



Saukutsu Pty Ltd

1290 Greendale Road

Water and Wastewater Assessment Report

October 2020

Executive Summary

Saukutsu Pty Ltd ATF Wallacia Trust (Saukutsu) engaged GHD Pty Ltd (GHD) to undertake a water and wastewater assessment for the proposed development of a cemetery and crematoria located on the site identified as 1290 Greendale Road, Wallacia (see Figure ES-1). The site is located on the western side of Greendale Road and eastern side of the Nepean River.



Figure ES-1: Location of proposed development site

The water and wastewater servicing options considered are summarised in Table ES-1:

Table ES-1: Summary of water and wastewater servicing options

Service	Option	Details
Wastewater	Wastewater Option A	Connection to Sydney Water wastewater network
	Wastewater Option B	Wastewater Option B-1 – on-site treatment and disposal via irrigation
		Wastewater Option B-2 – waterless toilets, on-site treatment and disposal via irrigation

		Wastewater Option B-3 - on-site treatment, recycled water and disposal via irrigation
Water	Water Option A	Connection to Sydney Water water supply network
	Water Option B	On-site potable water tank with tankered drinking water
	Water Option C	Rainwater tanks and potable water tank

Based on the water and wastewater options considered, and consultation with the developer, on-site treatment and disposal via irrigation, with waterless toilets (Wastewater Option B-2), drinking water storage tank with water delivered by registered water carter (Water Option B) is the recommended servicing option.

Requirements for the recommended servicing option is summarised in Table ES-2 and shown in Figure ES-2.

Table ES-2: Summary of recommended servicing option

Service	Option	Details
Wastewater	Wastewater Option B-2 – waterless toilets, on-site treatment and disposal via irrigation	Daily flow for treatment and disposal 3,600 L (at on-site package plant)
		On-site package treatment plant
		Effluent storage volume 125,000 L
		Irrigation area 30,000 m ² , with associated irrigation assets (pump/s, pipes, irrigation nozzles) for covered surface drip or shallow subsurface drip irrigation
		Waterless toilets for guests and employees
		Greywater treatment and disposal (waterless toilets)
Water	Water Option B - on-site potable water tank with tankered drinking water	Daily water demand 4,953 L/day
		12,200 L drinking water storage tank with booster pump and CI dosing unit

This report is subject to, and must be read in conjunction with, the limitations set out in Section 1.4 and the assumptions and qualifications contained throughout the Report.

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Figure ES-2: Potential locations for recommended water and wastewater supply and treatment assets, and disposal areas

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1. Introduction

1.1 Background

Saukutsu Pty Ltd ATF Wallacia Trust (Saukutsu) engaged GHD Pty Ltd (GHD) to undertake a water and wastewater assessment to provide the relevant documentation in support of a Development Application (DA) to Liverpool City Council.

The subject of the DA is a proposed development comprising of the demolition of existing structures and construction of a cemetery, crematoria, community facilities, administration buildings, halls, chapels and other buildings and structures all associated with the operation of a cemetery with a garden, parkland and landscape setting. The proposal also includes internal roads, lakes and ponds.

The proposed development is located on the site identified as 1290 Greendale Road, Wallacia (see Figure 1-1) and legally described as Lot 1 in DP 776645 in the Liverpool City Council Local Government Area (LGA). The site is located on the western side of Greendale Road and eastern side of the Nepean River. The surveyed land area is approximately 73.46 ha.



Figure 1-1: Location of proposed development site

The site is within the Draft Aerotropolis State Environmental and Planning Policy (SEPP) and the surrounding area is currently used for agricultural purpose. Cemeteries and associated civil works are permissible in the Liverpool City Council RU1 (primary production) zoned land.

1.2 Assessment Scope

The following scope was agreed for the water and wastewater assessment:

- Meetings:
 - Kick off / briefing meeting between client and consultant
 - Meeting for presentation of final report.
- Receive relevant client information:
 - maximum number of visitors per day, number of permanent residents on site
 - planned assets and plan showing locations
 - location of all load points (wastewater) and demands (water) site of a small water reservoir, site of a wastewater plant, if required, etc,
- Other data collection, such as planning level site assessment (generally including climate, geology, topography, soil and vegetation)
- Facility water demands / wastewater loads based on visitor and worker numbers provided by client
- Constraints assessment:
 - Sydney Water's nearest water and wastewater services and their availability for connection; and
 - preliminary land suitability details for possible on-site treatment and disposal of effluent.
- Option identification, development and analysis, including:
 - Connection to Sydney Water water and wastewater services
 - On-site wastewater management system, including assessment of required collection system, pumping requirements, treatment, effluent storage and effluent irrigation.
 - Statement of planning level performance specifications of the intended system, operations and maintenance requirements and likely servicing arrangements
 - Consideration of low water consumption facilities (such as composting toilets).
- Planning level cost estimates for identified options
- Recommended option for water and wastewater servicing.

1.2.1 Deliverables

- Memo with preliminary advice for on-site treatment and disposal of wastewater including setbacks, storage capacity and other constraints of the site so they can be mapped onto the development Masterplan.
- Water and Wastewater Assessment Report (this report):
 - Detailing option and costing methodology and analysis
 - Providing recommendation on preferred option for water and wastewater services
 - Presenting system layouts, maps and diagrams to assist in the description the recommended option for water and wastewater services.

1.3 Exclusions/clarifications

- Meetings to be held via video-conference (MS Teams or similar)
- Desktop assessment only, no site visits have been allowed for
- No allowance for environmental, geotechnical review or heritage assessment
- Land disposal is assumed for on-site treatment and disposal, if not recycled through toilets
- Recommendation of one option each for water and wastewater
- A draft report will be prepared for client review and comment (ideally using “Comments” in Word’s “Review Tab”)
- The client will provide a consolidated copy of feedback/comments.

1.4 Limitations

This report: has been prepared by GHD for Saukutsu Pty Ltd and may only be used and relied on by Saukutsu Pty Ltd for the purpose agreed between GHD and the Saukutsu Pty Ltd as set out in this report. GHD otherwise disclaims responsibility to any person other than Saukutsu Pty Ltd arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible. The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report. The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared. The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by Saukutsu Pty Ltd and others who provided information to GHD (including Government authorities)], which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

GHD has prepared the preliminary cost estimates set out in section using information reasonably available to the GHD employee(s) who prepared this report. Cost estimates have been prepared for the purpose of comparison of water and wastewater servicing options and must not be used for any other purpose.

Where estimates of potential costs are provided with an indicated level of confidence, notwithstanding the conservatism of the level of confidence selected as the planning level, there remains a chance that the cost will be greater than the planning estimate, and any funding would not be adequate. The confidence level considered to be most appropriate for planning purposes will vary depending on the conservatism of the user and the nature of the project. The user should therefore select appropriate confidence levels to suit their particular risk profile.

2. Planning and legislative considerations

The following planning and legislative documents were reviewed and used in the analysis of water and wastewater servicing options for the proposed development.

2.1.1 General

MKD Architects River Gardens Cemetery Masterplans

The Masterplan for the proposed development was reviewed and discussed with the proponent, including earthworks and flooding controls.

The proposal comprises of a cemetery, crematoria, community facilities, administration buildings, halls, chapels and other buildings and structures all associated with the operation of a cemetery with a garden, parkland and landscape setting. The proposal also includes internal roads, lakes and ponds.

Local Government (General) Regulation 2005

The proposed development must demonstrate that water supply and wastewater treatment and disposal can meet the standards and requirements of the Local Government (General) Regulation 2005.

Liverpool City Council Planning Controls

Local government is the primary authority responsible for land use planning in NSW. The proposed development is located in the Liverpool City Council LGA

Liverpool Local Environmental Plan (LEP) 2008

The LEP 2008 is a legal document containing development standards applying to land in Liverpool. It guides planning decisions and for each piece of land and specifies what may be built, what land may be used for, and what building heights and floor spaces are allowed.

The proposed development is located in Rural Zone RU1 Primary Production.

Cemeteries and associated civil works are permissible in the RU1 zone, subject to complying with the objectives of the RU1 zone and relevant requirements contained in Liverpool LEP 2008 and Liverpool DCP 2008.

Liverpool Development Control Plan (DCP) 2008

Liverpool DCP guides growth in the Liverpool LGA, and Part 1 General Controls for all Development applies to all proposed developments. This includes Section 15 - On-site Sewage Management Systems (OSMS).

In addition to the complying with Part 1 of the Liverpool DCP, the proposal must also comply with Part 5 Development in Rural and Environmental Zones (Clause 9.13 Cemeteries, Crematoriums and Funeral Chapels).

2.1.2 Wastewater

Liverpool City Council Pre-Development Application Advice (PL-34/2020)

In the final pre-development application advice, Liverpool City Council included the following advice for On-site Sewage Management System:

- The site proposed for the development currently does not have connection to public sewer and is serviced by an on-site sewage management system. The applicant is required to either connect the proposed development to a reticulated sewerage service or demonstrate that sustainable on-site sewage management systems can be installed to service the development.
- It is noted that on-site sewage management is a limiting factor for the development given the buffer distances required from water bodies, structures roadways etc.
- A wastewater report is to be provided when the application is submitted and shall consider all potential wastewater flows. The report is to be prepared by a suitably qualified and experienced person.

AS/NZS1547:2012. Australian/New Zealand Standard: On-site domestic wastewater management

Australian/New Zealand standard which provides the requirements for treatment units and their respective land application systems to achieve sustainable and effective on-site domestic wastewater management, to protect public health and the environment. The Standard identifies the performance statements that cover the overall design and sustainable management of on-site domestic wastewater systems

AS/NZ 1546.2:2008. Australian/New Zealand Standard: On-site domestic wastewater management Part 2: Waterless composting toilets

Australian/New Zealand standard that provides a set of performance statements which set out the requirements for a domestic waterless composting toilet, provides performance evaluation tests, and provides guidelines to ensure waterless composting toilets are operated and maintained so that public health and environmental requirements will be met.

Department of Environment and Conservation (NSW) Environmental Guidelines – Use of Effluent by Irrigation (October 2004)

Educational and advisory document on best management practices related to the management of effluent by irrigation, to be used to design and operate effluent irrigation systems, with the goal of reducing risks to the environment, public health and agricultural productivity

Utilised to guide the development of the water balance model for the proposed development.

Designing and Installing On-Site Wastewater Systems, A Sydney Catchment Authority Current Recommended Practice (2012)

The document is a Manual to assist system installers, design consultants, property owners, council officers, Sydney Catchment Authority officers, plumbers and contractors to ensure best practice methods are used to design and install on-site wastewater systems in Sydney's drinking water catchment.

Although the proposed development is not located in Sydney's drinking water catchment, the Manual is a current recommended practice for on-site wastewater management according to the 'Neutral or Beneficial Effect on Water Quality Assessment Guideline 2011' (the NorBE Guideline, Sydney Catchment Authority, 2011).

Your Home (Australian Government)

(www.yourhome.gov.au)

Australian government guide to environmentally sustainable homes, including information and advice regarding waterless toilets.

3. Options Assessment – Wastewater

3.1 Design wastewater flow

For the purposes of this assessment the following has been assumed, based on advice provided in meeting with the client of 12 June 2020:

- Daily flow estimates based on AS/NZS1547:2012, Appendix H
- Potable water supply from Sydney Water reticulation
- 500 guests each day, 7 days a week, all year round. This has been adopted as the highest guest visitation for the site
- Assumed that 50% of daily guests use the restroom facilities
- Wastewater fixture facilities provided for guests are WC and hand basin (café facilities considered separately)
- Daily flow estimated as 20% of the typical domestic wastewater flow allowance for each WC and hand basin fixture from AS/NZS1547:2012 Table H2 (using 6 litre / 3 litre dual flush toilets and hand basins), being 12 L/person/day
- Café with 10 employees, assumed to cater for 50% of daily guests
- Load form employees WC and hand basin facilities adopted as 25% of domestic allowance, being 15 L/per/day
- One on-site manager/staff residence (4 persons)

Table 3-1 below summarises the adopted daily wastewater flow for treatment and disposal.

Table 3-1: Design daily wastewater flow

Generation	Adopted flow
Wastewater flow from guest WC and hand basin facilities	12 L/person/day ¹
Café – guest allowance	12 L/guest/day ²
Café - employee	15 L/person/day
Manager/staff residence (4 persons)	150 L/person/day
Total	6,750 L/day

¹ Consistent with allowance for other daytime facilities such as schools (15 – 30 L/person/day)

² Based on allowance for tea rooms/lunch bars without restroom facilities

3.2 Wastewater Option A - Connection to Sydney Water system

3.2.1 Description and plans

A review of the potential to connect to the Sydney Water reticulated sewer system was undertaken. The proposed development is currently outside the Sydney Water wastewater service area. Sydney Water need to be consulted and modelling undertaken to determine if the development can be connected to the Sydney Water system.

The closest reticulated sewer system is the Wallacia catchment. For the purposes of this options assessment, it was assumed that the connection would need to be to a DN150 or trunk service main ($\geq$ DN200). A pressure sewer system has been adopted as the most cost effective wastewater transfer system, see Figure 3-1 for example of components of a typical pressure sewer system, and Appendix A for details of commercially available pressure sewer systems.

The likely route for connection would be along the verge of Greendale Rd to either the closest reticulated sewer (3,000 m) or the sewer trunk main at the intersection of Greendale Rd and Park Rd (up to 4,400 m), see Figure 3-2 for plan view and Figure 3-3 for elevation profile.

For the purposes of this options assessment, the following has been adopted:

- Pressure sewer systems with pressure sewer tank and pumping unit, control panel (including power switch and alarm)
 - Residential pressure sewer system for on-site manager residence
 - Commercial pressure sewer system for guest facilities (including café and toilet facilities) and administration/maintenance facilities
- DN63 HDPE rising main to Sydney Water system
- Connection route in road verge along Greendale Rd approximately 3,000 – 4,400 m
- Due to the length of rising main and detention time (> 2 hours) dosing with an iron salt (such as ferrous chloride) would be required to manage septicity.

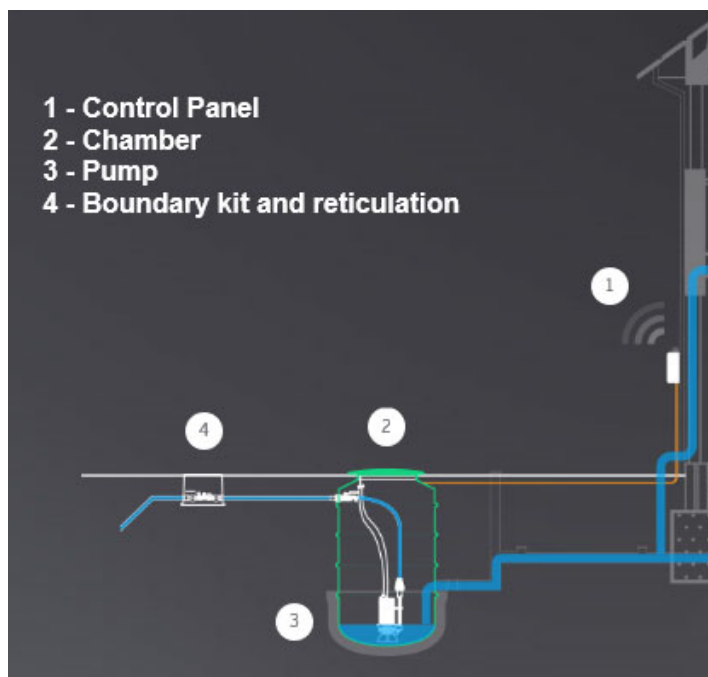


Figure 3-1: Example of a pressure sewer system

(Source: www.aquatecenviro.com.au)

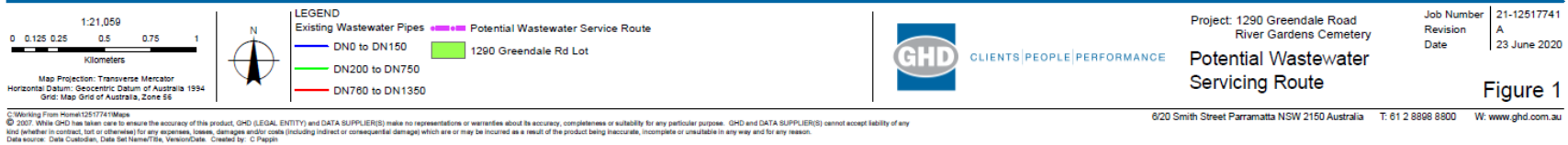
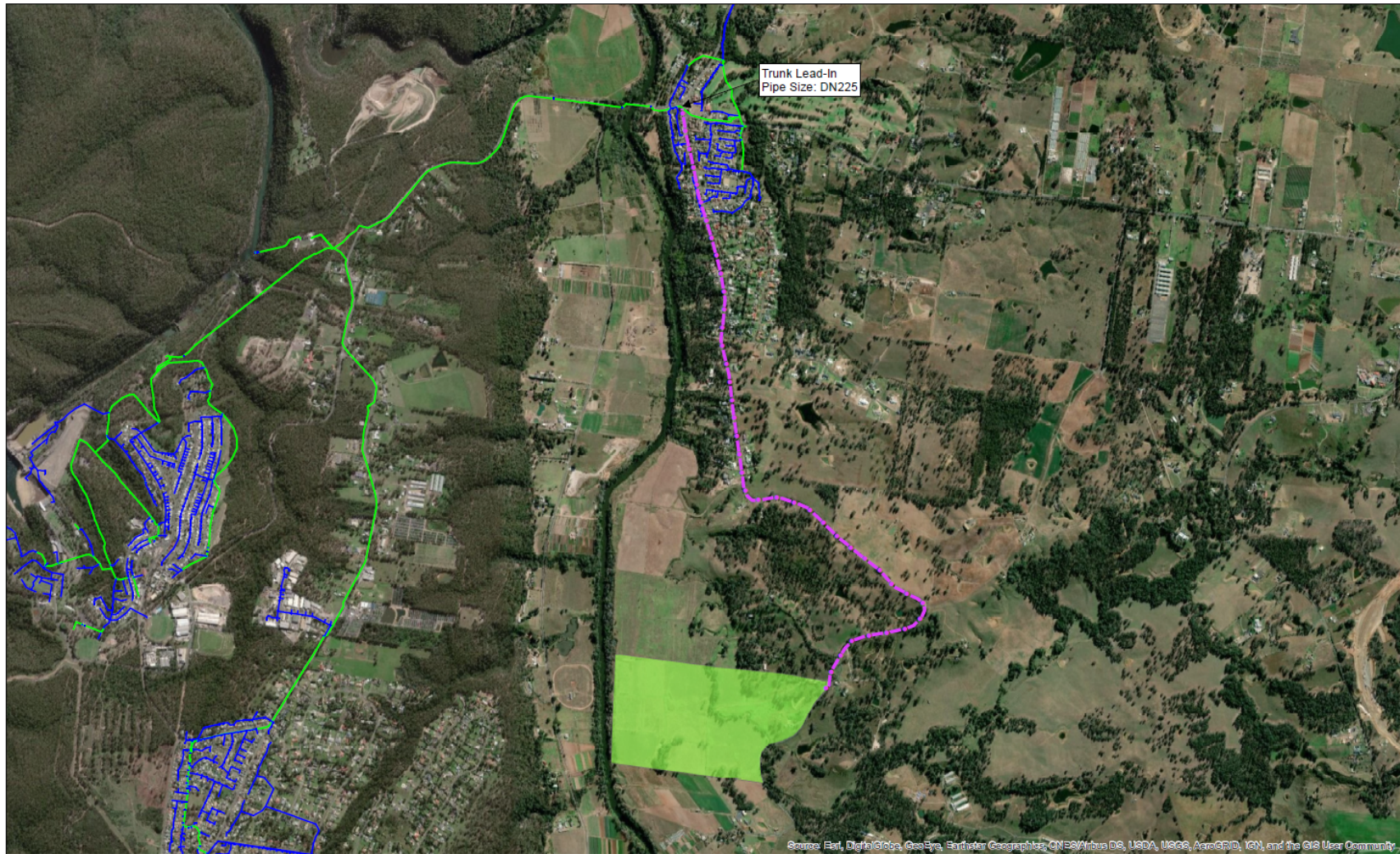


Figure 3-2: Potential connection to Sydney Water reticulated sewer system – Plan view

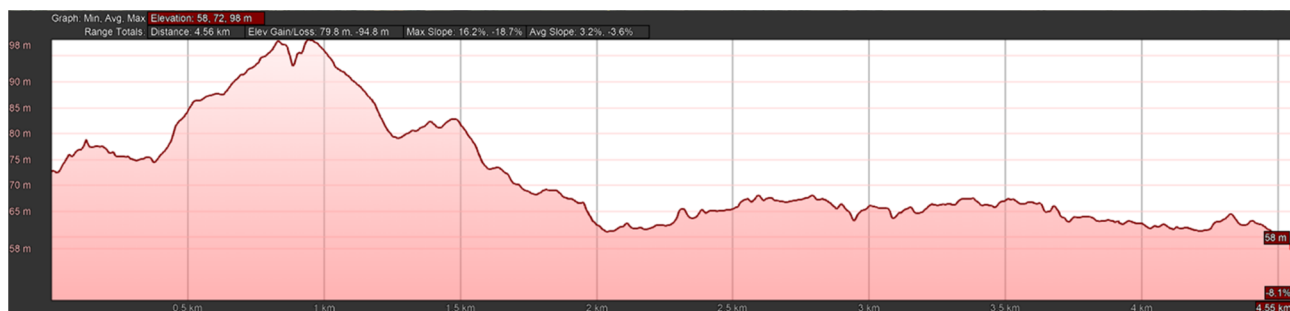


Figure 3-3: Potential connection to Sydney Water reticulated sewer system – Elevation profile

3.2.2 Cost estimate

Based on cost estimation for similar projects and commercial estimate for pressure sewer systems, a planning level cost estimate was undertaken. The estimated cost for connection to the Sydney Water sewer system was calculated to cost between \$340,000 and \$480,000, as detailed in Table 3-2.

Table 3-2: Capital cost estimate

Item	Unit rate	No.	Cost
Boundary kit	\$1,000	2	\$2,000
Residential pressure sewer pump and tank ^{1, 2}	\$7,500	1	\$7,500
Commercial pressure sewer system ^{1, 2}	\$30,000	1	\$30,000
DN63 HDPE ³	\$100/m	3,000 – 4,400 m	\$300,000 - \$440,000
TOTAL			\$339,500 - \$479,500

¹ See Appendix A for examples of commercially available residential and commercial pressure sewer systems

² Includes site preparation, delivery and installation of system

³ Includes design, materials, installation and restoration

3.3 Wastewater Option B - On-site treatment and disposal

An alternative option to connection to the Sydney Water reticulated sewer system is on-site treatment and disposal of the wastewater generated from the development. As noted in Section 2 there are a number of planning, design, construction and operation requirements to be met for on-site systems. See Appendix B for the Liverpool City Council pre-DA advice for On-site Sewage Management Systems.

Within Option B there are a number of sub-options, which are discussed and costed in further detail in later sub-sections:

- Wastewater Option B-1 - On-site treatment and disposal via irrigation
- Wastewater Option B-2 - Waterless toilets, on-site treatment and disposed via irrigation
- Wastewater Option B-3 - On-site treatment, recycled water and disposal via irrigation

3.3.1 Site assessment

A desktop review of the propose development site was undertaken to inform the high level assessment of the site for on-site treatment and disposal, including details of climate, geology, hydrogeology, topography, soil composition and vegetation of any related effluent disposal areas. This data and information were used to develop the daily time step water balance model for the site.

