

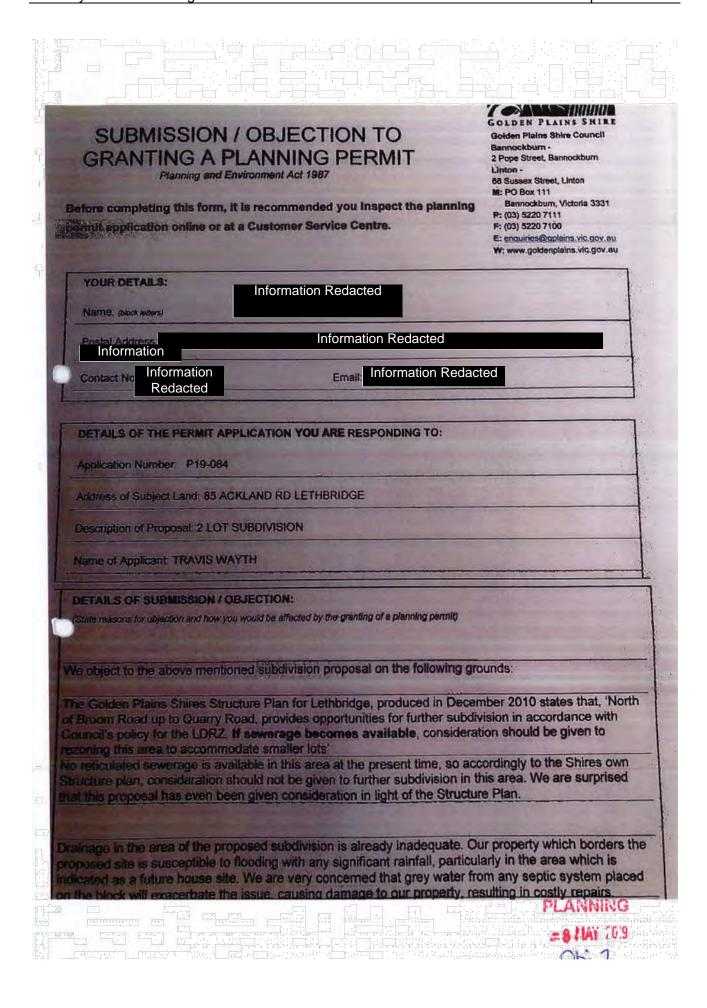
ATTACHMENTS

Under Separate Cover Ordinary Council Meeting

6.00pm Tuesday 24 September 2019

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A Charles	
	Attach additional pages if required
A distribution that could be	made to the proposal to address your concerns? Yes No 🗵
If yes, what changes would you suggest	that would meet your concerns.
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Information Rec	dacted
Signed:	Date: 1 5 19
	SUBMISSIONS / UBJECTIONS TO PERMIT APPLICATIONS
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PLANNING APPLICATION P19-084 FOR A TWO LOT SUBDIVISION AT 85 ACKLAND ROAD, LETHBRIDGE

File Number: P19-084

Author: Tim Waller

Authoriser: Eric Braslis, CEO

Applicant: John Halabarec, JH Surveying

Owner: Judith Wayth

Proposal: Two lot subdivision

Location: 85 Ackland Street, Lethbridge 3332

Attachments: Nil

RECOMMENDATION

That Council resolves to issue a Notice of Decision to Grant a Planning Permit for the development of a two lot subdivision at 85 Ackland Road, Lethbridge subject to the conditions attached to this report.

EXECUTIVE SUMMARY

This report relates to a planning permit application for the development of land for the purposes of a two lot subdivision at 85 Ackland Road, Lethbridge. The application has been referred to the Council Meeting for determination because there is an objection to the application.

PURPOSE

The application has been referred to the Council Meeting for determination because there is an objection to the application.

CONFLICT OF INTEREST

In accordance with Section 80B of the Local Government Act 1989, the Officer preparing this report declares no conflict of interest in regards to this matter.

COUNCIL PLAN

Managing natural and built environments.

BACKGROUND INFORMATION

Site description

The subject land is a regular rectangular shaped allotment containing a total area of 2.05 hectares. The site is currently developed with a single dwelling surrounded by existing mature trees. The property is located on a corner and fronts Ackland Road to the west and to the south. The site and the immediately adjoining properties are located in the Low Density Residential Zone. Land to the south, on the opposite side of Ackland Road, is located in the Township Zone. The land has access from Ackland Road which is a sealed road managed by Council. The land is not affected by any restrictive covenants. Refer to aerial image of subject site.

ltsm Page 1

Item 7.5 - Attachment 3

PLANNING APPLICATION P19-084 FOR A TWO LOT SUBDIVISION AT 85 ACKLAND ROAD, LETHBRIDGE

Subject site



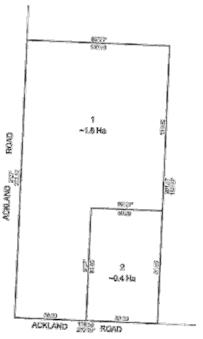
The proposal

The application proposes a two lot subdivision (refer to attachment 3). The proposed subdivision will create a vacant lot of 4000 square metres (0.4ha) in the southern corner of the subject land (proposed lot 2). Proposed lot two would have a 50 metre frontage to Ackland Road and would accommodate an existing dam. Lot 1 would contain the existing dwelling and have a total area of 1.6 hectares. No vegetation removal is required to facilitate the proposed subdivision. The subdivision proposal was supported by a detailed land capability assessment report. Refer to proposed plan of subdivision on following page.

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Agenda

PLANNING APPLICATION P19-084 FOR A TWO LOT SUBDIVISION AT 85 ACKLAND ROAD, LETHBRIDGE



CONSULTATION

Notice of the application was given in accordance with Section 52 (1) (a) of the *Planning and Environment Act* 1987. The application was advertised with a sign on-site and notices to the directly adjoining land owners. As a result of the public notice, one [1] objection was received (refer to Attachment 2). The objection raised concerns regarding existing planning scheme directions relevant to subdivision, and concerns regarding inadequate drainage that would potentially impact any future waste water treatment system on the proposed lot.

ASSESSMENT

This application was lodged with Council on the 26 March 2019 and a preliminary assessment was undertaken. There are no referral authorities specified in the Golden Plains Planning Scheme for an application of this type. An application for a two lot subdivision is exempt from referral to utility authorities. The application was internally referred to Council's Works and Environmental Health departments. The two internal referral responses indicated no objection to the issue of a permit subject to conditions being placed on the permit.

Golden Plains Planning Scheme

Planning Policy Framework (PPF)

Clause 11.02 Managing Growth

The objective of the policy for the supply of urban land (Clause 11.02-1S) is to ensure a sufficient supply of land is available for residential and other uses. Planning for urban growth should consider:

 Opportunities for the consolidation, redevelopment and intensification of existing urban areas.

