Form 2 **Section 52**

NOTICE OF AN APPLICATION FOR PLANNING PERMIT

The land affected by the application is located at:	LOT 2 TP200388 P/GLENMONA (30 CARALULUP ROAD, BUNG BONG VIC 3467) VOL; 09402 FOL: 372
The application is for a permit to:	CONSTRUCTION OF A NEW DWELLING
The applicant for the permit is:	MICHAEL EDWIN COGHLAN
The application reference number is:	PA2419/15
You may look at the application and any documents that support the application at the office of the responsible authority.	**www.pyrenees.vic.gov.au** OR Pyrenees Shire Avoca Community Resource Centre 122 High Street AVOCA VIC 3467 Tel: 03 5349 1100 Fax: 03 5349 2068

This can be done during office hours and is free of charge.

Any person who may be affected by the granting of the permit may object or make other submissions to the responsible authority.

An objection must
- **be sent to the Responsible Authority in writing,**
- **include the reasons for the objection, and**
- **state how the objector would be affected.**

The responsible Authority will not decide on the application before:	**15/10/2015**

If you object, the Responsible Authority will tell you its decision.


PCRZ
RDZ1
FZ
PYRENEES HIGHWAY
PCRZ
FZ
CARALULUP ROAD
PUZ1

PYRENEES SHIRE

Planning Enquiries
Phone:
Web: http://www.pyrenees.vic.gov.au

Office Use Only

Application No.: 2419/15 Date Lodged: / /

Application for
Planning Permit

If you need help to complete this form, read *How to Complete the Application for Planning Permit form*.

⚠ Any material submitted with this application, including plans and personal information, will be made available for public viewing, including electronically, and copies may be made for interested parties for the purpose of enabling consideration and review as part of a planning process under the *Planning and Environment Act 1987*. If you have any concerns, please contact Council's planning department.

⚠ **Questions marked with an asterisk (*) are mandatory and must be completed.**

⚠ **If the space provided on the form is insufficient, attach a separate sheet.**

PYRENEES SHIRE COUNCIL
FILE No: 319047300P
DOC No:
22 SEP 2015
ACTION: H SPADING
INFORMATION:

The Land

(1) Address of the land. Complete the Street Address and one of the Formal Land Descriptions.

Street Address *

Unit No.:	St. No.:	St. Name:
4	30	CARALULUP ROAD.

Suburb/Locality: BUNG BONG Postcode: 3467

Formal Land Description *
Complete either A or B.

⚠ This information can be found on the certificate of title.

A Lot No.: [redacted] ◯Lodged Plan ◯Title Plan ◯Plan of Subdivision No.:

OR

B Crown Allotment No.: [redacted] E 1 Section No.:

Parish/Township Name: GLENMONA

The Proposal

⚠ You must give full details of your proposal and attach the information required to assess the application. Insufficient or unclear information will delay your application.

(2) **For what use, development or other matter do you require a permit? ***

If you need help about the proposal, read: *How to Complete the Application for Planning Permit Form*

CONSTRUCT NEW DWELLING HOUSE
Existing house to be demolished on Occupancy.

■ Provide additional information on the proposal, including: plans and elevations; any information required by the planning scheme, requested by Council or outlined in a Council planning permit checklist; and if required, a description of the likely effect of the proposal.

(3) **Estimated cost of development for which the permit is required ***

Cost $ 315,000.00. ⚠ You may be required to verify this estimate.

Insert '0' if no development is proposed (eg. change of use, subdivision, removal of covenant, liquor licence)

Existing Conditions

(4) **Describe how the land is used and developed now ***

eg. vacant, three dwellings, medical centre with two practitioners, licensed restaurant with 80 seats, grazing.

FARMING

036106

■ Provide a plan of the existing conditions. Photos are also helpful.

Title Information

(5) **Encumbrances on title ***

If you need help about the title, read: *How to Complete the Application for Planning Permit Form*

Does the proposal breach, in any way, an encumbrance on title such as a restrictrive covenant, section 173 agreement or other obligation such as an easement or building envelope?

◯ Yes. (If 'yes' contact Council for advice on how to proceed before continuing with this application.)

◯ No

◉ Not applicable (no such encumbrance applies).

Provide a full, current copy of the title for each individual parcel of land forming the subject site. (The title includes: the covering 'register search statement', the title diagram and the associated title documents, known as 'instruments', eg. restrictive covenants.)

Applicant and Owner Details

(6) Provide details of the applicant and the owner of the land.

Applicant *

The person who wants the permit.

Name:

Title: MR | First Name: MICHAEL | Surname: COGHLAN

Organisation (if applicable):

Postal Address: | If it is a P.O. Box, enter the details here:

Unit No.: | St. No.: [redacted] | St. Name: PO BOX 32 AVOCA

Suburb/Locality: | State: VIC | Postcode: 3467

(1)

Where the preferred contact person for the application is different from the applicant, provide the details of that person.

Contact person's details * Same as applicant (if so, go to 'contact information') ☐

Name:

Title: MRS | First Name: SONIA | Surname: COGHLAN

Organisation (if applicable):

Postal Address: | If it is a P.O. Box, enter the details here:

Unit No.: | St. No.: | St. Name: PO BOX 32 AVOCA.

Suburb/Locality: | State: VIC | Postcode: 3467

(2)

*Please provide at least one contact phone number **

Contact information

Business Phone: 0429417100 | Email: Sonacoghlan@hotmail.com.

Mobile Phone: 0437754746. | Fax: 54653689

Owner *

The person or organisation who owns the land

Where the owner is different from the applicant, provide the details of that person or organisation.

Same as applicant ☑

Name:

Title: MR | First Name: MICHAEL | Surname: COGHLAN

Organisation (if applicable):

Postal Address: | If it is a P.O. Box, enter the details here:

Unit No.: | St. No.: | St. Name:

Suburb/Locality: | State: | Postcode:

Owner's Signature (Optional): | Date: day / month / year

Declaration

(7) **This form must be signed by the applicant ***

⚠ Remember it is against the law to provide false or misleading information, which could result in a heavy fine and cancellation of the permit.

I declare that I am the applicant; and that all the information in this application is true and correct; and the owner (if not myself) has been notified of the permit application.

Signature: [signature] | Date: 3-9-15 day / month / year

Need help with the Application?

If you need help to complete this form, read *How to complete the Application for Planning Permit Form*
General information about the planning process is available at *http://www.dpcd.vic.gov.au/planning*

Contact Council's planning department to discuss the specific requirements for this application and obtain a planning permit checklist. Insufficient or unclear information may delay your application.

(8) Has there been a pre-application meeting with a Council planning officer?

(✓) No ( ) Yes

If 'yes', with whom?:

Date: day / month / year

Checklist

(9) Have you:

[✓] Filled in the form completely?

[ ] Paid or included the application fee?

⚠ Most applications require a fee to be paid. Contact Council to determine the appropriate fee.

[✓] Provided all necessary supporting information and documents?

- [ ] A Full, current copy of title information for each individual parcel of land, forming the subject site.
- [ ] A plan of the existing conditions.
- [ ] Plans showing the layout and details of the proposal.
- [ ] Any information required by the planning scheme, requested by council or outlined in a council planning permit check list.
- [ ] If required, a description of the likely effect of the proposal (eg. traffic, noise, environmental impacts).

[ ] Completed the relevant Council planning permit checklist?

[ ] Signed the declaration (section 7)?

Lodgement

Lodge the completed and signed form, the fee payment and all documents with:

Pyrenees Shire Council
5 Lawrence Street Beaufort VIC 3373

5 Lawrence Street Beaufort VIC 3373

Contact Information:

Email: pyrenees@pyrenees.vic.gov.au

REGISTER SEARCH STATEMENT (Title Search) Transfer of Land Act 1958

VOLUME 09402 FOLIO 372 Security no : 124056875493Q
Produced 11/09/2015 02:45 pm

LAND DESCRIPTION

Lots 1,2 and 3 on Title Plan 200388S.
PARENT TITLE Volume 09007 Folio 236
Created by instrument J180208 06/10/1980

REGISTERED PROPRIETOR

Estate Fee Simple
Joint Proprietors
MICHAEL EDWIN COGHLAN
SONIA JANE COGHLAN both of AVOCA 3467
U717286P 10/04/1997

ENCUMBRANCES, CAVEATS AND NOTICES

MORTGAGE X582796A 06/07/2001
LA TROBE FINANCIAL ASSET MANAGEMENT LTD
VARIATION OF MORTGAGE AJ320115X 17/11/2011
TRANSFER OF MORTGAGE AL615364P 10/01/2015

Any encumbrances created by Section 98 Transfer of Land Act 1958 or Section 24 Subdivision Act 1988 and any other encumbrances shown or entered on the plan set out under DIAGRAM LOCATION below.

DIAGRAM LOCATION

SEE TP200388S FOR FURTHER DETAILS AND BOUNDARIES

ACTIVITY IN THE LAST 125 DAYS

NIL

DOCUMENT END

TITLE PLAN		EDITION 1	TP 200388S

Location of Land

Parish: GLENMONA
Township:
Section: 4
Crown Allotment: 25A (PT), 24, 26
Crown Portion:

Last Plan Reference:
Derived From: VOL 9402 FOL 372
Depth Limitation: NIL

Notations

ANY REFERENCE TO MAP IN THE TEXT MEANS THE DIAGRAM SHOWN ON THIS TITLE PLAN

Description of Land / Easement Information

ENCUMBRANCES REFERRED TO

As to the land shown marked D- — - — -

THE EASEMENT to Avoca Waterworks Trust created by Instrument E386008- - - - -

THIS PLAN HAS BEEN PREPARED FOR THE LAND REGISTRY, LAND VICTORIA, FOR TITLE DIAGRAM PURPOSES AS PART OF THE LAND TITLES AUTOMATION PROJECT
COMPILED: 27/10/1999
VERIFIED: GB

TOTAL AREA = 23·37 ha

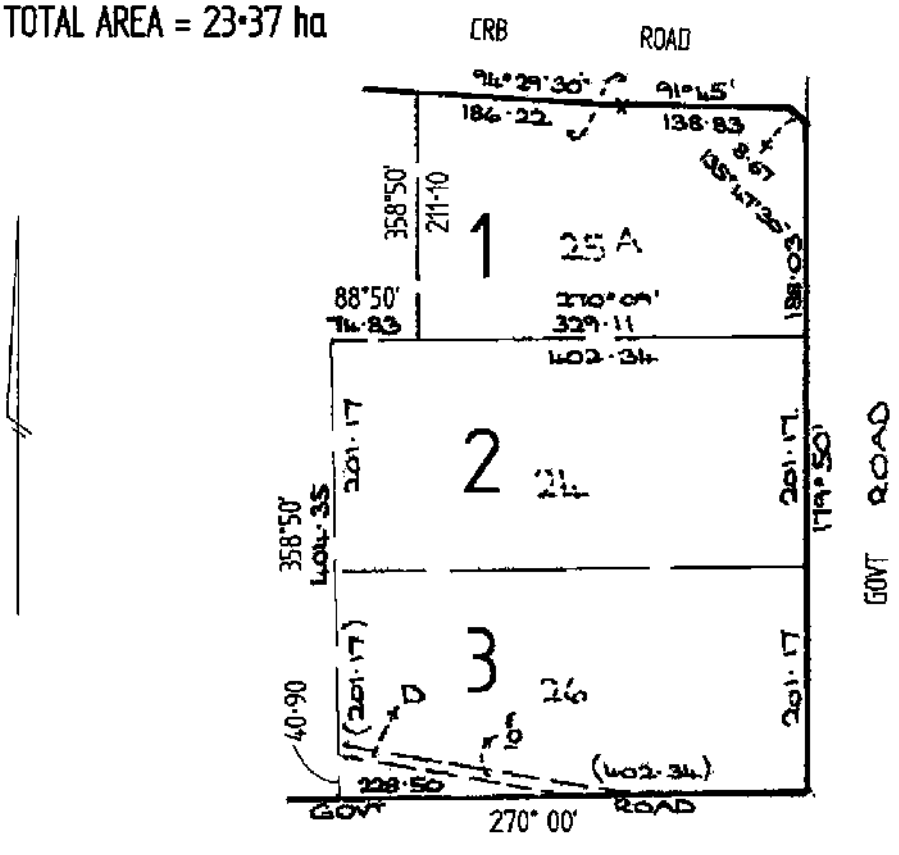


TABLE OF PARCEL IDENTIFIERS
WARNING: Where multiple parcels are referred to or shown on this Title Plan this does not imply separately disposable parcels under Section 8A of the Sale of Land Act 1962
PARCEL 1 = CA 25A (PT) SECTION 4
PARCEL 2 = CA 24
PARCEL 3 = CA 26

LENGTHS ARE IN METRES	Metres = 0.3048 x Feet Metres = 0.201168 x Links	Sheet 1 of 1 sheets

CERTIFICATE OF TITLE – VICTORIA

Volume 09402 Folio 372

124053627650E Page 1 / 1
Produced 10/01/2015 11:12 hr

Under the Transfer of Land Act 1958

I certify that the registered proprietor is the proprietor of the estate and interest in the land subject to the encumbrances, caveats and notices described

REGISTRAR OF TITLES

LAND DESCRIPTION

Lots 1,2 and 3 on Title Plan 200388S.
PARENT TITLE Volume 09007 Folio 236
Created by instrument J180208 06/10/1980

REGISTERED PROPRIETOR

Estate Fee Simple
Joint Proprietors
MICHAEL EDWIN COGHLAN
SONIA JANE COGHLAN both of AVOCA 3467
U717286P 10/04/1997

ENCUMBRANCES, CAVEATS AND NOTICES

MORTGAGE X582796A 06/07/2001
LA TROBE FINANCIAL ASSET MANAGEMENT LTD
VARIATION OF MORTGAGE AJ320115X 17/11/2011
TRANSFER OF MORTGAGE AL615364P 10/01/2015

Any encumbrances created by Section 98 Transfer of Land Act 1958 or Section 24 Subdivision Act 1988 and any other encumbrances shown or entered on the plan set out under DIAGRAM LOCATION below.

