BRAD FISHER

ONSITE SEWERAGE ASSESSMENT

LOT 12 ZENA CLOSE
CAPE TRIBULATION

REPORT No. GT12-020-001R FISHER_REV 1

APRIL 2013

REVISION NO. 1

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Document Status							
Revision No.	***Author***	***Reviewer***	***Reason for Issue***	***Approved for Issue***			
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1.0 INTRODUCTION

Engineering Testing Services Pty Ltd (ETS) have been engaged by Brad Fisher to prepare an Onsite Sewerage Assessment (OSA) to assess the suitability of installing a composting toilet and greywater treatment system to serve a proposed two (2) bedroom residence. The block has an area of approximately 5 hectares in the local government area of the Cairns Regional Council. This OSA addresses the requirements under AS/NZS1547:2000 for the proposed residence on the site.

2.0 LEGISLATIVE REQUIREMENTS

The Queensland Plumbing and Wastewater Code (the Code) specifies the requirements for onsite sewerage disposal and treatment systems that have a peak design capacity of 20 equivalent persons (EP) or less. The Code defines performance criteria for the following:

- Onsite Wastewater Management Systems
- Greywater Use Facilities
- Land Application Systems (including setback distances)
- Water Meters for New Premises
- Chief Executive Approvals (of treatment systems)

In consideration of an application for on-site treatment and disposal facilities, the local government is required to assess whether the application triggers referral for an Environmentally Relevant Activity under the Environmental Protection Act 1994. Disposal of on-site wastes becomes the Environmentally Relevant Activity (ERA) of sewage treatment when daily flows exceed 4,000 litres. Environmentally Relevant Activities require approvals from the Environmental Protection Agency, either as a concurrence agency or assessment manager.

This proposal does not exceed the daily flow limit therefore will not require referral to the Environmental Protection Agency.

Under Sections 440ZG of the EP Act, which relates to depositing prescribed contaminants in waters, it is an offence to deposit or release sewage and sewage residues, whether treated or untreated, and any other matter containing faecal

coliforms or faecal streptococci, including: for example:

- waste water pumped out from a septic tank, or
- solid or liquid waste from an on-site sewerage facility;

into waters, or a roadside gutter or stormwater drainage, or at another place, and in a way, so that the contaminant could reasonably be expected to wash, blow, fall or otherwise move into waters, a roadside gutter or stormwater drainage.

Relevant Australian Standards for the treatment of on-site effluent include the following:

- AS/NZS1547:2000 'On-site domestic-wastewater management'.
- AS1546 – 1998 'On-site domestic wastewater treatment units'
- AS3500 – National Plumbing and Drainage Code
- Department of Infrastructure and Planning 'Queensland Plumbing and Wastewater Code' April 2010 (the Code)

This report was prepared in accordance with the requirements of the standards set in these documents.

3.0 SITE AND SOIL EVALUATION

3.1 Site Assessment

The site is located on the northern side of Zena Close and is described as being a cut and fill site with batters and benches. The property has a sandy loam soil with few (2-10%), medium (6-20mm) gravel. There is a watercourse 25m to the east of the proposed land disposal area. The site was inspected on the 5th March 2013. At the time of inspection, the proposed land disposal area was covered in short grass and leaf litter.

SITE FACTOR	RESULT
Area	Approximately 5ha
Slope	Relatively flat land disposal area
Drainage Pattern	Linear planar at disposal area
Exposure	Partly shaded in morning and afternoon
Erosion and Land Slip	N/A
Boulders and Rock Outcrops	N/A
Vegetation	Short grass and leaf litter
Water Course	Creek 25m to the east
Water Bore	N/A
Water Table	>1.2 metres
Weathered Rock	>1.2 metres
Cut and Fill	None at land disposal area
Flooding	Never
Channelled Runoff	Surface runoff to the north
Soil Surface Condition	Moist
Other Site Specific Factors	None

3.2 Soil Assessment

SOIL PROPERTY	RESULT
Colour	Pale yellow brown
Texture	Sandy Loam
Structure	Weak
Coarse Fragments	Few, medium gravel
Permeability	>3.0 m/d
Soil Category	2
Resultant Design Loading Rate (DLR) for Conventional trenches (mm/day)	50 (advanced secondary effluent)

NOTE: This category of soil is classified as well drained.

4.0 SYSTEM SIZING FACTORS

4.1 Potable Water Supply

The proposed residence water supply will be from rain water tanks.

