

Water Tune-up Audit Report

for

Youth Activities Centre Gilmour Crescent Byron Bay

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Disclaimer

Rous Water has prepared this Water Tune-up Report for use by the recipient of the Report only. The Water Tune-up report is to act as a guide only as to the type of savings that may be found and the expected payback period on the water upgrades performed for the short-term (immediate) recommendations. The longer-term considerations will need to be fully costed but are outside the scope of the Report. Nothing in this Report is to be understood, implied, or stated as what each individual proprietor MUST or SHOULD do but merely represent suggestions that may be considered by the proprietor to improve water use and energy use efficiency.

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1 Executive Summary

This Water Tune-up audit was undertaken by Rous Water, with assistance from staff at the Youth Activities Centre (YAC) in Byron Bay. The YAC was identified as a key stakeholder and agreed to pursue targets for saving and protecting water, as part of the North Coast Eco-Friendly Youth Project.

Rous Water, as a partner in the Youth Project, agreed to carry out a water tune-up audit of the YAC property. The objective of the audit was to assist YAC staff, managers and visitors to the Centre in their efforts to consume water in an economical manner.

Methodology

The following steps have been carried out as part of this tune-up audit: -

- (a) on-site walk-through inspection
- (b) identify all water consuming activities
- (c) estimate current water usage
- (d) identify areas where possible savings can be achieved
- (e) estimate implementation costs and savings, where possible

Summary

YAC staff and managers are to be commended upon waterwise strategies already in place, for example;

- (a) new toilets are of an economical dual flush type
- (b) Irrigation activities are minimal
- (c) a waterless urinal has been installed

The complex is consuming about 1.75kL of water per day. This is an average figure over the whole year and may vary seasonally. The daily water consumption is low, given the large number of people who visit and work at the Centre. The potential to reduce water consumption is also low, compared with other non-residential water users throughout the region. However, the audit indicates that some improvements can still be made.

The audit found the following strategies could reduce water use further.

In the short-term: -

1. Apply educational stencils adjacent to the large stormwater drain located in the amphitheatre.
2. Start a regular water meter reading and monitoring program.
3. Carry out a simple leak detection test at least twice yearly.
4. Check the flush volumes of existing single flush toilets with wall-mounted, hidden cisterns.
5. Reduce hand basin flows to 6 litres per minute.
6. Reduce sink flows to 8 litres per minute.
7. Stop the use of deodorising blocks and avoid the use of other perfumed additives and cleaners in the waterless urinal.
8. Replace the waterless urinal treatment cartridge after approximately 12,000 uses as recommended by the supplier.
9. Assess the use of water by visitors and the homeless, accessing the YAC out of hours and use this information to guide future water management strategies.

10. Provide a dedicated tap/hose for use by visitors, campers and the homeless, rather than allowing use of the fire hydrant.

In the long-term: -

1. Replace all remaining single flush toilets with 3/6 litre dual flush models that are easy to monitor and maintain.
2. Install a rainwater tank or tanks to supply water for all existing and future outdoor water uses such as cleaning, watering of gardens and establishment of bush foods.
3. Consider the use of harvested rainwater for flushing of toilets within the complex.
4. Install only AAA-rated (at least) and vandal proof showers.

Summary of Costs and Savings

Option 1: short term strategies

Estimated cost	= \$670
Estimated water saving	= 20% = 128kL/a
Estimated achievable savings	= \$242/a
Rous Water funding available	= \$335 (or 50% of cost up to \$448)
Net Cost	= \$335
Payback Period	= 1.4 years

Option 2: short term strategies + dual flush toilets

Estimated cost	= \$3,200
Estimated water saving	= 45% = 288kL/a
Estimated achievable savings	= \$545/a
Rous Water funding available	= \$1,000
Net Cost	= \$2,200
Payback Period	= 4.0 years

Option 3: short-term + long-term strategies

Estimated cost	= \$9,622
Estimated water saving	= 60% = 385kL/a
Estimated achievable savings	= \$725/a
Rous Water funding available	= \$1,350
Net Cost	= \$8,272
Payback Period	= 11.4 years

Net Cost (1 tank only)	= \$6,100
Payback Period	= 8.4 years

Conclusion/s

Less than a two-year payback period is estimated for short-term recommendations made in this audit. It is highly recommended that the YAC and Byron Shire Council proceed with the implementation of all of the short-term strategies.

