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LAND CAPABILITY ASSESSMENT REPORT

**18 Pratts Road
Kinglake West VIC**



Prepared for: MILLAR MERRIGAN C/O TRAVIS DAVIES
PO Box 247
Croydon VIC 3136

Site: 18 Pratts Road
Kinglake West 3922

Prepared by: R H Krainz – Eco Vision Australia

Reference No. 45E023 LCA SUB

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1. Executive Summary

The purpose of this report is to provide a Land Capability Assessment (LCA) for Millar Merrigan C/O Travis Davies who is proposing to subdivide an allotment sized at approximately 4,055m² located at 18 Pratts Road, Kinglake West into two lots. Proposed Lot 2 is sized at 2,007m² and Proposed Lot 1 containing an existing 3 bedroom dwelling sized at 2,048m². The existing dwelling currently has a primary (septic) treatment Tank (approximately 3,000L with absorption trenches which will be decommissioned as part of the development proposal. It is proposed to install a secondary wastewater treatment system with the Land Application Area (LAA) provided by Subsurface Irrigation (SSI) on both proposed lots.

Proposed Lots 1 and 2 are irregular in shape in shape with the site being virtually flat to very gentle slopes consistent Upper Plateau Land System. Designated watercourses are located a minimum 285 metres from all property boundaries.

Diagrams 1, p. 5 depicts the proposed two lot subdivision.

This report provides information to ensure that each lot is capable of treating and retaining all wastewater in accordance with the State Environmental Protection Policy (Waters of Victoria) under the Environmental Protection Act 1970.

The methods used for this report include soil tests and site survey undertaken by Eco Vision Australia (14th February 2023). A desktop study was undertaken and included obtaining relevant planning reports and climate data. Soil samples were taken and further analysed. These methods provided the information to write the LCA.

The overall land capability generally rates between very good to fair. The one matrix indicator that rated as very poor is the rainfall the site receives.

The soil type in the LAA consists of a moderately structured orange brown loam to a maximum depth of 200mm overlying moderately structured orange brown clay loam to a maximum depth of 900mm. Between 900mm to 1100mm the soil becomes a strongly structured orange brown clay loam. Below 1100mm to 1500mm the soils transition to a strongly structured orange brown medium clay. No groundwater was encountered on the site inspection. There was no marked textural change within the soil profile with excellent internal drainage. This is an excellent example of soils derived from Humevale Siltstone which can have a wide variety of soil types associated with this geology depending upon specific locations.

Each proposed Lot is over 2,000m² and regarded as being a high hazard site using the Murrindindi Shire Domestic Wastewater Management Plan and would not be regarded as not being Non Cos lots. However, the site will require wastewater treatment to secondary levels with the Land Application Area provided by Sub Surface Irrigation. The existing primary system and absorption trenches servicing the existing dwelling should be decommissioned as part of the subdivision process.

Proposed Lot 1 containing the existing dwelling has an existing septic (primary) system with the LAA provided by absorption trenches which will be replaced by a secondary treatment system with the LAA provided by SSI. The onsite soils are excellent in structure with a small change of texture through the profile. The LAA area for proposed Lot 1 (existing three bedroom dwelling) is sized at 300m² and located towards the northern boundary as depicted on the site plan.

Proposed Lot 2 allows for the installation of a secondary wastewater treatment system (servicing a maximum four bedroom capacity). The onsite soils are excellent in structure with a small change of texture through the profile. An area of 400m² (four bedroom dwelling) or 300m² (three bedroom dwelling) is recommended for the site to distribute wastewater from a secondary treatment system. This will ensure that all wastewater will be contained on-site wastewater treatment system.

The SSI adequately covers the site for zero water storage during the winter months as typically household water use reduces by approximately 30% during the cooler months. There is area available within the LAA to install SSI within areas highlighted on the site plan.

The findings of this LCA have determined that wastewater can be treated and contained on the proposed lot. The site can be sustainably developed from a wastewater management perspective. The onsite soils are extremely suitable for the distribution of secondary treated wastewater within biologically active rootzone of grasses.

Table 1 – Land application Area (LAA) sizing (Lot 1) for three-bedroom capacity to size the area required for subsurface irrigation using a secondary wastewater system.

Bedroom	Hydraulic Load L/d	Total Hydraulic Load L/d	LAAm ² WB	LAAm ² Nitrogen	LAAm ² Phosphorus
3	150	600	266m ²	199m ²	304m ²

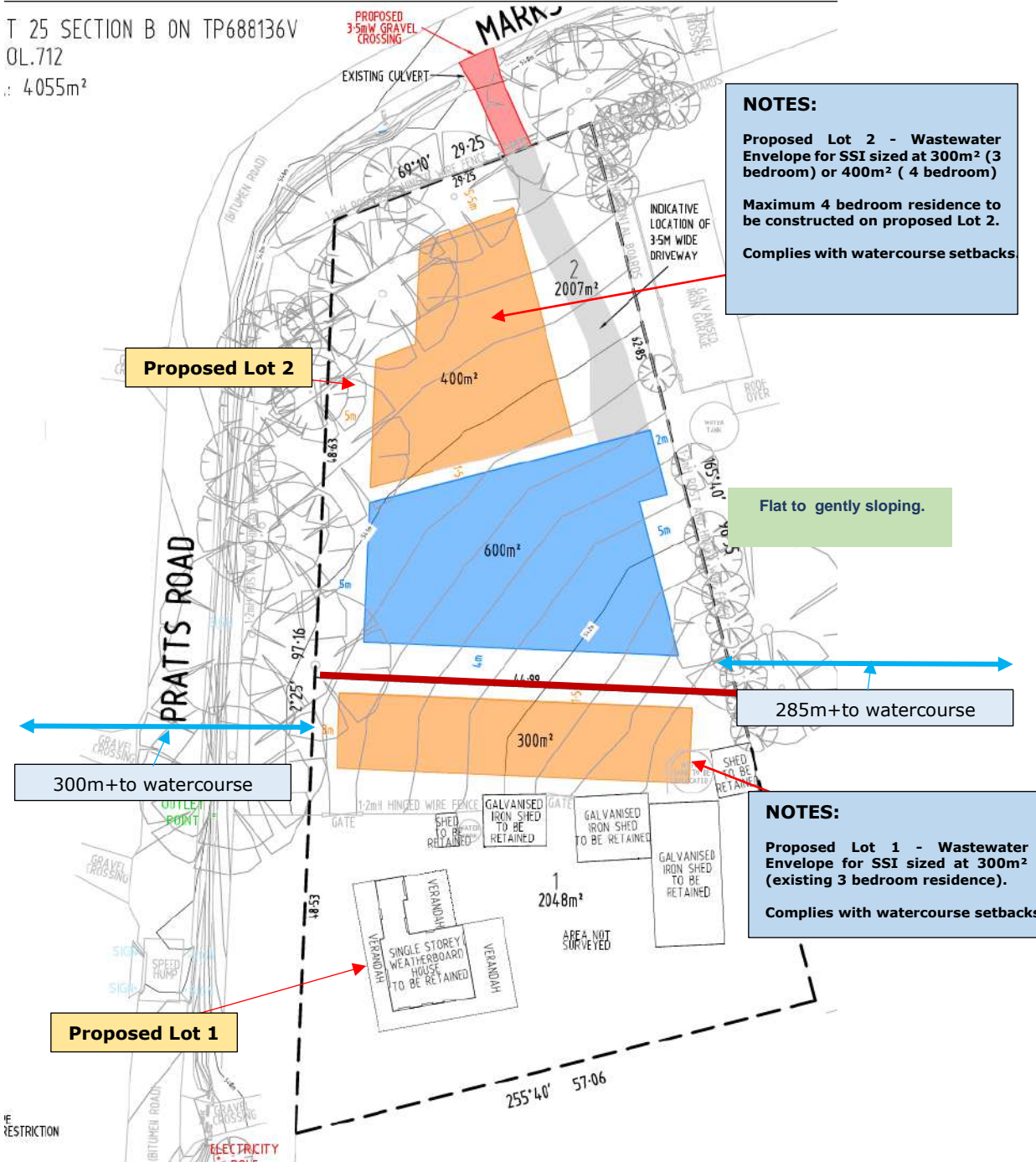
Table 2 – Land application Area (LAA) sizing (Lot 2) for bedroom capacity to size the area required for subsurface irrigation using a secondary wastewater system.

Bedroom	Hydraulic Load L/d	Total Hydraulic Load L/d	LAAm ² WB	LAAm ² Nitrogen	LAAm ² Phosphorus
3	150	600	266m ²	199m ²	304m ²
4	150	750	332m ²	249m ²	353m ²

Diagram 1 – Proposed Subdivision Lot 1 & 2 – 18 Pratts Road, Kinglake West



T 25 SECTION B ON TP688136V
 OL.712
 ∴ 4,055m²



2. Introduction

Eco Vision Australia has been engaged to undertake a Land Capability Assessment (LCA) for a site at 18 Pratts Road, Kinglake West. The field investigation and report have been undertaken and prepared by suitably experienced staff. Eco Vision Australia has appropriate professional indemnity insurance for this type of work. Our professional indemnity insurance certificate is available on request.

The report will accompany an application submitted to the Murrindindi Shire Council for a proposed two lot subdivision. The report is to ensure that each lot is capable of treating and retaining all wastewater in accordance with the State Environmental Protection Policy (Waters of Victoria) under the Environmental Protection Act 1970.

This document provides information about the site and soil conditions. It also provides a detailed LCA and includes a conceptual design for a suitable onsite wastewater management system, including recommendations for monitoring and management requirements.

The existing lot is sized at 4,055m² and contains an existing three-bedroom dwelling. The proposed two lots are sized at:

Proposed Lot 1 – 2,048m², Proposed Lot 2 – 2,007m².

Proposed Lot 1 (2,048m²) containing the existing dwelling is irregular in shape with boundary dimensions being approximately 45m (northern boundary), 75m (southern boundary), 48.5m (western boundary) and 33.5m (eastern boundary). The allotment is virtually flat with some gentle slopes. Access is from Pratts Road along the eastern boundary.

Proposed Lot 2 (2,007m²) is irregular in shape with the proposed access being provided via a driveway accessed towards the north east corner of proposed Lot 2. Boundary dimensions are variable being approximately 29.25m (northern boundary), 45m (southern boundary) 48.6 metres (western boundary) and 62.8m (eastern boundary) Proposed Lot 2 has a gentle slope to the east. Both lots are virtually flat. Topographical elevations are approximately 540m. Designated water courses are located a minimum distance of 285m outside property boundaries.

Temperature data was from obtained from Toolangi (Mount St Leonhard DPI) Climate Station 086142. Rainfall data was obtained from Kinglake West Climate Station 086374. Evaporation data was obtained from the Melbourne Airport Climate Station (086082) elevation 100m.

