2/157 Newcastle St, Fyshwick, ACT, 2609
43 Pine Street, Hamilton, QLD, 4007
2/538 Gardeners Road, Alexandria NSW 2015
PO Box 9225, Deakin ACT 2600

Consulting Engineers

(02) 6285 1547
(07) 3112 7277
(02) 9188 4033
FortifyGeotech.com.au

24 April 2025

Our ref: AS/C16045

Client: Joshua Leahy & Kelsey Walford
Via email: joshleahy.bond@gmail.com & kelsey.walford@suncorp.com.au

Attention: Joshua & Kelsey

PROPOSED RESIDENCE – LOT 56 WOODBURY RIDGE, SUTTON, NSW

On-Site Effluent Management Report

1 INTRODUCTION

At the request of the client, Fortify Geotech Pty. Ltd carried out an effluent disposal assessment to AS1547 "On-Site domestic wastewater management", for proposed new dwelling at 93 Harcourt Close (Lot 56), Woodbury ridge, Sutton, NSW.

The empty rural block is 1.01ha in area and has a falling slope of about 1° to 2° towards the north. At the time of site investigation, the proposed effluent management area has low to medium grass with no trees.

This Site and Soil Evaluation was conducted on 13 December 2024 in general accordance with AS 1547:2012 - "On-site domestic wastewater management", and "The Environment & Protection Guidelines 1998 – On-Site Sewage Management for Single Households" (Silver Book).

The recommendations outlined on Land Capability Assessment report prepared for the sub-division by Franklin Consulting Australia Pty Ltd (dated 11 December 2020) has been considered while preparing the report.

2 SITE INFORMATION

Address of site	93 Harcourt Close **(**Lot 56), Woodbury Ridge, Sutton, NSW
Local government	Yass Valley Council
Investigation	A site and soil assessment were undertaken using the Australian Standard 1547, *On-site domestic wastewater management*, and the Environment and Health Protection Guidelines, *On-site sewage management for single households* (1998), Department of Urban Affairs and

	Planning, as guidelines. Suitable wastewater application systems, sizing and location for the site are recommended. The evaluation is based on a dwelling with four (4) potential bedrooms in primary residence and equivalent of one (1) potential bedroom in a shed.
Size	Approximately 1.01ha
Location, shape, layout	A plan of the relevant areas of the site and proposed effluent application areas is described in Figures 1 and 2.
Photograph(s) attached	Yes (Figure 3 and 4)
Intended water supply	Rainwater for portable use (tank water supply)
Development	Proposed new primary residence and guest house
Expected wastewater flow:	Number of potential occupants in main residence = 4+1 = 5 Number of potential occupants in shed = 1+1 = 2 **Seven (7) potential occupants in total.** Usage per resident = 120 L/day (as per AS1547) **Design Flowrate** = 120 x 7 = **840 L/day** (Consistent with the land capability assessment for the subdivision) The water balance is calculated using full water saving devices such as dual flush toilets (6/3 liter water closets), water reduction cycles on dishwashers, aerator faucets fitted to taps, front loader washing machines and water reducing shower heads. Re-calculation of the hydraulic balance and application area is required for dwellings containing a differing number of potential bedrooms.
Setting	This lot is in a rural setting where the average dwelling density is less than 1 dwelling per 1ha and therefore less than the 1 per 0.4 hectares required for groundwater protection (Geary & Gardner 1996, Land Management for Urban Development, Australian Society of Soil Sciences, Qld).
Current land-use	Vacant
Climate	Summers are warm to hot, and winters are cold with little effective evaporation. Rainfall is distributed evenly throughout the year with an average annual rainfall of 516mm and pan evaporation of 1,726mm (Bureau of Meteorology Canberra Airport, ACT).

