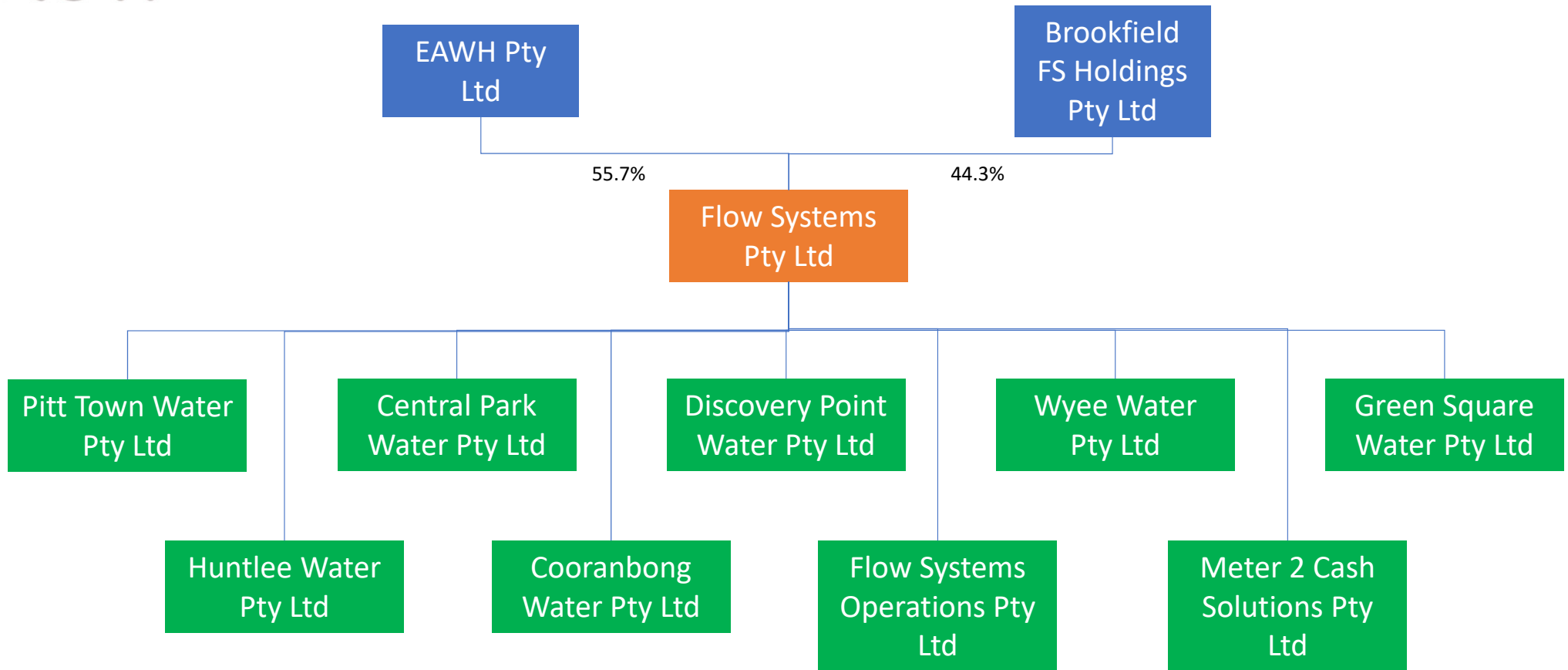




## Ownership Structure



<b>Position Title</b>	Managing Director/Chief Executive Officer
<b>Reporting to</b>	Board of Directors
<b>Functional team</b>	Executive
<b>Location</b>	Sydney

## PURPOSE OF ROLE

The primary purpose of this role is to manage the Flow Systems\* Group including its businesses, senior executive staff, and key business relationships to implement the strategies required to achieve the corporate objectives as set out in the Business Plan.

(\*to be read as including all Flow Systems' subsidiaries)

## KEY RELATIONSHIPS

Direct Reports	Internal stakeholders	External stakeholders
<ul style="list-style-type: none"> <li>▪ Chief Operating Officer</li> <li>▪ Exec Manager Business Development</li> <li>▪ Exec Manager Communications &amp; Marketing</li> </ul>	<ul style="list-style-type: none"> <li>▪ Flow Systems Exec team</li> <li>▪ Brookfield Infrastructure</li> <li>▪ Board members</li> </ul>	<ul style="list-style-type: none"> <li>▪ Clients</li> <li>▪ Government</li> <li>▪ Regulatory bodies</li> <li>▪ Public Utilities</li> <li>▪ Regulators (IPART, EPA)</li> <li>▪ Key contractors &amp; suppliers</li> </ul>

## WHS ACCOUNTABILITIES

- Executing a duty of care that ensures the health, wellbeing and safety of self and others at all times
- As a member of the Executive, demonstrating leadership in safe workplace practices consistent with Flow Systems' WHS Policy and Management System procedures
- Proactively identifying unsafe workplace conditions and/or practices and taking preventive and corrective actions as applicable

## KEY RESPONSIBILITIES

- Ensure ongoing re-appraisal and updating of Flow Systems' Business Plan and annual budgets
- Provide leadership and direction to the Executive management team to meet the Business Plan targets and objectives
- Review existing corporate policy and develop new policy in conjunction with the Board and in consultation with major stakeholders
- Coordinate and manage key strategic issues related to decentralised utility networks and retail regulation
- Manage the preparation and delivery of reports, consultation papers, guidelines and decisions on matters relating to project origination, network operation and retail businesses

- Plan and implement strategic consultation processes involving key stakeholders such as developers, customers and their representatives, other regulators, government departments and ministers, industry bodies, and other interested parties
- Provide assistance and input into the planning, scoping and management of the work program undertaken by Flow Systems
- Provide support to the Executive team in budgeting, resource and corporate planning and management
- Ensuring the Flow Systems businesses are conducted in accordance with all relevant laws, regulations, and ethical standards and otherwise in line with best market practice
- Represent Flow Systems at meetings of State and Federal development bodies
- Advocate in media and political forums for the efficient use of water through recycled water applications, and the evolution of the private water utility sector in Australia
- Represent Flow Systems on relevant industry associations at board or committee level to determine new initiatives, opportunities, and to enhance the company profile
- Chief spokesperson for the Flow Systems Group
- Increase the profile of Flow Systems by monitoring all opportunities to ensure optimum promotion of the organisation, and represent Flow Systems at a wide variety of events

## SKILLS AND EXPERIENCE

- Entrepreneurial, with a vision for the Australian water sector
- Highly developed leadership skills including the ability to maintain positive working relationships
- High-order strategic management skills, together with a proven record of success in the strategic management of other organisations
- Highly developed advocacy, negotiation and stakeholder management skills
- Ability to develop a workplace culture that balances teamwork and independent initiative in a small enterprise environment
- Ability to improve business performance through change management
- Strong skills in troubleshooting, problem-solving, and conflict resolution
- Ability to contribute to a workplace environment that fosters learning, teaching, personal and professional growth, risk-taking, innovation and fun
- Straight forward, self-confident and high self-awareness

## KNOWLEDGE AND QUALIFICATIONS

- A strong background and understanding of the water and/or utilities industry
- Highly developed knowledge of the legislative and regulatory frameworks for the water and utilities industries
- At least 15 years' general experience in all aspects of management at a senior level including senior management roles in infrastructure development and delivery projects
- Relevant tertiary qualifications

<b>Position Title</b>	Chief Operating Officer
<b>Reporting to</b>	Managing Director/Chief Executive Officer
<b>Functional team</b>	Executive
<b>Location</b>	Sydney

## PURPOSE OF ROLE

The primary purpose of this role is to manage all operational activities of the Flow Systems\* Group ensuring the implementation of overall organisational strategy.

(\*to be read as including all Flow Systems' subsidiaries)

## KEY RELATIONSHIPS

Direct Reports	Internal stakeholders	External stakeholders
<ul style="list-style-type: none"> <li>▪ Exec Manager Project Delivery</li> <li>▪ Exec Manager Utility Ops</li> <li>▪ Exec Manager Retail Ops</li> <li>▪ Finance Manager</li> <li>▪ Chief Technology Officer</li> </ul>	<ul style="list-style-type: none"> <li>▪ Flow Systems Exec team</li> <li>▪ Brookfield Infrastructure</li> <li>▪ Board members</li> </ul>	<ul style="list-style-type: none"> <li>▪ Clients</li> <li>▪ Government</li> <li>▪ Regulatory bodies</li> <li>▪ Public Utilities</li> <li>▪ Regulators (IPART, EPA)</li> <li>▪ Key contractors &amp; suppliers</li> </ul>

## WHS ACCOUNTABILITIES

- Executing a duty of care that ensures the health, wellbeing and safety of self and others at all times
- As a member of the Executive, demonstrating leadership in safe workplace practices consistent with Flow Systems' WHS Policy and Management System procedures
- Proactively identifying unsafe workplace conditions and/or practices and taking preventive and corrective actions as applicable

## KEY RESPONSIBILITIES

- Support the MD/CEO with ongoing re-appraisal and updating of Flow Systems' Business Plan and annual budgets
- Providing strategic direction, leading, managing and directing all operational activities of the organisation
- Accountability for the overall profitability of the operational activities of the organisation
- Building and aligning the organisational capability to deliver on the Business Plan strategy
- People development, risk and quality management, and innovation to drive growth
- Ensuring all corporate and business unit strategies and plans are aligned, reviewed and successfully implemented – taking remedial action where necessary
- Building relationships between all business units and ensuring the business units receive

adequate operational support

- Providing support and assistance to the MD/CEO on corporate and group issues where required
- Communicating with the MD/CEO to ensure he/she remains fully informed of all significant operating issues
- Acting, as required or in the absence of the MD/CEO, as the chief spokesperson for the organisation
- Directing and motivating direct reports to achieve agreed targets
- Provide support to the Executive team in budgeting, resource and corporate planning and management
- Ensuring the Flow Systems businesses are conducted in accordance with all relevant laws, regulations, and ethical standards and otherwise in line with best market practice
- Oversight of all regulatory compliance monitoring and reporting associated with the respective group businesses
- Develop and support any business relationships vital to the success of Flow Systems
- Ambassador for maintaining/improving the Flow Systems brand to all stakeholders including clients, customers, supply chain, and regulators

## SKILLS AND EXPERIENCE

- High-order skills in strategic planning, resource management, financial management, reporting and analysis
- Highly developed advocacy, negotiation and stakeholder management skills
- Excellent communication and presentation skills
- Ability to foster a workplace culture that balances collaboration and independent initiative in a small enterprise environment
- Ability to improve business performance through motivation and change management
- Strong skills in troubleshooting, problem-solving, and conflict resolution
- Ability to contribute to a workplace environment that fosters learning, teaching, personal and professional growth, risk-taking, innovation and fun
- Straight forward, self-confident and high self-awareness

## KNOWLEDGE AND QUALIFICATIONS

- A strong background and understanding of business management and corporate processes
- Well-developed knowledge of the legislative and regulatory frameworks for the water and utilities industries
- At least 15 years' general experience in all aspects of business management at a senior level
- Relevant tertiary qualifications

<b>Position Title</b>	Executive Manager Retail
<b>Reporting to</b>	Chief Operating Officer
<b>Functional team</b>	Retail
<b>Location</b>	Sydney based, with travel to all site locations as required

## PURPOSE OF ROLE

- The purpose of this role is to develop and grow the Flow Systems\* retail model and strategy. With overall accountability for Customer management strategy, the end to end retail model and community engagement.