We have considered several options for proposed Lot 1 and Lot 2 for both the treatment system and land application area (LAA). A secondary wastewater treatment system is suitable for proposed Lot 2. The preferred method to distribute the secondary treated wastewater is by sub surface irrigation (SSI) as mentioned in the report.

There is sufficient land available for sustainable onsite effluent management that maintains appropriate buffers to protect sensitive receptors for to residentially develop the site.

3. Description of the Development

Table 3 Site Description

Site Address:	18 Pratts Road Kinglake West VIC 3757
Owner/Developer:	Travis Davies
Postal Address:	PO Box 247 Croydon VIC 3136
Contact:	Millar Merrigan – 03 8720 9551
Council Area:	Murrindindi Shire Council
Rural Water Corporation:	Goulburn-Murray Water
Urban Water Corporation:	Goulburn Murray Water
Zoning:	Planning Zone – Township Zone Schedule – (TZS), Planning Overlays – Bushfire Management Overlay (BMO).
Allotment Size:	Current Site – 4,055m ² Proposed Lot 1 (Existing Dwelling) – 2,048m ² Proposed Lot 2 – 2,007m ²
Domestic Water Supply:	Reticulated / Tank
Anticipated Wastewater Load Lot 1 & Lot 2:	<u>3 Bedroom residence @ 4 person</u> per residence maximum occupancy. Design wastewater load is 150L/person/day, therefore total design load = 600L/day. This design load is sourced from Code of Practice Onsite Wastewater Management 891.4 (Jul 16). (Table 4 – Minimum daily wastewater flow rates and organic loading with full water reduction facilities)
Anticipated Wastewater Load Lot 2:	<u>4 Bedroom residence @ 5 person</u> per residence maximum occupancy. Design wastewater load is 150L/person/day, therefore total design load = 750L/day. This design load is sourced from Code of Practice Onsite Wastewater Management 891.4 (Jul 16). (Table 4 – Minimum daily wastewater flow rates and organic loading with full water reduction facilities)
Anticipated BOD Load Lot 1 & Lot 2:	<u>3 Bedroom residence @ 4 person</u> per residence maximum occupancy. Design BOD load is 60g/person/day, therefore total design load = 240g/day. This design load is sourced from Code of Practice Onsite Wastewater Management 891.4 (Jul 16). (Table 4 – Minimum daily wastewater flow rates and organic loading with full water reduction facilities)
Anticipated BOD Load Lot 2:	<u>4 Bedroom residence @ 5 person</u> per residence maximum occupancy. Design BOD load is 60g/person/day, therefore total design load = 300g/day. This design load is sourced from Code of Practice Onsite Wastewater Management 891.4 (Jul 16). (Table 4 – Minimum daily wastewater flow rates and organic loading with full water reduction facilities)
Availability of Sewer:	The area is unsewered and unlikely to be sewerred in the short to medium term future.

4. Site Key Features

Robert Krainz undertook a desktop review and site inspection on the 14th of February 2022. A range of site features were assessed in terms of the degree of limitation they present for a range of onsite wastewater management systems. Reference is made to the rating scale described in Table 1 of EPA (2003a). As a guide, remedial measures should be considered whenever ratings of 3, 4, or 5 occur and this might involve land improvement works, soil amelioration or simply adoption of higher-level technologies to ensure environmental protection. Table 3 summarises the key features in relation to effluent management at the site. The site experiences negligible stormwater run-on. There is no evidence of a water table within the proposed LAA for both proposed Lots 1 & Lot 2.

The soil type in the LAA consists of a moderately structured orange brown loam to a maximum depth of 200mm overlying moderately structured orange brown clay loam to a maximum depth of 900mm. Between 900mm to 1100mm the soil becomes a strongly structured orange brown clay loam. Below 1100mm to 1500mm the soils transition to a strongly structured orange brown medium clay. No groundwater was encountered on the site inspection. There was no marked textural change within the soil profile with excellent internal drainage. This is an excellent example of soils derived from Humevale Siltstone which can have a wide variety of soil types associated with this geology depending upon specific locations.

The site is within the locality of Kinglake West, which is part of the Planning Zone – Township Zone Schedule – (TZS), Planning Overlays – Bushfire Management Overlay (BMO).

Appendix i provides a site locality plan (Property Report) and indicates the location of the site of the proposed development.

Appendix ii provides a Proposed Development Plan.

Appendix iii provides photographs of the existing site conditions.

Appendix iv provides Bureau of Meteorology Climate Report for Toolangi (Mount St Leonhard DPI) - 086374 & Rainfall Report for Kinglake West Climate Station - 086374

Appendix v provides Test Site Location Plan

Appendix vi provides a water and nitrogen balance (600L/D & 750L/D)

Appendix vii provides Borelog descriptions.

Table 3 Site Features

Feature	
Climate	The site has a warm temperate climate with maximum temperatures and minimum rainfall in summer (Mount St Leonhard DPI) - 086142). The site experiences a mean annual rainfall of 1,040mm/yr (Kingslake West - 06374).
Exposure	Proposed Lot 1 contains the existing dwelling, shedding, some vegetation, and some grassed areas. The proposed LAA has high sun and wind exposure. The site currently contains a proportion of grassed areas and boundary and perimeter vegetation. The proposed LAA has high sun and wind exposure.
Vegetation	The site is a mix of grassed areas, existing dwelling, shedding with a mix of native and exotic vegetation.
Landform	The site is contained within a gentle slope associated with a hill crest within the Kingslake Upper Plateau landform element with the red brown soils consistent with this geology.
Slope	The proposed effluent management areas are located on gently sloping to virtually flat land suitable for SSI.
Fill	Minor fill was observed on the site.
Rocks and Rock Outcrops	No rock outcrops or low-lying large sub surface rocks were encountered.
Erosion Potential	The erosion hazard is moderate to low.
Surface Water	Not applicable.
Flood Potential	Areas available for application of treated effluent lie above the 1:100 year flood level.
Stormwater run-on and upslope seepage	The proposed effluent management area is expected to receive minor stormwater run-on which can be diverted via surface spoon drainage or sub surface drainage. There is no evidence of groundwater seepage, soaks or springs.
Groundwater	There are no signs of shallow groundwater tables.
Site Drainage and Subsurface Drainage	The site could experience variable stormwater run-on and run-off. However, there are minor visible signs of surface dampness. Surface dampness due to recent rainfall and seasonal conditions.
Recommended Buffer Distances	All buffer distances recommended in Table 5 of EPA Code of Practice; 891.4 July 2016 will be achievable in the proposed treatment envelopes.
Available Land Application Area	Considering all site constraints and the buffers mentioned above, the site has ample land that is suitable and available for land application of effluent treated to secondary levels for both proposed lots. There will be ample protection for surface and groundwater.

5. Soil Assessment and Constraints

The sites soils have been assessed for their suitability for onsite wastewater management by a combination of soil survey and review of desktop published material.

The site at 18 Pratts Road, Kinglake West contains soils consistent with the underlying geology of Silurian sedimentary rock (Dargile Formation) located within the Darraweit Guim Province (Heathcote -Deep Creek – Kilmore – Yan Yean – Kinglake section) – Humevale Siltstone and spans a vast geological age and as such soil types can be highly variable dependent upon topographical position and location. The on-site soils are typically Orange Brown Loam / Clay Loam soils overlying orange brown Light Clay at deeper profile depths. This is consistent with the Kinglake Upper Plateau with rolling to hilly surface topography with linear slopes.

The onsite soils are consistent with component 1 (gentle to moderate slopes) of the Kinglake Upper Plateau Land System landform element – a dissected plateau at intermediate altitude with deep red gradational soils. The underlying geology is Humevale Siltstone. The ASC soil type for this geology is predominately Red Brown Dermosols. These are described soils that have high iron levels and little textural changes between the A & B horizon. The site visit and field work has confirmed these characteristics.

The ASC soil type is consistent with Halpic, Eutrophic, Red Ferrosol; medium silty loam to clay soils. These are described as soils that have minor changes in texture. Infiltration is moderate to fast and soil permeability moderate to low depending upon specific soil type and profile location. The on-site soil clay loam B horizon has been used to size the LAA using a water balance. However, for additional conservatism due to the locations high rainfall characteristics an expanded SSI area is recommended for the site as noted in this report.

The soil type in the LAA consists of a moderately structured orange brown loam to a maximum depth of 200mm overlying moderately structured orange brown clay loam to a maximum depth of 900mm. Between 900mm to 1100mm the soil becomes a strongly structured orange brown clay loam. Below 1100mm to 1500mm the soils transition to a strongly structured orange brown medium clay. No groundwater was encountered on the site inspection. There was no marked textural change within the soil profile with excellent internal drainage. This is an excellent example of soils derived from Humevale Siltstone which can have a wide variety of soil types associated with this geology depending upon specific locations.

Soil permeability was not undertaken however textural soil analysis indicating that infiltration would be relatively fast through the A horizon and moderate through the B horizon. This is consistent with soil permeability testing undertaken on similar soil types. The on-site soils exhibit a sharp textural change throughout the soil profile. A conservative Ksat for a moderately structured loam is 1.5m m/d with a corresponding soil percolation rate of a minimum 62.5mm per hour. The moderately structured clay loam B horizon has a lower Ksat at 0.5 m/d with a corresponding soil percolation rate of 21mm per hour. Sizing of the LAA has an enlarged wastewater field.



On-site red Brown Dermosols at 18 Pratts Road, Kinglake West

Table 4 Soil Features:

Soil Feature		
Soil Depth	Soil depth up to 1500mm encountered.	
Depth to watertable	Groundwater not encountered.	
Coarse Fragments (%)	Some coarse fragments were observed through the lower portions of the soil profile.	
Soil Permeability and Design loading Rates	Soil permeability was not directly measured but can be inferred with reference to Tables L1 to N1 in AS/NZS 1547:2012, that describe conservative design loading rates (DI-R5) 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 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.	
	Topsoils	Subsoils
Description	Loam (moderate structure)	Clay Loam (moderate structure)
Soil Category (AS/NZ1547:2012)	3a	4a
Design Irrigation Rate (DIR mm/week)	28 (4mm/d) (Secondary Treated)	24.5 (3.5mm/d) (Secondary Treated)
Design Loading Rate (DLR mm/week) for trenches/beds	Design Loading Rate (DLR mm/day) for Wick Trenches / Beds 30 Secondary	Design Loading Rate (DLR mm/day) for Wick Trenches / Beds 30 Secondary
pH	The pH of 1:5 soil/water suspensions was not measured. The present soil conditions do not appear to be restricting plant growth.	
Electrical Conductivity	Electrical conductivity was not measured.	

*SSI irrigation field sizing based on a minimum area using light clay for sizing the LAA (300m² water balance 3 bedroom) & LAA (375m² water balance 4 bedroom).