4.2 Separation Distances

Table T4 of the “Queensland Plumbing and Wastewater Code” recommends the following horizontal separation distances for subsurface land application areas measured from the edge of the trench/bed excavation or any subsurface irrigation

distribution pipework to the feature. These separation distances will be achieved on-site.

Feature	Separation Distance Down slope	Separation Distance Up slope	Separation Distance Level
Property boundaries, pedestrian paths and walkways, recreation areas, footings of buildings, retaining wall footings.	2 metres	4 metres	2 metres
In ground swimming pools	6 metres	6 metres	6 metres
In ground potable water tank*	6 metres	6 metres	6 metres

*Note: For primary effluent the separation distance from an in-ground potable water tank must be 15 metres.

Table T7 from the Code recommends the following horizontal separation distances for subsurface land application areas.

Feature	Recommended Separation Distance	Measured Distance
Top of bank of permanent water course; Top of bank of intermittent water course; Top of bank of a lake, bay or estuary Top water level of a surface water source used for agriculture, aquaculture or stock purposes; Easement boundary of unlined open stormwater drainage channel or drain.	Primary effluent: 50 metres (horizontal) Secondary effluent: 30 metres (horizontal). Advanced secondary effluent: 10 metres (horizontal).	25m to water course from land disposal area
Bore or a dam used or likely to be used for human and or domestic consumption	Primary Effluent: 50 metres (horizontal). Secondary Effluent: 30 metres (horizontal). Advanced Secondary Effluent: 10 metres (horizontal).	N/A
Unsaturated soil depth to a permanent water table/ rock or hard pan.	Primary Effluent: 1.2 metres (vertical). Secondary Effluent: 0.6 metres (vertical). Advanced Secondary Effluent: 0.3 metres (vertical).	>1.2m

In accordance with Table T7 of the Code, the vertical separation requirement for primary treated effluent is 1.2 metres. Groundwater was not detected at 1.2 metres, and the required vertical separation requirement of 1.2 metres for primary effluent would be readily achieved.

The horizontal separation distances as recommended in the Code can only be achieved for advanced secondary effluent on the site.

Stormwater shall be diverted away from the land application areas.

The land application area shown on Figure 1, Appendix A meets all recommended horizontal separation distances for advanced secondary effluent quality.

4.3 Estimation of Daily Flows

The on-site wastewater system is to be designed for a two (2) bedroom residence. A composting toilet, such as the Clivis Multrum CM10, with a capacity of 20 visits a day or 8,000 per annum would be adequate for the site. It would need to be fitted with a holding tank to collect any excess liquid for recycling through dry areas of the composting tank. A normal domestic greywater treatment system capable of treating 1,800 litres of greywater per day to an advanced secondary effluent standard would be required. Effluent from the greywater treatment system could then be discharged to a suitably located land disposal area.

The following typical wastewater flow design allowance is given in AS/NZS1547:2000 for a two (2) bedroom domestic residence.

Classification	***No.***	***Flow (L/person/day)***	***Total Flow (L/day)***
Persons in a 2 bedroom house	3	200*	600

** Based on use of standard fixtures.*

For design of an effluent land disposal system the total wastewater design daily flow rate should be taken as 600 litres per day, or 3 equivalent persons (EP), for the site. These flow rates are based on the effluent comprising both blackwater and greywater with approximately one third of the effluent constituting the blackwater component. For design purposes, one third (blackwater component) has been subtracted from the total flow rates calculated in the above table giving a total flow for the greywater of 400 L/day.

To ensure the integrity of any treatment system standard water reducing fixtures should be incorporated to further reduce water consumption. These should include:-

- Low-flow shower heads
- Hand basins with taps that turn themselves off

4.4 Wastewater Treatment Options

Appendix 1 of the Code specifies the following effluent quality standards for the different standards of wastewater treatment.

Parameter	Primary Effluent (g/m^3)	Secondary Effluent (g/m^3)	Advanced Secondary Effluent (g/m^3)
Biological Oxygen Demand	120-240	20	10
Total Suspended Solids	65-180	30	10
Thermo-tolerant Organisms (org/100ml)	N/A	200	10
Suitable treatment system	Septic tank with outlet filter	Aerated wastewater treatment system.	Aerated wastewater treatment plant with sand filter

The recommended option for this site is:

Composting Toilet and Greywater Treatment System: The system installed must include a composting toilet of at least 8,000 uses per annum and a greywater treatment system able to treat 1,800 litres per day of greywater to an advanced secondary standard. The advanced secondary effluent from the greywater treatment system can then be disposed of to land.