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PLANNING APPLICATION P19-084 FOR A TWO LOT SUBDIVISION AT 85 ACKLAND ROAD, LETHBRIDGE

- Neighbourhood character and landscape considerations.
- The limits of land capability and natural hazards and environmental quality.
- Service limitations and the costs of providing infrastructure.

Clause 15.01 Urban Environment

The objective of the policy for subdivision design (Clause 15.01-35) is to ensure the design of subdivisions achieves attractive, safe, accessible, diverse and sustainable neighbourhoods. In the development of new residential areas and in the redevelopment of existing areas, subdivision should be designed to create liveable and sustainable communities by, among other things, providing a range of lot sizes to suit a variety of dwelling and household types to meet the needs and aspirations of different groups of people.

Clause 16.01 Residential Development

The objective of the policy for the location of residential development (Clause 16.01-25) is to locate new housing in designated locations that offer good access to jobs, services and transport. The policy seeks to increase the proportion of new housing in designated locations within established urban areas, ensure an adequate supply of redevelopment opportunities within the established urban area to reduce the pressure for fringe development and to identify opportunities for increased residential densities to help consolidate urban areas.

Local Planning Policy Framework (LPPF)

Clause 21.02 Settlement

The local policy for settlement patterns (Clause 21.02-1) includes objectives to make efficient use of land and encourage the consolidation of existing township areas. The policy seeks to direct residential development to township areas that have reticulated water, sewerage and stormwater drainage and community services and facilities. Infill development in towns lacking sewerage treatment will be required to provide onsite effluent treatment.

The policy for rural areas (Clause 21.02-3) applies to the subdivision of land in low density residential areas. The policy seeks to control the density and overall lot sizes of land according to environmental conditions and established character and to avoid indiscriminate subdivision of land. To satisfy this policy new subdivision must recognise and maintain the surrounding lot configurations and lot size, provide appropriate infrastructure, including drainage and roads, and provide for on-site effluent disposal including on-going maintenance of septic systems.

Clause 21.08 Local areas - Small Towns

The local policy for Lethbridge found at Clause 21.08 identifies locations for future rezoning

Clause 22.09 Low Density Residential Subdivision Policy

This policy seeks to ensure the elements of land capability and character are addressed when considering subdivision applications. The objectives of the policy are to ensure that new lots are of sufficient size for on-site effluent disposal and to maintain an open and spacious character through:

- Design that provides for open space and landscaping.
- Retention of existing vegetation.
- Avoiding creation of lots with battle-axe access in greenfield development.

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PLANNING APPLICATION P19-084 FOR A TWO LOT SUBDIVISION AT 85 ACKLAND ROAD, LETHBRIDGE

- The provision of wide driveways with sufficient areas available for landscaping.
- Lot sizes with sufficient area to accommodate setbacks required by the Design and Development Overlay Schedule 5.

It is policy that support for subdivision in the Low Density Residential Zone will be considered only where rigorous testing of soil capacity has been undertaken by suitably qualified practitioners to demonstrate that the lot can contain on site effluent disposal and that subdivision within established low density residential areas respects and positively contributes to the lot configuration and character elements of the surrounding area.

Zone and overlay provisions

Clause 32.03 Low Density Residential Zone (LDRZ)

The site is in a Low Density Residential Zone (LDRZ). The purpose of the LDRZ is to provide for low-density residential development on lots which, in the absence of reticulated sewerage, can treat and retain all wastewater. A permit is required to subdivide land under the provisions of the LDRZ. The LDRZ sets a minimum lot size of 0.4 hectares. The decision guidelines of the LDRZ require Council to consider, as appropriate:

- The protection and enhancement of the natural environment and character of the area including the retention of vegetation and faunal habitat and the need to plant vegetation along waterways, gullies, ridgelines and property boundaries.
- The availability and provision of utility services, including sewerage, water, drainage, electricity, gas and telecommunications.
- In the absence of reticulated sewerage, the capability of the lot to treat and retain all
 wastewater in accordance with the State Environment Protection Policy (Waters of Victoria)
 under the Environment Protection Act 1970.

Clause 43.02 Design & Development Overlay Schedule 5 (DDO5)

The land is affected by the Design & Development Overlay Schedule 5 (DDO5) which relates to setbacks for the construction of buildings. The DDOS does not contain any specific requirements related to subdivision.

General provisions

The decision guidelines contained in Clause 65.01 of the planning scheme require Council to consider the following matters, as appropriate:

- The matters set out in section 60 of the Act.
- · The Municipal Planning Strategy and the Planning Policy Framework.
- The purpose of the zone, overlay or other provision.
- Any matter required to be considered in the zone, overlay or other provision.
- · The orderly planning of the area.
- The effect on the amenity of the area.
- The proximity of the land to any public land.
- Factors likely to cause or contribute to land degradation, salinity or reduce water quality.
- Whether the proposed development is designed to maintain or improve the quality of stormwater within and exiting the site.

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PLANNING APPLICATION P19-084 FOR A TWO LOT SUBDIVISION AT 85 ACKLAND ROAD, LETHBRIDGE

- The extent and character of native vegetation and the likelihood of its destruction.
- Whether native vegetation is to be or can be protected, planted or allowed to regenerate.
- The degree of flood, erosion or fire hazard associated with the location of the land and the
 use, development or management of the land so as to minimise any such hazard.
- The adequacy of loading and unloading facilities and any associated amenity, traffic flow and road safety impacts.

In addition, before deciding on an application to subdivide land, the decision guidelines contained in Clause 65.02 must be considered, as appropriate:

- The suitability of the land for subdivision.
- The existing use and possible future development of the land and nearby land.
- The availability of subdivided land in the locality, and the need for the creation of further lots.
- The effect of development on the use or development of other land which has a common means of drainage.
- The subdivision pattern having regard to the physical characteristics of the land including existing vegetation.
- The density of the proposed development.
- The area and dimensions of each lot in the subdivision.
- The layout of roads having regard to their function and relationship to existing roads.
- The movement of pedestrians and vehicles throughout the subdivision and the ease of access to all lots.
- The provision and location of reserves for public open space and other community facilities.
- · The staging of the subdivision.
- The design and siting of buildings having regard to safety and the risk of spread of fire.
- · The provision of off-street parking.
- The provision and location of common property.
- The functions of any body corporate.
- The availability and provision of utility services, including water, sewerage, drainage, electricity and gas.
- If the land is not sewered and no provision has been made for the land to be sewered, the capacity of the land to treat and retain all sewage and sullage within the boundaries of each lot.
- Whether, in relation to subdivision plans, native vegetation can be protected through subdivision and siting of open space areas.