6. Land Capability Assessment Matrix

The Land Capability Assessment has been developed for the whole site, but using the soils in the vicinity of the building envelope.

Table 5 Land Capability Assessment Matrix

LAND FEATURES	Land capability class rating					Site rating
	Very good (1)	Good (2)	Fair (3)	Poor (4)	Very poor (5)	
GENERAL CHARACTERISTICS						
Site drainage	No visible signs of dampness	Moist soil, but no standing water in soil pit		Visible signs of dampness, such as moisture-tolerant plants	Water ponding on surface	2
Runoff	None	Low	Moderate	High – need for diversionary structures	Very high – diversion not practical	3
Flood Levels	Never		<1 in 100	>1 in 100 and <1 in 20	<1 in 20	2
Proximity to Watercourses	>60 metres				<60	3
Slope (%)	0-2	2-8	8-12	12-20	>20	2
Landslip	No actual or potential failure		Low potential for failure	High potential for failure	Present or past failure	3
Groundwater (seasonal watertable depth (m))	>5	5-2.5	2.5-2.0	2.0-1.5	<1.5	2
Rock outcrop (1% of land surface containing rock >200mm)	0	<10%	10-20%	20-50%	>50%	1
Erosion potential	No erosion potential	Minor	Moderate	High	Severe erosion potential	2
Exposure	High sun and wind exposure		Moderate	Low sun and wind exposure		1
Landform	Hill crests, convex side slopes and plains		Concave sideslopes and footslopes		Floodplains & incised channels	1
Vegetation Type	Turf or pasture				Dense forest with little understorey	2
Average Rainfall (mm/yr)	<450	450-650	650-750	750-1000	>1000	3
Pan evaporation (mm/yr)	<1500	1250-1500	1000-1250	---	<1000	1
Fill	No fill		Fill present			1

SOIL PROFILE CHARACTERISTICS

Soil permeability category ¹	2 and 3	4		5	1 and 6	4
Profile depth	>2m	1.5-2m	1.5 – 1	1.0-0.5m	>0.5m	3
Presence of mottling	None				Extensive	2
Course fragments (%)	<10	10-20	20-40		>40	1
Permeability * (m/d)	0.3-0.15	0.08-0.15 0.3-0.6	0.06-0.08 0.6-1.5	--- 1.5-2.0	<0.06 >2.0	3
pH	6-8		4.5-6		<4.5, >8	3
Emerson Aggregate	4, 6, 8	5	7	2, 3	1	4
Electrical Conductivity	<0.3	0.3-0.8	0.8-2	2-4	>4	1
Sodicitiy ESP%	<3		6-8	8-14	>14	2
Overall Site Rating	Poor					4

1. Source: AS/NZ1547:2012

7. The Management Program

This LCA has been prepared to accompany a development application to the Murrindindi Shire Council for a proposed two lot subdivision.

A secondary system is suitable for Lot 2. The existing primary (septic) system and absorption trenches servicing the existing three bedroom dwelling on proposed Lot 1 will be decommissioned and replaced with a wastewater system capable of treating wastewater to secondary treatment levels with dispersal provided by SSI towards the northern boundary. Secondary treated wastewater is to be installed on proposed Lot 2 as part of the development proposal to service a maximum four bedroom dwelling. As such, this report provides recommendations for treatment and land application systems that are appropriate to the land capability. The following sections provide an overview of a suitable system, with sizing and design considerations and justification for its selection. Detailed design for the system is beyond the scope of this study but should be undertaken at the time of building application and submitted to Council.

7.1 Treatment System

To treat domestic wastewater and allow irrigation with the treated effluent, the existing system provides secondary treatment with disinfection to meet Environment Protection Authority requirements for irrigation. Indicative target effluent quality is:

- BOD <20 mg/l;
- SS <30 mg/l;

7.2 Land Application

A range of possible land application systems have been considered, such as absorption trenches, evapotranspiration/absorption (ETA) beds, surface and subsurface irrigation, and sand mounds. The preferred system for proposed Lot 1 and Lot 2 is pressure compensating subsurface irrigation. In combination with the selected secondary treatment system subsurface irrigation will provide even and widespread dispersal of highly treated effluent loads within the root-zone of plants. Subsurface irrigation will provide beneficial reuse of wastewater. It will also ensure that the risk of effluent being transported off this site will be negligible.

7.3 Sizing the Irrigation System

To determine the necessary size of the irrigation area water and nutrient balance modelling has been considered.

A water balance is one calculation to size the SSI irrigation field. The water balance sizes the SSI area at 266m² (three bedroom residence Lot 1 & Lot 2) and 332m² (Lot 2). The water balance calculations are provided in Appendix v.

The nitrogen balance contained in Appendix v sizes the LAA at 199m² (three bedroom residence Lot 1 & Lot 2) and 249m² (four bedroom residence Lot 2).

The phosphorus balance calculations below sizes the LAA at 304m² (three bedroom residence Lot 1 & Lot 2) and 353m² (four bedroom residence Lot 2).

The phosphorus balance is the most limiting factor to initially size the LAA. However, advise provided by Environmental Health (high rainfall zone) recommend a LAA size of 300m² for the existing three bedroom residence on Lot 1 or a proposed three bedroom residence on Lot 2. The maximum bedroom capacity on Lot 2 is four bedrooms with the LAA sized at 400m².

Water Balance

A preliminary model water balance with wet month storage and a daily wastewater of 600 to 750 litres is contained in the appendices.

Nutrient Balance

A nutrient balance has been considered to check that the LAA 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.

We are of the opinion that the area required for nitrogen assimilation and phosphorus can be met by the above sized LAA.

A nitrogen balance sizing the for a three-bedroom dwelling is sized at 199m² and a four-bedroom dwelling is sized at 249m².

Phosphorus Balance – Three Bedroom Dwelling

Daily P load

Effluent Concentration P – 10mg/L
Daily hydraulic load – 600L/D
 $10 \times 600 = 6,000\text{mg/d}$

Annual P load

$6,000\text{mg/d} \times 365 \text{ days} = 2,190,000$
Annual P load = 2.190kg

Plant uptake (grasses) 50kg P/ha/year

P sorption each year for 50 years

$2190 / 50 \times 0.5 = 21.90 \text{ kg/ha/yr}$

Annual Application Rate

Plant uptake + P sorption = $21.90 + 50$
Total P application rate = 71.90 kg/ha/yr

Annual P load

$2.190 / 71.90 = 0.304$
 $0.304 \times 10,000 = 304\text{m}^2$

Minimum Area Required for P assimilation over 50 years = 304m²

Phosphorus Balance – Four Bedroom Dwelling

Daily P load

Effluent Concentration P – 10mg/L
Daily hydraulic load – 750L/D
 $10 \times 750 = 7,500\text{mg/d}$

Annual P load

$7,500\text{mg/d} \times 365 \text{ days} = 2,737,500$
Annual P load = 2.737kg

Plant uptake (grasses) 50kg P/ha/year

P sorption each year for 50 years

$2737 / 50 \times 0.5 = 27.37 \text{ kg/ha/yr}$

Annual Application Rate

Plant uptake + P sorption = $27.37 + 50$
Total P application rate = 77.37 kg/ha/yr

Annual P load

$2.737 / 77.37 = 0.353$
 $0.353 \times 10,000 = 353\text{m}^2$

Minimum Area Required for P assimilation over 50 years = 353m²

Summary and Discussion

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

- Hydraulic load for Lot 1 (600 L/D). This assumes a maximum capacity of 4 people will permanently occupy the 3 - bedroom residence. It is likely that the actual occupancy and daily water usage will be substantially less than this;
- Hydraulic load for Lot 2 (600 - 750 L/D). This assumes a maximum capacity of 4 people will permanently occupy a 3 - bedroom residence or 5 people will permanently occupy a four bedroom residence. It is likely that the actual occupancy and daily 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.

7.4 Siting and Configuration of the Land Application Area

It is preferable to keep the irrigation area as high on the property as possible based upon the proposed site plan. Eco Vision has delineated on the provided site plan a suitable LAA, but the areas tested are deemed suitable.

As well as providing area for application of effluent, it is important that buffer distances be adhered to. It is important to note that buffers are measured as the overland flow path for run-off water from the effluent irrigation area.

The LAA area is sized at an area of 300m² (three bedroom residence – Lot 1 & Lot 2) and 400m² (maximum four bedroom residence – Lot 2). This is depicted on the site plan contained in the appendices.

It is recommended that the owner consult an irrigation expert familiar with wastewater irrigation equipment, to help design and install the irrigation system. The irrigation plan must ensure good, even application of effluent.

7.5 Irrigation System Design

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 that employ a biocide to prevent build-up of slimes and inhibit root penetration. The laterals are usually 0.5 to 1.0 m apart, roughly parallel and along the contour if possible. -Installation depth is commonly 100-150 mm. 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 following manufacturer's instructions.

Vacuum breakers should be installed at the high points 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 least yearly. Flush water can be either returned to the treatment system or should be released where it will be readily absorbed.

All trenching used to install the pipes must be backfilled properly to prevent preferential subsurface flows along trench lines, particularly where trenches are not parallel to contours. Irrigation areas should not be subject to high traffic movement, especially by vehicles, otherwise compaction around emitters can lead to premature system failure.

7.6 Buffer Distances

Buffer distances from LAAs are required to help prevent human contact, maintain public amenity, and protect sensitive environments. Council generally adopts the following nominal buffers secondary sewage and greywater effluent, described in EPA Vic (891.4):

Landscape feature or structure	Setback distances (m)		
	Primary sewage and greywater systems	Secondary sewage and greywater systems	Advanced secondary greywater systems ³
Building			
Wastewater field up-slope of building ⁷	6	3	3
Wastewater field down-slope of building	3	1.5	1.5
Wastewater up-slope of cutting/escarpment ¹²	15	15	15
Allotment boundary			
Wastewater field up-slope of adjacent lot	6	3	1
Wastewater field down-slope of adjacent lot	3	1.5	0.5
Services			
Water supply pipe	3	1.5	1.5
Wastewater up-slope of potable supply channel	300	150	150
Wastewater field down-slope of potable supply channel	20	10	10
Gas supply pipe	3	1.5	1.5
In-ground water tank ¹⁴	15	7.5	3
Stormwater drain	6	3	2
Recreational areas			
Children's grassed playground ¹⁵	6	3 ¹⁶	2 ¹⁶
In-ground swimming pool	6	3 ¹⁶	2 ¹⁶
Surface waters (up-slope of:)			
Dam, lake or reservoir (potable water supply) ^{8,13}	300	300 ⁴	150
Waterways (potable water supply) ^{9,13}	100	100 ^{4,5,17}	50
Waterways, wetlands (continuous or ephemeral, non-potable); estuaries, ocean beach at high-tide mark; dams, reservoirs or lakes (stock and domestic, non-potable) ^{8,9}	60	30	30
Groundwater bores			
Category 1 and 2a soils	NA ¹¹	50 ¹⁹	20
Category 2b to 6 soils	20	20	20
Watertable			
Vertical depth from base of trench to the highest seasonal water table ¹⁸	1.5	1.5	1.5
Vertical depth from irrigation pipes to the highest seasonal water table ¹⁸	NA	1.5	1.5

8. Monitoring, Operation and Maintenance

Maintenance is to be carried out in accordance with the certificate of approval and Council's permit conditions. The system proposed above will only function adequately if appropriately maintained. Residents will be required to carry out maintenance as discussed below.

