PROVINCIAL GEOTECHNICAL PTY. LTD.

CONSULTING GEOLOGISTS

A.B.N. 88 090 400 114

LAND CAPABILITY ASSESSMENT REPORT

Site Address: 2681 Princes Highway
PORT FAIRY, VICTORIA

Client: [redacted]

Date: 27th August 2024

File No: 23004H

Author: Andrew P Redman

Contact: Provincial Geotechnical Pty Ltd
E: admin@pgvic.com.au
T: 03 5223 1566

TABLE OF CONTENTS

LIST OF APPENDICES

1. INTRODUCTION

THE CONSULTANTS

Provincial Geotechnical Pty Ltd has been engaged to undertake a Land Capability Assessment (LCA) for a site at 2681 Princes Highway, Port Fairy, Victoria.

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 Moyne Shire Council for an onsite wastewater management system for a private residence that may be developed on the site.

Provided Plans are appended to provide the nature of the development (Appendix i).

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 <u>sub-surface irrigation.</u>

SITE OVERVIEW

The proposed allotment has been cleared of its original vegetation. The allotment is thickly grassed.

The site slope is slight and variably undulating. The ocean shoreline is over 50m from the site.

Provided Feature & Levels Plans are appended (Appendix ii).

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: 2681 Princes Highway, Port Fairy, Victoria.

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

Client/Agent: [redacted]

Postal Address: [redacted]

Contact: Abe McCarthy Architects, 0437 366 611.

Council Area: Moyne Shire Council.

Zoning: Farming Zone (FZ).

Proposed Allotment Size: 44.99 hectares.

Domestic Water Supply: Assume reticulated supply not 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 12th August 2024.

3.1 SITE KEY FEATURES

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

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

NOTE:

- The site is not likely to experience significant stormwater run-on from Princes Highway.
- 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.

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 684.1mm Port Fairy AWS (Climate Station No.090175) (Appendix v).	Nil	NN
Drainage	No visible signs of surface dampness, 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 cleared. Excellent exposure and aspect.	Nil	NN
Flooding	The proposed effluent management area is located above the 1:100 year flood level (source WSC).	Nil	NN
Groundwater	No signs of shallow groundwater tables to a depth of 3.0m. No known groundwater bores within 20m of the proposed effluent management area.	Nil	NN
Imported Fill	No imported fill material was observed anywhere on the site.	Nil	NN
Land Available for LAA	Considering all the constraints and buffers, the site has ample suitable land for land application of treated effluent.	Nil	NN
Landform	Undulating coastal plain.	Nil	NN
Rock Outcrops	No evidence of surface rocks or outcrops.	Nil	NN
Run-on & Runoff	Negligible stormwater run-on and minor run-off hazard.	Nil	NN
Slope	The proposed effluent management area has negligible fall.	Nil	NN
Surface Waters	No surface water within 30m of proposed lot.	Nil	NN
Vegetation	Thickly grassed.	Nil	NN

NN: Not needed

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.

The soils on site have been derived from Quaternary Sediments (MapCode Qxr/Qa1) which is the regional geological setting. Appended is a Geovic Map indicating the site location (Appendix vi).

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 within the allotment, as shown in the Test Site Location Plan (Appendix vii), using a 100mm hydraulic earth 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 viii). 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 are characterised as sandy loam topsoils overlying a sand. The A1 horizon has a weak structure.

Full Laboratory data results are appended (Appendix ix).

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

3.6 TABLE 2: RISK ASSESSMENT OF SOIL CHARACTERISTICS

Feature	Assessment	Level of Constraint	Mitigation Measures
Cation Exchange Capacity (CEC)	32.4 MEQ%	Moderate	Secondary treatment.
Electrical Conductivity (ECe)	0.132 dS/m	Minor	NN
Emerson Aggregate Class	Topsoil: EA Class 2	Major	Secondary treatment.
	Subsoil: Test not required.	Nil	NN
pH	8.4	Minor	NN
Rock Fragments	<5% coarse fragments throughout the soil profile.	Minor	NN
Sodicity (ESP)	3.0%	Minor	NN
Sodium Absorption Ratio (SAR)	0.18	Nil	NN
Soil Depth	Topsoil: 300mm-400mm	Minor	NN
	Subsoil: >1000mm maximum depth.	Minor	NN
Soil Permeability & Design Loading Rates	Topsoil: Sandy Loam: >3.0mm/day saturated conductivity (K*sat*) to 5.0mm/day Design Irrigation Rate (DIR) for irrigation system (Code, 2016).	Major	Disposal via irrigation
	Subsoil: Sand 5.0mm/day (DIR).	Major	Disposal via irrigation
Soil Texture & Structure	Topsoil (<400mm): Weakly structured Sandy Loam (Category 2a)	Minor	NN
	Subsoil: Weakly structured Sand (Category 1).	Major	Disposal via irrigation
Watertable Depth	Groundwater not encountered. Maximum borehole depth 3000mm.	Nil	NN

NN: Not needed

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;

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 likely to be serviced by town water. It will also ensure that the risk of effluent being transported off-site will be negligible.

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

<u>Example: 4 bedroom dwelling – Five occupants.</u>

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.

The sizings equation can be expressed as:

$A = Q/DIR$

A = irrigation area m^2
Q = daily flow (L/day)
DIR = Design irrigation rate (mm/day) – adopt most constraining horizon.

A = 750/5.0 (sand)
= $250m^2$ (for a 4 bedroom dwelling)

4.4 SIZING THE IRRIGATION SYSTEM CONTINUED:

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 x 750 = 22,500mg/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 x 0.8 = 6,570,000mg/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)

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 must be adopted from the following provided table based upon the number of bedrooms proposed.

4.4 SIZING THE IRRIGATION SYSTEM CONTINUED:

Number of Bedrooms	Number of Occupants	Total Daily Wastewater Flow	Recommended Land Application Area Size
2	3	450	180m^2
3	4	600	240m^2
4	5	750	300m^2
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:

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

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 no preferred envelope of land on the allotment considered better suited for a Land Application Area than any other. I can confirm the 3 areas tested as shown on the provided site plan are suitable, however the Land Application Area could be place anywhere on site, subject to setback requirements.

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

I can confirm an LAA envelope on a provided site plan at a later date if required.

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.

4.5 SITING AND CONFIGURATION OF THE IRRIGATION SYSTEM CONTINUED

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.

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).

All buffer distances are achievable based upon secondary treatment.

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.

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).

6. CONCLUSION

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

AR: hs

7. REFERENCES

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

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

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

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

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

Environment Protection Authority (2016). Publication 891.4 *Code of Practice for Onsite Wastewater Management.*

