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AUGUST 25, 2020

Harrisenvironmental CONSULTING

ADDENDUM SOIL AND SITE ASSESSMENT FOR ONSITE WASTEWATER DISPOSAL

84-90 THIRD ROAD, BERKSHIRE PARK, NSW

LGA: Penrith

Lot 107 DP 975322

PROJECT MANAGER: Monique Wilson, Meek's Day Care

[redacted]

VERSION CONTROL

Title	Addendum Soil and Site Assessment for Onsite Wastewater Disposal			
Site address	84-90 Third Road, Berkshire Park, NSW			
Description	Addendum to wastewater disposal management system			
Created By	Pichamon Sarakan B.Env Engineering (UOW)			
Date Created	25/08/2020			
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[1.0]	P.S.	Issue for client review	25/08/2020	Complete
				-
				-

Limitations

The findings and recommendations in this report are based on the objectives and scope of work outlined above. Harris Environmental Consulting Pty performed the services in a manner consistent with the normal level of care and expertise exercised by members of the environmental assessment profession. The report and conclusions are based on the information obtained at the time of the assessment. Changes to the site conditions may occur subsequent to the investigation described herein, through natural processes or through the intentional or accidental addition of contaminants, and these conditions may change with space and time. The results of this assessment are based upon site assessment conducted by HEC personnel and information provided by the client and site management. All conclusions regarding the property are the professional opinions of the HEC personnel involved with the project, subject to the qualifications made above. While normal assessments of data reliability have been made, HEC assumes no responsibility or liability for errors in any data obtained from regulatory agencies, information from sources outside of HEC, or developments resulting from situations outside the scope of this project.

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1. INTRODUCTION

This Site and Soil Assessment for On-site Wastewater Management was prepared by Harris Environmental Consulting Pty at the request of Monique Wilson, Meek's Day Care, who is the manager of Meek's Preschool & Early Learning Centre, located at Lot 107 DP 975322 at 84-90 Third Road, Berkshire Park, NSW. This report relates to a proposal to increase the numbers of children and staff in the childcare facilities from 30 children and 4 staff to 45 children with 5 staff. The wastewater load increases from 1360L/day to 2000L/day.

This report is an amendment to an approved wastewater report prepared by Harris Environmental Consulting Pty (*REF-3795WW -19 June 2020*) and, Envirotech Environmental and Engineering Consultancy Services (*REF-18-5918-A2 -15 November 2018*). The Harris Pty report was approved with 286m^2 of semi-fixed spray irrigation for the disposal of an extra 320L of treated wastewater per day on top of 1040L/day for the existing wastewater generator (Envirotech Pty).

This assessment was undertaken for a proposal to install a soil absorption bed for the extra 640L/day of wastewater from the additional 15 children and 1 staff. This assessment based on the data and information from the approved reports prepared by Envirotech Environmental and Engineering Consultancy Services, and Harris Environmental Consulting Pty.

2. ASSESSMENT CRITERIA

Harris Environmental Consulting was commissioned by the owner to undertake this Soil and Site Assessment for On-Site Wastewater Management in accordance with:

- Penrith City Council's On-site Sewage Management and Greywater Reuse Policy;
- Australian Standard AS/NZS 3500 Plumbing and Drainage 2018;
- Environment and Health Protection Guidelines (1998) On-site Sewage Management; for Single Households (Department of Local Government);
- AS/NZ 1547:2012 On-site wastewater management (Standards Australia, 2012);

3. SITE INFORMATION

Project manager:	Monique Wilson, Meek's Day Care	
Size of property:	~1.617ha	
Site address:	84-90 Third Road, Berkshire Park, NSW	
Legal title:	Lot 107 DP 975322	
Local Government:	Penrith Council	
Wastewater design load and daily wastewater (L/day):	Approved wastewater load for 30 children and 4 staff	1360L/day
	Proposed wastewater load for a total of 45 children and 5 staff	2000L/day
	No. of additional children plus staff	15 children plus 1 staff
	Design wastewater load	640 L/day
Proposed wastewater treatment:	AWTS (existing)	
Proposed wastewater disposal:	Soil absorption bed	
Date site assessed:	August 24, 2020	
Date report prepared:	August 25, 2020	
Report prepared by	Pichamon Sarakan B.Env Engineering (UOW)	
Site assessor:	[redacted] Msc Env Science (UOW), Grad dip Nat Res (UNE), BscAppSc, Agriculture (HAC) Sean Harris	

