

Trine Solutions Pty Ltd
A.B.N. 20 080 357 973
On-site Wastewater Management Systems
102 Stokers Road Stokers Siding 2484
P.O. Box 8 New Brighton NSW 2483
Phone: 02 6677 9574
Email: 3@tinesolutions.com.au

THE GENERAL MANAGER
BYRON SHIRE COUNCIL

ON-SITE WASTEWATER MANAGEMENT
REPORT

FOR

PROPOSED SECONDARY DWELLING

AT

**LOT 31 DP: 609872
178 TYAGARAH ROAD MYOCUM**

OWNER
Jenny Long

SITE INVESTIGATION

TRINE SOLUTIONS

DATE
5th March 2020

Report No: TS20316

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TABLE OF CONTENTS

1.0	INTRODUCTION	3
2.0	PROPOSED DEVELOPMENT	3
3.0	SITE DESCRIPTION	3
	Plate 1 – The Site	4
	Plate 2 – Area Available for Wastewater Application	4
4.0	SOIL ASSESSMENT	5
5.0	SITE & SOIL SUMMARY	6
	Borehole 1 & 2	7
6.0	PROPOSED OSITE WASTEWATER MANAGEMENT SYSTEM	8
7.0	SIZING OF CONSTRUCTED WETLANDS	8
8.0	SIZING OF ETA BEDS	9
9.0	CONCLUSION	9
10.0	MAINTENANCE REQUIREMENTS	10
11.0	REFERENCES	11
13.0	S.T.F. FLOW PLAN	12

List of Attachments

OSMS Site Plan	- EXPANDesign / Modified by Trine Solutions P/L (16/03/20)
Byron OSMS	
Design Spreadsheet	- 2-Bedroom Secondary Dwelling
Reed Bed Design	- Trine Solutions P/L
ETA Bed design	- Rob Aungle & Associates
Floor Plan	- EXPANDesign

1.0 INTRODUCTION

Trine Solutions has been commissioned by the applicant to prepare an On-site Sewage Management Report for the proposed construction of a 2-Bedroom Secondary Dwelling at Lot 31 DP: 609872 / 178 Tyagarah Road Myocum.

The site is not connected to a centralised sewerage treatment system and will require approval for an on-site wastewater treatment system to service the proposed dwelling.

This report will identify and address the relevant matters for the effective and sustainable management of wastewater generated by the proposed development of the lot.

The report describes the site conditions as they effect the land application of effluent, presents the results of field testing, provides advice and recommendations on the available options for on-site wastewater management. Calculations for sizing of land area requirements are based on the methods set out in AS/NZ 1547:2012 – Appendix L - Land Application Methods and Byron OSMS Design Model.

The purpose of this report is to demonstrate to Byron Shire Council that appropriate arrangements can be made for Wastewater Management, which will minimise the environmental impact of the proposed development at this site.

2.0 PROPOSED DEVELOPMENT

Proposed construction of a 2-Bedroom Secondary Dwelling:

Therefore the **design** of the wastewater management system will be based on:

- 3 occupants (conservative)
- Water saving devices including 6/3 flush toilets, low flow shower roses, aerators ect
- Wastewater generated is (say) 345L per day (115L/person/day roof harvest water supply)
- **Secondary Treatment**
- 3000L Septic Tank with outlet filter
- Constructed Wetland (7.2m²)
- ETA Bed (45m²)

3.0 SITE DESCRIPTION

178 Tyagarah Road Myocum has an existing dwelling located downslope towards the eastern boundary of the lot. The lot has an area of approximately 18000m² (9000m² based on the cumulative impact of two (2) dwellings) with the topography (slope) of the site falling towards the eastern boundary. The lot is extensively landscaped with plantings and large lawn areas including areas of pasture below the proposed location of the secondary dwelling.

The location of the proposed secondary dwelling is towards the western boundary and ridgeline. There is good sun and wind exposure on the proposed application area which is located on moderate slopes to the east of the proposed dwelling site.

Plate 1 – Location of Secondary Dwelling towards top of ridge



Plate 2 – Location of Proposed LAA



4.0 SOIL ASSESSMENT

Boreholes were sampled for the purpose of classification and testing of the site soils. The soils consist of top soil to a depth of 100 to 300mm and consistent clay loam to a depth greater than 600mm.

Refer to photo plate:

The soil classification and profile description is consistent with published works by Morand titled 'Soil Landscapes of the Lismore - Ballina 1:100 000 Sheet'

Soil description

Soil Landscape	Erosional – Low undulating hills and rises on basalt
Grouping	bg – Bangalow
Description	Moderately deep to deep (100->200cm) well-drained Krasnozems
Limitations	Strongly acid soils with high aluminium toxicity potential

Soil sampling was undertaken on 5th March 2020 being a relatively wet climatic period.

The results indicated that the soils are not limited for the application of effluent and a percolation rate in the order of 0.3m/day can be achieved.

The complete results of the site assessment have been summarized in the table below.