4.5 Method of Disposal

Table 4.2B1 of AS/NZS1547:2000 identifies Land Application systems that are considered suitable for different site, soil and climatic factors. The land application systems that will be used on this site is a conventional bed for advanced secondary effluent from the greywater treatment system.

4.6 Required Disposal Area for Effluent Disposal

As per AS/NZS 1547:2000 Section 4.2A7.3.2 *Sizing*. - L = Q / (DLR * W)

Conventional Absorption Bed/Trenches

Q = design daily flow in L/day =	Greywater – 400
DLR = Design Loading Rate mm/day =	50
W = Width (m) =	4m
L = length (m) =	2m
Total Area (m^2)	**8**

The required effluent disposal area for the greywater would be provided by one (1) conventional bed 2.0 metres long by 4.0 metres wide.

It is recommended that:

- Stormwater is diverted away from the land disposal areas by bunding or diversion drains,
- Effluent is distributed uniformly over the land disposal area
- The land disposal areas are planted with suitable species where no established vegetation exists
- Loadings should be alternated to rest sections of the land application areas and minimise the risk of clogging.
- Gypsum be applied to the base of any effluent disposal area at a rate of 1kg per square metre and mixed to a depth of 200mm via the use of a rotary hoe to prevent the clay from dispersing.

A typical cross section of a conventional bed is shown in Figure 1, Appendix A.

5.0 SYSTEM INSTALLATION REQUIREMENTS

5.1 General

The systems and all of their components shall be designed and installed by a licensed Plumber in accordance with the manufacturer's recommendations and the relevant Australian Standards.

5.2 Wastewater Treatment Systems

In accordance with the requirements of AS/NZS1547:2000, a standard greywater septic system with a minimum capacity of 1,800 litres per day is required to treat the greywater from the proposed residence on the site.

5.3 Available Reserve Area

AS/NZS1547:2000 Clause, 4.2.3.4 requires a reserve area of 100% of the design area to be available on each site for the expansion of a land application facility. The 100% requirement can be satisfied and is also shown on Figure 1 Appendix A.

5.4 Earthworks and Stormwater

The effluent land disposal areas shall be graded to minimise contact between stormwater and the disposal area. All excess roof stormwater shall be collected and piped to a suitable discharge point away from any land disposal area.

6.0 SUMMARY & RECOMMENDATIONS

Date of Inspection	5th March 2013
Location of Site:	Lot 12 Zena Close, Cape Tribulation
Owner's Name:	Brad Fisher
Local Government:	Cairns Regional Council
Proposed Dwelling Type:	Two (2) bedroom residence
Land Area:	Approx. 5ha
Referral to EPA required:	No.
Assumed Design Daily Flow:	Composting Toilet – 8,000 uses/year Greywater – 1,800 litres/day
Assumed Soil Category:	Category 2 – Sandy Loam
Assumed Design Loading Rate:	50 mm/day.
Wastewater Treatment Options:	Greywater Septic System – 1,800 litres/day minimum capacity
Dimensions of Land Application Facility:	Greywater – Conventional bed 2mL X 4mW X 0.4mD = 8 square metres
Method of Calculations:	AS/NZS 1547:2000
Horizontal Separation Distances:	All advanced secondary effluent setbacks complied with.
Vertical Separation Distances:	OK
Potable Water Supply:	Rain Water
Reserve Area:	100%

The installation of the treatment and disposal system shall be inspected by Engineering Testing Services Pty Ltd to ensure the intent of the design is met.

This report is based on the information provided by the client. If any aspect of the site preparation or proposed construction changes from that originally advised, the Engineer shall be notified so that any amendments can be made. Should soil or environmental conditions encountered on the site differ significantly from those

indicated, the Engineer shall be notified before proceeding, as modifications to the design may be required.

Pollution Exclusion

Engineering Testing Services Pty Ltd, its employees and sub-consultants shall not be liable in respect of any claim for Personal Injury or Damage to Property including costs and expenses incurred in preventing, removing, nullifying or clean-up caused by or arising directly or indirectly out of actual, alleged or threatened discharge, dispersal, release or escape of smoke, vapour, soot, fumes, acids, alkalis, toxic chemical, liquids or gases, waste materials or other irritants, contaminants or pollutants into or upon any property, land, the atmosphere or any water course or body of water (including groundwater).