Climate

The proposed site is located in the Western Sydney Basin in the New South Wales and Australian Capital Territory Climate Zone Map Zone 6, mild temperate. Bureau of Meteorology daily rainfall and climate data for 1/1/1980 – 17/06/2020 (40 years) from the Liverpool weather station (#67035) were used in the development of the water balance model.

Geology, hydrogeology and soils

A desktop review of NSW geology, hydrogeology and soil maps was undertaken. It is noted that significant earthworks are to be undertaken on the site, and site testing will be required once complete.

Geology and hydrogeology

Review of the NSW 1500K Simplified Surface Geology (Department of Industry, Planning and Environment) shows the proposed development site is mostly located on Quaternary alluvial deposits. Lithology - current and recent mud, silt, sand and gravel deposited by river (alluvial) systems. The higher portion of the site is Triassic sedimentary rocks. Lithology - Quartz-lithic to quartz-rich sandstone with conglomerate, mudstone and siltstone. Deposited in high energy braided river systems. See Figure 3-4. The site is located in the Sydney Basin Central Water Sharing Plan area.

The draft Preliminary Geotechnical Investigation Report (JC Geotechnics Pty Ltd, August 2020) indicated that the site is located within the geological boundary characterised by “Fine-grained sand, silt and clay” (associated with the Nepean River), and near the boundary of areas characterised by Bringelly Shale of the Middle Triassic age Wianamatta Group.

The JC Geotechnics report also stated that groundwater was only encountered at one of the boreholes (located in the south eastern portion of the site) at a depth of 6.3 m below existing levels.

The proposed irrigation areas are located on the earthworks ‘pads’ raised above the 1 in 100 year flood level.

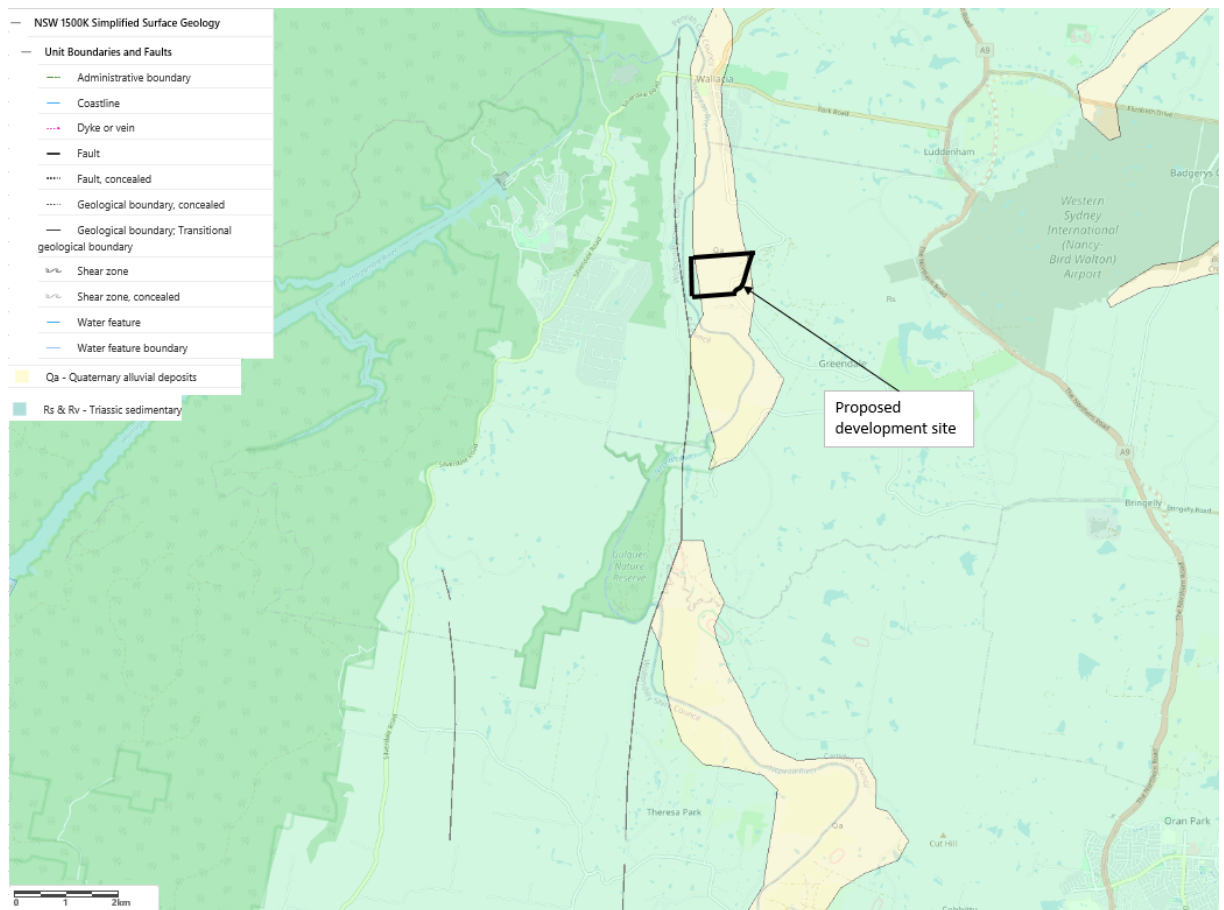


Figure 3-4: Geology of proposed development site

(Source: NSW 1500K Simplified Surface Geology, Department of Industry, Planning and Environment)

Soil

The proposed development site soil is mostly Australian soil classification type Tenosols (Alluvial), with some Dermosols on the higher portion of the site, as shown on Figure 3-5, and mostly Great Soil Group type Alluvial Soils – Medium Textured (Loams, Clay Loams) with some Red Podzolic Soils on the higher portion of the site, as shown on Figure 3-6.

The site is mainly classified as Alluvial, with some Colluvial on the higher portion of the site, on the Soil and Land Resources of the Hawkesbury-Nepean Catchment map.

The JC Geotechnics report reported that the Salinity potential in Western Sydney 2002 map indicates that the site is located within an area of moderate potential for saline soils. Site inspection and the results of Electrical Conductivity Testing indicated slightly saline conditions in accordance with the Environmental Planning & Assessment Regulation 1994.

As identified in the Sydney Catchment Authority Current Recommended Practice (2012), published soil data is broad scale and must be confirmed with site-specific soil testing once the proposed earthworks have been completed.

Australian Soil Classification (ASC) Soil Type map of NSW

Calcarosols
Chromosols
Dermosols
Ferrosols
Hydrosols
Kandosols
Kurosols
Kurosols, Natric
Organosols
Podosols
Rudosols
Rudosols (Alluvial)
Rudosols and Tenosols
Sodosols
Tenosols
Tenosols (Alluvial)
Vertosols
Not assessed
Water

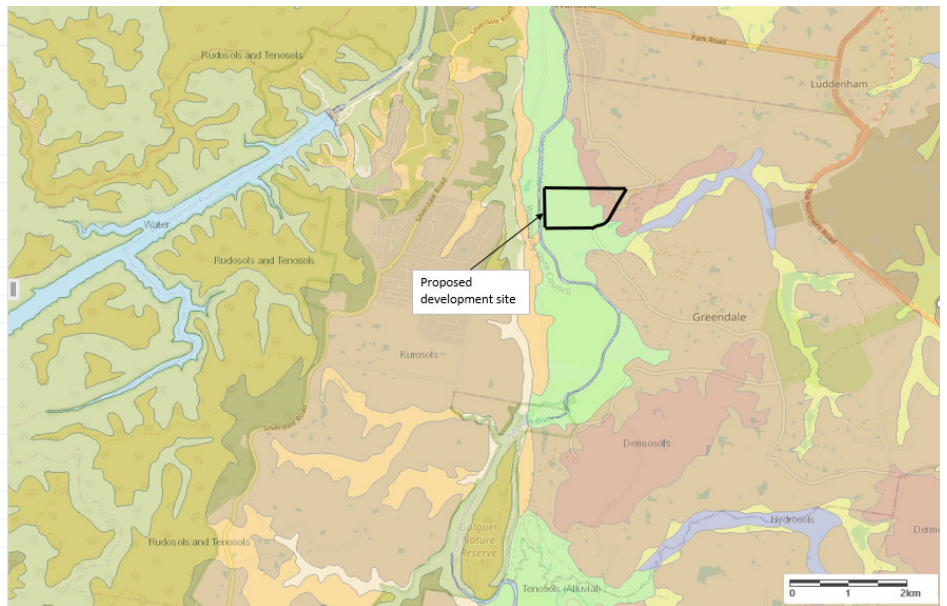


Figure 3-5: Soil types on the proposed development site (Australian Soil Classification)

(Source: Australian Soil Classification (ASC) Soil Type map of NSW, Department of Industry, Planning and Environment)

Great Soil Group (GSG) Soil Type map of NSW

Acid Peats (ACP)
Alluvial Soils - Light Sandy Textured (AL)
Alluvial Soils - Medium Textured (Am)
Alpine Humus soils (AH)
Black Earths (BE)
Brown Earths (BRE)
Brown Podzolic Soils (BP)
Calcareous Red Earths (KRE)
Calcareous Sands (KS)
Chernozems (CH)
Chocolate Soils (C)
Desert Loams (DL)
Earthy Sands (ES)
Euchrozems (E)
Gleyed Podzolic Soils (GP)
Grey Brown Podzolic Soils (GBP)
Grey Brown and Red Calcareous Soils (GBK and RK)
Red Earths - less fertile (granites and metasediment) (REI)
Red Earths - more fertile (volcanics and granodiorites) (REm)
Red Podzolic Soils - less fertile (granites and metasediment) (RPI)
Red Podzolic Soils - more fertile (volcanics and granodiorites) (RPM)
Red and Brown Hardpan Soils (RBH)
Red-brown Earths (RBE)
Rendzinas (R)
Climax or Canale (CC)

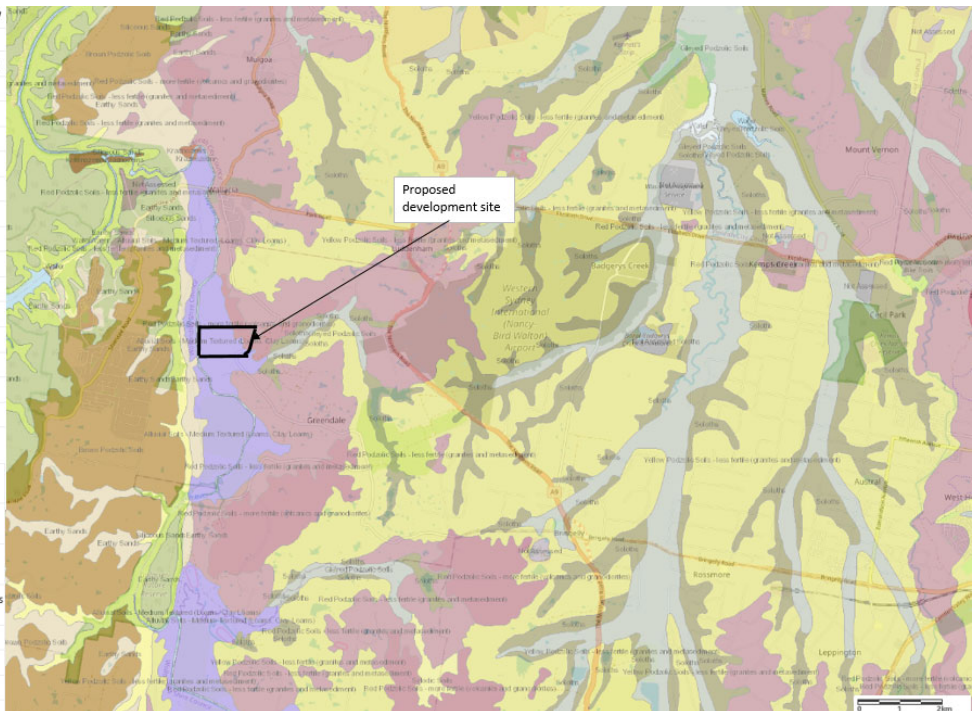


Figure 3-6: Soil types on the proposed development site (Great Soil Group)

(Source: Great Soil Group (GSG) Soil Type map of NSW, Department of Industry, Planning and Environment)

Detailed design will require the following confirmed by site specific testing of soil profiles of up to at least one metre (where possible) taken at the specific locations of the proposed effluent management areas:

- soil texture and structure with depth to rock using standard soil descriptions as per AS/NZS 1547:2012 - weathered and decomposing rock of the C Horizon is not considered part of the soil profile when considering effluent disposal
- dispersibility (soil with an Emerson aggregate test class 1 are not generally suitable for effluent disposal (Van de Graff and Patterson, 2001))
- other relevant chemical or physical characteristics that could impact on sustainable effluent disposal, such as:
 - electrical conductivity/salinity (soil with more than 8 dS/m are not suitable for effluent disposal unless the soil is treated)
 - sodicity (soils with more than 10% exchangeable sodium percentage are not suitable for effluent disposal unless the soil is treated)
 - weighted phosphorus sorption values for the soil profile, but only where effluent irrigation is proposed.

Following site-specific soil testing irrigation area and soil treatment requirements will need to be reviewed, for example:

- Soils with very low permeability will require:
 - larger application area
 - preparation of the soil with deep ripping and application of gypsum
 - planting of vigorous growing vegetation (grass/lawn selection)
 - minimising discharges containing sodium salts (ie avoid using soaps and detergents with high sodium content)
 - Alternate between different parts of the irrigation area.
- Dispersive or sodic soils will require:
 - land application which applies effluent to the topsoil
 - application of gypsum to receiving soil
 - minimising discharges containing sodium salts.

Topography and vegetation

There is earthworks proposed on site to develop 4 'pads' above the 1% AEP, for cemetery assets and buildings. The potential irrigation areas are to be located on these pads, which will be relatively flat, and planted with grass consistent with use as a lawn cemetery.

Adsorption trenches/beds associated with disposal of greywater from the waterless toilet hand basins shall be planted with vegetation suitable for effluent disposal.

3.3.2 On-site wastewater treatment and disposal criteria

On-site treatment

For the purposes of this option assessment it has been assumed that wastewater treatment will be by an on-site package wastewater treatment plant consistently producing ≤ 10 cfu/100 mL *E. coli* (secondary treated effluent with disinfection). This is to minimise the public health risk for land application and fouling of storage and irrigation assets.

Effluent from the package plant will need to be stored during periods where it cannot be irrigated (such as wet periods). Storage requirements are discussed in Section 3.3.3.

Domestic and commercial package wastewater treatment systems are readily available and can be supplied and installed by a number of accredited suppliers.

Onsite maintenance staff will need to undertake weekly operation and monitoring checks of the treatment and disposal systems, such as checking the disposal area is not leaking or damaged, all aeration pumps are active, all irrigation pumps are active, and checking for any damage to components of the treatment system.

Examples of on-site wastewater treatment systems to treat wastewater from the site to secondary standard with disinfection (suitable for on-site irrigation disposal) are shown in Figure 3-7 and Figure 3-8, with details provided in Appendix C.

Note this is not a product endorsement by GHD but provided for information purposes only as examples of on-site treatment systems that are readily available.

FEATURES

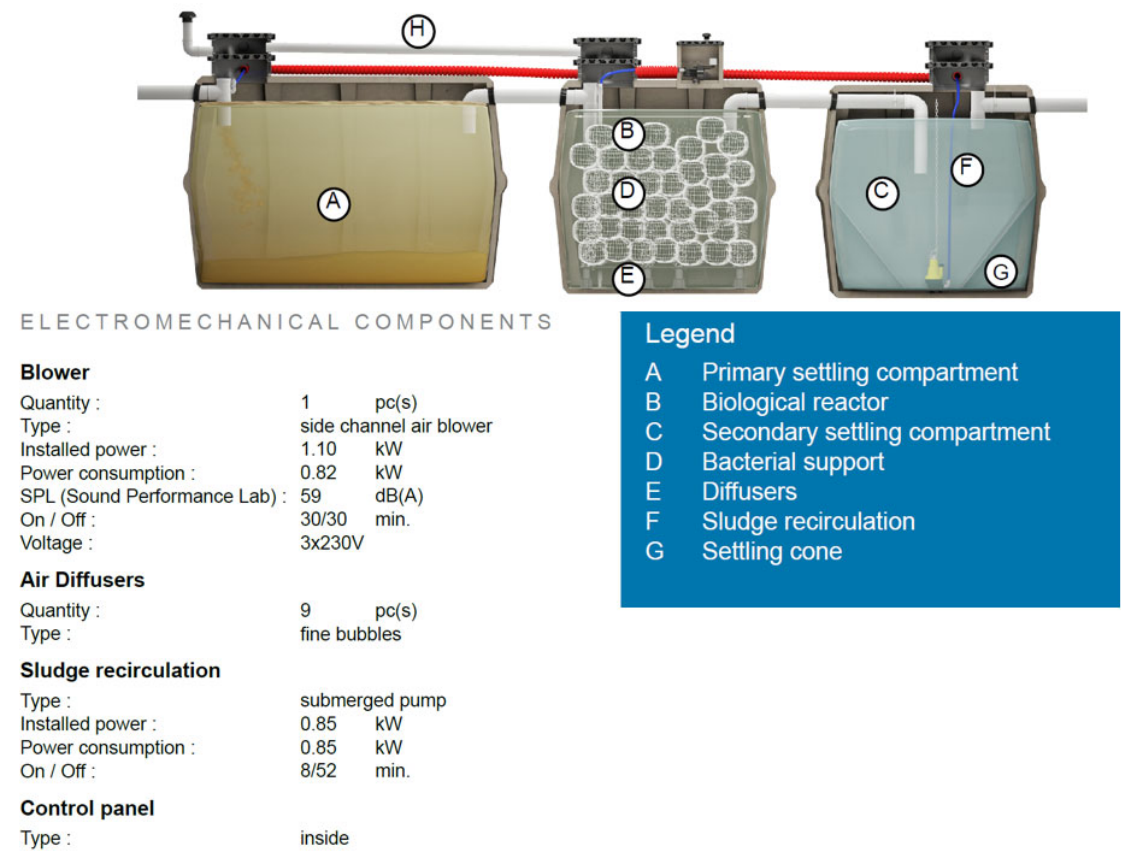
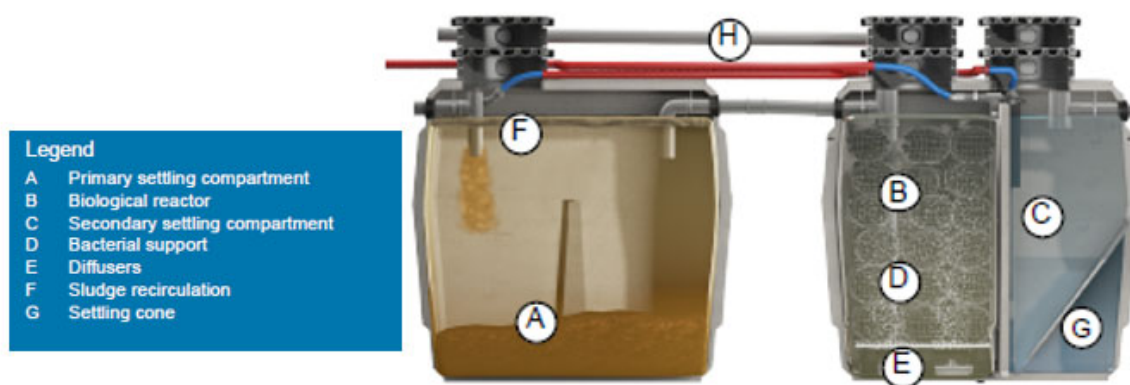


Figure 3-7: Package treatment plant suitable for 6,750 L/d load

FEATURES



ELECTROMECHANICAL COMPONENTS

Blower

Quantity :	1	pc(s)
Type :	diaphragm blower	
Installed power :	0.29	kW
Power consumption :	0.24	kW
SPL (Sound Performance Lab) :	55	dB(A)
On / Off :	60/00	min.
Voltage :	1x230V	

Air Diffusers

Quantity :	6	pc(s)
Type :	fine bubbles	

Sludge recirculation

Type :	airlift	
Installed power :	-	kW
Power consumption :	-	kW
On / Off :	-	min.

Control panel

Type :	inside
--------	--------

Figure 3-8: Package treatment plant suitable for 3,600 L/d load

Setbacks

Liverpool Development Control Plan 2008, Part 1 General Controls for all Development, Section 15 On-Site Sewage Management Systems (OSMS) provides location requirements for OSMS tanks and effluent disposal areas.

Location requirements and minimum setback criteria adopted for this analysis are provided in Table 3-3 and Table 3-4.

Table 3-3: Minimum setbacks adopted for treatment

Asset	Setback
OSMS tanks	1.5 m from any building and outside of any overland flow paths or depressions in the land
Lid to OSMS tanks and holding tanks and all associated electrical components	Above 1% AEP flood contour

Table 3-4: Minimum setbacks adopted for disposal (covered surface drip and shallow subsurface drip irrigation)

Criteria	Setback
Permanent surface waters	100 m
Domestic groundwater well	250 m
Other waters (farm dams, intermittent waterways and drainage channels)	40 m
Area up-gradient of driveways, property boundaries and buildings	6 m ¹
Area down-gradient of driveways, property boundaries and buildings	3 m ¹
Effluent disposal area	Adopted above 1% AEP flood contour ^{2, 3}

¹ Setback from property boundary adopted as 15 m consistent with required cemetery setback

² Shall not be located within the 5% AEP contour

³ Only effluent treated to a secondary standard by an Aerated Wastewater Treatment System on land below the 1% AEP contour

Potential location for wastewater treatment system and irrigation areas

A potential location for the package wastewater treatment system and associated storage was identified to the south-south east of the proposed buildings (administration, function room, crematorium maintenance building. Potential areas for irrigation were also identified on Pad 1, as shown on Figure 3-9.



Figure 3-9: Potential location for wastewater treatment system and irrigation areas

3.3.3 Water balance

A high-level water balance model was developed based on the requirements of the Department of Environment and Conservation (NSW) Environmental Guidelines – Use of Effluent by Irrigation.

Irrigation tends to increase runoff due to the reduction in the amount of rain needed to saturate soil to a point where runoff occurs. The Guideline requires runoff as a result of irrigation to be minimised, to ensure that runoff is not used as a means to dispose of the effluent to the environment and that runoff does not increase significantly above the natural baseline.

Effluent storage is also a key component of the water balance and can be used to optimise the land area required to satisfy water demand requirements. For full reuse (no wet weather discharges) the strength of the effluent is used as a tool to determine the allowable frequency of uncontrolled discharges which inevitably occur as a result of prolonged rainfall events. As a general guide, for low strength effluents, uncontrolled releases may be permitted in 50% of years. For medium and high strength effluent, discharges may be limited to 25 and 10% of years respectively. In some situations, either the strength of the effluent and/or the sensitivity of the receiving environment may be such that there should be no overflows (or less frequent overflows than those provided in the Guideline) from the storage to the environment.

Based on the criteria of the Guidelines, the effluent from the on-site treatment plant would be generally classified as low - medium strength.