TABLE OF SITE CHARACTERISTICS : Proposed Secondary Dwelling	
Soil:	Clay Loam
Land area:	Not limited
Flood Potential:	Nil
Exposure	Good wind & sun exposure
Slope %	12-14%
Landform	The sub-soils are well-drained
Run-on and up-slope seepage	To be diverted
Erosion potential	Nil
Site drainage	Good
Buffer distance	All buffers to be maintained
Depth to bedrock	>3m
Geology/regolith	The underlying stratum provides good internal drainage
Exchangeable Sodium Percentage	Not limiting
Permeability (Ksat)	0.3m/day

5.0 SITE & SOIL ASSESSMENT SUMMARY

SITE ASSESSMENT		
Details of Proposed Development	O.S.M. System for Proposed Secondary Dwelling	
Address		
Lot, DP Number	Lot 31 DP: 609872 / 178 Tyagarah Road Myocum	
Local Government Area	Byron Shire Council	
Date of assessment	05/03/2020	
Proposed Water Supply	Roof Harvest water supply	
Recent Weather Conditions	Dry with hot temperatures	
SITE DESCRIPTION		
Allotment Size	Approx. 18460m ²	
Existing Vegetation	Grass	
Slope (%)	12-14%	(✓)
Landform (for water spreading)	Waxing Divergent	(✓)
Exposure	Eastern aspect with good exposure	(✓)
Boulders/Floaters/Rock Outcrops	None observed	(✓)
Buffer Distance	All buffers met	(✓)
Run on and Upslope seepage	All run on to be directed away from application area	(✓)
Flooding Potential Above 1 in 100 year for disposal area and above 1 in 100 year for treatment system	No flooding potential	(✓)
Site Drainage	Good due to slope, slope type and soil type	(✓)
Vegetation indicating water logging	None	(✓)
Surface Condition Bare ground, cracking etc	Appears to be in good condition	(✓)
Fill	None observed	(✓)
Erosion/mass movement Rills, slips etc	None	(✓)
Limitations	Over all no limitations limitation(s)	(✓)
Depth to Water Table	>3m	(✓)

SOIL ASSESSMENT – Lot 31 DP: 609872 / 178 Tyagarah Road Myocum Date: 5 March 2020								
Borehole No.: 1 & 2								
SOIL UNIT (Morand, 1994): bg – Bangalow								
Horizon A & B	Depth (mm)	Texture	Structure	Colour	Soil Category (cf. Texture)	Course Fragments	Soil pH	Dispersive Class (Emerson)
.....	0	Clay loam	Moderate	Dark Reddish Brown	4 - CL	0%	5.8	6
.....	300	Clay loam	Moderate	Dark Reddish Brown	4 - CL			Slake (1) No Dispersion
.....	600	Clay loam	Moderate	Dark Reddish Brown				
.....	800	Clay Content Increasing	Moderate	Dark Reddish Brown				
.....	1000	Bore Hole Terminated						
Tick box:			No limitation Limitation	(√) (X)	(√)	(√)	(√)	(√)
					Over all:	No limitation Limitation(s)		(√)

Plate 3 – Bangalow soil profile



6.0 PROPOSED ON-SITE WASTEWATER MANAGEMENT SYSTEM

Assuming that:

A design waste flow of 345L per day (3 persons @ 115L per person – roof harvest water supply)

Secondary Treatment of Wastewater by:

- Septic Tank (3000L) with outlet filter
- Reed Bed 7.2m²
- ETA Bed 45m² (2 x 12m x 1.2m)

7.0 SIZING OF CONSTRUCTED WETLANDS (Reed Beds)

It is proposed to incorporate reed beds to achieve secondary treatment of all effluent generated from the proposed development. The design will be based on the hydraulic load generated from the premises.

The reed bed design will optimize the Theoretical Hydraulic Residence Time (HRT). The design is categorised as a subsurface flow system (SSF). The effluent will flow through the porous media, in this case gravel (20mm) in which the plants will be rooted.

Due to the expected hydraulic load the reed bed will be one (1) 7.2m² (concrete) cell to achieve the final pollutant removal.

The literature review of wetland design reveals three (3) methods of design namely:

- 'Rule of thumb' approach
- Reed et al 1995
- Kadlec and Knight (K-C* model) (1996)

The rule of thumb method according to the literature is accurate and useful for preliminary sizing (10 - 20m²) per m³ of effluent / day.

The Reed et al method is based on first order plug flow assumptions.

The Kadlec and Knight method presumes a first order decay, plug flow model for all pollutants. The model is based on areal (AREAL) rate constraints which are independent of temperature.

Rule of Thumb Method

At 20m²/m³/day a flow of 0.345m³ requires 6.9m²

Area required = 6.9m²

Notwithstanding the above, reed bed area required is 7.2m².

8.0 SIZING OF ETA BEDS

AS/NZS 1547:2012 Method

Loading Rates for Trenches & Beds AS/NZS 1547:2012 - Table L1 (D.L.R. (mm/day) Secondary treated effluent)

Bed dimensions shall be determined from the relationship
Reference: L4.2 AS/NZS 1547:2012

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

∴

$$L = \frac{345L}{20 \times I}$$

Area required = 17.25m² (1 x 17.25m x 1m bed)

Byron OSMS Design Model

The parameters discussed have been factored into the Byron Design Model resulting in a final application area of 45m².

