Stellen
Civil Engineering

Stellen Consulting
Level 1, 27 Belgrave Street
Manly NSW 2095

PO Box 151
Freshwater NSW 2096

+61 450 460 496 tel
ABN 61 149 095 189

21 November 2019

Carey Lee
13 Minkara Road
Bayview NSW 2104

c/o kinga@bsbd.com.au

Wastewater Treatment System for proposed alterations and additions at 13 Minkara Road

Dear Carey

1.0 Introduction

Stellen Consulting was engaged to assess the proposed alterations and additions at 13 Minkara Road in reference to the management of wastewater on-site.

This report assesses the impact of the proposed development on the existing wastewater treatment system (WWTS) and its ability to cater for the additional wastewater loads generated by the development.

2.0 Description of the Site

The property is a rectangular shaped allotment with an area of approximately 2 ha. The site is mostly grassed and located in a rural area sloping to the north. The site currently has a dwelling, an office, a small stable, a small shed and a pool. The site contains an existing overland flow path running north adjacent to the western boundary.

3.0 Description of the Development

The proposed development includes:

- A new shed and tennis court at the northern part of the site
- A new awning on the southern side of the existing dwelling
- A new car port and roof on the existing office

A site survey and architectural plans of the proposed development are attached in Appendix A.

4.0 Existing Wastewater Treatment System (WWTS)

Trunk sewer infrastructure is not present within the vicinity of the site. Existing sewage disposal is dealt with on-site with two Econocycle model ENC 10-1 aerated wastewater treatment systems (AWTS) and a single land application area (LAA) to the north-west of the site for disposal of the treated effluent. One AWTS is connected to the existing house with the other system servicing the existing office building.

A copy of the specifications of the existing WWTS are found in Appendix B.

5.0 Proposed WWTS

The development proposes relocation of the existing AWTS servicing the office building and construction of a new LAA to service the proposed development.

No change to the existing AWTS or LAA servicing the existing house is proposed.

The proposed WWTS is shown in Appendix D .

6.0 Assessment of the existing system's ability to cater for additional loading

6.1 Verification process

The following steps where completed to establish the existing system's capability to handle the additional wastewater loads generated as a result of the proposed development.

1. A site visit was conducted and visual inspection of the existing AWTS and LAA performed.
2. Perform a quantitative analysis of the existing system based on the proposed hydraulic load and nutrient levels to verify the system's ability to cater for the additional loads generated by the development.

6.2 Load generated by the development

Load generated by the development was calculated based on the approximate use of the proposed development and existing office space, provided by the client. The development proposes a daily load of 1 Equivalent Persons (EP) and will generate approximately 193 L of wastewater per day. The calculation of the daily wastewater generation rate is outlined below in Table 1. Wastewater generation rates are estimated from those found in Table H4 of AS/NZS 1547.

Existing office, no. of workers	3	person
Wastewater Production per worker	50	L/person/day
Total WW Prod.	150	L/day
Avg. per day for 1 week (5/7 x Total WW)	107	L/day (avg)
Proposed shed max persons	6	person
Wastewater Production per recreational user	100	L/person/day
Total WW Prod.	600	L/day
Avg. per day for 1 week (1/7 x Total WW)	86	L/day (avg)
Total (Office + Recreational use)	193	L/day (avg)

Table 1 - Estimated effluent loads (avg) generated by the proposed development

6.3 Verification of the existing AWTS

The existing AWTS is an Econocycle model ENC 10-1. The system is capable of treating 2,000 litres of effluent per day, approximately ten times the estimated effluent generated by the site.

6.4 Sizing the LAA

The LAA is designed in accordance with the following documents:

- AS/NZS 1547:2012 – *On-site domestic wastewater management*
- The Silver Book

To size the LAA, the hydraulic loading used was 193 L per day. Nutrient loads for phosphorous and nitrogen are estimated using the design guidance contained within AS/NZS 1547 and The Silver Book.

Rainfall and evaporation data for Sydney was used to estimate the required wet weather storage.

Soil type is conservatively assumed to be clay loam and is based on visual evidence gathered during a site inspection. No soil absorption rate testing was completed. A detailed soil inspection and testing must be completed prior to construction to verify the assumptions within this report.

The irrigation area required is estimated from either the hydraulic or the nutrient loading rate of the wastewater, depending on which is the most limiting. Table 2 provides a summary of the findings. Full calculations for sizing of the LAA can be found in Appendix C.

	Design Loading Rate	Water Balance	Nitrogen Balance	Phosphorous Balance
Minimum LAA for zero storage (m^2)	39	59	45	56

Table 2 - LAA sizing for hydraulic and nutrient loads

Based on Table 2, the critical calculation for the LAA is the water balance. The LAA shall be a minimum of 59 m^2; the proposed LAA is approximately 95 m^2 in area and meets this minimum requirement.

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7.0 Conclusion and recommendations

Based on a review of the site and estimated influent volumes, we conclude that the existing on-site WWTS and proposed LAA have sufficient capacity to service the proposed development. We recommend:

- A detailed soil inspection and testing must be completed prior to construction to verify the assumptions within this report.
- On-going testing of the effluent on a periodic basis to ensure the healthy and safe function of the system is maintained.

Provided the recommendations contained within this report are followed, we recommend the proposed WWTS as a safe and practical solution to support the development.

