Technical Investigation into Alternative Greywater Systems for Lake Eildon Houseboats - Findings and Draft Recommendations

In October 2017, the Victorian Government announced its decision to repeal the requirement in the Water (Lake Eildon Recreational Area) (Houseboats) Regulations 2013 for mandatory installation of greywater treatment systems on Lake Eildon houseboats.

Jacobs, on behalf of the Department of Environment, Land, Water and Planning (DELWP) are investigating alternative options for greywater treatment systems for Lake Eildon houseboats. We are seeking your feedback on the draft recommendations outlined in this paper.

1. Introduction

Lake Eildon is the only inland waterway in Victoria where houseboats operate. In addition to hosting over 700 licensed houseboats, the lake is a popular recreational site, used for camping, swimming, water skiing, sailing and fishing. These activities make a significant contribution to the local community and economy. Lake Eildon also provides water to downstream communities for consumption, irrigation and environmental uses in the lake's primary purpose as an irrigation water supply storage reservoir.

Houseboats on Lake Eildon are subject to wastewater regulations. Blackwater (sewage) is required to be contained on board and pumped out to shore based wastewater treatment facilities. Until 2013, houseboat greywater (water from showers, laundry, and kitchen) was able to be discharged directly to the lake. However, water quality concerns over unregulated greywater discharge led to the introduction of the Water (Lake Eildon Recreational Area) (Houseboats) Regulations 2013. These regulations required all houseboats to install an onboard greywater treatment system (GWTS) by 2020.

In October 2017, the Victorian Government announced its decision to repeal the requirement for the installation of greywater treatment systems on Lake Eildon houseboats. This requirement was removed on the advice of the Department of Environment, Land, Water and Planning (DELWP) in response to an independent review of the regulations.

2. Scope of 2018 Technical Investigation and Review

Jacobs, on behalf of DELWP is undertaking an independent technical investigation and review into alternative options for managing greywater for Lake Eildon houseboats. The scope of this investigation is to:

- Assess the technical aspects of the different types of greywater treatment systems available. This includes practicalities for installation and operation, as well as the treatment capabilities and effectiveness of the systems.
- Consult with stakeholders to fully explore the social, financial, environmental and technical issues associated with potential alternative greywater treatment systems.
- Assess similar regulatory systems and instruments to explore the connections between the technical and social issues, and the desired environmental outcomes that drove the introduction of regulations in 2013.

3. Key Terms

The table below explains some of the key terms used in this discussion paper.

Term	Definition
GWTS	Grey Water Treatment System
Greywater	Wastewater from kitchens, sinks, laundries and showers
Blackwater	Any waste produced by a toilet or urinal
Pathogen	A microorganism that can cause disease
Algal Bloom	A rapid increase in algae that can discolour the water or cause ill health
Type A System	Contains and treats all greywater produced on-board through a mechanical / chemical process, to certified water quality standards
Type B System	Simple filtration unit, to be used in conjunction with separation/containment of kitchen waste

4. Existing Conditions

4.1 Greywater Impacts on Water Quality

The impact of greywater on the water quality of Lake Eildon was a key driver for the technical investigation. Houseboat operation and the discharge of greywater into the lake releases pollutants into the waterway, including nutrients, microbes and oils. These have potential to cause, contribute to or exacerbate water quality issues that affect environmental values, recreational amenity, and the health and safety of lake and water users.

Key water quality issues of relevance to greywater discharge include:

- The risk or occurrence of algal blooms;
- Public health risks relating to the presence of pathogenic microbes in the water which have potential to cause illness to downstream water users, houseboat operators and other lake users, and
- General environmental condition and water quality as impacted by nutrients and pollutants (including metals, pesticides and herbicides) and indicated by general ‘health’ measures such as pH, dissolved oxygen and turbidity

Typically, houseboats operate in marina and harbor areas. The risk of algal blooms and health impacts from pathogens in greywater are higher in these areas, when compared to the lake as a whole. This is due to the high number of houseboats and the volume of discharge within the marina or harbor area, and the low volume of water mixing and diluting the greywater discharged.

Pathogens are of concern in terms of disease risk and water treatment requirements for recreational and downstream users. Although lake water is not potable, houseboat occupants and those who use Lake Eildon for recreation typically come in contact with the lake water, which may expose them to pathogen risks.

