LANDFILL GAS RISK ASSESSMENT

25 Cressy Road

Winchelsea, Victoria

May 2021
Report No. J1214-R2.0

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DOCUMENT CONTROL

Report Revision List

Report Number	Status	Date	Prepared By	Reviewed By
J1214-R2.0	Final	19 May 2021	MS	PK

1 Introduction

1.1 Background

Jet Environmental was requested by JR & KA Developments Pty Ltd (the client), care of Spectrum Planning Solutions, to undertake a landfill gas risk assessment (LGRA) at 25 Cressy Road, Winchelsea (site).

The location of the site, and nearby closed landfill, is presented in the attached Site & Landfill Location Plan (Figure 1 - Appendix I).

It is understood a combined planning scheme amendment and planning permit is proposed for the site to:

- rezone the land to Industrial 1 Zone (IN1Z) from Farming Zone (FZ); and
- develop the land for a 22 lot industrial subdivision.

A copy of the proposed subdivision plan, sourced from Spectrum Planning Solutions (2021), is provided in Appendix II.

It is further understood the existing dwelling (at Proposed Lot 20) and the maintenance and storage sheds (at Proposed Lot 14) are to remain on the land as interim uses until the subdivision and its development has taken place.

In light of the presence of former landfilling activity less than 500 metres from the site, it is understood Surf Coast Shire has requested an assessment into the potential for landfill gas to pose a risk to the proposal as part of the planning process.

1.2 Level of Assessment

To determine the appropriate level of assessment of landfill gas risk for the proposed rezoning and subdivision of the site, reference was made to Section 6 of EPA Victoria (2017) *Publication 1642 – Assessing planning proposals within the buffer of a landfill*.

To calculate the assessment level score, it was assumed future land industrial land uses at site are likely to include the construction of buildings and structures which exclude below ground structures such as basements and lift shafts. Furthermore, the following information pertaining to the nearby landfill obtained following completion of the desktop study (further details are contained in Section 2.3 of this report):

- Waste accepted at the landfill included solid inert waste and minor putrescible waste;
- The volume of waste received at the landfill was between 51 m^3 and 500,000 m^3; and
- The estimated year of closure of the landfill was 1994 (i.e. 27 years since closure).

Details of the assessment level score calculation are provided in Table 1-1.

Table 1-1: Landfill Level of Assessment Score (modified from EPA Victoria, 2017)

Step 1: Proposal Score for the Site	
Score	Proposal Type
1	Alterations to an existing building
2	**Buildings and structures that exclude below ground structures, such as basements and lift shafts**
3	Buildings and structures that include below ground structures, such as basements and lift shafts

Step 2: Landfill Score for Cressy Road Landfill	
Score	Landfill Size
1	Less than 50 m^3
2	**51 to 500,000 m^3**
3	500,001 to 2,000,000 m^3
4	2,000,001 to 5,000,000 m^3
5	More than 5,000,000 m^3 or unknown size
Score	Landfill Type
1	Soil
3	Solid inert waste
5	**Putrescible waste or unknown type**
Score	Landfill Age
1	More than 50 years since waste last placed
2	30 to 50 years since waste last placed
3	**10 to 30 years since waste last placed**
4	Fewer than 10 years since waste last placed
5	Operating landfill or unknown age

Step 3: Calculate an Overall Score
Overall score = proposal score x landfill score (landfill size + type + age) = 2 x (2 + 5 + 3) = 20

Step 4: Determine Level of Assessment Required	
Overall Score	Level of Assessment Required
1 – 8	No further assessment required
9 – 25	**Requires a landfill gas risk assessment**
26 – 45	Requires a Section 53V Audit

1.3 Objective

The objective of the landfill gas risk assessment was to investigate the potential for landfill gas sourced from former nearby landfilling activity to be present at site.

1.4 Scope of Works

To achieve the assessment objective the following works were undertaken:

- *Desktop Study:* A desktop study reviewing documentation relating to:
  - Former environmental investigations performed at, or nearby, the site;
  - Underground service plans at, and in close proximity to the site;
  - Topographical, geological and hydrogeological maps and information;
  - Historical aerial photographs to identify the location and boundaries of former quarries and landfills; and
  - Council records and EPA Victoria publications.
- *Site Inspection:* An inspection conducted in close proximity to proposed areas of monitoring at the site to identify potential sources and/or pathways of landfill gas generation and migration.
- *Conceptual Site Model:* Using findings of the site inspection and desktop study, a conceptual site model was prepared.
- *Landfill Gas Investigation:* A landfill gas survey including measurements collected with a gas analyser from underground utility locations and installation and monitoring of onsite landfill gas bores.
- *Data Assessment & Reporting:* Preparation of a written report detailing the findings of the site investigations and recommendations for further assessment where required.

The scope of works did not include a geotechnical assessment or a general contamination assessment with respect to the suitability of the site for the proposed rezoning and subdivision.

2 Site Condition & Surrounding Environment

2.1 Site Identification

The location of the site is depicted on the Site & Landfill Location Plan (refer Figure 1 - Appendix I) and relevant site details are tabulated in Table 2-1.

Table 2-1: Summary of Site Details

Address	25 Cressy Road, Winchelsea
Lot/Plan Description	Crown Allotments 1 – 9, Section 72 PP3123
Local Government Authority	Surf Coast Shire Council
Site Zoning	Farming Zone (FZ)
Site Area	~3.9 ha
Elevation	~91 – 93 mAHD
Planning Overlay/s	None

2.2 Site Inspection

At the time of the brief walkover inspections by Jet Environmental on 10 July 2020 and 6 May 2021, which was limited mostly to areas where landfill gas investigations were proposed, the following features and conditions were noted as presented in Table 2-2.

Table 2-2: Site Inspection Summary

Site occupant/s	The site was used for several purposes including as a residential dwelling, a civil earthworks company depot and grain storage.
Buildings & structures	Buildings and structures at site included a single storey brick dwelling, maintenance sheds and workshops.
Topography	The site generally sloped down towards the northeast.
Surface type and condition	External site surface coverage comprised a combination of exposed soil, vegetated areas, unsealed gravel driveways and tarpaulin covered grain storage areas.
Staining / odours	No surface staining or odorous soils were noted in areas where monitoring occurred.
Chemical storage	No chemical storage was observed at site, except for general materials used for workshop purposes.
Fuel storage infrastructure	No evidence was noted of any underground storage tanks or associated structures in areas where landfill gas investigations were proposed.
Other underground infrastructure	No evidence of underground infrastructure was noted at the surface in areas where landfill gas investigations were proposed, except for a vehicle servicing pit near the workshop buildings.
Stressed Vegetation	No stressed vegetation was observed during the inspection of areas where landfill gas investigations were proposed.

2.3 Nearby Landfill Summary

A landfilled former quarry, now forming part of the Winchelsea Waste Transfer Station, was identified to be within a 500 m radius of the subject site, with its approximate location depicted on the Site & Landfill Location Plan (Figure 1 - Appendix I).

Information pertaining to the former quarry was obtained from the following sources:

- Personal communication with a Surf Coast Shire Council waste officer on 7 July 2020;
- A Fisher Stewart preliminary plan titled *'Winchelsea Inert Landfill Site - Cressy Road, Winchelsea (Drawing No. 2000295/01)'* provided by the client to Jet Environmental (refer Appendix III);
- Historical aerial photos for 1947, 1970, 1986, 2003 and 2011 obtained from Landata and Google Earth (refer Appendix IV); and
- EPA Victoria (nd) *Victorian Landfill Register.* Accessed online 17 May 2021. https://nationalmap.gov.au/#share=s-f5r5qq5cndrnyxzCDJYBPk4422I

A summary of pertinent information obtained from the above sources is provided below:

- The easternmost boundary of the landfilled former quarry is approximately 210 m west of site.
- The former quarry is now occupied by the Winchelsea Waste Transfer Station in the northern portion and part of 45 Cressy Road in the southern portion.
- Waste accepted at the landfill included solid inert waste and minor putrescible waste.
- The volume of waste received at the landfill was between 51 m^3 and 500,000 m^3.
- The estimated year of closure of the landfill was 1994.
- Surf Coast Shire Council consider the landfill to be low risk and it was not licensed by EPA Victoria.
- Monitoring of groundwater bores around the perimeter of the landfill has not identified resultant contamination.
- The landfill was unlikely to have an engineered lining, however it was capped to EPA Victoria requirements.
- Review of available historical aerial photographs (refer Appendix IV) identified the following:
  - 1947 – disturbance of the central portion of the quarry area is depicted;
  - 1970 – the quarried area has increased primarily to the north and south since the 1947 aerial photograph;
  - 1986 – the quarry boundary appears to be of a similar size to that depicted in the 1970 aerial photograph and the majority of the landfill appears to have been backfilled;
  - 2003 – the southern portion of the landfill area appears to have been capped and is covered with grass. Numerous soil stockpiles appear to be evident in the central portion of the landfill; and
  - 2011 – the central portion of the landfill has been capped and the waste transfer station appears to be evident in the northern portion.

2.4 Underground Services

A review of plans sourced via the Dial Before You Dig service was undertaken to identify any potential underground infrastructure which may be acting as a conduit between the closed landfill and the site. The following underground services were identified in the vicinity of the site, as listed in Table 2-3.

Table 2-3: Underground Services Summary

Service	Asset Holder	Location
Sewer	Barwon Water	The nearest sewer easements are depicted beyond the railway line southeast of site. No direct easements are depicted between the site and the former quarry.
Water	Barwon Water	Town water mains are depicted northeast of site beneath Cressy Road. No direct water mains are depicted between the site and the former quarry.
Gas	AusNet	A gas distribution main is depicted northeast of site beneath Cressy Road. No direct gas mains are depicted between the site and the former quarry.
Stormwater	Surf Coast Shire Council	No stormwater easements are depicted within the vicinity of the site and the former quarry.
Electricity	Powercor	Short sections of underground low voltage electricity cable are depicted northeast of site beneath Cressy Road. No direct cables are depicted between the site and the former quarry.
Communications	Telstra	Telstra conduits are depicted northeast of site beneath Cressy Road. No direct conduits are depicted between the site and the former quarry.
	NBN Co	NBN cables are depicted northeast of site beneath Cressy Road. Cables are depicted entering site beneath the north eastern boundary. No direct cables are depicted between the site and the former quarry.

Copies of the underground service plans are provided in Appendix V.

2.5 Surrounding Land Use

Surrounding land uses were noted at the time of the site inspection and are summarised in Table 2-4.

Table 2-4: Surrounding Land Use Summary

Location	Site Use / Features
North	Cressy Road and several properties used for grazing
East	Cressy Road, grazing land, railway line and residential dwellings
South	Railway line, grazing land and several industrial and storage premises
West	Grain storage, grazing land and Cressy Road Waste Transfer Station

2.6 Hydrogeological Information

Hydrogeological features at, and in the vicinity of the site, as reviewed on 17 May 2021, are described in Table 2-5.

Table 2-5: Hydrogeological Information

Feature		Source	Site Description
Geology		VVG	The site and the former quarry are underlain by Newer Volcanic Group basalt flows comprising basalt, tuff, scoria and alluvium.
Surface Water		VicMap	A small dam was present near the north eastern site boundary. Aside from numerous small dams in nearby properties, the nearest surface water body is the Barwon River (approximately 770 m northeast of site at its nearest point).
Regional Groundwater	Quality	VVG	Total dissolved solids: 3,500 – 7,000 mg/L
	Depth	VVG	Typically 5 – 10 m below ground level (mbgl) at site and the closed landfill
	Flow Direction	Inferred	Based on topography, the likely groundwater flow direction beneath the site and the former quarry is east towards the Barwon River.

VVG – Visualising Victoria's Groundwater Federation University
VicMap – Victorian Department of Environment, Land, Water and Planning

2.7 Previous Site Investigations

A copy of a Provincial Geotechnical Pty Ltd report titled '*Land Capability Assessment Report – 25 Cressy Road, Winchelsea*' and dated 30 April 2020 was provided to Jet Environmental. Relevant findings from the report include:

- Five boreholes were advanced with a drill rig west of site in the land parcel formerly part of 25 Cressy Road (now known as 45 Cressy Road);
- Natural silty clay and heavy clays were encountered at depths of up to 1.6 m below surface;
- No waste material was encountered during the drilling works;

- Each borehole met refusal on basalt at depths ranging from 0.9 m to 1.6 m below surface; and
- Groundwater was not encountered during the drilling works.

2.8 Initial Conceptual Site Model

Based on information obtained from the site inspection and desktop assessment, a conceptual site model relating to landfill gas contamination issues was prepared.

Landfill Gas Sources

Desktop review confirmed landfilling occurred at the former quarry within a 500 m buffer zone of the site. Material suspected to have been disposed of at the former quarry likely included amounts of putrescible material, typically the main contributor to landfill sourced methane generation, until as recently as 1994 (refer Section 2.3).

Based on the time since landfilling of the nearby former quarry of at least 27 years, the gas generation potential from this landfill is considered to have likely decreased significantly in accordance with US EPA modelling for typical landfills as depicted in Figure 2-1 below.

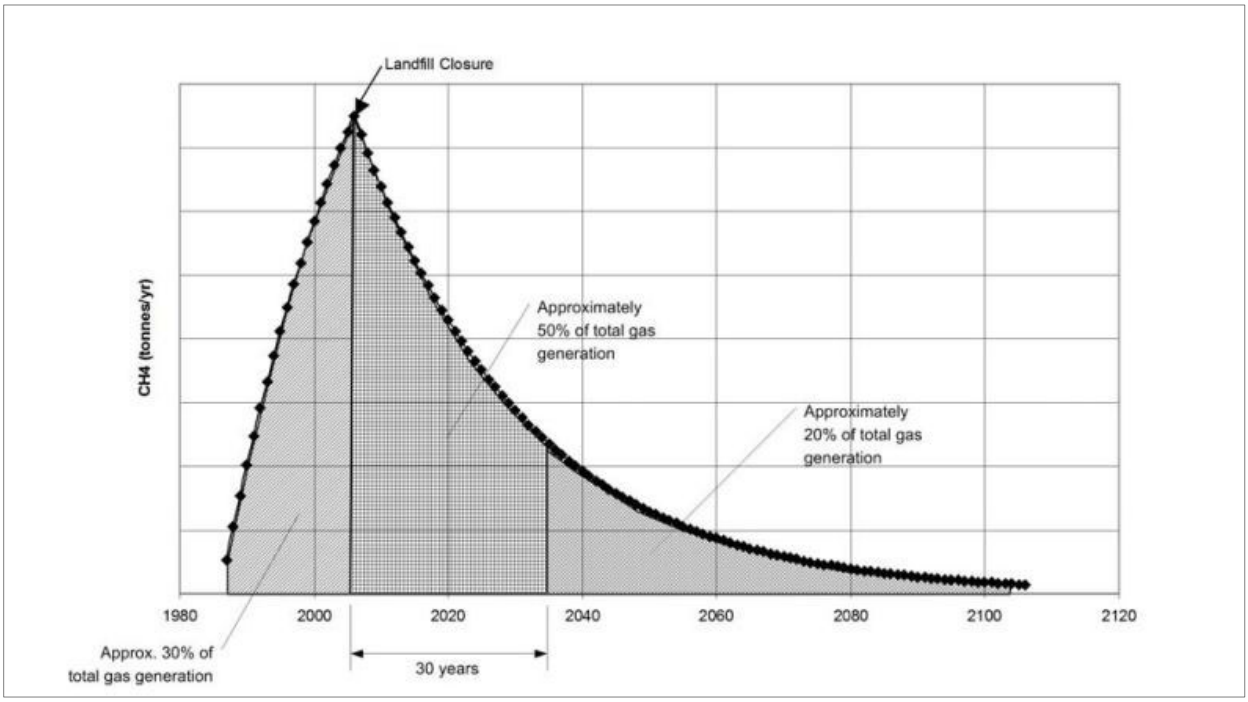


Figure 2-1: Typical landfill gas generation curve (after US EPA, 2005).

