Table 7.1 Adopted Groundwater Screening Criteria (mg/L)

Applicable Beneficial Use	Maintenance of Ecosystems [A]	Agriculture, Parks and Gardens[K,L]		Stock Watering [B,C]		Primary Contact Recreation [D]	Building and Structures [E]
Primary Adopted Screening Criteria	ANZECC 2000 Fresh Water 95% Protection	ANZECC 1992 Irrigation Water Quality	ANZECC 2000 Agricultural Irrigation (short term use)	ANZECC 1992 Livestock Watering	ANZECC 2000 Livestock Drinking Water	ANZECC 1992 Raw Water for Drinking Water Supply	AS2159-2009
Arsenic (III)	0.024	0.1	2	0.5	0.5	0.05	-
Cadmium	0.0002	0.01	0.05	0.01	0.01	0.005	-
Chromium (III)	-	-	-	-	-	-	-
Chromium (VI)	0.001	-	-	-	-	-	-
Chromium (Total)	-	-	1	1	1	0.05	-
Copper	0.0014	0.2	5	0.5-5[G]	0.4-5[G]	1	-
Lead	0.0034	0.2	5	0.1	0.1	0.05	-
Manganese	1.9	2	10	-	Not sufficiently toxic	0.1	-
Mercury Inorganic	0.0006	-	-	-	-	-	-
Methyl	-	-	-	-	-	-	-
Total	-	0.002	0.002	0.002	0.002	0.001	
Nickel	0.011	0.2	2	1	1	0.1	-
Selenium	0.011	0.02	0.05	0.02	0.02	0.01	-
Vanadium	-	0.1	0.5	-	-	-	-
Zinc	0.008	2	5	20	20	5	-
pH	-		6-9	-	-	6.5-8.5	>5.5
Sulphate	-	-	-	-	-	-	<1,000
TDS	-	-	-	3,000	2,000	1,000	-
Nitrate (as N)	0.6[M]	-	-	30	400	10	-
Ammonia (as N)	0.9	-	-	-	-	0.01	-
TPH C_6-C_9	-	-	-	-	-	-	-

Applicable Beneficial Use	Maintenance of Ecosystems [A]	Agriculture, Parks and Gardens [K,L]		Stock Watering [B,C]		Primary Contact Recreation [D]	Building and Structures [E]
Primary Adopted Screening Criteria	ANZECC 2000 Fresh Water 95% Protection	ANZECC 1992 Irrigation Water Quality	ANZECC 2000 Agricultural Irrigation (short term use)	ANZECC 1992 Livestock Watering	ANZECC 2000 Livestock Drinking Water	ANZECC 1992 Raw Water for Drinking Water Supply	AS2159-2009
TPH C_{10}-C_{36}	0.6	-	-	-	-	-	-
Benzene	0.95	-	-	0.01	0.001	0.01	-
Toluene	1 [F]	-	-	-	0.8	-	-
Ethylbenzene	0.15 [F]	-	-	-	0.3	-	-
Xylenes	0.2	-	-	-	0.6	-	-
Phenol	0.432	-	-	300 [H]	0.01	0.01	-
2-chlorphenol	0.49	-	-	0.0001	-	0.0001	-
2-nitrophenol	0.002	-	-	-	-	-	-
2,4-dimethylphenol	0.002	-	-	-	-	-	-
2,4-dichlorphenol	0.16	-	-	0.0003	-	0.0003	-
2,4,5-trichlorophenol	0.003	-	-	0.002	-	0.002	-
2,4,6-trichlorophenol	0.0038	-	-	0.01	-	0.01	-
Pentachlorophenol	-	-	-	-	-		-
Benzo(a)pyrene (BaP)	0.05 [F]	-	-	0.0000001 [H]	-	1E-07	-
Naphthalene	0.016	-	-	-	-	-	-
Total PAH	0.003	-	-	-	-	-	-
1,1,-dichloroethene	-	-	-	0.00003	-	0.00003	-
1,2-dichloroethane	-	-	-	-	-	0.01	-
1,1,2-trichloroethane	6.5	-	-	-	-	-	-
cis-1,2-dichloroethene	0.02 [F]	-	-	-	0.06 [I]	-	-
trans-1,2-dichloroethene	0.02 [F]	-	-	-	-	-	-
Trichloroethene (TCE)	0.5 [F]	-	-	0.03	-	0.03	-
Tetrachloroethene	-	-	-	0.001		0.001	

Applicable Beneficial Use	Maintenance of Ecosystems [A]	Agriculture, Parks and Gardens[K,L]		Stock Watering [B,C]		Primary Contact Recreation [D]	Building and Structures [E]
Primary Adopted Screening Criteria	ANZECC 2000 Fresh Water 95% Protection	ANZECC 1992 Irrigation Water Quality	ANZECC 2000 Agricultural Irrigation (short term use)	ANZECC 1992 Livestock Watering	ANZECC 2000 Livestock Drinking Water	ANZECC 1992 Raw Water for Drinking Water Supply	AS2159-2009
Vinyl chloride	-	-	-	-	0.0003[J]	-	-
1,2-dibromoethane	-	-	-	-	-	-	-
1,2-dochlorobenzene	0.16	-	-	0.001	-	0.001	-
1,3-dichloropropane	0.26	-	-	0.02	-	0.02	-
1,4-dichlorobenzene	0.06	-	-	0.003	-	0.003	-
Carbon tetrachloride	-	-	-	0.003	-	0.003	-
Chlorobenzene	-	-	-	0.01	-	0.01	-
Dichloromethane	-	-	-	-	-	-	-
Chlordane	0.00008	-	-	0.006	-	0.006	-
DDT	0.00001	-	-	0.003	-	0.003	-
Dieldrin	-	-	-	0.001	-	0.001	-
Endrin	0.00002	-	-	0.001	-	0.001	-
g-BHC	0.0002	-	-	0.01	-	0.01	-
Heptachlor	0.00009	-	-	0.003	-	0.003	-
Methoxychlor	-	-	-	-	-	-	-
Toxaphene	2E-07	-	-	-	-	-	-
Azinophos methyl	0.00002	-	-	0.01	-	0.01	-
Bolstar	-	-	-	0.02	-	0.02	-
CHlorpyrifos	0.00001	-	-	0.002	-	0.002	-
Diazinon	0.00001	-	-	0.01	-	0.01	-
Dichlorovos	-	-	-	0.02	-	0.02	-
Disulfoton	-	-	-	0.006	-	0.006	-
Ethion	-	-	-	0.006	-	0.006	-
Ethoprop	-	-	-	0.001	-	0.001	-

Applicable Beneficial Use	Maintenance of Ecosystems (A)	Agriculture, Parks and Gardens(K,L)		Stock Watering (B,C)		Primary Contact Recreation (D)	Building and Structures (E)
Primary Adopted Screening Criteria	ANZECC 2000 Fresh Water 95% Protection	ANZECC 1992 Irrigation Water Quality	ANZECC 2000 Agricultural Irrigation (short term use)	ANZECC 1992 Livestock Watering	ANZECC 2000 Livestock Drinking Water	ANZECC 1992 Raw Water for Drinking Water Supply	AS2159-2009
Fenitrothion	0.0002	-	-	0.02	-	0,.02	-
Fensulfothion	-	-	-	0.02	-	0.02	-
Methyl parathion	-	-	-	-	-	0.006	-
Mevinphos	-	-	-	0.006	-	0.006	-
Ronnel	-	-	-	0.06	-	0.06	-
Aroclor 1242	0.0006	-	-	-	-	-	-
Aroclor 1254	0.00003	-	-	-	-	-	-
Sum total	-	-	-	0.0001	-	0.0001	-

'-' denotes no screening criteria available.

A. ANZECC (2000) National Water Quality Management Strategy. Australian and New Zealand Guidelines for Fresh and Marine Water Quality. 95% trigger values for Fresh Waters – unless otherwise specified.

B. ANZECC (1992) National Water Quality Management Strategy. Australian Water Quality Guidelines for Fresh and Marine Waters 'Livestock Watering' – unless otherwise specified.

C. ANZECC (2000) National Water Quality Management Strategy. Australian Water Quality Guidelines for Fresh and Marine Waters 'Livestock Drinking Water Quality' – unless otherwise specified.

D. ANZECC (1992) National Water Quality Management Strategy. Australian Water Quality Guidelines for Fresh and Marine Waters 'Raw Waters' – unless otherwise specified.

E. Australian Standard (2009) Piling – Design and Installation – AS2159-2009.

F. Netherlands (2000) Circular on Target Values and Intervention Values for soil remediation. Ministry of Housing, Spatial Planning and the Environment, Netherlands Government (Dutch Intervention Value).

G. Concentration for copper ranges from 0.5 mg/L for sheep, 1 mg/L for pigs and poultry and 5 mg/L for cattle.

H. ANZECC (1992) National Water Quality Management Strategy. Australian Water Quality Guidelines for Fresh and Marine Waters – 'Raw Waters'.

I. NHMRC/NHMMC (2004) – Australian Drinking Water Guideline (ADWG) for 1,2-DCE adopted in the absence of ANZECC 2000 or ANZECC 1992 criteria for cis-1,2-DCE.

J. NHMRC/NHMMC (2004) - Australian Drinking Water Guideline (ADWG) for Vinyl chloride adopted in the absence of ANZECC 2000 or ANZECC 1992 criteria for Vinyl chloride.

K. ANZECC (1992) National Water Quality Management Strategy. Australian Water Quality Guidelines for Fresh and Marine Waters 'Irrigation use – unless otherwise specified.

L. ANZECC (2000) National Water Quality Management Strategy. Australian Water Quality Guidelines for Fresh and Marine Waters 'Agricultural irrigation (short term use) – unless otherwise specified.

M. SEPP *Waters of Victoria* (2003) guideline for total nitrogen.

8. Surface water

This Audit has considered surface water bodies that are located at the expected point of discharge for groundwater underlying the site. Two dams are present on the site however these dams are likely to represent points of groundwater recharge. Therefore, the nearest surface water body to the site is a tributary of Rodds Drain located approximately 320m to the west of the site. This tributary eventually joins Rodds Drain proper approximately 1,040 m of the site prior to discharging into Eumemmerring Creek/Patterson River approximately 9 km northwest of the site. It has been assumed that local groundwater flow mimics local surface water drainage and hence, Eumemmerring Creek/Patterson river is assumed to be the main receptor of the local groundwater flow.

The following screening criteria are considered relevant for the protection of Eumemmerring Creek/Patterson River:

- ANZECC (2000) *Australian and New Zealand Guidelines for Fresh and Marine Water Quality, 95% Level of Protection.*

9. Soil investigation

Soil investigation works were undertaken at the site by Coffey between May 2011 and May 2012 and the findings are summarised below. For the purpose of the soil investigation the Eastern Precinct was divided in 4 areas – Areas 1 to 3 and buffer/easement land – consistent with the proposed development. The environmental site assessment report (Coffey, 2012c) is provided as **Appendix E** of this Audit Report.

9.1 Scope and analytical program

Soil assessment works comprised the collection of soil samples from:

- 58 testpits (TP91 to TP148) in a grid pattern across the site.
- 14 shallow surface locations (MSS-Nth 1 to MSS-Nth 6 and MSS-East1 to MSS-East 8) (soil samples were collected using a shovel) around the drums identified at the north and southwestern ends of the Maintenance Shed.
- 4 testpits (TP148 to TP151) in the vicinity of the AST hardstand. One surface sample (AST-1) was also collected at the bund outlet.
- 3 groundwater wells (MW4 to MW6).
- 2 landfill gas bores in the along the southeastern site boundary.

Collected soil samples were analysed for COPC comprising OCPs, OPPs, herbicides, petroleum hydrocarbons, chlorinated hydrocarbons, PAHs, phenolic compounds, metals, PCBs and inorganics (nitrate, nitrite, cyanide, fluoride, ammonia, pH total kjeldahl nitrogen (TKN) and total organic carbon (TOC)). The primary laboratory was mgt-LabMark and the secondary laboratory was SGS. Both laboratories were NATA-accredited for the analysis undertaken.

Figures 7 and 8 (Appendix A) show the location of the soil investigation locations (including those locations subsequently converted to groundwater monitoring or landfill gas bores) and **Table 9.1** below summaries pertinent information regarding the investigation program.