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

LIST OF APPENDICES

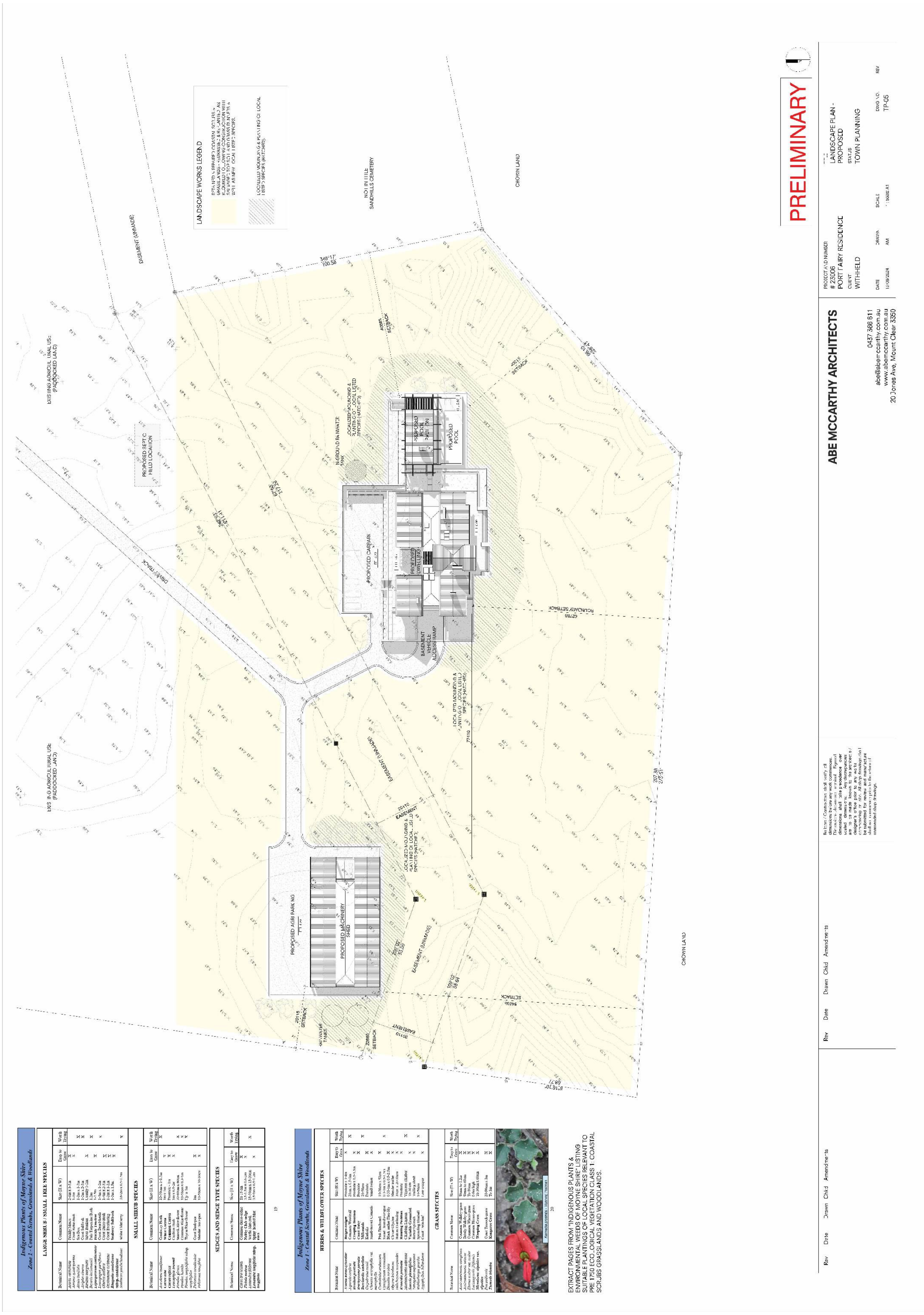
i. Proposed Site Plans
ii. Feature & Levels Plans
iii. Property Report
iv. Aerial and Site Photographs
v. Bureau of Meteorology Climate Report for Port Fairy AWS
vi. Geovic Map
vii. Test Site Location Plan
viii. Borelog Descriptions
ix. Analytical Laboratory Results