(\*to be read as including all Flow Systems' subsidiaries)

## KEY RELATIONSHIPS

Direct Reports	Internal stakeholders	External stakeholders
<ul style="list-style-type: none"> <li>▪ Customer Experience Leader</li> <li>▪ Billing Clerk/Customer Experience Rep</li> </ul>	<ul style="list-style-type: none"> <li>▪ Flow Systems Exec team</li> <li>▪ Brookfield Infrastructure</li> <li>▪ Board members</li> </ul>	<ul style="list-style-type: none"> <li>▪ Property Developers</li> <li>▪ Other clients (eg. Councils)</li> <li>▪ Contractors &amp; Suppliers</li> <li>▪ Public Utilities</li> <li>▪ Regulators (IPART, EPA)</li> </ul>

## WHS ACCOUNTABILITIES

- Executing a duty of care that ensures the health, wellbeing and safety of self and others at all times
- As a member of the Executive, demonstrating leadership in safe workplace practices consistent with Flow Systems' WHS Policy and Management System procedures
- Proactively identifying unsafe workplace conditions and/or practices and taking preventive and corrective actions as applicable

## KEY RESPONSIBILITIES

- To develop the Flow Systems customer relationship model
- To manage this model and look to improve customer service focus
- To manage the customer experience to meet the aims and objectives of the Flow Systems
- To ensure our customer experience drives business value and is better overall versus our competitors
- To manage the end to end system and process including third party arrangements, billing, CRM, etc
- Own e-commerce plans & model
- Drive business development & growth
- To assist with the development of on-going relationships with the regulatory and other statutory bodies as required

- To develop and own the community relationship model for the Flow Systems
- Educate staff and contractors to ensure implementation of Flow Systems' corporate systems, standards, policies and procedures to meet HSE and QA requirements
- Coordination of all regulatory compliance monitoring and reporting associated with the Retail Supply Licences
- Ambassador for maintaining/improving the Flow Systems brand to all stakeholders including clients, customers, supply chain, and regulators

## SKILLS AND EXPERIENCE

- Understanding of water and/or utilities industry
- Understanding of the retail market place for utilities
- Knowledge of community relationship model which drive business value
- Statutory & regulatory knowledge of utilities and specific the water industry and associated frameworks
- Ability to work independently in a small enterprise environment
- Ability to improve business performance through change management
- Strong skills in troubleshooting, problem-solving, and conflict resolution
- Ability to contribute to a workplace environment that fosters learning, teaching, personal and professional growth, risk-taking, innovation and fun
- Straight forward, self-confident and high self-awareness

## KNOWLEDGE AND QUALIFICATIONS

- A strong background and understanding of the water and/or utilities industry
- At least 15 years' experience in Customer Experience & Contact Centre Senior Management
- Relevant tertiary qualifications



## Position Description

<b>Position Title:</b>	Customer Experience Leader	<b>Division:</b>	Corporate
<b>Position No:</b>		<b>Department/Section:</b>	
<b>Classification:</b>	Clerical	<b>Location:</b>	Sydney
<b>Manager:</b>	Executive Manager- Retail Operations		

### JOB PURPOSE

The purpose of this role is to support and assist in the development of the FS Customer Experience Model. By ensuring that the customer experience runs smoothly on a daily basis.

### WORKING RELATIONSHIPS

<u>Direct Reports</u>	<u>Internal</u>	<u>External</u>
<ul style="list-style-type: none"> <li>Customer Experience Specialist</li> <li>Billings clerk</li> </ul>	<ul style="list-style-type: none"> <li>Flow Systems Executive</li> </ul>	<ul style="list-style-type: none"> <li>FS Customers</li> <li>Developers</li> <li>Local Councils</li> <li>Regulatory Bodies</li> <li>Other third parties</li> </ul>

### SCOPE AND AUTHORITIES

- You will champion customer experience and satisfaction by managing the day to day running of the Customer Experience Team including:
- Managing all customer interactions, providing help and advice to customers based on FS's services and policies
- Managing all customer feedback and complaints, including any EWON investigations
- Achieve customer experience standards by continuously striving to improve customer experience quality results by studying, evaluating, and re-designing processes; establishing and communicating service metrics; monitoring and analysing results and implementing changes.
- Determine customer experience requirements by maintaining contact with customers, visiting operational environments and working with FS partners to benchmark best practices
- Accomplish customer experience human resource objectives by recruiting, selecting, orienting, training, scheduling, coaching and disciplining employees; communicating job expectations; planning, monitoring, appraising, and reviewing job contributions; planning and reviewing compensation actions; enforcing policies and procedures.
- Assist with Work Health & Safety compliance

### CORE ACCOUNTABILITIES

- Customer Experience
- To manage all day to day customer, developer and general FS



interactions

- To perform daily, weekly, monthly analysis and reporting of customer interaction types
- To track and monitor all network and service requests and feedback any issues to network operations
- Working with Network Operations and Communications to ensure that any known Network outages or planned maintenance is notified to customers via the FS websites and via proactive customer communications.
- Work with Network Operations and Communications in the event of any unplanned fault or emergency. Enact FS response procedures and manage FS customer experience standards throughout this type of event.
- Manage monthly customer billing runs and all ongoing credit control requirements. Working with Finance team to validate and report on any outstanding payments and issue restriction notices to Network Operations – as required.
- Create and manage staff rosters
- Develop training material and produce training modules to continuously update and train staff
- To assist with office administration if the office administration clerk is on leave or absent – if required.
- To provide support to the Executive Manager Retail Operations when required.

Customer Experience  
Outsourced partnerships

- Monitor interactions handled by the outsource partner to ensure that the FS customer experience standards are maintained.
- Facilitate an ongoing feedback process to ensure the outsource partnership is kept updated

Regulatory

- Manage all EWON Investigations and continuously look to improve FS's customer experience interactions.

Technology

- To assist with the review of any customer experience technology deployment and facilitating user acceptance testing for the Customer Experience team

Work Health & Safety  
Compliance

- To assist with ensuring Work Health & Safety policies are followed in the customer experience area.

#### SPECIAL REQUIREMENTS AND WORKING CONDITIONS

- A strong contact centre background
- Good working knowledge of contact centre technology e.g. CRM, queuing and call vectoring, staff rostering, training and reporting. Advanced knowledge of Microsoft packages (Word, Excel, Powerpoint, Outlook)
- Experienced in either working in an outsourced environment or managing an outsourced environment
- An efficient and self-motivated person able to work to a varied work schedule
- Utilities experience is desired but not essential

#### PERSON SPECIFICATION

- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li>• Ability to work in a small enterprise environment (flexibility, agility, etc)</li> </ul> | <ul style="list-style-type: none"> <li>• Good attention to detail and methodical thorough approach to work</li> </ul> |
|---|---|

<ul style="list-style-type: none"> <li>You must be customer focused and passionate about helping people.</li> </ul>	<ul style="list-style-type: none"> <li>Technology savvy, able to manage Microsoft packages and the internet.</li> </ul>
<ul style="list-style-type: none"> <li>Willing to work across teams and able to juggle tasks and priorities at times</li> </ul>	<ul style="list-style-type: none"> <li>Open to personal development to expand capabilities with Flow Systems</li> </ul>

APPROVALS		
Manager:		
Signature:		Date:
Employee		
Signature:		Date:

## Flow Systems Utilities

PROJECT NO.	PROJECT NAME	RSL Status	LOCATION			SERVICES				CLIENT DETAILS		UTILITY DETAILS					
			LOCATION	STATE	LGA	WASTEWATER	RECYCLED WATER	DRINKING WATER	ULTIMATE RESIDENTIAL CAPACITY	CLIENT	Construction to commence	UTILITY NAME	NETWORK OPERATOR	WICA NOL No.	RETAILER	WICA RSL No.	DATE OF RSL VARIATION
1	PITT TOWN	Confirmed	Pitt Town	NSW	Hawkesbury	W	R		943	JPG	2010 Q4	Pitt Town Water	Pitt Town Water P/L	10_014	Flow Systems P/L	13_001R	11/11/2010
2	DISCOVERY POINT	Confirmed	Wolli Creek	NSW	Rockdale	W	R	D	1,654	FRASERS	2014 Q1	Discovery Point Water	Discovery Point Water P/L	13_025	Flow Systems P/L	13_001R	7/07/2014
3	CENTRAL PARK	Confirmed	Chippendale	NSW	City of Sydney	W	R	D	2,166	FRASERS	2013 Q2	Central Park Water	Central Park Water P/L	12_022	Flow Systems P/L	13_001R	17/04/2013
4	WYEE	Confirmed	Wyee	NSW	Lake Macquarie	W	R	D	818	WYEE DEV'T FUND	2014 Q1	Wyee Water	Wyee Water P/L	14_026	Flow Systems P/L	13_001R	20/10/2014
5	HUNTLEE	Confirmed	North Rothbury	NSW	Cessnock & Singleton	W	R	D	7,500	LWP	2016 Q2	Huntlee Water	Huntlee Water P/L	15_030	Flow Systems P/L	13_001R	27/08/2015
6	GREEN SQUARE TOWN CENTRE	Confirmed	Zetland	NSW	City of Sydney		R		4,100	CITY OF SYDNEY	2015 Q1	Green Square Water	Green Square Water P/L	15_031	Flow Systems P/L	13_001R	27/08/2015
7	COORANBONG	Confirmed	Cooranbong	NSW	Lake Macquarie	W	R	D	2,104	JPG	2017 Q1	Cooranbong Water	Cooranbong Water P/L	15_033	Flow Systems P/L	13_001R	22/05/2015
8	BELLBIRD	Submitted	Bellbird	NSW	Cessnock	W	R	D	1,650	JPG	2019	Bellbird Water	Flow Systems Operations P/L	TBC	Flow Systems P/L	13_001R	TBC
9	BOX HILL	Confirmed	Box Hill	NSW	The Hills	W	R		4,100	CELESTINO	2016 Q2	Box Hill Water	Flow System Operations P/L	16_037	Flow Systems P/L	13_001R	12/05/2016
10	SHEPHERDS BAY	Confirmed	Meadowbank	NSW	Ryde	W	R	D	1,786	HOLDMARK, BROOKFIELD	2016 Q3	Shepherds Bay Plus	Flow Systems Operations P/L	17_042	Flow Systems P/L	13_001R	13/10/2017
11	GLOSSODIA	Submitted	Glossodia	NSW	Hawkesbury	W	R	?	580	CELESTINO	2019	Glossodia Water	Flow Systems Operations P/L	TBC	Flow Systems P/L	13_001R	TBC

# Green Square Town Centre



**LEGEND**

- Property boundary
- Existing NOL15\_031 and RSL13\_001R boundary
- Proposed NOL15\_031 and RSL13\_001R boundary

# GREEN SQUARE WATER

## WATER BALANCE SUMMARY REPORT

PREPARED BY KINESIS FOR FLOW SYSTEMS

7 AUGUST 2015





**Prepared by Kinesis**  
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Final

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**Cover Image Credits**  
Flow, 2015

**Note: This report is provided subject to some important assumptions and qualifications:**

The results presented in this report are modelled estimates using mathematical calculations. The data, information and scenarios presented in this report have not been separately confirmed or verified. Accordingly, the results should be considered to be preliminary in nature and subject to such confirmation and verification.

Energy, water and greenhouse consumption estimates are based on local climate and utility data available to the consultant at the time of the report. These consumption demands are, where necessary, quantified in terms of primary energy and water consumptions using manufacturer's data and scientific principles.

Generic precinct-level cost estimates provided in this report are indicative only based on Kinesis's project experience and available data from published economic assessments. These have not been informed by specific building design or construction plans and should not be used for design and construct cost estimates.

The Kinesis software tool and results generated by it are not intended to be used as the sole or primary basis for making investment or financial decisions (including carbon credit trading decisions). Accordingly, the results set out in this report should not be relied on as the sole or primary source of information applicable to such decisions.



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## EXECUTIVE SUMMARY

The Green Square development is a proposed residential development near Alexandria in the local government area of the City of Sydney. Green Square Water proposes to provide recycled water to **4,320** apartments on **15 ha** and include **156,000 m<sup>2</sup>** of retail, commerce and office space and **1.6 ha** of public gardens and plazas.