The water balance model was used to determine area and storage requirements for various volume disposal options, based on the following:

- Daily time step model
- Modelling from 1/1/1980 – 17/06/2020 (40 years)
- No accounting for nutrients
- Soil type – Sandy Loam with Readily Available Water (RAW) of 70 mm/m
- Root depth (based on lawn grass) – 150 - 600 mm (average of 375 mm adopted)
- Effective RAW – 26.25 mm
- Irrigation Point – 13 mm
- Wilting point – (-) 20 mm
- Crop Factor – 0.7
- Initial Volume - 10.5 mm
- Leaching factor – 0.085
- Irrigation area was balanced to minimise the calculated runoff (irrigation) (mm) to runoff (no irrigation) (mm). For the purposes of this assessment, irrigation area was balanced with a runoff increase factor of 3%. There are diminishing returns below a factor of 5% (see Figure 3-10 and Figure 3-14)
- Storage volume calculated was based on discharges being limited to 10 - 25% of years.

Note that this is a preliminary assessment. MEDLI modelling or similar may be required when site-specific information is known and soil testing has been undertaken.

3.3.4 Wastewater Option B-1 – On-site treatment and disposal via irrigation

Assumptions

The following was adopted for Option B-1:

- Traditional services (such as dual flush toilets) to service the development – consideration of water saving measures, such as waterless toilets and recycled water use for toilet flushing are assessed in Option B-2 and B-3.
- All wastewater generated by the development (facilities for guest/visitors, café and on-site management) will be managed on-site
- Land application would be by covered surface drip and shallow subsurface drip irrigation to minimise public health risk and potential for run-off
- Irrigation systems shall be designed to ensure that effluent is not applied at rates which exceed the absorption capacity of the soil

Irrigation area and effluent storage requirements

It is calculated that the following will be required:

- Irrigation area 55,000 m² (see Figure 3-10)
- Effluent storage volume of 250,000 L (see Figure 3-11).

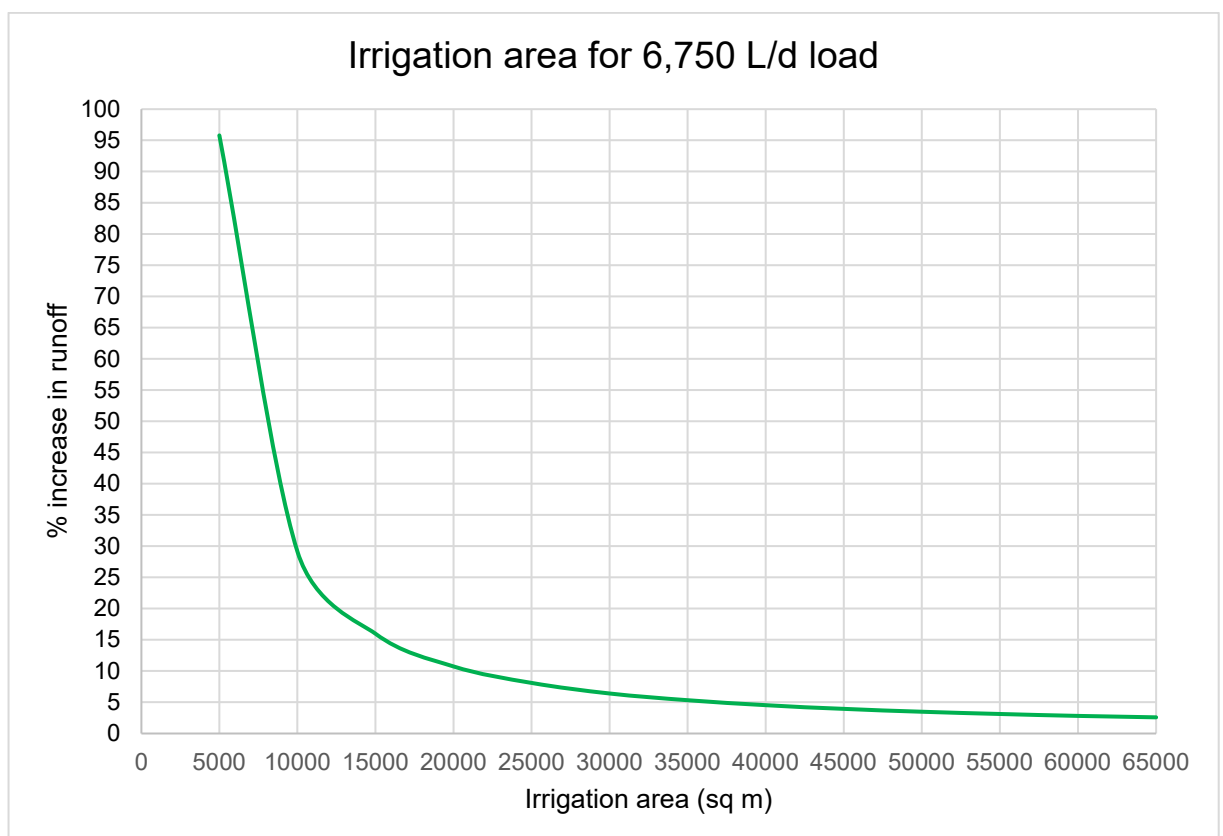


Figure 3-10: Irrigation area required for Option B-1

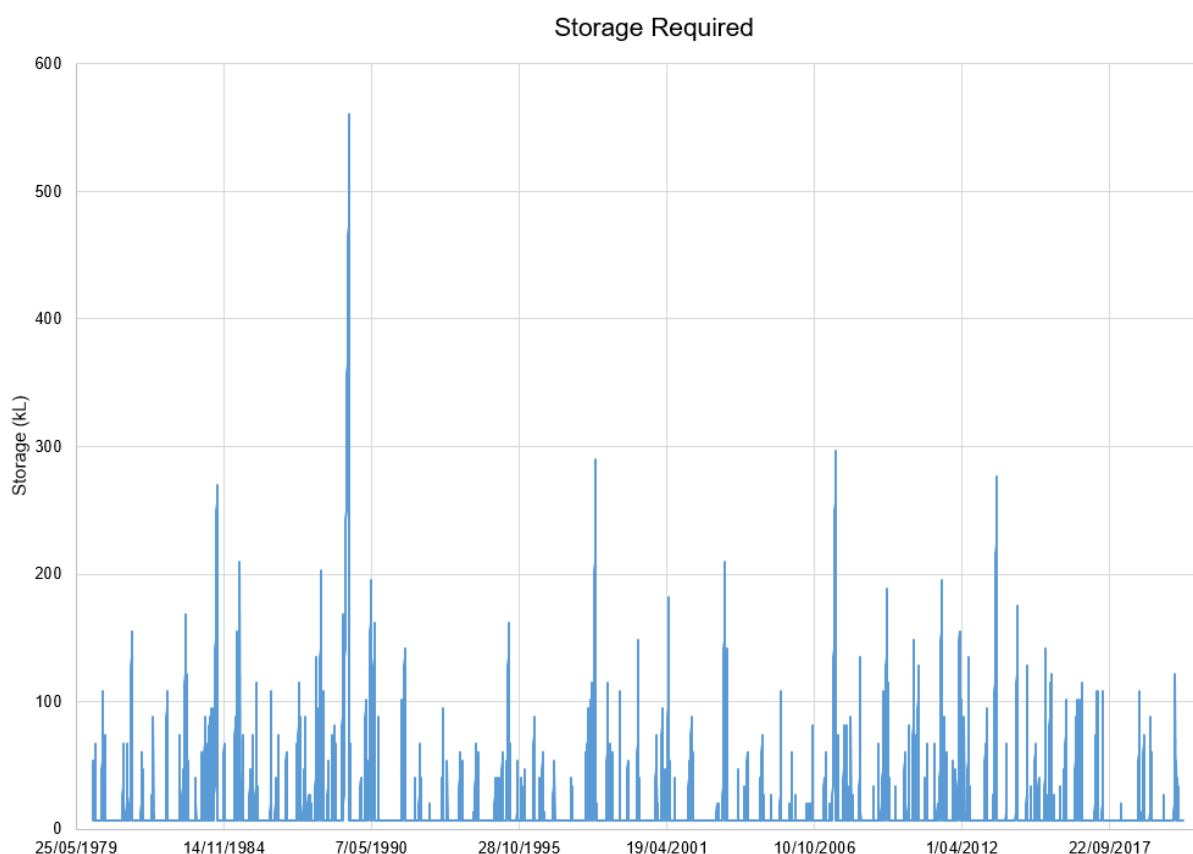


Figure 3-11: Water balance storage required results for Option B-1

Note that a significant proportion of the wastewater flow is “black water”, being from the toilets, with the subsequent nutrient and salt loading. The irrigation area may be required to be increased to account for nutrient load.

Cost estimate

Based on cost estimation for similar projects and commercial estimates for on-site package treatment plants, a planning level cost estimate was undertaken. The estimated cost of on-site treatment and disposal is \$252,500, as detailed in Table 3-5.

Table 3-5: Capital cost estimate for Wastewater Option B-1

Item	Unit rate	Unit	Cost
On-site package treatment plant ¹	\$85,000/unit	1	\$85,000
Irrigation infrastructure ²	\$15,000/Ha	5.5	\$82,500
250,000 L effluent storage tank ³	\$85,000	1	\$85,000
TOTAL			\$252,500

¹ Supply and installation, including site preparation and grease trap for Café wastewater

² Supply and installation of pipes, pumps etc for irrigation

³ Supply and installation

As with any on-site system there will be on-going operation and maintenance costs associated with the operation of the package treatment plant and irrigation system. Maintenance costs for the package treatment plant is estimated to be around \$3,000/year.

3.3.5 Wastewater Option B-2 – Waterless toilets, on-site treatment and disposal via irrigation

Waterless toilets

The most common type of waterless toilet, the ‘composting toilet’ (CT) does not smell if used and maintained correctly. All CTs require a volume of space under the toilet floor, which may necessitate the construction of either a pit or an elevated platform.

Decomposition in the holding tank or container of a CT takes place through a complex biochemical interaction of factors such as temperature, pH, desiccation and digestion by invertebrates, all taking place over an extended time-period.

They can produce fertiliser if sufficient time is allowed and correct treatment conditions have been maintained, however advice on its end use is required.

The standard for waterless composting toilets is the Australian/New Zealand Standard On-site domestic wastewater management Part 2: Waterless composting toilets (AS/NZ 1546.2:2008).

A water source for the hand basin will be required, which could be a rainwater tank topped up with water carted to site for the drinking water supply (see Section 4.3). A greywater system for the disposal of the hand basin wastewater is considered later in this Section. In some cases an overflow system for excess urine may be required, the greywater system for the hand basin wastewater can be used to cater for this as required.

CTs can be constructed to be sympathetic to the proposed development, with many outdoor structure options available. Consideration should be given to a CT system that minimises the floor level required (low profile or underground chamber options), to facilitate guests with limited mobility. There are commercial options available that can cater for 30+ uses per day with underground chamber, up to large capacity commercial options which cater for up to 110 visits/day.

Another option is a waterless toilet with a sealed pump out vault (also known as a Dry Vault toilet system). This option is suitable for high visitor numbers with precast concrete tanks (dry vault) emptied by septic tank pump-out trucks as required. The main factors that influence the frequency of pumping is the number of people using the facility per day and the vault tank size. Pump outs require good availability of septic tank servicing contractors with pump out equipment.

An assessment of which type of waterless toilet would be most suitable for the development is required. It is expected that the continuous or batch composting toilets would both be suitable, for locations around the site with lower guest usage, such as by the cremation wall and in-ground burials. For locations with higher visitor numbers, such as the crematorium, function room/café and chapel, the dry vault system may be more suitable.

See Figure 3-12 and Appendix D for examples of waterless composting toilets that are available in Australia and comply with AS/NZ 1546.2:2008, and Figure 3-13 and Appendix D for dry vault toilet systems. Note this is not a product endorsement by GHD but provided for information purposes only.

A list of waterless composting toilets approved for use by the NSW Government Health is provided on their website (note this is for domestic systems, but does provide a list of suppliers with approved products):

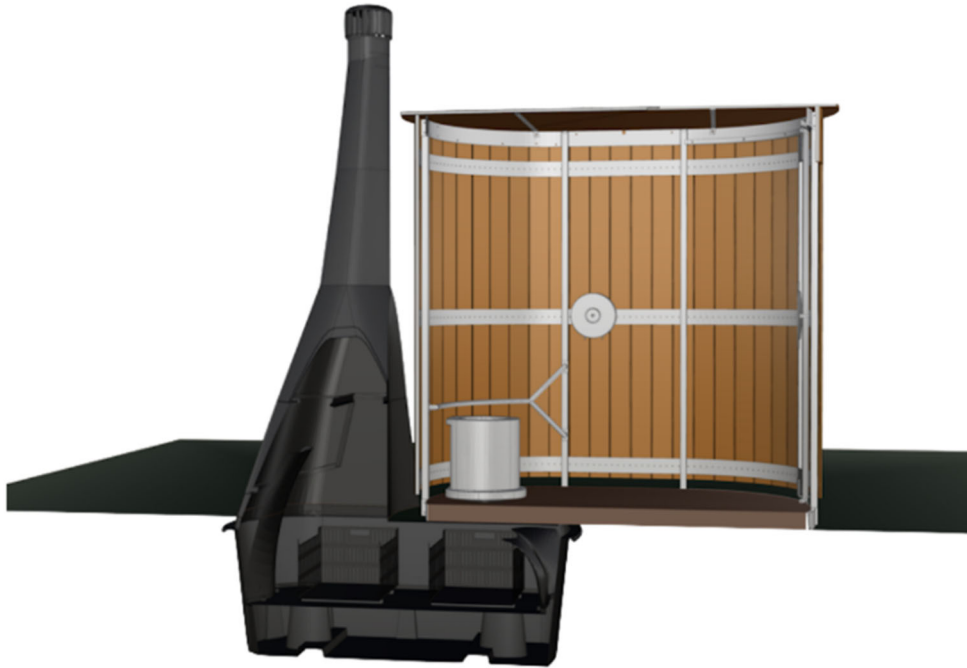


Figure 3-12: Example of a commercial composting toilet (capacity 30+ visits/day)

Source: Ecoflow Kazuba™ composting toilet

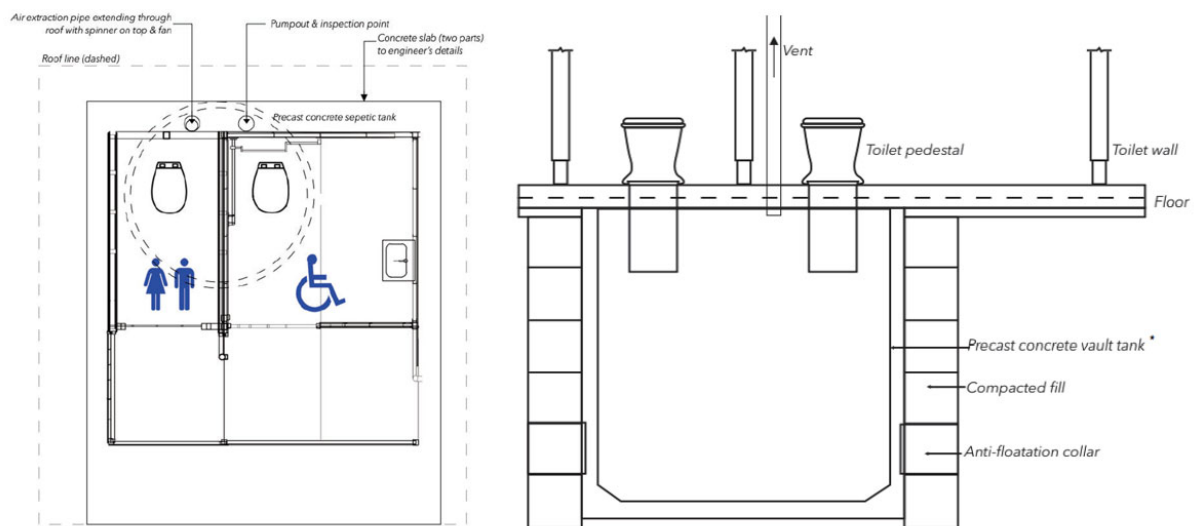


Figure 3-13: Example of Dry Vault toilet system (plan and cross-section)

Source: Ecoflow Dry Vault toilet system

Assumptions

The same assumptions as for Wastewater Option B-1 were adopted, with the following:

- Waterless toilets installed for guest and employee facilities. It is assumed that these can be constructed and maintained for similar cost as conventional toilet facilities (therefore not included in cost estimate).
- There is no wastewater flow for a centralised on-site wastewater treatment plant from guest and employee WC and hand basin facilities – wastewater from hand basins can be managed via a small greywater treatment system and adsorption trench/ garden bed adjacent to the facilities (as discussed later in this Section)
- Café – guest allowance and manager/staff residence will still require treatment and disposal on site.

Table 3-6: Design daily wastewater flow for Wastewater Option B-2

Generation	Adopted flow
Wastewater flow from guest WC and hand basin facilities	0 L/person/day ¹
Café – guest allowance	12 L/guest/day
Café - employee	0 L/person/day ¹
Manager/staff residence (4 persons)	150 L/person/day
Total	3,600 L/day

¹ To main treatment facility, hand basin wastewater considered separately (see below)

Irrigation area and effluent storage requirements

Wastewater from Café and Manager/Staff residence

It is calculated that the following will be required:

- Irrigation area 30,000 m² (see Figure 3-14)
- Effluent storage volume of 125,000 L (see Figure 3-15)

In addition to the reduced irrigation area and storage volume required the “black water” (toilet wastewater) would be removed, decreasing the nutrient load to the on-site package treatment plant and subsequently the irrigated land.

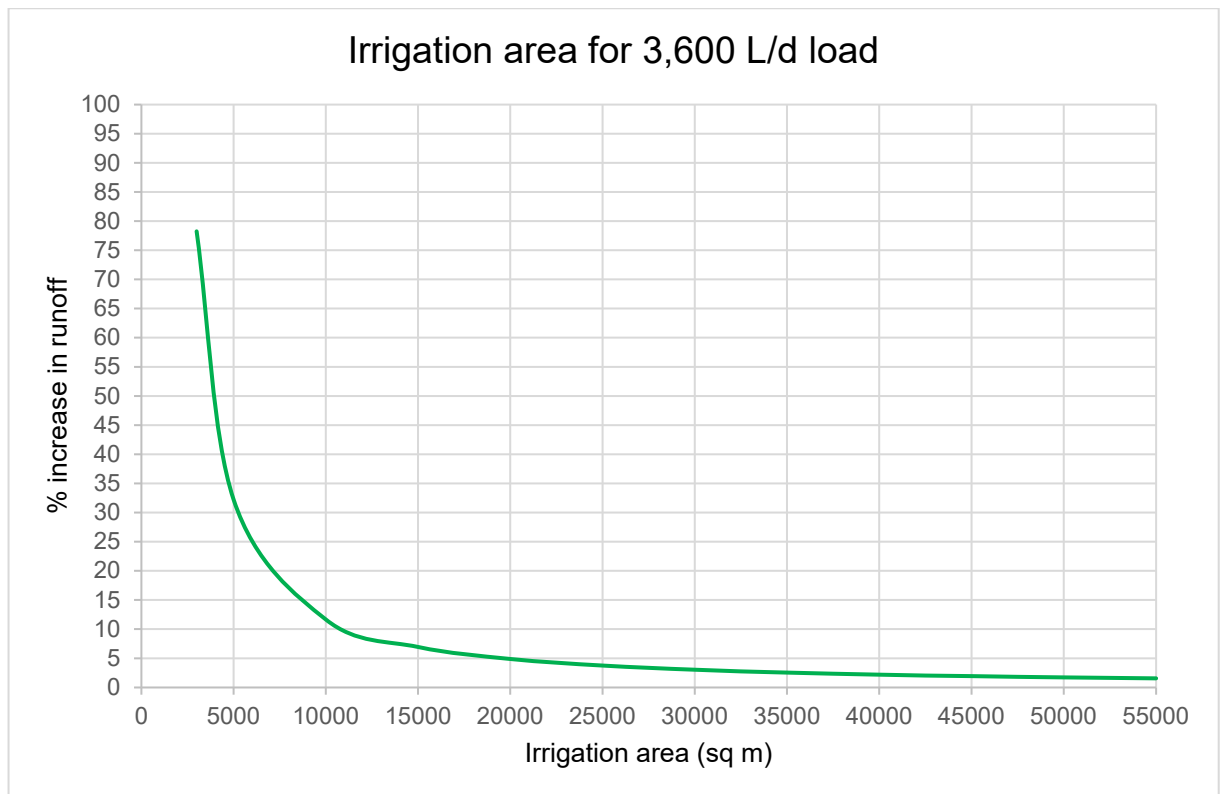


Figure 3-14: Irrigation area required results for Option B-2

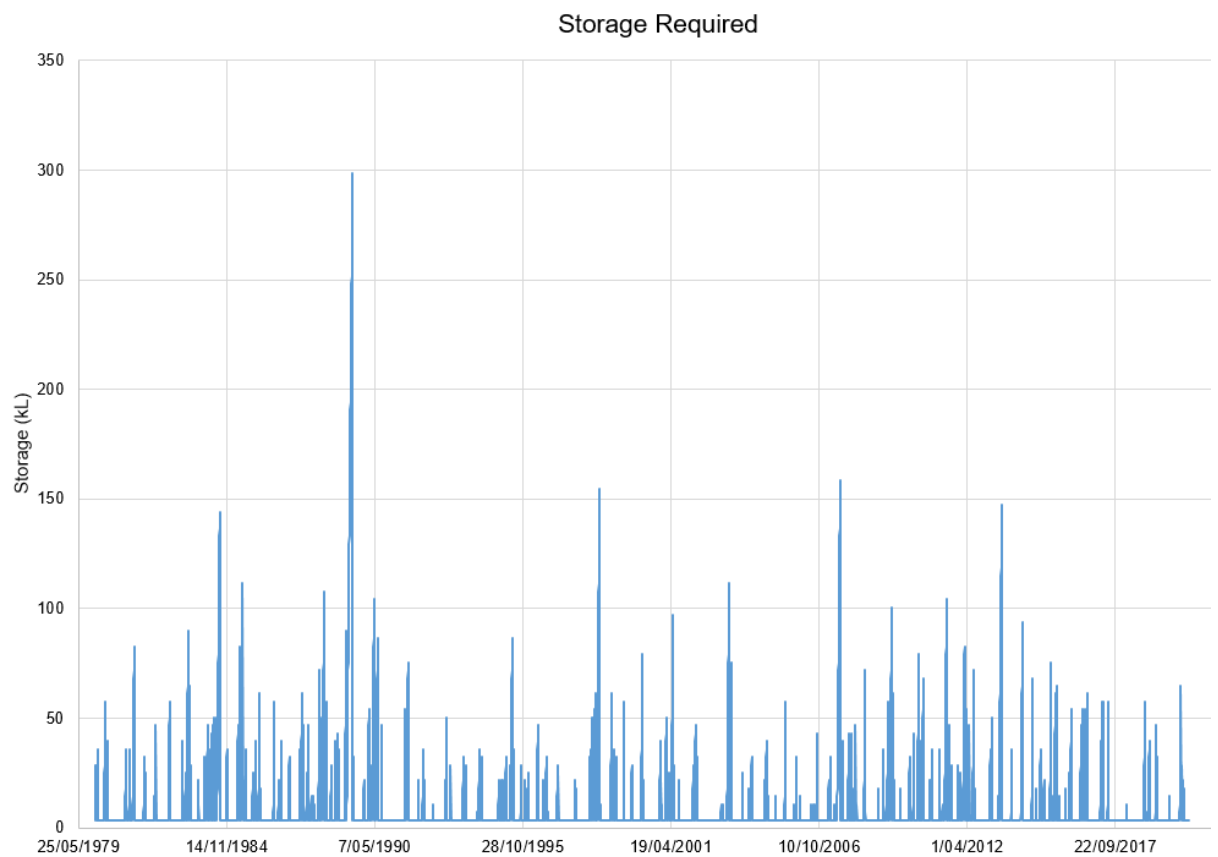


Figure 3-15: Water balance storage required results for Option B-2

Cost estimate

Based on cost estimation for similar projects and commercial estimate for on-site package treatment plant, a planning level cost estimate was undertaken. The estimated cost on-site treatment and disposal is \$150,000, as detailed in Table 3-7.