Kind regards,

Logan English-Smith
Senior Engineer

Stellen Consulting
Level 1, 27 Belgrave Street, Manly, NSW 2095
T. 0430 472 389
E. logan.englishsmith@stellenconsulting.com.au

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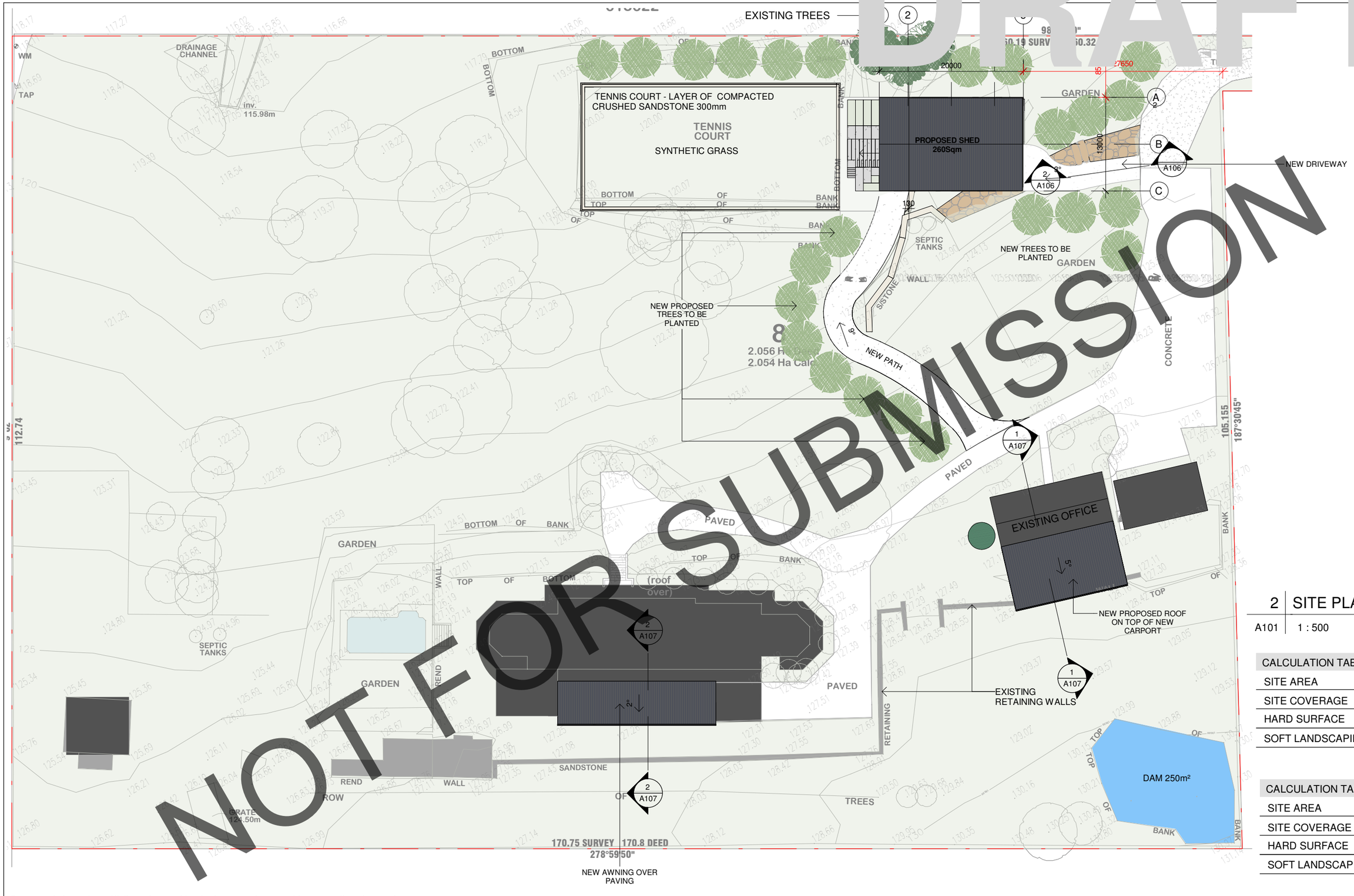
Appendix A

Survey and Architectural Plans



2 SITE PLAN

A101 | 1 : 500

CALCULATION TABLE - EXISTING	
SITE AREA	20 560 m²
SITE COVERAGE	957 m² / 4.6%
HARD SURFACE	2 694 m²
SOFT LANDSCAPING	16 909 m² / 82.2%

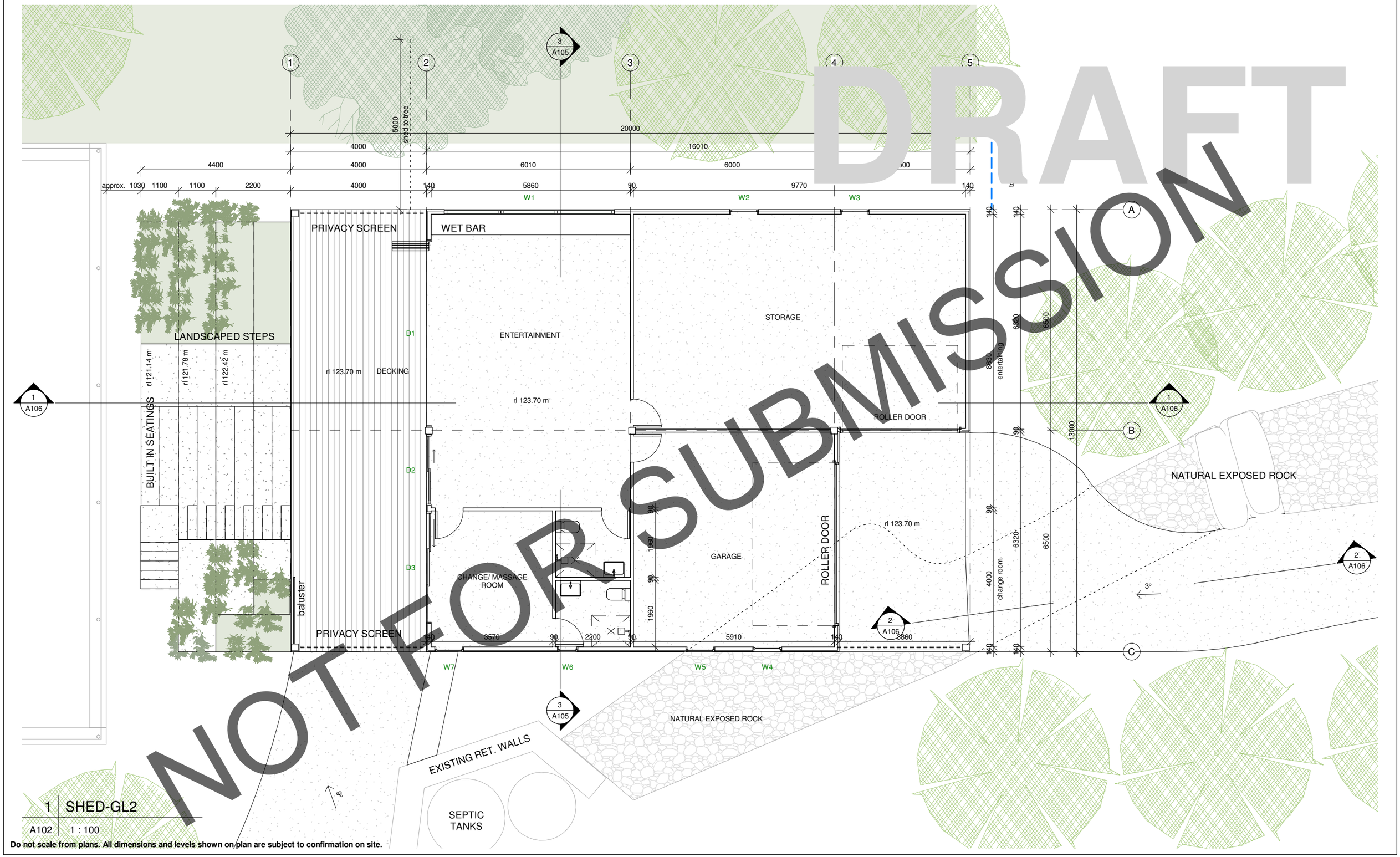
CALCULATION TABLE - PROPOSED	
SITE AREA	20 560 m²
SITE COVERAGE	1434 m² / 7%
HARD SURFACE	2 587 m²
SOFT LANDSCAPING	16539 m² / 80.4%

