SITE AND SOIL EVALUATION REPORT

ON SITE SEWAGE DISPOSAL STRATEGY

PROPOSED NURSING HOME FACILITY

LOT 7 (24) VALENCIA ROAD, CARMEL, WA

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1. Project Details

1.1. Introduction

Peritas Group Pty Ltd have been commissioned by Burswood Care Pty Ltd, a subsidiary of Roshana Group of Companies, to assist with the design of the proposed extension of the existing nursing home facility located at Lot 7 (24) Valencia Road in Carmel, WA.

The nursing home is a prominent aged care facility in Perth and is currently home to 66 patients, receiving high quality aged care services, as well as providing high care and support for residents with dementia.

This report states the results and findings of a site and soil evaluation carried out by Peritas, to assist with an application for an onsite sewage disposal strategy to the City of Kalamunda.

1.2. Site Description

The site comprises an area of approximately 1.2 ha and is identified as Lot 7 (24) Valencia Road in Carmel, WA. The facilities on site currently comprise single storey brick and tile buildings, operating as the nursing home facility, with associated car parking facilities, sheds and open space areas.

See Figure 1 below for a locality plan of the site.

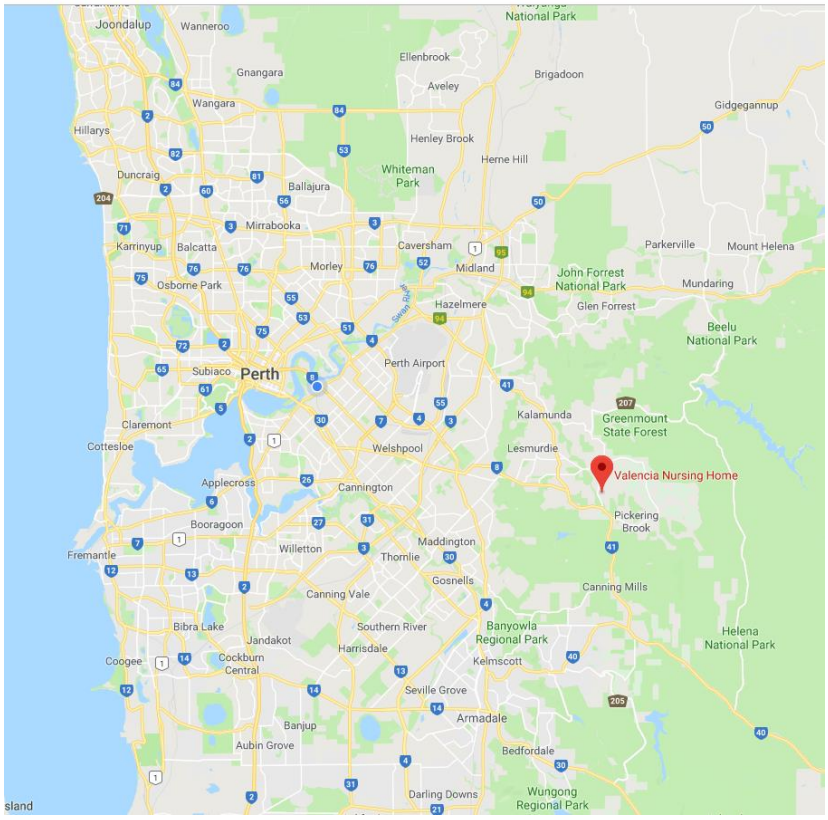


Figure 1 Locality Plan

Based on the City of Kalamunda's database, the site is zoned as *rural* MRS Zone and *private clubs and institutions* LPS Zone.

The surface levels across the site fall from approximately RL 270.2 m AHD in the southern corner of the site to approximately RL 264.5 n AHD in the northern corner of the site. The site has an approximate gradient of 4% falling towards the north.

Vegetation across the open areas of the site generally comprises short grasses with some medium to large sized trees located towards the north eastern half of the site.

See Figure 2 below for an aerial view of the site.



Figure 2 Site Aerial View

Based on the 1:50,000 Armadale environmental geology map, the shallow subsurface soil conditions beneath the site are mapped as comprising laterite-massive, and vuggy to cemented pisolites to 4 m thick, with associated loose, sandy pisolite gravel.

At the time of this writing report, published information regarding groundwater levels was available, however, based on our experience with the surrounding area, owing to the high surface level and shallow subsurface ground conditions, groundwater is not anticipated to be within at least 20 m of existing surface levels.

1.3. Proposed Development

The existing nursing home is currently operating with a maximum of 66 patients, with associated staff and visitors.

The proposed development comprises the construction of a two-storey building, north west of the existing buildings. The new building will comprise patient rooms with en-suite bathrooms, and associated facilities including staff offices/rooms and treatment rooms such as a physio/gym room and a hair dresser facility.

The proposed development will see the nursing home facility expand from the existing 66 patient capacity to the new 120 patient capacity with associated staff and visitors.

Please see Figure 3 below indicating ground floor plan of the proposed building footprint. Note that the area shaded in blue is the proposed new building and car park footprint areas. The architectural landscape drawing is attached as Appendix A of this document.

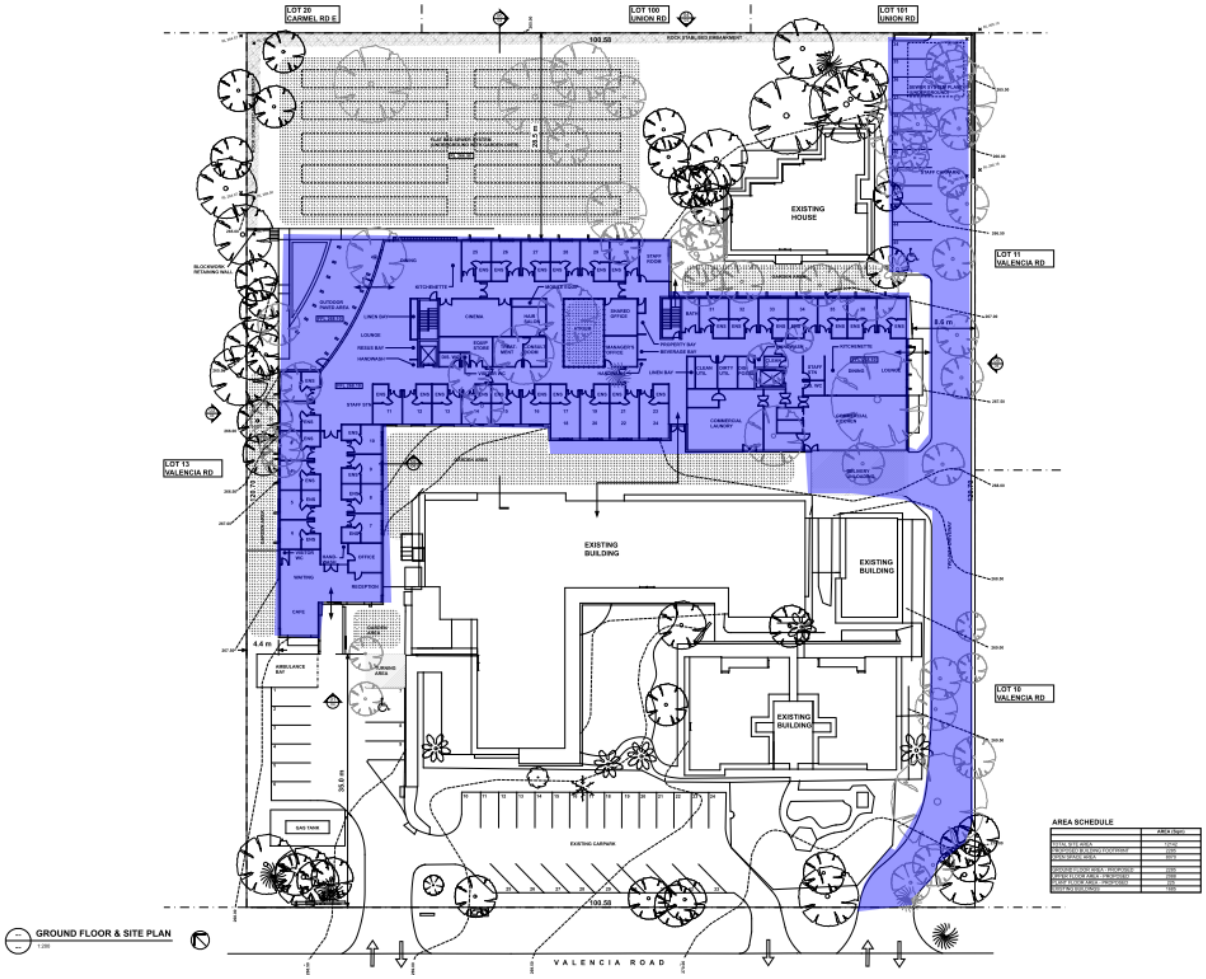


Figure 3 Proposed Development Footprint

1.4. Anticipated Wastewater Loading

The proposed facility, after all expansion, is designed to serve a total of 120 patients, with a patient to staff ratio of 3:1, and a patient to visitor ration of 10:1. The ratio of day staff to night staff is at a ratio of 3:1.

It is noted that the proposed facility includes a gym and hair dressing facility.

The gym /physiotherapy room will be operated daily by casual staff (1 x occupational therapist) for staff members and patients.

The hair dressing facility is proposed to be operated once weekly, for no more than half a day, by one casual staff, for existing patients.

Following these design parameters, the disposal system needs to account for:

Patients	120 daily
Staff	40 daily and 13 nightly. 53 permanent staff Based on advice received from Burswood Care Pty Ltd, it is understood that the gym is operated daily and hairdressing facility will only be operated once weekly and will require an additional staff member. An allowance has been made for **two additional daily staff** to account for casual staff operating the gym and hair dressing facility (which is greater than actually required for these functions). Total Staff = 55 daily
Visitors	12 daily

<u>Wastewater Load Calculation</u>

Patients	120 patients x 150L/person/day 18,000 L/day
Staff	55 staff x 70L/person/day 3,850 L/day
Visitors	12 visitors x 10L/person/day 120 L/day
TOTAL	18,000 L/day + 3,850 L/day + 120 L/day **21,970 L/day**

A calculation sheet is attached as Appendix B of this report.

1.5. **Proposed Land Application Area**

As can be seen from Figure 3 above, the proposed building and car park footprint occupies majority of the site area. As such, it is considered that the most practical location for a land application area (LAA) at this site, is the area shaded in green in Figure 4 below.

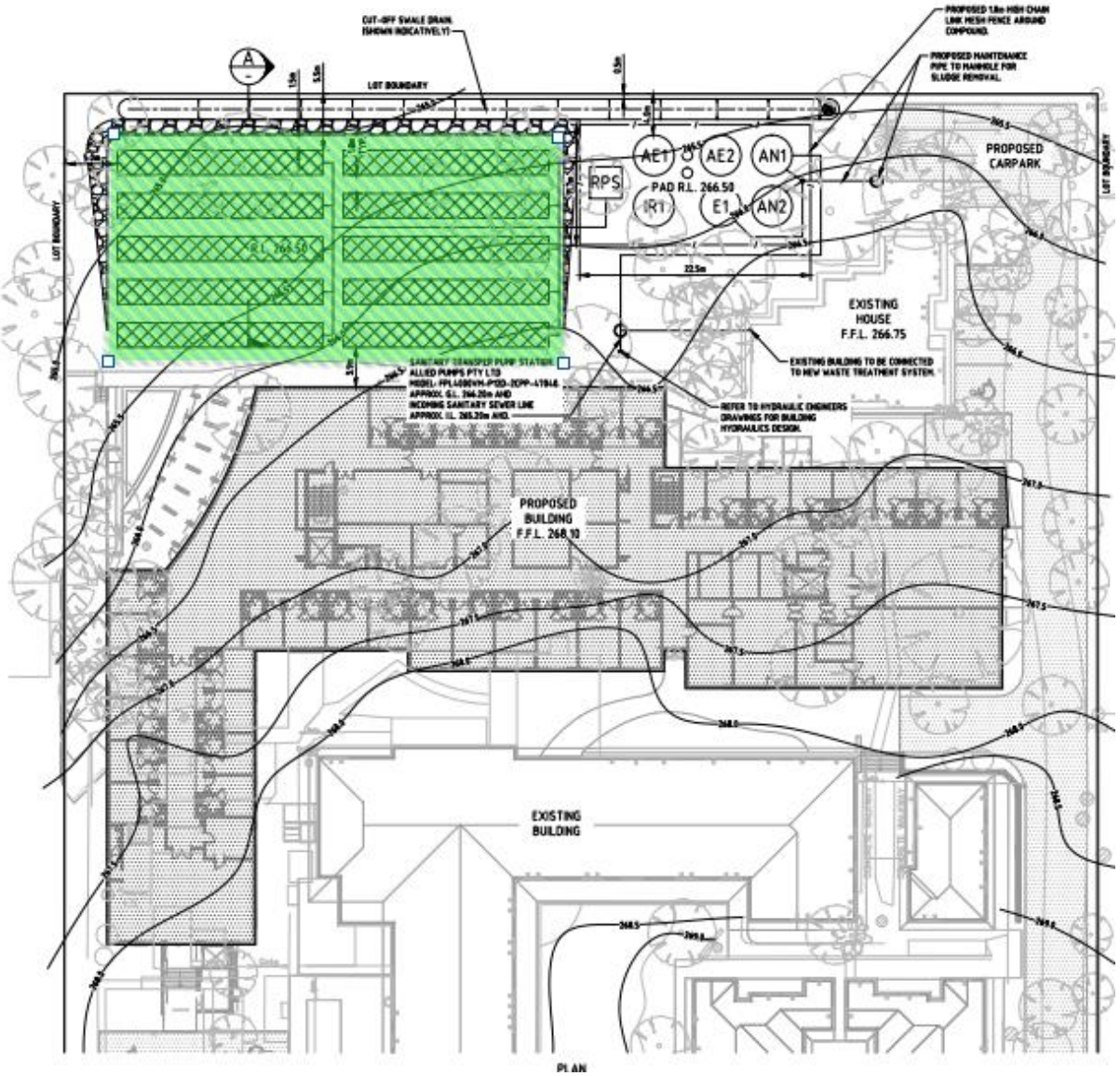


Figure 4 Proposed Land Application Area

1.6. **Development Summary**

See Table 1 below for a summary of the proposed development.

Table 1 Development Summary

Development Characteristic	Description
Site Address	Lot 7 (24) Valencia Road, Carmel, WA
Owner/Developer	Roshana Group of Companies
Postal Address	
Contact	+61 8 9279 9988 or +61 8 9293 5248
Local Government	City of Kalamunda
Zoning	Rural/Private Clubs and Institutions
Lot size	1.21 ha
Proposal	Nursing Home Expansion
Water Supply	Mains
Anticipated Wastewater Load	21,970 L/day (AS/NZS 1547)
Availability of Sewer	The area is unsewered and is unlikely to be sewered within the next 10 years, due to low development density in the area and the considerable distance from existing wastewater services.

2. Site and Soil Assessment

2.1. **Overview**

Peritas Group has conducted several site inspections between August 2016 and November 2018 to assist with the preparation of an adequate site assessment. In addition, Local Geotechnics have carried out a geotechnical investigation at the site in November 2016, with supplementary permeability and chemical testing carried out between August and November 2018. The results of desktop studies and site inspections carried out by Peritas, and the results of the geotechnical field investigations, are presented in the subsequent sections of this report.

2.2. **Climate**

The climate in Carmel is similar to Perth. Majority of rainfall occurs within the winter months between June and August with mean temperatures ranging between 8˚C and 18˚C. The summer months between December and February have mean temperatures ranging between 15˚C and 32˚C.

The nearest weather station is PERTH AIRPORT Station No. 009021. A summary of the average monthly rainfall and evaporations rates is presented in Table 2Table 2 below:

Table 2 Perth Airport Weather Statistics. Source Australian Government: Bureau of Meteorology

Statistics	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Temperature (˚C)													
Mean maximum temperature	31.8	31.9	29.7	25.6	21.8	19.0	17.9	18.6	20.2	22.7	26.0	29.0	24.5
Mean minimum temperature	17.1	17.5	15.9	13.0	10.4	9.0	8.0	8.1	8.9	10.3	12.8	14.9	12.2
Rainfall (mm)													
Mean rainfall (mm)	11.1	15.1	16.2	40.1	98.5	155.6	156.0	118.9	72.7	43.2	25.9	11.4	765.6
Evaporation (mm)													
Mean daily evaporation	10.2	9.6	7.7	5.0	3.0	2.2	2.1	2.6	3.7	5.4	7.5	9.1	5.7

2.3. Soil Evaluation

2.3.1. Geological Mapping

Based on the 1:50,000 Armadale environmental geology map, the shallow subsurface soil conditions beneath the site are mapped as comprising laterite-massive, and vuggy to cemented pisolites to 4 m thick, with associated loose, sandy pisolite gravel.

2.3.2. Geotechnical Report

A geotechnical field investigation as carried out in August 2016 by Local Geotechnics with the results stated in report LG6592016SC_Rev0 dated 14 August 2016 which forms Appendix C of this document. A summary of the report is presented below.

Six test pits were excavated to a maximum depth of 2.5 m below existing surface levels. See Figure 5 below for approximate test pit locations.



Figure 5 Test Pit Locations (2016)

The soil profile across all the test pits were similar and can be summarised as:

GRAVELLY SILTY SAND	fine to medium grained, low plasticity fines, black, moist, loose, fine to medium grained sand and fine to medium sized gravel with some grass rootlets and tree roots. This was observed from the surface to depths of 0.1 m and 0.5 m below existing surface level.
SANDY CLAYEY GRAVEL	fine to coarse sized, sub-rounded gravel up to 30 mm, brown to yellow, moist, stiff to very stiff, low to medium plasticity fines, fine to medium grained sand. This was observed underlying the gravelly silty sand to test termination depth of 2.5 m.

The upper gravelly silty sand layer is assumed to be as a result of initial earthmoving activities across the site during the original construction of the buildings.

Please see results of particle size distribution and Atterberg Limit testing carried out on the two identified soil types in Table 3 below.

Table 3 PSD and Atterberg Limits

Soil Type	Gravelly Silty Sand	Sandy Clayey Gravel
Particle Size Distribution (PSD)		
Gravel (%)	46	48
Sand (%)	53	37
Fines (%)	1	15
Atterberg Limit Tests (PI)		
Liquid Limit, LL (%)	20	32
Plastic Limit, PL (%)	18	22
Plasticity Index, PI (%)	2	10
Linear Shrinkage, LS (%)	1.0	5.0

For the purpose of the soil evaluation, the underlying layer of the sandy clayey gravel has been evaluated.

2.3.3. Groundwater

At the time of this writing report, published information regarding groundwater levels was available, however, based on our experience with the surrounding area, owing to the high surface level and shallow subsurface ground conditions, groundwater is not anticipated to be within at least 20 m of existing surface levels.

Groundwater was not encountered within any of the tests carried out during the geotechnical investigations between August 2016 and November 2018, to maximum test depths of 2.5 m below surface level.

It should be noted that geotechnical testing was carried out primarily between August and October ie during and after the wettest time of the year for the area. Perched groundwater levels, if any, would have been the highest at this time of the year, however, no perched groundwater was observed.

Based on published information, existing site surface levels, the results of the geotechnical field investigations, and experience in the area, groundwater is not anticipated to pose any risks to the proposed development nor the LAA.

In addition, soil salinity is also considered to be of no risk at this site.

2.3.4. Permeability of Soils

Local Geotechnics carried out additional permeability testing of the soils in September 2018. The results of the additional permeability testing are appended to Appendix D, however the results are summarised below.

It should be noted that the location of the nearest test pit to the proposed LAA is TP4. Further permeability and soil chemical testing were carried out within the vicinity of this test location, and within the proposed LAA boundary.

The additional permeability tests were carried at a depth of 0.75 m below existing surface level, in the Sandy Clayey Gravel soil strata identified in Section 2.3.2.

Results of the permeability testing indicate that hydraulic conductivity of the sandy clayey gravel soil strata K_{fs} varied between 3.8 m/day and 5.0 m/day.

Based on the results of the permeability testing, soil infiltration rates are adequate to support the proposed flat-bed leach drain system.

Approximate locations of additional permeability testing are shown in Figure 6 on the following page.

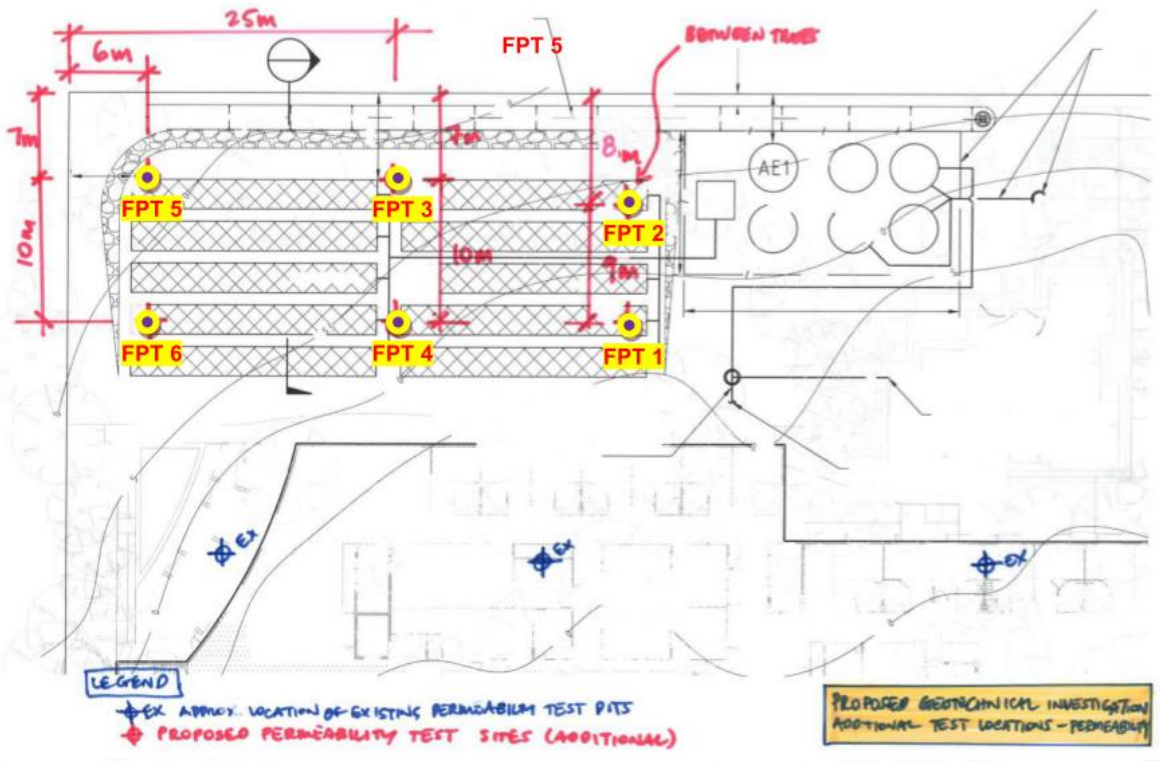


Figure 6 Permeability Test Locations

2.3.5. Soil Chemical Testing

Local Geotechnics carried out additional permeability testing of the soils in October 2018. The results of the additional chemical testing are appended to Appendix E, however the results are summarised below.

Soil samples for soil chemical testing were obtained at depths of between 0.6 m to 1.3 m below the existing surface level, within the sandy clayey gravel soil strata at the o locations shown in Figure 7 on the following page. The Chemical Testing Can be summarised in Table 4 below:

Table 4 Soil Chemical Testing Summary

Sample Location	Test Depth (m)	pH	Electrical Conductivity (mS/cm)	Cation Exchange Capacity ($cmol_c/kg$)	Phosphorus Retention Index (PRI)	Emerson Class
TH1	0.6-0.8	7.0	0.01	3	40.7	5
TH2	1.1-1.3	6.9	0.01	2	44.4	5

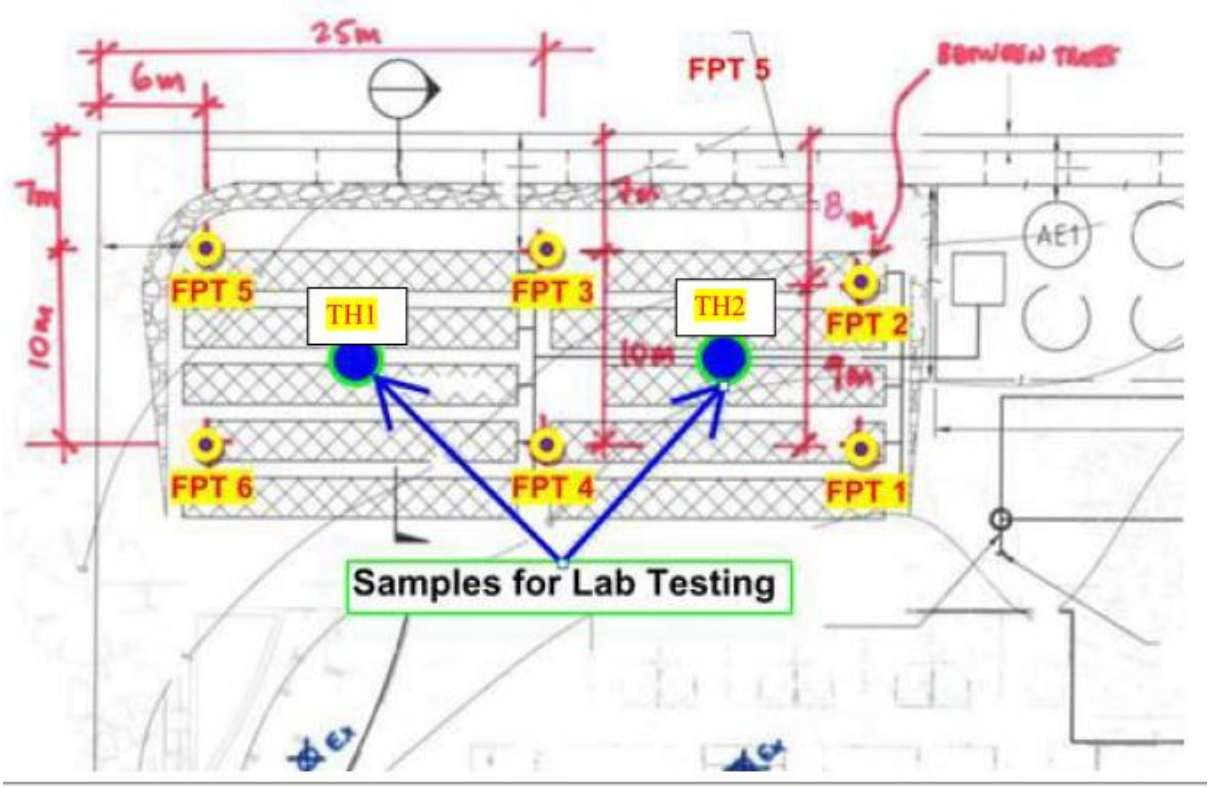


Figure 7 Soil Chemical Test Locations

2.3.6. Soil Category in Accordance with AS1547-2012

Taking in to account the particle size distribution analysis, the results of the field permeability testing, and the soil chemical analysis, Peritas considers that a **Soil Category 2: Sandy Loam** is applicable for the sandy clayey gravel material. Based on Table 5.2 of AS1547:2012, it is considered that a design loading rate **(DLR) of 50 mm/day** for secondary treated effluent is appropriate at this site.

2.4. Drainage and Site Gradient

Carmel Road and the existing crossovers to the site are graded such that no run-on, from Carmel Road, or the surrounding properties, is anticipated on the subject site.

