METRES 10 20 30 40 50

GN

APPROX. TRUE NORTH (M.G.A.)

Wooloowara Bay

LOT 21
D.P. 529644

1234
D.P. 822258

1
D.P. 226839

WOOLOOWARE AREA LEASED TO GALANOS BROS PTY LTD

ROAD NORTH

WOOLOOWARE ROAD NORTH

WATER MAIN

WATER MAIN (20.5 WIDE)

RIGHT OF WAY (13.2 WIDE)

EASEMENT FOR ELECTRICITY PURPOSES 2 WIDE

DRIVE

SYDNEY WATER

CALTEX SERVICE STATION

FITNESS FIRST

ROOF

BITUMEN

CAR PARK

PARK

PATH

GARDEN

ISLAND

TRAFFIC ISLAND

ROUNDABOUT

TIMBER WALKWAY

BOTTOM OF BANK

TOP OF MANGROVE

LINE OF MANGROVES (TRUNKS)

TRANSMISSION WIRES

ELECTRICAL TOWER

MARK (J114966)

LIGHT POLE
POWER BOARD

TOP CONC. STAIRWALL R.L. 19.11

ORNAMENTAL ROOF FEATURE (NIBS) R.L. 21.40

TOP LIFT TOWER R.L. 22.37

TOP MOBILE PHONE TRANSMITTER R.L. 24.4

ORNAMENTAL ROOF FEATURE (NIBS) R.L. 21.37

TOP CONC. STAIRWALL R.L. 18.42

TOP STAIR PARAPET R.L. 16.75

ROOF PARAPET R.L. 20.62

SNAKES SIGN

SIGN

TELSTRA

117.16 TITLE
117.17 SURVEY

102.87 TITLE
102.51 SURVEY

117.16

45° 69° 45° 22° 55° 8° 05"

51'

WARNING! The location of walls and detail points in relation to boundaries is approximate only!

NOTES

1. COPYRIGHT This drawing and/or design is the property of Harrison Friedmann & Associates Pty Ltd and should not be reproduced in part or whole without the written permission of the company.
2. Bearings, distances and areas of boundaries are from the Land and Property Management Authority records only. They are on Map Grid of Australia . If accurate True North is required a further survey would be necessary.
3. Relationship of improvements to boundaries is diagrammatic only. Boundary fences and retaining walls have not been accurately located and may not be shown on this plan.DO NOT SCALE OFF THIS PLAN. Where offsets from improvements, fences or walls to boundaries are critical for future building design and construction they MUST be confirmed by a further boundary survey. This survey has not investigated any subterranean structures.
4. The services information shown on this plan have been determined from visual inspection only and information provided by the relevant authorities through "Dial before you dig" . It is passed on with the understanding that no excavation or works will be commenced without a current services search of all services being obtained from "Dial before you dig" (DBYD) (phone 1100 or fax 1300 652 077) or from any individual service provider. Note that not all services providers are members of DBYD.
5. The location of Sydney Water's Sewer Main has been plotted approximately, based on visible maintenance holes and information from Sydney Water. This information can not be relied on. Any construction near Sydney Water Mains requires further investigation, a Service Protection Report (sewer pegout) and approval from Sydney Water.
6. The locations of spot levels are diagrammatic only. They are accurate to ± 0.3m in relation to boundaries. Levels critical to design, excavation or construction must be verified. If contours are shown they depict the topography rather than represent the exact level at any particular point. Care should be taken if extrapolating levels or contours.
7. The spread of the crown of the trees shown on this plan is diagrammatic only, based on the average spread observed in the field. Prior to any development proposal which might be affected by trees it is recommended that the tree spreads be verified by field inspection.
8. Australian Height Datum was established from PM, 31619 R.L. 1.279 located at the intersection of Captain Cook Drive & Woolooware Road Woolooware . Datum source obtained from S.C.I.M.S. 22/06/2011.
9. The plan has been compiled from field survey information and Plans prepared by Rygate & Company Pty Ltd and Johnathan C. Keen & Co. Pty Ltd

ALL ABOVE NOTES ARE AN INTEGRAL PART OF THIS PLAN

Legend

BB	Bottom of Bank
BFL	Balcony Floor Level
BRW	Bottom Retaining Wall
CONC	Concrete
EC	Edge of Concrete
FL	Floor Level
G	Grate
INV	Invert Level
LW	Lower Window
PC	Pedestrian Crossing
RL	Relative Level
TB	Top of Bank
TG	Top of Gutter
TK	Top of Kerb
TRW	Top Retaining Wall
TW	Top Wall
USG	Underside of Gutter
UW	Upper Window
VC	Vehicle Crossing
W	Window
WC	Toilet
LEW	Lowest Electrical Wire
TETW	Top Of Electrical Tower/Pole
TOC	Table on Concrete
TTTW	Top Of Telecommunication Tower
H	Hydrant
LH	Lamp Hole
LP	Light Pole
MH	Maintenance Hole
PP	Power Pole
SP	Sign Pole
SV	Stop Valve
T	Telstra

UNDERGROUND ELECTRICAL
OVERHEAD ELECTRICAL
EXISTING GAS
RECYCLED WATER
EXISTING TELECOMMUNICATIONS
EXISTING WATER
FENCE

HARRISON FRIEDMANN & ASSOCIATES PTY LTD
INCORPORATING THE PRACTICE OF **MICHAEL J. STYNES** ABN 69 001 953 331
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BUILDING, ENVIRONMENTAL & BUSHFIRE CONSULTANTS
WATER SERVICING CO-ORDINATOR FOR SYDNEY WATER
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ISO 9001 FS 520963
Liability is limited by a scheme approved under Professional Standards Legislation
COVER OF EXCELLENCE

PLAN SHOWING SITE DETAILS AND LEVELS FOR BUILDING DESIGN PURPOSES AT CAPTAIN COOK DRIVE WOOLOOWARE LOT 20 IN D.P. 529644 ,LOT 11 IN D.P. 526492

FOR BLUESTONE CAPITAL VENTURES No. 1

REDUCTION RATIO 1:500 @ A1	SURVEYED / DRAWN ML/CL
DATUM A.H.D.	CHECKED
DATE 2/6/2011	REFERENCE **40966DT** SHEET 3 OF 3

CAD FILE NAME: 40966DT DET.DWG PLOTTED: 08/07/11 – 4:40PM

Appendix G

List of Civil DA Drawings

Document Details

Document Number	Rev	Document Title
C001	A	COVER SHEET AND LOCALITY PLAN
C002	A	NOTES AND LEGENDS
C005	A	GENERAL ARRANGEMENT PLAN
C006	A	TYPICAL ROAD SECTIONS SHEET 1 OF 3
C007	A	TYPICAL ROAD SECTIONS SHEET 2 OF 3
C008	A	ROADWORKS AND STORMWATER DRAINAGE PLAN SHEET 1 OF 7
C010	A	ROADWORKS AND STORMWATER DRAINAGE PLAN SHEET 1 OF 7
C011	A	ROADWORKS AND STORMWATER DRAINAGE PLAN SHEET 2 OF 7
C012	A	ROADWORKS AND STORMWATER DRAINAGE PLAN SHEET 3 OF 7
C013	A	ROADWORKS AND STORMWATER DRAINAGE PLAN SHEET 4 OF 7
C014	A	ROADWORKS AND STORMWATER DRAINAGE PLAN SHEET 5 OF 7
C015	A	ROADWORKS AND STORMWATER DRAINAGE PLAN SHEET 6 OF 7
C016	A	ROADWORKS AND STORMWATER DRAINAGE PLAN SHEET 7 OF 7
C080	A	PAVEMENT, SIGNAGE AND LINEMARKING PLAN SHEET 1 OF 3
C081	A	PAVEMENT, SIGNAGE AND LINEMARKING PLAN SHEET 2 OF 3
C082	A	PAVEMENT, SIGNAGE AND LINEMARKING PLAN SHEET 3 OF 3
C090	A	SERVICES AND UTILITIES COORDINATION PLAN SHEET 1 OF 7
C091	A	SERVICES AND UTILITIES COORDINATION PLAN SHEET 2 OF 7
C092	A	SERVICES AND UTILITIES COORDINATION PLAN SHEET 3 OF 7
C093	A	SERVICES AND UTILITIES COORDINATION PLAN SHEET 4 OF 7
C094	A	SERVICES AND UTILITIES COORDINATION PLAN SHEET 5 OF 7
C095	A	SERVICES AND UTILITIES COORDINATION PLAN SHEET 6 OF 7
C096	A	SERVICES AND UTILITIES COORDINATION PLAN SHEET 7 OF 7
C100	A	EROSION AND SEDIMENTATION CONTROL PLAN SHEET 1 OF 3
C101	A	EROSION AND SEDIMENTATION CONTROL PLAN SHEET 2 OF 3
C102	A	EROSION AND SEDIMENTATION CONTROL PLAN SHEET 3 OF 3
C105	A	EROSION AND SEDIMENTATION CONTROL DETAILS
C130	A	INTERSECTION VEHICLE TURN PATH PLAN SHEET 1 OF 2
C131	A	INTERSECTION VEHICLE TURN PATH PLAN SHEET 2 OF 2

Appendix H

Water Management Report

INSYNC SERVICES
PTY LTD

Water Management Report

Woolooware Bay Town Centre

Client:

Bluestone Capital Ventures No. 1 Pty Ltd

Construction Manager:

Parkview Constructions Pty Ltd
Suite 3, 2 Wentworth Park Road
Glebe NSW 2037
(T) 02 9506 1500
(F) 02 9506 1599

Hydraulic & Fire Consultant:

Insync Services Pty Ltd
P.O. Box 6437
Alexandria NSW 2015
(T) 02 9669 4311
(F) 02 9669 4322

Date: 28 February 2013

File: Water Management Report

Review and Approval Record:

Rev	Date	Description of Release	Prepared By	Reviewed By	Approved By
A	11/01/13	Draft Issue	BL	RW	BL
B	28/02/13	Final Issue	BL	RW	BL

TABLE OF CONTENTS

1 EXECUTIVE SUMMARY

1.1 Background

The aim of this report is to provide an outline of the water management design initiatives that may be considered for this project with regard to hydraulic and wet fire services, and to identify the preferred option together with a recommendation for its inclusion in the project scope of works.

1.2 Water Consumption

Potable water consumption has been estimated throughout the entire development for the base building case to be used as a benchmark against which to compare the efficiency of various potable water consumption reduction strategies that have been proposed.