Do not scale from plans. All dimensions and levels shown on plan are subject to confirmation on site.

ISSUE	DATE	DESCRIPTION	DRWN	CHKD
-	13.02.2019	PRELIMINARY DESIGN	MW	
-	15.02.2019	PRELIMINARY DESIGN 2	MW	
-	25.03.2019	DA PREPARATION	KC	

BLUE SKY BUILDING DESIGNS
PO BOX 167
Newport 2106
Mobile: 0 414 310 171
E: info@bsbd.com.au
www.blueskybuildingdesigns.com.au

PROJECT TITLE:	NEW PROPOSED SHED
PROJECT NO.:	2018049
AT:	13 Minkara Rd, Bayview
FOR:	3rd Solution Investment Pty Ltd
SHEET TITLE:	SITE PLAN
SHEET NO:	A101
SCALE A3:	As indicated



1 | SHED-GL2

A102 | 1 : 100

Do not scale from plans. All dimensions and levels shown on plan are subject to confirmation on site.

DRAFT

SUBMISSION

NOT FOR SC

ISSUE	DATE	DESCRIPTION	DRWN	CHKD
-	13.02.2019	PRELIMINARY DESIGN	MW	
-	15.02.2019	PRELIMINARY DESIGN 2	MW	
-	25.03.2019	DA PREPARATION	KC	

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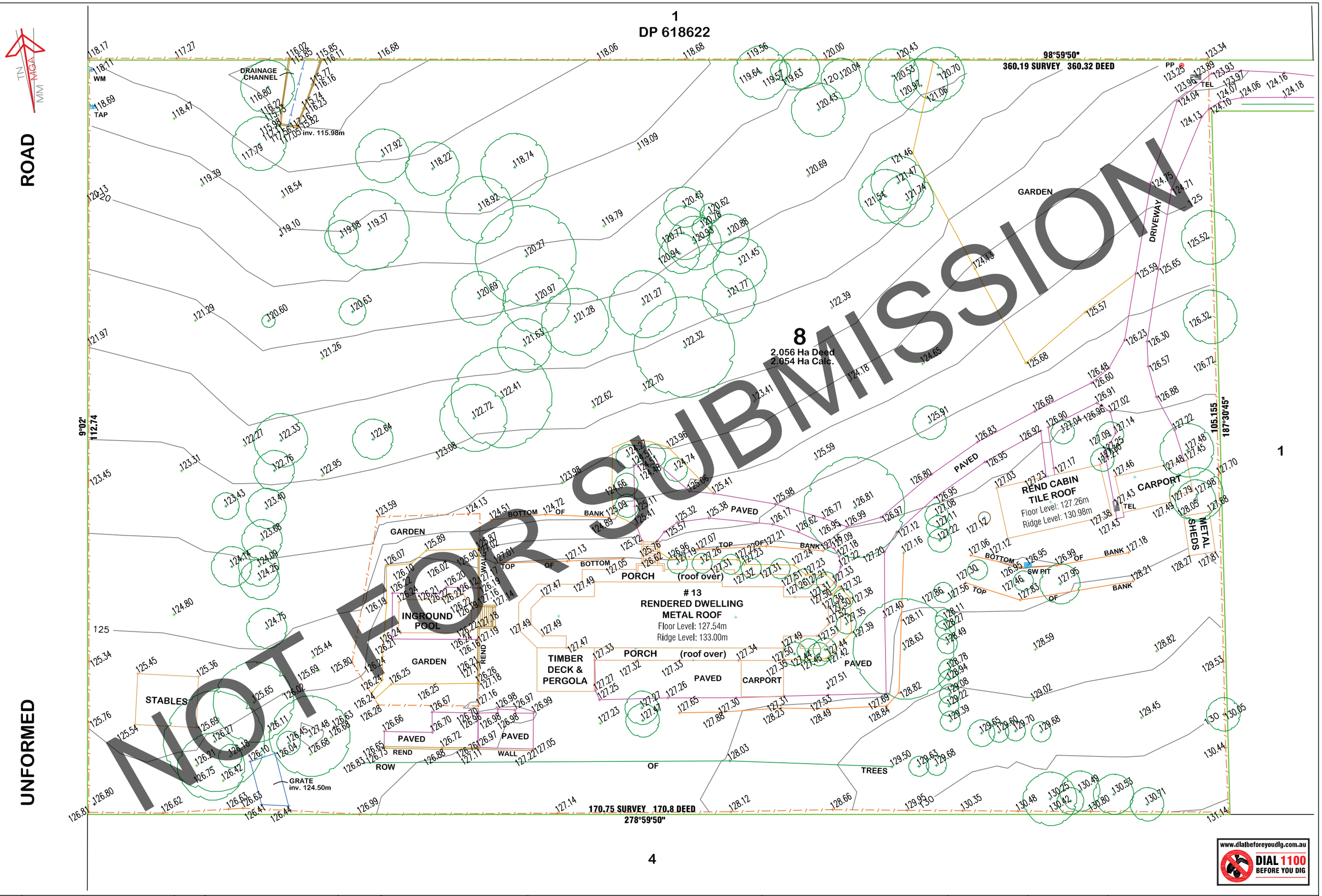
PROJECT TITLE:	NEW PROPOSED SHED
PROJECT NO.:	2018049
AT:	13 Minkara Rd, Bayview
FOR:	3rd Solution Investment Pty Ltd
SHEET TITLE:	FLOOR PLAN
SHEET NO:	A102
SCALE A3:	1 : 100



