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Mapleton and District Community Association Waste Water Pump Out Options Paper for Homeowners

This paper has been developed to explore options to reduce the pump out costs for those properties destined to always require pump out services. Reducing pump out also reduces the adverse environmental footprint associated with trucking waste off the range.

Whilst this paper has been written using the best available knowledge it is meant to inform and not to be used as a definitive document in any discussion with any authority and/or individual. MADCA takes no responsibility for how this document is used.

MADCA will continue to help lobby to have more options for homeowners in the community, where pump out costs have become a burden.

Contents

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Background

Many residents in the Mapleton and District have no current alternative than to continue to pay for pump out of septic waste. The cost of pump out will continue to increase as fuel and transport costs increase.

The heavy trucks travelling up and down the range increase wear and tear on the roads and contribute to environmental CO2 loading (around 150 tons per annum just on fuel consumption with total footprint around 30,000 tons – see Attachment 2).

Multiple companies are now in use and nearly every day there are pump out trucks on the town streets. Some streets get multiple visits in a day which can inconvenience traffic.

One option is to have an onsite treatment system. This is expensive and currently only allowed when the properties have a land and environment capacity to disperse the volume of treated water. The calculation of system size and capacity is generally a multiple of the number of bedrooms on the property.

SCRC have been assisting residents (through David Law) to have desk top assessments completed for treatment systems. To date (8 Feb 2023) these assessments have been for complete systems to replace pump outs. There are other options that could be considered in the desk top assessment.

For those who cannot afford or are not permitted to install complete treatment systems a use of hybrid systems could provide savings. Reducing pump out volume by 50% would save between $700 and $7,000 per annum depending on the number of people in the household.

For those people who have both a pump out requirement and a need to buy water in dry times there are further savings to be made – including reducing the carbon footprint for those trucks hauling water up the range.

This paper explains some of the options that are believed to be permitted under current Qld standards and guidelines, and advice from SCRC plumbing regulators.

Further benefits in reducing pump out frequency and volume: more water stays in the environment where the rain falls (all properties on the Range rely on rainwater), and the processing load for Unity Water sewerage out of Nambour is reduced by thousands of litres a month.

A guide in the following section is provided to help homeowners determine what option(s) may be best for them. The guide includes the relevant Section numbers within this document for further information.

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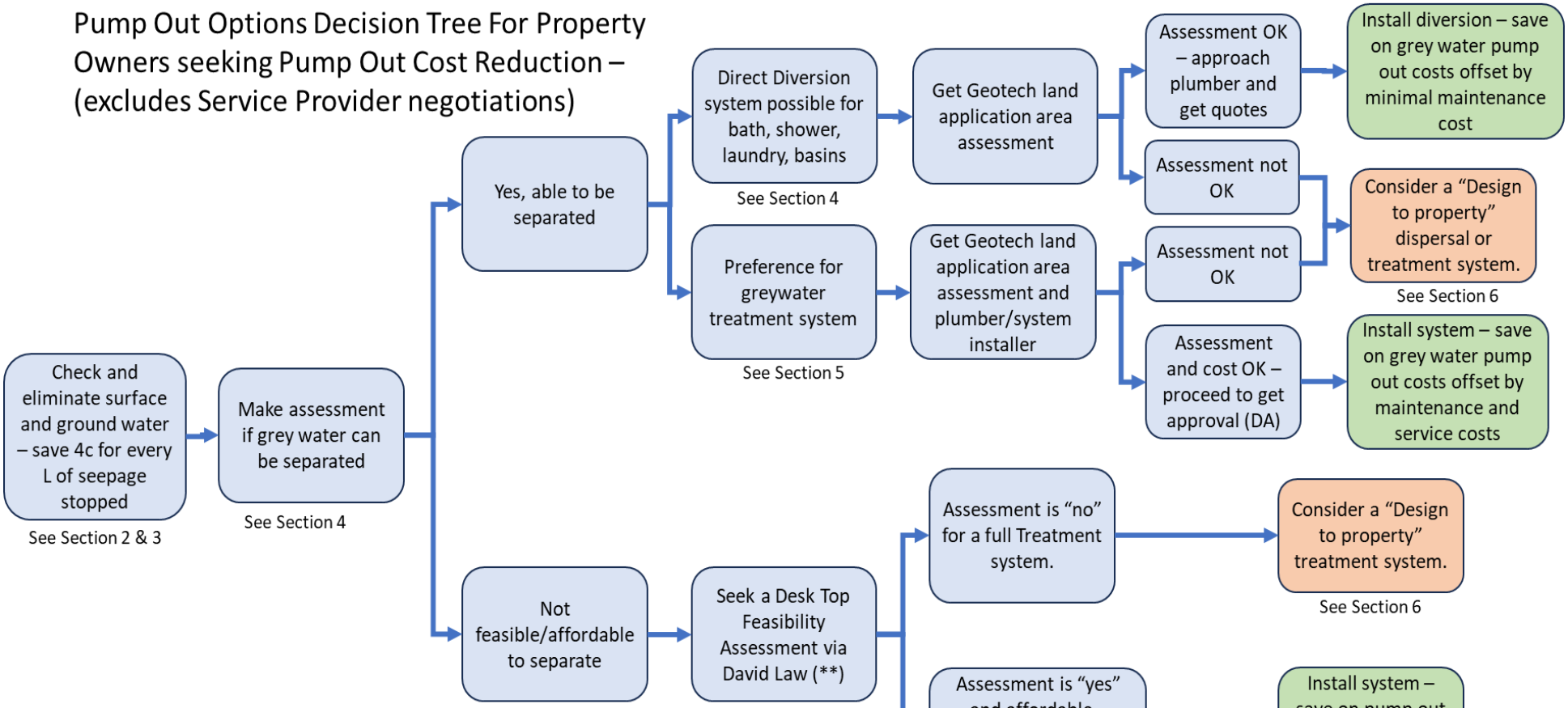
Guide for Homeowners