If dual flush toilets were converted in addition to the short-term strategies, the resulting payback period is about 4 years. Even though this is a little long, it is still considered a worthwhile project in this case. As a public venue, the YAC showcases the Council's image and role in the community as a sustainable user of water resources. Engaging Council staff to carry out installation works, wherever possible, could reduce the costs significantly.

Given that outdoor water use at the site is minimal at present, the installation of two (2) rainwater tanks cannot be justified. The option of installing tanks for flushing of toilets also appears to be cost-prohibitive and unnecessary at this stage, due in part to the relatively low annual water consumption.

The cost to install one (1) rainwater tank would be in the order of \$2,200. However, in terms of priority, the conversion of toilets to dual flush should take precedence over the installation of a rainwater tank, based on current water use practices. This situation could change in future, should outdoor water use by the YAC increase significantly. In this event, the installation of a single water tank might become cost-effective.

2 Demand Management Context

Rous Water promotes the efficient use of water by non-residential water customers in the Rous region and provides financial assistance for the implementation of works that result in a reduction in potable water use.

All non-residential water users such as small business, industry, public amenities, accommodation houses and schools are eligible for assistance under the program. The YAC is also eligible for funding under this scheme.

Financial assistance is available for projects that result in more efficient water use and the use of other water sources, such as reclaimed wastewater, rainwater and/or greywater, as a permanent substitute for potable water.

Financial Assistance

Projects are eligible for financial assistance of up to 50% of the cost of the water efficiency works. The actual water saving that results from the works limits the level of assistance. It is currently calculated using a value of \$3,500 for every 1ML per annum saved.

For example, for a project that reduces the demand on town water by 500,000 litres or 0.5ML per year, the calculated benefit would be \$1,750. This is therefore the maximum assistance that would be provided by Rous Water, or up to 50% of the capital cost of the scheme, whichever is the lower.

Free Water Audits

Free water audits are available to commercial and industrial water customers who qualify. From the water audit, a Water Tune-up Audit Report is produced, to assist the customer and Rous Water to identify possible water savings, benefits and costs.

Objectives

The main objectives of the non-residential assistance program are: -

- To raise the awareness of non-residential water customers about the benefits of conserving potable water and using it more efficiently.
- To show how each customer can contribute to the regional demand management strategy and have a positive impact on the future water supply strategy.
- To assist non-residential water customers to reduce their demand for potable water by providing water audits, advice about efficient water use and funding assistance, to carry out works that would result in water savings.
- To assist non-residential water customers to use alternative sources of water, where feasible.

What Do We Want To Achieve?

The initial target of the non-residential assistance program is to reduce potable water use by the top 25 water consumers in each Council area, by 20%, by 30 June 2006. The long-term target is to reduce potable water consumption by the top 250 water consumers in the Rous region, by 20%, by 30 June 2009.

3 Information

The YAC is located on crown land leased by the Byron Shire Council and managed by a Coordinator employed by the Council. Two other organisations share office space within the YAC complex, the Byron Youth Service and the Uncle Project. These organisations do not pay rent to the Council.

The YAC complex is bounded by melaleuca wetland to the south, playing fields to the west, the Sandhills Childcare Centre to the north and Gilmour Crescent to the east. There are areas of wetland and native bush further to the south and east, plus a small “rainforest” garden equipped with watering system, now out of commission, on the southwest corner of the YAC site.

The YAC Coordinator prepares a monthly maintenance audit for consideration by Byron Shire Council’s Property Manager and in this way, maintenance requests are actioned.

No specific funds have been set aside for carrying out water efficiency works arising from this water audit.

Outdoor Areas

A large number of people pass through the property, which lies at the end of Gilmour Crescent, bordering crown land with a mixture of wetland and bush areas. Illegal campers and the homeless occupy surrounding areas from time to time.

Security of the site, with respect to water supply and other fixtures, is therefore poor and difficult to manage. Existing outdoor taps, the fire hydrant, grease arrestor and gardens are fully accessible to people entering the site. Indoor areas of the YAC are also used by a large number of adults and young people every day throughout the year. The installation of rainwater tanks and/or other water saving features would need to take this limited opportunity for security into account.