Therefore area required is 45m² or 2 x 12m x 1.2m ETA beds (Conservative)

Find attached detailed ETA Bed design by Rob Aungle & Associates.

9.0 CONCLUSION

It is possible to provide a safe On-site Wastewater Management System for the proposed Secondary Dwelling at Lot 31 DP: 609782 / 178 Tyagarah Road Myocum.

This is based on the following points:

- **Secondary treatment of all wastewater via:**

Install

- Septic Tank (3000L) with effluent outlet filter
- Reed Bed – 1 x 7.2m² cell (Grahams Concrete cell recommended)
- ETA Beds (2 x 12m x 1.2m – see detail)

The proposed treatment train represents the best available option for a passive system.

In addition the nutrient removal achieved by Reed Beds mean that deeper drainage is appropriate for the site in lieu of the complete reuse of the reclaimed effluent.

10.0 MAINTENANCE REQUIREMENTS

Maintenance for Septic Tank, Wetlands & ETA Beds

For longevity of the on-site sewage management system the following maintenance regime should be employed by the owner/occupier of the dwelling.

- It will be necessary to have the contents of the septic tank pumped out on average every three (3) to five (5) years. Generally speaking households of meat eaters would need to pump out their septic every 3 to 5 years and vegetarians every 4 to 6 years.
- Bleach, bleach-based products, whiteners, nappy soakers and spot removers shall not be disposed of into the on-site system. They shall be disposed of on a disused area of a garden, well away from the disposal area.
- Hygiene products, condoms, tampons, sanitary napkins, disposable nappies and cotton buds and the like shall not be disposed of via the on-site disposal system. They should be disposed of into garbage bins in sealed plastic bags.
- Only the recommended amounts of disinfectants should be used. Biodegradable products for septic systems are recommended.
- Runoff diversion banks to be inspected annually and maintenance as required undertaken to ensure that surface runoff is diverted around the disposal area.
- No vehicular, stock or pedestrian access should be made across the application area.
- Vegetation from the application area needs to be harvested to promote young growth
- Effluent from treatment system should not be discharged to the stormwater system or over the ground.

SUB-SURFACE FLOW WETLAND

1. Quarterly maintenance check of the wetland area including checking of water level, cleaning of drains and elimination of weeds
2. The wetland plantings should generally be thinned or harvested annually to maintain the nutrient removal capacity of the system.
3. Inlet and outlet towers should be inspected six monthly (by removing the push-on caps). Breaking or severing the roots and removing them should remedy any root intrusion into the towers.
4. Protective gloves must be worn to prevent contact with partially treated effluent.
5. The water level can be lowered for a month in summer to promote breakdown of accumulated organic solids in the upper layer of the gravel. Replace the 100mm PVC outlet standpipe with the shorter pipe provided.

11.0 REFERENCES

Australian Standard AS1547:2012 - On-Site Domestic Wastewater Management.

Plumbing Code of Australia – December 2013

Byron Shire Council - Design Guidelines for On-Site Sewage Management Systems for Single Households. (1 December, 2004)

Environmental Protection Authority, Dept. of Local Government, Department of Land & Water Conservation and NSW Department of Health (Feb 1998). Environment and Health Protection Guidelines - On-Site Sewage Management Systems for Single Households.

Crites – Tchobanoglous (1998) - Small and Decentralized Wastewater Management Systems

Department of Land and Water Conservation NSW - The Constructed Wetlands Manual Volume 2

G. Swarbrick – Short Course in Waste Management – University N.S.W. 1996

Ratcliff (1983) Published Paper

Metcalf & Eddy (1991) Wastewater Engineering 3rd Edition

Morand, D.T. (1994) Soil Landscapes of the Lismore-Ballina 1:100,000 Sheet Report, Soil Conservation Service of NSW, Sydney.

Morand, D.T. (1994) Soil Landscapes of the Lismore-Ballina 1:100,000 Sheet Map, Soil Conservation Service of NSW, Sydney.