Pump Out Options Decision Tree For Property Owners seeking Pump Out Cost Reduction – (excludes Service Provider negotiations)



** A desk top assessment of the property is made by SCRC staff against the requirement to handle the full design load for waste dispersal. It would be better if the assessment also addressed grey water feasibility (different setbacks apply) and provided an indication as to what volume of waste could be dispersed on the property.

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1. Total House use and Grey Water vs Black Water

Most houses established with mandated pump out requirements through the planning process or subsequently when required to upgrade old septic systems, have all waste water going to the septic and/or holding tank for pump out. The waste water is made up of "Grey Water" – from laundry, basins, showers, baths and kitchens [1]; and Black Water – from kitchen and toilets. (Note Kitchen water can go to a Grey Water system but needs to go through a grease trap first).

An average daily water use was 149L per person as recorded by Unity Water in SE Qld (2021).

In the Mapleton District the average daily use is much lower because most people are conscious of water usage, being reliant on tank/rainwater. A typical breakdown of water for a household is as follows – making no allowance for garden watering:

Household Usage Breakdown - People in household		1	2	3	4	5	6
	Grey Water (Shower, Laundry, Basins)	45	90	135	180	225	270
	Toilet (5 flushes per day per person)	23	45	67.5	90	112.5	135
	Kitchen & other	33	65	97.5	130	162.5	195
	Total usage excluding external use	100	200	300	400	500	600
	Pump outs per annum	9.125	18.25	27.375	36.5	45.625	54.75
	Cost per annum at $175 per service	$1,596.88	$3,193.75	$4,790.63	$6,387.50	$7,984.38	$9,581.25

The table above shows the total annual cost for a pump out that takes all wastewater from the household. **(Note: This does not take into account ground water leaking into septic and/or pump out holding tanks – many households are adversely impacted by this and need to pump out more frequently than indicated above).**

The cost per litre for a pump out service (as at October 2023) ranges between 4 and 5 cents per litre[2]

[1] Definition from QPWCode 2019 Version 1 Page 6

[2] Based on residents citing $165 as the cheapest pump out service and up to $200 for a 4,000L pump out.

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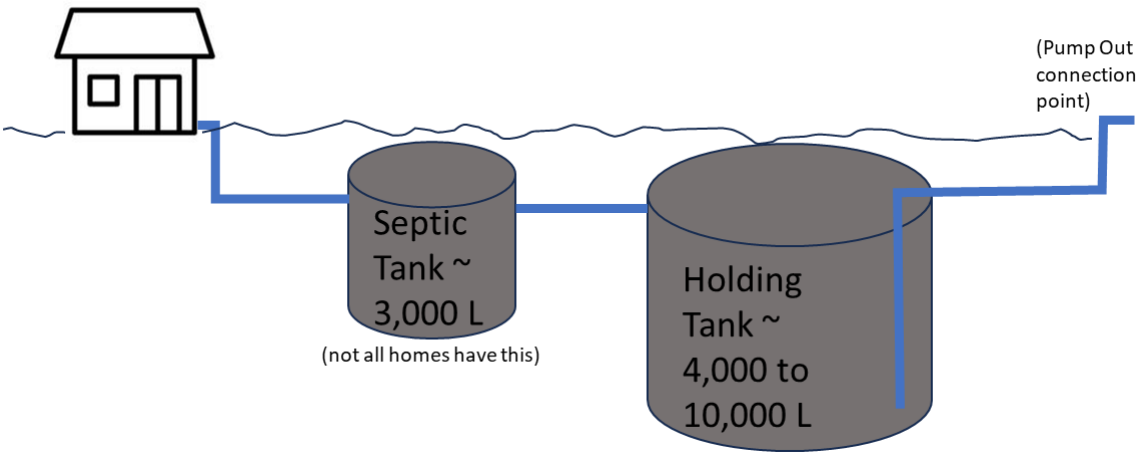
2. Before Starting 1 – How to tell if you are paying to pump out rain water.