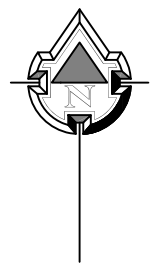
BRAD FISHER

LOT 12 ZENA
CAPE TRIBULATION

APPENDIX A

PLANS & DRAWINGS

NOTE :
REFER NEXT PAGE FOR ETA / ETS
BED DETAILS AND RELEVANT NOTES



LOT 11

124° 54' 00" (102.814m)

40° 55' 50" (319.332m)

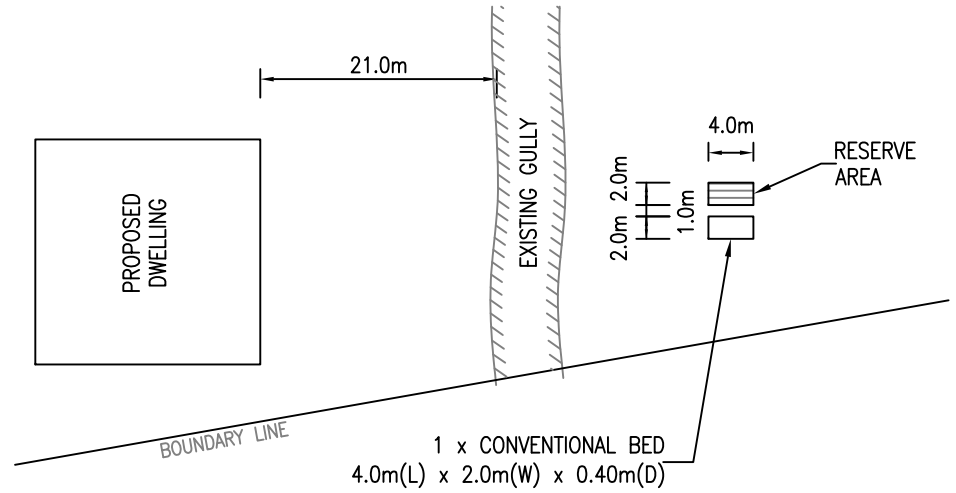
124° 54' 00" (100.000m)

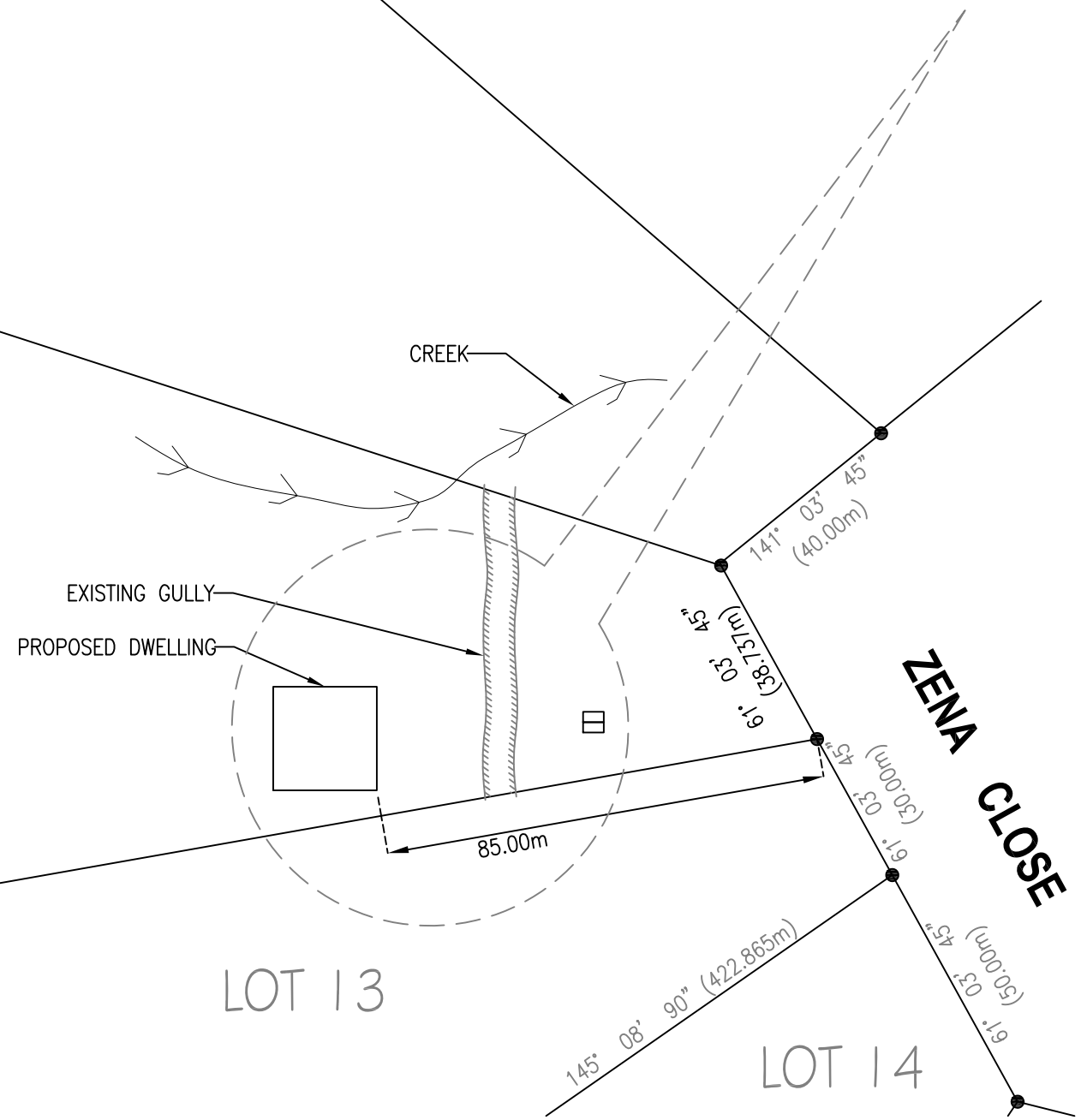
18° 15' 15" (354.838m)