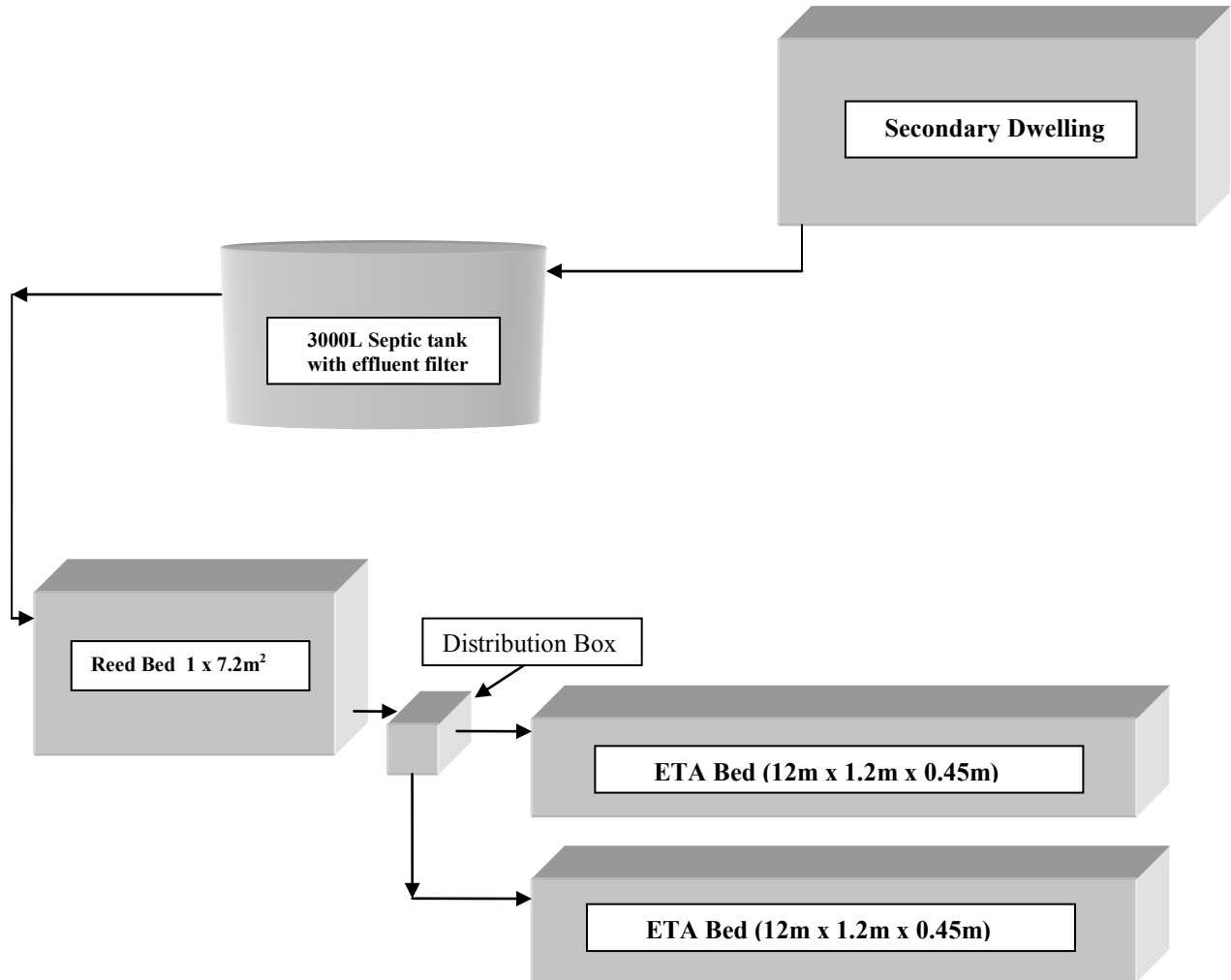
End of Report

Bradford Nicholson
Trine Solutions P/L

S.T.F. FLOW PLAN

