

# City of Karratha Water Efficiency Action Plan



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## 1. Introduction

Water is recognised as a vital, yet increasingly scarce resource in the Pilbara region of Western Australia. Water is a major feature not only of the natural environment, in terms of our rivers, oceans and floodplains but also of our culture and our economy. As such, the management of water related issues is fundamentally important to our community as a whole. The City of Karratha also recognises that as large consumers of water it has a responsibility to show leadership by utilising water within the community in a sustainable and efficient manner.

The City of Karratha has embraced this challenge through participation in the Water Corporation's Waterwise Council Program. The development of this Water Efficiency Management Plan is a subset of many initiatives aimed at furthering the City's overall vision of creating a vibrant and sustainable community. This Plan details specific management actions that the City of Karratha is committed to implementing in order to achieve its objectives in relation to water conservation.

### 1.1 Objectives

The objectives of the City of Karratha Water Efficiency Action Plan (CofK WEAP) are to:

- Assess current water use across council operations and the community;
- Identify inefficiencies and potential water savings;
- Set goals and benchmarks to improve water use;
- Prepare an action plan and implement water efficiency actions to progress towards goals; and
- Provide a process for annual reporting on implementation of water efficiency actions.

### 1.2 Background

The City of Karratha, with a total land area of 15,882 square kilometres, is located in the dynamic Pilbara region of Western Australia 1,535 kilometres north of Perth, bounded by the Indian Ocean in the North and West, the Town of Port Hedland in the East, and the Shire of Ashburton in the South. Settlement is largely confined to a string of towns along the coastal strip and the North West Coastal Highway, namely Dampier, Karratha, Roebourne, Wickham and Point Samson, along with a small number of Aboriginal communities.

The region's residents are employed in a variety of industries primarily related to iron ore mining and natural gas production, as well salt production, commercial fishing, and cattle and sheep grazing. The City also has a strong tourism industry that attracts up to 425,000 visitors annually.

The City has a current population of approximately 25,000 with planned growth and capacity to accommodate 38,000 by 2035 (Forecast. id). The speed and scale of growth depends in large measure on the extent to which the economy diversifies around its very strong base in the minerals and energy sector.

**Table 1: Population Projections by Settlement Area - Medium Growth Scenario**

Year	2011	2016	2021	2026	2031
Karratha District	16,944	20,790	24,500	27,451	30,120
Dampier	1,310	1,334	1,340	1,355	1,363
Wickham - Point Samson	2,336	3,004	3,128	3,332	3,347
Roebourne / City Remainder	2,979	3,224	3,237	3,266	3,291
City Total	23,619	28,351	32,204	35,405	38,121

Based on Valuer General's Office data and the 2011 ABS Census, the City has an existing dwelling stock of approximately 8,000, with approximately 79% of this located in Karratha. 80% of the occupied dwelling stock consisted of three or four bedroom dwellings in 2011.

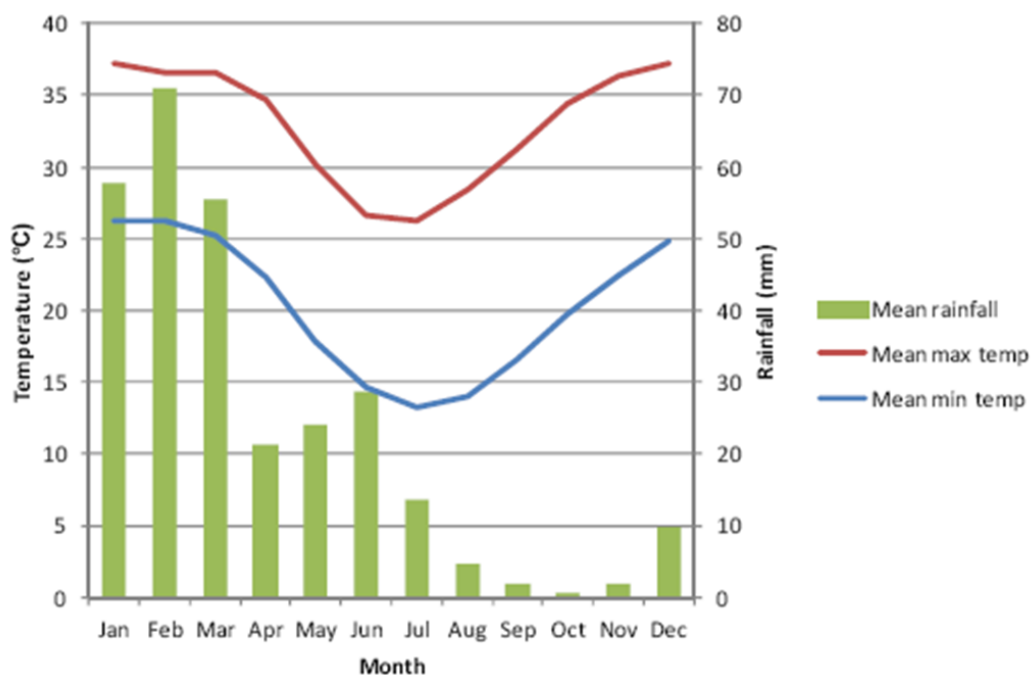
### 1.3 Climate

The City of Karratha has a tropical climate along the coastal areas, transitioning to an arid climate throughout the central and eastern parts.

An average climate profile for the City appears below. Results indicate the hottest months occur between October and April, a period which experiences average maximum temperatures ranging from 35°C-37°C. Temperatures between May and September are milder, with average maximum temperatures ranging from 26-31°C. The City experiences cooler nights between May and September, with minimum temperatures ranging from 13–18°C. Diurnal temperature range increases with increasing distance from the sea. This results in more extreme maximum and minimum temperatures at inland locations.

Coastal areas receive higher rainfall, in comparison to the more arid desert areas in the central east of the Pilbara region. Rainfall is generally low (270-400mm) variable and over 50% of rainfall received is from cyclonic events during summer. The Pilbara coastline (Broome to Exmouth) receives tropical cyclones with a frequency and severity higher than anywhere else in Australia, with an average of two tropical cyclones crossing the Pilbara coastline each year.

The City experiences long dry periods and overall the region experiences the highest annual evaporation rate in Australia (Van Vreeswyk et al 2004, Essential Environmental 2013), which has implications amongst other things for water resources.



**Table 2: Climatic ranges in the City of Karratha**

## 2. Summary of water sources

The City of Karratha, including all of its major settlements, rely on the West Pilbara Water Supply Scheme (WPWSS) which sources surface water from the Harding Dam (approximately 40km inland) and groundwater from the Millstream Wellfield (approximately 100km inland). These two sources operate together throughout the year, while water from Harding Dam is used as the preferential source when availability and quality allow.