The existing stormwater management plan comprises existing roof and road run-off directed to on site soakwells. No issues of localised flooding within the property boundary has been reported. A geotechnical report (explained in section 2.3.2) was carried out at the site in August 2016. Soil permeability rate testing was carried out at the site in August 2018 with tested soil permeability rates varying between 3.8 m/day and 5.0 m/day.

Based on the results of the permeability testing carried out as part of the geotechnical site investigations, it is considered that onsite disposal of stormwater and treated effluent through soakage is a suitable disposal strategy at this site.

It should be noted that no flooding or perched water has been observed at this site and therefore, is not considered a risk at this site.

The surface levels across the site fall from approximately RL 270.2 m AHD in the southern corner of the site to approximately RL 264.5 n AHD in the northern corner of the site. The site has an approximate gradient of 4% falling towards the north. However, the site gradient increases to approximately 5% towards the northern corner of the site. See Figure 8 below which indicates 0.5 m contours. The Feature Survey is attached as Appendix F of this report.

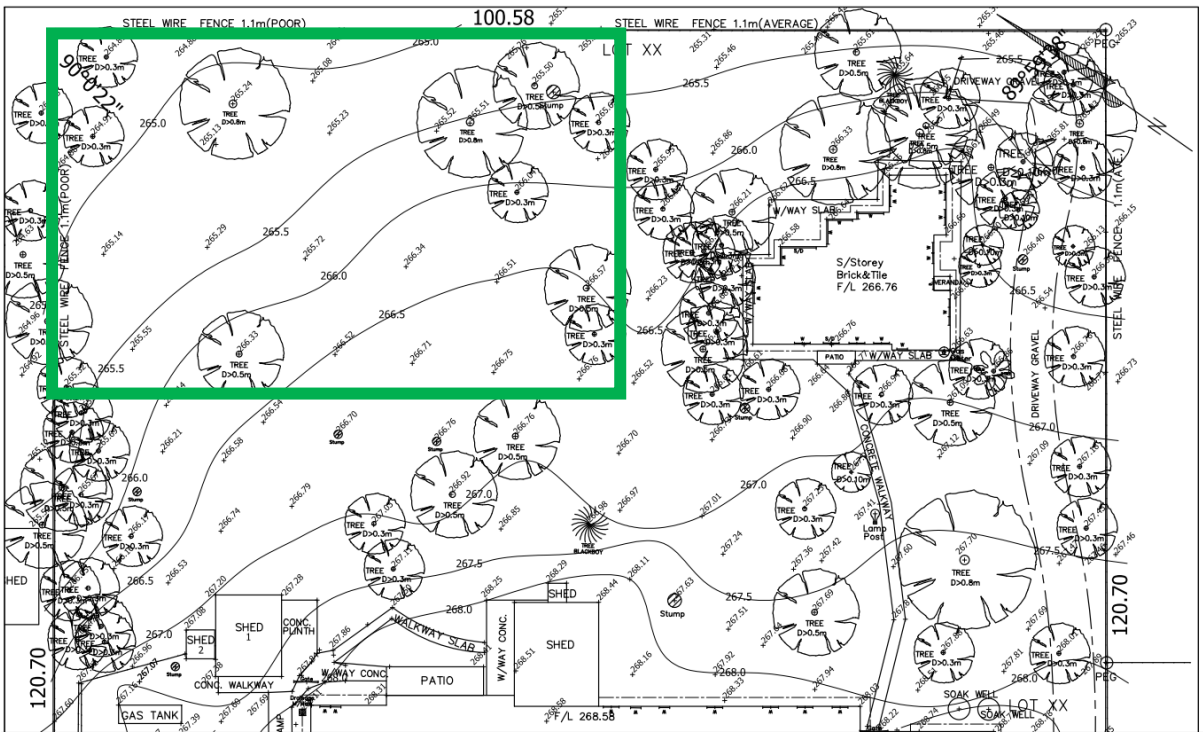


Figure 8 Site Survey Near Northern Corner

As can be seen from the above image, the location of the proposed LAA is in an area of approximately 5% gradient. To mitigate possible constraints associated with the site gradient in that location, it is proposed to fill the area with clean sand fill to form a level area for the LAA. See Figure 9 on the following page showing indicative sand filling.

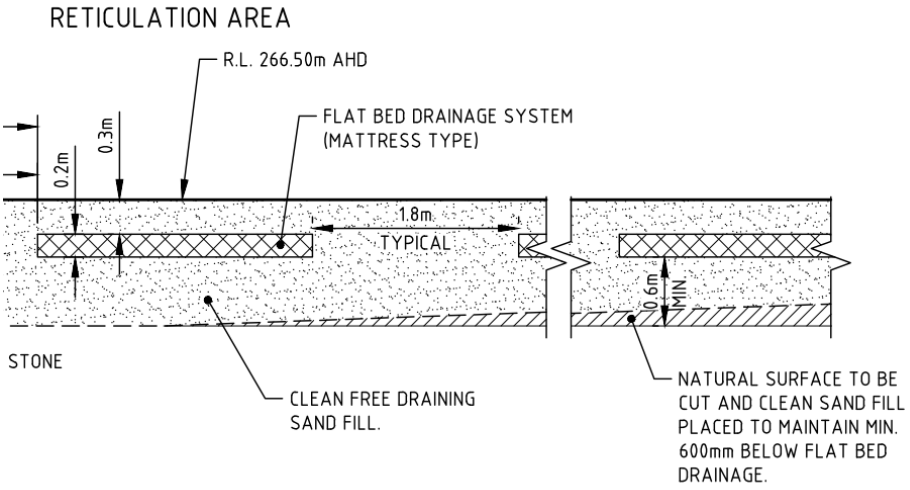


Figure 9 Sand Fill to Land Application Area

In addition, Peritas understands that some of the neighbouring property owners are concerned that the increased proposed development footprint will create increased stormwater run-off from the property. In order to mitigate this, Peritas proposes to install a cut off drain along the north eastern boundary of the site. This cut-off drain will be designed to catch excess stormwater run-off from the development. It is proposed that water contained within the proposed cut-off drain will be pumped to the City of Kalamunda stormwater drainage system.

2.5. **Erosion, Mass Movements and Landslips**

No evidence of erosion, mass movements or landslips has been observed at this site over the course of the site inspections carried out between August 2016 and November 2018. It is considered that erosion, mass movements and landslips are not a risk factor at this site.

2.6. **Vegetation**

Vegetation across the open areas of the site generally comprises short grasses with some medium to large sized trees located towards the north eastern half of the site.

2.7. **Rock Outcrops**

No evidence of rock outcropping was observed at this site.

2.8. **Buffer distances**

Peritas has been advised from the Government of Western Australia: Department of Health that the proposed flat-bed leach drain system will need to maintain a minimum of 1.8 m clearance between individual flat beds, and in between flat-beds and:

- property boundaries;

- drainage channels;
- building envelopes; and
- retaining walls.

2.9. Site Assessment Summary

Please see Table 5 below for a summary of the site assessment.

Table 5 Site Assessment

Feature	Description	Level of Constraint	Mitigation Measures
Buffer Distances	All relevant buffer distances in the Code are achievable from the proposed effluent management area.	Low	NN*
Climate	Average annual rainfall 765 mm (PERTH AIRPORT Station No. 009021), max. average 156 mm in July, min. average 11.1 mm in January. Average annual pan evaporation is 68.1 mm.	Low	NN
Drainage	No visible signs of surface dampness, spring activity or hydrophilic vegetation in the proposed effluent management area or surrounds.	Low	NN
Erosion & Landslip	No evidence of sheet or rill erosion; the erosion hazard is low. No evidence of landslip and landslip potential is low.	Low	NN
Exposure & Aspect	Vegetation generally comprises grasses and some small to medium sized trees and has moderate to low sun and wind exposure.	Low	NN
Flooding	The proposed effluent management area is located above the 1:100 year flood level (source National Map).	Low	NN

Feature	Description	Level of Constraint	Mitigation Measures
Groundwater	Groundwater was not encountered to 2.5 m depth within any of the test pits excavated as part of the Local Geotechnics geotechnical investigation. No known groundwater bores within 250 m of the proposed effluent management area.	Low	NN
Imported Fill	Imported fill material was not observed within the test pits excavated as part of the Local Geotechnics geotechnical investigation.	Nil	NN
Land Available for LAA**	Considering all the constraints and buffers, the site has required suitable land for land application of treated effluent. The preferred effluent management area is in the northern corner of the property.	Low	Ensure adequate set-backs during preliminary design.
Landform	The site grades at approximately 4%-5% from the south western site boundary towards the north east and north.	Medium	Locate LAA with towards the lower parts of the site, ie the northern corner of the site.
Rock Outcrops	No evidence of surface rocks or outcrops.	Nil	NN
Run-on & Runoff	Negligible stormwater run-on and minor run-off hazard. Public has expressed concern of run off from increased building footprint.	High	Install cut off drain at property boundary to minimise surface run off outside the propert boundary.
Slope	The proposed effluent management area is generally level with approximately 5% gradient to the north.	Medium	Nominate to fill the proposed LAA with clean sand to create a level

Feature	Description	Level of Constraint	Mitigation Measures
			pad for the flat-bed system.
Surface Waters	No surface water was observed within the vicinity of the proposed effluent disposal location.	Nil	NN
Vegetation	Vegetation generally comprises grasses and some small to medium sized trees.	Nil	NN

*NN: not needed

**LAA: Land Application Area

2.10. Soil Assessment Summary

See Table 6 below for the soil assessment summary.

Table 6 Soil Assessment Summary

Feature	Assessment	Level of Constraint	Mitigation Measures
Electrical Conductivity (mS/cm)	0.01	Low	NN
Emerson Aggregate Class	5	Low	NN
pH	6.9-7.0	Low	NN
PRI	40.7-44.4	Low	NN
Cation Exchange Capacity (cmolc/kg)	2 - 3	Low	NN

Rock Fragments	No coarse rock fragments throughout the profile to 2.5 m. Fine gravel encountered in both soil types <30mm.	Medium	Additional permeability testing carried out within soil layer to verify soil infiltration rates through gravelly materials.
Soil Depth	Subsoil >500 mm. Total soil depth greater than 2.5 m and no hardpans occur.	Low	NN
Soil Permeability & Design Loading Rates	Subsoil: gravels and sands (clayey) (Category 2): measured permeability 4.1 m/day K_{sat} (AS/NZS1547); 50mm/day DIR for leach drain system (AS/NZS1547).	Low	Design flat-bed system with DLR of 50mm/day.
Soil Texture & Structure	Subsoil (>500 mm): gravels and sands (clayey) (Category 2), in accordance with AS/NZS1547:2012.	Medium	Shallow subsurface irrigation in topsoil recommended
Water table **Depth**	Groundwater not encountered, pits terminated at 2.5 m.	Low	NN

3. Wastewater Management System

3.1. System Overview

The following sections provide an overview of a suitable onsite sewage system, with sizing and design considerations and justification for its selection. Detailed design for the system should be undertaken at the time of the building application and submitted to local government.

3.2. ATU System Design

Peritas has commissioned Allied Pumps to design and size the appropriate ATU for this development. A detailed system overview is provided in Allied Pumps Quote Ref: AR S47040D which is attached as Appendix G of this report. A brief summary of the ATU system details is provided in Table 7 below.

It should be noted that that the daily flow rate calculated in Section 1.4 resulted in a daily flow rate of 21,970 L/day. The ATU system was sized on an average daily flow rate of 22,950 L/day.

Table 7 ATU System Summary

System Design Basis	
Average Daily Flow Rate	22,950L/day
Peak Daily Flow Rate	32,000L/day
BOD5	300mg/L
TSS	300mg/L
TN	80mg/L
TP	15mg/L
pH	15mg/L
FOG	50mg/L max
Max feed Temperature	35 degrees C

Expected Effluent Quality	
Disposal	Disposal Low Risk
BOD5	20mg/L
TSS	30mg/L
NTU	N/A
pH	6.5 – 8.5
Chlorine	0.2 – 2.0ml
E/Coli	< 10 CFU / 100mL

3.3. **LAND APPLICATION SYSTEM**

A range of possible land application systems have been considered, including leach drains, flat-bed leach drains, absorption trenches, evapotranspiration/absorption (ETA) beds, subsurface irrigation and mounds. The preferred system is flatbed leach drain systems. Flat-bed leach drain systems are the preferred option in this case owing to:

- Approved by Government of Western Australia: Department of Health
- Complies with Australian Standard 1547:2012
- Reduced length disposal field
- High compressive strength
- Lightweight
- Low profile minimises excavation
- Minimise fill requirement
- Maximise infiltration area

DS Agencies Flat-bed leach drain is the nominated leach drain system for the proposed development. Product brochures, including Department of Health approval for these systems are attached as Appendix H.

3.4. **Sizing the Flat-Bed System**

To determine the necessary size of the required number of flat-beds, the procedure outlined in on the Department of Health website for Approved Leach Drains, the length of leach drains required can be calculated as:

Length Required = Hydraulic Loading (L/day) / DIR (mm/day) / IA (m^2/m)

Hydraulic Loading (Calculated in Section 1.4):	21,970 L/day
DIR (Calculated in Section 2.3.6):	50 mm/day
IA:	2.4 m^2/m
Length Required:	183.1m

This can be achieved by using 10 x 20 m lengths (total length = 200 m > 183.1 m) of DS Agencies Flatbed Leach Drains.

3.5. **Water Balance**

A Department of Health '*Water Balance'* spreadsheet was completed to verify the minimum land application area required. Based on information provided by the DoH, it is understood that that the *Water Balance* spreadsheet is a tool primarily used when sizing the LAA for irrigation systems, however, it was used in this case to confirm the minimum size of the LAA.

Taking in to account the size of the leach drains and meeting all DoH setback distances, the nominated LAA comprises an area of approximately:

Length	(3 x 1.8 m) + (2 x 20 m) 45.4 m
Width	(6 x 1.8 m) + (5 x 2.5 m) 23.3 m
Area	45.4 m x 23.3 m **1,058 m^2**

The climate information mentioned in Section 2.2 was entered in to the spreadsheet. Based on the local climate information, the minimum LAA required for 'zero storage' is **490 m^2**. It is noted that the proposed LAA is approximately double the area of the minimum LAA required from the *Water Balance* spreadsheet and is therefore considered suitable.

Please see Appendix I of this document which comprises the completed DoH *Water Balance* spreadsheet.

3.6. Siting and Configuration of the Flatbed System

3.6.1. Proposed Location

The preferred area is towards the northern boundary. Please see Peritas Drawing PC16117-CI-600-RevE attached as Appendix J of this document. The drawing shows the proposed location of the ATU system and the proposed location and orientation of the flatbed leach drains.

The drawing also indicates the existing and proposed surface level contours and a cross section of the flatbed system.

3.6.2. Buffer Distances

Required buffer distances have been previously mentioned in Section 2.8. As can be seen from drawing PC16117-CI-600-RevC (Appendix F), all buffer distances and set-backs can be achieved with the proposed flatbed system layout.

3.7. Installation of the Flatbed System

Installation of the flatbed system must be carried out by a suitably qualified, licensed plumber or drainer experienced with onsite sewage disposal systems.

3.8. Revegetation of the LAA

After installation of the flatbed system in accordance with manufacturer/supplier specifications, it is proposed to limit the revegetation of the of the LAA with turf grass. To prevent root intrusion in to the system, no other type of vegetation is proposed within the LAA.

The architectural landscape drawing is attached as Appendix A of this document.

3.9. Trafficability of the LAA

As stated in Clause 2.11 of Appendix H, the approval of the flatbed system is conditional that the LAA is not trafficable and must be located at least 1.2 m from an area that is subject to vehicular traffic. The proposed LAA meets this requirement.

Based on advice from DS Agencies, it is understood that the flatbed systems, when installed correctly, have a high compressive strength and can withstand regular loading of human foot traffic and driven lawn mowers. The developer will attempt to minimise human traffic over the proposed LAA, by the placement of adequate signage, advising that the area has underground flatbed system and to keep off the area, however, it is considered that light human traffic over the area will not be detrimental to the flatbed system.

The architectural landscape drawing is attached as Appendix A of this document.

4. Monitoring, Operation and Maintenance

Maintenance is to be carried out in accordance with the DOH Approval of the selected secondary treatment system and manufacturer's recommendations. The treatment system will only function adequately if appropriately and regularly maintained.

To ensure the treatment system and land application system functions adequately, the nursing home operator must:

- Have a suitably qualified maintenance service technician for the secondary treatment system at the frequency required by the manufacturer under the local governmet permit to use;
- Use household cleaning products that are suitable for the proposed ATU and flatbed system;
- Keep as much fat and oil out of the system as possible by implementing the use of grease traps as compatible with the proposed ATU and flatbed system;
- Minimise water usage (AAA rated fixtures and appliances are recommended);
- Regularly mow the lawn within the LAA and to maximise uptake of water and nutrients;
- Monitor and maintain the subsurface irrigation system following the manufacturer's recommendations, including flushing the lines;
- Regularly clean and replace all filters;
- Not erect any structures and paths over the LAA;
- Avoid vehicle and minimise human access to the LAA, to prevent compaction and damage; and
- Ensure that the LAA is kept level by filling any depressions with good quality topsoil (not clay).

5. Conclusion

As a result of our investigations we recommend that sustainable onsite sewage management systems can be installed to meet the needs of the proposed nursing home expansion at Lot 7 (24) Valencia Road in Carmel, WA.

The system should be installed as per the recommendations of this report.

6. References

Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulations 1974

Government of Western Australia (2018). Draft Government Sewerage Policy.

Standards Australia/Standards New Zealand (2012). AS/NZS 1547:2012 On-site domestic-wastewater management.

Appendix A Architectural Landscape Drawing

LOT 11

LOT 10

LOT 101

LOT 100

LOT 20

LOT 7

LOT 13

89° 59' 30"

120.70

GIVE WAY

FLOWERING PLANTS

FLOWERING/FOLIAGE PLANTS

Slope (262.1 to 263.5 m)

Proposed Battered Retaining Wall

STAFF CARPARK

AMBULANCE BAY

DELIVERY UNLOADING

EXISTING BUILDING

BIN STORE

PROPOSED CROSS OVER

PROPOSED CROSS OVER EXIT ONLY

LEACH DRAIN SYSTEM PLANT (FENCED - SEMISUBTERRANEAN)
(SUBJECT TO DETAILED ENGINEERING DESIGN AND DEPARTMENT OF HEALTH APPROVAL)

ATRIUM GARDEN

SHRUBS/BUSHES

GARDEN FEATURE

LEACH DRAINS WITH GARDEN OVER
(SUBJECT TO DETAILED ENGINEERING DESIGN AND DEPARTMENT OF HEALTH APPROVAL)

GRASSED AREA

REVEGETATED ROCK STABILISED EMBANKMENT

OUTDOOR PAVED AREA

CARPARK

Footpath
(Marked with contrasting pavement)

EXISTING CARPARK
(REFURBISHED)

GAS TANK

SCREENING TREES

FOLIAGE PLANTS

EXISTING TREES

90° 0' 22"

89° 59' 27"

100.58

100.69

VALENCIA ROAD

NOTES:

FOR EXTERIOR LIGHTING LAYOUT AND SCHEDULE REFER TO THE ELECTRICAL DRAWINGS FOR DETAILS.

PLANTING SCHEDULE

FOLIAGE PLANTS

AGAPANTHAS
BERGENIA
ROSEMARY
POA 'TUSSOCK GRASS'
HYDRANGEA
CANNA LILIES
PHORMIUM 'NEW ZEALAND FLAX'
PENNISETUM 'FOUNTAIN GRASS'

FLOWERING PLANTS

LAVENDAR
ACROLINUM 'EVERLASTING DAISY'
CALENDULA 'ENGLISH DAISY'
DIANTHUS 'FAIRY PINKS'
SNAP DRAGON ANTIRRHINUM
HELIANTHUS 'SUNFLOWER'
NASTURTIUM
RUDBECKIA 'MARMARLADE DAISY'
PHLOX DRUMMONDII DWARF 'NICOTIANA
PANDOREA JASMINOIDES
EUPHORIA 'JADE DRAGON'
VERONICA 'SPEEDWELL'

SMALL TREES

CORYMBIA FICIFOLIA
'DWARF CRIMSON'
EUCALYPTUS TORQUATA
CALLISTEMON PHOENICEUS
BANKSIA 'GIANT CANDLES'
DWARF CITRUS

SHRUBS/BUSHES

ASTROLOMA FOLIOSUM
AGENANTHUS SPECIES
CONOSTYLIS CANDICANS
ORTHOSANTHUS LAXUS
GREVILLEA 'SPIDER FLOWER'
PHILOTHECA 'WAXFLOWER'
CERATOPETALUM 'CHRISTMAS BUSH' HIBISCUS

GROUND COVER

HIBBERTIA SCANDENS
KENNEDIA COCCINEA
KENNEDIA PROSTRATA
LOBELIA ALATA
HARDENBERGIA COMPTONIANA
GREVILLEA POORINDA ROYAL MANTLE'
SCAEVOLA 'FAN FLOWER'
HARDENBERGIA VIOLACEA
BRACHYSCOME 'SWAN RIVER DAISY'
KENEDIA PROSTRATA

SCREENING TREES

AGONIS FLEXUOSA
CAMELLIA JAPONICA
PITTOSPORUM TENUIFOLIUM 'SILVER SHEEN
ABELIA X GRANDIFLORA

PREPARED FOR:

VALENCIA NURSING CARE

BURSWOOD CARE

ROSHANA GROUP OF COMPANIES

	REV	COMMENTS	CHECKED
12/11/18	G	ISSUED FOR REVIEW	CF
08/10/18	F	ISSUED FOR S.A.T. SUBMISSION & REVIEW	CF
28/09/18	E	REVISED AS PER MEDIATION COMMENTS	CF
03/09/18	D	ISSUED FOR THE PURPOSE OF MEDIATION	CF
30/08/18	C	REVISED TO TO COMPLY WITH SETBACK REQUIREMENTS	CF
	H	ISSUED FOR REVIEW	CF

DRAWN: P. Kreyen

CHECKED: C. Fernando

DATE: 27/11/18

FERHAN DESIGN

A: Unit 3/220 Star Street, Wehlopood WA 6106
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DO NOT SCALE FROM DRAWINGS. VERIFY ALL DIMENSIONS ON SITE BEFORE COMMENCING WORK
ALL FERHAN DRAWINGS ARE TO BE READ IN CONJUNCTION WITH CONSULTANTS DRAWINGS

PROJECT STATUS: FOR REVIEW

LOCAL COUNCIL: City of Kalamunda

PROJECT ADDRESS: VALENCIA AGED CARE
(Lot 7) 24 Valencia Road, Carmel, WA 6076

JOB NUMBER: 0268-16

SCALE: 1:200 (A1)

DRAWING TITLE: PROPOSED LANDSCAPE PLAN

SHEET No: A01.005

REV: H

Appendix B Leach Drain Calculations

Project:	**Valencia Nursing Home**
Project No:	**PC16117**
Revision :	**B**
Revision Date :	**26/11/2018**
Description :	**Wastewater Calculation**

Wastewater Volume Calculation - Septic Tank and On-site Disposal

Assumptions

Geotechnical information

	Soil Type		
Soil Description	Soil Category 2 SANDY CLAYEY GRAVEL		
Actual DLR (mm/day)	3,100		
Assumed DLR (mm/day)	50		Table L1 of AS 1547

Anticipated population

Residents	120		
Staff	55		
Visitors	12		

Nursing Home - Occupants

Total number of people per chalet	120		
Wastewater per person	150	L/p/d	As specified by DoH
Total volume of wastewater	18000	L	

Nursing Home - Staff / Visitors

Total number of people	67		
Staff	55		
Visitor	12		
Wastewater per staff	70	L/p/d	As specified by DoH
Wastewater per visitor	10	L/p/d	As specified by DoH
Volume of wastewater	3970	L	

Residence

Septic Tank (Combine population)

Volume of wastewater (Residents)	18000	L	Regulation 1974
Volume of wastewater (Staff and Visitors)	3970	L	
Minimum volume generated	21970	L/d	
Proposed septic tank	N/A		

Flat Bed Calculation (Combined Population)

Maximum Design loading rate allowable	50	mm/d	Table L1 of AS 1547 for trenches and beds	
Area per metre length of flat bed	2.4	m^2/m	(Flat bed drainage system)	
Volume per metre length of flat bed	0.12	m^3/m		
Total length of leach drain required	183	m	Therefore @ 20m lengths	9.15

Appendix C Geotechnical Report (August 2016)

Report on
Geotechnical Site Classification
24 Valencia Road Carmel WA

Project: LG6892016SC_Rev0 14 August 2016

Client: **Burswood Care Pty Ltd**

PO Box 5050, Canning Vale South WA 6155
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www.localgeotechnics.com.au

14 August 2016

To
Burswood Care Pty Ltd
43 Old Perth Road, Bassendean WA 6054

Attention: Mr. Dinu Ekanayake

Dear Dinu,

RE: Geotechnical Site Classification for 24 Valencia Road Carmel WA

This letter presents our report on a geotechnical site classification carried out at the above site. If you have any questions related to the report or we can be of further assistance, please do not hesitate to contact local geotechnics or the undersigned.

For and on behalf of Local Geotechnics.



Dr. Harun Meer
Ph.D.(Geotech), M. Eng. (Geotech), B. Eng. (Civil), MIE Aust
Director
Local Geotechnics

Distribution:	Original held by	Local Geotechnics
	1 Copy	Local Geotechnics Library
	1 Electronic Copy	Burswood Care Pty Ltd

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Appendix B: Test Pit Logs & DCP Test Certificates
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EXECUTIVE SUMMARY

This is a geotechnical site classification report for 24 Valencia Road Carmel WA (the project). The project was commissioned by Mr. Dinu Ekanayake on behalf of Burswood Care Pty Ltd (the client).

The proposed construction at the site will be single storey nursing home.

Objectives of the investigation are to obtain information on the subsurface conditions so as to classify the site in accordance with the definitions provided in Australian Standard AS2870 – 2011.

Field works were conducted on 2 August 2016. The investigation work consists of field observation, taking of photographs, sub-surface probing, soil profile logging, soil sampling, conducting of Dynamic Cone Penetrometer (DCP) testing alongside of the test pits and lab testing.

The weather condition was fine and sunny during field works. This report has to read or implement in full. No partial implementation of this report is allowed.

Findings are presented in the following sections:
DCP test revealed that soil is in very loose to dense and firm to hard condition. Based on the DCP results, we recommend that the foundation material is not capable of sustaining an allowable bearing pressure of 100 kPa in its current condition.

Site Classification
Provided earthworks are completed as per the recommendation of in Section 7, based on the site soil profile, laboratory test results and surrounding condition, the site can be classified as ***"CLASS S"*** in accordance with the definitions provided in Australian Standard AS2870 -2011. The characteristics surface movement ***Ys*** is considered to be 0 mm< Ys ≤ 20 mm.

Stormwater Drainage
Onsite disposal of stormwater via soakwell is not appropriate for this site. We recommend to discharge the stormwater or roof runoff offsite of the property or to the council drainage system by a site specific drainage system. The drainage system has to fulfil the requirements of the Shire of Kalamunda.

It is highly recommended that a competent geotechnical engineer should supervise earthworks and construction to ensure that all organic, roots, demolition debris, very soft to soft clayey material have been adequately removed from the area and that the fill material is adequately compacted.

1.0 INTRODUCTION

This is a geotechnical site classification report for 24 Valencia Road Carmel WA (the project). The project was commissioned by Mr. Dinu Ekanayake on behalf of Burswood Care Pty Ltd (the client). Aerial view of the site location is shown in Figure 1.