For Lot 31 DP: 609872 / 178 Tyagarah Road Myocum

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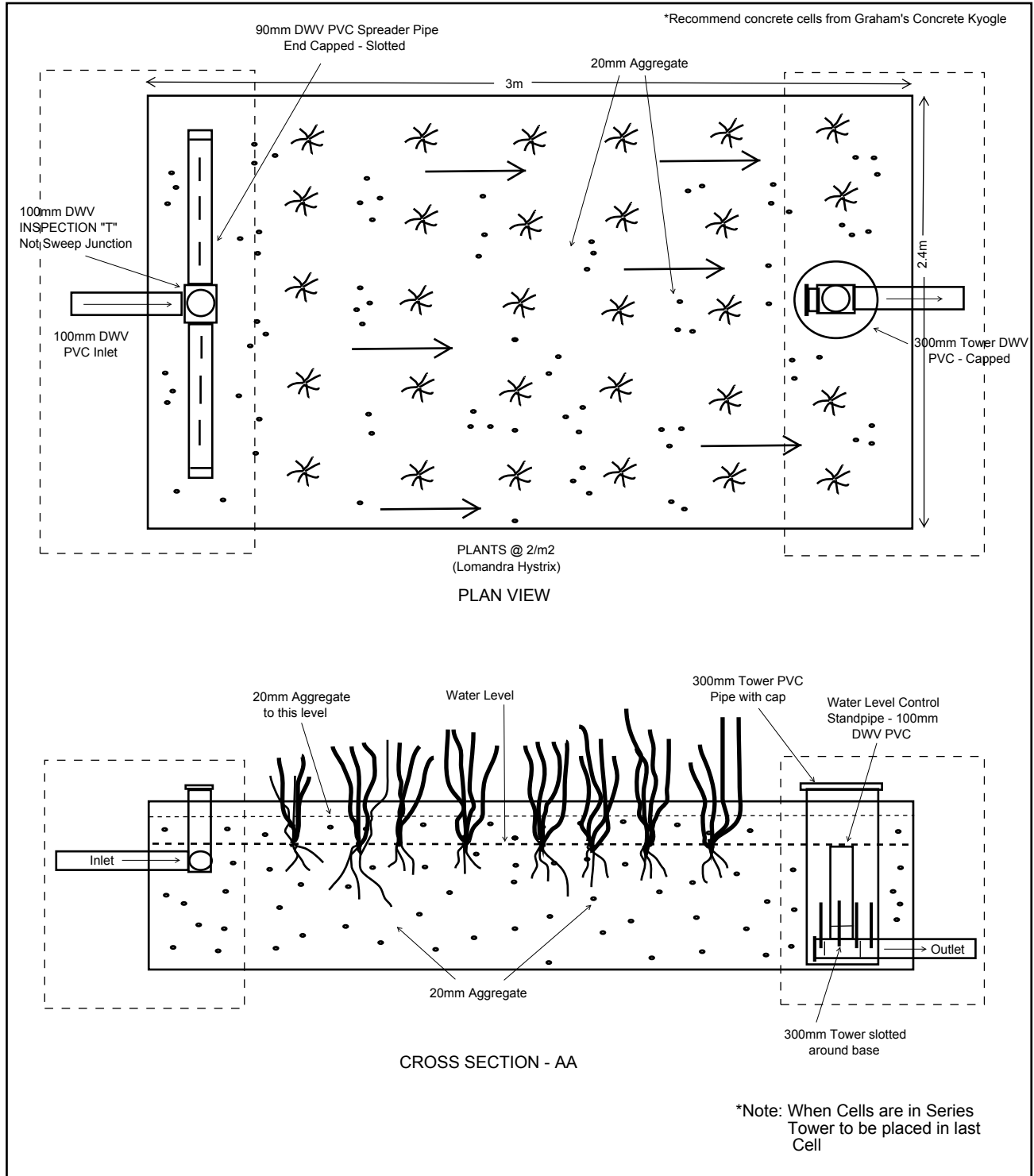