DIAGRAM LOCATION

SEE TP200388S FOR FURTHER DETAILS AND BOUNDARIES

END OF CERTIFICATE

CERTIFICATE OF TITLE – VICTORIA

Volume 10243 Folio 901	
124053627656X	Page 1 / 1
Produced 10/01/2015	11:12 hr

Under the Transfer of Land Act 1958

I certify that the registered proprietor is the proprietor of the estate and interest in the land subject to the encumbrances, caveats and notices described

REGISTRAR OF TITLES

LAND DESCRIPTION

Lots 1 and 2 on Title Plan 289389P.
PARENT TITLE Volume 09402 Folio 372
Created by instrument T606835P 21/03/1995

REGISTERED PROPRIETOR

Estate Fee Simple
Joint Proprietors
MICHAEL EDWIN COGHLAN
SONIA JANE COGHLAN both of AVOCA 3467
T606835P 21/03/1995

ENCUMBRANCES, CAVEATS AND NOTICES

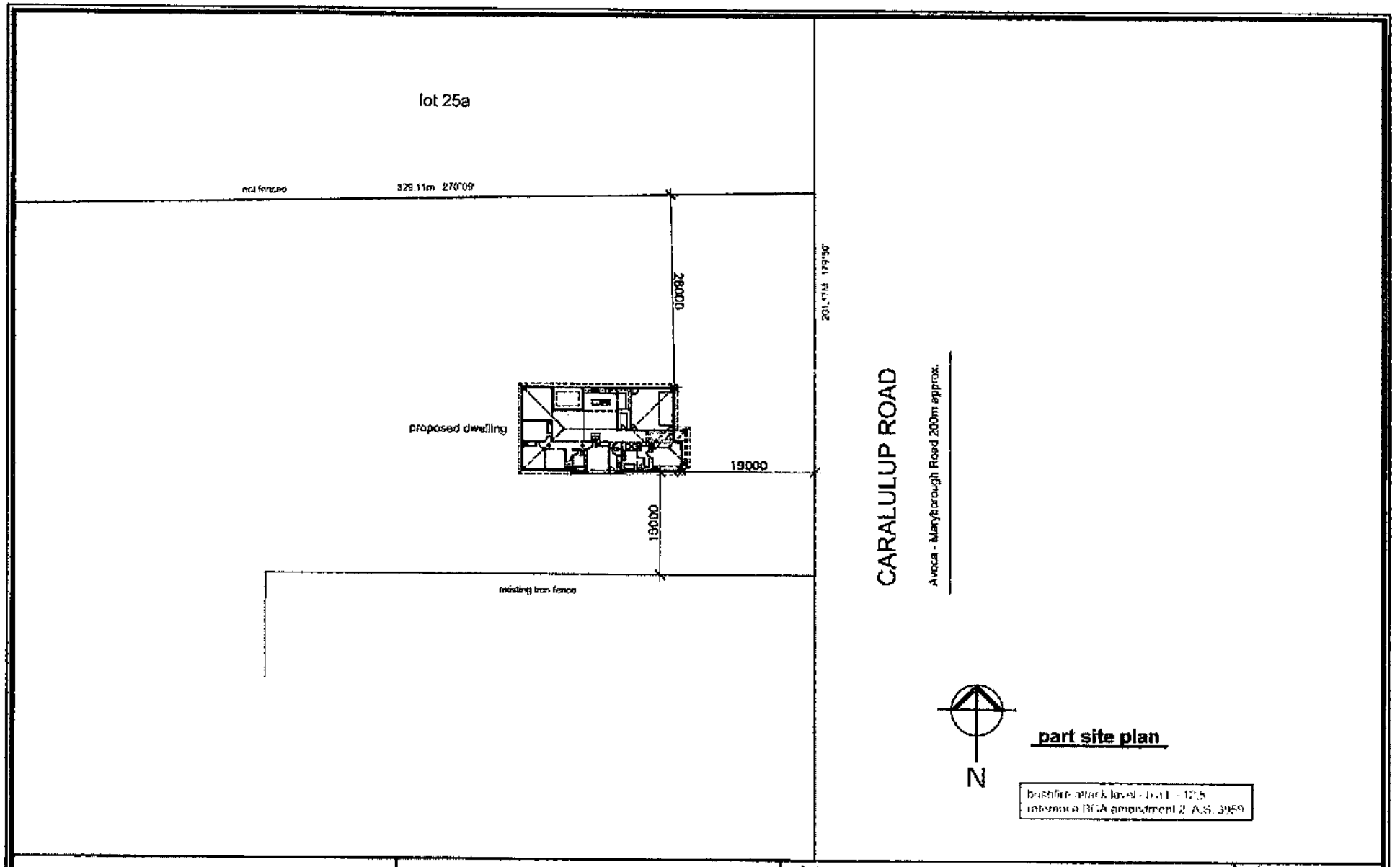
MORTGAGE X582796A 06/07/2001
LA TROBE FINANCIAL ASSET MANAGEMENT LTD
VARIATION OF MORTGAGE AJ320115X 17/11/2011
TRANSFER OF MORTGAGE AL615364P 10/01/2015

Any encumbrances created by Section 98 Transfer of Land Act 1958 or Section 24 Subdivision Act 1988 and any other encumbrances shown or entered on the plan set out under DIAGRAM LOCATION below.

DIAGRAM LOCATION

SEE TP289389P FOR FURTHER DETAILS AND BOUNDARIES

END OF CERTIFICATE



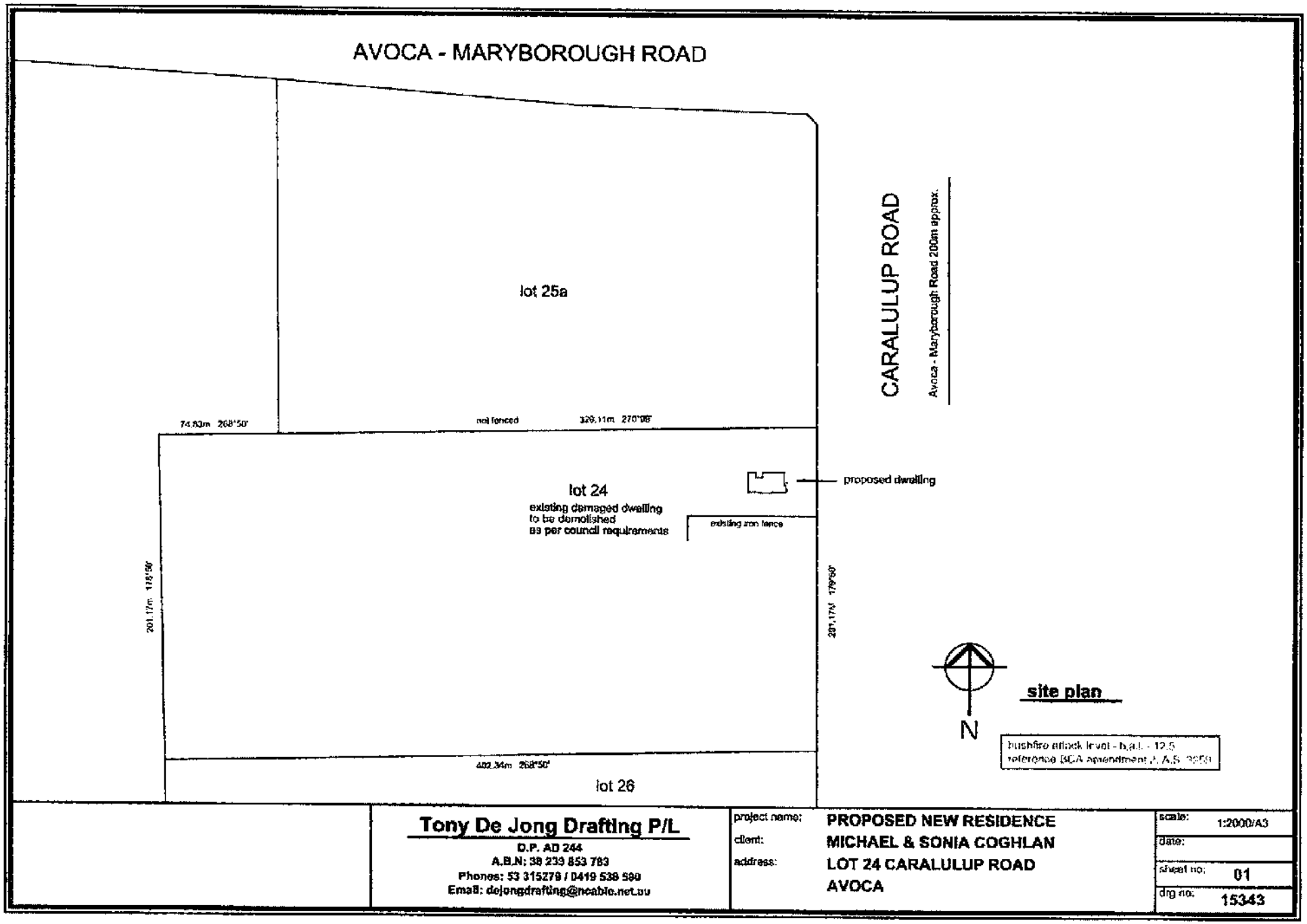
part site plan

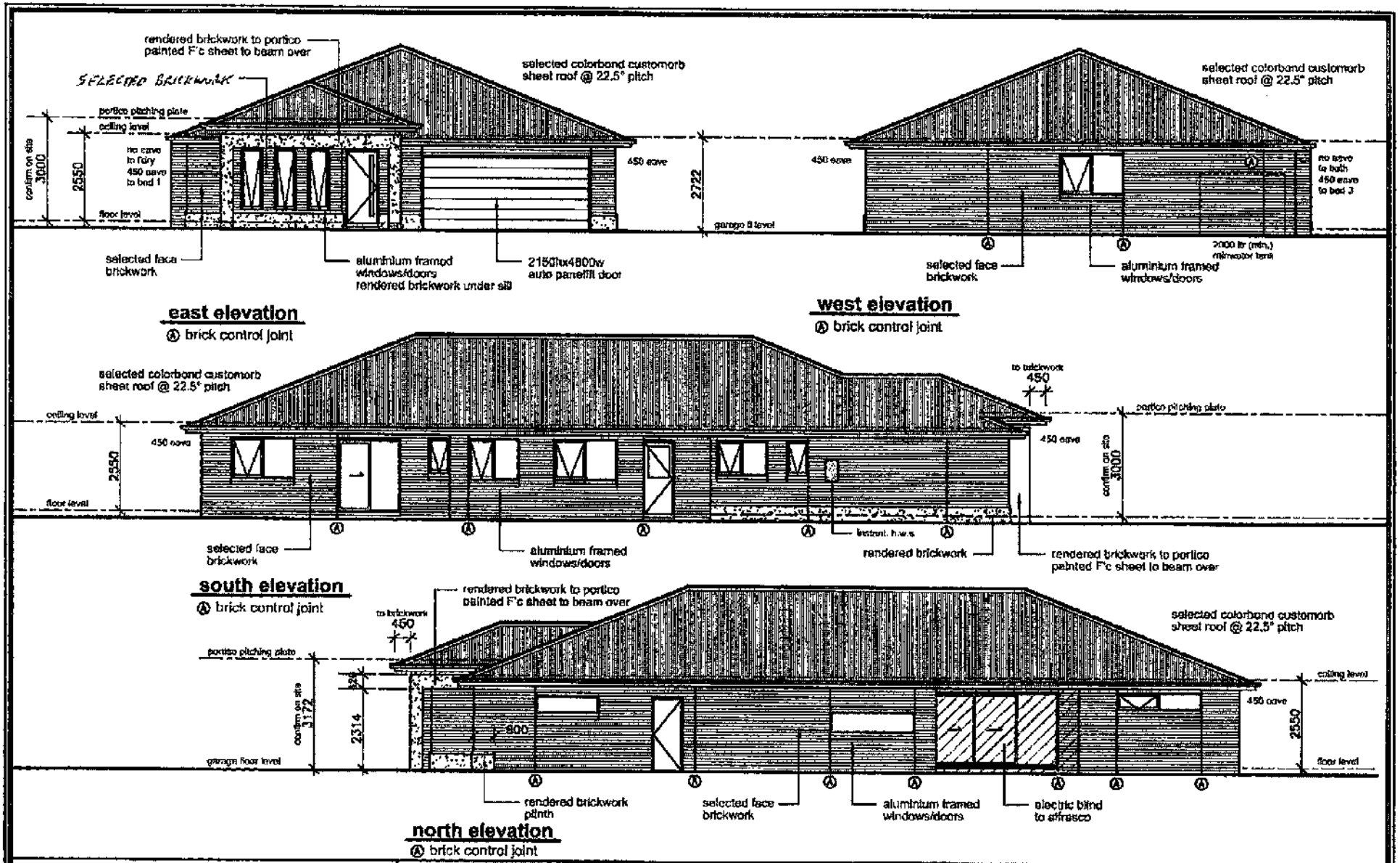
bushfire attack level - (BAL - 12.5
reference BCA amendment 2 A.S. 3959

Tony De Jong Drafting P/L
D.P. AD 244
A.B.N: 38 233 853 783
Phones: 53 315279 / 0419 538 580
Email: dejongdrafting@ncable.net.au

project name:	PROPOSED NEW RESIDENCE
client:	MICHAEL & SONIA COGHLAN
address:	LOT 24 CARALULUP ROAD AVOCA