Table 3-7: Capital cost estimate for Wastewater Option B-2

Item	Unit rate	Unit	Cost
On-site package treatment plant ¹	\$60,000/unit	1	\$60,000
Irrigation infrastructure ²	\$15,000/Ha	3.0	\$45,000
Storage tank ³	\$45,000	1	\$45,000
TOTAL			\$150,000

¹ Supply and installation, including site preparation and grease trap for Café wastewater

² Pipes, pumps etc for surface irrigation

³ Supply and installation

As with any on-site system there will be on-going operation and maintenance costs associated with the operation of the package treatment plant and irrigation system. Maintenance costs for the package treatment plant is estimated to be around \$2,000/year.

Wastewater from waterless toilet facilities

As a small amount of wastewater will still be generated from hand washing facilities, and potentially some urine overflow from the composting toilet facility, a suitable greywater treatment system will be required. These systems collect and treat (and some disinfect) the water to various levels of purity and hygiene. Considering that the wastewater will mostly be from hand washing, a simple primary treatment system should be suitable, especially with the use of eco-friendly soaps.

Systems available consist of a filtration tank (typically consisting of a pine bark coarse filter on top of different grades of sand and gravel, see Figure 3-16 and Appendix E for example) and a land disposal area. The filtered material and bark will compost over time and should be removed and replaced regularly.

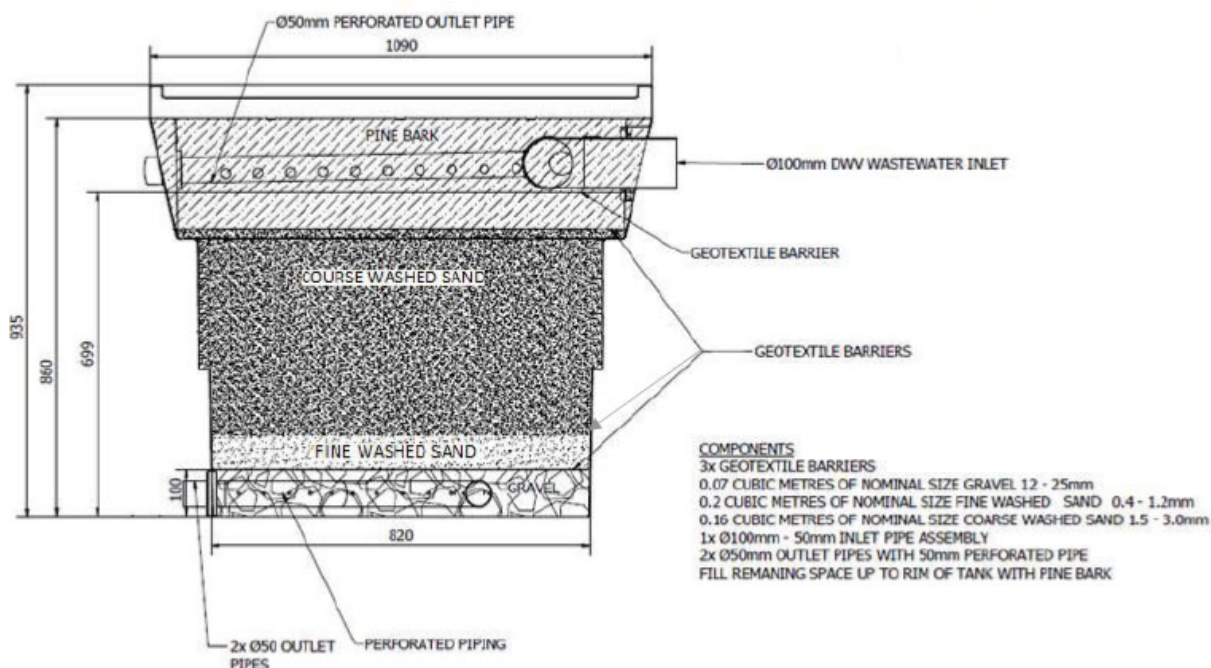


Figure 3-16: Example of greywater filtration tank

Source: Ecoflow wastewater management

The treated water can then be distributed into evapotranspiration-adsorption trenches/ garden beds, with sizing dependant on the guest loading for each waterless toilet. Surface vegetation shall be plants such as grasses and shrubs that tolerate wet conditions and have a high evapotranspiration capacity, and should be selected on the basis of local experience.

Table 3-8 provides an indication of the garden bed area that may be required to dispose of the greywater from the waterless toilet guest facilities. Volume and areas have been based on AS/NZS 1547:2012:

- Assumed 4 L/visit for handwashing
- 120 L/d for waterless toilet facility for 30 visits/day, up to 440 L/d for waterless toilet facility for 110 visits/day
- Sandy loam with a conservative design loading rate of 10 mm/d
- Bed design from AS/NZS 1547:2012, as shown in Figure 3-17
- Excavation width 1,500 mm
- Minimum distance between beds of 1,000 mm.

Table 3-8: Indication of garden bed area required for greywater disposal

Daily disposal volume (L/d)	Length of bed (m)	No. beds	Total area (sq. m)
120	4	2	16
440	5	6	70
1,000 (total volume for whole site) ¹	5.5	12	159.5

¹ As it is expected that the waterless toilets will be provided at various locations around the site, this area is provided as an indication of the total area only

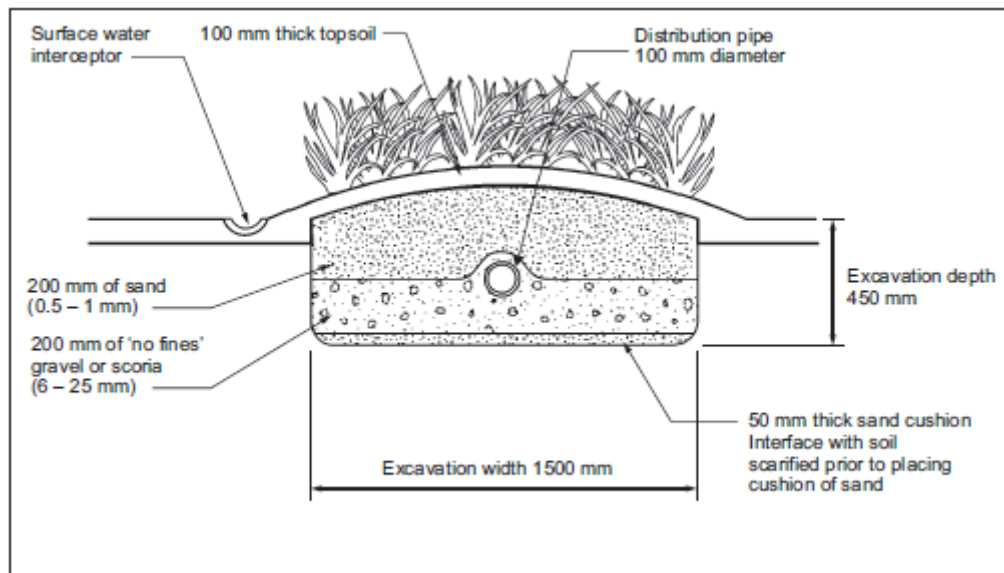


Figure 3-17: Evapotranspiration-adsorption trenches/ garden bed detail
(extracted from AS/NZS 1547)

3.3.6 Wastewater Option B-3 – On-site treatment, recycled water and disposal via irrigation

The option of recycling the treated wastewater through the toilets was considered, however irrigation of effluent would still be required. Salt is particularly difficult to remove from wastewater, and the proportion of salt in the irrigation effluent would increase over time by recycling the water. This would influence the type of vegetation able to be irrigated (salt tolerant plants are required when salt concentration exceeds 1,000 pds), and the soil may need to be “flushed”.

This option was not considered further.

4. Options Assessment – Water

4.1 Design water demand

For the purposes of this assessment the following has been assumed, based on advice provided in meeting with the client of 12 June 2020:

- Daily water demand estimates are based on the assumptions for design wastewater flow (refer to Section 3.1, waterless toilets have not been included in the calculated demand, this is considered in Water Option B)
- No irrigation with potable water (landscaped area will be irrigated via the water license the client has on site)
- Average daily water use based on Sydney Water guide per property development type for Manager's residence.

Table 4-1 below summarises the adopted daily potable water demand. A further assessment will need to be undertaken at the time of detailed design to confirm adopted values.

Table 4-1: Design daily water demand

Source	Adopted demand
Demand from guest WC and hand basin facilities	12 L/person/day
Café – guest allowance	13 L/guest/day
Café - employees	16 L/person/day
Manager/staff residence (single lot community)	623 L/lot/day
Total	7,033 L/day

4.2 Water Option A - Connection to Sydney Water water supply system

4.2.1 Description and plans

A review of the potential to connect to the Sydney Water water supply system was undertaken. The proposed development is currently outside the Sydney Water water service area. Sydney Water need to be consulted and modelling undertaken to determine if the development can be supplied.

The closest potable water supply system is the Warragamba North Water Supply Zone. For the purposes of this options assessment, the following has been adopted:

- On-site storage tank with float valve, tank fills over a 24 hour period and with minimum sizing for 1 maximum day storage (to minimise size of connection pipe and provide contingency)
- Adopt a 12,200 L colour bond steel tank with delivery booster pump for costing
- Connect to closest reticulation point on Greendale Rd (to a DN100 main in the Warragamaba North Reduced 1 Pressure Zone, as shown in Figure 4-1 and Figure 4-2)

- Connection route in road verge along Greendale Rd, approximately 2,330 m, with DN80 connection main
- Pressure at connection point assumed to be 20 – 30 m, total head loss approx. 22 m (12 m friction loss and increase in height 10 m), residual head approx. 8 m
- Potential location for the drinking water storage tank is shown in Figure 4-3.

4.2.2 Cost estimate

Based on cost estimation for similar projects and commercial estimate for on-site drinking water storage tank, the estimated cost for connection to the Sydney Water water supply system is \$243,000, as detailed in Table 4-2:

Table 4-2: Capital cost estimate for Water Option A

Item	Unit rate	Unit	Cost
DN80 HDPE ¹	\$100/m	2,330 m	\$233,000
Tank and pump ^{2, 3}	\$10,000	1 unit	\$10,000
TOTAL			\$243,000

¹ Includes design, materials, installation and restoration

² See Appendix F for example of typical commercially available 12.2 kL tank

³ Includes site preparation, delivery and installation of steel tank (colour bond colour sympathetic to development), booster pump and CI dosing unit

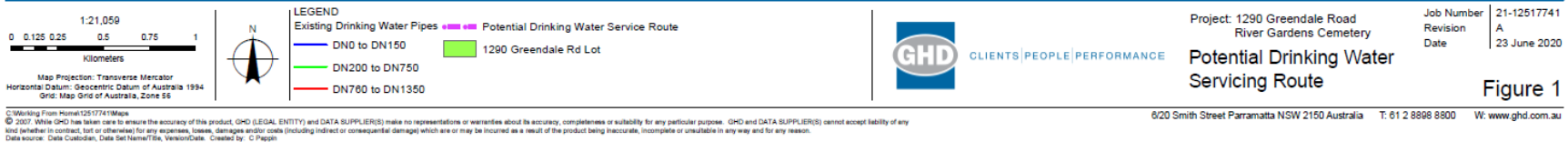
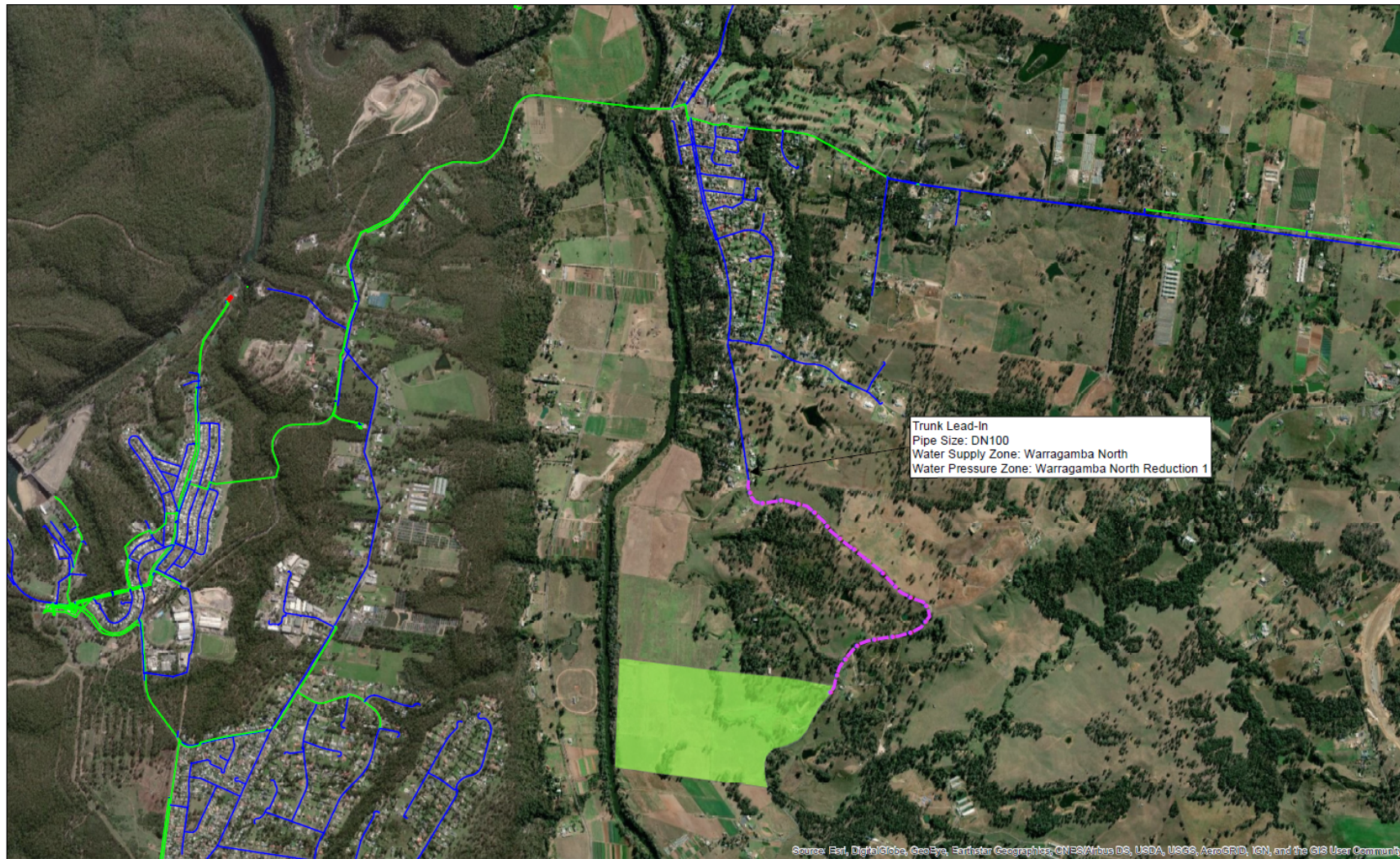


Figure 4-1: Potential connection to Sydney Water water supply system – Plan view

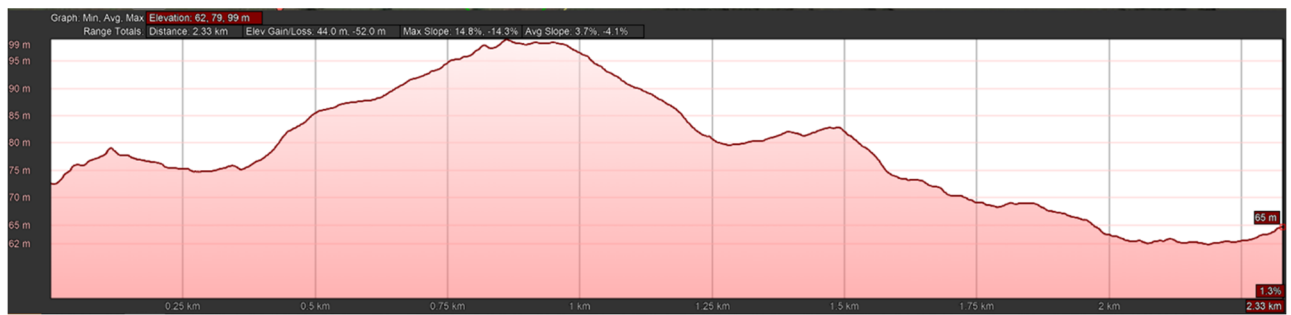


Figure 4-2: Potential connection to Sydney Water water supply system – Elevation profile

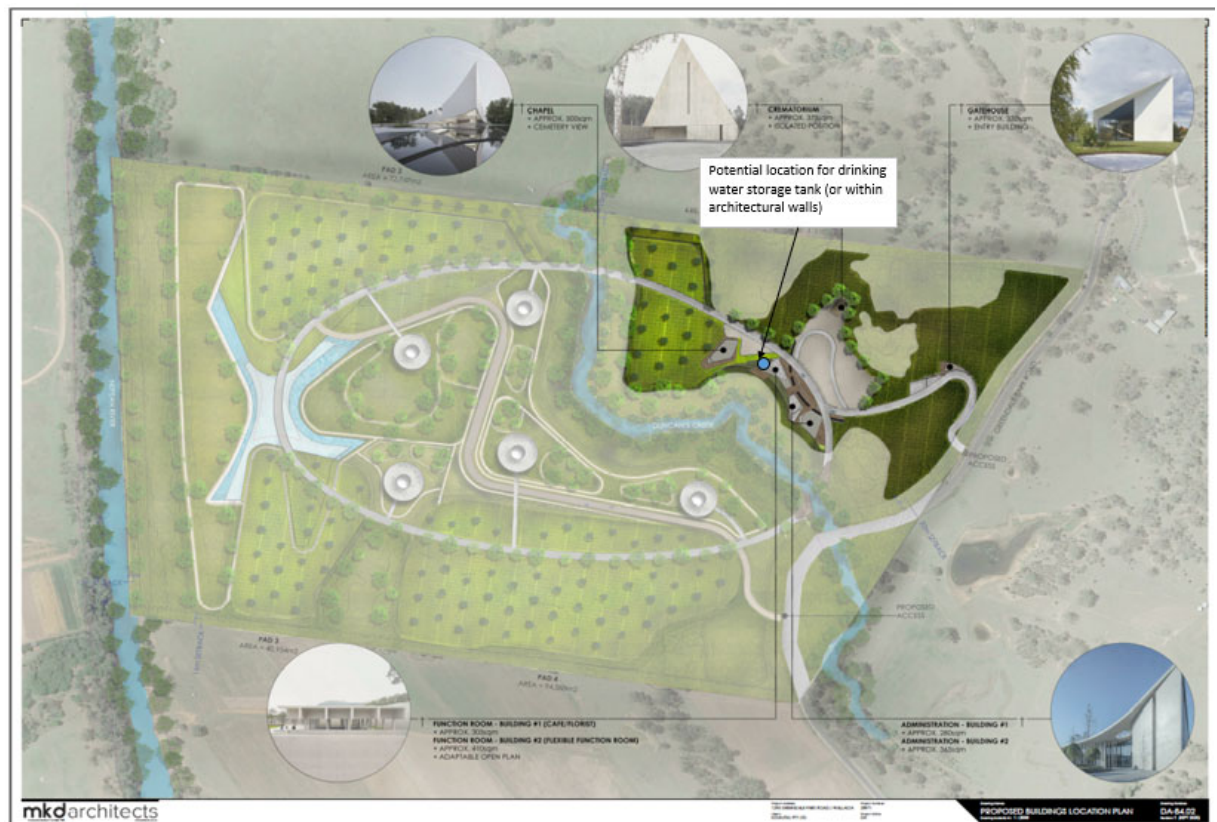


Figure 4-3: Potential location for drinking water storage tank

4.3 Water Option B – On-site potable water tank with tankered drinking water

4.3.1 Description

As can be seen from Option A, the greatest cost is associated with the construction of the connection from the site to the Sydney Water drinking water system.

There is potential to construct the drinking water storage tank on site, as per Option A, and have potable water delivered to the site by a suitably accredited water carter (see Appendix H for the NSW Health Guidelines for water carters). For the purposes of this options assessment, the 12,200 L colour bond steel tank with delivery booster pump has been adopted for costing, as in Water Option A.

For Water Option B it has been assumed that waterless toilets would be installed on the site, and only water for handwashing in the guest WC and hand basin facilities would be required.

Table 4-3 summarises the adopted daily potable water demand for Water Option B. A further assessment will need to be undertaken at the time of detailed design to confirm adopted values.

Table 4-3: Design daily water demand with waterless toilets

Source	Adopted demand
Demand from guest WC and hand basin facilities ¹	4 L/person/day
Café – guest allowance	13 L/guest/day
Café – employees ¹	8 L/person/day
Manager/staff residence (single lot community)	623 L/lot/day
Total	4,953 L/day

¹ Assumed 4 L/person for hand basin demand

4.3.2 Cost estimate

For the purposes of this Water Option B it is assumed that waterless toilets will be installed on site, thereby reducing the water required for delivery by water carter to around 5,000 L/day.

Table 4-4: Capital cost estimate for Water Option A

Item	Unit rate	Unit	Cost
Tank and pump ^{2, 3}	\$10,000	1 unit	\$10,000
TOTAL			\$10,000

¹ Includes design, materials, installation and restoration

² See Appendix F for example of typical commercially available 12.2 kL tank

³ Includes site preparation, delivery and installation of steel tank (colour bond colour sympathetic to development), booster pump and CI dosing unit

Although the construction cost is significantly reduced, the on-going cost of water delivery needs to be considered. Although this is a relatively small volume in terms of cost of the water, the main cost is in truck movements (water-carting trucks vary in capacity from around 5,000 L to 11,500 L).

Based on the assumption of \$100 - \$150/delivery (one truck every second day, all year round), it is estimated that it would cost around \$18,250 - \$27,375 per annum to cart water to the proposed development.

4.4 Water Option C - Rainwater tanks and potable water tank

4.4.1 Description

An option considered was on-site rainwater tanks, however a drinking water tank would still be required to service the café and other guest facilities (excluding WC), with minimal decrease in cost for construction and operation of the drinking water tank.

This option was not considered further as a water servicing option.

5. Recommended water and wastewater servicing of proposed development

Based on the water and wastewater options considered, and consultation with the developer, on-site treatment and disposal via irrigation, with waterless toilets (Wastewater Option B-2), drinking water storage tank with water delivered by registered water carter (Water Option B) is the recommended servicing option.

Requirements for the recommended servicing option is summarised in Table 5-1 and shown in Figure 5-1.

