

WATER & WASTE COMMITTEE 14 JULY 2010	5
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PRESSURE MANAGEMENT OF WATER DISTRIBUTION NETWORKS

EZesers : 24/22/212-03: 2621328 v2

RECOMMENDATION:

That Council notes the report and the proposed pressure management activities.

INTRODUCTION:

Pressure reduction or management is the process by which Water Service Providers identify and reconfigure areas within the water supply network which are subject to excessively high pressures. The intent is to reduce pressures and therefore minimise water loss, power consumption, leakage, pipe bursts and the consequential impacts (DIP 2010).

Water pressure management is a key objective of the Cairns Regional Council Water Demand Management Strategy 2009-2012. There are a number of areas in the CRC area where water pressures are excessively high and these areas will be subject to pressure reduction. This report provides a summary of proposed pressure management activities in various suburbs where high pressure has been identified.

BACKGROUND:

The Cairns Regional Council adopted the Water Demand Management Strategy (DMS) 2009-2012 in July 2009. The aims of the Strategy are:

- To build on the current demand management activities
- To achieve significant and sustained water savings by customers
- To continue to build a water conservation culture in the community
- To minimise losses and non revenue water in our distribution network
- To improve water accounting via metering, data management and reporting
- To ensure CRC is leading by example in water conservation.

An action identified in the DMS is the identification of high pressure zones and installation of pressure control systems. Twenty-seven demand management zones have been completed in the greater Cairns area. The zones generally consist of between 500 and 1200 properties that are metered at the zone level allowing for accurate monitoring of zone demand and leakage.

An independent consultant, Detection Services, was appointed in 2009 to undertake an analysis of pressures in each of the 27 zones and make recommendations on the potential for pressure management. The report has been received and reviewed and forms the basis of the current pressure reduction/management planning as outlined in this report.

Previous Pressure Management

Zone pressure management has been undertaken since July 2005 in Holloways Beach and from March 2005 in Machans Beach, in accordance with the DMS initiatives.

Zone pressures have been reduced to 600 kPa from approximately 900 kPa. Based on analysis of average daily consumption prior to and after pressure management, the average daily consumption in Holloways Beach and Machans Beach has shown the following results:

Pre Pressure Management	Post Pressure Management	% Reduction
Holloways Beach 1.342 kL/day/lot	1.055 kL/day/lot	21%
Machans Beach 0.949 kL/day/lot	0.807 kL/day/lot	15 %

Pressure management has also been implemented in Port Douglas due to a high frequency of main breaks as a direct result of excess pressures. Prior to pressure reduction 6 trunk main breaks were experienced between March 2008 and May 2008. Pressure was reduced from 780 kPa to 580 kPa in November 2008 and since that time no trunk main breaks have occurred.

Gold Coast Water Case Study

Gold Coast Water has established 60 demand management zones with 36 fully operational. Current daily water savings are 7.35 megalitres per day (ML/day), which has been achieved through pressure management in the 36 fully operational zones. These savings are expected to increase to approximately 12.5 ML/day when all zones are operational. This equates to a reduction in water usage of between 9.6% and 11.5%. Annual reduction in water main breaks is 36% with a 49% reduction in water service breaks.

Upon full completion it is estimated that there will be an annual reduction in water main breaks of 59% and water service breaks of 80% with a further projected reduction in maintenance costs of \$2.98M over 73,803 connections.

An additional benefit has been a reduction of greenhouse gas emissions of 354 equivalent tonnes of CO₂ since June 2008.

Source: http://www.goldcoastwater.com.au/t_gcw.aspx?pid=5228

COMMENT:

Actual water pressure in specific areas within the Cairns Region will be determined on a zone by zone basis and will be influenced by issues such as the extent of high rise buildings compared to residential buildings within the zone and number of buildings that require water for fire fighting. A maximum of 500kpa is the target pressure in areas that are primarily residential. Cairns Water and Waste will ensure water pressure will not drop below 220kpa in line with Customer Service Standards.