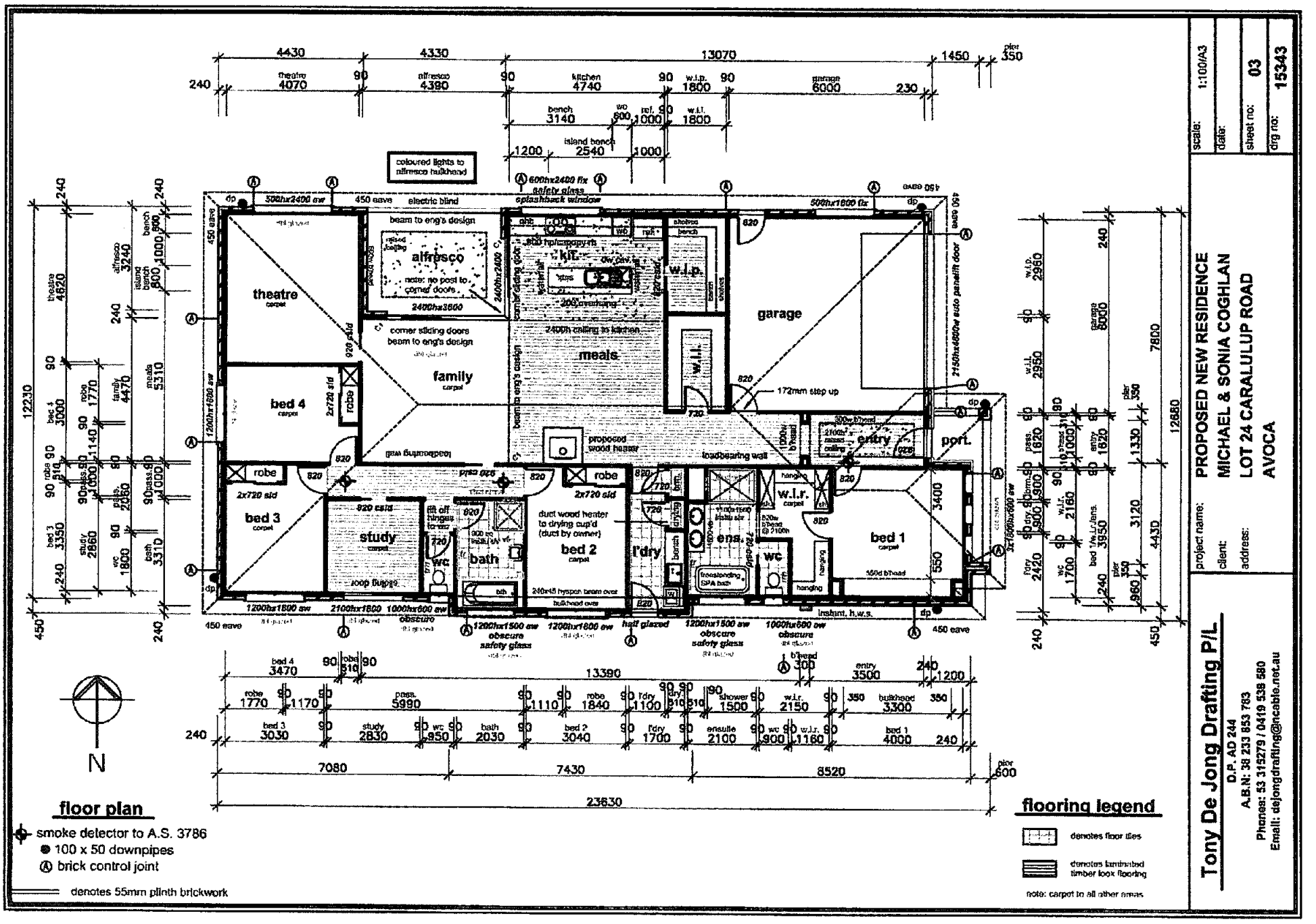
scale:	1:500/A3
date:	
sheet no:	02
drg no:	15343


AVOCA - MARYBOROUGH ROAD
lot 25a
CARALULUP ROAD
Avoca - Maryborough Road 200m approx.
74.83m 268°50'
not fenced
329.11m 270°08'
lot 24
existing damaged dwelling
to be demolished
as per council requirements
proposed dwelling
existing iron fence
201.17m 118°50'
201.17m 179°50'
N
site plan
bushfire attack level - b.a.l. - 12.5
reference SCA amendment A.A.S. 3259
402.34m 268°50'
lot 26
Tony De Jong Drafting P/L
D.P. AD 244
A.B.N: 38 239 853 783
Phones: 53 315279 / 0419 538 580
Email: dejongdrafting@ncable.net.au
project name: PROPOSED NEW RESIDENCE
client: MICHAEL & SONIA COGHLAN
address: LOT 24 CARALULUP ROAD
AVOCA
scale: 1:2000/A3
date:
sheet no: 01
drg no: 15343



Tony De Jong Drafting P/L
D.P. AD 244
A.B.N: 38 233 853 783
Phones: 53 315279 / 0419 538 580
Email: dejongdrafting@ncable.net.au

project name:	PROPOSED NEW RESIDENCE
client:	MICHAEL & SONIA COGHLAN
address:	LOT 24 CARALULUP ROAD AVOCA
scale:	1:100/A3
date:	
sheet no:	04
drg no:	15343


floor plan
smoke detector to A.S. 3786
100 x 50 downpipes
brick control joint
denotes 55mm plinth brickwork
flooring legend
denotes floor tiles
denotes laminated timber look flooring
note: carpet to all other areas
theatre
alfresco
kit.
w.i.p.
garage
meals
family
bed 4
bed 3
study
bath
bed 2
r'dry
ensuite
w.i.r.
bed 1
entry
port.
wc
coloured lights to alfresco bulkhead
beam to eng's design
corner sliding doors
proposed wood heater
duct wood heater to drying cup'd (duct by owner)
loadbearing wall
172mm step up
splashback window
safety glass
N
Tony De Jong Drafting P/L
D.P. AD 244
A.B.N: 38 233 853 783
Phones: 53 315279 / 0419 538 580
Email: dejongdrafting@ncable.net.au
project name: PROPOSED NEW RESIDENCE
client: MICHAEL & SONIA COGHLAN
address: LOT 24 CARALULUP ROAD AVOCA
scale: 1:100/A3
date:
sheet no: 03
drg no: 15343

CONSULTING STRUCTURAL &
CIVIL ENGINEERS
PROJECT CONSULTANTS

REPORT: LAND CAPABILITY ASSESSMENT FOR ON-SITE DOMESTIC WASTEWATER MANAGEMENT

COLIN
McCLELLAND &
ASSOCIATES

201 Armstrong Street North
Ballarat Victoria 3350
(03) 5333 3030

mail@colinmcclelland.com.au

www.colinmcclelland.com.au

CLIENT:

Hearty Homes
2 James Court
Miners Rest Vic 3352

PROJECT:

Residence for M. & S. Coghlan
Lot 2, No. 30 Caralulup Road
Bung Bong

APPROVED:	Todd J McClelland MIEAust CPEng (No. 1366805) NPER RBP (EC-41521)		REGISTERED Building Practitioner
REVIEWED:	Patrick M O'Neill BEngSc GradTIEAust(No. 3637795)	**PREPARED:**	Martin D Ferguson BEngSc GradTIEAust(No.4359475)
REPORT No:	15445 LCA01	**REVISION**	-
DATE:	10 September 2015		

CONTENTS

1. EXECUTIVE SUMMARY

1.1. SUMMARY OF REPORT RESULTS

Overall Assessment:	Severely constrained site	
Treatment Systems:	Primary :	Suitable with restrictions
	Secondary:	Suitable
	Secondary with Disinfection:	Suitable
Land Application Systems:	Absorption Trenches:	Not Readily Suitable
	Wick Trenches & Beds:	Possible
	Evapotranspiration Absorption Trenches and Beds:	Suitable
	Sub-surface Irrigation:	Suitable - Secondary Only
	Surface Irrigation:	Not Readily Suitable
	Low Pressure Effluent Dist.:	Not Readily Suitable
	Wisconsin Mounds:	Suitable

2. INTRODUCTION

2.1. TYPE DEVELOPMENT

Domestic four bedroom residence with rumpus room & study (Six bedroom equivalent)

2.2. SCOPE OF WORK:

To undertake a Land Capability Assessment for onsite domestic wastewater management which includes:

- Site and soil evaluation to assess the capability of the site to sustainably use and manage wastewater within the allotment boundaries, using a risk assessment methodology.
  Identification of a management program for minimising the health and environmental impacts of the on-site wastewater system.

2.3. CODES & REFERENCES:

EPA Publication 891.3 – February 2013 – Code of Practice – Onsite Wastewater Management
Victorian Land Capability Assessment Framework – January 2014 – MAV, DEPI and EPAVic
AS/NZS 1546.1:2008 On-site Domestic Wastewater Treatment Units – Part 1: Septic Tanks
AS/NZS 1546.2:2008 On-site Domestic Wastewater Treatment Units – Part 2: Waterless Composting Toilets
AS/NZS 1546.3:2008 On-site Domestic Wastewater Treatment Units – Part 3: Aerated Wastewater Treatment Systems
AS/NZS 1547:2012 On-site Domestic Wastewater Management
AS/NZS 1726:1993 Geotechnical Site Investigations
Planning Permit Applications in Open, Potable Water Supply Catchment Areas - November 2012 - State of Victoria Department of Sustainability & Environment

2.4. REPORT LIMITATIONS

Recommendations are provided based on the site and soil conditions encountered at the specific test sites identified, whilst also considering our experience with the performance of similar sites in this area. It is neither economically feasible nor practical to determine all sub-surface site conditions given the type of development proposed. The tests and test sites have been selected to provide an indication of overall site and soil conditions at the location where development is proposed, however, variations can occur. The recommendations are specific for the type of development identified, development location identified and the site conditions at the time of investigation and/or proposed as described in this report. Site conditions that differ to those outlined, either in the past or with future changes, will alter the recommendations provided. Changes to site conditions include planting or removing trees, cut or fill works, demolition or addition of structures, demolition or addition of ground paving, alterations to or failing to maintain site drainage and the treatment and disposal system. We must be notified of and provide written approval to proceed with development: for any known pre-existing site conditions that are not outlined in this report; where site conditions encountered do not coincide with those described in this report; or where site conditions are changed prior to development occurring. It is beyond the scope of this investigation to comment on site contamination, slope stability or building foundation soil conditions. This report primarily considers the ability to sustainably manage wastewater within the allotment boundaries and not the overall long term possible effects that higher density of development within the catchment may create. The Responsible Authority for the catchment is responsible for assessing the suitability of the catchment to sustainably support the proposed development. The recommendations outlined in this report are subject to Council, EPA and Referral Authority approval as deemed appropriate. This report and its attachments do not constitute detailed design of the wastewater treatment system, which should be undertaken by appropriately qualified personnel. We are able to assist with design of the wastewater treatment system where required.

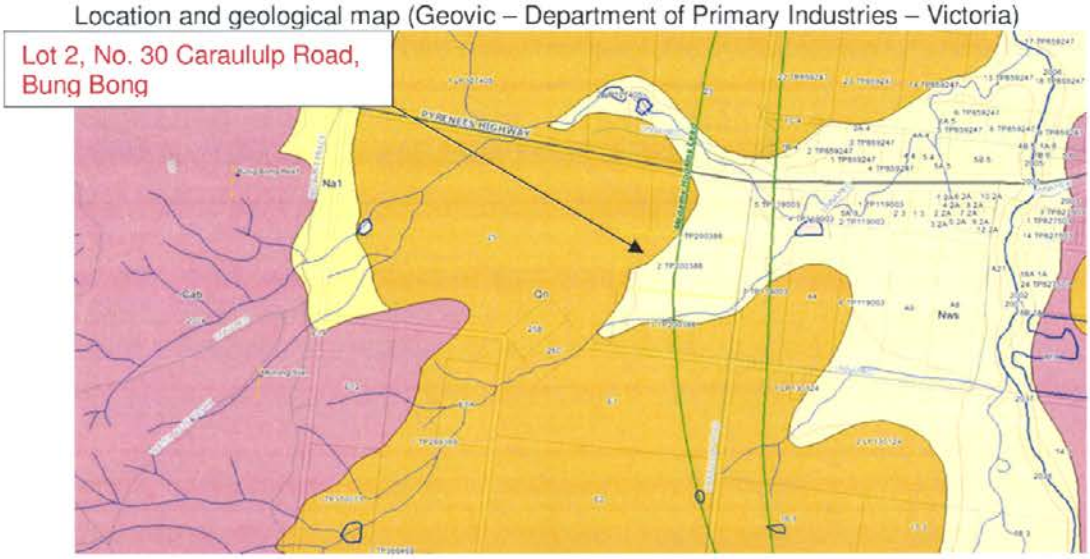
3. SITE INFORMATION

3.1. TITLE INFORMATION

Site Address:	No. 30 Caralulup Road, Bung Bong
Title Description:	Lot 2, TP 200388S Vol 8402 Folio 372
Exist. Allotment Area:	Approx. 8.2 ha

3.2. SITE LOCATION

Location and geological map (Geovic – Department of Primary Industries – Victoria)



3.3. STATUTORY PLANNING INFORMATION

The risk assessment table in APPENDIX A identifies current planning zones for the site, any special planning requirements and planning overlays applicable to this assessment.

3.4. REGULATORY AUTHORITIES

Municipal Council:	Pyrenees Shire Council
Catchment Management Authority:	North Central Catchment Management Authority
Regional Urban Water Business:	Central Highlands Water

3.5. SITE PHOTOGRAPH

PH1. View over the proposed development site looking west

PH2. View over the proposed effluent disposal field, looking southwest
Refer attachments for further site photographs (APPENDIX E)

3.6. PROCLAIMED CATCHMENT AREA

The risk assessment table in APPENDIX A identifies whether the site is located within or outside of a special proclaimed catchment as defined under the Catchment and Land Protection Act 1994 – Schedule 5.

3.7. CLIMATE DATA

Rainfall and evaporation data obtained from the closest Bureau of Meteorology weather station is summarised in APPENDIX A, with detailed data provided in the water balance computations sheet.

3.8. SITE GEOLOGY

With reference to the Department of Primary Industries and Environment, Minerals and Petroleum GeoMap Information System, from which an extract is included in Section **Error! Reference source not found.**, the site is located in an area influenced by the Quaternary (Pleistocene) period comprising Sedimentary (Non-Marine (fluvial deposits)) material. However, soil conditions consistent with a geology influenced by the Quaternary (Holocene) period comprising Igneous (Extrusive) material was encountered during our site investigation.

3.9. SEWER AVAILABILITY

Sewer is currently unavailable and is unlikely to be available in the short to medium term. We are not aware of any plans to provide a sewer service to this area.

4. SITE AND SOIL INVESTIGATION

4.1. SITE FEATURES

A summary of significant site features, relevant to this assessment, are outlined in the risk assessment table in APPENDIX B and as shown in the attached Site Investigation Plan (APPENDIX F).

4.2. SOIL PROFILE

Three 90mm diameter mechanically augured boreholes were placed in the locations indicated on the accompanying Site Investigation Plan (APPENDIX F) as part of the site investigation undertaken on the 20th of August 2014. The soil profile results, observed from a visual tactile assessment of the in-situ conditions and disturbed samples taken, are included in the attachments to this report (APPENDIX D).

Borehole 1

Borehole 2

Disturbed soil samples were collected and labelled as outlined below:

Sample No.	15445 – 01	15445 – 02
Test Site	BH1	BH3
Depth	300mm	600mm
Soil	SILTY CLAY	CLAY

4.3. SOIL PROFILE COMMENTS

4.3.1. Soil Profile

Soil profiles are generally consistent across the site comprising silty clay overlying clay

4.3.2. Rock

No special comments – Refer APPENDIX C

4.3.3. Groundwater

No special comments – Refer APPENDIX C

4.3.4. Fill

No special comments – Refer APPENDIX C

4.4. SOIL PERMEABILITY

On-site testing has been conducted to determine indicative soil permeability rates under constant head conditions using a Talsma and Hallam Permeameter as described in Appendix G of AS/NZS 1547:2012. The test results and permeability calculations worksheet is included in the attachments to this report (APPENDIX G). The location of testing is shown on the attached Site Investigation Plan (APPENDIX F). A summary of the results and indicative site permeability parameters, applicable to the wastewater envelope(s) are as follows:

Soil permeability (saturated hydraulic conductivity K_{sat}):

Indicative:	0.021 m/day
Typical range observed during testing:	0.003 – 0.044 m/day

The results above should be analysed, considering dry expansive clays existed on this site at the time of testing. An indicative long term soil permeability less than 0.06 is to be expected on this site.