Potential Landfill Gas Receptors

Potential landfill gas receptors to be considered at the site include:

- future site occupants;
- site workers during construction works performed following the proposed subdivision; and
- maintenance workers conducting intrusive works in underground utility pits, landscaped garden beds, etc.

Potential Landfill Gas Pathways

Potential pathways for exposure of the above receptors potentially affected by accumulation within enclosed spaces and inhalation of landfill gas are listed below:

- landfill gas generated from the former landfill migrating vertically and horizontally through soils and rock underlying the landfilled and surrounding areas;
- preferential migration of landfill gas via utility services and associated backfilled trenches; and
- dissolution of methane from landfill leachate into groundwater and subsequent migration of the methane away from landfilled areas.

Likelihood of Complete Source-Receptor Pathways

For exposure to occur, a complete pathway must exist between the potential source of landfill gas and the receptor. Where the exposure pathway is incomplete, there is no exposure and hence no risk via that pathway.

No direct underground utility services or associated trenches between the site and the nearby former quarry were identified (refer Section 2.4), suggesting gas migration via this pathway is unlikely.

The regional flow direction of groundwater underlying the site and the former quarry is likely to be in a general easterly direction towards the Barwon River. As such, potentially dissolved methane in groundwater originating from the former quarry may migrate to site.

Based on the relative topography of the site with respect to the former quarry (i.e. 91 – 93 mAHD at site compared with approximately 92 mAHD at the former quarry), potential exists for subsurface migration of gas generated by landfilling activity to site via underlying soil and rock.

3 Landfill Guidelines & Assessment Criteria

3.1 Landfill Guidelines

General information and guidelines for landfills in Victoria are detailed in:

- EPA Victoria (2015) Publication 788.3 - *Best Practice Environmental Management – Siting, Design, Operation, and Rehabilitation of Landfills* (Landfill BPEM);
- EPA Victoria (2018) Publication 1684 - *Landfill gas fugitive emissions monitoring guideline*; and
- EPA Victoria (2017) Publication 1642 – *Assessing planning proposals within the buffer of a landfill*.

According to the Landfill BPEM, a specific zone called a buffer zone is required to protect the public from any impacts resulting from a failure of landfill design or management or abnormal weather conditions. The failures might be in the form of discharge from the site of potentially explosive gas, offensive odours, noise, litter and dust.

Default buffer distances are set to reflect the potential impacts from landfilling activities. The post-closure buffers are set to manage landfill gas impacts, including the risk of explosion and/or asphyxiation. Buffer distances are measured from sensitive land use (i.e. residential area) to the edge of the closest cell or premises boundary, whichever is more practicable. The distances vary from 200 m for Type 3 landfill (inert materials) to 500 m for Type 2 landfill (putrescibles / municipal waste).

Buffer distances apply to closed landfill sites until the site has stabilised to the point where the potential for subsurface landfill gas migration has largely ceased, which can be in excess of 30 years.

3.2 Landfill Gas Assessment Criteria

To investigate risk posed by fugitive landfill gas emissions, reference was made to the action levels within Landfill BPEM as listed in Table 3-1 below.

Table 3-1: Landfill Gas Action Levels

Location	Parameter	Action level
Subsurface services on and adjacent to landfill site	Methane	10,000 ppm (1% v/v)
Buildings/structures on and adjacent to the landfill site	Methane	5,000 ppm (0.5% v/v)
Subsurface geology at the landfill boundary	Methane & carbon dioxide	1% v/v methane or 1.5% v/v carbon dioxide above background

Calculation of gas screening values (GSVs) using gas concentrations and flow rates was also performed in accordance with British Standard (2015) *BS8485:2015 Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings* (BS8485:2015). The GSV is a multiple of the maximum gas flow rate (L/hr) from a gas monitoring bore and the corresponding maximum gas concentration (% v/v).

4 Landfill Gas Investigations

4.1 Landfill Gas Assessment Methodology

To investigate for the presence of landfill gas a combination of underground utility monitoring and sub-surface gas bore monitoring was performed at and near site on 10 July 2020 and 6 May 2021. Monitoring locations are presented on Figure 1 – Landfill Gas Sampling Location Plan (refer Appendix I).

Utility Monitoring

Monitoring of landfill gas emissions (inclusive of methane and carbon dioxide) from various accessible underground service utilities was performed adjacent to site using a GTI GA5000 landfill gas monitor (refer calibration certificates presented in Appendix VI). Monitoring at the utility locations continued for two minutes until stabilised readings were obtained. Descriptions of the landfill gas monitoring utility locations are presented in Table 4-2.

Landfill Gas Bore Installation & Monitoring

Four landfill gas bores, LFG01 to LFG04, were installed on 10 July 2020 west of site (i.e. to the east and southwest of the closed landfill). An additional three gas bores, LFG05 to LFG07, were installed onsite near the western site boundary.

Following drilling of soil boreholes to the target depth using a hand auger, the gas bores were constructed using a 50 mm diameter PVC (Class 18) casing and factory slotted screen (3 mm wide slots). Upon placing the casing into each borehole, a 7 mm washed and graded gravel packing was installed, extending for up to 0.05 m above the slotted screen interval. A seal of approximately 0.5 m thick of moistened bentonite was placed above the gravel pack. The PVC casing extended up beyond the surface with an approximate 'stick up' of 1.0 m and was sealed with a gas-tight TriCap Gas cap.

The locations of gas bores are depicted on Figure 1 – Landfill Gas Sampling Location Plan (refer Appendix I). Construction details of the bores and descriptions of the material encountered during excavation of the bores are provided in the borehole log sheets (refer Appendix VII).

Monitoring of gas emissions into subsurface geology was undertaken via the onsite landfill gas bores, on 10 July 2020 for LFG01 to LFG04 and on 6 May 2021 for LFG05 to LFG07, in accordance with EPA Victoria (2018) *Publication 1684 – Landfill gas fugitive emissions monitoring guideline*. Measurements were collected with a calibrated GTI GA5000 gas analyser and included peak and stabilised methane, carbon dioxide and oxygen concentrations as provided in Table 4-3.

Supplementary parameters including relative and atmospheric pressure, stabilisation time and flow rate were also measured and recorded for the gas bore using the GA5000. Copies of the landfill gas monitoring field sheets are provided in Appendix VIII.

Landfill Gas Bore Leak Testing

To ensure the landfill gas bores had an adequately gas-tight seal at the surface, post-installation leak testing was performed following monitoring of each bore. The leak testing procedure included:

- Placing a stainless steel shroud with rubber seal over the PVC bore casing;
- Connecting the GA5000 sampling tube to the gas tight bore cap sampling point;
- Connecting a regulated carbon dioxide gas cylinder to the shroud with Teflon tubing via brass and nylon fittings;
- Filling the shroud with carbon dioxide from the gas cylinder at a rate of 2 L/min; and
- Monitoring for the presence of elevated carbon dioxide concentrations in the gas bore with the GA5000 for at least three minutes.

Results of the leak test monitoring did not identify the presence of increased carbon dioxide concentrations indicating each gas bore was leak free and no dilution from ambient air was occurring.

4.2 Field Odour Observations

No potentially offensive odours were noted at or nearby the site during the site inspections or throughout the duration of the landfill gas monitoring.

4.3 Meteorological Conditions

Meteorological conditions as recorded by the Bureau of Meteorology (at the nearest weather station, Colac – Mount Gellibrand) before and after landfill gas measurement on 10 July 2020 and 6 May 2021 are summarised in Table 4-1.

Table 4-1: Meteorological Conditions

Date	Time	Temperature (°C)	Relative Humidity (%)	Wind Direction	Wind Speed (km/h)	Atmospheric Pressure (hPa)
9 July 2020	3:00pm	11.5	96	N	22	1025.0
10 July 2020	**9:00am**	**7.3**	**87**	**NNE**	**11**	**1023.9**
10 July 2020	**3:00pm**	**11.8**	**88**	**ENE**	**4**	**1020.4**
11 July 2020	9:00am	8.8	89	N	2	1017.5
5 May 2021	3:00pm	13.2	87	SSE	20	1024.5
6 May 2021	**9:00am**	**11.6**	**100**	**E**	**30**	**1021.4**
6 May 2021	**3:00pm**	**18.2**	**84**	**ENE**	**13**	**1017.7**
7 May 2021	9:00am	12.5	82	NW	9	1014.7

It is considered that monitoring was completed under satisfactory meteorological conditions for the purposes of the assessment during decreasing or stable atmospheric pressure, in general accordance with EPA Victoria guidelines.

4.4 Landfill Gas Monitoring Results

A complete record of all landfill gas concentrations measured, including peak and stabilised readings (where applicable), is provided on the Landfill Gas Monitoring Sheets presented in Appendix VIII.

Utility Monitoring

A summary of the utility measurement location types, including maximum methane and carbon dioxide concentrations recorded, is presented in Table 4-2.

Table 4-2: Utility Landfill Gas Monitoring Results

Location	Utility Type	Maximum Methane Concentration (% v/v)	Maximum Carbon Dioxide Concentration (% v/v)
T1	Telstra pit	0.0	0.2
D1	Driveway culvert drain	0.0	0.2
E1	Electrical cable conduit	0.0	0.2
T2	Telstra pit	0.0	0.2
WV1	Water main valve	0.0	1.0

Landfill Gas Bore Monitoring

Results of landfill gas monitoring of the gas bores performed on 10 July 2020 and 6 May 2021, together with gas screening levels (GSVs) calculated using the BS8485:2015 method outlined in Section 3.2, are presented in Table 4-3.

Table 4-3: Landfill Gas Bore Monitoring Results

Bore	Date	Flow Rate (L/hr)	Peak Methane (% v/v)	Methane GSV (L/hr)	Peak Carbon Dioxide (% v/v)	Carbon Dioxide GSV (L/hr)
LFG01	10 July 2020	0.0*	0.0	0.0*	0.2	0.0002*
LFG02	10 July 2020	0.1	0.0	0.0	0.8	0.0008
LFG03	10 July 2020	0.0*	0.0	0.0*	0.3	0.0003*
LFG04	10 July 2020	0.0*	0.0	0.0*	0.6	0.0006*
LFG05	6 May 2021	0.0*	0.0	0.0*	2.1	0.0021*
LFG06	6 May 2021	0.1	0.0	0.0	0.9	0.0009
LFG07	6 May 2021	0.0*	0.0	0.0*	3.5	0.0035*

GSV – Gas screening value = maximum bore flow rate (L/hr) x maximum gas concentration (% v/v)

* – Positive flow rate of 0.1 L/hr conservatively utilised for GSV calculation

4.5 Interpretation of Results

Landfill Gas Action Levels

The landfill gas measurement results presented in Section 4.4 demonstrate that detected methane and carbon dioxide concentrations at and near site, were below the landfill gas action levels adopted in Section 3.2.

Gas Screening Values

In accordance with Section 6.4 of BS8485:2015, the calculated gas screening values of 0.0 and 0.0035 for methane and carbon dioxide respectively, indicate a characteristic gas situation (CS) of 1 (i.e. GSV is less than 0.07 L/hr). CS 1 is defined as posing a 'very low' hazard potential indicating that there is a low possibility that harm could arise to a potential receptor.

Based on these results, it is considered that the risk of adverse impacts upon the proposed site rezoning and subdivision from landfill gas migrating from the closed landfill is very low.

5 Conclusions & Recommendations

5.1 Conclusions

A summary of pertinent findings of the landfill gas risk assessment is provided below:

- The easternmost boundary of the landfilled former quarry is approximately 210 m west of site.
- A review indicated that the former quarry may have been backfilled with putrescible material until as recently as 1994.
- Due to the likely presence of putrescible waste in material historically used to backfill the former quarry, potential for generation of methane exists during decomposition of this material. However, given that landfilling of the former quarry ceased at least 27 years ago, the potential for significant subsurface landfill gas migration is likely to have largely decreased.
- No distinct odours were noted at or nearby site during inspection and monitoring works.
- Results of landfill gas monitoring did not report elevated surface concentrations of gas at the site or within the measured potential pathways of gas migration (e.g. underground service utilities) on or near site at the time of monitoring.
- Based on the assessment findings, it is considered that the risk of subsurface landfill gas migration from the former quarry adversely impacting the proposed rezoning and industrial site subdivision is very low.

5.2 Recommendations

Based on findings of the assessment and on the proviso that future construction of buildings and structures at site would exclude below ground structures such as basements and lift shafts:

- No ongoing management or monitoring of landfill gas is recommended with respect to the proposed site rezoning and subdivision; and
- Further assessment of landfill gas risk via an environmental audit under Section 53V of the *Environment Protection Act 1970* is not recommended for the site.

Should further information pertaining to nearby landfills, environmental reports or gas monitoring be provided, or the proposed rezoning and/or subdivision change, the findings of this report may need to be reviewed, and further assessment works may be required.

6 Statement of Limitations

This report has been commissioned and produced for JR & KA Developments Pty Ltd (the client), care of Spectrum Planning Solutions. The application or use of this report is for the sole purpose of the client. Jet Environmental accepts no liability for use or interpretation by any person or body other than the client who commissioned the works. The use, application, misuse or misapplication of information (whether in part or whole) or any consequences of its use, provided by Jet Environmental is not the responsibility of Jet Environmental, its employees, servants or agents. This report may not be reproduced or amended in any way without prior approval by the client and Jet Environmental. This report must be read in its entirety and in conjunction with the attached documents, only applying the report in accordance with the stated aims as outlined in the introduction of this report.

The interpretation of results, conclusions and recommendations presented in this report are predominantly based on the results of analyses at the time of the assessment works and may alter if the data obtained is not representative of the subsurface as i) soil, rock and aquifer conditions are often variable, ii) contaminant characteristics may be variable, and iii) boundaries between zones of variable contamination are often indistinct - potentially resulting in heterogeneous contaminant distributions across site. Furthermore, surface and sub-surface conditions may change in the future either naturally or anthropogenically.

Areas that were unable to be assessed due to access restrictions (e.g. buildings, overhead utilities, underground structures etc.) and/or a limited scope of works do not form part of this report.

Should further information become available regarding conditions at the site or relevant issues including previously unknown sources of contamination, Jet Environmental reserves the right to review the report in the context of the additional information.

All works carried out in preparing this report have been conducted on a fully professional basis with due care and attention utilising Jet Environmental professional knowledge and understanding of relevant and current National and State Standards, Codes of Practice, Regulations and Acts. Changes in Acts, Regulations or guidance information may occur at any time resulting in conclusions contained in this report becoming invalid, incorrect or inappropriate. Jet Environmental, at its discretion, may advise the client of the potential impact of such changes but does not accept responsibility for advising of, or implications of, any such changes.

7 References

British Standard (2015) *BS8485:2015 Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings*.

EPA Victoria (2015) Publication 788.3 – *Best Practice Environmental Management: Siting, design, operation and rehabilitation of landfills*.

EPA Victoria (2018) Publication 1684 – *Landfill gas fugitive emissions monitoring guideline*.

