LYNDSAY PRYOR ARBORETUM

On Site Sewage Management Report

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Version 1

Franklin Consulting Australia Pty Limited

ACN: 611 394 953
ABN: 59 611 394 953

GPO Box 837
Canberra ACT 2601

Phone: (02) 6179 3491
Mobile: 0490 393 234
E-mail: soil.land.water@gmail.com

Servicing the agriculture, conservation and development sectors with soil and water management advice, land capability and soil assessment, erosion control and soil conservation planning, catchment and property planning, and natural resource management policy advice.

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ASSESSOR DETAILS

John Franklin M App Sc, BSc, EIANZ

Franklin Consulting Australia Pty Ltd
(trading as) Soil and Water

GPO Box 837
Canberra ACT 2601

soil.land.water@gmail.com

P (02) 6179 3491

M 0490 393 234

John Franklin has over 26 years' experience in natural resource management in the ACT and Upper Murrumbidgee region. This experience includes providing extensive soil and water management advice to State and Local Government and the urban / rural residential development sector across the region. John has detailed knowledge of water resource policy and developed the NSW Farm Dams Policy in 1999 for the Department of Land and Water Conservation and provided strategic support and direction to the NSW water reform process.

Franklin Consulting Australia Pty Ltd holds current Workers Compensation Insurance with CGU (Policy Number O/16-5885), Professional Indemnity cover of $10,000,000 and Public Liability cover of $10,000,000 with Lloyds.

PROJECT DESCRIPTION

Summary

This report provides a design for an onsite effluent disposal system to be connected to proposed public toilet facilities at the Lyndsay Pryor Arboretum, located on Block 1299, Canberra Central.

The design includes determining the daily effluent load to be managed by the facilities and the associated usage patterns. The assessment provides an Effluent System Design for the system which meets current Australian Standards and ACT Health requirements.

This evaluation is a requirement of ACT Health and will be consistent with Government and relevant Australian Standards and Guidelines for the on-site management of domestic effluent.

The site constraints include:

- no mains power available
- low permeability light clay subsoil
- unrestricted public access
- intermittent and variable effluent loadings with peak numbers on the weekend

The effluent management system most suited to the site constraints is a primary treatment system (septic tank) connected to a subsoil absorption bed. This type of treatment system is suited to the intermittent loading expected from the facilities.

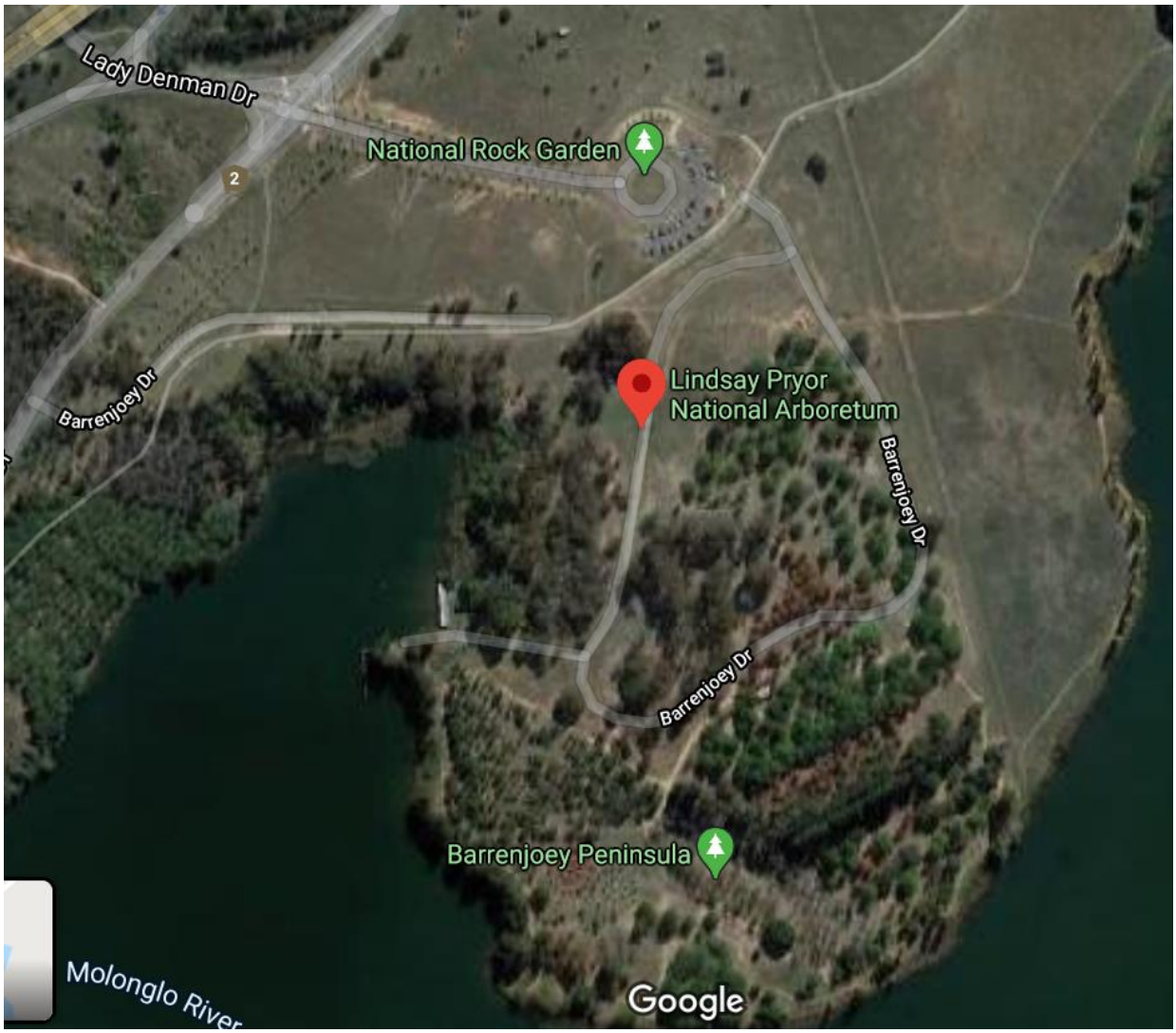
The septic tank primary treatment system has no power requirements so is suited to sites with no mains power. The subsoil absorption bed will limit the possibility of human contact with effluent and will also provide some wet weather and peak load storage capacity to deal with variable daily loading.