4.5. SOIL DISPERSION:

Testing of collected soil samples has been conducted to determine possible soil dispersion potential using the modified version of the Emerson Aggregate Test as set-out in AS 1289.3.8.1 and modified by AS/NZS 1547:2012. Air dried peds and remoulded samples were immersed in a de-ionised water and washing powder solution with approximate SAR of 5 and EC around 1 dS/m for a period of 24 hours. The results are outlined in the table below:

Sample No.	1	2
Photograpic Result – Natural Peds		
Photograpic Result – Remoulded Samples		
Class	Between 4 & 6	Between 4 & 6

4.6. PH

The pH of a 1:5 soil / deionised water suspension was measured using pH indicator strips with the results described in the table below:

Sample No.	1	2
pH	7	8

4.7. ELECTRICAL CONDUCTIVITY

Electrical conductivity of the saturated extract (EC_e) was calculated by first measuring the electrical conductivity of a 1:5 soil in deionised water suspension using a hand held EC metre. Using appropriate multiplier factors (after Charman & Murphy (2000)) $EC_{1:5}$ results were converted to EC_e as outlined in the table below:

Sample No.	1	2
$EC_{1:5}$ (dS/m)	0.16	0.12
Multiplier Factor	9	6
EC_e (dS/m)	1.44	0.72

5. RISK ASSESSMENT

5.1. RISK ASSESSMENT TABLES

Site context, site and soil risk assessment tables are included in APPENDIX A, APPENDIX B and APPENDIX C respectively.

Risk mitigation measures which are directly related to the identified risk are recommended in these tables. The risk mitigation measures identified form part of the site management requirements on this site.

The description and risk assessments outlined in the tables are applicable at the assessment site (ie: proposed development site / wastewater envelope). Areas on the property away from the assessment site may have adverse features which are not considered applicable in this assessment.

5.2. OVERALL RATING

We consider this site to be severely constrained for sustainable wastewater management. There exists several major and moderate constraints on this site. An on-site treatment and land application system is however possible, albeit with significant restrictions. The risk mitigation measures outlined in the risk assessment tables must be implemented on this site.

5.3. PROCLAIMED SPECIAL WATER SUPPLY CATCHMENT:

We note that the site is in a **Proclaimed Special Water Supply Catchment Area** and the density of adjacent dwellings is greater than 1 dwelling to 40 hectares. The DSE guidelines "Planning Permit Applications in Open, Potable Water Supply Catchment Areas", recommend a maximum dwelling density of 1 dwelling to 40 hectares to protect water supply catchments. This report and particularly the recommendations outlined in Section 6, primarily consider the ability to sustainably manage wastewater within the allotment boundaries and not the overall long term possible nutrient migration within the catchment. The Responsible Authority for the Proclaimed Catchment is responsible for assessing the suitability of the catchment to sustainably support the proposed development. The Responsible Authority may consider in their assessment, numerous factors external to the site including whether the relevant Council has prepared, adopted and is implementing a Domestic Wastewater Management Plan and the existing condition of the catchment and evidence of unacceptable water quality impacts. They may also consider the intensity or size of the development in relation to surrounding development and the link between the proposal and the use of the land for a productive agricultural purpose (where applicable).

6. RECOMMENDATIONS

6.1. WASTEWATER FLOWS

Proposed Development:	Six bedroom, continuously habituated residence
Water Supply:	Non - reticulated service, standard water fixtures and appliances
Indicative Design Daily Flow Per Person: (Table 4 – EPA Publication 891.3)	180 Litres per person per day
Indicative Design Daily Flow For Development (Q): (Cl 3.4.1 – EPA Publication 891.3)	1260 Litres per day for development

Note that the design flow and hence the recommended treatment effluent disposal areas and lengths outlined below may be factored for a smaller or larger domestic residence by a lineal relationship where the number of persons per residence is equal to the number of bedrooms plus one in accordance with EPA Publication 891.3: 2013.

Further reductions in the effluent disposal areas and lengths of up to 20% may be possible, if full water saving appliances and fittings are installed and a Section 173 Agreement is entered into with the Council.

6.2. DESIGN LOADING AND IRRIGATION RATES

Design Loading and Irrigation Rates (DLR & DIR) are set-out below. These parameters consider the permeability parameters set-out in Section 4 in conjunction with the relevant tables of AS/NZS1547:2012.

Design Loading Rates (DLR) for absorption trenches and beds:	-	(tL1 AS/NZS 1547:2012 & Appendix A, Table 9, EPA 891.3)
Design Loading Rates (DLR) for evapotranspiration absorption trenches and beds:	N/A	tL1 AS/NZS 1547:2012 & Appendix A, Table 9, EPA 891.3) Water Balance Undertaken: Design Application Rate = 2.8 mm/day
Design Loading Rates (DLR) for secondary standard effluent applied to wick trenches and beds	-	(Table 9, EPA 891.3)
Design Irrigation Rates (DIR) for irrigation systems:	N/A	(tM1&M2 AS/NZS 1547:2012 & Appendix A, Table 9, EPA 891.3) Water Balance Undertaken: Design Application Rate = 1.8 mm/day
Design Irrigation Rates (DIR) for Low Pressure Effluent Distribution (LPED)	-	(tM1&M2 AS/NZS 1547:2012 & Appendix A, Table 9, EPA 891.3)
Design Loading Rates (DLR) for mound system base area:	5 mm/day	(tN1 AS/NZS 1547:2012 & Appendix A, Table 9, EPA 891.3)

6.3. TREATMENT SYSTEM

With consideration of the risk assessment and limitations of a potential site management plan, possible on-site wastewater treatment systems are outlined in the table below.

Treatment System	Suitability
Primary – Septic Tank System	Suitable, with restrictions
Primary – Worm Farm System	Suitable, with restrictions
Primary – Composting Toilet	Suitable, with restrictions
Secondary – Aerated Wastewater Treatment Plan (AWTP)	Suitable
Secondary – Septic Tank and Sand Filter System	Suitable
Secondary with Disinfection - Aerated Wastewater Treatment Plan (AWTP)	Suitable
Secondary – Septic Tank and Reed Bed System	Suitable

All systems are to be approved and maintained EPA systems that comply with the relevant Australian Standard and EPA Certificate of Approval. All systems are to be installed by appropriately qualified personnel (eg: licensed plumber). All systems are to installed within the wastewater envelope as per Section 6.5. The property owner is responsible for selecting a treatment system in compliance with the above table and providing the details of that system to the Council when applying for a "Septic Tank Permit".

Septic tanks are susceptible to failure following surge flows from spa baths. If a spa bath is proposed as part of this development, ensure the treatment system adopted can handle such flows and it is appropriately sized for the proposed unit.

Where a composting toilet is adopted, the effluent land application area lengths and sizes outlined in Section 6.4 may be reduced by up to 20%. Note that if such a system is adopted and other waste control measures are implemented, wastewater produced from the residence may be considered grey water. A reduction in the set-back distances could therefore be considered between a grey water land application area and significant site features under EPA Publication 891.3.

For secondary standard systems, the quality of treated effluent must comply with the 20/30 rule as described in EPA Publication 891.3 2013 and AS/NZS 1546.3. Aerated wastewater treatment plants (AWTP) generally operate most effectively with continual use. Where irregular or intermittent use is likely, a system is to be selected which has the capacity to handle such flows. Secondary treated systems have the advantage of being able to recycle treated wastewater for irrigating vegetated areas. A reliable electricity supply is required to run most conventional secondary standard treatment systems other than reed bed systems. Secondary standard systems with disinfection capabilities are to use an ultra-violet system for disinfection in accordance with relevant Australian Standards and the EPA Certificate of Approval.

6.4. LAND APPLICATION SYSTEM

With consideration of the risk assessment and limitations of a potential site management plan, possible land application systems are outlined in the table below.

Treatment System	Indicative Trench Lengths (m)		Indicative Effluent Land Application Area Size Required (sqm)
Absorption Trenches	Not Readily Suitable		
Wick Trenches & Beds	Possible		
Evapotranspiration Absorption Trenches and Beds	Adopted Trench Width (mm)	Lineal Length (m)	
	1000	450	870
	1500	300	
	4000	113	
Sub-surface Irrigation	Suitable		690
Surface Irrigation	Not Readily Suitable		
Low Pressure Effluent Dist.	Not Readily Suitable		
Wisconsin Mounds	Suitable		300

A water balance model has been undertaken to determine the minimum indicative lineal length of trench systems and effluent irrigation land application areas listed above and is included in APPENDIX H. The water balance model considers the monthly balance equation:

Rainfall + Applied Effluent = Evapotranspiration + Seepage

The following parameters are used in the water balance model:

- Wastewater flows as outlined in Section 6.1;
- Design seepage loss rate significantly less than the measured Ksat value outlined above and factored for topography, profile thickness and shrink-swell potential equal to 2.7mm/day
- Monthly average rainfall and evaporation data as outlined in Section 3.7;
- No winter storage requirement;
- Crop factor of 0.6 (pasture) with southeast aspect;
- 75% of rainfall is retained and 25% runs off;
- No runoff into the effluent land application area from upslope land;
- Worst one single month considered, area conservative for all other months.

The minimum indicative areas and lengths outlined above may need to be refined during detailed design of the system using a similar water balance model. A nutrient balance model has not been undertaken given the soil types and climate data identified.

The effluent land application area provided for trench systems is indicative only as it depends on trench configuration and detailed system design. Trenches and beds are to be installed flat along the contour across the land application area.

Typical land application details, in accordance with AS/NZS 1547:2012 and EPA 891.3 are attached to this report, however for full installation requirements, direct reference to the publication should be made.

Evapotranspiration absorption trench and bed systems and wick trench and bed systems do not cope well with irregular and intermittent flows. Vegetation which is planted to promote evapo-transpiration requires regular flows into the system. An alternative system should be considered where intermittent or irregular flows are likely.

Effluent must be treated to at least a secondary standard for use of a pressure compensating sub-surface irrigation system. Where the land application area is greater than 400sqm, the system must be segregated into equal sized zones with a maximum size of 400sqm and the effluent dose loaded evenly over these zones. The irrigation system must include in-line filters, provision to flush-out irrigation lines and vacuum breakers to ensure air and soil being sucked into the irrigation system when the pump is shut off.

A primary / secondary standard treatment system with a mound effluent disposal system could be considered on this site. Such a system could be designed to overcome the identified problems of poor soil permeability. The minimum indicative land application area outlined above depends significantly on the slope of the land at the chosen location.

6.5. WASTEWATER ENVELOPE

The recommended wastewater envelope, consistent with EPA Victoria recommended setback distances as outlined in EPA Publication 891.3 is shown on the attached Site Investigation Plan. The wastewater envelope is the area that we recommend the land application system and treatment system is confined within. All land within the wastewater envelope is suitable for the land application system. It is preferable however, to ensure long term system effectiveness, that the selected land has maximum exposure to sun and wind, is as high as possible, is located in an area where it will be least likely to be disturbed and is located as far from watercourses and wet areas as possible. Minimum setback distances to significant site features are detailed on the Site Investigation Plan.

6.6. STORMWATER DRAINAGE

All site stormwater drainage is to be diverted away from the land application area. A surface cut-off drain is to be installed on the upslope side of the land application area. Refer to the attached typical details. Quarterly maintenance of these drains is to include clearing surface drains of accumulated sediment and cutting long grass.

7. MANAGEMENT PLAN

For Best Practice Environmental Management (BPEM) on this site, we recommend the following conditions for on-site disposal system site and system management on this property.

7.1. SITE MANAGEMENT

1. A "Septic Tank Permit" must be obtained from the Relevant Local Authority prior to installation of an on-site wastewater management system. A Certificate to Use the on-site wastewater management system must be obtained prior to use.

2. Installation, commissioning, monitoring, maintenance, testing and inspection of the wastewater management system is to be in accordance with the relevant EPA Certificate of Approval for the adopted system, any manufacturer's specifications, the Code of Practice – Onsite Wastewater Management (EPA 891.3), the Victorian Building and Plumbing Regulations including the referenced National Construction Code and relevant Australian / New Zealand Standards (eg: AS/NZS1547, AS/NZS1546 suite, AS 3500 suite, etc.) the recommendations of this report, the attached typical details and any Septic Tank Permit or Planning Permit conditions.

3. The wastewater treatment system is to be installed by appropriately qualified personnel (eg: licensed plumber or system manufacturer). The installer must ensure the building owners and occupiers understand all the attributes of the installed system. The installer must provide the Relevant Local Authority, building owner and building occupier with the following documents:
   - A commissioning report in accordance with AS/NZS 1547 Part 6
   - An as-built plan and report of the plumbing, treatment and/or land application systems accurately locating all components in relation to the house, driveway and allotment boundaries etc.
   - Statement of service life and warranty of parts.
   - Manufacturer's or distributor's warranty.
   - Owner's manual.
   - Maintenance and/or service manual including a service report template.
   - A copy of all plumbing compliance certificates.

4. The system is not to be modified or additions made without Council approval. Only suitably qualified persons are to perform work on the system (licensed plumber, system manufacturer etc.).

5. The effluent land application area and treatment system is to be located within the Wastewater Envelope shown on the accompanying Site Investigation Plan. Refer Section 6.5.

6. The Wastewater Envelope must be of sufficient size to accommodate a reserve area for a possible future effluent land application area as shown on the accompanying Site Investigation Plan (excluding shallow pressure compensating sub-surface irrigation systems). This reserve area is to be kept free of significant infrastructure development, so that if problems are being experienced with the principal land application area, a second or supplementary field can be developed in this area. Despite best intentions, effluent land application areas do sometimes fail, which requires the reserve area to be utilised.

7. The approved effluent land application area is to be set aside as a non-trafficable area and is to be subject to minimal pedestrian traffic and typically only that necessary to maintain the system and land.

8. The effluent land application area should not be used for stock grazing purposes.

9. Where effluent disposal is by spray irrigation, animals and humans should be prevented from entering the land application area except where absolutely necessary.