EPA Victoria (2017) Publication 1642 – *Assessing planning proposals within the buffer of a landfill.*

EPA Victoria (nd) *Victorian Landfill Register (VLR)*. Accessed online 17 May 2021. https://nationalmap.gov.au/#share=s-f5r5qq5cndrnyxzCDJYBPk4422I

Federation University (nd) *Visualising Victoria's Groundwater*. Accessed online on 17 May 2021. https://www.vvg.org.au/vvg_map.php

Provincial Geotechnical Pty Ltd (2020) *Land Capability Assessment Report – 25 Cressy Road, Winchelsea (Reference No. 14187D).*

Spectrum Planning Solutions (2021) *Combined Planning Scheme Amendment and Permit Application at 25 Cressy Road, Winchelsea*. Dated February 2021.

US EPA (2005) *Landfill Gas Emission Model (LandGEM) version 3.02*. Publication No. EPA-600/R-05/047.

APPENDIX I:

Site Plan

LEGEND:

NORTH

SITE BOUNDARY

LANDFILL BOUNDARY (APPROXIMATE)

LANDFILL GAS SAMPLE (UTILITY PIT / DRAIN)

LANDFILL GAS BORE

TITLE:	SITE & LANDFILL LOCATION PLAN
FIGURE NO:	FIGURE 1
SITE:	25 CRESSY RD, WINCHELSEA
JOB NO:	J1214
DRAWN BY:	MS
REFERENCE:	GOOGLE EARTH

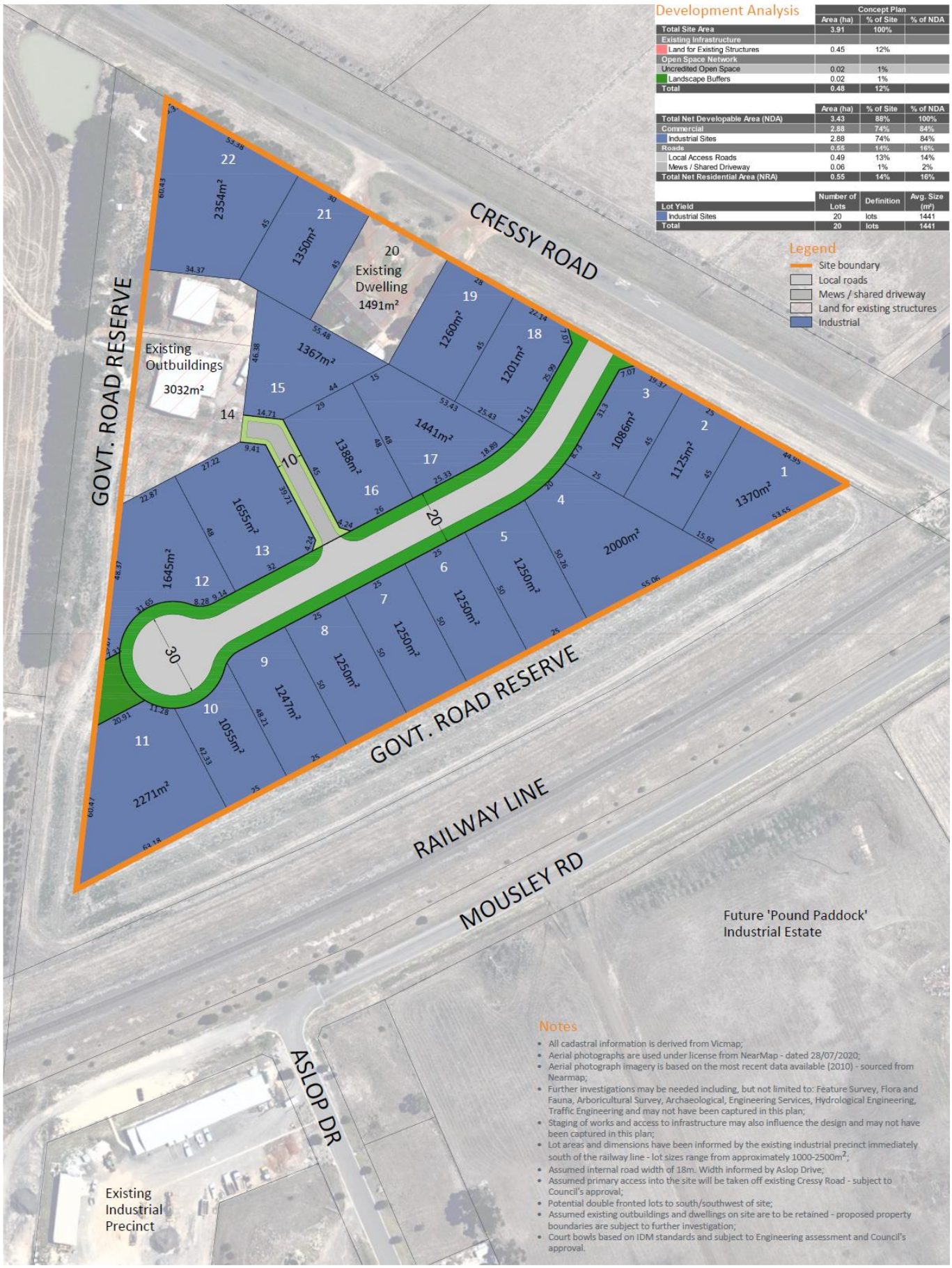
0 85 170 m

JET environmental

PO BOX 478
ALTONA VIC 3018
P: 03 9398 2837
E: info@jetenvironmental.com.au

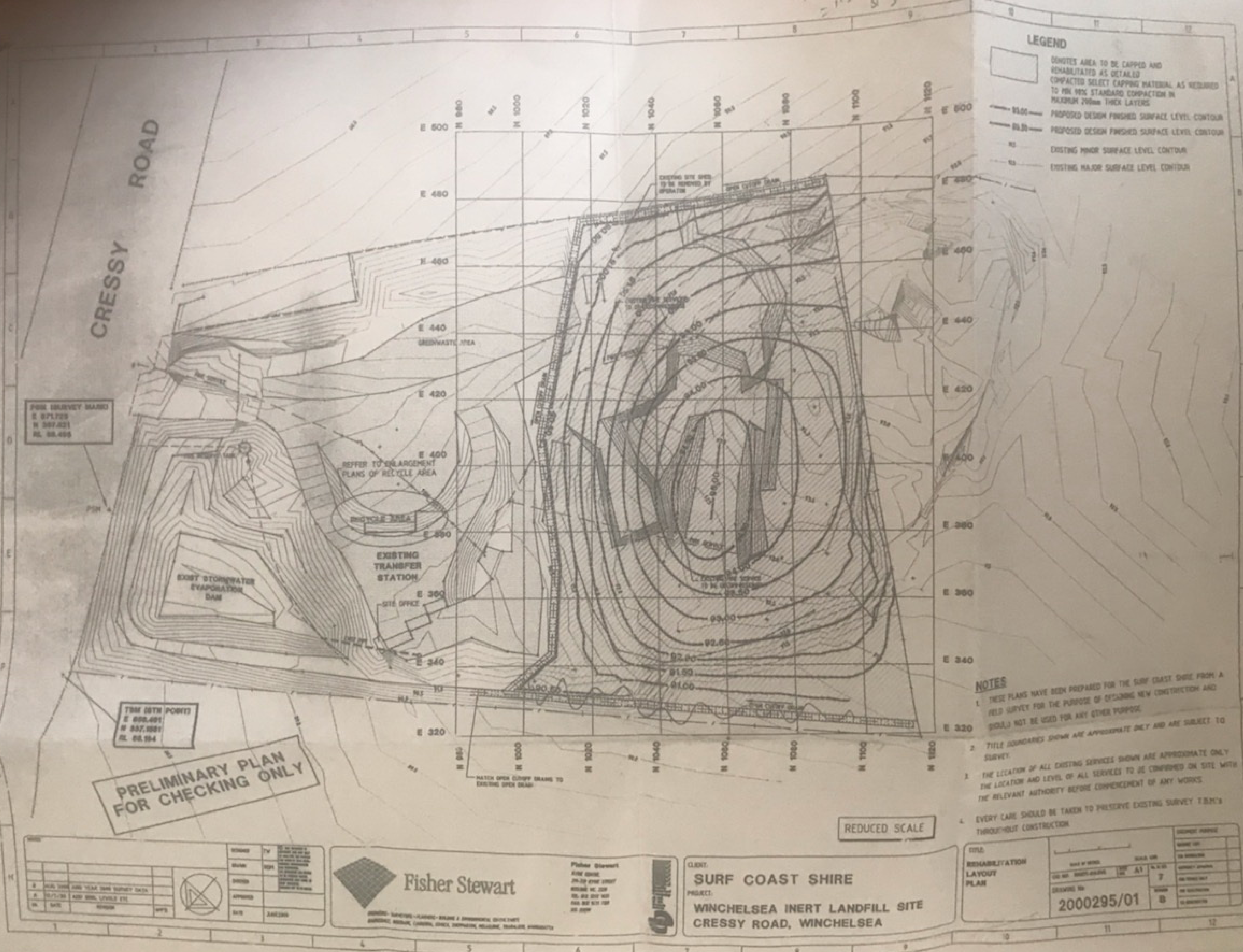
APPENDIX II:

Proposed Subdivision Plan


Development Analysis
Concept Plan
Area (ha) | % of Site | % of NDA
Total Site Area 3.91 100%
Existing Infrastructure
Land for Existing Structures 0.45 12%
Open Space Network
Uncredited Open Space 0.02 1%
Landscape Buffers 0.02 1%
Total 0.48 12%
Area (ha) | % of Site | % of NDA
Total Net Developable Area (NDA) 3.43 88% 100%
Commercial 2.88 74% 84%
Industrial Sites 2.88 74% 84%
Roads 0.55 14% 16%
Local Access Roads 0.49 13% 14%
Mews / Shared Driveway 0.06 1% 2%
Total Net Residential Area (NRA) 0.55 14% 16%
Lot Yield | Number of Lots | Definition | Avg. Size (m²)
Industrial Sites 20 lots 1441
Total 20 lots 1441
Legend
Site boundary
Local roads
Mews / shared driveway
Land for existing structures
Industrial
CRESSY ROAD
GOVT. ROAD RESERVE
GOVT. ROAD RESERVE
RAILWAY LINE
MOUSLEY RD
ASLOP DR
Existing Outbuildings 3032m²
20 Existing Dwelling 1491m²
Future 'Pound Paddock' Industrial Estate
Existing Industrial Precinct
Notes
All cadastral information is derived from Vicmap;
Aerial photographs are used under license from NearMap - dated 28/07/2020;
Aerial photograph imagery is based on the most recent data available (2010) - sourced from Nearmap;
Further investigations may be needed including, but not limited to: Feature Survey, Flora and Fauna, Arboricultural Survey, Archaeological, Engineering Services, Hydrological Engineering, Traffic Engineering and may not have been captured in this plan;
Staging of works and access to infrastructure may also influence the design and may not have been captured in this plan;
Lot areas and dimensions have been informed by the existing industrial precinct immediately south of the railway line - lot sizes range from approximately 1000-2500m²;
Assumed internal road width of 18m. Width informed by Aslop Drive;
Assumed primary access into the site will be taken off existing Cressy Road - subject to Council's approval;
Potential double fronted lots to south/southwest of site;
Assumed existing outbuildings and dwellings on site are to be retained - proposed property boundaries are subject to further investigation;
Court bowls based on IDM standards and subject to Engineering assessment and Council's approval.

APPENDIX III:

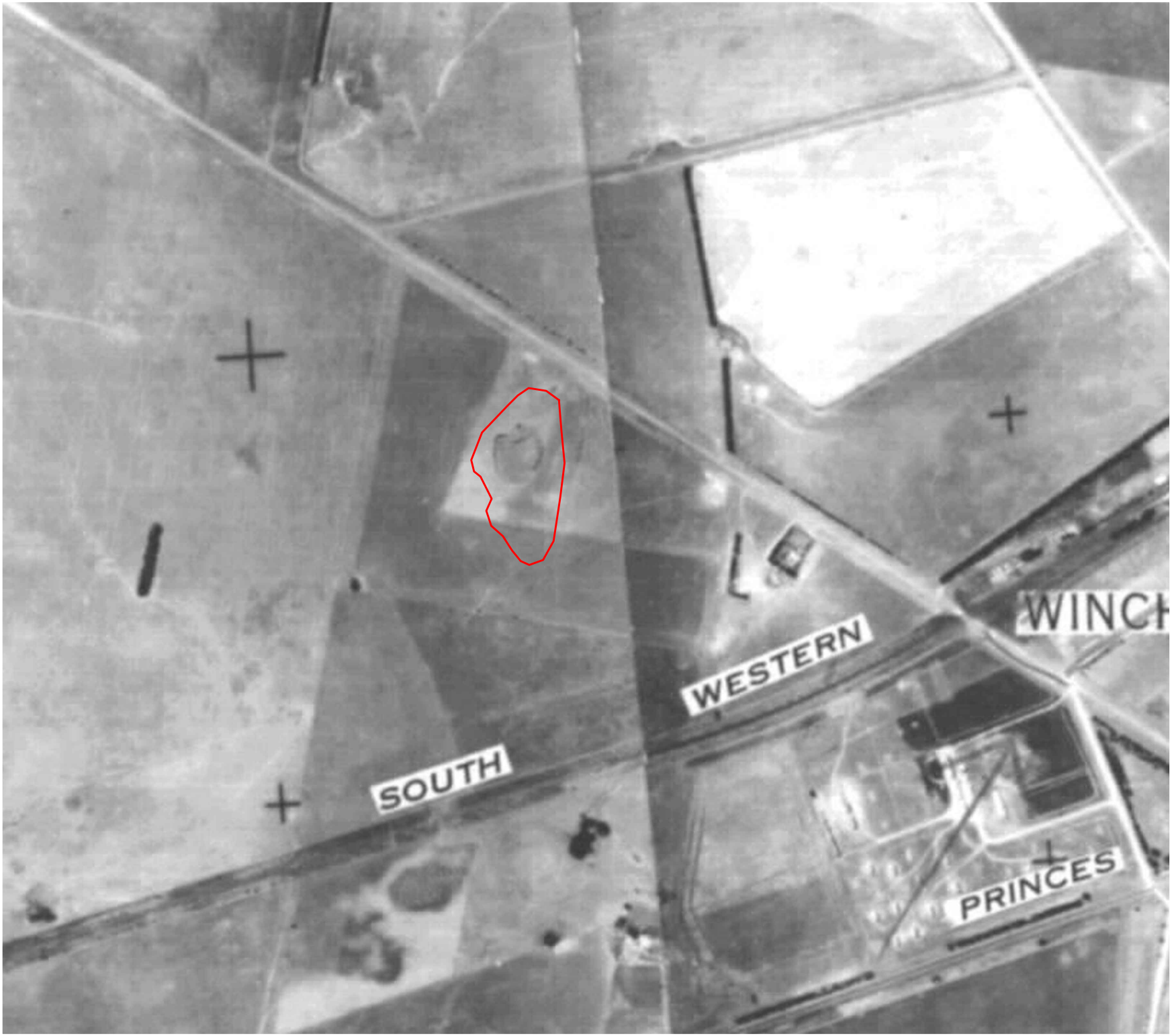
Preliminary Quarry Plan



LEGEND
DENOTES AREA TO BE CAPPED AND REHABILITATED AS DETAILED
COMPACTED SELECT CAPPING MATERIAL AS REQUIRED TO MIN 98% STANDARD COMPACTION IN MAXIMUM 200mm THICK LAYERS
PROPOSED DESIGN FINISHED SURFACE LEVEL CONTOUR
PROPOSED DESIGN FINISHED SURFACE LEVEL CONTOUR
EXISTING MINOR SURFACE LEVEL CONTOUR
EXISTING MAJOR SURFACE LEVEL CONTOUR
CRESSY ROAD
GREENWASTE AREA
REFFER TO ENLARGEMENT PLANS OF RECYCLE AREA
RECYCLE AREA
EXISTING TRANSFER STATION
SITE OFFICE
EXIST STORMWATER EVAPORATION DAM
PSM
PRELIMINARY PLAN FOR CHECKING ONLY
MATCH OPEN CUTOFF DRAINS TO EXISTING OPEN DRAIN
93.00
92.50
92.00
91.50
91.00
90.50
REDUCED SCALE
NOTES
1. THESE PLANS HAVE BEEN PREPARED FOR THE SURF COAST SHIRE FROM A FIELD SURVEY FOR THE PURPOSE OF DESIGNING NEW CONSTRUCTION AND SHOULD NOT BE USED FOR ANY OTHER PURPOSE.
2. TITLE BOUNDARIES SHOWN ARE APPROXIMATE ONLY AND ARE SUBJECT TO SURVEY.
3. THE LOCATION OF ALL EXISTING SERVICES SHOWN ARE APPROXIMATE ONLY THE LOCATION AND LEVEL OF ALL SERVICES TO BE CONFIRMED ON SITE WITH THE RELEVANT AUTHORITY BEFORE COMMENCEMENT OF ANY WORKS.
4. EVERY CARE SHOULD BE TAKEN TO PRESERVE EXISTING SURVEY T.B.M's THROUGHOUT CONSTRUCTION
Fisher Stewart
CLIENT:
SURF COAST SHIRE
PROJECT:
WINCHELSEA INERT LANDFILL SITE
CRESSY ROAD, WINCHELSEA
TITLE:
REHABILITATION LAYOUT PLAN
A1
DRAWING No
2000295/01
B
~ 1:1000