3 SITE ASSESSMENT

Site feature	Assessment	Limitation
Vegetation	Native grasses and weeds.	Minor
Flood potential: 1 in 20 year 1 in 100 year	 Nil Nil	Minor
Exposure Site aspect Shelter belts Topographical feature or structure	High North Nil Nil	Minor
Slope	1° to 2°	Minor
Landform	Mid-slope	Minor
Run-on and seepage: Comment	 Run-on and sub-surface seepage is expected to be low.	Minor
Erosion potential: Erodibility and Erosion hazard	 The topsoil and subsoil have a low erodibility. Erosion hazard is low and is reduced with ground cover.	Minor
Site drainage	No visible signs of surface dampness	Minor
Fill	Nil	Minor
Groundwater: Level of protection Bores and wells in the area and their purpose	 High	Minor

Site feature	Assessment	Limitation
	No groundwater bore is located within 200m of the application area. No impact on groundwater is expected from the application of effluent on the site.	
Surface water: Permanent waters, streams, lakes *(Recommended buffer distance 100m)* Other waters, intermittent waterways, dams *(Recommended buffer distance 40m)*	 No permanent waters, streams, or lakes within 200m of the proposed application areas. No drainage lines or dams within 40m of the proposed application areas.	Minor
Buffer distances from recommended application area to: Premises boundaries, paths and walkways, recreation areas *(Recommended buffer distance 3-4m)* Swimming pools *(Recommended buffer distance 6m)* Buildings *(Recommended buffer distance 3-15m)*	 ≥3m ≥6m ≥3m	Minor
Area required for application system(s): Area available (including buffers):	**280m^2** minimum area required for irrigation system and additional 134m^2 for nutrient uptake area. 414m^2 in total. A potential application area greater than 1000m^2 is available on site.	Minor
Surface rocks, rock outcrops	No within potential application area	Minor

Site feature	Assessment	Limitation
Geology/ regolith	The MinView Seamless Geology map indicated the area underlaid by Ordovician age Adabinaby Group, comprising spotted hornfels and metasedimentary rocks (contact metamorphic aureole).	Minor
Environmental concerns: Native plants intolerant of phosphorous High water table Water way/wetland Community water storage	 Nil Nil None nearby None nearby	 Minor
Site stability: Is expert assessment necessary	 No, not expected to affect system performance	 Minor

4 SOIL ASSESSMENT

The soil was assessed on site on 13 December 2024. To establish the subsurface condition and soil properties, two boreholes were drilled on the site to refusal at the depths ranging from 1.4m to 1.5m using a 50mm pushtube. Borehole 1 (BH1) was drilled within the proposed application area and soil samples were collected from BH1. BH2 was drilled on the proposed reserve area.

The soil profile was described, and representative samples collected for the determination of physical and chemical properties. Soil physical property measurements undertaken included: dispersion description, texture, colour, pH, and salinity. The laboratory tests for physical properties were undertaken at our office and the results are presented in the following table.

Depth (mm)	Description	Sampled (X)	Texture group	Moisture	Emerson aggregate test*	pH (1:5 water)	ECe dS/m
BH1							
0 - 800	Brown light clay with gravel	300	LC	M	5	6.6	0.59
800 - 1500	Grey, brown sandy clay loam	900	SCL	D-M	3	7.2	0.82

BH2							
0 - 800	Brown light clay with gravel		LC	M			
800 - 1400	Grey, brown sandy clay loam		SCL	D-M			

M=Moist, D=Dry *1= highly dispersive (slakes, complete dispersion), 2= moderately dispersive (slakes, some dispersion), 3= slightly dispersive (slakes, some dispersion after remoulding), 4= non-dispersive (slakes, carbonate or gypsum present), 5= non-dispersive (slakes, dispersion in shaken suspension) 6= non-dispersive (slakes, flocculates in shaken suspension), 7= non-dispersive (no slaking, swells in water), 8= non-dispersive (no slaking, does not swell in water).