DISCUSSION

Planning policy

The application is considered to satisfy the relevant provisions of the planning scheme including the local policy for Low Density Residential Development (Clause 22.09). The proposed subdivision design contributes to the character of the area by creating lots of sufficient size to provide setbacks in accordance with the DDO5, retaining existing vegetation and providing space for additional landscaping. A land capability assessment submitted with the application demonstrates that the proposed lots are capable of accommodating on-site effluent disposal.

Objector's concerns

The single objection lodged against the planning permit proposal raises concerns regarding directions within the Golden Plains Panning Scheme. Specifically the objection refers to a direction

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PLANNING APPLICATION P19-084 FOR A TWO LOT SUBDIVISION AT 85 ACKLAND ROAD, LETHBRIDGE

contained within the Lethbridge Structure Plan (adopted 2010) regarding Council's ability to consider future rezoning proposals given the current lack of sewerage infrastructure. This policy direction does not prohibit the subdivision of land within the Low Density Residential Zone and therefore does not provide grounds to refuse this application.

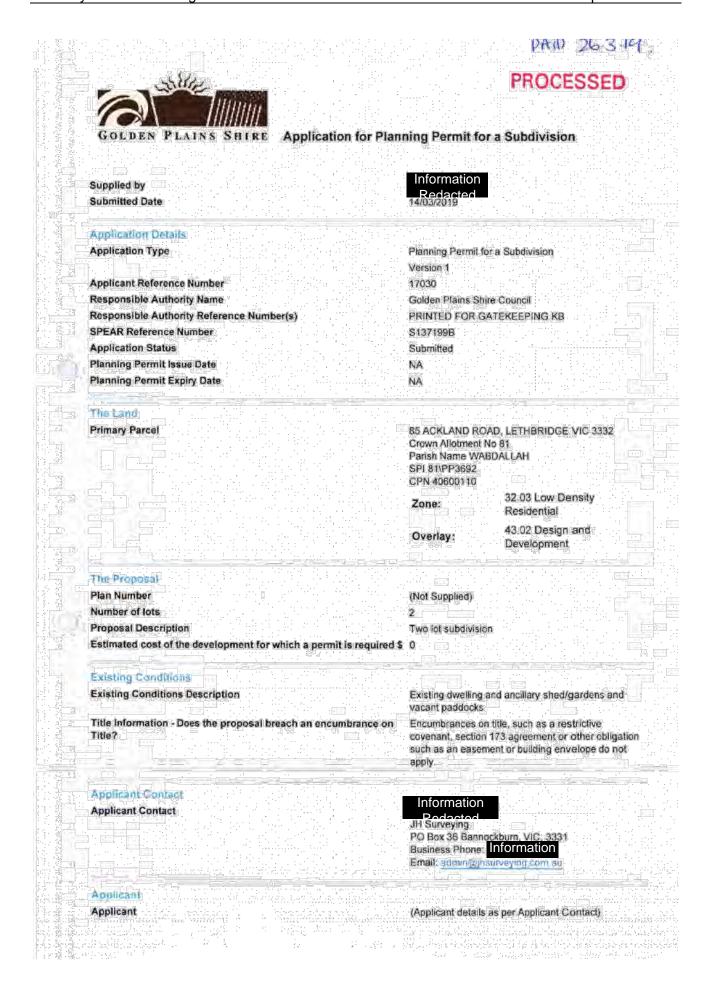
CULTURAL HERITAGE IMPLICATIONS

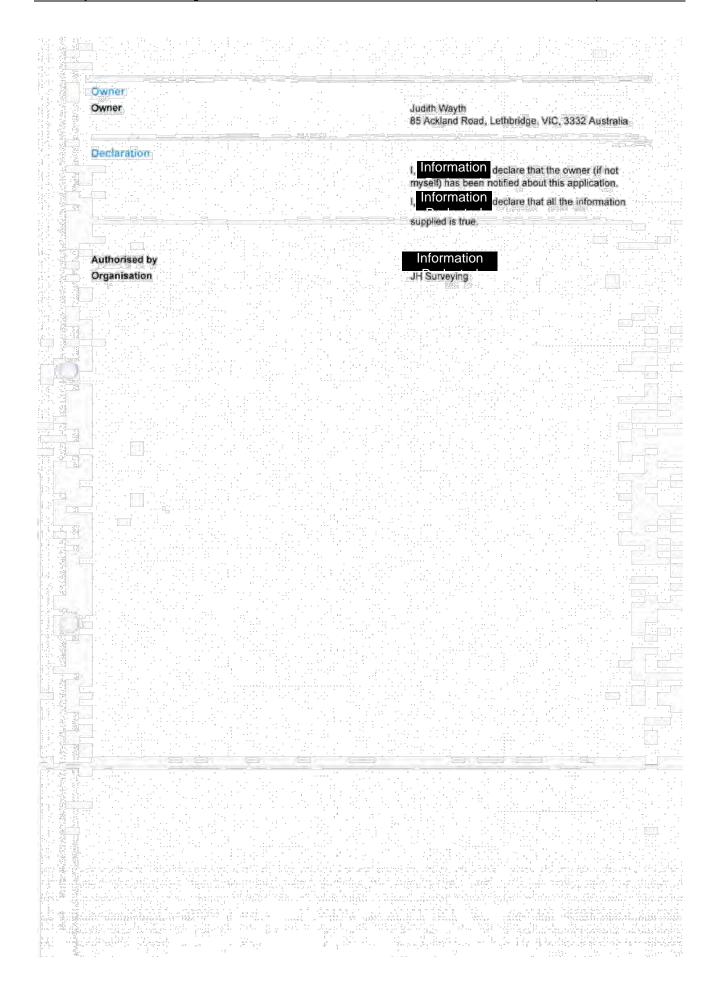
This proposal does not require the preparation of a Cultural Heritage Management Plan under the Aboriginal Heritage Regulations 2007.