10. A sign displaying the words "Effluent Land Application Area – Restricted Access" should be placed such that it is visible to both occupants and visitors to the property.

11. The effluent land application area is to be a maintained area, which is to include regular grass-cutting (including removal), site clearing, tree pruning, weed removal and other activities to ensure healthy growth of approved vegetation. Plants in effluent land application areas must be maintained for the life of the system, including any necessary additional watering prior to occupation of the building and during times when the building is not occupied.

12. Plants that will assist in further effluent transpiration are to be encouraged across the effluent land application area. Advice for recommended plant varieties should be obtained from Council. Large trees or vegetable gardens are not to be planted in the effluent land application area.

13. On-site stormwater is to be directed away from the effluent land application area.

14. No buildings, playgrounds, fences, other utility trenches or impermeable landscaping (eg: concrete, brick paving etc) are to be constructed in the effluent land application area.

15. The effluent land application area is to be a permanent dedicated area.

16. Maintenance of a sub-surface irrigation system is to include regular cleaning of in-line filters and flushing of irrigation lines.

17. For all systems, we recommend a service contract is entered into with an accredited and trained service technician to provide the recommended maintenance and testing requirements.

18. A regular visual inspection of the system is to be undertaken (effluent land application area, inspection openings, alarms and pumps) and attend to any indications of a failing system immediately. A limited list of indications of a failing system are outlined below.
    - Seepage break-out at the end of some or all trench or irrigation lines;
    - A lush green growth at the end of some or all trench lines, down slope of trench lines or particular areas of the irrigation field;
    - Inspection pit or trench lines consistently exhibiting high water levels;
    - Trench lines that fill following storms;
    - General waterlogging about the land application area;
    - Presence of dead and dying vegetation (often native vegetation) about land application areas;
    - A pungent odour about the treatment system;
    - Triggering of the system alarm;
    - Blocked plumbing and wastewater overflowing from the relief point;
    - High sludge levels in the primary tank of a septic tank or a scum surface layer blocking outflow.
    - Other treatment system specific items, as identified in the EPA Certificate of Approval.

    Further information is provided in the attachments to this report or in the relevant Certificate of Approval, manufacturer's information and EPA Publication 891.3

19. Conserve water use, particularly in times of high building occupancy and during winter months.

20. Use detergents that are low in sodium and phosphorus. Refer lanfaxlabs.com.au.

21. Use of bleaches, disinfectants and fabric softeners is detrimental to a treatment system and as such they should be used sparingly.

22. Minimise the amount of fats, cooking oils and food scraps entering the treatment system and never allow general oils, paint, petrol, acid, degreasers, cosmetics, lotions, pesticides and herbicides to enter the treatment system. Off site disposal of any of these substances is desired. Insinkerators are not recommended.

7.2. SPECIFIC RISK MITIGATION

Refer to APPENDIX A, APPENDIX B and APPENDIX C for specific risk mitigation measures which relate directly to the significant environmental risks identified.

8. ENVIRONMENTAL RISK & CONCLUSION

The report demonstrates that this is a **severely constrained** site, however **primary and secondary treated wastewater** can be sustainably managed within the allotment boundaries, given the nature of the proposed development, current legislation, standards and best practice. A management plan is proposed in Section 7. Specific risk mitigation measures, which form part of the management program, are outlined in APPENDIX A, APPENDIX B and APPENDIX C.

A conventional septic tank system using evapotranspiration absorption trenches or a Wisconsin Mound land application system may be adopted. Alternatively, an approved secondary standard treatment system, which utilises a sub-surface irrigation system, may be used for the possibility of maximising development potential, by recycling treated effluent for irrigation.

This report is to be submitted as part of a planning permit application on this site. This report may be used as an input to system design when obtaining a "Septic Tank Permit".

It is our client's responsibility to provide copies of this report and any accompanying planning permit conditions to the on-site wastewater system designer, installer, ultimate property owner, future owners and occupiers.

If there are any queries regarding the content of this report, or further assistance is required with detailed design or statutory approval, please contact this office.

APPENDICES

APPENDIX A SITE CONTEXT RISK ASSESSMENT TABLE

	Description	Level of Constraint	Risk Mitigation Measures
Planning Zone:	Farming Zone	Minor	-
Planning Overlays: (applicable to this assessment)	Schedule 1 Environmental Significance Overlay	Moderate	This assessment is to be included as part of a planning permit submission on this site.
Proclaimed Catchment:	Loddon River, Laanecoorie Reservoir Responsible Authority – Goulburn Murray Water	Moderate	The residence and effluent land application area are to be located with adequate buffer distances to all waterways as shown on the attached Site Investigation Plan. The Local Government Authority is to obtain approval for the development from the relevant referral authority for the catchment prior to approving. The Local Government Authority is to ensure the full recommendations of this report and Local Government requirements are adhered to, especially with regards to appropriate system design, correct installation & commissioning, strict adherence to buffer distances and ensuring inspections, testing and maintenance of the system is undertaken.
Dwelling Density:	There are less than 8 dwellings within a 1km radius of the proposed dwelling, which equates to a measured dwelling density of less than 1 dwelling to every 40 Ha, excluding public land.	Minor	-
Climate Data	Rainfall > evap. in wettest months	Major	The selection of a location for the effluent land application area should be positioned to maximise sun and wind exposure from the north and west. Irrigation areas are to be determined using a water balance model which considers the high winter rainfall and low winter evaporation, as per Section 6
Weather Station	Cairn Curran Reservoir - 088009 (nearest station with evaporation data) Avoca (Post Office) – 81000 (nearest station with rainfall data)		
Mean Annual Rainfall	541.4 mm/year		
Mean Annual Evap.	1425.0 mm/year		

APPENDIX B SITE RISK ASSESSMENT TABLE

	Description	Level of Constraint	Mitigation Measures
General Topography and Slope Gradient:	Land surface falls over and downslope of the proposed wastewater envelope and development site are less than 1 in 50 to the southeast.	Minor	-
Landform:	Middle slope, with straight side-slopes	Moderate	Provide surface cut-off drains on the up-hill side of the effluent land application area. Refer attached Typical Installation Details. Quarterly maintenance of these drains is to include clearing surface drains of accumulated sediment and cutting long grass. The wastewater envelope should contain sufficient land for a reserve effluent land application area.
Surface Drainage:	Good drainage	Minor	-
Stormwater Run-on / Overland Surface Water Flows:	Possible from adjacent properties and upslope of the proposed wastewater envelope.	Moderate	Provide surface cut-off drains on the up-hill side of the effluent land application area. Refer attached Typical Installation Details. Quarterly maintenance of these drains is to include clearing surface drains of accumulated sediment and cutting long grass.
Ground Vegetation:	Long and thick grass cover with significant depth of topsoil.	Minor	-
Trees:	Several isolated trees exist east of the proposed effluence disposal field	Minor	-
Current Land Use:	Land has been used for cropping in the past.	Minor	-
Aspect:	Southeast	Moderate	Irrigation areas are to be determined using a water balance model which considers a lower rate of evapotranspiration.
Exposure to Sun and Wind:	High sun and wind exposure with minimal shading.	Minor	-

	Description	Level of Constraint	Mitigation Measures
Surface Waters:	Several waterways are marked on 1:25,000 Topographic maps on or within close proximity to the property. These marked waterways were observed to have a defined channel. No standing or running water was observed during this site investigation.	Moderate	The Wastewater Envelope has been located with adequate buffer distances to all surface waters as shown on the attached Site Investigation Plan.
Susceptibility to Flooding:	The development area of the property is not within the 1:100 year flood area as shown on Catchment Information Mapper – Department of Sustainability and Environment. The allotment is not subject to an inundation overlay. A detailed study of flood levels has not been undertaken and the susceptibility to flooding should be checked against that listed on the Building Permit Property Information Request when obtained at Building Permit Stage.	Minor	-
Existing Developments:	A dwelling and multiple large sheds exist on the subject property to the south of the proposed development site. The existing dwelling is to be removed following completion of the proposed dwelling	Minor	-
Adjacent Properties:	Adjacent properties are used for rural purposes including grazing and cropping.	Minor	-
Adjacent Cuttings and Escarpments:	Nil	Minor	-
Salinity:	Vegetation types and soil observations do not indicate the presence of a saline environment at the proposed development site. The site is not subject to a Salinity Management Overlay.	Minor	Refer APPENDIX C regarding soil testing for salinity.

	Description	Level of Constraint	Mitigation Measures
Erosion:	No significant sheet or rill erosion is currently observed. Erosion is unlikely given topography at the proposed development area. The site is not subject to an Erosion Management Overlay.	Minor	-
Rock Outcrops:	Nil	Minor	-
Electricity Supply:	Mains electricity is observed.	Minor	-
Mains Water:	Mains water is not available	Minor	Nil. Adequate land is available for an effluent land application area
Land Available for an Effluent Land Application Area:	The attached Site Investigation Plan, drawn approximately to scale, demonstrates the allotment is of sufficient size to accommodate a principal and reserve effluent land application area (where required) for each type of land application system outlined above.	Minor	-
Other Features:	Existing septic tank and land application system to the east of the proposed effluent land application area. No surface water ponding or odours in this area were observed during the site investigation.	Minor	-

APPENDIX C SOIL RISK ASSESSMENT TABLE

	Description	Level of Constraint	Mitigation Measures
Profile Depth (m):	Greater than 1.5	Minor	-
Watertable Depth (m):	Greater than 2.5. We would expect, given topographical conditions, the soil profile identified and our experience in this area, that the depth to the winter groundwater table exceeds 2.5m	Minor	-
Seasonal Perched Water Table or Waterlogged Soils:	Unlikely across the site	Minor	-
Mottling:	Nil – Uniform colours observed	Minor	-
Presence of Fill:	No significant fill	Minor	-
Rock Fragments:	No rock fragments and gravels encountered at test sites.	Minor	-

	Description	Level of Constraint	Mitigation Measures
Soil Permeability: K_{sat} (m/day)	Indicative permeability rate less than 0.06	Major	We recommend adopting a secondary standard treatment system with a shallow sub-surface irrigation system or primary standard treatment system with evapotranspiration absorption trenches or mound land application system. Other treatment and land application systems are not readily suitable. All disposal systems should be designed using a water balance model. Prepare receiving soils by cultivating the soil to a depth of 300mm for irrigation and mound systems or 600mm for trench systems and applying gypsum at a rate of 1kg/m^2 to the base of the bed. Installation of the effluent disposal system is to be undertaken when soils are dry or slightly moist. Planting of vigorously growing vegetation is encouraged within the effluent land application area. Minimise any site cut earthworks and the removal of topsoil over the effluent land application area so that the irrigation system can be laid in topsoil. Import good quality topsoil over any areas where existing topsoil has been stripped or is not present. For irrigation systems, the effluent land application area is to be divided equally into areas of maximum 400sqm and dose loaded with each pump cycle (excluding mound systems). Provision for winter storage could be considered in detailed design to further minimise the size of the effluent land application area. The wastewater envelope is to contain sufficient undisturbed and undeveloped land for a reserve land application area.
Emerson Aggregate Class:	Between 4 and 6 – Soils are not considered dispersive	Minor	-
pH:	Between 5.5 and 8 – Soils are within the neutral range	Minor	-
Electrical Conductivity: EC_e (dS/m)	Sample 1 – Between 0.8 and 2 – Slightly saline Sample 2 – Between 0.8 and 2 – Slightly saline	Moderate	Plant only salt tolerant vegetation within the effluent land application area.

	Description	Level of Constraint	Mitigation Measures
Reactivity	High	Major	Land application systems which apply effluent to upper soil layers are preferable (eg: irrigation and mound systems). Prepare receiving soils by cultivating the soil to a depth of 300mm for irrigation systems and mound system or 600mm for trenches and applying gypsum at a rate of 1kg/m2 to the base of the bed, mound or trench. For irrigation systems, the effluent land application area is to be divided equally into areas of maximum 400sqm and dose loaded with each pump cycle to encourage wetting and drying of soils. For trench systems, avoid smearing sides and bases, install the system in dry weather only and do not leave trenches open for extended time periods. The wastewater envelope is to contain sufficient undisturbed and undeveloped land for a reserve effluent land application area. Design loading, seepage and irrigation rates provided in the tables above have been reduced.

APPENDIX D BOREHOLE PROFILES

Upper Depth	Description	Moisture	Consistency Density	Structure	Reactivity	Cat.
Borehole 1:	Refer attached Site Investigation Plan					
00	TOPSOIL – Moderately long and light crop	Dry	-	-	-	-
100	Brown / grey SILTY CLAY	Slightly Moist	Firm	-	Moderate	5
350	Brown / grey CLAY	Moist	Stiff	-	High	6
1500	End Borehole	-	-	-	-	-
Borehole 2:	Refer attached Site Investigation Plan					
00	TOPSOIL – Moderately long and light crop	Dry	-	-	-	-
100	Brown / grey SILTY CLAY	Slightly Moist	Firm	-	Moderate	5
400	Brown / grey CLAY	Moist	Stiff	-	High	6
1500	End Borehole	-	-	-	-	-
Borehole 3:	Refer attached Site Investigation Plan					
00	TOPSOIL – Moderately long and light crop	Dry	-	-	-	-
100	Brown / grey SILTY CLAY, some sands	Slightly Moist	Firm	-	Moderate	5
350	Brown / grey CLAY, some sands	Slightly Moist	Stiff	-	High	6
1500	End Borehole	-	-	-	-	-

APPENDIX E ADDITIONAL SITE PHOTOGRAPHS

PH3. View from the proposed development site, looking south towards the existing dwelling

PH4. View from the front of the property looking south

PH5. View from the road reserve looking down the marked waterway south of the proposed development site

PH6. View from within the property looking up the marked waterway south of the proposed development site

PH7. View from the road reserve looking down the marked waterway north of the proposed development site

PH8. View from the road reserve looking up the marked waterway north of the proposed development site

APPENDIX F SITE INVESTIGATION PLAN
Refer attached Site Investigation Plan SI01

APPENDIX G SOIL PERMEABILITY RESULTS
Refer attached

APPENDIX H WATER BALANCE
Refer attached

APPENDIX I TITLE PLAN – PROVIDED BY CLIENT
Refer attached

APPENDIX J CATCHMENT INFORMATION MAPPER
Refer attached Department of Sustainability and Environment

APPENDIX K PROPERTY REPORT
Refer attached Land Channel Report

APPENDIX L TYPICAL INSTALLATION DETAILS
Refer attached AS/NZS 1547:2012 and EPA Publication 891.3