The typical construct of a property with pump out is as depicted below:



Many properties are paying to have rainwater and ground water pumped out – at 4 to 5 cents per litre. Why?

- Surface rainwater and ground water seeps into the wastewater system:
  - Around manholes in the top of concrete underground tanks,
  - Around the lids of underground septic and holding tanks,
  - Around the fitting going into and out of those tanks.
  - Into cracked and broken underground pipes
- In a wet times the seepage can be thousands of litres a month – yes hundreds and even thousands of dollars a year wasted.
- It is not unusual to have this problem because over time the soil has moved, dislodging pipes and seals, tree roots get into pipes and septic systems, and older septics were not well sealed in the first place.

How to tell?

- Monitor your pump out volumes over a six month period, noting when there was rain during the period and the number of people in the household at the time – see if there is a correlation between wet times and high, or more frequent pump outs.
- If you are going away for a week or more, measure the amount in the holding tank before you go and after you come back – if there is a significant increase and it has been raining – you most likely have a seepage problem.
- An alternative when going away is to have your tank pumped out just before you go away, and again when you come back (if it rained significantly whilst you were away) – make some special arrangement with the pump out operator.
- The best way (but not cheapest) would be to install a tank level monitoring gauge – see “Before Starting 2” next section.

To rectify any seepage, you will need a plumber and/or a keen handyman to excavate all pipes, over septic and holding tanks and around their lids. Any repairs or new works should be done by a plumber.

3. Before Starting 2 – How can you optimise the pump out and avoid extra costs?

If you have had a recently installed pump out system, then it is likely you will also have a level monitor that flashes when you have reached the level requiring a pump out. Most properties are not fitted with these monitors and hence it is difficult to tell whether a pump out is due/needed.

Why you might benefit from a tank level monitor:

- If your pump out exceeds the set amount for the standard fee (e.g. in most cases this is 4,000L), then any additional volume pumped out to empty your tank will attract an additional fee. (unless you are charged a fixed $ per litre)
- If you have less than the set pump out amount, you will be charged a standard fee and hence be paying for more than you have pumped out. (unless you are charged a fixed $ per litre)
- To determine if you have rain or surface water leaking into your tanks – see previous section.
- To remove the stress associated with trying to judge whether a pump out is needed or not, depending on estimated usage.

Tank level monitors are available to suit septic holding tank systems. The mechanical style using a float or sensor in the liquid are mostly not suitable for septic systems due to the solid material and potential to collect debris. Ultrasonic or radar type sensors are the preferred ones.

These are available – see Attachment 4 for some examples. Price ranges from around $100 to $500 depending on what functionality you want and whether you may also wish to monitor multiple tanks – e.g. your rainwater tanks.

Provided it is set up correctly (with tank dimensions), the systems can be quite accurate, allowing you to verify the amounts metered by the pump out service operator.

Most systems will also allow you to set high level indicators and/or alerts – so plenty of advance warning to make the pump out service call.

4. Option 1 – Divert all Grey Water to use on site

This is an option only for those houses where grey water can be accessed and diverted prior to mixing with waste from toilets. The option is not viable where houses are on slabs with all under slab aggregation of waste.

QPW Code requirements for grey water

Under the QPW Code definitions the direct diversion of grey water is one option under the definition: "**Grey water use facility** means a facility consisting of: (a) a greywater diversion device and a land application area; or (b) greywater treatment plant, with or without a land application area"

F1.2 of the Code "Grey Water Use Facility" sets out the functional requirements to be met including not endangering health, contamination, pollution, allow maintenance etc. See Attachment 3. The

Code further sets out the requirements for a "land application area" and specifies that it must comply with AS/NZS 1547:

"D1 The design of a land application area must take into account a site and soil evaluation report produced as a result of an on-site inspection carried out in accordance with AS/NZS 1547."

AS/NZS 1547 seems to require soil profile testing as well as visual assessment and measurements. This means it is beyond most property owners to perform this assessment and would require a geotechnical professional. In the potential savings calculation we have assumed $1,000 for an inspection and report.

The Code indicates that "grey water" can be directly diverted to a land use area – without a treatment system. "grey water" in the Code definition includes water from the kitchen.

It may be the author's interpretation of the Code – but it does not specify grease trap and/or treatment for kitchen water under direct diversion. This seems to be incorrect. As a minimum kitchen water would most likely require at least a grease trap. In the calculations on potential saving the assumption is that kitchen water would still go to the pump out.

The Code seems to be silent on the number of litres per day per person that the land application area has to absorb for direct diversion, however it does state 100L per day per person for a grey water treatment system.