A 4,000L septic tank has been specified to maximise the treatment capacity of the system to deal with peak loads and to minimise maintenance requirements. The larger capacity septic tank will also enable the subsoil absorption bed to be upgraded to manage additional daily load, without requiring the septic tank to be replaced.

An absorption bed with a base area of 80m^2 is specified. This will be delivered in a single absorption bed with 20 metre X 4 metre dimensions. This absorption bed will have a capacity of 400 litres per day. This will be adequate to assimilate the estimated average daily load. The absorption bed will incorporate adequate in-bed storage to manage peak loadings across the weekends and to manage periods of extended wet weather.

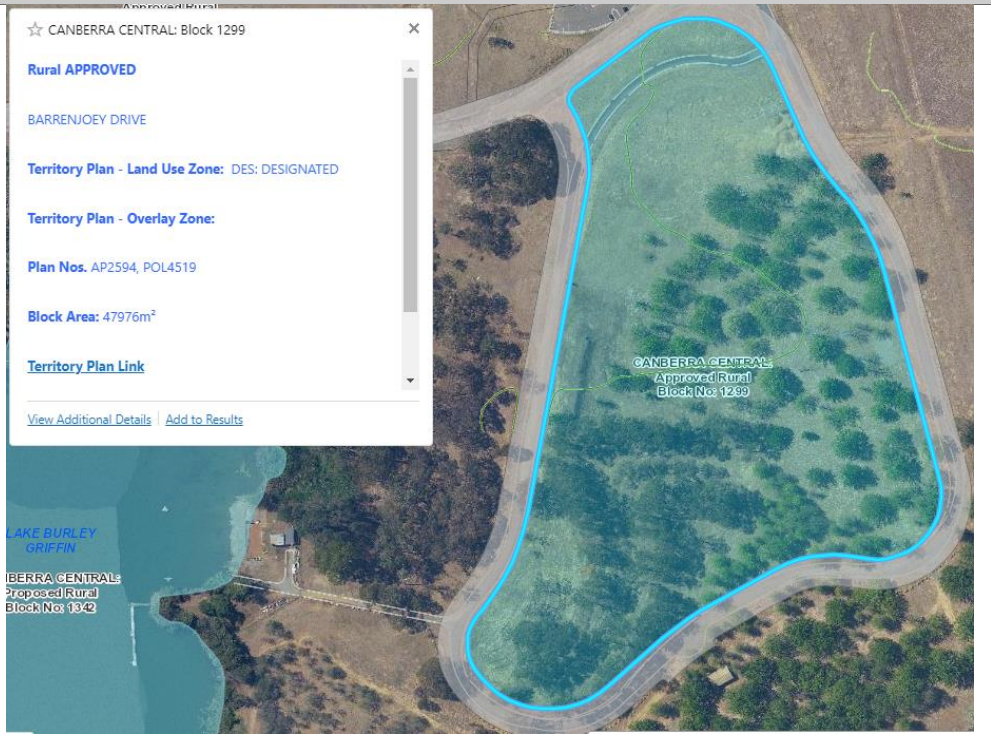
	It is recommended that an equivalent adjacent area be quarantined for future installation of an equivalent size absorption bed if required - following commissioning of the system and monitoring of actual usage and daily load figures. This would enable the capacity of the effluent management system to be doubled by the installation of another subsoil absorption bed of equivalent size Public access to the absorption bed area must be restricted to prevent possibility of human contact with effluent and to prevent damage to effluent management infrastructure.
Technical References	*On-site Sewage Management for Single Households* (The Silver Book) NSW Govt, 1998 *ANZ Standard 1547:2012 On-site Domestic Wastewater Management* *Soil Landscapes of the Canberra 1:100,000 Sheet*. Jenkins B.R. (2000) DLWC
Report Scope	The report assesses land in the vicinity of the proposed public toilet facilities at the Lyndsay Pryor Arboretum to identify land suited to effluent application. This involves excluding land with major physical constraints, such as rock outcrop and poor drainage, and areas within buffer distances from drainage depressions and proposed buildings. The report estimates the daily loading associated with the proposed facilities using established guidelines. It should be noted however that no figures were available on patron numbers so estimates may not be accurate. It is recommended that the number of users be monitored following commissioning, to ensure that the designed system is adequate to cater for actual usage and daily effluent load. Should the system be inadequate then options for upgrading the system and capacity will need to be determined. All information required by ACT Government is contained in the report, including management prescriptions, site plan and photographs, with supporting information in this report including water balance and limitation tables.