4 Notes and Observations

Outdoor Areas

Amphitheatre

A large 1m² drain located in the amphitheatre to the north side of the YAC collects stormwater from the amphitheatre and surrounding area. The area is surrounded by native plant species so there is no watering of gardens. YAC staff report that the outdoor lawn area is also not watered.

Stormwater from the amphitheatre and the rest of the site drains to Gilmour Crescent and most probably, the bush beyond to the east. Care is therefore required when washing down outdoor areas or using water outdoors.

Rainforest Garden

A small garden is located in the southwest corner of the YAC site. The area is equipped with a watering system, which is currently not in use and in disrepair. Repairs would be required in order to operate the watering system again.

YAC staff indicated future plans to develop a vegetable garden and bush tucker plantings, in the south, southwest or northeast of the property. Protection of the proposed gardens, given the large number of people passing through the property, is likely to be an issue.

Rainwater Tanks

A number of locations around the YAC building would be suitable for a rainwater tank. The northeast corner and east side of the building would be the most suitable. Both locations have convenient alcoves in the building wall and stormwater down pipes very close by. The rear of the building on the south side would also be suitable, but YAC staff indicated that there are alternative plans for this area, possibly an extension or shed.

Front Awning

The awning at the front north of the building has a large surface area and would provide a good opportunity to harvest rainwater, if this were feasible. The canvas is dipping somewhat at present, due to past accumulation of water in some sections during rainfalls. YAC staff advised that the "sail" is due to be repaired soon. The design of the structure and sail makes conversion for rainwater harvesting challenging. The sail has "laced" edges and there are no downpipes on the support structure. One possible design would require a hanging and possibly, portable gutter, installed under the laced edges and secured to vertical support beams, diverting water to rainwater tanks. The cost of modifying the awning for rainwater collection is likely to be excessive.

Fire Hose Reel

Located on the northwest corner of the building. A check confirmed that the fire water supply is metered. YAC staff advise that visitors, campers and the homeless use the hose reel periodically. As the hose reel cannot be locked, for safety reasons, a solution to frequent use by visitors is required.

Office Toilets – Ladies

1 toilet, Fowler 3/6 litre dual flush, cistern mounted
1 basin, hot & cold water, no aerator

Office Toilets – Mens

1 toilet, Fowler 3/6 litre dual flush, cistern mounted
1 basin, hot & cold water, no aerator

Byron Youth Service – sink/kitchenette

Office located at south end of building.
Sink supplied with cold water only, new swivel faucet, aerator installed

Showers

There are no showers currently on the premises but YAC staff indicated that a shower could be installed in the future, possibly in the disabled toilet, to provide a hot shower for homeless people.

Washing Machines

No washing machines were identified on the site.

Summary

There are a total of eight (8) toilets located on the premises. Six (6) toilets are single flush only and consideration should be given to replacing these with dual flush models over time. The existing single flush toilets have wall-mounted, hidden cisterns, making monitoring and maintenance more difficult.

There are six (6) basins located on the premises and none are fitted with in-tap flow regulators or aerators. To conserve water when taps are left running, consideration should be given to fitting in-tap regulators or aerators into all taps or onto faucets to reduce flows to 6 litres per minute. In-tap flow regulators take the place of regular tap washers and allow water to flow at a predetermined rate, usually 6 litres a minute or less. Regulators rated at least 4 'Stars' or 4 'A' are recommended.

There are four (4) sinks located on the premises, three (3) in the main kitchen and one (1) in the Byron Youth Service kitchenette. One set of taps in the main kitchen is not fitted with any flow control and consideration should be given to fitting in-tap regulators or an aerator to reduce the flow to 8 litres per minute.

Aerators and other flow control devices for mixer (single lever) and regular taps can save up to half the water used normally. To have a comfortable flow in a bathroom basin, 5L/min litres per min is about right. This allows washing of hands and more is usually not required. In the kitchen, 8 litres per minute is recommended compared with the normal 15 litres used, because here you need to fill buckets and so on.

Aerators restrict the flow of water from the tap without reducing water pressure. An aerator can reduce the amount of water used by more than 50%. They come in a number of sizes and varying flow rates.

