PP12/2018-1

8 Mitchell Grove SEPARATION CREEK

Lot: 16 LP: 57713 V/F: 8430/388, Parish of Kaanglang

Construction of a Dwelling and Associated Works

R J McKenzie

Officer - Bernadette McGovan

EXHIBITION FILE

Submissions to this planning application will be accepted until a decision is made on the application.

If you would like to make a submission relating to a planning permit application, you must do so in writing to the Planning Department

8.

Colac Otway SHIRE

Office Use Only			Fee:	$
Application No.:			Receipt No.:	
Date Lodged:	/	/	Ward:	
Date Allocated:	/	/	Zone(s):	
Allocated to:			Overlay(s):	

Planning Enquiries
Phone: (03) 5232 9412
Web: www.colacotway.vic.gov.au

Application for Planning Permit

Use this form to make an application for a planning permit and to provide the information required by section 47 of the *Planning and Environment Act 1987* and regulations 15 and 38 of the Planning and Environment Regulations 2005.

Supplementary information requested in this form should be provided as an attachment to your application. ■ Please print clearly or complete the form electronically (refer to How to complete the Application for Planning Permit form).

Privacy notice

⚠ Information collected with this application will only be used to consider and determine the application. It will be made available for public inspection in accordance with section 51 of the *Planning and Environment Act 1987.*

Need help with the application?

If you need help to complete this form, read *How to complete the Application for Planning Permit form.* For more information about the planning process, refer to *Planning: a Short Guide.* These documents are available from your local council, the Planning Information Centre (Ph: 03 9637 8610, 8 Nicholson Street, Melbourne), or www.dse.vic.gov.au/planning.

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

(1) Has there been a pre-application meeting with a council officer?

☑ Yes ☐ No

If yes, with whom?: BERNADETTE McGOWAN Date: 23 / 11 / 2017

The land

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

Street Address

Street No.: 8 Street Name: MITCHELL GROVE

Suburb/Locality: SEPARATION CREEK Postcode: 3234

Formal Land Description

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

Lot No.: 16 on Lodged Plan, Title Plan or Subdivision Plan No.: LP 5773

OR

Crown Allotment No.: 29F Section No.: Parish Name: KAANGLANG

(3) Title information.

☐ ■ Attach a full, current copy of title information for each individual parcel of land, forming the subject site.

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

eg. single dwelling, three dwellings, shop, factory, medical centre with two practitioners, licensed restaurant with 80 seats.

VACANT BLOCK

(5) Plan of the land.

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

The proposal

⚠ You must give full details of your proposal and attach the information required to assess the application.

If you do not give enough detail or an adequate description of the proposal you will be asked for more information. This will delay your application.

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

Read *How to complete the Application for Planning Permit form* if you need help in describing your proposal.

ERECT HOLIDAY HOME

(7) Additional information about the proposal.

Contact council or refer to council planning permit checklists for more information about council's requirements.

■ Attach additional information providing details of the proposal, including:

- [x] Any information required by the planning scheme, requested by council or outlined in a council planning permit checklist.
- [x] Plans showing the layout and details of the proposal.
- [ ] If required, a description of the likely effect of the proposal (eg. traffic, noise, environmental impacts).

(8) Encumbrances on title.

Encumbrances are identified on the certificate of title.

Is the land affected by an encumbrance such as a restrictive covenant, section 173 agreement or other obligation on title such as an easement or building envelope?

- [x] No, go to 9.
- [ ] Yes, ■ Attach a copy of the document (instrument) specifying the details of the encumbrance.
  - Does the proposal breach, in any way, the encumbrance on title?
    - [ ] No, go to 9.
    - [ ] Yes, contact council for advice on how to proceed before continuing with this application.

⚠ **Note**

Council must not grant a permit that authorises anything that would result in a breach of a registered restrictive covenant (sections 61(4) and 62 of the *Planning and Environment Act 1987*).

Contact council and/or an appropriately qualified person for advice.

Costs of buildings/permit fee

Most applications require a fee to be paid. Where development is proposed, the value of the development affects the fee. Contact council to determine the appropriate fee.

(9) Estimated cost of development for which the permit is required.

Cost $ 350,000 ⚠ You may be required to verify this estimate.

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

(10) Do you require a receipt for the permit fee?

- [x] Yes
- [ ] No

Contact, applicant and owner details

(11) Provide details of the contact, applicant and owner of the land.

Contact

The person you want Council to communicate with about the application.

Name: RUSSELL MCKENZIE

Organisation (if applicable):

Postal address: 328 LIGAR ST

BALLARAT Postcode: 3350

Contact phone:

Mobile phone: 0405 54 5554 ✓

Email: RUSSELLMKENZIE@LIVE.COM ✓ SAY

Fax:

Indicate preferred contact method

Applicant

The person or organisation who wants the permit.

☑ Same as contact. If not, complete details below.

Name:

Organisation (if applicable):

Postal address:

Postcode:

Owner

The person or organisation who owns the land.

☐ Same as contact ☐ Same as applicant

Where the owner is different from the applicant or contact, provide the name of the person or organisation who owns the land.

Name (if applicable):

Organisation (if applicable):

Postal address:

Postcode:

Checklist

(12) Have you?

- ☐ Filled in the form completely?
- ☐ Paid or included the application fee?
- ☐ Attached all necessary supporting information and documents?
- ☐ Completed the relevant council planning permit checklist?
- ☐ Signed the declaration on the next page?

Declaration

(13) This form must be signed. Complete one of A, B or C

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

A Owner/Applicant

I declare that I am the applicant and owner of the land and all the information in this application is true and correct.

Signature

Date: 04 / 12 / 2017

B Owner

I declare that I am the owner of the land and I have seen this application.

Signature

Date: / /

Applicant

I declare that I am the applicant and all of the information in this application is true and correct.

Signature

Date: / /

C Applicant

I declare that I am the applicant and:

- I have notified the owner about this application;
- and all the information in this application is true and correct.

Signature

Date: / /

Lodgement

Lodge the completed and signed form and all documents with:

Colac-Otway Shire
PO Box 283, COLAC VIC 3250
2-6 Rae Street, COLAC VIC 3250
Telephone: (03) 5232 9412
Fax: (03) 5232 1046
Email: inq@colacotway.vic.gov.au
TTY: (03) 5231 6787

For help or more information

D17/109059

No 8 MITCHELL GROVE.
SEPARATION CREEK.
COLOUR CHART.

SEE DRAWINGS FOR LOCATIONS

VIC Lands

TITLE SEARCH ON 08430 / 388

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

VOLUME 08430 FOLIO 388 Security no : 124070385768J
Produced 15/02/2018 12:15 pm

LAND DESCRIPTION

Lot 16 on Plan of Subdivision 057713.
PARENT TITLE Volume 08419 Folio 243
Created by instrument B518572 14/08/1963

REGISTERED PROPRIETOR

Estate Fee Simple
Joint Proprietors
RUSSELL JOHN MCKENZIE
AMANDA LOUISE MCKENZIE both of 328 LIGAR STREET BALLARAT VIC 3350
AL811075D 14/04/2015

ENCUMBRANCES, CAVEATS AND NOTICES

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 or imaged folio set out under DIAGRAM LOCATION below.

DIAGRAM LOCATION

SEE LP057713 FOR FURTHER DETAILS AND BOUNDARIES

ACTIVITY IN THE LAST 125 DAYS

NIL

----------END OF REGISTER SEARCH STATEMENT----------

Additional information: (not part of the Register Search Statement)

Street Address: 8 MITCHELL GROVE SEPARATION CREEK VIC 3234

DOCUMENT END

ORIGINAL

NOT TO BE TAKEN FROM THE OFFICE OF TITLES

VICTORIA

REGISTER BOOK VOL. 8430 FOL. 388

Certificate of Title

UNDER THE "TRANSFER OF LAND ACT"

VOL. 8430 FOL. 388

PATRICK JAMES HARRINGTON Farmer and ROY STANWAY Estate Agent both of - Wye River and GRANT CHARLES STANWAY of Mount Ida Avenue Hawthorn - - - Salesman are the proprietors as tenants in common in equal shares of an -- estate in fee simple subject to the encumbrances notified hereunder in so - much as lies above the depth of Fifty feet below the surface of ALL THAT -- piece of land coloured on the map hereon being Lot 16 on Plan of - - - - - Subdivision No.57713 Parish of Kaanglang - - - - - - - - - - - - - - - - - -

Issued under Regulation 12 on the approval of the above Plan of Subdivision

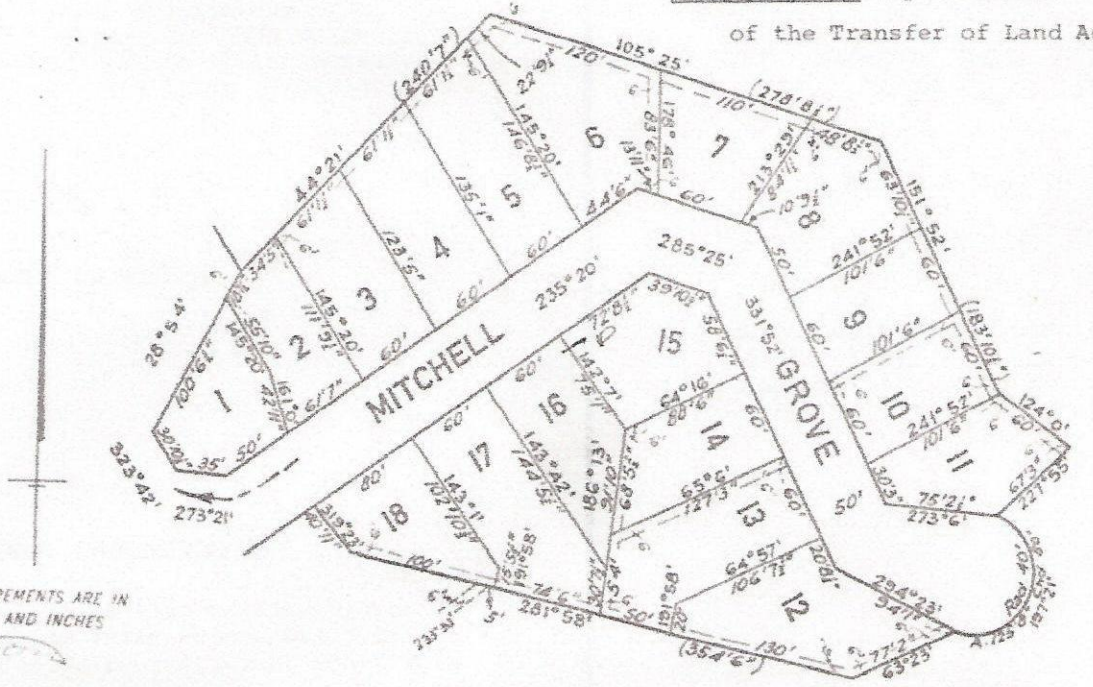
REGISTRAR OF TITLES VICTORIA

Assistant Registrar of Titles

ENCUMBRANCES REFERRED TO

As to any land coloured blue--

ANY EASEMENTS implied under Section 98 of the Transfer of Land Act



DERIVED FROM VOL.8419 FOL.243
B.518572
14/8/'63.

CAVEAT No. B882433 LODGED 16 MAR 1964

CAVEAT LAPSED 29 SEP 1966

OFFICE OF TITLES J.V.F. VICTORIA

WILLIAM JOHN BROMLEY Maintenance Fitter and MARGARET ADELE BROMLEY Stenographer both of 41 Alec Crescent North Fawkner are now JOINT PROPRIETORS

Registered 23rd September 1966

No.C598066

OFFICE OF TITLES R.A.B. VICTORIA

KNOWLTON NOMINEES PTY. LTD. of 10 Mountain Grove Kew is now the proprietor

Registered 18th December 1975

No.F974612

OFFICE OF TITLES V.J.D. VICTORIA

PROPOSED DWELLING,
8 MITCHELL GROVE, SEPERATION CREEK, VICTORIA.

The following document details how the proposed development satisfies the standards required by RESCODE.

54.1 NEIGHBOURHOOD AND SITE DESCRIPTION AND DESIGN RESPONSE

54.1.1 Neighbourhood and Site Description

- The site is located in a Seperation Creek residential area in Mitchell Grove.
- The allotment is vacant.
- The allotment has a rectangular frontage of 18.30m to Mitchell Grove, the rear of the allotment tapers to the south west.
- The allotment has an area of 625 m^2.
- The allotment has a fall of 7.5m to the south west.
- The surrounding dwellings are predominantly “Beach Style” weatherboard and fibro. dwellings constructed over many decades.

54.2 Design Response

- The proposed development consists of a three bedroom, two storey dwelling.
  - The site shall be cut to allow the sitting of the dwelling. This will provide the appearance of a single storey dwelling facing the street.
  - The private open space shall be to the south east behind the dwelling.

54.02 NEIGHBOURHOOD CHARACTER AND INFRASTRUCTURE

54.02-1 Neighbourhood Character Objectives Standard A1

- The surrounding dwellings are weatherboard and fibro. approximately constructed from the turn of the twentieth century.
- An area on the allotment, for the proposed dwelling shall be cut. A bridge shall be provided to give disabled access to the upper floor.

- No front fence shall be constructed.
- The new construction will have minimal impact on the existing landscape. This area was affected by the Christmas bushfires of 2015. No gardens exist.

54.02-2 Integration with Street Objective Standard A2

- The property will have driveway leading to its car park.
- The dwelling shall provided with a personal access path to the front door.
- The proposed site is not located next to any public open space.

54.03 SITE LAYOUT AND BUILDING MASSING

54.03-1 Street Setback Objective Standard A3

ROAD ZONE	Allotment is not in a Road Zone, no setback distance specified.
SCHEDULE TO THE ZONE	Allotment is in a Schedule to the Zone, a setback distance of 7.0m is specified.

FRONT STREET SETBACK	The front setback to the proposed dwelling shall be 7.0m.
SIDE STREET SETBACK	Not applicable
ENCROACHMENTS	There no proposed encroachment into the setback distance specified.

54.03-2 Building Height Objective **Standard A4**

SCHEDULE TO THE ZONE	Allotment is in a Schedule to the Zone, a maximum height of 8.0m above ground levels is specified.
MAXIMUM HEIGHT	Maximum height of dwelling will be 6.8m. This is below the maximum permitted.

54.03-3 Site Coverage Objective **Standard A5**

SCHEDULE TO THE ZONE	Allotment is in a Schedule to the Zone, a maximum site coverage of 25% is specified.
MAX. SITE COVERAGE	Maximum site coverage is 19.28%. This is below the maximum permitted.

SITE CALCULATION

Description	Floor Area including decks & verandahs
Dwelling	120.47 sq.m.

Allotment Area	625 sq.m.
Site Coverage	120.47/625 = 19.28%

54.03-4 Permeability Objectives **Standard A6**

The area of the site not covered by hard surface is 77.6% This is above the minimum 20 % permitted.

SITE CALCULATION

Total Dwellings & Verandah	120.47 sq.m.
Total Paved Areas approx.	19.36 sq.m.
Total Site Coverage & Hard Surfaces	139.83/625. = 22.4%

54.03-5 Energy Efficiency Objective **Standard A7**

- As required, the proposed dwelling achieves a six star rating.

54.03-6 Significant Trees Objectives **Standard A8**

- The proposed construction will not require the removal of any trees.

54.04 AMENITY IMPACTS

55.04-1 Side and Rear Setback Objective **Standard A10**

SCHEDULE TO THE ZONE	Allotment is in a Schedule to the Zone, a setback distances are specified. The setback for side boundaries is 3.0 m. The setback for rear boundaries is 5.0 m.
MAXIMUM SETBACK	The proposed dwelling will be 3.00m from the south west boundary and 3.30m from the north east boundary. The proposed dwelling shall be 7.80m from the rear boundary.
ENCROACHMENTS	There will be an encroachment of a 3.00m deck into the rear setback distance specified.

54.04-2 Walls on Boundaries Objective Standard A11

- There will be no walls built on boundaries.

54.04-3 Daylight to Existing Windows Objective Standard A12

- Not applicable. There are no existing habitable windows of an adjoining dwelling within 12.00m of the proposed new dwelling.

54.04-4 North Facing Windows Objective Standard A13

- Not applicable, as no existing dwellings within 3.0m of the Southern boundary abut the new dwelling.

54.04-5 Overshadowing Open Space Objective Standard A14

- There is no overshadowing of the private open spaces of the adjoining properties to the west and the south of the proposed dwelling. The overshadowing on the west adjoining allotment is on the area of the allotment between the dwelling and the street. This is not secluded the private open space.

54.04-6 Overlooking Objective Standard A15

- The finished ground floor level of the proposed dwelling will not exceed 0.6m above ground level at the eastern boundary line.
- The overlooking on the west adjoining allotment is on the area of the allotment between the dwelling and the street. This is not secluded the private open space.

54.05 ONSITE AMENITY AND FACILITIES

54.05-1 Daylight to New Windows Objective Standard A16

- All habitable windows will face at least one of the following areas,

-A space with a minimum area of 3.0 sq.m. and a maximum width of 1.0m clear to the sky
-A verandah open for at least one third of its perimeter
-A carport open on two or more sides and open for at least one third of its perimeter.

54.05-2 Private Open Space Objective Standard A17

SCHEDULE TO THE ZONE	Allotment is in a Schedule to the Zone, no area specified.

PRIVATE OPEN SPACE

Dwelling	Open Space Area
Proposed Deck	First Floor 16.20 sq.m.
Proposed at ground level	In excess of 350.00 sq.m.

- The private open space of the proposed dwelling meet the minimum width requirement of 3.0m.

54.05-3 Solar Access to Open Space Objective Standard A18

- The private open space of the proposed dwelling is located to the south east of the dwelling. This area is will receive solar access as it extend some distance south east.