4. SOIL ASSESSMENT

Method:	Hand augur/crowbar/shovel			
Depth to bedrock (m):	1000mm to restrictive layer; minor limitation			
Depth to high soil watertable:	No groundwater or subsoil mottling encountered at a depth of 1000mm; minor limitation			
Coarse (%):	5-10% coarse fragments in subsoil, minor limitation			
pH (soil/water):	pH 5.5-6; minor limitation			
Electrical conductivity:	<4dSm, minor limitation			
Salinity hazard:	No salinity information available for this area			
Domestic groundwater use:	The Department of Primary Industries Office of Water search of groundwater bores found there are **no known groundwater bores** within 100m of the proposed effluent management area			
Native vegetation and environmentally sensitive vegetation	No native vegetation or environmentally sensitive vegetation within 1m of the proposed EMA.			
Surface rock:	No surface rock in proposed effluent management area			
Bulk density:	Well drained soil profile; minor limitation			
Phosphorus balance assumptions:	NA for soil absorption beds			
Soil profile, from two similar soil profiles in EMA:	Layer 1		DIR	DLR
	Texture Colour Depth Structure Coarse frag.	Loam Black 0-100mm Moderately structured NA	NA	NA
	Layer 2		DIR	DLR
	Texture Colour Depth Structure Coarse frag.	Gravelly sandy clay loam Cram / light brown 100-1000mm Weakly structured 5-10%	NA	20mm/day
	Layer 3		DIR	DLR
	Texture Colour Depth Structure Coarse frag.	NA	NA	NA

5. SUMMARY OF SOIL AND SITE CONSTRAINTS

There are no major soil or site constraints that would prevent the installation of a soil absorption bed for treated wastewater disposal. The extra wastewater load will be treated with the existing AWTS.

The proposed soil absorption bed will be installed to the north of the childcare buildings. It is in the location that is compliant with the buffers and setback distances required by Penrith Council, this includes locating the proposed effluent disposal area more than 40m from drainage depressions, 12m upslope of property boundaries and 6m downslope of property boundaries, 6m upslope of buildings/driveways/walkways and 3m downslope of buildings/driveways/walkways.

As per AS/NZS 1547:2012 for onsite effluent disposal, a 100% reserve effluent disposal area is required and has been designated as land to be set aside for future effluent disposal onsite.

The loam to clay loam soil profile has ideal permeability and nutrient absorption properties for this method of wastewater treatment and disposal on site. This assessment assumes the proposed irrigation area will be fully grassed and the lawns managed, with clippings removed after mowing.

Photo 1 Onsite soil assessment profile

Photo 2 Looking towards the location of the proposed soil absorption bed

Photo 3 Terrain and landform of the site at the proposed effluent disposal area

6. SYSTEM DESIGN

6.1 WASTEWATER TREATMENT SYSTEM

The total design wastewater load is 2000L/day. The existing Aerated Wastewater Treatment System (AWTS) appears to be in good working order and has sufficient capacity to manage the design wastewater load.

The existing AWTS is to be maintained in accordance with Section 5 of the guidelines 'On-site Sewage Management for Single Households' (Department of Local Government, 1998) and AS/NZS 1547-2012 'On-site Domestic Wastewater Management' (Standards Australia, 2012).

Photo 4 Existing AWTS

6.2 PIPES

The sewer pipes between the plumbing amenities, treatment system and effluent disposal area must conform with 'AS/NZS 3500(Set):2018 Plumbing and Drainage Set' specifying the nominal pipe sizes and respective minimum grades. Table 1 contains these specifications.

In addition, where a sewer carrying untreated wastewater to a treatment system is longer than 60 metres, the minimum grade should be doubled, and inspection ports should be installed at least every 30 metres or at an angle or change of grade.

The sewer pipes between the plumbing amenities, AWTS and effluent disposal area must be buried at a depth that provides protection against mechanical damage or deformation, in accordance with 'AS/NZS 3500(Set):2018 Plumbing and Drainage Set'. Table 2 shows the minimum pipe depth for trafficable areas.