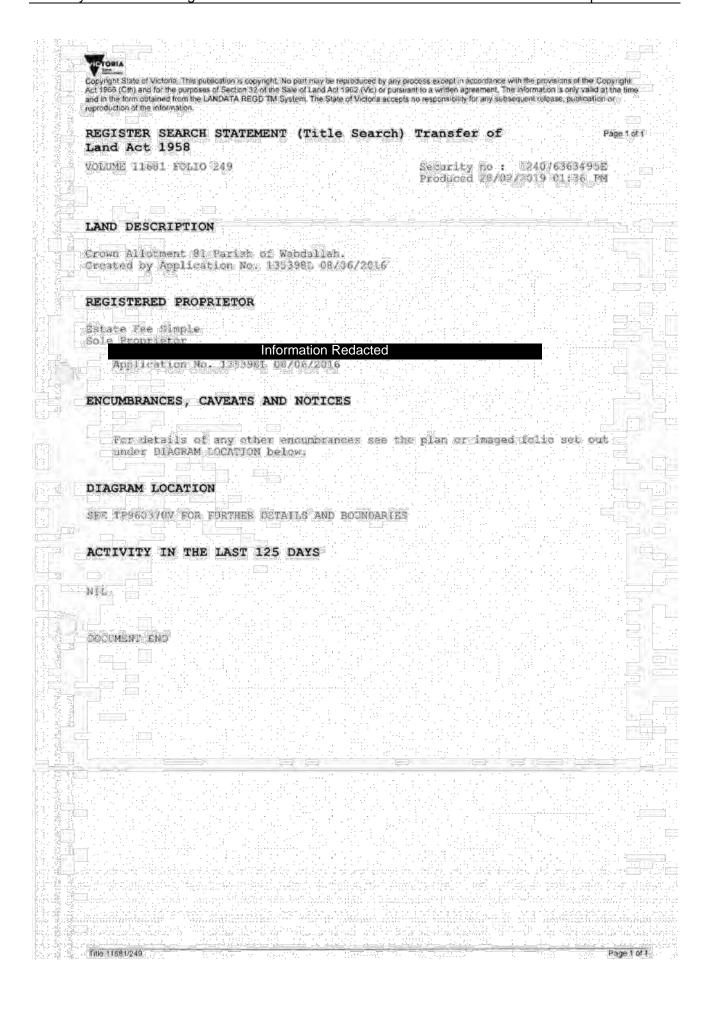
CONCLUSION

The application satisfies the provisions of the Planning Scheme, including State and Local planning policies, particularly the Local Policy for Low Density Residential Development (Clause 22.09), the provisions of the Low Density Residential Zone, and the decision guidelines of the Planning Scheme (Clause 65). The proposed subdivision has been designed to maintain the character of the area and the proposed lots are considered to be capable of on-site effluent disposal.