The independent pressure management study identified 12 demand management zones that have good potential for pressure reduction. Three zones – Goldsborough, Yorkeys Knob and Trinity Beach are zones where pressure reduction could be implemented as a priority due to relative ease of implementation and excessively high pressures. In addition both Machans Beach and Holloways Beach have the potential for further pressure reduction by adjustment of the existing pressure reduction valves.

The remaining zones are those where high pressures exist primarily to serve higher lying areas and further investigation is required to evaluate the feasibility of separating the higher areas to ensure sufficient pressure while reducing pressure in the lower lying sections of the zones.

It is important to note that pressure management by zones does not mean the entire suburb will be affected. Detailed maps showing the pressure reduction areas including before and after pressures will be prepared and distributed to affected customers prior to pressure reduction being implemented.

Phase one 2010	Phase two 2011
Goldsborough	Bayview Heights
Yorkeys Knob	Earlville
Trinity Beach	Kewarra Beach East
Machans Beach	Redlynch High
Holloways Beach	Smithfield – Canopy's Edge
	Smithfield
	Trinity Park

Impact on Customers

Most residents, businesses and council facilities in the affected areas will not notice any significant change to their water pressure, however if homes have plumbing that is in poor condition, or appliances or irrigation systems that require specific pressures there may be a noticeable change in their performance.

In areas with excessively high pressures there may be less wear and tear and a reduction in hose breakages on appliances such as washing machines and dishwashers.

In practical terms a dwelling experiencing available pressures of around 600 to 650 kPa is unlikely to observe a drop in pressure to 500 kPa. However dwellings with available pressures in excess of 650 kPa, are likely to notice the pressure reduction to 500 kPa.

In the event of customers notifying Water and Waste that water pressure is not sufficient for day to day uses, Water and Waste will inspect the site and assess each case to determine where problems may lie and if there are actions required to assist with potential remediation measures.

It is noteworthy that the Water and Waste Department's Customer Service Standards specify a minimum water pressure at the property boundary of 220 kPa. The minimum water pressure has also been the benchmark of water supply planning in Queensland dating back to the mid 1950s (i.e. 70 feet pressure in 1956). The customer service standards have been widely distributed to the community.

Pressure reduction from approximately 800 kPa to 500 kPa on a normal residential property, is estimated to reduce consumption by 20%. Average daily consumption for a Class 1 dwelling is approximately 0.777 kL/day/ lot, indicating a reduction in available pressure can lead to potential consumption decreases of 0.16kl/d/lot. If pressure is dropped from 600 kPa to 500 kPa, the estimated saving is 14%. This could result in a reduction in household water charges of approximately \$52 per annum.

Impact on Fire Services

Reduced water pressures may cause fire safety systems to operate less effectively. In existing buildings the sprinkler and/or hydrant systems may have been designed for water pressures at the time of approval and potentially may not perform adequately if pressures are significantly reduced. This scenario is a possibility in those areas of commercial activity with multi storey buildings and fire systems. Pressure reduction will therefore not be undertaken in the Cairns CBD. Commercial activity in each zone will be considered prior to pressure reduction.

The Queensland Fire and Rescue Service will be informed of the proposed pressure reduction measures for each zone prior to implementation.

Key fire safety industry stakeholders advise that where average daily reticulated water pressures are maintained at 500 kPa, sprinkler and/or hydrant systems in approximately 80% of existing buildings will still perform adequately (DERM 2010). Water and Waste staff will contact those businesses with fire safety systems to inform and advise of pressure reduction measures and levels prior to pressure reduction being implemented.

In the event of customers notifying Water and Waste that water pressure is not sufficient for fire fighting purposes, Water and Waste will inspect the site and assess each case to determine where problems may lie and if there are actions required to assist with potential remediation measures.

CONSIDERATIONS:

Corporate and Operational Plans:

Corporate Plan Goal 4.1 - *Provide a robust, secure, high quality water supply to meet the growing needs of the community.*

Corporate Plan Key Goal 4.2 – *Encourage wiser use of water by all members of the regional community.*

Corporate Plan Goal 4.4 - *Deliver effective long-term maintenance and renewal of existing infrastructure and community assets.*

Statutory:

Building Act 1975

Plumbing and Drainage Act 2002

Building and plumbing laws cover standards for fire safety, including fire safety installations such as sprinkler and hydrant systems. In the implementation of pressure reduction plans, consideration must be given to the effect of pressure and flow reductions on the performance of fire safety systems.