**Figure 1: Harding Dam.**

In June 2010 the Water Corporation advised that the WPWSS was under extreme pressure to supply sufficient water to towns and industry, placing supply security under a high level of risk. Currently around 3 gigalitres of spare source capacity exists in the Harding Dam and Millstream groundwater sources. Assuming the current growth rate (about 300 - 500 services or 1000 people per year) continues, the Water Corporation believe that this will be sufficient for another 10-15 years of growth. In response, the water source was augmented through a \$330M investment by Rio Tinto which extract water from the Bungaroo Valley borefield, transferring it into the existing water supply scheme. Water from these sources is treated and then transferred by large trunk mains to the storage tanks at the various townsites.

In 2011 and 2012, the Water Corporation reviewed its long-term water planning for the West Pilbara WSS and for the Karratha scheme, based on a planning horizon of 2040. The long term plan identified the need and approximate timing of various upgrades and expansions to meet anticipated demands. Options for upgrade included a combination of improved water efficiency and recycling, and expansion of existing sources and new water sources, such as the West Canning Basin. The Water Corporation will continue to monitor growth and then make decisions accordingly.

## 3. Existing water efficiency programs

Ongoing improvements in water efficiency and recycling are important as they can help delay large investment in new water sources. Significant gains have been made over the past decade, for example Rio Tinto has reduced water used at the Dampier port by almost 30 per cent. The Water Corporation has also implemented programs expected to save 3.4 GL/yr across the Pilbara and will continue to identify and implement further improvements.

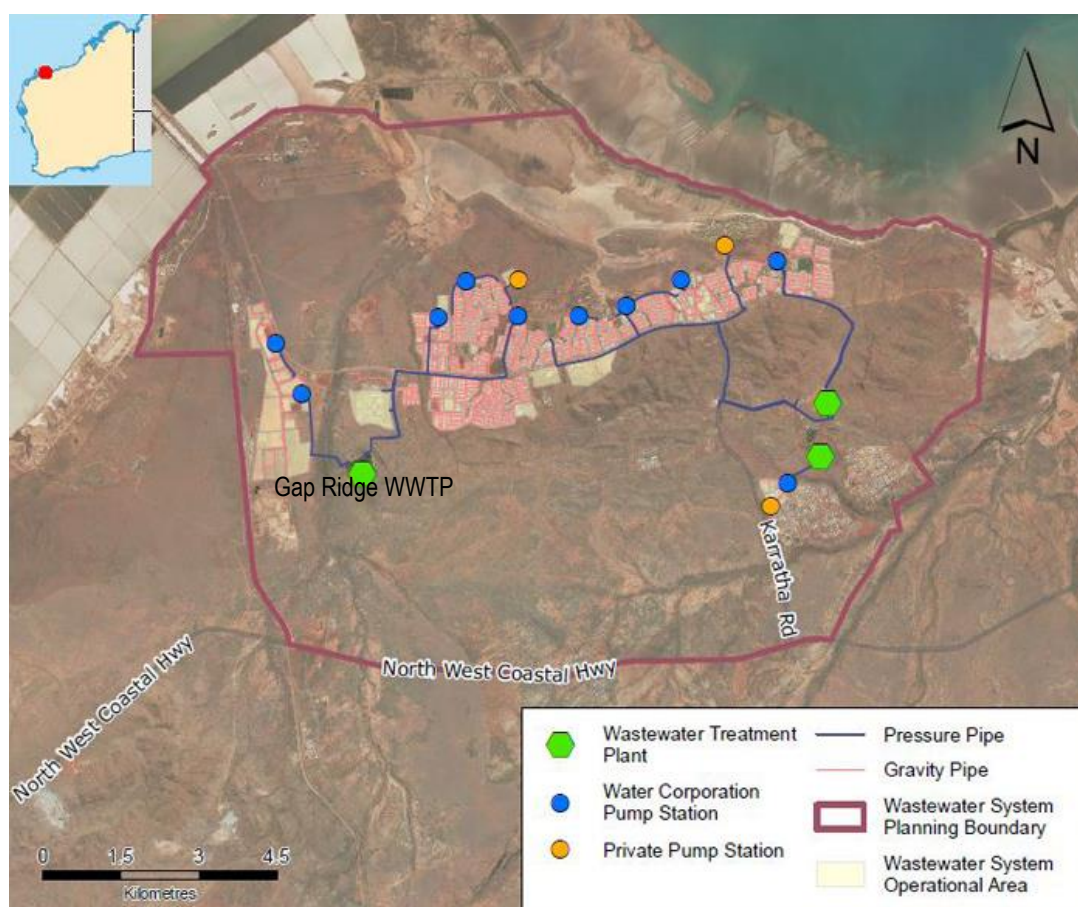
Currently, the No 1. Karratha Waste Water Treatment Plant (WWTP) has a wastewater recycling capacity of 2.19 GL/year of 'High Risk' water and 1.28 GL/year of 'Low Risk'. Water of a 'High Risk' end use standard, involves the use of membrane treatment, UV and chlorine disinfection to produce recycled water of a quality that can be used for irrigation at any time of day and with no need for regulatory signage. 'Low Risk' water must be used only at night time, must be fenced and appropriately signposted.

Although the Karratha WWTP has the capacity to produce 2.19 GL/year, current flows are circa 0.98 GL/year, meaning that at present the volume of recycled water available for reuse application is constrained by population growth. The City is currently building infrastructure for an expanded Effluent Reuse Scheme (see below), which although bound by population growth, will enable the City to recycle a vast amount of waste water.

## 4. Existing City of Karratha Water Efficiency Programs.

### 4.1 The Effluent Reuse Scheme

The City of Karratha's Wastewater Network is a large-scale water distribution system that supplies treated recycled water sourced from the Water Corporation's wastewater treatment plants (WWTPs) to a number of grassed open space areas within the City of Karratha. Currently there are 13 wastewater pump stations, including three private pump stations and three waste water treatment plants (see figure 2 below). The number of waste water treatment plants in the City will be consolidated through the closing of the 'Gap Ridge WWTP', and an upgrade of facilities at the other WWTP's.



**Figure 2: Current City of Karratha Wastewater Network**

The City of Karratha, in association with the Water Corporation, LandCorp and Pindan, are in the process upgrading the existing network to provide an improved and sustainable recycled water supply to all existing and future planned open green spaces throughout Karratha. The Wastewater Network Upgrade will have improved capacity and functionality to supply treated water on a prioritised basis to each open space area which will ensure effective and sustainable use and management of this valuable resource. The City of Karratha will have ownership of the new infrastructure and be responsible for its ongoing operation and maintenance.



The next stages of the project will see pump stations at Cattrall Park, Millars Well Oval, Tambrey Oval, Brogla Park and the City Centre. More than 9 kilometres of new pipeline will be laid linking the new pump stations with the supply of high quality treated water. The final stages of the project (to be completed mid 2016) will involve a \$5.7 million pipeline and pump station on Bathgate and Balmoral roads.