Aerators should be pressure compensating, which means they regulate the flow no matter how much the pressure is. This means that a 6 litre per minute flow regulated aerator will provide the same flow of water, even if the pressure goes up and down.

All tapware fixtures and fittings were in good order and no leaks were observed during the walk-through inspection.

There are two (2) urinals at the premises, one (1) out of order and the other is a waterless urinal supplied by Waterless (1800 351 359). Water use in urinals is therefore minimal. During the walk-through, the waterless urinal drain was partially blocked by a deodorising block. Care should be taken to ensure that the drain is not blocked, to permit the urinal to operate efficiently. Blocking the drain can actually cause the urinal to smell, blocking easy flow of urine into the treatment cartridge, which is contained in the drain. The treatment cartridge is filled with layers of liquid with different specific gravities, allowing urine to flow under the top layer, forming an air trap to minimising odours. The urine then flows directly to the sewer. The supplier confirms that deodorising blocks and/or other perfumed additives should not be used in the waterless urinal.

Irrigation activities at the YAC have been reduced to a minimum.

There is no regular water meter reading program currently in place, besides quarterly meter readings by Byron Shire Council. An assessment of water use at the site, outside business hours by visitors and the homeless, would be prudent.

There is no on-site leak detection program currently in place. The consistent water consumption over the past two years indicates that there is likely to be no major leak. A simple leak check would be worthwhile to confirm this.

At present, there is no rainwater harvesting on the site. A number of opportunities for using rainwater as an alternative water source were identified during the audit. A number of locations, suitable for the installation of rainwater tanks, were also identified. The YAC complex has a large total roof area, with several areas that drain separately to downpipes that could easily be diverted to tanks. The YAC complex has a corrugated style roof.

Use of harvested rainwater for flushing of toilets could also be further investigated, depending on funds available. A larger tank would be required to ensure adequate water supply for toilet flushing. A volume of 9,000 litres or more is recommended.

For irrigation, the tank, put on a platform, should not require a pump. A low-pressure hose outlet or filling a watering can directly from the tank would be sufficient. For toilet flushing, a pump and appropriate backflow prevention would be required.

Byron Shire Council and Rous Water offer rebates to residential town water customers who install rainwater tanks. However, as the property is non-residential and operated by Byron Shire Council, these rebates would not apply. However, funding would be available under Rous Water's non-residential assistance program (discussed in section 2).

5. Recommendations

5.1. Short Term Strategies

It is recommended that the YAC and tenants, with assistance from Byron Shire Council: -

- 5.1.1. Run a competition or activity to design and prepare stencils for the stormwater drain located in the amphitheatre at the front of the building. Similar to the signs used by Council on street gutters, the stencils would raise the awareness of visitors and staff, about where the stormwater drains to and caring for the surrounding environment.
- 5.1.2. Start a regular water meter reading and monitoring program. This would work best if incorporated in a regular activity for youth using the YAC facilities or a special "caring for the YAC" program. Regular meter reading would establish normal water consumption patterns and facilitate quicker and more accurate detection of misuse and hidden leaks. It would also provide data about water use before and after the implementation of any water efficiency works or changes to operating procedures. It would allow an assessment of water use by visitors out of hours, which could be used to develop future water management strategies.
- 5.1.3. Carry out a simple leak detection test at least twice yearly. This could also be incorporated in an activity for youth visiting the YAC. The test is performed by taking two (2) meter readings, at least one hour apart, during non-use periods, such as late at night or very early morning. Unaccounted consumption is considered leakage.
- 5.1.4. Check the flush volumes of the six (6) single flush toilets with wall-mounted cisterns. The results of this check will indicate whether replacement or conversion are warranted.
- 5.1.5. Install flow control @ 6 litres per minute to reduce flows at all hand basins. This could be done using in-tap flow regulators or aerators installed on faucets.
- 5.1.6. Install flow control @ 8 litres per minute to reduce flows at all sinks. This could be done using drop-in type regulators or aerators, installed in taps or faucets.
- 5.1.7. Stop the use of deodorising blocks in the waterless urinal. Perfumed blocks tend to block the urinal drain and can affect the proper operation of the treatment cartridge. Adding cleaners and/or other perfumed additives to the urinal can also damage the treatment cartridge and these should also be avoided.
- 5.1.8. Replace waterless urinal treatment cartridge after 15,000 uses.