APPENDIX M EXTRACT FROM EPA PUBLICATION 891.3
Refer attached Appendix C: Useful factors to consider when selecting an EPA-Approved Onsite Wastewater Treatment System

APPENDIX N EXTRACT FROM EPA PUBLICATION 891.3
Refer attached Appendix D: Septic Tanks

NOTES:

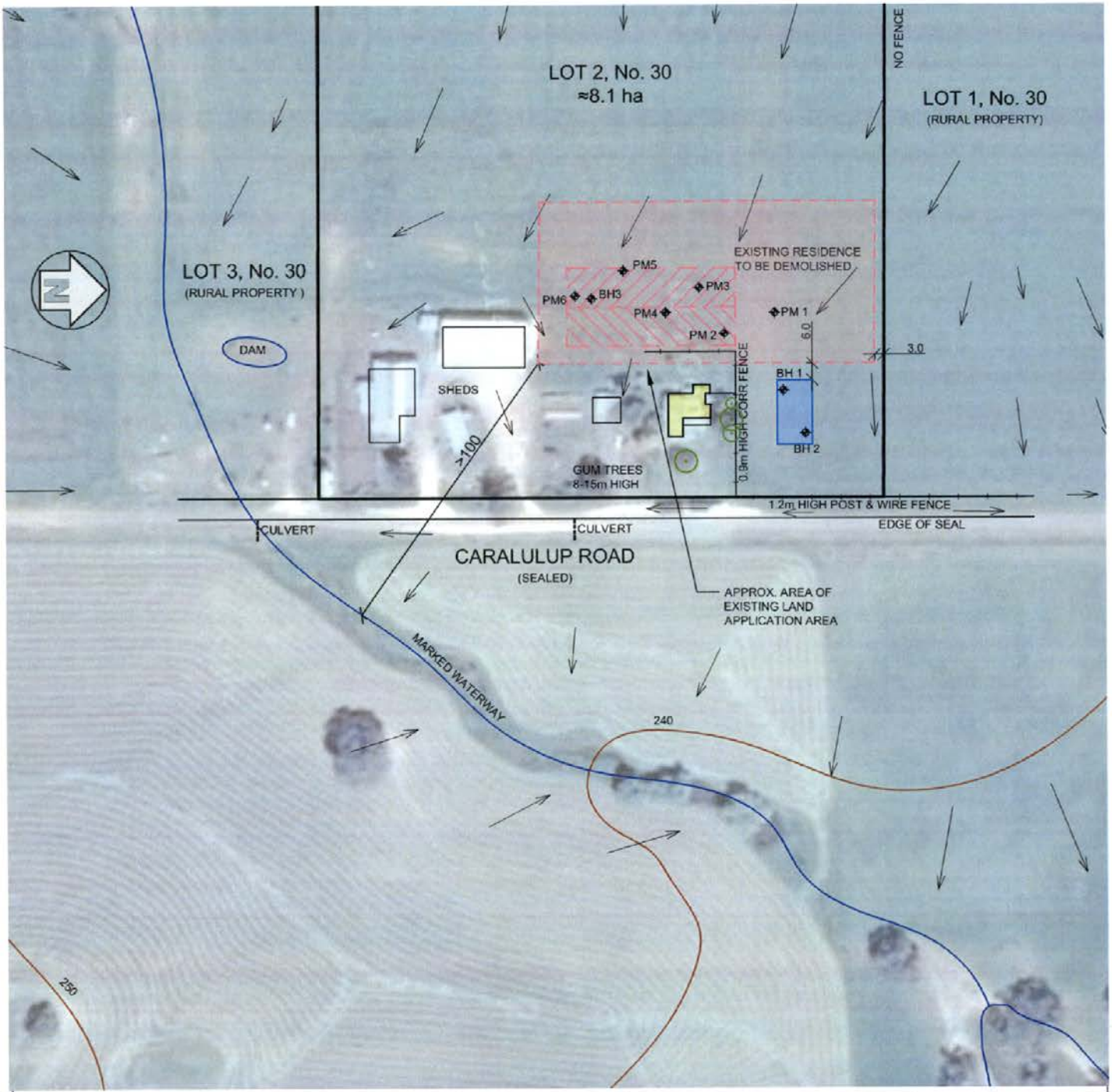
1. CONTOURS AND FEATURES FROM 1:25,000 SERIES TOPOGRAPHICAL MAPS
2. ALL DIMENSIONS ARE IN METRES
3. THIS IS NOT A TITLE RE-ESTABLISHMENT SURVEY. PROPERTY BOUNDARIES SHOWN ARE BASED ON THE SURVEY PEGS IDENTIFIED AND / OR THE ALIGNMENT OF FENCES ON THE SUBJECT AND ADJACENT PROPERTIES. SITE FEATURES ARE LOCATED RELATIVE TO THESE PEGS AND / OR FENCES.

LEGEND

◆ BH	90mm Ø BOREHOLE
◆ PM	PERMEABILITY TEST
→	INDICATIVE SURFACE FALL DIRECTION
	PROPOSED BUILDING AREA
	PROPOSED WASTEWATER ENVELOPE (≈ 7,000 sqm)
	LAND APPLICATION AREA (LAA) & RESERVE LAA (INDICATIVE LAA ONLY WITHIN NOMINATED WASTEWATER ENVELOPE)

SUMMARY OF TYPICAL WASTEWATER ENVELOPE SETBACK DISTANCES. REFER EPA PUB 891 (EXCEPT WHERE NOTED OTHERWISE)

FEATURE:	PRIMARY STANDARD TREATMENT	SECONDARY STANDARD TREATMENT
BUILDING - UPSLOPE:	6m	6m
BUILDING - DOWNSLOPE:	3m	1.5m
PROPERTY BOUNDARY - UPSLOPE:	6m	3m
PROPERTY BOUNDARY - DOWNSLOPE:	3m	1.5m
SURFACE WATERS - POTABLE:	300m	150m
SURFACE WATERS - NON-POTABLE:	60m	30m
WATERWAY - POTABLE SUPPLY:	100m	100m
WATERWAY - NON-POTABLE SUPPLY:	60m	30m
CUTTING / ESCARPMENT - UPSLOPE:	15m	15m
IN-GROUND SWIMMING POOLS:	6m	3m
WATER & GAS SUPPLY PIPES:	3m	1.5
IN-GROUND WATER STORAGE TANKS:	15m	4m
STORMWATER DRAIN:	6m	3m
GROUNDWATER BORE:	20m	20m



COLIN McCLELLAND & ASSOCIATES
CONSULTING STRUCTURAL & CIVIL ENGINEERS
PROJECT CONSULTANTS
201 Armstrong Street North
Ballarat Victoria 3350
T (03) 5333 3030
F (03) 5333 4298
mail@colinmcclelland.com.au

PROJECT:
RESIDENCE FOR M. & S. COGHLAN
LOT 2, NO. 30 CARALULUP ROAD
BUNG BONG

CLIENT:
HEARTY HOMES

DRAWING TITLE:
LAND CAPABILITY ASSESSMENT - SITE INVESTIGATION PLAN

PROJ. NO	DWG NO	REV
15445	SI01	-
DRAWN	ATTENDED	DATE
MDF	MCR MDF	SEPT.'15
REVIEWED	APPROVED	SCALES
PMO'N	TJMcC	1:2000 @ A4

COMPUTATION SHEET

Project:	Residence for M. & S. Coghlan	**Job No.:**	15445
	Lot 2, No. 30 Caralulup Road	**Comp:**	CC01
	Bung Bong	**Date:**	10.09.15
Client:	Hearty Homes	**Attendee:**	MDF
Subject:	Soil Permeability Calculations	**Review:**	PMO'N

COLIN McCLELLAND & ASSOCIATES

SOIL PERMEABILITY CALCULATIONS

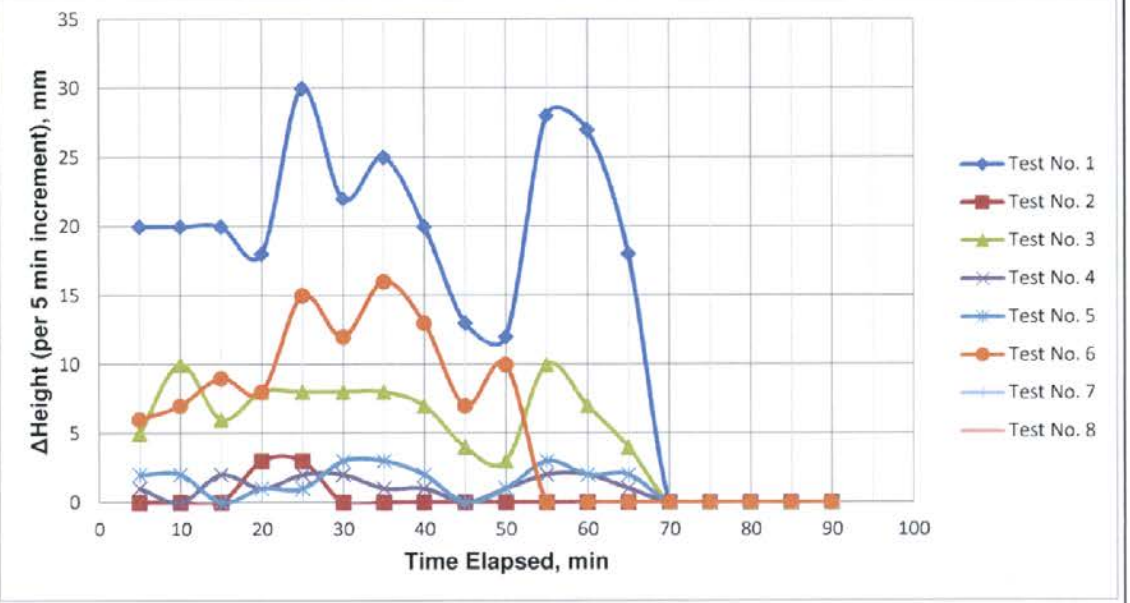
Refer Site Investigation Plan for locations of test sites
Refer Borehole Profiles for soil types and depths encountered

Test Number:		1	2	3	4	5	6
Time Step (min):		5	5	5	5	5	5
Hole Depth(mm):		500	500	500	500	500	500
Hole Dia. (mm)		90	90	90	90	90	90
Tube Inside Dia. (mm):		50	50	50	50	65	65
Lim. Layer Depth(mm):		300	300	300	300	300	300
Lim. Layer Material:		clay	clay	clay	clay	clay	clay
Tube Insert. Depth:		150	150	150	150	150	150
Tube Number:		8	5	7	6	1	2
Test Liquid:		Tap Water	Tap Water	Tap Water	Tap Water	Tap Water	Tap Water
Soil Moisture:		SM	SM	SM	SM	SM	SM
	Time						
Time	0:00	440	162	215	225	360	332
Reading:	5	460	162	220	226	362	338
Drop:		20	0	5	1	2	6
Reading:	10	480	162	230	226	364	345
Drop:		20	0	10	0	2	7
Reading:	15	500	162	236	228	364	354
Drop:		20	0	6	2	0	9
Reading:	20	518	165	244	229	365	362
Drop:		18	3	8	1	1	8
Reading:	25	548	168	252	231	366	377
Drop:		30	3	8	2	1	15
Reading:	30	570	168	260	233	369	389
Drop:		22	0	8	2	3	12
Reading:	35	595	168	268	234	372	405
Drop:		25	0	8	1	3	16
Reading:	40	615	168	275	235	374	418
Drop:		20	0	7	1	2	13
Reading:	45	628	168	279	235	374	425
Drop:		13	0	4	0	0	7
Reading:	50	640	168	282	236	375	435
Drop:		12	0	3	1	1	10
Reading:	55	668	168	292	238	378	
Drop:		28	0	10	2	3	
Reading:	60	695	168	299	240	380	
Drop:		27	0	7	2	2	
Reading:	65	713	168	303	241	382	
Drop:		18	0	4	1	2	
Reading:	70						
Drop:							
Reading:	75						
Drop:							
Reading:	80						
Drop:							
Reading:	85						
Drop:							
Reading:	90						
Drop:							

COMPUTATION SHEET

Project:	Residence for M. & S. Coghlan Lot 2, No. 30 Caralulup Road Bung Bong	**Job No.:**	15445
		Comp:	CC01
		Date:	10.09.15
Client:	Hearty Homes	**Attendee:**	MDF
Subject:	Soil Permeability Calculations	**Review:**	PMO'N

COLIN McCLELLAND & ASSOCIATES



	1	2	3	4	5	6
Starts uniform drop	5		5	15	5	5
Stops uniform drop	65		65	65	65	50
Time elapsed(min)	60		60	50	60	45
Total Drop (cm)	25.3		8.3	1.3	2.0	9.7
z	3.9		3.9	3.9	3.9	3.9
Flow, Q (cm^3/min)	8.3		2.7	0.5	1.1	7.2
K_{sat} (cm/min)	0.0031		0.0010	0.0002	0.0004	0.0026
K_{sat} (m/day)	0.044		0.014	0.003	0.006	0.038
			Average K_{sat} (m/day)			**0.0210**

COMPUTATION SHEET

Project: Residence for M. & S. Coghlan
Lot 2, No. 30 Caralulup Road
Bung Bong
Client: Hearty Homes
Subject: Sub-surface Irrigation Area Sizing Using Water Balance & Storage Calculations

Job No.: 15445
Comp: CC02
Date: 10.09.15
Attendee: MDF
Review: PMO'N

COLIN McCLELLAND & ASSOCIATES

INPUT DATA

Design Wastewater Flow	Q	1,260	L/day	Refer report
Design Seepage Rate	DSR	2.7	mm/day	Refer report
Trial Land Application Area	LAA	690	m^2	
Crop Factor	C	0.6	unitless	Refer report
Rainfall Runoff Factor	RF	0.75	untiless	Refer report
Effective Void Ratio	N	0.3	unitless	
Minimum Freeboard Topsoil Layer	F	100	mm	
Mean Monthly Pan Evaporation Data	Cairn Curran Reservoir			BoM Station
Mean Monthly Rainfall Data	Avoca (Post Office)			BoM Station