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Imaged Document Cover Sheet

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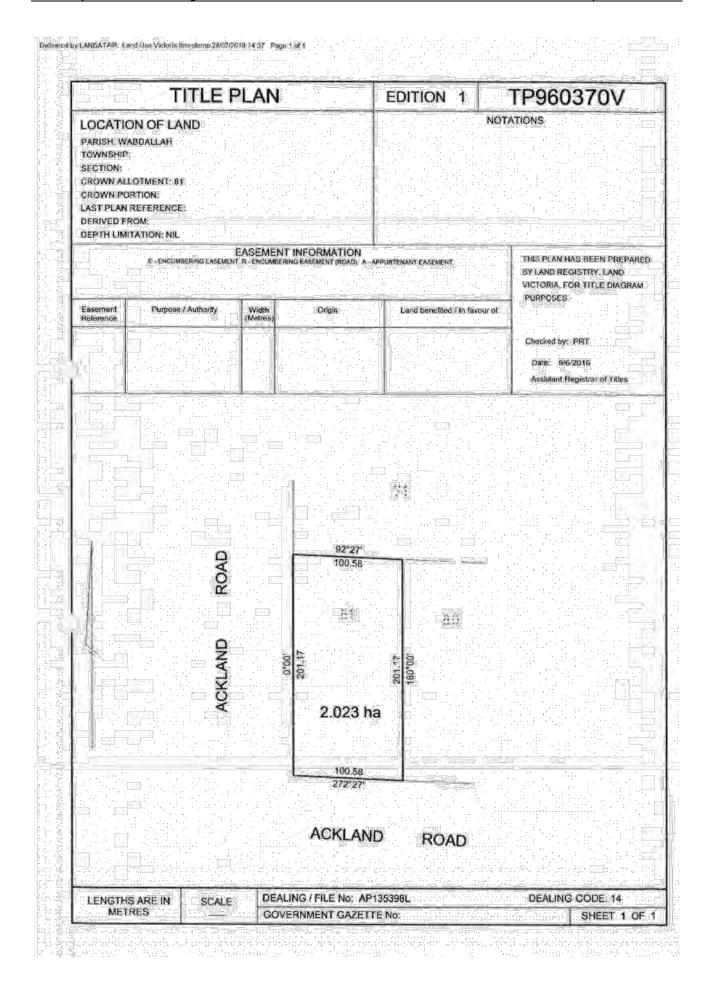
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Number of Pages (excluding this cover sheet)	
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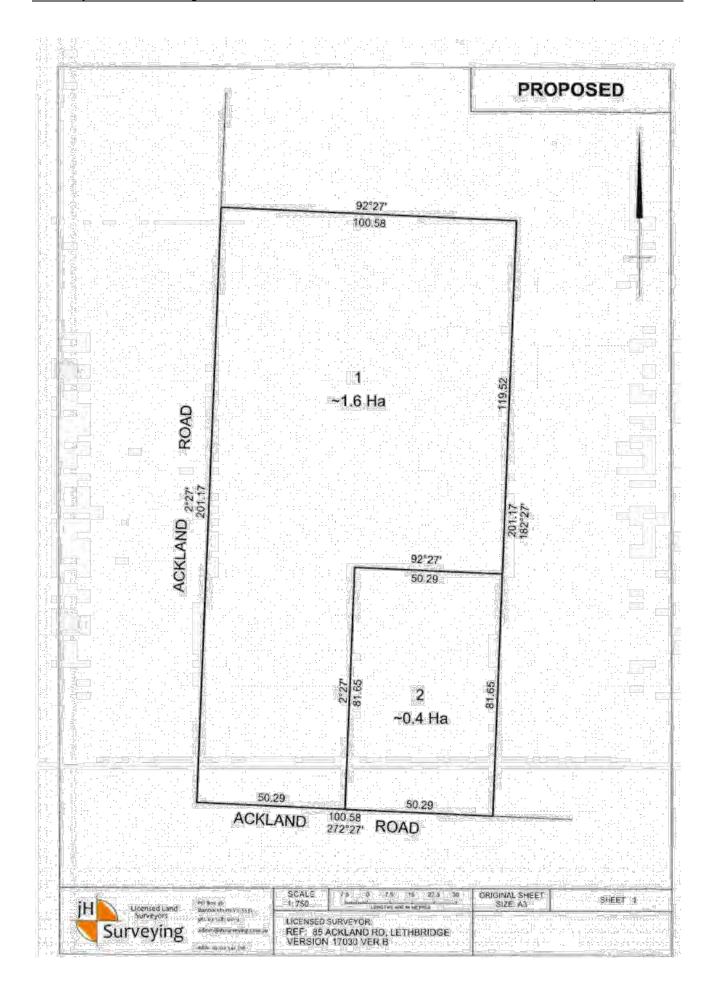
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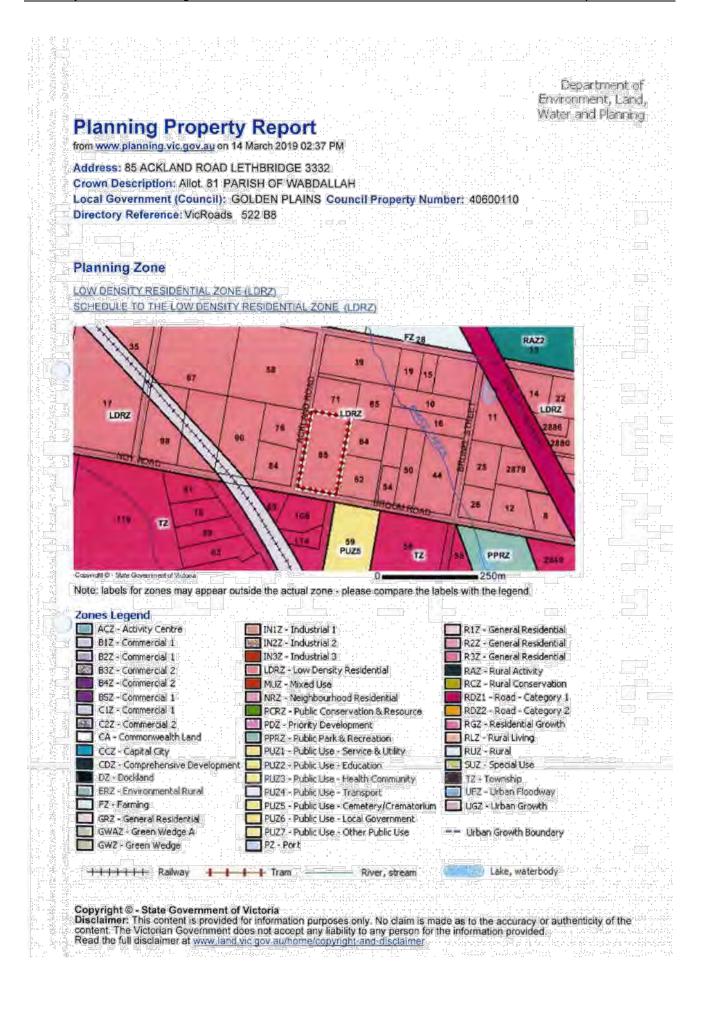
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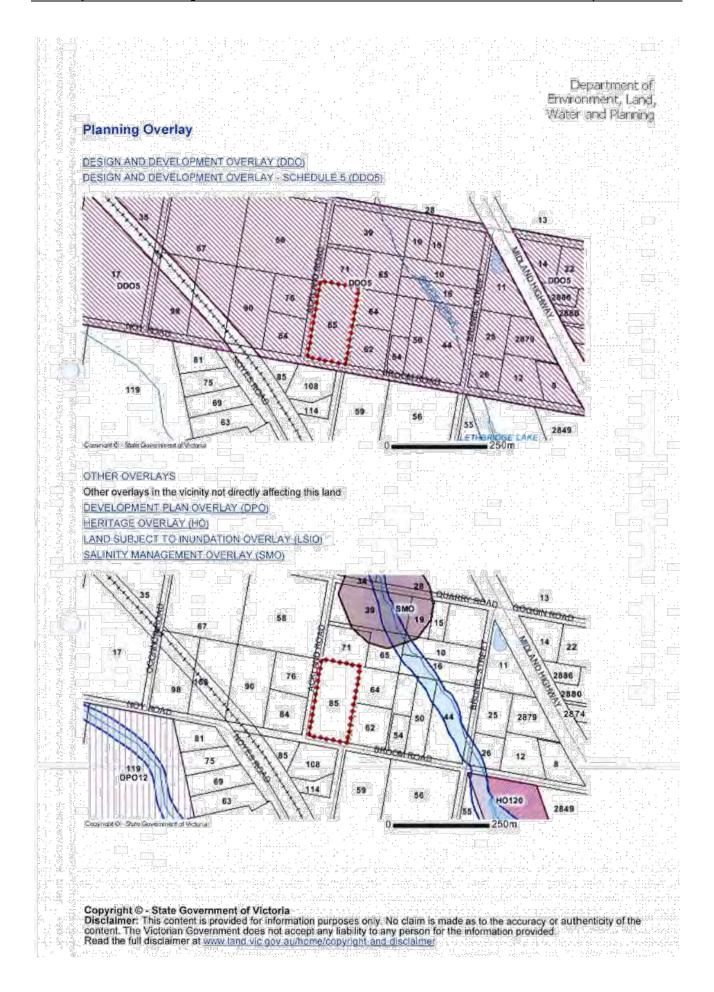
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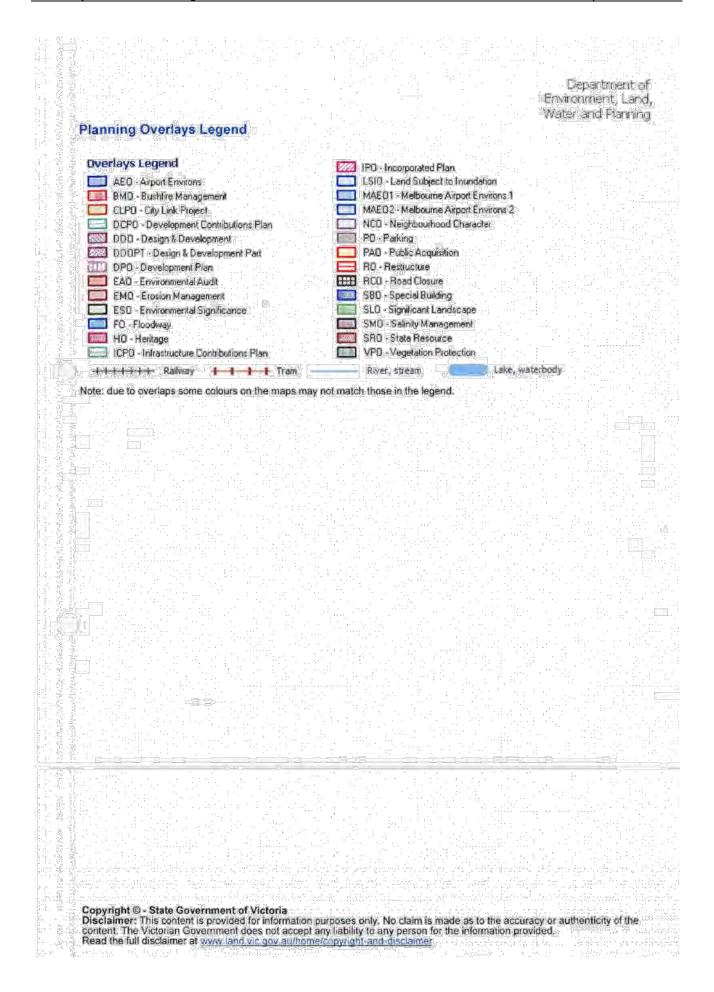
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Department of Environment, Land, Water and Planning

Areas of Aboriginal Cultural Heritage Sensitivity

All or part of this property is an 'area of cultural heritage sensitivity'.