Water Supply (Safety and Reliability) Act 2008

Water service providers are required to submit a System Leakage Management Plan to the Department of Environment and Resource Management. Pressure management is a key action in the approved System Leakage Management Plan.

Policy:

The Water & Waste Customer Service Standards have a target minimum and maximum water pressure at the property boundary of 220 and 500 kpa respectively. It should also be noted that all new class 1 residential properties are required to have a 500 kpa pressure limiter in new water meters that are installed.

Financial and Risk:

Pressure reduction at the zone level is a key objective of the Demand Management Strategy. It has been estimated that the actions contained in the Demand Management Strategy could defer the need for a new water supply by 4 to 6 years with a resulting cost saving of between \$7M and \$8M in capital expenditure alone (Least Cost Planning Study, MWH 2005).

Table 1 shows proposed pressure for Phase 1 zones that are scheduled for pressure reduction in the near future. These have been chosen due to excessive pressure and relative ease of pressure management. The cost saving estimates are calculated using maximum value of retail residential water of \$0.96, i.e. cost of water saved. Further cost benefits will be realized as a result of reduced mains breaks, increased life of assets and reduced energy costs in the treatment and pumping of water.

Table 1: Pressure Reduction and Cost Benefit Phase 1 Zones

	Proposed Pressure Reduction kPa	Capital Cost Estimate	Estimated Annual Water Savings (kl)*	Estimated Cost Savings over 5 Year Return Period (using highest residential retail price of water as per SLMP methodology)
Yorkeys Knob	250 (from 800 to 500)	\$20,000	28,382	\$184,000
Goldsborough	25-125	\$12,000	15,768	\$75,700
Trinity Beach	110	\$25,000	21,003	\$100,800
Holloways Beach	100	NA PRV's installed 2005		
Machans Beach	100	NA PRV's installed 2005		

*Initial estimates assume that 30% of estimated recoverable portion will be recovered via pressure management actions.

Sustainability:

In addition to prolonging the need for a new water supply for the region, more efficient use of existing and future water supplies has a number of important environmental benefits such as:

- Reducing the impact on rivers by protecting environmental flows that are critical for river system health
- Reducing energy needed to transport and treat potable water and wastewater thereby reducing greenhouse gas emissions
- The deferral of new sources will defer impacts on catchments such as disruption of downstream flows affecting riverine and estuarine ecosystems.

Lower pressures will also result in reduced maintenance and repair of leaks and pipe bursts resulting in lower costs and energy consumption.

CONSULTATION:

An action identified in the DMS is the identification of high pressure zones and installation of pressure control system. Consultation on the development of the DMS was primarily internal with Cairns Water and Waste and Council staff.

An independent study on pressure management was undertaken by Detection Solutions to identify the potential for pressure management.

A Pressure Reduction Communication Plan is currently being prepared. The plan details the Communication and Engagement Techniques to be used prior to and during the implementation of pressure reduction. (#2611528).

OPTIONS:

That Council notes the report and proposed pressure management actions.

CONCLUSION:

Pressure management is a major requirement for efficient water resource and asset management and fulfils the requirements of Cairns Regional Council's Water Demand Management strategy 2009 -2012 and the Cairns Regional Council System Leakage Management Plan, March 2010.

Recommendation – That Council notes the report and proposed pressure management actions.