- 5.1.9. Assess the use of water by visitors and the homeless, accessing the YAC out of hours and use this information to guide future water management strategies.
- 5.1.10. Provide a dedicated tap/hose for use by visitors, campers and the homeless, rather than allowing use of the fire hose reel. The flow through the hydrant is much higher than that through a standard tap/hose. A dedicated tap/hose would most likely result in reduced water use.

5.2. Long Term Strategies

It is recommended that the YAC and tenants, with assistance from Byron Shire Council: -

- 5.2.1. Replace remaining single flush toilets with 3/6 litre dual flush models. The selected models should be easy to monitor and maintain.
- 5.2.2. Install a rainwater tank or tanks to supply water for all existing and future outdoor uses, including cleaning, occasional watering of the future vegetable garden and establishment of bush foods. The tank/s could source water from a number of separate sections of the roofed area. The best sites are the northeast corner and east side of the building. Given the space available and outdoor water requirements, two tanks, 2500 to 4500 litres each, would be sufficient for the above purpose.
- 5.2.3. Investigate the use of harvested rainwater for flushing of toilets.
- 5.2.4. While there are no showers in the complex at this stage, YAC staff indicated that a shower might be installed in the future. Any showers installed at the premises should be at least AAA-rated and vandal proof.

6. Estimated Current Water Costs & Charges

Byron Shire Council has provided history of water consumption. The totals are compiled purely for the purposes of establishing an average annual pattern, thus forming a benchmark for future budget and as a basis of this study.

Property Details

Meter No: MX33583 (green pit east of YAC)
Assessment No: 1097781 (Byron Shire Council)

Estimated Usage

19/8/03 to 30/7/04	642kL/a	1.76kL/d
30/7/094 to 28/7/05	637.5kL/a	1.75kL/d

Average usage adopted for this study = 640kL/a

Costing basis

The YAC is charged for each kL of water consumed and then for each kL of wastewater discharged to sewer. The volume discharged is assumed to be 75% of the water consumed. This so-called 'discharge factor' is incorporated in the sewer discharge rate and the charge is calculated using the water consumption multiplied by the rate.

- (a) \$1.08/kL for water "in", measured through meter
- (b) \$0.81/kL for sewage discharge "out", based on kL of water "in"

Current total cost per kL of water = \$1.89/kL

Hence, for each 1kL of water saved, the financial saving is \$1.89.

7. Estimated Savings and Implementation Costs

An estimated total annual usage of 640kL (refer to section 6) is used as a basis for this study.

Estimated Water Savings

Estimated total water usage = 640kL/a

Estimated achievable savings = 20% = 640kL/a x 0.20 = 128kL/a

Estimated dollar savings = 128kL/a x \$1.89/kL = \$242/a

The estimated cost saving is \$242 per year. This is based on a conservative estimate of reducing water consumption by 20% after implementing the short-term strategies listed below. The actual savings could be much higher than this, however, this is the best estimate with the information currently available.

If single flush toilets were converted or changed to dual flush, in addition to the short-term works, the water savings could increase by another 20-30% to approximately 288kL/a and a cost saving of \$545 per year. The total cost of the works would increase to about \$3,200.

If all short-term and long-term strategies were implemented, including flushing of toilets with rainwater, water consumption could be reduced by a total of 50-60%, depending on what work was done. This would result in water saving of up to 385kL/a and a potential cost saving of about \$725 per year. A more accurate assessment of visitor numbers and water use by visitors after hours would also be required to predict savings more accurately.

Estimated Implementation Costs

Short-term Strategies (section 5.1)