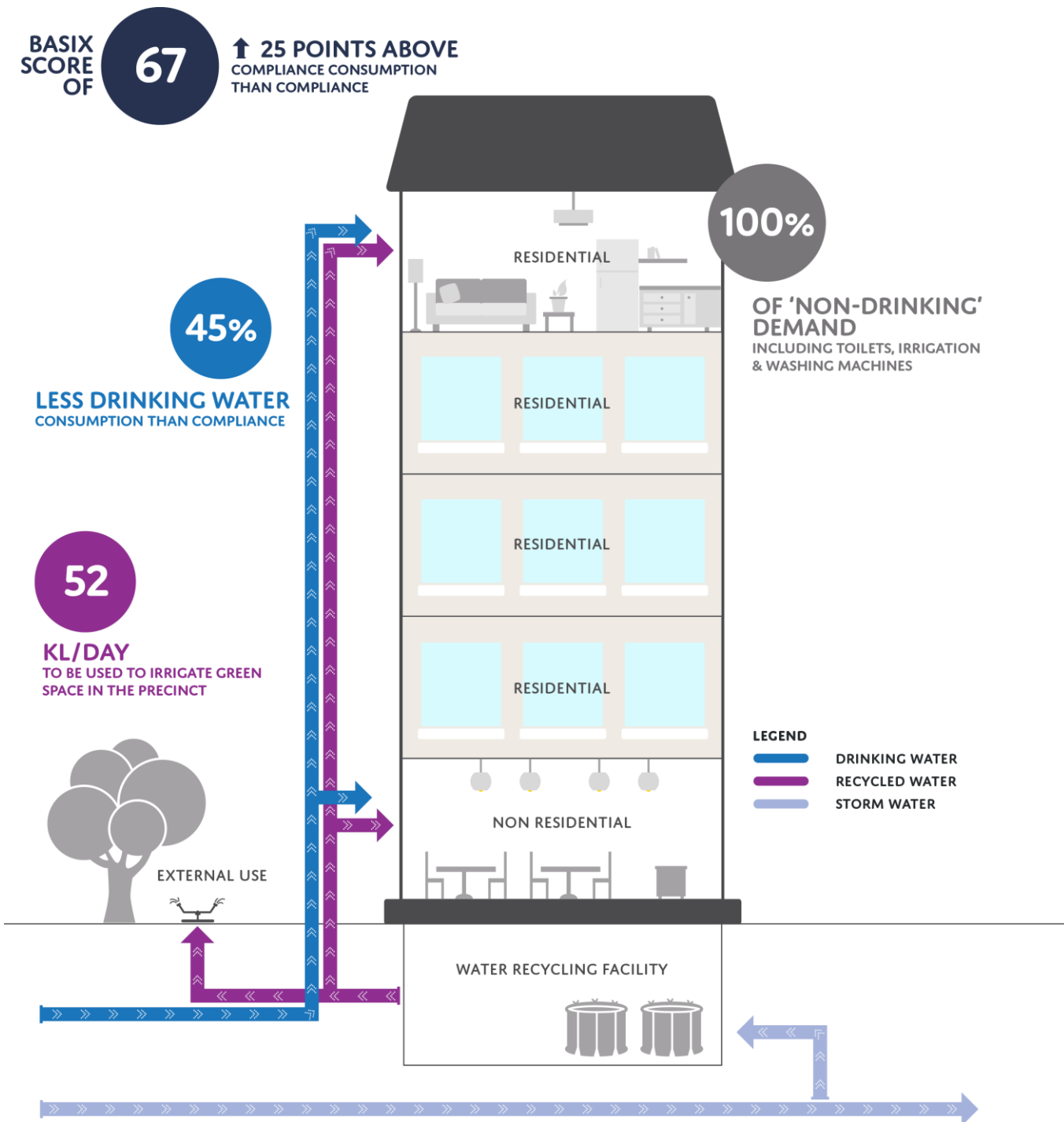
Green Square Water will operate a recycled water scheme that incorporates a combined membrane bioreactor and ultrafiltration system with a **1 ML** storage tank. The system will take inflows from two stormwater culverts and provide recycled water for:

- Residential use in
  - Toilets
  - Washing Machines (cold only)
  - Car washing
- Non-residential use in
  - Toilets
  - Washing machines (cold only)
  - Irrigation
  - Washdown, and
  - Water features.

These end-uses will be supplied by **100% recycled water**, with no potable top-up required.

With the recycled water scheme, dwellings in the precinct are expected to achieve, on average, a **BASIX Water score of 67**. Furthermore, to achieve BASIX Water targets without the recycled water scheme, dwellings at Green Square would be required to install centralised rainwater tanks connected to both toilet flushing and external use.

## GREEN SQUARE SERVICES SYSTEM





# 1. PROJECT DETAILS

This report documents the water balance analysis of Green Square development in order to inform the delivery of a recycled water scheme.

The Green Square development is a proposed residential development near Alexandria in the local government area of the City of Sydney. Ultimately it will comprise 4,320 apartments on 15 ha and include 156,000 m<sup>2</sup> of retail and commerce/office space and 1.6 ha of public gardens. Analysis in this report outlines the results and performance outcomes for Green Square. This analysis is undertaken based on figures provided by Flow Systems (see Figure 1 and Table 1) using Kinesis's C<sup>CAP</sup> Precinct modelling tool. C<sup>CAP</sup> Precinct is a land use and planning tool that models key environmental, economic, social and infrastructure implications and requirements for precinct-scale development projects.

The report is structured as follows:

- Summary of Outcomes and Benefits
- Water Demands
- Source Water Production
- Recycled Water System Performance
- Project Staging

Land Use	Area
<b>Total Development Area</b>	<b>15 ha</b>
<b>Public Space</b>	
Road area	1.7 ha
Public Gardens	0.8 ha
Public Plazas	0.8 ha
<b>Total public space</b>	<b>5.2 ha</b>
<b>Non-Residential Land Use</b>	
Retail	14,092 m <sup>2</sup>
Commerce/Office	141,668 m <sup>2</sup>
<b>Total non-residential</b>	<b>155,760 m<sup>2</sup></b>
<b>Residential Dwellings</b>	
Apartments	4,320
<b>Total dwellings</b>	<b>4,320</b>

Table 1: Dwelling yield and floor space for the Green Square Precinct.

# GREEN SQUARE MASTER PLAN

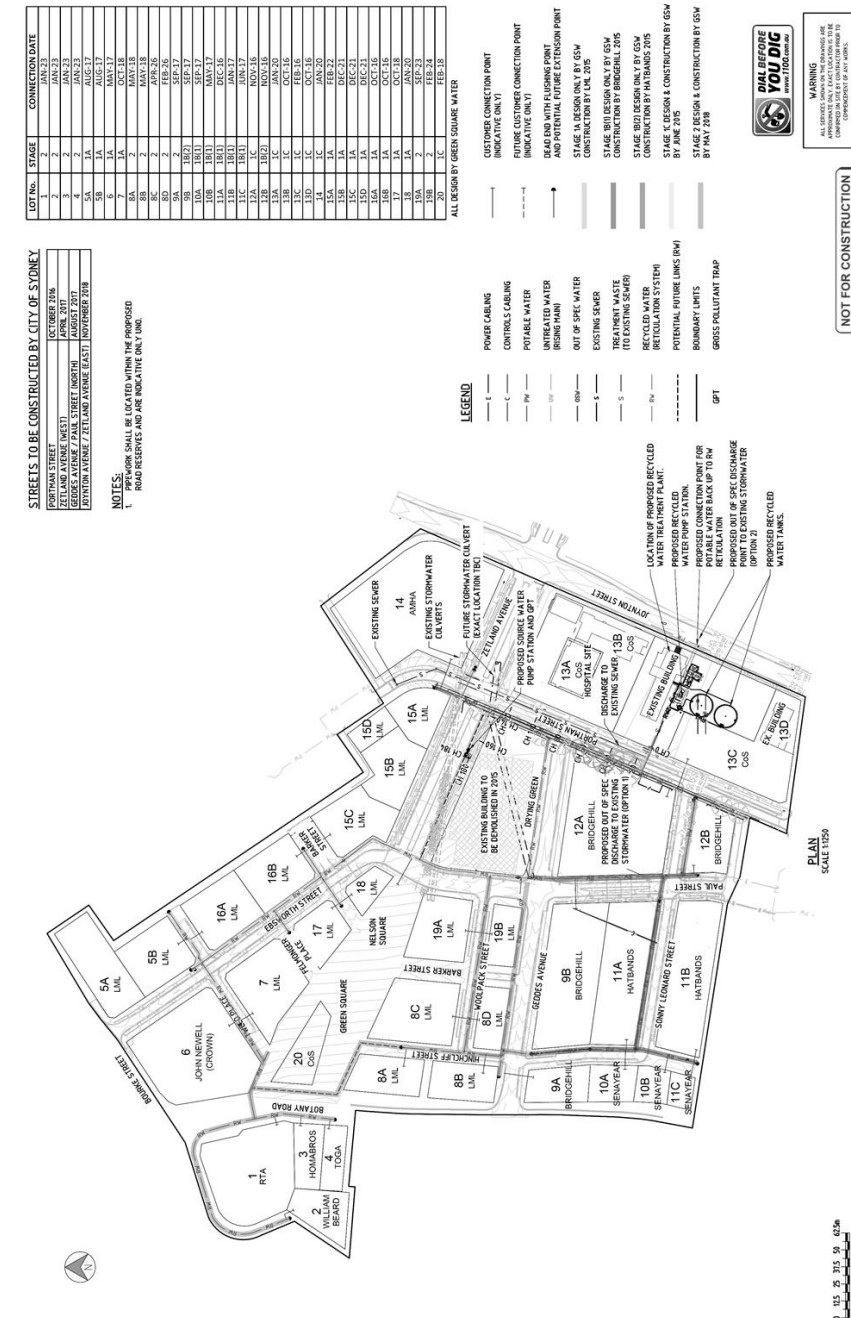


Figure 1: Green Square Master Plan



## 2. WATER DEMANDS

### 2.1 RESIDENTIAL WATER DEMANDS

Residential water demands were calculated based on the specific residential building types proposed for the Green Square development. The details of the dwelling type configuration are outlined in Tables 2 and 3. Monthly total and daily average residential water demands by end use are outlined in Figures 3 and 4. Month to month variation is evident due to changes to irrigation water demands based on rainfall and evaporation profiles. Monthly internal total demands vary slightly due to differences in the number of days per month.

#### APARTMENT DAILY WATER BALANCE

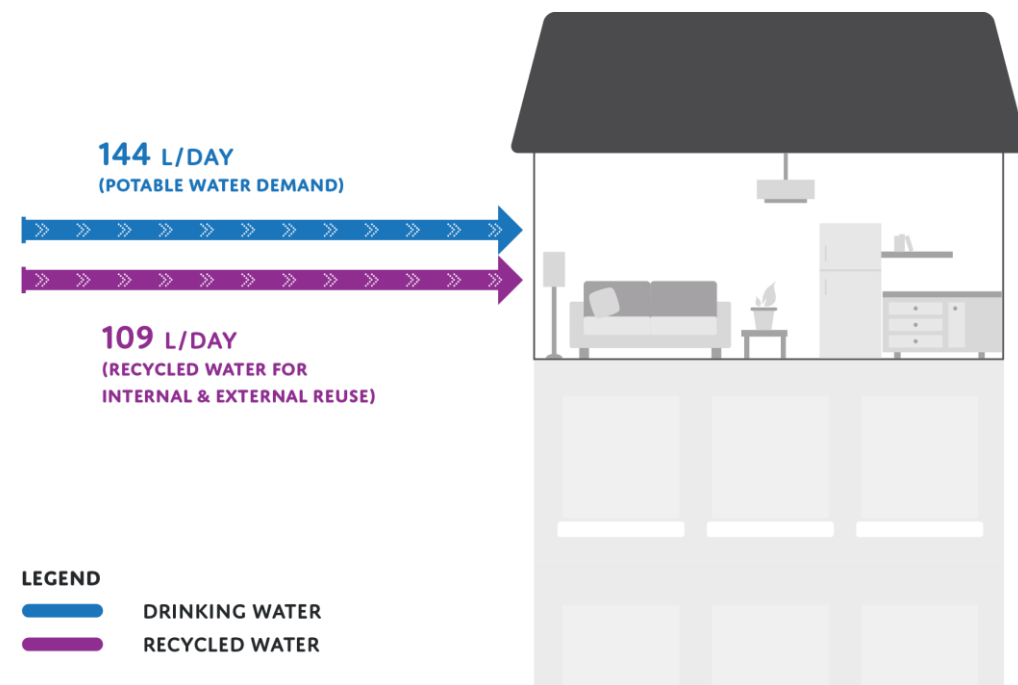


Figure 2: Schematic showing a single apartment's expected daily drinking and recycled water consumption.