Currently eleven sites across the City are entirely irrigated with treated effluent, significantly reducing the demand on potable water use. These sites have been prioritised according to irrigation needs, however; dependent upon volumes of treated effluent (which in turn is dependant on increasing population numbers) additional sites have been identified as next in line to be irrigated via the ERS. The City has real time monitoring programs that provides ongoing information on treated effluent volumes. As such, new areas can be placed on the ERS in a timely and efficient manner. This project also incorporates the introduction of intelligent irrigation technology which is able to respond to tank water levels and irrigate spaces on a priority basis, so parks and ovals that require regular irrigation still receive water when supply levels are low.

#### 4.3 Grey Water Use at the City of Karratha Airport

In addition to recycling of waste water for irrigation purposes the City also uses recycled waste water at the airport for irrigation, urinals and toilets. In 2012, the City commissioned the upgrade of the Airport Hydraulic System which included a gravity and pressurised sewer system that delivers all waste to a treatment plant. This waste water treatment plant is capable of treating and producing 200kL of recycled water per day. Additionally, as part of the project Over 10 kilometres of reticulation infrastructure to be used for recycled water has been installed into feature gardens. This recycled water will also be fed into the newly refurbished terminal to service toilets, urinals and car rental companies for car washing purposes. Water will also be diverted to two 144kL tanks for the Airports fire hydrant system. Since the inception of this program the City has seen a 50% improvement in water efficiency at the Karratha Airport and as a result received platinum recognition under the Water Corporation's Water Efficiency Management Program (WEMP).

It is important to note, that the although airport accounts for approximately 10% of the City's water use, a third of that water use is consumed by the airport tenancy's. The WEAP addresses only the water consumption directly attributed to the City.

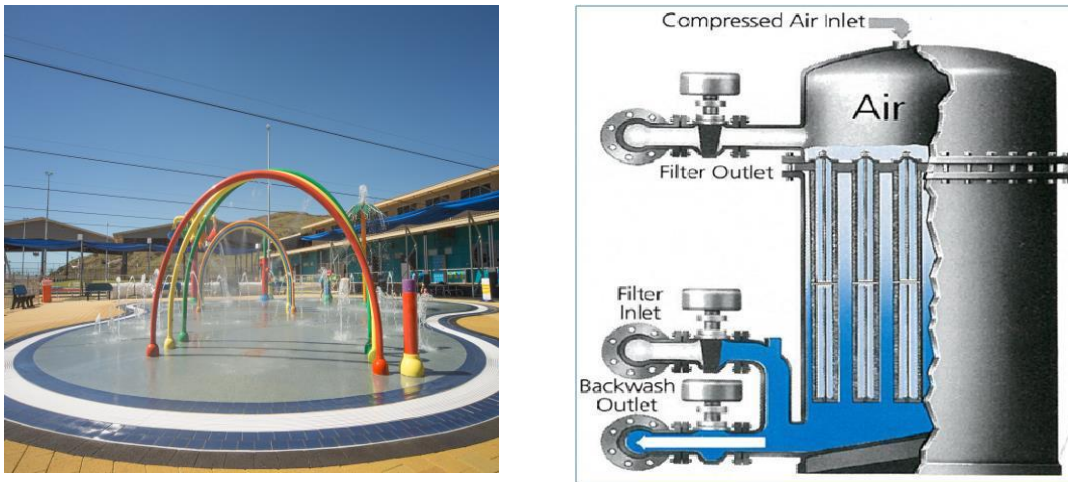


Figure 3: City of Karratha Airport

#### 4.4 Water Efficiency at the Karratha Leisureplex

The City of Karratha Leisureplex (KLP) is subject to the Water Corporations Water Efficiency Management Plan (WEMP) program. Under this program as a business that uses more than 20,000kL of water annually, the KLP is required to devise a plan that audits current water

use, devises programs that reduce water consumption and monitors and reports on the use of water annually. Since the inception of the KLP's WEMP program in 2013, a number of water efficiency actions have been undertaken. Most notably, the City installed a Backwash Recycling System (BRS). Pool back wash (water that is used to flush out contaminants by reversing the flow through swimming pool filters) prior to the installation of the BRS accounted for 30% of the centres scheme water use. The BRS uses backwash from the 50m pool and splash pad to irrigate the centres public open space and wash out effluent tanks.



**Figure 4: KLP Splash Pad and Example of a Backwash Filtering System.**

The KLP also undertakes the following additional water savings measures:

- Timed water taps and showers;
- Pool blankets to reduce water loss from evaporation;
- Leak detection processes for daily inspections; and
- Commitment to join the Waterwise Aquatic Centre Program, which aids with wider water conservation education of the community.

#### **4.5 Additional City of Karratha water Efficiency Programs.**

Several other efficiency projects are currently underway in the City including non-residential irrigation audits and retrofits, urinal audits and upgrades and the installation of Water Corporation Smart meters on all water meters across West Pilbara towns (excluding Dampier). Selected suburbs of Baynton, Baynton West, Millars Well and Bulgarra will also have access to hour-by-hour water use information through the My Water online Water Corporation access website. The City is also undertaking soil moisture monitoring at three trial sites across the City, with a review on irrigation practices to be determined after the monitoring period.

#### **4.6 City of Karratha Water Planning Documents**

The City has also completed a number of strategic and technical documents to guide the long term use and conservation of water. Recently completed is the Draft City of Karratha Water Management Strategy which informs management of water resources in the region to safeguard the water needs of the future community while maintaining environmental, cultural and social values. Feeding into this overarching strategy has been a number of management plans and modelling reports, these documents are listed in the table below.



**Table 3: City of Karratha Water Management Documents**

Town site	Study	Author, Year	Key messages
Karratha	7 Mile Creek Flood Study	GHD 2009	Investigation of flood levels in support of proposed industrial development
	Karratha Drainage Assessment	GHD 2010	Examined the existing stormwater drainage network capacity within the Karratha townsite.
	Karratha Drainage Management Plan	GHD 2010	Provides information on the existing drainage network condition, identifies areas for improvement plus locations for major drains in future development areas
	Madigan Creek – 2D Flood Study	JDA Consultant Hydrologists, 2012	2D Mike Flood Model of Madigan Creek to determine flood levels in support of the Madigan residential development.
	Mulataga Creek – 2D Flood Study	JDA Consultant Hydrologists, 2012	2D Mike Flood Model of Mulataga Creek to determine flood levels in support of the Mulataga residential development.
	Karratha Vulnerability Study (KCVS)	JDA Consultant Hydrologists <i>et. al</i> , 2012	Regional assessment of the impacts of future climate change on the hydrology, shoreline stability, storm surge and riverine flooding in Karratha to evaluate opportunities and constraints for potential development.
	Lazy Lands - 2D Flood Study & Local Water Management Framework	JDA Consultant Hydrologists/ TME, 2013	Flood assessment of local stormwater flooding over Karratha at a local scale with the results used to inform and identify potential areas of development within existing drainage corridors.
Roebourne	Harding Dam, Extreme flood study	DoE, 2004	Reviewed flood frequency of historical data and estimated peak flows into and out of the Harding Dam.
	Roebourne Townsite Stormwater and Flood Management Plan	Essential Environmental, 2013	Assessment of flood risk from the Harding River and stormwater within the townsite and recommendations for strategies for land use planning, development and building controls, structural measures and flood emergency planning.
	Roebourne townsite Local water management strategy	Essential Environmental, 2013	Prepared to support the development of the Roebourne townsite structure plan, which provides a framework for the redevelopment of the Roebourne townsite. It includes strategies and design criteria for stormwater and groundwater management; water resource use; and landscaping which have been developed in response to the proposed redevelopment and the local site conditions
Point Samson	Point Samson Stormwater and coastal management strategy	Essential Environmental, 2014	Presents the findings of modelling undertaken and an analysis of risks to establish a proposed strategy for addressing the stormwater and coastal vulnerability of Point Samson. It recommends an approach to the mitigation and management of coastal and flood risks, highlighting potential