TABLE 1 MINIMUM PIPE DIAMETER AND GRADE CALCULATIONS

Nominal pipe size (DN)	Minimum grade %	Minimum grade ratio
65	2.5	1:40
80	1.65	1:60
100	1.65*	1:60
125	1.25	1:80
150	1.00	1:100

* Except for drains from septic tanks, sewage treatment plants and unvented discharge pipes from tundishes, which may have a minimum grade of 1%,
Source: 'AS/NZS 3500.2:2018 Plumbing and drainage Part 2 Sanitary plumbing and drainage' Table 3.4.1. NB: pipe grades are expressed as a percentage of vertical to horizontal distances.

TABLE 2 MINIMUM PIPE DEPTH FOR TRAFFICABLE AREAS

Location	Minimum depth of cover (mm) for all materials other than cast iron
Where subject to vehicular traffic	500
Elsewhere	300

Source: 'AS/NZS 3500 (Parts 0-4):2018 Plumbing and drainage Set'. Table 3.7.2 Minimum Cover for Buried Pipes'

6.3 WASTEWATER DISPOSAL METHOD

The soil absorption bed can be constructed within the range of widths and depths shown in Table 3 (ASNZ1547, 2012). The bed can be no deeper than 600mm and no wider than 4m. For this site, the proposed base of the bed is 450mm below the ground surface (300mm aggregate and 150mm topsoil).

TABLE 3 DIMENSIONS FOR CONSTRUCTING SOIL ABSORPTION BED

	Typical dimensions (mm)	Maximum (mm)	Minimum (mm)
Width	1000-4000	4000	1000
Depth of aggregate	300-600	600	300
Depth of topsoil	100-150	150	100
Spacing between adjacent beds	-	NA	1000
Source:'AS/NZS 1547:2012 *On-site* domestic wastewater management			

The size of the soil absorption bed is calculated using the formulae in AS/NZ 1547(2012). It is based on design flow rate, design width and Design Loading Rate (DLR), which is the amount of effluent that, over the long-term, be applied each day per area of an infiltrative surface without failure of the infiltrative surface. ASNZ1547(2012) recommends a DLR of 10mm/day for well-structured clay loam subsoils, receiving primary treated effluent.

The AS/NZ1547(2012) method for calculating bed size is as follows:

$$L = \frac{Q}{DLR \times W}$$

Where

L = Length in m
Q = Design daily flow in L/day (**640L/day**)
W = Width in m
DLR = Design Loading Rate in mm/d (**20mm/d**)

Based on the above formulae and assumptions described in this report, the soil absorption bed must be **32m^2.**

The **32m^2 bed** must be designed. The proposed configuration will include **ONE x 1.8m wide x 18m long bed.**

A **100% reserve soil absorption bed** is required in accordance with ASNZ1547(2012). The reserve soil absorption bed is to be 32m^2.

7. COMPLETION OF WORKS

The last stage of this process involves submitting an Installation Certificate provided by the installer. This is to certify that the systems have been installed according to the System Design. A copy of the installation certificate must be provided to the council and the system designer. A council certifier will make a final inspection before the system is approved for use.

The treatment and application systems must be installed by a contractor(s) licensed by NSW Fair Trading. That could be a licensed plumped or a licensed irrigation contractor (or both), each with at least three years' experience in effluent disposal.

8. SUMMARY

The purpose of this assessment is to assess whether on-site wastewater management can be undertaken on the subject lot to achieve the relevant assessment criteria. This assessment finds that on-site wastewater management can be undertaken for the extra wastewater load in the childcare facilities from 30 children and 4 staff to 45 children with 5 staff.

Following the soil and site assessment, this assessment recommends the following:

- Wastewater to be treated with the existing Aerated Wastewater Treatment System (AWTS) for wastewater treatment;
- Installation of a 32m^2 soil absorption bed as ONE x 1.8m x 18m bed as described in the Appendix and shown on the Site Plan; and
- Reservation of a 32m^2 of land as reserve soil absorption bed as shown on the Site Plan.

9. REFERENCES

Department of Local Government (1998) *On-site Sewage Management for Single Households*. NSW Government.

Standards Australia (2012) Australian/New Zealand Standard 1547:2012 *On-site domestic wastewater management*. Standards Australia.

NSW Health Septic Tank Accreditation Guidelines (2001).