To ensure the treatment system functions adequately, residents must:

- Have a suitably qualified maintenance contractor service the AWTS as required by Council under the approval to operate.
- Any pump will need regular maintenance and seals checked regularly.
- Use household cleaning products sparingly and check that they are suitable for septic tanks;
- Keep as much fat and oil out of the system as possible; and
- Conserve water

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 of irrigation lines;
- Regularly clean in-line filters;
- Not erect any structures over the LAA;
- Minimise vehicle access to the LAA, to prevent compaction; and
- Ensure that the LAA is kept level by filling any depressions with good quality topsoil (not clay).
- Good water conservation is an important aspect in the overall management of onsite systems. It will be important for the ongoing performance of both the treatment and application system that they are not overloaded hydraulically. AAA rated plumbing is recommended for all future water fixtures.

9. Stormwater Management

As mentioned above, stormwater runoff is not expected to be a major concern in this case. However, the construction and maintenance of diversion drains would provide an additional precaution. Roof stormwater must not be disposed in the LAA.

10. Conclusions

As a result of our investigations, we recommend that a sustainable onsite wastewater management system can be treated and contained within proposed Lot 2.

Specifically, we recommend the following:

- Installation of a secondary wastewater treatment system such as Aerated Wastewater Treatment System (AWTS) on the site for both Lot 1 & Lot 2;
- The existing primary (septic) tank and absorption trenches for the existing dwelling on Lot 1 to be decommissioned;
- Proposed Lot 2 has land available to treat and contain secondary treated wastewater for a maximum four bedroom dwelling;
- Proposed Lot 1 has land available to treat and contain secondary treated wastewater for the three bedroom dwelling;
- Utilising sub surface irrigation (for proposed lot 1) in conjunction with secondary treatment the LAA area is sized at 300m² for the existing three bedroom dwelling;
- Utilising sub surface irrigation (for proposed lot 2) in conjunction with secondary treatment the LAA area is sized at a minimum of 300m² using the water balance as the most limiting factor based on a 3-bedroom capacity and four-bedroom capacity 400;
- Preferable location of the LAA for SSI is depicted on the site plan – Lot 1 located towards the proposed northern boundary and Lot 2 located towards the proposed western boundary;
- Any wastewater treatment system requires supervision by the designer and test on completion;
- Do not allow any vehicle access and utilise surface plants that tolerate wet conditions (including roots) and have a high evapo-transpiration capacity. Where possible use plants well exposed to the sun. Plant high transpiration species to minimise waterlogging.
- Use of low phosphorus and low sodium (liquid) detergents to improve effluent quality and maintain soil properties;
- Operation and management of the treatment and disposal system in accordance with manufacturer's recommendations and the recommendations made in this report; and
- Construction of diversion drains on sides of the LAA to divert stormwater and surface water run-on.

Robert Krainz

Land Management Consultant

Grad Cert. Environmental Management (CSU), Ad. Dip. Land Management (Syd), Cert Hort. Landscape & Nursery (Qld)

11. References & Bibliography

AS/NZS 1547:2012, *On-site domestic wastewater management*, SAI Global Limited

Charman, P.E.V. & Murphy, B.W., ed. (2007), *Soils Their Properties and Management (Third Edition)*, Oxford University Press.

Code of Practice: *Onsite Wastewater Management Guidelines for Environmental Management Publication 891.4*, Jul 2016. Environmental Protection Authority.

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

Environment Protection Authority Code of Practice - Publication 451, March 1996 - *Septic Tanks On Site Domestic Wastewater Management*

Environment Protection Authority Information Bulletin – Publication 746.1
March 2003 – *Land Capability Assessment for On-site Domestic Wastewater Management*.

MAV – The Model Land Capability Assessment Report – February 2006

McKenzie N., Jacquier D., Isbell R. & Brown K. (2004), *Australian Soils and Landscapes: An illustrated compendium*. CSIRO Publishing

11. APPENDICES

- i. Site Locality Plan – Property Reports
- ii. Proposed Development Plan
- iii. Existing conditions
- iv. Bureau of Meteorology Climate Report Toolangi (Mount St Leonhard
DPI) – 086374 and Rainfall Report for Kinglake West (086374)
- v. Test Site Location Plan
- vi. Water & Nitrogen Balance (600L/D, 750L/D)
- vii. Borelog Descriptions

APPENDIX i

SITE LOCALITY PLAN - PROPERTY PLANNING REPORTS

PROPERTY REPORT



From www.planning.vic.gov.au at 13 February 2023 05:11 PM

PROPERTY DETAILS

Crown Description: **Allot. 25 Sec. B TOWNSHIP OF PHEASANT CREEK**
 Address: **18 PRATTS ROAD KINGLAKE WEST 3757**
 Standard Parcel Identifier (SPI): **25-B\PP5632**
 Local Government Area (Council): **MURRINDINDI** www.murrindindi.vic.gov.au
 Council Property Number: **7194**
 Directory Reference: **Vicroads 61 F9**

SITE DIMENSIONS

All dimensions and areas are approximate. They may not agree with those shown on a title or plan.



Area: 4193 sq. m
Perimeter: 285 m
 For this property:
 — Site boundaries
 — Road frontages

Dimensions for individual parcels require a separate search, but dimensions for individual units are generally not available.

Calculating the area from the dimensions shown may give a different value to the area shown above

For more accurate dimensions get copy of plan at [Title and Property Certificates](#)

UTILITIES

Rural Water Corporation: **Goulburn-Murray Water**
 Urban Water Corporation: **Goulburn Valley Water**
 Melbourne Water: **Outside drainage boundary**
 Power Distributor: **AUSNET**

STATE ELECTORATES

Legislative Council: **NORTHERN VICTORIA**
 Legislative Assembly: **EILDON**

PLANNING INFORMATION

Property Planning details have been removed from the Property Reports to address duplication with the Planning Property Reports which are DELWP's authoritative source for all Property Planning information.

The Planning Property Report for this parcel can found here - [Planning Property Report](#).

Planning Property Reports can be found via these two links

Vicplan <https://mapshare.vic.gov.au/vicplan/>

Property and parcel search <https://www.land.vic.gov.au/property-and-parcel-search>

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PROPERTY REPORT: Allot. 25 Sec. B TOWNSHIP OF PHEASANT CREEK

Page 1 of 2

PLANNING PROPERTY REPORT



From www.planning.vic.gov.au at 13 February 2023 04:33 PM

PROPERTY DETAILS

Address: **18 PRATTS ROAD KINGLAKE WEST 3757**
 Crown Description: **Allot. 25 Sec. B TOWNSHIP OF PHEASANT CREEK**
 Standard Parcel Identifier (SPI): **25-B\PP5632**
 Local Government Area (Council): **MURRINDINDI** www.murrindindi.vic.gov.au
 Council Property Number: **7194**
 Planning Scheme: **Murrindindi** [Planning Scheme - Murrindindi](#)
 Directory Reference: **Vicroads 61 F9**

UTILITIES

Rural Water Corporation: **Goulburn-Murray Water**
 Urban Water Corporation: **Goulburn Valley Water**
 Melbourne Water: **Outside drainage boundary**
 Power Distributor: **AUSNET**

STATE ELECTORATES

Legislative Council: **NORTHERN VICTORIA**
 Legislative Assembly: **EILDON**

OTHER

Registered Aboriginal Party: **Taungurung Land and Waters Council Aboriginal Corporation**

[View location in VicPlan](#)

Planning Zones

[TOWNSHIP ZONE \(TZ\)](#)
[SCHEDULE TO THE TOWNSHIP ZONE \(TZ\)](#)



INIZ - Industrial 1
 LDRZ - Low Density Residential
 PPRZ - Public Park and Recreation
 TZ - Township
 Water course

Note: labels for zones may appear outside the actual zone - please compare the labels with the legend.

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Notwithstanding this disclaimer, a vendor may rely on the information in this report for the purpose of a statement that land is in a bushfire prone area as required by section 32C (b) of the Sale of Land 1962 (Vic).

PLANNING PROPERTY REPORT: 18 PRATTS ROAD KINGLAKE WEST 3757

Page 1 of 3

PLANNING PROPERTY REPORT



Planning Overlay

BUSHFIRE MANAGEMENT OVERLAY (BMO)



BMO - Bushfire Management Overlay **Water course**

Note: due to overlaps, some overlays may not be visible, and some colours may not match those in the legend.

Further Planning Information

Planning scheme data last updated on 8 February 2023.

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 <https://www.planning.vic.gov.au>

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 affect the land. To obtain a Planning Certificate go to Titles and Property Certificates at Landata - <https://www.landata.vic.gov.au>

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 <https://mapshare.maps.vic.gov.au/vicplan>

For other information about planning in Victoria visit <https://www.planning.vic.gov.au>

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PLANNING PROPERTY REPORT



Designated Bushfire Prone Areas

This property is in a designated bushfire prone area. Special bushfire construction requirements apply to the part of the property mapped as a designated bushfire prone area (BPA). Planning provisions may apply.

Where part of the property is mapped as BPA, if no part of the building envelope or footprint falls within the BPA area, the BPA construction requirements do not apply.

Note: the relevant building surveyor determines the need for compliance with the bushfire construction requirements.



Designated BPA are determined by the Minister for Planning following a detailed review process. The Building Regulations 2018, through adoption of the Building Code of Australia, apply bushfire protection standards for building works in designated BPA.

Designated BPA maps can be viewed on VicPlan at <https://mapshare.vic.gov.au/vicplan/> or at the relevant local council.

Create a BPA definition plan in VicPlan to measure the BPA.

Information for lot owners building in the BPA is available at <https://www.planning.vic.gov.au/>.

Further information about the building control system and building in bushfire prone areas can be found on the Victorian Building Authority website <https://www.vba.vic.gov.au/>. Copies of the Building Act and Building Regulations are available from <http://www.legislation.vic.gov.au/>. For Planning Scheme Provisions in bushfire areas visit <https://www.planning.vic.gov.au/>.