BASE BUILDING

Water consumption estimates for the base building benchmark have been prepared with regard to the following base data;

- Water Closets – 3 Star WELS rated, having an average flush volume of 4 litres
- Urinals – 3 Star WELS rated, having an average flush volume of 2 litres
- Tapware – 3 Star WELS rated, having a flow rate of 9 litres/minute
- Showers – 3 Star WELS rated, having a flow rate of 9 litres/minute

Category	Water Consumption (kL/week)	Consumption Reduction (kL/week)	Alternative Water Supply (kL/week)	Total Water Saving (%)
Retail Amenities	184.448	0.000	0.000	0%
Retail Tenancies	186.812	0.000	0.000	0%
Gymansium	72.945	0.000	0.000	0%
Medical	33.234	0.000	0.000	0%
Club	126.603	0.000	0.000	0%
Heat Rejection	207.640	0.000	0.000	0%
Irrigation	1.208	0.000	0.000	0%
Totals	**812.890**	**0.000**	**0.000**	**0%**

OPTION 1 – WATER EFFICIENT FIXTURES & TAPWARE

Water consumption estimates for Option 1 have been prepared with regard to the following base data;

- Water Closets – 4 Star WELS rated, having an average flush volume of 3.5 litres
- Urinals – 6 Star WELS rated, having an average flush volume of 1 litres
- Tapware – 6 Star WELS rated, having a flow rate of 4.5 litres/minute
- Showers – 3 Star WELS rated, having a flow rate of 9 litres/minute

Category	Water Consumption (kL/week)	Consumption Reduction (kL/week)	Alternative Water Supply (kL/week)	Total Water Saving (%)
Retail Amenities	127.565	56.883	0.000	31%
Retail Tenancies	186.812	0.000	0.000	0%
Gymansium	64.432	8.514	0.000	12%
Medical	25.082	8.152	0.000	25%
Club	96.382	30.221	0.000	24%
Heat Rejection	207.640	0.000	0.000	0%
Irrigation	1.208	0.000	0.000	0%
Totals	**709.121**	**103.769**	**0.000**	**13%**

OPTION 2 – WATER EFFICIENT FIXTURES & TAPWARE + NON-POTABLE WATER FOR FLUSHING

Water consumption estimates for Option 2 have been prepared with regard to the following base data;

- Water Closets – 4 Star WELS rated, having an average flush volume of 3.5 litres
- Urinals – 6 Star WELS rated, having an average flush volume of 1 litres
- Tapware – 6 Star WELS rated, having a flow rate of 4.5 litres/minute
- Showers – 3 Star WELS rated, having a flow rate of 9 litres/minute
- Non-potable water supply used for 100% of all toilet and urinal flushing

Category	Water Consumption (kL/week)	Consumption Reduction (kL/week)	Alternative Water Supply (kL/week)	Total Water Saving (%)
Retail Amenities	57.556	56.883	70.009	69%
Retail Tenancies	186.812	0.000	0.000	0%
Gymansium	53.953	8.514	10.478	26%
Medical	15.049	8.152	10.033	55%
Club	59.187	30.221	37.195	53%
Heat Rejection	207.640	0.000	0.000	0%
Irrigation	1.208	0.000	0.000	0%
Totals	**581.405**	**103.769**	**127.716**	**28%**

OPTION 3 – WATER EFFICIENT FIXTURES & TAPWARE + NON-POTABLE WATER FOR FLUSHING, HEAT REJECTION & IRRIGATION

Water consumption estimates for Option 3 have been prepared with regard to the following base data;

- Water Closets – 4 Star WELS rated, having an average flush volume of 3.5 litres
- Urinals – 6 Star WELS rated, having an average flush volume of 1 litres
- Tapware – 6 Star WELS rated, having a flow rate of 4.5 litres/minute
- Showers – 3 Star WELS rated, having a flow rate of 9 litres/minute
- Non-potable water supply used for 100% of all toilet and urinal flushing
- Non-potable water supply used for 90% of all cooling tower requirements
- Non-potable water supply used for 100% of all irrigation requirements

Category	Water Consumption (kL/week)	Consumption Reduction (kL/week)	Alternative Water Supply (kL/week)	Total Water Saving (%)
Retail Amenities	57.556	56.883	70.009	69%
Retail Tenancies	186.812	0.000	0.000	0%
Gymnasium	53.953	8.514	10.478	26%
Medical	15.049	8.152	10.033	55%
Club	59.187	30.221	37.195	53%
Heat Rejection	20.764	0.000	0.000	90%
Irrigation	0.000	0.000	0.000	100%
Totals	**393.321**	**103.769**	**315.800**	**52%**

1.3 Description

Option 1 achieves a potable cold water consumption reduction of 13% when compared to the base case benchmark. The improvement in water efficiency is achieved via the installation or more water efficient fixtures and tapware. For a new installation which does not require any equipment to be replaced or retrofitted, the cost of more water efficient fixtures and tapware is equivalent to less efficient fixtures and tapware, and therefore Option 1 to achieve a 13% reduction in potable cold water consumption throughout the development has been assessed as a no cost option.

Option 2 achieves a potable cold water consumption reduction of 28% when compared to the base case benchmark. The improvement in water efficiency is achieved via the installation of more water efficient fixtures and tapware, as well as the substitution of a non-potable water supply for flushing purposes. The non-potable water supply can be provided in either of two ways;

1. Rainwater Harvesting – requiring a rainwater storage tank, a booster pump and filtration system, and a non-potable water reticulation system throughout the development. The cost of a rainwater harvesting system has been estimated at $255,000.

(Infrastructure $170,000 + Reticulation $85,000). A rainwater harvesting system has no ongoing cost for the provision of non-potable water apart from general system maintenance.

2. Recycled Water – requiring a mains supply, booster pump, and a non-potable water reticulation system throughout the development. The cost of a recycled water system has been estimated at $110,000. (Infrastructure $25,000 + Reticulation $85,000). A recycled water system will have ongoing water supply charges in addition to general system maintenance. The cost of water supply requires further investigation with the supplier.

Option 3 achieves a potable cold water consumption reduction of 52% when compared to the base case benchmark. The improvement in water efficiency is achieved via the installation of more water efficient fixtures and tapware, as well as the substitution of a non-potable water supply for flushing purposes, heat rejection and irrigation requirements. The non-potable water supply would need to be provided from two supplies as follows;

1. Rainwater Harvesting (Heat Rejection & Irrigation) – requiring a rainwater storage tank, a booster pump and filtration system, and a non-potable water reticulation system to the cooling towers. The cost of a rainwater harvesting system has been assessed at $180,000. (Infrastructure $170,000 + Reticulation $10,000). A rainwater harvesting system has no ongoing cost for the provision of non-potable water apart from general system maintenance.

2. Recycled Water (Flushing) – requiring a mains supply, booster pump, and a non-potable water reticulation system throughout the development. The cost of a recycled water system has been assessed at $110,000. (Infrastructure $25,000 + Reticulation $85,000). A recycled water system will have ongoing water supply charges in addition to general system maintenance. The cost of water supply requires further investigation with the supplier.

1.4 Summary

Option	Description	Potable Cold Water Reduction	Cost
Base Case	Base building used for benchmark potable cold water consumption	0%	$0
Option 1	Inclusion of water efficient fixtures and tapware	13%	$0
Option 2a	Inclusion of water efficient fixtures and tapware, non-potable water supply (rainwater harvesting) to 100% of all flushing requirements.	28%	$255,000
Option 2b	Inclusion of water efficient fixtures and tapware, non-potable water supply (recycled water) to 100% of all flushing requirements.	28%	$110,000
Option 3	Inclusion of water efficient fixtures and tapware, non-potable water supply (recycled water) to 100% of all flushing requirements. Non-potable water supply (rainwater harvesting) to 90% of heat rejection and 100% of irrigation requirements.	52%	$290,000

NOTE: recycled water supply rates are yet to be clarified and included for Option 2b and Option 3.

2 INTRODUCTION

2.1 Background

Bluestone Capital Ventures No.1 Pty Ltd (the Client), have commissioned Insync Services Pty Ltd (the Hydraulic & Wet Fire Consultant) to prepare a Water Management Report for the proposed Woolooware Bay Town Centre development.

2.2 Aims

The aim of this report is to provide an outline of the water management design initiatives that may be considered for this project with regard to hydraulic and wet fire services, and to identify the preferred option together with a recommendation for its inclusion in the project scope of works.

2.3 ESD Targets

Environmentally Sustainable Development targets for this development have been outlined previously in the Executive Summary to Cronulla Sharks Redevelopment ESD DA Report prepared by Cundall. (Appendix R of the Environmental Assessment Report)

Specifically this Water Management Report seeks to outline the proposed methodology for the water consumption reduction strategies that will be included within the development to meet the following ESD target,

Benchmark	Minimum Requirement	Project Target
Residential	40% reduction in potable cold water consumption compared to the NSW average	40% reduction in potable cold water consumption compared to the NSW average
Leisure / Retail	Not Applicable	Minimise potable cold water consumption in fittings/fixtures, cooling towers and irrigation.

2.4 Briefing Documents

The engineering elements considered in this report have based or taken into consideration the following documents:

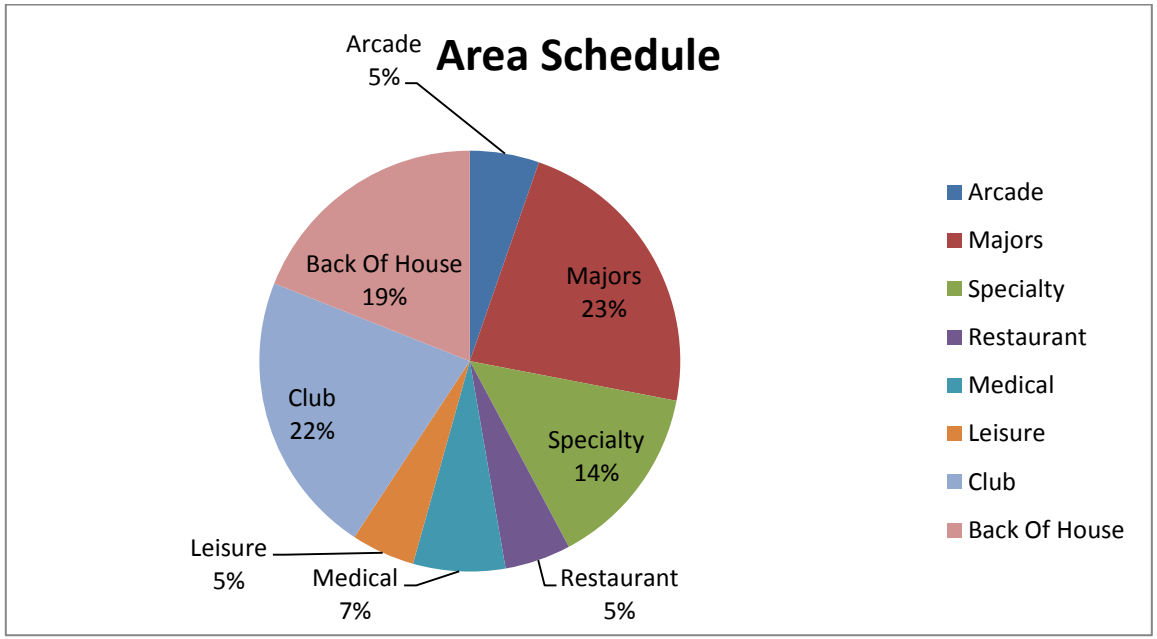
- Development Application architectural drawings prepared by Scott Carver Architects Pty Ltd.

3 BASE DESIGN DATA

3.1 Location & Development Description

The proposed Woolooware Bay Town Centre development is located on Captain Cook Drive.