Location



Landscape	Undulating low hills with low to moderate slope gradients of 5-15%. Local relief between 30-90 m with elevations ranging between 500 – 630 m. Extensively cleared box-gum woodland vegetation communities modified for passive recreational activities through extensive landscaping and vegetation. Surrounding landscapes currently comprise of open pastureland interspersed by plantings of mature trees. Existing infrastructure includes roads, bike paths and walking trails. Proposed infrastructure includes public toilet facilities, additional walking trails and picnic facilities.
Soils	Moderately well-drained Red and Brown Chromosols (Podzolics) grading to Poorer drained Yellow Chromosols in drainage depressions. The soils have formed in situ and from alluvial-colluvial material derived from parent material of Duoro Volcanics.

	Areas identified as suitable for land application of effluent are Brown Chromosol soil types with a weakly structured sandy loam upper layer overlying a bleached sandy loam A2 horizon which sits atop a moderately structured fine sandy clay loam subsoil which grades to light clay at depth. Total depth is variable but exceeds 100 cm. Extrapolating from the soil survey of the Canberra 1:100,000 sheet (Jenkins, 2000) the area is occupied by the Williamsdale Soil Landscape Unit. The representative analytical data in the Canberra 1:100,000 survey report shows a moderate phosphorous sorption level, non-saline subsoils and low exchangeable sodium. As such the soils are free of any significant chemical limitations to effluent dispersal. Refer to **Appendix 1** for detailed soil profile descriptions

SITE INFORMATION	
Jurisdiction	Australian Capital Territory
Address/locality	Barrenjoey Drive Canberra Central: Block 1299 Registered: Designated
Owner	ACT Government
Developer	Sellick Consultants Canberra: **24 Lonsdale Street, Suite 122 Mode 3, Braddon ACT 2612** Sydney: **99 Mount St, Suite 1601, Level 16, North Sydney NSW 2060** Brisbane: **410 Queen St, Level 1, Brisbane QLD 4000** E: carl@sellickconsultants.com.au W: www.sellickconsultants.com.au
Block configuration: plans attached photo attached	

Proposed facilities	
Intended water supply	Water supplied through non reticulated tank water captured from the roofs of the adjacent shelter.
Expected wastewater load (volume in litres/day)	The estimates used to determine daily loads associated with the proposed facilities block are detailed below: Non-Peak Daily Usage Patterns: Monday – Friday Patrons using the park 50-100 people per day Peak Daily Usage Patterns: Saturday – Sunday Patrons using the park 100-200 people per day Effluent Load 3 Litres Per Visitor Per Day (based on *Recreation Grounds figures in Septic Tank and Collection Well Accreditation Guideline* December 2001 Page 19, see below) Non-Peak Daily Load: 150-300L/day Peak Daily Load: 300-600L/day Maximum Weekly Load: 2,700L/day **Average (Maximum) Daily Load: 400L/day**

	The system will be designed based on the Average Maximum Daily Load with adequate in bed storage to manage Peak Daily Load on Weekends.

TYPE OF PREMISES	WASTES	DAILY FLOW Litres/Person/Day	CALCULATION OF DAILY FLOW RATE	REMARKS
Hospitals	WC, urinal, basin WC, urinal, basin, 1 waste WC, urinal, basin, 2 wastes WC, urinal, basin, 3 wastes Non resident staff	55 82 109 136 55	Persons + staff x 55 Persons x 82 + staff x 55 Persons x 109 + staff x 55 Persons x 136 + staff x 55 Staff x 55	Persons = No. of patient beds + resident staff Staff = non resident or casual staff Basic capacity = 1820 Litres Over 50 persons increase to 2730 Litres Septic tank capacity all wastes over 50 persons = persons x 136 + staff x 55 + 2730
Mines	WC WC, urinal, basin WC, urinal, basin, Shower	23 27 45	Persons x 23 Persons x 27 Persons x 45	Persons = total staff/day Septic tank capacity = persons x daily flow + 1550 Litres
Railway Stations	WC, urinal, basin	27	Persons x 27	Persons = staff/day + 20% of travellers/day. Septic Tank Capacity = persons x 27 + 1550 Litres
Recreation Grounds	WC, urinal, basin For shower add	3 23	Persons x 3 User x 3 + users x 23	Persons = estimated daily attendance. Shower usage = estimated No. persons using showers. Septic tank capacity = persons x 3 + users x 23 + 1550

Septic Tank and Collection Well Accreditation Guideline December 2001 - Page19

Local experience	Most primary treatment and subsoil absorption systems work adequately in the area, provided they are on appropriate soil and site conditions. Systems commonly malfunction due to insufficiently sized absorption trenches to accommodate for the low permeability subsoil conditions. All systems to be maintained regularly, in accordance with ACT Government regulations and the management prescriptions in this report.