Table 5-1: Summary of recommended servicing option

Service	Option	Details
Wastewater	Wastewater Option B-2 – waterless toilets, on-site treatment and disposal via irrigation	Daily flow for treatment and disposal 3,600 L (at on-site package plant)
		On-site package treatment plant
		Effluent storage volume 125,000 L
		Irrigation area 30,000 m ² , with associated irrigation assets (pump/s, pipes, irrigation nozzles) for covered surface drip or shallow subsurface drip irrigation
		Waterless toilets for guests and employees
		Greywater treatment and disposal (waterless toilets)
Water	Water Option B - on-site potable water tank with tankered drinking water	Daily water demand 4,953 L/day
		12,200 L drinking water storage tank with booster pump and Cl dosing unit

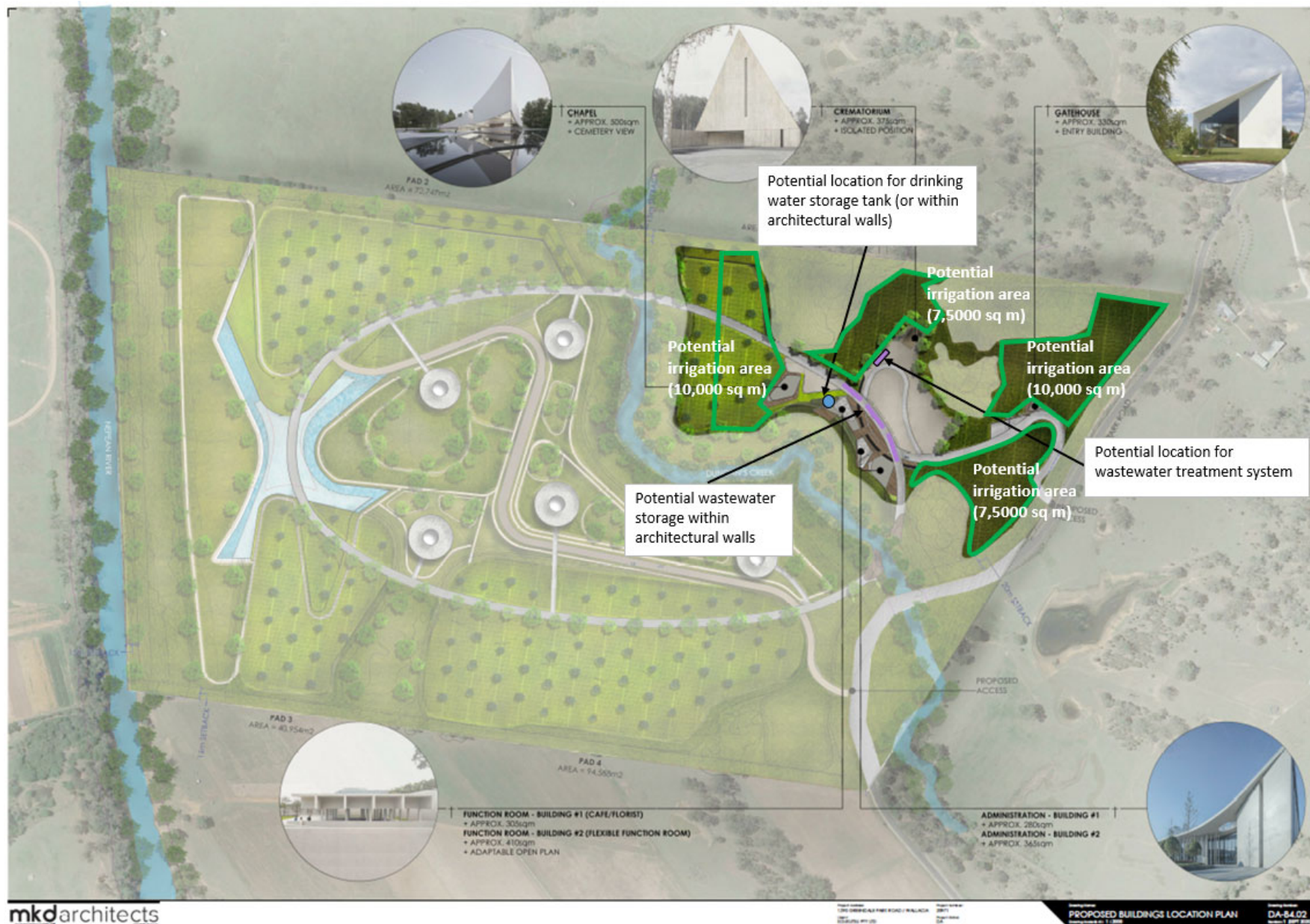


Figure 5-1: Potential locations for recommended water and wastewater supply and treatment assets, and disposal areas

Appendices

Appendix A – Examples of pressure sewer systems

NOTE: Note this is not a product endorsement by GHD Pty Ltd but provided for information purposes only as examples of systems that are readily available.



Pressure Sewer Systems

Built under ISO9001
Quality Management System

Built to WSAA Standards
Certified by BSI to NSF/ANS146





What is a pressure sewer system?

A pressure sewer system is a network of fully sealed sewer pipes, which are fed by a grinder pump at each property. The pump grinds the solids present in the wastewater to a fine "slurry", which is then pumped through a small diameter pipeline from the house to the main, and the main to the treatment facility.

Pressure Sewer Systems

Aquatec Pressure Sewer Systems are one of the most economical and environmentally friendly sewerage systems on the market today.

Aquatec is Australia's number one provider of customised end-to-end pressure sewer systems.

Aquatec is at the forefront of the wastewater revolution. We want more innovative systems and smarter responses without extra costs or excessive time involvement.

Aquatec takes a customised approach to the design of Pressure Sewer Systems based on practical requirements and site conditions. Single, dual and triple pump options meet changing demands across domestic, commercial and industrial applications.

Manufacturing Process

Aquatec's Pressure Sewer Systems are manufactured in a controlled factory environment under strict ISO 9001:2008 and BSI Global Standards.

Proprietary chamber designs are pre-moulded to exact specifications, stringently tested and certified prior to delivery.



ISO9001:2008 Accreditation
Designed to comply with AS/NZS4546.1:2008
BSI Global Standards
NSW Health Certificate of Accreditation
NT Government Department of Health
and Families
SA Health Certificate of Accreditation

Chambers

Aquatec's Pressure Sewer chambers are engineered with a domed base forcing solids into the cutter of the pump, eliminating the potential for solids build up in dead zones and associated odour issues.

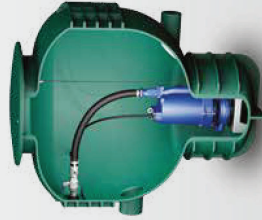
Product Range

Models	Litres*	Diameter	Depth	Depth to inlet (max)
PS5900	900	1.2m	1.45m	0.9m
PS5950	950	1.1m	1.65m	1.0m
PS51100	1100	1.0m	1.6m	1.1m
PS51500	1500	1.0m	2.2m	1.7m
PS53000	3000	1.5m	2.2m	1.7m
PS55000	5000	1.5m	3.0m	2.4m
PS57500	7500	1.85m	3.0m	2.4m
PS510000	10000	2.0m	3.2m	2.4m
PS515000	15000	2.5m	3.5m	2.9m

* - Nominal

Enviroplex

A unique shallow base for adaptability across adverse ground conditions and rocky terrains. LDPE (Low Density Polyethylene) roto moulded from high-grade virgin polyethylene.



Duplex

A dual pump system for multiple residential, industrial or commercial applications. LDPE or fibreglass dependent on daily volume requirements.



Triplex

Fibreglass chamber engineered on a case-by-case basis for multiple commercial and industrial applications where greater storage and depth is required.



Enduraplex

A world class injection moulded single pump system designed to endure the most rigorous conditions.

- 1 Self venting lid, with provision for optional profile seal for flood prone areas.
- 2 Heavy duty glass filled polypropylene cable hooks.
- 3 Child safe one bolt cover for ease of removal, with pad lockable option.
- 4 Specially manufactured PNI16 wire enforced rubber discharge hose.
- 5 316 S/S outlet, valve & disconnection coupling
- 6 Honeycomb inspired rib design to provide maximum strength whilst remaining lightweight.
- 7 High strength injection moulded HDPE** tank designed for 50 year life.
- 8 Anti-siphon valve and tank flush.
- 9 Smooth tank interior minimising solids build up.
- 10 Pressure transducer providing incremental control and measurement of tank level.
- 11 Moulded inlet stubs to ensure no leakage to the environment.
- 12 OGT Omni Grind Turbine pump providing peace of mind grinding and 20 year life*.

*Tested for the equivalent of 20 years usage for domestic sewer applications.

** High Density Polyethylene. Compliant with WSA-07.

Pumps

With an International Protection Rating of IP68, Aquatec's pumps hold the highest levels of protection on the market today.

Omni Grind Turbine - OGT

- New innovation technology
- Low amp turbine technology
- Residential, industrial and commercial applications
- Smaller cutter radius for greater ability to grind fibrous materials
- Special Aerospace Industry coating to prevent wear from abrasive products
- Non-contact pumping assembly with minimal wearing parts
- Flows up to 1.2l/s giving higher scouring velocities
- Capable and tested to operate at 80m continuously giving greater flexibility for network design
- Certified by BSI to NSF/ANSI46
- Class F motor insulation
- Highest cutting force of any pressure sewer pump



Omni Grind Plus - OGP

- For commercial, industrial and large scale residential applications
- Recessed vortex impellers for higher flows with reduced wear
- Flows up to 1.75l/s
- Capable and tested to operate at 60m
- 1.5kw motor
- Available in single or three phase
- Hydraulically balanced
- Class F motor insulation



Optional Accessories

Aquatec offers a wide range of Optional Accessories to meet or improve on your project specifications. Our Technical Consultants make recommendations for enhancements to your Pressure Sewer System based on budgets and the unique demands of your application.

Key Optional Accessories include:

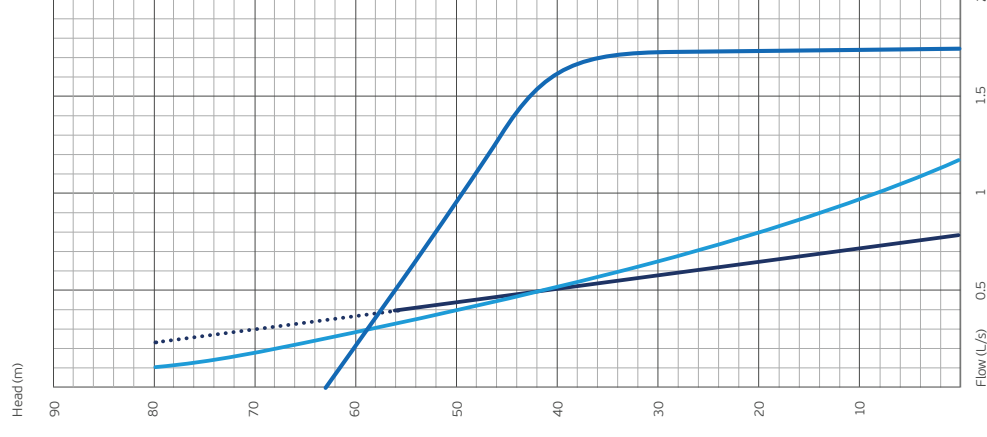
- Full Range of Custom Chambers
- External Storage Vessels
- Service trailers and equipment
- Access Covers
- Odour Controls
- Swiftlift Pump Trolley

Pump Upgrades

Upgrade kits with new components purpose-built for existing networks are designed to retrofit into your existing system for trouble free operation.

Grinder Pump Performance Comparison

- OGT Regenerative Turbine
- OGP 2 Stage Centrifugal
- — Progressing Cavity (for comparison)



Level Controls

Aquatec offers a variety of methods for level control, from simple level monitoring and control to remote real level display and operation.

Accessories

Aquatec's Reticulation Valve Kits introduce a range of mechanisms throughout the network for preventative pressure management, automatic cleaning and scheduled maintenance. All reticulation kits are 316 SS.

From isolating individual properties or lines within the network, to periodic cleaning or pressure reduction, Aquatec's Reticulation Valve Kits are available in kit form inclusive of all parts for immediate installation.

Hydrostatic Transducer

- Aquatec's Hydrostatic Transducers deliver offsite monitoring and control of liquid levels with pinpoint accuracy via desktop or smartphone, providing a superior level of reliability and precision over solid state sensors.
- Provides incremental liquid level via signal output
- Compact design
- Wholly protected sensor body
- Industry Standard IP68 submergence rating
- Flush diaphragm to withstand chemicals, fats and grime
- Designed to function continuously in challenging conditions

Float Switches

- Aquatec's Float Switches are capable of operating pumps or alarms either integral with the pump or wired directly to the control panel connection.
- Consistent and reliable long life performance
- Double liquid and raw sewerage proof chamber protecting the internal mechanism
- Smooth, circular shape ideal for Pressure Sewer applications
- Simple and proven operation

Boundary Connection Kits

- Aquatec's Boundary Connection Kits provide a means of isolation at the property boundary. Each kit includes a full bore isolation valve, a non-return valve, inspection tee and an optional flushing point mounted inside a polycarbonate or concrete valve box marked 'Pressure Sewer'.

Lid Ratings

- Class A
- Class B
- Class D



Isolation Valve Kits

- Available with extension spindles for ease of operation, Aquatec's Isolation Valve Kits provide line isolation throughout the reticulation for scheduled maintenance. Each kit includes a flanged, resilient seated isolation valve, polyethylene connection stubs with backing rings, gaskets and bolts, and a cast iron twist lock inspection cover with concrete surround.

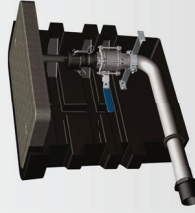


Flushing Point Kits

- Aquatec's Flushing Point Kits provide a means of reduction or introduction of high volumes of liquid for periodic scouring of a pressure sewer main. Each kit includes pipework, full bore lockable isolation valve and camlock connection all mounted inside an underground chamber.

Lid Ratings

- Class B
- Class D



Air Valve Kits

- Aquatec's Air Valve Kits provide a means of air release for high sections of the network, and as a siphon break for descending mains. Each kit includes a double acting sewerage combination air valve, isolation valve and interconnecting pipework, mounted inside a heavy duty, underground chamber.

Lid Ratings

- Class B
- Class D





The OmniSmart controller is a fully automated pre-programmed device that accurately controls flows within your reticulation systems prioritising pump operation to optimise your pressure sewer network.

- Aquatec's OmnisSmart controller thinks outside the box, by:
- Integrating your system into the surrounding sewer connections;
 - Can be retrofitted to upgrade existing pressure sewer installations
 - Optimising the whole network by analysing usage and flow to iron out the peaks and troughs.

This optimisation:

- Increases the life of your whole network;
- Self-scouting rising mains by creating daily 'flushing waves';
- Prioritises operation after power failure based on effluent levels in each tank;
- Improves flow and minimises retention issues;
- Reduces both capital and operation expenditure;
- Reduces additional infrastructure/ maintenance requirements; and
- Reduces whole of life costs by increasing the life expectancy of existing assets.

Features	OS1000 Series			OS6000 Series		
	1000A	1000B	6000A	6000B		
Key lockable IP65 polycarbonate green enclosure	•	•	•	•		
Backing plate for easy mounting on wall or post	•	•	•	•		
900db audible alarm with automatic mute, night time chirp and self-correction	•	•	•	•		
External mute button for audible alarm	•	•	•	•		
Strobe light for fault notification and identification	•	•	•	•		
Automatic and manual pump modes	•	•	•	•		
Microprocessor based operation with upgradeable firmware and is fully programmable	•	•	•	•		
Compatible with level switches or hydrostatic transducers	•	•	•	•		
Back up high level float switch compatible	•	•	•	•		
Brown out/Low voltage protection	•	•	•	•		
High voltage protection	•	•	•	•		
Adjustable Over Pressure Protection	•	•	•	•		
Motor current monitoring and protection for both low and high amps	•	•	•	•		
Real time Clock (date and time)	•	•	•	•		
Pump protection for Anti-seize, excessive run time and motor starts	•	•	•	•		
Adjustable pump and alarm activation points	•	•	•	•		
Adjustable Alarm delays	•	•	•	•		
LED system status indication	•	•	•	•		
Internal status history (last 2500 events including motor state, adjustable fluid levels granularity, configurational changes and alarms)	•	•	•	•		
USB Plug and Play administration interface and history	•	•	•	•		
SCOP compatible for improved system health and diurnal curve flattening	•	•	•	•		
Controller behaviour and activation based on time of day and fluid levels	•	•	•	•		
Adjustable start delay after power failure based on fluid levels	•	•	•	•		
Automatic scouring, time delay and storage modes	•	•	•	•		
Output to control external devices	•	•	•	•		
Battery Backup for Alarms, fluid levels, history and telemetry/SMS	•	•	•	•		
Hours run and pump start counter*	•	•	•	•		
Backlit LCD screen for system status, diagnostics and fluid level	•	•	•	•		
Telemetry/SCADA RS485 and RS232 MODBUS (see telemetry flyer)					•	
Telemetry/SCADA 3G Cellular and DNP3 (see telemetry flyer)						•
Email Alarm notifications						
Remote Diagnostics, pump control and administration						
FTP support of historical event data transfer						

• Standard

• Optional

* Available via USB on 1000A



Remote Capabilities

SCADA

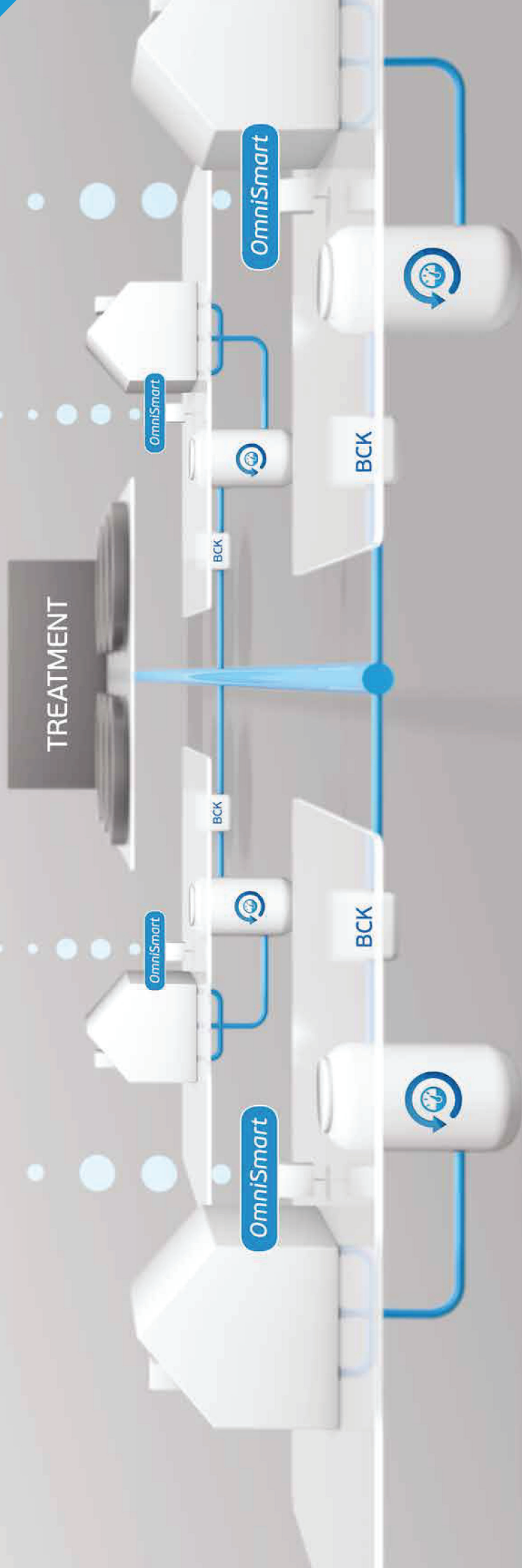
The standard OmniSmart Controller has inbuilt smarts for localised analysis and decision making. It is easily upgradable to become an edge device within your SCADA network by simply inserting a plug in module. This has the benefits of reducing demand on both your network and SCADA servers, improving response times, while still giving you real time operational and management capabilities. As an edge device, the OmniSmart also continues to give you all the benefits of an optimised reticulation network even during loss of communication or SCADA system outages.

SMS/Email

The OmniSmart supports two way SMS communication for fault notification along with remote diagnostics, adjustment and rectification. It can also email faults directly to your job management system to automate ticket issuing and prioritisation. The OmniSmart also has the ability to produce nightly historical exports via email for in-depth reporting and analytics.

File Transfer Protocol (FTP)

The OmniSmart transfers historical events to your FTP site at defined intervals, for automated phasing into your data warehouse. This gives you near real time data for reporting and analytics without the need of a SCADA system. OmniSmart supports CSV, tab delimited, and XML data file formats.



After Sales Service

Service Warranty

Aquatec are committed to providing full after sales service, support and long term warranties on all components.

Technical & Product Support

Australasia – +61 3 5823 4200

System Maintenance Management

Aquatec's nationwide network of accredited maintenance providers cover urban and rural areas with a same day response policy.

Water Innovation Partners

Australia

T 1300 088 555
> aquatecenviro.com.au

New Zealand

T 61 3 5823 4200
> aquatecenviro.co.nz

Appendix B – Copy of Pre-DA advice (extract)

Onsite Sewage Management System

- The site proposed for the development currently does not have connection to public sewer and is serviced by an on-site sewage management system. The applicant is required to either connect the proposed development to a reticulated sewerage service or demonstrate that sustainable on-site sewage management systems can be installed to service the development.
- It is noted that on-site sewage management is a limiting factor for the development given the buffer distances required from water bodies, structures roadways etc.
- A wastewater report is to be provided when the application is submitted and shall consider all potential wastewater flows. The report is to be prepared by a suitably qualified and experienced person and is to include the following as a minimum;

Plan

A plan, to scale, showing the location of:

- The sewage management facilities proposed to be installed or constructed on the premises;
- Any related effluent application areas;
- Any buildings or facilities existing on, and any environmentally

sensitive areas of, any land located within 100 metres of the sewage management facility or related effluent application areas;

- Any related drainage lines or pipework (whether natural or constructed); and
- All water bodies whether that be permeant or intermittent.

Specifications

Full specifications of the sewage management facilities proposed to be installed or constructed on the premises concerned.

Site assessment

Details of the climate, geology, hydrogeology, topography, soil composition and vegetation of any related effluent disposal areas together with an assessment of the site in the light of those details.

Statement

The report shall include a statement of:

- the maximum number of visitors /guests/ patrons that can occupy all of the chapels at any one time and the maximum number of services that may be held in a 24 hour period;
- wastewater calculations for the hall, administration building, community facility and café as per relevant NSW government wastewater documents and Australian Standards; and
- such other factors as are relevant to the capacity of the proposed sewage management facility.

Operation and maintenance

The report shall include details of:

- The operation and maintenance requirements for the proposed sewage management facilities;
- The proposed operation, maintenance and servicing arrangements intended to meet those requirements; and
- The action to be taken in the event of a breakdown in, or other interference with, its operation.