Site feature	Assessment	Limitation
Depth to bedrock	Greater than 1.5m in recommended application areas *(0.6m below application base recommended)*	Minor
Depth to high water table	Greater than 1.5m in recommended application areas *(0.6m below application base recommended)*	Minor
Coarse fragments	Gravel ~ 5%	Minor
Bulk density	1.5g/cm^3 (estimated)	Minor
pH	Satisfactory *(4.5-8.5 optimum range)*	Minor
Salinity	Non-saline *(<4.0 dS/m desirable threshold)*	Minor
Phosphorus sorption index	6500 kg/ha (estimated)	Minor
Nutrient balance	Application area to be dictated by the nutrient balance.	Minor
Cation exchange capacity	Moderate (estimated). Will provide adequate retention of nutrients for plant growth.	Minor
Dispersiveness (Emerson aggregate test)	Non-dispersive light clay over a slightly dispersive sandy clay loam subsoil.	Minor
Soil structure	Moderately structured	Minor

5 EFFLUENT DISPOSAL SYSTEM SELECTION

Based on the site and soil assessment, an effluent system comprising of a sub-surface drip irrigation system and a secondary treatment system (AWTS) is suitable for the site, which is consistent with the recommendations on Land Capability Assessment prepared for the subdivision. Lot 56 is located within a special effluent disposal area, as outlined in the land capability assessment for the subdivision. This means only a subsurface drip irrigation system with an AWTS septic system can be used.

6 EFFLUENT DISPOSAL SYSTEM DESIGN

The calculations in determining the size for the application area are outlined below. Using Table H1 in AS1547:2012 – "Disposal Systems for Effluent from Domestic Premises", the daily flow was calculated using the assumptions outlined in Table 1.

Water Balance:

A = Q (L/day)/DIR (mm/day)
Where Q = 840 L/day
DIR = 3 mm/day (for light clay)
A = 840/3 = **280m^2**

Nitrogen Balance:

A = Q(L/day) x TN (mg/L)/ Ln (critical loading of TN, mg/m^2/day)
Where Q = 840L/day
TN = 30mg/L

Assume 20% loss by denitrification; 30mg/L – (30 x 0.8) = 24mg/L
Ln = 24,000mg/m^2/year (240kg/ha/year, for managed land)
A = 840 x 24 x 365/24,000 = **302m^2**

Phosphorous Balance:
P sorption capacity

A = P gen/ (P uptake + P sorb)

P sorb = 0.65kg/m^2 x 1/3 = 0.22kg/m^2

P uptake for design period of 50 years
P uptake = 8.2mg/m^2/day x 365 x 50 = 0.15kg/m^2

P generated over 50 year design period
P gen = 10mg/l x 840 x 365 x 50 = 153.3kg

A = P gen/ (P uptake + P sorb) = 153.3/ (0.15 + 0.22) = **414m^2**

Nutrient and water balance results used to determine the size of the nutrient uptake area (m^2).

Based on the difference between the phosphorous balance area (414m^2) and the hydraulic (irrigation) area (280m^2) a dedicated nutrient uptake area (NUA) of 134 m^2 downslope or around the irrigation area required to safely dispose of the effluent.

7 TREATMENT SYSTEM

For sub-surface drip irrigation, the effluent must be secondary treated effluent, which can be treated in an NSW Health accredited AWTS system and should be installed as per the Plumber's installation manual. The list of NSW Health accredited secondary treatment system can be found on https://www.health.nsw.gov.au/environment/domesticwastewater/Pages/awts.aspx .

The system shall have adequate capacity to treat the design flow rate (840L/day) for the proposed dwellings. The septic tank should be fitted with an outlet filter. The tank should be installed to comply with the local council requirements and the

standard AS3500.2:2003 – "Plumbing and Drainage Part 2 Sanitary Plumbing and Drainage", and the manufacturer's recommendations.

The tanks should be installed so that the lid of the tank is exposed at least 100mm off the ground surface level to ensure that it is properly sealed, and no stormwater enters the tank.