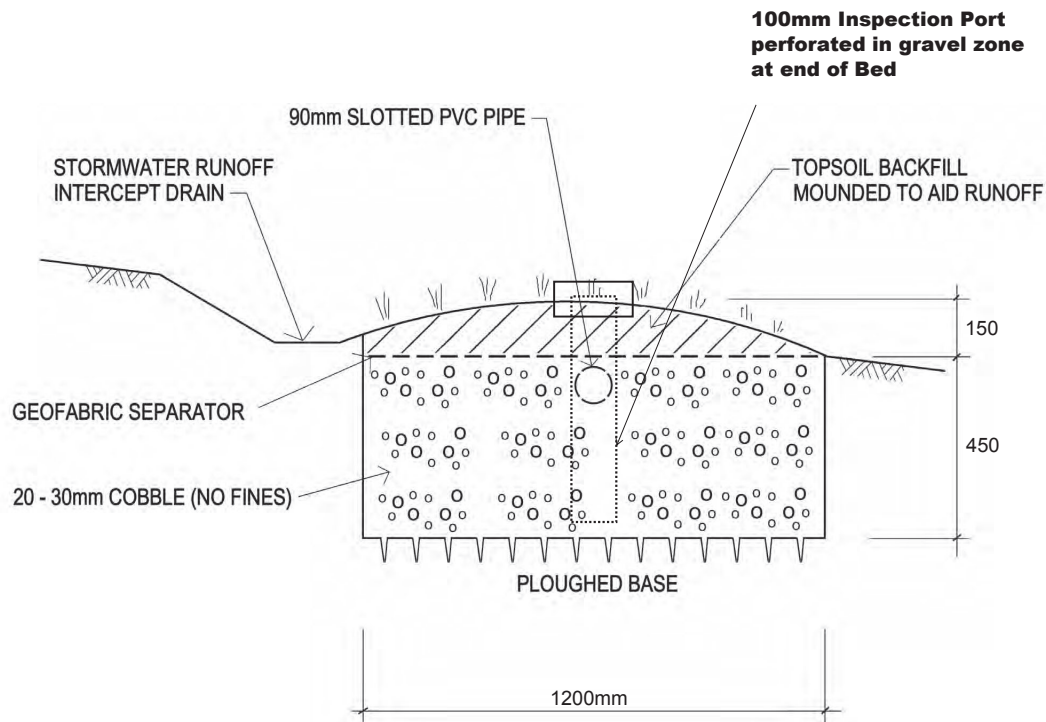
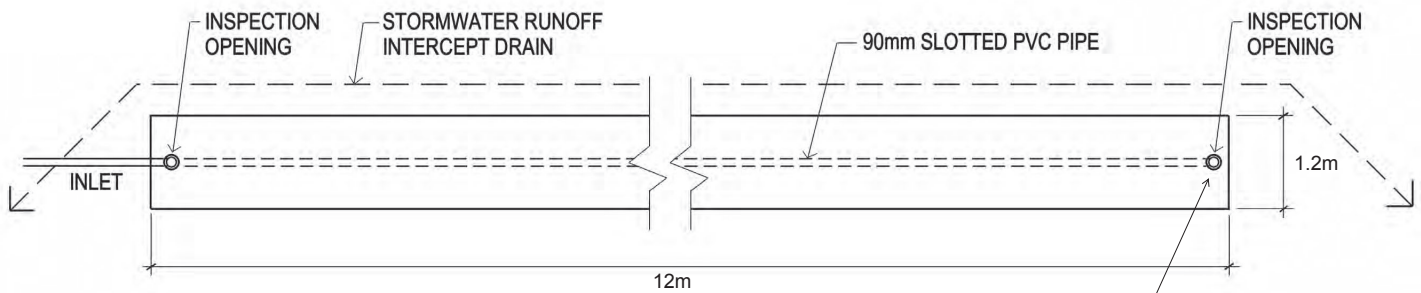
Head count by (1) bedrooms / (2) persons	1
Bedrooms (gp1)	2
Bedrooms (gp2)	0
Persons (grp 1)	3
Persons (grp 2)	0
Block size (ha)	9000
Setback type listbox	1
Setback distance (m)	100
Daily Effluent Flow per person (L/day)	115
Daily effluent water supply type listbox	4
toilet g1 tickbox	TRUE
bath g1 tickbox	TRUE
laundry g1 tickbox	TRUE
kitchen g1 tickbox	TRUE
toilet g2 tickbox	FALSE
bath g2 tickbox	FALSE
laundry g2 tickbox	FALSE
kitchen g2 tickbox	FALSE
Treatment system listbox	6
% black to total wastewater in a full system: Water	32%
N production per person per year (kg/person/yr)	4.2
% black to total wastewater in a full system: TN	70%
N loss in treatment system (% reduction)	50%
N loss in disposal bed (% reduction)	20%
N Plant Uptake rate (kg/ha/year)	200
P production per person per year (kg/person/yr)	0.6
% black to total wastewater in a full system: TP	40%
P uptake by plants (Hp) (kg/ha/yr)	10
P soil sorption (Ps) (kg/ha/m depth)	10000
P soil sorption according to soil type listbox	3
Water Table Depth (Wtd) (m)	3
Buffer to Water Table (Bwt) (m)	0.5
Time for accumulation of P(years)	50
Crop factor(grass = 0.74)	1
Crop coefficient (TRUE) / crop factor (FALSE) tickbox	TRUE
% Effective Rainfall	65%
Effective Rainfall listbox	1
Percolation (mm/day)	27.36632336
Soil texture and structure beneath system listbox	6
Depth of root zone (m)	0.15
Effective porosity of root zone	0.37
Avail. Water of root zone	0.15
Soil texture in rootzone listbox	3
Depth of trench below root zone (m)	0.15
Effective porosity of trench below root zone	0.43
Avail. Water of trench below root zone	0
Permissible percentile exceedence	5.0000%
Trench width (m)	1.2
Lateral seepage width (m)	0.3
Disposal Type SSI (1) / ETA (2) listbox	2
Number of trenches (spinner button)	2
Hydraulic area (m2)	15.05
Nitrogen area (m2)	0.00
Phosphorus area (m2)	35.29
Water balance area (m2) - Cntl-q (see text)	45.00
Final area (m2)	45.00

Horizontal Flow Wetland Detail

TRINE SOLUTIONS PTY LTD

Client - Jenny Long
178 Tyagarah Road Myocum





ON-SITE WASTEWATER MANAGEMENT DETAILS

2-Bedroom Dwelling
178 Tyagarah Road Tyagarah

Client: Jenny Long

ETA Bed

TRINE SOLUTIONS PTY LTD
ON-SITE WASTEWATER MANAGEMENT SYSTEMS
P.O. BOX 8 NEW BRIGHTON NSW 2483

Drawn

R.A.