ATTACHMENTS:

- Attachment 1 - Proposed pressure reduction for Goldsborough
- Attachment 2 - Proposed pressure reduction for Machans Beach
- Attachment 3 - Proposed pressure reduction for Holloways Beach
- Attachment 4 - Proposed pressure reduction for Yorkeys Knob

Jon Turner
Manager Infrastructure

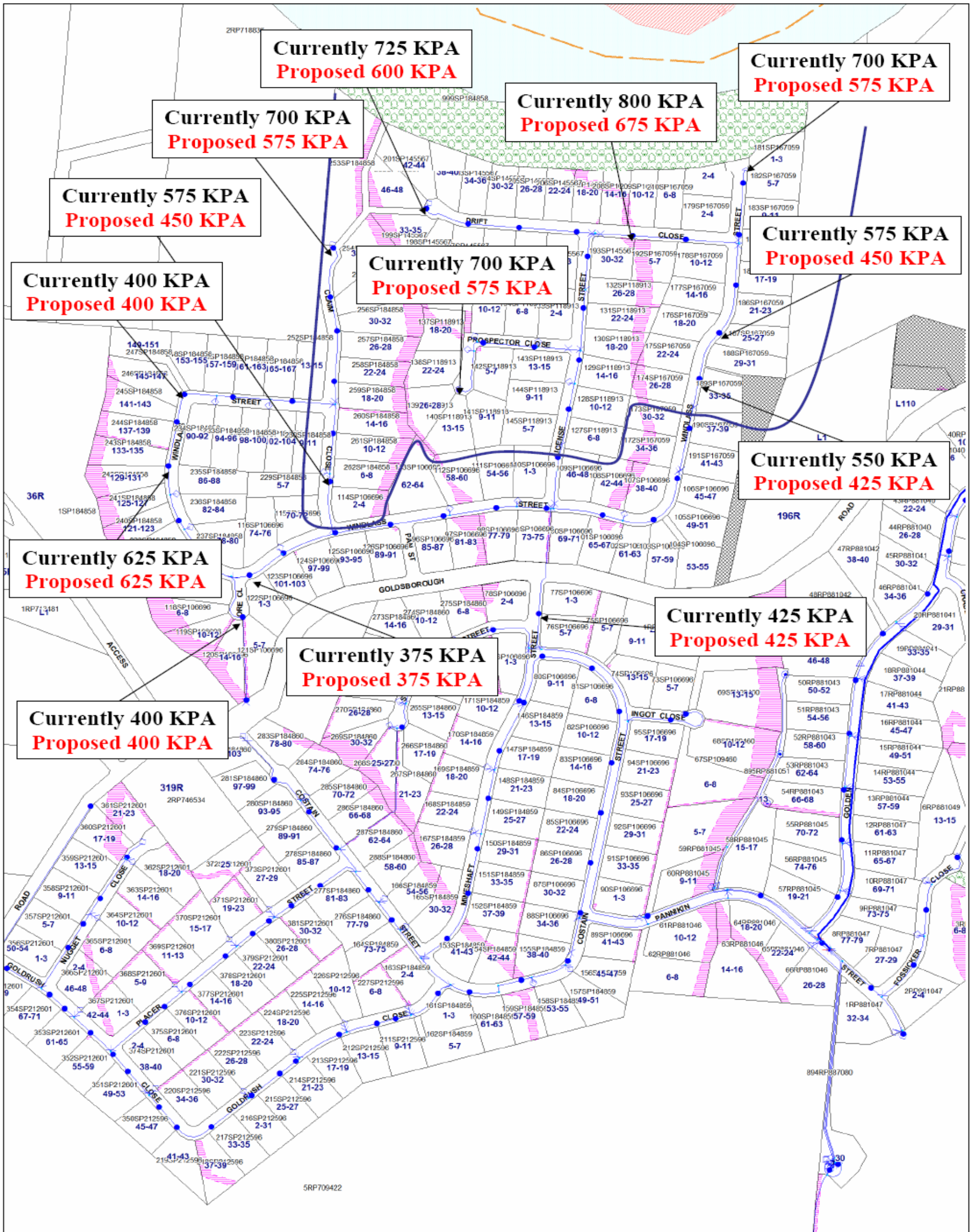
Bruce Gardiner
General Manager Water & Waste

References:

*Building and Plumbing Newsflash number 429, Water Pressure Reduction.
Department of Infrastructure and Planning, Building Codes, Queensland Division issued 24 May 2010.*

Cairns Water Least Cost Planning Study, Analysis of Demand and Supply Management, alternatives to Secure the Future Water Supply MWH 2005.