90° 09' 15" (130.996m)

LOT 12
5.436 ha

170° 20' 00" (416.352m)





SITE PLAN

NOT TO SCALE

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A	12-04-13	INITIAL ISSUE	
NO.	DATE	DESCRIPTION	APPOV.

CLIENT
BRAD FISHER

ASSOCIATED CONSULTANTS

ETS GEOTECHNICAL
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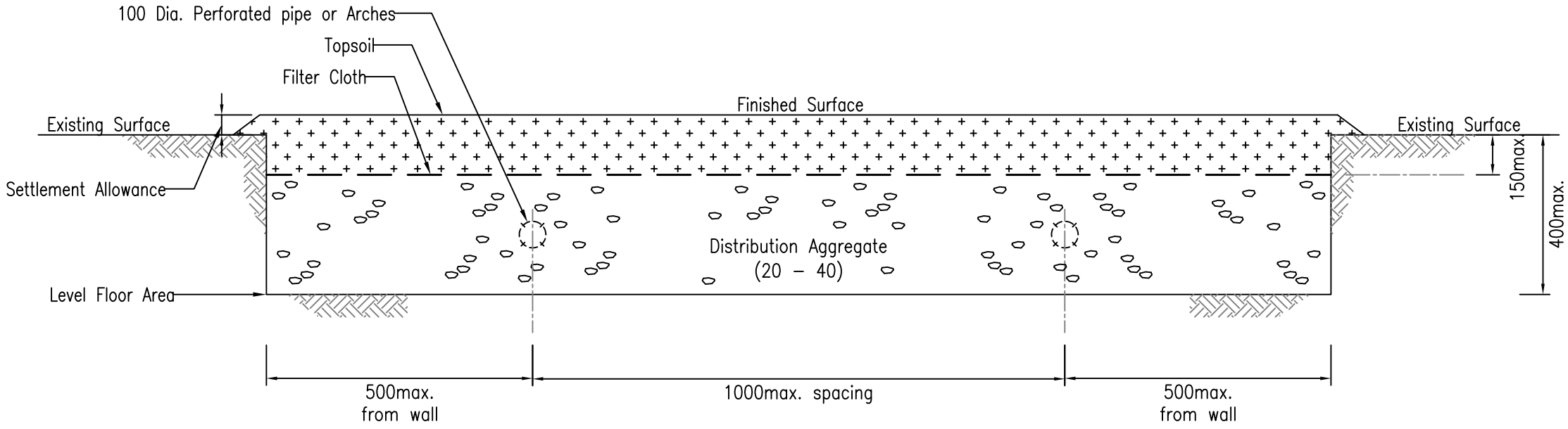
DRAWN: NINA	CHECKED: CR	ONSITE SEWERAGE ASSESSMENT
DESIGNED	CHECKED	FIGURE 1 – INDICATIVE LAND DISPOSAL AREAS LOT 12 ZENA CLOSE CAPE TRIBULATION, QLD
CAD REF.: GT13-020-FIG1	DATE: 12-04-13	
APPROVED	SIZE: A3	SCALE: AS SHOWN
DRAWING NO.: GT13-020-FIG1	No. 1 of 2 drgs	REVISION: A