8 DESIGNATED AREA

The sub-surface (drip) irrigation system with a minimum application area of **280m^2** and additional a dedicated nutrient uptake area (NUA) of 134 m^2 downslope or around the irrigation area is required for the proposed residence. Both the irrigation area and NUA herein are referred to as the effluent management area (EMA). No structures should be built within the EMA and is best to remain landscaped as a lawn or planted with trees and shrubs suited to receive treated wastewater.

Irrigation system should be installed in accordance with the requirements of AS1547: 2012.

The area will need to be covered with at least 150mm of fertile topsoil to act as an immediate storage media for effluent applied to it, and to support the rapid growth of suitable vegetation to maximize evapo-transpiration. A list of suitable plants is provided in "The Easy Septic Guide" produced by the NSW Department of Local Government.

A fence should be placed around the effluent disposal area if there is a risk of children, animals or vehicles coming into the area. Signage, complying with AS1319 shall be placed in at least two places at the boundary of the application area, clearly visible to property uses, with wording such as "Recycled Water – Avoid Contact – DO NOT DRINK".

The treated effluent is not suitable for vegetable gardens or areas where people can come in contact with the effluent.

The area should not be used for any purposes that compromise the effectiveness of the system or access for future maintenance purposes.

2/157 Newcastle St, Fyshwick, ACT, 2609
43 Pine Street, Hamilton, QLD, 4007
2/538 Gardeners Road, Alexandria NSW 2015
PO Box 9225, Deakin ACT 2600

Consulting Engineers

(02) 6285 1547
(07) 3112 7277
(02) 9188 4033
FortifyGeotech.com.au

9 CLOSURE

Should you require any further information regarding this report, please do not hesitate to contact our office.

Yours faithfully,

Fortify Geotech Pty Ltd

Written by:

Andrei Stepunin

Geotechnical Engineer & Geologist

Reviewed by:

Jeremy Murray
Senior Geotechnical Engineer | Director
FIEAust CPEng Eng Exec NER RPEQ APEC Engineer IntPE(Aust)
Registered Professional Engineer of Queensland (RPEQ) #19719
NSW Professional Engineer Registration #PRE0001487