Woolooware Bay Town Centre development has a total net lettable floor area of 30,511m^2, generally distributed in accordance with the following allocations;



Category	Area
Arcade	1624
Majors	6925
Specialty	4327
Restaurants	1549
Gymnasium	2159
Medical	1493
Club	6642
Back Of House	5792
TOTALS	**30511**

3.2 Population Data

Population data for the Woolooware Bay Town Centre development has been calculated from the following assumptions;

Population	Retail	Gymnasium	Medical	Club
Staff	1/50m2	1/50m2	1/10m2	1/30m2
Visitors	1/3m2	1/3m2	1/10m2	1/3m2

3.3 Fixture Usage Data

Fixture usage data for the Woolooware Bay Town Centre development has been calculated from the following assumptions;

Population	Water Closet	Urinal	Tapware (20 seconds per use)	Showers (5 minutes per use)
Male Staff	1 per day	2 per day	3 per day	0.2 per day
Female Staff	3 per day	0 per day	3 per day	0.2 per day
Male Visitors	0.2 per day	0.4 per day	0.6 per day	0 per day
Female Visitors	0.6 per day	0 per day	0.6 per day	0 per day

3.4 Fixture Water Consumption

Fixture water consumption for the Woolooware Bay Town Centre development has been calculated from the following assumptions;

Fixture	3 Star	4 Star	5 Star	6 Star
Water Closet (L/flush)	4	3.5	3	2.5
Urinal (L/flush)	2	1.5	1	1
Tapware (L/min)	9	7.5	6	4.5
Showers (L/min)	9	7.5	6	6

3.5 Process Water Consumption

Process water consumption for the Woolooware Bay Town Centre development has been calculated from the following assumptions;

Process	Flow Rate
Retail Tenancy	0.11L/m2/day
Food Retail Tenancy	5.23L/m2/day
Supermarket	0.21L/m2/day

4 Water Supply Options

4.1 Water Quality

For the Base Case model, all of the water consumed within the development is potable water drawn from the local Authority potable water supply infrastructure. However not all of the processes generating water consumption throughout the development require a water supply of potable quality (suitable for drinking).

A summary of the water quality requirements for the various building uses detailed within this report is provided below;

Building Use	Water Quality
Toilet Flushing	Non-Potable
Urinal Flushing	Non-Potable
Tapware	Potable
Showers	Potable
Irrigation	Non-Potable
Fire Services	Non-Potable

The range of potential water supply options considered within this report are listed below;

- Potable Authority Mains Water (potable)
- Non-Potable Authority Mains Water (non-potable)
- Stormwater Harvesting (non-potable)

4.2 Potable Authority Mains Water

Potable mains water is traditionally used to supply all of the water requirements within a building. It is of a quality suitable for drinking, and therefore exceeds the quality requirements of many water consuming processes within a building.

Regardless of various water saving initiatives that may be employed within a development, a potable mains water connection will always be required to supply the potable water requirements of the building and to provide a back-up water supply to any non-potable water supplies sources.

4.3 Non-Potable Authority Mains Water

Non-potable mains water is available in some locations and can be used to supply all of the non-potable water requirements within a building. It is of a quality unsuitable for drinking, and therefore requires careful planning regarding its application and integration into developments in order to avoid cross connections and potential contamination of any potable water supplies.

Non-potable mains water can be considered for the Woolooware Bay Town Centre development, as Sutherland Shire Council operates a recycled water plant to service the adjacent Woolooware golf course. The quality, quantity and cost of this water supply are yet to be established and therefore require further consideration with regard to possible inclusion within this development.

4.4 Stormwater Harvesting

Stormwater harvesting refers to the collection of stormwater from the developments internal stormwater drainage system. Stormwater from the stormwater drainage system can be classified as either rainwater where the flow is from roof areas only, or stormwater where the flow is from all areas of the development.

For the purposes of this development, we refer to a rainwater harvesting system, where the following benefits can be achieved over a stormwater harvesting system;

- Rainwater collected from roof areas is generally less polluted than general stormwater drainage.

In general terms the rainwater harvesting system will be an in-line tank for the collection and storage of rainwater. At times when the rainwater storage tank is full rainwater can pass through the tank and continue to be discharged via gravity into the stormwater drainage system. Rainwater from the storage tank will be pumped for distribution throughout the development in a dedicated non-potable water reticulation system.

The collected rainwater is not classified in terms of water quality, but the use of rainwater for cooling tower make up water supply, toilet flushing and spray irrigation systems is recommended as safe practice by all Australian Health Departments. Rainwater falling on roofs is soft, clear and generally low in microbial and chemical contamination.

The use of simple and cost effective rainwater collection and treatment systems ensures reliable operation and water quality for non-potable use. The objective of rainwater treatment is to maintain a high quality of water in the rainwater storage tank. A typical rainwater treatment process would include the following;

1. Primary treatment before water enters the storage tank via a first flush system.
2. Media filtration before to water enters the non-potable cold water reticulation system.
3. UV treatment before water enters the non-potable cold water reticulation system.

The use of rainwater harvesting reduces potable water demand within the development, and the amount of stormwater runoff generated by the development. By collecting the rainwater run-off from roof areas, rainwater tanks provide a valuable water source suitable for flushing toilets and landscape irrigation.

Rainwater harvesting systems can be considered to have the following advantages;

- Collected rainwater is of high quality allowing for uses including toilet flushing, cooling tower make up and un-controlled irrigation.

- Rainwater harvesting can provide a large reduction in potable water consumption.
- Rainwater harvesting is well suited to buildings where the available roof footprint is large for collection of the rainwater.
- Rainwater harvesting systems have a relatively low capital cost.
- Rainwater harvesting systems do not require specialized maintenance.

Rainwater harvesting systems can be considered to have the following dis-advantages;

- Rainwater harvesting systems rely upon favorable climatic conditions.
- Rainwater harvesting systems are relatively inflexible as they rely on gravity discharge from the roof collection point to the storage tank.
- Rainwater harvesting systems are relatively inefficient in terms of their spatial requirements due to the need to store larger volumes of rainwater allowing for periods of little or no rainfall.
- Rainwater harvesting systems require a potable cold water supply make up facility for periods when the storage has been exhausted.

4.4.1 Rainfall Data

Rainfall data for the Woolooware Bay Town Centre development has been sourced from the Bureau of Meteorology, specifically from the Sydney Airport weather station (066037). A summary of the rainfall data is as follows;

January Mean Rainfall	94.0mm
February Mean Rainfall	112.9mm
March Mean Rainfall	116.3mm
April Mean Rainfall	106.3mm
May Mean Rainfall	100.1mm
June Mean Rainfall	120.7mm
July Mean Rainfall	71.0mm
August Mean Rainfall	75.5mm
September Mean Rainfall	60.3mm
October Mean Rainfall	70.7mm
November Mean Rainfall	81.2mm
December Mean Rainfall	74.3mm
Mean Annual Rainfall	1082.8mm
Mean Rain Days > 1mm	96.1

4.4.2 Catchment Data

Catchment data for the Woolooware Bay Town Centre development has been sourced from the architectural drawings prepared by Scott Carver Architects Pty Ltd. A summary of the catchment data is as follows;

Total Catchment Area	18,348m^2
Harvested Catchment	10,091m^2
Harvesting Ratio	55%
Run-off Coefficient	0.95

The total available rainfall harvesting supply with these parameters has been estimated at 199.719kL per week.

5 Base Case - Water Consumption Evaluation

5.1 Retail Amenity Water Requirements

Base case retail amenity water consumption for the Woolooware Bay Town Centre development, has been modelled based upon following information;

- 7 days of building operation per week.
- 3 Star WELS rated water closets, having an average volume per flush of 4 litres.
- 3 Star WELS rated urinals, having an average volume per flush of 2 litres.
- 3 Star WELS rated tapware, having a flow rate of 9.0 litres per minute.
- 3 Star WELS rated showers, having a flow rate of 9.0 litres per minute.

A summary of the estimated base case retail amenity water consumption for the parameters listed above is as follows;

Base Building Assessment	Water Closet	Urinal	Tapware	Showers	Totals
Area	14425	14425	14425	14425	**14425**
Male - Staff	144	144	144	144	**144**
Female - Staff	144	144	144	144	**144**
Male - Visitor	2404	2404	2404	2404	**2404**
Female - Staff	2404	2404	2404	2404	**2404**
Fixture Efficiency	3 Star	3 Star	3 Star	3 Star	
Consumption Per Use	4	2	3	45	
Male - Staff	577	577	1298	1298	**3751**
Female - Staff	1731	0	1298	1298	**4328**
Male - Visitor	1923	1923	4328	0	**8174**
Female - Visitor	5770	0	4328	0	**10098**
Total Consumption (L/day)	**10001**	**2500**	**11252**	**2597**	**26350**
Efficiency (L/m2/day)	**0.69**	**0.17**	**0.78**	**0.18**	**1.83**
Days Of operation Per Week	7	7	7	7	**7**
Total Consumption (kL/week)	**70.009**	**17.502**	**78.761**	**18.176**	**184.448**

The total base case retail amenity water consumption with these parameters has been estimated at 184.448kL per week throughout the development.

5.2 Retail Tenancy Water Requirements

Retail tenant water consumption for the Woolooware Bay Town Centre development, has been modelled based upon actual metered consumption data from similar retail centres. Specifically the base model has been developed upon following information;

- 7 days of building operation per week.
- Non-food tenants having an average water consumption rate of 0.11kL/m^2 per annum.
- Food tenants having an average water consumption rate of 5.23kL/m^2 per annum.
- Supermarkets having an average water consumption rate of 0.21kL/m^2 per annum.
- Majors and Mini Majors having an average water consumption rate of 0.11kL/m^2 per annum.

A summary of the estimated retail tenancy water consumption for the parameters listed above is as follows;

Base Building Assessment	Specialty	Restaurants	Supermarkets	Majors	Totals
Area	4327	1549	4019	2906	12801
Consumption Rate	0.11	5.23	0.21	0.11	
Total Consumption (L/day)	**1304**	**22195**	**2312**	**876**	**26687**
Efficiency (L/m2/day)	**0.30**	**14.33**	**0.58**	**0.30**	**2.08**
Days Of operation Per Week	7	7	7	7	7
Total Consumption (kL/week)	**9.128**	**155.367**	**16.186**	**6.130**	**186.812**

The total retail tenant water consumption with these parameters has been estimated at 186.812kL per week throughout the development.

5.3 Gymnasium Tenancy Water Requirements

Base case gymnasium tenancy water consumption for the Woolooware Bay Town Centre development, has been modelled based upon following information;

- 7 days of building operation per week.
- 3 Star WELS rated water closets, having an average volume per flush of 4 litres.
- 3 Star WELS rated urinals, having an average volume per flush of 2 litres.
- 3 Star WELS rated tapware, having a flow rate of 9.0 litres per minute.
- 3 Star WELS rated showers, having a flow rate of 9.0 litres per minute.