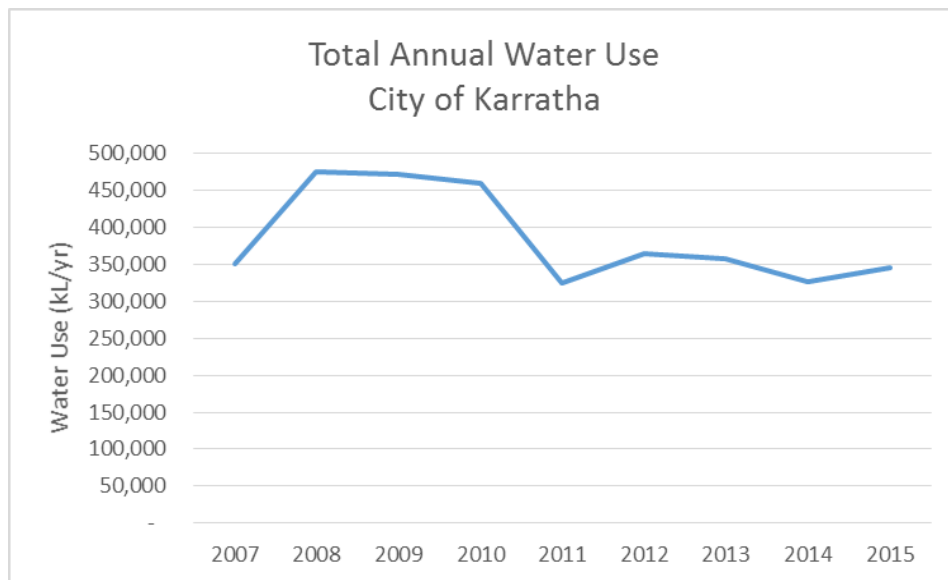
Town site	Study	Author, Year	Key messages
			limitations to future development and critical stormwater infrastructure required to facilitate development.
	Point Samson Water and wastewater servicing report	Essential Environmental, 2014	Presents an analysis of the water and wastewater services capacity of Point Samson, including current condition and capacity and planned upgrades. An assessment of viable water and wastewater strategies for future development of the town is presented using two different growth scenarios, considering potential constraints and risks under alternative wastewater systems.
	Point Samson District Water Management Strategy	Cardno, 2015	Provides a structure within which subsequent development can occur consistent with the 'total water cycle management' approach described.
Dampier	Dampier drainage review	GHD, 2010	Assessment of original design intent of the drainage network and hydrologic and hydraulic assessment to determine the suitability of the drainage network.
	Dampier stormwater management study	GHD, 2015	Identifies existing encroachments into the drainage system and determines the resultant flood risk and areas unaffected by flood risk.
Wickham	Wickham flood study	JDA, 2011	Guidance for drainage and water management for the proposed Accommodation Expansion Project in the Wickham townsite. The study recommended appropriate fill levels above the 100 year ARI event (0.5m) and upgrading the existing culvert on the Point Sampson-Roebourne Road to mitigate risk to flooding to the existing town and proposed development.
	Wickham townsite accommodation expansion project	JDA, 2011	The Wickham Flood Study considers the impact of using fill to facilitate three proposed developments (Wickham lodge, Cajuput and town office) adjacent to the Creek Wickham Drive Creek, within the existing Wickham Townsite. The study found that filling for the Wickham lodge increased flood levels from 9.73m to 11.70m(AHD). The other sites did not have an impact in flood levels.
	Wickham 2D Flood Study	JDA, 2015	Provides stormwater flood mapping to assist with assessing Local Storm Surge Risk Planning Policy DP19, for pre-Wickham South development and post-Wickham South development.
	Wickham Storm Surge Modelling Study	MP Rogers & Associates, 2015	Provides an assessment of the impacts of a100 ARI and 500 ARI inundation storm surge event to evaluate opportunities and constraints for potential development.
Cossack	None available at this stage		



## 5. Water Use Inventories

The purpose of the Corporate and Community water use inventories is to identify priority areas for action and assist council to track water consumption over time. The Corporate water use inventory shows water consumption on City accounts.