APPENDIX IV:

Historic Aerial Photographs



LEGEND:

NORTH

LANDFILL BOUNDARY (APPROX)

TITLE:	1947 AERIAL PHOTOGRAPH
SITE:	25 CRESSY RD, WINCHELSEA
JOB NO:	J1214
DRAWN BY:	MS
REFERENCE:	DEPARTMENT OF LAND

JET environmental

PO BOX 478
ALTONA VIC 3018
P: 03 9398 2837
E: info@jetenvironmental.com.au

LEGEND:

NORTH

LANDFILL BOUNDARY (APPROX)

TITLE:	1970 AERIAL PHOTOGRAPH
SITE:	25 CRESSY RD, WINCHELSEA
JOB NO:	J1214
DRAWN BY:	MS
REFERENCE:	DEPARTMENT OF LAND

JET environmental

PO BOX 478
ALTONA VIC 3018
P: 03 9398 2837
E: info@jetenvironmental.com.au

LEGEND:

NORTH

LANDFILL BOUNDARY (APPROX)

TITLE:	1986 AERIAL PHOTOGRAPH
SITE:	25 CRESSY RD, WINCHELSEA
JOB NO:	J1214
DRAWN BY:	MS
REFERENCE:	DEPARTMENT OF LAND

JET environmental

PO BOX 478
ALTONA VIC 3018
P: 03 9398 2837
E: info@jetenvironmental.com.au

LEGEND:

NORTH

LANDFILL BOUNDARY (APPROX)

TITLE:	2003 AERIAL PHOTOGRAPH
SITE:	25 CRESSY RD, WINCHELSEA
JOB NO:	J1214
DRAWN BY:	MS
REFERENCE:	GOOGLE EARTH

JET environmental

PO BOX 478
ALTONA VIC 3018
P: 03 9398 2837
E: info@jetenvironmental.com.au

LEGEND:

NORTH

LANDFILL BOUNDARY (APPROX)

TITLE:	2011 AERIAL PHOTOGRAPH
SITE:	25 CRESSY RD, WINCHELSEA
JOB NO:	J1214
DRAWN BY:	MS
REFERENCE:	GOOGLE EARTH

JET environmental

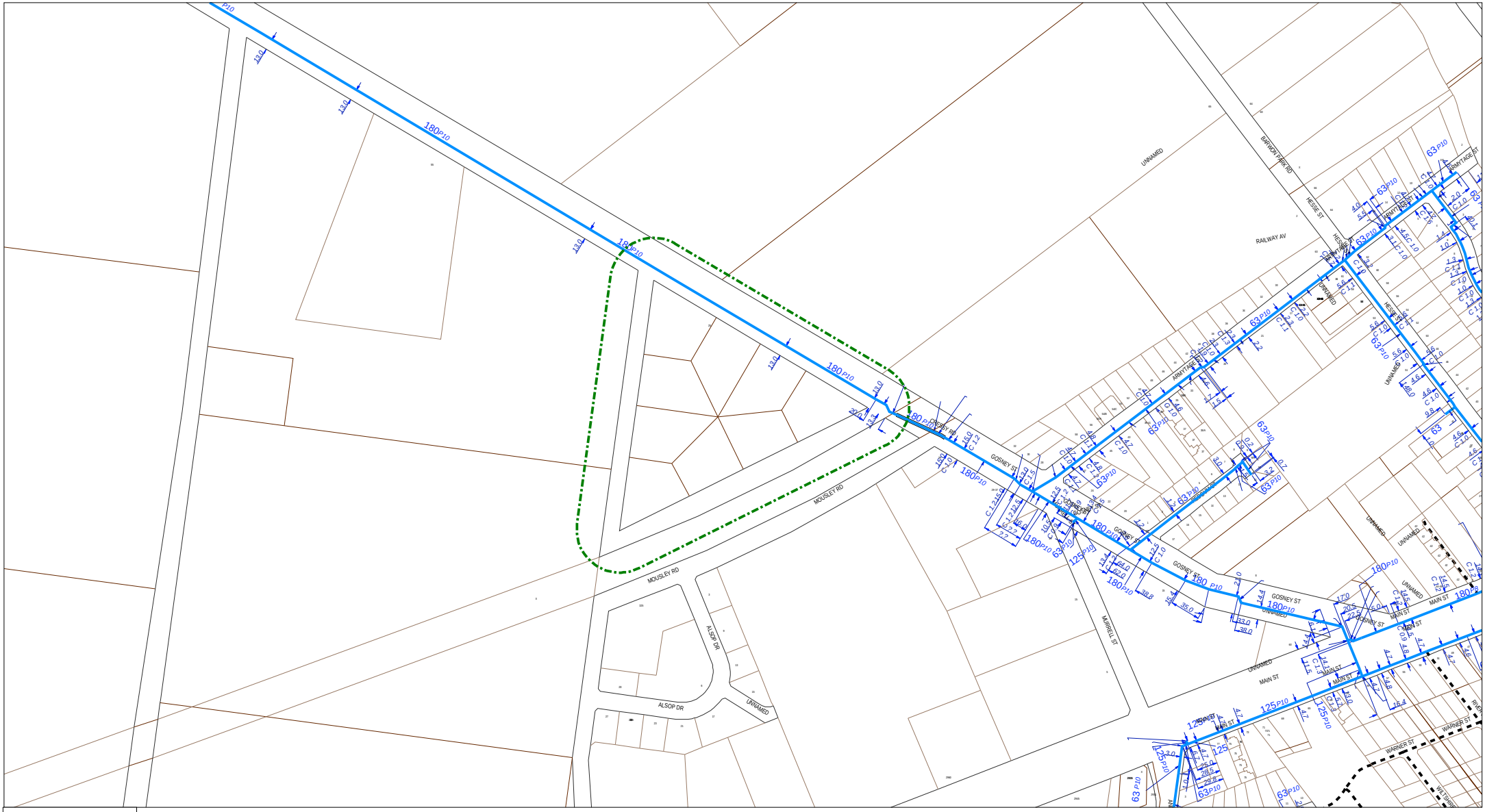
PO BOX 478
ALTONA VIC 3018
P: 03 9398 2837
E: info@jetenvironmental.com.au

APPENDIX V:

Underground Service Plans

AusNet services

0m 100m 200m 300m 400m 500m 600m 700m 800m 900m 1000m 1100m 1200m 1300m



N W E S

NOTE: AusNet Services has taken care to ensure that the locations of Gas Mains shown on this plan are accurate however some variations from records do exist and complete accuracy is not guaranteed. It is essential that the position of pipes be proved on site by hand excavation. AusNet Services shall not be liable for any loss damage claim or demand incurred either directly or indirectly resulting from any act or omission which was made in reliance in whole or in part upon this plan.

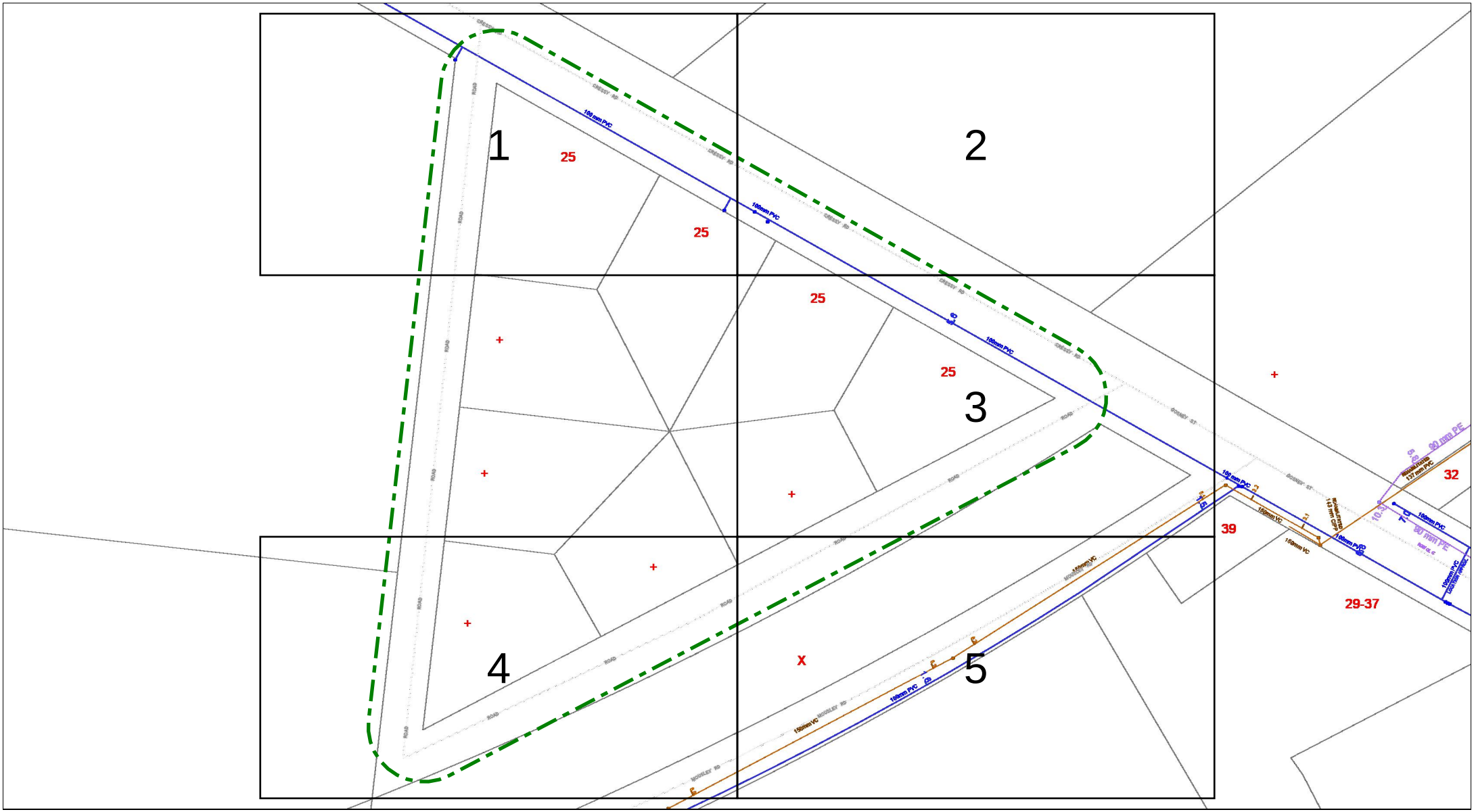
Warning - Take Precautions if Printing this Plot in Black & White.
All planned mains shall be treated as live mains, as mains under pressure may be in existence.

- Gas Transmission Pipeline
- Gas Distribution Mains
- Planned Gas Assets
- Abandoned Gas Assets
- Requested Area

Sequence Number: 109322597 **Job Number:** 21553550

Location: Cressy Road, Winchelsea VIC 3241

Date Generated: 04/05/2021



PLANS MUST BE PRINTED IN COLOUR

N

Scale: 1:2306

Overview

Asset Types

- Water
- Recycled Water
- Gravity Sewer
- Pressure Sewer

Feature Types

- Pipes
- Decommissioned Pipe
- Fitting / Manhole
- 2.0 Offset

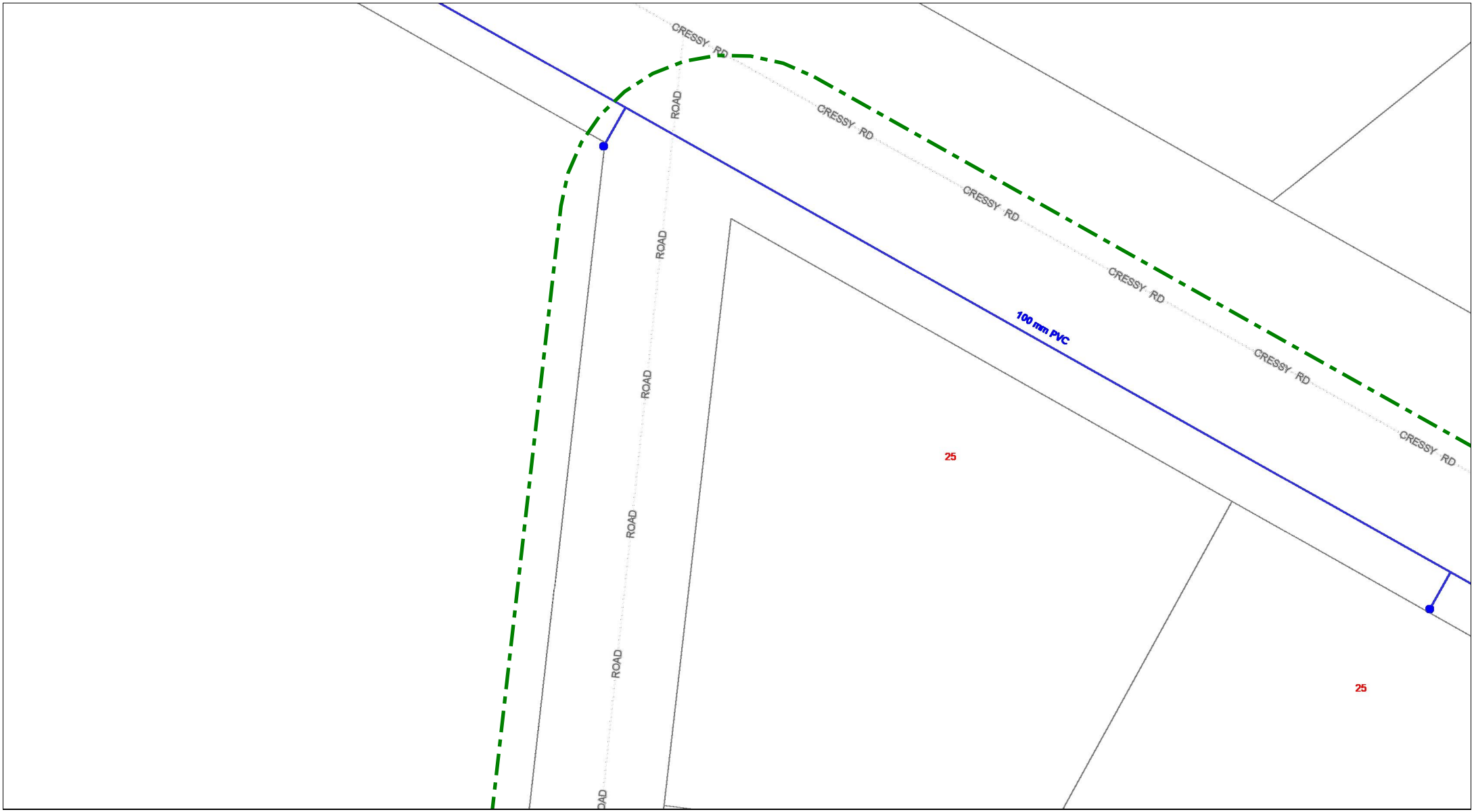
OH&S Hazard Types

- Cracked AC Pipe
- Asbestos in Wrapping
- Benzene Detected
- LEL Detected
- Contaminated Ground