A summary of the estimated base case gymnasium water consumption for the parameters listed above is as follows;

Base Building Assessment	Water Closet	Urinal	Tapware	Showers	Totals
Area	2159	2159	2159	2159	2159
Male - Staff	22	22	22	22	22
Female - Staff	22	22	22	22	22

Male - Visitor	360	360	360	360	360
Female - Staff	360	360	360	360	360
Fixture Efficiency	3 Star	3 Star	3 Star	3 Star	
Consumption Per Use	4	2	3	45	
Male - Staff	86	86	194	194	561
Female - Staff	259	0	194	194	648
Male - Visitor	288	288	648	3239	4462
Female - Visitor	864	0	648	3239	4750
Total Consumption (L/day)	**1497**	**374**	**1684**	**6866**	**10421**
Efficiency (L/m2/day)	**0.69**	**0.17**	**0.78**	**3.18**	**4.83**
Days Of operation Per Week	7	7	7	7	7
Total Consumption (kL/week)	**10.478**	**2.620**	**11.788**	**48.059**	**72.945**

The total base case gymnasium water consumption with these parameters has been estimated at 72.945kL per week throughout the development.

5.4 Medical Tenancy Water Requirements

Base case medical tenancy water consumption for the Woolooware Bay Town Centre development, has been modelled based upon following information;

- 7 days of building operation per week.
- 3 Star WELS rated water closets, having an average volume per flush of 4 litres.
- 3 Star WELS rated urinals, having an average volume per flush of 2 litres.
- 3 Star WELS rated tapware, having a flow rate of 9.0 litres per minute.
- 3 Star WELS rated showers, having a flow rate of 9.0 litres per minute.

A summary of the estimated medical water consumption for the parameters listed above is as follows;

Base Building Assessment	Water Closet	Urinal	Tapware	Showers	Totals
Area	1493	1493	1493	1493	1493
Male - Staff	75	75	75	75	75
Female - Staff	75	75	75	75	75
Male - Visitor	75	75	75	75	75
Female - Staff	75	75	75	75	75
Fixture Efficiency	3 Star	3 Star	3 Star	3 Star	
Consumption Per Use	4	2	3	45	
Male - Staff	299	299	672	672	1941
Female - Staff	896	0	672	672	2240

Male - Visitor	60	60	134	0	254
Female - Visitor	179	0	134	0	314
Total Consumption (L/day)	**1433**	**358**	**1612**	**1344**	**4748**
Efficiency (L/m2/day)	**0.96**	**0.24**	**1.08**	**0.90**	**3.18**
Days Of operation Per Week	7	7	7	7	7
Total Consumption (kL/week)	**10.033**	**2.508**	**11.287**	**9.406**	**33.234**

The total base case medical water consumption with these parameters has been estimated at 33.234kL per week throughout the development.

5.5 Club Tenancy Water Requirements

Base case club tenancy water consumption for the Woolooware Bay Town Centre development, has been modelled based upon following information;

- 7 days of building operation per week.
- 3 Star WELS rated water closets, having an average volume per flush of 4 litres.
- 3 Star WELS rated urinals, having an average volume per flush of 2 litres.
- 3 Star WELS rated tapware, having a flow rate of 9.0 litres per minute.
- 3 Star WELS rated showers, having a flow rate of 9.0 litres per minute.

A summary of the estimated club water consumption for the parameters listed above is as follows;

Base Building Assessment	Water Closet	Urinal	Tapware	Showers	Restaurants	Totals
Area	6642	6642	6642	6642	664.2	6642
Male - Staff	111	111	111	111		111
Female - Staff	111	111	111	111		111
Male - Visitor	1107	1107	1107	1107		1107
Female - Staff	1107	1107	1107	1107		1107
Fixture Efficiency	3 Star	3 Star	3 Star	3 Star		
Consumption Per Use	4	2	3	45	5.23	
Male - Staff	443	443	996	996		2878
Female - Staff	1328	0	996	996		3321
Male - Visitor	886	886	1993	0		3764
Female - Visitor	2657	0	1993	0		4649
Total Consumption (L/day)	**5314**	**1328**	**5978**	**1993**	**3474**	**18086**
Efficiency (L/m2/day)	**0.80**	**0.20**	**0.90**	**0.30**	**5.23**	**2.72**
Days Of operation Per Week	7	7	7	7	7	
Total Consumption (kL/week)	**37.195**	**9.299**	**41.845**	**13.948**	**24.316**	**126.603**

The total base case club water consumption with these parameters has been estimated at 126.603kL per week throughout the development.

5.6 Heat Rejection Water Requirements

Water consumption within each mechanical services air conditioning system varies depending upon the location of the building, the type of building construction, and the type of mechanical services systems incorporated. For the Woolooware Bay Town Centre development, the heat rejection water demand has been developed using the following information;

- Gross Floor Area 30,511m^2
- 7 days of building operation per week.
- Average Cooling Tower Water Supply 1.2L/day/m^2

A summary of the estimated heat rejection water consumption for the parameters listed above is as follows;

Base Building Assessment	Arcade	Supermarket	Majors	Specialty	Restaurants	Gymnasium	Medical	Club	Back Of House	Totals
Area	1624	4019	2906	4327	1549	2159	1493	6642	5792	**30511**
Consumption Rate	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	0.0	
Total Consumption (L/day)	**1949**	**4823**	**3487**	**5192**	**1859**	**2591**	**1792**	**7970**	**0**	**29663**
Efficiency (L/m2/day)	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**0.00**	
Days Of operation Per Week	7	7	7	7	7	7	7	7	7	
Total Consumption (kL/week)	**13.642**	**33.760**	**24.410**	**36.347**	**13.012**	**18.136**	**12.541**	**55.793**	**0.000**	**207.640**

The total base case heat rejection water demand with these parameters is estimated to be 207.640kL per week.

5.7 Outdoor Water Requirements

Water consumption within each landscape irrigation system varies depending upon the nature of the irrigation system, species of planting, and the prevailing climate. For the Woolooware Bay Town Centre development, the base case outdoor water demand has been developed using following information;

- Irrigation area of approximately 500m^2
- Irrigation rate 15mm/m^2

A summary of the estimated irrigation water consumption for the parameters listed above is as follows;

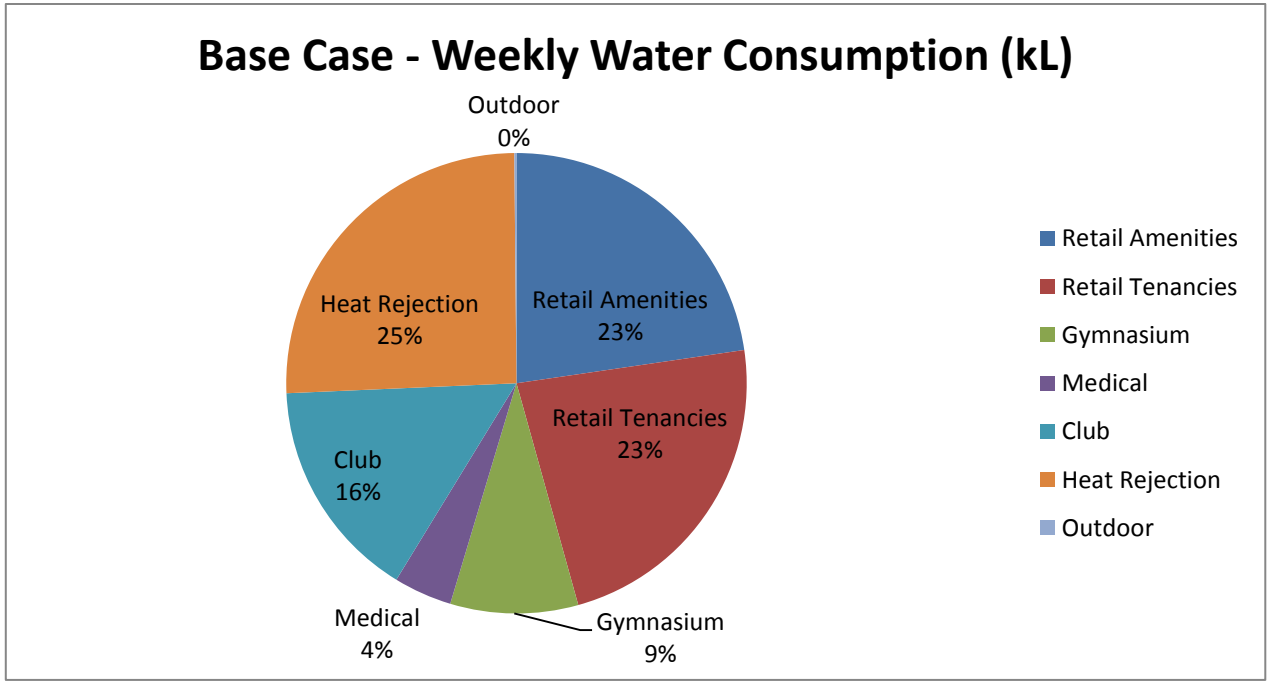
Base Building	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Totals
Weeks	4.4	4.0	4.4	4.3	4.4	4.3	4.4	4.4	4.3	**4.4**	4.3	4.4	52.0
Applications	3	3	2	2	2	1	1	1	2	**2**	2	3	

Area	500	500	500	500	500	500	500	500	500	500	500	500	
Irrigation Rate	15	15	15	15	15	15	15	15	15	15	15	15	
Requirement	198	180	132	129	132	65	66	66	129	132	129	198	
Rainfall	94.0	112.9	116.3	106.3	100.1	120.7	71.0	75.5	60.3	70.7	81.2	74.3	1083.3
Monthly	52.000	33.550	7.850	11.350	15.950	0.000	0.000	0.000	34.350	30.650	23.900	61.850	271.450
Weekly	**11.818**	**8.388**	**1.784**	**2.640**	**3.625**	**0.000**	**0.000**	**0.000**	**7.988**	**6.966**	**5.558**	**14.057**	**62.824**

The average base case outdoor water demand with these parameters has been estimated at 1.208kL per week throughout the development.

5.8 Total Base Building Retail Water Consumption

Based on the estimated retail amenity water requirements of 184.448kL per week, the estimated retail tenancy water requirements of 186.812kL per week, the estimated gymnasium water requirements of 72.945kL per week, the estimated medical water requirements of 33.234kL per week, the estimated club water requirements of 126.603kL per week, the estimated heat rejection water requirements 207.640kL per week and the estimated outdoor water requirements of 1.208kL per week, the total retail water consumption for this development will be 812.890kL per week.



6 Option 1 - Water Consumption Evaluation

6.1 Retail Amenity Water Requirements

Option 1 retail amenity water consumption for the Woolooware Bay Town Centre development, has been modelled based upon following information;

- 7 days of building operation per week.
- 4 Star WELS rated water closets, having an average volume per flush of 3.5 litres.
- 6 Star WELS rated urinals, having an average volume per flush of 1 litre.
- 6 Star WELS rated tapware, having a flow rate of 4.5 litres per minute.
- 3 Star WELS rated showers, having a flow rate of 9.0 litres per minute.