54.06 DETAIL DESIGN

54.06-1 Detail Design Objective Standard A19

- The proposed dwelling will be “fibro” clad in keeping with the existing neighbourhood character.
- The proposed dwelling has a “flat” skillion roof in keeping with the existing neighbourhood character.
- The windows of the proposed dwelling will have similar proportions to the windows in the existing dwellings.

54.06-2 Front Fence Objective Standard A20

- No front fence will be constructed.

This concludes this report.

Bruce Hollioake and Partners
Consulting Civil and Structural Engineers
102 Dawson Street South, Ballarat.....3350
ph. 53 388270
fax 53 388207
Bruce Hollioake, B.E. (Civil), M.I.E.Aust., G.Dip.M.E., Reg. EC 1249, BS 1209, DP-AD258

GEOTECHNICAL ASSESSMENT AND LAND STABILITY ASSESSMENT REPORT

PROJECT:

Proposed Residence at
Lot 16, 8 Mitchell Grove,
Separation Creek.

CLIENT:

Russell McKenzie.

CODES USED:

AS 2870, 2011
Australian Geomechanics Society, V42, N1, March, 2007. (AGS Guidelines 2007).

DESCRIPTION OF WORK:

Site investigation for a proposed residence and Site Classification in accordance with AS 2870, 2011, The Residential Slabs and Footings Code.
Geotechnical report on excavations, embankments and slope stability.

ENGINEER:

Bruce D. Hollioake
M.I.E. Aust., C.P. Eng., M.E., M.B.S.
Building Practitioners Registration EC 1249

REFERENCE:

14263.

DATE:

24th April, 2015.

Bruce Hollioake and Partners
Consulting Civil and Structural Engineers
102 Dawson Street South, Ballarat.....3350
ph. 53 388270
fax 53 388207

Bruce Hollioake, B.E. (Civil), M.I.E.Aust., G.Dip.M.E., Reg. EC 1249, BS 1209, DP-AD258

SCOPE OF WORKS:
Initially to carry out a Geotechnical Assessment at Lot 16, 8 Mitchell Grove, Separation Creek, to determine soil conditions and site features, and then prepare a Landslip Risk Assessment in accordance with the AGS Guidelines, 2007. If appropriate, to also classify the site in accordance with AS 2870, 2011.

CONSTRUCTION:
No known but presumed to be a multi-level, clad framed residence with a corrugated iron roof, and timber or steel framed sub-floor structure on stumps / poles, located towards the frontage of the allotment. Refer Appendix A for a rough site plan of the proposal.

TOPOGRAPHY:
This allotment is located at the top end of a shallow gully extending up to this lot from Olive Street to the south. The land has a moderate fall to the south east, with very good site drainage. The slope of the land is around 14 degrees across this lot, with the general slope from Mitchell Grove to Olive Street being 17 degrees.
The land is generally well grassed, with this allotment effectively cleared, apart from a large tree in a low point running through the rear portion of the allotment. There are scattered larger trees on the surrounding allotments, but generally this and the surrounding allotments contain only smaller trees and shrubs.
The proposed house site is to be towards the front of the lot, with the effluent disposal field to be to the rear or south east portion of the allotment. This should be possible to install without the removal of the large tree, but it is likely that a retaining wall will be provided along the rear portion of the allotment to enable the low point, which is effectively redundant, to be partially filled. Refer also to the site plan.
There is formal access driveway to this lot, but an access to Mitchell Grove can be easily constructed with virtually no earthworks required.
There are no significant recent landslips through this allotment, however based on the Colac Otway landslide data base and airborne lidar maps, refer appendix 2 and 3, there are relatively low-lying and irregular slopes surrounded by arc-shaped steep slopes in this area. These low-lying and irregular slopes, including this allotment, comprise old colluvium of “fossil” landslides, and the arc-shaped steep slopes likely represent the eroded remnants of the main and side scarps of the “fossil” landslides.

SOIL CONDITIONS:
Boreholes / probes were excavated on the site in various locations, as indicated on the site plan, whilst nearby road and driveway cut batters provided a better soil of the soil profile.
The soil profiles encountered were generally consistent, as follows:

Centre of Lot, 10m from Road Frontage. Typical Soil Profile.

DEPTH	DESCRIPTION	E.B.C.	REACTIVITY
00	Moist, firm, friable, brown loam and organic matter.		
100	Moist, firm, brown (grey) silty clays of low plasticity and cohesion.	>50 kPa.	Low
700	Moist, firm, brown (silty) clays of low to moderate plasticity and cohesion.	100+kPa	Low to Mod.
1800	End Borehole.		

Bruce Hollioake and Partners
Consulting Civil and Structural Engineers
102 Dawson Street South, Ballarat.....3350
ph. 53 388270
fax 53 388207
Bruce Hollioake, B.E. (Civil), M.I.E.Aust., G.Dip.M.E., Reg. EC 1249, BS 1209, DP-AD258

Centre of Lot – Base of Gully.

DEPTH	DESCRIPTION	E.B.C.	REACTIVITY
00	Moist, firm, friable, brown loam and organic matter.		
300	Moist, firm, brown (grey) silty clays of low plasticity and cohesion.	>50 kPa.	Low
800	Moist, firm, brown (silty) clays of low to moderate plasticity and cohesion.	100+kPa	Low to Mod.
1500	End borehole.		

Report any variations to the above profile to the Engineer for approval.

AVAILABLE HISTORY:
The Colac Otway landslide database provides information on a large number of landslides in the Wye River area, including several in this immediate area. In addition, the Coffey Geotechnics Report, prepared as part of the Geotechnical Assessment for a Pressure Sewer Scheme of the area, provides information on additional landslides and relevant geological features. The landslide of immediate concern to this allotment is the larger landslide feature following Mitchell Grove. This is also visible on the Lidar Image of the Separation Creek and Wye River Area. Refer Appendix B and C, attached

Significant data on landslips and landslip potential is also contained in the Colac Otway Shire Coastal Community Revitalisation Project, published 27 March, 2003. Whilst there was no specific detailed study site in this immediate area, based on slope angle, slope aspect, orientation of the discontinuities in relation to the conditions for planar and or wedge type failures, and the location of existing landslides, this allotment was mapped as having a lower susceptibility to landslide.

GEOLOGICAL CLASSIFICATION / MODEL:
The area is indicated as being of the Early Cretaceous (Kl) Period on a 1:250,000 scale Geological map of the region and comprise sedimentary rocks of the Eumeralla Formation. These rocks generally comprise sandstones and mudstones, with minor conglomerate and carbonaceous shale, which have been folded and faulted. Landslides are common in this Formation, both in the overlying soils, which often comprise colluvium / landslide debris, as well as in the underlying rock, particularly along planes of weaker material.

Based on the available mapping, the rocks in this area generally dip to the SE, with this allotment being part of a larger landslide feature following the arc of Mitchell Grove. This is also visible on a Lidar Image of the area. This general area has irregular slopes below the ‘arc’ with the slope on this lot being around 15 degrees, with a distinct slightly eroded gully running through this allotment to the south. The Coffey Report considers that these slopes comprise old colluvium of ‘fossil’ landslides. Our boreholes indicate that the thickness of this colluvium layer, which comprises very few rock fragments, and is in excess of 1.8m thick.

Fossil landslides may be described as Inactive landslides of old age that generally developed in the Pleistocene or earlier periods, under different morphological and climatic conditions. Movement generally will therefore not be repeated under present conditions, and in this particular instance we consider the soil unlikely to again slide ‘en-masse’. However, the soil is likely to be susceptible to erosion and possibly tunnel gully erosion, and may contain local water springs.

Bruce Hollioake and Partners
Consulting Civil and Structural Engineers
102 Dawson Street South, Ballarat.....3350
ph. 53 388270
fax 53 388207
Bruce Hollioake, B.E. (Civil), M.I.E.Aust., G.Dip.M.E., Reg. EC 1249, BS 1209, DP-AD258

SLOPE STABILITY AND POTENTIAL FAILURE MODES:

The proposed residence is to be located on old colluvium with a slope to the south of approximately 15 degrees, and is likely to remain fundamentally stable. This slope is greater than 14 degrees, which (along with other factors) triggers the need for a formal Landslip Risk Assessment. However a slope of 15 degrees is also well below what we have found to be the usual practical threshold value of soils in this area.

The Coastal Community Revitalisation Project, figure 1, indicates that there is a low susceptibility of this site to planar or wedge type failures, which is consistent with our findings.

There are no significant site cuts proposed on this allotment for either the house or the driveway, however it is likely that a 1.6m high retaining wall may be constructed to level the rear portion of the allotment to provide an adequate area for effluent disposal. This will not significantly affect the surface drainage of this general area, as the small gully has no effective catchment area above this lot and the adjoining allotment to the north east.

The potential modes of landslip failure for this allotment therefore comprise the following:

- Minor slumping to the south-east during heavy rainfall events.
- Soil creep extending through the proposed house site.
- Tunnel gully erosion extending through this allotment.
- Failure of the retaining wall supporting new filling on this allotment.

DISCUSSION OF POTENTIAL FAILURE MODES AND RISK ASSESSMENT:

The Coffey report has identified the potential for ‘soil side flow’ in this general area, with the size of the landslip judged to be small to very small with an order of magnitude of movement of 3 to 10m, and a 0.3 probability of a structure being impacted. The degree of damage is also judged to be ‘some’. Based on the AGS Matrix, assuming ‘normal’ practices, the likelihood was assessed as ‘Likely’ with ‘Minor’ consequence, and a risk level of ‘Moderate Risk’. If ‘Good hillside practices’ are adopted, the likelihood of landslide is reduced to ‘Possible’.

On this particular allotment, minor slumping could occur during heavy rainfall events, although there is no indication of recent movement in this area, and the slope of the land is only 15 degrees, further reducing the likelihood. The size of the landslide is expected to be small and have a total movement of less than 10m. We therefore consider the likelihood of minor slumping to be ‘Unlikely’ with ‘Minor’ consequence.

Soil creep is also possible, but given the relatively low slope, and with little evidence of past movement, soil creep is also ‘Unlikely’ with ‘Minor’ consequence. Tunnel gully erosion is ‘Possible’ but is only likely to have ‘Minor’ to ‘Insignificant’ consequence to property.

The retaining wall will be engineer designed with some allowance for soil creep, hence failure of the wall is considered to be ‘Unlikely’ with ‘Insignificant’ damage. The additional weight of soil retained by the wall will not significantly increase the risk of landslip to the slope below this allotment due to the slope of the land and low susceptibility to landslides of this general area. The retaining wall post footings will also assist in limiting soil creep potential.

Bruce Hollioake and Partners
Consulting Civil and Structural Engineers
102 Dawson Street South, Ballarat.....3350
ph. 53 388270
fax 53 388207
Bruce Hollioake, B.E. (Civil), M.I.E.Aust., G.Dip.M.E., Reg. EC 1249, BS 1209, DP-AD258

A risk assessment has been undertaken for both property and life for each mode of failure, in accordance with AGS 2007 guidelines. Refer sheets G1-G6, attached for workings and comments.

Failure Mode	**Risk to Property**	**Risk to life**
Minor Slumping	Very Low to Low	Rd.i.= 2.5 x10-7
Soil Creep	Very Low to Low	Rd.i.= 2.5 x10-7
Tunnel Gully Erosion	Low to Moderate	Rd.i.= 1 x10-6
Water Tank Retaining Wall Failure	Very Low	Rd.i.= 1 x10-7

The risk to life is less than both the recommended 'Acceptable Risk' of 10-5 and the 'Tolerable Risk' of 10-4 in all instances.

Given the generally low risk to life and property for this allotment, there are no additional risk management measures required, however good engineering practice for hillside construction should be followed for this allotment.

The following works and requirements are recommended:

- The footing system to the house should comprise bored piers founded a minimum of 1500mm deep, and into the silty clay. Founding into the competent bedrock is not considered essential.
- Earthworks on this site should be kept to a minimum, however the relatively low potential of the area for landslip will limit the potential for earthworks to destabilise the site.
- Provide surface catch drains around the high side of the house to prevent water flowing under the house. All collected surface water and roof water overflow from the rainwater tanks should be discharged to the existing underground stormwater drain at the rear of the allotment via a piped system.
- The single large tree towards the rear of this allotment is not providing a significant contribution towards the stability of the slope and may be removed if required for the development of this site. Planting of trees on this allotment is not a specific requirement for the maintenance of slope stability.
- Ensuring construction and site works are generally undertaken in accordance with good hillside building practice, such as per Appendix J of 'Landslide Risk Management Concepts and Guidelines' published by the Australian Geomechanics Society.

Bruce Hollioake and Partners
Consulting Civil and Structural Engineers ph. 53 388270
102 Dawson Street South, Ballarat.....3350 fax 53 388207
Bruce Hollioake, B.E. (Civil), M.I.E.Aust., G.Dip.M.E., Reg. EC 1249, BS 1209, DP-AD258

SITE CLASSIFICATION (AS2870):
Based on the disturbed samples taken, the size and nature of construction of the residence, and our experience of the performance of footings in this area, we have classified the site as:
Class P – Problem Site – Slope Stability, in accordance with AS 2870, 2011.

FOUNDING DEPTHS:
PAD FOOTINGS: Founded a minimum of 1500mm deep and into the silty clay colluvium.
Pad footings founded into the silty clay may be designed for a maximum bearing capacity of 100 kPa.

SPECIAL REQUIREMENTS:
DRAINAGE:
The building perimeter shall be properly drained to prevent the collection of water against the residence, and the flow of water towards the residence. Land slip potential is greatly increased by the presence of water.
Sub-surface drains should be avoided near footings as they can introduce water to the foundation if they become blocked, and contribute towards an increased landslip risk. During construction, ensure that guttering and downpipes are connected to the stormwater system as soon as possible after installation of the roof cladding to avoid locally saturating the subsoil surrounding the building. Similarly, water must not pond at or near the residence, either during or after construction.

VEGETATION INFLUENCE:
For pad footings founded 1500mm deep, the influence of trees on the footing performance will be limited, but if large trees are to be planted adjacent to the house, footing depth should be increased to at least 2m deep, or onto the bedrock if encountered at a shallower depth.

INSPECTIONS:
Inspect all excavations to ensure a suitable foundation material has been reached. Report any variations from the logged borehole results to the Engineer for approval.
It is the Builders responsibility to check that the Engineering plan and details match the final adopted Architectural drawings.

ARTICULATION:
Minor cracking in buildings may be caused by shrinkage of timber, plaster or concrete, by brick growth or by soil movement. This minor cracking is generally of little structural significance and does not detract from the performance or durability of the building. It is not economically possible to design footings to eliminate all possibility of cracking.

MAINTENANCE:
Leaks in plumbing pipes and fixtures should be repaired promptly to limit long term ingress of water.
For further information on correct site maintenance, refer to the CSIRO publication "Guide to Home Owners on Foundation Maintenance and Footing Performance".

CONSTRUCTION DIFFICULTIES:
Minimal as access is good and excavation of footings should be relatively easy.

Bruce Hollioake and Partners
Consulting Civil and Structural Engineers
102 Dawson Street South, Ballarat.....3350
ph. 53 388270
fax 53 388207

Bruce Hollioake, B.E. (Civil), M.I.E.Aust., G.Dip.M.E., Reg. EC 1249, BS 1209, DP-AD258

ACCESS AND CONSTRUCTION:
Access to the site is readily available without the need for any significant site cuts or filling.

IMPACT ON ADJOINING ALLOTMENTS:
The proposed residence and development of the site will not markedly affect the landslip potential of any nearby allotments. There is an underground drainage system available, hence there will be no more, and likely less, surface water drainage to be discharged onto another property than currently exists.
The effluent disposal field could potentially seep onto the allotment to the south, Lot 17 Mitchell Grove, but this is unlikely to significantly increase the potential for slope instability as any such seepage will be minimal compared to the current surface catchment area and resultant rainwater runoff onto this land during a wet winter, as it is located in a general shallow gully.

VEGETATION REMOVAL:
Bushfire regulations and requirements usually require a degree of clearing of trees from around a proposed residence. Sometimes the area of clearing can be significant and the removal of trees can increase the potential for landslip. However, in this instance, the current trees contribute little towards slope stability on this allotment, and even if all of the trees were removed from this and the adjoining allotments, the increased risk of landslip will be minimal.

SUITABILITY FOR THE PROPOSED DEVELOPMENT:
Subject to the recommendations contained in this report, we believe that the proposed house is suitable for this allotment.

Yours Faithfully,

.....
Bruce D. Hollioake
M.I.E. Aust., C.P. Eng.

.