Hazelton, P.A and Murphy, B.W ed. (1992) *What Do All the Numbers Mean? A Guide for the Interpretation of Soil Test Results.* Department of Conservation and Land Management (incorporating the Soil Conservation Service of NSW), Sydney.

APPENDIX I CONSTRUCTION OF SOIL ABSORPTION BEDS

The process for constructing soil absorption beds is described below:

Step 1 Site Preparation

Obtain a copy of the council approved plans and conditions of consent. Accurately locate beds as shown on the site plans and according to the specified and approved design and/or any covenant. Check the location of all constructed beds against the approved site plans. If there is any change in their position from the site plans, a Section 96 application (from the *Environmental Planning and Assessment Act 1979)* must be made to the council to alter their position.

Step 2 Positioning

Build the bed along the contours and use laser levelling to ensure that the base is exactly level. If this does not happen, distribution will not be even and one part of the bed will be more heavily loaded. This could cause the most heavily loaded part of the bed to fail prematurely, with further creeping failure as the effluent is forced to more distant parts of the bed.

Step 3 Timing

Build beds during fine weather. If it rains before beds are completed, they should be covered to protect them from rain damage. Once dug, complete the bed promptly to avoid foreign material being washed into the open bed.

Step 4 Excavation

Carefully excavate the base of any bed and level it with a dumpy or laser level. The bed must be level along and across the line of the bed. If there is a slope across the base of the bed, the effluent will drain to and preferentially load the downslope side of the bed, which may then fail or overflow.

Where beds are dug along the contour on sloping ground by an excavator that does not have a pivoting bucket, the base of the bed will probably be cut parallel to the ground surface. In this case, the base of the bed will have a fall towards the downslope side. The bed should be further hand dug to level the base and stop excessive effluent accumulating against the downslope wall of the bed.

Step 5 Construction

The pipe work that distributes effluent into each bed shall include a tap/valve to enable flows to be managed between beds so individual beds can be rested off-line. A brief resting phase is needed to break down the microbial biomass that develops around the bed that can eventually lead to its failure.

The effluent will be distributed in the bed using a 100mm PVC pipe laid level onto a 200mm depth of 20-40mm aggregate.

The pipe will be drilled out with 10mm deburred holes every 30cm, and 20 degrees off the bottom of the pipe. Seep holes of 5mm should be sited at 2m intervals along the bottom of the pipe.

Once laid, the pipe has a 50mm cover of aggregate. Total aggregate depth is 300mm. The end of each length of pipe will have a capped riser to allow flushing of the distribution pipe.

A capped inspection port to be inserted on downhill side of the trench, using 50mm PVC pipe, slotted entire depth of gravel bed.

Cover gravel with geotextile to prevent topsoil mixing with gravel bed.

Ensure that the sides of beds are not damaged or caused to collapse when the beds are filled with gravel or sand.

Bed can be filled with gravel (typically 20-40 millimetres), but it should not be compacted. Appropriate consideration should be given to bed storage capacity where beds are filled with material other than gravel.
Test the beds with clean water before filling with gravel to ensure effective and even distribution of effluent.

Apply 150 to 200 millimetres of topsoil to the top of the bed and leave it slightly mounded above ground level to allow it to settle and to encourage incident rainfall to be shed away from the top of the bed.

The top of the absorption bed area should be turfed or grass planted to establish vegetation cover promptly after construction. This ensures the best uptake of effluent by evapotranspiration. Ensure that larger deep-rooting plants are not planted close to bed to reduce the chance of root intrusion and clogging of the beds.

A stormwater diversion berm/ drain should be built on sloping sites upslope of the absorption beds.

Step 6 Dosing

Bed is to be pressure-dosed from the AWTS.

Run-on stormwater is to be diverted around bed means of a berm or diversion drain.

APPENDIX II GENERAL RECOMMENDATIONS TO MANAGE WATER QUALITY AND QUANTITY

InSinkErator style kitchen garbage disposal units should be avoided as they increase water consumption and raise the nutrient and BOD concentrations of household effluent.