4.2 Lake Eildon Houseboat Fleet

Houseboat design in the Lake Eildon fleet is varied, with differences in length, breadth, deck number, pontoon size and shape. This means that no two GWTS installations will be the same. The technical investigations are examining Lake Eildon houseboats across categories 1-6 to investigate the existing constraints and opportunities, and the suitability of different GWTS options.

The four critical design aspects considered in the investigation of feasible GWTS are:

- Physical space
- The power capacity of the houseboat
- Impacts to buoyancy from weight and displacement
- Suitability of existing services installed on the houseboat

4.3 Existing Infrastructure Constraints

The technical investigations are examining the ability of existing infrastructure to handle increases in wastewater volumes that could be created through alternative GWTS options.

Goulburn Murray Water operates and maintains two blackwater pump out floating sanitation barges on Lake Eildon, located at Point Worner and Jerusalem Creek. The Point Worner sanitation barge primarily services the Eildon Boat Club and the Lake Eildon Marina, while the Jerusalem Creek barge serves the Jerusalem Creek and Darlingford Marinas. Wastewater from the Jerusalem Creek barge is transported to the Point Worner barge, which pumps the wastewater through to a series of treatment ponds, via an onshore pump station.

Houseboat fleets that utilise GWTS which hold water (e.g. type B systems) require pump out facilities that can handle increased wastewater volumes without significantly increasing wait times. The investigation is assessing the capacity of both barges based on usage recorded during peak times, like long weekends. The assessment found that the Point Worner pump out facilities have the capacity to accept an increase in wastewater volumes. However, the Jerusalem Creek barge, which primarily services the Jerusalem Creek and Darlingford Marinas, has limited capacity to accept increased wastewater volumes.

5. Alternative Greywater Treatment Systems

Four potential management options are being investigated. These include:

- Contain all greywater
- Treat all greywater onboard (type A system)
- Capture galley water and treat remaining wastewater with simpler system (Type B system)
- Grease trap and in-line strainer

5.1 Full Greywater Containment

In this system, all greywater is captured and contained onboard the houseboat, in either holding tanks or pumped into existing blackwater tanks. The water is then pumped out with blackwater at pump out barges.

A full containment system offers houseboat owners the opportunity to install a method of treating greywater that is low cost, makes no noise, has no additional power requirements and has zero lake discharge, provided there is sufficient space onboard to install the holding tanks.

Space and volume constraints mean most houseboats are unlikely to be able to use this type of system. The large tanks required to contain the wastewater may also pose issues for buoyancy and stability when filled and would require more frequent trips to the pump out barges during a stay on Lake Eildon.

5.2 'Type A' System

A 'type A' system contains and treats all greywater produced on a houseboat through mechanical and chemical processes. This type of GWTS offers the opportunity to treat all houseboat greywater to high quality for discharge into the lake.

'Type A' systems allow houseboats to treat all greywater within one system. Compared to other systems which require containment, these systems place less pressure on pump out barges and lake infrastructure as the treatment systems are all contained and operated onboard.

The typical cost of equipment and installation is an issue for 'type A' GWTS on Lake Eildon Houseboats. The cost of retrofitting existing houseboats with a 'type A' system may also be more expensive and difficult than installing the system on a new houseboat. In the 2016-17 Lake Eildon Houseboat greywater independent review submissions were also received from the houseboat community reporting concerns about operational issues for Type A systems such as odour and noise.

5.3 'Type B' System

A 'type B' filter- based GWTS is a simple unit which filters then discharges wastewater from showers and sinks. It also separates and contains the kitchen wastewater. 'Type B' systems use a series of filters for bathroom sink and shower wastewater to remove solids and other particles, before being disinfected through chlorination prior to discharge. Water treated by 'type B' systems meets the Australian Standard.

A 'type B' system requires the separation and containment of galley wastewater, which is then pumped out at a barge with blackwater waste. This would create increased demand on pump out barges. The filter- based system also requires maintenance cleaning of the filters on land and away from the lake.

'Type B' systems are smaller than 'type A' and are easier to install, giving greater opportunity to retrofit these systems to a wider scope of existing houseboats. When compared to a 'type A' system, the filter-style 'type B' system has lower maintenance requirements, reduced running costs, a smaller footprint and lower risk of odour.

5.4 Grease Trap and In-line Strainer

The simplest GWTS is a grease trap and in-line strainer. This removes fats, oils and solid from galley wastewater and captures solids such as hair and lint from showers and basins. This type of system offers the opportunity to treat greywater where no other system can be installed due to practical constraints.