Table 9.1 Soil investigation locations

Eastern Precinct area (ha)	Sample density: AS4482.1 -2005 Completed test pit locations Test pit numbers	Depth of investigation, dominant lithology & anomalies	Comment
Area 1 0.9 ha	AS4482-1-2005: 20 Actual: 11 TP92 to TP96 & TP99-TP103 AS4482-1-2005 satisfied: No	1.8 mBGL Lithology: Gravel and sand fill Natural, sand, gravelly clay, silt, silty and sandy clay (some basalt fragments), dry to moist	The depth of investigation was considered to be appropriate. Given the understanding of previous site activities and the consistent nature of the geology, the Auditor is satisfied that this area has been adequately assessed and characterised.
	Monitoring Well: MW4	11.7 mBGL Weathered basalt fragments noted from 5.0 m Screened in clay with weathered basalt fragments	
Area 2 2.04 ha	AS4482-1-2005: 30 Actual: 23 TP109-TP112, TP117-TP119, TP134-TP136, TP138-TP148, AS4482-1-2005 satisfied: No	3.2 mBGL Lithology: Gravelly sand, silty sand and silty clay fill. Natural clay, silty clay, silt, sand, sandy silt, sandy clay, clayey silt, clayey sand, dry to moist TP134: vegetation waste material fill with clay, sand and gravel from 0.1 to 1.5 mBGL (limit of investigation)	The depth of investigation was considered to be appropriate. Given the understanding of previous site activities and the consistent nature of the geology, the Auditor is satisfied that this area has been adequately assessed and characterised.
	Monitoring Well: MW6	11.0 mBGL Fractured/weathered basalt noted at approximately 5.5 to 6.7 mBGL and from 9.0 mBGL to limit of investigation Screened in basalt and silty clay	
	Landfill gas bore: LFG1	12.8 mBGL Lithology: natural silty/sandy clay and clay	

Eastern Precinct area (ha)	Sample density: AS4482.1 -2005 Completed test pit locations Test pit numbers	Depth of investigation, dominant lithology & anomalies	Comment
Area 3 1.78 ha	AS4482-1-2005: 30 Actual: 20 TP113-TP116, TP120-TP132, TP137 AS4482-1-2005 satisfied: No	3.3 mBGL Lithology: Sand fill Natural silty clay, sand, clayey sand, silt, dry to moist	The depth of investigation was considered to be appropriate. Given the understanding of previous site activities and the consistent nature of the geology, the Auditor is satisfied that this area has been adequately assessed and characterised.
	Monitoring Well: MW5	12.0 mBGL Screened in clay	
	Landfill gas bore: LFG2	10.0 mBGL Lithology: sand, clayey sand, clay and sandy silt, wet soil noted from 4 mBGL	
Buffer/easement 0.98 ha	AS4482-1-2005: 21 Actual: 9 TP91, TP97-TP98, TP104-TP108, TP133 AS4482-1-2005 satisfied: No	1.7 mBGL Lithology: Sand and sandy gravel fill Natural sandy clay, silt, sand, clayey sand, sandy clay, silty clay, dry to moist	The depth of investigation was considered to be appropriate. Given the understanding of previous site activities and the consistent nature of the geology, the Auditor is satisfied that this area has been adequately assessed and characterised.

The Auditor notes that two rusted empty metal drums were identified next to the derelict house however no assessment of this area could be undertaken due to the boggy nature of the soil. No evidence of a spill in the vicinity of the drums was identified.

A review of the test pit and drilling logs by the Auditor indicate that no odours or staining were noted during the intrusive investigation works. The highest PID reading was 981 ppm_v from sample TP136-0.5, (a grid location in Area 2) with four additional samples reporting PID readings greater than 100 ppm_v . These four samples were:

- TP91-0.5 – grid location in the buffer/easement.
- TP109-0.2 – grid location in Area 2.
- TP113-0.2 and TP113-0.5 - grid location in Area 3.

Concentrations of TPH and BTEX less than LOR were reported for four of the five samples with PDS greater than 100 ppm_v (TP113-0.5 was not analysed for petroleum hydrocarbons) and no odour or staining was noted.

The soil analytical program undertaken by Coffey is summarised in **Table 9.2** and **Table 9.3** below.

Table 9.2 Analytical program for grid based sampling - soil

Analysis	Percentage of samples analysed			Comments
	Surface samples	Near-surface samples	Deeper samples	
Pesticides (OPPs & OCPs)	100% (61 of 61)	79% (22 of 28)	57% (17 of 30)	Pesticides and herbicides are likely to have been topically applied. Therefore this sampling program is considered appropriate.
Herbicides	70% (43 of 61)	36% (10 of 28)	13% (4 of 30)	
Petroleum hydrocarbons	38% (23 of 61)	32% (9 of 28)	50% (15 of 30)	Vehicle maintenance and above ground storage areas were considered the most likely to be impacted with hydrocarbons. Given the likely volatile loss in the shallow soil profile, the distribution of samples analysed is considered appropriate.
Chlorinated hydrocarbons	18% (11 of 61)	18% (5 of 28)	3% (1 of 30)	The potential source of these contaminants was considered imported fill, therefore this mix of shallow and deep sampling is considered appropriate to characterise any potential fill material on site.
PAHs	84% (51 of 61)	89% (25 of 28)	97% (29 of 30)	
Phenolic compounds	90% (55 of 61)	54% (15 of 28)	20% (6 of 30)	
Metals	41% (25 of 61)	68% (19 of 28)	90% (27 of 30)	
PCBs	21% (13 of 61)	21% (6 of 28)	3% (1 of 30)	
Inorganics	18% (11 of 89)	18% (5 of 28)	3% (1 of 30)	

Table 9.3 Analytical program for targeted sampling – soil

Target area	Sample depth	Analytical schedule for soil	Comments
AST hardstand	Surface	Petroleum hydrocarbons, PAH, phenols – 100% (1 of 1)	Surface sampling considered appropriate to assess potential for impacts from leaks from bund.
AST hardstand	Deeper (1.0 mBGL) samples	Nutrients (nitrate, nitrite, ammonia, TKN), petroleum hydrocarbons, PAH, metals, TOC) – 100% (4 of 4)	Given the likely volatile loss in the shallow soil profile, the distribution of samples analysed is considered appropriate.
Drums near Machinery Shed	Surface	Petroleum hydrocarbons, PAH, phenols – 60% (9 of 15) Lead – 33% (5 of 15) OCP & OPP – 13% (2 of 15)	Surface sampling considered appropriate to assess potential for impacts from leaks from drums.

NOTE: Summary Table 5.2 in Coffey (2012c) does not match tabulated data in Appendix B in Coffey (2012c), therefore tabulated data in Appendix B has been relied upon.

9.2 Soil results

The soil samples reporting analyte concentrations above the selected investigation levels are summarised in **Table 9.4** below.

Table 9.4 Summary of soil results exceeding adopted investigation levels

Analyte	Criteria exceeded (mg/kg)	Conc. range reported (mg/kg)	Locations exceeding criteria
Grid testpits			
Arsenic	NEPM EIL – 20	<2-38	TP124-1.6
Manganese	NEPM EIL – 500	<5-1,000	TP142-0.5
Mercury	NEPM EIL – 1	<0.1-6.4	TP135-0.2
Nickel	NEPM EIL – 60	<5-140	TP93-0.5, TP103-1.8, TP105-0.5, TP117-0.5, TP119-0.5, TP136-1.7, TP138-1.0, TP142-0.5, TP143-1.0, TP145-0.2, TP148-0.5
Grid soil bores			
Nickel	NEPM EIL – 60	<5-110	LFG1-0.2, LFG1-5.5, LFG2-4.5, MW4-2.0, MW6-0.3, MW4-3.0 (QC sample)
Surface samples around drums near Machinery Shed			
TPH C_{10}-C_{36}	NSW EPA Service Station Guidelines – 1,000 mg/kg	<50-3,900	MSS-East 2

Given that reported concentrations of arsenic, manganese and nickel are within the background concentrations quoted by the NEPM (NEPC, 1999), the Auditor considers that elevated concentrations are naturally occurring and representative of background conditions at the site. In addition, most soils encountered at the site were logged as 'natural', suggesting that these analytical results are indicative of naturally occurring background concentrations.

Although reported TPH C_{10}-C_{36} concentrations at location MSS-East 2 exceeded the adopted NSW EPA threshold concentrations for sensitive landuse, reported concentrations comprised TPH >C_{16}-C_{34} of 1,900 mg/kg and TPH >C_{34}-C_{40} of 2,000 mg/kg, below the CRC CARE HSLs for direct contact in a low density residential setting of 4,500 mg/kg and 6,300 mg/kg respectively. Concentrations of TPH <C_{16} at this location were reported at the LOR. No odors or staining were identified in the vicinity of the reported impact.

Concentrations of mercury above NEPM EIL, but below NEPM HIL A criteria were reported in natural surface soil at one location (TP135-0.2). No potential sources of mercury were identified at this location, nor were there any visual signs of soil disturbance, staining, hard waste or other aesthetic impacts. As such no further investigation of this excedance was considered necessary.

10. Soil remediation and validation works

Soil remediation and validation works were conducted at the site on 17 May 2012 and included the removal of the septic tank associated with the toilet in the former maintenance shed. The methodology adopted during remediation and validation works included the removal of all sewage impacted soils to the extent practicable. One excavation (EXA) with approximate dimensions of 13 m length x 3 m width by 1.5 m depth was created during remediation works, with 5 validation samples (EXA-2, 3, 4, 11 and 12) collected from the floor of the excavation, and 15 validation samples (EXA-1, 5, 6, 7, 8, 9, 10, 13, 14, 15, 16, 17, 18, 19 and 20) collected from the walls of the excavation.

Validation samples were analysed for the following:

- Nitrogen (nitrate, nitrite, ammonia, TKN) and total organic carbon (TOC) – 12 samples.
- Metals – 5 samples.
- Broad contaminant suite – 2 samples.

Validation soil samples reported nitrate (as N) concentrations in the range <5 mg/kg to 25 mg/kg. Concentrations of metals below NEPM EIL and HIL A criteria were reported and concentrations of nitrite (as N) and ammonia (as N) and all other analytes were less than the LOR.

Validation sample locations completed by Coffey are shown on **Figure 8 (Appendix A)**.

The Auditor's representative was present during the validation sampling – further information is provided in section 14.8 below.

10.1 Stockpile sampling and classification works

Soils generated during excavation of EXA were stockpiled as follows:

- Stockpile SPA – approximate volume of 30 m^3.

Ten samples were collected from the stockpile with two samples (SPA-1 and SPA-2) analysed for metals and pH, and one sample (SPA-3) analysed for a broad IWRG621 screen.

Soil from stockpile SPA was classified and disposed of offsite to landfill as EPA Fill Material.

The methodology and outcomes of the soil classification work undertaken by Coffey for the imported backfill material is detailed in Section 7.1.3 and Appendix U of Coffey (2012c).

10.2 Imported backfill material

Approximately 30 m^3 of clay was imported to the site for backfilling/levelling of excavation EXA. The clay was sourced from 11-15 Wellington Street, West St Kilda, VIC and was initially classified by Watson Environmental Assessments as EPA Fill Material. Coffey collected one confirmatory soil sample from the imported fill which was analysed for a broad contaminant screen including petroleum hydrocarbons, PAH, metals, PCBs, phenolic compounds, pesticides and volatile halogenated compounds. Concentrations below NEPM EIL and HIL A were reported.

The methodology and outcomes of the soil classification work undertaken by Coffey for the imported backfill material is detailed in Section 7.1.4 and Appendix V of Coffey (2012c).

11. Groundwater investigation

The groundwater investigation undertaken by Coffey targeted the local unconfined (water table) aquifer. Groundwater in the region is hosted in the surficial Quaternary aged dune (sand) and swamp (silty clay) deposits, the underlying Baxter Sandstone aquifer, and the top of the highly weather Older Volcanics basalt beneath the site. With the exception of the presence of weathered basalt fragments from 5.0 metres depth at wells MW4 and MW6, differentiation between the overlying sedimentary units was not clear from the drilling logs. Given the contiguous nature of the environment, groundwater assessment data for both the site, and the neighbouring Western Precinct site, has been referred to in the discussion below.

Three groundwater monitoring wells (MW4 to MW6) were installed on the site between August and September 2011 and three groundwater monitoring wells (MW1 to MW3) were installed on the neighbouring Western Precinct between June and August 2011. Groundwater monitoring wells were installed to depths between 5 mBGL and 12 mBGL, within the Surficial Quaternary sediments, underlying Baxter Sandstone and top of the weathered basalt which together form the water table aquifer. Of the three wells installed on the Western Precinct, two wells (MW1 and MW3) were found of be dry and could not be sampled. Groundwater well locations are shown on **Figures 7 and 9, Appendix A.**

Table 11.2 below summaries pertinent information regarding the groundwater investigation program.