Bruce Hollioake and Partners
Consulting Civil and Structural Engineers
102 Dawson Street South, Ballarat.....3350
ph. 53 388270
fax 53 388207

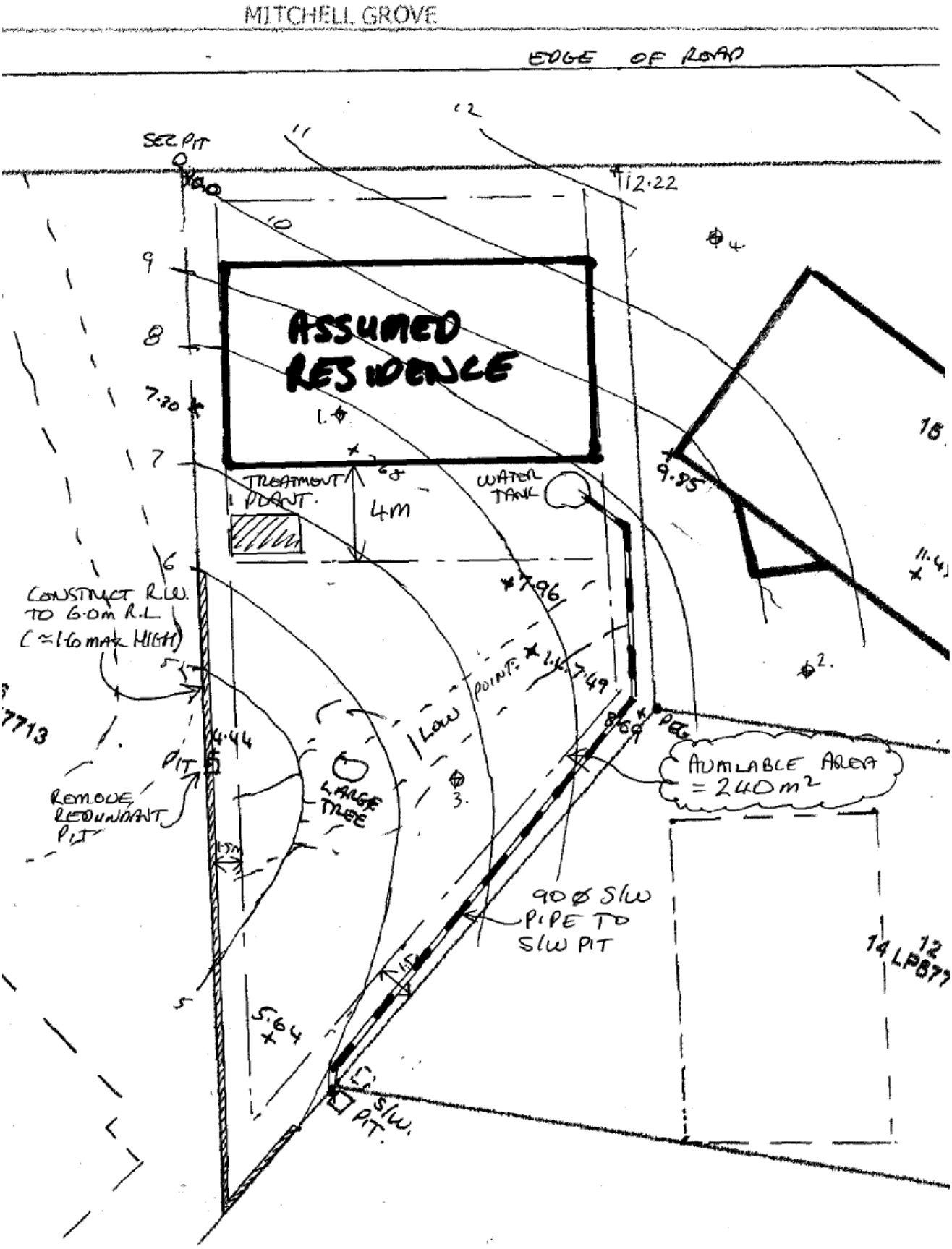
Bruce Hollioake, B.E. (Civil), M.I.E.Aust., G.Dip.M.E., Reg. EC 1249, BS 1209, DP-AD258

1. View of proposed house site, looking north west from the shallow gully.

2. View of large tree at rear of lot .

Bruce Hollioake and Partners
Consulting Civil and Structural Engineers
102 Dawson Street South, Ballarat.....3350
ph. 53 388270
fax 53 388207
Bruce Hollioake, B.E. (Civil), M.I.E.Aust., G.Dip.M.E., Reg. EC 1249, BS 1209, DP-AD258

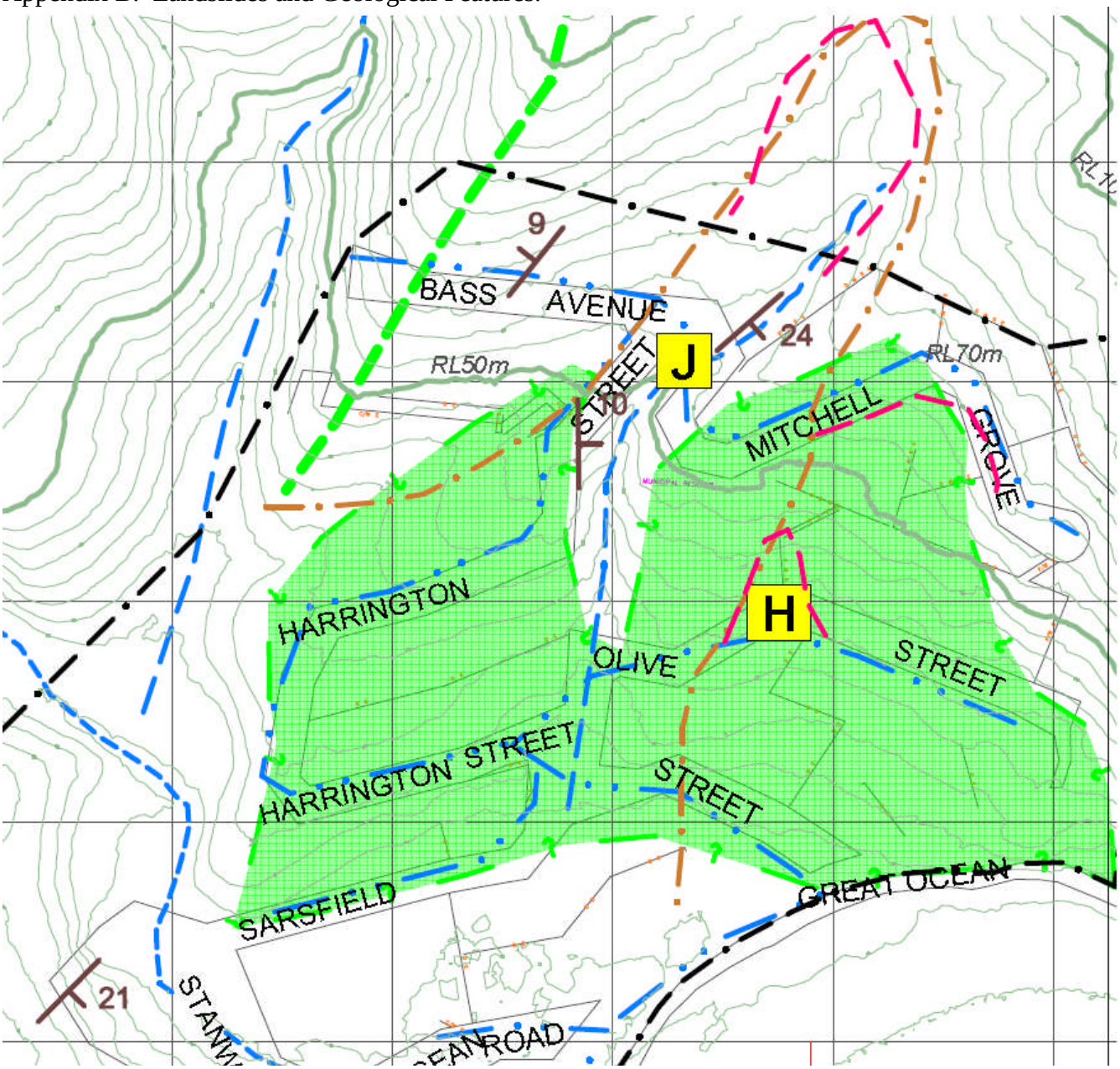
Appendix A. Probable Development Plan of Site



Bruce Hollioake and Partners
Consulting Civil and Structural Engineers
102 Dawson Street South, Ballarat.....3350
ph. 53 388270
fax 53 388207

Bruce Hollioake, B.E. (Civil), M.I.E.Aust., G.Dip.M.E., Reg. EC 1249, BS 1209, DP-AD258

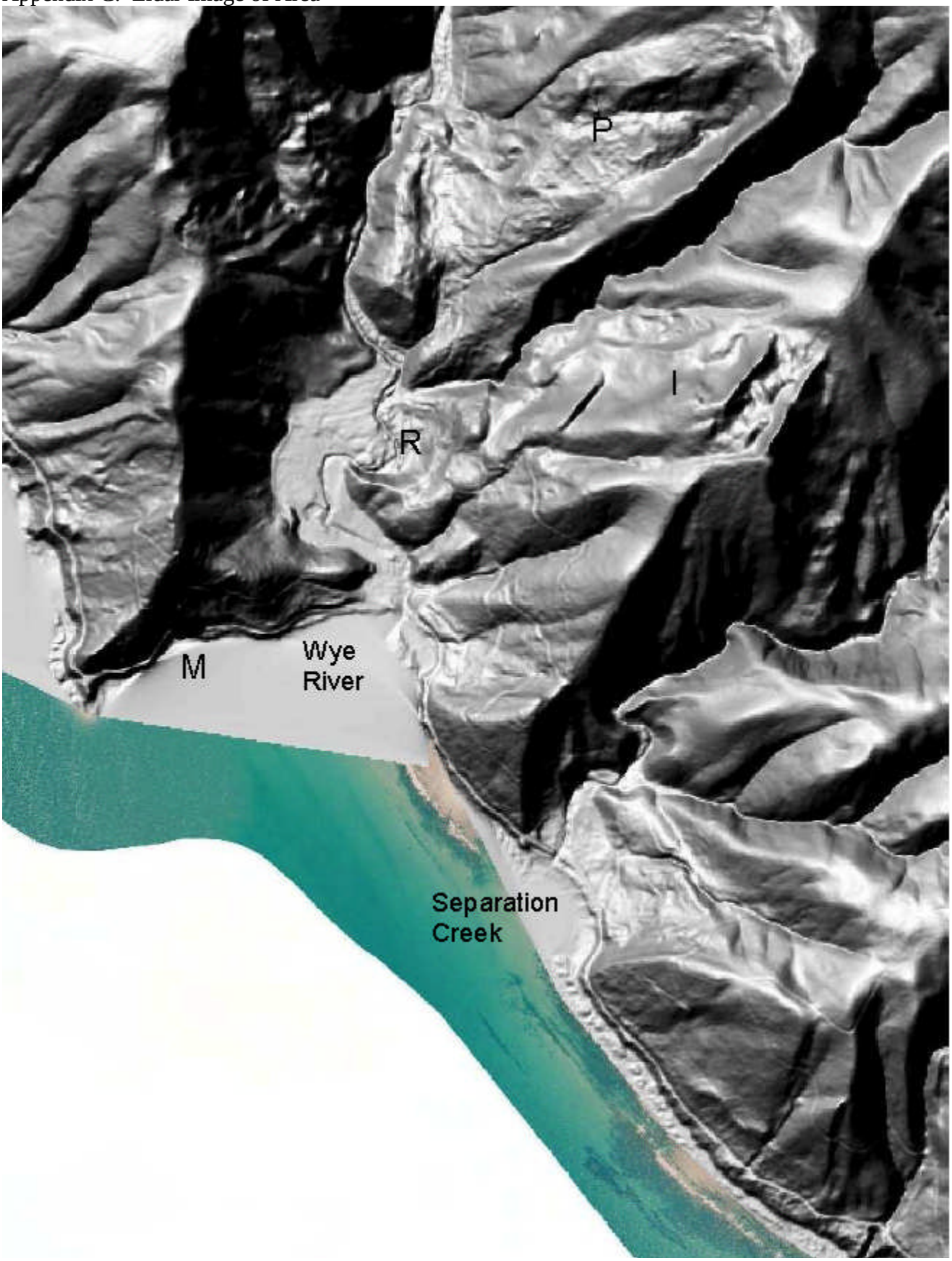
Appendix B. Landslides and Geological Features.



Bruce Hollioake and Partners
Consulting Civil and Structural Engineers
102 Dawson Street South, Ballarat.....3350
ph. 53 388270
fax 53 388207

Bruce Hollioake, B.E. (Civil), M.I.E.Aust., G.Dip.M.E., Reg. EC 1249, BS 1209, DP-AD258

Appendix C. Lidar Image of Area



RISK ASSESSMENT - SLOPE STABILITY
Proposed Residence at:
Lot 165 Mitchell Grove, Separation Creek.

Sheet G1
Job. No. 14263
Date 23.04.15

For: Russell McKenzie

Construction: Proposed Residence

Site Data:
Slope of Land: 15 degrees
Existing Landslide: Yes
Nearby Slides: Yes

Potential Failure Mode:
(i) Slumping extending into the residence site from the south

A. Risk to Property:
Use a qualitative assessment in accordance with Appendix G. Australian Geomechanics Society - March 2000.

	Level	Descriptor	Probability
Likelihood:	D	Unlikely	0.000100
Consequence:	4	Minor	

Level of Risk to property matrix: **Very Low to Low**

Comment: Risk is considered acceptable.

B. Risk to Life:
Use a quantitative assessment in accordance with section 3.5 of A.G.S.

			Probability
Factors:	(I) Ph =	From Appendix G,	0.0001000
	(ii) Psh =	Use 0.50 as only part of house affected.	0.50
	(iii) Pt:s=	Use 0.05 as unlikely to be occupied.	0.05
	(iv) Vd.t.=	From App F, shallow depth, no inundation of building	0.10

Individual Risk **Rdi =** **0.00000025** **< 10E-4** **Accept risk**

Discussion:
Risk appears acceptable.

Prepared by: Bruce Hollioake
M.I.E.Aust., C.P. Eng.

RISK ASSESSMENT - SLOPE STABILITY
Proposed Residence at:
Lot 16 Mitchell Grove, Separation Creek.

Sheet G2
Job. No. 14263
Date 23.04.15

For: Russell McKenzie

Construction: Proposed Residence

Site Data:
Slope of Land: 15 degrees
Existing Landslide: Yes
Nearby Slides: Yes

Potential Failure Mode:
(ii) Soil Creep extending into the residence site from the south

A. Risk to Property:
Use a qualitative assessment in accordance with Appendix G. Australian Geomechanics Society - March 2000.

	Level	Descriptor	Probability
Likelihood:	D	Unlikely	0.000100
Consequence:	4	Minor	

Level of Risk to property matrix: **Very Low to Low**

Comment: Risk is considered acceptable.

B. Risk to Life:
Use a quantitative assessment in accordance with section 3.5 of A.G.S.

			Probability
Factors:	(I) Ph =	From Appendix G,	0.0001000
	(ii) Psh =	Use 0.50 as only part of house affected.	0.50
	(iii) Pt:s=	Use 0.05 as unlikely to be occupied.	0.05
	(iv) Vd.t.=	From App F, shallow depth, no inundation of building	0.10

Individual Risk **Rdi =** **0.00000025** **< 10E-4** **Accept risk**

Discussion:
Risk appears acceptable.

Prepared by: Bruce Hollioake
M.I.E.Aust., C.P. Eng.

RISK ASSESSMENT - SLOPE STABILITY
Proposed Residence at:
Lot 16 Mitchell Grove, Separation Creek.

Sheet G3
Job. No. 14263
Date 23.04.15

For: Russell McKenzie

Construction: Proposed Residence

Site Data:
Slope of Land: 15 degrees
Existing Landslide: Yes
Nearby Slides: Yes

Potential Failure Mode:
(iii) Tunnel Gully Erosion impacting the residence.

A. Risk to Property:
Use a qualitative assessment in accordance with Appendix G. Australian Geomechanics Society - March 2000.

	Level	Descriptor	Probability
Likelihood:	C	Possible	0.001000
Consequence:	4	Minor	

Level of Risk to property matrix: **Low to Moderate**

Comment: Risk is considered acceptable.

B. Risk to Life:
Use a quantitative assessment in accordance with section 3.5 of A.G.S.

			Probability
Factors:	(I) Ph =	From Appendix G,	0.0010000
	(ii) Psh =	Use 0.20 as only small part of house affected.	0.20
	(iii) Pt:s=	Use 0.05 as unlikely to be occupied.	0.05
	(iv) Vd.t.=	From App F, shallow depth, no inundation of building	0.10

Individual Risk **Rdi =** **0.00000100** **< 10E-4** **Accept risk**

Discussion:
Risk appears acceptable.

Prepared by: Bruce Hollioake
M.I.E.Aust., C.P. Eng.

RISK ASSESSMENT - SLOPE STABILITY
Proposed Residence at:
Lot 16 Mitchell Grove, Separation Creek.

Sheet G4
Job. No. 14263
Date 23.04.15

For: Russell McKenzie

Construction: Proposed Residence

Site Data:
Slope of Land: 15 degrees
Existing Landslide: Yes
Nearby Slides: Yes

Potential Failure Mode:
(iv) Retaining Wall Failure

A. Risk to Property:

Use a qualitative assessment in accordance with Appendix G. Australian Geomechanics Society - March 2000.

	Level	Descriptor	Probability
Likelihood:	D	Unlikley	0.000100
Consequence:	5	Insignificant	

Level of Risk to property matrix: **Very Low**

Comment: Risk is considered acceptable.

B. Risk to Life:

Use a quantitative assessment in accordance with section 3.5 of A.G.S.

			Probability
Factors:	(I) Ph =	From Appendix G,	0.0001000
	(ii) Psh =	Use 0.20 as only small part of lot affected.	0.20
	(iii) Pt:s=	Use 0.05 as unlikely to be occupied.	0.05
	(iv) Vd.t.=	From App F, shallow depth, no inundation of building	0.10

Individual Risk **Rdi =** **0.00000010** **< 10E-4** **Accept risk**

Discussion:
Risk appears acceptable.

Prepared by: Bruce Hollioake
M.I.E.Aust., C.P. Eng.

Bruce Hollioake
Consulting Civil & Structural Engineers
P: 03 5338 8270
F: 03 5338 8207
M: 0417 143 231
www.hollioake.com.au
102 Dawson St Sth,
Ballarat VIC 3350

LAND CAPABILITY REPORT – EFFLUENT DISPOSAL

PROJECT:

Site Assessment for Effluent Disposal
Proposed Residence at
Lot 16, 8 Mitchell Grove,
Separation Creek.

CLIENT:

Russell McKenzie.

CODES USED:

Code of Practice – Onsite Wastewater Management, 891.4, Feb. 2016.
AS 1547 – 2012 On Site Domestic Wastewater Management.

REFERENCES:

EPA Bulletin for EPA Approved Systems, April 1997.
EPA Information Bulletin 746.1, March, 2003.
EPA Guidelines – Planning Permit Applications in Open Potable Water Supply Catchments.

DESCRIPTION OF WORK:

Land assessment for effluent disposal, and land management program.