The Code also specifies the setback distances for grey water diversion facility – and they are much less than for a treatment system. This means more blocks would meet the criteria.

Grey Water Diversion Potential Savings Conclusion

- Direct diversion of grey water from baths, showers, laundry and basins is permitted
- A geotechnical assessment is required for the land application area – where the grey water is to be dispersed
- Dispersal has to meet the requirements of the Code – drippers, sprinklers etc.
- Direct diversion of kitchen water is not included in the assessment due to it needing additional treatment

Excluding the investment cost to set a direct diversion system up the potential savings are as set out below:

Option 1 - Grey Water Diversion - potential saving	1 person	2 people	3 people	4 people	5 people	6 people
Toilet (5 flushes per day per person)	22.5	45	67.5	90	112.5	135
Kitchen & other	32.5	65	97.5	130	162.5	195
	55	110	165	220	275	330
Pump outs per annum	5.01875	4.015	6.0225	8.03	10.0375	12.045
Cost per annum at $175 per service	$ 878.28	$ 702.63	$1,053.94	$1,405.25	$1,756.56	$2,107.88
Saving per annum	$ 718.59	$2,491.13	$3,736.69	$4,982.25	$6,227.81	$7,473.38

The investment cost will depend on the individual property. For example:

- a high set home with accessible plumbing under floor will require much less work to divert relevant waste water than will a house on a slab or a two story house.

- A gravity based system may be possible where the land application area is downhill from the house, as opposed to a system requiring a holding tank and pump.

Investment Costs items to consider:

- Geotechnical land application area assessment.
- Plumber to install the waste intercept and diversion system.
- Cost of material and labour to install the dispersal system.

Grey Water Diversion – steps for property owners

1. Make an assessment (or get someone to assist) as to whether your house is suitable for direct diversion of grey water (i.e. grey water can be accessed) and you have some suitable land for the land application area. The assessment could also include reviewing your past pump out bills, volumes and frequency to determine your starting position and how much you might save. If you think it is a possibility then Step 2.
2. Seek a geotechnical assessment of the land application area to determine whether it is suitable and meets setback requirements etc.
3. Engage a plumber to quote for a direct diversion system.

Note: See Footnote[3]

5. Option 2 – Grey Water Treatment Plant

This is an option only for those houses where grey water can be accessed and diverted prior to mixing with waste from toilets. The option is not viable where houses are on slabs with all under slab aggregation of waste.

There are two potential benefits over Option 1 depending on the specific property, treatment system and investment:

- Ability to remove kitchen water from pump out
- Ability to save water by recirculating grey water through toilets

There are many different types of approved grey water treatment systems available, some of which are also approved for recirculating the water through toilets.

Installation of such systems requires:

- an assessment of the land application area (per Option 1) – with more onerous setback distance from boundaries
- an assessment of the property for placement of the treatment system
- alteration to waste plumbing to divert all “grey water” to the system
- regular inspection of the installed system (quarterly or annually depending on the type of system).

[3] In the SCRC desk top assessments on property feasibility for treatment systems it would be beneficial that they consider and provide feasibility for grey water as well as an indication of the volume that the property could handle – even if it is not the design load. (See Section 6) To be noted is that grey water diversion land application area set back distances are much less than a treatment system – has this been considered?

Option 2 - Grey Water Treatment - potential saving	1 person	2 people	3 people	4 people	5 people	6 people
Toilet (5 flushes per day per person)	22.5	45	67.5	90	112.5	135
Total pump out	22.5	45	67.5	90	112.5	135
Pump outs per annum	2.053125	1.6425	2.46375	3.285	4.10625	4.9275
Cost per annum at $175 per service	$ 359.30	$ 287.44	$ 431.16	$ 574.88	$ 718.59	$ 862.31
Saving per annum	$1,237.58	$2,906.31	$4,359.47	$5,812.63	$7,265.78	$8,718.94

Note the above savings will be offset by servicing and maintenance costs of the treatment system.

Option 2A – Grey Water Treatment & Recirculating

This is an option for those who have access to both grey water and the ability to access plumbing to their toilets and even laundry (for washing machine). It is most relevant for those who may be buying water and/or thinking of outlaying money to increase rainwater storage capacity.

Approved treatment systems are permitted to recirculate the treated water to use for flushing toilets. It does not save any on pump out (the same amount of water is used in toilets), however it does save if the residents need to purchase water. Purchase cost is about 2.5c per litre delivered to Mapleton.

Potential saving will only occur during dry times – say 4 months of the year and is probably relevant for households of 3 or more people. For a household of 3 people, it could potentially save them one full water delivery, although actual saving will be very dependent on the amount and timing of rain.

A recirculating system should also reduce the required land application area required, and hence allow such systems to be installed on more urban blocks, whereas at present those blocks are deemed unsuitable for full septic treatment systems.