APPENDIX i

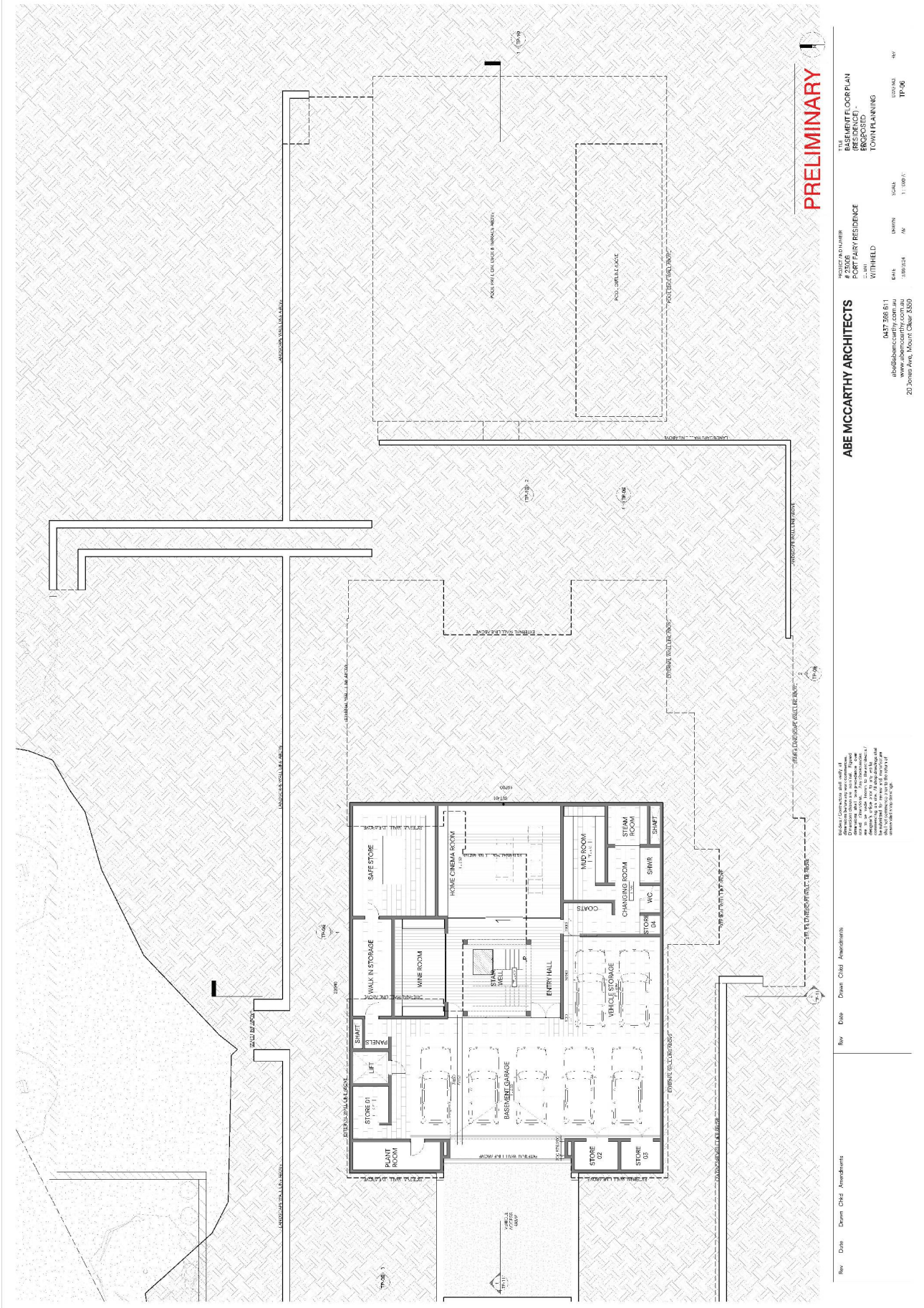
PROPOSED SITE PLANS

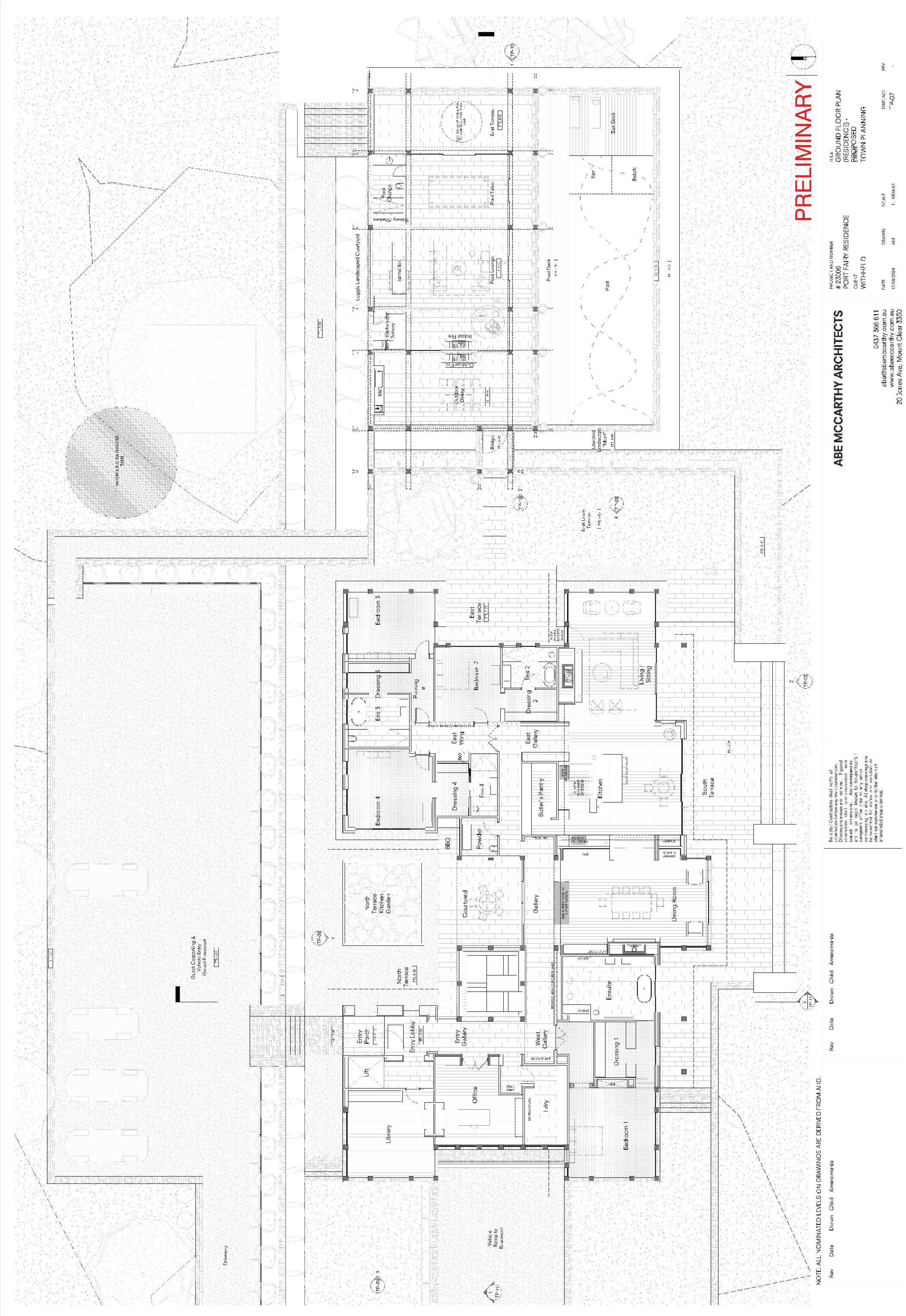
PRELIMINARY
SITE PLAN OVERALL - PROPOSED W. AERIAL
TOWN PLANNING
TP-02
PORT FAIRY RESIDENCE
WITHHELD
ABE MCCARTHY ARCHITECTS
0437 366 611
PRINCES HIGHWAY


NOT IN TITLE
SANDHILLS CEMETERY
GOVT. ROAD
CROWN LAND
PROPOSED SEPTIC FIELD LOCATION
PROPOSED POOL
PROPOSED CARPARK
PROPOSED DWELLING
BASEMENT VEHICLE ACCESS RAMP
NOT FENCED
TBM PEG
RL 4.02m
GOVT. ROAD
PROPOSED AGRI PARK NG
PROPOSED MACHINERY SHED
PC 375165L
39.85ha (PART)
(T=SAME)
PC 375165L
2.479ha (PART)
(T=2.436ha)
CROWN LAND
45.01ha TOTAL
(T=44.97ha)
PRELIMINARY
ABE MCCARTHY ARCHITECTS
0437 366 611
abe@abemccarthy.com.au
www.abemccarthy.com.au
20 Jones Ave, Mount Clear 3350
PROJECT AND NUMBER
23006
PORT FAIRY RESIDENCE
WITHHELD
TOWN PLANNING
SITE PLAN DEVELOPMENT
AREA - PROPOSED
TP-04



PRELIMINARY
ABE MCCARTHY ARCHITECTS
PORT FAIRY RESIDENCE
WITHHELD
LANDSCAPE PLAN - PROPOSED
TOWN PLANNING
TP-05
LANDSCAPE WORKS LEGEND
PROPOSED DWELLING
PROPOSED POOL
PROPOSED CARPARK
PROPOSED MACHINERY SHED
PROPOSED AGRI PARKING
BASEMENT VEHICLE ACCESS RAMP
PROPOSED SEPTIC FIELD LOCATION
CROWN LAND
EXTRACT PAGES FROM "INDIGENOUS PLANTS & ENVIRONMENTAL WEEDS OF MOYNE SHIRE" LISTING SUITABLE PLANTINGS OF LOCAL SPECIES RELEVANT TO PRE 1750 ECOLOGICAL VEGETATION CLASS 1 COASTAL SCRUBS GRASSLANDS AND WOODLANDS.