ENGINEER:

Bruce D. Hollioake
M.I.E. Aust., C.P. Eng., N.E.R.

DATE:

28th April, 2015.
Revised 8th February, 2018

REFERENCE:

14263.

Bruce Hollioake
Consulting Civil & Structural Engineers
P: 03 5338 8270
F: 03 5338 8207
M: 0417 143 231
www.hollioake.com.au
102 Dawson St Sth,
Ballarat VIC 3350

1 Introduction

THE CONSULTANTS

Bruce Hollioake has been engaged to undertake a Land Capability Assessment (LCA) for a 615m2 site at Lot 16, 8 Mitchell Grove, Separation Ctreek. The field investigation and report have been undertaken and prepared by Mr. Bruce Hollioake, who has appropriate professional indemnity insurance for this type of work. Our professional indemnity insurance certificate is available on request.

REPORT SUMMARY

This report will accompany an application for a Septic Tank Permit to Install submitted to Colac Otway Shire Council for an onsite wastewater management system for a private 3-bedroom, double storey residence. This document provides information about the site and soil conditions. It also provides a detailed LCA for the lot, and includes a conceptual design for a suitable onsite wastewater management system, including recommendations for monitoring and management requirements. A number of options are available for both the treatment system and land application area (LAA). However, the wastewater should be treated to at least a secondary level by a suitable EPA-approved treatment system and the effluent applied to land via sub-surface irrigation. UV disinfection is also recommended due to the potential for seepage along the base of the filling.

SITE OVERVIEW

The site, which had mostly been previously cleared of the original vegetation, with further clearing following the bushfires, has a moderate grass / weed cover, with a single mature gum tree remaining, towards the rear of the allotment, along with scattered smaller trees and shrubs.

The land has a moderate to steel fall to the south of around 14-15 degrees, and is slightly undulating, with a shallow gully running through the centre to rear portion of the allotment. This allotment is the top end of this shallow gully, which effectively ends on the north east side of this allotment.

There are no dams or watercourses on or immediately adjacent to this allotment, with the shallow gully in our opinion not meeting this definition due to it ending effectively at this allotment. The roadside table drain of Mitchell Grove does not dischare directly into this gully. There is also a stormwater pit at the south corner of the allotment in which to direct stormwater flows.

The proposed house site is to be at the frontage of the allotment, with the proposed LAA at the rear of the proposed house site. The allotment is elevated and above the 1 in 100 year flood level. There is extremely limited land available for sustainable onsite effluent management that maintains the required buffers to protect surface waters and the floodways, with the existing shallow gully providing a significant restraint. It will be necessary to fill the gully to provide an adequate area for effluent disposal, which will need to be closely controlled, as there is a very real risk of seepage along the base of the fill.

2 Description of the Development

Site Address: Lot 16, 8 Mitchell Grove, Separation Creek. (Figure 1).
Owner/Developer: Russell McKenzie.
Postal Address: 328 Ligar Street, Ballarat, 3350.
Contact: Ph: 0408 545554.
Council Area: Colac Otway Shire Council
Zoning: TZ – Township Zone. Environmental Management Overlay EMO1 Overlay – Landslip.
Allotment Size: 615m2
Domestic Water Supply: Reticulated supply is not available.
Anticipated Wastewater Load: 3-bedroom residence with standard water-reduction fixtures @ 4 people per max. Occupancy is assumed . Wastewater generation = 150 L/person/day; total design load = **600 L/day** (source Table 4 of the EPA Code of Practice 891.3).
Availability of Sewer: The area is unsewered and whilst a sewer scheme was previously proposed, it has now been abandoned. It is therefore unlikely that this allotment will be sewered within the foreseeable future.
Vehicle Access: Access can be readily made available, but no formal driveway at present.
Current Land Use: Vacant residential lot.
Category Risk: High, under Colac Otway DWMP.

Bruce Hollioake
Consulting Civil & Structural Engineers
P: 03 5338 8270
F: 03 5338 8207
M: 0417 143 231
www.hollioake.com.au
102 Dawson St Sth,
Ballarat VIC 3350

3 Site and Soil Assessment

Bruce Hollioake undertook original site investigations on 26th April, 2014.

SITE KEY FEATURES
Table 1 summarises the key features of the site in relation to effluent management proposed for the site.

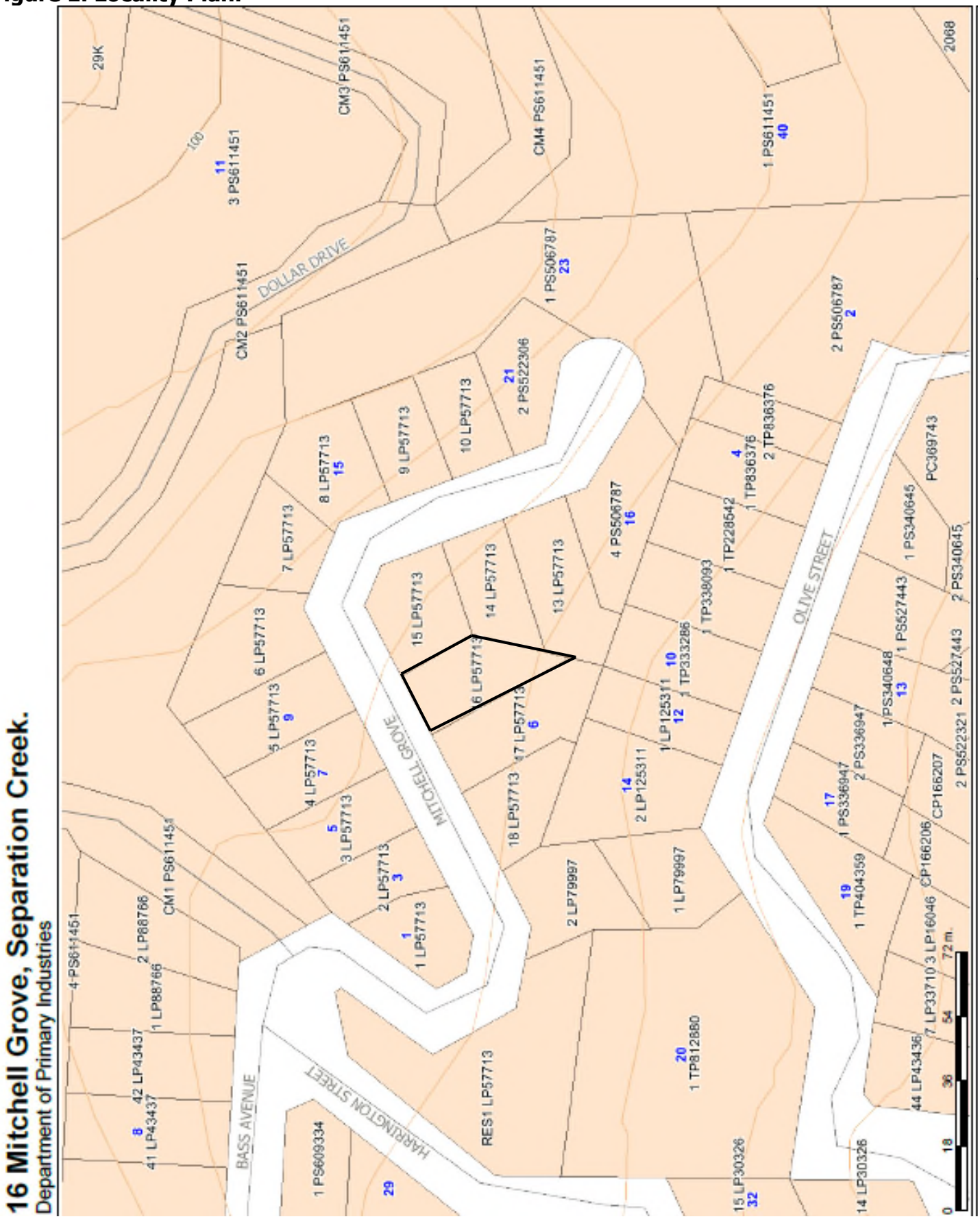
NOTE:
- The site is not in a special water supply catchment area.
- The allotment experiences limited stormwater run-on from neighboring land to the north due to the roadside table drain, and availability of underground stormwater drainage. Any run-on to the proposed LAA area can be easily diverted.
- There was no evidence of a shallow watertable or other significant soil constraints, including landslip.
- This is a very small allotment and has a shallow gully running through the allotment, severely limiting available areaq for the LAA. Earthworks / filling are required to create sufficient useable area, and
- There is a risk of offsite effluent transport, even from a properly designed system, hence a higher level of treatment is recommended.

Figure 1 provides a locality plan and indicates the location of the site of the proposed development. Figure 2 provides a site plan describing the location of the proposed building envelope and other development works, wastewater management system components and physical site features.

Aerial Photograph of the site – Prior to the bushfires.

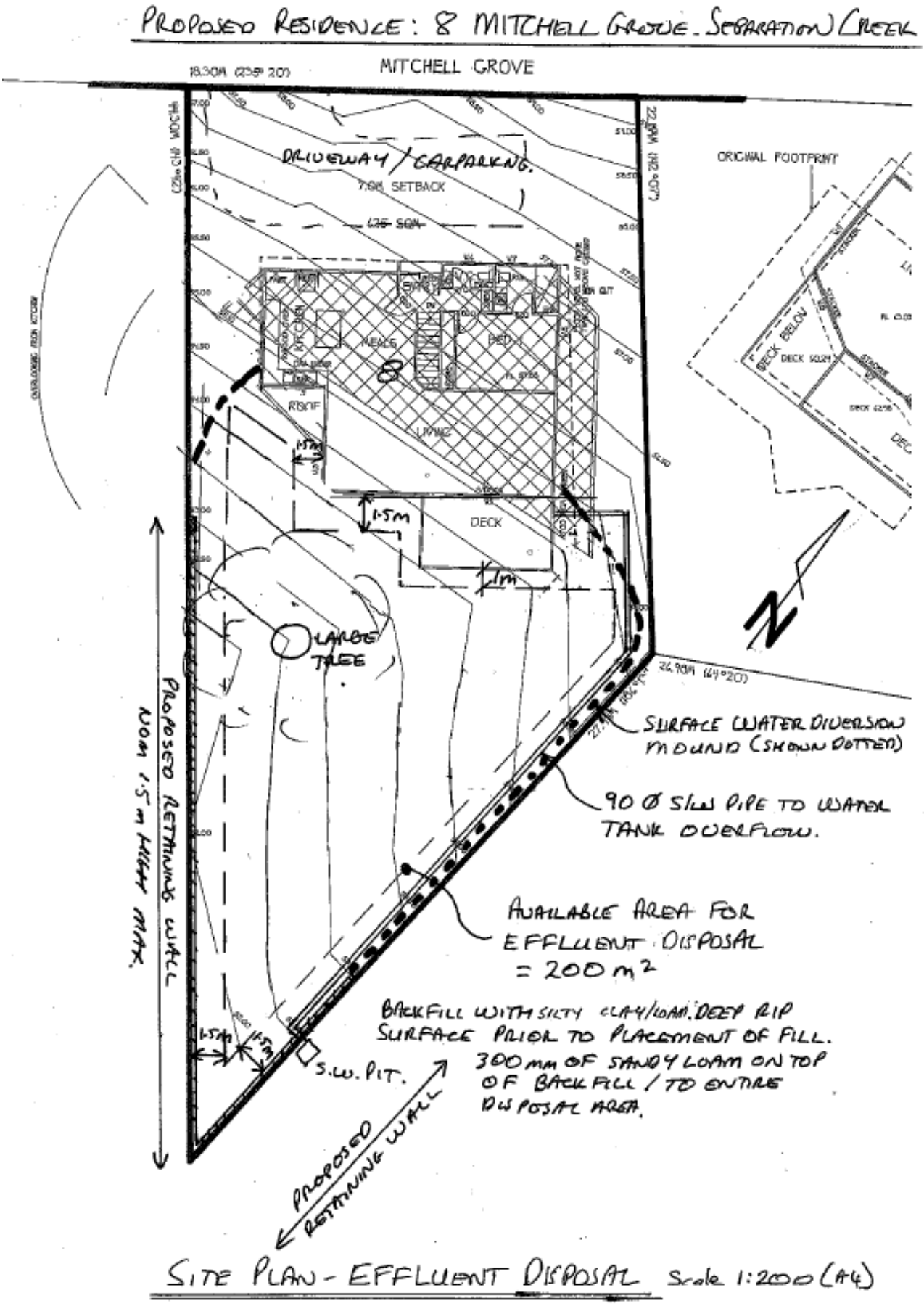
Bruce Hollioake
Consulting Civil & Structural Engineers
P: 03 5338 8270
F: 03 5338 8207
M: 0417 143 231
www.hollioake.com.au
102 Dawson St Sth,
Ballarat VIC 3350

Figure 1. Locality Plan.



Bruce Hollioake
Consulting Civil & Structural Engineers
P: 03 5338 8270
F: 03 5338 8207
M: 0417 143 231
www.hollioake.com.au
102 Dawson St Sth,
Ballarat VIC 3350

Figure 2. Site Plan. 1:200 approx.



Bruce Hollioake
Consulting Civil & Structural Engineers
P: 03 5338 8270
F: 03 5338 8207
M: 0417 143 231
www.hollioake.com.au
102 Dawson St Sth,
Ballarat VIC 3350

Table 1: Site Assessment

Feature	Description	Level of Constraint	Mitigation Measures
Buffer Distances	All relevant buffer distances in Table 5 of the Code (2013) are achievable from the proposed effluent management area.	Moderate	Requires filling to create adeqate suitable area.
Climate	Average annual rainfall 971.6 mm (Coffey Report), max. mean 116.7mm in August, min. mean 46.8 mm in Jan. Average no. of rain days per year: 163. Average annual pan evaporation is assumed as 1351mm (Wardibuloc).	Moderate	Shallow sub-surface irrigation.
Drainage	No visible signs of surface dampness, spring activity, no hydrophilic vegetation (rushes) in the proposed effluent management area or surrounds. Shallow gully enters SW boundary but no effective catchment above.	Minor	NN
Erosion & Landslip	No evidence of sheet or rill erosion; the erosion hazard is low to moderate. This is a fossil landslip that is considered stable and the landslip potential is acceptable.	Moderate	Adopt secondary treatment and shallow sub-surface irrigation
Exposure & Aspect	Partially cleared with a southerly aspect and has fair sun and wind exposure.	Minor	NN
Flooding	The proposed effluent management area is located above the 1:100 year flood level (source WSC).	Minor	NN
Groundwater	No signs of shallow groundwater tables to 2 m depth. There are no groundwater bores for stock and domestic supply in close proximity. From experience, significant seasonal water logging is unlikely on this relatively steep, well drained allotment.	Minor	NN
Imported Fill	No significant fill material but imported filling proposed, that could allow seepage along the base of the filling.	High	Adopt secondary treatment and shallow sub-surface irrigation
Land Available for LAA	Considering all the constraints and buffers, the site has limited suitable land for land application of treated effluent, and severe limitations will need to be placed on the generation of effluent. The only available effluent management area is the rear portion of the allotment but earthworks will be required.	High	Adopt secondary treatment and shallow sub-surface irrigation with UV disinfection.
Landform	The site is relatively steep and undulating, formed by a likely large ancient landslip and subsequent erosion. Drainage lines have dissected the landform, with this site having a moderate fall to the south.	Minor	Generally Unsuitable fo trenches / soakage pits.
Rock Outcrops	None visible.	Nil	NN

Bruce Hollioake
Consulting Civil & Structural Engineers
P: 03 5338 8270
F: 03 5338 8207
M: 0417 143 231
www.hollioake.com.au
102 Dawson St Sth,
Ballarat VIC 3350

Feature	Description	Level of Constraint	Mitigation Measures
Run-on & Runoff	The house site and proposed effluent management area receives limited run-on from the land to the north but this can be easily controlled. The Mitchell Grove roadside table drain intercepts the majority of the flow from further up the slope.	Minor	Surface water diversion mound to be provided around the high side of the LAA
Slope	The proposed effluent management area has a gradient of 24% to the south east, but with the construction of a retaining wall and filling, this will reduce to around 12%.	High	Fill site to provide adequate area and reduce slope
Surface Waters	The proposed house and LAA site is over 60m from any drainage line or surface waters. The low-point running through the centre of the lot is not deemed as surface waters as non-incised.	Moderate	Fill existing hollow running through the allotment.
Vegetation	Mixture of generally exotic pasture grasses, shrubs, small trees and a large native tree.	Nil	NN

*NN: not needed

Site Assessment Results
Based on the most constraining site features, specifically the limited available area and the need to fill the lot, the overall land capability of the site to sustainably manage all effluent onsite may be satisfactory if a suitable design is adopted to minimise the generation of effluent and to treat the effluent to a high standard. The proposed effluent management area is located above the 1:100 flood level and by using secondary treatment with UV disinfection, and pressure-compensating sub-surface irrigation, there should be adequate protection of surface waters and groundwater. A composting type toilet could be considered to minimise effleunt generation, or a maximum 2 bedroom cottage be constructed if a suitable LAA cannot be found.

SOIL KEY FEATURES
The site's soils have been assessed for their suitability for onsite wastewater management by a combination of soil survey and desktop review of published soil survey information as outlined below.

Published Soils Information
The allotment is classified as being of Eumeralla formation of the Otway Group, known to consist of significant silty clays, sand, sandstone and mudstone. Clays of this classification are commonly low to moderately reactive.
There are no mineshafts or shallow working from mining activity shown on or near this allotment on the DELWP map base.
There have been two major studies carried out recently that provide extensive data on site, climate and soil conditions for this area. These are the Colac Otway Domestic Management Plan, and more recently the Coffey Land Capability Report on Wye River and Separation Creek, dated 31st March, 2016.
The Coffey Report carried out Emerson Class testing for dispersion and Sodicity Testing on 20 sites in the Separation Creek and Wye River areas. Specifically, borehole 2 was taken at 12 Mitchell Grove, immediately at the rear of the recommended LAA on this allotment and on the same soil type. A further borehole (BH 18) was taken at 11 Mitchell Grove, virtually opposite this allotment to the north. Both sites were classified in that report as soil type 5c: Silty Clay with a design effluent loading rate of 3mm/day. Measured at a soil depth of 500mm, BH2 had an exchangeable Sodium Percent of 9.7 and an Emerson Class Number of 3. BH18 had exchangeable Sodium Percent of 11.7 and an Emerson Class Number of 3.