Sequence Number: 109322597 **Job Number:** 21553550

Location: Cressy Road, Winchelsea VIC 3241

Date Generated: 04/05/2021



Disclaimer: Barwon Water does not provide any warranty, express or implied, as to the accuracy, completeness, currency or reliability of plans provided as part of the 'Dial Before You Dig' program. Furthermore, Barwon Water does not provide a warranty that the scale of the plans is accurate, or that they are suitable for a specific purpose. These plans are intended for general information only. Barwon Water is not responsible and does not accept liability for any loss, expense or damage (direct or indirect) which has arisen from reliance on any plans provided by Barwon Water. It is the responsibility of users of the plans to ensure the accuracy of the plans by independent means and to take care when undertaking works that have the potential to damage Barwon Water assets.

PLANS MUST BE PRINTED IN COLOUR

N

Scale: 1:750

Plan No: 1

Asset Types

- Water
- Recycled Water
- Gravity Sewer
- Pressure Sewer

Feature Types

- Pipes
- Decommissioned Pipe
- Fitting / Manhole
- 2.0 Offset

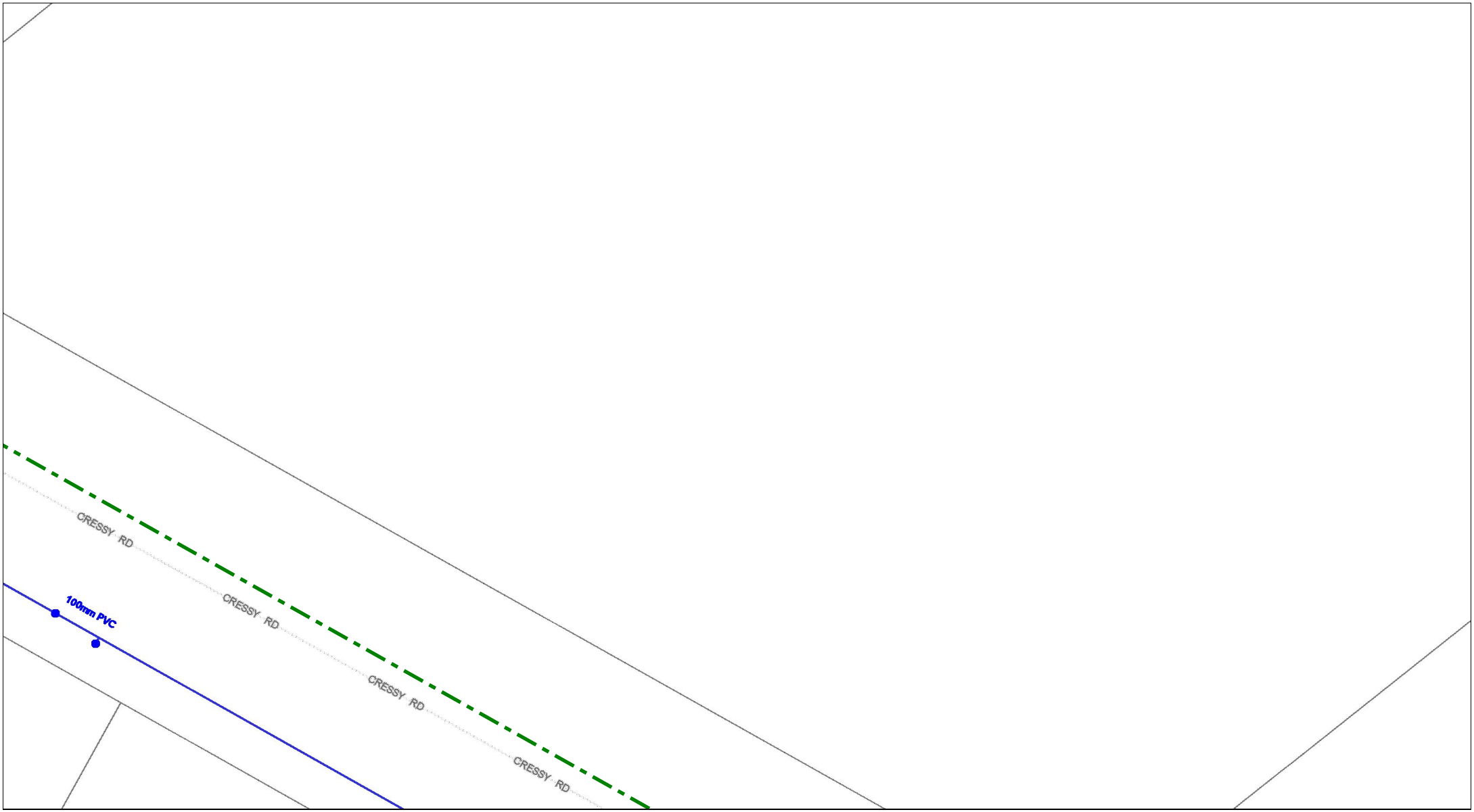
OH&S Hazard Types

- Cracked AC Pipe
- Asbestos in Wrapping
- Benzene Detected
- LEL Detected
- Contaminated Ground

Sequence Number: 109322597 **Job Number:** 21553550

Location: Cressy Road, Winchelsea VIC 3241

Date Generated: 04/05/2021



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PLANS MUST BE PRINTED IN COLOUR

N

Scale: 1:750

Plan No: 2

Asset Types

- Water
- Recycled Water
- Gravity Sewer
- Pressure Sewer

Feature Types

- Pipes
- Decommissioned Pipe
- Fitting / Manhole
- 2.0 Offset

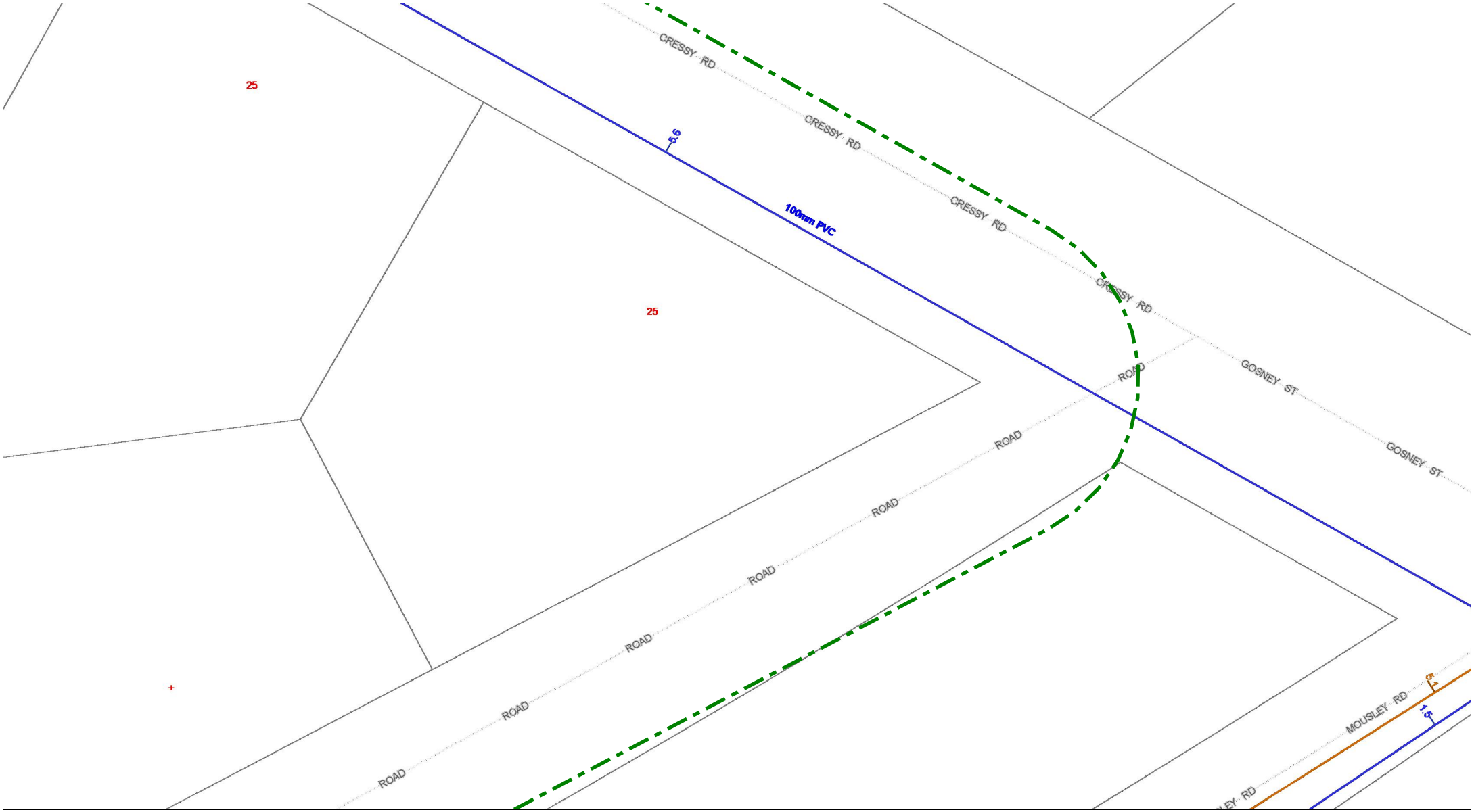
OH&S Hazard Types

- Cracked AC Pipe
- Asbestos in Wrapping
- Benzene Detected
- LEL Detected
- Contaminated Ground

Sequence Number: 109322597 **Job Number:** 21553550

Location: Cressy Road, Winchelsea VIC 3241

Date Generated: 04/05/2021



Disclaimer: Barwon Water does not provide any warranty, express or implied, as to the accuracy, completeness, currency or reliability of plans provided as part of the 'Dial Before You Dig' program. Furthermore, Barwon Water does not provide a warranty that the scale of the plans is accurate, or that they are suitable for a specific purpose. These plans are intended for general information only. Barwon Water is not responsible and does not accept liability for any loss, expense or damage (direct or indirect) which has arisen from reliance on any plans provided by Barwon Water. It is the responsibility of users of the plans to ensure the accuracy of the plans by independent means and to take care when undertaking works that have the potential to damage Barwon Water assets.

PLANS MUST BE PRINTED IN COLOUR

N

Scale: 1:750

Plan No: 3

Asset Types

- Water
- Recycled Water
- Gravity Sewer
- Pressure Sewer

Feature Types

- Pipes
- Decommissioned Pipe
- Fitting / Manhole
- 2.0 Offset

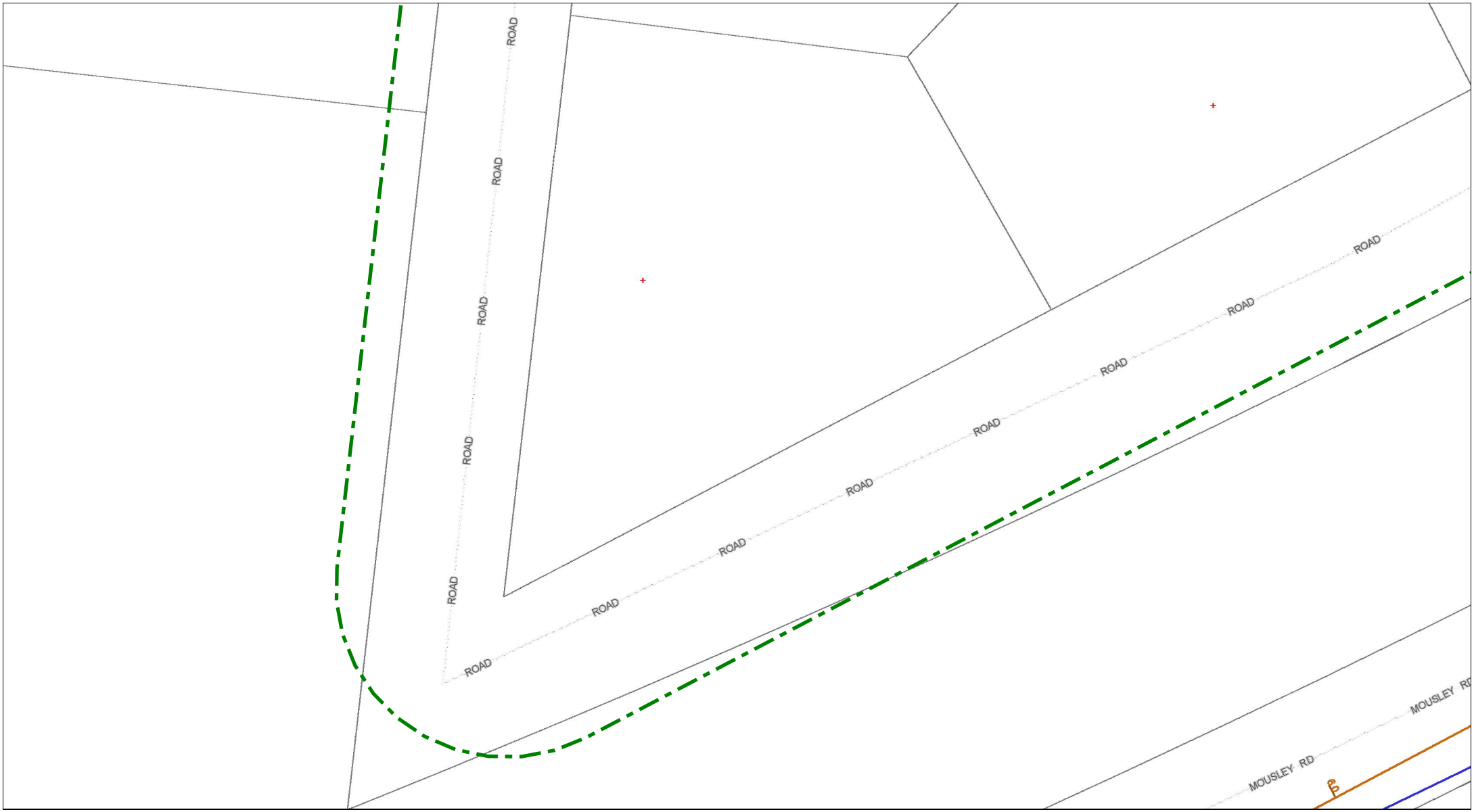
OH&S Hazard Types

- Cracked AC Pipe
- Asbestos in Wrapping
- Benzene Detected
- LEL Detected
- Contaminated Ground