A summary of the estimated option 1 retail amenity water consumption for the parameters listed above is as follows;

Efficiency Assesssment	Water Closet	Urinal	Tapware	Showers	Totals
Area	14425	14425	14425	14425	14425
Male - Staff	144	144	144	144	144
Female - Staff	144	144	144	144	144
Male - Visitor	2404	2404	2404	2404	2404
Female - Staff	2404	2404	2404	2404	2404
Fixture Efficiency	4 Star	6 Star	6 Star	3 Star	
Consumption Per Use	3.5	1	1.5	45	
Male - Staff	505	289	649	1298	2741
Female - Staff	1515	0	649	1298	3462
Male - Visitor	1683	962	2164	0	4808
Female - Visitor	5049	0	2164	0	7213
Total Consumption (L/day)	**8751**	**1250**	**5626**	**2597**	**18224**
Efficiency (L/m2/day)	**0.61**	**0.09**	**0.39**	**0.18**	**1.26**
Days Of operation Per Week	7	7	7	7	7
Weekly Consumption (kL/week)	**61.258**	**8.751**	**39.380**	**18.176**	**127.565**
Non-Potable Ratio	0%	0%	0%	0%	
Non-Potable Contribution (kL/week)	0.000	0.000	0.000	0.000	0.000
Total Consumption (kL/week)	**61.258**	**8.751**	**39.380**	**18.176**	**127.565**

The total option 1 retail amenity water consumption with these parameters has been estimated at 127.565kL per week throughout the development.

6.2 Retail Tenancy Water Requirements

Option 1 retail tenant water consumption for the Woolooware Bay Town Centre development, has been modelled based upon actual metered consumption data from similar retail centres. Specifically the base model has been developed upon following information;

- 7 days of building operation per week.
- Non-food tenants having an average water consumption rate of 0.11kL/m^2 per annum.
- Food tenants having an average water consumption rate of 5.23kL/m^2 per annum.
- Supermarkets having an average water consumption rate of 0.21kL/m^2 per annum.
- Majors and Mini Majors having an average water consumption rate of 0.11kL/m^2 per annum.

A summary of the estimated option 1 retail tenancy water consumption for the parameters listed above is as follows;

Base Building Assessment	Specialty	Restaurants	Supermarkets	Majors	Totals
Area	4327	1549	4019	2906	12801
Consumption Rate	0.11	5.23	0.21	0.11	
Total Consumption (L/day)	**1304**	**22195**	**2312**	**876**	**26687**
Efficiency (L/m2/day)	**0.30**	**14.33**	**0.58**	**0.30**	**2.08**
Days Of operation Per Week	7	7	7	7	7
Total Consumption (kL/week)	**9.128**	**155.367**	**16.186**	**6.130**	**186.812**

The total option 1 retail tenant water consumption with these parameters has been estimated at 186.812kL per week throughout the development.

6.3 Gymnasium Tenancy Water Requirements

Option 1 gymnasium tenancy water consumption for the Woolooware Bay Town Centre development, has been modelled based upon following information;

- 7 days of building operation per week.
- 4 Star WELS rated water closets, having an average volume per flush of 3.5 litres.
- 6 Star WELS rated urinals, having an average volume per flush of 1 litre.
- 6 Star WELS rated tapware, having a flow rate of 4.5 litres per minute.
- 3 Star WELS rated showers, having a flow rate of 9.0 litres per minute.

A summary of the estimated option 1 gymnasium water consumption for the parameters listed above is as follows;

Efficiency Assessment	Water Closet	Urinal	Tapware	Showers	Totals

Area	2159	2159	2159	2159	2159
Male - Staff	22	22	22	22	22
Female - Staff	22	22	22	22	22
Male - Visitor	360	360	360	360	360
Female - Staff	360	360	360	360	360
Fixture Efficiency	4 Star	6 Star	6 Star	3 Star	
Consumption Per Use	3.5	1	1.5	45	
Male - Staff	76	43	97	194	410
Female - Staff	227	0	97	194	518
Male - Visitor	252	144	324	3239	3958
Female - Visitor	756	0	324	3239	4318
Total Consumption (L/day)	**1310**	**187**	**842**	**6866**	**9205**
Efficiency (L/m2/day)	**0.61**	**0.09**	**0.39**	**3.18**	**4.26**
Days Of operation Per Week	7	7	7	7	7
Weekly Consumption (kL/week)	**9.169**	**1.310**	**5.894**	**48.059**	**64.432**
Non-Potable Ratio	0%	0%	0%	0%	
Non-Potable Contribution (kL/week)	0.000	0.000	0.000	0.000	0.000
Total Consumption (kL/week)	**9.169**	**1.310**	**5.894**	**48.059**	**64.432**

The total option 1 gymnasium water consumption with these parameters has been estimated at 64.432kL per week throughout the development.

6.4 Medical Tenancy Water Requirements

Option 1 medical tenancy water consumption for the Woolooware Bay Town Centre development, has been modelled based upon following information;

- 7 days of building operation per week.
- 4 Star WELS rated water closets, having an average volume per flush of 3.5 litres.
- 6 Star WELS rated urinals, having an average volume per flush of 1 litre.
- 6 Star WELS rated tapware, having a flow rate of 4.5 litres per minute.
- 3 Star WELS rated showers, having a flow rate of 9.0 litres per minute.

A summary of the estimated option 1 medical water consumption for the parameters listed above is as follows;

Efficiency Assessment	Water Closet	Urinal	Tapware	Showers	Totals
Area	1493	1493	1493	1493	1493
Male - Staff	75	75	75	75	75
Female - Staff	75	75	75	75	75

Male - Visitor	75	75	75	75	75
Female - Staff	75	75	75	75	75
Fixture Efficiency	4 Star	6 Star	6 Star	3 Star	
Consumption Per Use	3.5	1	1.5	45	
Male - Staff	261	149	336	672	1418
Female - Staff	784	0	336	672	1792
Male - Visitor	52	30	67	0	149
Female - Visitor	157	0	67	0	224
Total Consumption (L/day)	**1254**	**179**	**806**	**1344**	**3583**
Efficiency (L/m2/day)	**0.84**	**0.12**	**0.54**	**0.90**	**2.40**
Days Of operation Per Week	7	7	7	7	7
Weekly Consumption (kL/week)	**8.779**	**1.254**	**5.644**	**9.406**	**25.082**
Non-Potable Ratio	0%	0%	0%	0%	
Non-Potable Contribution (kL/week)	0.000	0.000	0.000	0.000	0.000
Total Consumption (kL/week)	**8.779**	**1.254**	**5.644**	**9.406**	**25.082**

The total option 1 medical water consumption with these parameters has been estimated at 25.082kL per week throughout the development.

6.5 Club Tenancy Water Requirements

Option 1 club tenancy water consumption for the Woolooware Bay Town Centre development, has been modelled based upon following information;

- 7 days of building operation per week.
- 4 Star WELS rated water closets, having an average volume per flush of 3.5 litres.
- 6 Star WELS rated urinals, having an average volume per flush of 1 litre.
- 6 Star WELS rated tapware, having a flow rate of 4.5 litres per minute.
- 3 Star WELS rated showers, having a flow rate of 9.0 litres per minute.

A summary of the estimated option 1 club water consumption for the parameters listed above is as follows;

Efficiency Assessment	Water Closet	Urinal	Tapware	Showers	Restaurants	Totals
Area	6642	6642	6642	6642	664.2	6642
Male - Staff	111	111	111	111		111
Female - Staff	111	111	111	111		111
Male - Visitor	1107	1107	1107	1107		1107
Female - Staff	1107	1107	1107	1107		1107
Fixture Efficiency	4 Star	6 Star	6 Star	3 Star		

Consumption Per Use	3.5	1	1.5	45	5.23	
Male - Staff	387	221	498	996		2103
Female - Staff	1162	0	498	996		2657
Male - Visitor	775	443	996	0		2214
Female - Visitor	2325	0	996	0		3321
Total Consumption (L/day)	**4649**	**664**	**2989**	**1993**	**3474**	**13769**
Efficiency (L/m2/day)	**0.70**	**0.10**	**0.45**	**0.30**	**5.23**	**2.07**
Days Of operation Per Week	7	7	7	7	7	
Weekly Consumption (kL/week)	**32.546**	**4.649**	**20.922**	**13.948**	**24.316**	**96.382**
Non-Potable Ratio	0%	0%	0%	0%	0%	
Non-Potable Contribution (kL/week)	0.000	0.000	0.000	0.000	0.000	0.000
Total Consumption (kL/week)	**32.546**	**4.649**	**20.922**	**13.948**	**24.316**	**96.382**

The total option 1 club water consumption with these parameters has been estimated at 96.382kL per week throughout the development.

6.6 Heat Rejection Water Requirements

Water consumption within each mechanical services air conditioning system varies depending upon the location of the building, the type of building construction, and the type of mechanical services systems incorporated. For the Woolooware Bay Town Centre development, the option 1 heat rejection water demand has been developed using the following information;

- Gross Floor Area 30,511m^2
- 7 days of building operation per week.
- Average Cooling Tower Water Supply 1.2L/day/m^2

A summary of the estimated option 1 heat rejection water consumption for the parameters listed above is as follows;

Efficiency Assessment	Arcade	Supermarket	Majors	Specialty	Restaurants	Gymnasium	Medical	Club	Back Of House	Totals
Area	1624	4019	2906	4327	1549	2159	1493	6642	5792	**30511**
Consumption Rate	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	0.0	
Total Consumption (L/day)	**1949**	**4823**	**3487**	**5192**	**1859**	**2591**	**1792**	**7970**	**0**	**29663**
Efficiency (L/m2/day)	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**0.00**	
Days Of operation Per Week	7	7	7	7	7	7	7	7	7	
Weekly Consumption (kL/week)	**13.642**	**33.760**	**24.410**	**36.347**	**13.012**	**18.136**	**12.541**	**55.793**	**0.000**	**207.640**
Non-Potable Ratio	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Non-Potable Contribution (kL/week)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Consumption (kL/week)	**13.642**	**33.760**	**24.410**	**36.347**	**13.012**	**18.136**	**12.541**	**55.793**	**0.000**	**207.640**

The total option 1 heat rejection water demand with these parameters is estimated to be 207.640kL per week.