The Coffey report found this allotment to be Highly Constrained (Figure 5), with Appendix D recommending an area of 200m2 be provided for Sub-surface and surface irrigation.

Bruce Hollioake
Consulting Civil & Structural Engineers
P: 03 5338 8270
F: 03 5338 8207
M: 0417 143 231
www.hollioake.com.au
102 Dawson St Sth,
Ballarat VIC 3350

Soil Survey and Analysis

A soil survey was carried out at the site to determine suitability for application of treated effluent. Soil investigations were conducted at two locations across the allotment, as nominated, using small diameter power augered boreholes (BH1 and BH3) to 1.5 m depth, with four additional boreholes on the adjacent lot to the north. This was sufficient to adequately characterise the soils as only minor variation would be expected throughout the area of interest, and soil profiles could be better observed in nearby road cuttings. Full profile descriptions are provided in Appendix A. Table 2 describes the soil constraints in detail.

Samples of all discrete soil layers for each soil type were not collected for subsequent laboratory analysis because of the availability of the detailed information provided in the Coffey report.

The surface soils in the vicinity of the proposed residence and effluent disposal envelope generally comprise a shallow depth of brown silty loam, overlying a grey to brown silty clay to between 700-1200mm deep. The underlying clays are a firm to stiff, light brown / pale / yellow, strongly to moderately structured light sandy clay. These clays extend to at least 2000mm deep before ultimately transitioning to a weathered mudstone / sandstone. The A horizon has a moderate structure with minimal mottling and bleaching.

Soil permeability was measured in the Coffey report as generally having a Ksat of 0.06 to 0.12 m/day, although the upper soils on this site, based on our experience and with reference to AS/NZS 1547:2012 and Appendix A of the Code of Practice, will have a significantly higher rate than this.
Critical soil properties are texture and structure, but depth, colour and degree of mottling are also used to infer drainage conditions.
In our experience a Ksat of 0.12 m/day could be used in this instance.

For the soil in the proposed land application area, some features present moderate constraints, but in each case a mitigation measure is presented to address the specific constraint in such a way as to present an acceptable wastewater management solution.

Given the physical and chemical limitations of the subsoil in this area of the site, effluent application via an absorption trench could be satisfactory, but is not recommended due to the limited area available for the LAA.

Bruce Hollioake
Consulting Civil & Structural Engineers
P: 03 5338 8270
F: 03 5338 8207
M: 0417 143 231
www.hollioake.com.au
102 Dawson St Sth,
Ballarat VIC 3350

Table 2: Soil Assessment – TP1-3 Brown Sodosol

Feature	Assessment	Level of Constraint	Mitigation Measures
Cation Exchange Capacity (CEC)	Not tested. Good grass growth evident. The CEC has been tested for this soil type as part of previous soil studies in the area and typically ranges from 19-23, which is adequate.	Minor	NN
Electrical Conductivity	The EC has been tested for this soil type as part of previous soil studies in the area and typically ranges from 0.11-0.18mS/cm, which is adequate.	Minor	NN
Emerson Aggregate Class	Topsoil: Low dispersion. EA Class 3 - Fair.	Minor	NN
	Subsoil: Low dispersion EA Class 3 - Fair	Minor	NN
pH	The ph has been tested for this soil type as part of previous soil studies in the area and typically ranges from 4.8-5, which is on the low side of the optimal range of 5.5-8 for plant growth. However, soil conditions do not appear to be affecting plant growth.	Minor	Apply lime as required for good plant growth.
Rock Fragments	<10% coarse fragments in the A or B horizon.	Minor	NN
Sodicity (ESP)	9.7%. High as greater than 6%, Hence sodic. However good previous tree and understorey growth evident.	Moderate	Add gypsum / lime / organic matter if ever required
Sodium Absorption Ratio (SAR)	No evidence of elevated sodium levels. SAR is expected to be low and not expected to pose a constraint.	Minor	NN
Soil Depth	Topsoil: <700 mm	Minor	NN
	Subsoil: >700 mm. Total soil depth greater than 1.8 m and no hardpans occur.	Minor	NN
Soil Permeability & Design Loading Rates	Topsoil: Moderate silty clays / loam: 0.05-1.5m/day saturated conductivity (K_{sat}) (AS/NZS1547:2012); 3.5mm/day Design Loading Rate (DLR) for irrigation system.	Minor	NN
	Subsoil: Moderately structured light clay: 0.06-0.5 m/day saturated conductivity (K_{sat}) (AS/NZS1547:2012); 3 mm/day DLR for irrigation system (Code of Practice, 2013).	Minor	NN
Soil Texture & Structure	Topsoil (<700 mm): Moderate silty clay/loam overlying silty sandy clays (Category 4a)	Minor	NN
	Subsoil (>700 mm): Moderately structured light silty clay (Category 5c) in accordance with AS/NZS/NZS 1547:2012	Minor	Shallow subsurface irrigation in topsoil recommended
Watertable Depth	Groundwater not encountered, pit terminated at 1.8 m. Minimal mottling in subsoils to indicate a potential seasonal water-logging.	Minor	NN

NN: not needed

Bruce Hollioake
Consulting Civil & Structural Engineers
P: 03 5338 8270
F: 03 5338 8207
M: 0417 143 231
www.hollioake.com.au
102 Dawson St Sth,
Ballarat VIC 3350

Soil permeability was not directly measured but can be inferred with reference to AS/NZS 1547:2012 and Appendix A of the Code of Practice, which describe conservative Design Loading Rates (DLRs) and Design Irrigation Rates (DIRs) for various effluent application systems according to soil type. Critical soil properties are texture and structure, but depth, colour and degree of mottling are also used to infer drainage conditions. We also have extensive experience with soil conditions in this area. We note that the indicative loading rates below assume secondary treated effluent is being applied. Reduced loading rates would apply to primary treatment systems (septic tanks), although these are not recommended here.

For the soil in the proposed land application area, a number of features present minor constraints, but in each case a mitigation measure is presented to address the specific constraint in such a way as to present an acceptable wastewater management solution.

OVERALL LAND CAPABILITY RATING

Based on the results of the site and soil assessment tabled above and provided in the Appendices, the overall land capability of the proposed effluent management area is constrained. Contraint risk appears to be high, consistent with the listed risk under the DWMP and the Coffey report.

Therefore, the effluent management system must be designed, installed and maintained in ways which will mitigate these factors.

4 Wastewater Management System

The following sections provide an overview of a suitable onsite wastewater management system, with sizing and design considerations and justification for its selection. Detailed design for the system should be undertaken at the time of the building application and submitted to Council.

TREATMENT SYSTEM

The secondary effluent quality required is:

- BOD < 20 mg/L;
- SS < 30 mg/L;
- UV disinfection

Refer to the EPA website for the list of approved options that are available http://www.epa.vic.gov.au/en/your-environment/water/onsite-wastewater. Any of the secondary treatment system options are capable of achieving the desired level of performance. The property owner has the responsibility for the final selection of the secondary treatment system and will include the details of it in the Septic Tank Permit to Install application form for Council approval.

EFFLUENT MANAGEMENT SYSTEM

A range of possible land application systems have been considered, such as absorption trenches / beds, evapotranspiration/absorption (ETA) beds, subsurface irrigation and mounds. The preferred system is pressure compensating subsurface irrigation. Subsurface irrigation will provide even and widespread dispersal of the treated effluent within the root-zone of plants. This system will provide beneficial reuse of effluent, which is desirable given that the site is not serviced by town water. It will also ensure that the risk of effluent being transported off-site will be minimised, particularly given the filling required to level the area.

Description of the Irrigation System

A detailed irrigation system design is beyond the scope of this report, however a general description of subsurface irrigation is provided here for the information of the client and Council.

Subsurface irrigation comprises a network of drip-irrigation lines that is specially designed for use with wastewater. The pipe contains pressure compensating emitters (drippers) that employ a biocide to prevent build-up of slimes and inhibit root penetration. The lateral pipes are usually 0.6 to 1.0 m apart, installed parallel along the contour. Installation depth is 100-150 mm in accordance with AS/NZS 1547:2012. It is critical that the irrigation pump be sized properly to ensure adequate pressure and delivery rate to the irrigation network. A filter is installed in the main line to remove fine particulates that could block the emitters. This must be cleaned regularly (typically monthly) following manufacturer's instructions. Vacuum breakers should be installed at the high point/s in the system to prevent air and soil being sucked back into the drippers when the pump shuts off. Flushing valves are an important component and

Bruce Hollioake
Consulting Civil & Structural Engineers
P: 03 5338 8270
F: 03 5338 8207
M: 0417 143 231
www.hollioake.com.au
102 Dawson St Sth,
Ballarat VIC 3350

allow periodic flushing of the lines, which should be done at six monthly intervals. Flush water can be either returned to the treatment system, or should be released to a small dedicated gravel-based trench.
All trenching used to install the pipes must be backfilled properly to prevent preferential subsurface flows along trench lines. Irrigation areas must not be subject to high foot traffic movement, and vehicles and livestock must not have access to the area otherwise compaction around emitters can lead to premature system failure.

Sizing the Irrigation System

Extensive modelling has been carried out in the DWMP and the Coffey report with specific LAA areas given in that document for the various effluent generation rates, soil type and system proposed. In addition, the areas provided in the reports appear to be conservative based on historical systems provided in this area.
Based on an effluent generation rate of 600 l/day, for a silty clayey loam topsoil the required irrigation area from the Coffey report is 200m2. No additional allowances have been made for the slope of the land.

Alternatively, to determine the necessary size of the irrigation area, water balance modelling has been undertaken using the method and water balance tool in the Victorian Land Capability Assessment Framework (2013) and the EPA Code (2013). The calculations are summarised below, with full details provided in Appendix 2, 3 and 4.
The water balance can be expressed by the following equation:

Precipitation + Effluent Applied = Evapotranspiration + Percolation

Data used in the water balance includes:

- Mean monthly rainfall and mean monthly pan evaporation (Inferred Wye River and Wurdiboluc);
- Average daily effluent load – 600 L;
- Design irrigation rate (DIR) – 3.5 mm/day (24.5mm per week) (from Appendix A of the Code);
- Crop factor – 0.6 to 0.8; and
- Retained rainfall – 100% (gently sloping site of approximately 12% final gradient).

The nominated area method is used to calculate the area required to balance all inputs and outputs to the water balance. As a result of these calculations the minimum required area is 299m2.

However, the maximum available irrigation area is 200m2. We have worked backwards to find that this corresponds to a maximum effluent generation rate of 400l/day, based on a DLR of 3.5mm/day, or a 600l/day based on a DLR of 4.5mm/day. Therefore, in order to make the proposed design work, it will be necessary to import at least 300mm compacted thickness of sandy loam, to achieve a DLR of 4.5mm/day on this site.

As preparation for the imported sandy loam, the existing ground should be tilled / ripped to at least 200mm deep.

Nutrient Balance

A nutrient balance has been undertaken to check that the LAA is of sufficient size to ensure nutrients are assimilated by the soils and vegetation. The model used here is based on a simplistic methodology, but improves on this by incorporating more variables in the respective nutrient cycles to more accurately model actual processes.
It acknowledges that a proportion of nitrogen will be retained in the soil through processes such as mineralisation (the conversion of organic nitrogen to ammonia) and volatilisation (Geary and Gardner 1996). It also accounts for crop growth rates (and hence nutrient uptake rates) for a typical pasture.

Some assumptions used in the modeling follow:
· Hydraulic loading – 600 L/day;
· Nitrogen concentration in effluent – 30 mg/L[1];
· Nitrogen percentage lost to soil processes – 20%
· Phosphorus concentration in effluent – 10 mg/L[1];
· Critical nutrient loading rates – 220 kg/ha/year (60 mg/m2/day) for nitrogen and 50 kg/ha/year (14 mg/m2/day) for phosphorus [2];
· Soil phosphorus sorption capacity – 3375 kg/ha of soil [3];
· Proportion of phosphorus sorption capacity utilised – 50%; and
· Design life of system - 50 years;
The area required for nitrogen assimilation is 239 square metres, while phosphorus requires 261 square metres. However, these figures are conservative, as discussed below, and a 200m2 of LAA area will likely provide for a 50-year design life in this soil type.

Bruce Hollioake
Consulting Civil & Structural Engineers
P: 03 5338 8270
F: 03 5338 8207
M: 0417 143 231
www.hollioake.com.au
102 Dawson St Sth,
Ballarat VIC 3350

Summary and Discussion

The preferred irrigation area is based on the larger of the water and nutrient balance calculations. An area of only 200 square metres is available, which corresponds to a maximum effluent generation rate of between 400 l/day for the natural soil. It is worth noting that the modeling includes several significant factors of conservatism:

- Hydraulic load (600 L/day) – this assumes 4 people will permanently occupy a 3-bedroom residence. It is likely that the actual occupancy and flow rates over the life of the house will be significantly less than this, with this number of persons likely to only apply for short periods, and mainly over the warmer months. It is only May through to August when an area greater than 200m2 is required; Alternatively, composting toilets or recycling of treated water for toilet flushing would both offer means of reducing the effluent generation rate.
- From the nutrient balances, in the absence of site specific data conservative estimates of crop nutrient uptake rates and total nitrogen lost to soil processes have been adopted. Regular harvesting of the grass, and removal off-site will further improve the long-term nutrient capacity and uptake.

Siting and Configuration of the Irrigation System

The only available area is to the rear portion of the allotment. Figure 2 shows a potential layout for a sub-surface irrigation system, which involves the construction of a retaining wall up to 1.5m high and filling the site to an RL of 53.0m as shown. There is limited area available and the entire process will need to be closely monitored to ensure that a clay-loam backfill is used for the bulk filling, and that the existing ground surface to be filled is deep ripped prior to reduce the potential of seepage along the fill / ground surface interface. A 300mm compacted depth of sandy clay must then be placed over the existing ground surface. This area must be kept clear of shedding and vehicle access areas.

It is recommended that the owner consult an irrigation expert familiar with effluent irrigation equipment to design the system, and an appropriately registered plumbing/drainage practitioner to install the system. The irrigation plan must ensure even application of effluent throughout the entire irrigation area.

Buffer Distances

Setback buffer distances from effluent land application areas and treatment systems are required to help prevent human contact, maintain public amenity and protect sensitive environments. The relevant buffer distances for this site, taken from Table 5 of the Code (2013) for secondary treated effluent are:

- 20 metres from potable or non-potable groundwater bores;
- 30 metres from watercourses that are non-potable; and
- 100 metres from watercourses in a potable water supply catchment.
- 3 metres if area up-gradient and 1.5 metres if area down-gradient of property boundaries, swimming pools and buildings.

All the above buffers are achievable, except for the 3m up-gradient requirement. In order to compensate for this, we recommend a UV disinfection process be added to the system. The proposed retaining wall will also be lined with plastic, ensuring a greater depth of soil to act as a 'reservoir' to limit seepage.

The site plan in Figure 2 shows a potential location of the proposed wastewater management system components and other relevant features.

Reserve Disposal Field:

A suitable area for a reserve disposal field is not available on this allotment.

Clause 3.10.2 of the Code of Practice provides that a reserve area is not required for a sub-surface pressure-compensating irrigation system where the sizing of the system has been calculated using the latest version of the Model LCA report and the recommended design irrigation rates, unless Council considers the site to be high risk.

We believe that the design does effectively comply with the latest Model LCA Report, however we also note that the site has been given a High sensitivity rating under the Colac Otway Shire Council Domestic Wastewater Management Plan.

The difficulty in providing a suitable reserve disposal area will need to be considered by Council as part of the assessment of this application, but it should be noted that in the event of failure / unacceptable performance, there will be limited capacity to add additional irrigation lines.

Bruce Hollioake
Consulting Civil & Structural Engineers
P: 03 5338 8270
F: 03 5338 8207
M: 0417 143 231
www.hollioake.com.au
102 Dawson St Sth,
Ballarat VIC 3350

Installation of the Irrigation System

Installation of the irrigation system must be carried out by a suitably qualified, licensed plumber or drainer experienced with effluent irrigation systems.

To ensure even distribution of effluent, it is essential that the pump capacity is adequate for the size and configuration of the irrigation system, taking into account head and friction losses due to changes in elevation, pipes, valves, fittings etc.

The Netafim system, with 3l/hr emitters spaced at 300mm cts, and provided with 25mm diameter manifolds at each end of the laterals, is a suitable system, as is the Wasteflow system, although this system should be zoned into two areas, and tends to place more load on the pressure pumps than other systems.

The irrigation area and surrounding area must be vegetated or revegetated immediately following installation of the system, preferably with turf. The area should be fenced or otherwise isolated (such as by landscaping), to prevent vehicle and stock access; and signs should be erected to inform householders and visitors of the extent of the effluent irrigation area and to limit their access and impact on the area.

All trenching used to install the pipes must be backfilled properly with soil to prevent preferential subsurface flows along trench lines, particularly where trenches are not absolutely parallel to contours.

Stormwater run-on must be diverted around the proposed irrigation area. Upslope diversion berms or drains may need to be constructed, although the house will act as a significant diverter around portion of the LAA. Stormwater from roofs and other impervious surfaces must not be disposed of into the wastewater treatment system or onto the effluent management system. These can be disposed of in the existing underground stormwater system.

5 Monitoring, Operation and Maintenance

Maintenance is to be carried out in accordance with the EPA Certificate of Approval of the selected secondary treatment system and Council's permit conditions. The treatment system will only function adequately if appropriately and regularly maintained.