	Recommendation	Description	Est. Cost (\$)
1	“protect stormwater” stencils at main drain	incorporate in YAC activities materials \$60	60
2	Meter reading program	incorporate in YAC activities	0
3	Leak detection test twice yearly	incorporate in YAC activities	0
4	Check the flush volumes of the six (6) single flush toilets	Rous Water and/or Byron Shire Council staff could assist	0
5	In-tap flow regulators (6 L/min) at hand basins	e.g. Jemflo A+ drop-in type 10 off @ \$12.75 materials = \$127.50 10 off @ max 10 mins each @ \$66/hr labour = \$110.00	250
6	In-tap regulators (8 L/min) or aerators at sinks	2 off @ \$12.75 materials = \$25.50 2 off @ max 10 mins each @ \$66/hr labour = \$22	50
7	Maintenance and monitoring of waterless urinal	Should be covered by existing cleaning contract	0
8	Dedicated tap/hose for	Hose, nozzle, signs - \$60 materials	310

	use by visitors & homeless	existing tap – labour nil new tap – labour/materials \$250	
9	Assess the use of water by visitors and the homeless, accessing the YAC out of hours.	Incorporate in meter reading program	0
Total			670

The estimated total cost of the recommended short-term strategies is \$670. Some of the recommendations could be incorporated in everyday YAC activities and/or adapted to existing or new education programs. Byron Shire Council plumbing staff could assist with the installation of flow regulators and tap fittings. In these ways, the cost could be significantly reduced.

Long-term Strategies (section 5.2)

	Recommendation	Description	Cost (\$)
1	Replace remaining single flush toilets with 3/6 litre dual flush models.	Significant changes would be required to convert single flush toilets to dual flush. Flush converters are also available for this job. 6 off @ \$200 toilet suites min 12 hrs @ \$66/hr labour pipework & materials \$500	1200 792 500
2	Install a rainwater tank or tanks to supply water for all existing and future outdoor uses	2700L Poly tank - \$650 4500L Poly tank - \$900 2 tank stands \$900 first flush diverters 2 off @ \$50 each = \$100 pump (if required) \$350 Additional charges: delivery, installation of stands & tanks, plumbing, guttering = \$1,500	650 900 900 350 1500
3	Use of harvested rainwater for flushing of toilets	Significant changes to plumbing and a pump would be required. Cost is approximate only.	3500
Total			10,292

The estimated total cost of the recommended long-term strategies is over \$10,000. The costs are approximate only and a detailed assessment of each job and formal quotes would be required in order to calculate the costs more accurately. Byron Shire Council staff could assist with the installation of tanks and plumbing work, potentially reducing the cost significantly.

8 Conclusion/s

The estimated cost of implementing short-term strategies is \$670 and the potential saving is \$242 per year. This is based on an estimate of reducing water consumption by 20% (128kL/a) as a result of the short-term works. Funding of \$335 (or 50% of the cost of the works up to \$448) would be available from Rous Water, based on these estimates.

A two-year payback period is therefore estimated for short-term recommendations made in this audit. It is highly recommended that the YAC and Byron Shire Council proceed with the implementation of all of the listed short-term strategies.

If single flush toilets were converted or changed to dual flush, in addition to the short-term strategies, the water savings could increase by another 20-30% to approximately 288kL/a and a cost saving of \$545 per year. The total cost of the works would increase to about \$3,200. Funding of about \$1,000 would be available from Rous Water, reducing the actual cost about \$2,200 and a payback period of about four (4) years.

Given the margin of error involved in these estimates, the resulting payback period of about 4 years is still considered worthwhile in this case. The YAC is a public venue and as such, other factors such as Council's image and role in the community as a sustainable user of water resources, need to be taken into account. Further, engaging Council's own staff to carry out installation works, wherever possible, could reduce the costs significantly.

Given that outdoor water use at the site is minimal at present, the installation of two (2) rainwater tanks cannot be justified. The option of installing tanks for flushing of toilets also appears to be cost-prohibitive and unnecessary at this stage, due in part to the relatively low annual water consumption.

If only one tank were installed, the cost would be in the order of \$2,200.

However, in terms of priority, the conversion of toilets to dual flush should take precedence over the installation of a rainwater tank, based on current water use practices. This situation could change in future, should outdoor water use by the YAC increase significantly. In this event, the installation of a single water tank might become cost-effective.

If all short-term and long-term strategies were implemented, including flushing of toilets with rainwater, water consumption could be reduced by a total of 50-60%, depending on what work was done. This would result in water saving of up to 385kL/a and a potential cost saving of about \$725 per year. The total cost of the works would be about \$11,000 and Rous Water could contribute up to \$1,350 under its non-residential assistance program. A more accurate assessment of visitor numbers and water use by visitors after hours would also be required to predict savings more accurately.