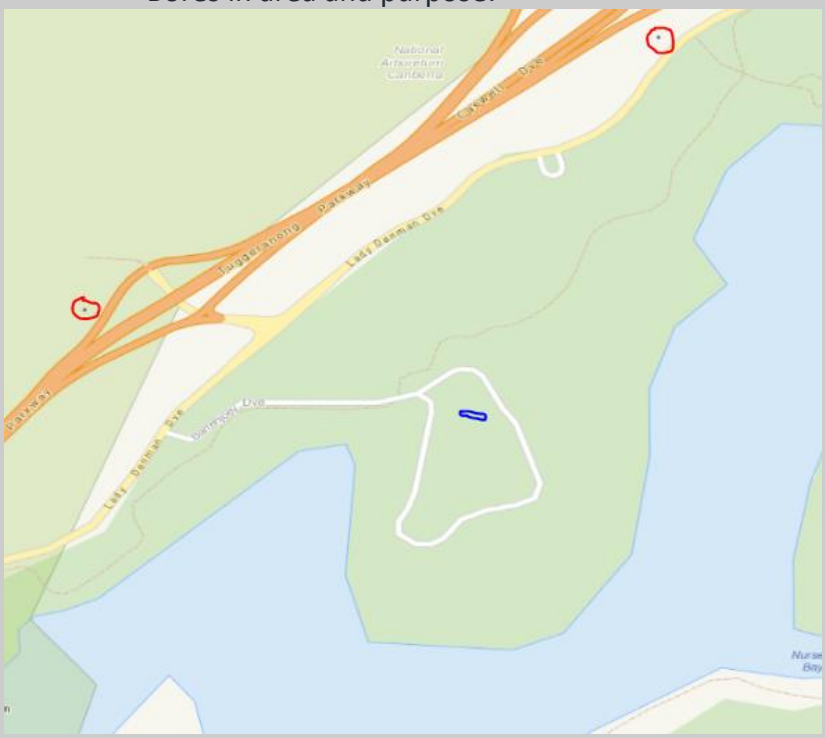
Figure 1: Looking north from the subsoil absorption area

Figure 2: Looking south east from subsoil absorption bed area

Figure 3: Looking from subsoil absorption bed area towards the car park

Figure 4: Looking from subsoil absorption bed area towards the drainage depression/culvert

SITE ASSESSMENT	
Climate	The climate is typically a cool and moderately dry climate. Average rainfall for the area is 600 – 800 mm. Warm summers with large evaporative deficit, cool winters with small evaporative deficit; median summer monthly rainfall for Canberra airport 49 mm; median monthly winter rainfall 38 mm; mean monthly summer evaporation is 177 mm, mean monthly winter evaporation is 60 mm.
Rainfall water balance attached	Yes
Land application area calculated	Yes
Wet weather storage calculation attached	NA
Flood potential land application area above 1:20 year flood: land application area above 1:100 year flood: electrical components above 1:100 year flood:	 Yes Yes Yes
Exposure	Subsoil absorption bed area has no topographical shelter and limited vegetative shading from planted exotic landscaping vegetation. General aspect for effluent dispersal area is south and west. ***Exposure is suitable for subsoil absorption.***
Slope	The effluent dispersal area is located on a 4-6% west facing slope immediately south west of the proposed buildings. ***Slopes are not a constraint to effluent dispersal by subsoil absorption.***
Landform	Slope form of the site is divergent in the proposed effluent disposal area and is suited to the subsoil absorption. ***Landform is suited to effluent disposal by subsoil absorption.***
Run-on	Run-on water is minimal due to location high in the landscape and divergent landform. ***Run-on water will not be a constraint on the site and will be diverted around the absorption bed by a small diversion bank constructed with excess spoil material from the excavation process.***
Seepage	***No seepage*** was evident in the vicinity.
Erosion potential	The low slope and good groundcover presents minimal erosion potential***.***

	Groundcover should be retained at 100% in the effluent disposal area and the topsoiled absorption bed should be seeded and mulched immediately after construction.
Site drainage	Site drains through overland surface flow and a minor drainage depression. The proposed effluent disposal area is outside the 40m buffer distance required between drainage depressions and effluent disposal practices. The site is also on the foreshores of Lake Burley Griffin (Molonglo River), which requires a 100 metre buffer from effluent disposal practices. ***A 40 m drainage buffer is required between the effluent disposal site and the adjacent drainage depression. A 100 m watercourse buffer is required between the effluent disposal site and the adjacent Molonglo River (Lake Burley Griffin)***
Fill	***No fill*** was detected on the property and no fill is proposed.
Groundwater Horizontal distance to groundwater well used for domestic supply: Groundwater vulnerability map category: Bores in area and purpose:  **Closest Bores** **Absorption Bed (indicative only)**	There are no known wells used for water domestic water supply in the area. The area is mapped as moderate groundwater vulnerability on the DLWC Groundwater Vulnerability Map of the Murrumbidgee Catchment. There are no registered bores in the vicinity of the property (i.e. within 500 metres). The closest bores are: • Bore ID LBG 3 (800m north east) 37 metres deep • Bore ID 498 (800m west) ***The effluent management practices proposed in this report will not impact bores or the groundwater aquifer due to large spatial separation (>800m), vertical depth to groundwater table of***

	>30m, low transmissivity of fractured rock aquifer systems and low application rate of effluent to the near surface.
Buffer distance from treatment system to Perennial rivers and creeks: Drainage depressions: Other sensitive environments: Boundary of premises: Driveway/path Swimming pools: Buildings: *[Buffers distances as per AS1547:2012]*	 100 m (Molonglo River) 40 m NA NA 3/6 m (up/downslope) NA 3/6 m (up/downslope)
Is there sufficient land area for Application system including buffers: Reserve application system:	 Yes Yes Refer **Figure 5**
Surface rock outcrop	***None***