6.7 Outdoor Water Requirements

Water consumption within each landscape irrigation system varies depending upon the nature of the irrigation system, species of planting, and the prevailing climate. For the Woolooware Bay Town Centre development, the option 1 outdoor water demand has been developed using following information;

- Irrigation area of approximately 500m^2
- Irrigation rate 15mm/m^2

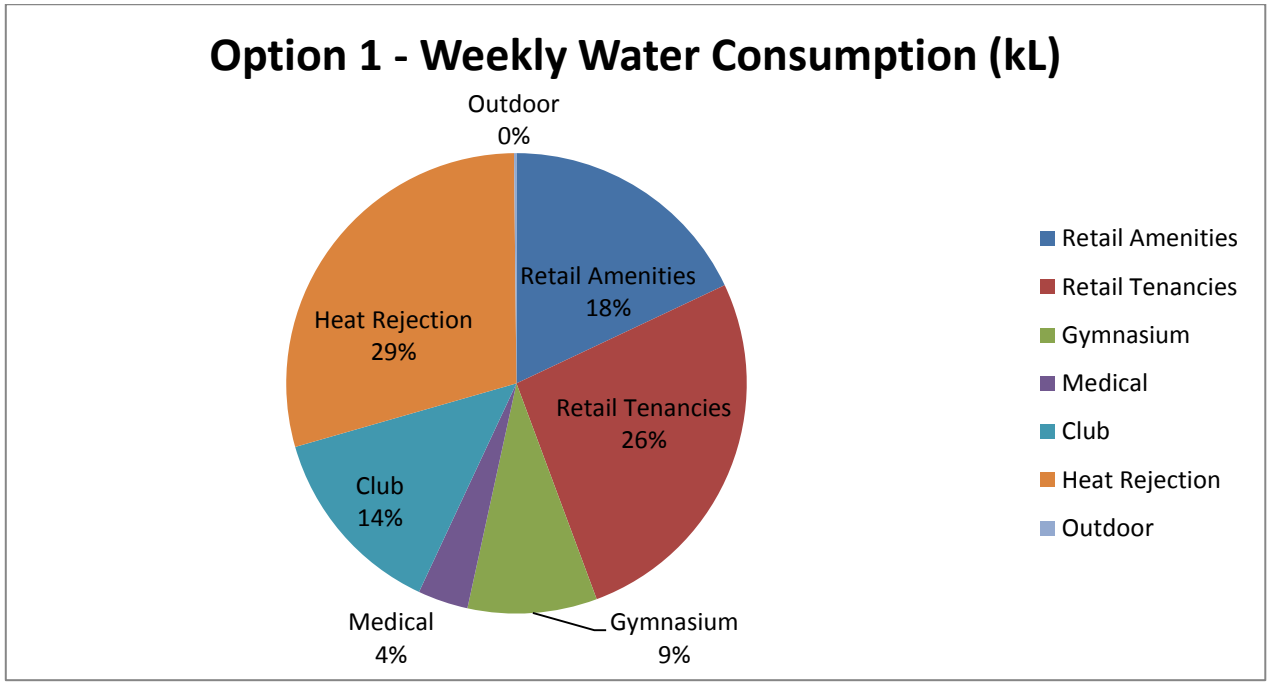
A summary of the estimated option 1 irrigation water consumption for the parameters listed above is as follows;

Water Efficiency	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Totals
Weeks	4.4	4.0	4.4	4.3	4.4	4.3	4.4	4.4	4.3	**4.4**	4.3	4.4	52.0
Applications	3	3	2	2	2	1	1	1	2	**2**	2	3	
Area	500	500	500	500	500	500	500	500	500	500	500	500	
Irrigation Rate	15	15	15	15	15	15	15	15	15	15	15	15	
Requirement	198	180	132	129	132	65	66	66	129	132	129	198	
Rainfall	94.0	112.9	116.3	106.3	100.1	120.7	71.0	75.5	60.3	70.7	81.2	74.3	1083.3
Monthly	52.000	33.550	7.850	11.350	15.950	0.000	0.000	0.000	34.350	30.650	23.900	61.850	271.450
Weekly Consumption (kL/week)	**11.818**	**8.388**	**1.784**	**2.640**	**3.625**	**0.000**	**0.000**	**0.000**	**7.988**	**6.966**	**5.558**	**14.057**	**62.824**
Non-Potable Ratio	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Non-Potable Contribution (kL/week)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Consumption (kL/week)	11.818	8.388	1.784	2.640	3.625	0.000	0.000	0.000	7.988	6.966	5.558	14.057	62.824

The average option 1 outdoor water demand with these parameters has been estimated at 1.208kL per week throughout the development.

6.8 Total Option 1 Water Consumption

Based on the estimated retail amenity water requirements of 127.565kL per week, the estimated retail tenancy water requirements of 186.812kL per week, the estimated gymnasium water requirements of 64.432kL per week, the estimated medical water requirements of 25.082kL per week, the estimated club water requirements of 96.382kL per week, the estimated heat rejection water requirements 207.640kL per week and the estimated outdoor water requirements of 1.208kL per week, the total retail water consumption for this development will be 709.121kL per week.


Option 1 - Weekly Water Consumption (kL)
Outdoor
0%
Retail Amenities
18%
Heat Rejection
29%
Retail Tenancies
26%
Club
14%
Medical
4%
Gymnasium
9%
Retail Amenities
Retail Tenancies
Gymnasium
Medical
Club
Heat Rejection
Outdoor

7 Option 2 - Water Consumption Evaluation

7.1 Retail Amenity Water Requirements

Option 2 retail amenity water consumption for the Woolooware Bay Town Centre development, has been modelled based upon following information;

- 7 days of building operation per week.
- 4 Star WELS rated water closets, having an average volume per flush of 3.5 litres.
- 6 Star WELS rated urinals, having an average volume per flush of 1 litre.
- 6 Star WELS rated tapware, having a flow rate of 4.5 litres per minute.
- 3 Star WELS rated showers, having a flow rate of 9.0 litres per minute.
- Non-potable water used for 100% of all flushing requirements.

A summary of the estimated option 2 retail amenity water consumption for the parameters listed above is as follows;

Efficiency Assesssment	Water Closet	Urinal	Tapware	Showers	Totals
Area	14425	14425	14425	14425	14425
Male - Staff	144	144	144	144	144
Female - Staff	144	144	144	144	144
Male - Visitor	2404	2404	2404	2404	2404
Female - Staff	2404	2404	2404	2404	2404
Fixture Efficiency	4 Star	6 Star	6 Star	3 Star	
Consumption Per Use	3.5	1	1.5	45	
Male - Staff	505	289	649	1298	2741
Female - Staff	1515	0	649	1298	3462
Male - Visitor	1683	962	2164	0	4808
Female - Visitor	5049	0	2164	0	7213
Total Consumption (L/day)	**8751**	**1250**	**5626**	**2597**	**18224**
Efficiency (L/m2/day)	**0.61**	**0.09**	**0.39**	**0.18**	**1.26**
Days Of operation Per Week	7	7	7	7	7
Weekly Consumption (kL/week)	**61.258**	**8.751**	**39.380**	**18.176**	**127.565**
Non-Potable Ratio	100%	100%	0%	0%	
Non-Potable Contribution (kL/week)	61.258	8.751	0.000	0.000	0.000
Total Consumption (kL/week)	**0.000**	**0.000**	**39.380**	**18.176**	**57.556**

The total option 2 retail amenity water consumption with these parameters has been estimated at 57.556kL per week throughout the development.

7.2 Retail Tenancy Water Requirements

Option 2 retail tenant water consumption for the Woolooware Bay Town Centre development, has been modelled based upon actual metered consumption data from similar retail centres. Specifically the base model has been developed upon following information;

- 7 days of building operation per week.
- Non-food tenants having an average water consumption rate of 0.11kL/m^2 per annum.
- Food tenants having an average water consumption rate of 5.23kL/m^2 per annum.
- Supermarkets having an average water consumption rate of 0.21kL/m^2 per annum.
- Majors and Mini Majors having an average water consumption rate of 0.11kL/m^2 per annum.

A summary of the estimated option 2 retail tenancy water consumption for the parameters listed above is as follows;

Efficiency Assessment	Specialty	Restaurants	Supermarkets	Majors	Totals
Area	4327	1549	4019	2906	12801
Consumption Rate	0.11	5.23	0.21	0.11	
Total Consumption (L/day)	**1304**	**22195**	**2312**	**876**	**26687**
Efficiency (L/m2/day)	**0.30**	**14.33**	**0.58**	**0.30**	**2.08**
Days Of operation Per Week	7	7	7	7	7
Total Consumption (kL/week)	**9.128**	**155.367**	**16.186**	**6.130**	**186.812**

The total option 2 retail tenant water consumption with these parameters has been estimated at 186.812kL per week throughout the development.

7.3 Gymnasium Tenancy Water Requirements

Option 2 gymnasium tenancy water consumption for the Woolooware Bay Town Centre development, has been modelled based upon following information;

- 7 days of building operation per week.
- 4 Star WELS rated water closets, having an average volume per flush of 3.5 litres.
- 6 Star WELS rated urinals, having an average volume per flush of 1 litre.
- 6 Star WELS rated tapware, having a flow rate of 4.5 litres per minute.
- 3 Star WELS rated showers, having a flow rate of 9.0 litres per minute.
- Non-potable water used for 100% of all flushing requirements.

A summary of the estimated option 2 gymnasium water consumption for the parameters listed above is as follows;

Efficiency Assessment	Water Closet	Urinal	Tapware	Showers	Totals
Area	2159	2159	2159	2159	2159
Male - Staff	22	22	22	22	22
Female - Staff	22	22	22	22	22
Male - Visitor	360	360	360	360	360
Female - Staff	360	360	360	360	360
Fixture Efficiency	4 Star	6 Star	6 Star	3 Star	
Consumption Per Use	3.5	1	1.5	45	
Male - Staff	76	43	97	194	410
Female - Staff	227	0	97	194	518
Male - Visitor	252	144	324	3239	3958
Female - Visitor	756	0	324	3239	4318
Total Consumption (L/day)	**1310**	**187**	**842**	**6866**	**9205**
Efficiency (L/m2/day)	**0.61**	**0.09**	**0.39**	**3.18**	**4.26**
Days Of operation Per Week	7	7	7	7	7
Weekly Consumption (kL/week)	**9.169**	**1.310**	**5.894**	**48.059**	**64.432**
Non-Potable Ratio	100%	100%	0%	0%	
Non-Potable Contribution (kL/week)	9.169	1.310	0.000	0.000	0.000
Total Consumption (kL/week)	**0.000**	**0.00**	**5.894**	**48.059**	**53.953**

The total option 2 gymnasium water consumption with these parameters has been estimated at 53.953kL per week throughout the development.

7.4 Medical Tenancy Water Requirements

Option 2 medical tenancy water consumption for the Woolooware Bay Town Centre development, has been modelled based upon following information;

- 7 days of building operation per week.
- 4 Star WELS rated water closets, having an average volume per flush of 3.5 litres.
- 6 Star WELS rated urinals, having an average volume per flush of 1 litre.
- 6 Star WELS rated tapware, having a flow rate of 4.5 litres per minute.
- 3 Star WELS rated showers, having a flow rate of 9.0 litres per minute.
- Non-potable water used for 100% of all flushing requirements.

A summary of the estimated option 2 medical water consumption for the parameters listed above is as follows;

Efficiency Assessment	Water Closet	Urinal	Tapware	Showers	Totals
Area	1493	1493	1493	1493	1493
Male - Staff	75	75	75	75	75
Female - Staff	75	75	75	75	75
Male - Visitor	75	75	75	75	75
Female - Staff	75	75	75	75	75
Fixture Efficiency	4 Star	6 Star	6 Star	3 Star	
Consumption Per Use	3.5	1	1.5	45	
Male - Staff	261	149	336	672	1418
Female - Staff	784	0	336	672	1792
Male - Visitor	52	30	67	0	149
Female - Visitor	157	0	67	0	224
Total Consumption (L/day)	**1254**	**179**	**806**	**1344**	**3583**
Efficiency (L/m2/day)	**0.84**	**0.12**	**0.54**	**0.90**	**2.40**
Days Of operation Per Week	7	7	7	7	7
Weekly Consumption (kL/week)	**8.779**	**1.254**	**5.644**	**9.406**	**25.082**
Non-Potable Ratio	100%	100%	0%	0%	
Non-Potable Contribution (kL/week)	8.779	1.254	0.000	0.000	0.000
Total Consumption (kL/week)	**0.000**	**0.000**	**5.644**	**9.406**	**15.049**

The total option 2 medical water consumption with these parameters has been estimated at 15.049kL per week throughout the development.