### 5.1 Corporate Water Use Inventory

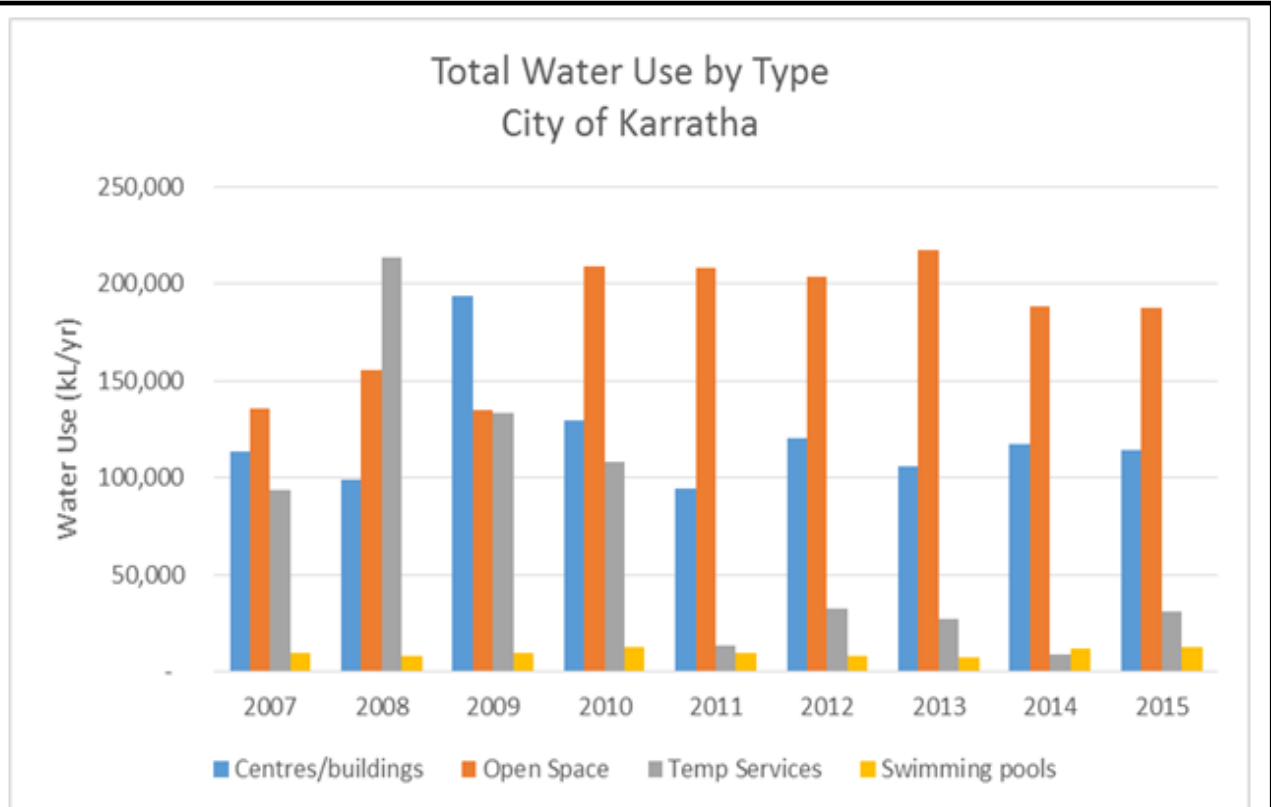


**Figure 5: Total City of Karratha Annual Water Use**

Figure 5 shows the historical potable water use from all meters owned by the City of Karratha combined. The table and figure below splits annual water consumption into different land use categories.



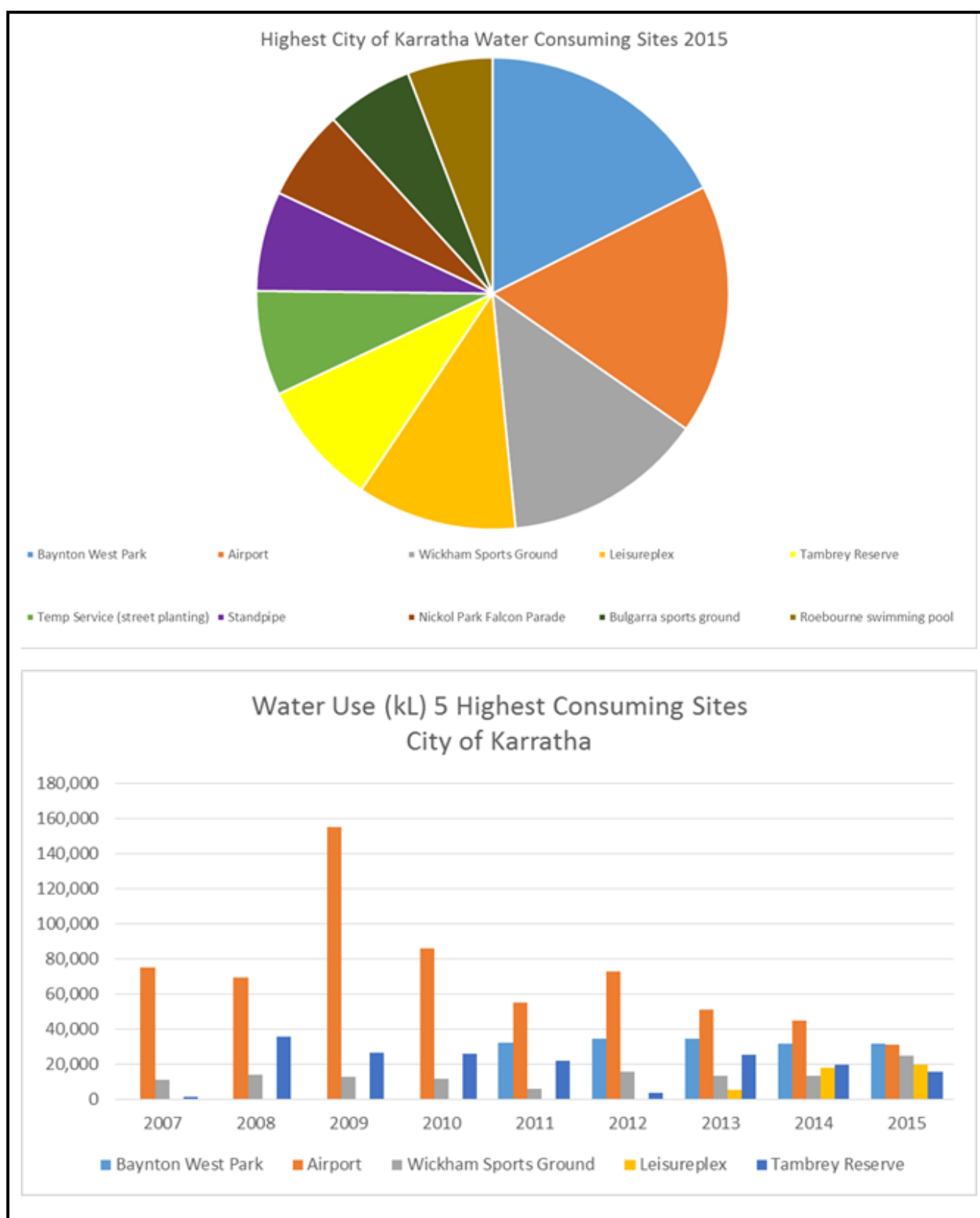
Figure 6: Annual Water Consumption by Type (kL)



Type	2007	2008	2009	2010	2011	2012	2013	2014	2015
Centres/buildings	113,391	99,182	193,848	129,447	93,997	120,177	105,492	117,305	113,978
Open Space	135,270	155,226	135,245	208,687	208,072	203,926	217,084	188,388	187,861
Temp Services	93,646	213,510	133,437	108,467	13,471	32,069	27,229	8,696	30,939
Swimming pools	9,169	7,731	9,675	12,555	9,829	8,002	7,297	11,946	12,390
Total Annual	351,476	475,649	472,205	459,156	325,369	364,174	357,102	326,335	345,168
Average Daily	963	1,303	1,294	1,258	891	998	978	894	946

The following graphs show the 10 highest water consuming sites in the City of Karratha and how consumption rates have varied over time.

**Figure 7: The Five Highest Water Consuming sites at the City of Karratha**



Some sites, such as the Airport, have shown significant water savings due to the implementation of water efficiency projects and programmes. Other have increased their consumption, partially due to the transition between recycled and potable water use or because of fluctuations in the use of temporary services and standpipes.

In particular, Wickham Sports Precinct depicted a large jump in water consumption between 2014 and 2015. This has partly been due to the recent handing back of management of the reserve from RTIO to the City. There was also the development of 'Saylor Park' a new recreational area for the precinct which required high levels of start-up water consumption.

Although, some water consumption at the precinct can be attributed to the above events, there is still a large amount of unaccounted water consumption for the 2015 calendar year. Currently, a non-potable water tank services the Bistro, the precinct amenities building (change room, first aid rooms, toilets and kitchen), Saylor Park reticulation, reticulation of half of the Wickham Oval, the Pool and the Pool complex reticulation. Despite this 'non-potable' water use, there is still an annual consumption amount of approximately 22,000 kL (approx. 20,000kL attributed to the sporting ground and 2000kL is attributed to the pool). It is recommended that a water audit of the precinct is undertaken.