SOIL ASSESSMENT	
Depth to bedrock or hardpan:	>1.0 m
Depth to high soil water table:	>1.5 m
Hydraulic loading rate Soil texture: Soil structure: Permeability *(from table L1 of AS1547:2012)*: Recommended design loading rate for subsoil absorption *(from table L1 of AS1547:2012)*:	 Sandy clay loam/light clay Weak - Moderate 0.12 – 0.5 m/day 5 mm/day
Coarse fragments:	<5%
Bulk density (1):	1.6 – 1.8 t/m^3 in topsoil, 1.5 t/m^3 in subsoil
pH field (1)	5.5 in topsoil, 6.5 in subsoil
Electrical conductivity dS/m (1)	0.1 in topsoil, 0.07 in subsoil
Exchangeable sodium %(1)	1 in topsoil, 12 in subsoil
Cation exchange capacity (mequiv/100g) (1)	16 in topsoil, 6 in subsoil
Phosphorous sorption capacity mg/kg (1)	191 (3,438 kg/ha) in topsoil, 503 (7,545 kg/ha) in subsoil
Geological feature Discontinuities: Fractured rock:	 None None
Soil landscape reference (1):	Williamsdale
Dispersiveness EAT class (1):	8 in topsoil, 3(2) in subsoil

1 extrapolated from Jenkins (2000) *Soil Landscapes of the Canberra 1:100,000 Sheet*. DLWC

SYSTEM SELECTION	
Consideration of connection to centralised sewerage system:	Distance: Greater than 1 kms Potential for future connection: Limited Potential for reticulated water: Limited
Type of land application system best suited:	**Subsoil Absorption Bed** Suited to site and soil conditions. Suited to the variable loading patterns and high public usage location.
Type of treatment system best suited:	**NSW Health accredited primary treatment system** Reliable systems suited to variable effluent loading and with no power requirement – therefore suited to no mains power applications.

EFFLUENT MANAGEMENT PRESCRIPTIONS	
Effluent treatment	Effluent will be treated in a primary treatment system. The following specific recommendations are made in respect of the treatment system: 1. Effluent will be treated by a NSW Health Accredited primary treatment system (septic tank) with a minimum capacity of 4,000L. 2. The septic tank should be of concrete construction to minimise potential damage during installation and service 3. The treatment system should be installed so that the lid remains at least 100 mm above final ground level to avoid stormwater entering the tank. 4. The final location for the treatment unit should be chosen by the installer, in consultation with the client, and provide a minimum 3 m buffer from buildings and other built infrastructure – an indicative location is provided in **Figure 5**. 5. Treatment tanks should be installed in compliance with the manufacturer's recommendations, 'AS/NZS 3500.2:2003 Plumbing and Drainage Part 2 Sanitary Plumbing and Drainage' and Council requirements.
Effluent disposal	Effluent will be disposed in a Subsoil Absorption Bed. The following specific management practices should be implemented to ensure effluent is appropriately treated: 1. The Absorption Bed should be located on land shown as suitable in **Figure 5.** 2. A basal absorption (floor) area of 80 m^2 is required. This can be achieved by the installation of a single Subsoil Absorption Bed constructed on the contour with a 20m length and 4 m width. A design is provided in **Figure 6.** Alternative bed(s) layouts are acceptable provided they deliver a combined basal area in excess of 80m^2). 3. The bed should be excavated parallel to the contour so the floor is level across both length and width to ensure an even spread of effluent. 4. The base of the bed should be left with a rough scarified finish into which 80kg of gypsum should be spread on the floor of the bed and loosely raked into in situ soils prior to laying the distribution aggregate. 5. The effluent can be delivered in a perforated 90-100mm pipe bedded in clean durable 20-40 mm aggregate. 6. The 20 m absorption bed should be fed by two delivery lines (perforated pipe) which are spaced at 1000 mm from the edge of the bed with 2000 mm between the two delivery lines. 7. The pipe delivery lines of 90-100mm PVC sewer pipe will be drilled out with 5-10 mm holes every 500-1000mm, and 45 degrees off the bottom of the pipe. Seep holes of 5mm diameter should be drilled at 1-2m intervals along the bottom of the pipe. The even flow of effluent along both distribution lines should be tested prior to backfilling the bed. 8. The two delivery lines should be joined such that effluent is distributed equally to each.