**NOTE:** Wastewater is discussed further in Section 3 - Source Water Production.

#### RESIDENTIAL DWELLING SPECIFICATIONS

Dwelling type	Number	Bedrooms	Occupancy	EP
Apartments				
3-bedroom	432	3	2.57	1108
2-bedroom	2160	2	1.99	4300
1-bedroom	1728	1	1.32	2275
<b>TOTAL</b>	<b>4,320</b>	<b>-</b>	<b>-</b>	<b>7,684</b>
<b>AVE. DWELLING</b>		<b>1.7</b>	<b>1.78</b>	

Table 2: Residential dwelling specifications used in the analysis

#### RESIDENTIAL END USE SPECIFICATIONS AND AVERAGE DEMANDS

Water End Use	Technology	Per Person Demand L/day			Development Demand kL/day		
		DW	RW	Total	DW	RW	Total
Shower	4 star WELS	28.5	-	28.5	218.6	-	218.6
Kitchen Sink	5 Star WELS	7.0	-	7.0	54.0	-	20.5
Bathroom Basin	5 Star WELS	1.4	-	1.4	10.7	-	4.0
Dishwasher	2.5 Star WELS	3.0	-	3.0	23.1	-	8.7
Laundry trough	-	5.0	-	5.0	38.4	-	38.4
Bath	-	8.7	-	8.7	66.8	-	66.8
Leaks	-	20.5	-	20.5	157.5	-	157.5
Toilet	4 star WELS	-	17.5	17.5	-	134.7	51.0
Washing Machine	2 star WELS	6.9	39.2	46.1	53.1	301.1	134.1
Fire Test	-	-	0.3	0.3	-	2.6	2.6
Car Washing + External	-	-	4.0	4.0	-	30.7	30.7
<b>TOTAL</b>	<b>-</b>	<b>81.0</b>	<b>61.1</b>	<b>142.0</b>	<b>622.2</b>	<b>469.1</b>	<b>733.0</b>
<b>AVE. DWELLING</b>		<b>144.0</b>	<b>108.6</b>	<b>252.6</b>			

Table 3: Residential dwelling end use specifications and average per person daily demands used in the analysis (DW = Drinking water demand, RW = Recycled water demand)



### TOTAL RESIDENTIAL WATER DEMANDS

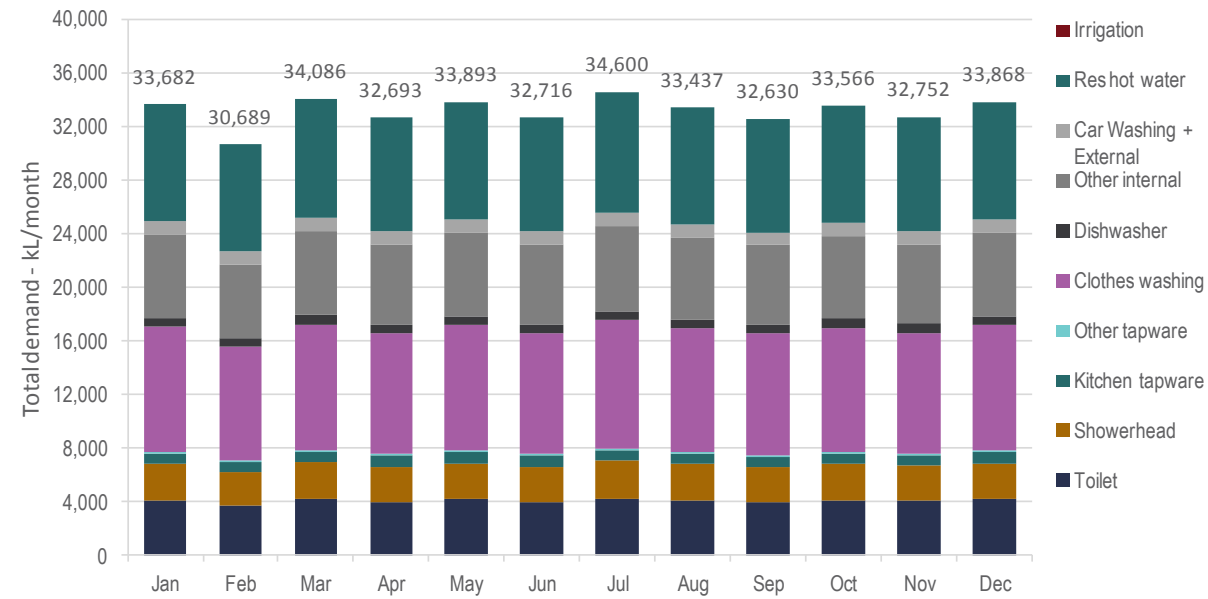


Figure 3: Total residential total water demands by end use, by month

### AVERAGE DAILY RESIDENTIAL WATER DEMANDS

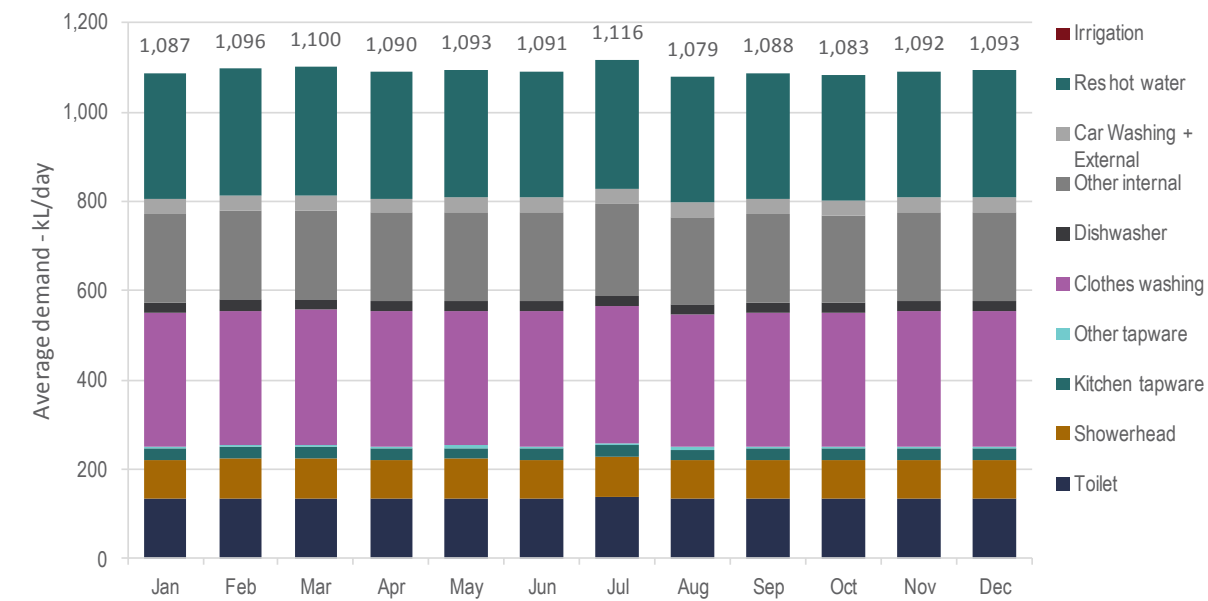


Figure 4: Average daily residential water demands by end use, by month

### TEMPERATURE AND RAINFALL EVAPORATION AT GREEN SQUARE

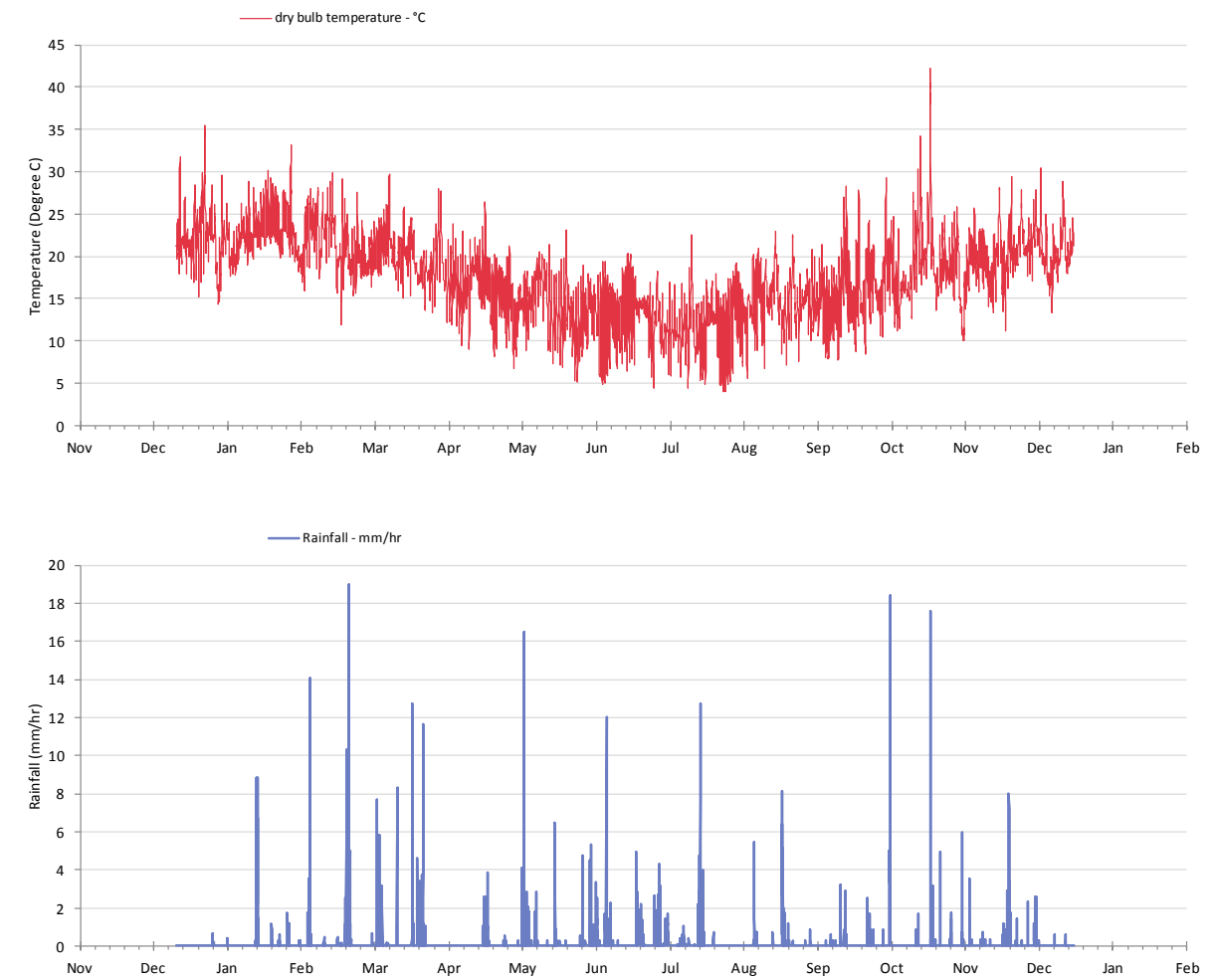


Figure 5: Dry bulb temperature, historic average rainfall and pan evaporation for local climate zone.



## 2.2 NON-RESIDENTIAL WATER DEMANDS

Non-Residential water demand was calculated based on the specific retail, community and open space proposed for the Green Square development.

Details of the building type configuration are outlined in Table 4. Median Practice is assumed to be current average practice and is derived from various sources, including Sydney Water Best Practice Guidelines for water conservation in commercial office buildings and shopping centres (see Appendix).

Monthly total and daily average non-residential water demands by end use are outlined in Figures 6 and 7. Monthly internal total demands vary due to differences in the number of days per month. Month to month variation is only evident in changes to irrigation water demand based on rainfall and evaporation profiles.

### NON-RESIDENTIAL SPECIFICATIONS - TOTAL

Demand Hierarchy	Water End Use	Area (m2)	Per m2 demand L/day			Development Demand kL/day		
			DW	RW	Total	DW	RW	Total
1	Retail	14,000	1.4	0.4	1.8	7.0	1.8	8.8
2	Commerce/Office	142,000	0.5	1.3	1.8	0.0	32.6	32.6
3	Public Plazas	8,000	0.0	0.1	0.1	0.0	0.8	0.8
4	Public Gardens	8,000	0.0	1.5	1.5	0.0	11.6	11.6
5	Other Irrigation	29,000	0.0	1.4	1.4		39.6	39.6
<b>TOTAL</b>						<b>7.0</b>	<b>86.5</b>	<b>93.5</b>

Table 4: Non-Residential specifications and average annual demands used in the analysis