Native Vegetation

Native plants that are indigenous to the region and important for biodiversity might be present on this property. This could include trees, shrubs, herbs, grasses or aquatic plants. There are a range of regulations that may apply including need to obtain a planning permit under Clause 52.17 of the local planning scheme. For more information see [Native Vegetation \(Clause 52.17\)](#) with local variations in [Native Vegetation \(Clause 52.17\) Schedule](#).

To help identify native vegetation on this property and the application of Clause 52.17 please visit the Native Vegetation Information Management system <https://nvm.delwp.vic.gov.au/> and [Native vegetation \(environment.vic.gov.au\)](#) or please contact your relevant council.

You can find out more about the natural values on your property through NatureKit [NatureKit \(environment.vic.gov.au\)](#)

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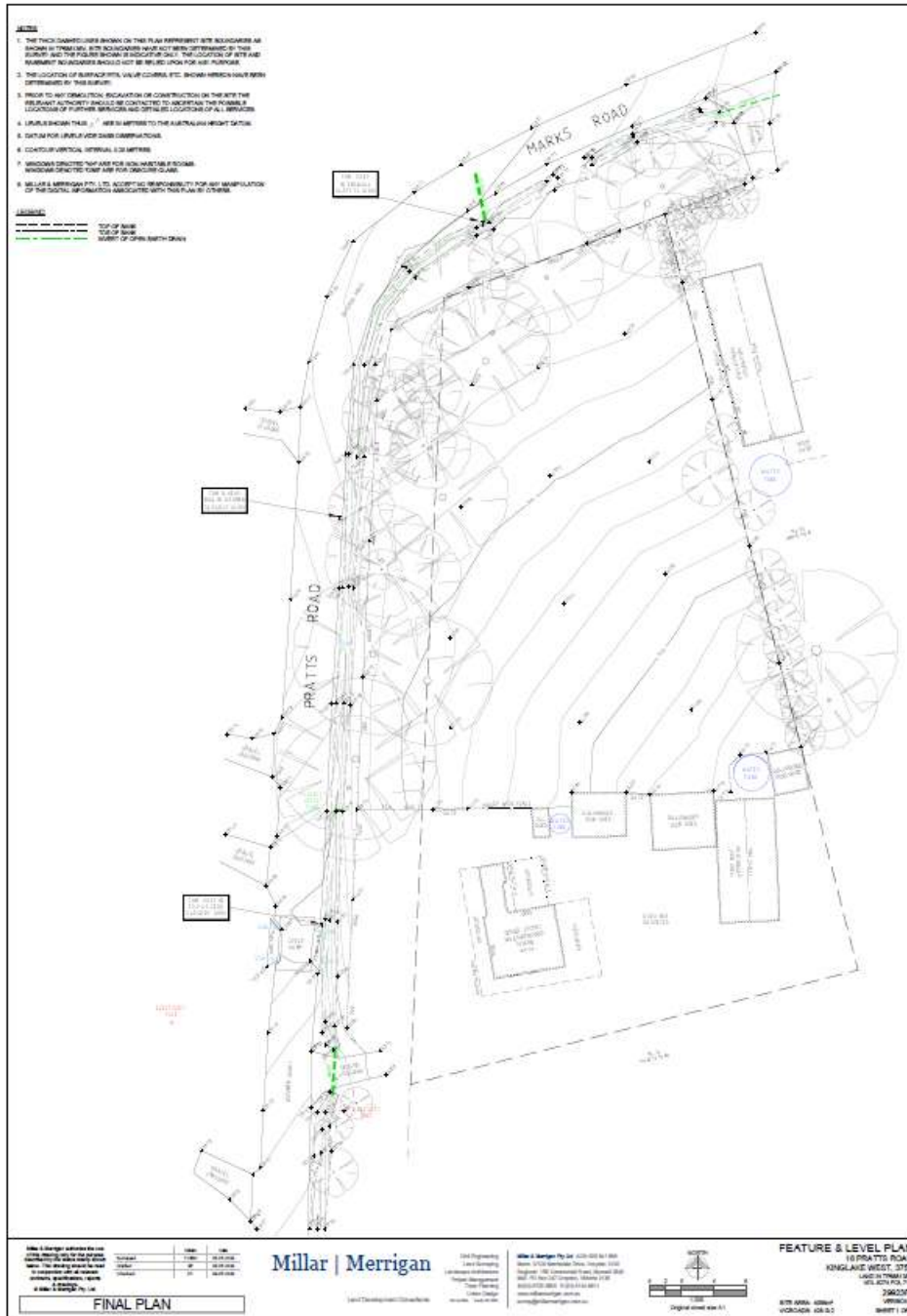
Notwithstanding this disclaimer, a vendor may rely on the information in this report for the purpose of a statement that land is in a bushfire prone area as required by section 32C (b) of the Sale of Land 1962 (Vic).

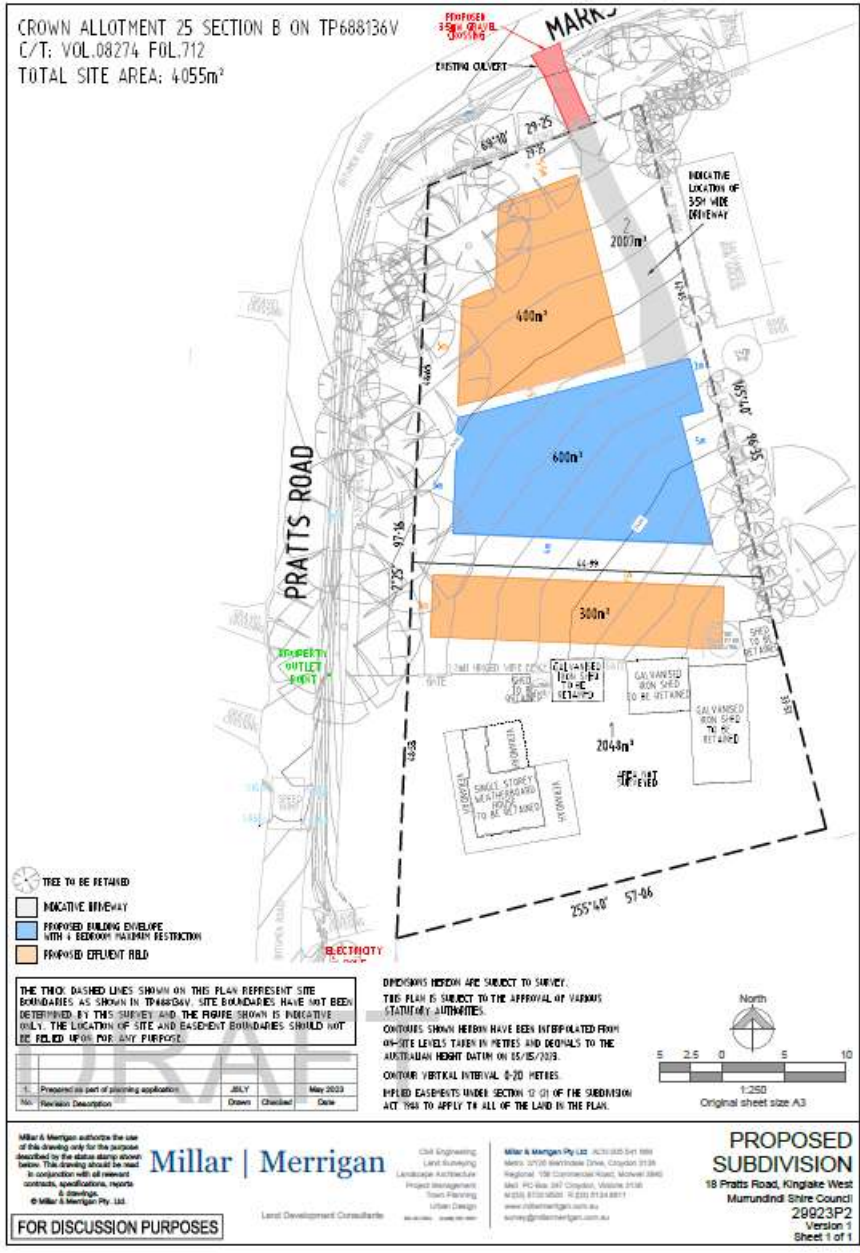
PLANNING PROPERTY REPORT: 18 PRATTS ROAD KINGLAKE WEST 3757