	9. The excavation should have a total depth of 550 mm comprising a wetted depth of 400 mm and a 150 mm cover of topsoil. 10. Geotextile should be placed between the aggregate in the bed and the covering of topsoil. 11. Excess spoil from the excavated bed should be used to create a diversion bank around the topside of the bed. The bank should be 300 mm in height and have a grade of 2-3% which outlets well away from the bed area. 12. The bed should be finished with 100-150mm of good quality topsoil which is domed in profile to minimise infiltration. 13. The topsoiled bed should be sown immediately with suitable perennial grass/pasture species or commercial turf laid. 14. An inspection port of 50-90mm PVC pipe which is slotted/perforated for the bottom 100mm, should be installed to the level of the base of the distribution aggregate layer and end flush with the topsoil layer with an inspection cap. 15. The following buffers will be applied to the subsoil absorption area: 3 m from upslope buildings/paths/roads, 6 m from downslope buildings/paths/roads, 40 m from drainage depression and 100 m from watercourse (Lake Burley Griffin/Molonglo River.
Special Measures	1. An area of adjacent to the absorption bed should be quarantined for the future installation of an equal size absorption bed should it be required, refer **Figure 5.** 2. The absorption bed area (including the reserve area) should be fenced or otherwise screened to limit public access to the site. This can include fencing with access gate and/or vegetative screening with shrubs and trees to effectively limit access. 3. The sewage line between the facilities block and the septic tank should be buried 350-450mm. 4. The effluent distribution line between the septic tank and the absorption bed should be buried a 350-450mm. 5. The number of patron using the facilities should be monitored following commissioning. This may include counters fitted to the door and/or flow monitoring equipment fitted to the distribution line in the effluent management system. Monitoring the water use from the water tank will also provide a useful measure of effluent volumes being managed by the system. 6. The additional 150mm wetted area available in the absorption bed provides an effective storage volume of 12,000 litres which provides for up to 30 days storage at the average daily load of 400 litres. This should be adequate to cater for periods of extended wet weather and /or periods of peak loading associated with long weekends and/or holiday periods
General	1. Vehicular access must be excluded from the absorption area as they compact the soil, thereby reducing the infiltration rate and water holding capacity.

	2. Water conservation measures should be adopted to the greatest extent possible in the facilities, particularly in relation to the high water use activities of toilet flushing. AAA+ plumbing appliances and fittings should be used. Measures including use of low volume dual flush toilets reduce water usage by 30 to 40%. 3. Soap products low in phosphorous and sodium should be used as much as possible (see details in appendix) in order to protect the soil's capacity to absorb water.