DW = Drinking water demand, RW = Recycled water demand

## TOTAL NON-RESIDENTIAL WATER DEMANDS

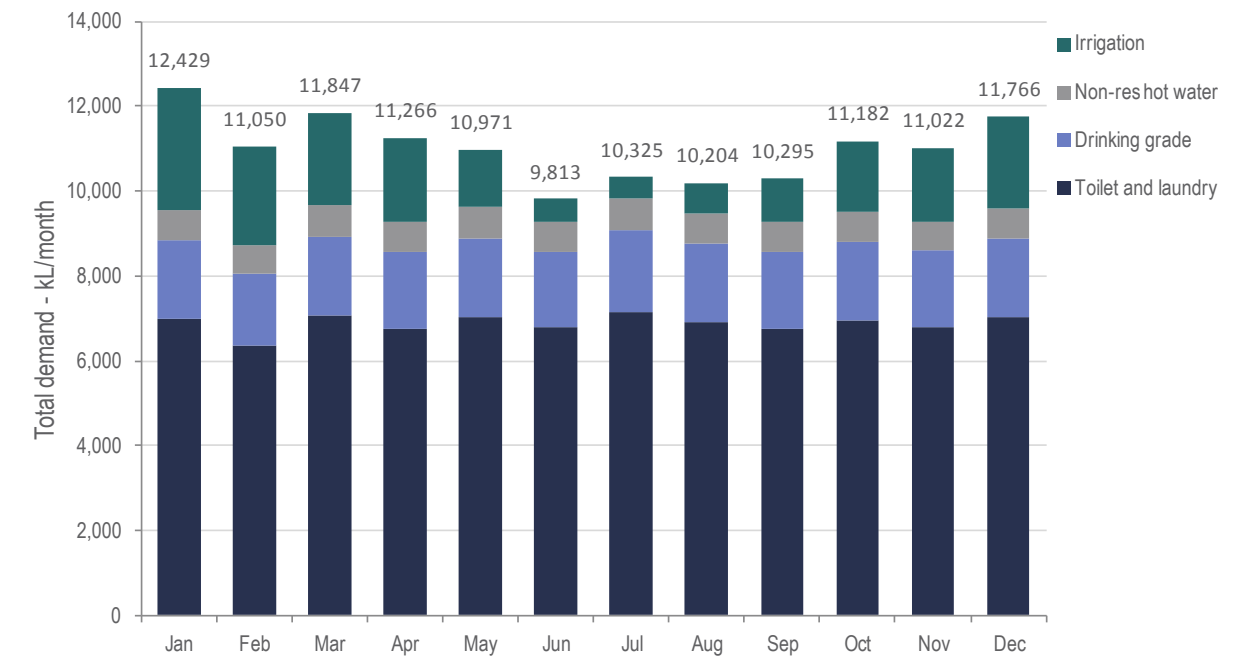


Figure 6: Non-Residential total water demands by end use, by month

## AVERAGE DAILY NON-RESIDENTIAL WATER DEMANDS

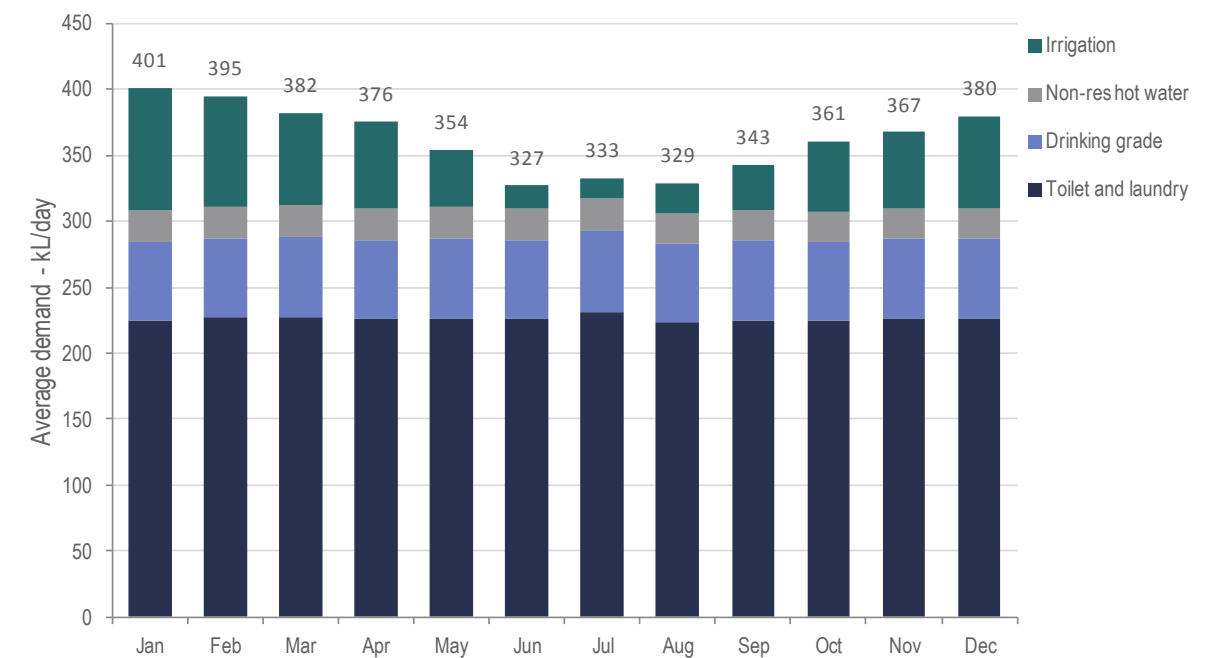


Figure 7: Average daily Non-Residential water demands by end use, by month



### 2.3 TOTAL AND PEAK WATER DEMANDS

Total water consumption, drinking water demand and recycled water demands are outlined in Tables 5 to 7, showing both total and peak demands for each use.

**Total water demands** are outlined in Figures 8 to 10 (monthly totals) and Figures 11 to 13 (daily average), summarising the results of the residential and non-residential demands for both drinking and recycled water demands.

As with the individual residential and non-residential demands, month to month variation is predominantly due to changes in irrigation demands. The irrigation demand analysis takes into account hourly rainfall data and cumulative period since the last rain event and irrigation, to predict the time and water use of the next irrigation event. Predictions are also calibrated against real irrigation data for better alignment and accuracy (See Key Data Sources in Appendix).

**Peak water demand** (kilolitres per hour) for each month is provided in Figure 14. Peak demands for drinking and recycled water are also shown separately in Figures 15 and 16. The peak demand was determined based on the hourly maximum demand for each month, calculated based on the following variables:

- Hourly internal water demands based on a standard hourly internal water demand profile for each end use and building type.
- Hourly irrigation demands based on the irrigation area and local hourly rainfall and evaporation rates.

Due to the fact that internal water demand is relatively consistent over time, in all cases, outdoor irrigation demand is the key contributor towards peak water demands. It should also be noted that peak demands for drinking water and recycled water (Figures 15 and 16) do not necessarily add up to the total peak demand (Figure 14) as the individual peak demands may occur at different times.

#### TOTAL WATER DEMAND PROFILE

FACTOR	RESIDENTIAL	NON-RESIDENTIAL	TOTAL
Average Daily Demand - kL/d	1,092	362	1,454
Peak day - kL/d	1,574	595	2,169
Peak hour – kL/hr	165	61	226

Table 5: Demand profile for the Green Square development

#### DRINKING WATER DEMAND PROFILE

FACTOR	RESIDENTIAL	NON-RESIDENTIAL	TOTAL
Average Daily Demand - kL/d	623	84	706
Peak day - kL/d	898	121	1,018
Peak hour – kL/hr	94	13	107

Table 6: Demand profile for the Green Square development

#### RECYCLED WATER DEMAND PROFILE

FACTOR	RESIDENTIAL	NON-RESIDENTIAL	TOTAL
Average Daily Demand - kL/d	469	278	748
Peak day - kL/d	677	482	1,151
Peak hour – kL/hr	71	48	119