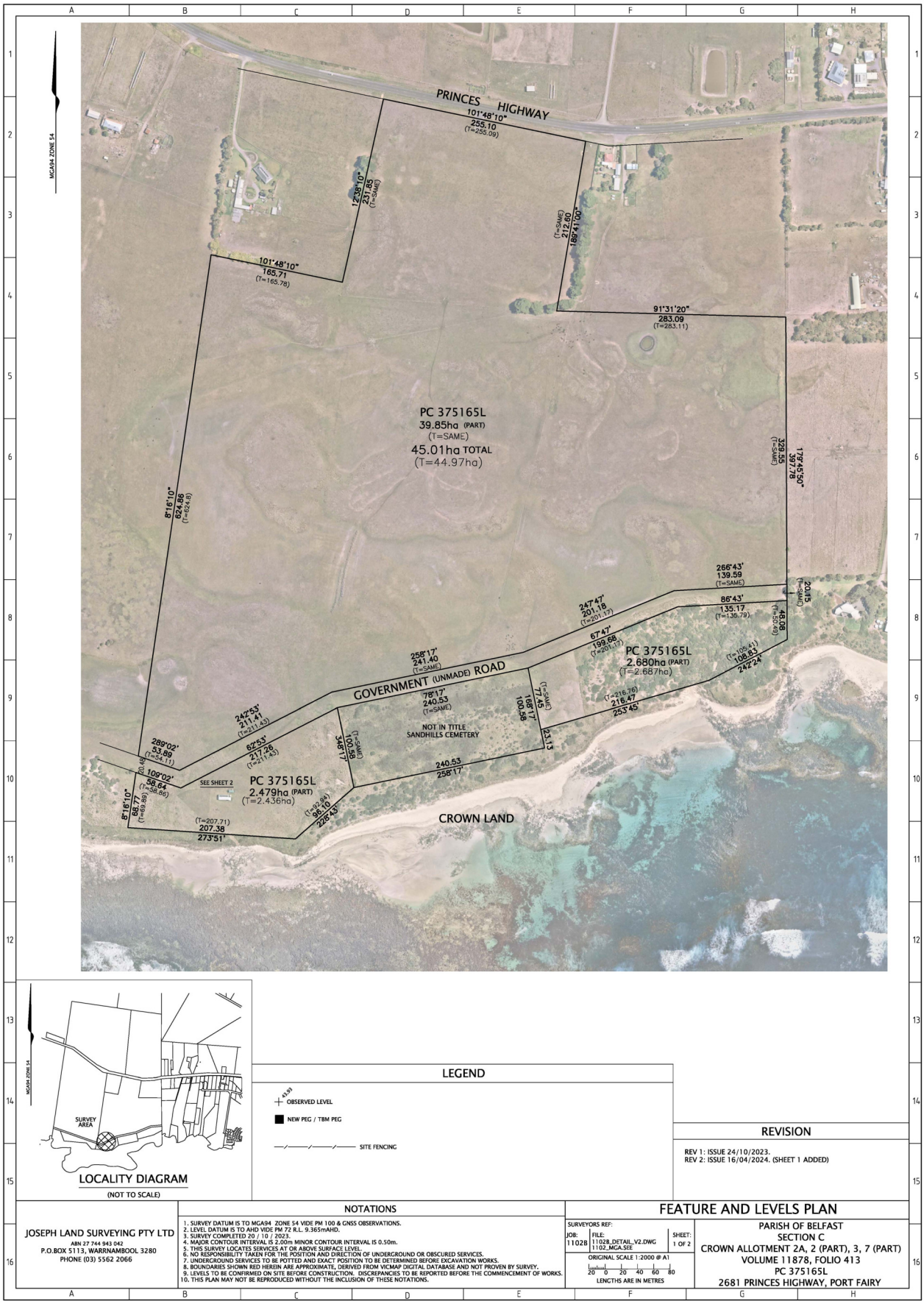

PRELIMINARY
ABE MCCARTHY ARCHITECTS
0437 366 611
abe@abemccarthy.com.au
www.abemccarthy.com.au
20 Jones Ave, Mount Clear 3350
WITHHELD
TOWN PLANNING
TP-06
SAFE STORE
HOME CINEMA ROOM
MUD ROOM
STEAM ROOM
SHAFT
SHWR
WC
CHANGING ROOM
COATS
STORE 04
WALK IN STORAGE
WINE ROOM
STAIR WELL
ENTRY HALL
VEHICLE STORAGE
PANELS
LIFT
STORE 01
BASEMENT GARAGE
PLANT ROOM
STORE 02
STORE 03



PRELIMINARY
ABE MCCARTHY ARCHITECTS
PORT FAIRY RESIDENCE
GROUND FLOOR PLAN
Pool
Kitchen
Dining Room
Bedroom 1
Office
Library
South Terrace
North Terrace

APPENDIX ii

FEATURE & LEVELS PLANS


PRINCES HIGHWAY
101°48'10"
255.10
(T=255.09)
12°38'10"
231.85
(T=SAME)
101°48'10"
165.71
(T=165.78)
(T=SAME)
212.60
189°41'00"
91°31'20"
283.09
(T=283.11)
PC 375165L
39.85ha (PART)
(T=SAME)
45.01ha TOTAL
(T=44.97ha)
8°16'10"
824.86
(T=824.46)
329.55
(T=SAME)
179°45'50"
397.78
266°43'
139.59
(T=SAME)
20.15
(T=SAME)
86°43'
135.17
(T=135.79)
48.08
(T=50.49)
24°7'47"
201.16
(T=201.17)
67°47'
199.66
(T=201.17)
PC 375165L
2.680ha (PART)
(T=2.687ha)
(T=106.41)
106.83
242°24'
(T=216.76)
216.47
253°45'
258°17'
241.40
(T=SAME)
GOVERNMENT (UNMADE) ROAD
78°17'
240.53
(T=SAME)
(T=SAME)
77.68
100.58
NOT IN TITLE
SANDHILLS CEMETERY
242°53'
211.41
(T=211.43)
289°02'
53.89
(T=54.11)
67°53'
217.26
(T=214.63)
(T=SAME)
100.59
348°17'
123.13
240.53
258°17'
109°02'
58.64
(T=58.86)
SEE SHEET 2
PC 375165L
2.479ha (PART)
(T=2.436ha)
8°16'10"
85.77
(T=89.89)
(T=92.84)
96.10
228°43'
(T=207.71)
207.38
273°51'
CROWN LAND
MGA94 ZONE 54
SURVEY AREA
LOCALITY DIAGRAM
(NOT TO SCALE)
LEGEND
43.89
OBSERVED LEVEL
NEW PEG / TBM PEG
SITE FENCING
REVISION
REV 1: ISSUE 24/10/2023.
REV 2: ISSUE 16/04/2024. (SHEET 1 ADDED)
NOTATIONS
1. SURVEY DATUM IS TO MGA94 ZONE 54 VIDE PM 100 & GNSS OBSERVATIONS.
2. LEVEL DATUM IS TO AHD VIDE PM 72 R.L. 9.365mAHD.
3. SURVEY COMPLETED 20 / 10 / 2023.
4. MAJOR CONTOUR INTERVAL IS 2.00m MINOR CONTOUR INTERVAL IS 0.50m.
5. THIS SURVEY LOCATES SERVICES AT OR ABOVE SURFACE LEVEL.
6. NO RESPONSIBILITY TAKEN FOR THE POSITION AND DIRECTION OF UNDERGROUND OR OBSCURED SERVICES.
7. UNDERGROUND SERVICES TO BE POTTED AND EXACT POSITION TO BE DETERMINED BEFORE EXCAVATION WORKS.
8. BOUNDARIES SHOWN RED HEREIN ARE APPROXIMATE, DERIVED FROM VICMAP DIGITAL DATABASE AND NOT PROVEN BY SURVEY.
9. LEVELS TO BE CONFIRMED ON SITE BEFORE CONSTRUCTION. DISCREPANCIES TO BE REPORTED BEFORE THE COMMENCEMENT OF WORKS.
10. THIS PLAN MAY NOT BE REPRODUCED WITHOUT THE INCLUSION OF THESE NOTATIONS.
JOSEPH LAND SURVEYING PTY LTD
ABN 27 744 943 042
P.O.BOX 5113, WARRNAMBOOL 3280
PHONE (03) 5562 2066
FEATURE AND LEVELS PLAN
SURVEYORS REF:
JOB: 11028
FILE: 11028_DETAIL_V2.DWG 1102_MGA.SEE
SHEET: 1 OF 2
ORIGINAL SCALE 1:2000 @ A1
20 0 20 40 60 80
LENGTHS ARE IN METRES
PARISH OF BELFAST
SECTION C
CROWN ALLOTMENT 2A, 2 (PART), 3, 7 (PART)
VOLUME 11878, FOLIO 413
PC 375165L
2681 PRINCES HIGHWAY, PORT FAIRY


FEATURE AND LEVELS PLAN
PARISH OF BELFAST
SECTION C
CROWN ALLOTMENT 2A, 2 (PART), 3, 7 (PART)
VOLUME 11878, FOLIO 413
PC 375165L
2681 PRINCES HIGHWAY, PORT FAIRY
NOTATIONS
REVISION
REV 1 : ISSUE 24/10/2023.
REV 2. ISSUE 16/04/2024. (SHEET 1 ADDED)
JOSEPH I LAND SURVEYING PTY LTD
P.O. BOX 511 S. WARRNAMBOOL 3280
PHONE (03) 5562 2066
NOT IN TITLE
SANDHILLS CEMETERY
GOVT. ROAD
CROWN LAND
NOT FENCED
TBM PEG
R.L. 4.02m AHD
PC 375165L
39.85ha (PART)
(T=SAME)
45.01ha TOTAL
(T=44.97ha)
PC 375165L
2.479ha (PART)
(T=2.435ha)
CROWN LAND
MGA94 ZONE 54