Table 11.1 Groundwater investigation locations

Eastern Precinct area (ha)	Groundwater well locations and IDs	Depth of investigation, dominant lithology & anomalies	Comment
Area 1 0.9 ha	Monitoring Well: MW4	11.7 mBGL Weathered basalt fragments noted from 5.0 m Screened in clay with weathered basalt fragments from 7.5 to 11.7 mBGL	Water table intersected at 11.0 mBGL and stabilised at 6.8 mBGL. The depth of investigation and was considered to be appropriate. The Auditor notes that the groundwater SWL in this well is above the screened interval. Given that this well was installed to investigate nutrient impacts identified at the site, this does not affect the outcome of the Audit.
Area 2 2.04 ha	Monitoring Well: MW6	11.0 mBGL Fractured/weathered basalt noted at approximately 5.5 to 6.7 mBGL and from 9.0 mBGL to limit of investigation Screened in basalt and silty clay from 5 to 11 mBGL	Water table intersected at 6 mBGL and stabilised at 6.8 mBGL. The depth of investigation and well construction was considered to be appropriate.

Eastern Precinct area (ha)	Groundwater well locations and IDs	Depth of investigation, dominant lithology & anomalies	Comment
Area 3 1.78 ha	Monitoring Well: MW5	12.0 mBGL Screened in clay from 7.5 to 12 mBGL	Water stabilised at 9.7 mBGL, initial depth to water during drilling note noted. The depth of investigation and well construction was considered to be appropriate.

One round of sampling of all three wells on the Eastern Precinct, and well MW2 on the Western Precinct was undertaken in September 2011. Three additional rounds of groundwater sampling of wells MW4 to MW6 was subsequently undertaken in May, June and August 2012. In September 2011, samples from all wells were analysed for a broad contaminant screen. In May, June and August 2012, samples from wells MW4 to MW6 were analysed for COPC associated with the septic tank only i.e. nutrients. All wells were sampled using low-flow micropurge sampling.

11.1 Groundwater results

Concentrations of metals (copper, iron, manganese, nickel and zinc), nitrate (as N) and ammonia (as N) were reported in excess of the adopted screening criteria for protected beneficial uses of groundwater during the groundwater investigation at the Eastern Precinct.

Further discussion is provided in **Sections 11.1.1** to **11.1.2** below.

11.1.1 Metals

A summary of the metals reported to exceed the adopted screening criteria for protected beneficial uses of groundwater during the groundwater investigation at the Eastern Precinct are provided in **Table 11.2** below.

Table 11.2 Summary of groundwater results above guidelines – metals

Analyte	Precinct	Well exceeding guidelines	Max. Conc. (µg/L)	Protected Beneficial Uses Precluded (Shaded Cell)			
				MoE	Irrigation	Stock Water	PCR(1)
Copper	Eastern	MW4, MW5 & MW6	21	1.4	200	400	1,000
	Western	MW2	74	1.4	200	400	1,000
Iron	Eastern	MW4	280	-	200	-	300
	Western	MW2	680	-	200	-	300
Manganese	Eastern	MW4	200	1,900	2,000	-	100
	Western	MW2	940	1,900	2,000	-	100
Nickel	Eastern	MW4 & MW5	240	11	200	1,000	100
	Western	MW2	210	11	200	1,000	100
Zinc	Eastern	MW4, MW5 & MW6	260	8	2,000	20,000	5,000
	Western	MW2	200	8	2,000	20,000	5,000

Notes: MoE = Maintenance of Ecosystems, PCR = Primary Contact Recreation, guideline values shown in µg/L.

(1) Also considered to be protective of human health in an industrial scenario.

Groundwater samples obtained from the Eastern Precinct exceeded the following guidelines:

- Maintenance of ecosystems: Copper, nickel and zinc.
- Agriculture, Parks and Gardens (irrigation): Iron and nickel.
- Primary contact recreation/industrial water use: Manganese and nickel.

With respect to the elevated metal concentrations reported in groundwater, the Auditor notes the following:

- Concentrations of metals were generally reported uniformly across both the Western and Eastern Precincts, including monitoring well MW6 (Eastern Precinct) which is considered to represent background groundwater conditions for both precincts. It is considered that the identified metal concentrations do not constitute an impact to groundwater sourced from the site.
- The observed metals concentrations may be either naturally elevated as a result of mildly acidic groundwater conditions, a function of aquifer lithology, or due to agricultural and golf course maintenance activities to the south and southeast of the site (e.g. trace elements in fertilisers).
- In consideration of the Stevenson Road landfill as a potential source of the observed metals, the observed concentrations of metals appear to represent background conditions and a point source such as the landfill cannot be solely attributed to these impacts. Regional groundwater flow also suggests that impacts from the landfill, if present, would tend to pass to the east of the audit site.

- The Auditor undertook a review of groundwater data provided in Environmental Audit Reports for properties in the Cities of Casey and Frankston where there were similar land uses and similar hydrogeological settings. Where identified point sources of groundwater impact were not present, concentrations of metals in the upper (water table) aquifer were generally consistent with the observations on the Western and Eastern Precincts.

On the basis of the above, the Auditor has concluded that the beneficial uses of groundwater at the site are not precluded by the identified metal concentrations.

11.1.2 Nitrogen

Groundwater results for nitrate (as N) and ammonia (as N) from the most recent round of sampling (post remediation; August 2012) are summarised in **Table 11.3** and **Table 11.4** below.

Table 11.3 Summary of groundwater results above guidelines – Nitrate (as N)

Conc. range[1]	Maintenance of Ecosystems		Primary Contact Recreation	
	Guideline adopted by Assessor	Wells exceeding guideline value (location)	Adopted guideline	Wells exceeding guideline value (location)
1.1 to 61 mg/L	0.6 mg/L[2]	MW5 (onsite, immediately down-gradient of septic tank leach pad source) MW4 (onsite, 200 m down-gradient of source) MW6 (onsite, up-gradient of source)	10 mg/L[3]	MW5 (onsite, immediately down-gradient of source)

NOTES:
1. Most recent round of sampling in August 2012.
2. SEPP *Waters of Victoria* (2003) guideline for total nitrogen.
3. ANZECC (2000) *Recreational Water Quality and Aesthetics*

Table 11.4 Summary of groundwater results above guidelines – Ammonia (as N)

Conc. range[1]	Primary Contact Recreation	
	Guideline adopted by Assessor	Wells exceeding guideline value (location)
<10 to 20 µg/L	10 µg/L[2]	MW5 (onsite, immediately down-gradient of septic tank leach pad source) MW4 (onsite, 200 m down-gradient of source)

NOTES:
1. Most recent round of sampling in August 2012.
2. ANZECC (2000) *Recreational Water Quality and Aesthetics*

The extent of the nitrate concentrations in groundwater are shown on **Figure 10 (Appendix A)**.

With respect to nitrate concentrations and the protected beneficial use of Maintenance of Ecosystems, Coffey have undertaken groundwater contaminant fate and transport modelling and identified that the nitrate plume is not likely to migrate to the nearest natural surface water body (Eumemmerring Creek/Patterson River), located approximately 9 km northwest of the site (refer to Coffey, 2012) . A tributary of Rodd's Drain is located approximately 320 m west of the site, however based on the depth to groundwater (6.1 to 8.8 mBGL), and the shallow nature of the tributary of the drain (likely to be incised to less than 1 m below the land surface), groundwater discharge into this feature is unlikely.

Therefore, the Auditor has concluded that the beneficial use of Maintenance of Ecosystems is not precluded by the identified nitrate concentrations.

With respect to nitrate concentrations and the protected beneficial use of *Primary Contact Recreation*, the guideline adopted by Coffey for nitrate is protective of human consumption (i.e. drinking water) and therefore should only be regarded as an initial guide to the quality of recreational water. In accordance with NHMRC (2008), for chemicals where dermal absorption is not considered to be significant, a simple screening approach can be applied whereby the guideline value provided in NHMRC (2008) is multiplied by 10 times. Using the approach, the guideline value for Primary Contact Recreation would be 100 mg/L nitrate (as N). The maximum concentration of nitrate remaining in groundwater at the site is 61 mg/L nitrate (as N) (refer to **Table 11.3** above).

Therefore, the Auditor has concluded that the beneficial use of Primary Contact Recreation is not precluded by the identified nitrate concentrations.

With respect to the ammonia concentrations and the protected beneficial use of Primary Contact Recreation, Coffey note that the adopted criteria for ammonia is based on the potential for sewage contamination and does not directly relate to the toxicity of ammonia. I concur with this evaluation, and also note that concentrations of ammonia in groundwater are below the criterion of 500 µg/L provided by the 2011 Australian Drinking Water Guidelines (NHMRC/NRMMC, 2011) and the 2008 *Guidelines for Managing Risks in Recreation Waters* (NHMRC, 2008) for the protection of aesthetics. (Note, guideline is provided for Ammonia as NH3, this equates to 412 µg/L Ammonia as N). NHMRC/NRMMC (2011) also indicates that concentrations of ammonia in Australian reticulated drinking water supplies are in the range 20 µg/L to 400 µg/L. The maximum concentration of ammonia remaining in groundwater at the site is 20 µg/L ammonia (as N) (refer to **Table 11.4** above).

Therefore, the Auditor has concluded that the beneficial use of Primary Contact Recreation is not precluded by the identified ammonia concentrations.

12. Landfill gas investigation

A landfill gas investigation was undertaken by Coffey to assess the potential for the former Stevensons Road landfill complex, located approximately 1 km to the southeast of the audit site, to impact on the audit site. Landfill gas investigation works undertaken at the site by Coffey comprised the installation of two landfill gas bores (LFG1 and LFG2) on the southeastern site boundary on 1 December 2011.

Figure 7 (Appendix A) shows the location of the landfill gas bores and **Table 9.1** below summaries pertinent information regarding the investigation program.

Table 12.1 Landfill gas investigation locations

Eastern Precinct area (ha)	Landfill gas bore locations and IDs	Depth of investigation, dominant lithology & anomalies	Comment
Area 2 2.04 ha	Landfill gas bore: LFG1	12.8 mBGL Lithology: natural silty/sandy clay and clay	The depth of investigation and landfill gas bore construction was considered to be appropriate.
Area 3 1.78 ha	Landfill gas bore: LFG2	10.0 mBGL Lithology: sand, clayey sand, clay and sandy silt, wet soil noted from 4 mBGL	The depth of investigation and landfill gas bore construction was considered to be appropriate.

Measurement of oxygen, methane, carbon dioxide and carbon monoxide and hydrogen sulphide concentrations, differential pressure and barometric pressure in both bores was completed with a GA2000SG landfill gas meter on 7, 14 and 19 December 2011.

Maximum landfill gas anlayte concentrations are provided in **Table 12.2** below.

Table 12.2 Summary of landfill gas concentrations

Analyte	Maximum reported concentration
Methane	0.2 %v/v
Oxygen	17.6 %v/v
Carbon dioxide	13.5 %v/v
Carbon monoxide	9 ppm
Hydrogen sulphide	0 ppm

Based on the results of the landfill gas assessment Coffey concluded that the methane concentrations do not pose an explosive risk to future residents at the site, and the Auditor concurs with this conclusion.

13. Hazardous materials assessment

A hazardous materials survey was undertaken in August 2012 by Coffey for the dilapidated structures (i.e. former house) at the site.

The hazardous materials survey identified asbestos containing materials (ACM) and synthetic mineral fibre (SMF) insulation at the property. The ACM was labelled as A1 – restrict access and remove, as the site is scheduled for demolition. No sampling for lead based paint was able to be undertaken but it is reported in the hazardous materials survey as "presume to be present to surfaces in the main house". No polychlorinated biphenyl (PCB) or ozone depleting substances (ODS) materials were identified. A number of areas of the property were unable to be accessed given the instability of the structure, observed fire damage and presence of debris.

The hazardous materials assessment report is provided in **Appendix C**.