Table 7: Demand profile for the Green Square development

#### TOTAL WATER DEMAND

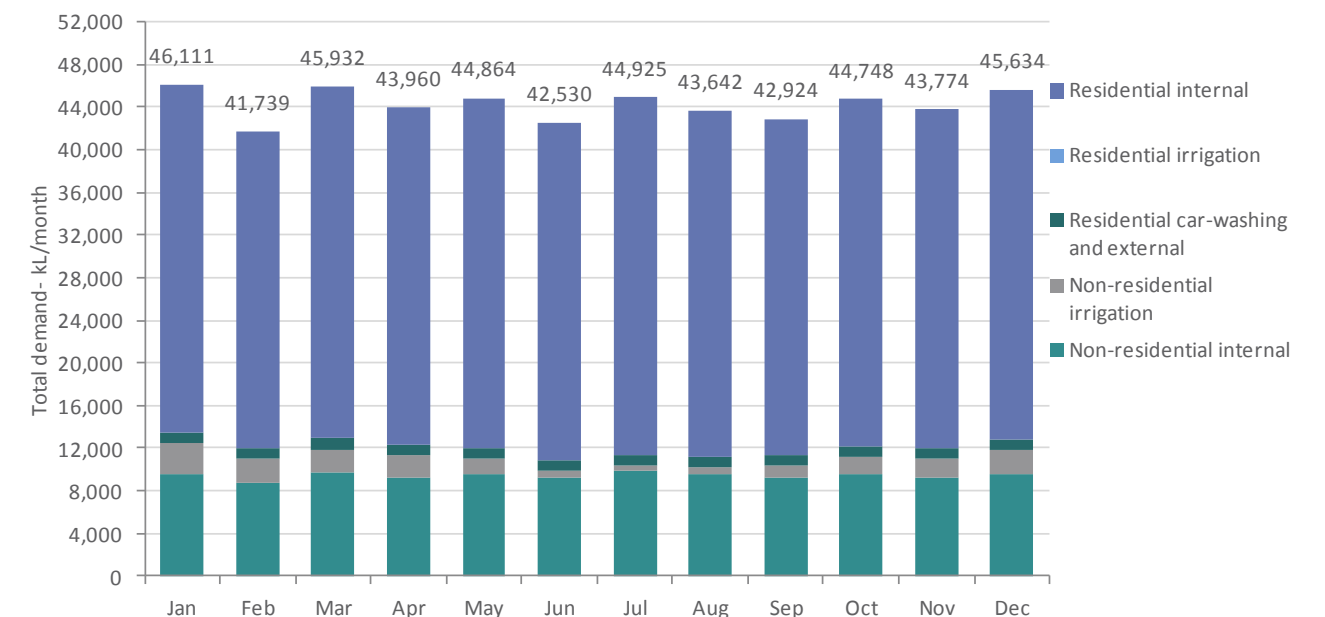


Figure 8: Total water demand by month



### TOTAL DRINKING WATER DEMAND

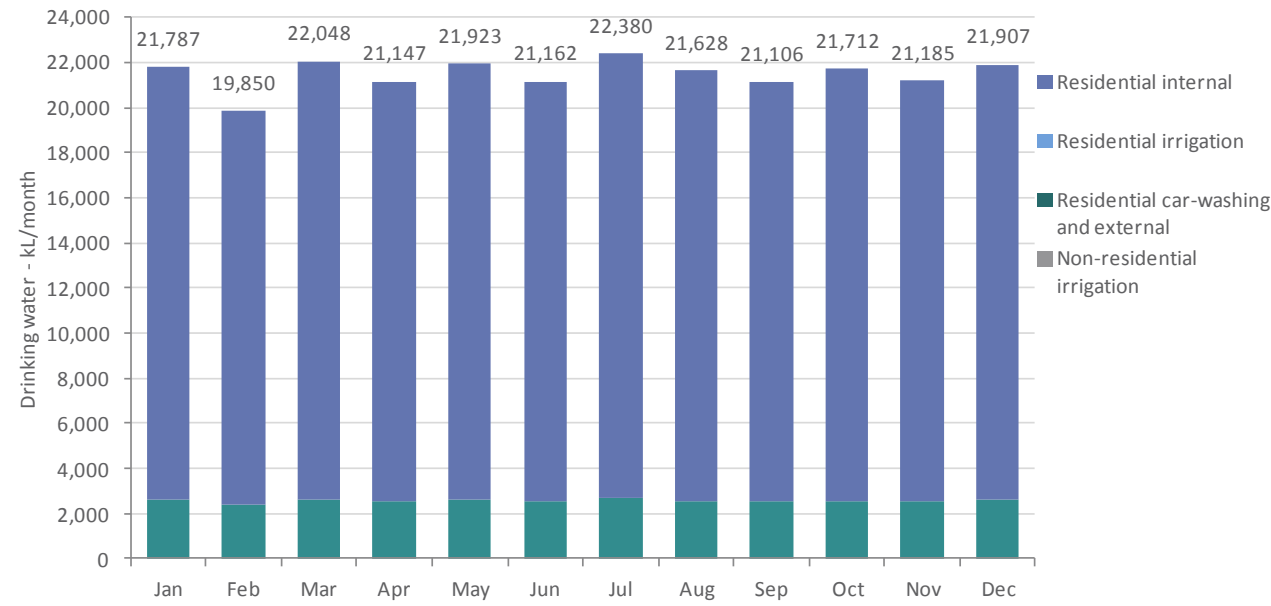


Figure 9: Total drinking water demand by month

### DAILY AVERAGE WATER DEMAND

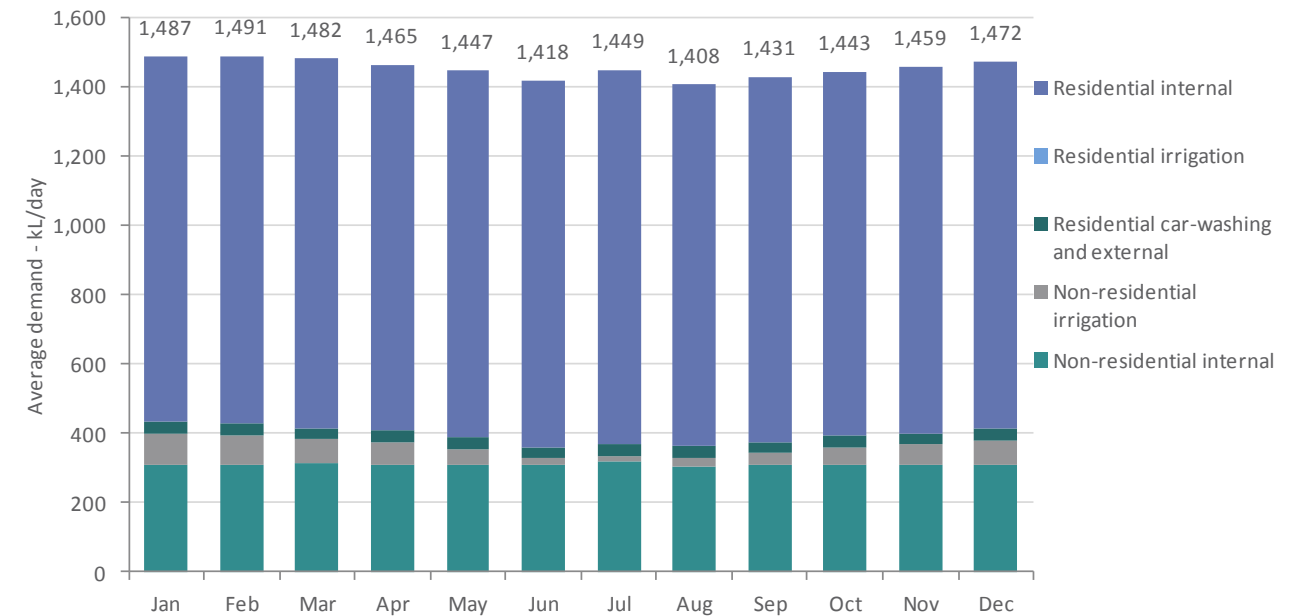


Figure 11: Daily average total water demands by month

### TOTAL RECYCLED WATER DEMAND

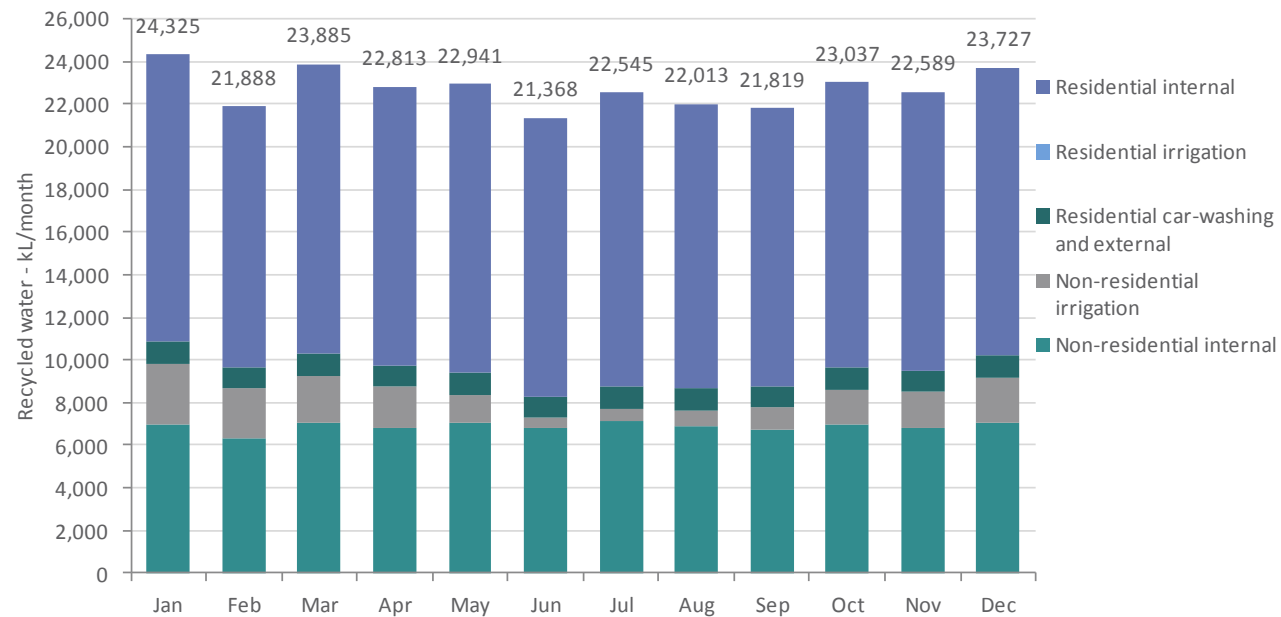


Figure 10: Total recycled water demands by month

### DAILY AVERAGE DRINKING WATER DEMAND

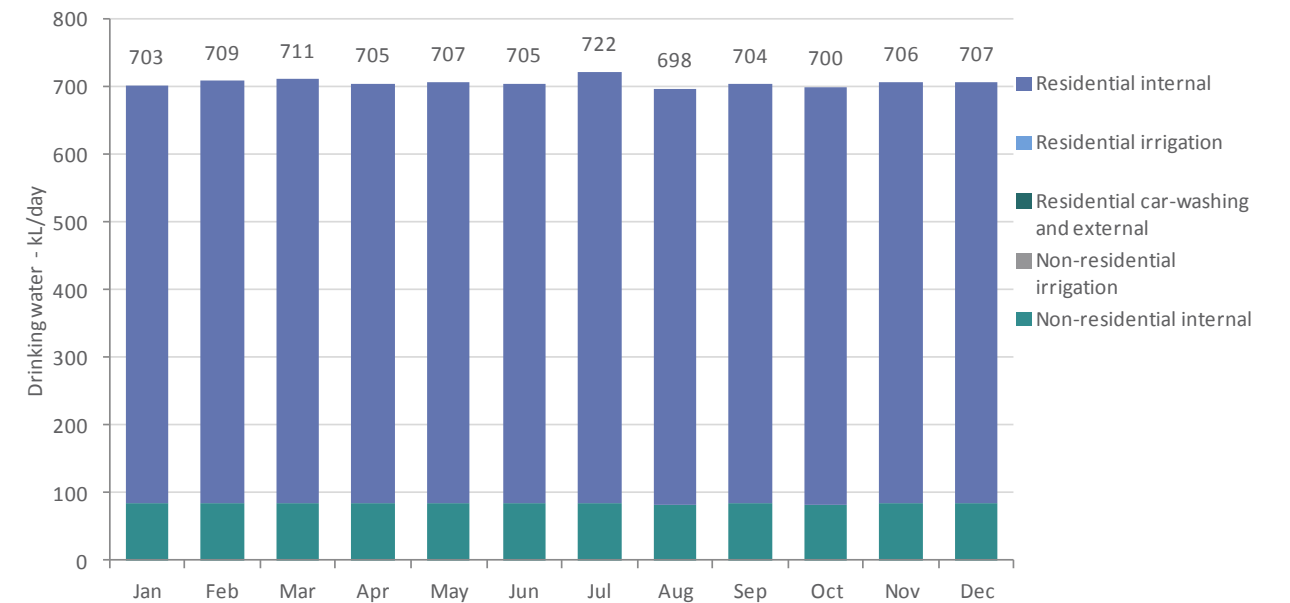


Figure 12: Daily average drinking water demand by month



### DAILY AVERAGE RECYCLED WATER DEMANDS

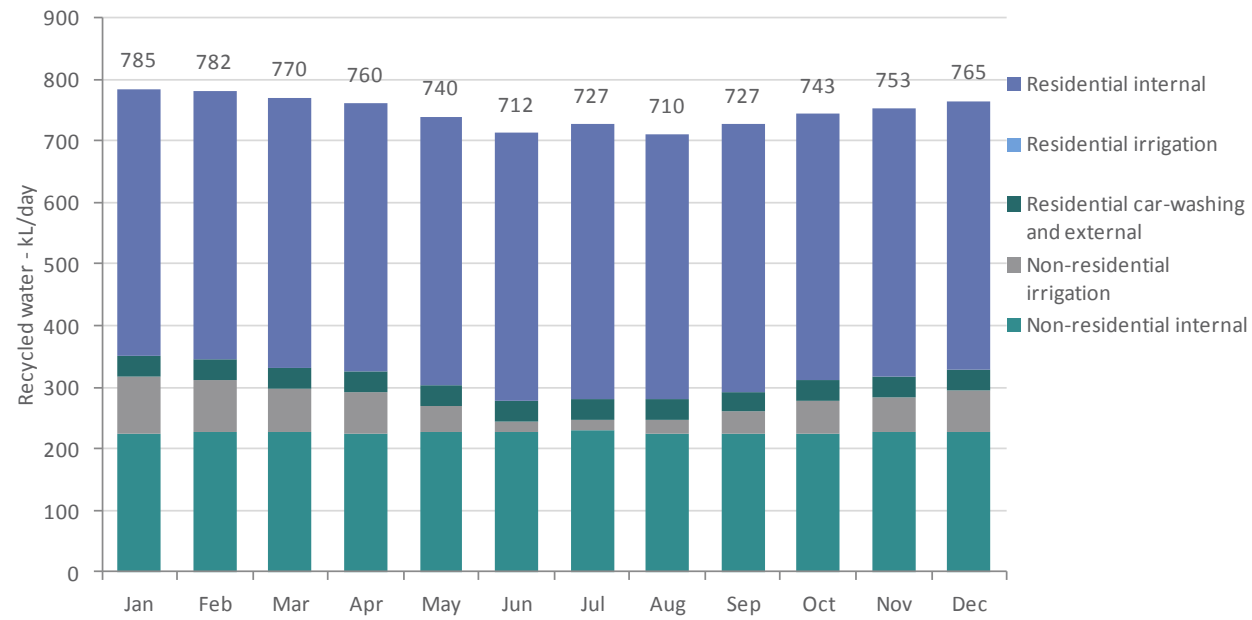


Figure 13: Daily average recycled water demand by month

### PEAK RECYCLED WATER DEMANDS

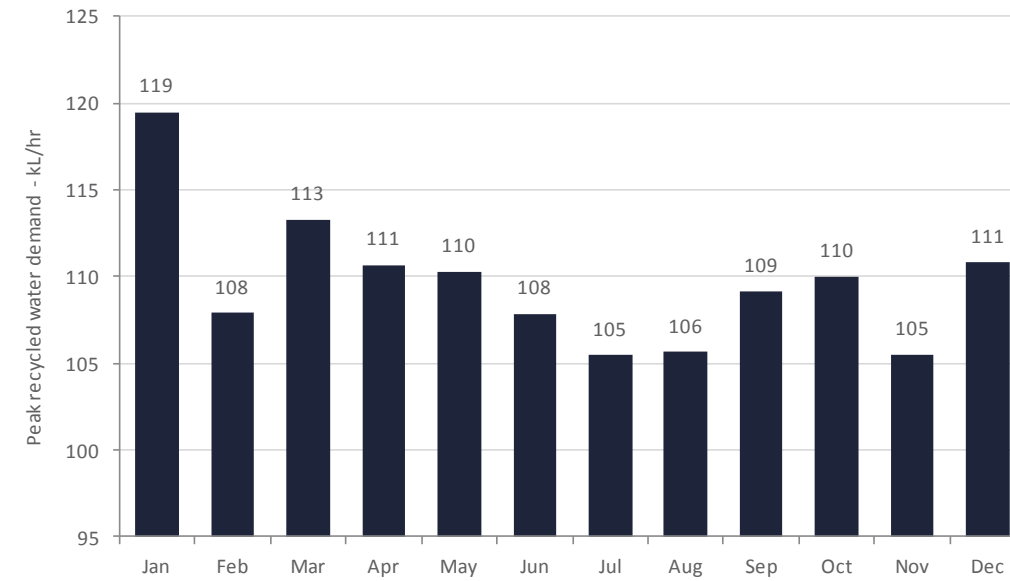


Figure 15: Peak recycled water demands by month

### PEAK TOTAL WATER DEMANDS

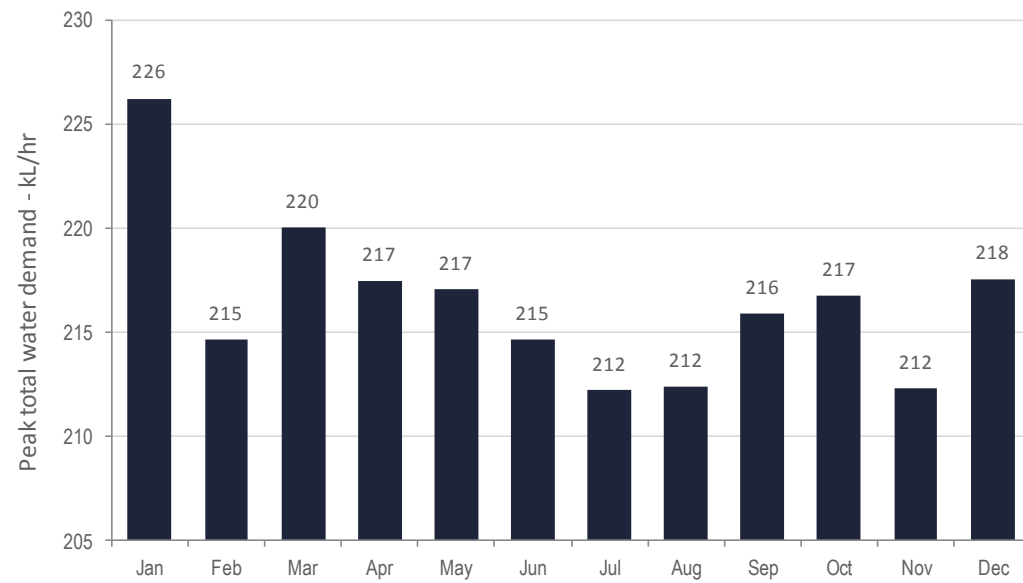


Figure 14: Peak total water demand by month

### PEAK DRINKING WATER DEMANDS

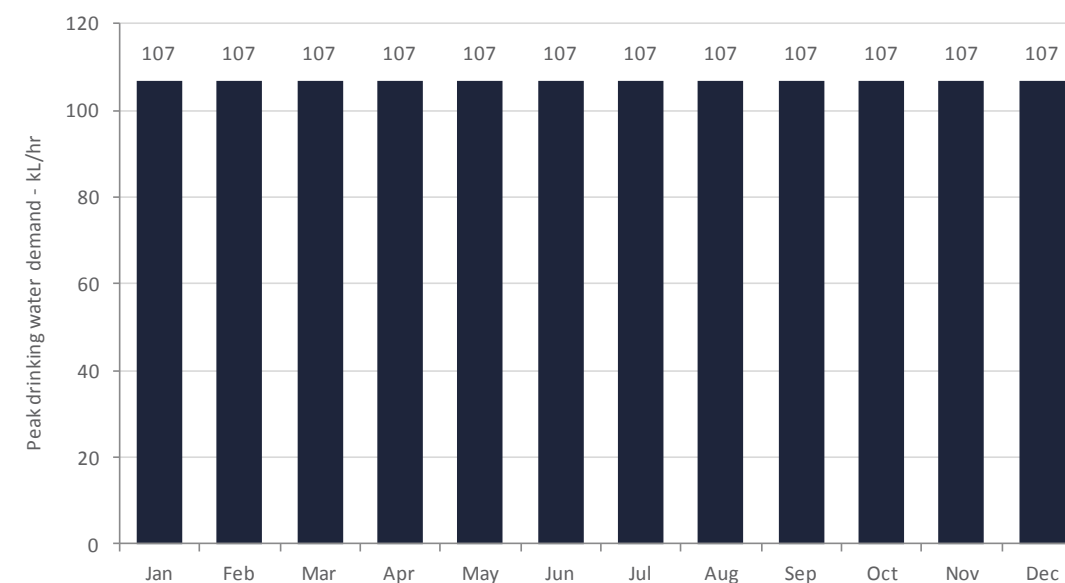


Figure 16: Peak drinking water demand by month

**NOTE:** Peak demands for drinking water and recycled water (Figures 15 and 16) do not necessarily add up to the total peak demand (Figure 14) as the individual peak demands may occur at different times.



### 3. SOURCE WATER PRODUCTION

#### 3.1 SOURCE WATER PRODUCTION

Source water for the recycled water scheme is sourced from two storm water culverts. A continuous flow of 19.3 L/s has been identified as available with high reliability.

Measurements of storm water flow in L/s were made every five minutes for 181 days in February to August of 2014. The frequency and cumulative distribution of flow measurements is shown in Figure 17 and key statistics in Table 8. A flow rate of 19.3 L/s or greater was observed in 99% of measurements.

In general, 19.3 L/s will be more than sufficient to service the recycled water demand of Green Square. Figure 18 shows the total monthly quantities of storm water expected to be harvested.