7.5 Club Tenancy Water Requirements

Option 2 club tenancy water consumption for the Woolooware Bay Town Centre development, has been modelled based upon following information;

- 7 days of building operation per week.
- 4 Star WELS rated water closets, having an average volume per flush of 3.5 litres.
- 6 Star WELS rated urinals, having an average volume per flush of 1 litre.
- 6 Star WELS rated tapware, having a flow rate of 4.5 litres per minute.
- 3 Star WELS rated showers, having a flow rate of 9.0 litres per minute.
- Non-potable water used for 100% of all flushing requirements.

A summary of the estimated option 2 club water consumption for the parameters listed above is as follows;

Efficiency Assessment	Water Closet	Urinal	Tapware	Showers	Restaurants	Totals
Area	6642	6642	6642	6642	664.2	6642

Male - Staff	111	111	111	111		111
Female - Staff	111	111	111	111		111
Male - Visitor	1107	1107	1107	1107		1107
Female - Staff	1107	1107	1107	1107		1107
Fixture Efficiency	4 Star	6 Star	6 Star	3 Star		
Consumption Per Use	3.5	1	1.5	45	5.23	
Male - Staff	387	221	498	996		2103
Female - Staff	1162	0	498	996		2657
Male - Visitor	775	443	996	0		2214
Female - Visitor	2325	0	996	0		3321
Total Consumption (L/day)	**4649**	**664**	**2989**	**1993**	**3474**	**13769**
Efficiency (L/m2/day)	**0.70**	**0.10**	**0.45**	**0.30**	**5.23**	**2.07**
Days Of operation Per Week	7	7	7	7	7	
Weekly Consumption (kL/week)	**32.546**	**4.649**	**20.922**	**13.948**	**24.316**	**96.382**
Non-Potable Ratio	100%	100%	0%	0%	0%	
Non-Potable Contribution (kL/week)	32.546	4.649	0.000	0.000	0.000	0.000
Total Consumption (kL/week)	**0.000**	**0.000**	**20.922**	**13.948**	**24.316**	**59.187**

The total option 2 club water consumption with these parameters has been estimated at 59.187kL per week throughout the development.

7.6 Heat Rejection Water Requirements

Water consumption within each mechanical services air conditioning system varies depending upon the location of the building, the type of building construction, and the type of mechanical services systems incorporated. For the Woolooware Bay Town Centre development, the option 2 heat rejection water demand has been developed using the following information;

- Gross Floor Area 30,511m^2
- 7 days of building operation per week.
- Average Cooling Tower Water Supply 1.2L/day/m^2

A summary of the estimated option 2 heat rejection water consumption for the parameters listed above is as follows;

Efficiency Assessment	Arcade	Supermarket	Majors	Specialty	Restaurants	Gymnasium	Medical	Club	Back Of House	Totals
Area	1624	4019	2906	4327	1549	2159	1493	6642	5792	**30511**
Consumption Rate	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	0.0	
Total Consumption (L/day)	**1949**	**4823**	**3487**	**5192**	**1859**	**2591**	**1792**	**7970**	**0**	**29663**
Efficiency (L/m2/day)	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**0.00**	
Days Of operation Per Week	7	7	7	7	7	7	7	7	7	
Weekly Consumption (kL/week)	**13.64**	**33.760**	**24.41**	**36.347**	**13.012**	**18.136**	**12.541**	**55.79**	**0.000**	**207.64**

	2		**0**					**3**		**0**
Non-Potable Ratio	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Non-Potable Contribution (kL/week)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Consumption (kL/week)	**13.642**	**33.760**	**24.410**	**36.347**	**13.012**	**18.136**	**12.541**	**55.793**	**0.000**	**207.640**

The total option 2 heat rejection water demand with these parameters is estimated to be 207.640kL per week.

7.7 Outdoor Water Requirements

Water consumption within each landscape irrigation system varies depending upon the nature of the irrigation system, species of planting, and the prevailing climate. For the Woolooware Bay Town Centre development, the option 2 outdoor water demand has been developed using following information;

- Irrigation area of approximately 500m^2
- Irrigation rate 15mm/m^2

A summary of the estimated option 2 irrigation water consumption for the parameters listed above is as follows;

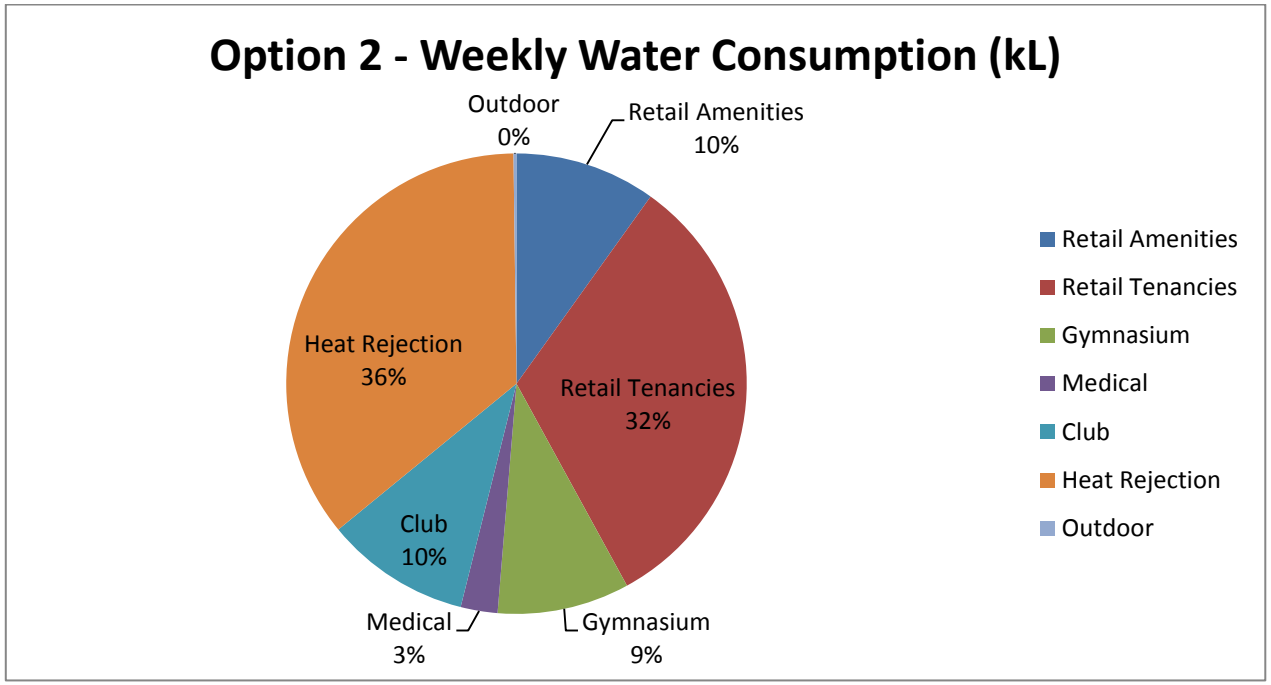
Water Efficiency	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Totals
Weeks	4.4	4.0	4.4	4.3	4.4	4.3	4.4	4.4	4.3	**4.4**	4.3	4.4	52.0
Applications	3	3	2	2	2	1	1	1	2	**2**	2	3	
Area	500	500	500	500	500	500	500	500	500	500	500	500	
Irrigation Rate	15	15	15	15	15	15	15	15	15	15	15	15	
Requirement	198	180	132	129	132	65	66	66	129	132	129	198	
Rainfall	94.0	112.9	116.3	106.3	100.1	120.7	71.0	75.5	60.3	70.7	81.2	74.3	1083.3
Monthly	52.000	33.550	7.850	11.350	15.950	0.000	0.000	0.000	34.350	30.650	23.900	61.850	271.450
Weekly Consumption (kL/week)	**11.818**	**8.388**	**1.784**	**2.640**	**3.625**	**0.000**	**0.000**	**0.000**	**7.988**	**6.966**	**5.558**	**14.057**	**62.824**
Non-Potable Ratio	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Non-Potable Contribution (kL/week)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Consumption (kL/week)	11.818	8.388	1.784	2.640	3.625	0.000	0.000	0.000	7.988	6.966	5.558	14.057	62.824

The average option 2 outdoor water demand with these parameters has been estimated at 1.208kL per week throughout the development.

7.8 Total Option 2 Water Consumption

Based on the estimated retail amenity water requirements of 57.556kL per week, the estimated retail tenancy water requirements of 186.812kL per week, the estimated gymnasium water requirements of 53.953kL per week, the estimated medical water requirements of 15.049kL per week, the estimated club water requirements of 59.187kL per week, the estimated heat rejection water requirements

207.640kL per week and the estimated outdoor water requirements of 1.208kL per week, the total retail water consumption for this development will be 581.404kL per week.



8 Option 3 - Water Consumption Evaluation

8.1 Retail Amenity Water Requirements

Option 3 retail amenity water consumption for the Woolooware Bay Town Centre development, has been modelled based upon following information;

- 7 days of building operation per week.
- 4 Star WELS rated water closets, having an average volume per flush of 3.5 litres.
- 6 Star WELS rated urinals, having an average volume per flush of 1 litre.
- 6 Star WELS rated tapware, having a flow rate of 4.5 litres per minute.
- 3 Star WELS rated showers, having a flow rate of 9.0 litres per minute.
- Non-potable water used for 100% of all flushing requirements.

A summary of the estimated option 3 retail amenity water consumption for the parameters listed above is as follows;

Efficiency Assesssment	Water Closet	Urinal	Tapware	Showers	Totals
Area	14425	14425	14425	14425	14425
Male - Staff	144	144	144	144	144
Female - Staff	144	144	144	144	144
Male - Visitor	2404	2404	2404	2404	2404
Female - Staff	2404	2404	2404	2404	2404
Fixture Efficiency	4 Star	6 Star	6 Star	3 Star	
Consumption Per Use	3.5	1	1.5	45	
Male - Staff	505	289	649	1298	2741
Female - Staff	1515	0	649	1298	3462
Male - Visitor	1683	962	2164	0	4808
Female - Visitor	5049	0	2164	0	7213
Total Consumption (L/day)	**8751**	**1250**	**5626**	**2597**	**18224**
Efficiency (L/m2/day)	**0.61**	**0.09**	**0.39**	**0.18**	**1.26**
Days Of operation Per Week	7	7	7	7	7
Weekly Consumption (kL/week)	**61.258**	**8.751**	**39.380**	**18.176**	**127.565**
Non-Potable Ratio	100%	100%	0%	0%	
Non-Potable Contribution (kL/week)	61.258	8.751	0.000	0.000	70.009
Total Consumption (kL/week)	**0.000**	**0.000**	**39.380**	**18.176**	**57.556**

The total option 3 retail amenity water consumption with these parameters has been estimated at 57.556kL per week throughout the development.