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**
Evaporation	E		mm/month	235.0	200.4	157.4	94.9	50.0	31.2	33.7	52.3	74.4	119.2	164.7	214.0	1425.0
Rainfall	R		mm/month	30.9	33.3	28.4	37.6	51.0	59.4	58.8	59.8	53.1	48.8	37.5	36.8	541.4
Crop Factor	C		unitless	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	
OUTPUTS																
Evapotranspiration	ET	E x C	mm/month	141.0	120.2	94.4	56.9	30.0	18.7	20.2	31.4	44.6	71.5	98.8	128.4	**856**
Seepage	S	DIR x D	mm/month	83.7	75.6	83.7	81.0	83.7	81.0	83.7	83.7	81.0	83.7	81.0	83.7	**985.5**
Total Outputs		ET+S	mm/month	224.7	195.8	178.1	137.9	113.7	99.7	103.9	115.1	125.6	155.2	179.8	212.1	**1841.8**
INPUTS																
Retained Rainfall	RR	R x RF	mm/month	23.2	25.0	21.3	28.2	38.3	44.6	44.1	44.9	39.8	36.6	28.1	27.6	**401.6**
Applied Effluent	W	QxD	L/month	39060	35280	39060	37800	39060	37800	39060	39060	37800	39060	37800	39060	**459900**
Total Inputs		RR+W	mm/month	62.2	60.3	60.4	66.0	77.3	82.4	83.2	83.9	77.6	75.7	65.9	66.7	**861.5**
DISPOSAL RATE																
Disposal Rate	DR	(ET+S)-RR	mm/month	201.5	170.9	156.8	109.7	75.5	55.2	59.8	70.2	85.8	118.6	151.7	184.5	
LAND AREA REQUIRED FOR ZERO STORAGE			m^2	194	206	249	344	518	685	653	556	440	329	249	212	
STORAGE CALCULATION																
Application Rate	AR	Q/L	mm/month	56.6	51.1	56.6	54.8	56.6	54.8	56.6	56.6	54.8	56.6	54.8	56.6	
Storage For The Month	ST	AR-DR	mm/month	-144.9	-119.7	-100.2	-55.0	-18.8	-0.4	-3.2	-13.6	-31.0	-62.0	-96.9	-127.9	
Increase In Depth Of Stored Effluent	ΔH	ST/N	mm/month	-483.1	-399.1	-334.1	-183.2	-62.8	-1.3	-10.7	-45.4	-103.4	-206.7	-323.0	-426.3	
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	
Cumulative Storage At End Of Month	CS		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	
Cumulative Storage From Previous Year	CS		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	

MINIMUM AREA REQUIRED FOR ZERO STORAGE: 685 m^2

Maximum Storage Depth for Nominated Area MS: 0 mm

DESIGN DIMENSIONS SUMMARY

Land Application Area	LAA	685	m^2
Maximum Storage Height	MS	0	mm
Minimum Freeboard Topsoil Layer	F	100	mm
Min Depth Of Land Application System	Z		mm

Department of Sustainability and Environment

Map created Tue Aug 18 14:50:49 EST 2015

Legend

* Refer to page 2 for legend details

Generated at http://nremap-sc.nre.vic.gov.au/MapShare.v2/

Produced on Tue Aug 18 14:50:53 EST 2015

Map Scale 1:5,000

NOT FOR NAVIGATION

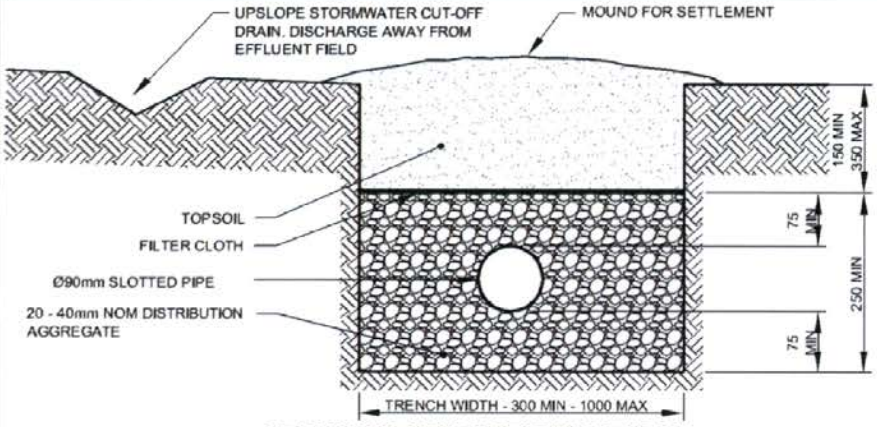
GDA Vicgrid94

Map Server: nremap.nre.vic.gov.au

Map Service: wsg_waterresource_v4

Generated at http://nremap-sc.nre.vic.gov.au/MapShare.v2/ Produced on Tue Aug 18 14:50:53 EST 2015

GDA Vicgrid94

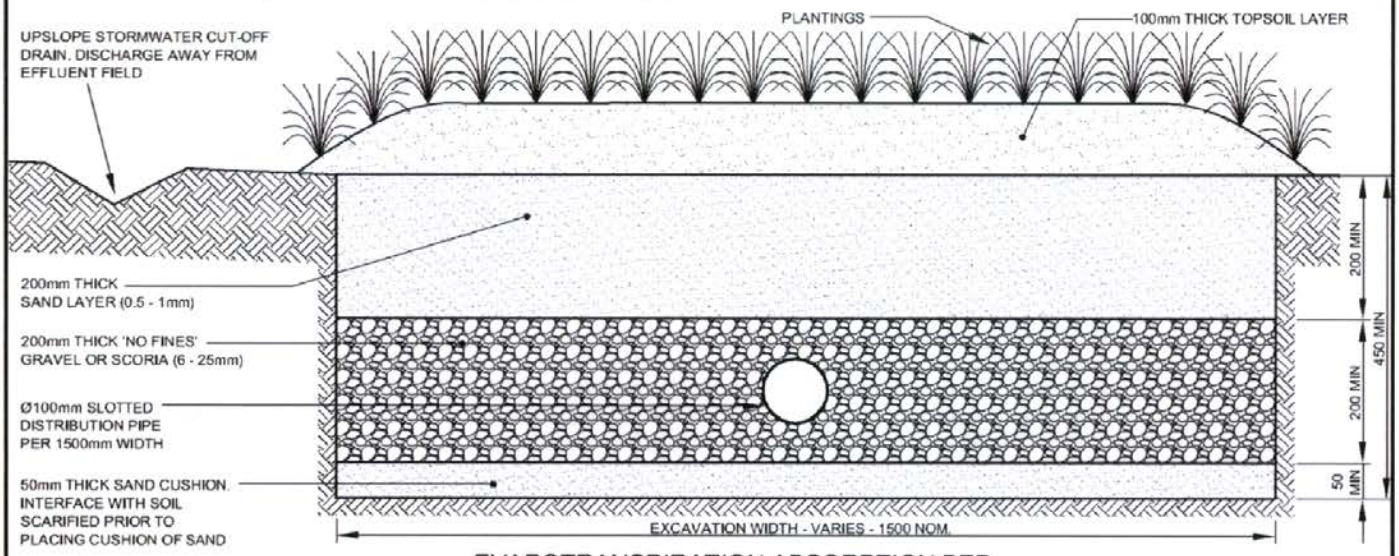


EFFLUENT ABSORPTION TRENCH

(PRIMARY OR SECONDARY TREATED WASTEWATER) - 1:10

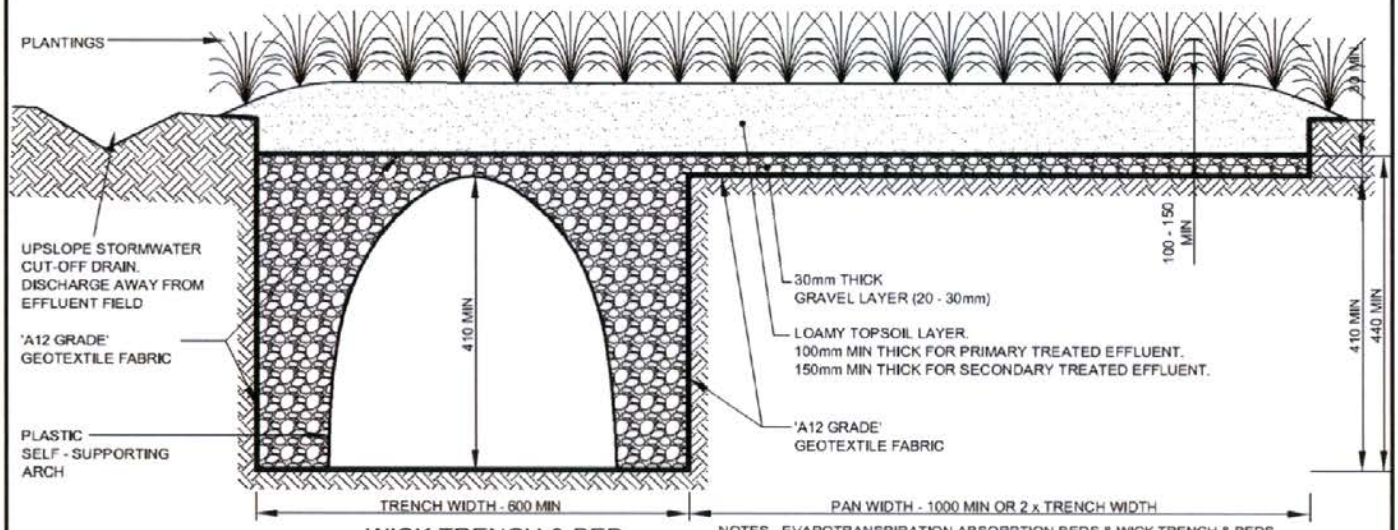
NOTES - EFFLUENT ABSORPTION TRENCHES

1. MAXIMUM INDIVIDUAL TRENCH LENGTH 30m. USE SEVERAL TRENCHES IN PARALLEL TO PROVIDE MINIMUM REQUIRED LENGTH.
2. MINIMUM SPACING BETWEEN TRENCH WALLS 1.0m
3. MINIMUM OFFSET FROM TRENCH WALL TO WASTEWATER ENVELOPE BOUNDARY 1.0m
4. MAXIMUM TRENCH GRADE 1 IN 100 AND IDEALLY FLAT. CONTOUR AS REQUIRED.
5. PROVIDE PLUMBING FITTINGS AND PIPES OF SUFFICIENT SIZE TO ENSURE PEAK FLOWS ARE CATERED FOR AND EVENLY DISTRIBUTED THROUGHOUT THE EFFLUENT FIELD.
6. PROMOTE SALT TOLERANT GRASS AND SMALL PLANT GROWTH WITHIN THE EFFLUENT FIELD. DO NOT PLANT LARGE TREES WITHIN A DISTANCE EQUAL TO THEIR MATURE HEIGHT FROM EFFLUENT DISPOSAL TRENCHES



EVAPOTRANSPIRATION ABSORPTION BED

(PRIMARY OR SECONDARY TREATED WASTEWATER) - 1:10



WICK TRENCH & BED

(PRIMARY OR SECONDARY TREATED WASTEWATER) - 1:10

NOTES - GENERAL

1. THE DETAILS INDICATE ONLY SEVERAL POSSIBLE ALTERNATIVES. CONSULT REFERENCE DOCUMENTATION FOR FURTHER INFORMATION.
2. MINIMISE DISTURBANCE TO EXISTING VEGETATION DURING INSTALLATION OF EFFLUENT DISPOSAL FIELDS
3. RESTRICT ACCESS TO EFFLUENT DISPOSAL FIELD BY HEAVY VEHICLES AND ANIMALS
4. INSTALLATION TO BE UNDERTAKEN BY A LICENSED PLUMBER

NOTES - EVAPOTRANSPIRATION ABSORPTION BEDS & WICK TRENCH & BEDS

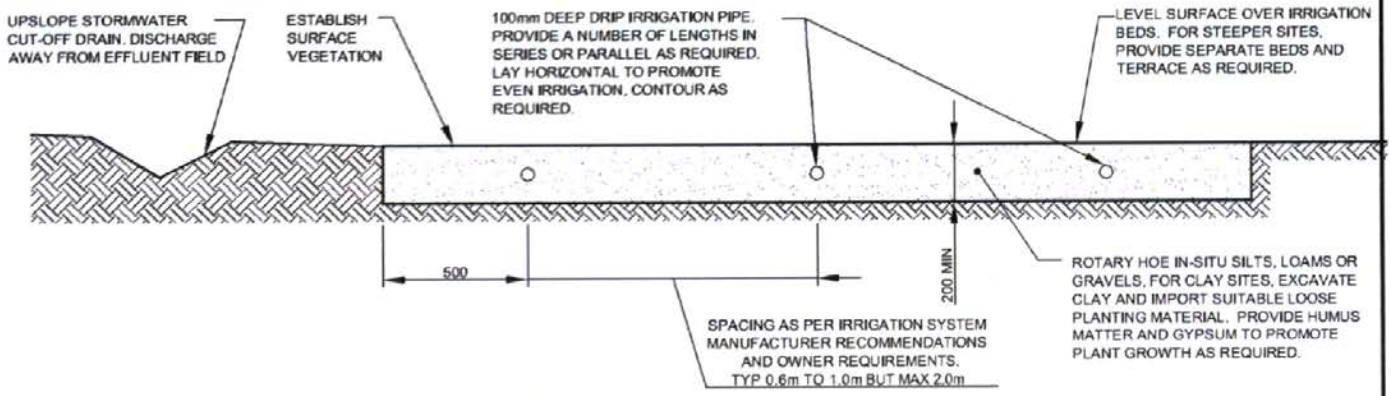
1. MAXIMUM INDIVIDUAL TRENCH LENGTH 30m. USE SEVERAL TRENCHES IN PARALLEL TO PROVIDE MINIMUM REQUIRED LENGTH.
2. MINIMUM SPACING BETWEEN TRENCH WALLS 1.0m
3. MINIMUM OFFSET FROM TRENCH WALL TO WASTEWATER ENVELOPE BOUNDARY 1.0m
4. BEDS TO BE FLAT. CONTOUR AS REQUIRED.
5. PROVIDE PLUMBING FITTINGS AND PIPES OF SUFFICIENT SIZE TO ENSURE PEAK FLOWS ARE CATERED FOR AND EVENLY DISTRIBUTED THROUGHOUT THE EFFLUENT FIELD.
6. PROMOTE SALT TOLERANT GRASS AND SMALL PLANT GROWTH WITHIN THE EFFLUENT FIELD. DO NOT PLANT LARGE TREES WITHIN A DISTANCE EQUAL TO THEIR MATURE HEIGHT FROM EFFLUENT DISPOSAL TRENCHES

COLIN McCLELLAND & ASSOCIATES
CONSULTING STRUCTURAL & CIVIL ENGINEERS - PROJECT CONSULTANTS
201 ARMSTRONG STREET NORTH BALLARAT 3350 TEL 03 5333 3030 FAX 03 5333 4298