Option 2A - Grey Water Treatment & Recirculating - pot	1 person	2 people	3 people	4 people	5 people	6 people
Toilet (5 flushes per day per person)	22.5	45	67.5	90	112.5	135
Total pump out	22.5	45	67.5	90	112.5	135
Pump outs per annum	2.053125	1.6425	2.46375	3.285	4.10625	4.9275
Cost per annum at $175 per service	$ 359.30	$ 287.44	$ 431.16	$ 574.88	$ 718.59	$ 862.31
Rain Water Saving			$ 205.31	$ 273.75	$ 342.19	$ 410.63
Saving per annum	$1,237.58	$2,906.31	$4,564.78	$6,086.38	$7,607.97	$9,129.56

Note the above savings will be offset by servicing and maintenance costs of the treatment system.

Investment costs will be higher for Treatment systems, than for direct diversion. Investment costs to consider:

- Geotechnical land application area assessment.
- Treatment system supply and installation
- Plumber to install the waste intercept and diversion system and recirculating system.
- Cost of material and labour to install the dispersal system.

Note: See Footnote [4]

[4] In the SCRC desk top assessments on property feasibility for treatment systems it would be beneficial that they consider and provide feasibility for grey water as well as an indication of the volume that the property

More information on Grey Water diversion and approved treatment systems refer to https://www.business.qld.gov.au/industries/building-property-development/building-construction/plumbing-drainage/greywater

could handle – even if it is not the design load. (See Section 6) To be noted is that grey water diversion land application area set back distances are much less than a treatment system – has this been considered?

6. Option 3 – Combined Treatment and Pump Out or "Design to Property Capacity"

In this option the design allows the maximum diversion and/or treatment and dispersal on site to the maximum the site can handle, with any excess being pumped out.

This option has not (to the author's knowledge) been previously considered, but is permitted (according to SCRC regulator advice), provided the total design load of effluent can be reliably handled.

Such option may result in significant reduction or even elimination of pump out costs, especially for single and 2 person households (which seem[5] to be the majority in the Mapleton District). It could also significantly reduce the cost for large families.

The assessment is relevant for both grey water and full waste treatment systems.

At present the capacity of a property to allow a treatment system is based on a requirement to be able to treat and disperse waste water at the rate of 100L per person per day – for grey water only. The author could not readily find in the new Code the rate for a full blown waste water management system – the assumption taken is that it is as per the old code at 300L per bedroom.

Using these figures the treatment system capacity and land application area would need to handle:

Sizing of Treatment Systems according to the Code		Number of bedrooms			
	Design System Size in L per day	2	3	4	5
	Waste Water - Total	600	900	1200	1500
	Grey Water	400	600	800	1000
	Typical 2 person actual in L per day				
	Waste Water	200	200		
	Grey Water	155	155		

The above also shows the more typical average water consumption/waste rates.

According to 2021 census more than 70% of homes in the Mapleton area are 3 bedroom or less.

Thus the design capacity is 3 to 4.5 times the actual use the majority of the time. The design criteria would result in properties being deemed unsuitable for an on site treatment system, IF the system was to handle 100% of the effluent ("design load").

A design could be done for a treatment system to the capacity of the property, with a diversion to pump out when the volume in any one day exceeded the application area capacity. I have dubbed this a "Design to Property Capacity" system.

For example – a 2 person, 3 bedroom home may be on a property that could support a small 100L (5 x 20L buckets) per day treatment system and land application area. Their actual use would be around 300L per day, hence they could disperse on site 1/3 of their waste and save 1/3 of their pump

[5] Based on Mapleton 2021 census – average people per household is 2.1.

out costs. More details in the following table where the assumption is that waste is 100L per person per day.

System Design to Property Capacity - Pump Out Litres								
	Treatement System Capacity L per Day	100	150	200	250	300	350	400
	1 person	0						
	2 people	100	50	0				
	3 people	200	150	100	50	0		
	4 people	300	250	200	150	100	50	0
System Design to Property Capacity - Pump Out Saving								
	1 person	$1,596.88	$1,596.88	$1,596.88	$1,596.88	$1,596.88	$1,596.88	$ 1,596.88
	2 people	$1,596.88	$2,395.31	$3,193.75	$3,193.75	$3,193.75	$3,193.75	$ 3,193.75
	3 people	$1,596.88	$2,395.31	$3,193.75	$3,992.19	$4,790.63	$4,790.63	$ 4,790.63
	4 people	$1,596.88	$2,395.31	$3,193.75	$3,992.19	$4,790.63	$5,589.06	$ 6,387.50
Note - for the shaded cells this is the maximum saving based on no one day exceeding the limit.								