To ensure the treatment system functions adequately, residents must:

- Have a suitably qualified maintenance contractor service the secondary treatment system at the frequency required by Council under the permit to use;
- Use household cleaning products that are suitable for septic tanks;
- Keep as much fat and oil out of the system as possible; and
- Conserve water (AAA rated fixtures and appliances are recommended).

To ensure the land application system functions adequately, residents must:

- Regularly harvest (mow) vegetation within the LAA and remove this to maximise uptake of water and nutrients;
- Monitor and maintain the subsurface irrigation system following the manufacturer's recommendations, including flushing the irrigation lines;
- Regularly clean in-line filters;
- Not erect any structures and paths over the LAA;
- Avoid vehicle and livestock access to the LAA, to prevent compaction and damage; and
- Ensure that the LAA is kept level by filling any depressions with good quality topsoil (not clay).

Additional Risk Management Measures:

We believe that further risk mitigation areas are warranted on this site, including the minimisation of effluent to no more than 600l/day, along with UV disinfection to ensure that if there is any off-site seepage, which will likely only occur during periods of wet weather, downslope effects will be minimal.

The typical use of this house is likely to be vacation occupation, primarily over the drier summer months, hence the finding of this report are likely to be conservative in practice, but do still allow for permanent occupation.

Bruce Hollioake
Consulting Civil & Structural Engineers
P: 03 5338 8270
F: 03 5338 8207
M: 0417 143 231
www.hollioake.com.au
102 Dawson St Sth,
Ballarat VIC 3350

6 Conclusions

As a result of our investigations we conclude that sustainable onsite wastewater management is feasible with appropriate mitigation measures, as outlined, for a proposed residence at 8 Mitchell Drive, Separation Creek.

Specifically, we recommend the following:

- Preparation of a suitable LAA area by the construction of a retaining wall up to 1.5m high, deep ripping of the existing surface and backfilling with a silty clayey loam similar to the natural soils on this site, possibly sourced from earthworks for the proposed house. Then topping the entire LAA area with a 300mm compacted depth of sandy loam.
- Secondary treatment of wastewater by an EPA-accredited treatment system, combined with UV disinfection;
- Land application of treated effluent to a 200 m² sub-surface irrigation area;
- The actual layout of the trenches to be determined by the irrigation sytem contractor, but will generally involve a pressure compensating pipe system laid along the contour.
- Installation of water saving fixtures and appliances in the new residence to reduce the effluent load;
- Use of low phosphorus and low sodium (liquid) detergents to improve effluent quality and maintain soil properties for growing plants; and
- Operation and management of the treatment and disposal system in accordance with manufacturer's recommendations, the EPA Certificate of Approval, the EPA Code of Practice (2013) and the recommendations made in this report.
- Soakage trenches may be possible on this allotment, but given the risk to landslip, are not the preferred option.

7 References

Environment Protection Authority (2003). *Guidelines for Environmental Management: Use of Reclaimed Water* Publication 464.2.

Environment Protection Authority (1991). *Guidelines for Wastewater Irrigation* Publication 168.

Environment Protection Authority (2013). Publication 891.3 *Code of Practice for Onsite Wastewater Management.*

Geary, P. and Gardner, E. (1996). On-site Disposal of Effluent. In Proceedings from the one day conference *Innovative Approaches to the Management of Waste and Water*, Lismore 1996.

Isbell, R.F. (1996). The Australian Soil Classification. CSIRO Publishing, Melbourne.

Municipal Association of Victoria, Department of Environment and Sustainability and EPA Victoria (2013) *Victorian Land Capability Assessment Framework.*

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

USEPA (2002). *Onsite Wastewater Treatment Systems Manual*. United States Environmental Protection Agency.

Date: 08.02.2018.

Yours Faithfully,

Bruce Hollioake

.....

Bruce D. Hollioake
M.I.E.Aust., C.P. Eng.

Bruce Hollioake
Consulting Civil & Structural Engineers
P: 03 5338 8270
F: 03 5338 8207
M: 0417 143 231
www.hollioake.com.au
102 Dawson St Sth,
Ballarat VIC 3350

APPENDIX 1. Soil Profiles.

Borehole 1.

Depth		Texture	Structure	Colour	Mottles	Moisture	Comments
00		Silty Loam	Moderate	Brown	No	Slightly moist	Firm, grass.
100	A1	Silty Clay	Moderate	Grey - brown	Minor	Slightly moist	Firm.
700	B1	Light (silty) Clay	Moderate	Brown	Minor	Moist	Firm to stiff.
1000	B2	Light (silty) Clay	Moderate	Brown-orange Yellow	Minor	Moist	Firm to stiff.
1800		End borehole.					

Borehole 2.

Depth		Texture	Structure	Colour	Mottles	Moisture	Comments
00		Silty Loam	Moderate	Brown	No	Slightly moist	Firm, grass.
300	A1	Silty Clay	Moderate	Grey - brown	Minor	Slightly moist	Firm.
800	B1	Clay	Moderate	Brown/orange	Minor	Moist	Firm to stiff.
1500		End borehole.					

Bruce Hollioake
Consulting Civil & Structural Engineers
P: 03 5338 8270
F: 03 5338 8207
M: 0417 143 231
www.hollioake.com.au
102 Dawson St Sth,
Ballarat VIC 3350

coffey
A TETRA TECH COMPANY

Drilling Log

Soil Boring BH2

Project *Bushfire emergency response assessment* Owner *Victorian Government*
Location *12 Mitchell Grove, SC* Proj. No. *ENAUABTF11630AA*
Surface Elev. *NA* Total Hole Depth *1.3 m.* North *NA* East *NA*
Top of Casing *NA* Water Level Initial *NA* Static *NA* Diameter *55 mm.*
Screen: Dia *NA* Length *NA* Type/Size *NA*
Casing: Dia *NA* Length *NA* Type *NA*
Fill Material _____ Rig/Core _____
Drill Co. _____ Method *Hand auger.*
Driller _____ Log By *PL, ST* Date *3/3/16* Permit # *NA*
Checked By _____ License No. _____

COMMENTS

Depth (m.)	PID (ppm)	Sample ID & % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0						**FILL: Silty CLAY**; dark brown, no coarse fragments, massive,no groundwater, dry.
						Silty CLAY; dark brown, no coarse fragments, massive,no groundwater, moist.
						Silty CLAY; orange/brown/yellow, no coarse fragments, massive,no groundwater, moist.
						Silty CLAY; orange/brown/yellow, no coarse fragments, massive, no groundwater, moist.
1						**Silty CLAY**; yellow/orange, no coarse fragments, massive, no groundwater, moist.
						End of investigation at 1.25mbgs.
2						
3						

Bruce Hollioake
Consulting Civil & Structural Engineers
P: 03 5338 8270
F: 03 5338 8207
M: 0417 143 231
www.hollioake.com.au
102 Dawson St Sth,
Ballarat VIC 3350

APPENDIX 2. Water and Nutrient Balance – 600 lpd, DIR 3.5mm/day.

Sub-surface Irrigation - Water Balance Calculation
Proposed Residence at 8 Mitchell Grove, Separation Creek.

Job: 14263
Date: 08.02.2018

Assumptions:

DIR	24.5	mm/week	Nominated LAA:	200	m2
Daily Flow	600	l/day			
Surface Run-off 'C'	0.25				
Crop Factor	0.75				
Pan Evaporation	1351	mm	(1295.8 used)		

Wye River

Month	Pan Evap. E	Evap-Tran ET	Rainfall	Ret. Rain Rr	Perc	Total Output	Effluent Applied	Total Input	Storage for month	Land for Zero Storage
	mm	mm	mm	mm	mm	mm/m	mm	mm/m	mm/m	m2
Jan	191.2	143.4	46.8	35.1	108.5	252	93.0	128.1	123.8	86
Feb	158	118.5	50.4	37.8	98.0	217	84.0	121.8	94.7	94
Mar	131.4	98.6	57.7	43.3	108.5	207	93.0	136.3	70.8	114
Apr	84	63.0	80.6	60.5	105.0	168	90.0	150.5	17.6	167
May	53.3	40.0	90.8	68.1	108.5	148	93.0	161.1	-12.6	231
Jun	41.1	30.8	97.4	73.1	105.0	136	90.0	163.1	-27.2	287
July	46.7	35.0	108.4	81.3	108.5	144	93.0	174.3	-30.8	299
Aug	62.6	47.0	116.7	87.5	108.5	155	93.0	180.5	-25.1	274
Sept	88.8	66.6	95.2	71.4	108.5	175	90.0	161.4	13.7	174
Oct	124	93.0	92.6	69.5	108.5	202	93.0	162.5	39.1	141
Nov	143.8	107.9	74.2	55.7	108.5	216	90.0	145.7	70.7	112
Dec	170.9	128.2	60.8	45.6	108.5	237	93.0	138.6	98.1	97
Totals	1295.8		971.6				Min. Area		m2	299

Sub-surface Irrigation - Nutrient Balance Calculation
Proposed Residence at 8 Mitchell Grove, Separation Creek.

Wastewater Loading

Hydraulic Load	600	l/day
Effluent N Concentration	30	mg/l
Daily N Load	18000	mg/day
Annual N Load	6570000	mg
Allow 20% loss through denitrification, volatisation etc.		
Actual annual N load	5.256	kg/yr

Nutrient Crop Uptake

Crop N Uptake	220	kgN/ha/yr	=	60 mg/m2/day
Crop P Uptake	50.0	kgP/ha/yr	=	14 mg/m2/day

Phosphorous Sorption

P sorption result	250.0	mg/kg	=	3375 kg/ha

Effluent P Concentration	10	mg/l
Daily P Load	6000	mg/day
Annual P Load	2.19	kg
Allow uptake by plants	50	P/ha/yr
P Sorption allow:	250	mg/kg
Bulk Density	1.5	g/cm2
Depth Soil	0.9	mg/kg
P Sorption Result - Adopt	3375	kg/ha
P Sorption each year	33.75	kg/ha/yr (0.5 Factor)

Nutrient Balance based on annual crop uptake rates.

Minimum Area Required

Nitrogen	**239 m2**
Phosphorous	**261 m2**

Total annual uptake rate: 33.75 + 50 = 83.75 Pkg/ha/yr

Bruce Hollioake
Consulting Civil & Structural Engineers
P: 03 5338 8270
F: 03 5338 8207
M: 0417 143 231
www.hollioake.com.au
102 Dawson St Sth,
Ballarat VIC 3350

APPENDIX 3. Water and Nutrient Balance – 400 lpd, DIR of 3.5mm/day.

Sub-surface Irrigation - Water Balance Calculation
Proposed Residence at 8 Mitchell Grove, Separation Creek.

Job: 14263
Date: 08.02.2018

Assumptions:

DIR	24.5	mm/week	Nominated LAA:	200	m2
Daily Flow	400	l/day			
Surface Run-off 'C'	0.25				
Crop Factor	0.75				
Pan Evaporation	1351	mm	(1295.8 used)		

Month	Pan Evap. E mm	Evap-Tran ET mm	Wye River Rainfall mm	Ret. Rain Rr mm	Perc mm	Total Output mm/m	Effluent Applied mm	Total Input mm/m	Storage for month mm/m	Land for Zero Storage m2
Jan	191.2	143.4	46.8	35.1	108.5	252	62.0	97.1	154.8	57
Feb	158	118.5	50.4	37.8	98.0	217	56.0	93.8	122.7	63
Mar	131.4	98.6	57.7	43.3	108.5	207	62.0	105.3	101.8	76
Apr	84	63.0	80.6	60.5	105.0	168	60.0	120.5	47.6	112
May	53.3	40.0	90.8	68.1	108.5	148	62.0	130.1	18.4	154
Jun	41.1	30.8	97.4	73.1	105.0	136	60.0	133.1	2.8	191
July	46.7	35.0	108.4	81.3	108.5	144	62.0	143.3	0.2	199
Aug	62.6	47.0	116.7	87.5	108.5	155	62.0	149.5	5.9	183
Sept	88.8	66.6	95.2	71.4	108.5	175	60.0	131.4	43.7	116
Oct	124	93.0	92.6	69.5	108.5	202	62.0	131.5	70.1	94
Nov	143.8	107.9	74.2	55.7	108.5	216	60.0	115.7	100.7	75
Dec	170.9	128.2	60.8	45.6	108.5	237	62.0	107.6	129.1	65
Totals	1295.8		971.6				Min. Area		m2	199

Sub-surface Irrigation - Nutrient Balance Calculation
Proposed Residence at 8 Mitchell Grove, Separation Creek.

Wastewater Loading

Hydraulic Load	400	l/day
Effluent N Concentration	30	mg/l
Daily N Load	12000	mg/day
Annual N Load	4380000	mg
Allow 20% loss through denitrification, volatisation etc.		
Actual annual N load	3.504	kg/yr

Nutrient Crop Uptake

Crop N Uptake	220	kgN/ha/yr	=	60 mg/m2/day
Crop P Uptake	50.0	kgP/ha/yr	=	14 mg/m2/day

Phosphorous Sorption

P sorption result	250.0	mg/kg	=	3375 kg/ha

Effluent P Concentration	10	mg/l
Daily P Load	4000	mg/day
Annual P Load	1.46	kg
Allow uptake by plants	50	P/ha/yr
P Sorption allow:	250	mg/kg
Bulk Density	1.5	g/cm2
Depth Soil	0.9	mg/kg
P Sorption Result - Adopt	3375	kg/ha
P Sorption each year	33.75	kg/ha/yr (0.5 Factor)

Nutrient Balance based on annual crop uptake rates.

Minimum Area Required

Nitrogen	**159 m2**
Phosphorous	**174 m2**

Total annual uptake rate: 33.75 + 50 = 83.75 Pkg/ha/yr

Bruce Hollioake
Consulting Civil & Structural Engineers
P: 03 5338 8270
F: 03 5338 8207
M: 0417 143 231
www.hollioake.com.au
102 Dawson St Sth,
Ballarat VIC 3350

APPENDIX 4. Water and Nutrient Balance – 600 lpd, DIR of 4.5mm/day.

Sub-surface Irrigation - Water Balance Calculation
Proposed Residence at 8 Mitchell Grove, Separation Creek.

Job: 14263
Date: 08.02.2018

Assumptions:

DIR	31.5 mm/week		Nominated LAA:	200 m2
Daily Flow	600 l/day			
Surface Run-off 'C'	0.25			
Crop Factor	0.75			
Pan Evaporation	1351 mm	(1295.8 used)		

Wye River

Month	Pan Evap. E mm	Evap-Tran ET mm	Rainfall mm	Ret. Rain Rr mm	Perc mm	Total Output mm/m	Effluent Applied mm	Total Input mm/m	Storage for month mm/m	Land for Zero Storage m2
Jan	191.2	143.4	46.8	35.1	139.5	283	93.0	128.1	154.8	75
Feb	158	118.5	50.4	37.8	126.0	245	84.0	121.8	122.7	81
Mar	131.4	98.6	57.7	43.3	139.5	238	93.0	136.3	101.8	95
Apr	84	63.0	80.6	60.5	135.0	198	90.0	150.5	47.6	131
May	53.3	40.0	90.8	68.1	139.5	179	93.0	161.1	18.4	167
Jun	41.1	30.8	97.4	73.1	135.0	166	90.0	163.1	2.8	194
July	46.7	35.0	108.4	81.3	139.5	175	93.0	174.3	0.2	200
Aug	62.6	47.0	116.7	87.5	139.5	186	93.0	180.5	5.9	188
Sept	88.8	66.6	95.2	71.4	139.5	206	90.0	161.4	44.7	134
Oct	124	93.0	92.6	69.5	139.5	233	93.0	162.5	70.1	114
Nov	143.8	107.9	74.2	55.7	139.5	247	90.0	145.7	101.7	94
Dec	170.9	128.2	60.8	45.6	139.5	268	93.0	138.6	129.1	84
Totals	1295.8		971.6				Min. Area		m2	200

Sub-surface Irrigation - Nutrient Balance Calculation
Proposed Residence at 8 Mitchell Grove, Separation Creek.

Wastewater Loading

Hydraulic Load	600	l/day
Effluent N Concentration	30	mg/l
Daily N Load	18000	mg/day
Annual N Load	6570000	mg
Allow 20% loss through denitrification, volatisation etc.		
Actual annual N load	5.256	kg/yr

Nutrient Crop Uptake

Crop N Uptake	220	kgN/ha/yr	=	60 mg/m2/day
Crop P Uptake	50.0	kgP/ha/yr	=	14 mg/m2/day

Phosphorous Sorption

P sorption result	250.0	mg/kg	=	3375 kg/ha

Effluent P Concentration	10	mg/l
Daily P Load	6000	mg/day
Annual P Load	2.19	kg
Allow uptake by plants	50	P/ha/yr
P Sorption allow:	250	mg/kg
Bulk Density	1.5	g/cm2
Depth Soil	0.9	mg/kg
P Sorption Result - Adopt	3375	kg/ha
P Sorption each year	33.75	kg/ha/yr (0.5 Factor)

Nutrient Balance based on annual crop uptake rates.