Page 3 of 3

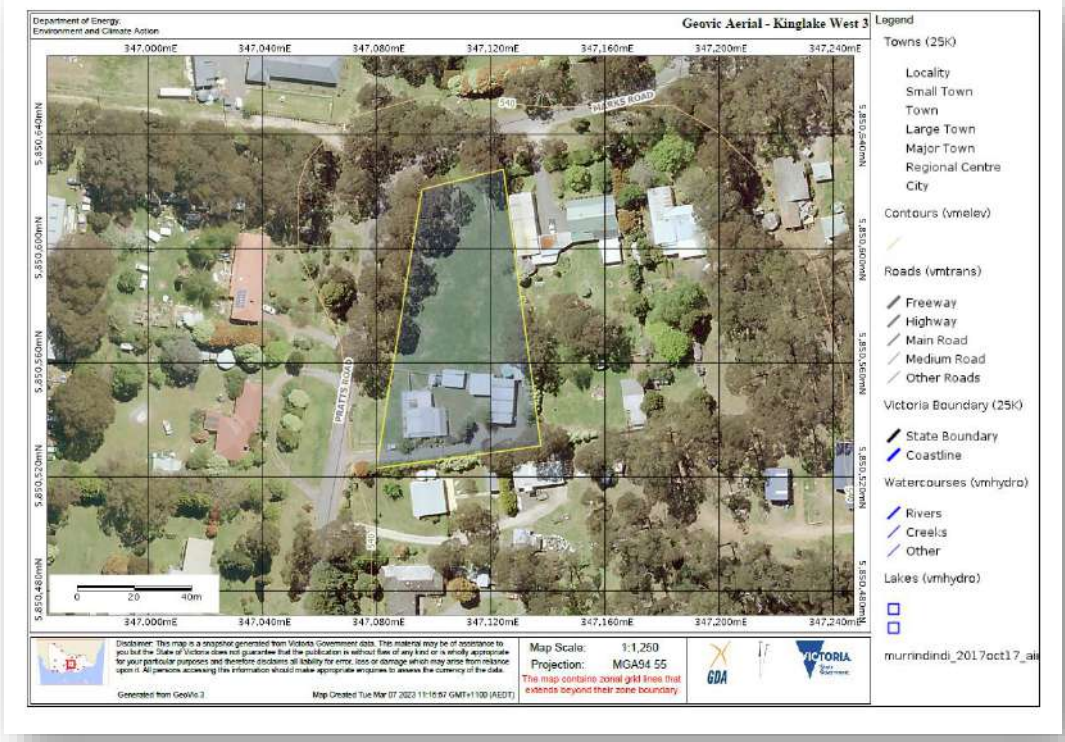
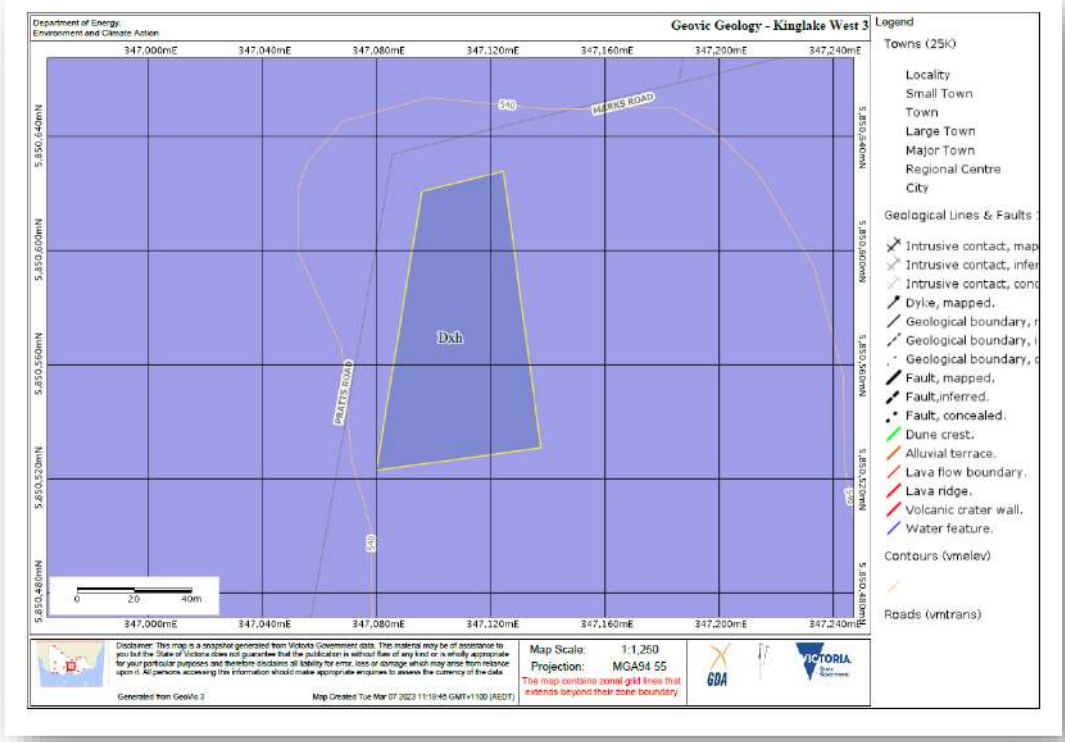
APPENDIX ii

**PROPOSED DEVELOPMENT PLAN,
MAPSHARE, GEOVIC & AERIAL
PHOTO**



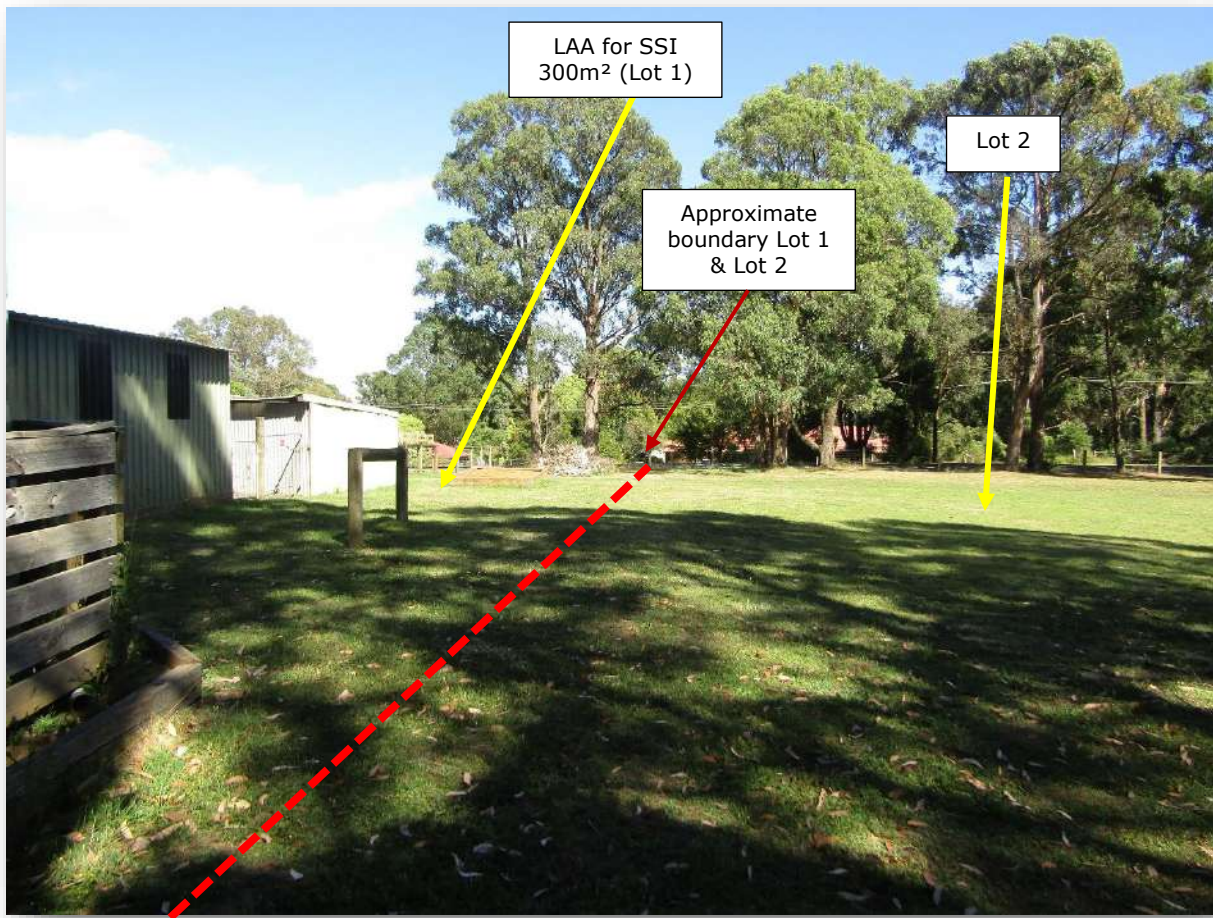






APPENDIX iii

EXISTING CONDITIONS



P1 - View towards the west depicting the proposed SSI location for secondary treated wastewater – existing dwelling – 300m² (Proposed Lot 1, 18 Pratts Road, Kinglake West).



P2 – View towards the west depicting the proposed LAA area for secondary treated wastewater (Proposed Lot 2, 18 Pratts Road, Kinglake West).



P3 – View towards the south proposed Lot 1 & Lot 2 with locations for wastewater SSI (Proposed Lot 1 & Lot 2, 18 Pratts Road, Kinglake West).

APPENDIX iv

**CLIMATE STATISTICS TEMPERATURE TOOLANGI (MOUNT ST LEONHARD
(086142) & RAINFALL KINGLAKE WEST CLIMATE STATION (086374)**

Australian Government Bureau of Meteorology

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[Bureau Home](#) > [Climate](#) > [Climate Data Online](#) > Monthly Statistics

Climate statistics for Australian locations

Monthly climate statistics

All years of record

[About Climate statistics](#) | [Data file of statistics for this site \(csv\)](#) | [Site selection menu](#)

Summary statistics TOOLANGI (MOUNT ST LEONARD DPI)
 A summary of the major climate statistics recorded at this site is provided below. There is also an extended table with more statistics available. More [detailed data for individual sites](#) is available.

Site information

Site name: TOOLANGI (MOUNT ST LEONARD DPI)
 Site number: 086142
 Latitude: 37.57°S Longitude: 145.50°E
 Elevation: 595 m
 Commenced: 1953 Status: Open
 Latest available data: 31 May 2018

Additional information

Additional site information

Nearest alternative sites

- 086050 BADGER CRK SANCTUARY (12.0km)
- 090383 COLDSTREAM (18.6km)
- 086243 MOUNT DANDENONG GTV9 (31.5km)

[View larger map](#)

0 100 300 500 800m
 Elevation - metres

View: Main statistics All available | Period: | Text size: Normal Large

Statistics	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Years	Plot	Map
Temperature																
Mean maximum temperature (°C)	22.7	23.2	20.4	16.1	12.3	9.5	6.0	9.8	12.3	15.4	18.0	20.9	15.8	44	1953 2006	
Mean minimum temperature (°C)	10.9	11.8	10.6	8.7	6.8	4.7	3.8	4.1	5.2	6.6	7.7	9.5	7.5	44	1953 2006	
Rainfall																
Mean rainfall (mm)	85.7	74.6	85.1	104.6	122.7	110.3	110.9	137.1	136.2	129.2	126.3	116.7	1267.0	55	1953 2018	
Decile 5 (median) rainfall (mm)	62.5	70.4	79.7	96.0	113.9	110.8	110.2	138.4	128.4	119.7	121.2	104.2	1359.0	62	1953 2018	
Mean number of days of rain ≥ 1 mm	7.5	6.1	8.3	9.1	12.5	12.9	14.8	15.1	12.9	12.1	10.4	9.0	130.7	62	1953 2018	
Other daily elements																
Mean daily sunshine (hours)	7.5	7.7	6.1	5.0	3.3	2.6	2.7	3.4	4.2	5.5	6.3	6.4	5.1	31	1955 2001	
Mean number of clear days														1	1955 1956	
Mean number of cloudy days														1	1955 1956	
9 am conditions																
Mean 9am temperature (°C)	14.0	15.5	13.8	11.3	8.8	6.3	5.4	6.1	7.9	10.1	11.6	13.4	10.4	45	1953 2006	
Mean 9am relative humidity (%)	76	75	76	79	83	85	85	82	79	77	77	77	79	45	1953 2006	
Mean 9am wind speed (km/h)	12.5	12.0	11.8	12.1	12.7	13.0	14.1	14.5	14.0	13.8	13.1	11.9	13.0	33	1953 2006	
9am wind speed vs direction plot																
3 pm conditions																
Mean 3pm temperature (°C)														1	1955 1956	
Mean 3pm relative humidity (%)														1	1955 1956	
Mean 3pm wind speed (km/h)														0	1955 1956	
3pm wind speed vs direction plot																

red = highest value blue = lowest value

Product IDCJCM0026 Prepared at Thu 05 Jul 2018 02:24:05 AM EST

Related information

Maps

- Long term [climatology maps](#) for selected elements
- [Rainfall maps](#) and [temperature maps](#) based on recent observations