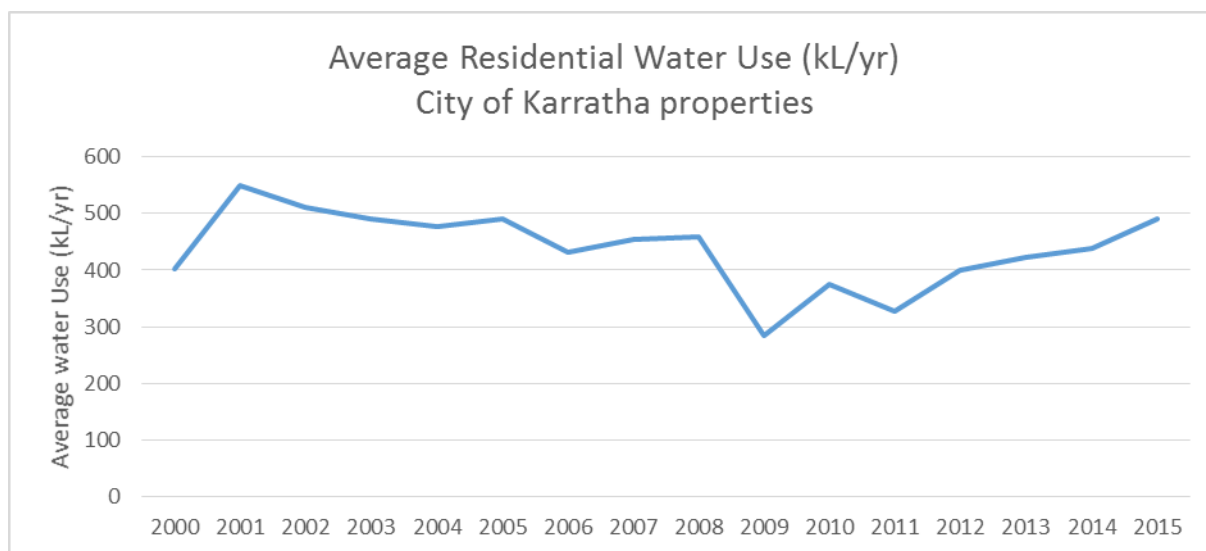
**Figure 8. Wickham Recreation Precinct**

## **5.2 City of Karratha Residential Property Water Consumption**

The City of Karratha owns a number of residential properties for its employees. Residents are responsible for paying the water bill on these properties, along with maintenance of the irrigation and gardens.

The current 2015 average per residential property is just under 500kL/yr. There is significant scope for instituting a water efficiency messaging program with employees to reduce this consumption back to the most efficient average experienced in 2009.

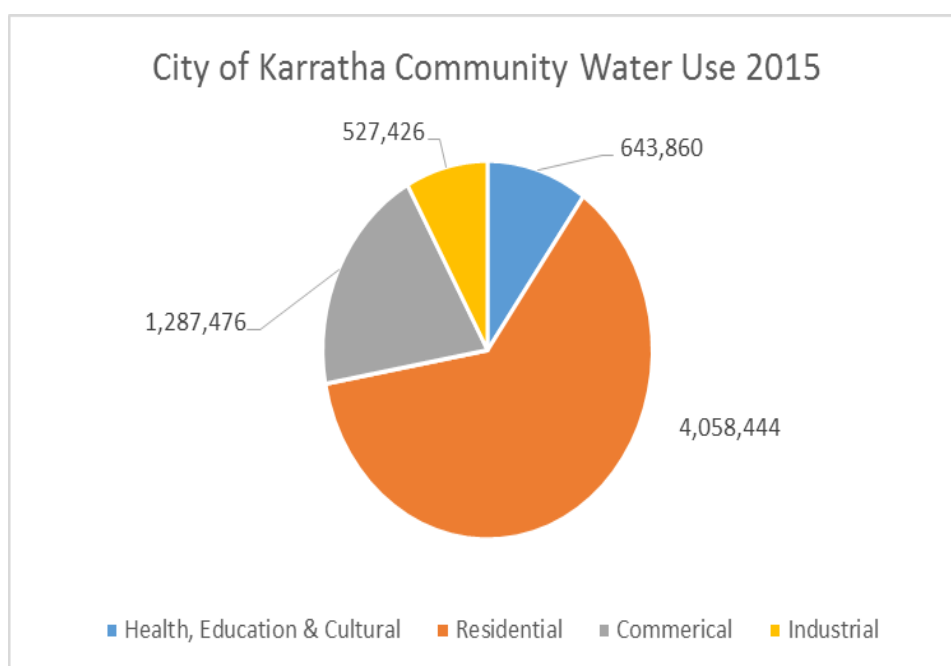




**Figure 9: Average Residential Water Use of City Owned Properties**

### 5.3 Community Water Use Inventory

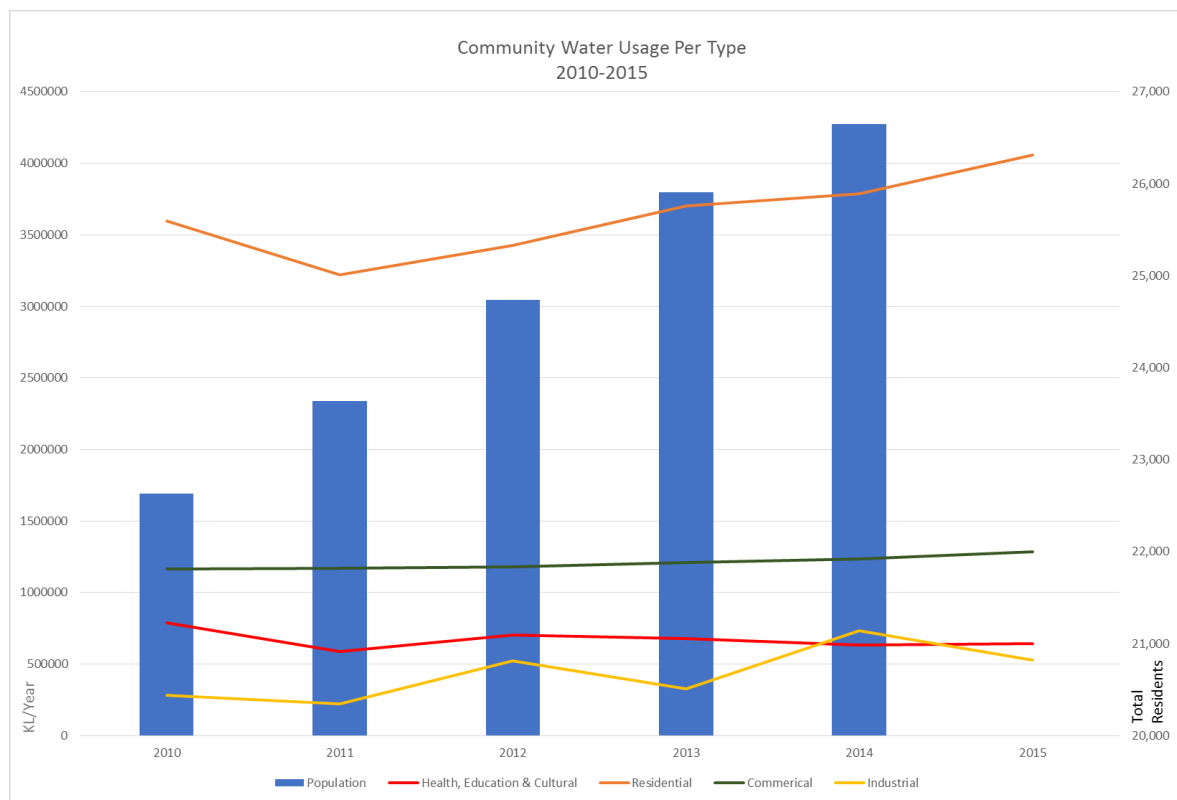
The following inventory of community water consumption indicates that water use is high in certain sectors with considerable scope for water use reduction. In particular, the graph below states that residential properties are the highest water consumers, with over 4 million kL of water used in 2015.