Attachment 1



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CAIRNS REGIONAL COUNCIL



P.O. Box 359
Cairns, Qld., 4870
Tel: (07) 4044 3044

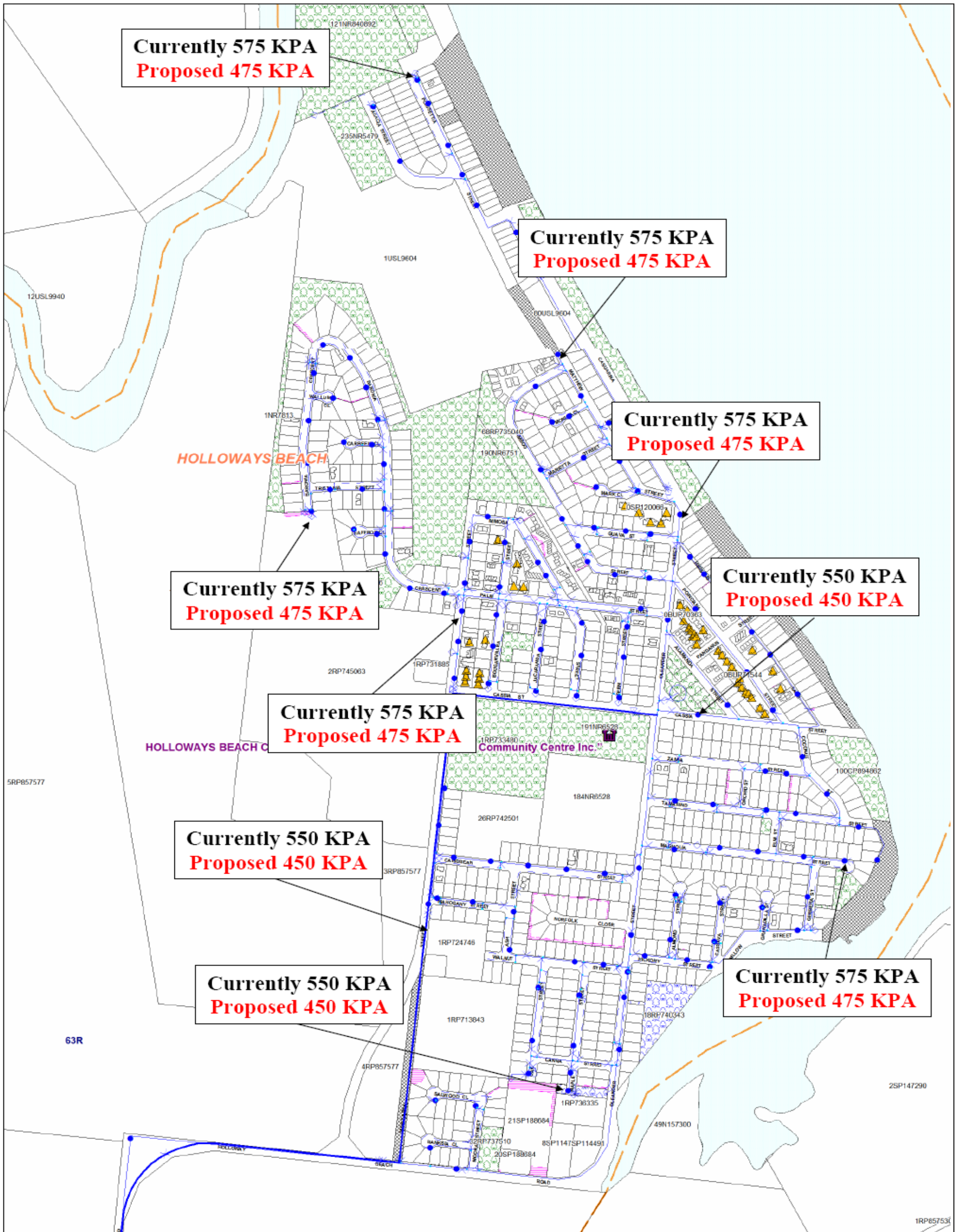
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