Origin of Levels : PM 48789 fd.
Location : Minkara Road, Bayview.
R.L. : 128.330m A.H.D.

revision	description:	date:

client: C LEE'S GROUP PTY LTD

approved: | assessed: A.W.C.
drawn: R.G.
Registered Surveyor | surveyed: A.P.

Clarke Dowdle & Associates
surveyors - planners - ecologists - bushfire consultants
Development Consultants
#1 OSCAR STREET
UMINA BEACH NSW 2257
ph (02)43443553 fax (02)43446636
email admin@cdasurveys.com.au
Po Box 3122 Umina NSW 2257

project: #13 MINKARA ROAD, BAYVIEW.
details: Lot 8 in DP 238742
drawing: PLAN SHOWING SPOT-LEVELS, CONTOURS & DETAIL.

red. ratio:	1:500	datum:	A.H.D.
reference #Co:	20055	ref ext:	
contour interval:	1m	DA #:	
Job date:	21/04/16	number in set:	2 of 3
LGA:	PITTWATER		
Parish:	NARRABEEN		
County:	CUMBERLAND		

-all dimensions are in metres unless otherwise shown.
-check and confirm all areas & dimensions on site prior to the commencement of any works.
-do not scale from face of plan.
-preliminary boundary fixation has been undertaken only.
-if any construction is planned on or close to the boundaries further survey work will be required.
-a complete investigation of services has not been undertaken for this survey.
-services shown hereon have been located by visible features only.
-tree trunk & height dimensions are approximate only.
-tree spreads are approximate only but have been drawn to scale.
-ridge& gutter levels displayed on buildings are approximate only.
-underground utility mains locations are provided by Council diagrams & are approx positions only.

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Appendix B

Existing WWTS Documentation

NSW GOVERNMENT | Health

Certificate of Accreditation

Sewage Management Facility
Aerated Wastewater Treatment System

This Certificate of Accreditation is issued by the Secretary of the NSW Ministry of Health pursuant to Clause 41(1) of the Local Government (General) Regulation 2005.

System: ***Econocycle model ENC 10-1 AWTS***

Manufacturer: ***Eco-septic Pty Ltd t/a Econocycle***

Of: ***15 Econo Place, Silverdale, NSW, 2752***

The Econocycle model ENC 10-1 AWTS as described in Schedule 1, has been accredited as a sewage management facility for use in single domestic premises in NSW. This accreditation is subject to the conditions of accreditation and permitted uses specified in Schedule 2.

Director, Environmental Health
for Secretary (delegation PH335)

Issued: *28 September 2015*
Certificate No: *AWTS 015*
Expires: *31 December 2020*

Schedule 1: Specification

Econocycle model ENC 10-1 Aerated Wastewater Treatment System

General Description

The Econocycle model ENC 10-1 Aerated Wastewater Treatment System (AWTS) is designed to treat the wastewater from a residential dwelling occupied by a maximum of 10 persons. The Econocycle model ENC 10-1 AWTS is contained in one vertical axis type cylindrical precast concrete collection well with a design capacity of 7000 litres. The operational water level in the aeration chamber of the system is 1440 mm. The system consist of:

- A primary sedimentation chamber with a capacity of 3050 litres;
- A contact aeration chamber with a capacity of 2500 litres, divided into two sections and each containing a block of contact filter media measuring 800 mm long x 800 mm wide x 1200 mm high with a surface area of 50 m^2;
- A sedimentation/clarifying chamber with a capacity of 420 litres;
- An irrigation pump chamber with a capacity of 420 litres incorporating a capacity of 300 litres for chlorine contact of the effluent;
- A chlorine disinfection unit installed on the outlet of the clarification filter;
- Air is supplied to the contact aeration chamber by an air blower with an output of 80 litres/minute at 1.5 m water depth;
- A submersible irrigation pump which delivers a minimum flow of 2.0 m^3/hour at a minimum head of 7 m, or better.

Schedule 2: Conditions of Accreditation

1.0 General

1.1 For each installation the owner/occupier of the premises shall make an application to the local authority to install an Econocycle model ENC 10-1 AWTS as a waste management facility in accordance with Section 68, Part C of the Local Government Act 1993 and Clause 26 of the Local Government (General) Regulation 2005.

1.2 The Econocycle model ENC 10-1 AWTS shall be supplied, constructed and installed in accordance with the design as submitted and accredited by the NSW Ministry of Health.

1.3 Any modification or variations to the accredited design of the Econocycle model ENC 10-1 AWTS shall be submitted for separate consideration and variation of the Certificate of Accreditation by the Secretary of the NSW Ministry of Health.

1.4 Each Econocycle model ENC 10-1 AWTS shall be permanently and legibly marked on a non-corrosive metal plaque or equivalent, attached to the lid with the following information:
- The brand name of the system;
- The manufacturer's name or registered trademark;
- The month and year of manufacture.