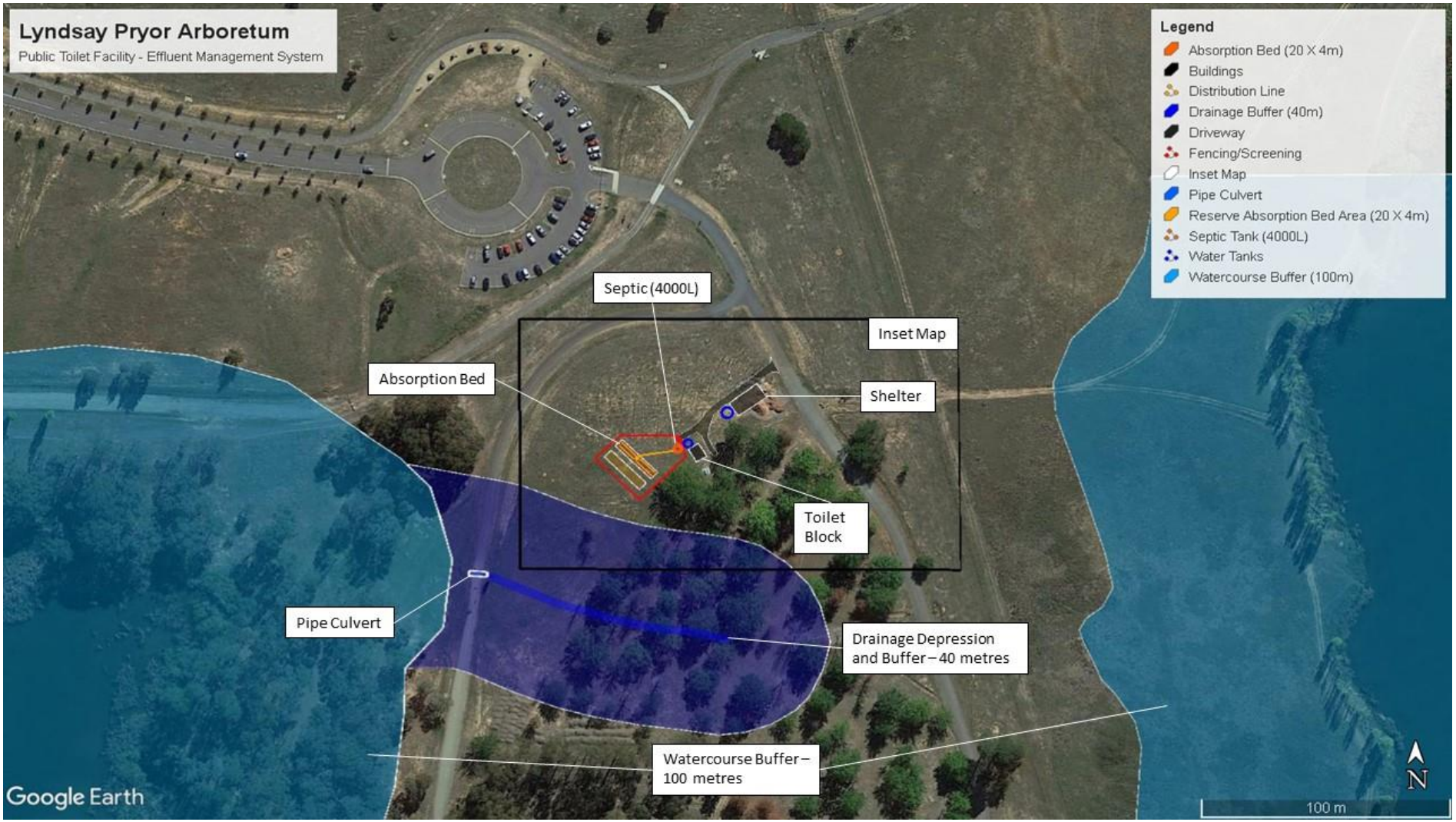


Figure 5a: Effluent management infrastructure and constraints

Figure 5b: Effluent management infrastructure

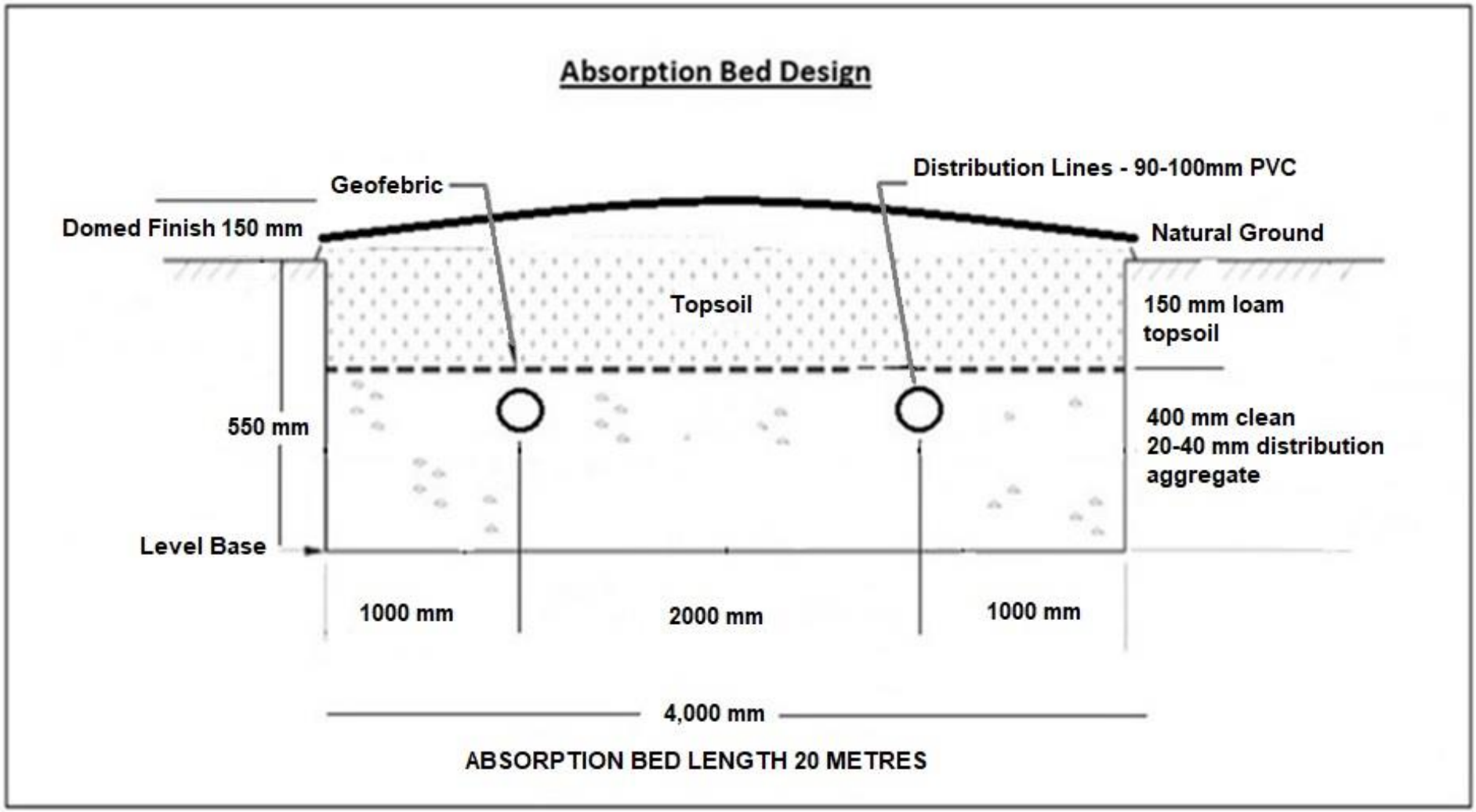


Figure 6: Absorption bed design

SIZING EFFLUENT DISPOSAL AREA

Using the DLR for subsoil absorption light clay soils of 5 mm/day and design loading of 400L/day, the following subsoil absorption areas are required to manage the hydraulic loading, nitrogen and phosphorous generated.

Water balance	• **Sizing based on hydraulic loading:** A = Q (l/day)/DLR (mm/day) where A = area; Q = 400 l/day; DLR = 5 mm/day A = 400/5 = 80 m^2 **Area required = 80 m^2**
Subsoil Absorption Area	Therefore, a subsoil absorption area of **80 m^2** will account for phosphorous, nitrogen and water applied from the proposed new facilities block.

SITE AND SOIL LIMITATION ASSESSMENT

The following two limitation tables are a standardised guide to the site and soil characteristics which may limit the suitability of the site for effluent disposal and which would require attention through specific management practices. The tables have been reproduced from *On-site Sewage Management for Single Households* (tables 4 and 6, Anon, 1998). The highlighted categories represent site and soil conditions of the land covered in this report. The tables show that the land designated for effluent application has slight to moderate limitations, but no severe limitations.