'Areas of cultural heritage sensitivity' are defined under the Aboriginal Heritage Regulations 2018, and include registered Aboriginal cultural heritage places and land form types that are generally regarded as more likely to contain Aboriginal cultural heritage.

Under the Aboriginal Heritage Regulations 2018, 'areas of cultural heritage sensitivity' are one part of a two part trigger which require a 'cultural heritage management plan' be prepared where a listed high impact activity' is proposed.

If a significant land use change is proposed (for example, a subdivision into 3 or more lots), a cultural heritage management plan may be triggered. One or two dwellings, works ancillary to a dwelling, services to a dwelling, alteration of buildings and minor works are examples of works exempt from this requirement.

Under the Aboriginal Heritage Act 2006, where a cultural heritage management plan is required, planning permits, licences and work authorities cannot be issued unless the cultural heritage management plan has been approved for the activity.

For further information about whether a Cultural Heritage Management Plan is required go to http://www.aav.nims.net.au/aavQuestion1.aspx

More information, including links to both the Aboriginal Heritage Act 2006 and the Aboriginal Heritage Regulations 2018, can also be found here - https://www.vic.gov.au/aboriginal/victor/a/heritage/planning-and-heritage-management-processes.html



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Department of Environment, Land, Water and Planning

Further Planning Information

Planning scheme data last updated on 13 March 2019.

A planning scheme sets out policies and requirements for the use, development and protection of land.

This report provides information about the zone and overlay provisions that apply to the selected land.

Information about the State and local policy, particular, general and operational provisions of the local planning scheme that may affect the use of this land can be obtained by contacting the local council or by visiting Planning Schemes Online

This report is NOT a Planning Certificate issued pursuant to Section 199 of the Planning and Environment Act 1987. It does not include information about exhibited planning scheme amendments, or zonings that may abut the land. To obtain a Planning Certificate go to Titles and Property Certificates.

For details of surrounding properties, use this service to get the Reports for properties of interest

To view planning zones, overlay and heritage information in an interactive format visit Planning Maps Online

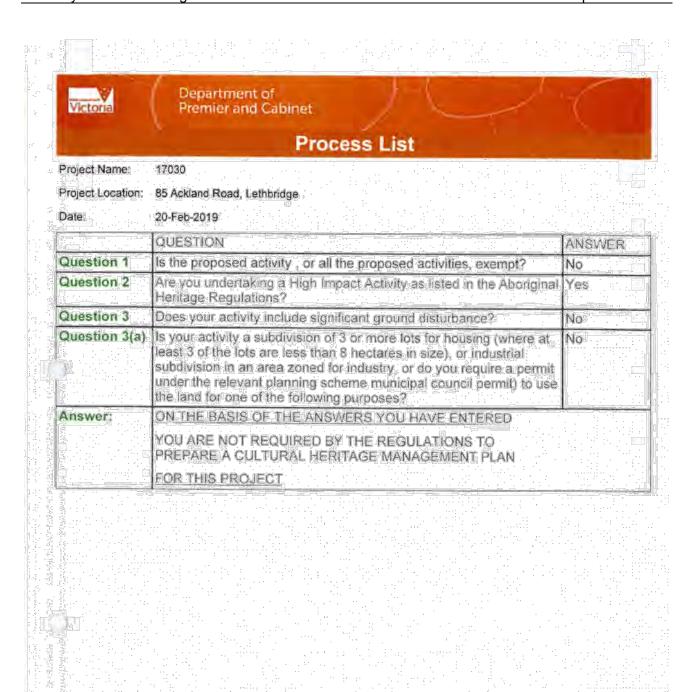
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CONSULTING GEOLOGISTS

A.B.N. 88 090 400 114



GEELON

91 Nicholas Street, NEWTOWN VIC 32; P.O. BOX 1161, GEELONG VIC 32; Phone: (03) 5223 1566 Fax: (03) 5222 456

BALLARA

P. O. BOX 1124, BAKERY HILL VIC 335 Phone: (03) 5338 1770 Fax: (03) 5339 655

E-MAIL: admin@pgvic.com.a

PRINCIPAL: ANDREW P. REDMAN BS

Land Capability Assessment Report

Lot 2, 85 Ackland Road, LETHBRIDGE

	Prepared for:	TRAVIS WAYTH
	Prepared by:	Andrew Redman
. 500	Deference Ne	
: 200	Reference No.	1388
	Date:	30th October 2018

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CONSULTING GEOLOGISTS

A.B.N. 88 090 400 114



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1. INTRODUCTION

THE CONSULTANTS

Provincial Geotechnical Pty Ltd has been engaged to undertake a Land Capability Assessment (LCA) for a proposed 0.4 hectares subdivided allotment at Lot 2, 85 Ackland Road, Lethbridge.

The field investigation and report have been undertaken and prepared by suitably experienced staff.

Andrew Redman BSc Geology, undertook the site investigation and prepared this report.

Provincial Geotechnical Pty Ltd has appropriate professional indemnity insurance for this type of work.

REPORT SUMMARY

I understand that this report may accompany an application for a Septic Tank Permit to Install submitted to Golden Plains Shire Council for an onsite wastewater management system for a private residence that may be developed on the site after subdivision has occured. This document provides information about the site and soil conditions of the lot.

This report provides a detailed LCA for a proposed dwelling and includes a conceptual design for a suitable onsite wastewater management system including recommendations for monitoring and management requirements. A number of options are provided for both the treatment system and land application area (LAA).

However, the wastewater should be treated to <u>secondary level</u> by a suitable EPA-approved treatment system and the effluent applied to land via sub-surface irrigation.

I note that Golden Plains Shire Domestic Wastewater Management Plan recommends a 15% land useage for effluent disposal. It is my opinion that up to a five bedroom dwelling can be developed on this site, acknowledging that the 15% site allowance (in this case $\approx 600 \text{m}^2$) is exceeded only by the potential requirement for a reserve field.

SITE OVERVIEW

The allotment has been cleared of its original vegetation but scattered introduced trees and shrubs are present.

The slope is very slight over the allotment.

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SITE OVERVIEW CONTINUED

There is sufficient land available for sustainable onsite effluent management that maintains satisfactory buffers to protect nearby surface waters and floodways.