Minimum Area Required

Nitrogen	**239 m2**
Phosphorous	**261 m2**

Total annual uptake rate: 33.75 + 50 = 83.75 Pkg/ha/yr

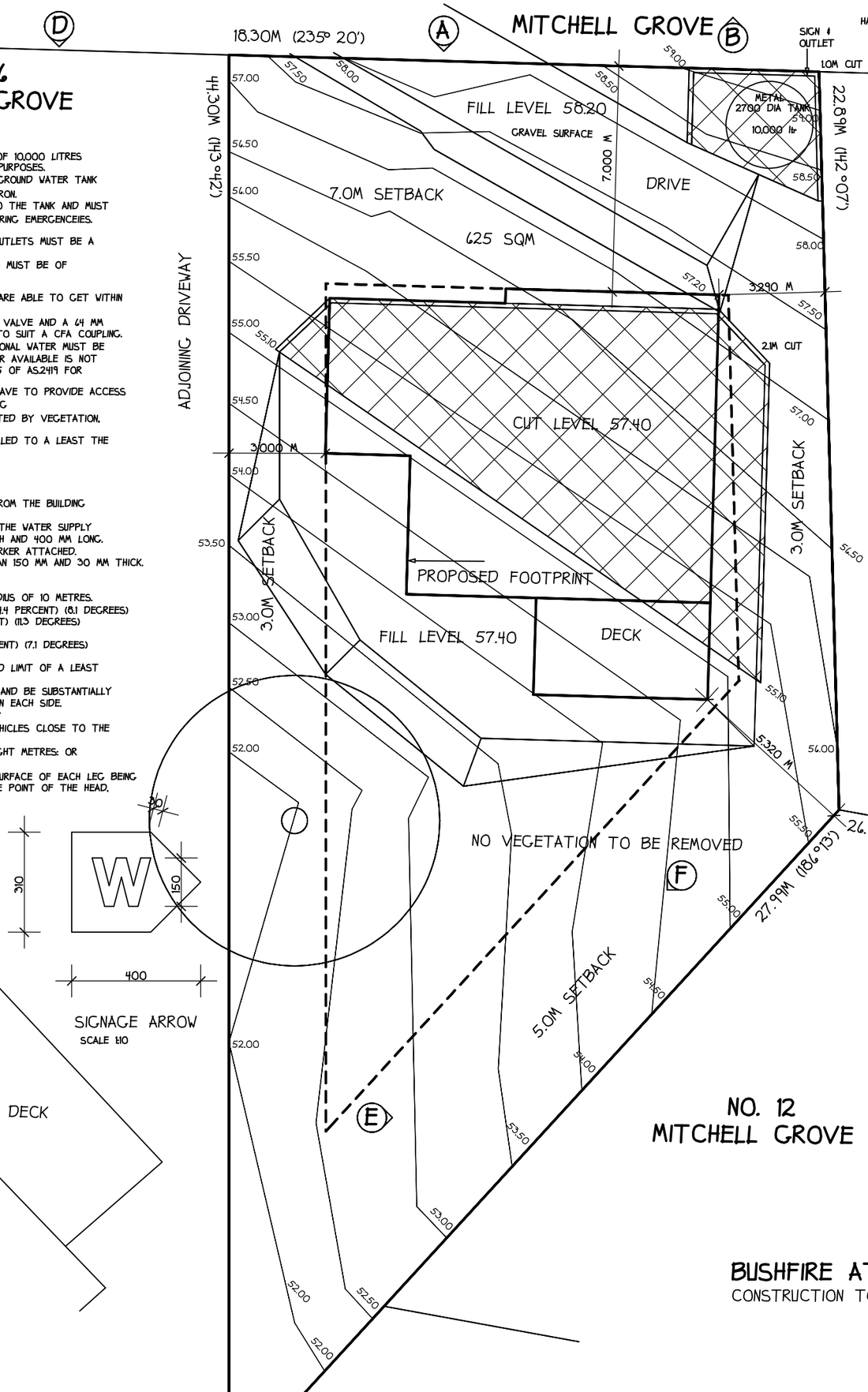
NO. 6 MITCHELL GROVE

STATIC WATER SUPPLY

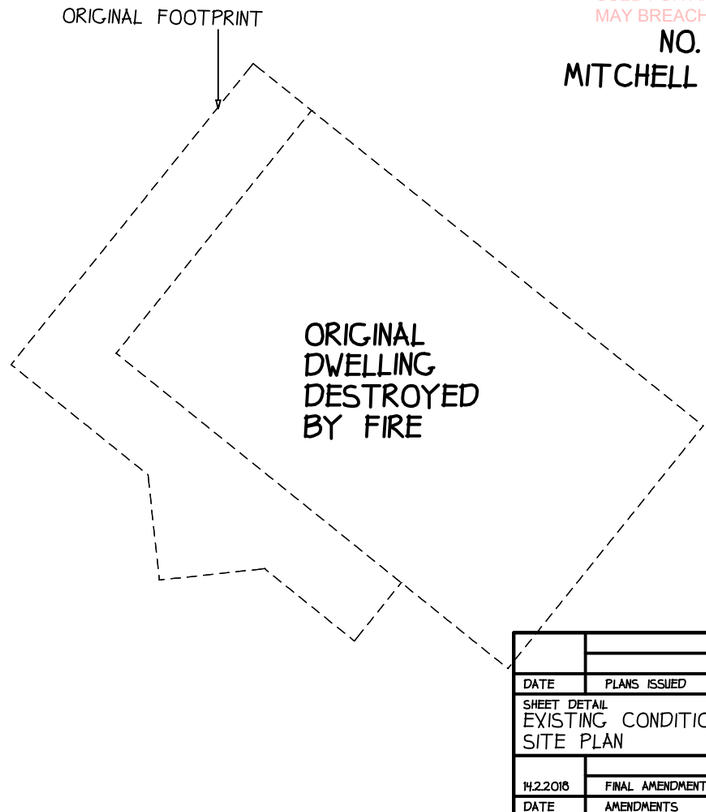
- THE WATER SUPPLY MUST HAVE A MINIUM CAPACITY OF 10,000 LITRES THAT IS MAINTAINED SOLELY FOR THE FIRE FIGHTING PURPOSES.
- THE WATER SUPPLY MUST BE STORED IN AN ABOVE GROUND WATER TANK CONSTRUCTED OF CONCRETE, STEEL OR CORRUGATED IRON.
- THE WATER SUPPLY FITTINGS MUST BE ATTACHED TO THE TANK AND MUST FACE AWAY FROM THE BUILDING TO ENABLE ACCESS DURING EMERGENCEIES. A REMOTE WATER SUPPLY OUTLET MUST NOT BE USED.
ALL PIPEWORK BETWEEN THE WATER SUPPLY AND THE OUTLETS MUST BE A MINIMUM OF 64 MM NOMINAL BORE.
ALL FIXED ABOVE GROUND WATER PIPELINS AND FITTING MUST BE OF CORRODIBLE AND NON-COMBUSTABLE MATERIALS.
  - WATER SUPPLY AND OUTLET MUST:
    - BE LOCATED SO THAT FIRE BRIGADE VEHICLES ARE ABLE TO GET WITHIN 4 METRES OF THE WATER SUPPLY OUTLET.
    - INCORPORATE A +64 MM (MINIMUM) GATE OR BALL VALVE AND A 64 MM (FIXED SIZE), 3 THREADS PER INCH, MALE FITTING TO SUIT A CFA COUPLING.
    - INCORPORATE A VORTEX INHIBITOR OR AN ADDITIONAL WATER MUST BE PROVIDED TO ENSURE THAT THE VOLUME OF WATER AVAILABLE IS NOT RESTRICTED BY A VORTEX. REFER TO SECTION 5 OF AS.2419 FOR REQUIREMENTS FOR VORTEX INHIBITORS.
    - INCORPORATE AN ADDITIONAL BALL OR GATE VALAVE TO PROVIDE ACCESS TO THE WATER BY THE RESIDENT OF THE DWELLING.
- THE WATER SUPPLY OUTLET MUST NOT BE OBSTRUCTED BY VEGETATION, BUILDINGS, FENCE OR OTHER STRUCTURES.
- ALL BELOW GROUND WATER PIPELINES MUST BE INSTALLED TO A LEAST THE FOLLOWING DEPTHS:
    - SUBJECT TO VEHICLE TRAFFIC: 300 MM
    - UNDER DWELLINGS OR CONCRETE SLABS: 75 MM
    - ALL OTHER LOCATIONS: 225 MM
- THE WATER SUPPLY MUST BE READILY IDENTIFABLE FROM THE BUILDING OR APPROPRIATE SINAGE MUST BE PROVIDED WHICH:
    - HAS AN ARROW POINTING TO THE LOCATION OF THE WATER SUPPLY
    - HAS DIMENSIONS OF NOT LESS THAN 310 MM HIGH AND 400 MM LONG.
    - IS RED IN COLOUR, WITH A BLUE REFLECTIVE MARKER ATTACHED.
    - IS LABELLED WITH A "W" THAT IS NOT LESS THAN 150 MM AND 30 MM THICK.

ACCESS

- CURVES IN DRIVEWAY MUST HAVE A MINIMUM INNER RADIUS OF 10 METRES.
- THE MINIMUM GRADE MUST BE NO MORE THAN 1 IN 7(14.4 PERCENT) (8.1 DEGREES) WITH A MAXIMUM OF NO MORE THAN 1 IN 5 (20 PERCENT) (11.3 DEGREES) FOR MORE THAN 50 METRES.
- DIPS MUST HAVE NO MORE THAN A 1 IN 8 (12.5 PERCENT) (7.1 DEGREES) ENTRY AND EXIT ANGLE.
- DESIGNED, CONSTRUCTED AND MAINTAINED FOR A LOAD LIMIT OF A LEAST 15 TONNES AND BE OF ALL WEATER CONSTRUCTION.
- HAVE A MINIMUM TRAFFICABLE WIDTH OF 3.5 METRES AND BE SUBSTANTIALLY CLEAR OF ENCROACHMENT FOR A LEAST 0.5 METRES ON EACH SIDE.
- BE CLEAR OF ENCROACHMENTS 4 METRES VERTICALLY
- INCORPORATE A TURNING AREA FOR FIRE FIGHTING VEHICLES CLOSE TO THE BUILDING MUST BE PROVIDED, BY EITHER
    - A TURNING CIRCLE WITH A MINIMUM RADIUS OF EIGHT METRES: OR
    - A DRIVEWAY ENCIRCLING THE DWELLINHG; OR
    - AT HEAD OR Y HEAD WITH A MINIMUM FORMED SURFACE OF EACH LEG BEING 8 METRES IN LENGTH MEASURED FROM THE CENTRE POINT OF THE HEAD, AND 4 METRES TRAFFICABLE WIDTH.



NO. 10 MITCHELL GROVE



Ⓐ DENOTES PHOTOGRAPH REFERENCE

BUSHFIRE ATTACK LEVEL - BAL 40

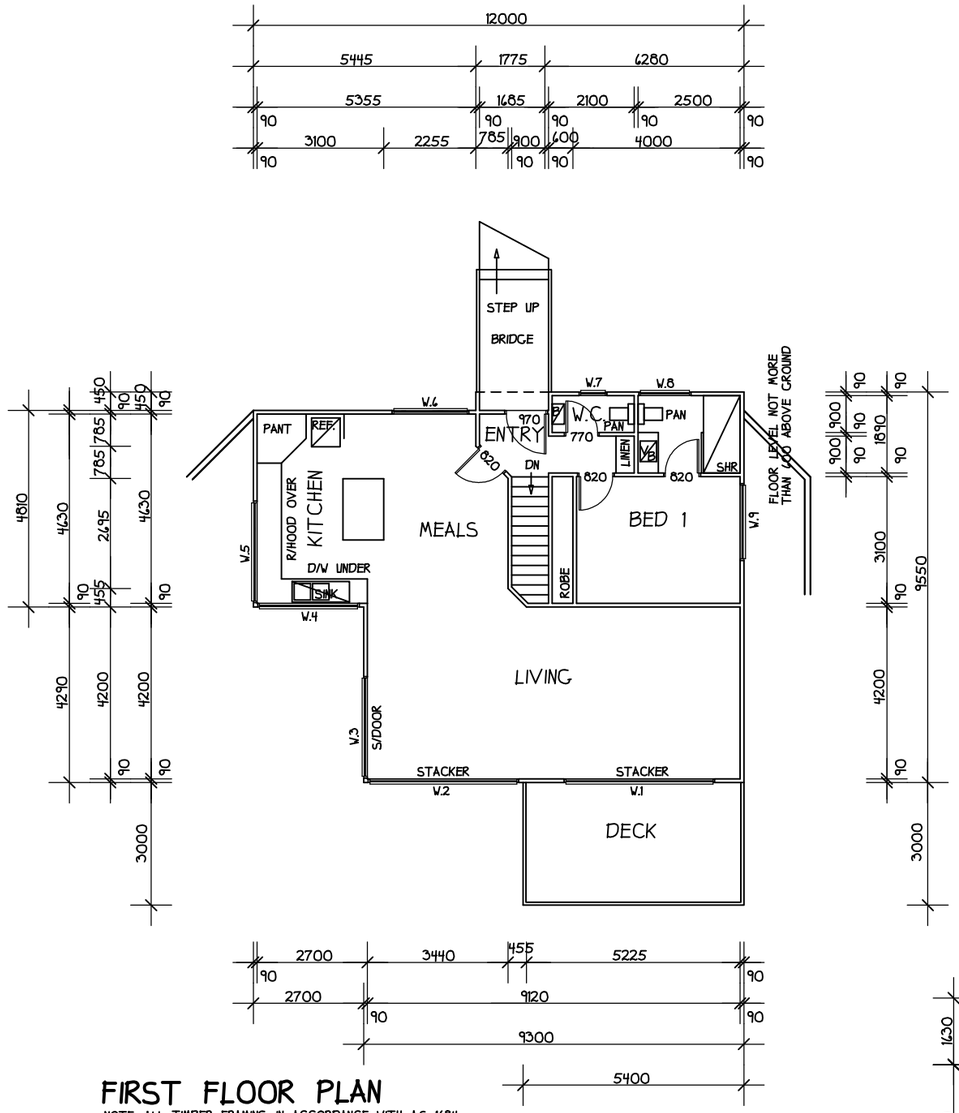
CONSTRUCTION TO COMPLY WITH AS 3959 - 2011 SECTION 3 & 5

DATE	PLANS ISSUED
SHEET DETAIL	EXISTING CONDITIONS SITE PLAN
14.2.2018	FINAL AMENDMENT A - PLANNING
DATE	AMENDMENTS
PROJECT	PROPOSED DWELLING
PROPRIETOR	R.J. & A.L. McKENZIE PH 0408 545554
SITE LOCATION	8 MITCHELL GROVE SEPARATION CREEK
DATE	11 : 6 : 14
SCALES	A2 1:100 / A3 1:150
DRAWN	R. Barnett
SHEET NUMBER	1 OF 5

ROSS BARNETT DESIGN
224A Doveton St. Sth.
Ballarat 3350
Ph/Fax 53322077
Registered Building Practitioner DP-AD1268

NORTH

ROSS BARNETT DESIGN

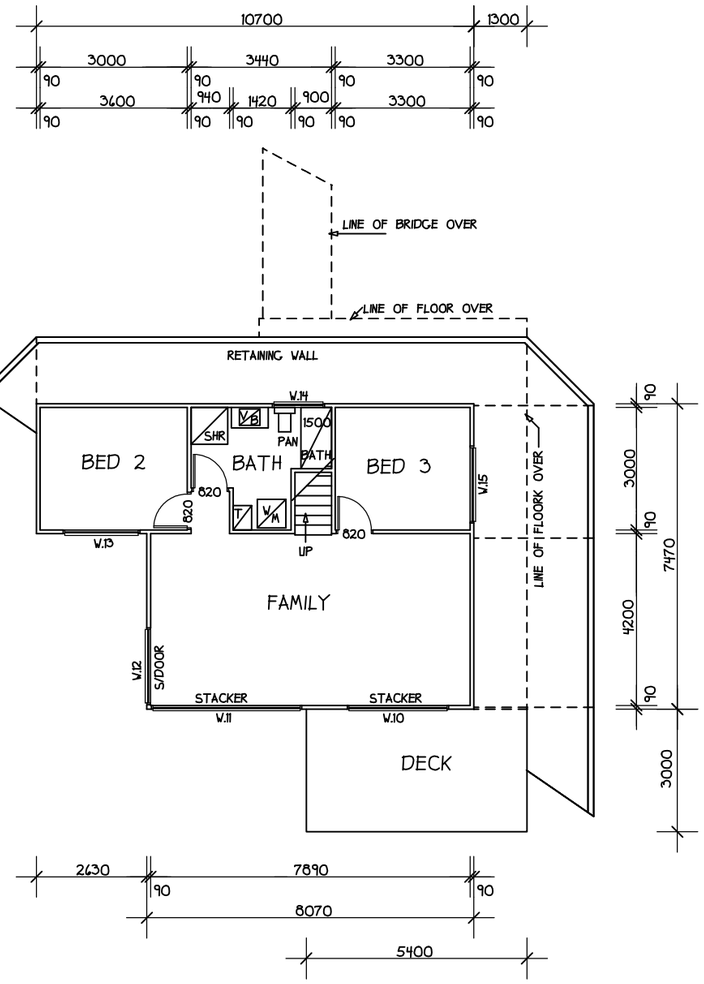


FIRST FLOOR PLAN

NOTE: ALL TIMBER FRAMING IN ACCORDANCE WITH A.S 1684
NOTE SMOKE DETECTORS TO BE INSTALLED IN ACCORDANCE WITH NCC 2014 AND AS 3786
NOTE: (AJ) DENOTES ARTICULATION JOINTS IN ACCORDANCE WITH TNGI ARTICULATED WALLING OCTOBER 1991
NOTE: BATHROOM TO BE ARTIFICIALLY LIT
NOTE: BATHROOM TO BE MECHANICALLY VENTED FANS TO GIVE SIX AIR CHANGES PER HOUR.
NOTE: WATER CLOSET TO BE FITTED WITH EMERGENCY RELEASE HINGES
NOTE: MINIMUM 2000 LITRE WATER TANK FOR CISTERN FLUSHING