The proposed built area is back of the existing nursing home and the area is approximately 3,680 m_2.



Figure 1. Aerial view of the site location (Source: Google map)

Objectives of the investigation are to obtain information on the sub-surface conditions so as to classify the site in accordance with the definitions provided in Australian Standard AS2870 – 2011 and to provide recommendation on stormwater drainage. Compaction control, bearing capacity, wind force calculations or classifications, slope stability checking and settlement calculation were not in the scope of this investigation. Environmental issues were not considered in this report.

Field works were conducted on 2 August July 2016. The weather condition was fine and sunny during field works. This report has to read or implement in full. No partial implementation of this report is allowed.

2.0 PROPOSED DEVELOPMENT

The proposed construction at the site will be single storey nursing home.

3.0 SCOPE AND OBJECTIVES

The scope and objectives of the investigation are as follows:

- Conducting of up to 6 Test Pits by using a backhoe up to 2.5 m or refusal.
- Logging of site soil profile and groundwater recording as per test pits observation.
- Soil sampling as deemed necessary for laboratory tests, which includes:
    - Particle Size Distribution (PSD)
    - Plasticity Index (PI) test
- Conducting of DCP tests to a depth of 1.0 m or refusal alongside of test pits.

- Submit a factual report on findings so as to classify the site in accordance with the Australian Standard AS2870 - 2011.
- Provide recommendation on earthworks.
- Provide recommendation on stormwater drainage.

4.0 SITE CONDITIONS

4.1 Surface condition

The site is located at 24 Valencia Road, Carmel WA. There is an existing nursing home at the site which will remain. There is a house near to the south-east corner of the site. There are few small to large size trees at the site and the site is covered with grasses. There are few leach drains were found at site. The topography of the area is hilly and the site level is found with slope from western towards eastern side. No water ponding was observed at the time of investigation. The site photos taken during the field investigation are shown in Appendix D.

4.2 Subsurface condition

Desktop study was conducted in office about the site condition before going for field investigation to have a better idea about the site geology as well as to implement the proper investigation technique.

A review of Environmental Geological Western Australia survey Map of Armadale 1:50,000 revealed that the site is consisted of Laterite-massive and vuggy to cemented pisolites to 4 m thick, associated loose, sandy pisolite gravel (G2), of residual origin.

Environmental Geological map of Armadale also revealed that the site soil has variable permeability, Low corrosion potential, medium to high slope stability, high bearing capacity.

Competent, requires to excavate, strong foundations but poorly drained, may be ferruginuous or bauxitic, overlies pallid saprolite.

5.0 FIELD INVESTIGATION

The field investigation consists of sub-surface probing by using a backhoe at six locations up to a depth of 2.5 m or refusal, soil profile logging, soil sampling, conducting of Dynamic Cone Penetrometer (DCP) testing alongside of the test pits, laboratory test and taking photographs.

5.1 Test Pit Logs

Six Test Pits (TP1 to TP6) were conducted at the site by using a backhoe. Test pit locations are shown in the site sketch in Appendix A.

Test pits (TP1 to TP6) revealed similar soil profile and consists of fine to medium grained, fines of low plasticity silty SAND, black, moist, loose to medium dense, followed by sandy clayey GRAVEL, fine to coarse grained, sub rounded gravel up to 30 mm, brown to yellow, yellow to orange mottled red, moist, firm to hard, low to medium plasticity, fine to medium grained sand to a depth of 2.5 m.

The depth of silty sand varies from 0.1 m to 0.5 m followed by sandy clayey Gravel. The depth of topsoil for this site can be considered up to 0.1 m. However, it can vary over the site.

Ground water table was not observed at any of the test pits.

Test Pits (TP1 to TP6) were terminated at the target depth of 2.5 m. Test pit logs are attached in Appendix B.

5.2 Dynamic Cone Penetrometer (DCP) Tests

Dynamic Cone Penetrometer (DCP1-6) tests were conducted alongside of the test pits. DCP test indicates that the soil density of the site as per Standard Australia HB 160-2006, Table 6.4.6.1 (A) & (B). DCP data are presented in Table 1 and DCP test certificates are attached in Appendix B. It is observed from the DCP test that soil is in very loose to dense and firm to hard condition.

Table 1. Summary of DCP test data Ref. Table 6.4.6.1 (A) & (B) HB 160-2006

DCP Location	DCP1	DCP2	DCP3	DCP4	DCP5	DCP6
Depth (mm)	**No. of Blows/100mm (Density Classification)**					
0-100	6 (D)	3 (MD)	1 (L)	1 (L)	<1 (VL)	2 (L)
100 - 200	7 (VSt)	4 (St)	2 (F)	1 (L)	<1 (VL)	2 (L)
200 - 300	6 (VSt)	4 (St)	2 (F)	1 (L)	<1 (VL)	3 (MD)
300 - 400	4 (St)	4 (St)	2 (F)	1 (L)	<1 (VL)	2 (L)
400 - 500	3 (St)	3 (St)	2 (F)	2 (L)	1 (L)	3 (MD)
500 - 600	3 (St)	9 (St)	3 (St)	5 (VSt)	1 (F)	2 (F)
600 - 700	4 (St)	20 (H)	2 (F)	7 (VSt)	1 (F)	3 (St)
700 - 800	5 (VSt)	>25-R (H)	5 (VSt)	8 (VSt)	1 (F)	5 (VSt)
800 - 900	7 (VSt)	-	8 (VSt)	2 (F)	4 (St)	3 (St)
900 - 1000	8 (VSt)	-	9 (VSt)	2 (F)	6 (VSt)	5 (VSt)

Note: Density Classification is obtained based on Number of blows required for 100 mm penetration of DCP
(Table A) Very Soft (VS) < 1; Firm (F) 1 – 2; Stiff (St) 3 – 4; Very Stiff (VSt) 5 – 10; Hard (H) > 10; R= Refusal
(Table B) Very Loose (VL) < 1; Loose (L) 1 – 2; Medium Dense (MD) 2 – 3; Dense (D) 4 – 8; Very Dense (VD) > 8;

6.0 LABORATORY TEST

6.1 General

Laboratory tests were conducted at Kanga & Associates, Naval Base WA, a NATA accredited laboratory. The following laboratory tests were scheduled and undertaken:

- Atterberg Limit Test, AS 1289 2.1.1
- Particle Size Distribution Test, AS 1289 3.6.3, 3.5.1

6.2 Laboratory Test Data

The laboratory test results are summarised in Table 2. Laboratory test data show that the site soil is slightly to moderately reactive. Laboratory test certificates are included in Appendix C.

Table 2. Summary of Laboratory Test Data

Sample Location	TP1 0.1 to 0.5 m	TP1 1.2 to 1.8 m
Particle Size Distribution (PSD)		
Gravel (%)	46	48
Sand (%)	53	37
Fines < 75µm (%)	1	15
Atterberg Limit Tests (PI)		
Liquid Limit, LL (%)	20	32
Plastic Limit, PL (%)	18	22
Plasticity Index, PI (%)	2	10
Linear Shrinkage, LS (%)	1.0	5.0

7.0 EARTHWORKS RECOMMENDATION

Any earthworks at the site should be carried out in general accordance with the Australian Standard AS 3798-2007 "Guidelines on Earthworks for Commercial and Residential Developments". Asbestos and septic tank investigation was not in the scope of this investigation. Client has to confirm that the site is free from asbestos and there is no septic tank at the site.

The following are general guidelines to be followed during preparation of the site:

- Remove all the trees including tree roots from the site.
- Clear the unsuitable material from site. Unsuitable materials includes: organics, grass roots, uncontrolled fill of building rubbles, bricks, concrete, wood, different types of waste etc. Site soil can be used after screening from unsuitable materials.
- Cut and level the site foundation area as required. Remove the spoil if encountered pockets of very soft to soft clay/silty soils during excavation, if any. Remove to spoil all unsuitable materials exposed by proof rolling and replace with structural fill.
- If imported fill is required due to pockets of very soft to soft clay/silty soils during excavation under the base of the footing, the thickness of each fill material must not be exceeded 300 mm in loose condition. All fill materials layer has to be compacted to dense condition.
- Compact the existing material over excavated area at least to dense condition.
- Prepare a sand pad of 500 mm over the built area and compact to dense condition.
- All backfilling layer or sand pad must be compacted to dense condition, at least 8 Perth Sand Penetrometer (PSP) blows per 300 mm of penetration.
- Site should be prepared in a way so that surrounding stormwater does not pass through the building envelop.
- Care will need to be taken when compacting in the vicinity of existing structures to avoid damage from excessive vibrations.
- Retaining wall is required if there is an elevation difference of 0.5 m.
- *It is highly recommended that a competent geotechnical engineer should supervise earthworks and construction.*
- *For site maintenance it is recommended to follow the CSIRO publication "Guide to Home Owners on Foundation Maintenance and Footing Performance" in Building Technology File Number 18. This document provides important information on the implications of plumbing, property maintenance, site classification on foundation design, drainage and performance expectations.*

8.0 ENGINEERING CONSIDERATIONS AND RECOMMENDATIONS

8.1 Site Classification

Provided earthworks are completed as per the recommendation of in Section 7, based on the site soil profile, laboratory test results and surrounding condition, the site can be classified as ***"CLASS S"*** in accordance with the definitions provided in Australian Standard AS2870 -2011.

The characteristics surface movement ***Ys*** is considered to be 0 mm< Ys ≤ 20 mm. An assumption of soil suction change of 2.5 m is made in this case.

Any earthwork or modification made in the soil profile could change the site classification. General definition of 'Site Class' is shown in Table 3 (Source: AS 2870-2011).

Table 3. General Definition of Site Class (Source: AS 2870-2011)

Site Class	Soil Description	Characteristic Surface Movement (mm)
A	Most SAND and ROCK sites with little or no ground movement due to moisture content variation	little or no ground movement
S	Slightly reactive clayey or silty SAND, which will cause slight ground movement due to moisture content variation	0< Ys ≤ 20
M	Moderately reactive clayey or silty soil which will cause moderate ground movement due to moisture content variation	20< Ys ≤ 40
H1	Highly reactive clayey or silty soil which will cause high ground moved due to moisture content variation	40< Ys ≤ 60
H2	Highly reactive clayey or silty soil which will cause high ground moved due to moisture content variation	60< Ys ≤ 75
E	Extremely reactive clayey or silty soil which will cause extreme ground movement due to moisture content variation	Ys >75
P	Problematic sites, sites consisted of soft soils, soft clay or silt or loose sand; landfills, mine subsidence, collapsing soils, very reactive soils, subjected to erosion and sites which cannot be classified as A to E.	-

8.2 Earthquake Design Factor

Australian Standard AS1170.4-2007 Structural design actions Part 4 "Earthquake actions in Australia" is recommended for earthquake consideration. AS1170.4-2007 outlines the design criteria required for a structure in consideration of the risk of being subjected to earthquake loads. Earthquake design factors are summarized in Table 4.

Table 4. Earthquake Design Factors

Factor/Class	Value/Name	Ref. AS1170.4- 2007
Hazard Factor (z), Perth Zone	0.09 to 0.10	Section 3 Table 3.2
Site subsoil class	Class C_e – Shallow Soil	Section 4 Clause 4.1.1

8.3 Stormwater Drainage

Onsite disposal of stormwater via soakwell is not appropriate for this site. We recommend to discharge the stormwater or roof runoff to the council drainage system by a site specific drainage system. The drainage system has to fulfil the requirements of the Shire of Kalamunda.

9.0 LIMITATION OF USE

The ground is a product of continuing natural and man-made processes and therefore exhibits characteristics and properties which vary from place to place and can change with time. Geotechnical site investigation involves gathering and assimilating limited facts about these characteristics and properties in order to better understand or predict the behaviour of the ground at a particular site under certain conditions.

This site investigation has been carried out by inspection, using a limited amount of pit excavation, sampling, testing or other means of investigation. Achieving a full coverage of the site to ensure all variations is not practical and is seldom done due to cost constraints as well as the impracticality.

It should be noted that the subsurface conditions encountered by the limited number of pit excavation as part of this geotechnical site investigation represents the ground conditions at the locations where the samples were taken and where tests have been undertaken and as such are an extremely small proportion of the site to be developed. The facts reported in this document are directly relevant only to the ground at the place where, and time when, the investigation was carried out and are believed to be reported accurately.

Given the limited number of test pit and limited field and laboratory testing carried out with respect to the overall site area, variations between investigation locations is likely and ground conditions different to those presented in this report may be present within the subject site area. The risk associated with this variability and the impact it will have on the proposed development should be carefully considered.

The level of geotechnical investigation that has been completed to date is considered appropriate for the project objectives. If the above mentioned client, its subcontractors, agents or employees use this factual information for any other purpose for which it was not intended, then the client, its subcontractors, agents or employees does so at its own risk and Local Geotechnics will not and cannot accept liability in respect of the advice, whether under law of contract, tort or otherwise.

Any interpretation or recommendation given in this report is based on judgement and experience and not on greater knowledge of the facts reported. Local Geotechnics does not represent that the information or interpretation contained in this report addresses completely the existing features, subsurface conditions or ground behaviour at the subject site.

10.0 REFERENCES

- Geological Survey Map of Western Australia of *Armadale 1:50,000*
- Australian Standard AS1170.4-2007, *"Earthquake Actions in Australia"*.
- Australian Standard AS 1726-1993 *"Geotechnical Site Investigations".*
- Australian Standard AS 2870-2011, *"Residential Slabs and Footings".*
- Australian Standard AS 3798-2007, *"Guidelines on Earthworks for Commercial and Residential Developments".*
- Standards Australia, Hand Book HB 160-2006 *"Soil Testing".*
- CSIRO publication *"Guide to Home Owners on Foundation Maintenance and Footing Performance"* in Building Technology File Number 18.

APPENDIX A

SITE SKETCH



Site Sketch : Test Pit & DCP Test Locations

Reference	LG6892016SC
Client	Burswood Care Pty Ltd
Project	Geotechnical Site Classification Location: 24 Valencia Road Carmel WA

LOCAL GEOTECHNICS
PO Box 5050, Canning Vale South WA 6155
Phone: 0425 545 508(M), 08 9457 3517
E-mail: admin@localgeotechnics.com.au
Web: www.localgeotechnics.com.au

LOCAL
GEOTECHNICS

APPENDIX B

TEST PIT LOGS &
DCP TEST CERTIFICATES

REPORT OF TEST PIT

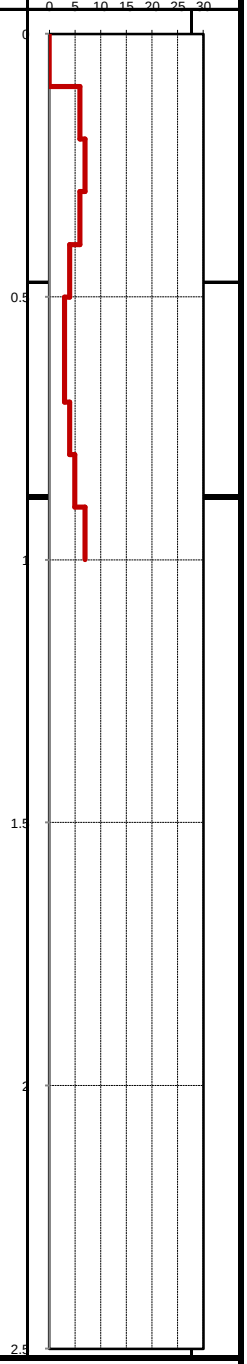
LOCAL GEOTECHNICS

ABN: 61 737 984 867
PO Box 5050
Canning Vale South WA 6155

Reference	LG6892016SC	Test Pit/BH No.	01
Client	Burswood Care Pty Ltd	Date Excavated	2-Aug-2016
Project	Geotechnical Site Classification	Date completed	2-Aug-2016
Location	24 Valencia Road Carmel WA	Equipment Type	Backhoe
Chainage	Northing: 6 456 790 / Easting: 50 414 893	Water Table	N/A

Depth (m)	RL (m)	Method	Penetration resistance	Sampling Type	Graphic Log	Classification Symbol	Description of Soil Strata	Additional observations
0.1						SM	**Gravelly Silty SAND**- fine to medium grained, fines of low plasticity, black, moist, loose, fine to medium grained gravel up to 15 mm with grass roots, tree roots and organics (TOPSOIL)	
0.5				B		GC	**Sandy Clayey GRAVEL**- fine to coarse grained, sub rounded gravel up to 30 mm, brown to yellow, moist, stiff to very stiff, low to medium plasticity, fine to medium grained sand, trace of cobble/boulder up to 100 mm	
0.9							changes colour to yellow-orange mottled red with quartz at a depth of 0.9 m	
1.0								
1.2								
1.5				B				
1.8								
2.0								
2.5							**Terminated at the target depth of 2.5 m**	

Dynamic Cone Penetrometer Test (Blows/100mm)



Notes:

Sampling Type:
B - Bulk/Disturbed Sample,
UD - Undisturbed Sample

Method:
HA - Hand Auger
E - Excavator
BH - Backhoe Bucket

Moisture:
D - Dry
M - Moist
W - Wet

Symbols:
W_L - Plastic Limit
W_P - Plastic Limit

Logged : MH
Checked: HM

REPORT OF TEST PIT

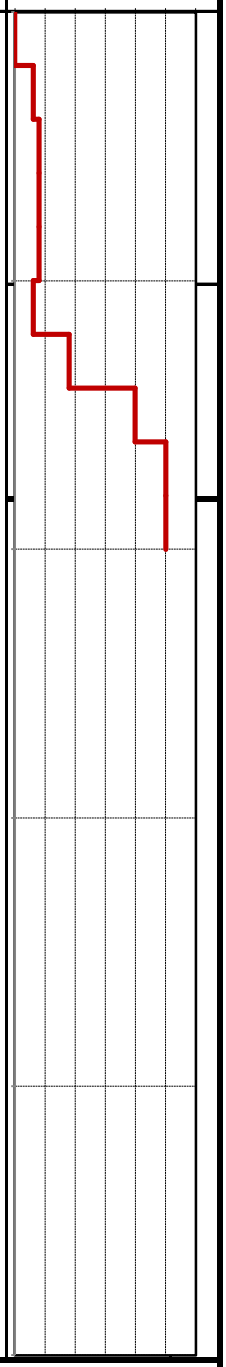
LOCAL GEOTECHNICS

ABN: 61 737 984 867
PO Box 5050
Canning Vale South WA 6155

Reference	LG6892016SC	Test Pit/BH No.	02
Client	Burswood Care Pty Ltd	Date Excavated	2-Aug-2016
Project	Geotechnical Site Classification	Date completed	2-Aug-2016
Location	24 Valencia Road Carmel WA	Equipment Type	Backhoe
Chainage	Northing: 6 456 796 / Easting: 50 414 869	Water Table	N/A

Depth (m)	RL (m)	Method	Penetration resistance	Sampling Type	Graphic Log	Classification Symbol	Description of Soil Strata	Additional observations
0.1						SM	**Gravelly Silty SAND**- fine to medium grained, fines of low plasticity, black, moist, loose, fine to medium grained gravel up to 15 mm with grass roots, tree roots and organics (TOPSOIL)	
						GC	**Sandy Clayey GRAVEL**- fine to coarse grained, sub rounded gravel up to 30 mm, brown to yellow, moist, stiff to hard, low to medium plasticity, fine to medium grained sand, trace of cobble/boulder up to 100 mm	
0.5								
0.6							it changes colour to yellow-orange mottled red with quartz at a depth of 0.6 m	
1.0								
1.5								
1.7							changes colour to yellow-grey mottled red at a depth of 1.7 m	
2.0								
2.5							**Terminated at the target depth of 2.5 m**	

Dynamic Cone Penetrometer Test (Blows/100mm)



Notes:

Sampling Type:
B - Bulk/Disturbed Sample,
UD - Undisturbed Sample

Method:
HA - Hand Auger
E - Excavator
BH - Backhoe Bucket

Moisture:
D - Dry
M - Moist
W - Wet

Symbols:
W_L - Plastic Limit
W_P - Plastic Limit

Logged : MH
Checked: HM

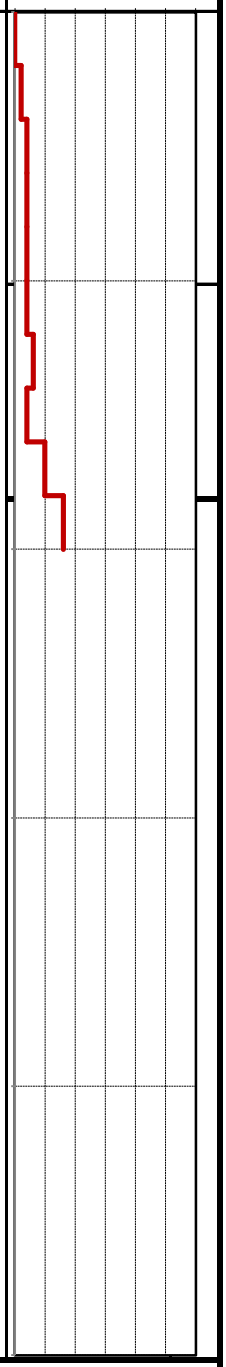
REPORT OF TEST PIT

LOCAL GEOTECHNICS
ABN: 61 737 984 867
PO Box 5050
Canning Vale South WA 6155

Reference	LG6892016SC	Test Pit/BH No.	03
Client	Burswood Care Pty Ltd	Date Excavated	2-Aug-2016
Project	Geotechnical Site Classification	Date completed	2-Aug-2016
Location	24 Valencia Road Carmel WA	Equipment Type	Backhoe
Chainage	Northing: 6 456 831 / Easting: 50 414 890	Water Table	N/A

Depth (m)	RL (m)	Method	Penetration resistance	Sampling Type	Graphic Log	Classification Symbol	Description of Soil Strata	Additional observations
0.1						SM	**Gravelly Silty SAND**- fine to medium grained, fines of low plasticity, black, moist, loose, fine to medium grained gravel up to 15 mm with grass roots, tree roots and organics (TOPSOIL)	
						GC	**Sandy Clayey GRAVEL**- fine to coarse grained, sub rounded gravel up to 30 mm, brown to yellow, moist, firm to very stiff, low to medium plasticity, fine to medium grained sand	
0.5								
0.6							changes colour to yellow-orange mottled red with quartz at a depth of 0.6 m	
1.0								
1.5								
2.0								
2.5							**Terminated at the target depth of 2.5 m**	

Dynamic Cone Penetrometer Test (Blows/100mm)



Notes:

Sampling Type:
B - Bulk/Disturbed Sample,
UD - Undisturbed Sample

Method:
HA - Hand Auger
E - Excavator
BH - Backhoe Bucket

Moisture:
D - Dry
M - Moist
W - Wet

Symbols:
W_L - Plastic Limit
W_P - Plastic Limit

Logged : MH
Checked: HM

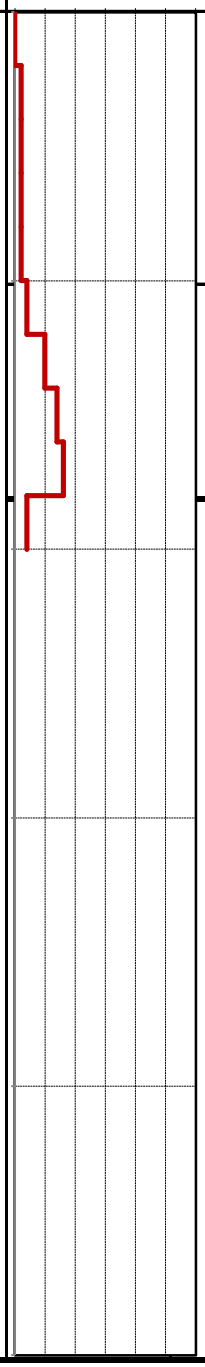
REPORT OF TEST PIT

ABN: 61 737 984 867
PO Box 5050
Canning Vale South WA 6155

Reference	LG6892016SC	Test Pit/BH No.	04
Client	Burswood Care Pty Ltd	Date Excavated	2-Aug-2016
Project	Geotechnical Site Classification	Date completed	2-Aug-2016
Location	24 Valencia Road Carmel WA	Equipment Type	Backhoe
Chainage	Northing: 6 456 857 / Easting: 50 414 875	Water Table	N/A

Depth (m)	RL (m)	Method	Penetration resistance	Sampling Type	Graphic Log	Classification Symbol	Description of Soil Strata	Additional observations
0.5						SM	**Gravelly Silty SAND**- fine to medium grained, fines of low plasticity, black, moist, loose, fine to medium grained gravel up to 15 mm with grass roots, tree roots and organics (TOPSOIL)	
0.9						GC	**Sandy Clayey GRAVEL**- fine to coarse grained, sub rounded gravel up to 30 mm, brown to yellow, moist, firm to very stiff, low to medium plasticity, fine to medium grained sand	
1.0							changes colour to yellow-orange mottled red with quartz at a depth of 0.9 m	
1.5								
2.0							changes colour to yellow-grey mottled red at a depth of 2.0 m	
2.5							**Terminated at the target depth of 2.5 m**	

Dynamic Cone Penetrometer Test (Blows/100mm)



Notes:

Sampling Type:
B - Bulk/Disturbed Sample,
UD - Undisturbed Sample

Method:
HA - Hand Auger
E - Excavator
BH - Backhoe Bucket

Moisture:
D - Dry
M - Moist
W - Wet

Symbols:
W_L - Plastic Limit
W_P - Plastic Limit

Logged : MH
Checked: HM

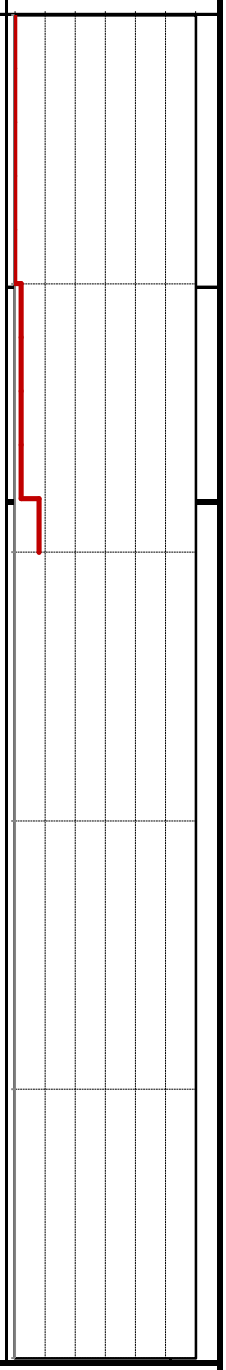
REPORT OF TEST PIT

ABN: 61 737 984 867
PO Box 5050
Canning Vale South WA 6155

Reference	LG6892016SC	Test Pit/BH No.	05
Client	Burswood Care Pty Ltd	Date Excavated	2-Aug-2016
Project	Geotechnical Site Classification	Date completed	2-Aug-2016
Location	24 Valencia Road Carmel WA	Equipment Type	Backhoe
Chainage	Northing: 6 456 849 / Easting: 50 414 848	Water Table	N/A

Depth (m)	RL (m)	Method	Penetration resistance	Sampling Type	Graphic Log	Classification Symbol	Description of Soil Strata	Additional observations
0.5						SM	**Gravelly Silty SAND**- fine to medium grained, fines of low plasticity, black, moist, very loose, fine to medium grained gravel up to 15 mm with grass roots, tree roots and organics (TOPSOIL)	
0.8						GC	**Sandy Clayey GRAVEL**- fine to coarse grained, sub rounded gravel up to 30 mm, brown to yellow, moist, firm to very stiff, low to medium plasticity, fine to medium grained sand	
1.0							changes colour to yellow-orange mottled red with quartz at a depth of 0.8 m	
1.5								
1.7							changes colour to yellow-grey mottled red at a depth of 1.7 m	
2.0								
2.5							**Terminated at the target depth of 2.5 m**	