APPENDIX iii

PROPERTY REPORT

PROPERTY REPORT

VICTORIA State Government | Energy, Environment and Climate Action

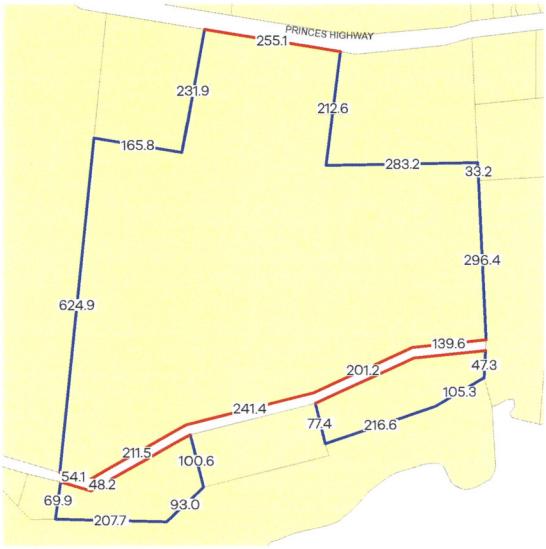
From www.land.vic.gov.au at 02 August 2024 04:40 PM

PROPERTY DETAILS

Address:	**2681 PRINCES HIGHWAY PORT FAIRY 3284**
Lot and Plan Number:	**Plan PC375165**
Standard Parcel Identifier (SPI):	**PC375165**
Local Government Area (Council):	**MOYNE** www.moyne.vic.gov.au
Council Property Number:	**533179**
Directory Reference:	**Vicroads 89 E8**

SITE DIMENSIONS

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



Area: 449852 sq. m (44.99 ha)
Perimeter: 4479 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.

5 overlapping dimension labels are not being displayed

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:	**Southern Rural Water**
Urban Water Corporation:	**Wannon Water**
Melbourne Water:	**Outside drainage boundary**
Power Distributor:	**POWERCOR**

STATE ELECTORATES

Legislative Council:	**WESTERN VICTORIA**
Legislative Assembly:	**SOUTH-WEST COAST**

PLANNING INFORMATION

Property Planning details have been removed from the Property Reports to avoid duplication with the Planning Property Reports from the Department of Transport and Planning which are the authoritative source for all Property Planning information.

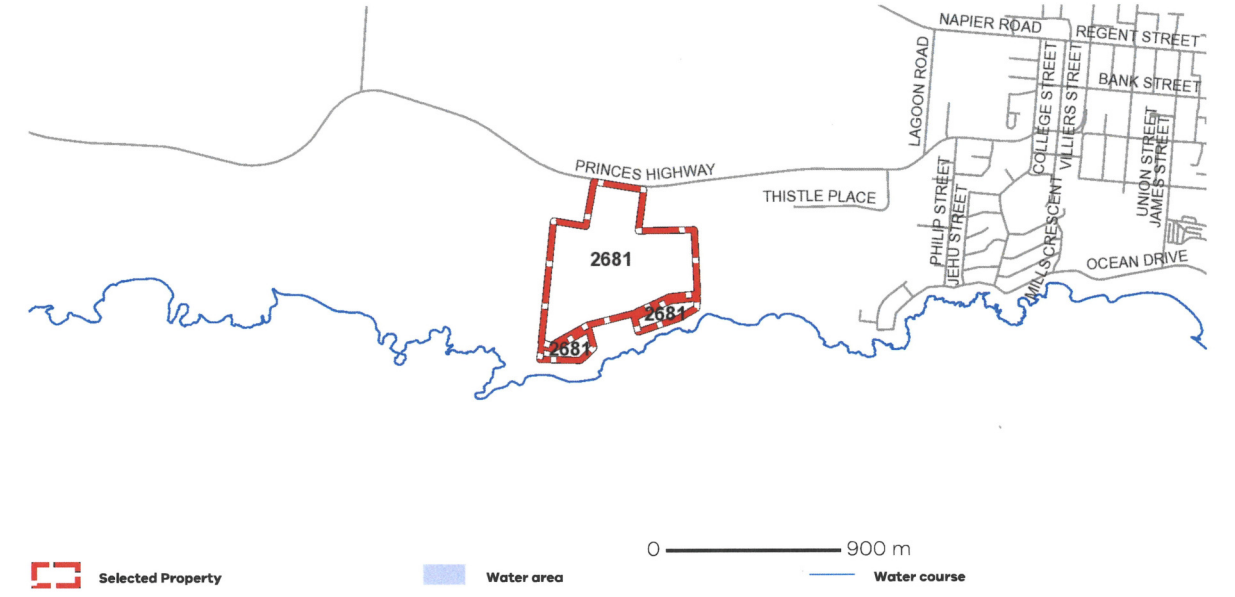
The Planning Property Report for this property can found here - Planning Property Report