1.5 The manufacturer shall supply with each Econocycle model ENC 10-1 AWTS and owner's manual, which sets out the care, operation, maintenance and on-going management requirements of the system.

1.6 The manufacturer shall provide the following information to each local authority where it is intended to install an AWTS in their area once Ministry accreditation has been obtained:

- Statement of warranty
- Statement of service life
- Quality Assurance Certification
- Installation Manual
- Service Manual
- Owner's Manual
- Service Report Form
- Engineering Drawings on A3 format
- Detailed Specifications
- A4 Plans
- Accreditation documentation from NSW Health.

2.0 Installation and Commissioning

2.1 The local authority should require that on completion of the installation of the Econocycle model ENC 10-1 AWTS, the system is inspected and checked by the manufacturer or the manufacturer's agent. The manufacturer or the agent is to certify that the system has been installed and commissioned in accordance with its design, conditions of accreditation and any additional requirements of the local authority.

2.2 The local authority should require that all electrical work must be carried out by a licensed electrician and in accordance with the relevant provisions of AS/NZS 3000.

3.0 Maintenance

3.1 The local authority shall require the owner/occupier of the premises to enter into an annual service contract with a representative of Econocycle or a service contractor or company acceptable to the local authority.

3.2 The Econocycle model ENC 10-1 AWTS shall be serviced at three monthly intervals in accordance with the details set out in the owner's and service manual.

3.3 Each three monthly service shall include a check on all mechanical, electrical and functioning parts of the system including:

- The chlorinator and replenishment of the disinfectant,
- Pumps, air blower, fan or air venturi,
- The alarm system (where possible),
- Slime growth on the filter media,
- Operation of the sludge return system,
- The effluent irrigation area,
- On-site testing for free residual chlorine, pH and dissolved oxygen.

3.4 The local authority should require that a service report sheet, in triplicate, is completed for each service. The original shall be given to the owner, the duplicate forwarded to the local authority and the triplicate retained by the service contractor.

4.0 On-going Management

4.1 The owner's manual prepared by the manufacturer shall contain a plan for the on-going management of the Econocycle model ENC 10-1 AWTS. The plan shall include details of:

- the treatment process,
- procedures to be followed in the event of a system failure,
- emergency contact numbers,
- maintenance requirements,
- inspection and sampling procedures to be followed as part of the on-going monitoring program developed by the local authority.

4.2 Effluent from the Econocycle model ENC 10-1 AWTS taken in any random grab sample shall comply with the following standard:

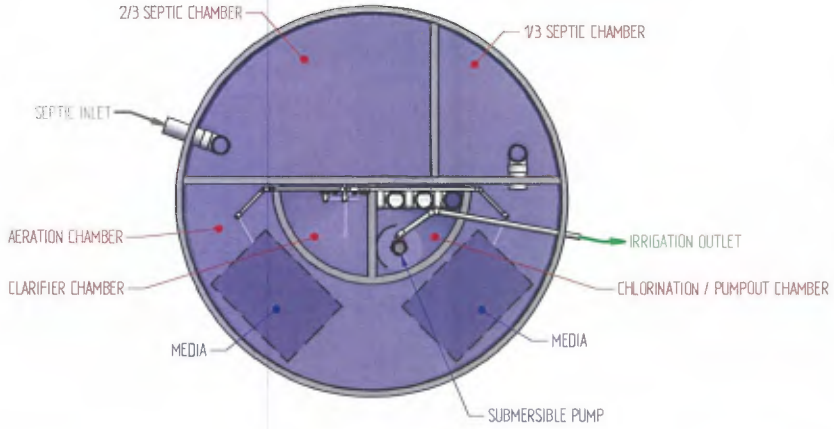
- BOD^5 (less than 30 mg/L)
- SS (less than 45 mg/L)
- E. coli (less than 100 cfu/100 ml)
- Free residual chlorine (greater than 0.2 and less than 2.0 mg/L)

5.0 Permitted uses

5.1 The effluent is suitable for re-use for garden purposes by way of any of the forms of irrigation as described in AS/NZS 1547:2000:

- above ground spray irrigation; or
- surface drip irrigation covered by mulch; or
- sub-surface drip irrigation installed at around 100 mm depth.

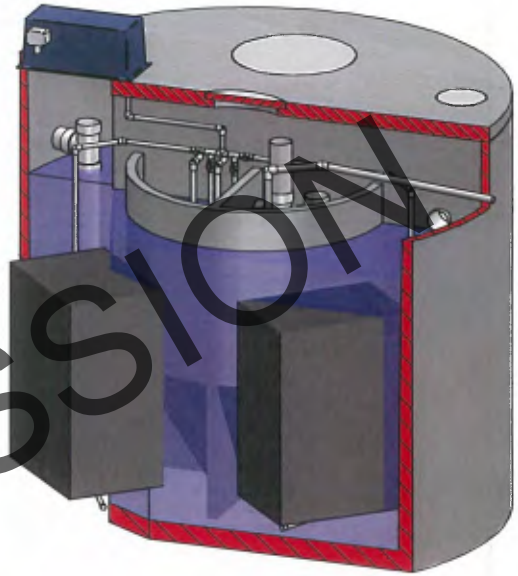
Each of the three forms of irrigation is subject to the approval of the local authority.