14. Quality of environmental assessment

The following section reviews the quality and completeness of the environmental assessment works performed by Coffey. The quality of the available data relating to the site was assessed as follows:

- Site investigation reports were audited against the relevant SEPPs, EPA publications and guidelines and other relevant national standards and guidelines in order to verify the quality and completeness of the assessment.
- The Auditor's assistant attended the site on 10 May 2011, 17 May 2012 and 1 August 2012 to inspect the site conditions and to observe sampling and investigation protocols.
- The quality assurance/quality control (QA/QC) system adopted by Coffey has also been audited. The quality system is intended to ensure that conclusions drawn with respect to the suitability of the site for its intended use as well as unrestricted use are able to be supported by the dataset.

The results of the quality review are provided in **Sections 14.1 to 14.6** below.

14.1 Review of site history information

The following table (**Table 14.1**) below presents information pertaining to the review of site history information for the site.

Table 14.1 Quality of site history review

Objective	Comments	Environmental Site Assessment Report Reference (Coffey, 2012c unless otherwise noted)
Title plan/clear description of site	Yes. The current title information indicates the current owners of the site are Australian International Property Corporation PTY LTD.	Detailed site description provided in Appendix N (Coffey Geosciences Pty Ltd, 8 August 2005. Stage 1 Environmental site assessment Amstel Golf Course Cranbourne-Frankston Road, Cranbourne, Report No. E16663/1 AC. Report for Watsons Pty Ltd) Title information provided in Appendix T.
Zone planning information provided	Yes. The site is currently zoned Residential One Zone (R1Z).	The zoning status was provided in Appendix L.
Identified beneficial uses to be protected	Yes. The beneficial uses of both land and groundwater were clearly defined.	Section 6.1.1, page 35 Section 6.2.1, page 40
Historic site uses	Yes. The site was used for farming until it was developed as a golf course between 1960 and 1970.	Section 3.3, page 12

Objective	Comments	Environmental Site Assessment Report Reference (Coffey, 2012c unless otherwise noted)
Historic uses offsite	Quarrying and landfilling activities offsite, including the presence of the Stevensons Road Landfill located 1,000 m from the eastern boundary of the site, were identified as having a potential to impact upon the site. The Auditor notes that the area around the site was largely rural prior to the recent urban development of the area.	Section 4.2, page 20
Aerial photographs inspected	Yes. Photographs dated from 1960, 1970, 1980, 1991and 2009 were reviewed.	Section 3.2, page 11 Appendix N.
Geological survey maps inspected	Yes. The geological survey map was referenced as Geological Survey of Victoria Queenscliff map sheet.	Section 2.2.2, page 6
Groundwater database inspected	Yes. A search of the groundwater database was conducted by the Auditor prior to completion of the Audi for the Western Precinct (Parsons Brinckerhoff, 2012). The search identified 81 bores within a 2 km radius.	Groundwater database search undertaken by the Auditor in February 2012.
Visual inspections and description provided	Yes	Section 5.1, page 23
Site interviews conducted	Yes. Anecdotal information was collected by Coffey.	Section 3.6, page 18
Description of current and historical structures	Yes. Current and historical structures were clearly described.	Section 3, page 10 & 5.1, p23
Potentially contaminating uses identified	Yes, potentially contaminating landuses were clearly described.	Section 4. page 20
	OVERALL AUDIT SUMMARY – Overall, the Auditor is satisfied with the level of site history review conducted by Coffey.	

14.2 Review of soil investigations

Comments relating to the quality of on-site soil investigations undertaken by Coffey are detailed in **Table 14.2** below.

Table 14.2 Quality of soil investigations

Objective	Comments	Environmental Site Assessment Report Reference (Coffey, Jan 2012 unless otherwise noted)
Sampling frequency and pattern	63 grid test pit/soil bore sampling locations were advanced across the site. 4 target test pit locations and 14 target surface sample locations were also advanced. One excavation (EXA) was validated and one stockpile (SPA) sampled.	Section 5.2, page 25
	OVERALL AUDIT SUMMARY – The sampling pattern and frequency was considered suitable to address potential onsite sources of contamination. It is noted that the sample density, while not strictly in accordance with AS4482.1 is considered appropriate by the Auditor given the history and current use of the site.	
Point sources targeted	Point sources, including the septic tank/soak, AST hard-stand and drums adjacent to the maintenance shed were identified and adequately targeted.	Section 5.2.2, page 26
Sampling method	Soil samples were collected from the centre of the excavator bucket while test pitting, off the auger during the installation of groundwater wells and landfill gas bores and with a trowel or shovel for validation/surface sampling. The Auditor considers that the methodology adopted for collection of soil samples from soil bores and excavations were conducted in accordance with procedures outlined in AS4482.1.	Section 5.2, page 25 Appendix F
	OVERALL AUDIT SUMMARY – Information provided by Coffey in relation to the sampling methodology has given cognisance to AS4482.1 and other relevant guidelines and is considered appropriate for describing the final condition of the site.	

Objective	Comments	Environmental Site Assessment Report Reference (Coffey, Jan 2012 unless otherwise noted)
Depth of samples	The gridded test pit locations were advanced to a maximum depth of 3.3 mBGL. Target test pit locations were installed to a maximum depth of 1.0 mBGL. Fill material was only encountered at a handful of locations across the site and it is likely that minimal or no soil was imported onto the site and any landscaping of the site used soil native to the site. Location - TP134 – reported vegetation waste material fill with clay, sand and gravel from 0.1 to 1.5 mBGL (limit of investigation).	Section 5.2, page 25 Appendices D & E
Contaminants analysed consistent with operations, history or EPA screen	The analysis program adopted by Coffey gave appropriate consideration to background information including site and surrounding site historical data, visual inspections and previous investigations with the exception that fertilisers were not identified as a potential contaminant of concern and were not tested for in the soil samples. Collected soil samples were analysed for COPC comprising OCPs, OPPs, herbicides, petroleum hydrocarbons, chlorinated hydrocarbons, PAHs, phenolic compounds, metals, PCBs and inorganics (nitrate, nitrite, cyanide, fluoride, ammonia, pH TKN and TOC). The primary laboratory was mgt-LabMark and the secondary laboratory was SGS. Both laboratories were NATA-accredited for the analysis undertaken.	Section 5.2.3.2, page 27 Appendix B
	OVERALL AUDIT SUMMARY – The analytes tested for are considered to adequately address potential contamination issues identified from the site history review as well as visual inspections of the site.	
Asbestos considered	A Hazardous Materials Assessment was undertaken for the derelict residential house identified on the Easter Precinct. Removal and disposal of asbestos containing materials in the derelict house must be done by a removalist licensed by WorkSafe Victoria. No asbestos was noted during soil investigation works.	Appendix W Appendices D & E
Vertical and lateral delineation of impacts	All test pits extended into natural soil. The exception was location TP134 where the test pit terminated in waste material (vegetation).	Appendices D & E

Objective	Comments	Environmental Site Assessment Report Reference (Coffey, Jan 2012 unless otherwise noted)
Assessment conclusions	The conclusions of the environmental assessment report are considered acceptable in relation to the final condition of soils at the site and the suitability of the site for the proposed residential land-use.	Section 10, page 69

14.3 Review of groundwater investigations

Comments relating to the quality of on-site groundwater investigations are detailed in **Table 14.3** below.

Table 14.3 Quality of groundwater investigations

Objective	Comments	Environmental Site Assessment Report Reference (Coffey 2012 unless otherwise noted)
Point sources targeted	Yes. Three wells (MW4, to MW6) were installed at the site, including two in the near vicinity of, and down hydraulic gradient of the septic system associated with the former Maintenance Shed. The well installed on the Western Precinct (MW2) has also been referred to for comparison purposes.	Section 5.3, p29
	OVERALL AUDIT SUMMARY – The groundwater well network was considered sufficient to characterise groundwater quality in the water table aquifer below the site.	
Well screen depths	Bore construction details provided for monitoring wells were considered appropriate for intercepting the regional aquifer and groundwater impacts. Monitoring wells were drilled to between 11 and 12 mBGL.	Table 13, Appendix B Bore logs and related information provided in Appendix D.
Sampling method/s	Groundwater samples were collected via low flow sampling techniques (micropurge).	Section 5.3, page 29 Appendix F Appendix R
	OVERALL AUDIT SUMMARY – The Auditor considers that the sampling methodologies employed during the groundwater investigative works are appropriate for the purposes of the Audit.	
Measured field parameters	Measured field parameters collected throughout the GME were generally consistent with the parameters specified within EPA publication 669 – *Groundwater Sampling Guidelines*.	Section 5.5.3.2, page 33 Field sheets contained in Appendix R
Groundwater flow – direction/elevation determined	Yes. The distribution of monitoring wells was considered adequate to characterise groundwater flow direction beneath the site as well as identifying any potential anthropogenic influences on groundwater flow and quality. The groundwater flow was determined to be in a general northwesterly direction.	Section 5.5.3, page 32 Appendix A, Figure 8
Analytical suite consistent with COPC based on operations, history or regulatory requirements	Yes. The analytes selected were considered to adequately address potential contamination issues associated with the sites previous use for farming and a golf course, including the presence of a septic system and soak. Identified COPC comprised herbicides & pesticides (including OCPs, OPPs, arsenic), fertilisers (ammonia, nitrate, nitrite, phosphorous, potassium and trace metals), chlorinated hydrocarbons, petroleum hydrocarbons (TPH, BTEX), PAH, phenolic compounds and metals.	Section 5.3.2, page 30 Tables 17 & 18, Appendix B

Objective	Comments	Environmental Site Assessment Report Reference (Coffey 2012 unless otherwise noted)
	The groundwater analytical suite comprised a range or inorganic and organic analytes including: TDS, metals and alkali metals, fluoride, TPH, OCPs, OPPs, PAHs, PCBs, phenols, chlorinated hydrocarbons in the first round of sampling. In the three following sampling round, the analytical schedule was reduced to specific COPC (nitrate and ammonia). The primary laboratory was mgt-LabMark and the secondary laboratory was SGS. Both laboratories were NATA-accredited for the analysis undertaken.	
Background samples collected	Based upon the groundwater flow direction, wells MW6 located at the site and MW2 located on the Western Precinct are considered to represent background conditions.	
Have groundwater impacts been delineated?	Elevated metal concentrations in groundwater are considered to be indicative of background conditions as they reflect well the background soil conditions and there is no evidence of their use on site in the past. Nitrate concentrations were reported above the adopted assessment criteria for maintenance or ecosystems however groundwater fate and transport modelling undertaken by Coffey indicated that the nitrate plume is not likely to migrate to the nearest natural surface water body (Eumemmerring Creek/Patterson River), located approximately 9 km northwest of the site.	Section 7.2, p55; Section 9, p55 & Section 10, p69
	OVERALL AUDIT SUMMARY – The Auditor considers that the distribution of monitoring wells on-site provided adequate characterisation of the groundwater quality beneath the site.	
Conclusions – groundwater investigation	The conclusions of the environmental assessment report are considered acceptable in relation to the final condition of groundwater at the site.	Section 10, page 69

14.4 Review of landfill gas investigations

Comments relating to the quality of on-site landfill gas investigation are detailed in **Table 14.4** below.

Table 14.4 Quality of landfill gas investigations

Objective	Comments	Environmental Site Assessment Report Reference (Coffey 2012 unless otherwise noted)
Point sources targeted	Yes. Two landfill gas bores were installed on the southeastern site boundary (as near as practicable to the former Stevensons Road Landfill)	Section 5.4, p30
	OVERALL AUDIT SUMMARY – The landfill gas bores were considered sufficient to investigate whether landfill gas was present in the subsurface.	
Bore screen depths	Bore construction details provided for landfill gas bore were considered appropriate. Landfill gas bores were drilled to 10 and 12.8 mBGL and screened from 1.0 mBGL to the base of the bore. It is expected that groundwater would have been intersected during installation of the landfill gas bores however the borelogs in Coffey (2012a) do not identify that this was the case.	Bore logs provided in Appendix D.
Sampling method/s	Landfill gas was measured using a GA2000SG landfill gas analyser.	Appendix F
	OVERALL AUDIT SUMMARY – The Auditor considers that the sampling methodologies employed during the groundwater investigative works are appropriate for the purposes of the Audit.	
Analytical suite consistent with operations, history or regulatory requirements	Yes. Concentrations of oxygen, methane, carbon dioxide, carbon monoxide and hydrogen sulphide were measured on three occasions.	Section 5.4, p30
Have landfill gas impacts been delineated?	Yes. No landfill gas was identified.	Section 7.3, p62
	OVERALL AUDIT SUMMARY – The Auditor considers that the distribution of landfill gas bores provided adequately investigated the potential for landfill gas to be present beneath the site.	
Conclusions – landfill gas investigation	The conclusions of the environmental assessment report are considered acceptable in relation to the final condition of landfill gas at the site.	Section 10, page 69

14.5 Review of QA/QC data – Soil

A number of soil quality control samples including duplicate and split samples were collected by Coffey during the course of fieldworks in 2011 and 2012. **Table 14.5** below outlines the Auditor's consideration of quality control information provided as part of Coffey's soil investigation.