2. DESCRIPTION OF THE DEVELOPMENT

Site Address: Lot 2, 85 Ackland Road, Lethbridge. A Land Channel Property Report provides a locality plan and indicates the location of the site of the proposed development (Appendix i).

Client/Agent: Travis Wayth.

Postal Address: C/- JH Surveying, PO Box 36, Bannockburn, Victoria, 3331.

Contact: John Halabarec, JH Surveying, 0477 003 999.

Council Area: Golden Plains Shire Council.

Zoning: Low Density Residential Zone (LDRZ).

Proposed Allotment Size: 0.4 hectares. Design Response Plan appended

(Appendix ii).

Domestic Water Supply: Assume reticulated supply available.

Anticipated Wastewater Load: Assume a residence with full water-reduction fixtures at maximum occupancy. Wastewater generation = 150 L/person/day. (source Table 4 of the EPA Code of Practice 891.4).

Availability of Sewer: The area is unsewered and highly unlikely to be sewered within the next 10-20 years, due to low development density in the area and the considerable distance from existing wastewater services.

3. SITE AND SOIL ASSESSMENT

I undertook a site investigation on the 14th October 2018.

3.1 SITE KEY FEATURES

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

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3.1 SITE KEY FEATURES CONTINUED

NOTE:

- The site is not likely to experience significant stormwater run-on from Ackland Road.
- There is a dam to the south of the site but the LAA can be placed >30m upslope of this feature.
- There is no evidence of a shallow watertable or other significant constraints that cannot be mitigated.
- The risk of effluent transport offsite is low.
- There are no significant environmental receptors within 30m of the proposed Land Application Area.
- I did not notice any evidence during my investigation of salinity as an issue on this site.

Both aerial and site photographs are appended to provide current site context (Appendix iii).

3.2 Table 1: Risk Assessment of Site Characteristics

Feature	Description	Level of Constraint	Mitigation Measures	
Buffer Distances	All relevant buffer distances in Table 5 of the Code (2016) are achievable from the proposed effluent management area.	Moderate	Appropriately place Land Application Area	
Climate	Average annual rainfall 509.2mm Bannockburn (Climate Station No.087009) (Appendix iv).	Nit	NN	
Drainage	No visible signs of surface dampness, no spring activity or hydrophilic vegetation in the proposed effluent management area or surrounds. No mottling was observed in any of the assessed soil profiles.	Nil	NN	
Erosion & Landslip	No evidence of sheet or rill erosion; the erosion hazard is low. No evidence of landslip and landslip potential is low.	Minor	NN	
Exposure & Aspect	Site predominantly cleared.	Nil	NN	

NN: Not needed

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3.2 Table 1: Risk Assessment of Site Characteristics Continued:

Feature Description		Level of Constraint	Mitigation Measures	
Flooding	The proposed effluent management area is located above the 1:100 year flood level (source WSC).	Nil	NN .	
		Nil	NN	
Imported Fill	No imported fill material was observed anywhere on the site.	NI	NN	
Considering all the constraints and buffers, the site has ample suitable land for land application of treated effluent.		Nil	NN	
		Nil	NN	
Rock Outcrops	No evidence of surface rocks or outcrops.	Nil	NN	
Run-on & Negligible stormwater run-on and minor run-off hazard. Slope The proposed effluent management area has negligible fall.		Nil	NN	
		Ni	NN	
Surface Waters	200 ACCOUNTS		Appropriately place LAA	
Vegetation	Thickly grassed. Occasional scattered trees.	Nil	NN	

NN: Not needed

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3.3 SITE ASSESSMENT RESULTS

Considering the most constraining site features the overall land capability of the site to sustainably manage all effluent onsite is still satisfactory. The proposed effluent management area is located above the 1:100 flood level and by using secondary treatment and disposal via irrigation there will be ample protection of surface waters and groundwater.

3.4 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.

3.5 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 3 locations in the vicinity of the building envelope in areas that may be potential Land Application Area's, as shown in the Test Site Location Plan (Design Response Plan) (Appendix v), using an hydraulic auger. This was sufficient to adequately characterise the soils as only minor variation would be expected throughout the area of interest.

Two soil types were encountered in these investigations. Full profile descriptions are provided in the Borelogs (Appendix vi). Samples of all discrete soil layers for each soil type were collected for subsequent laboratory analysis of pH, electrical conductivity and Emerson Aggregate Class where it was deemed necessary. Table 2 describes the soil constraints in detail for each of the soils encountered.

Soils in the vicinity of the nominated effluent envelope (boreholes 1-3) are characterised as clay loam topsoils overlying a light clay. The A1 horizon has a weak structure.

Full Laboratory data results are appended (Appendix vii).

Table 2 below provides an assessment of the physical and chemical characteristics of the soil type present.

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3.6 TABLE 2: RISK ASSESSMENT OF SOIL CHARACTERISTICS

Feature	Assessment	Level of Constraint	Mitigation Measures
Cation Exchange Capacity (CEC)	2.8%	Minor	NN,
Electrical 0.028 dS/m Conductivity (ECe)		Minor	NN
Emerson Aggregate Class	Topsoil: EA Class 1	Major	Secondary treatment
	Subsoil: Test not required.	Nil	NN
рH	6.5	Minor	NN
Rock Fragments	<5% coarse fragments throughout the soil profile.	Minor	NN
Sodicity (ESP)	9.0%	Major	Secondary treatment.
Sodium Absorption Ratio (SAR)	0.16	Nil	NN.
Soil Depth	Topsoil: 400mm	Nil	NN
	Subsoil: Up to 1500mm maximum depth.	Minor	NN
Soil Permeability & Design Loading Rates	Topsoil: Clay Loam: 0.06-0.12 /day saturated conductivity (Ksat) to 3.5 mm/day Design Irrigation Rate (DIR) for irrigation system (Code, 2016).	Minor	NN 9
	Subsoil: Light Clay 3.0mm/day.	Nil	NN.
Soil Texture & Structure	Topsoil (<400mm): Moderately structured Clay Loam (Category 4b)	Minor	NN:
	Subsoil: Moderately structured Light Clay (Category 5b).	N	NN
Watertable	Groundwater not encountered.	NII -	NN'
Depth	Maximum borehole depth 1500mm.	j	

NN: Not needed

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3.7 OVERALL LAND CAPABILITY RATING

For the soils in the proposed land application area a number of features present a moderate to major constraint and require a mitigation measure.

Nonetheless 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 not constrained as long as disposal of secondary treatment effluent by irrigation is used.

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.

4.1 TREATMENT SYSTEM

The secondary effluent quality required is:

- BOD < 20 mg/L;
- SS < 30 mg/L;</p>

Refer to the EPA website for the list of approved options that are available. 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 must include the details of it in the Septic Tank Permit to Install application form for Council approval.