Standards and guidelines

	The report shall demonstrate that a system can be installed in accordance with the requirements of the following documents: • Liverpool Development Control Plan Part 1, Section 15 – On-site Sewage Management Systems (OSMS); • Local Government (General) Regulation 2005; • Australian/New Zealand Standard 1547:2012, On-site Domestic Wastewater Management, or any updated standard which supersedes AS1547:2012; • Sydney Catchment Authority 2012, Designing and Installing On-site Wastewater Systems; • NSW Health 2001, Septic Tank and Collection Well Accreditation Guideline; and • Department of Local Government 1998, On-site Sewage Management for Single Households. Note: a “suitably qualified and experienced person” is an Environmental Scientist or Engineer with a minimum Bachelor degree qualification and extensive industry experience in site and soil assessment within an on-site sewage management context. Note: There is currently no certification body for this field. The report’s cover or title page must confirm the consultant’s qualifications. Council is unable to recommend specific consultants or auditors.
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Appendix C – Examples of on-site treatment systems

NOTE: Note this is not a product endorsement by GHD Pty Ltd but provided for information purposes only as examples of systems that are readily available.

Product : Sewage treatment plant

Type : Oxyfix® FIXEUC90
 Model : 4.05 m³/day - C-90 MB 27 PE (2)
 Process : Submerged Aerated Fixed Film (SAFF) Technology

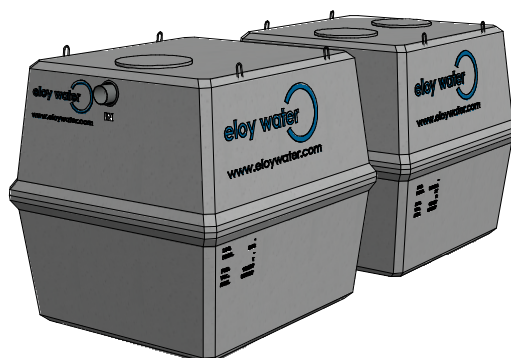
PERFORMANCE

Assumed Influent Values

Application :	Wastewater Treatment*
Pollutant load BOD ₅ :	400 mg/L
Pollutant load TSS :	600 mg/L
Pollutant load Ntot :	80 mg/L
Pollutant load Ptot :	13 mg/L

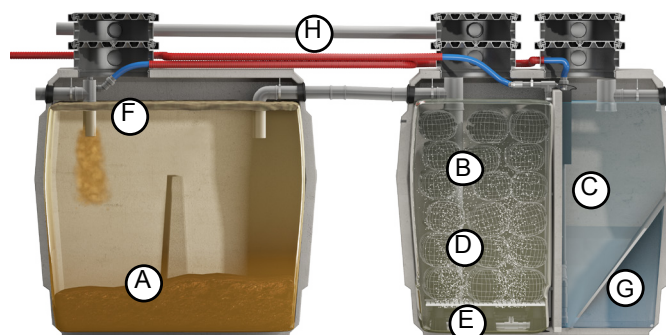
Purification performance

BOD ₅ :	20 mg/L
TSS :	30 mg/L



* We recommend placing a grease trap for treating waste water generated by a restaurant, kitchens used for commercial purposes, etc.

FEATURES



ELECTROMECHANICAL COMPONENTS

Blower

Quantity :	1 pc(s)
Type :	diaphragm blower
Installed power :	0.29 kW
Power consumption :	0.24 kW
SPL (Sound Performance Lab) :	55 dB(A)
On / Off :	60/00 min.
Voltage :	1x230V

Air Diffusers

Quantity :	6 pc(s)
Type :	fine bubbles

Sludge recirculation

Type :	airlift
Installed power :	- kW
Power consumption :	- kW
On / Off :	- min.

Control panel

Type :	inside
--------	--------

Legend

A	Primary settling compartment
B	Biological reactor
C	Secondary settling compartment
D	Bacterial support
E	Diffusers
F	Sludge recirculation
G	Settling cone

APPROVALS AND CERTIFICATES

 : 2014/04/138/A
 : EN 12566-3 CPD 89/106/CEE

DIMENSIONS | VOLUMES | WEIGHTS

Measure	Unit	Tank 1	Tank 2
Total height* :	(cm)	240	240
Entry height* :	(cm)	213	213
Exit height* :	(cm)	209	209
Length :	(cm)	260	260
Width :	(cm)	238	238
Total volume :	(m³)	10.00	10.00
Useful volume :	(m³)	9.19	9.00
Weight :	(T)	5.75	6.73
Weight (w/o shipping cover):	(T)	-	-
Manhole(s) :	(cm)	1 x Ø60	2 x Ø60
Ø In / Out :	(mm)	160/160	160/160

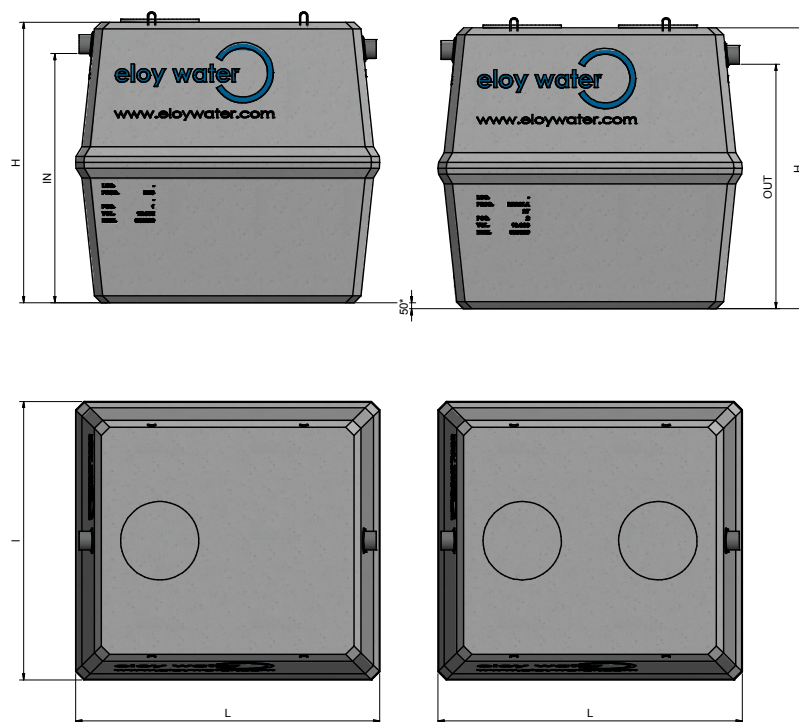
* tolerance ± 2 cm



Material

Tank(s):	High performance steel reinforced concrete
Biocarrier:	Recycled PP
Air feed pipes:	PVC PN16

TANK DIMENSIONS



OPERATION

Useful volumes/surfaces

Primary settling compartment:	9.19	m³
Biological reactor:	6.80	m³
Clarifier:	1.00	m²

Operation

Sampling chamber:	integrated
Theoretical desludging frequency:	every 24 months
Approximate energy consumption:	2,372.50 kW
Maintenance frequency :	annually (recommended)
Admissible load :	80 cm of fill + pedestrian load

Consumables

Blower filter:	annually
Blower membranes:	every 2 years
Air diffusers:	every 8 years

OPTIONS

Wall support for blower	
PE/concrete tank cover riser	3 pces
PE/steel tank cover	3 pces

GUARANTEES

Electromechanical kit :	2 years
Tanks :	10 years
Resistance :	B125



Product : Sewage treatment plant

Type : Oxyfix® FIXEUC90
Model : 5.7 m³/day - C-90 CB 38 PE (3) Tri 3x400V+N
Process : Submerged Aerated Fixed Film (SAFF) Technology

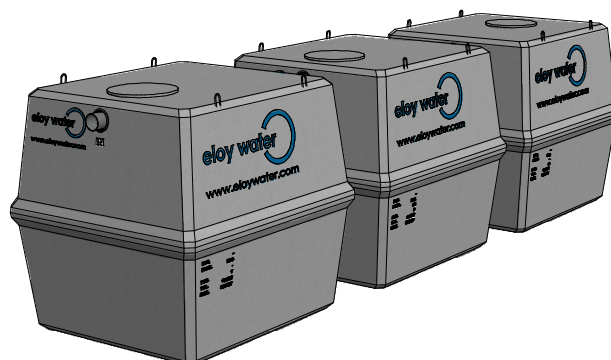
PERFORMANCE

Assumed Influent Values

Application :	Wastewater Treatment*
Pollutant load BOD ₅ :	400 mg/L
Pollutant load TSS :	600 mg/L
Pollutant load Ntot :	80 mg/L
Pollutant load Ptot :	13 mg/L

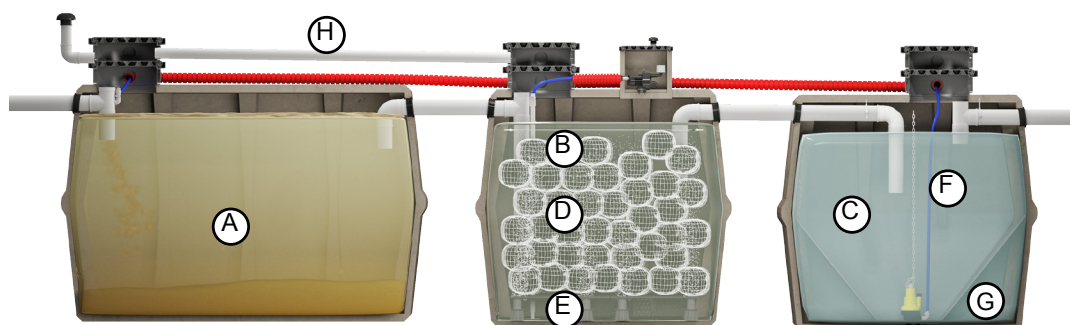
Purification performance

BOD ₅ :	20 mg/L
TSS :	30 mg/L



* We recommend placing a grease trap for treating waste water generated by a restaurant, kitchens used for commercial purposes, etc.

FEATURES



ELECTROMECHANICAL COMPONENTS

Blower

Quantity :	1 pc(s)
Type :	side channel air blower
Installed power :	0.81 kW
Power consumption :	0.68 kW
SPL (Sound Performance Lab) :	68 dB(A)
On / Off :	30/30 min.
Voltage :	3x400V

Air Diffusers

Quantity :	8 pc(s)
Type :	fine bubbles

Sludge recirculation

Type :	submerged pump
Installed power :	0.85 kW
Power consumption :	0.85 kW
On / Off :	5/55 min.

Control panel

Type :	inside
--------	--------

Legend

A	Primary settling compartment
B	Biological reactor
C	Secondary settling compartment
D	Bacterial support
E	Diffusers
F	Sludge recirculation
G	Settling cone

APPROVALS AND CERTIFICATES

 : 2014/04/139/A
 : EN 12566-3 CPD 89/106/CEE

DIMENSIONS | VOLUMES | WEIGHTS

Measure	Unit	Tank 1	Tank 2	Tank 3
Total height* :	(cm)	240	240	240
Entry height* :	(cm)	213	213	213
Exit height* :	(cm)	209	209	209
Length :	(cm)	260	260	260
Width :	(cm)	238	238	238
Total volume :	(m³)	10.00	10.00	10.00
Useful volume :	(m³)	9.19	9.19	9.19
Weight :	(T)	5.75	6.12	5.82
Weight (w/o shipping cover):	(T)	-	-	-
Manhole(s) :	(cm)	1 x Ø60	1 x Ø60	1 x Ø60
Ø In / Out :	(mm)	160/160	160/160	160/160

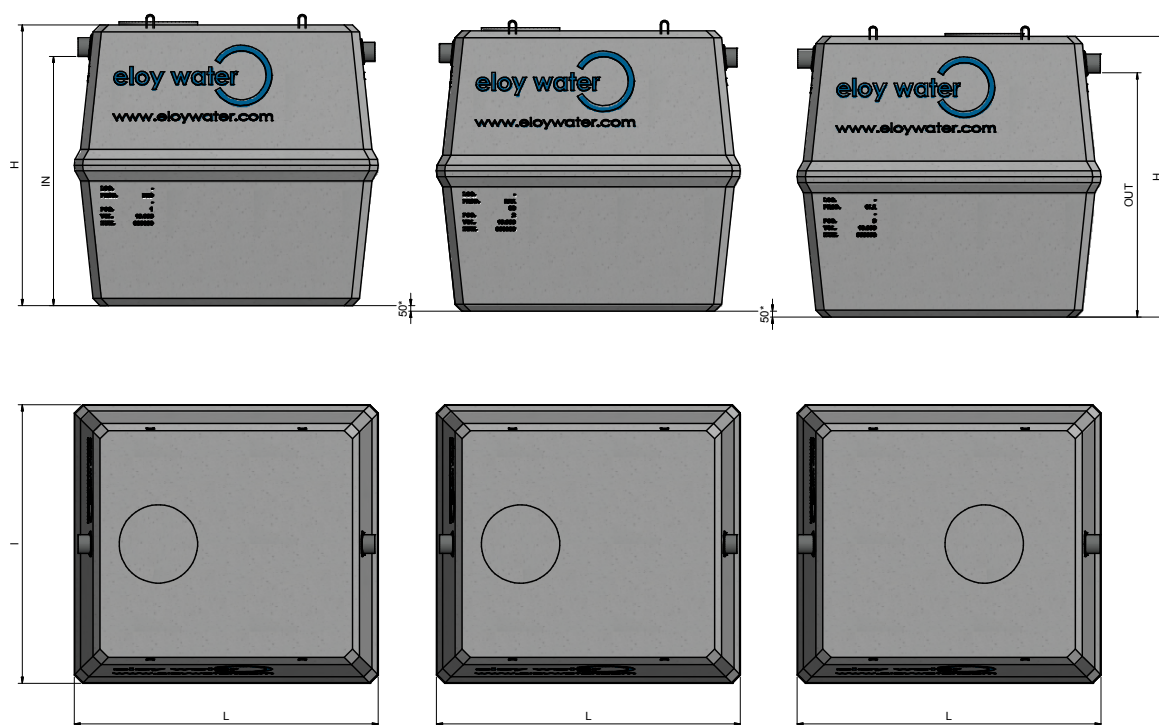
* tolerance ± 2 cm



Material

Tank(s):	High performance steel reinforced concrete
Biocarrier:	Recycled PP
Air feed pipes:	PVC PN16

TANK DIMENSIONS



OPERATION

Useful volumes/surfaces

Primary settling compartment:	9.19	m³
Biological reactor:	9.19	m³
Clarifier:	4.41	m²

Operation

Sampling chamber:	integrated
Theoretical desludging frequency:	every 17 months
Approximate energy consumption:	3,598.60 kW
Maintenance frequency :	annually (recommended)
Admissible load :	80 cm of fill + pedestrian load

Consumables

Blower filter:	annually
Blower membranes:	-
Air diffusers:	every 8 years

OPTIONS

Wall support for blower	
PE/concrete tank cover riser	3 pcs
PE/steel tank cover	3 pcs

GUARANTEES

Electromechanical kit :	2 years
Tanks :	10 years
Resistance :	B125

Product : Sewage treatment plant

Type : Oxyfix® FIXEUC90
 Model : 8.7 m³/day - C-90 CB 58 PE (3) Tri 3x230V
 Process : Submerged Aerated Fixed Film (SAFF) Technology

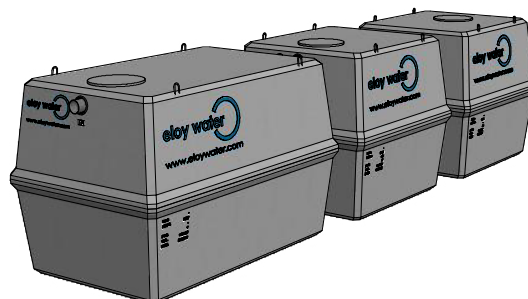
PERFORMANCE

Assumed Influent Values

Application :	Wastewater Treatment*
Pollutant load BOD ₅ :	400 mg/L
Pollutant load TSS :	600 mg/L
Pollutant load Ntot :	80 mg/L
Pollutant load Ptot :	13 mg/L

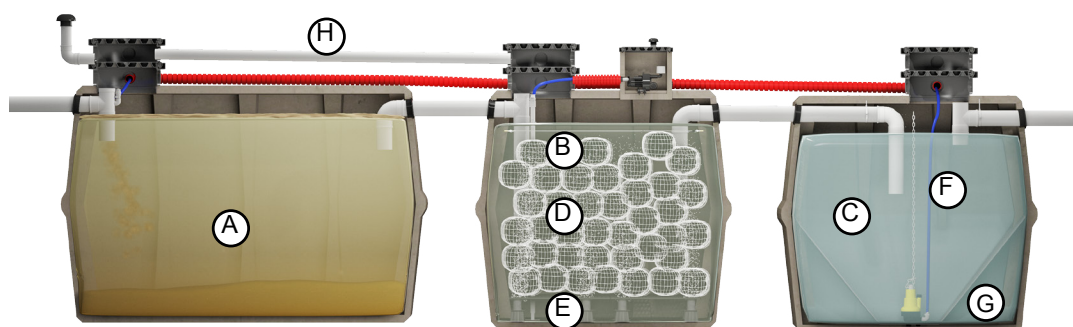
Purification performance

BOD ₅ :	20 mg/L
TSS :	30 mg/L



* We recommend placing a grease trap for treating waste water generated by a restaurant, kitchens used for commercial purposes, etc.

FEATURES



ELECTROMECHANICAL COMPONENTS

Blower

Quantity :	1 pc(s)
Type :	side channel air blower
Installed power :	1.10 kW
Power consumption :	0.82 kW
SPL (Sound Performance Lab) :	59 dB(A)
On / Off :	30/30 min.
Voltage :	3x230V

Air Diffusers

Quantity :	9 pc(s)
Type :	fine bubbles

Sludge recirculation

Type :	submerged pump
Installed power :	0.85 kW
Power consumption :	0.85 kW
On / Off :	8/52 min.

Control panel

Type :	inside
--------	--------

Legend

A	Primary settling compartment
B	Biological reactor
C	Secondary settling compartment
D	Bacterial support
E	Diffusers
F	Sludge recirculation
G	Settling cone

APPROVALS AND CERTIFICATES

 : 2014/04/140/A

DIMENSIONS | VOLUMES | WEIGHTS

Measure	Unit	Tank 1	Tank 2	Tank 3
Total height* :	(cm)	240	240	240
Entry height* :	(cm)	213	213	213
Exit height* :	(cm)	209	209	209
Length :	(cm)	370	260	260
Width :	(cm)	238	238	238
Total volume :	(m³)	15.00	10.00	10.00
Useful volume :	(m³)	13.68	9.19	9.19
Weight :	(T)	7.50	6.23	5.82
Weight (w/o shipping cover):	(T)	-	-	-
Manhole(s) :	(cm)	1 x Ø60	1 x Ø60	1 x Ø60
Ø In / Out :	(mm)	160/160	160/160	160/160

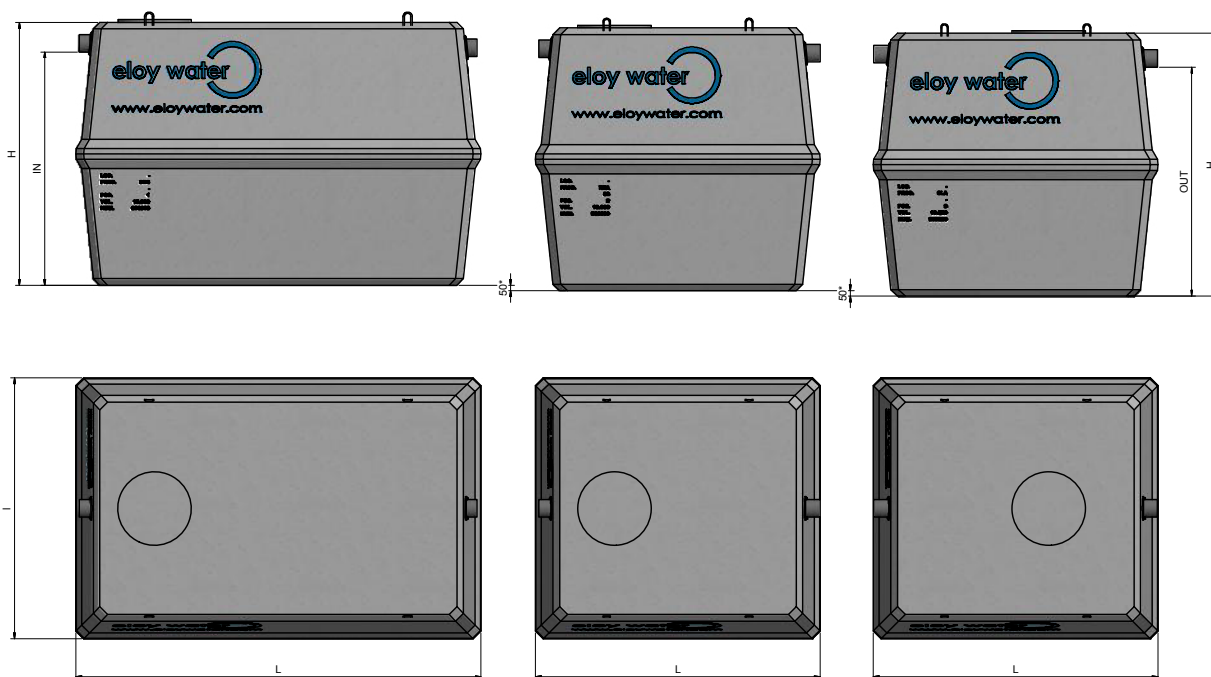
* tolerance ± 2 cm



Material

Tank(s):	High performance steel reinforced concrete
Biocarrier:	Recycled PP
Air feed pipes:	PVC PN16

TANK DIMENSIONS



OPERATION

Useful volumes/surfaces

Primary settling compartment:	13.68	m³
Biological reactor:	9.19	m³
Clarifier:	4.41	m²

Operation

Sampling chamber:	integrated
Theoretical desludging frequency:	every 11 months
Approximate energy consumption:	4,584.40 kW
Maintenance frequency :	annually (recommended)
Admissible load :	80 cm of fill + pedestrian load

Consumables

Blower filter:	annually
Blower membranes:	-
Air diffusers:	every 8 years

OPTIONS

Wall support for blower	
PE/concrete tank cover riser	3 pcs
PE/steel tank cover	3 pcs

GUARANTEES

Electromechanical kit :	2 years
Tanks :	10 years
Resistance :	B125

AWTS Maintenance Services Pty Ltd

Setting the Standard in Waste Water Treatment | ABN 88 073 578 195

QUOTE #0907202010NR

DATE: 09/07/2020

PO Box 293, Wallsend, NSW 2287

Phone: 1300 789 588

Email: nsw@envirocycle.com.au

EXPIRATION DATE: 90 DAYS

TO Contact Name: **Ricky Bligh**
Email: **Ricky.Bligh@ghd.com**

Street Address: Western Sydney Region
Phone: 02 8898 8869

Provision of 1 x Envirocycle System with Capacity to treat 3,600 L/pd
OR
Provision of 1 x Envirocycle System with Capacity to treat 4,140 L/pd
OR
Provision of 1 x Envirocycle System with Capacity to treat 6.75 L/pd

SALESPERSON	JOB	PAYMENT TERMS	COUNCIL
Jasper Seymore	New System	Due on receipt	TBA

Stage 1 - Section 68 Applications to Council

This stage consists of preparing all associated documentation for council approval. This involves a dedicated amount of time from Envirocycle to prepare Section 68 applications liaise with owners (Project managers) and Council Officers. Council fees are not included within the price below

STAGE 1 - COUNCIL APPLICATION		
INCLUSIONS		EXCLUSIONS
-	Preparation of documents for council approval	Council Section 68 Application fee
-	Submission of documents to council	
-	Follow up and confirmation of approval	
SUBTOTAL	FREE	
GST	FREE	
TOTAL	FREE	