Site limitation assessment

Site feature	Relevant system	Minor limitation	Moderate limitation	Major limitation	Restrictive feature
Flood potential	All land application systems	> 1 in 20 yrs.		Frequent, below 1 in 20 yrs	Transport in wastewater off site
	All treatment systems	components above 1 in 100 yrs.		Components below 1 in 100 yrs.	Transport in wastewater off site, system failure
Exposure	All land application systems	High sun and wind exposure	Moderate sun and wind exposure	Low sun and wind exposure	Poor evapo-transpiration
Slope %	Surface irrigation	0-6	6-12(drip)	>12	Runoff, erosion potential
	Sub-surface irrigation	0-10	10-20	>20	Runoff, erosion potential
	Absorption	0-10	10-20	>20	Runoff, erosion potential
Landform	All systems	Hillcrests, convex side slopes and plains	Concave side slopes and foot slopes	Drainage plains and incised channels	Groundwater pollution hazard, resurfacing hazard
Run-on and seepage	All land application systems	None-low	Moderate	High, diversion not practical	Transport of wastewater off site

Site feature	Relevant system	Minor limitation	Moderate limitation	Major limitation	Restrictive feature
Erosion potential	All land application systems	No sign of erosion potential		Indications of erosion e.g. rills, mass failure	Soil degradation and off-site impact
Site drainage	All land application systems	No visible signs of surface dampness		Visible signs of surface dampness	Groundwater pollution hazard, resurfacing hazard
Fill	All systems	No fill	Fill present		Subsidence
Land area	All systems	Area available		Area not available	Health and pollution risk
Rock and rock outcrop	All land application systems	<10%	10-20%	>20%	Limits system performance
Geology	All land application systems	None		Major geological discontinuities, fractured or highly porous regolith	Groundwater pollution hazard

Soil limitation assessment

Soil feature	Relevant system	Minor limitation	Moderate limitation	Major limitation	Restrictive feature
Depth to bedrock	Surface and sub surface irrigation	> 1.0	.5-1.0	< 0.5	Restricts plant growth
or hardpan (m)	Absorption	> 1.5	1.0-1.5	< 1.0	Groundwater pollution hazard
Depth to seasonal water table (m)	Surface and sub surface irrigation	> 1.0	0.5-1.0	< 0.5	Groundwater pollution hazard
	Absorption	> 1.5	1.0-1.5	< 1.0	Groundwater pollution hazard
Permeability	Surface and sub surface irrigation	2b, 3 and 4	2a, 5	1 and 6	Excessive runoff and waterlogging
Class	Absorption	3, 4		1, 2, 5, 6	Percolation
Coarse fragments %	All systems	0-20	20-45	>40	Restricts plant growth, affects trench installation
Bulk density (g/cc) **SL** **L, CL** **C**	All land application systems	 < 1.8 < 1.6 < 1.4		 > 1.8 > 1.6 >1.4	restricts plant growth, indicator of permeability
pH	All land application systems	> 6.0	4.5-6.0	-	Reduces plant growth
Electrical conductivity (dS/m)	All land application systems	<4	4-8	>8	Restricts plant growth

Soil feature	Relevant system	Minor limitation	Moderate limitation	Major limitation	Restrictive feature
Sodicity (ESP)	Irrigation 0-40cm; absorption 0-1.2mtr	0-5	5-10	> 10	Potential for structural degradation
CEC mequiv/100g	Irrigation systems	> 15	5-15	< 5	Nutrient leaching
P sorption kg/ha	All land application systems	> 6000	2000-6000	< 2000	Capacity to immobilise P
Aggregate stability	All land application systems	Classes 3-8	class 2	class1	Erosion hazard

APPENDIX 1: SOIL PROFILE DESCRIPTION

Soil Profile 1: Located within effluent absorption area (refer Figure 5 for location)

Soil classification	Depth (cm)	Properties
Red Chromosol	0-20	A1 Medium to dark brown fine sandy loam, no coarse fragments, moist and friable, massive to weak structure, gradational colour change to
	20-50	A2 Bleached light brown fine sandy loam, no coarse fragments, weak to massive structure, moist and friable, grades to
	50-70	B1 Red brown fine sandy clay loam, moist and friable, no coarse fragments, weak structure, grades to
	70-100	B2 Red with grey/orange mottles fine sandy light clay loam, 5% coarse fragments as pea gravel iron nodules, moderate structure, dry and friable, degrades to saprolite material and decomposed granite bedrock

Soil Profile 2: Located within the effluent subsoil absorption irrigation area (refer Figure 5 for location)

Soil classification	Depth (cm)	Properties
Red Chromosol	0-30	A1 Medium to dark brown fine sandy loam, no coarse fragments, moist and friable, massive to weak structure, gradational colour change to
	30-45	A2 Bleached light brown fine sandy loam, no coarse fragments, weak to massive structure, moist and friable, grades to
	45-100	B1 Red brown fine sandy clay loam, moist and friable, no coarse fragments, weak structure, grades to
	100-125	B2 Red with grey/orange mottles fine sandy light clay loam, 5% coarse fragments as pea gravel iron nodules, moderate to strong structure, dry and friable, degrades to saprolite material and decomposed granite bedrock

Soil texture assessment – soil ribbon average length of 65mm = Light Clay with Design Loading Rate (DLR) of 5mm/day