Recent observations for this site

- Daily Weather Observations from this site are included in the Daily Weather Observations

Climate outlooks

- Monthly and seasonal [climate outlooks](#)

Additional climate information

- [Weather station directory](#)
- [Climate and oceans data and analysis](#)

Page created: Thu 05 Jul 2018 02:24:05 AM EST

WARNINGS

WATER | CLIMATE | ENVIRONMENT

Tropical Cyclones
 Tsunami Warning Centre
 Agriculture - Water and the Land

MetEye™

National Weather Services
 Aviation Weather Services
 Defence Services
 Space Weather Services

Facebook | Twitter
 YouTube | Blog
 Google+ | RSS

Careers | Sitemap | Feedback

Freedom of Information

Monthly Rainfall (millimetres)

KINGLAKE WEST

Station Number: 086374 · State: VIC · Opened: 1989 · Status: Open · Latitude: 37.47°S · Longitude: 145.26°E · Elevation: 490 m

Statistics for this station calculated over all years of data

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean	65.2	60.9	60.9	87.3	89.9	103.1	101.7	116.5	107.0	93.0	99.1	87.9	1040.5
Lowest	3.6	1.4	20.6	19.2	26.8	23.8	11.6	48.4	38.8	26.6	42.8	10.2	704.4
5th percentile	7.4	4.7	23.5	25.0	32.2	35.8	42.6	50.9	53.1	29.0	54.4	19.8	807.6
10th percentile	17.3	15.3	28.2	29.0	40.4	56.7	50.0	57.4	59.0	36.7	55.3	39.7	845.3
Median	66.5	59.5	56.0	85.2	87.0	107.5	102.8	121.3	89.8	75.3	84.8	71.9	1056.8
90th percentile	111.6	109.6	97.0	151.8	148.0	146.6	150.5	166.0	174.2	183.0	183.2	155.2	1215.9
95th percentile	116.2	135.6	115.5	166.9	168.1	151.6	165.2	176.1	196.2	194.3	192.1	182.1	1332.7
Highest	179.0	211.6	125.2	260.2	205.2	171.4	174.6	177.2	216.4	200.2	209.8	239.4	1499.3

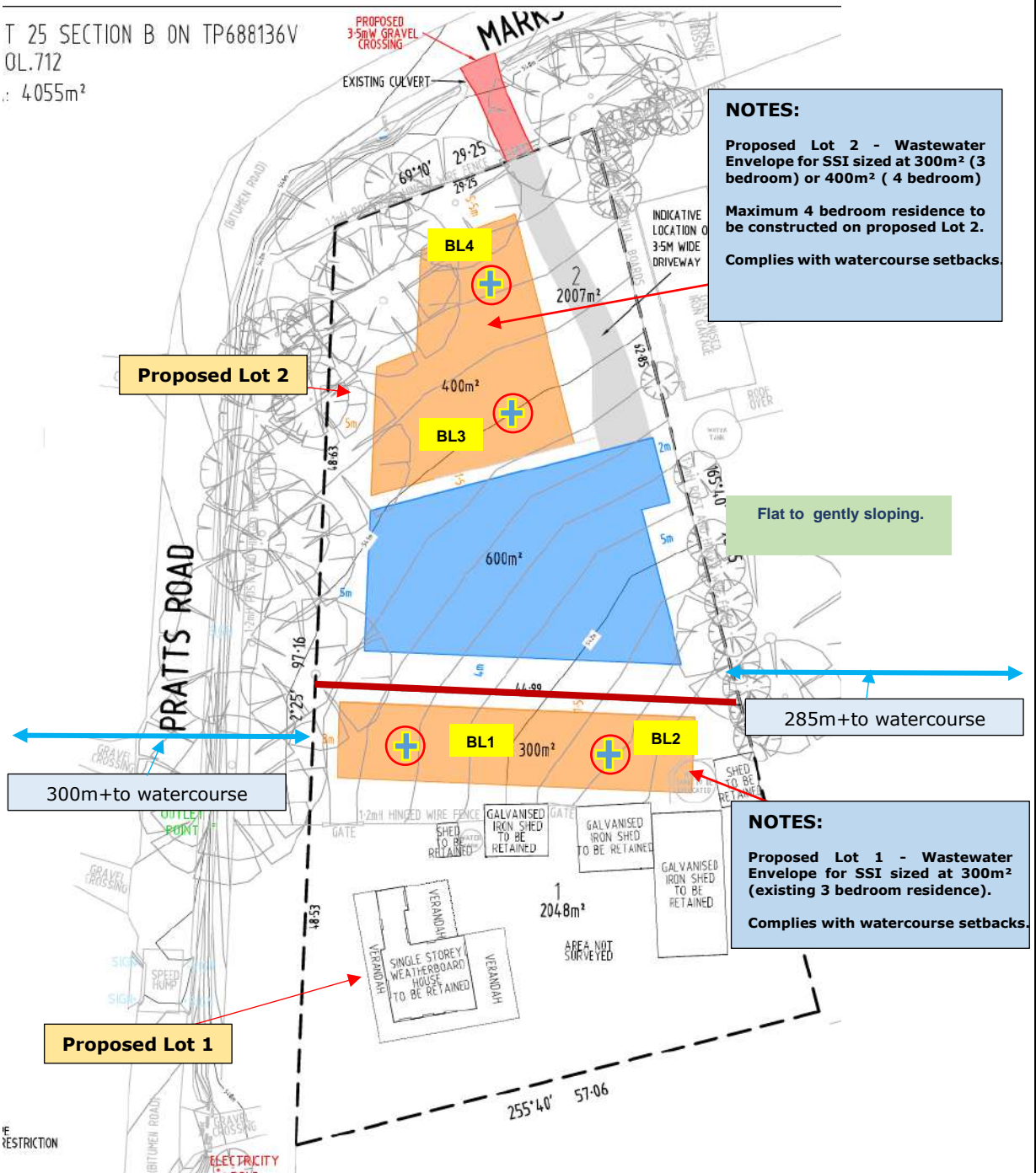
TEST SITE LOCATION PLAN

BORE LOG LOCATION PLAN & PROPOSED LAA
 (NOT TO SCALE)
 18 Pratts Road, Kinglake West

Date: 27/09/21



T 25 SECTION B ON TP688136V
 OL.712
 : 4055m²



NOTES:
 Proposed Lot 2 - Wastewater Envelope for SSI sized at 300m² (3 bedroom) or 400m² (4 bedroom)
 Maximum 4 bedroom residence to be constructed on proposed Lot 2.
 Complies with watercourse setbacks

Flat to gently sloping.

285m+to watercourse

300m+to watercourse

NOTES:
 Proposed Lot 1 - Wastewater Envelope for SSI sized at 300m² (existing 3 bedroom residence).
 Complies with watercourse setbacks.

APPENDIX vii

**PROPOSED LOT 1 & LOT 2 – WATER & NITROGEN BALANCES
(600L/D & 750L/D)**

Nominated Area Water Balance & Storage Calculations - Sub surface Irrigation

Site Address: Proposed Lot 1 18 Pratts Road Kinglake West

INPUT DATA

Design Wastewater Flow	Q	600	L/day
Design DIR	DI R	24.5	mm/week
Daily DIR		3.5	mm/day
Nominated Land Application Area	L	350	m sq
Crop Factor	C	0.7-0.8	unitless
Retained Rainfall	Rf	0.8	unitless
Rainfall Data	Kinglake West Climate Station (086374)		
Evaporation Data	Viewbank monthly (2015-2016)		

600
Ave hydraulic load

Parameter	Symbol	Formula	Units	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Days in month	D	\	days	31	28	31	30	31	30	31	31	30	31	30	31	365
Rainfall	R	\	mm/month	65.2	60.9	60.9	87.3	89.9	103.1	101.7	112.5	107	93	99.1	87.9	1068.5
Evaporation	E	\	mm/month	229.4	205.2	171.2	191.2	109	69.8	69.6	79.2	121.8	225.6	189	278.2	1939.2
Crop Factor	C			0.80	0.80	0.80	0.75	0.70	0.65	0.65	0.65	0.70	0.80	0.80	0.80	
OUTPUTS																
Evapotranspiration	ET	ExC	mm/month	183.5	164.2	137.0	143.4	76.3	45.4	45.2	51.5	85.3	180.5	151.2	222.6	1485.33
Percolation	B	(DIR/7)*D	mm/month	106.5	98	106.5	105.0	108.5	105.0	108.5	105.0	105.0	108.5	105.0	106.5	1277.5
Outputs		ET+B	mm/month	292.0	262.16	245.5	248.4	184.8	150.4	153.7	160.0	190.3	289.0	256.2	331.1	2763.4
INPUTS																
Retained Rainfall	RR	R*RF	mm/month	52.16	48.72	48.72	69.84	71.92	62.48	61.36	90	85.6	74.4	79.28	70.32	854.8
Effluent Irrigation	W	(Qx/D)/L	mm/month	53.1	48.0	53.1	51.4	53.1	51.4	53.1	53.1	51.4	53.1	51.4	53.1	625.7
Inputs		RR+W	mm/month	105.3	96.7	101.9	121.3	125.1	133.9	134.5	143.1	137.0	127.5	130.7	123.5	1480.5
STORAGE CALCULATION																
Storage remaining from previous month			mm/month	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Storage for the month	S	(RR+W)-(ET+B)	mm/month	-186.7	-166.4	-143.6	-127.1	-99.7	-16.5	-19.2	-16.8	-53.2	-161.4	-126.5	-207.6	-548.4
Cumulative Storage	M		mm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Storage for Nominated Area	N		mm	0.00												0.0
	V	NxL	L	0												
LAND AREA REQUIRED FOR ZERO STORAGE																
			m ²	78	79	95	101	165	265	257	266	172	87	102	71	
MINIMUM AREA REQUIRED FOR ZERO STORAGE:				265.8 m ²												

Nitrogen Balance

Site Address: Lot 1, 18 Pratts Road, Kinglake West

SUMMARY - LAND APPLICATION AREA REQUIRED BASED NITROGEN BALANCE 199 m²

INPUT DATA¹

Wastewater Loading			Nutrient Crop Uptake					
Hydraulic Load	600	L/day	Crop N Uptake	220	kg/ha/yr	which equals	60.27	mg/m ² /day
Effluent N Concentration	25	mg/L						
% N Lost to Soil Processes (Geary & Gardner 1996)	0.2	Decimal						
Total N Loss to Soil	3000	mg/day						
Remaining N Load after soil loss	12000	mg/day						

NITROGEN BALANCE BASED ON ANNUAL CROP UPTAKE RATES

Minimum Area required with zero buffer		Determination of Buffer Zone Size for a Nominated Land Application Area (LAA)			
Nitrogen	199	m ²	Nominated LAA Size	300	m ²
			Predicted N Export from LAA	-2.22	kg/year
			Minimum Buffer Required for excess nutrient	0	m ²