Dynamic Cone Penetrometer Test (Blows/100mm)



Notes:

Sampling Type:
B - Bulk/Disturbed Sample,
UD - Undisturbed Sample

Method:
HA - Hand Auger
E - Excavator
BH - Backhoe Bucket

Moisture:
D - Dry
M - Moist
W - Wet

Symbols:
W_L - Plastic Limit
W_P - Plastic Limit

Logged : MH
Checked: HM

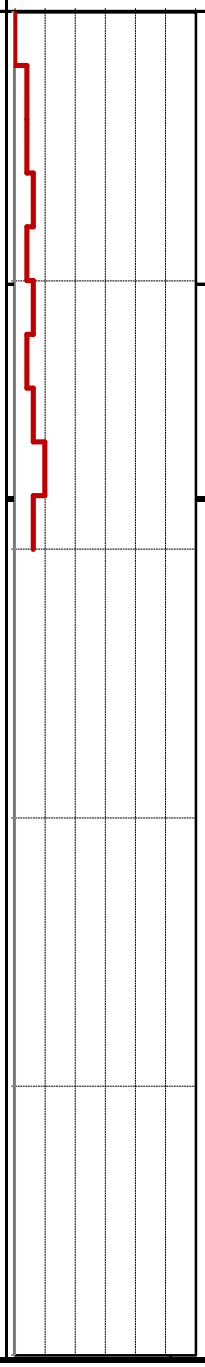
REPORT OF TEST PIT

ABN: 61 737 984 867
PO Box 5050
Canning Vale South WA 6155

Reference	LG6892016SC	Test Pit/BH No.	06
Client	Burswood Care Pty Ltd	Date Excavated	2-Aug-2016
Project	Geotechnical Site Classification	Date completed	2-Aug-2016
Location	24 Valencia Road Carmel WA	Equipment Type	Backhoe
Chainage	Northing: 6 456 830 / Easting: 50 414 858	Water Table	N/A

Depth (m)	RL (m)	Method	Penetration resistance	Sampling Type	Graphic Log	Classification Symbol	Description of Soil Strata	Additional observations
0.5						SM	**Gravelly Silty SAND**- fine to medium grained, fines of low plasticity, black, moist, loose, fine to medium grained gravel up to 15 mm with grass roots, tree roots and organics (TOPSOIL)	
0.9						GC	**Sandy Clayey GRAVEL**- fine to coarse grained, sub rounded gravel up to 30 mm, brown to yellow, moist, firm to very stiff, low to medium plasticity, fine to medium grained sand	
1.0							changes colour to yellow-orange mottled red with quartz at a depth of 0.9 m	
1.5								
2.0							changes colour to yellow-grey mottled red at a depth of 2.0 m	
2.5							**Terminated at the target depth of 2.5 m**	

Dynamic Cone Penetrometer Test (Blows/100mm)



Notes:

Sampling Type:
B - Bulk/Disturbed Sample,
UD - Undisturbed Sample

Method:
HA - Hand Auger
E - Excavator
BH - Backhoe Bucket

Moisture:
D - Dry
M - Moist
W - Wet

Symbols:
W_L - Plastic Limit
W_P - Plastic Limit

Logged : MH
Checked: HM

DYNAMIC CONE PENETROMETER (DCP) TEST CERTIFICATES

(AS 1289.6.3.2)

LOCAL GEOTECHNICS
ABN: 61 737 984 867
PO Box 5050
Canning Vale South
WA 6155

Density Correlation - Table 6.4.6.1 (A) & (B) HB 160-2006

Reference	LG6892016SC	Test ID	01 to 06
Client	Burswood Care Pty Ltd	Date Tested	02/08/2016
Project	Geotechnical Site Classification	Tested by	MH
Site	24 Valencia Road Carmel WA	Checked by	HM

DCP No.	DCP 1	DCP 2	DCP 3	DCP 4	DCP 5	DCP 6
Depth below ground level (mm)	**Penetration Resistance - Blows/100mm**					
0-100	6	3	1	1	<1	2
100 - 200	7	4	2	1	<1	2
200 - 300	6	4	2	1	<1	3
300 - 400	4	4	2	1	<1	2
400 - 500	3	3	2	2	1	3
500 - 600	3	9	3	5	1	2
600 - 700	4	20	2	7	1	3
700 - 800	5	>25- R	5	8	1	5
800 - 900	7	-	8	2	4	3
900-1000	8	-	9	2	6	5
Depth below ground level (mm)	**Density Classification**					
0-100	D	MD	L	L	VL	L
100 - 200	VSt	St	F	L	VL	L
200 - 300	VSt	St	F	L	VL	MD
300 - 400	St	St	F	L	VL	L
400 - 500	St	St	F	L	L	MD
500 - 600	St	VSt	St	VSt	F	F
600 - 700	St	H	F	VSt	F	St
700 - 800	VSt	H	VSt	VSt	F	VSt
800 - 900	VSt	-	VSt	F	St	St
900-1000	VSt	-	VSt	F	VSt	VSt

VS=Very **S**oft **to S**oft < 1	**F=F**irm 1 - 2	**St=St**iff 3 – 4	**VS$_t$=V**ery **S**tiff 5 - 10	**H=H**ard **> 10**

VL=Very **L**oose < 1	**L=L**oose 1 - 2	**MD=M**edium **D**ense 2 - 3	**D=D**ense 4 - 8	**VD=V**ery **D**ense > 8

LOCAL
GEOTECHNICS

APPENDIX C

LABORATORY TEST CERTIFICATES

TEST CERTIFICATE

CLIENT : **Local Geotechnics**

PROJECT : **No : 24 Valencia Road - Carmel**

LOCATION : **Carmel**

LG Ref : : **N/A**

SAMPLE ID : **T P : 1**

DEPTH(m) : **(0.1 - 0.5)**

K&A JOB NO : **05/185/16**

SAMPLE No : **NB37458**

TEST DATE : **04/08/16**

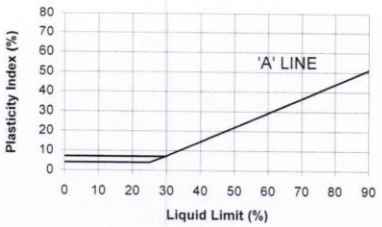
TEST DATA

ATTERBERG LIMITS		TEST METHODS
LIQUID LIMIT(%)	20	AS 1289 3.1.2
PLASTIC LIMIT(%)	18	AS 1289 3.2.1
PLASTICITY INDEX	2	AS 1289 3.3.1
LINEAR SHRINKAGE(%)	1.0	AS 1289 3.4.1

TESTING INFORMATION

ATTERBERG LIMITS:		
	SAMPLE HISTORY:	**Oven Dried**
	METHOD OF PREPARATION	**Dry Sieve**
LINEAR SHRINKAGE :		
	SIZE OF MOULD (mm)	**250**
	CRUMBLING OR CURLING	**Flat**

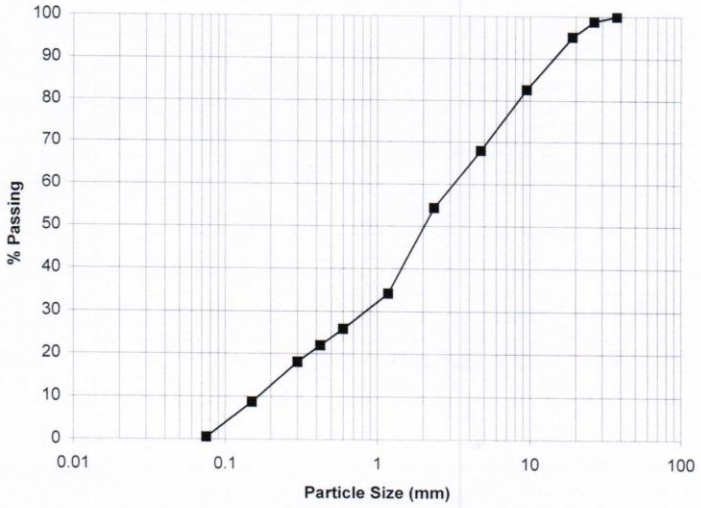
PLASTICITY CHART



AS 1289 3.6.1
PARTICLE SIZE DISTRIBN.

SIEVE SIZE	%PASSING
100.0mm	
75.0mm	
53.0mm	
37.5mm	*100*
26.5mm	*99*
19.0mm	*95*
9.50mm	*83*
4.75mm	*68*
2.36mm	*54*
1.18mm	*34*
0.600mm	*26*
0.425mm	*22*
0.300mm	*18*
0.150mm	*9*
0.075mm	*1*

AS 1289 3.6.1 - PARTICLE SIZE DISTRIBUTION



Note: Sample supplied by Client

DATE: 08/08/16

APPROVED SIGNATORY: M.Murugesan.

M.Murugesan

NATA ACCREDITED FOR TECHNICAL COMPETENCE

'Accredited for compliance with ISO/IEC 17025'

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PARTICLE SIZE DISTRIBUTION - TEST CERTIFICATE

CERTIFICATE No: N33188

Kanga & Associates

42Lionel Street, Naval Base 6165-WA

ACCREDITATION No. 2337

TEST CERTIFICATE

CLIENT : Local Geotechnics
PROJECT : No : 24 Valencia Road - Carmel
LOCATION : Carmel
LG Ref : : N/A
SAMPLE ID : T P : 1
DEPTH(m) : (1.2 - 1.8)

K&A JOB NO : 05/185/16
SAMPLE No : NB37459
TEST DATE : 04/08/16

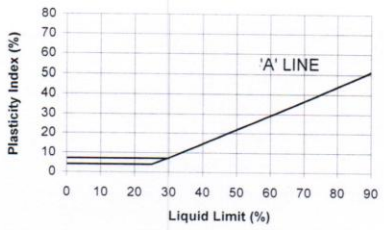
TEST DATA

ATTERBERG LIMITS		TEST METHODS
LIQUID LIMIT(%)	32	AS 1289 3.1.2
PLASTIC LIMIT(%)	22	AS 1289 3.2.1
PLASTICITY INDEX	10	AS 1289 3.3.1
LINEAR SHRINKAGE(%)	5.0	AS 1289 3.4.1

TESTING INFORMATION

ATTERBERG LIMITS:		
	SAMPLE HISTORY:	Oven Dried
	METHOD OF PREPARATION	Dry Sieve
LINEAR SHRINKAGE :		
	SIZE OF MOULD (mm)	250
	CRUMBLING OR CURLING	Flat

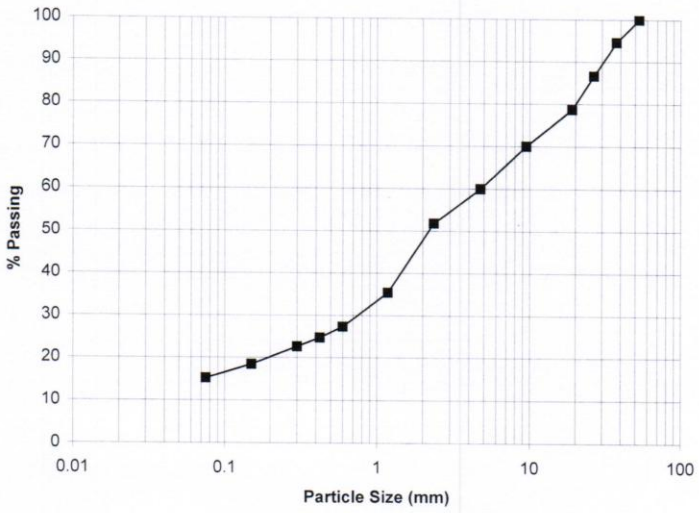
PLASTICITY CHART



AS 1289 3.6.1
PARTICLE SIZE DISTRIBN.

SIEVE SIZE	%PASSING
100.0mm	
75.0mm	
53.0mm	*100*
37.5mm	*95*
26.5mm	*87*
19.0mm	*79*
9.50mm	*70*
4.75mm	*60*
2.36mm	*52*
1.18mm	*35*
0.600mm	*27*
0.425mm	*25*
0.300mm	*23*
0.150mm	*18*
0.075mm	*15*

AS 1289 3.6.1 - PARTICLE SIZE DISTRIBUTION



Note: Sample supplied by Client

DATE: 08/08/16

APPROVED SIGNATORY: M.Murugesan

NATA ACCREDITED FOR TECHNICAL COMPETENCE

'Accredited for compliance with ISO/IEC 17025'

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PARTICLE SIZE DISTRIBUTION - TEST CERTIFICATE

CERTIFICATE No: N33189

Kanga & Associates
42Lionel Street, Naval Base 6165-WA
ACCREDITATION No. 2337

APPENDIX D

SITE PHOTOS



Photo 1. Site, view from the Access Road



Photo 2. Site, view from the rear boundary of the site



Photo 3. Site, view from north towards south, showing existing leach drains



Photo 4. Test Pit location 01 (TP1), sub-surface probing by using backhoe



Photo 5. Soil Profile of Test Pit location 01 (TP1)



Photo 6. Soil from Test Pit location 01 (TP1)



Photo 7. Test Pit location 03 (TP3), sub-surface probing by using backhoe



Photo 8. Test Pit location 06 (TP6), sub-surface probing by using backhoe



Photo 9. Test Location DCP2, Conducting Dynamic Cone Penetrometer Test



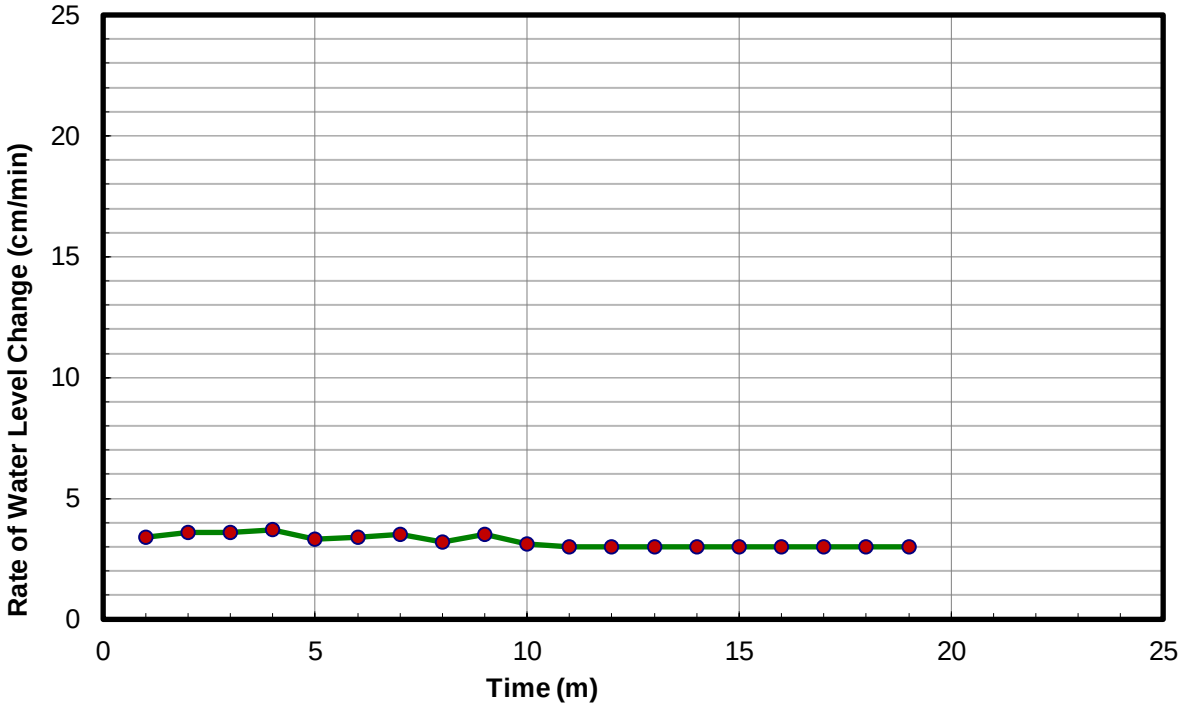
Photo 10. Test Location DCP4, Conducting Dynamic Cone Penetrometer Test

Appendix D Soil Permeability Test Results (September 2018)

ABN: 61 737 984 867
PO Box 5050 Canning Vale South
WA 6155
admin@localgeotechnics.com.au

PERMEABILITY TEST CERTIFICATES (AS 1547)

Reference	LGK5032018SC			Test ID	FPT01
Client	Burswood Care Pty Ltd			Date Tested	10-Sep-18
Project	Field Permeability Test			Date Completed	10-Sep-18
Location	24 Valencia Road, Carmel WA			Instrument Type	Guelph Permeameter
Position	Northing: 6 456 843	Easting:	50 414 886	Tested by	AB



Notes: Test was conducted at a depth of 0.75 m from the existing surface level

Water Hydraulic conductivity K_{fs}: **4.7E-03** **cm/sec**

4.1E+00 **m/day**

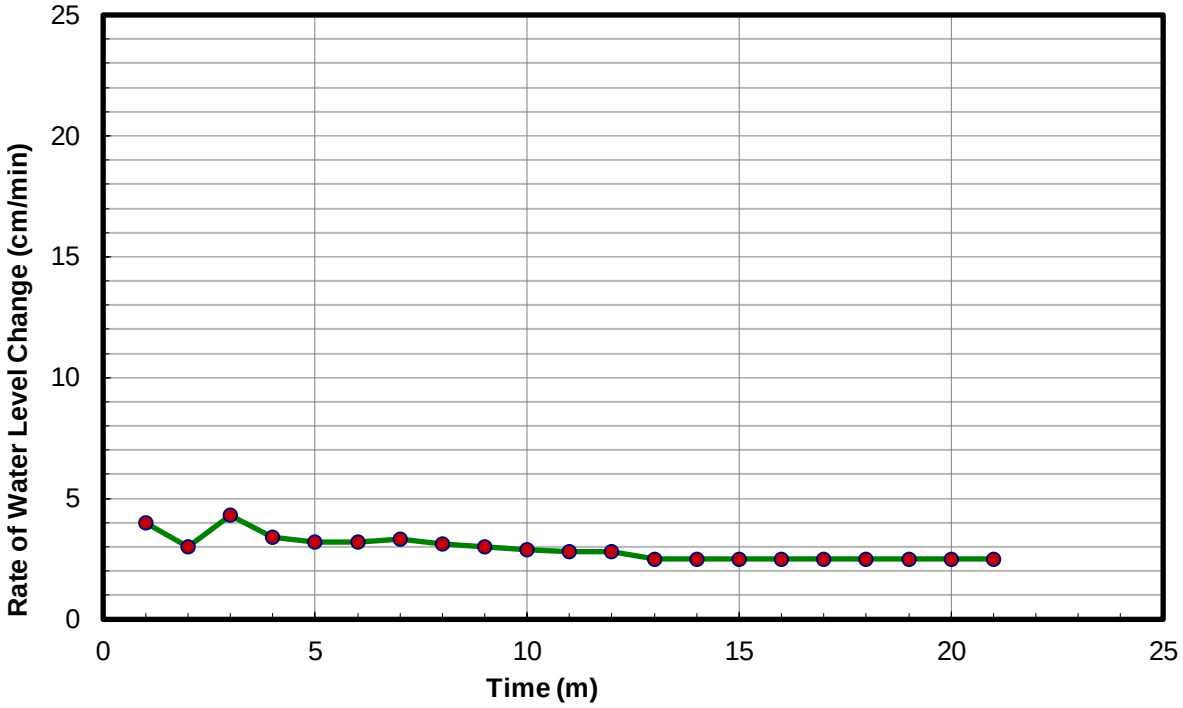
Signatory: *Dr. Harun Meer*

Date: 13/09/2018

PERMEABILITY TEST CERTIFICATES (AS 1547)

ABN: 61 737 984 867
PO Box 5050 Canning Vale South
WA 6155
admin@localgeotechnics.com.au

Reference	LGK5032018SC			Test ID	FPT02
Client	Burswood Care Pty Ltd			Date Tested	10-Sep-18
Project	Field Permeability Test			Date Completed	10-Sep-18
Location	24 Valencia Road, Carmel WA			Instrument Type	Guelph Permeameter
Position	Northing: 6 456 846	Easting:	50 414 895	Tested by	AB



Notes: Test was conducted at a depth of 0.75 m from the existing surface level

Water Hydraulic conductivity K_{fs}: **4.7E-03** **cm/sec**

4.1E+00 **m/day**

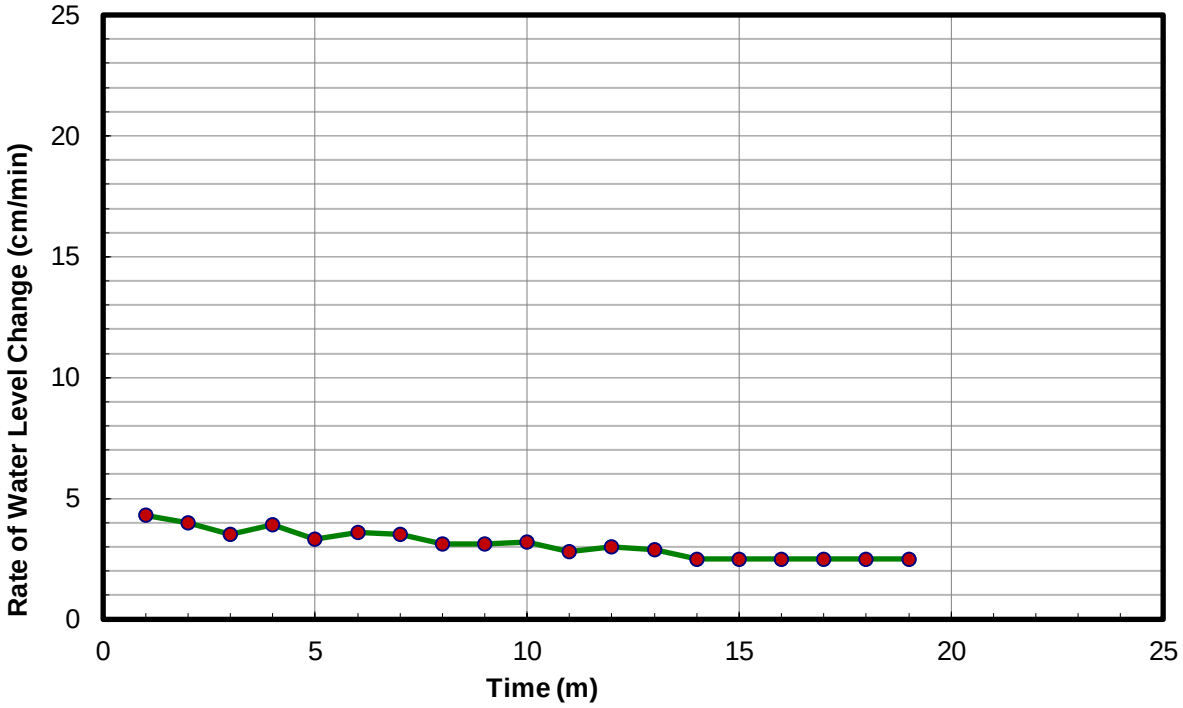
Signatory: *Dr. Harun Meer*

Date: 13/09/2018

ABN: 61 737 984 867
PO Box 5050 Canning Vale South
WA 6155
admin@localgeotechnics.com.au

PERMEABILITY TEST CERTIFICATES (AS 1547)

Reference	LGK5032018SC			Test ID	FPT03
Client	Burswood Care Pty Ltd			Date Tested	10-Sep-18
Project	Field Permeability Test			Date Completed	10-Sep-18
Location	24 Valencia Road, Carmel WA			Instrument Type	Guelph Permeameter
Position	Northing: 6 456 861	Easting:	50 414 886	Tested by	AB



Notes: Test was conducted at a depth of 0.75 m from the existing surface level

Water Hydraulic conductivity K_{fs}: **5.1E-03** **cm/sec**

4.4E+00 **m/day**

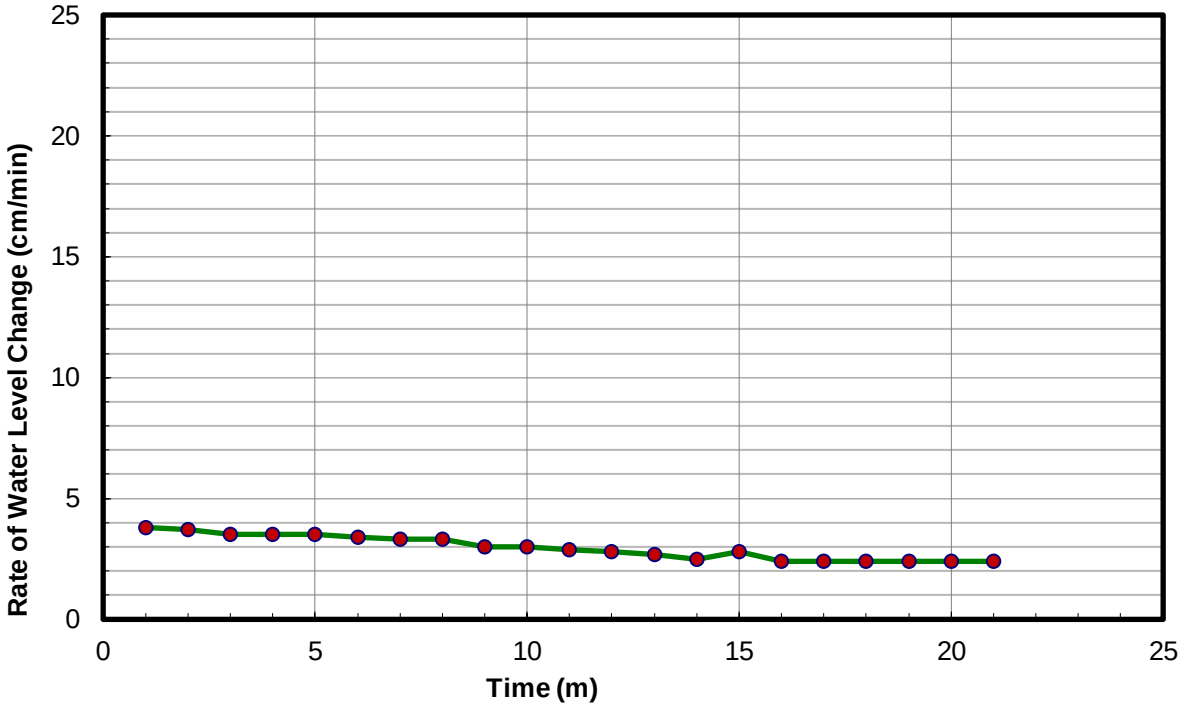
Signatory: _____ Date: 13/09/2018

Dr. Harun Meer

ABN: 61 737 984 867
PO Box 5050 Canning Vale South
WA 6155
admin@localgeotechnics.com.au

PERMEABILITY TEST CERTIFICATES (AS 1547)

Reference	LGK5032018SC			Test ID	FPT04
Client	Burswood Care Pty Ltd			Date Tested	10-Sep-18
Project	Field Permeability Test			Date Completed	10-Sep-18
Location	24 Valencia Road, Carmel WA			Instrument Type	Guelph Permeameter
Position	Northing: 6 456 853	Easting:	50 414 874	Tested by	AB