A grease trap and in-line strainer system is simpler to clean and maintain, with low installation and operation costs. However, water discharges from this system would not meet the water quality objectives for Lake Eildon.

6. Key Findings

Technical investigations have confirmed the following:

- Alternative greywater treatment systems would improve water quality
- The Type B system option would provide a simpler, cheaper alternative for many Lake Eildon houseboats and would help to protect water quality and public health at the lake.
- The existing GMW infrastructure would be able to handle the increased volume in wastewater generated by Type B system usage if houseboats moored in different locations were allocated to nominated pump out locations

7. Draft Recommendations

A number of draft recommendation have been developed for DELWPs consideration. The recommendations are designed to deliver an improvement in water quality while allowing for the available infrastructure at Lake Eildon and the differing houseboat constraints. These recommendations are outlined in the following table.

Theme	Recommendation
Type B systems adoption	Type B systems would improve water quality. Type B systems should be adopted as a feasible GWTS solution for all category houseboats. The potential cost to purchase and install a filtration system of this type would begin at $3,500, plus containment tank costs, which would vary from boat to boat.
Short term action to improve water quality	All existing houseboats (Category 1 to 6) should be required to install grease traps and strainers on their kitchen sinks unless they already have a GWTS installed. This would be an inexpensive measure to improve water quality in the short term and would not require the houseboats to be slipped. The likely cost of purchase of this type of GWTS is between $200 and $400, plus installation
Tiered management framework: Lake Eildon Boat Club or Lake Eildon Marina	These recommendations recognise the greater capacity of the Point Worner floating barge. These should apply to all houseboats moored at Lake Eildon Boat Club or Lake Eildon Marina. · All new houseboat builds under Category 3 to 6 should be required to install a Type A or B GWTS. · Houseboats with an existing approved GWTS installed should be allowed to continue to operate without being required to install another system, unless the houseboat owner chooses to change or upgrade their GWTS system. · Category 3 to 6 houseboats should be required to install either Type A or B greywater treatment systems at their next houseboat slip. · Houseboats that choose to install Type B systems be required to pump out their galley waste at the Point Worner floating sanitation barge only. · Existing Category 1 and 2 houseboats should be exempt from installing both Type A and B GWTS both because of their low number and the potential difficulty of installing such systems. However, new houseboat builds under Category 1 and 2 should be required to install a Type B GWTS.
Tiered management framework:	These recommendations recognise the limited capacity of the Jerusalem Creek floating sanitation barge. These should apply to all houseboats moored at Darlingford and Jerusalem Creek Marinas.

Theme	Recommendation
Darlingford and Jerusalem Creek Marinas	· All new houseboat builds under Category 3 to 6 should be required to install a Type A or B GWTS. · Houseboats with an existing approved GWTS should be allowed to continue to operate without being required to install another system, unless the houseboat owner chooses to change or upgrade their GWTS system. · Houseboats that choose to install Type A systems would have no restrictions placed on their use. · Houseboats moored at the Darlingford and Jerusalem Creek Marinas and equipped with Type B systems should be subject to restricted use on peak days or weekends over summer unless the owner can make alternative arrangements to have their houseboat pumped out by a privately operated vessel. Existing Category 1 and 2 houseboats should be exempt from installing both Type A and B GWTS both because of their low number and the potential difficulty of installing such systems. However, new houseboat builds under Category 1 and 2 should be required to install a Type B GWTS.
Managing the transition	Consider a two-year public education campaign to enable the houseboat community prepare for any change in the regulations.
Infrastructure upgrades	Consider upgrading the Jerusalem Creek floating sanitation barge to provide sufficient capacity for the increased demand place on it by type B systems during peak periods of demand. Following upgrade of this facility, the management framework for houseboats could be harmonised across Lake Eildon.

8. Next Steps

8.1 Comments sought

The study team wants your feedback on the draft recommendations detailed in this discussion paper.

Feedback can be provided by through an online survey at https://www.surveymonkey.com/r/GWTS_Eildon. Submissions can also be lodged electronically at greywater@jacobs.com.

Survey and submission responses must be received by 5pm, Tuesday 19th June 2018.

8.2 Next steps

Following the receipt of comments on the draft review and potential opportunities identified, the report will be finalised for DELWP's consideration. Following this we will hold a final meeting with houseboat owners to explain the draft findings and demonstrate how their feedback was considered.

DELWP will brief the Minister for Water on the final recommendation put forward, with a decision to be made by the Victorian Government.