NOTE

1. ALL WORK TO BE CARRIED OUT IN ACCORDANCE WITH THE LOCAL GOVERNMENT REQUIREMENTS AND THE FOLLOWING CODES :
   - AS 3500 NATIONAL PLUMBING AND DRAINAGE CODE
   - AS 1546.3 : 2001 ONSITE DOMESTIC WASTEWATER TREATMENT UNITS – AERATED WASTEWATER TREATMENT SYSTEM
   - AS 1547 : 2000 ONSITE DOMESTIC WASTEWATER MANAGEMENT
   - DEPARTMENT OF INFRASTUCTURE & PLANNING QUEENSLAND PLUMBING AND WASTE WATER CODE APRIL 2010.
2. SURFACE WATER SHALL BE DIVERTED AROUND THE PERIMETER & UPSLOPE OF THE LAND APPLICATION AREA
3. THE TRENCH BED IS TO BE LEVEL AND SHOULD FOLLOW THE CONTOURS OF THE SITE

NOTE:
DISPOSAL AREA IS TO BE LOCATED A MINIMUM OF 4.0m FROM ANY BUILDING, 2.0m FROM BOUNDARIES, 10.0m FROM ANY WATER COURSES AND BORES



LEVEL SITE - SLOPE LESS THAN 5%

FIGURE 4.5A5 – CONVENTIONAL BED DETAILS (AS/NZS 1547:2000)

N.T.S.

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DRAWN: NINA	CHECKED: CR	ONSITE SEWERAGE ASSESSMENT		
DESIGNED:	CHECKED:	FIGURE 1 – INDICATIVE LAND DISPOSAL AREAS LOT 12 ZENA CLOSE CAPE TRIBULATION, QLD		
CAD REF.: GT13–020–FIG1	DATE: 12–04–13			
APPROVED:	SIZE: A3	SCALE: AS SHOWN	DRAWING NO.: GT13–020–FIG1 No. 2 of 2 drgs	REVISION: A

GEOTECHNICAL & MATERIALS TESTING

UNDERSTAND THE LIMITATIONS OF YOUR GEOTECHNICAL REPORT

This report has been based on project details as provided to us at the time of the commission. It therefore applies only to the site investigated and to a specific set of project requirements as understood by Engineering Testing Services.

If there are changes to the project, you need to advise us in order that the effect of the changes on the report recommendations can be adequately assessed. Engineering Testing Services cannot take responsibility for problems that may occur due to project changes if they are not consulted.

It is important to remember that the subsurface conditions described in the report represent the state of the site at the time of investigation. Natural processes and the activities of man can result in changes to site conditions. For example, ground water levels can change or fill can be placed on a site after the investigation is completed. If there is a possibility that conditions may have changed with time, Engineering Testing Services should be consulted to assess the impact on the recommendations of the report.

The site investigation only identifies the actual subsurface conditions at the location and time when the samples were taken. Geologists and engineers then extrapolate between the investigation points to provide an assumed three-dimensional picture of the site conditions. The report is based on the assumption that the site conditions as identified at the investigation locations are representative of the actual conditions throughout an area. This may not be the case and actual conditions may differ from those inferred to exist. This will not be known until construction has commenced. Your geotechnical report and the recommendations contained within it can therefore only be regarded as preliminary.

In the event that conditions encountered during construction are different to those described in the report, Engineering Testing Services should be consulted immediately. Nothing can be done to change the actual site conditions which exist but steps can be taken to reduce the impact of unexpected conditions. For this reason, the services of Engineering Testing Services should be retained through the development stage of a project.

Problems can occur when other design professionals misinterpret a report. To help avoid this, Engineering Testing Services should be retained for work with other design professionals to explain the implications of the report.

This report should be retained as a complete document and should not be copied in part, divided or altered in any way.

It is recommended that Engineering Testing Services is retained during the construction phase to confirm that conditions encountered are consistent with design assumptions. For example, this may involve assessment of bearing capacity for footings, stability of natural slopes or excavations or advice on temporary construction conditions.

This document has been produced to help all parties involve recognise their individual responsibilities.