Notes: Test was conducted at a depth of 0.75 m from the existing surface level

Water Hydraulic conductivity K_{fs}: **5.8E-03** **cm/sec**

5.0E+00 **m/day**

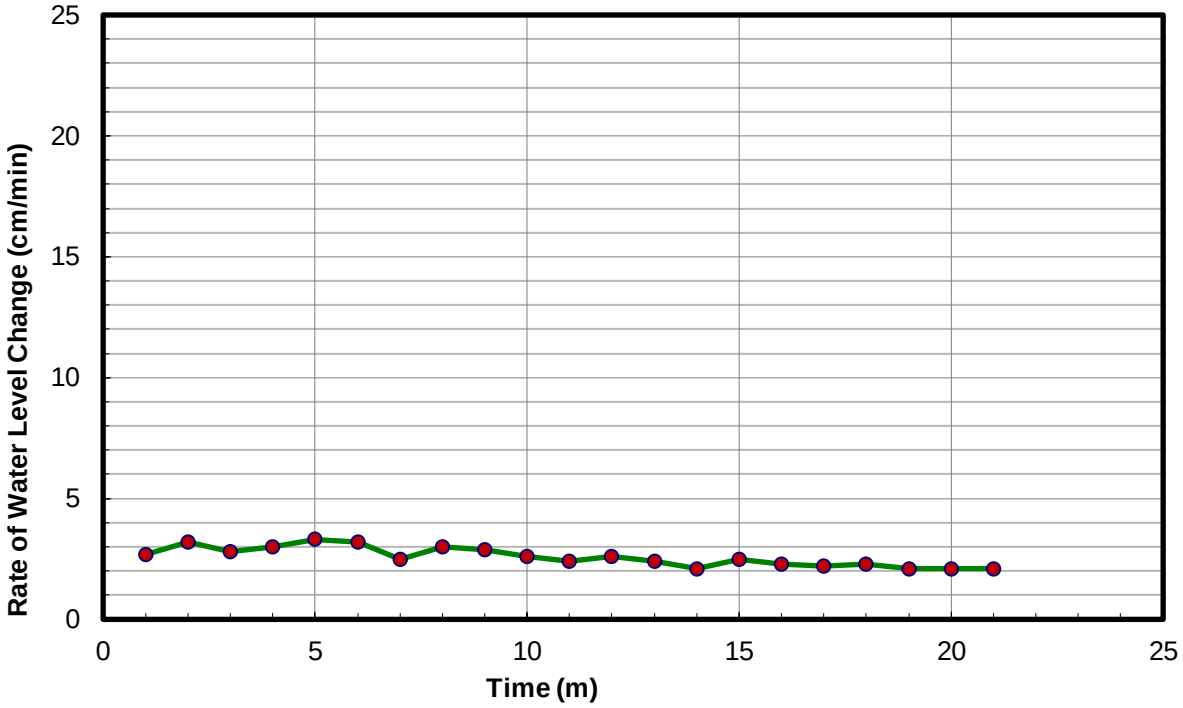
Signatory: _____ Date: 13/09/2018

Dr. Harun Meer

ABN: 61 737 984 867
PO Box 5050 Canning Vale South
WA 6155
admin@localgeotechnics.com.au

PERMEABILITY TEST CERTIFICATES (AS 1547)

Reference	LGK5032018SC			Test ID	FPT05
Client	Burswood Care Pty Ltd			Date Tested	10-Sep-18
Project	Field Permeability Test			Date Completed	10-Sep-18
Location	24 Valencia Road, Carmel WA			Instrument Type	Guelph Permeameter
Position	Northing: 6 456 871	Easting:	50 414 876	Tested by	AB



Notes: Test was conducted at a depth of 0.75 m from the existing surface level

Water Hydraulic conductivity K_{fs}: **5.1E-03** **cm/sec**

4.4E+00 **m/day**

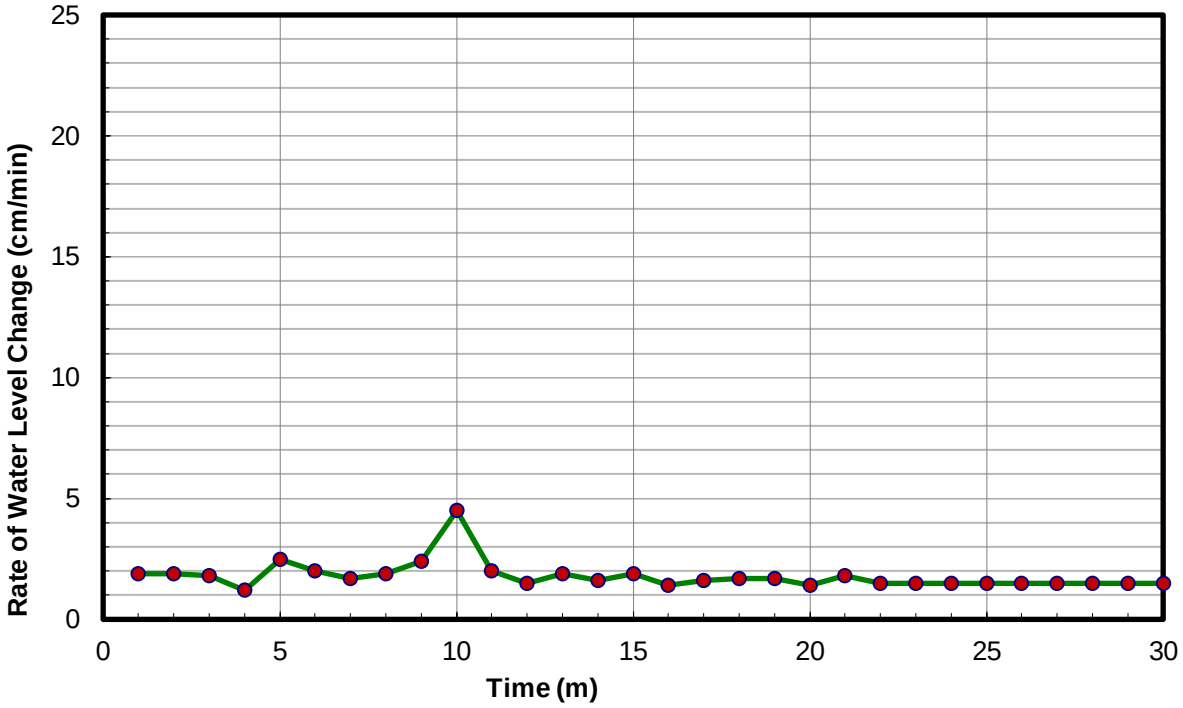
Signatory: _____ Date: 13/09/2018

Dr. Harun Meer

ABN: 61 737 984 867
PO Box 5050 Canning Vale South
WA 6155
admin@localgeotechnics.com.au

PERMEABILITY TEST CERTIFICATES (AS 1547)

Reference	LGK5032018SC			Test ID	FPT06
Client	Burswood Care Pty Ltd			Date Tested	10-Sep-18
Project	Field Permeability Test			Date Completed	10-Sep-18
Location	24 Valencia Road, Carmel WA			Instrument Type	Guelph Permeameter
Position	Northing: 6 456 871	Easting:	50 414 876	Tested by	AB



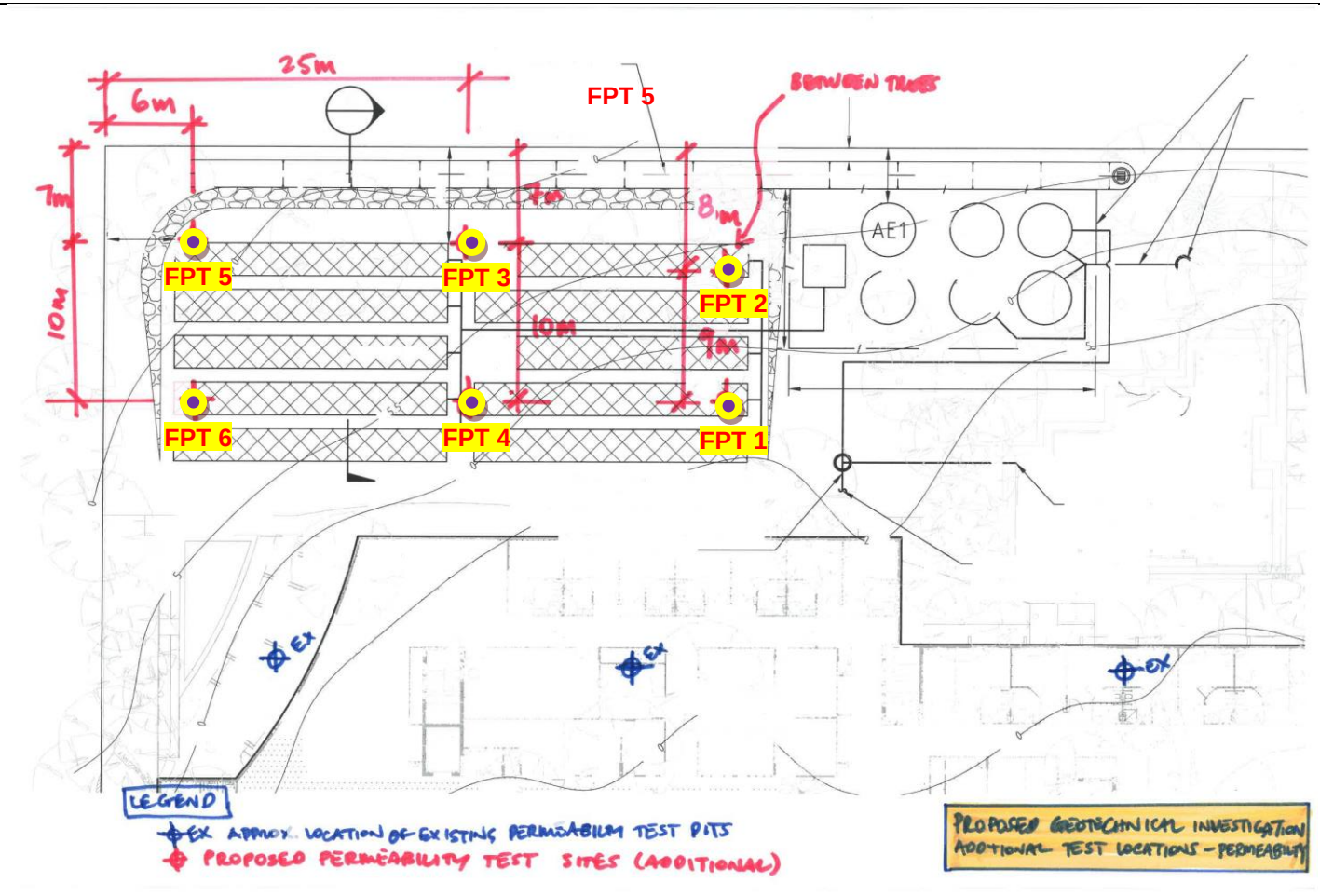
Notes: Test was conducted at a depth of 0.75 m from the existing surface level

Water Hydraulic conductivity K_{fs}: **4.4E-03** **cm/sec**

3.8E+00 **m/day**

Signatory: _____ Date: 13/09/2018

Dr. Harun Meer



Site Sketch : Field permeability, test hole and DCP test locations

Reference	LGK5032018SC
Client	Burswood Care Pty Ltd
Project	Geotechnical Site Classification Location: 24 Valencia Road, Carmel WA

LOCAL GEOTECHNICS

Unit 12, 8 Production Road Canning Vale WA 6155
PO Box 5050, Canning Vale South WA 6155
Phone: 08 9457 3517
E-mail: admin@localgeotechnics.com.au
Web: www.localgeotechnics.com.au

Appendix E Soil Chemical Test Results (October 2018)

LOCAL GEOTECHNICS

03 November 2018

To
Burswood Care Pty Ltd
43 Old Perth Road, Bassendean WA 6054

Dear Sir/Madam,

RE: Laboratory tests for 24 Valencia Road, Carmel WA

Local Geotechnics (LG) was engaged by Burswood Care Pty Ltd for sampling from two locations and to organize laboratory testing. An engineer from LG visited the site on 19 October 2018 and collected soil samples from two location as determined by the client. A summary of soil sampling, testing plan and test results are summarized below. Sampling locations, soil profile and laboratory test certificates are attached with this letter.

Analyte	LOR	Unit	Sample TH1 Depth: 0.6-0.8m	Sample TH2 Depth: 1.1-1.3m
Misc Inorganics in Soil				
pH	**.01**	pH units	7.0	6.9
Conductivity	**0.01**	mS/cm	0.01	0.01
Cation Exchange Capacity				
Exchangeable Calcium	**0.2**	$cmol_c/kg$	1.7	0.8
Exchangeable Acidity	**0.1**	$cmol_c/kg$	<0.1	<0.1
Exchangeable Potassium	**0.05**	$cmol_c/kg$	<0.05	0.10
Exchangeable Magnesium	**0.2**	$cmol_c/kg$	1.1	0.5
Exchangeable Sodium	**0.2**	$cmol_c/kg$	0.3	0.2
Cation Exchange Capacity	**1**	$cmol_c/kg$	3	2
Phosphorus Retention Index				
PRI	**-**	-	40.7	44.4
Emerson Class Number				
ECN	**-**	-	5	5

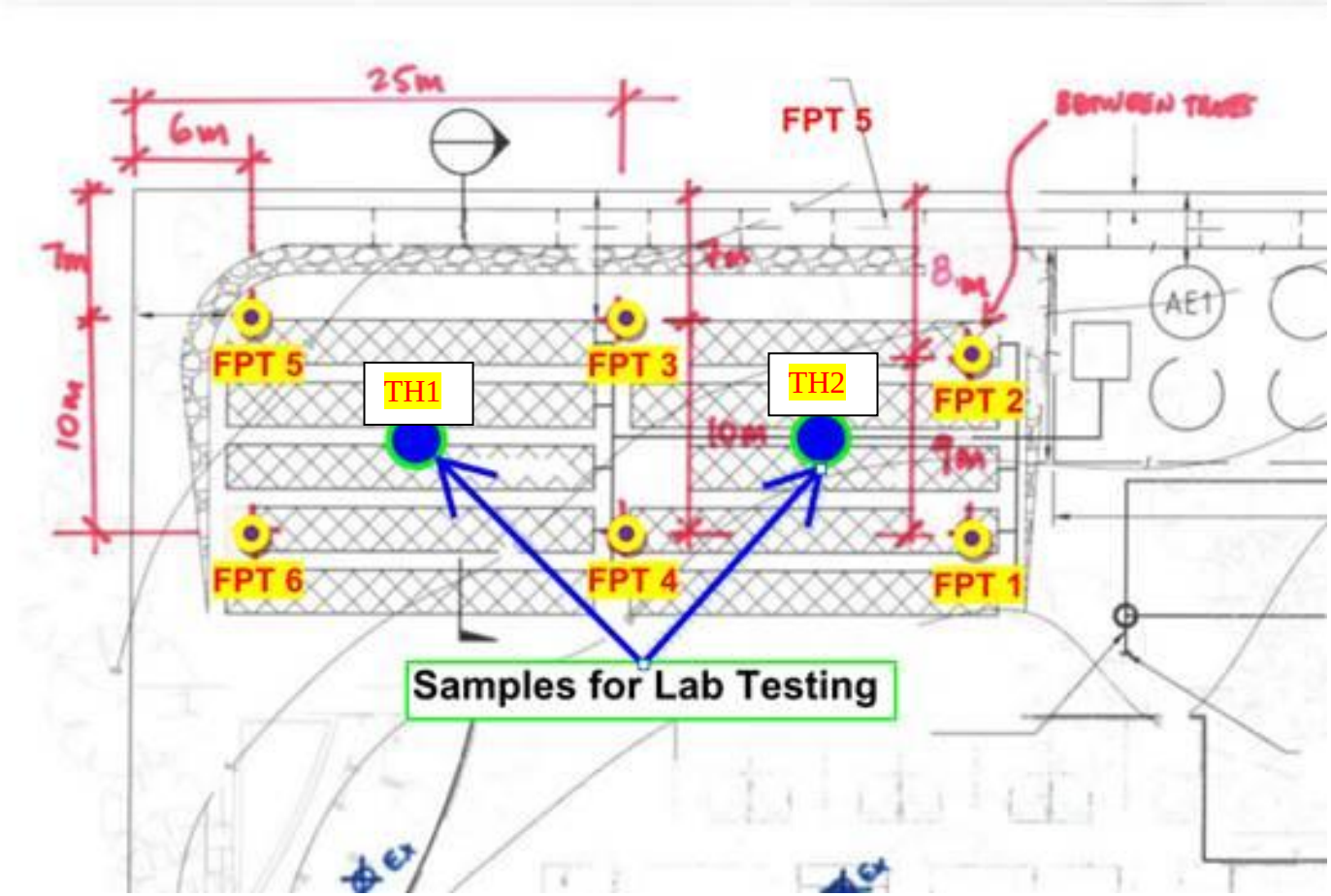
If you have any questions related to the report or we can be of further assistance, please do not hesitate to contact Local Geotechnics.

For and on behalf of Local Geotechnics.



Dr. Harun Meer
Ph.D.(Geotech), M. Eng. (Geotech), B. Eng. (Civil), MIE Aust
Director
Local Geotechnics

Attachments: Sampling locations, soil profile and laboratory test certificates are attached with this letter.



Site Sketch : Test Pit Locations	
Reference	LGK5472018Lab
Client	Burswood Care Pty Ltd
Project	Location: 24 Valencia Road, Carmel WA

LOCAL GEOTECHNICS
PO Box 5050, Canning Vale South WA 6155
Phone: 0425 545 508(M), 08 9457 3517
E-mail: admin@localgeotechnics.com.au
Web: www.localgeotechnics.com.au

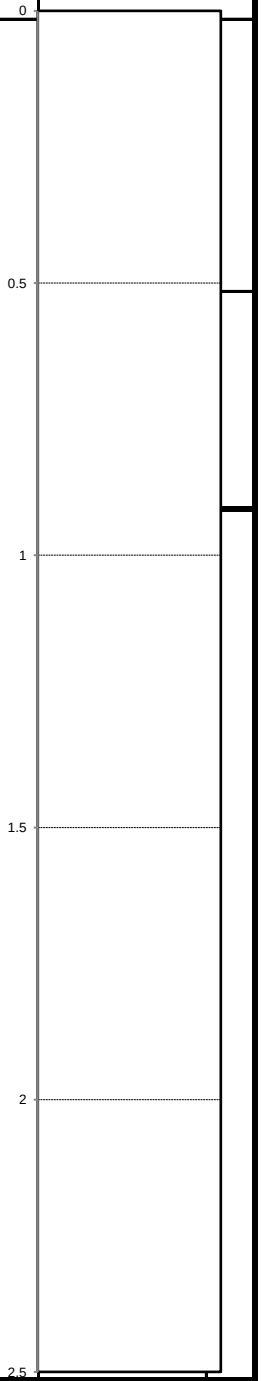
REPORT OF TEST PIT

ABN: 61 737 984 867
PO Box 5050
Canning Vale South WA 6155
admin@localgeotechnics.com.au

Reference	LGK5472018Lab	Test Pit/BH No.	01
Client	Burswood Care Pty Ltd	Date Excavated	19-Oct-2018
Project	Geotechnical Site Classification	Date completed	19-Oct-2018
Location	24 Valencia Road Carmel WA	Equipment Type	Hand Auger
Chainage	Northing: / Easting:	Water Table	N/A

Depth (m)	RL (m)	Method	Penetration resistance	Sampling Type	Graphic Log	Classification Symbol	Description of Soil Strata	Additional observations
0.1						SM	**Gravelly Silty SAND**- fine to medium grained, fines of low plasticity, black, moist, loose, fine to medium grained gravel up to 15 mm with grass roots, tree roots and organics (TOPSOIL)	
						GC	**Sandy Clayey GRAVEL**- fine to coarse grained, sub rounded gravel up to 30 mm, brown to yellow, moist, stiff to very stiff, low to medium plasticity, fine to medium grained sand, trace of cobble/boundder up to 100 mm	
1.2							**Terminated at a depth of 1.2 m** **Terminated at the target depth of 2.5 m**	

Dynamic Cone Penetrometer Test (Blows/100mm)



Notes:

Sampling Type:
B - Bulk/Disturbed Sample,
UD - Undisturbed Sample

Method:
HA - Hand Auger
E - Excavator
BH - Backhoe Bucket

Moisture:
D - Dry
M - Moist
W - Wet

Symbols:
W_L - Plastic Limit
W_P - Plastic Limit

Logged : FR
Checked: HM

REPORT OF TEST PIT

ABN: 61 737 984 867
PO Box 5050
Canning Vale South WA 6155
admin@localgeotechnics.com.au

Reference	LGK5472018Lab	Test Pit/BH No.	02
Client	Burswood Care Pty Ltd	Date Excavated	19-Oct-2018
Project	Geotechnical Site Classification	Date completed	19-Oct-2018
Location	24 Valencia Road Carmel WA	Equipment Type	Hand Auger
Chainage	Northing: / Easting:	Water Table	N/A

Depth (m)	RL (m)	Method	Penetration resistance	Sampling Type	Graphic Log	Classification Symbol	Description of Soil Strata	Additional observations	Dynamic Cone Penetrometer Test (Blows/100mm)
0.1						SM	**Gravelly Silty SAND**- fine to medium grained, fines of low plasticity, black, moist, loose, fine to medium grained gravel up to 15 mm with grass roots, tree roots and organics (TOPSOIL)		0
0.5						GC	**Sandy Clayey GRAVEL**- fine to coarse grained, sub rounded gravel up to 30 mm, brown to yellow, moist, stiff to very stiff, low to medium plasticity, fine to medium grained sand, trace of cobble/boulder up to 100 mm		0.5
1.0									1
1.2									
1.5							**Terminated at the target depth of 1.5 m**		1.5
2.0									2
2.5									2.5

Notes:

Sampling Type:
B - Bulk/Disturbed Sample,
UD - Undisturbed Sample

Method:
HA - Hand Auger
E - Excavator
BH - Backhoe Bucket

Moisture:
D - Dry
M - Moist
W - Wet

Symbols:
W_L - Plastic Limit
W_P - Plastic Limit

Logged : FR
Checked: HM

Liquid Labs WA
08 94723349
16B/81 Briggs Street
Carlisle, WA 6101

EMERSON CLASS TEST REPORT

AS 1289.3.8.1

Client	**Local Geotechnics**	Ticket No.	**S2440**
Client Address	**8 Production Road, Canning Vale WA 6155**	Report No.	**LLS18/4801-4802_1_RCN**
Project	**Geotechnical Site Classification**	Sample No.	**LLS18/4801-4802**
Location	**24 Valencia Road, Carmel WA**	Sampled By	**Client**
Sample Identification	**Various - See Below**		
Sampling Method:	**Sampled by Client, Tested as Received**		
Source of Material	**Not Specified**		

EMERSON CLASS NUMBER

Sample Number	Soil Description	Sample Identification	Emerson Class Number
LLS18/4801	Silty Gravel	TH1 0.6-0.8m	**5**
LLS18/4802	Silty Gravel	TH2 1.1-1.3m	**5**

Comments:

Approved Signatory

Name Brooke Elliott
Function Quality Manager
Issue Date 24-October-2018

Accredited for compliance with ISO/IEC 17025 - Testing
Accreditation No. 19872

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LABORATORY REPORT

Job Number: 18-15746
Revision: 02
Date: 2 November 2018

ADDRESS: **Local Geotechnics**
12/8 Production Rd
Canning Vale WA

ATTENTION: Harun Meer

DATE RECEIVED: 19/10/2018

YOUR REFERENCE: Local Geotechnics

PURCHASE ORDER: Inv: 137689

APPROVALS:



Sean Sangster
Inorganics Supervisor

Sam Becker
Inorganics Manager

DouglasTodd
Laboratory Manager

REPORT COMMENTS:

This report is issued by Analytical Reference Laboratory (WA) Pty Ltd
Samples are analysed on an as received basis unless otherwise noted.
PRI analysis subcontracted to CSBP, Report Number 3RS18153-54

METHOD REFERENCES:

Method ID	Method Description
ARL No. 138	pH in Soil and Biosolid
ARL No. 140	Conductivity in Soil and Biosolid
ARL No. 213	Exchangeable Bases
ARL No. 212	Exchangeable Acidity
Subcontracting	See Report Comments section for more information.

Local Geotechnics
Job No: 18-15746

LABORATORY REPORT
Revision: 02

Date: 2/11/18

Misc. Inorganics in Soil		Sample No:	18-15746-1	18-15746-2
		Sample Details:	TH1 (0.6-0.8m)	TH2 (1.1-1.3m)
ANALYTE	LOR	Units	19/10/2018	19/10/2018
pH	0.1	pH units	7.0	6.9
Conductivity	0.01	mS/cm	0.01	0.01

Cation Exchange Capacity		Sample No:	18-15746-1	18-15746-2
		Sample Details:	TH1 (0.6-0.8m)	TH2 (1.1-1.3m)
ANALYTE	LOR	Units	19/10/2018	19/10/2018
Exchangeable Calcium	0.2	$cmol_c/kg$	1.7	0.8
Exchangeable Acidity	0.1	$cmol_c/kg$	<0.1	<0.1
Exchangeable Potassium	0.05	$cmol_c/kg$	<0.05	0.10
Exchangeable Magnesium	0.2	$cmol_c/kg$	1.1	0.5
Exchangeable Sodium	0.2	$cmol_c/kg$	0.3	0.2
Cation Exchange Capacity	1	$cmol_c/kg$	3	2

Subcontracting		Sample No:	18-15746-1	18-15746-2
		Sample Details:	TH1 (0.6-0.8m)	TH2 (1.1-1.3m)
ANALYTE	LOR	Units	19/10/2018	19/10/2018
Phosphorus Retention Index		-	40.7	44.0

Result Definitions
LOR Limit of Reporting [NT] Not Tested [ND] Not Detected at indicated Limit of Reporting
* Denotes test conducted by in-house methodology.

FOR MICROBIOLOGICAL TESTING - The data in this report may not be representative of a lot, batch or other samples and may not necessarily justify the acceptance or rejection of a lot or batch, a product recall or support legal proceedings. Tests are not routinely performed as duplicates unless specifically requested. Changes occur in the bacterial content of biological samples. Samples should be examined as soon as possible after collection, preferably within 6 hrs and must be stored at 4 degrees Celsius or below. Samples tested after 24 hrs cannot be regarded as satisfactory because of temperature abuse and variations.