BUSHFIRE ATTACK LEVEL - BAL 40

CONSTRUCTION TO COMPLY WITH AS 3959 - 2011 SECTION 3 & 5



GROUND FLOOR PLAN

NOTE: ALL TIMBER FRAMING IN ACCORDANCE WITH A.S 1684
NOTE SMOKE DETECTORS TO BE INSTALLED IN ACCORDANCE WITH NCC 2014 AND AS 3786
NOTE: (AJ) DENOTES ARTICULATION JOINTS IN ACCORDANCE WITH TNGI ARTICULATED WALLING OCTOBER 1991
NOTE: BATHROOM TO BE ARTIFICIALLY LIT
NOTE: BATHROOM TO BE MECHANICALLY VENTED FANS TO GIVE SIX AIR CHANGES PER HOUR.
NOTE: WATER CLOSET TO BE FITTED WITH EMERGENCY RELEASE HINGES
NOTE: MINIMUM 2000 LITRE WATER TANK FOR CISTERN FLUSHING

WINDOW SCHEDULE
ALL GLAZING TO COMPLY WITH A.S. 1288 & A.S 2047

NUMBER	HEIGHT X WIDTH	REMARKS
W.1	2100 X 3600	STACKER DOOR
W.2	2100 X 3600	STACKER DOOR
W.3	2100 X 2400	SLIDING DOOR
W.4	1100 X 2400	SLIDING
W.5	1100 X 2400	SLIDING
W.6	2100 X 1800	SLIDING
W.7	600 X 600	AWNING
W.8	600 X 1200	AWNING
W.9	2100 X 1800	SLIDING
W.10	2100 X 3600	STACKER DOOR
W.11	2100 X 3600	STACKER DOOR
W.12	2100 X 1800	SLIDING DOOR
W.13	2100 X 1800	SLIDING
W.14	600 X 1200	AWNING
W.15	2100 X 1800	SLIDING

SHOWER SCREENS TO BE LAMINATED SAFETY GLASS

AREA

DESCRIPTION	METRES SQUARE	SQUARES
DWELLING		
GROUND FLOOR	68.35	7.36
FIRST FLOOR	100.57	10.83
GROUND FLOOR DECK	16.20	1.74
FIRST FLOOR DECK	16.20	1.74
VERANDAH		

DATE	PLANS ISSUED

SHEET DETAIL
LOCATION PLAN

DATE	AMENDMENT
14.2.2018	FINAL AMENDMENT A - PLANNING

PROJECT
PROPOSED DWELLING

PROPRIETOR
R.J. & A.L. McKENZIE
PH 0408 545554

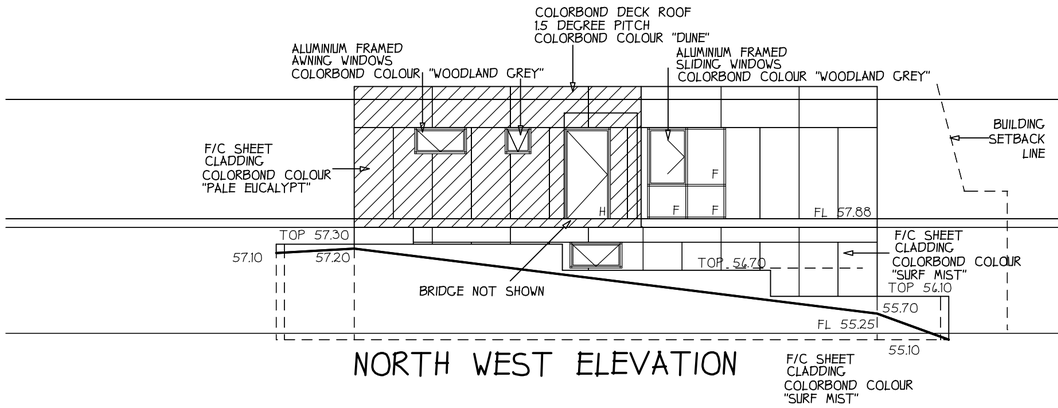
SITE LOCATION
8 MITCHELL GROVE
SEPARATION CREEK

DATE	SCALES
11 : 6 : 14	A2 1:100 / A3 1:150
DRAWN	SHEET NUMBER
R. Barnett	2 OF 5

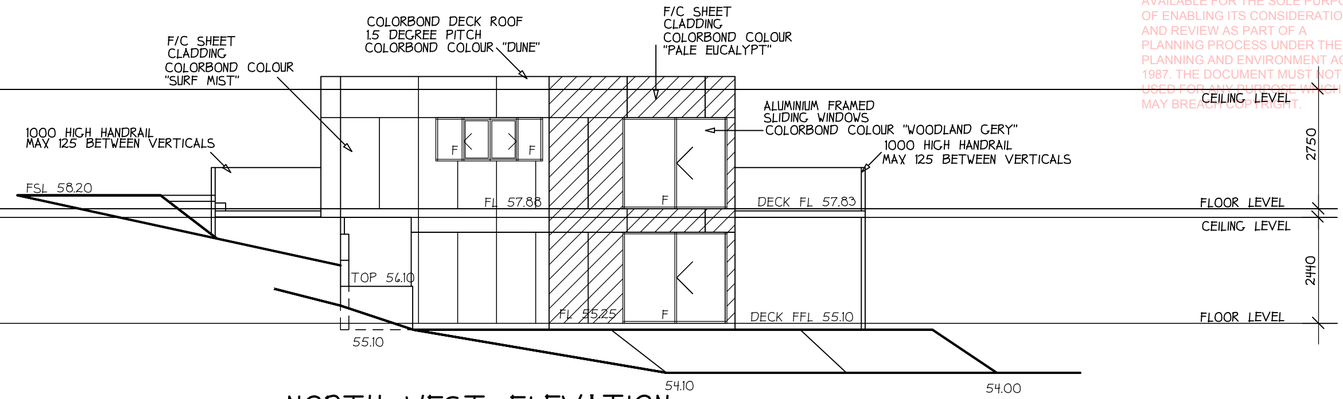
ROSS BARNETT DESIGN
224A Doveton St. Sth.
Ballarat 3350
Ph/Fax 53322077
Registered Building Practitioner DP-AD1268

NORTH

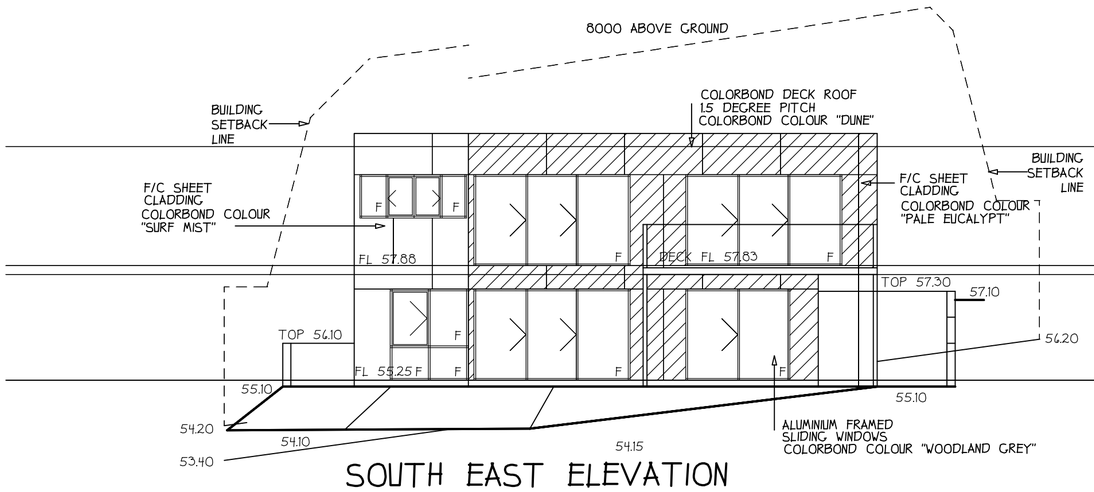
ROSS BARNETT DESIGN



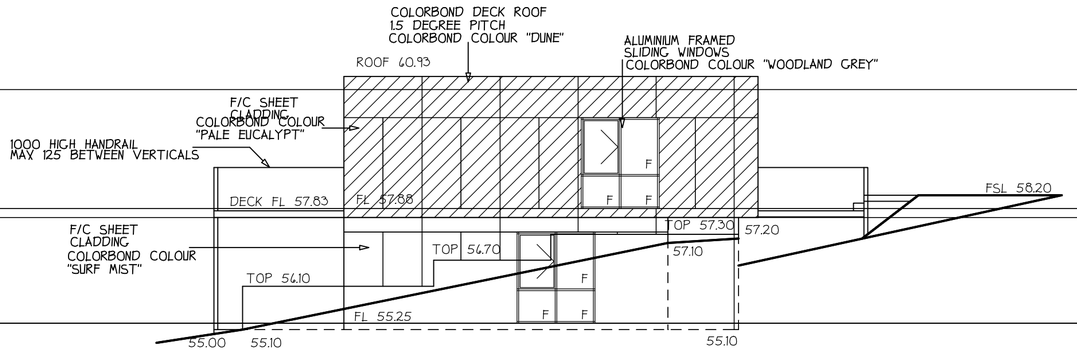
NORTH WEST ELEVATION



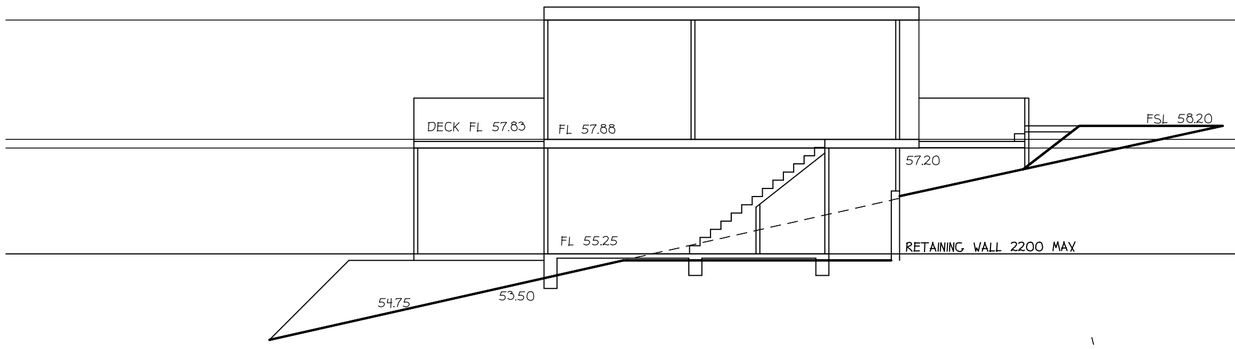
NORTH WEST ELEVATION

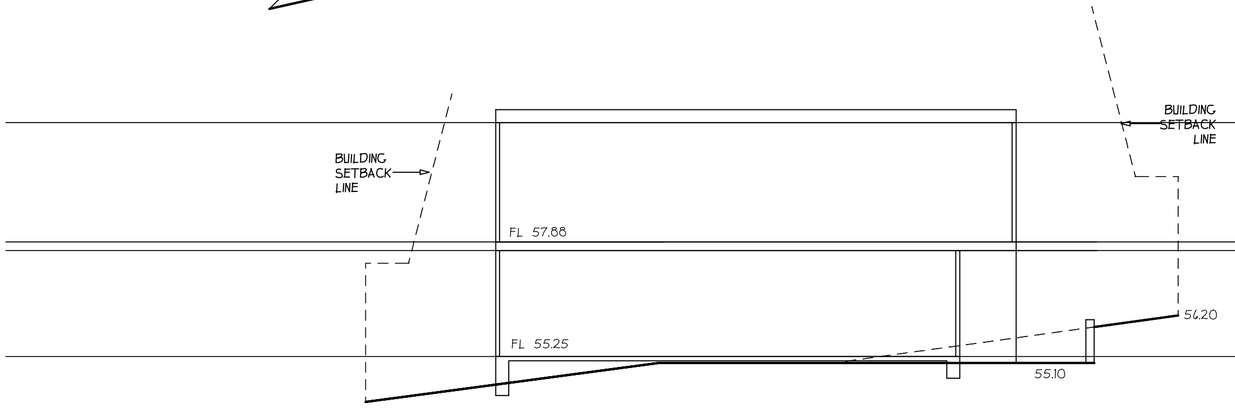


SOUTH EAST ELEVATION



SOUTH EAST ELEVATION





DATE	PLANS ISSUED

SHEET DETAIL

ELEVATIONS & SECTION

DATE	AMENDMENTS

PROJECT

PROPOSED DWELLING

PROPRIETOR

R.J. & A.L. McKENZIE
PH 0408 545554

SITE LOCATION

8 MITCHELL GROVE
SEPARATION CREEK

DATE	SCALES
11 : 6 : 14	1:100
DRAWN	SHEET NUMBER
R. Barnett	3 OF 5

ROSS BARNETT DESIGN
224A Doveton St. Sth.
Ballarat 3350
Ph/Fax 53322077
Registered Building Practitioner DP-AD1268

ROSS BARNETT
DESIGN

MITCHELL GROVE

18.30M (235° 20')

NO. 6
MITCHELL GROVE

NO. 10
MITCHELL GROVE

44.30M (143° 42')

22.89M (142° 07')

LINE OF OVERSHADOWING AT 9.00 AM

LINE OF OVERSHADOWING AT 9.00 AM

DECK LINE OF OVERSHADOWING AT 9.00 AM

ADJOINING DRIVEWAY

FILL LEVEL 58.20

GRAVEL SURFACE

DRIVE

METAL 2700 DIA TANK 10,000 ltr

STEP UP

BRIDGE

ENTRY

W.C.

PAN

LINEN

SHR

PANT

REF.

KITCHEN

R/HOOD OVER

D/W UNDER

SINK

MEALS

BED 1

ROBE

FL 57.88

LIVING

DECK

S/DOOR

V.1 V.2 V.3 V.4 V.5 V.6 V.7 V.8

57.00 56.50 56.00 55.50 55.00 54.50 54.00 53.50 53.00 52.50 52.00

58.00 57.50 57.00 56.50 56.00 55.50 55.00 54.50

26.98M (64° 20')

27.99M (186° 05')

LINE OF OVERSHADOWING AT 3.00 PM

ADJOINING DWELLING

FL 51.29

DECK

NO. 12
MITCHELL GROVE

ADJOINING DWELLING

FL 62.90

DECK

UNDER CONSTRUCTION

DECK BELOW

DECK 60.84

LIVING

FL 63.58

STACKER

LDRY

PANTRY

ENTRY

W.C.

PAN

SHR

ENS

BENCH

KITCHEN

D/W UNDER

SINK

R/HOOD OVER

REF.

ROBE

BED 1

DECK 63.53

DECK

820

DN

OVERSHADOWING DIAGRAM

NOTE OVERSHADOWING AT 9.00 AM & 3.00 PM ON SEPTEMBER 22

BUSHFIRE ATTACK LEVEL - BAL 40

CONSTRUCTION TO COMPLY WITH AS 3959 - 2011 SECTION 3 & 5

DATE	PLANS ISSUED
SHEET DETAIL	ELEVATIONS & SECTION
14.2.2018	FINAL AMENDMENT A - PLANNING
DATE	AMENDMENTS
PROJECT	PROPOSED DWELLING
PROPRIETOR	R.J. & A.L. McKENZIE PH 0408 545554
SITE LOCATION	8 MITCHELL GROVE SEPARATION CREEK
11 : 6 : 14	SCALES A2 1:100 / A3 1:150
DRAWN R. Barnett	SHEET NUMBER 4 OF 5

ROSS BARNETT DESIGN
224A Doveton St. Sth.
Ballarat 3350
Ph/Fax 53322077
Registered Building Practitioner DP-AD1268

NORTH

ROSS BARNETT DESIGN

MITCHELL GROVE

18.30M (235° 20')

NO. 6
MITCHELL GROVE

22.89M (142°07')

NO. 10
MITCHELL GROVE

ADJOINING DRIVEWAY

FILL LEVEL 58.20

GRAVEL SURFACE

DRIVE

METAL 2700 DIA TANK 10,000 ltr

STEP UP

BRIDGE

ENTRY

W.C.

PAN

LINEN

SHR

PANT

REF

KITCHEN

R/HOOD OVER

D/W UNDER

SINK

MEALS

BED 1

ROBE

FL 57.88

LIVING

S/DOOR

DECK

GROUND FLOOR LEVEL NOT MORE THAN 1.200 ABOVE GROUND

2.1M CUT

OVERLOOKING FROM KITCHEN

OVERLOOKING FROM LIVING

OVERLOOKING FROM DECK

OVERLOOKING FROM BED 1

27.99M (186°13')

26.98M (64°20')

57.00 57.50 58.00 58.50 54.50 54.00 55.50 55.00 56.50 54.50 57.00 54.00 53.00 52.50 52.00 55.50 55.00 54.00 53.00 52.50 52.00

LIVING

FL 63.56

DECK BELOW

DECK 60.84

DECK 63.53

DECK

KITCHEN

BENCH

D/W UNDER

SINK

R/HOOD

OVER

LAUNDRY

PANTRY

ENTRY

W.C.

ROBE

ENS

BED 1

STACKER

DN

ADJOINING DWELLING

FL 51.29

DECK

NO. 12
MITCHELL GROVE

HABITABLE WINDOW

DECK

ADJOINING DWELLING

FL 62.90

UNDER CONSTRUCTION

BUSHFIRE ATTACK LEVEL - BAL 40

CONSTRUCTION TO COMPLY WITH AS 3959 - 2011 SECTION 3 & 5

DATE	PLANS ISSUED

SHEET DETAIL

ELEVATIONS & SECTION

14.2.2018	FINAL AMENDMENT A - PLANNING
DATE	AMENDMENTS

PROJECT

PROPOSED DWELLING

PROPRIETOR

R.J. & A.L. McKENZIE
PH 0408 545554

SITE LOCATION

8 MITCHELL GROVE
SEPARATION CREEK

DATE	SCALES
11 : 6 : 14	A2 1:100 / A3 1:150
DRAWN	SHEET NUMBER
R. Barnett	5 OF 5

ROSS BARNETT DESIGN
224A Doveton St. Sth.
Ballarat 3350
Ph/Fax 53322077
Registered Building Practitioner DP-AD1268

NORTH

ROSS BARNETT DESIGN