Table 14.5 Evaluation of soil QA/QC data

Objective	Comments	Environmental Site Assessment Report Reference (Coffey, 2012c unless otherwise noted)
QA/QC Samples: Intra-laboratory (blind) duplicates	Blind duplicates: AS4482.1 recommends 1 blind duplicate per 20 primary samples. 10 blind duplicates were collected and tested during field works. The blind duplicate was analysed for a broad selection of analytes to reflect that of the primary sample.	Appendix C Appendix G Section 8, page 64 Table 11, Appendix B
Inter-laboratory (split) duplicates	Split duplicates: AS4482.1 recommends 1 split duplicate per 20 primary samples. 11 split duplicates were collected during field works. The split duplicates were analysed for a broad selection of analytes to reflect that of the primary sample. Note, Table C2 in Appendix C of Coffey (2012) appears to incorrectly identify which blind and split duplicates were analysed. In addition, results for two duplicate samples (QC71 and QC71) have not been provided in Table 11, Appendix B. Hence the Auditor has relied upon the NATA Reports in Appendix G.	
Rinsate samples	7 rinsate blanks were collected and analysed for a broad selection of contaminants of concern. With the exception of samples QC31 (29 November 2011) and QC40 (28 November 2011), all analytes were reported below the laboratory. Both samples reported concentrations of zinc at the LOR (0.001 mg/L). Coffey (2012) notes that the detectable zinc concentrations are likely to be due to a contaminated batch of de-ionised water.	Appendix C Appendix G Section 8, page 64 Table 12, Appendix B
Trip blanks	Coffey (2012) states that 12 trip blanks were analysed however from Table 12, Appendix B it appears that 10 trip blanks were collected and analysed for a selection of TPH C_6-C_9, BTEX and MTBE. Reported analytical results for all trip blank samples were reported below the laboratory detection limits.	Appendix C Appendix G Table 12, Appendix B
Field blanks	No field blanks were collected or analysed Due to an absence of reported volatile analyte concentrations within primary samples, the Auditor considers that the lack of field blanks collected for the site would not affect the conclusions of this Audit.	

Objective	Comments	Environmental Site Assessment Report Reference (Coffey, 2012c unless otherwise noted)
Total QA/QC samples analysed: *Primary samples: 180* *Blind duplicates: 10* *Split duplicates: 11* *Rinsates: 7* *Trip blanks: 10* *Field blanks: 0* *Equipment blanks: 0*	***OVERALL AUDIT SUMMARY***- The frequency of blind duplicate and split samples collected and analysed met the minimum requirements specified within AS4482.1. Due to an absence of reported volatile analyte concentrations within primary samples, the Auditor considers that the lack of field blanks collected for the site would not affect the conclusions of this Audit.	
Background samples	No background soil samples were collected.	
Relative percent difference (RPD) calculations	A review of Table 11, Appendix B indicates that 1 blind duplicate and 7 split duplicates reported unacceptable RPDs. Unacceptable RPDs were reported for chromium, nickel and arsenic. The unacceptable RPD were attributed to heterogeneity of the sample and the Auditor does not believe this unacceptable RPD will significantly impact on the overall quality of the data. As noted above, 2 duplicate sample results (QC70 and QC71) were not provided in Table 11, Appendix B. The Auditor independently calculated the RPDs for these primary/duplicate sample pairs, based on the NATA Reports presented in Appendix G, and this analysis indicated the RPDs are within the acceptable range.	Table 11, Appendix B
NATA accredited laboratories and NATA endorsed analytical methods	The use of laboratories accredited by the National Association of Testing Authorities, Australia (NATA) for the analysis of soil samples was undertaken. Laboratory certificates were provided by Coffey to validate the results of sampling programs.	Appendix G.
Chain-of-Custody (CoC) documentation	CoC forms have been provided for samples collected during the assessment works.	Appendices G & H
Holding times	No discussion of holding times presented in Appendix C, however an Auditor 10% check of the laboratory certificates indicates that all samples were analysed within the holding time.	Appendix G
Laboratory report limits	No discussion of LORs were presented in Appendix C. The Auditor has check LORs against the criteria for the key contaminants and found them to be acceptable.	Appendix B

Objective	Comments	Environmental Site Assessment Report Reference (Coffey, 2012c unless otherwise noted)
Laboratory quality assurance procedures	Spike recoveries: A review of the quality assurance information contained within laboratory reports for the soil analysis, confirmed that percentage recoveries for spike samples ranged between 71% - 129%. Duplicate samples: A review of the quality assurance information contained within the laboratory reports confirmed that RPDs for duplicate samples were generally within the acceptable range. 35 duplicate samples reported RPDs outside of acceptable range (metals, TRH, pyrene) however the MGT RPD report noted that RPDs passed acceptance criteria as stipulated in AS-POL-002.	Appendix G.
Method blanks	All the method blank samples analysed by the primary and secondary laboratories reported concentrations below the detection limit for the analytical method.	
	OVERALL AUDIT SUMMARY – An appraisal of the laboratory quality assurance results demonstrates an adequate degree of consistency within and between laboratories. As such, it is considered that the laboratory quality control data is adequate to provide confidence in the laboratory results.	
Transcription of data	The following transcription errors were identified during review of Coffey (2012): - Minor errors were identified in Table 2.1 (Volume and Folio number) and Table 5.2 (number of locations installed). - TPH, BTEX, PAH and metal results were not provided for location TP148-1.0 (17/05/2012) in Table 5, Appendix B. - 2 QC samples (QC70 & QC71) were not tabulated in Table 19, Appendix B. - Table C2, Appendix C did not correctly identify the QC samples that were analysed. - NATA Reports 339048-S-V1 & 337865-S-V1 incorrectly identified sample TP148-1.0 (17/05/2012) as TP152-1.0 (17/May/2012); refer to **Appendix F** for a copy of correspondence from Coffey. The Auditor has reviewed the transcription errors noted about and concluded that the errors do not affect the outcome of the Audit.	

14.6 Review of QA/QC data – Groundwater

A number of groundwater quality control samples including duplicate, split and rinsate samples were collected by Coffey during the course of fieldworks. **Table 14.6** below outlines the Auditor's consideration of quality control information provided as part of Coffey's environmental site assessment for wells MW4 to MW6.

Table 14.6 Evaluation of groundwater QA/QC data

Objective	Comment	Environmental Site Assessment Report Reference (Coffey, 2012c unless otherwise noted)
QA/QC Samples: Intra-laboratory (blind) duplicates Inter-laboratory (split) duplicates	Blind duplicates: 3 blind duplicate samples were collected and analysed during field works completed for the groundwater investigation. Split duplicates: 3 split duplicate samples were collected and analysed for the analytes of concern within the primary samples. Note, not all QC samples appear to have been tabulated in Table 19, Appendix B of Coffey (2012), hence the Auditor has relied upon the NATA Reports in Appendix G.	Appendix C Appendix G Table 19, Appendix B
Rinsate samples	5 rinsate samples were collected during groundwater sampling for the primary contaminants of concern. With the exception of sample QC14, all analytes were reported below the laboratory quantitation limits. Sample QC14 reported TKN concentrations of 0.4 mg/L and ammonia (as N) of 20 µg/L. No explanation for the detections in sample QC14 was provided in Coffey (2012). Sample QC 14 was collected during groundwater sampling field works on 28 June 2012. Of the three wells sampled on 28 June 2012, two wells reported ammonia concentrations of <10 µg/L and the remaining well (MW4) reported an ammonia concentration of 30 µg/L. Therefore, it is possible that the concentration of 20 µg/L in the rinsate represents cross contamination following the sampling of well MW4. However, this cross contamination, if present, does not appear to have impacted on the results of the assessment.	Appendix C Table 20, Appendix B
Trip blanks	5 trip blanks were collected and analysed for BTEX and TRH C_6-C_9. Reported analytical results for all trip blank samples were reported below the laboratory detection limits.	Appendix C Table 20, Appendix B
Field blanks	No field blanks were collected or analysed Due to an absence of reported volatile analyte concentrations within primary samples, the Auditor considers that the lack of field blanks collected for the site would not affect the conclusions of this Audit.	

Objective	Comment	Environmental Site Assessment Report Reference (Coffey, 2012c unless otherwise noted)
Total QA/QC samples analysed: *Primary samples: 12* *Blind duplicates: 3* *Split duplicates: 3* *Rinsates: 5* *Trip blanks: 5* *Field blanks: 0*	***OVERALL AUDIT SUMMARY –*** The Auditor considers that the frequency of blind, split, rinsate, field and trip blank samples collected and analysed for the site is adequate for the purposes of the Audit.	
Relative percent difference (RPD) calculations	Calculated RPD results for blind and split duplicate analysis provided for in Table 19, Appendix B of Coffey (2012) are within the acceptable limits. However, as noted above, 3 blind or split duplicate sample results (QC8, QC12 and QC13) were not provided in Table 19, Appendix B. The Auditor independently calculated the RPDs for these primary/duplicate sample pairs, based on the NATA Reports presented in Appendix G, and this analysis indicated the RPDs were within the acceptable range.	Appendix C Table 19, Appendix B
	OVERALL AUDIT SUMMARY- The frequency of blind duplicate and split samples collected and analysed met the minimum requirements specified within AS4482.1. Due to an absence of reported volatile analyte concentrations within primary samples, the Auditor considers that the lack of field blanks collected for the site would not affect the conclusions of this Audit.	
NATA accredited laboratories and NATA endorsed analytical methods	The use of laboratories accredited by NATA for the analysis of groundwater samples was undertaken. Laboratory certificates were provided by Coffey to validate the results of the groundwater sampling programs.	Appendix G.
Chain-of-Custody (CoC) documentation	CoC forms have been provided for all samples	Appendix H.
Holding times	No discussion of holding times presented in Appendix C, however an Auditor 10% check of the laboratory certificates indicates that all samples were analysed within the holding time.	Appendix G
Laboratory reporting limits	No discussion of LORs were presented in Appendix C. The Auditor has check LORs against the criteria for the key contaminants and found them to be acceptable.	
Laboratory quality assurance procedures	Spike recoveries: A review of the quality assurance information contained within the laboratory reports for the groundwater analysis, confirmed that percentage recoveries were within acceptable recovery limits, as specified by the laboratory. Duplicate samples: A review of the quality assurance information contained within the laboratory reports confirmed that RPDs for duplicate samples were generally within the acceptable range. 3 duplicate samples reported RPDs outside of acceptable range (mercury, xylenes and TRH) however the MGT RPD report noted that RPDs passed acceptance criteria as stipulated in AS-POL-002.	

Objective	Comment	Environmental Site Assessment Report Reference (Coffey, 2012c unless otherwise noted)
Method Blanks	All the method blank samples analysed by the primary and secondary laboratories reported concentrations below the detection limit for the analytical method.	
	OVERALL AUDIT SUMMARY – An appraisal of the laboratory quality assurance results demonstrates an adequate degree of consistency within and between laboratories. As such, it is considered that the laboratory quality control data is adequate to provide confidence in the laboratory results.	
Transcription of data	An Auditor 10% check of the transcribed data did not identify any major issues with the exception of the following: - 3 blind or split duplicate samples were not tabulated in Table 19, Appendix B (refer above). - Table 7.4 in the body of the report does not identify that manganese concentrations above the adopted criteria for Primary Contact Recreation in well MW4. The Auditor has reviewed the transcription errors noted above and concluded that the errors do not affect the outcome of the Audit.	

14.7 Adequacy of environmental site assessment

Based on the above information, the Auditor considers that assessment works undertaken by Coffey during the Environmental Audit were of a sufficient quality and completeness to support the enclosed Certificate of Environmental Audit, and were generally conducted in accordance with the relevant guidelines, policies and standards referenced throughout this report.

14.8 Auditor verification activities

The Auditor's representative conducted one site inspection in order to verify the environmental quality of the site as reported by the Assessor (Coffey). **Table 14.7** below summarises the site inspection conducted by the Auditor's Representative.