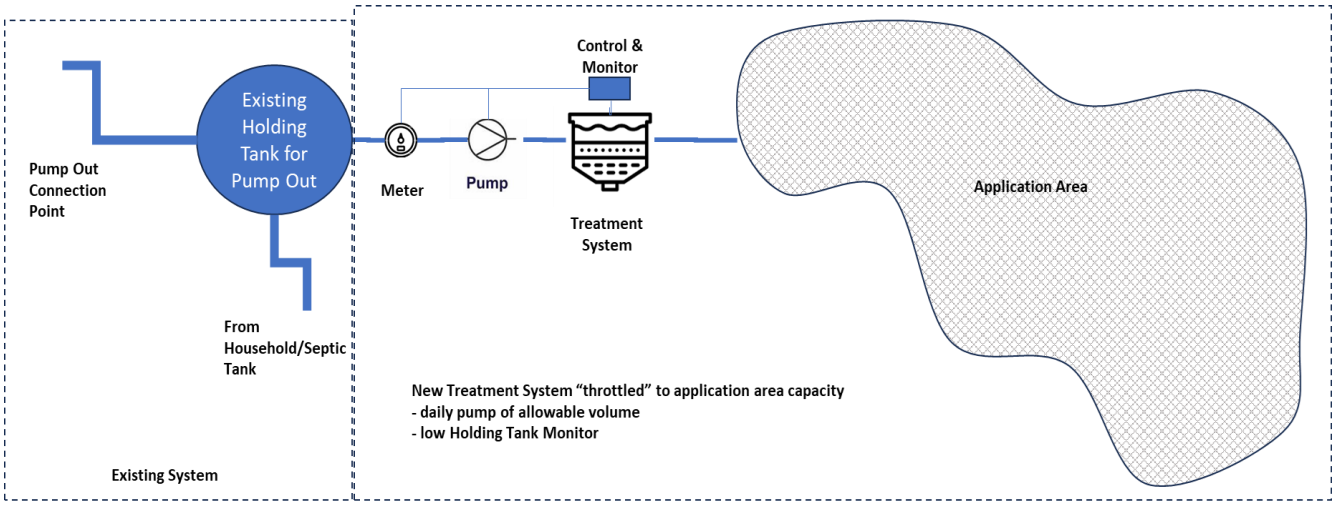
This shows that just a 100L per day treatment system could eliminate pump out costs for a single person living in a three bedroom house, whilst a 400L per day treatment system could eliminate pump out costs for a 4 person household – regardless of the number of bedrooms. This is compared with the design criteria that mandates a circa 1200L per day requirement.

If the approach outlined was adopted and the treatment systems affordable (or subsidised) it is conceivable that more than 2/3[6] of current pump outs could be eliminated. The total potential savings:

- to individuals: 300 pump out properties at monthly pump out = $630K to $1m
- The saving to Unity Water on treatment of 14 to 18 Mega Litres of Waste
- The saving on greenhouse gas emissions: around 20,000 tons per annum in transportation.
- Improved safety with fewer trucks up/down the range
- Reduced wear and tear on State Managed roads and local council roads due to heavy trucks on minor streets
- Environment improvement through allowing water to enter the environment where it fell as rain.

Possible System Design:

[6] Based on Mapleton 2021 census – average people per household is 2.1 and 36.4% of the population is over 65. Older people are smaller users of water and 50% of households are less than 2.1 people.