Sequence Number: 109322597 **Job Number:** 21553550

Location: Cressy Road, Winchelsea VIC 3241

Date Generated: 04/05/2021



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PLANS MUST BE PRINTED IN COLOUR

N

Scale: 1:750

Plan No: 4

Asset Types

- Water
- Recycled Water
- Gravity Sewer
- Pressure Sewer

Feature Types

- Pipes
- Decommissioned Pipe
- Fitting / Manhole
- 2.0 Offset

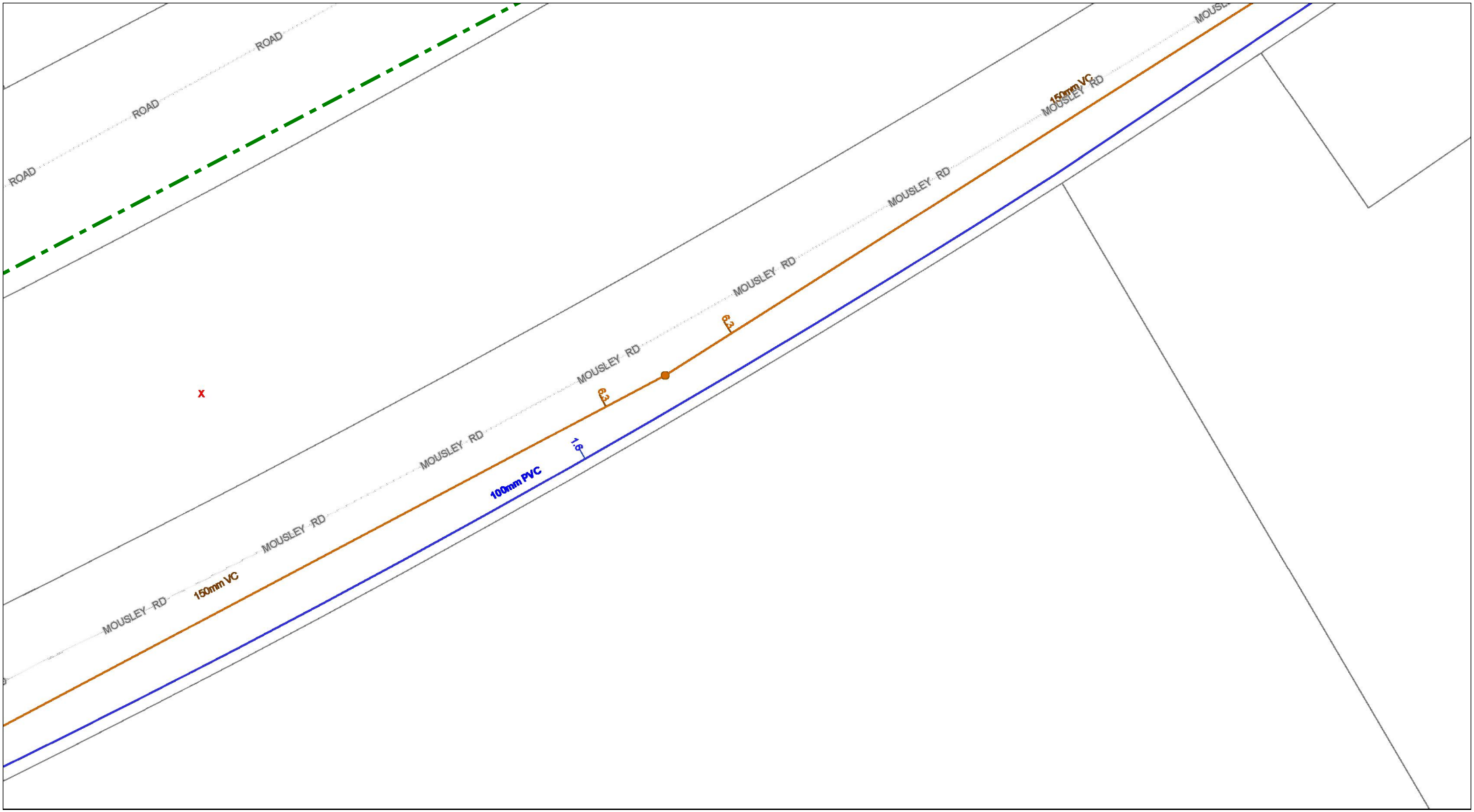
OH&S Hazard Types

- Cracked AC Pipe
- Asbestos in Wrapping
- Benzene Detected
- LEL Detected
- Contaminated Ground

Sequence Number: 109322597 **Job Number:** 21553550

Location: Cressy Road, Winchelsea VIC 3241

Date Generated: 04/05/2021



Disclaimer: Barwon Water does not provide any warranty, express or implied, as to the accuracy, completeness, currency or reliability of plans provided as part of the 'Dial Before You Dig' program. Furthermore, Barwon Water does not provide a warranty that the scale of the plans is accurate, or that they are suitable for a specific purpose. These plans are intended for general information only. Barwon Water is not responsible and does not accept liability for any loss, expense or damage (direct or indirect) which has arisen from reliance on any plans provided by Barwon Water. It is the responsibility of users of the plans to ensure the accuracy of the plans by independent means and to take care when undertaking works that have the potential to damage Barwon Water assets.

PLANS MUST BE PRINTED IN COLOUR

N

Scale: 1:750

Plan No: 5

Asset Types

- Water
- Recycled Water
- Gravity Sewer
- Pressure Sewer

Feature Types

- Pipes
- Decommissioned Pipe
- Fitting / Manhole
- 2.0 Offset

OH&S Hazard Types

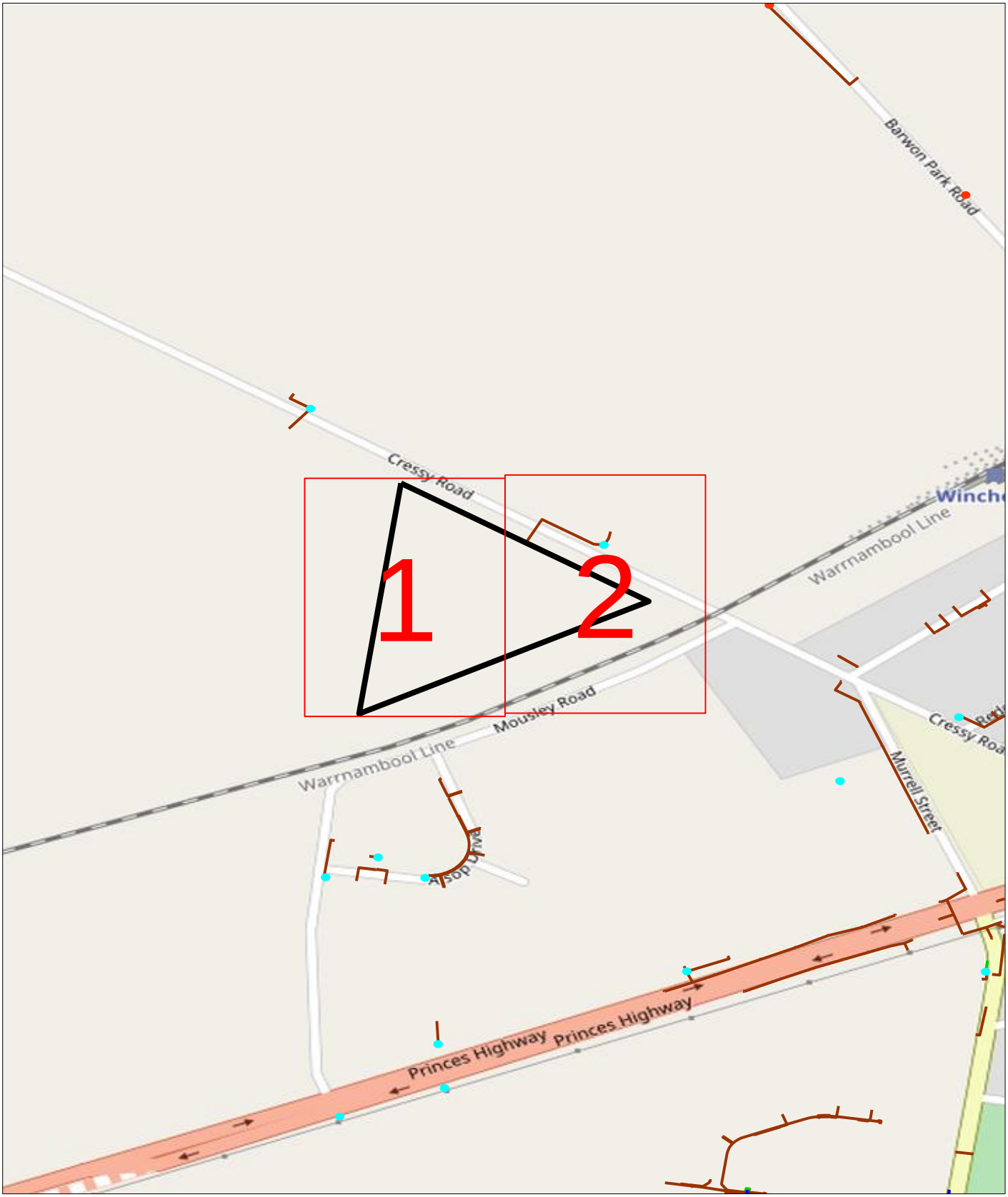
- Cracked AC Pipe
- Asbestos in Wrapping
- Benzene Detected
- LEL Detected
- Contaminated Ground

Locality Map

Sequence No: 109322594

Cressy Road Winchelsea

MAP IS A GUIDE ONLY- REFER TO CABLE PLANS FOR ACCURATE ASSET LOCATIONS



LEGEND:

DBYD Work Area | SWER Substation | High Voltage Cable | Communication Cable

Zone Substation | Distribution Substation | Low Voltage Cable | Earth Cable

This map represents the location of the submitted DBYD Work Area and all CitiPower/Powercor responses are based on this location. It is the responsibility of the enquirer to ensure the accuracy of the DBYD Work Area.

0 0.06km

N

Imagery sourced from Open StreetMaps

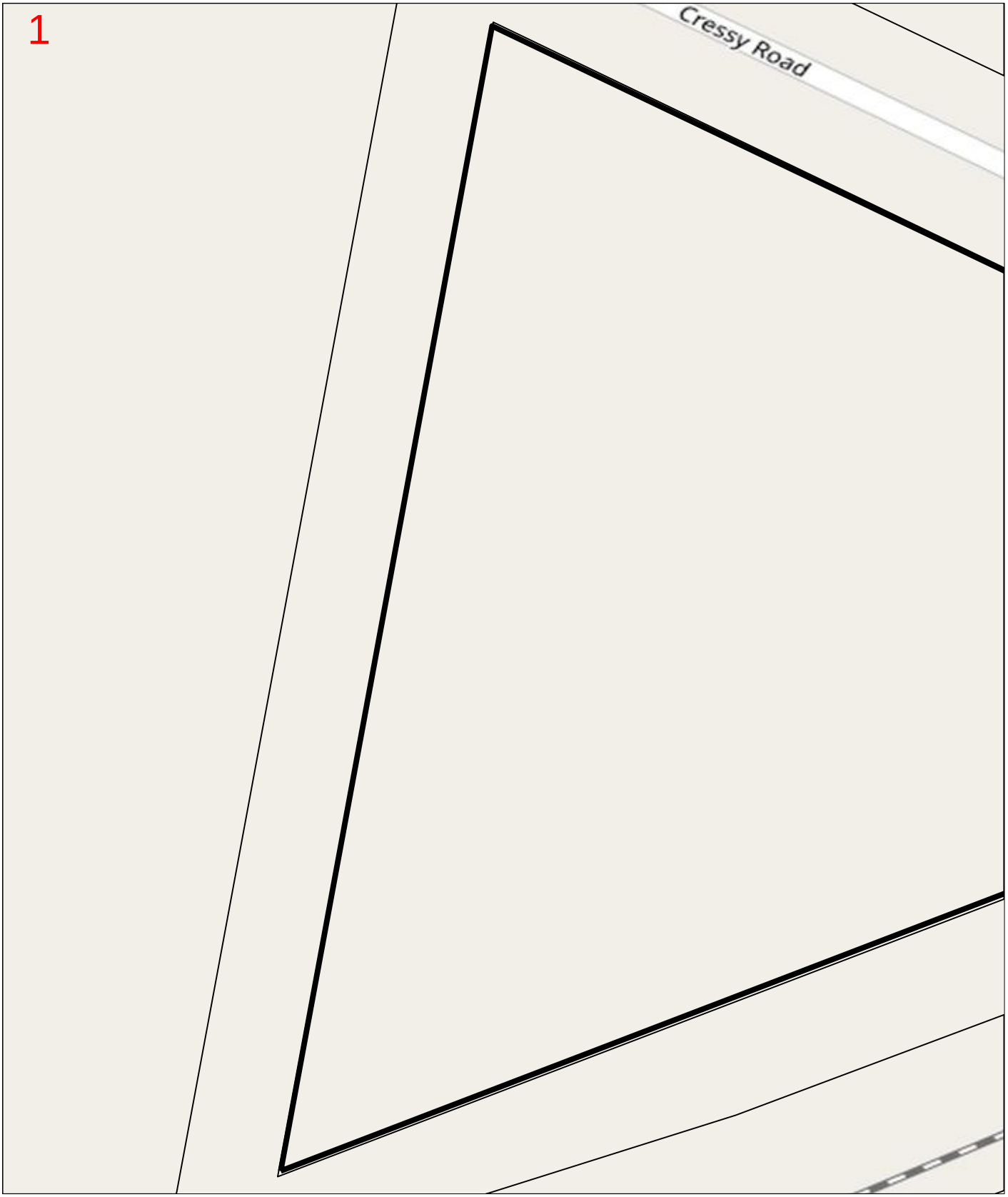
Powered by dbyd

Map 1

Sequence No: 109322594

Cressy Road Winchelsea

MAP IS A GUIDE ONLY- REFER TO CABLE PLANS FOR ACCURATE ASSET LOCATIONS



LEGEND:

- DBYD Work Area
- SWER Substation
- High Voltage Cable
- Communication Cable
- Pole (Subtransmission)
- Pole (LV)
- Zone Substation
- Distribution Substation
- Low Voltage Cable
- Earth Cable
- Pole (HV)
- Property Boundary

This map represents the location of the submitted DBYD Work Area and all CitiPower/Powercor responses are based on this location. It is the responsibility of the enquirer to ensure the accuracy of the DBYD Work Area.