ARL
Analytical Reference Laboratory

CHAIN OF CUSTODY

46-48 Banksia Road WELSHPOOL WA 6106
Ph: +61 8 6253 4444 www.arlwa.com.au

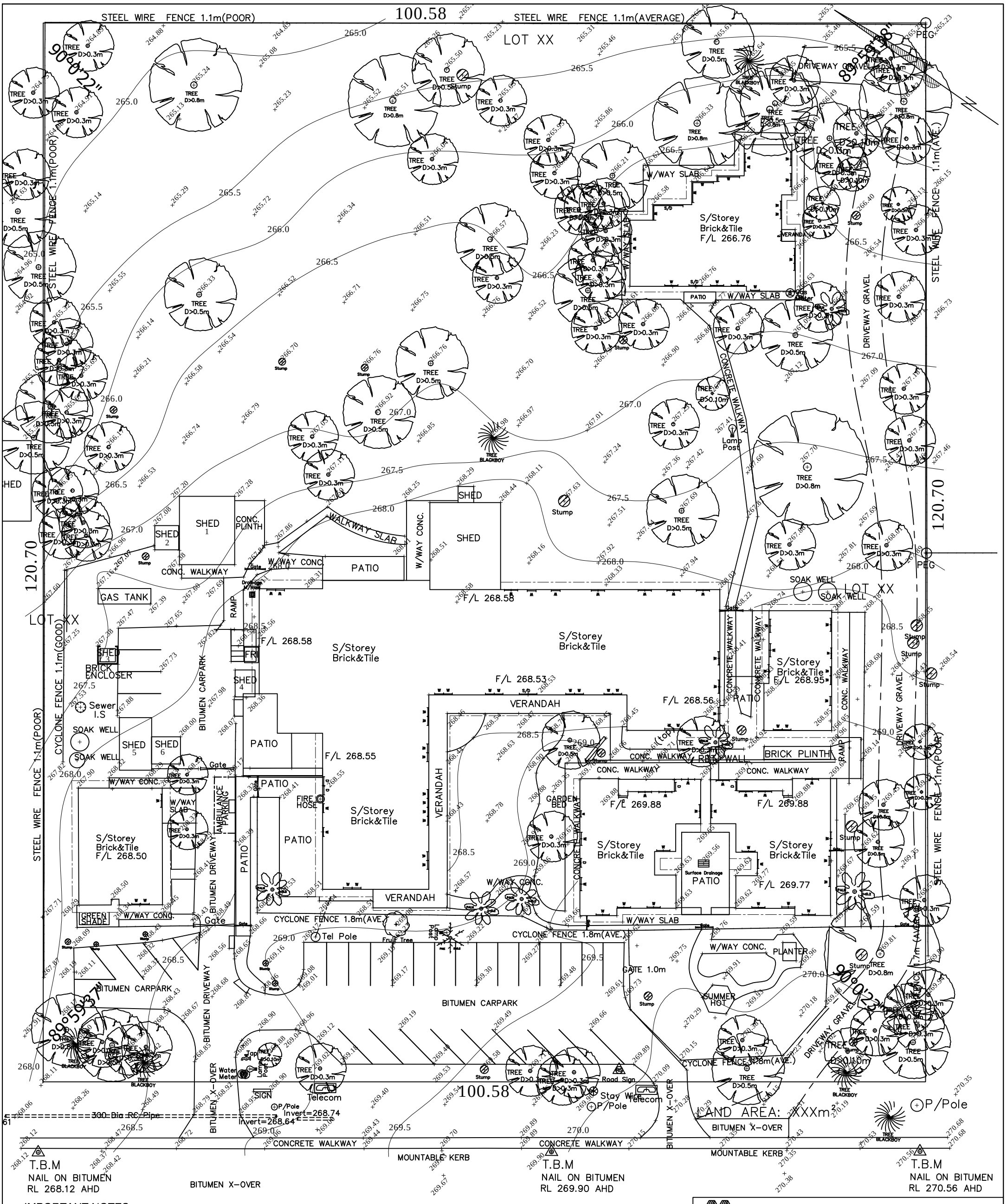
Client: Local Geotechnics	Date Results Required By: Std TAT (Please specify a time frame or number of working days)	Purchase Order No:
Contact Name: Harun Meer		ARL Quote No:
Address: 12/8 production Road, Canning Vale.	Email Reports To: ~~harun~~ admin@localgeotechnics.com.au	LABORATORY USE ONLY
Phone No: 0425545508	Email Invoices To: Same as above.	Payment Method:
Fax No:		Invoice No: 137689
Project Reference: LGK5472018LAB		
Comments		
ARL Job Number: 18-15746	Temperature of Samples: 20°C	

Lab #	Sample Description	Date Sampled	Sample Type	Total Containers	pH	EC	Cation Exchange Capacity	PR1 - to CSSP	ANALYSIS REQUIRED
-1	TH1: 0.6-0.8m		Soil	1	✓	✓	✓	✓	
-2	TH2: 1.1m - 1.3		"	1	✓	✓	✓	✓	

Samples Relinquished By: ..... On: ../../.. At: ..... Signed: .....

Samples Received By: M.GOLIAS On: 19/10/18 At: 4pm Signed: .....

Appendix F Feature Survey



IMPORTANT NOTES:

- THIS PLAN IS INTENDED FOR THE DEPT OF PLANNING & INFRASTRUCTURE ONLY.
- SEWER / DRAINAGE MAY VARY FROM SCHEMATIC PRESENTATION / CHECK WITH APPROPRIATE AUTHORITY BEFORE ADOPTION OF POSITION.
- THIS SURVEY DOES NOT GUARANTEE THE LOCATION OF BOUNDARY PEGS OR FENCES.
- CHECK TITLE FOR EASEMENTS / COVENANTS ETC.

VALENCIA ROAD

Ausnal Associates
38 Damepattie Drive
Willetton 6155
WA. AUSTRALIA
Tel: (08)93102834 Email: ausnalv@bigpond.net.au Mob: 0402 975 551

Surveyor: M.S.Van | Drafter: M.S.Van | Drg No: VC 564 F 01

FEATURE SURVEY OF LOT 7(24) VALENCIA ROAD CARMEL | DATE: 05/08/2016

SCALE: 1: 400 | PLAN OFCarmel Town Lots | C/T: | LOCAL AUTHORITY: SHIRE OF KALAMUNDA | DATUM: AHD

Site survey only location of boundary pegs or fences in relation to the boundary is not guaranteed

Appendix G ATU System Proposal (Allied Pumps)

Peritas Group

Kalamunda Nursing Home

Date: 31 August 2018
Quote Ref: AR S47040 D

ALLIED PUMPS PTY LTD

Perth
2 Modal Crescent, Canning Vale WA 6155
PO Box 1468, Canning Vale DC WA 6970

T: 08 9350 1000
F: 08 9356 5255

Southwest
115 Stead Road, Centennial Park WA 6330

T: 08 9841 1811
F: 08 9841 1810

E: sales@alliedpumps.com.au
www.alliedpumps.com.au

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CLIENT:	Peritas Group
ATTN:	Enzo Biagioni-Froudist
EMAIL:	enzo@peritasgroup.com
RE:	Kalamunda Nursing Home

Dear Sir,

We would like to thank you for the opportunity to provide you Allied Pumps' products and services. We have much pleasure in submitting our quotation for the supply of pumping equipment.

Allied Pumps is an Australian owned business with head office in Perth, Western Australia, specialising in the supply of COMPLETE PACKAGE PUMPING AND TREATMENT SOLUTIONS. Our aspiration is to be a supplier of choice in providing advanced, efficient products that will help to safeguard to our community and further the well-being of mankind.

Our goal is to achieve the highest manufacturing standard and to always exceed customer expectations. We have implemented a Quality Management System accredited by AS/NZS ISO 9001:2008 throughout the company, covering every aspect of our operations. We would like to inform our clients that by engaging the services of Allied Pumps, they can be assured of the success of their project and the highest quality of product.

Once again, thank you for this opportunity and we are looking forward to working with you on this project.

Yours Sincerely,

Management Team
Allied Pumps Pty Ltd

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1.0 PROJECT DETAILS

PROJECT DETAILS	
Client	Peritas Group
Project	Kalamunda Nursing Home
Area	Kalamunda
SYSTEM DESIGN BASIS	
Average Daily Flow Rate	22,950L/day
Peak Daily Flow Rate	32,000L/day
BOD5	300mg/L
TSS	300mg/L
TN	80mg/L
TP	15mg/L
pH	15mg/L
FOG	50mg/L max
Max feed Temperature	35 degrees C
EXPECTED EFFLUENT QUALITY	
Disposal	Low Risk
BOD5	< 20mg/L
TSS	< 30mg/L
NTU	< N/A
pH	6.5 – 8.5
Chlorine	0.2 – 2.0ml
E/Coli	< 10 CFU / 100mL

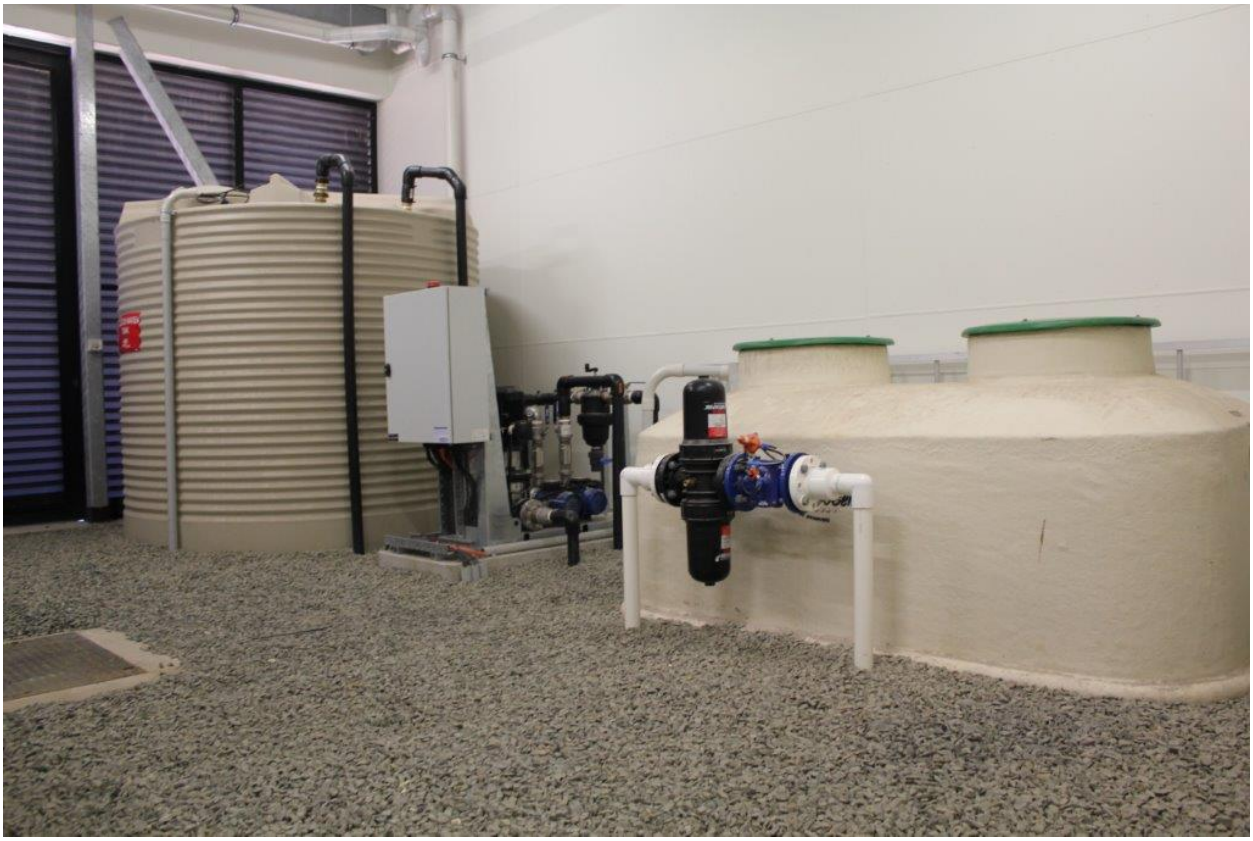
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2.0 TREATMENT OVERVIEW

Allied Pumps leads the way providing complete advanced treatment systems utilising the Enviropac fixed film media bio modules to treat sewage and wastewater for dispersal and reuse purposes. The treatment and delivery system utilises Enviropac's Aerobloc™ fixed film media which has been tested to International Standard requirements. This system which is ideal for decentralised sewage schemes significantly reduces BOD, TSS, and Total Nitrogen to provide treated wastewater to achieve your needs.

The system consists of a bio-module containing a predetermined amount of Aerobloc™ media (Aerobloc™ is an open cell proprietary foam patented for the use of biological treatment of sewage). Effluent is sprayed over the Aerobloc™ using designated specialised spray nozzles. This patented delivery system evenly distributes wastewater to achieve the desired treatment levels. Enviropac Aerobloc™ systems have been successfully utilised over the past 10 years.

Allied Pumps has many years' experience in the wastewater industry and specialises in providing packaged sewage treatment solutions for challenging applications. The Enviropac system focuses on the output of high quality effluent to condition the output for the reuse of treated blackwater for irrigation purposes where appropriate.

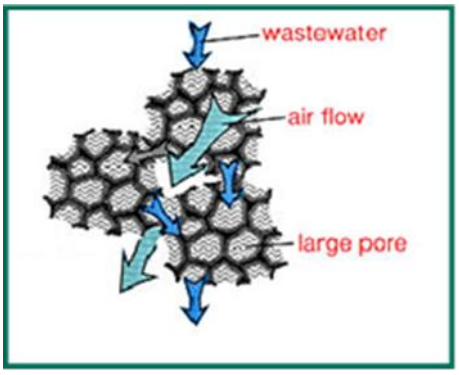


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3.0 AEROBLOC™ SYSTEM TECHNOLOGY

TREATMENT PROCESS

Treatment using open cell foam is unique in that it is very absorptive, highly porous and has a very large surface area, which allows effluent and air to flow freely through it at the same time. These features prevent the foam from becoming clogged over extended periods of time and allow loading rates of up to ten times that of soil, sand and peat filters.
Higher loading rates allow the Aerobloc™ systems to be placed in small modules, which occupy a smaller footprint compared to other advanced treatment systems.



Treatment occurs when the septic (primary) tank effluent is sprayed over the foam, where it slowly percolates (trickles) downward. As the effluent passes around and through the open cell foam media it contacts large populations of aerobic organisms and degradation of the wastewater strength occurs. Additional treatment occurs when 80% of the effluent is recirculated back through the septic tank. Significant reductions in BOD, TSS, TN and coliform bacteria are obtained through this process. The other 20% is made available for subsurface disposal or further treatment for irrigation purposes.

EFFLUENT QUALITY

Open cell foam media has a fifteen-year track record for use in residential and commercial treatment systems.

The Aerobloc™ has been tested by an Independent third party through NSF International which demonstrated the Aerobloc™ produced effluent quality as presented.



Actual effluent sample from NSF testing facility.

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4.0 SYSTEM COMPONENTS & FUNCTION

PRIMARY TREATMENT

Wastewater is pumped into primary (anaerobic) tank, where initial settling occurs. The outlet from the first compartment into the second compartment is fitted with an appropriately sized Enviropac-EF Series Effluent Filter. The EF Series Filter provides filtration of solids and has been proven to reduce BOD by 20-45% and TSS by 50-90%. These primary settling tanks located at the start of the system are sized equal to two (2) times the daily design flow.



SECONDARY TREATMENT / EMERGENCY STORAGE

A recirculation pre-treatment tank is installed to further enhance treatment and provide emergency storage. The recirculation tank is sized equal to the daily design flow or as required by relevant authorities.

PUMP SYSTEMS PACKAGE

The Effluent Dosing Pumps, Treated Effluent Recirculation Pumps and the Final Discharge Pumps are mounted on a common skid or in tanks with pipework and valves. The pumps are prewired where possible to the system control panel.

TREATMENT BIO MODULES AND MICRO-DOSING

Micro-dosing occurs when effluent from the recirculation tank is pressure dosed to the treatment module. Each treatment module contains specially designed helical spray nozzles that distribute effluent evenly across the treatment media. Effluent is delivered to the treatment media in frequent doses to allow the proper contact time with beneficial organisms attached to the media.



Aerobloc™ media showing bacterial growth

The treatment module(s) receive an individual dose volume of approximately 1000 litres per dose cycle. Each module contains spray nozzles that can deliver approximately 30 litres per minute. The pump delivers a minimum of 180 litres per minute. The 20% discharge (to the final dispersal tank) per dose will result in a minimum of 106 cycles per 24-hour period.



SPLITTER AND TRANSFER PUMP STATION

Each system will recirculate at a minimum rate of 80%. This recirculation is achieved by utilising an Enviropac- Splitter / Transfer Pump Station.

The recirculation device is designed to recirculate effluent at a rate of 4:1 or an 80% return to the pre-treatment unit (septic tank) and a 20% flow to the Final Discharge Contact Tank.

FINAL DISCHARGE IRRIGATION TANK

The 20% of flow diverted through the Enviropac- Splitter / Transfer Pump Station is fed into a Final Discharge Irrigation Tank.
This provides contact time for the final treated effluent prior to discharge. The Recirculation Pumps constantly circulate the treated effluent and sanitise on a continue basis. The tank is sized to match system requirements and is subject to local authority requirements. Final Discharge Pumps transfer the treated effluent from this tank to the irrigation drip-field/spray-field network.



NUTRIENT RETENTION – ALUM DOSING

The treated wastewater shall be dosed with Aluminium Sulphate to precipitate phosphates within the system. Dosing system complete with mixing/contact chamber, dosing pump, control and chemical for commissioning.

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OZONE SANITISATION SYSTEM



The final stage of treatment is achieved by Enviropac Ozone injector and its micro bubble diffusion system which allows for extremely high mass transfer of the gas to wastewater. This means creating a supersaturate solution of ozone with little or no off gassing in a very stable state. Supersaturate ozone solutions allow reactions with unsaturated hydrocarbons to happen faster, but also push reactions that typically would not happen in less concentrated solutions. BOD, COD, TSS and bacteria are now easily eliminated very efficiently and economically. The micro-bubbles dramatically increase the available surface area for reaction and result in an extremely stable super-saturate solution. Gas remains in solution for extended periods of time, which facilitates maximum treatment results and minimal off gassing.

ENVIROPAC CONTROL SYSTEM

Enviropac provides full automated control of the Sewage Treatment System utilising the EC Enviropac Control Controller. Controller is mounted and prewired on the Pump Systems Skid.

MAINTENANCE

All onsite wastewater treatment and dispersal systems should be inspected and maintained periodically in order to provide years of trouble free operation. The frequency and type of maintenance required is based upon the complexity of the system. Since the Aerobloc™ systems are very basic in operation; it only requires a minimal inspection and maintenance program typically every 3-6 months. In addition to this, the regulatory authority may require a more regular testing and monitoring program (typically 1-3 monthly). Furthermore, if the system is classed as a reuse system, the Dept. of Health may dictate more extensive monitoring and analysis. Costs associated with monitoring and maintenance is excluded from this proposal.

WARRANTY

All Enviropac components are warranted to be free from defects in material and workmanship for a minimum of one year from the date of original installation. The open cell foam is warranted to be free from defects and workmanship for a period of ten years. Warranty is limited to the replacement of defective componentry only and does not include travel and accommodation costs associated with non-capital city locations.

Budget Price: **$ 155,000.00 Plus GST**
$ 170,500.00 Inc. GST

IMPORTANT NOTES

1.0 Design

1.1 System proposed is designed for discharge to a disposal field. If reuse of the treated effluent is required, further details should be looked at on a case by case basis. If proceeding with the reuse option for irrigation for example, site measures need to be adhered to, to minimise risk such as;
- Time of irrigation to avoid periods where people are present (i.e.2am)
- Subsurface irrigation to be used
- Signage for all irrigated areas
- No irrigation in low lying areas
- Alternate disposal for areas that are prone to flooding for these occurrences.
- Alternate disposal area for periods of validation, maintenance and out of specification discharge.

1.2 Any commercial kitchens should discharge to system via grease trap (sized at twice that of normal loading) i.e. twice the capacity in litres.

1.3 Equipment provided has a general cyclone rating but specific engineering calculations are required to confirm this. Tie down and anchor points are the responsibility of the client.

1.4 Regulatory setbacks should be observed in locating equipment for site planning.

1.5 Approval for specific installation is required from local authority prior to installation.

1.6 ALLIED PUMPS is in no way responsible for the design, including calculation of pump duties, of the project hydraulics and sewer systems. A hydraulics or fire systems design engineer should be consulted for this.

2.0 Installation

2.1 Equipment to be located in non-traffic, segregated area.

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3.0 Maintenance

3.1 System should be maintained on a regular basis in accordance with local authority, health department and manufacturing requirements by an approved service agent.

3.2 Proposal excludes operational maintenance for the first 12 months and thereafter.

3.3 All cleaning agents used on site should be biodegradable and environmentally friendly.

3.4 Treated water reuse systems require a significantly greater level of monitoring.

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5.0 KEY FEATURES

- LOW POWER USAGE – System design has very low power usage when compared to conventional treatment systems. Typically the power usage can be less than a quarter of comparable size units.
- SHOCK LOADING ABILITY - Highly retentive deep structure bio media with 'shielding' properties.
- VARIABLE LOAD CAPABILITY – Ability to handle extended periods of low flow due to integral recirculation features.
- RESILIANCE TO LOSS OF POWER CONDITION – Moisture retaining media protects active bacteria.
- HIGH QUALITY EFFLUENT OUTPUT – Exceeding authority requirements, the output quality reduces potential maintenance on irrigation system, provides better quality irrigation water, reduced potential risk and is better for the environment.
- LOW MAINTENANCE – Low number of mechanical components when compared with conventional systems and simplified maintenance procedures.
- CONFIGURATION FLEXIBILITY – Modular system with ability to expand by adding modules and designed to be located above or below ground.

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6.0 SYSTEM DETAILS

SYSTEM DETAILS	
System Model	**APST-32-RT32.6D/DF-47040**
Primary Tank	1 x 32kL: 3.5m ø x 3.1m (H) per tank Polyethylene Primary above ground Tank.
Secondary Treatment	1 x 32kL: 3.5mØ x 3.1m (L) per tank Polyethylene above ground tank
Emergency Storage	1 x 32kL: 3.5mØ x 3.1m (L) per tank Polyethylene above ground tank
Pump Systems Package	1 x Dual Effluent Dosing Pump System 1 x Dual Recirculation Pump System 1 x Dual Final Discharge Irrigation Pump System
Bio Treatment Module	2 x 3.5m Ø x 3.1m (H)
Splitter and Transfer Pump Station	2 x 1.0m Ø x 1.6m (D) per tank Fibreglass below ground pump station fitted with Dual Recirculation Pumps and Dual Treated Effluent Transfer Pumps
Final Discharge Irrigation Tank	1 x 32kL: 3.5mØ x 3.1m (L) per tank Polyethylene above ground tank
Sanitisation System	Residual Trim Chlorine Dosing System
Pressure Distribution Valve Package (optional)	Not/included in the package

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7.0 ELECTRICAL REQUIREMENTS

ELECTRICAL REQUIREMENTS:

3 phase, neutral and earth supply to suit

- 2 x 2.5kW Sewage Grinder Pumps
- 2 x 4.0kW Primary Feed Pumps
- 2 x 1.2kW Recirculation Pumps
- 2 x 1.2kW Transfer Pumps.
- 2 x 0.5kW Treated Water Recirculation Pumps
- 2 x 4.0kW Irrigation Pumps

Above pumps are Duty/Standby

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8.0 INSTALLATION REQUIREMENTS

Work Scope	Included	Excluded
Operating & Maintenance Instructions	√	
Commissioning chemicals	√	
Site Commissioning	√	
Inter-piping between below ground tanks		√
Inter-wiring between below ground tanks and controller		√
Mounting Controller	√	
Inter-piping between tanks and bio-modules		√
Delivery to Site	√	
Onsite Cranage and onsite crane hire		√
Civil works including; Rock breaking, Excavation, Trenching, Back Fill, Compaction, etc.		√
Removal of excess soil from site		√
Power supply to controller		√
Drainage pond installation or pumped rising main		√
Site plumbing drainage system		√
Reinstatement of bitumen and concrete surfaces		√
Connection to remote alarm or dialler system		√
Excavation installation or concrete slab for tanks and pump stations		√
Irrigation spray/Drip irrigation disposal including fencing and signage		√
Safety shower		√
Operator training during commissioning	√	
Council and authority charges and fees		√

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9.0 PACKAGE SEWAGE PUMP STATION

DUTY: 2.5L/sec @ 10m TDH (Estimated only – please confirm).

MAXIMUM INLET INVERT LEVEL: 1000mm below ground level

WE OFFER: Allied Pumps Fibreglass 2200mm diameter Package Pump Station Model **FPL4000VM-P12D-2CPP-47040** comprising of pumps, chamber, controls and fit out as follows.



PUMPS
Package will be supplied with dual Piranha Model P12D guide rail mount grinder sewage pumps with inbuilt thermal protection. Pumps will be heavy duty cast iron/stainless steel construction fitted with 10metres of submersible cable.

CHAMBER
Pumps will be mounted on sliding guide rails and plumbed inside a 2200mm diameter x 4.0metres deep mould formed heavy duty reinforced fibreglass pumping chamber complete with Class D sealed gas tight cast iron access cover. Pump access cover will have a removable safety grate fitted.

FIT OUT
Pumps will be plumbed in 63mm HDPE (high density polyethylene) with electrofusion joints to two checkvalves and two gate valves which will be plumbed inside an integral valve chamber formed as an integral part of the chamber with a separate Class D sealed gas tight cast iron access cover, and terminate outside chamber in a single discharge point for on-site connection to rising main by others.

CONDUCTIVE LIQUID LEVEL SENSOR
Package will include 1 x *Marke* Model Number MCP-10-100-10 multi-sensor conductive liquid level sensing probe having 10m of submersible sensor cable.

CONTROL
The pumps and the *Marke* multi-sensor liquid level sensing probe to be wired on-site (by others) to a KWIKSTART Logikos M7 Plus Twin Pump Controller (supplied loose with the package) incorporating thermal protection, phase failure protection, over voltage protection, hours run log, pump start log, text fault and operation display, visual indication of actual pit level, alarm history log, along with the starting and alarm equipment in a lockable metal enclosure.

Commissioning of the above pump system by an Allied Pumps' Commissioning Technician is available (on request from site) once installation has been fully completed by others.

Budget Price: **$ 31,000.00 Plus GST**
$ 34,100.00 Inc. GST

Notes:

1.0 Site installation of equipment is not included.

2.0 Package
- For traffic areas, a concrete slab should be used to spread the load onto the surrounding ground area. Pump chambers installed without loadbearing cover slab must be in area inaccessible to vehicles or have bollards installed around.
- Extra concrete ballast may be required for high water table areas.
- Site crane is excluded.

3.0 Mechanical
- Station should be adequately vented by others.
- Pit penetrations by others. All pit penetrations to be adequately sealed after installation.

4.0 Electrical
- 3 phase, neutral and earth supply to suit 2 x 2.9kW pumps required to be terminated in controller.
- Ensure contractor allows to conduit (2 x 50mm HD minimum) wire between pit and controller and plug conduits after installation. Pumps/level sensors supplied with 10m cable.

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- System alarms should be continuously monitored via BMS or alarm system.

5.0 Commission

- Commissioning cost subject to site accessibility, location, and conditions.
- Non-metro commissioning is available at additional cost.
- Extra charge may be incurred if installation is incomplete or incorrect or if more than one site visit is required.
- Pump chamber should not be contaminated with sewage prior to commission otherwise an additional environmental fee of $75.00 plus GST applies.

6.0 No allowance has been made for mining or special standards with respects to the equipment or documentation. Please advise if this is required.

7.0 Allied Pumps are not responsible for the site design and requirements including pump duty.

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10.0 PROJECT SCHEDULE

Process	Estimated Schedule
System Design – Data Sheets and design documentation	**3 weeks from Award**
Design Drawings – Mechanical & Electrical	**3 Weeks from Design Approval**
FAT Testing – In house Witness Testing	**12 Weeks from Design Drawings**
Onsite Commission	**2 Weeks from Completed Commission Sheets**
Onsite Training	**At final Commission**

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11.0 PROJECT SPECIFIC NOTES

General Notes:

1.0 Price is budget and subject to further design works.
2.0 System alarms should be continuously monitored via BMS or alarm system.
3.0 Client should obtain approval for installing system from relevant authorities.

12.0 TERMS AND CONDITIONS OF SALE

a. Price quoted is firm for thirty days then subject to rise and fall.
b. Equipment is available ex our works. Delivery is not included and may incur additional charges if requested.
c. Goods are custom build and are not returnable or refundable.
d. Terms of payment:
- Non-account customers - 20% deposit with order and balance payable prior to dispatch.
- Current approved account customers - 20% deposit (if applicable) with order and balance payable thirty days from invoice date.

e. Progress claims may apply to custom-build equipment.
f. Goods will be charged for on agreed required by completion date with payment terms apply from this date and storage charges apply to any goods left longer than 3 months in our warehouse.
g. Our standard conditions of sale endorsed hereon/attached apply to this offer.
h. Goods are subject to retention of title claim.