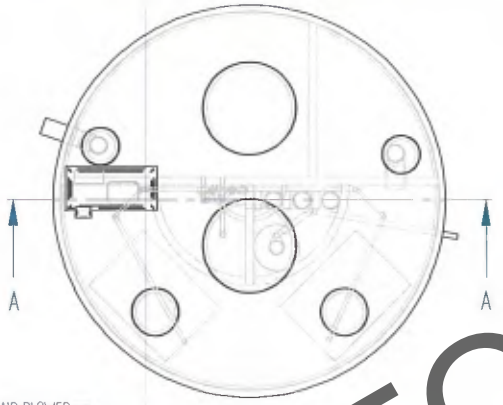


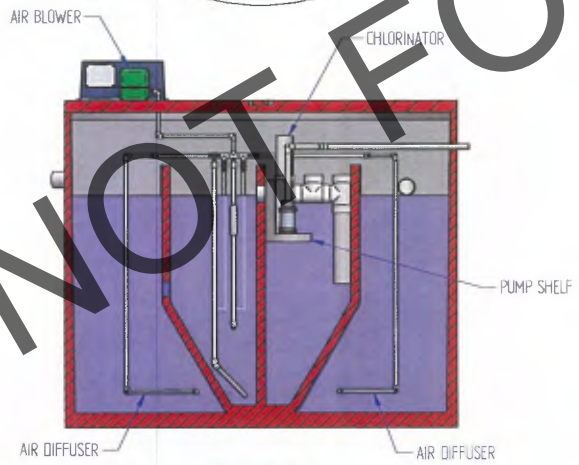
APPROVED

2 8 SEP 2015

NSW MINISTRY OF HEALTH







SECTION A-A

NOTES:
1. SYSTEM CAPACITY 10 PEOPLE
2. SEPTIC TANKS MANUFACTURED AND TESTED IN ACCORDANCE WITH AS/NZS 1546.1:2008

Econocycle
AERATED WASTEWATER TREATMENT SYSTEMS

UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN MM

SCALE	DO NOT SCALE
DRAWN BY	P. MCKAY
MODELLED BY	P. MCKAY
DATE PLOTTED	24/09/2010
DRAWING LAST MODIFIED BY	P. MCKAY
MODEL LAST MODIFIED BY	P. MCKAY
PROJECT	ENC10-1
TITLE	TANK ASSY CERTIFICATION DRAWING
COAT/TREAT	-
PART #	124_0710
REVISION	2.G
SHEET SIZE	A3
SHEET No.	1 OF 1

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Appendix C

WWTS Calculations

Site Address:	**13 Minkara Road, Bayview**		
Date:	21-Nov-19	**Designer:**	LES

INPUT DATA

Design Wastewater Flow	Q	193	L/day	Based on maximum potential occupancy and derived from Table 4 in the EPA Code of Practice (2013)
Design Irrigation Rate	DIR	5.0	mm/day	Based on soil texture class/permeability and derived from Table 9 in the EPA Code of Practice (2013)
Nominated Land Application Area	L	59	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	unitless	Proportion of rainfall that remains onsite and infiltrates, allowing for any runoff
Mean Monthly Rainfall Data	Design and Installation of On-site Wastewater Systems			
Mean Monthly Pan Evaporation Data	Design and Installation of On-site Wastewater Systems			

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	107.8	129.8	122.3	114.5	98.2	126	63.3	74.5	60.9	71.4	90.9	70.7	**1130.3**
Evaporation	E		mm/month	282.875	227.5	209.25	180	155	125	139.5	163.8571	210	265.7143	247.5	286.75	**2492.946**
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	226	182	146	126	93	75	84	98	147	213	198	229	**1817.761**
Percolation	B	DIRxD	mm/month	155.0	140	155.0	150.0	155.0	150.0	155.0	155.0	150.0	155.0	150.0	155.0	**1825.0**
Outputs		ET+B	mm/month	381.3	322	301.5	276.0	248.0	225.0	238.7	253.3	297.0	367.6	348.0	384.4	**3642.8**
INPUTS																
Retained Rainfall	RR	RxRF	mm/month	107.8	129.8	122.3	114.5	98.2	126	63.3	74.5	60.9	71.4	90.9	70.7	**1130.3**
Applied Effluent	W	(QxD)/L	mm/month	101.4	91.6	101.4	98.1	101.4	98.1	101.4	101.4	98.1	101.4	98.1	101.4	**1194.0**
Inputs		RR+W	mm/month	209.2	221.4	223.7	212.6	199.6	224.1	164.7	175.9	159.0	172.8	189.0	172.1	**2324.3**
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	-172.1	-100.6	-77.8	-63.4	-48.4	-0.9	-74.0	-77.4	-138.0	-194.8	-159.0	-212.3	
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	22	28	33	36	40	58	34	33	25	20	23	19	

MINIMUM AREA REQUIRED FOR ZERO STORAGE: 59.0 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 for pasture grass in Victoria

Please read the attached notes before using this spreadsheet

Nitrogen Balance

Site Address:	13 Minkara Road, Bayview		
Date:	21-Nov-19	Designer:	LES

SUMMARY - LAND APPLICATION AREA REQUIRED BASED NITROGEN BALANCE 45 m^2

INPUT DATA[1]

Wastewater Loading		
Hydraulic Load	193	L/day
Effluent N Concentration	20	mg/L
% N Lost to Soil Processes (Geary & Gardner 1996)	0.2	Decimal
Total N Loss to Soil	772	mg/day
Remaining N Load after soil loss	3088	mg/day

Nutrient Crop Uptake					
Crop N Uptake	250	kg/ha/yr	which equals	68.49	$mg/m^2/day$

NITROGEN BALANCE BASED ON ANNUAL CROP UPTAKE RATES

Minimum Area required with zero buffer		
Nitrogen	45	m^2

Determination of Buffer Zone Size for a Nominated Land Application Area (LAA)		
Nominated LAA Size	59	m^2
Predicted N Export from LAA	-0.35	kg/year
Minimum Buffer Required for excess nutrient	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] Model sensitivity to input parameters will affect the accuracy of the result obtained. Where possible site specific data should be used. Otherwise data should be obtained from a reliable source such as:

- *EPA Guidelines for Effluent Irrigation*
- *Appropriate Peer Reviewed Papers*
- *Environment and Health Protection Guidelines: Onsite Sewage Management for Single Households*
- *USEPA Onsite Systems Manual*

Please read the attached notes before using this spreadsheet

Phosphorus Uptake

Site Address:	**13 Minkara Road, Bayview**		
Date:	21-Nov-19	**Designer:**	LES

SUMMARY - LAND APPLICATION AREA REQUIRED BASED PHOSPHORUS BALANCE 56 m^2

INPUT DATA[1]