0 0.01km

N

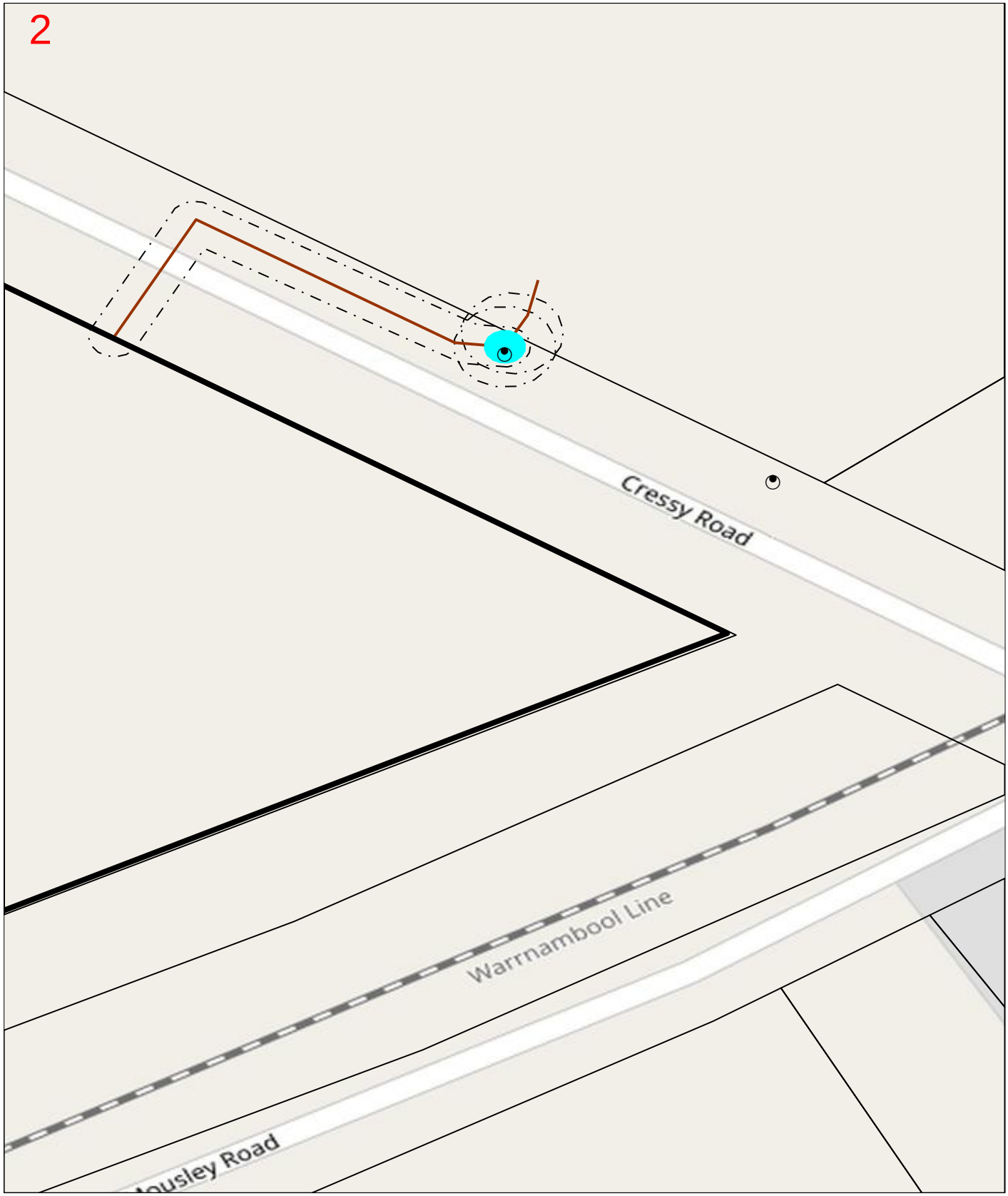
Imagery sourced from Open StreetMaps

Map 2

Sequence No: 109322594

Cressy Road Winchelsea

MAP IS A GUIDE ONLY- REFER TO CABLE PLANS FOR ACCURATE ASSET LOCATIONS



LEGEND:

DBYD Work Area
SWER Substation
High Voltage Cable
Communication Cable
Pole (Subtransmission)
Pole (LV)
Zone Substation
Distribution Substation
Low Voltage Cable
Earth Cable
Pole (HV)
Property Boundary

This map represents the location of the submitted DBYD Work Area and all CitiPower/Powercor responses are based on this location. It is the responsibility of the enquirer to ensure the accuracy of the DBYD Work Area.

0 0.01km

N

Imagery sourced from Open StreetMaps

Job No 21553550

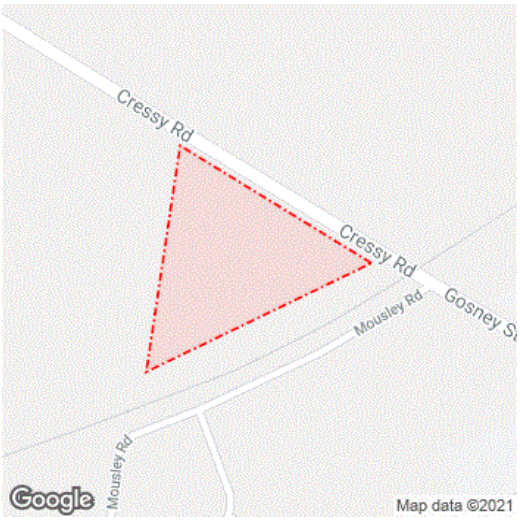
Phone: 1100
www.1100.com.au

Caller Details

Contact:	Mr Peter King	**Caller Id:**	1692504	**Phone:**	0417330473
Company:	Jet Environmental	**Mobile:**	0417330473	**Fax:**	Not Supplied
Address:	5 Greeney Street Altona VIC 3018	**Email:**	peter@jetenvironmental.com.au		

Dig Site and Enquiry Details

WARNING: The map below only displays the location of the proposed dig site and does not display any asset owners' pipe or cables. The area highlighted has been used only to identify the participating asset owners, who will send information to you directly.



User Reference: J1214
Working on Behalf of: Private

Enquiry Date:	Start Date:	End Date:
04/05/2021	06/05/2021	06/05/2021

Address:
Cressy Road
Winchelsea VIC 3241

Job Purpose:	Onsite Activity:
Excavation	Vertical Boring
Location of Workplace:	**Location in Road:**
Private Property	Not Supplied

- Check the location of the dig site is correct. If not submit a new enquiry.
- If the scope of works change, or plan validity dates expire, resubmit your enquiry.
- Do NOT dig without plans. Safe excavation is your responsibility. If you do not understand the plans or how to proceed safely, please contact the relevant asset owners.

Notes/Description of Works:

Your Responsibilities and Duty of Care

- The lodgement of an enquiry does not authorise the project to commence. You must obtain all necessary information from any and all likely impacted asset owners prior to excavation.
- If plans are not received within 2 working days, contact the asset owners directly & quote their Sequence No.
- ALWAYS perform an onsite inspection for the presence of assets. Should you require an onsite location, contact the asset owners directly. Please remember, plans do not detail the exact location of assets.
- Pothole to establish the exact location of all underground assets using a hand shovel, before using heavy machinery.
- Ensure you adhere to any State legislative requirements regarding Duty of Care and safe digging requirements.
- If you damage an underground asset you MUST advise the asset owner immediately.
- By using this service, you agree to Privacy Policy and the terms and disclaimers set out at **www.1100.com.au**
- **For more information on safe excavation practices, visit www.1100.com.au**

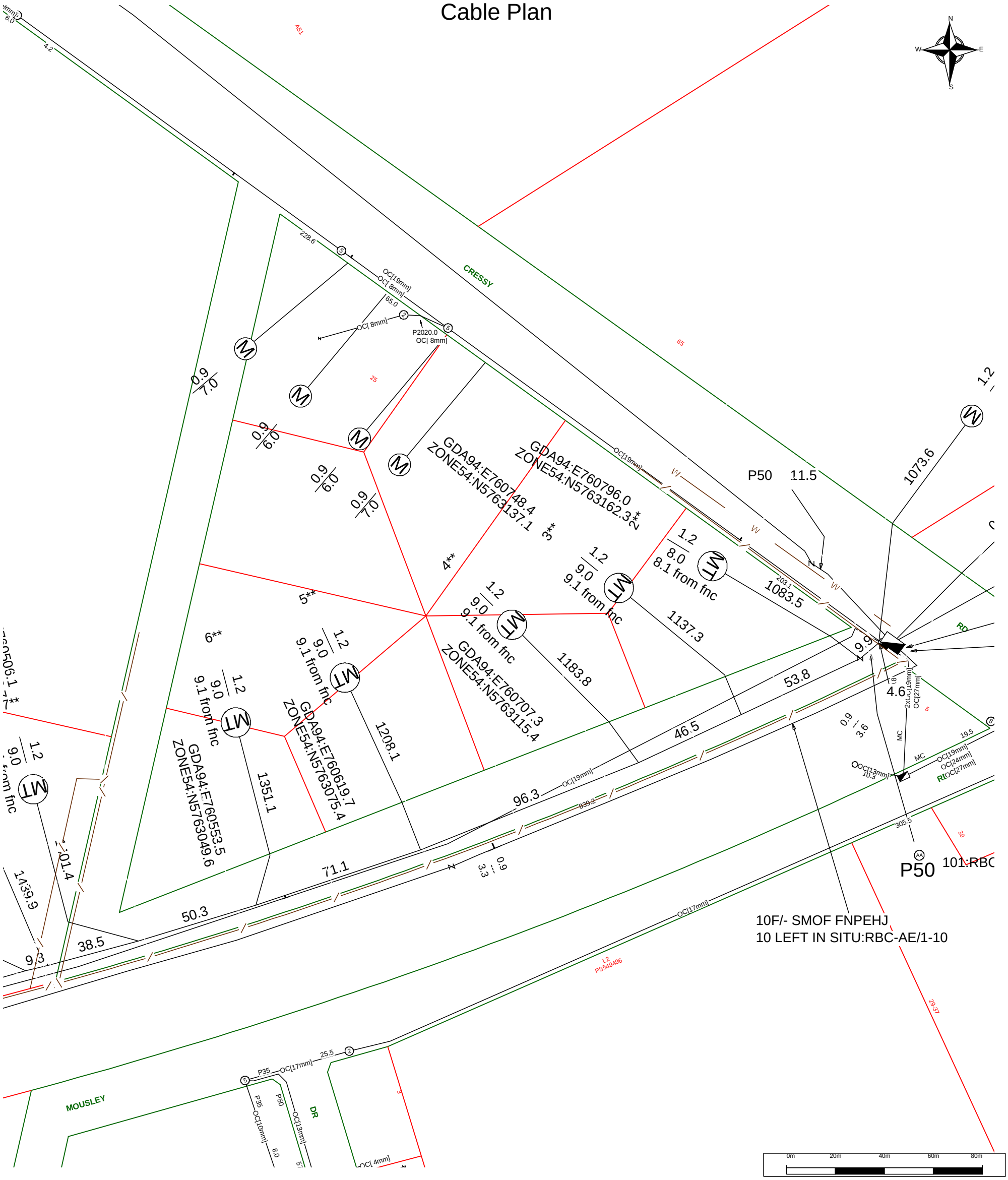
Asset Owner Details

The assets owners listed below have been requested to contact you with information about their asset locations within 2 working days.
Additional time should be allowed for information issued by post. It is **your responsibility** to identify the presence of any underground assets in and around your proposed dig site. Please be aware, that not all asset owners are registered with the Dial Before You Dig service, so it is **your responsibility** to identify and contact any asset owners not listed here directly.
** Asset owners highlighted by asterisks ** require that you visit their offices to collect plans.
# Asset owners highlighted with a hash require that you call them to discuss your enquiry or to obtain plans.

Seq. No.	Authority Name	Phone	Status
109322596	AusNet Gas Services Pty Ltd	1800088208	NOTIFIED
109322597	Barwon Water	1300656007	NOTIFIED
109322594	Powercor Australia (Ballarat)	132206	NOTIFIED
109322595	Telstra VICTAS	1800653935	NOTIFIED
109322593	VicTrack Access	0396198078	NOTIFIED

END OF UTILITIES LIST

Cable Plan



Telstra	For all Telstra DBYD plan enquiries - email - Telstra.Plans@team.telstra.com For urgent onsite contact only - ph 1800 653 935 (bus hrs)
TELSTRA CORPORATION LIMITED A.C.N. 051 775 556	
Generated On 04/05/2021 13:29:59	Sequence Number: 109322595 CAUTION: Fibre optic and/ or major network present in plot area. Please read the Duty of Care and contact Telstra Plan Services should you require any assistance.

The above plan must be viewed in conjunction with the Mains Cable Plan on the following page

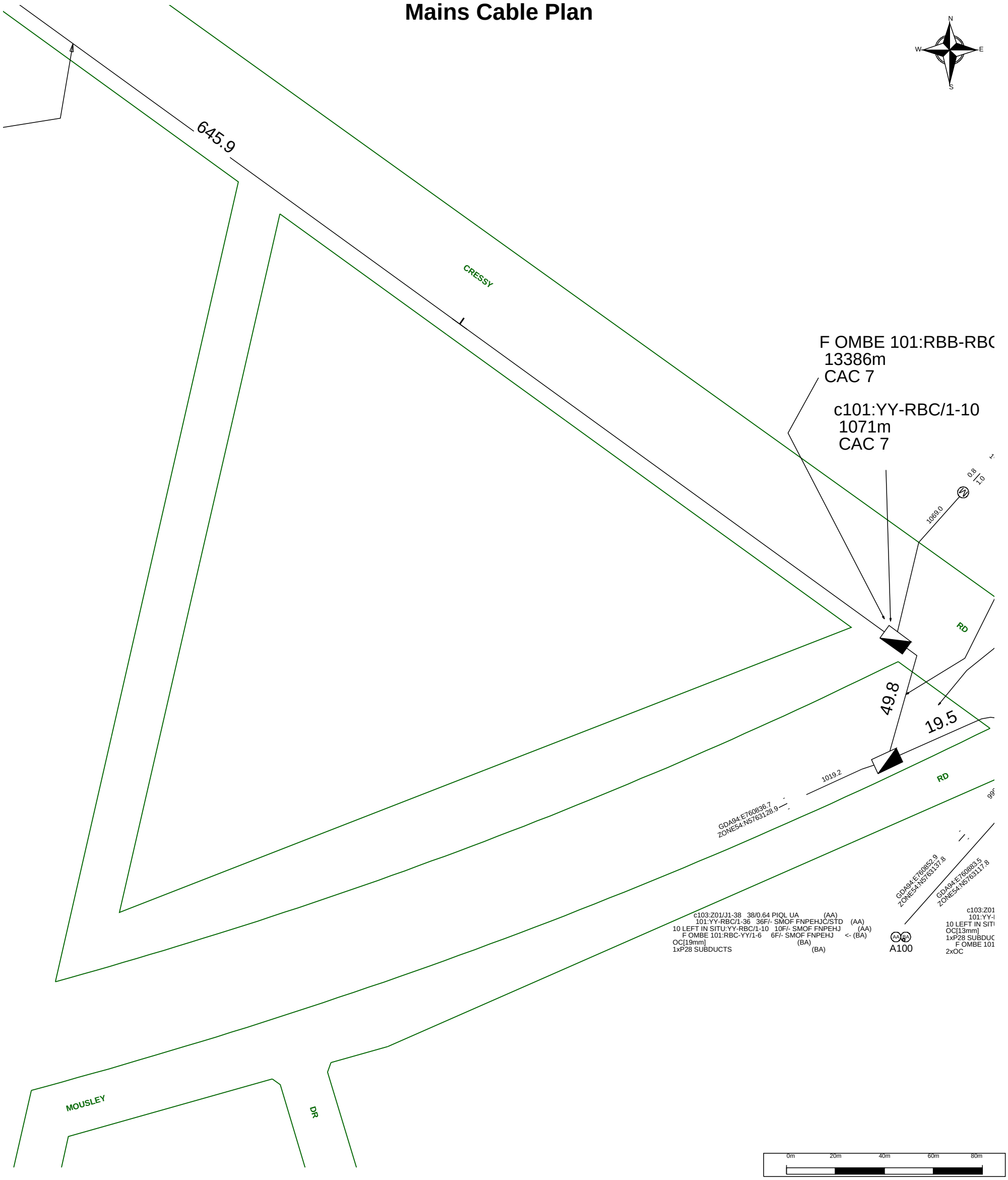
WARNING - Due to the nature of Telstra underground plant and the age of some cables and records, it is impossible to ascertain the precise location of all Telstra plant from Telstra's plans. The accuracy and/or completeness of the information supplied can not be guaranteed as property boundaries, depths and other natural landscape features may change over time, and accordingly the plans are indicative only. Telstra does not warrant or hold out that its plans are accurate and accepts no responsibility for any inaccuracy shown on the plans.