Table 14.7 Auditor verification activities

Activity	Date	Comment
Initial site condition inspection.	10 May 2011	An inspection conducted by the Auditor's Representative of test pitting conducted by Coffey. No soil samples were collected during the site inspection.
Site inspection to view excavation and removal of septic tank and soak, and soil validation sampling.	17 May 2012	An inspection conducted by the Auditor's Representative of soil validation sampling conducted by Coffey. Soil verification samples were collected for the purpose of verifying the general soil conditions and the sampling protocol applied by the Assessor.

Activity	Date	Comment
Site inspection to view groundwater sampling .	1 August 2012	An inspection conducted by the Auditor's Representative of groundwater sampling conducted by Coffey. A groundwater verification sample was collected for the purpose of verifying the general groundwater conditions and the sampling protocol applied by the Assessor.

14.8.1 Soil

The Auditors Representative collected 2 independent soil samples during soil sampling works conducted by Coffey on 17 May 2012. A direct comparison between the Auditor verification sample results (analysed by ALS) and the corresponding Coffey results (analysed by mgt Labmark) is provided in **Table 14.8** and **Table 14.9**. Only analytes analysed by both the Auditor and Coffey are included in the tables. Laboratory certificates of analysis are provided in Appendix H.

The Auditor notes that all RPDs were within the acceptable range of 50%.

Table 14.8 Summary of soil verification results – nutrients

Analyte	Verification Sample VEXA-3 (mg/kg)	Assessor's Sample – EXA-3 (mg/kg)	%RPD
Ammonia (as N)	<20	<5	N/A
Nitrate (as N)	1.6	<5	N/A
Nitrite (as N)	<0.1	<5	N/A

Notes:

1. All results are in mg/kg.
2. RPD = Relative Percent Difference
3. N/A – indicates that one or more samples reported results below laboratory reporting limits. RPD is not applicable.

Table 14.9 Summary of soil verification results – metals

Analyte	Verification Sample VSPA-3 (mg/kg)	Assessor's Sample – SPA-3 (mg/kg)	%RPD
Arsenic	<5	<2	N/A
Cadmium	<1	<0.4	N/A
Chromium	2	<5	N/A
Copper	32	27	4%
Nickel	6	<5	N/A
Lead	<5	8.3	N/A
Zinc	83	91	2%
Mercury	<0.1	<0.1	N/A

Notes:

1. All results are in mg/kg.
2. RPD = Relative Percent Difference
3. N/A – indicates that one or more samples reported results below laboratory reporting limits. RPD is not applicable.

14.8.2 Groundwater

The Auditors Representative collected 1 independent groundwater sample during the GME undertaken by Coffey on 1 August 2012. A direct comparison between the Auditor verification sample results (analysed by ALS) and the corresponding Coffey results (analysed by mgt Labmark) is provided in **Table 14.10**. Only analytes analysed by both the Auditor and Coffey are included in the tables. Laboratory certificates of analysis are provided in **Appendix H**.

The Auditor notes that RPDs all analytes were within the acceptable range of 50%.

Table 14.10 Summary of groundwater verification results – 1 August 2012

Analyte	Verification Sample MW6 (mg/L)	Assessor's Sample – MW6 (mg/L)	%RPD
TDS	514	440	4%
Ammonia (as N)	0.03	<0.01	N/A
Nitrate (as N)	1.03	1.1	2%
Nitrite (as N)	<0.01	<0.02	N/A

Notes:

4. All results are in mg/kg.
5. RPD = Relative Percent Difference
6. N/A – indicates that one or more samples reported results below laboratory reporting limits. RPD is not applicable.

15. Discussion

15.1 Soil

The results of the soil assessment and remediation works confirmed that soil across the site generally contained analyte concentrations below the adopted ecological and health-based screening criteria. The exceptions were:

- Arsenic, manganese and nickel concentrations which exceeded the adopted ecological criteria at selected locations across the site. Concentrations of vanadium in excess of the ecological screening criteria were identified on the neighbouring Western Precinct (Parsons Brinckerhoff, 2012), and although limited analysis for vanadium in soil was undertaken for the Eastern Precinct, the Auditor considers that elevated concentrations of vanadium may also be present. The Auditor notes the reported arsenic, manganese nickel and vanadium concentrations are within or slightly above (manganese) the NEPM Background Range, and below the adopted health-based criteria for the site – NEPM HIL A criteria.

- Mercury concentrations which exceeded the adopted ecological criteria at one location in natural surface soils. No potential sources of mercury were identified at this location, nor were there any visual signs of soil disturbance, staining, hard waste or other aesthetic impacts. No further investigation of this excedance was considered necessary.

- TPH C_{10}-C_{36} concentrations at location MSS-East 2 (in the vicinity of the drums adjacent to the former Maintenance Shed) which exceeded the adopted NSW EPA threshold concentrations for sensitive landuse. Reported concentrations were below the CRC CARE HSLs for direct contact in a low density residential setting which are considered to be more relevant to the assessment of the site than the NSW EPA threshold concentrations for sensitive landuse. No odors or staining were identified in the vicinity of the reported impact.

In summary, concentrations of arsenic, manganese, nickel and vanadium are considered to be naturally occurring, associated with background concentrations. The beneficial use of maintenance of ecosystems is unlikely to be adversely impacted by the identified mercury and TPH and C_{10}-C_{36}.

15.2 Beneficial uses of land

This section outlines the Auditor's opinion on the likelihood of impact to the beneficial uses of the land, due to residual soil impacts identified at the site. In accordance with Appendix 4 of EPA Publication 759.1 (2007), *Environmental Auditor (Contaminated Land) Guidelines for Issue of Certificates and Statements of Environmental Audit*, the development is classified as medium-high density residential and falls under the land use *Sensitive Use: Other* under the Land SEPP. In order for a *Certificate* of *Environmental Audit* to be issued, it must be demonstrated that the site is neither detrimental nor potentially detrimental to any one or more of the relevant beneficial uses of the land.

In accordance with the Land SEPP, '*Maintenance of Natural Ecosystems*' is not required to be protected for the proposed medium-high density residential development, however cognisance is given to this beneficial use in order to consider unrestricted use of the site.

Table 15.1 below summarises the likelihood of relevant beneficial uses of the land being precluded.

Table 15.1 Likelihood of relevant beneficial uses of the land being precluded

Beneficial Use	Likelihood	Comment
Maintenance of natural, modified and highly modified ecosystems	Unlikely	Natural soils contain some exceedances of the adopted environmental criteria for arsenic, nickel, manganese and vanadium however these concentrations are considered to be representative of background ranges at the site and the beneficial use maintenance of ecosystems is unlikely to be adversely impacted. Although reported TPH C_{10}-C_{36} concentrations at location MSS-East 2 exceeded the adopted NSW EPA threshold concentrations for sensitive landuse, reported concentrations were below the CRC CARE HSLs for direct contact in a low density residential setting. As such, the beneficial use maintenance of ecosystems is unlikely to be adversely impacted and no further investigation of this excedance was considered necessary. Concentrations of mercury above NEPM EIL, but below NEPM HIL A criteria were reported in natural surface soil at one location (TP135-0.2). No potential sources of mercury were identified at this location, nor were there any visual signs of soil disturbance, staining, hard waste or other aesthetic impacts. As such, the beneficial use maintenance of ecosystems is unlikely to be adversely impacted and no further investigation of this excedance was considered necessary.
Human health	Unlikely	All analytes are below the adopted HIL A criteria protective of a standard residential land-use. Hence, there would be no unacceptable human health risks for the proposed medium-high density residential land-use. It is considered that the site conditions determined by the Audit are unlikely to pose any other unacceptable human health risks for other land uses. Therefore site conditions do not preclude the beneficial use of human health. Demolition of the derelict house and associated infrastructure must be undertaken by a licensed contractor, and validation sampling undertaken post demolition to confirm that all asbestos containing materials have been removed.
Buildings and structures	Unlikely	No evidence of acidic or other corrosive soil conditions were observed that could impact upon buried structures or building foundations. Therefore this beneficial use is considered to be protected at the site.
Aesthetics	Unlikely	Minor vegetation (tree roots) was identified at one location in the fill during soil investigation works. No odours or staining were noted at any sampling location. The beneficial use of aesthetics was not considered to be precluded by this material. There was no other evidence of imported fill material onsite. Any landscaping appears to have utilised onsite materials. Green waste and occasional inert waste (plastic, terracotta, and rubble) is present on the surface of the site. The presence of this material does not preclude the beneficial uses at the site and is not present in a volume beyond that which would usually be addressed during site preparation works prior to construction. Therefore this beneficial use is considered to be protected at the site. Removal and disposal of asbestos containing materials in the derelict house must be done by a removalist licensed by WorkSafe Victoria.
Production of food & flora	Unlikely	While arsenic, manganese, nickel, vanadium, mercury and TPH C_{10}-C_{36} concentrations were present in soils above the adopted environmental criteria, it is considered unlikely that the indicator levels in food, flora and fibre produced in a residential setting at the site would be greater than that specified by the Australian New Zealand Food Authority, Food Standards Code. Therefore this beneficial is not considered to be precluded.

15.3 Groundwater

Groundwater investigations conducted at the site identified exceedences of the criteria adopted by Coffey and the Auditor for the following protected beneficial uses:

- *Maintenance of ecosystems*: copper, nickel, zinc.
- *Agriculture, Parks and Gardens*: iron and nickel.
- *Primary contact recreation and industrial (protection of human health)*: manganese and nickel.

In addition, Coffey identified concentrations of nitrate above the adopted criteria for the protection of *maintenance of ecosystems* and *primary contact recreation*, and concentrations of ammonia above the adopted criteria for the protection of *primary contact recreation.* Coffey subsequently prepared a Clean Up to the Extent Practicable (CUTEP) Report which is provided in **Appendix D**.

15.3.1 Nitrate and ammonia

Elevated concentrations of nitrate/ammonia reported for groundwater at the site are likely to be:

- Due to releases from the former septic tank and associated leach field located adjacent to the former Maintenance shed. The septic tank and soak was removed, and impacted soils excavated to the extent practicable and validated by Coffey in May 2012.
- Representative of regional conditions supported by the former agricultural and golf course maintenance activities in the area. This is based on a review of groundwater data for background wells MW2 and MW6

Groundwater fate and transport modelling undertaken by Coffey has identified that the nitrate plume emanating from the former septic tank is not likely to migrate to the nearest natural surface water body (Eumemmerring Creek/Patterson River), located approximately 9 km northwest of the site. Rodd's Drain, which discharges to Patterson River, is located approximately 320 m west of the site, however based on the depth to groundwater (6.1 to 8.8 mBGL), and the shallow nature of the drain (likely to be incised to less than 1 m below the land surface), groundwater discharge into this feature is unlikely. Therefore, the Auditor has concluded that the beneficial use of *Maintenance of Ecosystems* is not precluded by the identified nitrate concentrations.

Upon receipt of the Coffey CUTEP Report (Coffey, 2012b), the Auditor undertook a review of the weight of evidence relating to the identified nitrate and ammonia impacts, and the criteria adopted for the protected beneficial use of primary contact recreation. The review indicated:

- Nitrate: the guideline adopted by Coffey is protective of human consumption (i.e. drinking water) and therefore should only be regarded as an initial guide to the quality of recreational water. In accordance with NHMRC (2008), for chemicals where dermal absorption is not considered to be significant, a simple screening approach can be applied whereby the guideline value provided in NHMRC (2008) is multiplied by 10 times. Using the approach, the guideline value for Primary Contact Recreation would be 100 mg/L nitrate (as N), above the maximum concentration of nitrate remaining in groundwater at the site (61 mg/L nitrate (as N).

- The adopted criteria for ammonia is based on the potential for sewage contamination and does not directly relate to the toxicity of ammonia. Concentrations of ammonia in groundwater are below the criterion of 500 µg/L provided by the 2011 *Australian Drinking Water Guidelines* (NHMRC/NRMMC, 2011) and the 2008 *Guidelines for Managing Risks in Recreation Waters* (NHMRC, 2008) for the protection of aesthetics. NHMRC/NRMMC (2011) also indicates that concentrations of ammonia in Australian reticulated drinking water supplies are in the range 20 µg/L to 400 µg/L.

On the basis of the above, the Auditor concludes that the beneficial use of Primary Contact Recreation is not precluded by the identified nitrate and ammonia concentrations.

On 2 November 2012, The Auditor sought the advice of EPA Victoria in relation to the above. On 10 December 2012 EPA Victoria advised that *"Based on the information provided EPA accepts that elevated nitrogen and ammonia at the site can be considered not to preclude the beneficial uses of primary contact recreation (PCR) and maintenance of ecosystems (MoE) at the site."* The correspondence from EPA Victoria is provided in **Appendix G**.