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

PROPERTY REPORT

VICTORIA State Government | Energy, Environment and Climate Action

Area Map



APPENDIX iv

AERIAL AND SITE PHOTOGRAPHS

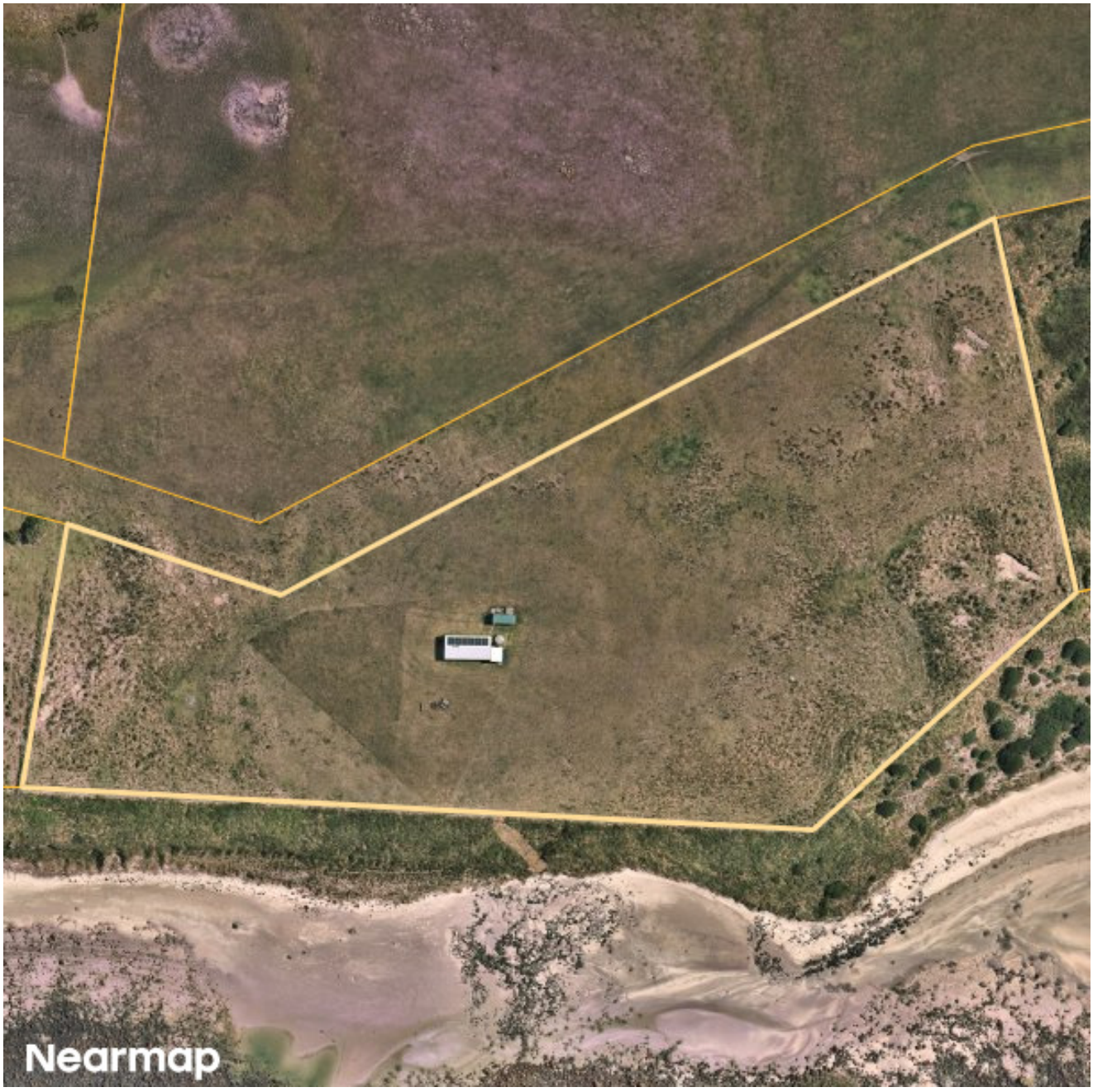
AERIAL PHOTOGRAPH

Client: TIM & KRISTY METCALF
Ref. Number: 23004H
Date: 12/08/2024
Site: 2681 Princes Highway, PORT FAIRY

SUBJECT SITE

AERIAL PHOTOGRAPH

Client: TIM & KRISTY METCALF
Ref. Number: 23004H
Date: 12/08/2024
Site: 2681 Princes Highway, PORT FAIRY



SITE PHOTOGRAPHS

LOOKING NORTH FROM TEST SITE 1

LOOKING EAST FROM TEST SITE 1

SITE PHOTOGRAPHS

LOOKING SOUTH FROM TEST SITE 1

LOOKING WEST FROM TEST SITE 1

SITE PHOTOGRAPHS

LOOKING NORTH FROM TEST SITE 2

LOOKING EAST FROM TEST SITE 2

SITE PHOTOGRAPHS

LOOKING SOUTH FROM TEST SITE 2

LOOKING WEST FROM TEST SITE 2

SITE PHOTOGRAPHS

LOOKING NORTH FROM TEST SITE 3

LOOKING EAST FROM TEST SITE 3

SITE PHOTOGRAPHS

LOOKING SOUTH FROM TEST SITE 3

LOOKING WEST FROM TEST SITE 3

APPENDIX v

BUREAU OF METEOROLOGY CLIMATE REPORT FOR PORT FAIRY AWS

Monthly Rainfall (millimetres)

PORT FAIRY AWS

Station Number: 090175 · State: VIC · Opened: 1990 · Status: Open · Latitude: 38.39°S · Longitude: 142.23°E · Elevation: 10 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	31.9	28.2	36.6	49.5	68.1	76.9	87.8	85.4	67.2	56.8	46.0	40.0	684.1
Lowest	2.0	0.8	4.0	12.8	12.8	7.2	32.2	38.8	25.2	7.6	10.6	5.2	493.6
5th percentile	5.4	2.4	10.7	14.6	17.3	21.5	45.5	42.5	27.6	20.0	11.2	8.8	544.4
10th percentile	9.4	5.0	18.2	18.5	20.6	40.2	51.2	44.4	37.7	25.6	17.4	16.2	562.8
Median	23.2	28.0	34.9	42.0	66.9	80.6	82.8	83.1	71.7	51.0	39.8	33.6	652.6
90th percentile	78.6	57.2	56.4	79.9	102.6	125.6	121.8	141.2	90.9	104.3	91.2	64.4	847.1
95th percentile	96.5	64.0	63.3	94.6	132.2	143.4	139.0	159.9	92.8	112.3	93.5	95.9	903.8
Highest	121.6	66.0	71.4	105.2	142.6	152.2	151.2	184.0	96.2	137.2	98.6	125.4	952.0

1) Calculation of statistics

Summary statistics, other than the Highest and Lowest values, are only calculated if there are at least 20 years of data available.

2) Gaps and missing data

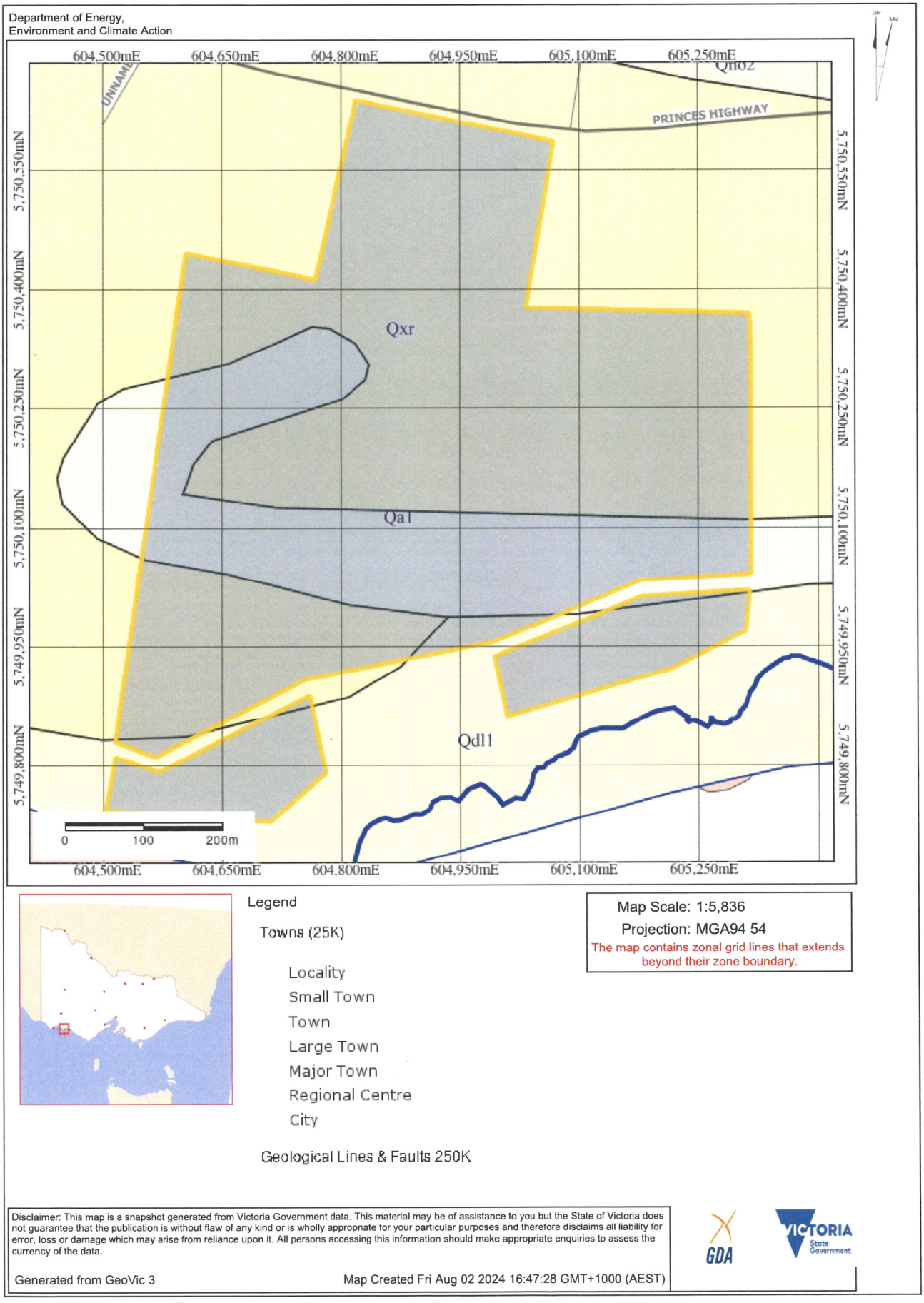
Gaps may be caused by a damaged instrument, a temporary change to the site operation, or due to the absence or illness of an observer.