Conceptual Design to Property System utilising treatment and pump out

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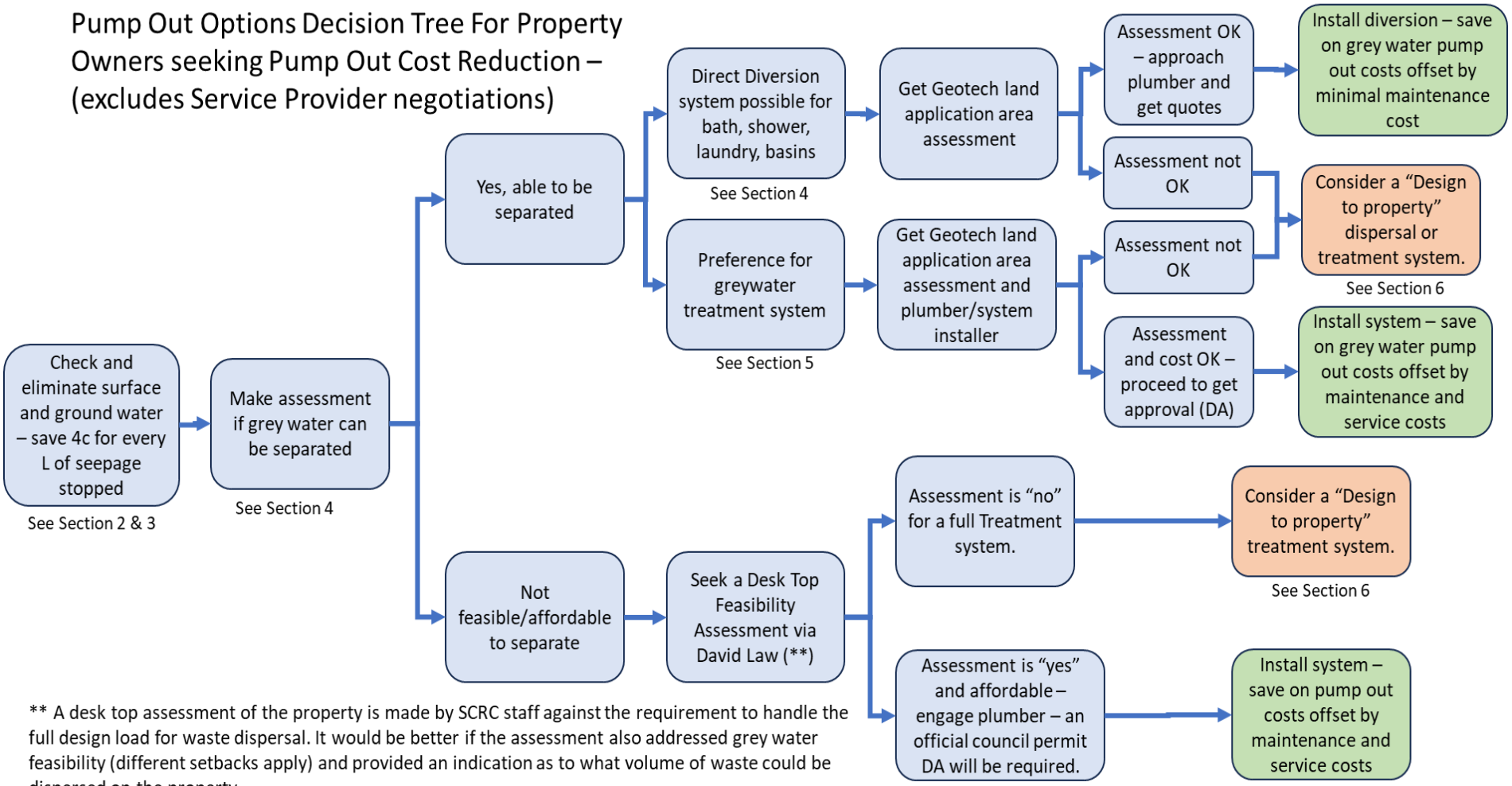
Attachment 1: Decision Tree for home owners



** A desk top assessment of the property is made by SCRC staff against the requirement to handle the full design load for waste dispersal. It would be better if the assessment also addressed grey water feasibility (different setbacks apply) and provided an indication as to what volume of waste could be dispersed on the property.

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Attachment 2: Calculation of CO2 produced by pump out trucks

Average distance for a return trip to Nambour/Mapleton/Flaxton/Montville – 35 km

Average Consumption of a 10 ton tare truck – 30L/100km

Litres consumed per trip – 10.5L

Number of trip per annum (Assume 450 pump out on the range, with monthly servicing)

= 450 *10.5*12 = 56,700 Litres.

Equivalent kg of CO2 produced: 2.68*56,700 = 151.956 tons of CO2. (This does not include CO2 produced in the manufacture of the vehicle, its servicing, repair and tyres).

(**Note** The calculator for total CO2 footprint of an equivalent truck according to https://8billiontrees.com/carbon-offsets-credits/carbon-ecological-footprint-calculators/truck-co2-emissions-per-km-calculator/ is 158kg per km. This would make the total footprint 29,882 tons of CO2).

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Attachment 3: Grey Water Use Facility (extract from QPW Code Version 1 2019)

F1.2 Greywater Use Facility

Performance requirements

P1 A greywater use facility must be designed, constructed, installed and maintained:

(a) to protect public health by ensuring that risks associated with the use and/or disposal of greywater to the land application area are minimised; and

(b) protect the environment by ensuring:

(i) surface, ground water and waterways are not polluted; and

(ii) soil productivity is maintained or enhanced.

(c) with adequate treatment and storage capacity for the volume of waste and frequency of disposal;

(d) with adequate size, strength and rigidity for the nature, flow rates, volume of wastes and/or waste products which must be processed;

(e) with adequate vehicle access for collection of waste from the facility;

(f) to avoid the likelihood of contamination of any drinking water supplies;

(g) from materials which are impervious both to the waste for which disposal is required and to water;

(h) to avoid the likelihood of foul air and gases accumulating within or entering into buildings or nearby premises;

(i) to avoid the likelihood of unauthorised access;

(j) to permit cleaning, maintenance, measurement and performance sampling;

(k) to avoid the likelihood of surface water and stormwater entering the system;

(l) to avoid the likelihood of unintended or uncontrolled discharge;

(m) to permit the manufacturer, model, serial number and designed capacity to be reasonably easily identifiable after installation;

(n) to minimise nuisance (e.g. noise) to the occupants of nearby premises; and

(o) so that the installation throughout its design life will continue to satisfy the requirements of items (a) to (n).