15.3.2 Metals

As discussed in Section 11, the site is not considered to represent a source of the observed metals concentrations in groundwater at the site. They are considered to be:

- Representative of naturally occurring background concentrations, or
- Representative of regional conditions and not sourced from the site.

On the basis of the above, the Auditor has concluded that the beneficial uses of groundwater at the site are not precluded by the identified metal concentrations.

15.4 Process for considering groundwater pollution

In accordance with Section 13 of the *Environmental Auditor (Contaminated Land) Guidelines for Issue of Certificates and Statements of Environmental Audit,* EPA Publication 759.1, September 2007, the Auditor must address the following questions to determine the potential for groundwater beneath the site to be polluted.

Is groundwater likely to be polluted?

In other words, is there any significant risk that groundwater at the site is contaminated to the extent it may be polluted from on-site or off-site sources?

The former agricultural use of the site and its surrounds, and more recent use of the site to the south as a golf course suggested there is a risk of groundwater pollution from the use of agricultural chemicals and fertilisers. Such impacts are known to exist in the region surrounding the site and therefor a groundwater investigation was justified on this basis.

Is groundwater polluted?

In other words, does any groundwater contamination found at the site constitute pollution of groundwater in accordance with the definition in SEPP Groundwaters of Victoria?

In answering the above questions, Coffey's environmental site assessment incorporated a desktop hydrogeological study as well as an intrusive groundwater investigation that included the installation of three onsite wells and the sampling of one off-site and three on-site wells.

15.5 Beneficial uses of groundwater precluded by pollution

The following discussion presents the Auditor's analysis of the degree of compliance with the objectives in SEPP Groundwaters of Victoria.

Table 11.2 to **Table 11.4** summarised the findings of the groundwater assessment, and identified the adopted criteria for protected beneficial uses that are exceeded by groundwater conditions at the site. **Table 15.2** below summarises which protected beneficial uses are relevant to the site, i.e. are an existing use, or could be considered likely to be realised at the site.

Table 15.2 Summary of on-site groundwater pollution

Protected Beneficial Use	Does the use Exist?	Is the use likely to be realised in the future?	Relevance to site	Use precluded
Maintenance of ecosystems	No	No	Not relevant	No
Stock watering	No	Unlikely	Unlikely	No
Agriculture Parks and Gardens	Possible	Possible	Possible	No
Industrial use	No	No	Not relevant	No
Primary contact recreation	No	Possible	Possible	No
Buildings & structures	No	Unlikely	Unlikely	No

The analysis indicates that of the all protected uses precluded by groundwater pollution, only *Primary Contact Recreation and Agriculture Parks and Gardens (on-site)* were considered to be relevant (i.e. existing or likely to be realised) to the site. Neither beneficial use was identified to be precluded by the identified groundwater concentrations.

15.6 Landfill gas

The results of the landfill gas assessment undertaken by Coffey did not provide any evidence that landfill gases are present beneath the site. The outcomes of the investigations are expected given the distance to the closest know landfill (Stevensons Road Landfill, Cranbourne) located 1 km to the southeast, and the generally sandy nature of the shallow geological formations in the region.

16. Conclusions

This Environmental Audit was undertaken to assess the suitability of the land for all potential land-uses.

The Auditor has concluded the following with respect to the adequacy of the assessment works completed at the site by Coffey:

- The site history information provided was considered sufficient to identify potentially contaminating activities.
- The regional and local geological setting identified during investigative works was generally consistent with the geological setting for the site.
- The soil sampling programs conducted in 2011 and 2012 is considered to adequately characterise the site for the purposes of the Audit. The sampling methodology was generally consistent with Australian Standard AS4482.1 and other relevant guidelines and is considered appropriate for describing the final condition of the site. The analytes tested adequately addressed potential contamination issues identified from the site history review as well as visual inspections of the site.
- The groundwater well network included three wells installed on the site and three wells installed on the neighbouring Western Precinct (CARMS # 69347-1; note that only one of these wells produced water). Overall, the well network was sufficient to target all potential point sources of groundwater impacts and characterise regional groundwater quality. The sampling methodologies employed during the groundwater investigative works were appropriate for the purposes of the Audit.
- The QA/QC procedures employed were adequate to provide confidence in the laboratory results.

Based on the above information, the Auditor considers that assessment works undertaken in the Environmental Site Assessment by Coffey in support of the Environmental Audit were of a sufficient quality and completeness to support the enclosed Certificate of Environmental Audit, and were generally conducted in accordance with the relevant guidelines, policies and standards referenced throughout this report.

The findings of the environmental assessment indicated that the final land surface contains concentrations of arsenic, manganese, nickel and vanadium in excess of the adopted environmental criteria (i.e. NEPM EIL). These elevated metal concentrations are considered to be associated with naturally occurring background concentrations at the site. All analytes were reported below the adopted health-based criteria protective of a sensitive land-use (i.e. NEPM HIL A).

Mercury concentrations exceeded the adopted ecological criteria at one location in natural surface soils. No potential sources of mercury were identified at this location, nor were there any visual signs of soil disturbance, staining, hard waste or other aesthetic impacts. No further investigation of this excedance was considered necessary.

TPH C_{10}-C_{36} concentrations at location MSS-East 2 (in the vicinity of the drums adjacent to the former Maintenance Shed) exceeded the adopted NSW EPA threshold concentrations for sensitive landuse. Reported concentrations were below the CRC CARE HSLs for direct contact in a low density residential setting which are considered to be more relevant to the assessment of the site than the NSW EPA threshold concentrations for sensitive landuse. No odors or staining were identified in the vicinity of the reported impact.

The Auditor considers that the site is not a specific source of the reported metals in groundwater, which are considered to be either:

- Representative of naturally occurring background concentrations, or
- Representative of regional conditions and not sourced from the site.

Concentrations of nitrate, exceeding the adopted criteria for *maintenance of ecosystems* are likely to be due to releases from the former septic tank and soak located adjacent to the former Maintenance shed, or are representative of regional conditions supported by the former agricultural and golf course maintenance activities in the area. The septic tank and soak was removed, and impacted soils excavated to the extent practicable and validated by Coffey in May 2012. Groundwater fate and transport modelling undertaken by Coffey has identified that the nitrate plume is not likely to migrate to the nearest natural surface water body (Eumemmerring Creek/Patterson River), located approximately 9 km northwest of the site. A tributary of Rodd's Drain is located approximately 320 m west of the site, however based on the depth to groundwater (6.1 to 8.8 mBGL), and the shallow nature of the tributary of the drain (likely to be incised to less than 1 m below the land surface), groundwater discharge into this feature is unlikely.

16.1 Audit outcome

In view of the assessment works completed by Coffey the site is considered suitable for all potential land-uses and hence, a *Certificate of Environmental Audit* has been issued for the site and is attached at the front of this report.

Other related information

- Groundwater at the site contains concentrations of copper, iron, manganese, nickel and zinc above adopted criteria. The concentrations are considered to be typical of the regional groundwater quality surrounding the site and do not constitute pollution in accordance with clause 10(2)(c) of the State Environmental Protection Policy (Groundwater of Victoria).
- Groundwater bores present at the site (MW4 to MW6) should be decommissioned in accordance with the requirements of "Minimum Construction Requirements for Water Bores in Australia", published by the Land and Water Biodiversity Committee, 2012.
- Removal and disposal of asbestos containing materials in the derelict house must be done by a removalist licensed by WorkSafe Victoria.

16.2 Support team involvement

No specialist support team members were required during the preparation of this report.

17. References

Australian and New Zealand Environment and Conservation Council/National Health and Medical Research Council (1992). *Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites.*

Canadian Council of Ministers of the Environment (2007). *Canadian Environmental Quality Guidelines.*

Coffey (2005). *Stage 1 Environmental site assessment Amstel Golf Course Cranbourne-Frankston Road, Cranbourne*, Report No. E16663/1 AC. Report for Watsons Pty Ltd.

Coffey (2012a). *Hazadous Materials Report, Disused Land and Dilapidated Structures, 1030 Cranbourne-Frankston Road, Cranbourne, Victoria*, ENAUABTF00207AA. Report for Waraplus Pty Ltd, 20 August 2012.

Coffey (2012b). *CUTEP Report: Proposed Amstel Golf Course Development (Eastern Precinct) 1016-1030 Cranbourne-Frankston Road, Cranbourne*, *ENAUABTF00207AA-R09.* Report for Waraplus Pty Ltd, 7 November 2012.

Coffey (2012c). *Environmental site assessment Proposed Amstel Golf Course development (Eastern Precinct) 1016-1030 Frankston-Cranbourne Road, Cranbourne, Victoria, ENAUABTF00207AA-R09.* Report for Waraplus Pty Ltd, 11 December 2012.

Coffey (2012d). *RE: Amstel East: TP148 vs TP152.*

CRC CARE Technical Report No. 10. September 2011. *Health Screening Levels for Petroleum Hydrocarbons in Soil and Groundwater.* E. Friebel & P. Nadebaum

DCNR (1995), *Victoria Groundwater Beneficial Use Map Series*, *South Western Victoria* (1:250,000 scale). Department of Conservation and Natural Resources.

Environment Protection Act 1970 Victoria. Act No. 8056/1970. (*EPA* 1970).

EPA Victoria (2006), *Publication 1037 – Environmental Audit of Unimin Lime (Victoria) Pty Ltd.*

EPA Victoria (2007). *Publication 1147 - Environmental Auditor Guidelines - Provision of environmental audit reports, certificates and statements.*

EPA Victoria (2007). *Publication 860.1 - Environmental Auditing of Contaminated Land.*

EPA Victoria (2007). *Environmental Auditor (Contaminated Land) – Guidelines for Issue of Certificates and Statements of Environmental Audit, Publication 759.1.*

EPA Victoria (2012). *CUTEP 1016-1030 Cranbourne-Frankston Road (CARMS 69347-2).*

Freeze and Cherry (1979) Groundwater. ISBN 0-13-365312-9.

Geological Survey of Victoria *1:63,360 Cranbourne Map Sheet.*

VANDENBERG, A.H.M., 1997. QUEENSCLIFF SJ 55-9 Edition 2, 1:250 000 Geological Map Series 1:250,000 geological map. Geological Survey of Victoria.

Lane Piper Pty Ltd, 20 December 2010. Environmental Audit report (Groundwater Quality) 2010 Stevensons Road Landfill, Cranbourne, Vic, Doc Ref: 0664AReport04.2. Report for Casey City Council.

Leonard (1992). *Port Phillip Region Groundwater Resources - Future Use and Management*. Department of Water Resources, Victoria.

National Environmental Protection Council (1999). *National Environment Protection (Assessment of Site Contamination) Measure*.

Netherlands (2000). *Circular on Target Values and Intervention Values for Soil Remediation*, *Ministry of Housing, Spatial Planning and Environment*.

NSW Environment Protection Authority (1994), Guidelines *for Assessing Service Station Sites*.

Parsons Brinckerhoff (2012). *Environmental Audit Report - Western Precinct, 980 Cranbourne-Frankston Road, Cranbourne, Victoria (CARMS #69347-1)*, 18 April 2012.

State Environment Protection Policy (SEPP) (2002). (*Prevention and Management of Contamination of Land*), *EPA* 1970, Victoria.

State Environment Protection Policy (SEPP) (1997). (*Groundwaters of Victoria*), *EPA* 1970, Victoria.

Standards Australia (2005). *Guide to the Sampling and Investigation of Potentially Contaminated Soil Part 1: Non-volatile and Semi-volatile Compounds*. Australian Standard AS 4482.1-2005.

Standards Australia (2009). *Piling Design and Installation.* Australian Standard AS2159-2009.

18. Limitations of this Environmental Audit Report

This Environmental Audit Report and Certificate of Environmental Audit have been prepared under Part IXD Section 53W (1) of the *Environment Protection Act 1970*, and in accordance with relevant State Environmental Protection Policies (SEPPs) and EPA Victoria guidelines. The Certificate of Environmental Audit represents the Auditor's opinion of the environmental condition of the site and its suitability for specified beneficial uses at the date that the Certificate is signed.

In forming his opinion of the site, the Auditor has assessed the data and information supplied by Coffey Environments Pty Ltd and has also undertaken a number of independent verification activities. He has accepted that the information supplied represents a fair and reasonable assessment of site conditions, taking into account the limitations inherent to all site assessment processes.