Should you require any further information please do not hesitate to contact our office.

Trusting our quotation meets with your favourable consideration.

Yours Faithfully,

Ryan Sharpe
Sales Engineer
Allied Pumps Pty. Ltd.
E: ryan.s@alliedpumps.com.au

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ALLIED PUMPS PTY LTD
Terms & Conditions of Trade

1. Definitions

1.1 "Seller: shall mean Allied Pumps Pty Ltd – ACN: 143 208 440.

1.2 "Buyer" shall mean the Buyer or any person acting on behalf of and with the authority of the Buyer.

1.3 "Guarantee" means that person (or persons), or entity who agrees herein to be liable for the debts of the Buyer on a principal debtor basis.

1.4 "Goods" shall mean Goods supplied by the Seller to the Buyer (and where the context so permits shall include any supply of Services as hereinafter defined).

1.5 "Services shall mean all services supplied by the Seller to the Buyer and includes any advice or recommendations (and where the context so permits shall include any supply of Goods as defined supra).

1.6 "Price" shall mean the cost of the Goods as agreed between the Seller and the Buyer subject to clause 4 of this contract.

2. Acceptance

2.1 Any instructions received by the Seller from the Buyer for the supply of Goods and/or the Buyers acceptance of Goods supplied by the Seller shall constitute acceptance of the terms and conditions contained herein.

2.2 Where more than one Buyer has entered into this agreement, the Buyers shall be jointly and severally liable for all payments of the Price.

2.3 Upon acceptance of these terms and conditions by the Buyer the terms and conditions are irrevocable and can only be rescinded in accordance with these terms and conditions or with the written consent of the manager of the Seller.

2.4 None of the Seller's agents or representatives are authorised to make any representations, statements, conditions or agreements not expressed by the manager of the Seller in writing nor is the Seller bound by any such unauthorised statements.

2.5 The Buyer undertakes to give the Seller not less than fourteen (14) days prior written notice of any proposed change in the Buyer's name and/or any other change in the Buyer's details (including but not limited to changes in the Buyer's address, facsimile number, or business practise).

3. Goods

3.1 The Goods are as described on the invoices, quotation, work authorisation or any other work commencement forms as provided by the Seller to the Buyer.

4. Price and Payment

4.1 At the Seller's sole discretion the Price shall be either;

a. As indicated on invoices provided by the Seller to the Buyer in respect of Goods supplied: or

b. The Seller's quoted Price (subject to clause 4.2) which shall be binding upon the Seller provided that the Buyer shall accept in writing the Seller's quotation within thirty (30) days.

4.2 Any variation from the plan of scheduled works or specifications will be charged for on the basis of the Seller's quotation and will be shown as variations on the invoice. Payment for all variations must be made in full at their time of completion.

4.3 At the Seller's sole discretion a deposit a deposit may be required. The deposit amount or percentage of the Price will be stipulated at the time of the order of the Goods and shall become immediately due and payable.

4.4 Time for payment for the Goods shall be of the essence and will be stated on the invoice, quotation or any other order forms. If no time is stated then payment shall be on delivery of the Goods.

4.5 The Seller may withhold delivery of the goods (or part thereof) until the Buyer has paid for them, in which event payment shall be made before the delivery date.

4.6 At the Seller's sole discretion, payment for approved Buyers shall be made by instalments in accordance with the Seller's delivery/payment schedule.

4.7 At the Seller's sole discretion, payment for approved Buyer's shall be due on thirty (30) days following the end of the month in which a statement is posted to the Buyer's address or address for notices.

4.8 At the Seller's sole discretion, for certain approved Buyers payment will be due thirty (30) days following the date of the invoice.

4.9 Payment will be made by cash on delivery, or by cheque, or by bank cheque, or by credit card, or by direct credit, or by any other method as agreed to between the Buyer and the Seller.

4.10 The Price shall be increased by the amount of any GST and other taxes and duties which may be applicable, except to the extent that such taxes are expressly included in any quotation given by the Seller.

5. Delivery of Goods/Services

5.1 Delivery of the Goods shall be made to the Buyer's address. The Buyer shall make all arrangements necessary to take delivery of the Goods whenever they are tendered for delivery, or delivery of the Goods shall be made to the Buyer at the Seller's address.

5.2 Delivery of the Goods to a carrier, either named by the Buyer or failing such naming to a carrier at the discretion of the Seller for the purpose of transmission to the Buyer, is deemed to be a delivery of the Goods to the Buyer.

5.3 The costs of carriage and any insurance which the Buyer reasonably directs the Seller to incur shall be reimbursed by the Buyer (without any set-off or other withholding whatsoever) and shall be due on the date for payment of the Price. The carrier shall be deemed to be the Buyer's agent.

5.4 The Seller may deliver the Goods by separate instalments (in accordance with the agreed delivery schedule). Each separate instalment shall be invoiced and paid for in accordance with the provisions in this contract of sale.

5.5 Delivery of the Goods to a third party nominated by the Buyer is deemed to be delivery to the Buyer for the purposes of this agreement.

5.6 The failure of the Seller to delivery shall not entitle either party to treat this contract as repudiated.

5.7 The Seller shall not be liable for any loss or damage whatsoever due to failure by the Seller to deliver the Goods (or any of them) promptly or at all.

6. Risk

6.1 If the Seller retains property in the Goods nonetheless, all risk for the Goods passes to the Buyer on delivery,

6.2 If any of the Goods are damaged or destroyed prior to property in them passing to the Buyer, the Seller is entitled, without prejudice to any of its other rights or remedies under these Terms and Conditions of Trade (including the right to receive payment of the balance of the Price for the Goods), to receive all insurance proceeds payable for the goods. This applies whether or not the Price has become payable under the Contract. The production of these terms and conditions by the seller is sufficient evidence of the Seller's rights to receive the insurance proceeds without the need for any person dealing with the Seller to make further enquiries.

7. Buyer's Disclaimer

7.1 The Buyer hereby disclaims any right to rescind, or cancel the contract or to sue for damages or to claim restitution arising out of any misrepresentation made to him by any servant or agent of the Seller and Buyer acknowledges that he buys the Goods relying solely upon his own skill and judgement and that the Seller shall not be bound by nor responsible for any term, condition representation or warranty other than the warranty given by the Manufacturer which warranty shall be personal to the Buyer and shall not be transferable to any subsequent Buyer.

8. Defect / Returns

8.1 The Buyer shall inspect the Goods on delivery and shall within seven (7) days of delivery notify the Seller of any alleged defect, shortage in quantity, damage or failure to comply with the description or quote. The Buyer shall afford the Seller an opportunity to inspect the Goods within a reasonable time following delivery if the Buyer believes the Goods are defective in any way. If the Buyer shall fail to comply with these provisions, the Goods shall be conclusively presumed to be in accordance with terms and conditions and free from any defect or damage/

8.2 For Goods, which the Seller has agreed in writing that the Buyer is entitled to reject, the Seller's liability is limited to rather (at the Seller's discretion) replacing the Goods or repairing the Goods provided that:

a) The Buyer has complied with the provisions of clause 8.1;

b) The Goods are returned at the Buyer's cost within seven (7) days of the delivery date;

c) The Seller will not be liable for Goods which have not been stored or used in a proper manner;

d) The Goods are returned in the condition in which they were delivered and with all packaging material, brochures and instruction material in as new condition as is reasonable possible in the circumstances.

8.3 The Seller may (in its discretion) accept the Goods for credit but this may incur a handling fee of 20% of the value of the returned Goods plus any freight.

9. Warranty

9.1 To the extent permitted by law, the Seller excludes all warranties, statements, representations, conditions, promises, undertakings, covenants and other provisions expressed or implied (and whether implied by lam including an Act of Parliament or otherwise), relating to the Goods including provisions that might otherwise form part of these conditions or be collateral to these conditions. In no circumstance, including negligent acts or omissions by the Seller, will the Seller be liable to the buyer for any special, consequential, direct or indirect loss, damage, harm or injury suffered by the Buyer or any other person including without limiting the generality of the foregoing loss of market, loss of profit and loss of contract.

9.2 At the Seller's sole discretion the Seller may office the following warranty. Subject to the conditions of warranty set out in Clause 9.3 the Seller warrants that if any defect in any workmanship manufactured by the Seller becomes apparent and is reported the Seller within twelve (12) months of the date of delivery (time being of the essence) then the Seller will either (at the Seller's sole discretion) repair the defect or replace the workmanship.

9.3 The conditions applicable to the warranty given by Clause 9.1 are:

a. The warranty shall not cover any defect or damage which may be caused or partly caused by or arise through;

i. Failure on the part of the Buyer to properly maintain any Goods; or

ii. Failure on the part of the Buyer to follow any verbal or written instructions or guidelines provided by the Seller; or

iii. Any use of any Goods otherwise than for any application specified on a quote or order form; or

iv. The continued use of any Goods after any defect becomes apparent or would have become apparent to a reasonably prudent operator or user; or

v. The use of the Goods prior to the Seller completing the installation and/or commission of the Goods; or

vi. Fair wear and tear, any accident or act of God.

b. The warranty shall cease and the Seller shall thereafter in no circumstances be liable under the terms of the warranty if the workmanship is repaired, altered or overhauled without the Seller's consent.

c. In respect of all claims the Seller shall not be liable to compensate the Buyer for any delay in either replacing or repairing the workmanship/Goods or in properly assessing the Buyer's claim.

d. The warranty shall cease and the Seller shall thereafter in no circumstances be liable under the terms of the warranty if the Buyer defaults in any payment due to the Seller.

9.4 For Goods not manufactured by the Seller, the warranty shall be the current warranty provided by the manufacturer of the Goods. The Seller shall be under no liability whatsoever, except for the express conditions as detailed and stipulated in the manufacturer's warranty.

10. The Commonwealth Trade Practices Act 1974 and Fair Trading Acts

10.1 Nothing in this agreement is intended to have the effect of contracting out of any applicable provisions of the Commonwealth Trade Practices Act 1974 or the Fair Trading Acts in each of the States and Territories of Australia except to the extent permitted by those Acts where applicable.

11. Intellectual Property

11.1 Where the Seller has designed or drawn Goods for the Buyer, then the copyright in those designs and drawings shall remain vested in the Seller, and shall only be used by the Buyer at the Seller's discretion.

12. Default & Consequences of Default

12.1 Interest on overdue invoices shall accrue from the date when payment becomes due daily until the date of payment at a rate of 2.5% compounding per calendar month and shall accrue at such a rate after as well as before any judgement.

12.2 If the Buyer defaults in payment of any invoice when due:

a. The Buyer shall indemnify the Seller from and against all the Seller's costs and disbursements including on a solicitor and own client basis and in addition all of the Seller's nominees costs of collection.

b. The Buyer agrees that the Seller may negotiate payment with any interested third party.

12.3 Without prejudice to any other remedies the Seller may have, if at any time the Buyer is in breach of any obligation (including those relating to payment); the Seller may suspend or terminate the supply of Goods to the Buyer and any of its other obligations under the terms and conditions. The Seller will not be liable to the Buyer for any loss or damage the Buyer suffers because the Seller exercised its rights under this clause.

12.4 If any account remains unpaid at the end of the second month after supply of the goods or services an immediate amount of the greater of $ 20.00 or 10.00% of the amount overdue shall be levied for administration fees which sum shall become immediately due and payable in addition to the interest payable under clause 11.1 hereof.

12.5 In the event that:

a. Any money payable to the Seller becomes overdue, or in the Seller's opinion the Buyer will be unable to meet its payments as they fall due; or

b. The Buyer becomes insolvent, convenes a meeting with its creditors or proposes or enters into an arrangement with creditors, or makes an assignment for benefit of its creditors; or

c. A receiver, manager, liquidator (provisional or otherwise) or similar person is appointed in respect of the Buyer or any asset of the Buyer: then without prejudice to the Seller's other remedies at law.

i. the Seller shall be entitled to cancel all or any part on any order of the Buyer which remains unperformed in addition to and without prejudice to any other remedies: and

ii. All amounts owing to the Seller shall, whether or not due for payment, immediately become payable.

13. Title

13.1 It is the intention of the seller and agreed by the Buyer that property in the Goods shall not pass until:

13.2 It is further agreed that:

a. Until such time as ownership of the Goods shall pass from the Seller to the Buyer the Seller may give notice in writing to the Buyer to return the Goods or any of them to the Seller. Upon such notice the rights of the Buyer to obtain ownership or any other interest in the Goods shall cease.

b. The Buyer is only a bailee of the Goods and until such time as the Seller has received payment in full for the Goods then the Buyer shall hold any proceeds from the sale or disposal of the goods on trust for the Seller.

c. The Buyer shall not charge the Goods in any way nor grant nor otherwise give any interest in the Goods while they remain the property of the Seller.

d. Receipt by the Seller of any form of payment other than cash shall not be deemed to be payment until that form of payment has been honoured, cleared or recognised and until then the Seller's ownership of rights in respect of the Goods shall continue.

e. The Buyer shall not charge the Goods in any way nor grant nor otherwise give any interest in the Goods while they remain the property of the Seller.

f. The Seller may require payment of the Price or the balance of the Price due together with any other amounts due from the Buyer to the Seller arising out of these terms and conditions, and the Seller may take any lawful steps to require payment of the amounts due and the Price.

g. The Seller can issue proceedings to recover the Price of the Goods sold not withstanding that ownership of the goods may not have passed to the Buyer.

h. Until such time the Buyer has the Seller's authority to convert the goods into other products and if the goods are so converted, the parties agree that the Seller will be the owner of the end products.

14. Security and Charge

14.1 Despite anything to the contrary contained herein or any other rights which the Seller may have howsoever:

a. Where the Buyer and/or the Guarantor (if any) is the owner of land, realty or any other asset capable of being charged, both the Buyer and/or the Guarantor agree to mortgage and/or charge all of their joint and/or several interest in the said land, realty or any other asset to the Seller or the Seller's nominee to secure all amounts and other monetary obligations payable under the terms and conditions. The Buyer and/or the Guarantor acknowledge and agree that the Seller (or the Seller's nominee) shall be entitled to lodge where appropriate a caveat, which caveat shall be released once all payments and other monetary obligations payable hereunder have been met.

b. Should the Seller elect to proceed in any manner in accordance with this clause and/or its sub-clauses, the Buyer and/or Guarantor shall indemnify the seller from and against all the Seller's costs and disbursements including legal costs on a solicitor and own client basis.

c. To give effect to provisions of clause {14.1 a) and b) inclusive hereof the Buyer and/or the Guarantor (if any) do hereby irrevocably nominate constitute and appoint the Seller or the Seller's nominee as the Buyer's and/or Guarantor's true and lawful attorney to execute mortgages and charges (whether registrable or not including such other terms and conditions as the Seller and/or the Seller's nominee shall think fit in his/her/its/their absolute discretion against the joint and/or several interest of the Buyer and/or the Guarantor in any land, realty or asset in favour of the Seller and in the Buyer's and/or Guarantor's name as may be necessary to secure the said Buyer's and/or Guarantor's obligations and indebtedness to the Seller and further to do and perform all necessary and other acts including instituting any necessary legal proceedings and further to execute all or any documents in the Seller's absolute discretion which may be necessary or advantageous to give effect to the provisions of this clause.

15. Cancellation

15.1 The Seller may cancel these terms and conditions or cancel delivery of Goods at any time before the Goods are delivered by giving written notice. The Seller shall not be liable for any loss or damage whatsoever arising from such cancellation.

15.2 At the Sellers sole discretion the Buyer may cancel delivery of the Goods. In the event that the Buyer cancels delivery of the Goods the Buyer shall be liable for any costs incurred by the Seller up to the time of cancellation.

16. Privacy Act 1988

16.1 The Buyer and/or the Guarantor/s agree for the Seller to obtain from a credit reporting agency a credit report containing personal credit information about the Buyer and Guarantor/s in relation to credit provided by the Seller.

16.2 The Buyer and/or the Guarantor/s agree that the Seller may exchange information about Buyer and Guarantor/s with those credit providers maned in the Application for Credit account or named in a consumer credit report issued by a reporting agency for the following purposes:

a. To assess an application by Buyer;

b. To notify other credit providers of a default by the Buyer;

c. To exchange information with other credit providers as to the status of this credit account, where the Buyer is in default with other credit providers; and

d. To assess the credit worthiness of Buyer and/or Guarantor/s.

16.3 The Buyer consents to the Seller being given a consumer credit report to collect overdue payment on commercial credit (Section 18K(1)(h) Privacy Act 1988).

16.4 The Buyer agrees that Personal Data provided may be used and retained by the Seller for the following purposes and for other purposes as shall be agreed between the Buyer and Seller or required by law from time to time:

a. Provision of Services & Goods;

b. Marketing of Services and or Goods by the Seller, it agents or distributors in relation to the Services and Goods;

c. Analysing, verifying and/or checking the Buyer's credit, payment and /or status in relation to provision of Services/Goods;

d. Processing of any payment instructions, direct debit facilities and /or credit facilities requested by Buyer; and

e. Enabling the daily operation of Buyer's account and/or the collection of amounts outstanding in the Buyer's account in relation to the Services and Goods.

16.5 The Seller may give, information about the Buyer to a credit reporting agency for the following purposes:

a. To obtain a consumer credit report about the Buyer; and or

b. Allow the credit reporting agency to create or maintain a credit information file containing information about the Buyer.

17. Unpaid Seller's Rights to Dispose of Goods

17.1 In the event that:

a. The Seller retains possession or control of the Goods; and

b. Payment of the Price is due to the Seller, and

c. The Seller has made demand in writing of the Buyer for payment of the Price in terms of this contract; and

d. The Seller has not received the Price of the Goods,

then, whether the property in the Goods has passed to the Buyer or has remained with the Seller, the Seller may dispose of the Goods and may claim from the Buyer the loss to the Seller on such disposal.

18. Buyers Responsibilities

18.1 It is the sole responsibility of the Buyer to;

a. Obtain any Council or Government approvals; and/or

b. Comply with any relevant Australian Standards

that are required for the installation or use of the Goods. Any fees applicable will be the sole responsibility of the Buyer.

19. Lien & Stoppage in Transit

19.1 Where the Seller has not received or been tendered the whole of the price, or the payment has been dishonoured, the Seller shall have:

a. A lien on the goods;

b. The right to retain them for the price while the Seller is in possession of them;

c. A right of stopping the goods in transit whether or not delivery has been made or ownership has passed; and

d. A right of resale,

e. The foregoing right of disposal,

provided that the lien of the Seller shall continue despite the commencement of proceedings or judgement for the price having been obtained.

20. General

20.1 If any provision of these terms and conditions shall be invalid, void, illegal or unenforceable the validity, existence, legality and enforceability of the remaining provisions shall not be affected, prejudiced or impaired.

20.2 All Goods supplied by the Seller are subject to the laws of Western Australia and the Seller takes no responsibility for changes in the law which affect the Goods supplied.

20.3 The Seller shall be under no liability whatsoever to the Buyer for any indirect loss and/or expense (including loss of profit) suffered by the Buyer arising out of a breach by the Seller of these term s and conditions.

20.4 In the event of any breach of this contract by the Seller the remedies of the Buyer shall be limited to damages. Under no circumstances shall the liability of the Seller exceed the Price of the Services.

20.5 The Buyer shall not set off against the Price amounts due from the Seller.

20.6 The Seller may license or sub-contract all or any part of its rights and obligations without the Buyer's consent.

20.7 The Seller reserves the right to review these terms and conditions at any time and from time to time. If, following any such review, there is to be any change in such terms and conditions, that change will take effect from the date on which the seller notifies the Buyer of such change.

20.8 Neither party shall be liable for any default due to any act of God, war, terrorism, strike, lock out, industrial action, fire, flood, drought, storm or other event beyond the reasonable control of either party.

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Appendix H DS Flatbed Leach Drain (DS Agencies)

Water Management
Landscaping • Engineering • Environmental

Flatbed Leach Drain



DS Water
1300 661 801
info@ds.com.au

Flatbed Leach Drain

Index:

1. **WA Health Department Approval for DS Flatbed Plastic Leach Drains**
2. **Australian Standards AS/NZS1547:2012 Preferred Characteristics**
   a) *Effluent Loading*
   b) *Design Area Sizing*
3. **Site Photos**

DS Water
1300 661 801
info@ds.com.au

Government of **Western Australia**
Department of **Health**

Henry Tan (9388 4936)

Mr Andy Holland
DS Agencies
184 Beechboro Road
BAYSWATER WA 6053

Dear Mr Holland

APPROVAL OF DS AGENCIES FLATBED

I refer to the trial approval issued by the Executive Director, Public Health (EDPH), on 30 July 2014 for the DS Agencies Flatbed.

The Environmental Health Officers of the local governments where the trial systems has been installed has verified that there are no reported issues with the systems. As such, the EDPH is prepared to grant DS Agencies approval for the system for use in Western Australia.

It shall be a condition of installation that each system is installed in accordance with the conditions of this approval.

The DS Agencies Flatbed has an infiltrative area of 2.4m^2 per metre length.

This approval may be amended or may be withdrawn at any time by the EDPH. Copies of the approved documents and approval conditions are enclosed.

If you require further information to the above matter, please contact the Department of Health's Water Unit on 9388 4999.

Yours faithfully

Richard Theobald
Delegate of
EXECUTIVE DIRECTOR
PUBLIC HEALTH

14 December 2015

W:\Public Health\EHD\Water Unit\WASTEWATER MANAGEMENT\WASTE\Product Approvals\PreApproval Documents\Infiltration Bed Matrix\DS Agencies\2015 approval\DS Agencies Infiltration Bed 20151214.doc

Environmental Health
All correspondence PO Box 8172 Perth Business Centre Western Australia 6849
Grace Vaughan House 227 Stubbs Terrace Shenton Park WA 6008
Telephone (08) 9388 4999 Fax (08) 9388 4955
wa.gov.au
28 684 750 332

Government of **Western Australia**
Department of **Health**

DS Agencies Flatbed

CONDITIONS OF APPROVAL

This is to certify that the DS Agencies Flatbed

Manufactured by: **DS Agencies Pty Ltd**
184 Beechboro Road
BAYSWATER WA 6053

is approved by the Executive Director, Public Health under the Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulations 1974 for use within Western Australia (WA) in accordance with the conditions of this approval.

Date of Issue: 14 December 2015

This approval is valid for a period of 5 years from the date of this approval or until withdrawn by the Executive Director, Public Health (EDPH).

Richard Theobald
Delegate of
EXECUTIVE DIRECTOR
PUBLIC HEALTH

14 December 2015

DEPARTMENT OF HEALTH
APPROVED
14 DEC 2015
EDPH
OF WA

W:\Public Health\EHD\Water Unit\WASTEWATER MANAGEMENT\WASTE\Product Approvals\PreApproval Documents\Infiltration Bed Matrix\DS Agencies\2015 approval\DS Agencies Infiltration Bed conditions 20151214.doc

Environmental Health
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Grace Vaughan House 227 Stubbs Terrace Shenton Park WA 6008
Telephone (08) 9388 4999 Fax (08) 9388 4955
wa.gov.au
28 684 750 332



1 General

1.1 No alteration to the design or specification of the DS Agencies Flatbed as detailed in this approval shall occur without prior approval of the EDPH.

1.2 Any changes to the design or the construction of the DS Agencies Flatbed shall be submitted for assessment and approval to the EDPH before being made commercially available in WA.

1.3 Conditions of approval may be varied or withdrawn at the discretion of the EDPH.

1.4 Each DS Agencies Flatbed owner shall be provided with the following documents:

- The site plan detailing the location and dimensions of the DS Agencies Flatbed on the lot.
- The date of installation.
- Warranty certification for the system and the installation.

2 Installation and Commissioning

2.1 For each installation, an application for approval to install shall be in the form of an application to install an apparatus as required under the Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulations 1974. Each application for installation shall be made to the Local Government and include full plans and specifications, a completed Application to Construct or Install an Apparatus for the Treatment of Sewage form, and pay all fees as prescribed.

2.2 Installation of each DS Agencies Flatbed shall be carried out in accordance with the DS Agencies Flatbed Installation Manual.

2.3 Installation of each DS Agencies Flatbed shall be carried out only by installers authorised by DS Agencies.

2.4 DS Agencies to keep an updated list of authorised installers and to make it readily available upon request by the Department of Health and the Local Government.

2.5 On the completion of the installation, the authorised installer must issue a certificate certifying the system has been installed in accordance with this approval. A copy of the certificate must be provided to the local government before the Permit to Use is issued.

2.6 When a pump dosing system is used, DS Agencies shall determine the pump rate for the system taking into account the volume of each pump event and the length of the flatbed.

2.7 When required by the approving authority, automatic sequencing valves are to be used to distribute the effluent uniformly among the flatbeds.

2.8 The installation of each DS Agencies Flatbed shall comply with the Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulations 1974.

2.9 The DS Agencies Flatbed shall be supplied, constructed and installed in accordance with this approval.

2.10 The DS Agencies Flatbed must be installed in a manner that ensures even distribution throughout the entire length of the infiltration bed.

2.11 The DS Agencies Flatbed is not approved to be trafficable and must be located at least 1.2m from an area that is subject to vehicular traffic.

2.12 DS Agencies shall provide the local government a copy of this approval together with the Application to Construct or Install an Apparatus for the Treatment of Sewage for every first system to be installed at each local government locality.

Richard Theobald
Delegate of
EXECUTIVE DIRECTOR
PUBLIC HEALTH

14 December 2015

DEPARTMENT OF HEALTH
APPROVED
14 DEC 2015
EDPH
OF WA

DS FLATBED LEACH DRAIN

GUARANTEE

DS Agencies provides a guarantee for the DS Flatbed, as per the technical specifications, and installation instructions.

If the DS Flatbed cells and distribution pipe is installed in accordance with above specifications, DS Agencies will provide a 15-year product guarantee.

Our guarantee offer extends only to the supply of faulty product.

DS Agencies and its agents and distributors accept no responsibility for incidental damage or improper product use.