Deemed-to-satisfy solutions

D1 Greywater that is treated in a closed loop greywater treatment system must be used for the purpose, and comply with the requirements, set out in Table T1.

D2 The design, commissioning, installation, performance and compliance testing of a greywater treatment plant, other than a closed loop greywater treatment system, must be in accordance with AS/NZS 1546.4.

D3 Disposal of greywater to a land application area must comply with F1.3 of the QPW code.

D4 The greywater use facility must be operated and maintained in accordance with the designer's or manufacturer's instructions.

D5 The design, construction, installation, replacement, repair, alteration and maintenance of all sanitary plumbing and drainage systems for a greywater use facility must be in accordance with AS/NZS 3500.

D6 All work for a greywater treatment plant must comply with the treatment plant approval.

F1.3 Land application area

Performance requirements

P1 A land application area must be designed, constructed, installed and maintained in such a manner as to:

(a) complete the treatment, uptake and absorption of the final effluent within the boundaries of the approved application area;

(b) avoid the likelihood of the creation of unpleasant odours or the accumulation of offensive matter;

(c) avoid the likelihood of the ingress of effluent, foul air or gases entering buildings or nearby premises;

(d) avoid the likelihood of stormwater run-off entering the pipes;

(e) avoid the likelihood of root penetration or ingress of ground water entering the pipes;

(f) protect against internal contamination;

(g) provide adequate access for maintenance;

(h) incorporate adequate provisions for effective cleaning;

(i) avoid the likelihood of unintended or uncontrolled discharge;

(j) avoid the likelihood of blockage and leakage;

(k) avoid the likelihood of damage from superimposed loads or ground movement;

(l) avoid the likelihood of contamination of any drinking water supplies;

(m) avoid the likelihood of contamination of soils, ground water and waterways; and

(n) ensure that the installation throughout its design life will continue to satisfy the requirements of items (a) to (n).

Deemed-to-satisfy solutions

D1 The design of a land application area must take into account a site and soil evaluation report produced as a result of an on-site inspection carried out in accordance with AS/NZS 1547.

extract from https://d39d3mj7qio96p.cloudfront.net/media/documents/BU637-domestic-onsite-foul-water.pdf

(5.1.1 Site investigations for an effluent disposal system must consider the following:

∫ Nature of the subsoil, including percolation rates and stability. Note that AS/NZS 1547:2012 relies on soil profile inspections whereas AS/NZS 1546:2008 relies on the percolation test.

∫ Site characteristics such as:

- land slope

- natural drainage characteristics including subsoil drainage capacity

- (seasonal) water table, surface water run-off and flood tendency

- proximity of water courses

- physical size and shape of the field

- vegetation and planting – existing and proposed

- field location to avert vehicular traffic and grazing animals.

∫ Potential effects on:

- downstream neighbouring properties

- downstream food sources such as mussel farming

- natural water courses – the ocean and estuaries, lakes, rivers and streams

- local ecology.)

D2 The complies with the setback distances set out in Part 2 of the Appendix and AS/NZS 1547 land application area.

D3 The design of a land application area for a greywater treatment plant must be based on a design flow of 100L per person per day.

D4 The land application area and any pump or motor are not located adjacent to bedrooms, living rooms or recreational areas of the premises or nearby premises.

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Attachment 4: Tank Monitors:

Brand/Model	Description	Price
Water watch T35	Radar sensor that screws to the top of a tank. Wifi connection available – mobile App to monitor. Up to 3 tanks to the one App. High Low level indicators. https://waterwatch.com.au/products/wifi-tank-monitor	tba
TankMate R3 Tank Level Sensor – WiFi	Radar sensor that screws to top of tank. Wifi connected – to mobile via an App. App is free for limited functionality for up to two tanks/sensors. Annual fee for App functionality that provides high/low alerts. This also allows three or more tanks to be monitored. https://tankmate.com.au/products/tankmate-r3-tank-level-sensor-wifi	$449 per tank.
 Ultrasonic Water Tank Level Meter with Thermo Sensor - IC0331TL	Ultrasonic, single tank monitor. RF connection between tank sensor and the monitor. https://www.instrumentchoice.com.au/ultrasonic-water-tank-level-meter-with-thermo-sensor-ic0331tl#description Support high and low level alerts. Multiple suppliers including Jaycar & Amazon. May need to be careful with neighbours having the same unit – there could be interference.	$89 to $119
Wireless Fluid Level Monitor Multi Tank (916-926Mhz) - IC-D110	Ultrasonic sensor – it is suitable septic, and can even be mounted inside tank. Up to 6 tanks with additional sensors. RF link back to a monitor panel. High and Low level indicators.	$406 for first sensor and monitor panel. $349 for each subsequent sensor/tank.