8.2 Retail Tenancy Water Requirements

Option 3 retail tenant water consumption for the Woolooware Bay Town Centre development, has been modelled based upon actual metered consumption data from similar retail centres. Specifically the base model has been developed upon following information;

- 7 days of building operation per week.
- Non-food tenants having an average water consumption rate of 0.11kL/m^2 per annum.
- Food tenants having an average water consumption rate of 5.23kL/m^2 per annum.
- Supermarkets having an average water consumption rate of 0.21kL/m^2 per annum.
- Majors and Mini Majors having an average water consumption rate of 0.11kL/m^2 per annum.

A summary of the estimated option 3 retail tenancy water consumption for the parameters listed above is as follows;

Efficiency Assessment	Specialty	Restaurants	Supermarkets	Majors	Totals
Area	4327	1549	4019	2906	12801
Consumption Rate	0.11	5.23	0.21	0.11	
Total Consumption (L/day)	**1304**	**22195**	**2312**	**876**	**26687**
Efficiency (L/m2/day)	**0.30**	**14.33**	**0.58**	**0.30**	**2.08**
Days Of operation Per Week	7	7	7	7	7
Total Consumption (kL/week)	**9.128**	**155.367**	**16.186**	**6.130**	**186.812**

The total option 3 retail tenant water consumption with these parameters has been estimated at 186.812kL per week throughout the development.

8.3 Gymnasium Tenancy Water Requirements

Option 3 gymnasium tenancy water consumption for the Woolooware Bay Town Centre development, has been modelled based upon following information;

- 7 days of building operation per week.
- 4 Star WELS rated water closets, having an average volume per flush of 3.5 litres.
- 6 Star WELS rated urinals, having an average volume per flush of 1 litre.
- 6 Star WELS rated tapware, having a flow rate of 4.5 litres per minute.
- 3 Star WELS rated showers, having a flow rate of 9.0 litres per minute.
- Non-potable water used for 100% of all flushing requirements.

A summary of the estimated option 3 gymnasium water consumption for the parameters listed above is as follows;

Efficiency Assessment	Water Closet	Urinal	Tapware	Showers	Totals
Area	2159	2159	2159	2159	2159
Male - Staff	22	22	22	22	22
Female - Staff	22	22	22	22	22
Male - Visitor	360	360	360	360	360
Female - Staff	360	360	360	360	360
Fixture Efficiency	4 Star	6 Star	6 Star	3 Star	
Consumption Per Use	3.5	1	1.5	45	
Male - Staff	76	43	97	194	410
Female - Staff	227	0	97	194	518
Male - Visitor	252	144	324	3239	3958
Female - Visitor	756	0	324	3239	4318
Total Consumption (L/day)	**1310**	**187**	**842**	**6866**	**9205**
Efficiency (L/m2/day)	**0.61**	**0.09**	**0.39**	**3.18**	**4.26**
Days Of operation Per Week	7	7	7	7	7
Weekly Consumption (kL/week)	**9.169**	**1.310**	**5.894**	**48.059**	**64.432**
Non-Potable Ratio	100%	100%	0%	0%	
Non-Potable Contribution (kL/week)	9.169	1.310	0.000	0.000	10.478
Total Consumption (kL/week)	**0.000**	**0.00**	**5.894**	**48.059**	**53.953**

The total option 3 gymnasium water consumption with these parameters has been estimated at 53.953kL per week throughout the development.

8.4 Medical Tenancy Water Requirements

Option 3 medical tenancy water consumption for the Woolooware Bay Town Centre development, has been modelled based upon following information;

- 7 days of building operation per week.
- 4 Star WELS rated water closets, having an average volume per flush of 3.5 litres.
- 6 Star WELS rated urinals, having an average volume per flush of 1 litre.
- 6 Star WELS rated tapware, having a flow rate of 4.5 litres per minute.
- 3 Star WELS rated showers, having a flow rate of 9.0 litres per minute.
- Non-potable water used for 100% of all flushing requirements.

A summary of the estimated option 3 medical water consumption for the parameters listed above is as follows;

Efficiency Assessment	Water Closet	Urinal	Tapware	Showers	Totals
Area	1493	1493	1493	1493	1493
Male - Staff	75	75	75	75	75
Female - Staff	75	75	75	75	75
Male - Visitor	75	75	75	75	75
Female - Staff	75	75	75	75	75
Fixture Efficiency	4 Star	6 Star	6 Star	3 Star	
Consumption Per Use	3.5	1	1.5	45	
Male - Staff	261	149	336	672	1418
Female - Staff	784	0	336	672	1792
Male - Visitor	52	30	67	0	149
Female - Visitor	157	0	67	0	224
Total Consumption (L/day)	**1254**	**179**	**806**	**1344**	**3583**
Efficiency (L/m2/day)	**0.84**	**0.12**	**0.54**	**0.90**	**2.40**
Days Of operation Per Week	7	7	7	7	7
Weekly Consumption (kL/week)	**8.779**	**1.254**	**5.644**	**9.406**	**25.082**
Non-Potable Ratio	100%	100%	0%	0%	
Non-Potable Contribution (kL/week)	8.779	1.254	0.000	0.000	10.033
Total Consumption (kL/week)	**0.000**	**0.000**	**5.644**	**9.406**	**15.049**

The total option 3 medical water consumption with these parameters has been estimated at 15.049kL per week throughout the development.

8.5 Club Tenancy Water Requirements

Option 3 club tenancy water consumption for the Woolooware Bay Town Centre development, has been modelled based upon following information;

- 7 days of building operation per week.
- 4 Star WELS rated water closets, having an average volume per flush of 3.5 litres.
- 6 Star WELS rated urinals, having an average volume per flush of 1 litre.
- 6 Star WELS rated tapware, having a flow rate of 4.5 litres per minute.
- 3 Star WELS rated showers, having a flow rate of 9.0 litres per minute.
- Non-potable water used for 100% of all flushing requirements.

A summary of the estimated option 3 club water consumption for the parameters listed above is as follows;

Efficiency Assessment	Water Closet	Urinal	Tapware	Showers	Restaurants	Totals
Area	6642	6642	6642	6642	664.2	6642

Male - Staff	111	111	111	111		111
Female - Staff	111	111	111	111		111
Male - Visitor	1107	1107	1107	1107		1107
Female - Staff	1107	1107	1107	1107		1107
Fixture Efficiency	4 Star	6 Star	6 Star	3 Star		
Consumption Per Use	3.5	1	1.5	45	5.23	
Male - Staff	387	221	498	996		2103
Female - Staff	1162	0	498	996		2657
Male - Visitor	775	443	996	0		2214
Female - Visitor	2325	0	996	0		3321
Total Consumption (L/day)	**4649**	**664**	**2989**	**1993**	**3474**	**13769**
Efficiency (L/m2/day)	**0.70**	**0.10**	**0.45**	**0.30**	**5.23**	**2.07**
Days Of operation Per Week	7	7	7	7	7	
Weekly Consumption (kL/week)	**32.546**	**4.649**	**20.922**	**13.948**	**24.316**	**96.382**
Non-Potable Ratio	100%	100%	0%	0%	0%	
Non-Potable Contribution (kL/week)	32.546	4.649	0.000	0.000	0.000	37.195
Total Consumption (kL/week)	**0.000**	**0.000**	**20.922**	**13.948**	**24.316**	**59.187**

The total option 3 club water consumption with these parameters has been estimated at 59.187kL per week throughout the development.

8.6 Heat Rejection Water Requirements

Water consumption within each mechanical services air conditioning system varies depending upon the location of the building, the type of building construction, and the type of mechanical services systems incorporated. For the Woolooware Bay Town Centre development, the option 3 heat rejection water demand has been developed using the following information;

- Gross Floor Area 30,511m^2
- 7 days of building operation per week.
- Average Cooling Tower Water Supply 1.2L/day/m^2
- Non-potable water used for 90% of all heat rejection requirements.

A summary of the estimated option 3 heat rejection water consumption for the parameters listed above is as follows;

Efficiency Assessment	Arcade	Supermarket	Majors	Specialty	Restaurants	Gymnasium	Medical	Club	Back Of House	Totals
Area	1624	4019	2906	4327	1549	2159	1493	6642	5792	**30511**
Consumption Rate	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	0.0	
Total Consumption (L/day)	**1949**	**4823**	**3487**	**5192**	**1859**	**2591**	**1792**	**7970**	**0**	**29663**
Efficiency (L/m2/day)	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**0.00**	
Days Of operation Per Week	7	7	7	7	7	7	7	7	7	

Weekly Consumption (kL/week)	**13.642**	**33.760**	**24.410**	**36.347**	**13.012**	**18.136**	**12.541**	**55.793**	**0.000**	**207.640**
Non-Potable Ratio	90%	90%	90%	90%	90%	90%	90%	90%	90%	
Non-Potable Contribution (kL/week)	12.277	30.384	21.969	32.712	11.710	16.322	11.287	50.214	0.000	186.876
Total Consumption (kL/week)	**1.364**	**3.376**	**2.441**	**3.635**	**1.301**	**1.814**	**1.254**	**5.579**	**0.000**	**20.764**

The total option 3 heat rejection water demand with these parameters is estimated to be 20.764kL per week.

8.7 Outdoor Water Requirements

Water consumption within each landscape irrigation system varies depending upon the nature of the irrigation system, species of planting, and the prevailing climate. For the Woolooware Bay Town Centre development, the option 3 outdoor water demand has been developed using following information;

- Irrigation area of approximately 500m^2
- Irrigation rate 15mm/m^2
- Non-potable water used for 100% of all irrigation requirements.

A summary of the estimated option 3 irrigation water consumption for the parameters listed above is as follows;

Water Efficiency	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Totals
Weeks	4.4	4.0	4.4	4.3	4.4	4.3	4.4	4.4	4.3	**4.4**	4.3	4.4	52.0
Applications	3	3	2	2	2	1	1	1	2	**2**	2	3	
Area	500	500	500	500	500	500	500	500	500	500	500	500	
Irrigation Rate	15	15	15	15	15	15	15	15	15	15	15	15	
Requirement	198	180	132	129	132	65	66	66	129	132	129	198	
Rainfall	94.0	112.9	116.3	106.3	100.1	120.7	71.0	75.5	60.3	70.7	81.2	74.3	1083.3
Monthly	52.000	33.550	7.850	11.350	15.950	0.000	0.000	0.000	34.350	30.650	23.900	61.850	271.450
Weekly Consumption (kL/week)	**11.818**	**8.388**	**1.784**	**2.640**	**3.625**	**0.000**	**0.000**	**0.000**	**7.988**	**6.966**	**5.558**	**14.057**	**62.824**
Non-Potable Ratio	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	
Non-Potable Contribution (kL/week)	11.818	8.388	1.784	2.640	3.625	0.000	0.000	0.000	7.988	6.966	5.558	14.057	62.824
Total Consumption (kL/week)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

The average option 3 outdoor water demand with these parameters has been estimated at 0.000kL per week throughout the development.

8.8 Total Option 3 Water Consumption

Based on the estimated retail amenity water requirements of 57.556kL per week, the estimated retail tenancy water requirements of 186.812kL per week, the estimated gymnasium water requirements of 53.953kL per week, the estimated medical water requirements of

15.049kL per week, the estimated club water requirements of 59.187kL per week, the estimated heat rejection water requirements 20.764kL per week and the estimated outdoor water requirements of 0.000kL per week, the total retail water consumption for this development will be 393.321kL per week.