#### STORM WATER FLOW STATISTICS

Statistics	Value
Number of measurements	44713
Minimum	14.0 L/s
Maximum	9000 L/s
Mean	109.1 L/s
Standard Deviation	448.2
Median	28.1 L/s
Mode	24.7 L/s

Table 8: Key statistical results of storm water monitoring

#### STORM WATER AVAILABILITY

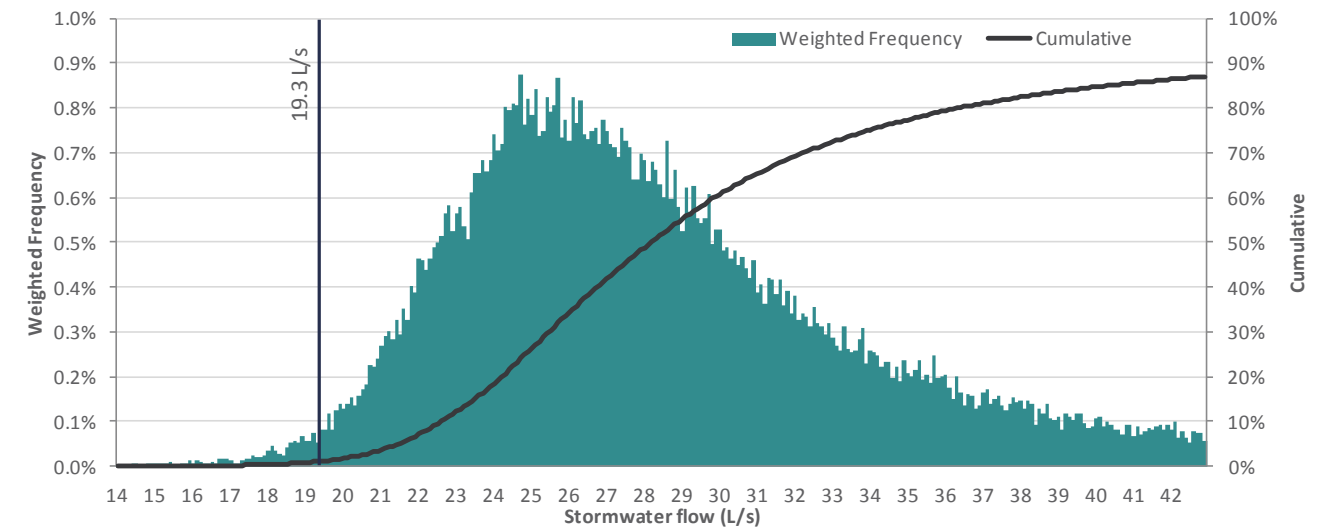


Figure 17: Frequency distribution of storm water availability. The modal flow is 24.7 L/s, and 19.3 L/s or more was available in 99% of measurements.

#### MODELLED STORM WATER HARVEST

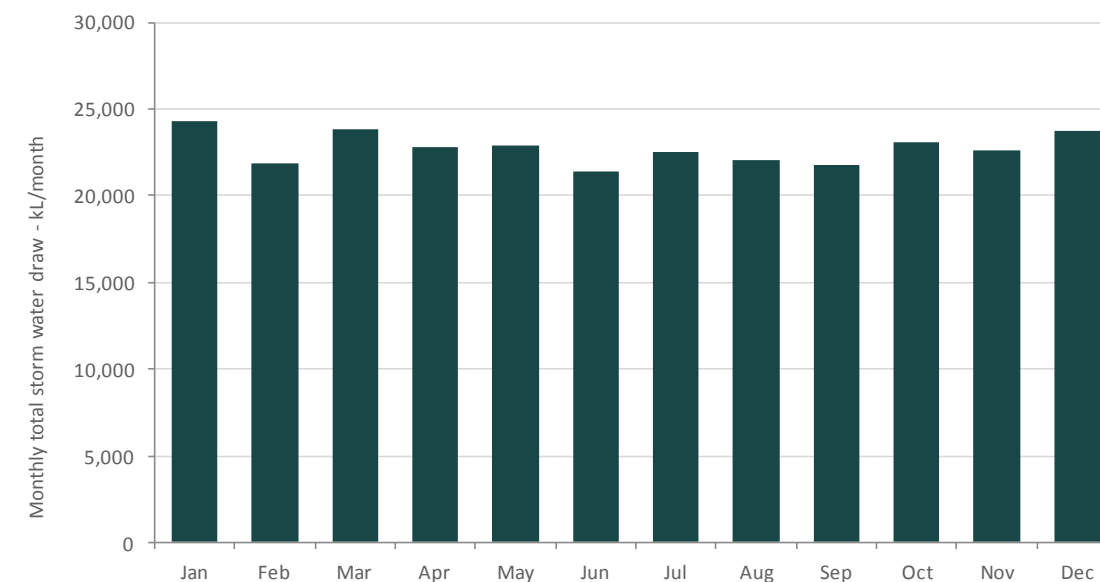


Figure 18: Modelled storm water harvest





### 4. RECYCLED WATER SYSTEM PERFORMANCE

#### 4.1 RECYCLED WATER SYSTEM CONFIGURATION

The recycled water system for Green Square was configured as follows:

- Connection to all dwellings for toilet and washing machine (cold tap)
- Connection to car washing bays in the carpark
- Connection to all non-residential buildings for irrigation and toilet flushing
- Connection to all open space for irrigation
- Storage tank is sized at 1 ML
- Accepted inflow volume is calculated as the sum of end-use demand and missing storage volume, analysed on an hourly basis.
- A 2% volume loss is also considered for the UF treatment process.

#### 4.2 WATER BALANCE

The average daily performance of the recycled water system at full build out of Green Square is in Figure 19 and the key water results are shown in

Water Source	ML per year
Total Precinct Water Demand	531
Recycled Water Demand	273
Recycled Water Demand Met	273
Water Import for Recycled Water Use	0
Drinking Water Demand	258

Table 9: Estimated development average water balance with recycled water system at full build out

##### Water Import for Recycled Water Use

The model shows that, at full build out, no mains water top-up (water import) will be required as daily sewage production will be greater than the daily recycled water demand.

### ANNUAL AVERAGE DAILY FLOWS IN KL/DAY

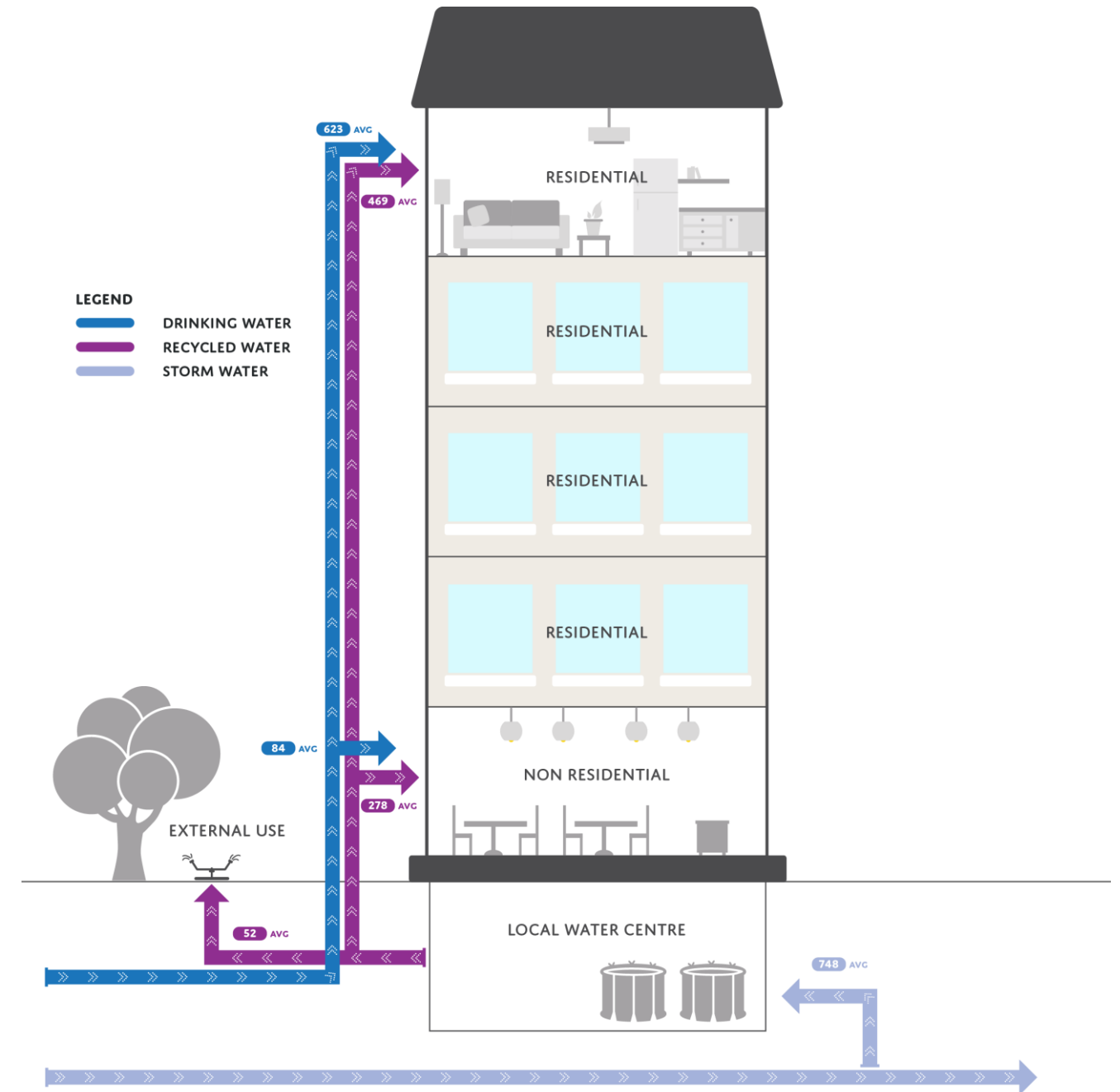


Figure 19: Schematic of the recycled water system showing annual average daily flows in kL/day.