CONTINUED

SYSTEM 1 - SUPPLY OF 1X ENVIROCYCLE COMMERCIAL TREATMENT SYSTEM (SECONDARY TREATMENT) - 3,600 L/PD		MAXIMUM TREATMENT CAPACITY - 4,050 L/PD
INCLUSIONS		EXCLUSIONS/ ALLOWANCES
- 1x Envirocycle light Commercial treatment system to treat 3,600 L p/d (Capacity to treat up to 4,050L/pd) (Including pumps, blowers, and controllers)		- Electrical Connection
- Excavation		- Rock Excavation
- Delivery of treatment system/ Lower system into pre-excavated hole		- Plumbing Connection (Unless connection point provided at system location)
- 6m ³ Irrigation tank		- Dewatering - (not expected)
- Commissioning of System w/ Certificate of Compliance		- Disposal Area (To be determined)
- Warranty as per contract		- Removal of excess soil
- Maintenance for first 12 months of operation (Valued at \$1,800.00)		
- Preparation of documents for council approval		
SYSTEM 2 - SUPPLY OF 1X ENVIROCYCLE COMMERCIAL TREATMENT SYSTEM (SECONDARY TREATMENT) - 4,140 L/PD		MAXIMUM TREATMENT CAPACITY - 5,700 L/PD
INCLUSIONS		EXCLUSIONS/ ALLOWANCES
- 1x Envirocycle light Commercial treatment system to treat 4,140L p/d (Capacity to treat up to 5,700L/pd) (Including pumps, blowers, and controllers)		- Electrical Connection
- Excavation		- Rock Excavation
- Delivery of treatment system/ Lower system into pre-excavated hole		- Plumbing Connection (Unless connection point provided at system location)
- 6m ³ Irrigation tank		- Dewatering - (not expected)
- Commissioning of System w/ Certificate of Compliance		- Disposal Area (To be determined)
- Warranty as per contract		- Removal of excess soil
- Maintenance for first 12 months of operation (Valued at \$2,400.00)		
- Preparation of documents for council approval		
SYSTEM 3 - SUPPLY OF 1X ENVIROCYCLE COMMERCIAL TREATMENT SYSTEM (SECONDARY TREATMENT) - 6,750 L/PD		MAXIMUM TREATMENT CAPACITY - 8,700 L/PD
INCLUSIONS		EXCLUSIONS/ ALLOWANCES
- 1x Envirocycle Medium Commercial treatment system to treat 6,750L p/d (Capacity to treat up to 8,700L/pd) (Including pumps, blowers, and controllers)		- Electrical Connection
- Excavation		- Rock Excavation
- Delivery of treatment system/ Lower system into pre-excavated hole		- Plumbing Connection (Unless connection point provided at system location)
- 6m ³ Irrigation tank		- Dewatering - (not expected)
- Commissioning of System w/ Certificate of Compliance		- Disposal Area (To be determined)
- Warranty as per contract		- Removal of excess soil
- Maintenance for first 12 months of operation (Valued at \$2,800.00)		
- Preparation of documents for council approval		

System Prices

System 1 - 3,600 L/pd - Maximum Treatment Capacity 4,050 L/pd

SUBTOTAL	\$46,000.00	**Excludes Allowances**
GST	\$4,600.00	
TOTAL	\$50,600.00	

System 2 - 4,140 L/pd - Maximum Treatment Capacity 5,700 L/pd

SUBTOTAL	\$54,000.00	**Excludes Allowances**
GST	\$5,400.00	
TOTAL	\$59,400.00	

System 3 - 6,750 L/pd - Maximum Treatment Capacity 8,700 L/pd

SUBTOTAL	\$64,500.00	**Excludes Allowances**
GST	\$6,450.00	
TOTAL	\$70,950.00	

Considerations

Monitoring and Testing

Onsite maintenance staff will be provided a weekly check list that will assess the ongoing operation and monitoring of the treatment system. This list will ensure the disposal area is not leaking or damaged, all aeration pumps are active, all irrigation pumps are active and check for any damage to components of the treatment system.

System Failure Contingency

The treatment system will operate with two irrigation pumps, one will sit idle incase primary irrigation pump fails. In the event the primary irrigation pump fails an alarm will signal in the main complex and secondary pump will activate until technicians attend site to repair primary pump.

Air pumps will also be connected to an alarm system that too will notify employees in the main complex that there is an issue with the aeration.

In the event of the above-mentioned failure or any others for that matter, staff at the complex will notify Envirocycle and a service technician will be dispatched to rectify the issues.

Health and Safety

Exposure to untreated effluent will be very limited as treatment system will be sealed. This is the same for the treated effluent as all treated water will be dispersed underground in the prescribed pressure dosed beds. Disposal area will also have a number on warning signs that indicate the treatment and disposal of effluent.

Quotation prepared by: Jasper Seymore | 0413 174 710 | nsw@envirocycle.com.au

This is a quotation on the goods named, subject to the conditions noted below: *Inspection of site, council approval, if any changes to client's requirements occur and quotation requires adjustment, access to site, conditions applied by regulatory authorities, contract of sale.*

To accept this quotation, sign here and return: _____

THANK YOU FOR YOUR BUSINESS!

Appendix D – Examples of waterless toilet systems

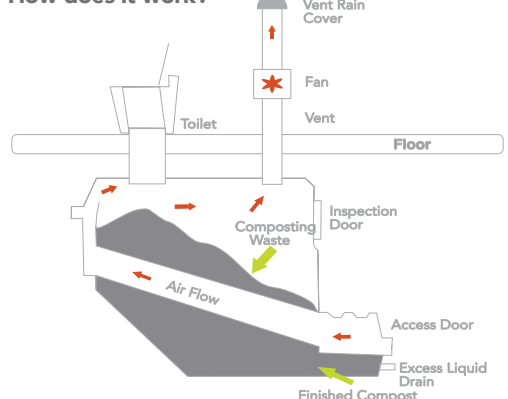
NOTE: Note this is not a product endorsement by GHD Pty Ltd but provided for information purposes only as examples of systems that are readily available.



Clivus Multrum has been designing and manufacturing waterless composting toilets in Australia for over 35 years.

- Australian owned
- Chemicals free & Waterless
- Easy to install
- Certified systems
- No polluting discharge
- Free Compost

How does it work?



Ideal for

Residential Uses | Camping Sites | Walking Tracks | National Parks
|Community Gardens | Public Toilets



Specification

	CM10	CM14	CM20	CM40
Capacity Full time	7-13 people	9-19 people	13-25 people	27-28 people
Uses	Daily 25 visits (average) Annual 10000 visits (approx)	Daily 38 visits (average) Annual 14000 visits (approx)	Daily 55 visits (average) Annual 20000 visits (approx)	Daily 110 visits (average) Annual 40000 visits (approx)
Unit Dimensions mm	1550 L 1560 W 1100 H	2080 L 1500 W 1090 H	2390 L 1200 W 1630 H	2480 L 1890 W 1720 H
Max. fixtures	2 pedestals	2 pedestals	2 pedestals + 1 urinal	4 pedestals +2 urinals



What will you get?

A standard Tank Package includes:

- Fully assembled composting tank
- Pedestal chute and collar
- 12V fan & 240V transformer
- Vent pipe flashing, fan housing & vent rain cover (150mm)
- Maintenance tool
- Starter bacteria
- Bulking agent sample
- Sealant & screws
- Installation manual
- Operation & Maintenance manual

A Standard Pedestal Package includes:

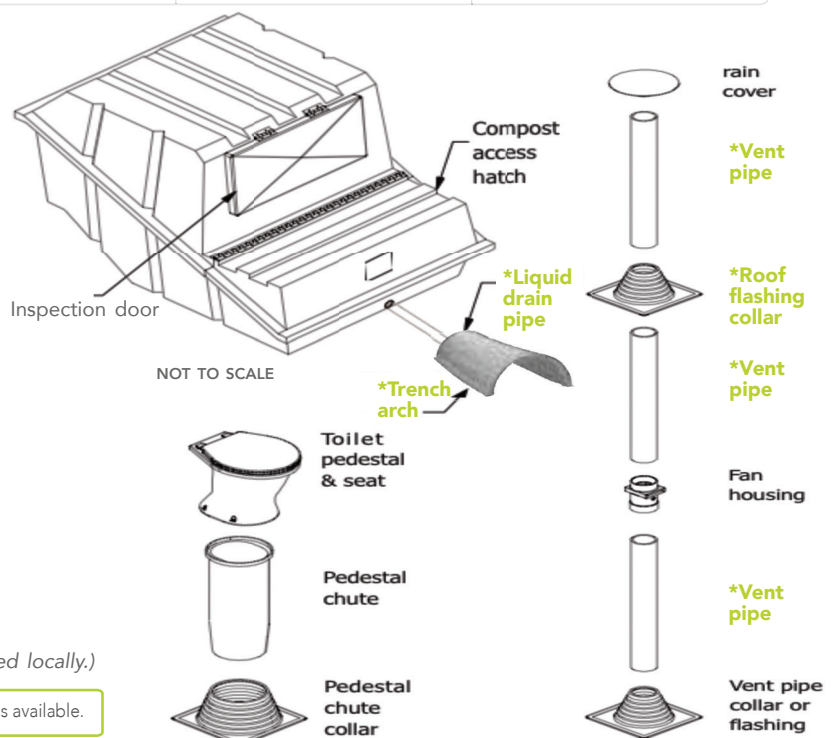
(Various options available, sold separately)

Vent & Drain Kit*:

(*To save delivery cost, vent & drain kit can be purchased locally.)



Replacement fans, solar package, heater pad & additional chutes available.



Get in Touch

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info@clivusmultrum.com.au

clivusmultrum.com.au

#ecoflowm





PUBLIC TOILET SOLUTION

Fibre Reinforced Polymer (FRP) Building with Dry Vault toilet system



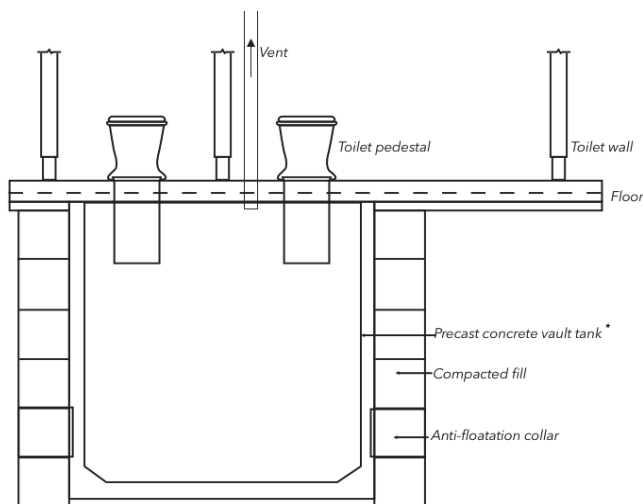
If you are looking for a low-cost toilet block option where there is no local sewer connection then a waterless toilet with a sealed pump out vault could be an ideal option.

The benefits are that they are generally low maintenance and little or no power demand, and no potential for environmental impact.

As long as the location is within service distance of septic tank pump-out service contractors, flushing toilets are not required and are a perfect fit when coupled with our FRP Buildings.

Precast concrete tanks are readily available from local suppliers and the dry vault can be emptied by pump out trucks as required.

- Ideal for:**
- High visitor numbers
 - Site located > 1km from a main line sewer
 - Any climate conditions
 - Sensitive environment

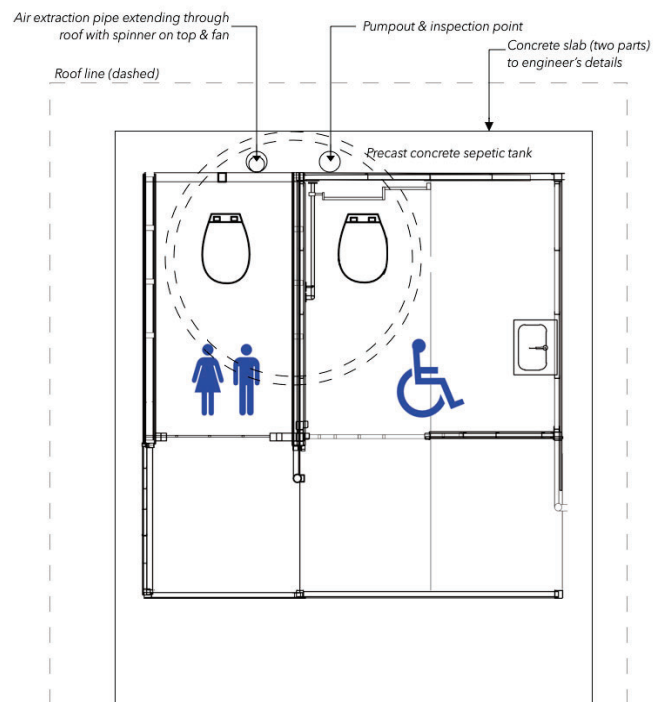


* Vault will be sourced from your local tank supplier to save on freight.

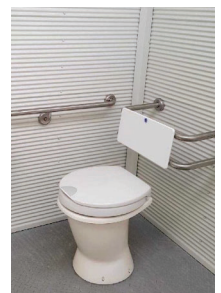
How often will you be required to pump out?

The main factors that influence the frequency of pumping is the number of people using the facility per day and the vault tank size.

Pumpouts require good availability of septic tank servicing contractors with pumpout equipment.



NB. This diagram is indicative only - not for construction.



If you would like more information about our public toilet solutions have a chat with us today.

Get in Touch

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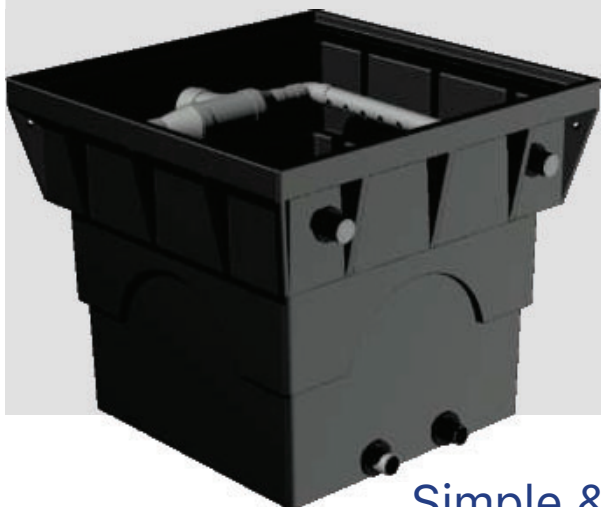
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@ecoflowm

B-DVTS v2 ver240420

Appendix E – Examples of greywater treatment systems

NOTE: Note this is not a product endorsement by GHD Pty Ltd but provided for information purposes only as examples of systems that are readily available.

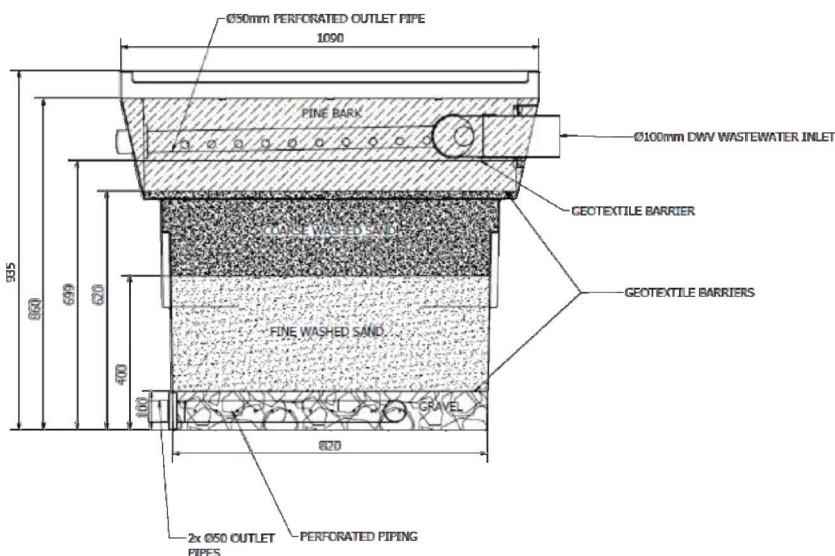
Nature Clear Greywater Sand Prefilter (GWS10™) 450 Litre



- Material:** Medium density grade polyethylene
- Properties:** U.V stabilised - High stress resistance
- Thickness:** Average 5 mm
- Construction:**
- Rotation moulding
 - All surfaces are continuous with no welded or joined seams
 - Ribbed structure for additional strength
- Dimensions:** L 820 - 1090 mm x W 820 - 1090 mm x H 935 mm

Simple & Low Cost Effective

The 0.5 cubic meter filtration tank consists of a pine bark coarse filter on top of different grades of sand and gravel. The pine bark traps large particles plus lint and hair. The sand filter catches still finer materials, polishes the water and reduces the organic content of the water. The pine bark is separated from the sand by filter cloth.



The filtered material and bark will compost over time and should be removed every 12 months or so and replaced with fresh bark, available from your local garden nursery.

Grease Trap Options

Volume	Purpose	Clean
45 Litres	Remove food scraps and grease from kitchen waste water.	every 6 weeks
300 Litres		every 1-2 years

*Save 10% on grease trap when purchase with a Nature Clear Greywater



Nature Clear Greywater Sand Prefilter (GWS10™) 450 Litre is approved in Queensland and some councils in NSW + Tasmania have also allowed the installation of Nature-Clear. Contact us to learn more information.

Get In Touch

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#ecoflowm



Appendix F – Example of water tank

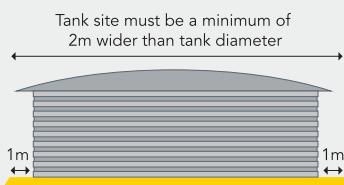
NOTE: Note this is not a product endorsement by GHD Pty Ltd but provided for information purposes only as examples of systems that are readily available.

SITE PREPARATION

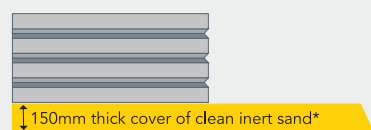


Before a Pioneer water tank can be installed, a stable tank pad foundation must be prepared. There are several important steps to consider when selecting your tank site and preparing the pad:

TANK SITE MUST BE LEVEL AND FLAT

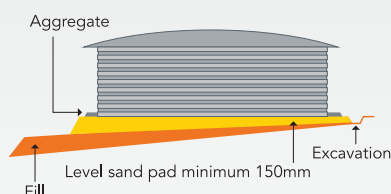


IMPORTANT

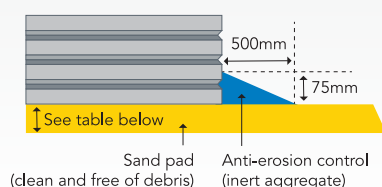


NOTE: Base must be free from sticks, stones and debris

SLOPING SITES



IMPORTANT



- 1 The tank pad must be level, stable and constructed using clean inert sand* that is free of any debris.
- 2 The tank pad must be at least two meters larger than the diameter of your tank. It is also important to make sure that there are no nearby obstructions**, for when our local dealer installs your new Pioneer water tank.
- 3 For sloping tank sites, ensure adequate drainage to divert water run-off away from the tank wall.
- 4 An inert aggregate must be placed around the base perimeter of the tank, once it has been installed. This aggregate helps to prevent the tank pad from eroding away, and keeps your tank in place***.
- 5 A retaining wall may be required to maintain pad integrity, on sloping or uneven sites*.
- 6 Once your tank has been installed, it is important to fill it with the amount of water specified in the table below. This initial fill acts as an anchor weight, to help prevent movement from occurring in high wind areas.

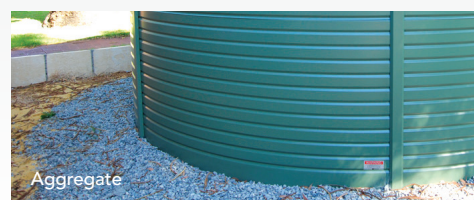
* Where clean inert sand is not easily sourced, Pioneer recommends using a 150mm crusher dust base with a geotextile membrane for additional liner protection.

** Please ensure that there is a space of at least 1 meter allowed for, between the tank wall, and any objects within the proposed tank pad vicinity.

*** Check with your local dealer to see if they provide this additional service. If not, you are responsible for completing this step.

Following the above process will help to ensure that your tank pad is prepared correctly.

Before you start preparing your site for installation of your water tank, Pioneer Water Tanks also recommends you contact your local shire to see if there are any regulations or restrictions in place.



MODEL	GROSS CAPACITY		TANK DIMENSIONS		TANK PAD PREPARATION DETAILS			
	Litres	Gallons	Diameter	Height	Tank Pad Size Required (Diameter x Depth)	Min. Clean Sand Required	Aggregate Required	Water Required After Build
GT 500**	500,659	110,129	14.04 m	3.24 m	16.04 m X 150 mm	30.30 m ³	0.83 m ³	46,429 l
GT 410**	409,836	90,151	12.70 m	3.24 m	14.70 m X 150 mm	25.46 m ³	0.75 m ³	38,006 l
GT 370**	367,831	80,911	12.03 m	3.24 m	14.03 m X 150 mm	23.20 m ³	0.71 m ³	34,111 l
GT 330**	328,096	72,171	11.36 m	3.24 m	13.36 m X 150 mm	21.04 m ³	0.67 m ³	30,426 l
GT 290**	290,632	63,930	10.70 m	3.24 m	12.70 m X 150 mm	18.99 m ³	0.63 m ³	26,952 l
GT 280	276,180	60,751	12.70 m	2.18 m	14.70 m X 150 mm	25.46 m ³	0.75 m ³	38,006 l
GT 250	247,874	54,525	12.03 m	2.18 m	14.03 m X 150 mm	23.20 m ³	0.71 m ³	34,111 l
GT 220	221,097	48,635	11.36 m	2.18 m	13.36 m X 150 mm	21.04 m ³	0.67 m ³	30,426 l
GT 200	195,851	43,081	10.70 m	2.18 m	12.70 m X 150 mm	18.99 m ³	0.63 m ³	26,952 l
GT 170	172,134	37,864	10.03 m	2.18 m	12.03 m X 150 mm	17.04 m ³	0.59 m ³	23,688 l
GT 150	149,948	32,984	9.36 m	2.18 m	11.36 m X 150 mm	15.20 m ³	0.55 m ³	20,635 l
GT 130	129,292	28,440	8.69 m	2.18 m	10.69 m X 150 mm	13.46 m ³	0.51 m ³	17,792 l
GT 110	110,166	24,233	8.02 m	2.18 m	10.02 m X 150 mm	11.83 m ³	0.47 m ³	15,160 l
GT 90	92,570	20,363	7.35 m	2.18 m	9.35 m X 150 mm	10.31 m ³	0.43 m ³	12,739 l
GT 80	76,504	16,829	6.68 m	2.18 m	8.68 m X 150 mm	8.89 m ³	0.39 m ³	10,528 l
GT 60	61,968	13,631	6.02 m	2.18 m	8.02 m X 150 mm	7.57 m ³	0.35 m ³	8,528 l
GT 50	48,963	10,770	5.35 m	2.18 m	7.35 m X 150 mm	6.36 m ³	0.32 m ³	6,738 l
GT 40	37,487	8,246	4.68 m	2.18 m	6.68 m X 150 mm	5.26 m ³	0.28 m ³	5,159 l
GT 30	27,542	6,058	4.01 m	2.18 m	6.01 m X 150 mm	4.26 m ³	0.24 m ³	3,790 l
GT 20	19,126	4,207	3.34 m	2.18 m	5.34 m X 150 mm	3.36 m ³	0.20 m ³	2,632 l
GT 10	12,241	2,693	2.67 m	2.18 m	4.67 m X 150 mm	2.57 m ³	0.16 m ³	1,684 l

Note: This table provides necessary information about the area, and minimum volume of clean inert sand required to correctly prepare a tank pad, for your Pioneer water tank.