**Figure 10: City of Karratha Community Water Use 2015**

The Australian Bureau of Statistics indicates that in the year 2011, the per capita household water use in Australia was 70kL. In comparison, the per capita residential water use in the same year in Karratha amounted to approximately 130kl, indicating room for behavioural change.

The community consumption rate has remained fairly stable over time, however; it is to be noted that the following graph depicts an 18% increase in population with only a 13% increase in water consumption between 2010 and 2105.



**Figure 11: City of Karratha Community Water between 2010 and 2015.**

## 6. Water Conservation Goals

The City has nominated some overarching goals to improve water management within the Council's own operations. These include the following:

1. Enhanced water efficiency through improved irrigation practices employed in the watering of green space.
2. Improve water efficiency at community centres and other public facilities controlled by the City of Karratha.
3. Implement the Effluent Reuse Scheme Program.
4. Achieve improved per household average annual water consumption in those dwellings owned by the City of Karratha.

A series of water conservation actions will be implemented to achieve these overarching goals (see implementation table page 22.)

### 6.1 City of Karratha Potable Water Conservation Goal

The City of Karratha is required to provide a vast amount of services in an increasingly drying climate. With unreliable rainfall patterns, and the need to find alternative water sources, defining a set reduction target for corporate water consumption is not pragmatic. Instead the City has a conservation 'goal'.

The City of Karratha aims to implement up-to-date, best practice water conservation measures in City buildings, City parks and City facilities to ensure that water consumption is undertaken at optimum efficiencies annually.

To ensure that the water efficiency goal is met the City will measure annual water use of high consuming sites against benchmarks.

## 6.2 Monitoring Water Consumption Savings from Council Operations: Setting Benchmarks

Benchmarks have been set for each of the high water consuming sites. These performance indicators will allow water use comparisons to be made each year (all figures are approximate).

Facility or Irrigated Area (Parkland)	Description	Period (Financial Year)	Water Used (kL)	Performance Indicator	Current Water Usage Rate
Baynton West Park	Park irrigation plus public amenities	2015	31,716	kL/ha	5766kL/ha
Airport	City consumption only	2015	19,979	kL/patron	0.097kL/patron
Wickham Sports Precinct	Excludes facilities	2015	24,777	kL/ha	6194kL/ha
Leisureplex	Excludes oval	2015	19,729	kL/patron	0.036kL/patron
Tambrey Park	Park irrigation plus public amenities	2015	15,580	kL/ha	7790 kL/ha
Nickol Park Falcon Parade	Park irrigation plus public amenities	2015	11,207	kL/ha	2947kL/ha
Frank Butler Centre	Some park irrigation plus public facilities and amenities	2015	10,727	kL/patron	0.12 kL/patron
Roebourne swimming pool	<b>Pool plus public amenities</b>	<b>2015</b>	<b>10,533</b>	<b>kL/patron</b>	<b>1.06kL per patron</b>

To be noted, the temporary service and standpipe which are used to establish street trees and verge plantings have not been given a benchmark as the total water use fluctuates significantly from year to year depending on planting programs.

## 7. Community Potable Water Conservation Goal

The Community Goal differs from the Corporate Goal to some extent in that it is unable to be achieved purely through Local Government single effort. The community goal will be based on the achievement of community education and awareness programs as detailed in the Table of Actions.

## 8. Monitoring and Governance

As a priority an immediate audit of the high water consuming sites is to be undertaken. The Information used to determine benchmarks was derived from Water Corporation metering information. As such, specific water uses (for irrigation, for toilets, for community centres) at each site was not necessarily separated out. An indication of how the water is used at each of these sites is needed in the short term, to determine if the benchmarks set within this plan are accurate and will enable the City to adequately monitor water use over time.

In particular, noticeable discrepancies in water use at the Wickham Sports Precinct and the Frank Butler Centre require further investigation into benchmarks set. For example, the water use at the Wickham Sports Precinct is currently attributed to the oval, as such, the benchmark has been set using kL/hectare. If a water audit of the precinct indicates that water use is not occurring at the oval, the benchmark will need to be changed. I.e. if part of the water use is occurring at the function room within the precinct, the benchmark for this water use will have to be changed to kL/patron.

Also of concern is the benchmark set for the Frank Butler Centre. This centre accounts for 10% of the water use in City buildings annually. Currently the bench mark has been set using the function rooms capacities, however; observations of use of the centre indicate that it may not be solely the function rooms that are contributing to the high water consumption. The centre contains change rooms that are open to the public. These changes rooms contain a



number of facilities that are heavily used by sporting teams, especially in the winter months (March to September). It is recommended that a usage survey/patron count is undertaken for these facilities to determine the actual source of water consumption and to devise reduction measures accordingly. Additionally, although the irrigation for this oval is largely on the ERS, health requirements have dictated that potable water is used for irrigation around buildings. These two volumes need to be separated out to achieve a full understanding of water use of the reserve and in turn provide accurate benchmarks for monitoring.

Under the Water Wise program the City is required to monitor and report on water saving initiatives on regular intervals. The reporting interval proposed for this plan is every two years.