Wastewater Loading			Nutrient Uptake					
Hydraulic Load	193	L/day						
Effluent P Concentration	12	mg/L						
Effluent P Total	0.85	kg/year	Crop P Uptake	30	kg/ha/yr	which equals	8.22	$mg/m^2/day$
Design Life	50	years	Soil P Uptake	4000	kg/ha/yr	which equals	1095.89	$mg/m^2/day$
Depth to Water Table	2	m						
Water Table buffer	0.5	m						

PHOSPHORUS BALANCE BASED ON ANNUAL UPTAKE RATES

Minimum Area required with zero buffer		
Phosphorus	56.36	m^2

Determination of Buffer Zone Size for a Nominated Land Application Area (LAA)		
Nominated LAA Size	59	m^2
Predicted P Export from LAA	-0.18	kg/year
Minimum Buffer Required for excess nutrient	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

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- *EPA Guidelines for Effluent Irrigation*
- *Appropriate Peer Reviewed Papers*
- *Environment and Health Protection Guidelines: Onsite Sewage Management for Single Households*
- *USEPA Onsite Systems Manual*

Please read the attached notes before using this spreadsheet

DesignLoading Rate - Minimum Pipe Length

Site Address:	**13 Minkara Road, Bayview**		
Date:	21-Nov-19	**Designer:**	LES

SUMMARY - MINIMUM PIPE LENGTH REQUIRED BASED ON DESIGN LOADING RATE 39 m^2

INPUT DATA[1]

Wastewater Loading			
Hydraulic Load	Q	193	L/day
Design Loading Rate	DLR	5	mm/day
Trench Width	W	0.6	m

Minimum Length Required

Minimum Pipe Length = Q/(DLR x W)	L	64	m

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] Model sensitivity to input parameters will affect the accuracy of the result obtained. Where possible site specific data should be used. Otherwise data should be obtained from a reliable source such as:

- *EPA Guidelines for Effluent Irrigation*
- *Appropriate Peer Reviewed Papers*
- *Environment and Health Protection Guidelines: Onsite Sewage Management for Single Households*
- *USEPA Onsite Systems Manual*

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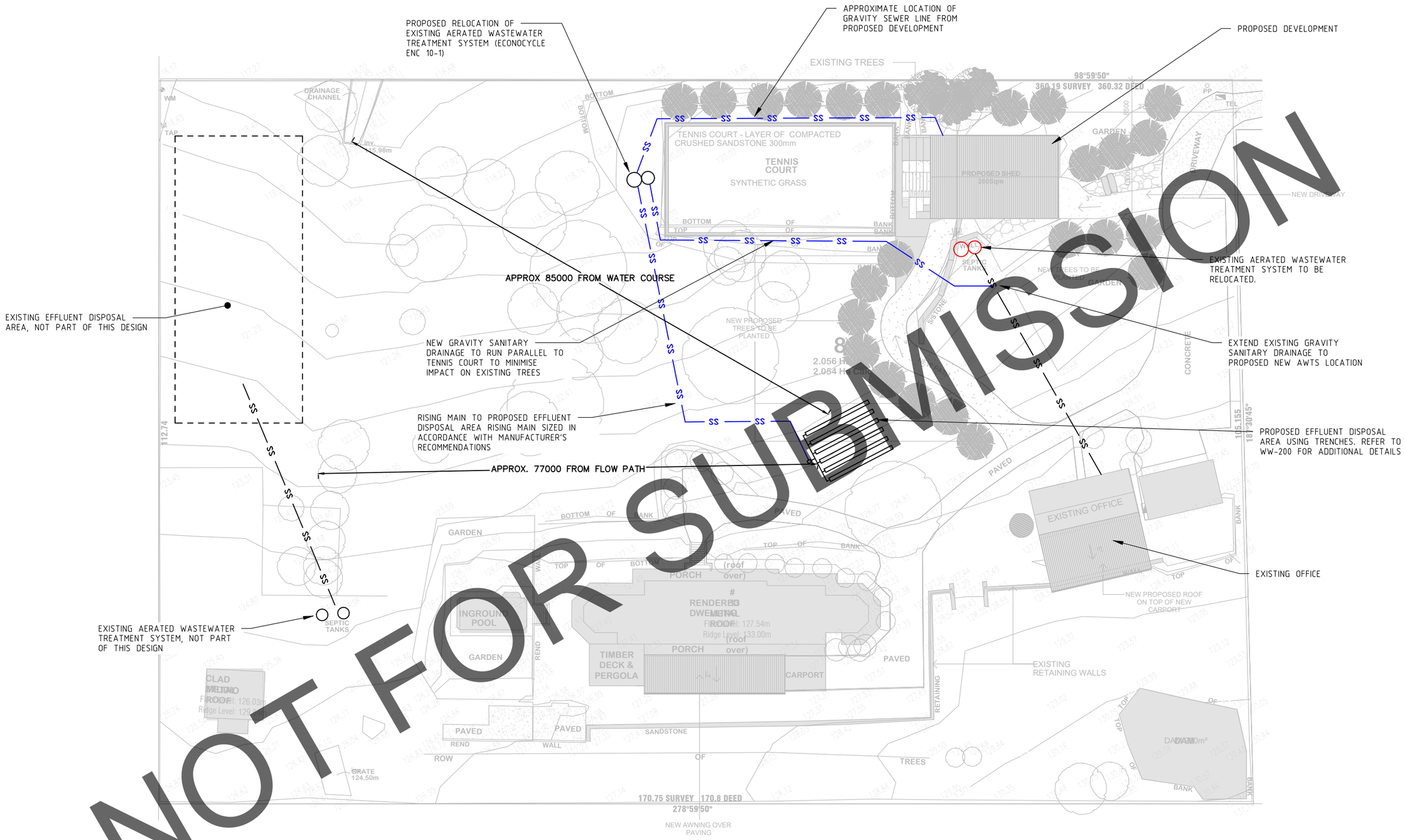
Civil Engineering