Nominated Area Water Balance & Storage Calculations - Sub surface Irrigation

Site Address: Proposed Lot 2 18 Pratts Road Kinglake West

INPUT DATA

Design Wastewater Flow	Q	600	L/day
Design DIR	DI R	24.5	mm/week
Daily DIR		3.5	mm/day
Nominated Land Application Area	L	350	m sq
Crop Factor	C	0.7-0.8	unitless
Retained Rainfall	Rf	0.8	unitless
Rainfall Data	Kinglake West Climate Station (086374)		
Evaporation Data	Viewbank monthly (2015-2016)		

600 Ave hydraulic load

Parameter	Symbol	Formula	Units	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Days in month	D	\	days	31	28	31	30	31	30	31	31	30	31	30	31	365
Rainfall	R	\	mm/month	65.2	60.9	60.9	87.3	89.9	103.1	101.7	112.5	107	93	99.1	87.9	1068.5
Evaporation	E	\	mm/month	229.4	205.2	171.2	191.2	109	69.8	69.6	79.2	121.8	225.6	189	278.2	1339.2
Crop Factor	C	\		0.80	0.80	0.80	0.75	0.70	0.65	0.65	0.65	0.70	0.80	0.80	0.80	
OUTPUTS																
Evapotranspiration	ET	ExC	mm/month	183.5	164.2	137.0	143.4	76.3	45.4	45.2	51.5	85.3	180.5	151.2	222.6	1485.93
Percolation	B	(DIR7)/D	mm/month	108.5	98	108.5	105.0	108.5	105.0	108.5	108.5	105.0	108.5	105.0	108.5	1277.5
Outputs		ET+B	mm/month	292.0	262.16	245.5	248.4	184.8	150.4	153.7	160.0	190.3	289.0	256.2	331.1	2763.4
INPUTS																
Retained Rainfall	RR	R/Rf	mm/month	52.16	48.72	48.72	69.84	71.92	82.48	81.36	90	85.6	74.4	79.28	70.32	854.8
Effluent Irrigation	W	(Q/D)/L	mm/month	53.1	48.0	53.1	51.4	53.1	51.4	53.1	53.1	51.4	53.1	51.4	53.1	625.7
Inputs		RR+W	mm/month	105.3	96.7	101.9	121.3	125.1	133.9	134.5	143.1	137.0	127.5	130.7	123.5	1480.5
STORAGE CALCULATION																
Storage remaining from previous month	D	\	mm/month	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Storage for the month	S	(RR+W)-(ET+B)	mm/month	-156.7	-165.4	-143.6	-127.1	-89.7	-16.5	-19.2	-16.8	-53.2	-161.4	-125.5	-207.6	-548.4
Cumulative Storage	M	\	mm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Storage for Nominated Area	N	\	mm	0.00												0.0
	V	NxL	L	0												
LAND AREA REQUIRED FOR ZERO STORAGE			m ²	78	79	95	101	165	265	257	266	172	87	102	71	
MINIMUM AREA REQUIRED FOR ZERO STORAGE:			m ²	265.8												

Nitrogen Balance

Site Address: Lot 2, 18 Pratts Road, Kinglake West

SUMMARY - LAND APPLICATION AREA REQUIRED BASED NITROGEN BALANCE 199 m²

INPUT DATA¹

Wastewater Loading			Nutrient Crop Uptake					
Hydraulic Load	600	L/day	Crop N Uptake	220	kg/ha/yr	which equals	60.27	mg/m ² /day
Effluent N Concentration	25	mg/L						
% N Lost to Soil Processes (Geary & Gardner 1996)	0.2	Decimal						
Total N Loss to Soil	3000	mg/day						
Remaining N Load after soil loss	12000	mg/day						

NITROGEN BALANCE BASED ON ANNUAL CROP UPTAKE RATES

Minimum Area required with zero buffer		Determination of Buffer Zone Size for a Nominated Land Application Area (LAA)			
Nitrogen	199	m ²	Nominated LAA Size	300	m ²
			Predicted N Export from LAA	-2.22	kg/year
			Minimum Buffer Required for excess nutrient	0	m ²

Nominated Area Water Balance & Storage Calculations - Sub surface Irrigation

Site Address: Proposed Lot 2 18 Pratts Road Kinglake West

INPUT DATA

Design Wastewater Flow	Q	750	L/day
Design DIR	DI R	24.5	mm/week
Daily DIR		3.5	mm/day
Nominated Land Application Area	L	350	m sq
Crop Factor	C	0.7-0.8	unitless
Retained Rainfall	Rf	0.8	unitless
Rainfall Data	Kinglake West Climate Station (086374)		
Evaporation Data	Viewbank monthly (2015-2016)		

750

 Ave hydraulic load

Parameter	Symbol	Formula	Units	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Days in month	D	\	days	31	29	31	30	31	30	31	31	30	31	30	31	365
Rainfall	R	\	mm/month	55.2	60.9	60.9	87.3	89.9	103.1	101.7	112.5	107	93	99.1	87.9	1068.5
Evaporation	E	\	mm/month	229.4	205.2	171.2	191.2	109	69.8	69.6	79.2	121.8	225.6	189	278.2	1938.2
Crop Factor	C			0.80	0.80	0.80	0.75	0.70	0.65	0.65	0.70	0.75	0.80	0.80	0.80	
OUTPUTS																
Evapotranspiration	ET	EvC	mm/month	183.5	164.2	137.0	143.4	76.3	45.4	45.2	55.4	91.4	180.5	151.2	222.6	1485.98
Percolation	B	(DIR/7)xD	mm/month	108.5	98	108.5	105.0	108.5	105.0	108.5	108.5	105.0	108.5	105.0	108.5	1277.5
Outputs		ET+B	mm/month	292.0	262.16	245.5	248.4	184.8	150.4	153.7	163.9	196.4	289.0	256.2	331.1	2773.5
INPUTS																
Retained Rainfall	RR	R/Rf	mm/month	52.16	48.72	48.72	69.84	71.92	82.48	81.36	90	85.6	74.4	79.28	70.32	854.8
Effluent Irrigation	W	(QxD)/L	mm/month	66.4	60.0	66.4	64.3	66.4	64.3	66.4	66.4	64.3	66.4	64.3	66.4	782.1
Inputs		RR+W	mm/month	118.6	108.7	115.1	134.1	138.3	146.8	147.8	156.4	149.9	140.8	143.6	136.7	1636.9
STORAGE CALCULATION																
Storage remaining from previous month			mm/month	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Storage for the month	S	(RR+W)-(ET+B)	mm/month	-173.4	-153.4	-130.3	-114.3	-46.5	-3.6	-6.0	-7.5	-46.5	-148.2	-112.6	-194.3	-461.5
Cumulative Storage	M		mm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Storage for Nominated Area	N		mm	0.00												
	V	NxL	L	0												
LAND AREA REQUIRED FOR ZERO STORAGE																
			m ²	97	98	118	126	206	331	321	314	203	108	127	89	
MINIMUM AREA REQUIRED FOR ZERO STORAGE:				331.4 m ²												

Nitrogen Balance

Site Address: Lot 2, 18 Pratts Road, Kinglake West

SUMMARY - LAND APPLICATION AREA REQUIRED BASED NITROGEN BALANCE 249 m²

INPUT DATA¹

Wastewater Loading			Nutrient Crop Uptake					
Hydraulic Load	750	L/day	Crop N Uptake	220	kg/ha/yr	which equals	60.27	mg/m ² /day
Effluent N Concentration	25	mg/L						
% N Lost to Soil Processes (Geary & Gardner 1996)	0.2	Decimal						
Total N Loss to Soil	3750	mg/day						
Remaining N Load after soil loss	15000	mg/day						

NITROGEN BALANCE BASED ON ANNUAL CROP UPTAKE RATES

Minimum Area required with zero buffer			Determination of Buffer Zone Size for a Nominated Land Application Area (LAA)		
Nitrogen	249	m ²	Nominated LAA Size	300	m ²
			Predicted N Export from LAA	-1.13	kg/year
			Minimum Buffer Required for excess nutrient	0	m ²

APPENDIX vi

BORELOGS



BORELOG SHEET

CLIENT: Millar Merrigan C/O Travis Davies
 PROJECT ADDRESS: 18 Pratts Road, Kinglake West
 JOB NO: 45EO23 LCA SUB
 FIELD WORK DATE: 14/02/23
 LOGGED BY: Rob Krainz
 DRILLING METHOD: 90mm Mechanical Auger, 100mm Earth Auger, Shovel and Crowbar

BORELOG 1				BORELOG 2			
DEPTH	Soil Profile	Clr	Fill	DEPTH	SOIL PROFILE	Clr	Fill
100mm	Loam (Or Br)			100mm	Loam (Or Br)		
200mm	Moist			200mm	Moist		
300mm	Clay Loam (Or Br)			300mm			
400mm	Damp			400mm	Clay Loam (Or Br)		
500mm				500mm	Damp		
600mm				600mm			
700mm				700mm			
800mm				800mm			
900mm	Light Clay (Or Br)			900mm			
1000mm	Damp			1000mm	Light Clay (Or Br)		
1100mm	Medium Clay (Or Br)			1100mm	Damp		
1200mm	Damp			1200mm	Medium Clay (Or Br)		
1300mm	Slightly Mottled			1300mm	Damp		
1400mm				1400mm	Slightly Mottled		
1500mm				1500mm			
1600mm	End Log			1600mm	End Log		
1700mm				1700mm			
1800mm				1800mm			
1900mm				1900mm			
2000mm				2000mm			
2100mm				2100mm			

BORELOG 3				BORELOG 4			
DEPTH	Soil Profile	Clr	Fill	DEPTH	SOIL PROFILE	Clr	Fill
100mm	Loam (Or Br)			100mm	Loam (Or Br)		
200mm	Moist			200mm	Moist		
300mm	Clay Loam (Or Br)			300mm			
400mm	Clay Loam (Or Br)			400mm	Clay Loam (Or Br)		
500mm	Damp			500mm	Damp		
600mm				600mm			
700mm				700mm			
800mm	Light Clay (Or Br)			800mm			
900mm	Damp			900mm	Light Clay (Or Br)		
1000mm				1000mm	Damp		
1100mm	Medium Clay (Or Br)			1100mm			
1200mm	Damp			1200mm	Medium Clay (Or Br)		
1300mm	Slightly Mottled			1300mm	Damp		
1400mm				1400mm	Slightly Mottled		
1500mm				1500mm			
1600mm	End Log			1600mm	End Log		
1700mm				1700mm			
1800mm				1800mm			
1900mm				1900mm			
2000mm				2000mm			
2100mm				2100mm			