FIGURE 1: SITE LOCALITY | AS/C16045

FIGURE 2: SITE PLAN

AS/C16045

FIGURE 3: SITE PHOTOGRAPH OF THE PROPOSED APPLICATION AREA | AS/ C16045

FIGURE 4: SOIL PROFILE AT BH1 | AS/C16045

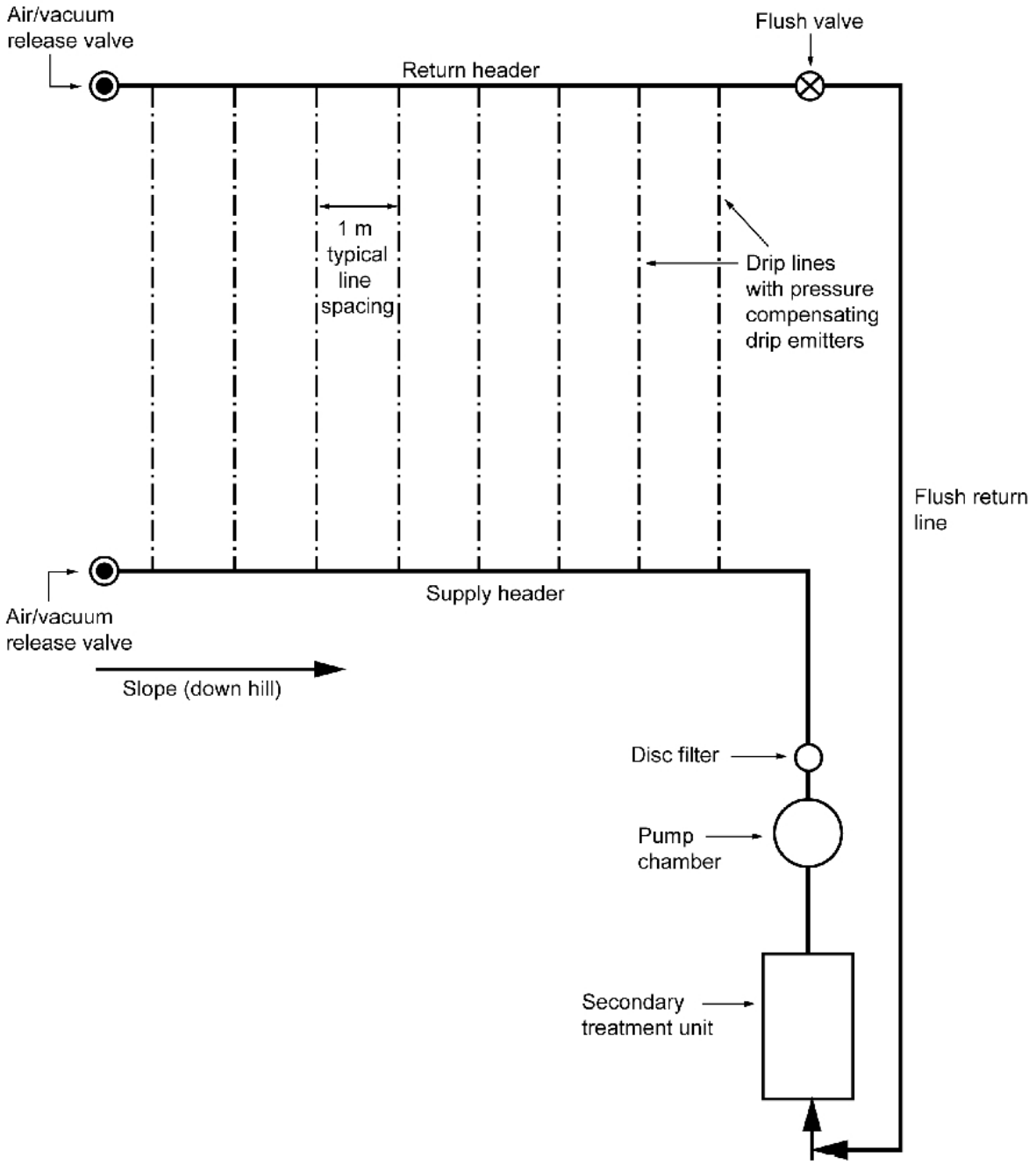

FIGURE 5: EXAMPLES OF DRIP IRRIGATION SYSTEM | AS/C16045

2/157 Newcastle St, Fyshwick, ACT, 2609
43 Pine Street, Hamilton, QLD, 4007
2/538 Gardeners Road, Alexandria NSW 2015
PO Box 9225, Deakin ACT 2600

Consulting Engineers

(02) 6285 1547
(07) 3112 7277
(02) 9188 4033
FortifyGeotech.com.au

Checklist for effective management of wastewater systems

Domestic wastewater system

DO

- Check household products for suitability of use with a septic tank.
- Conserve water, prolonged period of high-water use can lead to application area failure. For optimum operation, avoid daily and weekly surges in water flows. Spas are not recommended.
- Scrape cooking dishes and plates prior to washing to reduce solid load.
- Maintain the system with regular servicing as per the manufacturer's instructions.

DON'T

- Dispose of excessive solid material, fats, lint or large water volumes into drains.

Land application area

- Construct and maintain diversion drains around the top side of the application area to divert surface water.
- The application area should be a grassed area, which is maintained at 10-30cm height.
- The area around the perimeter can be planted with small shrubs to aid transpiration of the wastewater.
- Ensure run-off from the roof or driveway is directed away from the application area.
- Periodic application of gypsum may be necessary to maintain the absorptive capacity of the soil.
- **Don't** erect any structures or paths on the land application area.
- **Don't** graze animals on the land application area.
- **Don't** drive over the land application area.
- **Don't** plant large trees that shade the land application area thereby reducing transpiration of water.
- **Don't** let children or pets play on the land application area.
- **Don't** extract untreated groundwater for potable use.