Scale: 1:10
Drawn: TJMcC
Designed: TJMcC
Approved: CJMcC

TYPICAL LAND BASED EFFLUENT DISPOSAL SYSTEMS

A4

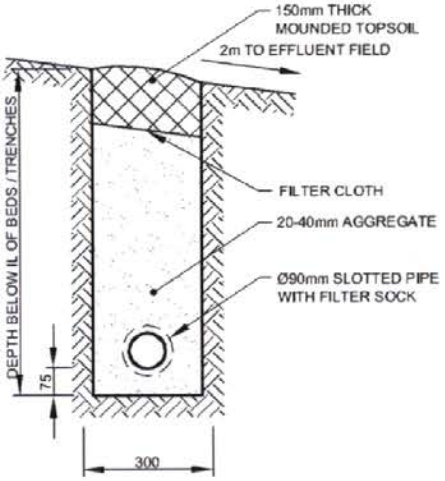


SHALLOW SUB-SURFACE IRRIGATION BEDS

(SECONDARY TREATED WASTEWATER) - 1:25

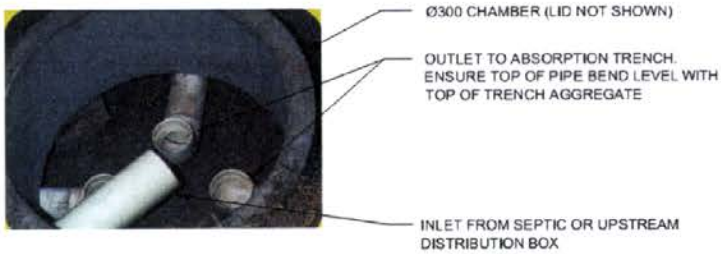
NOTES - SHALLOW SUB-SURFACE IRRIGATION BEDS

1. ENSURE EVEN IRRIGATION OVER DESIGN MINIMUM AREA (ALLOWING FOR DOSING AS REQUIRED) BY CONSIDERING SYSTEM LAYOUT, SELECTION OF PUMP FOR ADEQUATE PRESSURE & DELIVERY RATE, SELECTION OF IRRIGATION PIPELINE AND SUITABLE EMITTERS AND A PRESSURE COMPENSATING SYSTEM
2. INSTALL FILTERS AND FLUSING VALVES
3. INSTALL VACUUM BREAKERS TO PREVENT AIR AND SOIL BEING SUCKED INTO THE SYSTEM FOLLOWING PUMP SHUT OFF



TYPICAL UPSLOPE SUBSURFACE CUT OFF DRAIN

(IF REQUIRED - PRIMARY OR SECONDARY TREATED WASTEWATER) - 1:20



TYPICAL EFFLUENT DISTRIBUTION BOX

NOTES - GENERAL

1. THE DETAILS INDICATE ONLY SEVERAL POSSIBLE ALTERNATIVES. CONSULT REFERENCE DOCUMENTATION FOR FURTHER INFORMATION.
2. MINIMISE DISTURBANCE TO EXISTING VEGETATION DURING INSTALLATION OF EFFLUENT DISPOSAL FIELDS
3. RESTRICT ACCESS TO EFFLUENT DISPOSAL FIELD BY HEAVY VEHICLES AND ANIMALS
4. INSTALLATION TO BE UNDERTAKEN BY A LICENSED PLUMBER

COLIN McCLELLAND & ASSOCIATES
CONSULTING STRUCTURAL & CIVIL ENGINEERS - PROJECT CONSULTANTS
201 ARMSTRONG STREET NORTH BALLARAT 3350 TEL 03 5333 3030 FAX 03 5333 4298

Scale: 1:20, 1:25
Drawn: TJMcC
Designed: TJMcC
Approved: CJMcC

TYPICAL LAND BASED EFFLUENT DISPOSAL SYSTEMS

A4

Appendix C: Useful factors to consider when selecting an EPA-Approved Onsite Wastewater Treatment System

Physical features
Dimensions of the treatment plant
Location of treatment unit – above-ground or below-ground
Number and power of pumps, aerators and other electrical components
Size of effluent storage tank
Type of treatment processes
Type of disinfection used if applicable
Chemicals used
Capital and installation costs
Council Permits – e.g. Permit to Install, Permit to Alter and Certificate to Use
Capital and delivery charge for the treatment system components including the septic tank, sump and sump pump (if applicable) and effluent storage tank
Cost of manoeuvring the treatment unit into the back yard (i.e. is vehicular access or a crane required or can it be carried by several people?)
Cost of digging the hole and removing the debris (if applicable)
Concrete pad (if required)
Cost of electrician's work to lay power cords to connect the treatment plant to the house, including a dedicated weather-proof power point and any modifications required to the switch board
For greywater systems – cost of internal plumbing for toilet flushing, washing machine, backflow prevention device and automatic diversion valve to sewer
Cost of the plumber/drainer digging trenches and laying pipes to connect the treatment system to the house
Cost of land application/irrigation system including ancillary equipment (e.g. effluent pump, disc or mesh filter, vacuum breakers, scour valves, soil moisture sensors or rain gauges)
Cost of the audio-visual alarm system and/or remote monitoring system
Performance
Minimum and maximum daily volumes that can be effectively treated
Effluent quality (primary, secondary 10/10/10, 10/10, 20/30/10 or 20/30)
Commissioning time to achieve approved effluent quality
Total pump run time per day
How does the system cope with: large shock loads or surge flows? toxic substances like bleach, oil, paint thinners etc.? 24-hour power failure? 72-hour power failure? being switched off for 1 week, 1 month, 3 months? no inflow for 1 week, 1 month, 3 months?
kWh of electricity per kilogram of BOD removed
Estimated lifetime of the treatment systems and its component parts
Sustainability features of the treatment system
Maintenance
Desludging frequency or what is the fate of the biosolids?
Number of service visits per year
Number of hours of maintenance per year
Expected maintenance tasks during each service call
Qualifications and training of service technicians
Ongoing costs
Electricity usage per day; electricity cost per kL of wastewater; electricity cost per year
Service fees per year (labour and travel costs)
Annual cost of chemicals used
Annual cost of replacing the UV lamp, membranes
Annual cost of testing any backflow prevention devices
Average annual cost of consumables, spare parts, pumps and desludging per year (annualised over 30 years)
Annual effluent monitoring cost
Cost of desludging the system every 3 to 5 years
Total annual cost to run the treatment plant (including annualised spare parts and desludging)

Appendix D: Septic Tanks

Commissioning

After installation or desludging, and before use, a septic tank must be two-thirds filled with clean water to:

- provide ballast in the tank to prevent groundwater lifting the tank out of the ground
- reduce odours
- enable any subsequent secondary treatment plant to be switched on, commissioned and used immediately.

When domestic wastewater from the dwelling flows into the septic tank it contains sufficient microbiological organisms to start and continue the treatment process. There is no need to 'feed' or dose a new or desludged septic tank with starter material or micro-organisms. If odour occurs after the commissioning of a system, a cup of garden lime can be flushed down the toilet each day until the odour disappears. If the odour persists, the property should seek professional advice from a plumber.

Sludge and scum

As organic matter from the wastewater and inert material, such as sand, settle to the bottom of the tank a layer of sludge forms. This layer contains an active ecosystem of mainly anaerobic micro-organisms which digest the organic matter and reduce the volume of sludge. Scum forms as a mixture of fats, oils, grease and other light material floats on top of the clarified liquid that has separated from the solids. When the clarified liquid flows out of the septic tank it is called 'primary treated effluent'.

It is not necessary or recommended that householders pour commercial products that are reputed to dissolve sludge build-up, down the toilet or sink. A teaspoon of granulated yeast flushed down the toilet once a fortnight may assist with microbial activity, though such a procedure is not an alternative to regular sludge and scum pump-out (Lord 1989).

Desludging septic tanks

Over time, the sludge and scum layers build up and need to be removed for the tank to function properly. The level of solids accumulation in the tank cannot be accurately predicted, and will depend on the waste load to the tank. Therefore, the sludge and scum depth should be checked annually by a contractor. If a septic tank is under a maintenance contract, regular assessment (every 1 to 3 years) of the sludge and scum layers must be part of the maintenance agreement.

The sludge and scum need to be pumped-out with a vacuum suction system when their combined thickness equals 50% of the operational depth of the tank. The frequency of pump-out depends on:

- whether the tank is an adequate size for the daily wastewater flow
- the composition of the household and personal care products
- the amount of organic matter, fat, oil and grease washed down the sinks
- the use of harsh chemicals such as degreasers
- overuse of disinfectants and bleaches
- the use of antibiotics and other drugs, especially dialysis and chemotherapy drugs
- whether any plastic or other non-organic items are flushed into the tank.

A well-functioning septic tank – one that is not overloaded with liquid, organic matter or synthetic material – typically only needs to be desludged once every 3 to 8 years (depending on the size of the tank). A septic tank connected to a home with a frequently used dishwasher will need to be pumped out more frequently (typically every 3 to 4 years) than a home with no dishwasher connected (typically every 5 to 6 years). A holiday home will need to be pumped out less frequently. Large (6,000 L) domestic septic tanks which are common in New Zealand and the USA and have started to be installed in Victoria, have been proven to require desludging only once every 10 to 15 years (Bounds, 1994).

After pump-out, tanks must not be washed out or disinfected. They should be refilled with water to reduce odours and ensure stability of plumbing fixtures. A small residue of sludge will always remain and will assist in the immediate re-establishment of bacterial action in the tank.

Householders should keep a record of their septic tank pump-outs and notify the local Council that a pump-out was undertaken in accordance with the Council Permit.

Septic tank failure

It is critical that a septic tank is not used as a rubbish receptacle. Septic tanks are designed solely for the treatment of water and organic materials. Items such as sanitary napkins, tampons, disposable nappies, cotton buds, condoms, plastic bags, stockings, clothing and plastic bottles will cause the septic tank to fail and require costly removal of these items. If a tank is contaminated or poisoned by household materials it should be pumped out immediately to enable the microbiological ecosystem to re-start.

Without the removal of the scum and sludge, sewage biosolids will increasingly be discharged into the soil absorption trenches and will eventually cause them to fail. This can force untreated sewage onto the ground surface and cause:

- noxious odours
- a boggy backyard
- a health hazard to the family, pets, visitors and neighbours from the pathogens in the sewage
- environmental degradation of the property, surrounding area and waterways from the nutrients, organic matter and other pollutants in the discoloured water

  and
- a public health risk to drinking water supplies in potable water supply catchments.

Positive actions a property owner can take to help a septic tank function well:

- Use soapy water (made from natural unscented soap), vinegar and water or bi-carbonate of soda and water to clean toilets and other water fixtures and fittings.
- Read labels to learn which bathroom and laundry products are suitable for septic tanks. Generally plain, non-coloured, unscented and unbleached products will contribute to a well-functioning septic tank.
- Use detergents with low levels of salts (e.g. liquid detergents), sodium absorption ratio, phosphorus and chlorine (see www.lanfaxlabs.com.au).
- Wipe oils and fats off plates and saucepans with a paper towel and dispose of in the kitchen compost bin.
- Use a sink strainer to restrict food scraps entering the septic system.
- Ensure no structures such as pavements, driveways, patios, sheds or playgrounds are constructed over the tank or absorption trench area.
- Ensure the absorption trench area is not disturbed by vehicles or machinery.
- Engage a service technician to check the sludge and scum levels, pumps and alarms annually.
- Keep a record of the location of the tank and the trenches and all maintenance reports (including the dates of tank pump-outs, tank inspections and access openings) and ensure the service technician sends a copy of the maintenance report to the local Council
- Have the tank desludged when the combined depth of the scum and sludge is equal to the depth of the middle clarified layer.

Indications of failing septic tanks and soil absorption trenches

- Seepage along effluent absorption trench lines in the soil
- Lush green growth down-slope of the soil absorption trench lines
- Lush green growth down-slope of the septic tank
- Inspection pits and/or the soil absorption trenches consistently exhibiting high water levels
- Soil absorption trench lines become waterlogged after storms
- General waterlogging around the land disposal area
- Presence of dead and dying vegetation (often native vegetation) around and down-slope of the land disposal areas
- A noxious odour near the tank and the land disposal area
- Blocked water fixtures inside the house, with sewage overflowing from the relief point
- High sludge levels within the primary tank (within about 150 mm of inlet pipe)
- Flow obstructed and not able to pass the baffle in the tank
- The scum layer blocking the effluent outflow.

Decommissioning treatment systems

Septic tanks

When a septic tank is no longer required it may be removed, rendered unusable or reused to store stormwater. The contents of the tank must first be pumped out by a sewage sludge contractor. The contractor must also hose down all inside surfaces of the tank and extract the resultant wastewater. Where the tank will no longer be used but will remain in the ground, the contractor must first disinfect the tank by spreading (broadcasting) hydrated lime over all internal surfaces in accordance with the WorkSafe safety precautions associated with using lime (i.e. wearing gloves, safety goggles and not using lime on a windy day).

Under no circumstances should anyone enter the tank to spread the lime or for any other reason, as vapours in confined spaces can be toxic.

A licensed plumbing practitioner must disconnect the tank from the premises and from the absorption trench system. The inlet and outlet pipes on the tank must be permanently sealed or plugged. To demolish a tank, the bottom of the tank is broken and then the lid and those parts of the walls that are above ground are collapsed into the tank. The tank is then filled with clean earth or sand.

Before a tank may be used to store stormwater a licensed plumbing practitioner must disconnect it from the premises and the trench system and connect an overflow pipe from the tank to the stormwater legal point of discharge. Before disinfecting the tank, it must be pumped out, the inside walls hosed down and then pumped out again. The tank is to be filled with fresh water and disinfected, generally with 100 mg/L of pool chlorine (calcium hypochlorite or sodium hypochlorite) to provide a resultant minimum 5 mg/L of free residual chlorine after a contact time of 30 minutes. However, advice should be obtained from a chemical supplier about safety precautions, dosage and concentrations to provide adequate disinfection for any tank. The chlorine is not to be neutralised, but be allowed to dissipate naturally for at least 1 week, during which time the water must not be used. Pumps may be installed to connect the tank to the irrigation system. The contents of the tank must not be used for any internal household purposes or to top-up a swimming pool. The water may only be used for garden irrigation. The tank and associated irrigation system must be labelled to indicate the water is unfit for human consumption in accordance with AS/NZS 3500: *Plumbing and Drainage* (Blue Mountains City Council 2008).

Secondary treatment systems

All treatment systems must be decommissioned by a licensed plumbing practitioner.