March 2014

APPENDICES

A: -DS Flat bed specification sheet

B: -DS Perforated distribution pipe

C: -DS Flat bed Leach drain (3D presentation)

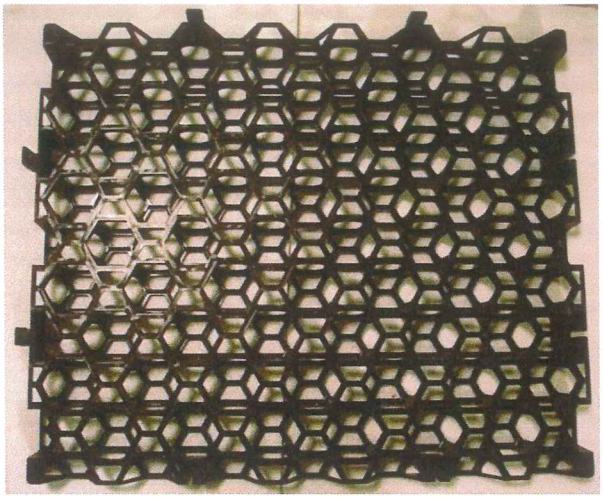
D: -DS Flat bed base preparation

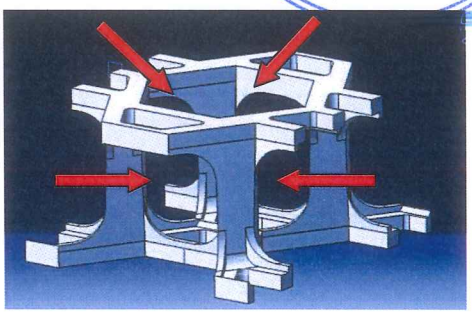


D S Agencies November 2011

Rainsmart® 50mm (2.0") NERO DRAINAGE CELL, Turf & Gravel Paver
SPECIFICATION SHEET

DEPARTMENT OF HEALTH
APPROVED
14 DEC 2015
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OF WA





	Standard Used	Metric	Imperial
Width		500mm	19.68 in
Length		600mm	23.62 in
Height		50mm	1.96 in
Surface Void Area		>90% void	
Internal Void Area		>95% void	
Material		100% recycled polypropylene	
Biological & Chemical Resistance		Unaffected by moulds and algae, soil-borne chemicals, bacteria and bitumen	
Service Temperature		-10°C to 85°C	-14°F to 185°F
Compressive Strength/ Ultimate Load	ASTM D1621	>225 t/m2	>320.02 psi
Flow Rate per unit width unfilled	ASTM D4716	>23.5 lt/m.s @ 1% gradient	>6.20 gals/m/s @ 1% gradient

Compressive strength test – confined filled with sand

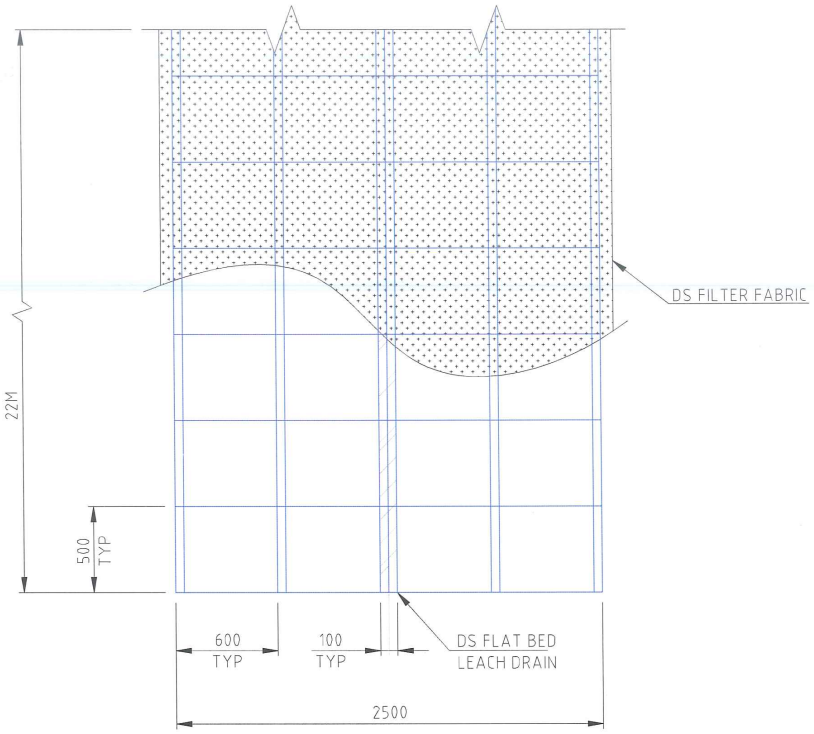
Filled with sand	Area (sqm)	Area (sq inches)	Compressive strength (t/m2)	Compressive Strength (PSI)
*110 mm diameter load.	0.03799 m^2	58.884 in^2	±465.66	± 661.38

NOTE: ***All RainSmart Products and Systems are Design Registered or Design Registration Pending.***

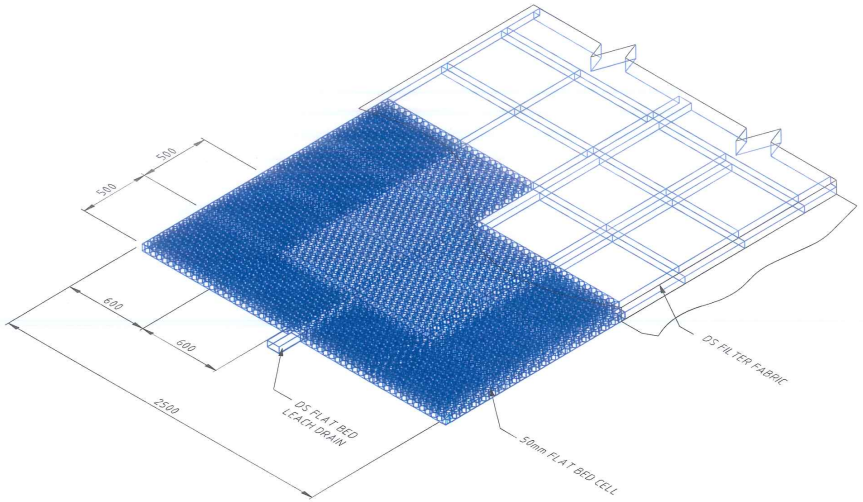
Safety Factors: Engineers, designers and geotechnical engineers should design and calculate safety factors to a serviceable limited state to suit specific project. In case of doubt, consult your nearest distributor or representative.

Disclaimer: All information provided in this publication is correct to the best knowledge of the company and is given out in good faith. This information is intended only as a general guide, no responsibility can be accepted for any errors, omissions or incorrect assumption. As each project is unique, and as Rainsmart Solutions Pty ltd. and its distributors and agents worldwide have no direct control over the methods employed by the user in specifying, installing or supervising of its products hence no responsibility is accepted by Rainsmart Solutions Pty Ltd. and its distributors and agents worldwide. Users should satisfy themselves as to the suitability of the product for their purpose

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Web : www.rainsmartsolutions.com **Email :** info@rainsmartsolutions.com

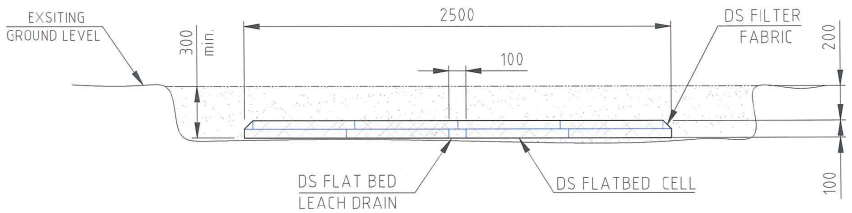


DS MODULAR FLATBED CELL UNITS
PLAN VIEW
SCALE 1:30



TYPICAL DS MODULAR FLATBED CELL ARRANGMENT
SCALE 1:30

NOTE: CELLS ARE TO BE FULLY COVERD WITH
DS FILTER FABRIC ON INSTALLATION.



DS MODULAR FLATBED CELL UNITS
SECTIONAL VIEW
SCALE 1:30

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NOTES:

NO.	AMENDMENT	DATE	INIT.

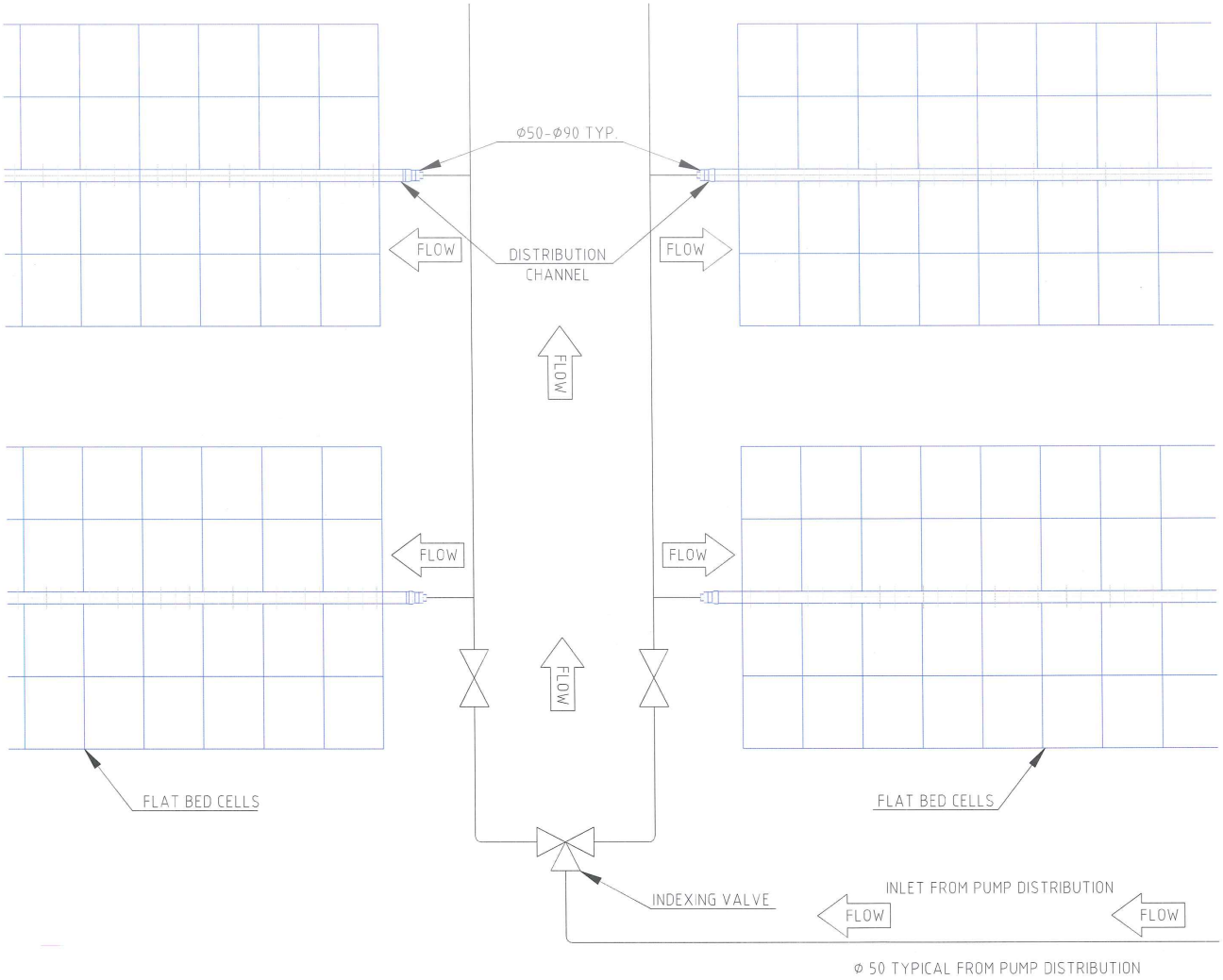
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AST Advanced Spatial technologies
CaddWest BUREAU
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Rivervale W.A. 6103
Tel: (08) 9367 2888
Fax: (08) 9367 2899
A.C.N. 069 196 096

DS AGENCIES
DS-Modular Flat Bed Soakage Trench System

DRAWN MRC	DATE 05/05/15		DRAWING No.
CHECKED	SCALE AS SHOWN		NC-104
APPROVED	JOB# 3279		

THIS IS A CADD DRAWING
DO NOT AMEND MANUALLY



TYPICAL DS MODULAR FLAT BED CELL ARRANGMENT
PLAN PART VIEW
SCALE 1:50

NOTE:
1) CELLS ARE TO BE FULLY COVERD WITH DS FILTER FABRIC ON INSTALLATION.
2) PIPE DIAMETERS ARE VARIABLE, DEPENDENT ON APPLICATION.

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NOTES:

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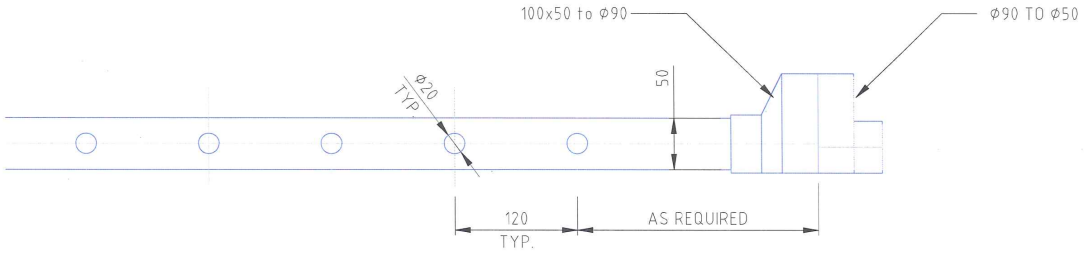
DS AGENCIES
DS- Modular Flat Bed Soakage Trench System
CONNECTION PLAN VIEW

DRAWN MRC	DATE 03/12/15		DRAWING No.
CHECKED	SCALE AS SHOWN		NC-152
APPROVED	JOB # 3279		

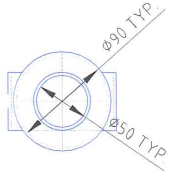
THIS IS A CADD DRAWING
DO NOT AMEND MANUALLY



PLAN VIEW



SIDE VIEW



END VIEW

TYPICAL DS MODULAR FLAT BED CELL ARRANGMENT
DISTRIBUTION CHANNEL CONNECTION
SCALE 1:5

NOTE:
1) CELLS ARE TO BE FULLY COVERD WITH DS FILTER FABRIC ON INSTALLATION.
2) PIPE DIAMETERS ARE VARIABLE, DEPENDENT ON APPLICATION.

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NOTES:

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DS AGENCIES
DS-Modular Flat Bed Soakage Trench System
CHANNEL CONNECTION DETAILS

DRAWN MRC	DATE 03/12/15		DRAWING No.
CHECKED	SCALE AS SHOWN		NC-151
APPROVED	JOB# 3279		

THIS IS A CADD DRAWING
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Flat Bed ETA/ETS Installation Manual

Application

Component List

DS Water 50 mm cell	4 pieces per 1.2 square metre (Appendix A)
DS geotextile	non-woven in packs (11.0m x 3.0m)
DS Water perforated pipe	100mm x 50mm x 3000 mm (Appendix B)
DS Water pipe connector	1 per length
DS Water pipe end cap	1 per length

Excavation

We recommend that construction techniques described in AS/NZS 1547 Clause L7 be observed as well as the specific details that follow.

Ensure that the level bed is prepared to +/- 20mm tolerance.

Also if excavating in gravel/ clay soils, use bucket teeth to scarify the floor to a min depth of 50mm.

Installation

Step 1. Distribution Pipe

In a prepared bed (as detailed above) lay the Distribution Line centrally in the trench, with the pipe orientated so it is 50mm high. Using the connectors, join the 3.0m lengths, the required length, ensuring it finishes a max of 2000 from the end. NB insert the gutter plug in the end of the run, or ensure it is blocked off. Then fit a pipe connector to the start of the line, to accept the incoming feed line.

Step 2. Bottom layer

Clipping or abutting the cells together to form a continuous blanket installs the 50mm cell units, either side of the DS Water perforated pipes. The 600mm dimension across the bed, and the 500mm dimension along the bed (See Appendix C) NB: LPED lines can be used instead of distribution pipes, when dose-loading effluent into beds.

To ensure that the 50 Flatbed blanket is level, additional friable material can be added through the cells to their underside, to areas which exhibit depressions, using a lift and drop technique. (See Appendix D)

Step 3. Top layer

Similar to the Bottom layer, except this forms a continuous mat on top of the Bottom layer and Distribution pipe.

Step 4. Geotextile

The Flat bed is then covered with the geotextile supplied, in packs (11.0m x 3.0m) or complete 3.0m wide rolls. . The geotextile covers the top and the sides.

Step 5. Backfilling

The Flat bed leach drain can now be carefully backfilled using the excavated material.

Water Management
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Domestic Application









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Landscaping • Engineering • Environmental

Commercial Application



DS Water
1300 661 801
info@ds.com.au

Appendix I DoH Water Balance Spreadsheet

Land Capability Assessment Framework

Please read the attached notes before using this spreadsheet

Irrigation area sizing using Nominated Area Water Balance for Zero Storage

Site Address:	**Valencia Nursing Home, Carmel**		
Date:	13 November 18	**Assessor:**	Sanoj Jayaseelan

INPUT DATA

Design Wastewater Flow	Q	21,970	L/day	Based on maximum potential occupancy
Design Irrigation Rate	DIR	50.0	mm/day	Based on soil texture class/permeability
Nominated Land Application Area	L	1058	m^2	[1]
Crop Factor	C	0.6-0.8	unitless	Estimates evapotranspiration as a fraction of pan evaporation; varies with season and crop type[2]
Rainfall Runoff Factor	RF	1.0	untiless	Proportion of rainfall that remains onsite and infiltrates, allowing for any runoff
Mean Monthly Rainfall Data	PERTH AIRPORT (009021)			BoM Station and number
Mean Monthly Pan Evaporation Data	PERTH AIRPORT (009021)			BoM Station and number

Parameter	Symbol	Formula	Units	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Days in month	D		days	31	28	31	30	31	30	31	31	30	31	30	31	**365**
Rainfall	R		mm/month	11.1	15.1	16.2	40.1	98.5	155.6	156	118.9	72.7	43.3	25.9	11.4	**764.8**
Evaporation	E		mm/month	10.2	9.6	7.7	5	3	2.2	2.1	2.6	3.7	5.4	7.5	9.1	**68.1**
Crop Factor	C		unitless	0.80	0.80	0.70	0.70	0.60	0.60	0.60	0.60	0.70	0.80	0.80	0.80	
OUTPUTS																
Evapotranspiration	ET	ExC	mm/month	8	8	5	4	2	1	1	2	3	4	6	7	**50.86**
Percolation	B	DIRxD	mm/month	1550.0	1400	1550.0	1500.0	1550.0	1500.0	1550.0	1550.0	1500.0	1550.0	1500.0	1550.0	**18250.0**
Outputs		ET+B	mm/month	1558.2	1407.68	1555.4	1503.5	1551.8	1501.3	1551.3	1551.6	1502.6	1554.3	1506.0	1557.3	**18300.9**
INPUTS																
Retained Rainfall	RR	RxRF	mm/month	11.1	15.1	16.2	40.1	98.5	155.6	156	118.9	72.7	43.3	25.9	11.4	**764.8**
Applied Effluent	W	(QxD)/L	mm/month	643.8	581.5	643.8	623.1	643.8	623.1	643.8	643.8	623.1	643.8	623.1	643.8	**7580.7**
Inputs		RR+W	mm/month	654.9	596.6	660.0	663.2	742.3	778.7	799.8	762.7	695.8	687.1	649.0	655.2	**8345.5**
STORAGE CALCULATION																
Storage remaining from previous month			mm/month	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Storage for the month	S	(RR+W)-(ET+B)	mm/month	-903.2	-811.0	-895.3	-840.3	-809.5	-722.6	-751.4	-788.8	-806.8	-867.2	-857.0	-902.0	
Cumulative Storage	M		mm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Maximum Storage for Nominated Area	N		mm	0.00												
	V	NxL	L	0												
LAND AREA REQUIRED FOR ZERO STORAGE			m^2	440	442	442	450	469	490	488	475	461	451	445	441	

MINIMUM AREA REQUIRED FOR ZERO STORAGE: 490.0 m^2

CELLS

	Please enter data in blue cells
XX	Red cells are automatically populated by the spreadsheet
XX	Data in yellow cells is calculated by the spreadsheet, DO NOT ALTER THESE CELLS

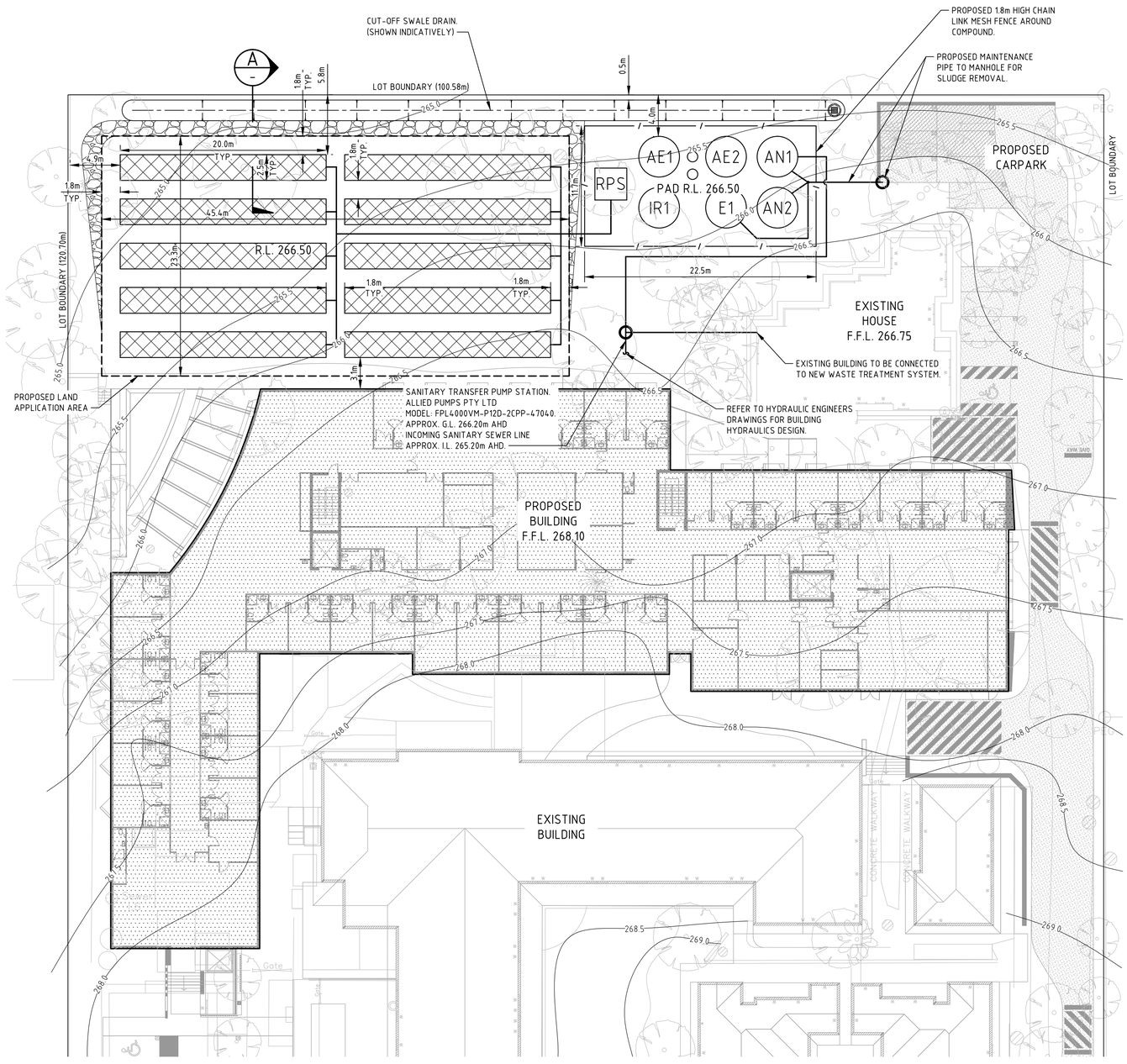
NOTES

[1] This value should be the largest of the following: land application area required based on the most limiting nutrient balance or minimum area required for zero storage

[2] Values selected are suitable for pasture grass in WA

Weather Station Link: http://www.bom.gov.au/climate/averages/tables/cw_009021_All.shtml

Appendix J Peritas Drawing PC16117-CI-600-RevE



PLAN
SCALE: 1:250

NOTES:
1. REFER TO ALLIED PUMPS PTY. LTD. DRAWING 47040-M-001 FOR STANDARD DESIGN TYPICAL LAYOUT.

LEGEND:
- 268.5 — EXISTING CONTOURS (0.5m INTERVALS)
- PROPOSED LEACH DRAINS
- PROPOSED WASTEWATER PIPES

A.T.U. LEACH DRAIN CALCULATIONS

TOTAL NUMBER OF OCCUPANTS	= 120
TOTAL NUMBER OF STAFF + VISITORS	= 67
TOTAL NUMBER OF OCCUPANTS	= 120 x 150 LITRES/day = 18,000 L/day
TOTAL NUMBER OF STAFF	= 55 x 70 LITRES/day = 3,850 L/day
TOTAL NUMBER OF VISITORS	= 12 x 10 LITRES/day = 120 L/day
TOTAL LITRES/DAY	= 21,970 L/day

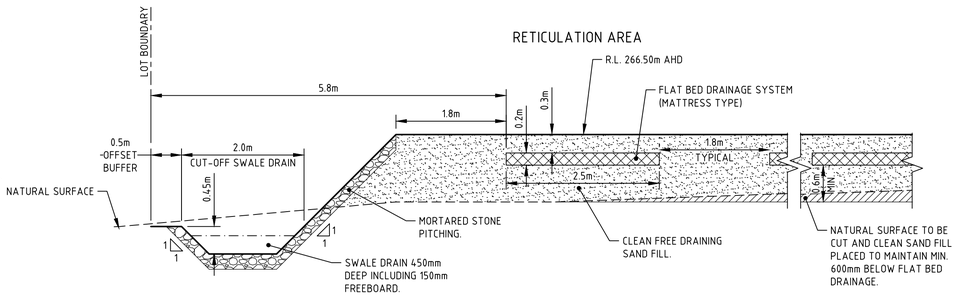
ATU:
ALLIED PUMPS PTY. LTD.
SYSTEM MODEL (APST-32-RT32.6D/DF-47040) = 22,950 L/day.

WASTEWATER DISPOSAL:
DIR = 50mm/day

INFILTRATION AREA = 2.4m²/m

21,970(L/day) / 50(mm/day) / 2.4(m²/m) = 183.1m OF FLAT BED REQUIRED

10 x 20m LENGTHS OF FLAT BED DRAINAGE CELLS = 200m > 183.1m.



TYPICAL SECTION A-A
SCALE: 1:50

WARNING

BEWARE OF UNDERGROUND SERVICES

The location of underground cables are approximate only and their exact position should be checked on site. No guarantee is given that all existing cables and services are shown. Locate all underground cables and services before commencement of work. Refer to Worksafe Regulation 3.21.

DIAL1100 BEFORE YOU DIG

EXISTING SERVICES TO BE LOCATED AND PROTECTED BY THE CONTRACTOR. ALL COST ASSOCIATED WITH LOCATION OF SERVICES AND REINSTATEMENT OF VERGES, DRIVEWAYS, AND DAMAGED SERVICES TO BE AT THE CONTRACTORS EXPENSE.

1:50 AT A1 — 0 0.5m 1m 2m 3m

1:250 AT A1 — 0 2.5m 5m 10m 15m

21/11/2018 4:41:20 PM
E:\Project Delivery (PD)\3.0 Projects\3.4 Civil\2016\PC16117 - Valencia Nursing Home Mt Carmel\2.0 Design\2.34 Drawings\2.34.1 Acad\PC16117-CI-600.dwg

No.	REVISION	BY	DATE
E	DIMENSIONS ADDED	DA	21.11.18
D	DIMENSIONS ADDED; APPLICATION AREA SHOWN	DA	13.11.18
C	LEACH DRAINS LAYOUT AMENDED	DA	12.11.18
B	DRAWING UPDATED	DA	10.09.18
A	ISSUED FOR APPROVAL	DA	31.08.18

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PROJECT: VALENCIA NURSING HOME, MT CARMEL - PRIVATE WASTEWATER TREATMENT SYSTEM

DRAWING TITLE: WASTEWATER DISPOSAL SYSTEM LAYOUT PLAN

SCALE	AS SHOWN	FILE	-
HORIZONTAL		DESIGN	EBF
VERTICAL		DRAWN	DA
SURVEY DATUM	AHD	CHECKED	EBF
WAPC No	.....	DATE	AUG 18
CADFILE NAME	PC16117-CI-600	DRAWING No.	PC16117-CI-600
		REV.	E

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APPROVED .....