3) Further information

http://www.bom.gov.au/climate/cdo/about/about-rain-data.shtml.

APPENDIX vi

GEOVIC MAP


Department of Energy,
Environment and Climate Action
604,500mE
604,650mE
604,800mE
604,950mE
605,100mE
605,250mE
5,750,550mN
5,750,400mN
5,750,250mN
5,750,100mN
5,749,950mN
5,749,800mN
UNNAMED
PRINCES HIGHWAY
Qhc2
Qxr
Qa1
Qdl1
0
100
200m
Legend
Towns (25K)
Locality
Small Town
Town
Large Town
Major Town
Regional Centre
City
Geological Lines & Faults 250K
Map Scale: 1:5,836
Projection: MGA94 54
The map contains zonal grid lines that extends beyond their zone boundary.
Disclaimer: This map is a snapshot generated from Victoria Government data. This material may be of assistance to you but the State of Victoria does not guarantee that the publication is without flaw of any kind or is wholly appropriate for your particular purposes and therefore disclaims all liability for error, loss or damage which may arise from reliance upon it. All persons accessing this information should make appropriate enquiries to assess the currency of the data.
Generated from GeoVic 3
Map Created Fri Aug 02 2024 16:47:28 GMT+1000 (AEST)
GDA
VICTORIA
State Government

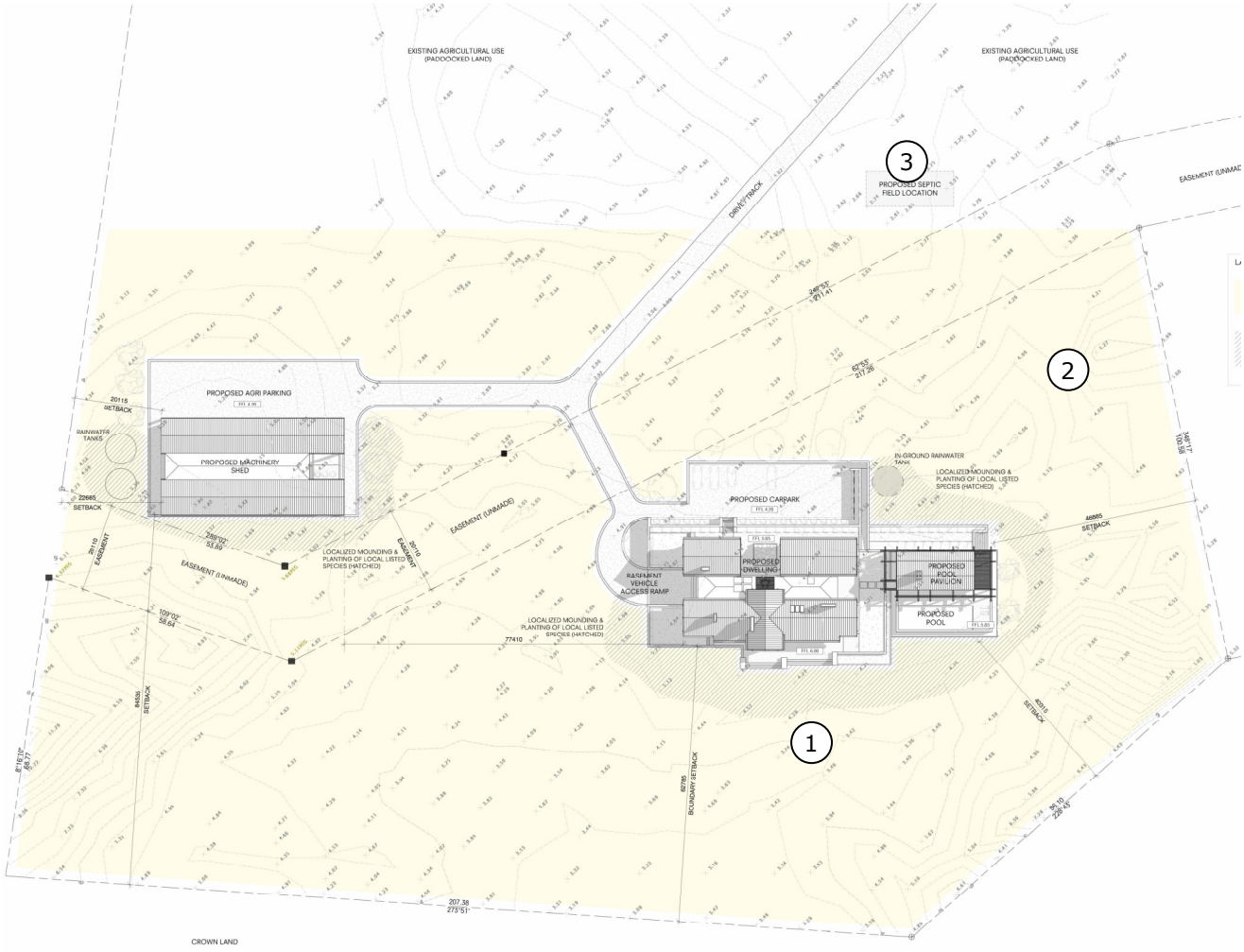
APPENDIX vii

TEST SITE LOCATION PLAN

TEST SITE LOCATION PLAN

(Not to Scale) – ○ Distances are approximate)

Client: TIM & KRISTY METCALF
Ref. Number: 23004H
Date: 12/08/2024
Site: 2681 Princes Highway, PORT FAIRY



APPENDIX viii

BORELOG DESCRIPTIONS

Client: TIM & KRISTY METCALF
Ref. Number: 23004H
Date: 12/08/2024
Site: 2681 Princes Highway, PORT FAIRY

TEST SITE 1 EXCAVATION METHOD: HYDRAULIC DRILLING RIG					TEST SITE 2 EXCAVATION METHOD: HYDRAULIC DRILLING RIG				
Depth mm	FILL	SOIL PROFILE	CAT		Depth mm	FILL	SOIL PROFILE	CAT	
100		**SILTY SAND**	**2b**		100		**SILTY SAND**	**2b**	
200		**(Sandy Loam)**			200		**(Sandy Loam)**		
300		**weakly structured**			300		**weakly structured**		
400		**SAND (Sands)**	**1**		400		**SAND (Sands)**	**1**	
500		**structureless**			500		**structureless**		
600		**brown**			600		**brown**		
700		**slightly moist;**			700		**slightly moist;**		
800		**medium dense**			800		**medium dense**		
900					900				
1000					1000				
1100					1100				
1200		**END BORE HOLE**			1200		**light brown**		
1300					1300				
1400					1400				
1500					1500				
1600					1600				
1700					1700		**moist**		
1800					1800				
1900					1900				
2000					2000				
2100					2100				
2200					2200				
2300					2300				
2400					2400				
2500					2500		**very moist**		
2600					2600				
2700					2700				
2800					2800		**becoming clayey**		
2900					2900				
3000					3000				
3100					3100		**END BORE HOLE**		
3200					3200				
3300					3300				
3400					3400				
3500					3500				
3600					3600				
3700					3700				
3800					3800				
3900					3900				
4000					4000				