Appendix D

Proposed WWTS



NOT FOR SUBMISSION

NOT FOR CONSTRUCTION

REVISIONS					
No.	BY	DATE	DESCRIPTION	APPD
0	LES	21/11/2019	APPROVED FOR DA SUBMISSION	IRW

Scale

1:600

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DRAWN	LES	CHECKED	IRW
APPROVED	IRW	DATE	21/11/2019

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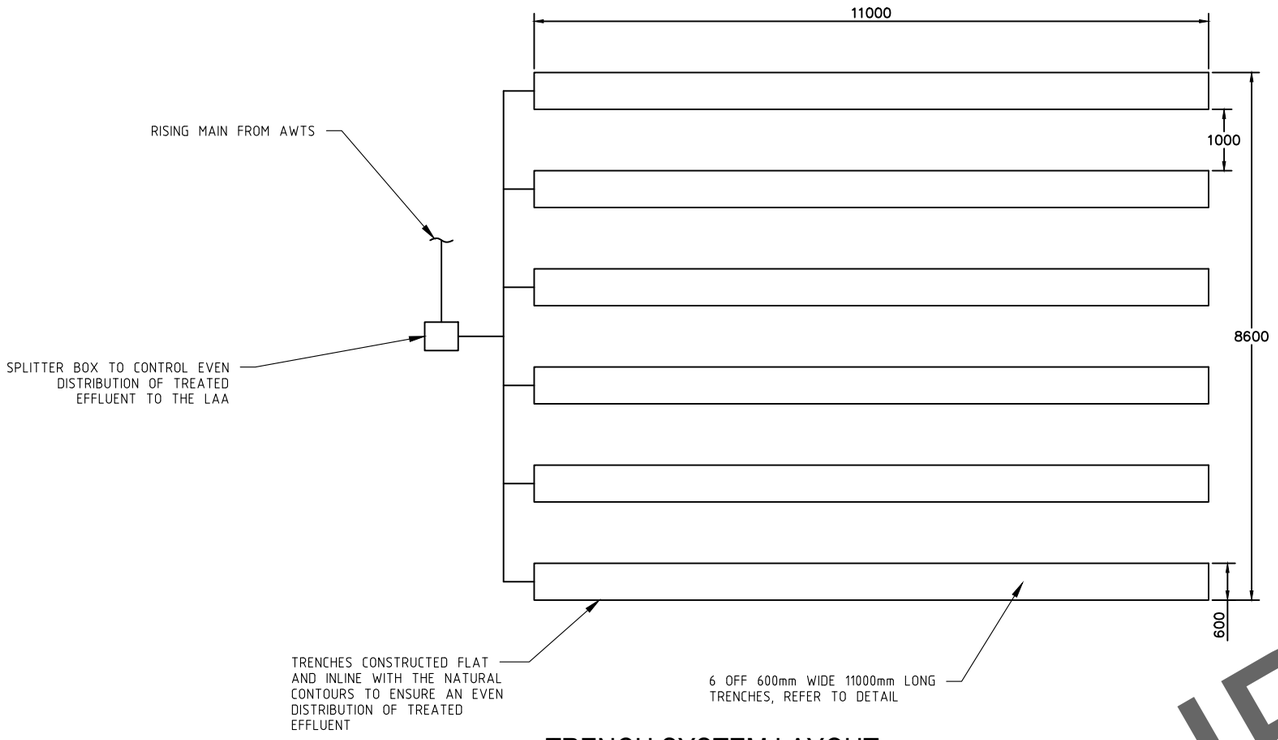
13 MINKARA ROAD, BAYVIEW

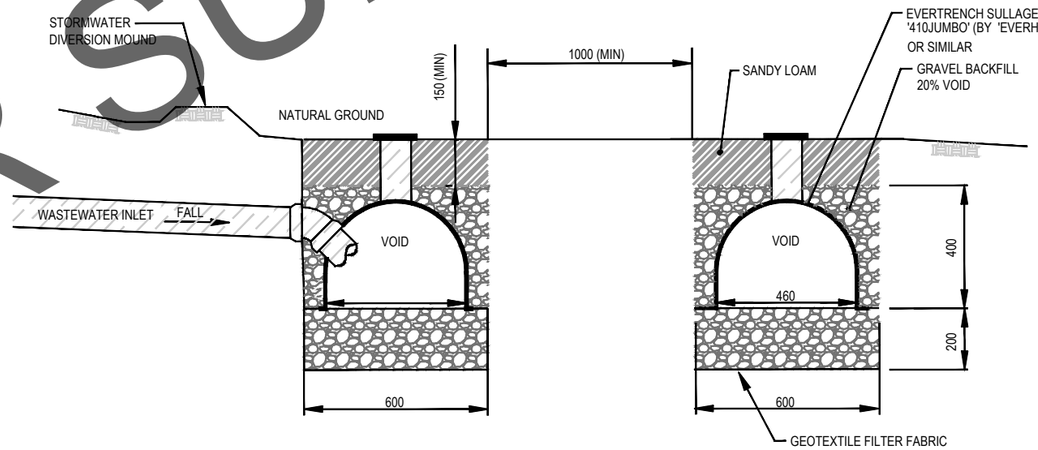
WASTEWATER - SITE LAYOUT

Size	Status	Drg No.	Rev.
A3	APPROVED FOR DA SUBMISSION	WW-101	0



TRENCH SYSTEM LAYOUT

NTS



TYPICAL ABSORPTION TRENCH SYSTEM

NTS

NOTES:

1. TYPICAL EFFLUENT DISPOSAL TRENCH SYSTEM ONLY.
2. LOCATION OF ALL SERVICES MUST BE CONFIRMED ON SITE PRIOR TO COMMENCEMENT OF EXCAVATION WORKS.

NOT FOR CONSTRUCTION

REVISIONS					
0	LES	21/11/2019	APPROVED FOR DA SUBMISSION		IRW
No.	BY	DATE	DESCRIPTION		APPD

Scale

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APPROVED	IRW	DATE	21/11/2019

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13 MINKARA ROAD, BAYVIEW

WASTEWATER - SYSTEM LAYOUT AND DETAILS

Size	Status	Drg No.	Rev.
A3	APPROVED FOR DA SUBMISSION	WW-200	0