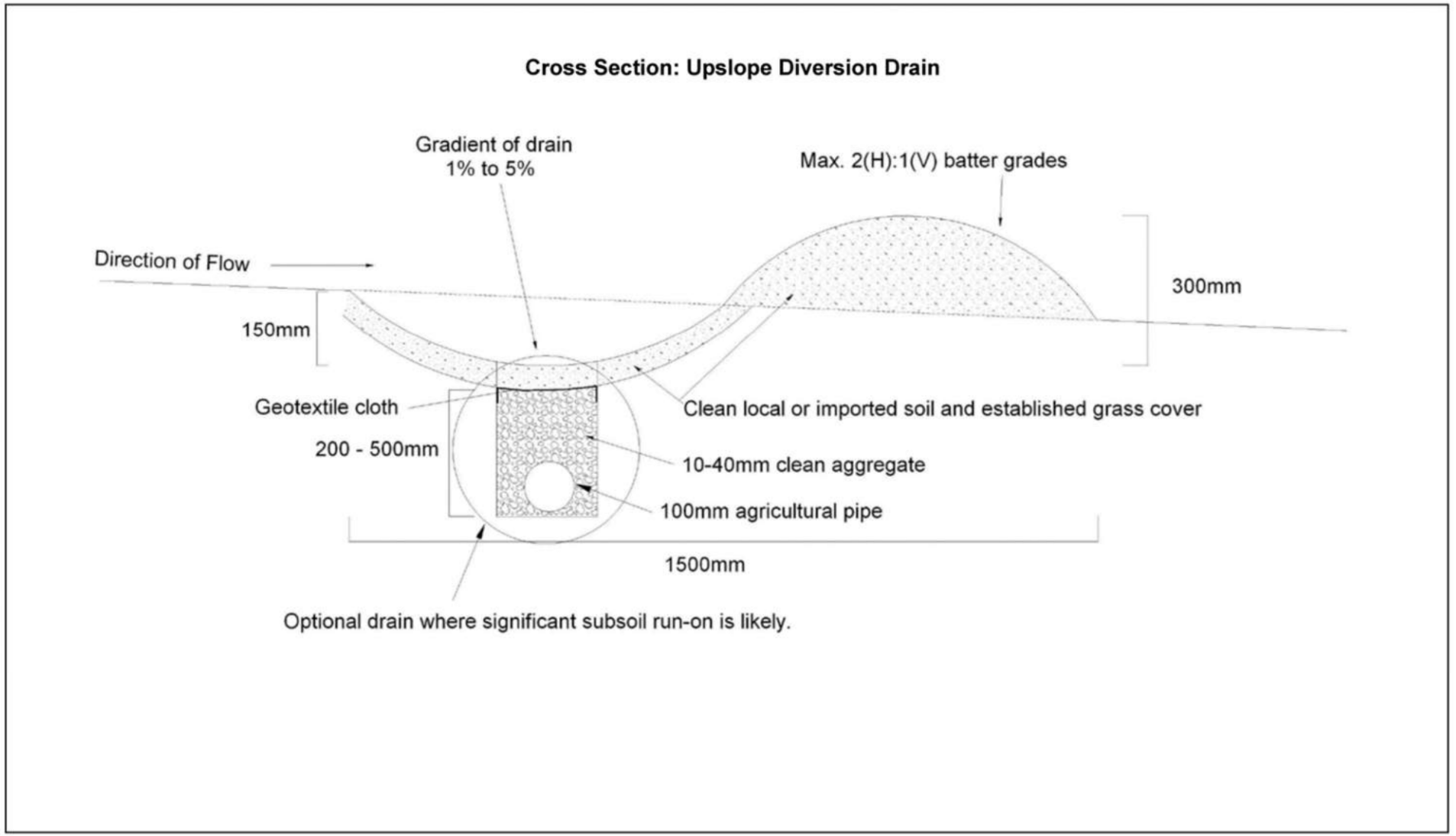
Water conservation can reduce the volume of wastewater that needs to be treated and discharged on site. The residence should include appliances that are rated under the Water Efficiency Labelling and Standards (WELS) Scheme that includes:

i. 4 star dual-flush toilets;
ii. 3 star showerheads;
iii. 4 star taps (for all taps other than bath outlets and garden taps);
iv. 3 star urinals; and
v. Water efficient washing machines and dishwashers are to be specified and used wherever possible.

Chemical cleaning compounds and other chemicals that enter the treatment system should be low in phosphate and salt.

Anti-bacterial chemical cleaning compounds and other chemicals that enter the treatment system should be avoided. This includes chlorine, disinfectants, bleaches etc.