Client: TIM & KRISTY METCALF
Ref. Number: 23004H
Date: 12/08/2024
Site: 2681 Princes Highway, PORT FAIRY

TEST SITE 3
EXCAVATION METHOD: HYDRAULIC DRILLING RIG

Depth mm	FILL	SOIL PROFILE	CAT	
100		**SILTY SAND**	**2b**	
200		**(Sandy Loam)**		
300		**weakly structured**		
400				
500		**SAND (Sands)**	**1**	
600		**structureless**		
700		**brown**		
800		**slightly moist;**		
900		**medium dense**		
1000				
1100				
1200		**light brown**		
1300				
1400				
1500				
1600				
1700		**moist**		
1800				
1900				
2000		**becoming clayey**		
2100				
2200				
2300				
2400		**END BORE HOLE**		
2500		**UNABLE TO**		
2600		**PENETRATE**		
2700		**BASALT**		
2800				
2900				
3000				
3100				
3200				
3300				
3400				
3500				
3600				
3700				
3800				
3900				
4000				

APPENDIX ix

LABORATORY RESULTS

Groundswell laboratories

" A New Force in Analytical Testing"

CERTIFICATE OF ANALYSIS

Client Name :	Provincial Geotechnical	**Groundswell Batch # :**	GS24543
Client Address :	91 Nicholas Street, Newtown, Victoria, 3220	**Project Name :**	2681 Princes Highway, Port Fairy VIC
Client Phone # :	03 5223 1566	**Project # :**	23004H
Client Fax # :	03 5224 4560	**Date Samples Received :**	13/08/2024
Project Manager :	Andrew Redman	**Sample Matrix :**	Soil
E-mail :	admin@pgvic.com.au	**Sample # Submitted :**	1
Project Sample Manager :	Andrew Redman	**Groundswell Quote # :**	Not Applicable
E-mail :	admin@pgvic.com.au	**Date CofA Issued :**	20/08/2024

Paul Woodward
Managing Director
paul@groundswelllabs.com.au

Groundswell Laboratories Pty Ltd ABN 24 133 248 923
116 Moray Street, South Melbourne, Victoria, 3205 Ph (03) 8669 1450 Fax (03) 8669 1451 E-mail : admin@groundswelllabs.com.au

Groundswell Batch # : GS24543

Soil Analysis Results

Client Sample ID			Sample 1				
Laboratory Sample Number			GS24543-1				
Date Sampled			12/08/2024				
Analytes	**Units**	**LOR**					
pH	pH Units	0.1	8.4				
Electrical Conductivity @ 25°C	dS/m	0.005	0.132				
Exchangeable Calcium	mg/Kg	1	5530				
Exchangeable Magnesium	mg/Kg	1	386				
Exchangeable Potassium	mg/Kg	1	215				
Exchangeable Sodium	mg/Kg	1	224				
CEC	MEQ%	0.1	32.4				
ESP	%	0.1	3.0				
Sodicity Rating	---	---	Non-Sodic				
SAR		0.01	0.18				

Reference AF56.Rev4 Date Issued : 19/5/2014

Comments :

1- pH & electrical conductivity determined & reported on a 1:5 soil:water extraction

2- CEC determined by soil chemical method 15B1 'Exchangeable bases and cation exchange capacity - 1M amonium chloride at pH 7.0, no pre-treatment for soluble salts'

3- ESP, sodicity rating & SAR determined by calculation using the exchangeable cation results

4- Measurement Uncertainty available upon request

Groundswell Laboratories Pty Ltd ABN 24 133 248 923
116 Moray Street, South Melbourne, Victoria, 3205 Ph (03) 8669 1450 Fax (03) 8669 1451 E-mail : paul@groundswelllabs.com.au

Groundswell Batch # : GS24543

Soil Analysis Results

Client Sample ID			Sample 1	Sample 1			
Laboratory Sample Number			GS24543-1	GS24543-1			
Date Sampled			12/08/2024	12/08/2024			
Analytes	**Units**	**LOR**					
Sample Type	---	---	Air Dried Aggregates	Re-moulded Ped			
Emerson Aggregate Class - 2 Hours	---	---	Slaking / No Dispersion	Slaking / No Dispersion			
Emerson Class Number	---	---	Class 7	Class 7			
Emerson Aggregate Class - 20 Hours	---	---	Slaking / Some Dispersion	Slaking / Some Dispersion			
Emerson Class Number	---	---	Class 2	Class 2			
Addition of 1M HCl	---	---	---	---			
1:5 Soil:Water 10 minute extraction	---	---	---	---			
Emerson Class Number	---	---	---	---			

Reference AF56.Rev4 Date Issued : 19/5/2014

Comments :

1- Classification conducted in accordance with Emmerson 'A clasification of soil aggregates based on their coherence in water', 1967 & AS1289.C8.1-1980

Inorganics Quality Control Report

Client Sample ID							
Laboratory Sample Number							
QC Parameter			Method Blank		Laboratory Control Standard (LCS)		
			Method Blank	Within GSL Acceptance Criteria (<LOR) (Pass/Fail)	LCS (%R)	LCS (%R) Acceptance Criteria	Within GSL Acceptance Criteria (Pass/Fail)
Analyte	**Units**	**LOR**					
pH	pH units	0.1	NA	NA	6.96	7.00 ± 0.1 pH Unit	Pass
Conductivity	dS/m	0.005	<0.005	Pass	96%	80-120%	Pass
Exchangeable Calcium	mg/Kg	1	<1	Pass	98%	70-130%	Pass
Exchangeable Magnesium	mg/Kg	1	<1	Pass	100%	70-130%	Pass
Exchangeable Potassium	mg/Kg	1	<1	Pass	109%	70-130%	Pass
Exchangeable Sodium	mg/Kg	1	<1	Pass	102%	70-130%	Pass
CEC	MEQ%	0.1	NA	NA	NA	NA	NA
ESP	%	0.1	NA	NA	NA	NA	NA
SAR	---	0.01	NA	NA	NA	NA	NA

Reference AF56.Rev4 Date Issued : 3/11/2010

Comments :

1- Exchangeable cations LCS values based on independent water standards

2- NA = Not Applicable

Groundswell Laboratories Pty Ltd ABN 24 133 248 923
116 Moray Street, South Melbourne, Victoria, 3205 Ph (03) 8669 1450 Fax (03) 8669 1451 E-mail : admin@groundswelllabs.com.au

PROVINCIAL GEOTECHNICAL PTY. LTD.
CONSULTING GEOLOGISTS
A.B.N. 88 090 400 114

PRINCIPAL: ANDREW P. REDMAN BSc.

GEELONG
91 Nicholas Street, NEWTOWN VIC 3220
P.O. BOX 1161, GEELONG VIC 3220
Phone: (03) 5223 1566

BALLARAT
P. O. BOX 1124, BAKERY HILL VIC 3354
Phone: (03) 5338 1770

E-MAIL: admin@pgvic.com.au

14th August 2024

Our Reference: 23004H

Groundswell Laboratories
116 Moray Street
SOUTH MELBOURNE VIC 3205

Dear Sir/Madam,

Re: 2681 Princes Highway, Port Fairy, Victoria.

Please perform the following soil tests:

i Emerson Aggregate Class
ii Cation Exchange Capacity
iii Electrical Conductivity (EC)
iv pH
v Sodicity – Exchangeable Sodium Percentage (ESP)
iv Sodium Absorption Ratio (SAR)

For the following One (1) sample from one (1) location:

DATE	SAMPLE	TEST SITE	DEPTH (mm)	MATERIAL	LAB ID
12/08/2024	1	1	200mm	SOIL	

Yours sincerely,

ANDREW REDMAN BSc.
GEOLOGIST.
AR: hs