It is your responsibility to locate Telstra's underground plant by careful hand pot-holing prior to any excavation in the vicinity and to exercise due care during that excavation.

Please read and understand the information supplied in the duty of care statement attached with the Telstra plans. TELSTRA WILL SEEK COMPENSATION FOR LOSS CAUSED BY DAMAGE TO ITS PLANT.

Telstra plans and information supplied are valid for 60 days from the date of issue. If this timeframe has elapsed, please reapply for plans.

Mains Cable Plan



Telstra

For all Telstra DBYD plan enquiries -
email - Telstra.Plans@team.telstra.com
For urgent onsite contact only - ph 1800 653 935 (bus hrs)

TELSTRA CORPORATION LIMITED A.C.N. 051 775 556

Generated On 04/05/2021 13:30:00

Sequence Number: 109322595

CAUTION: Fibre optic and/ or major network present in plot area. Please read the Duty of Care and contact Telstra Plan Services should you require any assistance.

APPENDIX VI:

Calibration Certificates

Equipment Calibration Form
GA5000

Enqip #: 12161
Company: Jet Environmental
Consultant: Peter King
PO #: J1214
Certificate #: 17465

INSTRUMENT IDENTIFICATION

Model Number: GA5KA0F-100
Serial Number: G506198
Instrument Type: GTI - GA5000

INSPECTION RECORD

Date & Time: PASS
Flow Rate: 639 mL/min

CALIBRATION DETAILS

Sensor	Standard	Reading	Traceability Lot #
CH_4	N_2 UHP	0 %	1218973
	2.5 %	2.5 %	1185587
	60 %	60.0 %	1327131
CO_2	5 %	5.0 %	1199086
	40 %	40.0 %	1327131
O_2	N_2 UHP	0 %	1218973
	20.9 %	20.9 %	N/A
CO	N_2 UHP	0 ppm	1218973
	100 ppm	100 ppm	1185587
H_2S	N_2 UHP	0 ppm	1218973
	25 ppm	25 ppm	1273370

Calibration Successful: YES

Calibrated By: Doyle Schapendonk

Test Date: 9/07/2020

enqip
116 Thistlethwaite St, South Melbourne 3205
P 1300 218 987
E info@enqip.com.au | **W** www.enqip.com.au

Equipment Calibration Form
GA5000

Enqip #: 14037
Company: Jet Environmental
Consultant: Peter King
PO #: J1214
Certificate #: 20627

INSTRUMENT IDENTIFICATION

Model Number: GA5KA0F-100
Serial Number: GA500136
Instrument Type: GTI - GA5000

INSPECTION RECORD

Date & Time: PASS
Flow Rate: 612 mL/min

CALIBRATION DETAILS

Sensor	Standard	Reading	Traceability Lot #
CH_4	N_2 UHP	0 %	1415414
	2.5 %	2.5 %	1298752
	60 %	60.0 %	1327131
CO_2	5 %	5.0 %	1346147
	40 %	40.0 %	1327131
O_2	N_2 UHP	0 %	1415414
	20.9 %	20.9 %	N/A
CO	N_2 UHP	0 ppm	1415414
	100 ppm	100 ppm	1298752
H_2S	N_2 UHP	0 ppm	1415414
	25 ppm	25 ppm	1424070

Calibration Successful: YES

Calibrated By: Doyle Schapendonk **Test Date:** 5/05/2021

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APPENDIX VII:

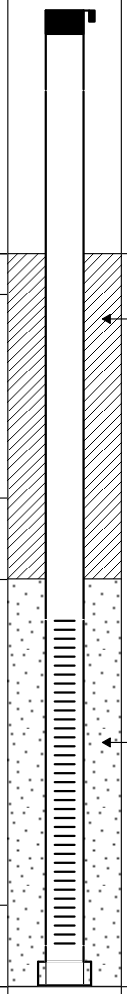
Gas Monitoring Bore Logs

Gas Bore: LFG01

Job No: J1214
Client: Earl Civil
Site: 25 Cressy Rd, Winchelsea
Bore Casing Diameter (mm): 50
Bore Depth (mbgl): 0.8

Date: 10 July 2020
Logged: PJK
Driller: PJK
Method: Hand auger
Screen Interval (mbgl): 0.45 - 0.9

Depth (m)	Graphic	Description	Sample	PID	Bore Details	Comments
0.0		**FILL** moist, dark brown, disturbed natural sandy clay, firm, moderate plasticity	-	-		No odour
		CLAY moist, mottled orangish brown, stiff, moderate to high plasticity, minor sand, trace gravel	-	-		No odour
		CLAY moist, dark grey, stiff, high plasticity, trace highly weathered basalt	-	-		No odour
1.0						Bore terminated at 0.9 m due to refusal on basalt

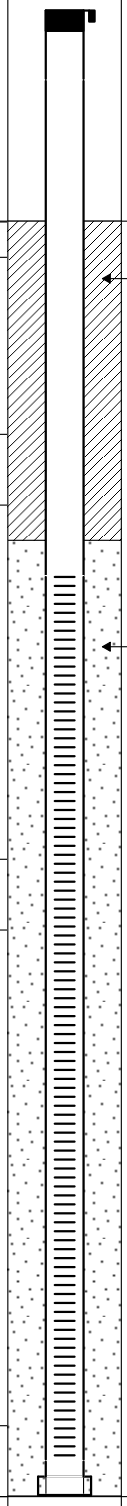


Gas Bore: LFG02

Job No: J1214
Client: Earl Civil
Site: 25 Cressy Rd, Winchelsea
Bore Casing Diameter (mm): 50
Bore Depth (mbgl): 1.8

Date: 10 July 2020
Logged: PJK
Driller: PJK
Method: Hand auger
Screen Interval (mbgl): 0.5 - 1.8

Depth (m)	Graphic	Description	Sample	PID	Bore Details	Comments
0.0		**FILL** slightly moist, brown, disturbed natural sand, dense, fine to medium grained	-	-		No odour
		CLAY moist, mottled orangish brown, stiff, moderate to high plasticity, minor sand, trace gravel	-	-		No odour
		becoming grey	-	-		No odour
1.0			-	-		No odour
2.0						



Gas Bore: LFG03

Job No: J1214
Client: Earl Civil
Site: 25 Cressy Rd, Winchelsea
Bore Casing Diameter (mm): 50
Bore Depth (mbgl): 2.0

Date: 10 July 2020
Logged: PJK
Driller: PJK
Method: Hand auger
Screen Interval (mbgl): 0.5 - 2.0

Depth (m)	Graphic	Description	Sample	PID	Bore Details	Comments
0.0		**FILL** slightly moist, brown, disturbed natural sandy silt, dense	-	-		No odour
		CLAY moist, mottled orangish brown, stiff, moderate to high plasticity, minor sand, trace gravel	-	-		No odour
		becoming grey				
			-	-		No odour
1.0		becoming orangish brown				
			-	-		No odour
2.0						

Bentonite seal

Gravel pack

Gas Bore: LFG04

Job No: J1214
Client: Earl Civil
Site: 25 Cressy Rd, Winchelsea
Bore Casing Diameter (mm): 50
Bore Depth (mbgl): 1.5

Date: 10 July 2020
Logged: PJK
Driller: PJK
Method: Hand auger
Screen Interval (mbgl): 0.5 - 1.5

Depth (m)	Graphic	Description	Sample	PID	Bore Details	Comments
0.0		**FILL** very moist, orange, sandy clay, firm, non-plastic, with fine gravel	-	-		No odour
		CLAY slightly moist, grey, stiff, high plasticity				Bentonite seal
			-	-		No odour
		becoming orange, with weathered basalt gravel				Gravel pack
			-	-		No odour
1.0						
			-	-		No odour
						Bore terminated at 1.5 m due to refusal on basalt

Gas Bore: LFG05

Job No: J1214
Client: JR & KA Developments Pty Ltd
Site: 25 Cressy Rd, Winchelsea
Bore Casing Diameter (mm): 50
Bore Depth (mbgl): 1.6

Date: 6 May 2021
Logged: PJK
Driller: PJK
Method: Hand auger
Screen Interval (mbgl): 0.55 - 1.6

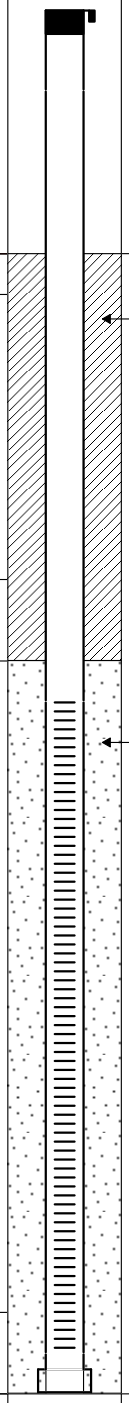
Depth (m)	Graphic	Description	Sample	PID	Bore Details	Comments
0.0		**FILL** moist, brown with grey and orange patches, gravelly sand, dense, coarse grained	-	-		No odour
		CLAY moist, brown, firm, moderate plasticity				Bentonite seal
			-	-		No odour
		becoming stiff, high plasticity				Gravel pack
1.0		white patches of extremely weathered rock	-	-		No odour

Gas Bore: LFG06

Job No: J1214
Client: JR & KA Developments Pty Ltd
Site: 25 Cressy Rd, Winchelsea
Bore Casing Diameter (mm): 50
Bore Depth (mbgl): 1.4

Date: 6 May 2021
Logged: PJK
Driller: PJK
Method: Hand auger
Screen Interval (mbgl): 0.55 - 1.4

Depth (m)	Graphic	Description	Sample	PID	Bore Details	Comments
0.0		**FILL** moist, dark grey, sandy gravel with cobble, very dense, coarse grained	-	-		No odour
		CLAY moist, brown with grey and orange mottling, firm, moderate plasticity	-	-		No odour
1.0		becoming stiff, white patches of extremely weathered rock	-	-		No odour

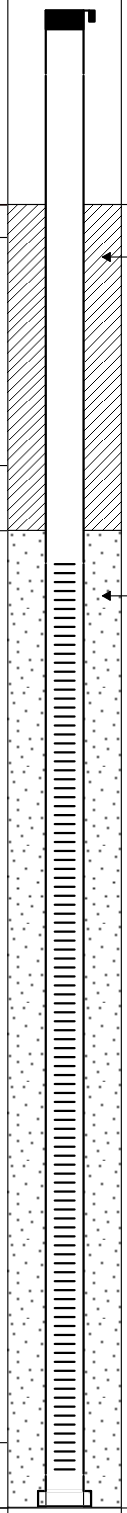


Gas Bore: LFG07

Job No: J1214
Client: JR & KA Developments Pty Ltd
Site: 25 Cressy Rd, Winchelsea
Bore Casing Diameter (mm): 50
Bore Depth (mbgl): 2.0

Date: 6 May 2021
Logged: PJK
Driller: PJK
Method: Hand auger
Screen Interval (mbgl): 0.55 - 2.0

Depth (m)	Graphic	Description	Sample	PID	Bore Details	Comments
0.0		**FILL** moist, dark grey, sandy gravel with cobble, very dense, coarse grained	-	-		No odour
		CLAY moist, brown with grey mottling, firm, high plasticity	-	-		No odour
1.0		becoming pale brown, stiff, white patches of extremely weathered rock	-	-		No odour
2.0						



APPENDIX VIII:

Landfill Gas Monitoring Sheets

Landfill Gas Monitoring Sheet

JET environmental

Project No: J1214 Equipment: GA 5000 Date: 10/7/20

Site: 25 CRESSY RD, WINCHELSEA Conditions: COOL, GENTLE BREEZE Staff: PJK

Location ID	Start Time	Flow Rate (L/hr)	Relative Pressure (mb)	Atmospheric Pressure (mb)	Peak concentrations (% v/v)			Stabilised concentrations (% v/v)				Stabilisation Time (sec)	Comments (e.g. Location/bore condition, direction & rate of change if unstabilised)
					Max. CH_4	Max. CO_2	Min. O_2	CH_4	CO_2	O_2	Bal.		
LFG01	15.12	0.0	0.03	1010	0.0	0.2	19.6	0.0	0.2	19.6	80.2	180	BORE IN GOOD CONDITION
LFG02	15.23	0.1	0.05	1011	0.0	0.8	19.7	0.0	0.8	19.7	79.5	180	" " "
LFG03	15.38	0.0	0.02	1011	0.0	0.3	19.1	0.0	0.3	19.1	80.6	180	" " "
LFG04	15.48	0.0	0.05	1010	0.0	0.6	18.6	0.0	0.6	18.6	80.8	180	" " "
WV1	16.18	—	—	1010	0.0	1.0	20.2	0.0	1.0	20.2	78.8	120	WATER MAIN VALVE

Landfill Gas Monitoring Sheet

JET environmental

Project No: J1214 Equipment: GA5000 Date: 6-5-21

Site: 25 CRESSY RD, WINCHELSEA Conditions: COOL (~17°C) light wind NO rain Staff: PJK

Location ID	Start Time	Flow Rate (L/hr)	Relative Pressure (mb)	Atmospheric Pressure (mb)	Peak concentrations (% v/v)			Stabilised concentrations (% v/v)				Stabilisation Time (sec)	Comments (e.g. Location/bore condition, direction & rate of change if unstabilised)
					Max. CH_4	Max. CO_2	Min. O_2	CH_4	CO_2	O_2	Bal.		
LFG05	13:03	0.0	0.03	1009	0.0	2.1	17.7	0.0	2.1	17.7	80.2	~~420~~ 420	Good condition
LFG06	13:23	0.1	0.04	1009	0.0	0.9	19.2	0.0	0.9	19.2	79.9	420	" "
LFG07	13:45	0.0	0.04	1009	0.0	3.5	15.0	0.0	3.5	15.0	81.5	420	" "
T1	12:40	–	0.07	1010	0.0	0.2	~~20.0~~	0.0	0.2	20.0	79.6	120	Telstra Pit.
D1	12:45	–	0.07	1010	0.0	0.2	19.8	0.0	0.2	19.8	79.9	120	Driveway culvert drain.
E1	12:48	–	0.07	1010	0.0	0.2	19.8	0.0	0.2	19.8	79.9	120	Elect cable in ground.
T2	12:53	–	0.07	1010	0.0	0.2	19.7	0.0	0.2	19.7	80.1	120	Telstra Pit.
WV1	12:59	–	0.07	1010	0.0	0.2	19.8	0.0	0.2	19.8	80.0	120	Water valve. outside T4.


JET
environmental