4.2 EFFLUENT MANAGEMENT SYSTEM

A range of possible land application systems have been considered, such as absorption trenches, evapotranspiration/absorption (ETA) beds wick trenches, subsurface irrigation and mounds.

The nominated and 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 negligible.

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4.3 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 1.5m to 2.0m apart for clay soils, installed parallel along the contour. Installation depth is 150mm to 200mm 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 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.

4.4 SIZING THE IRRIGATION SYSTEM

Example: 4 bedroom dwelling - Five occupants,

To determine the necessary size of the irrigation area water balance modelling has been considered using the method and water balance tool in the Victorian Land Capability Assessment Framework (2014) and the EPA Code (2016). The final sizings of the irrigation system has been undertaken adopting a DIR from Table 9 of the EPA code (2016). The calculations are summarised below.

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4.4 SIZING THE IRRIGATION SYSTEM CONTINUED:

The sizings equation can be expressed as:

A = O/DIR

A = irrigation area m²

Q = daily flow (L/day)

DIR = Design irrigation rate (m/day) - adopt most constraining horizon.

A = 750/3.0 (light clay)

= 250m² (for a 4 bedroom dwelling)

As well as water balance modelling a preliminary nutrient balance has been considered to check that the Land Application Area is of sufficient size to ensure nutrients are assimilated by the soils and vegetation. It is acknowledged that a proportion of nitrogen will be retained in the soil through processes such as mineralisation and volatilisation.

Reference: Victoria Land Capability Assessment Framework Jan 2014 (app 2)

NOTE: Soil has a high PRI (phosphorus retention Index) in clayey soils. Phosphorus is readily removed under these circumstances from wastewater fixation in clayey soil by the action of adsorption. Phosphate in dispersed effluent is lost within a few centimetres of the soil.

This leaves nitrogen (N) as the limiting factor in this proposed development

EPA performance criteria for Aerated Wastewater Treatment Systems (AWTS) is TKN 30mg/L. Adopt as design criteria.

Proposed wastewater loading:

750L/d (Litres/day)

Determine the daily N load:

 $30 \times 750 = 22,500 \text{mg/day}$

Determine the annual N load:

22,500mg/day x 365 days

Annual N load = 8,212,000mg/day

Allow 20% loss through denitrification and other processes $8,212,000 \times 0.8 = 6,570,000 \text{mg/day}$

Annual N load = 6.570kg/yr

Allow for uptake by plants (application rate) of 220kgn/ha/yr (This figure is suitable for a regularly maintained grass cover)

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4.4 SIZING THE IRRIGATION SYSTEM CONTINUED:

Divided the annual N load by the application rate 6.570/220 = 0.2986ha or = 298m²

Minimum area required for N uptake = 298m² (say 300m²).

Therefore adopt 300m² as required minimal area required for effluent irrigation for a 4 bedroom dwelling (based on most constraining calculation).

I am of the opinion that the area required for nitrogen assimilation and phosphorus can be met by the above sized Land Application Area.

Note: A factor of conservatism is applied to the water and nutrient balance calculations and the Land Application Area sizing <u>must</u> be adopted from the following provided table based upon the number of bedrooms proposed.

Number of Bedrooms	Number of Occupants	Total Daily Wastewater Flow	Recommended Land Application Area Size
2	3	450	180m ²
	4-1-1	600	240m ²
4	5	750	300m²
5	6	900	360m ²

NOTES:

A more detailed monthly water balance or nutrient balance computation was not considered necessary for this site for the following reasons:

- Past modeling on similar sites in this area that exhibit the same climatic and soil data.
- The site size and configuration is large enough to accommodate conservative modeling providing a dedicated Land Application Area in excess of computed requirements.

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4.4 SIZING THE IRRIGATION SYSTEM CONTINUED:

Summary and Discussion

It is worth noting that modeling includes several significant factors of conservatism:

 Hydraulic load. This assumes a maximum occupancy of the residence at a rate of 150 Litres/person/day.

It is likely that the actual occupancy and water usage will be less than this;

 From the nutrient balances, in the absence of site specific data very conservative estimates of crop nutrient uptake rates and total nitrogen lost to soil processes are considered.

4.5 SITING AND CONFIGURATION OF THE IRRIGATION SYSTEM

There is a specific envelope of land required on the allotment to maintain a 30m upslope buffer from the dam on site. I have nominated the envelope on the Test Site Location Plan (Design Response Plan (Appendix v) and the Land Application Area must be placed in this envelope.

Final placement and configuration of the irrigation system will be determined by the client and/or system installer, provided it remains within this envelope and satisfies the minimum area required according to the water balance.

Whilst there is ample area for application of the effluent, it is important that appropriate buffer distances to neighbouring properties be maintained. It is important to note that buffers are measured as the overland flow path for run-off water from the effluent irrigation area.

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.

4.6 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.

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4.6 BUFFER DISTANCES CONTINUED

The relevant buffer distances for this site, taken from Table 5 of the Code (2016) are:

- 20 metres from groundwater bores.
- 100 metres from potable watercourses.
- 30 metres from non-potable watercourses.
- 3 metres if area up-gradient and 1.5 metres if area down-gradient of property boundaries, swimming pools and buildings (conservative values for secondary effluent).



4.7 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. An additional, optional measure to achieve even coverage is to divide the irrigation area into two or more separate sub-zones of equal size; dosed alternately using an automatic indexing or sequencing valve.

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.

Stormwater run-on is not expected to be a concern for the proposed irrigation area, due to the landform of the site and its relatively gentle slopes. However, upslope diversion berms or drains may be constructed if this is deemed to be necessary during installation of the system, or in the future. Stormwater from roofs and other impervious surfaces must not be disposed of into the wastewater treatment system or onto the effluent management system.

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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).

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6. CONCLUSIONS

As a result of my investigations I conclude that sustainable onsite wastewater management is feasible with appropriate mitigation measures as outlined for a residential development on this proposed subdivided allotment.

Specifically, I recommend the following:

- Secondary treatment of wastewater by an EPA-accredited treatment system;
- Location of Land Application Area as per this report.
- Land application of treated effluent to a suitably sized subsurface irrigation area (which may be subdivided into two or more evenly sized zones using an indexing or sequencing valve);
- 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 (2016) and the recommendations made in this report.

ANDREW REDMAN BSc. GEOLOGIST. C.E.T. ACCREDITED

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7. REFERENCES

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APPENDICES

Land Channel Property Report

ii. Design Response Plan

iii. Aerial and Site Photographs

iv. Bureau of Meteorology Climate Report for Bannockburn

Test Site Location Plan (Design Response Plan)

ii. Borelog Descriptions

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i. Analytical Laboratory Results

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