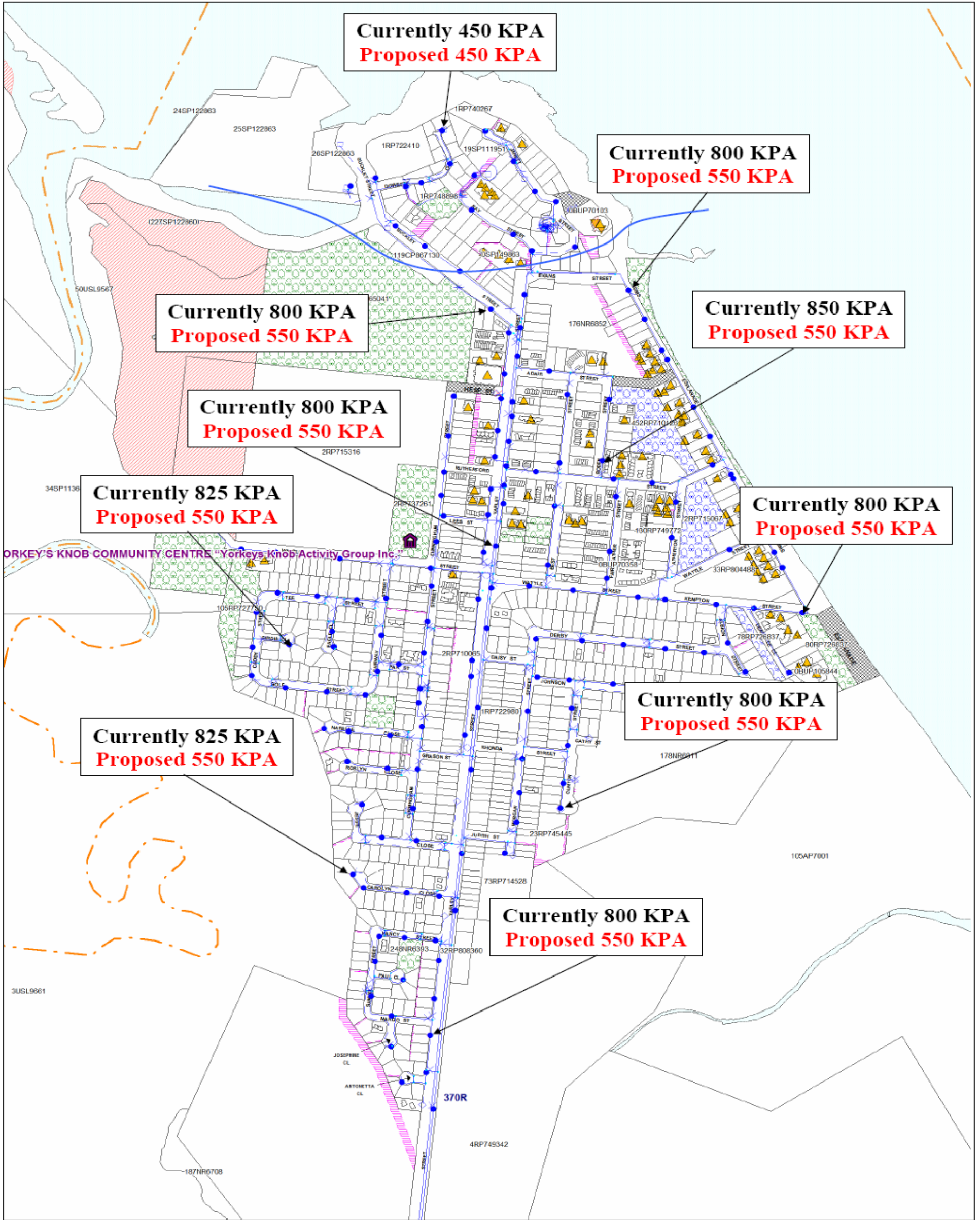
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Attachment 3



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Attachment 4



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