Tanks that are located in cyclonic regions may require a concrete ring beam.

Allowance must be made for an air gap and pipe work positioning, to establish a usable tank volume (effective capacity).

OTHER PIONEER TANK SIZES ARE AVAILABLE. CONTACT US ON 1800 999 599 FOR MORE INFORMATION.

Appendix G – NSW Guidelines for Water Carters (NSW Health, NSW Food Authority, 2012)

NSW Guidelines for Water Carters

NSW Health
NSW Food Authority

2012



NSW MINISTRY OF HEALTH

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November 2012

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Key Terms and Abbreviations

<i>Australian Drinking Water Guidelines</i>	Primary guidance for drinking water quality and management within Australia. Copies are available at http://www.nhmrc.gov.au/guidelines/publications/eh52
<i>Food Act 2003</i> (NSW)	Sets out requirements for management of food safety – including notification of businesses (includes water carters if carrying drinking water) to the NSW Food Authority.
Framework for Management of Drinking Water Quality	Drinking water-specific quality assurance framework. Quality assurance programs within the Public Health Regulation 2012 are required to take the Framework into account.
<i>Local Government Act 1993</i> (NSW)	Along with the Local Government (General) Regulation 2005 (NSW), sets out provisions for the regulation of water carting vehicles by local councils.
<i>Public Health Act 2010</i> (NSW)	Along with the Public Health Regulation 2012, sets out how drinking water suppliers should manage drinking water safety, including mandating the development and implementation of a quality assurance program.
Quality Assurance Program	A program for assuring the quality of water supplied for drinking, required under Section 25 of the <i>Public Health Act 2010</i> (NSW).
Water Carter	Any person who receives water from a drinking water supplier (defined in the <i>Public Health Act 2010</i>) and who supplies drinking water from a water carting vehicle in the course of a commercial undertaking.

SECTION 1

Background

Water carters provide a drinking water supply in areas where other water supplies are insufficient or temporarily unsuitable. NSW Health and NSW Food Authority have developed these Guidelines to help water carters provide safe drinking water and comply with the requirements of the Public Health Act 2010, the Public Health Regulation 2012, the Food Act 2003 and the Local Government Act 1993.

These Guidelines will help a water carter develop a quality assurance program as required by the *Public Health Act 2010* and the Public Health Regulation 2012. From 1 September 2014, drinking water carters must develop and adhere to a quality assurance program. A copy of the completed quality assurance program document must be provided to the local NSW Health Public Health Unit. Water carters may complete the quality assurance program template (available at <http://health.nsw.gov.au/environment/water/Pages/drinkwater-watercarters.aspx>) or create their own.

These Guidelines should be read together with any specific requirements that water utilities and/or councils may have as a condition of access to their water supplies.

NSW Health acknowledges the assistance of the Department of Health Western Australia in preparing these guidelines.

Assuring Quality from Source to Consumer

2.1 Water Source

Water carters providing drinking water for human consumption should take water from a supply that meets the *Australian Drinking Water Guidelines* (potable water supplies). Appropriate sources include town drinking water supplies, or directly from a bulk water supplier at the point of water treatment. Other sources should be avoided.

Chlorine is the main disinfectant used in reticulated water supplies. However, some water suppliers use chloramine, which is a disinfectant produced from the

mixing of chlorine and ammonia. Water carters should check with the water supplier for the type of disinfection used, as this guides the testing required.

It is essential that the water contains adequate chlorine until it is supplied to consumers. Chlorine of 0.2 to 0.5 milligrams per litre (mg/L) is adequate.

If the chlorine level is not adequate, chlorine should be added to the water load prior to carting, to ensure safety (see Box 1).

BOX 1

How do I measure the chlorine?

A chlorine test kit, such as a swimming pool kit can be used to check the chlorine at the point of supply. The amount of chlorine that is available for disinfection is usually measured as 'free chlorine' and is also known as 'available chlorine'. A 'combined chlorine' test should be performed for chloraminated supplies. Combined chlorine is formed when free chlorine reacts with ammonia.

Measure the chlorine in the source water, either at the filling point or if more practical, from the tank. Measure the chlorine in the tank if chlorine has been added.

How much chlorine should I add?

Where insufficient chlorine is present, chlorine disinfection can be boosted with:

- 8 grams (one dessert spoon) of calcium hypochlorite (granular or powdered chlorine) at 65% strength per 10,000 L of water to give a rise of 0.5 mg/L of chlorine, or
- 40 mL of sodium hypochlorite (liquid chlorine) at 12.5% strength per 10,000 L of water to give a rise of 0.5 mg/L of chlorine.

For chloraminated supplies, please contact the water utility or your local Public Health Unit for advice on boosting chlorine.

How do I obtain chlorine?

Sodium hypochlorite and calcium hypochlorite can be purchased from supermarkets, hardware stores and swimming pool suppliers. Check the label to be sure the strength is correct.

Do not use stabilized swimming pool chlorine for disinfection because it contains iso-cyanuric acid and is not effective in enclosed tanks.

The required amount of chlorine can be added to clean water in a plastic bucket. Do not pour water into chlorine, always add chlorine to water. Prepare the chlorine in the open air. Use the appropriate personal protective equipment.

Add the chlorine partway through refilling the tank so that it mixes through the water.

If chlorine comes into contact with diesel or acid, a chemical reaction can occur which may cause a fire.

When water is added to an empty water storage tank, it may re-suspend the sediment in the bottom of the tank creating taste and dirty water problems. It is important for the water carter to confirm the quality of the water before it enters the tank.

In an emergency, water carters may need to take water from non potable sources, for example, untreated dam or river water. In such circumstances, water carters should seek advice from Environmental Health Officers at their local Public Health Unit or Council.

2.2 The Tank, Hoses and Fittings

Water carting tanks and fittings must be kept clean and in good repair so that they do not cause deterioration of water quality. Tanks, hoses and fittings should be made of, or lined with, a material that will not contaminate the drinking water.

Applicable standards or certification include:

- AS/NZS 4020:2005 The testing of products for use in contact with drinking water and/or

- AS 2070:1999 Plastics materials for food contact use.
- Australian Technical Standard ATS 5200.026: 2004 Technical Specification for Plumbing and Drainage Products, Cold Water Storage Products
- AS/NZS 4766:2006 – Polyethylene storage tanks for water and chemicals.
- WaterMark



Use only containers, hoses and fittings which are marked as WaterMark, AS/NZS4020, AS2070, AS/NZS4766 or ATS5200.026.

Tanks used for carting drinking water should be used only for that purpose. If this is not possible, then the tank must not be used for transport of effluent (treated or otherwise), petroleum products, or other potentially hazardous materials that may be harmful to health.

Tanks, hoses and fittings should be regularly cleaned and disinfected. See Box 2. When a tank has been used for transport of non-hazardous materials other than drinking water, the tank, hoses and fittings should be cleaned and disinfected prior to filling with drinking water.

Hoses and fittings should be capped or stored in a dust proof container during transport and when not being used.

BOX 2

Cleaning and disinfecting tanks

At least every 3 months, clean and flush tanks.

Fill cleaned tanks with water at not less than 5 mg/L chlorine and hold for at least 30 min. Test chlorine in water prior to disposal or use.

Cleaning and disinfecting hoses and fittings

At least every month, clean hoses and fittings.

Fill with water containing at least 5 mg/L chlorine and cap for at least 30 minutes.

Rinse with clean drinking water.

Drain, dry and seal securely to prevent dust and dirt entry. Test chlorine prior to disposal of rinse water.

Preparing the chlorine solution

Add the required amount of chlorine to clean water in a plastic bucket.

Chlorine of 5 mg/L can be achieved by either:

- 76 grams of calcium hypochlorite at 65% strength per 10,000 L of water
- 400 mL sodium hypochlorite at 12.5% strength per 10,000 L of water.

2.3 Disposal of water after cleaning

Water with a chlorine level of 5 mg/L can cause environmental damage and a person discharging such water could be liable to action under the *Protection of the Environment Operations Act 1997*. Water should be tested prior to discharge to ensure that the chlorine level has been reduced appropriately. Contact the Environment Protection Authority for advice on disposal of chlorinated water to the environment.

Water should not be disposed of until the chlorine level has reached;

Less than 1 mg/L for disposal onto low risk grassed areas,

Less than 0.1 mg/L for disposal near waterways, creeks or drains.

Alternatively, chlorinated water may be discharged into the town sewer (not to a septic system), however consult with your relevant Council or Water Utility for advice before doing so. Water with a chlorine level of less than 1 mg/L could be used for non-drinking purposes such as dust suppression or construction.

Because of confined space and other risks, it is important to be aware of work health and safety guidelines if entering a tank. Further information can be obtained from your local WorkCover office.

2.4 Hydrant Boxes and Standpipes

To protect water quality in the source water, it is important to prevent flow of water back into the reticulation system.

Hydrant boxes should be self-draining, mounted above ground level and not collect surface runoff. Fixed standpipes must have an air gap to prevent backflow. If possible, remove any water ponding in the hydrant box prior to connecting a removable standpipe and while the standpipe is in use. Alternatively, if the hydrant box contains water, removable standpipes should be flushed to discard any contaminated water.

Tanks being filled from a reticulated supply using a removable standpipe must have a backflow prevention device that complies with the Plumbing Code of Australia and AS/NZS3500 Part 1.

SECTION 3

Documentation and Records

Water carters are required to:

1. **notify their business to the NSW Food Authority, at**
<http://www.foodnotify.nsw.gov.au>

and

2. obtain necessary approvals from the water utility or supplier.

Documentation and records provide evidence that the water carter's business is being operated appropriately. Documents, records and logs may be requested by authorities to check on business operation. For example, the local Council or Public Health Unit can require the submission of the vehicle, tank, hoses, fittings, and/or logbooks for inspection.

3.1 Records to be kept by Water Carters - Log Books

A water carter should keep a log book to record information on deliveries and cleaning. A sample log book is provided as an attachment to these Guidelines.

The *Public Health Act 2010* and Public Health Regulation 2012 require water carters to keep the following records:

- The name of each supplier of drinking from whom the water carter receives water
- The place, date, and time at which water is supplied to the water carter
- The name and address of each person to whom the water carter supplies water
- The place, date and time at which the water is supplied to that person
- The volume of water supplied to that person,
- Details of any substances other than drinking water transported in the water tank used by the water carter
- The dates on which any water tank used by the water carter is cleaned.

These records must be retained for at least 6 months.

The water carter should also keep a record of the following:

- Identification detail for temporary mounted tanks. (e.g. serial number if applicable)
- Chlorine level at the time of filling or re-chlorination
- Additional chlorine added (if applicable)

3.2 Records to be kept by Water Utilities/Suppliers

Water utilities and any other water supplier should keep a record of water carters who draw from their drinking water supply. They should ensure that each water carter is notified to the NSW Food Authority, undergoes regular sanitary inspections by the local council and maintains appropriate log books prior to accessing the reticulated drinking water supply.

The *Public Health Act 2010* and Public Health Regulation 2012 require water utilities/suppliers to keep records of the name and contact details of each water carter to which drinking water is supplied.

These records must be retained for at least 6 months.

It is also recommended that water utilities/suppliers or local councils keep a record of:

- Details of water carting vehicles, make, model, registration, tank volume, type of tank e.g. temporary mounted tanks, etc
- Date and results of last inspection of each vehicle.

For further information contact your local Council or Public Health Unit. (Under Health in the white pages or at <http://www.health.nsw.gov.au/Infectious/Pages/plus.aspx>).

SECTION 4

Legislative Summary (NSW)

Responsibility	Description	Legislative Requirement
Implement a Quality Assurance Program Provide copy to NSW Health	Water carters are required to establish and adhere to a Quality Assurance Program. NSW Health may review the quality assurance program at any time. The quality assurance program is required to address the elements of the Framework for Management of Drinking Water Quality within the <i>Australian Drinking Water Guidelines</i> .	<i>Public Health Act 2010</i> (NSW), Section 25 <i>Public Health Regulation 2012</i> (NSW) Clause 34
Keep records	Water carters and water utilities/suppliers are to keep certain records (see these Guidelines for notes on records to be kept).	<i>Public Health Regulation 2012</i> (NSW), Clause 35
Notify the NSW Food Authority of your business	A water carter that supplies drinking water is classified in the <i>Food Act 2003</i> as a 'food business' and must notify the NSW Food Authority of their business activity details. Notification to the NSW Food Authority can be via the internet or in a paper form. Guidance is provided at http://www.foodnotify.nsw.gov.au	<i>Food Act 1993</i> (NSW), Section 100
Seek approval from and comply with local council/water utility requirements	Outside the areas of operation of Sydney Water Corporation or Hunter Water Corporation a water carter must obtain approval from the water supplier (Council/Water Utility) to draw and sell water. The water supplier may require the water carter to comply with additional conditions, to those set out in these guidelines, before granting access to their supply.	<i>Local Government Act 1993</i> (NSW) section 68 (Under clause 2 of Part B of the Table to that section)
Preserve the quality of water during transport	Water must be kept in a potable condition from source to supply. A water carting vehicle must be kept in a clean and sanitary condition. If water contains any foreign matter it may be classed as unsafe or unsuitable for its intended use. If a supplier sells unsafe water, an offence may have been committed.	<i>Food Act 2003</i> (NSW) section 8, 9 and 14. The Minister has powers to do what is considered necessary to protect public health, <i>Public Health Act 2010</i> (NSW) section 7. <i>Local Government Act 1993</i> (NSW) Councils may order the owner or operator of a vehicle used for the storage and transportation of food (including drinking water) to take action as specified by the council to render the vehicle in a clean or sanitary condition.
Appropriate aperture of water carting vehicle	A water carting vehicle must have an aperture that is large enough to enable easy inspection and thorough cleaning of the interior and must have a cover that is able to be kept clean.	<i>Local Government (General) Regulation 2005</i> (NSW) Part 3, Clause 93.
Disposal of cleaning water	Chlorinated water used for cleaning may not be disposed into the environment where it may reach waterways or drains. A person discharging such water could be liable to action under the <i>Protection of the Environment Operations Act 1997</i> . Water should not be disposed of until the chlorine level is reduced to less than 1 mg/L for low risk use onto grassed areas and "non-detect" (less than 0.1 mg/L) for discharge to a creek or drain.	<i>Protection of the Environment Operations Act 1997</i> (NSW), Chapter 5.

References and Further Information

Government of Western Australia (2010) *Guidelines for the Bulk Cartage of Drinking Water*. Department of Health, Public Health.

NHMRC/NRMMC (National Health and Medical Research Council/ Natural Resource Management Ministerial Council) (2011) *Australian Drinking Water Guidelines* (ADWG) National Water Quality Management Strategy.

NSW Environment and Heritage (2012) Environmental Issues

<http://www.environment.nsw.gov.au/environmentalissues.htm>

NSW Division of Local Government (2012) Local Government Directory

http://www.dlg.nsw.gov.au/dlg/dlghome/dlg_localgovdirectory.asp

NSW Food Authority (2011) Water (non reticulated)

<http://www.foodauthority.nsw.gov.au/industry/food-business-issues/water-non-reticulated/#.UcAulRYqpYh>
Helpline: 1300 552 406

NSW Department of Fair Trading

http://www.fairtrading.nsw.gov.au/ftw/TradespeoplePlumbers_and_drainers/page?

NSW Health (2012) Drinking Water Suppliers

<http://www.health.nsw.gov.au/environment/water/Pages/drinking-watersuppliers.aspx>

NSW Health (2007) Private Water Supply Guidelines

<http://www.health.nsw.gov.au/environment/water/Documents/pwsg.pdfs>

NSW Health Rainwater tanks brochure

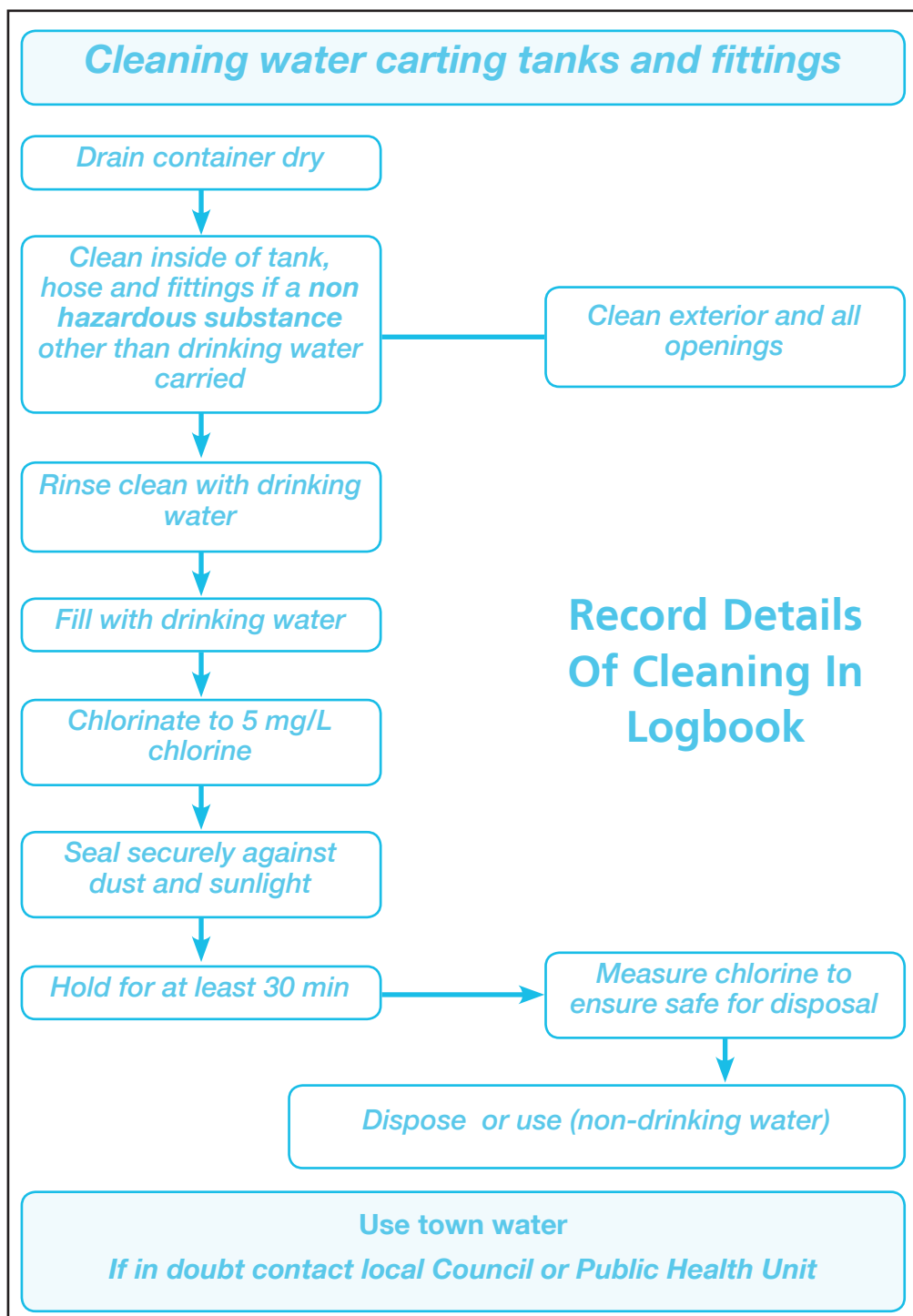
http://www.health.nsw.gov.au/environment/water/Documents/rainwater_tanks.pdf

NSW Health Public Health Unit Contact Details

<http://www.health.nsw.gov.au/Infectious/Pages/phus.aspx>

Cleaning and Disinfection Checklists

These checklists can be printed for use in vehicles.



Drinking Water Disinfection Continual Use

Fill with drinking water



Measure chlorine and boost if less than 0.2 mg/L



Seal tank securely against dust and sunlight



Deliver drinking water



*Record details filling, treatment and delivery
in logbook*

What to do when transporting water

- Empty all hoses, standpipes, etc.
- Join hoses end to end or cap.
- Cap or cover water container inlets and outlets.
- Empty any other fittings used in the water system and store away from dirt, dust and other contaminants.

Use town water

If in doubt contact local Council or Public Health Unit

Water Carter Information and Inspection Templates

These templates are provided as an example of the records that should be kept. Water carters may use their own recording system or log book.

Water Carter Details

Business Name:		Driver:
Business Registration Details:		
Food Authority Reference Number:		
Business Address:	Address:	
Email:		
Driver's Mobile No:		
Driver's Signature:		
Vehicle Registration No:		
Business Phone:	Business Fax:	
Comments:		

Equipment Check – before use for water carting

1	Have the tank, container hoses or fittings been used to cart hazardous materials such as recycled water, petrochemicals or human or animal waste?	Yes / No
If 'Yes', do not use the equipment for carting drinking water.		
2	Have the tank, container hoses or fittings been used to cart any non hazardous substance other than drinking water, for example milk or wine?	Yes / No
If 'Yes', clean and disinfect all equipment in accordance with the NSW Guidelines for Water Carters.		
3	Visually inspect all equipment to ensure that is clean and that the tank is empty. Record findings.	Tank empty: Yes / No Comments on cleanliness:
4	Flush hoses, fittings and pumps thoroughly before use with drinking water. Circle answer to record action.	Flushed / Not flushed

Check on Water Source

Source/town:		Collection point location:	
Water utility/water supplier:			
Disinfection type (free chlorine/chloramine):			
Before filling the tank, check the chlorine in the source water.			
Record the chlorine, it should be at least 0.2 mg/L. If the source water is less than 0.2 mg/L, contact the water supplier to check that the water is treated and record comments.		Chlorine in source water	
		mg/L	
Fill Date:		Time Fill Commenced:	AM / PM
Water Type:	Raw Water/Treated water	Volume collected:	litres
Type of Supply:	Removable Standpipe	Hydrant	Other (provide details):
After filling: If the chlorine is less than 0.2 mg/L, add chlorine in accordance with the NSW Guidelines for Water Carters.		If additional chlorine is added record the chlorine 30 minutes after dosing	
		mg/L	

Details of water delivery

Customer Name:		Volume Delivered:	litres
Customer Details:	Street:	Point of Delivery to Customer (eg tank at house):	
	Town:		
	Postcode:		
	Phone:		
Date:		Delivery Time:	AM / PM
Operator Signature (print name, date and sign):	Name:		
	Date:		
	Sign:		

Water Carting Vehicle - Record of Cleaning and Disinfection

Business Name:					
Business Details:		Address:			
		Phone:			
		Email:			
Business Registration Details:					
Equipment:*	Identification Details:**	Date Cleaned and Disinfected:	Disinfectant Used:	Notes:***	Operator Signature (name and signature):

* State whether tanks or hoses and fittings.
 ** For tanks, record the vehicle registration or detail of tank serial number if removable; for hoses and fittings, record the identification detail.
 *** Note whether the action is a scheduled or exception action e.g. 3 monthly scheduled clean for tanks, 1 monthly clean for hoses and fittings, exception clean due to visual inspection having identified unhygienic state or from carting of non-potable but non-hazardous material such as untreated raw water or foodstuff.



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Revision	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
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