APPENDIX III STANDARD DRAWING 9A - UPSLOPE DIVERSION DRAIN



Issue:	Description:	Date	Drawn	Approved
A	HEC Standard Drawing	25/08/20	PS	SH

North

Client / project manager:

MONIQUE WILSON

Harris Environmental Consulting

[redacted]

ABN: 541 287 40 549

Wastewater | Bushfire | Stormwater

Project

PROPOSED SOIL ABSORPTION BED

LOT 7 DP 975322

84-90 THIRD ROAD, BERKSHIRE PARK, NSW

LGA: PENRITH

Drawing Title:

ON-SITE WASTEWATER MANAGEMENT SHEET 1

Drawn:	Date:	Scale:	Q.A. Check:	Date:
PS	25/08/2020	1:250	—	25/08/2020
Designed:	**Our reference:**		**Dwg. No.**	**Issue:**
PS	3795ww		#1	A

HARRIS

Issue:	Description:	Date	Drawn	Approved
A	HEC Standard Drawing	25/08/20	PS	SH

North

Client / project manager:

MONIQUE WILSON

Harris Environmental Consulting

[redacted]

ABN: 541 287 40 549

Wastewater | Bushfire | Stormwater

Project

PROPOSED SOIL ABSORPTION BED

LOT 7 DP 975322

84-90 THIRD ROAD, BERKSHIRE PARK, NSW

LGA: PENRITH

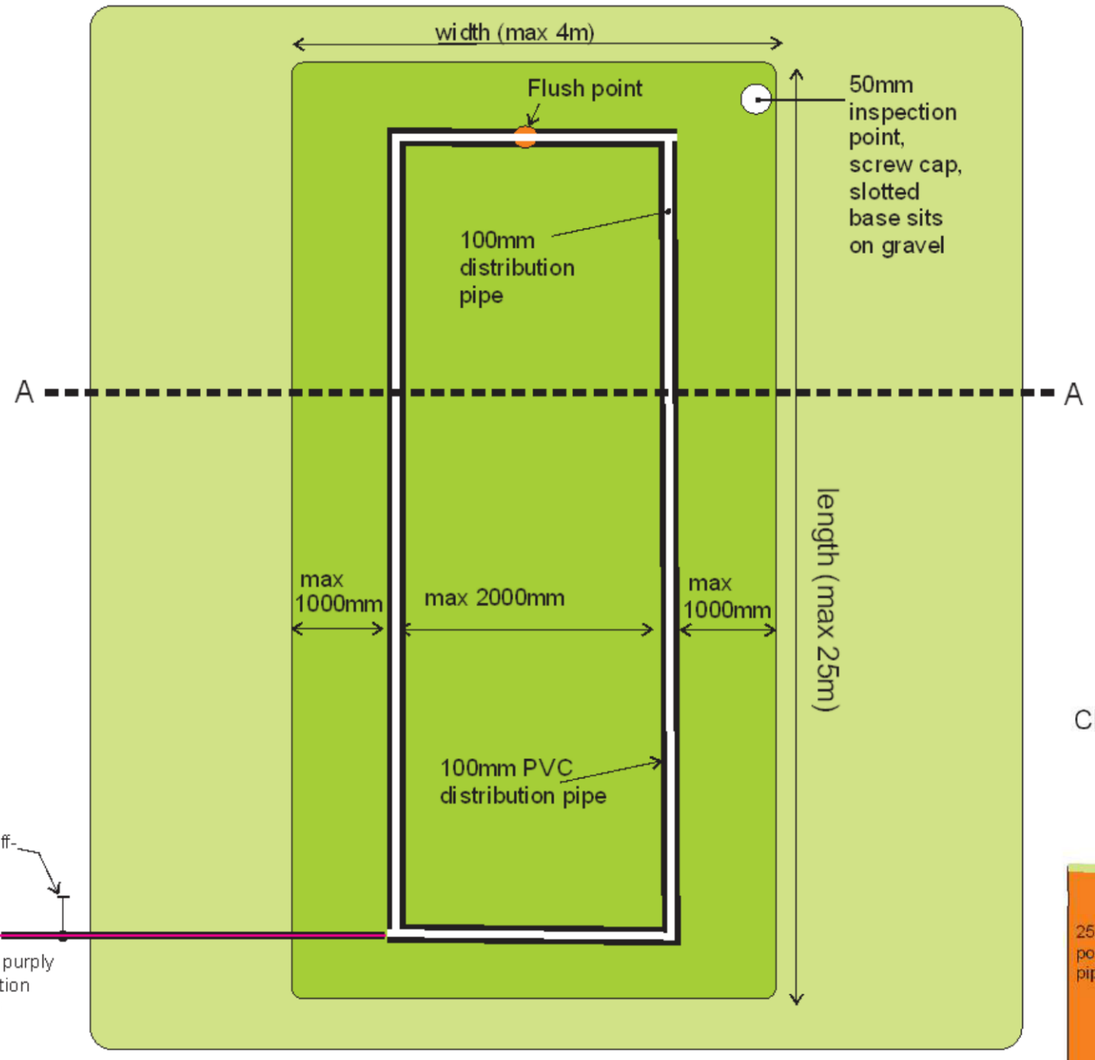
Drawing Title:

ON-SITE WASTEWATER MANAGEMENT SHEET 2

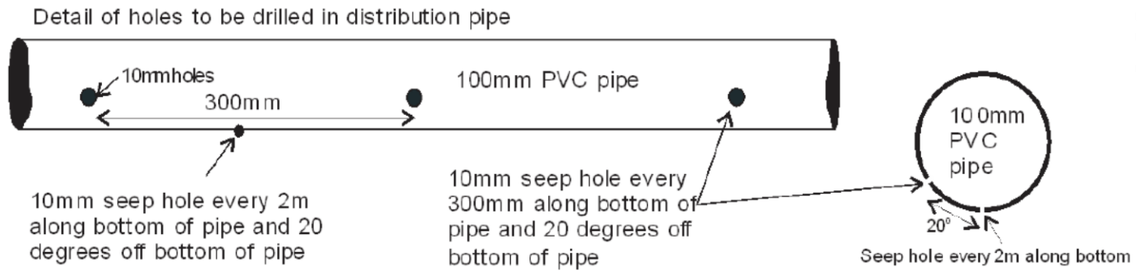
Drawn:	Date:	Scale:	Q.A. Check:	Date:
PS	25/08/2020	1:600	–	25/08/2020
Designed:	**Our reference:**		**Dwg. No.**	**Issue:**
PS	3795ww		#2	A

DESIGN AND CONSTRUCTION

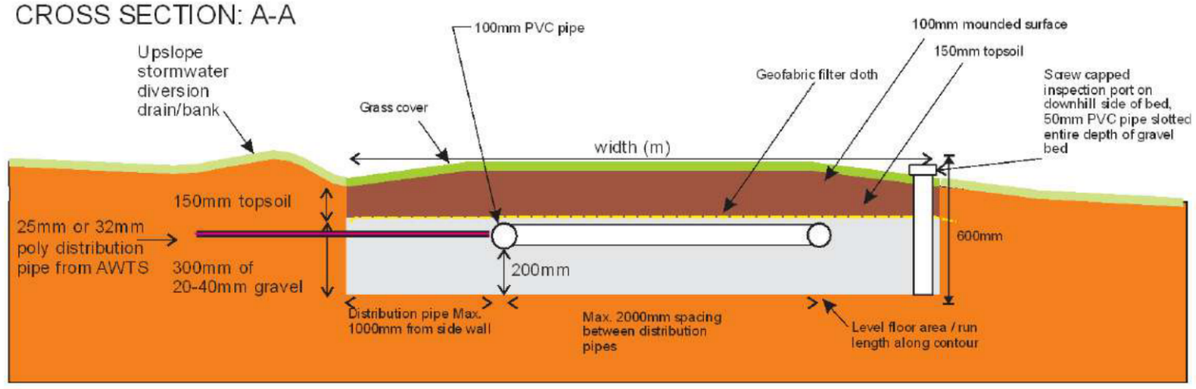
PLAN VIEW



DISTRIBUTION PIPE



CROSS SECTION: A-A



Issue:	Description:	Date	Drawn	Approved
A	HEC Standard Drawing		PS	SH

North

Client

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Wastewater | Bushfire | Stormwater

Project

Drawing Title:
SOIL ABSORPTION BED STANDARD DRAWING

Drawn:	Date:	Scale:	Q.A. Check: Date:
PS		NTS	—
Designed:	Our reference:		Dwg. No. Issue:
PS			