## 9. Table of Actions

Water Saving Area	Action / Initiative	Status (Complete, Ongoing, To be Completed or N/A )	Proposed Completion Date	Department Responsible	Monitoring Criteria ( to be completed by Planning Services)
All sites	Investigation into benchmarks set to determine if they adequately reflect actual water usage at each site.	To be completed	ASAP	Planning Services with input from Water Corporation and information on current irrigation use data.	Review of Benchmarks
Facilities	Conduct a water audit on each of the council's top water using sites. Priority sites for audits include: <ul style="list-style-type: none"> <li>The Wickham Recreation Precinct.</li> <li>The change rooms and facilities at the Frank Butler Centre and surrounds.</li> </ul>	Ongoing (Airport and Leisureplex have had a water audit)	June 2018	Infrastructure Services	Current audit documentation
	Commit to implementing the most viable recommendations from water audits undertaken.	Ongoing (some actions out of Airport and Leisureplex WEMP's have been undertaken)	Ongoing	All Departments	Post project audit of water consumption. After the 2017/2018 financial year.
	Procurement processes incorporate consideration of better than 3 star WELS rated fixtures.	To be completed	June 2018	City of Karratha Corporate Compliance Team	Water efficiency guidelines to be incorporated into procurement processes.
	Use of technology to actively monitor water, e.g. use of data loggers or smart metering applications.	Ongoing	June 2018	Parks and Gardens Team	Assessment of high water using sites to determine use of smart meters
	Replace or retro-fit appliances and fixtures in City facilities with water efficient options. 5-Star WELS rated Water efficient devices, fixtures and fittings are installed in any new council facilities or retrofitted in existing facilities.	To be completed	Ongoing	Infrastructure Services Team	Post project period audit of City building to determine those buildings still in need of retrofitting.
	Continue the use of backwash at the Leisureplex for use in irrigation and non-potable areas.	Ongoing	Ongoing	Leisureplex	N/A

Water Saving Area	Action / Initiative	Status (Complete, Ongoing, To be Completed or N/A )	Proposed Completion Date	Department Responsible	Monitoring Criteria ( to be completed by Planning Services)
	Continue the use of grey water at the Airport for non-potable uses such as irrigation.	Ongoing	Ongoing	Airport	N/A
	Investigate possible areas of grey water use for non-potable purposes in additional City run facilities.	To be completed	June 2017	Planning Services	Report on areas suitable for grey water use.
Education	Appropriate staff have completed Water Corporation water efficiency training.	To be completed	June 2018	Planning Services	Enrolment in and completion of water efficiency training for key staff.
	Processes in place to achieve behavioural change within council, e.g. leak reporting process established and water conservation signage in staff facilities, water management team meetings held on a regular basis.	Ongoing	June 2018	Building Maintenance	Processes in place within infrastructure team.
	The Leisureplex to investigate the possibility of partaking in the Waterwise Aquatic Centre program.	To be completed	June 2018	Leisureplex	Leisureplex becomes a certified Waterwise Aquatic Centre
	An education program on water use behaviours to be rolled out to City staff that are eligible for City housing.	To be completed	June 2018	Planning Services	Reduction in water
Monitoring	Continue with real time monitoring program of ERS volumes (SCADA).	Ongoing	Ongoing	Infrastructure Services	Processes in place.
	Leak detection is included in inspections and reported on or repaired if a leak is observed.	Ongoing	Ongoing	Infrastructure Services	Processes in place.
Irrigation practices	Continue the use of treated waste water for the irrigation of new areas of public open space where possible.	Completed/Ongoing	Completed in 2016	Infrastructure Services	Review of use of treated waste water post project period.



<b>Water Saving Area</b>	<b>Action / Initiative</b>	<b>Status (Complete, Ongoing, To be Completed or N/A )</b>	<b>Proposed Completion Date</b>	<b>Department Responsible</b>	<b>Monitoring Criteria ( to be completed by Planning Services)</b>
	Create/maintain a water budget for council open spaces. Each irrigated area of irrigated parkland to have base annual water budget. Scheduling should be adjusted on a monthly basis and tracked against the water budget.	To be completed	June 2017	Parks and Gardens Team	Assessment against benchmarks and water budgets.
	Audit of irrigation system to identify poorly performing irrigation hardware.	To be completed	June 2018	Parks and Gardens Team	Audit documentation
	Develop a system maintenance and audit schedule. Keep replacement and repair parts consistent and available to maintain irrigation system performance.	To be completed	June 2017	Parks and Gardens Team	Process in place.
	Continue to trial the use of soil moisture sensors in POS and review irrigation practices accordingly.	Ongoing	Ongoing	Parks and Gardens Team	Assessment of effectiveness of soil moistures, and review of irrigation practices.
Monitoring	Install a water meters to the standards detailed in the Department of Water Guidelines for water meter installation 2009, on all irrigation systems to measure both water flow rate and cumulative volume.	To be completed	June 2017	Parks and Gardens Team	Review of high water consuming POS to determine use of water metres.
Irrigation & landscape Design	Landscaping plans to include low water use plants, hydrozoning and soil amendments.	Ongoing	Ongoing	Parks and Gardens Team	Landscaping Policy Documentation
	Develop fertiliser application plan that is based on water, soil and / or tissue samples that doesn't promote excess growth.	To be completed	June 2017	Parks and Gardens Team	Fertiliser Application Policy Documentation
	Develop the Karratha Water Management Strategy to implement water sensitive urban design in new land developments.	Complete	April 2016	Planning Services	Council endorsement of Karratha Water Management Document.

<b>Water Saving Area</b>	<b>Action / Initiative</b>	<b>Status (Complete, Ongoing, To be Completed or N/A )</b>	<b>Proposed Completion Date</b>	<b>Department Responsible</b>	<b>Monitoring Criteria ( to be completed by Planning Services)</b>
Engagement	Engage with household and business ratepayers to promote water efficiency.	To be completed	June 2018	Planning Services	Education program complete
	Engage with local schools on water efficiency and sustainability programs.	To be completed	June 2018	Planning Services	Education program complete
	Support waterwise verges and provide information to ratepayers on how to design and maintain a waterwise verge.	To be completed	Ongoing	Parks and Gardens, Planning Services	Education material (leaflets, webpage, Facebook) made available.
Water sources (recycling/non potable)	Provide information on the installation and local regulation of greywater systems and rainwater tanks where appropriate.	Ongoing	Ongoing	Health Services	Education material made available.

## 10. Management endorsement and Water Corporation and Department of Water acceptance

Endorsement of Water Efficiency Action Plan			
<Council Name>:			
a)	Will implement the water saving measures stated in Section 5 of the Water Efficiency Action Plan and ensure employees and contractors assist in implementing actions.		
c)	Acknowledges that the Water Corporation and / or Department of Water may comment on the WEAP and/or request additional information relating to the WEAP.		
d)	Acknowledges that the Water Corporation and Department of Water will monitor the WEAP and failure to meet requirements of the program may result in the withdrawal of Waterwise endorsement.		
e)	Will submit an annual report, in accordance with Section 5 (Action Plan), detailing progress made on the WEAP in order to maintain endorsement as a Waterwise Council.		
Name			
Position			
Signature		Date	
Water Corporation and Department of Water Acceptance of WEAP			
Water Corporation and Department of Water has reviewed and accepted the WEAP. With acceptance of this WEAP <LGA>: will be eligible for endorsement as a Waterwise Council.			
Water Corporation:			
Name			
Position			
Signature		Date	
Department of Water:			
Name			
Position			
Signature		Date	
Document Number			