**Note** - The sum of monthly recycled water use and discharge to sewerage does not always equal the total sewage production, due to the hourly analysis run by CCAP Precinct and the storage tank actively accepting and supplying water in order to minimize top-up, e.g. sewage production in excess of the recycled water demand is kept in the flow balance or recycled water is kept in the recycled water storage tanks, for periods where sewage production cannot meet the recycled water demand.



### RECYCLED WATER SYSTEM PERFORMANCE AT FULL BUILD OUT

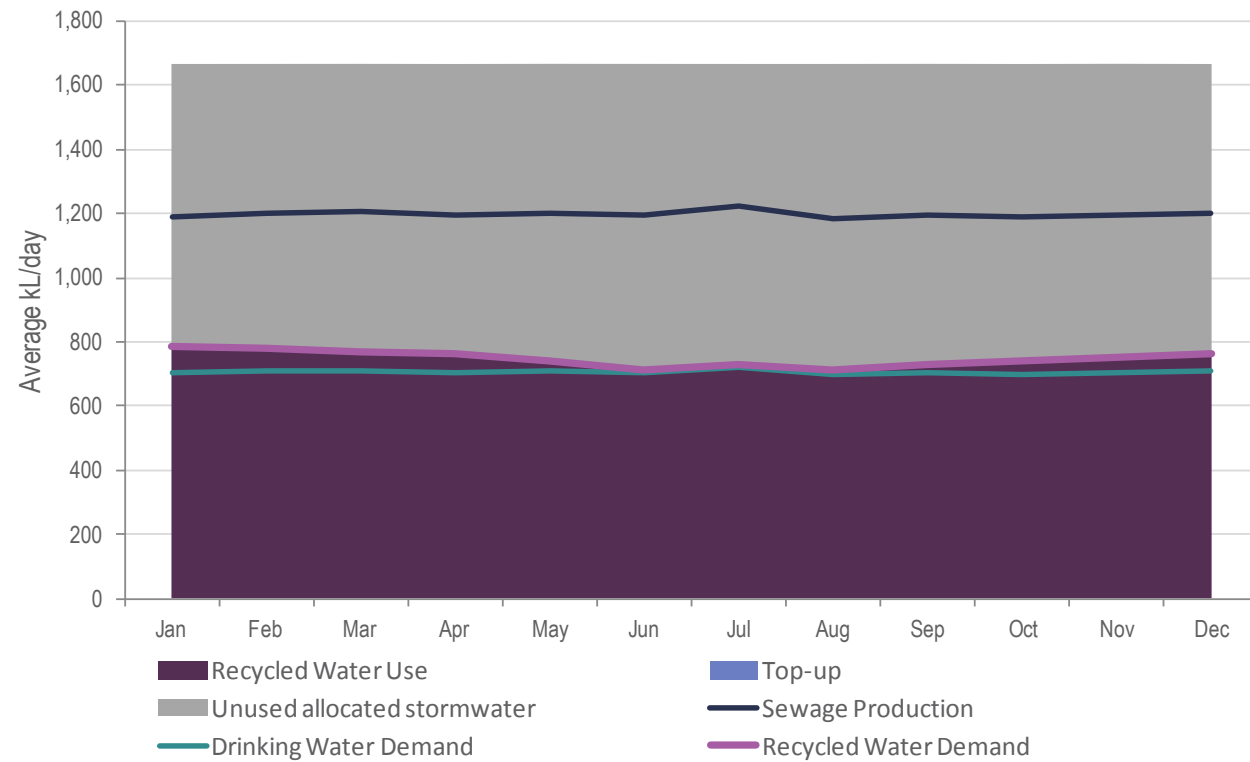


Figure 20: Recycled water system performance showing monthly recycled water use, demand and off-site use

#### Recycled Water System Stored Volume

Figure 21 outlines the hourly recycled water storage volume over the year, reflecting the low variability in both recycled water production and use throughout the year. On average, the daily stored volume in the recycled water system tanks is just below full at about 970 kL.

### RECYCLED WATER STORED VOLUME

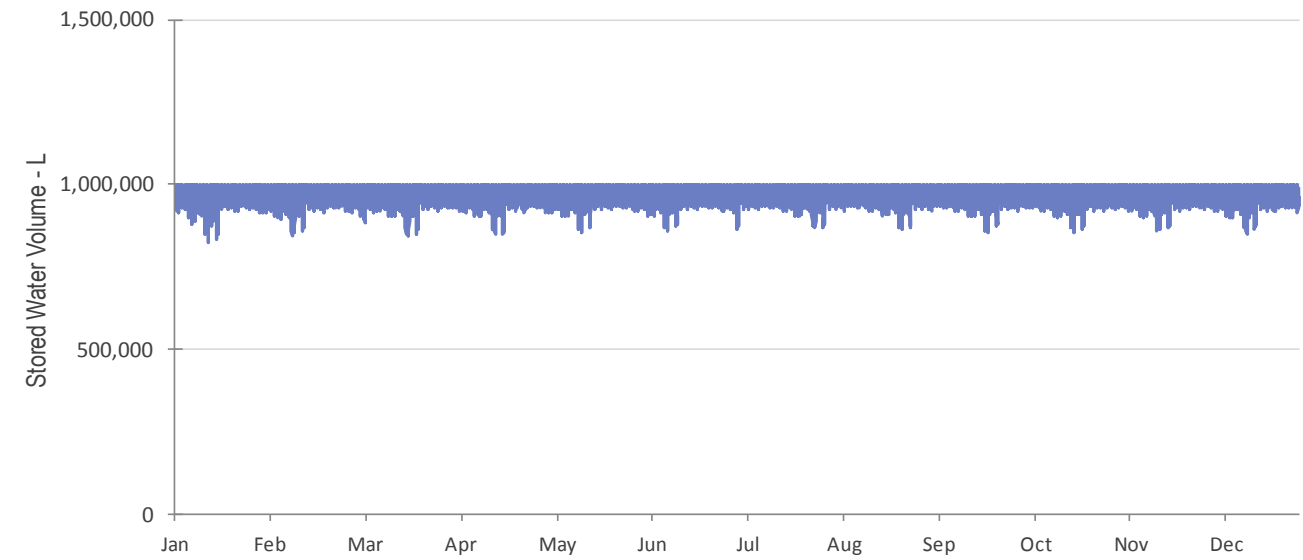


Figure 21: Hourly recycled water stored volume for the recycled water system

### 4.3 BASIX COMPLIANCE

With connection to the recycled water system, residential dwellings at Green Square are estimated to achieve an average **BASIX water score of approximately 65**.



# APPENDIX

## KEY DATA SOURCES

- ACADS-BSG Australian Climatic Data (Reference Meteorological Year, RMY) for hourly temperature, insulation and humidity.
- Bureau of Meteorology local rainfall and evaporation data (station 066037 – SYDNEY AIRPORT AMO, 15 km from development, synthesized RMY), see Figure 25:
  - The weather station is selected to represent the climate zone (NatHERS zone 56) of the project.
  - The RMY (Representative Meteorological Year) is synthesized from a composite of 12 typical meteorological months that best represent the historic average of the specified location using post-1986 data in addition to the earlier weather data for each of the 69 climate zones in Australia. The total rainfall and evaporation for this climate zone is:
    - Annual rainfall (mm) – 1,012
    - Annual evaporation (mm) – 1,810
- Department of Resources, Energy and Tourism, 2010, Energy in Australia – 2010, ABARE, Canberra
- Kinesis 2014, Additional water end use breakdowns derived from first principle analysis of residential and non-residential building types.
- National Water Commission, 2011, National performance report 2009-2010: urban water utilities, National Water Commission, Canberra
- NSW Department of Planning, BASIX Residential Water Consumption Data (2010)
- Sydney Water Best Practice Guidelines for water conservation in commercial office buildings and shopping centres (2007), [http://www.sydneywater.com.au/web/groups/publicwebcontent/documents/document/zgrf/mdu0/~edisp/dd\\_054580.pdf](http://www.sydneywater.com.au/web/groups/publicwebcontent/documents/document/zgrf/mdu0/~edisp/dd_054580.pdf)
- Sydney Water Best Practice Guidelines for holistic open space turf management (2011), [https://www.sydneywater.com.au/web/groups/publicwebcontent/documents/document/zgrf/mdq1/~edisp/dd\\_045253.pdf](https://www.sydneywater.com.au/web/groups/publicwebcontent/documents/document/zgrf/mdq1/~edisp/dd_045253.pdf)
- Flow 2015, Storm water flow monitoring at Green Square. Data provided to Kinesis for analysis by Flow. Unpublished.

# CERTIFICATE OF APPROVAL

No. 005-98285-S

This is to certify that the Occupational Health & Safety Management System at

Flow Systems Pty Ltd

of

Level 40, 259 George Street, Sydney, NSW 2000

Has been examined by assessors of QMS Certification Services and found to be conforming to the requirements of:

AS/NZS 4801:2001  
OH&S Management Systems

In respect of the following activities:

Design, construction, operation, maintenance and retail supply of drinking water, waste water and recycled water services

This certificate is valid from: 10/08/2018 to 10/08/2021  
Original certification date: 03/09/2015



Gerry Bonner, CEng, BEng, FIE Aust, Chairman – QMSCS Pty Ltd  
Approval: QMSCS Pty Ltd Trading as QMS Certification Services  
To verify the validity of this certificate please visit [www.jas-anz.org/register](http://www.jas-anz.org/register)

Occupational Health & Safety Management System



QMSCS Pty Ltd  
Trading as QMS Certification Services  
Suite 404, Level 2 - 161 King St,  
Newcastle NSW 2300 Australia



Accreditation Number 03910907AL

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No. 005-98285-S

Schedule of Certified Locations

## Flow Systems Pty Ltd

Level 40, 259 George Street, Sydney, NSW 2000  
Discovery Point Local Water Centre, Suite 19, 5 Brodie Spark Drive,  
Wolli Creek, NSW 2205  
Pitt Town Local Water Centre, 83 Bootles Lane, Pitt Town, NSW 2756  
Central Park, 80 Broadway, Chippendale, NSW 2008  
Green Square Local Water Centre, 3 Joynton Avenue, Zetland, NSW  
2017  
Cooranbong Local Water Centre, 617 Freemans Drive, Cooranbong,  
NSW 2265  
Huntlee Local Water Centre, 1794 Wine Country Drive, North  
Rothbury, NSW 2335  
Melbourne Office, Unit 18, 828 High Street, Kew East, VIC 3102  
Box Hill, Lot 10 Red Gables Rd., Box Hill, NSW 2675  
Shepherd's Bay, Street Address to be provided, Meadowbank NSW  
2114

Occupational Health & Safety Management System



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Newcastle NSW 2300 Australia



Accreditation Number 03910907AL

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Original certification date: 03/09/2015



Gerry Bonner, CPEng, BEng, FIE Aust, Chairman – QMSCS Pty Ltd  
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Environmental Management System

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Rothbury, NSW 2335  
Box Hill, Lot 10 Red Gables Rd., Box Hill, NSW 2675  
Shepherd's Bay, 10 Nancarrow Ave, Ryde, NSW 2112

Environmental Management System



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