Certified

Rob Aungle

Date

16/03/2020

Scale

As shown

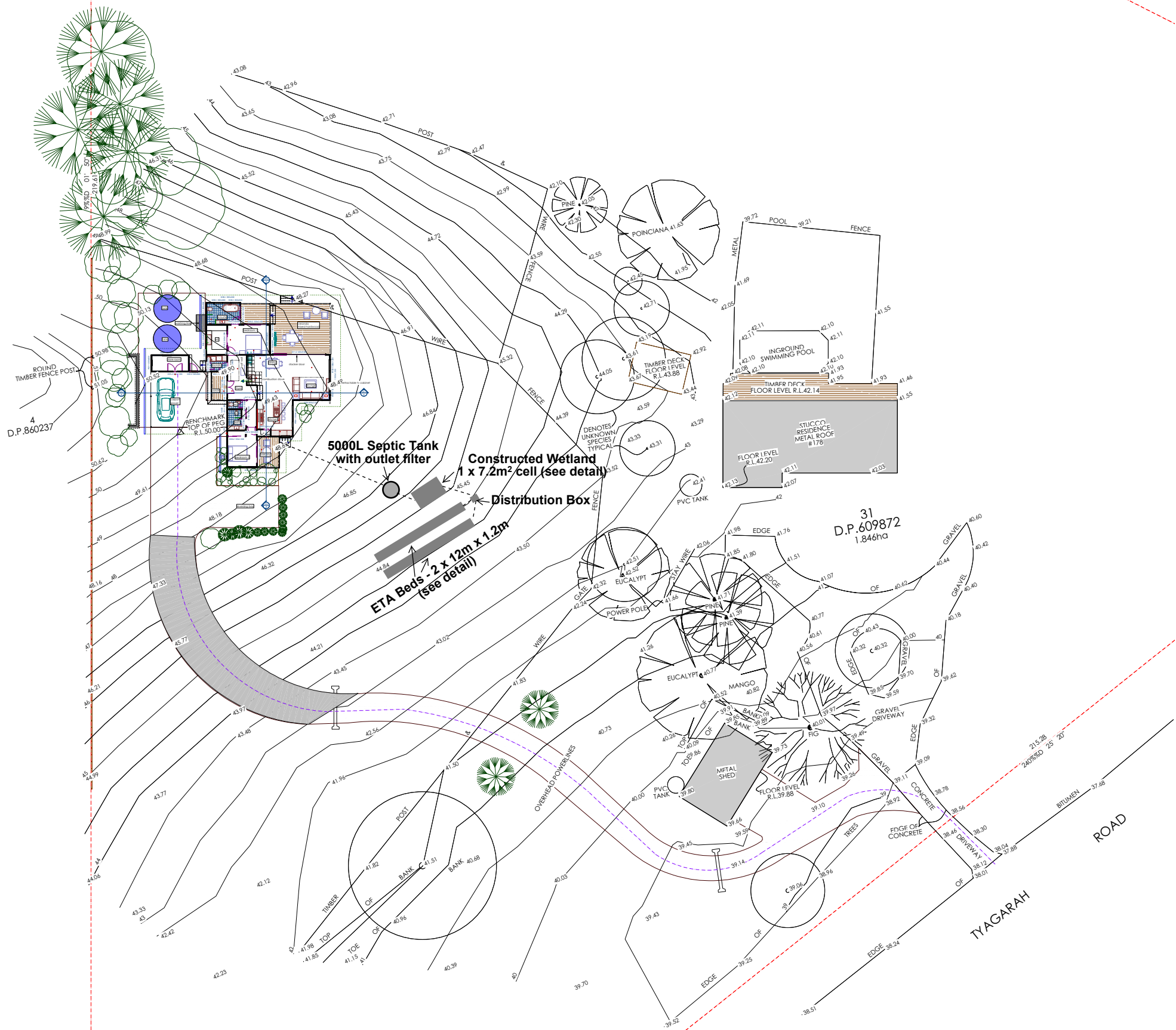
Drawing No

00-001

Rob Aungle & Associates

CONSULTING ENGINEERS
Civil, Structural & Geotechnical

305%
188.57 55'



OSMS SITE PLAN

Trine Solutions Pty Ltd
Dated: 16/03/2020

- Wastewater Notes:**
1. All wastewater to be treated on-site
 2. All wastewater via gravity flow to S.T.F.
 3. Install 3000L septic tank with effluent outlet filter
 4. Install constructed wetland - 1 x 7.2m² cell (see detail)
 5. Install distribution box
 6. Install ETA beds - 2 x 12m x 1.2m (see detail)
 7. ETA beds to be laid on contour
 8. Installation to comply with AS3500 & AS1547:2012

Note:
All works have to comply with relevant Australian standards, the
BCA, Council regulations and engineers details at all times.
If in doubt: ask.



Project:

Construction of 2 bedroom
dwelling to create Dual
Occupancy

Client:

Jenny Long, 178 Tyagarah Road
Myocum 2481
Lot 31, DP. 609872

Drawings
provided by:

Alok

EXPANDesign
198 Tyagarah Road, Myocum 2481
0061 266 847180
expandesign@bigpond.com
www.expandesign.com.au

DATE:

23/01/2020

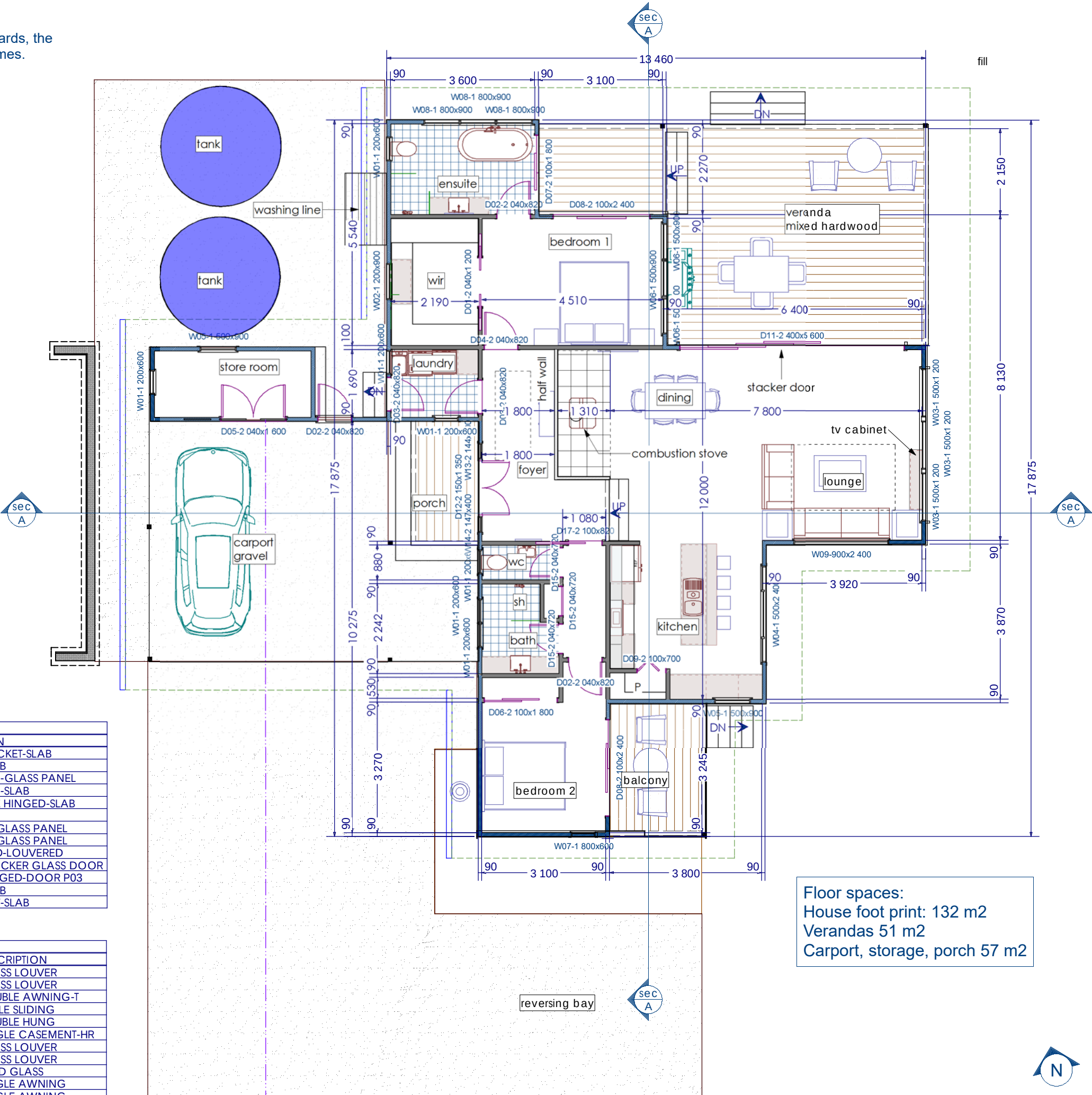
SCALE:

SHEET:

S-4

DOOR SCHEDULE				
NUMBER	QTY	HEIGHT	WIDTH	DESCRIPTION
D01	1	2040	1200	DOUBLE POCKET-SLAB
D02	3	2040	820	HINGED-SLAB
D03	2	2040	820	EXT. HINGED-GLASS PANEL
D04	1	2040	820	EXT. HINGED-SLAB
D05	1	2040	1600	EXT. DOUBLE HINGED-SLAB
D06	1	2100	1800	SLIDER-SLAB
D07	1	2100	1800	EXT. SLIDER-GLASS PANEL
D08	2	2100	2400	EXT. SLIDER-GLASS PANEL
D09	1	2100	700	2 DR. BIFOLD-LOUVERED
D11	1	2400	5600	4 PANEL STACKER GLASS DOOR
D12	1	2150	1350	DOUBLE HINGED-DOOR P03
D15	3	2040	720	HINGED-SLAB
D17	1	2100	820	EXT. POCKET-SLAB

WINDOW SCHEDULE					
NUMBER	QTY	FLOOR	HEIGHT	WIDTH	DESCRIPTION
W01	7	1	1200	600	GLASS LOUVER
W02	1	1	1200	900	GLASS LOUVER
W03	3	1	1500	1200	DOUBLE AWNING-T
W04	1	1	1500	2400	TRIPLE SLIDING
W05	2	1	1500	900	DOUBLE HUNG
W06	3	1	1500	900	SINGLE CASEMENT-HR
W07	1	1	1800	600	GLASS LOUVER
W08	3	1	1800	900	GLASS LOUVER
W09	1	1	900	2400	FIXED GLASS
W10	3	2	600	1200	SINGLE AWNING
W11	4	2	600	1350	SINGLE AWNING
W12	1	2	600	2400	TRIPLE SLIDING
W13	1	1	2144	400	GLASS LOUVER
W14	1	1	2147	400	GLASS LOUVER



Floor spaces:
House foot print: 132 m2
Verandas 51 m2
Carport, storage, porch 57 m2

floor plan 1:100

2-Bedroom Dwelling
178 Tyagarah Road
Tyagarah