This report has been prepared specifically for use by EPA Victoria, the City of Casey Council and Waraplus Pty Ltd (the current site developer). Should another party rely on the information and conclusions presented in this report, they do so at their own risk.

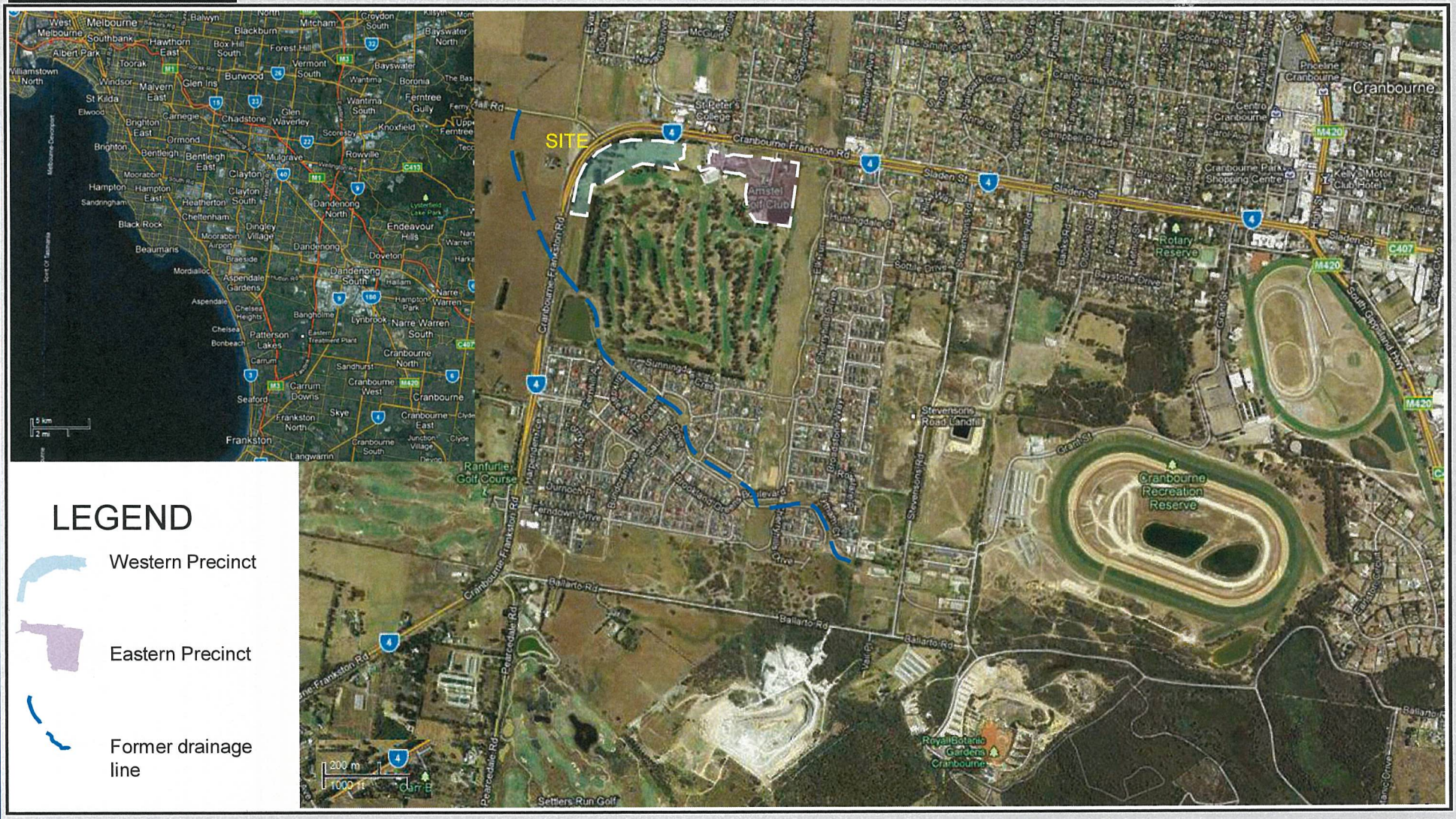
In the event that changes to the state or condition of the site and/or surrounding area occur after the date of signing of the Certificate of Environmental Audit, the Environmental Audit Report may no longer be valid.

Appendix A

Figures

Cranbourne-Frankston Road, Cranbourne, Waraplus Pty Ltd

Figure 1– Site Location Plan

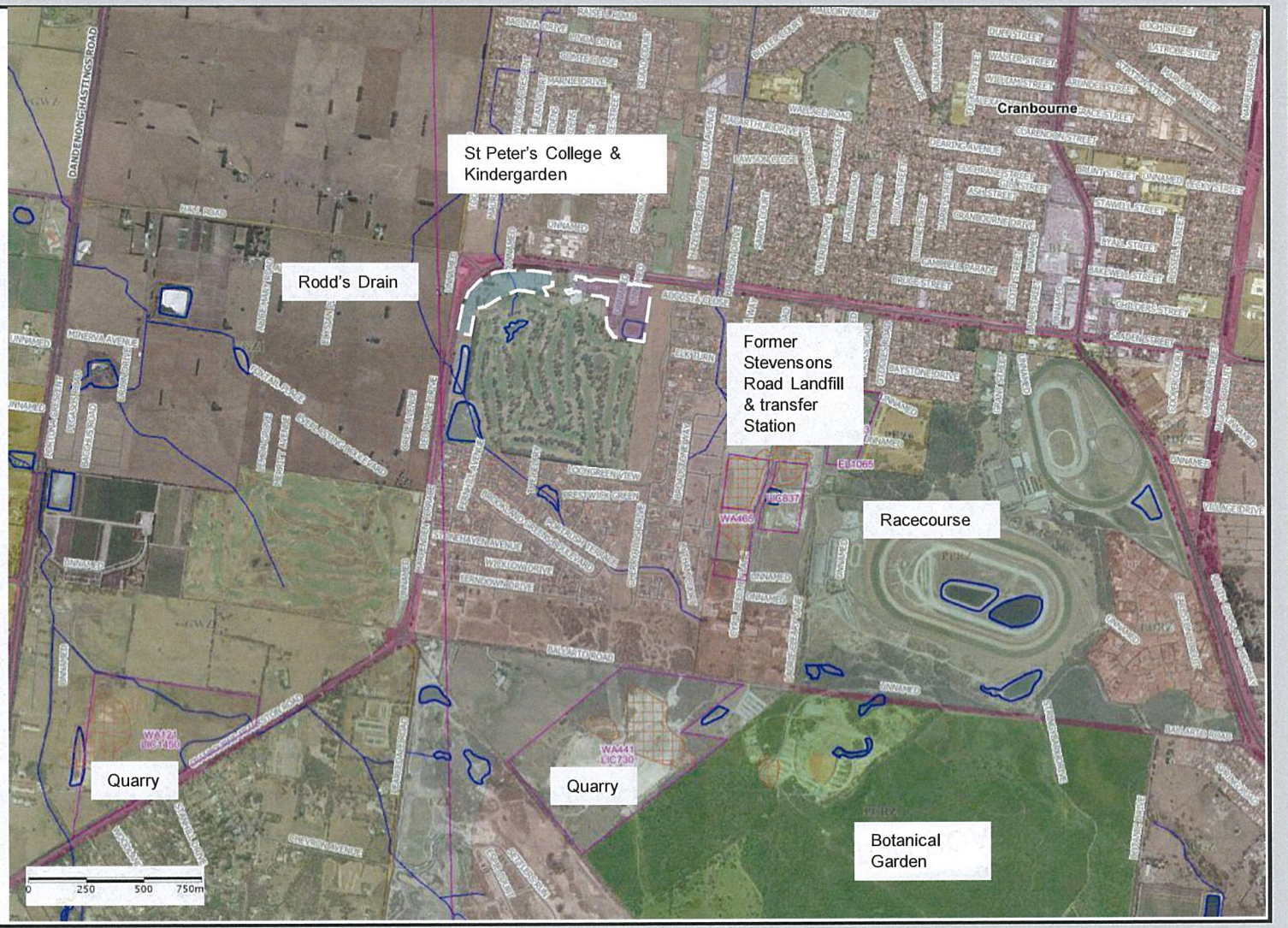


NCSI certified Quality System to ISO 9001

[redacted]

Cranbourne-Frankston Road, Cranbourne, Waraplus Pty Ltd

Figure 2– Surrounding landuses



LEGEND

- Western Precinct
- Eastern Precinct
- Former drainage line

0 400m (approx.)

Source: Coffey, 2011

N W E S

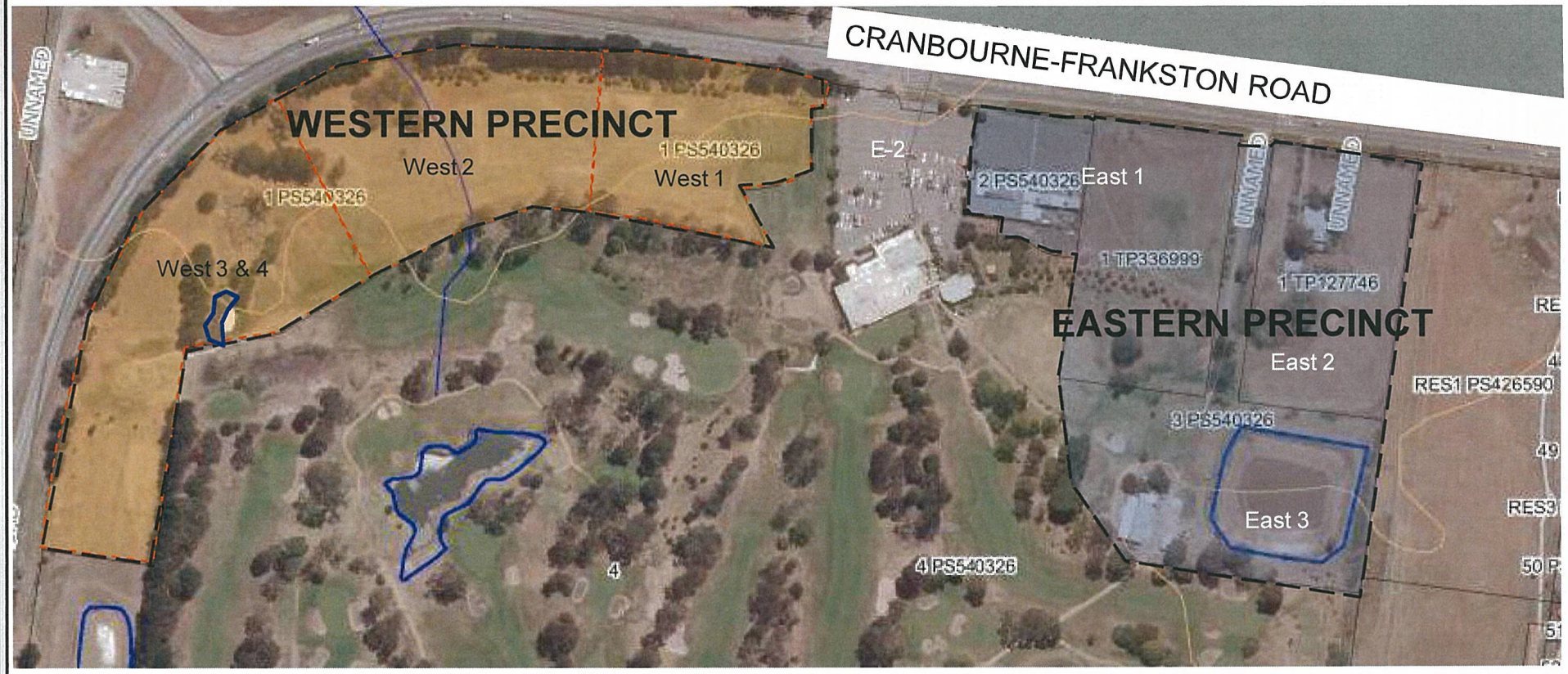
Project No: 2171147A
Revision: 0
Drawn: CLS
Verify: CLS
Date: 2011

PARSONS BRINCKERHOFF

NCSI certified Quality System to ISO 9001

Cranbourne-Frankston Road, Cranbourne, Waraplus Pty Ltd

Figure 3 – Amstel Golf Course Audit Boundary



0 65m (approx.)

Source: Coffey, 2011

N W E S

Project No: 2171147A
Revision: 0
Drawn: CLS
Verify: CLS
Date: 2011

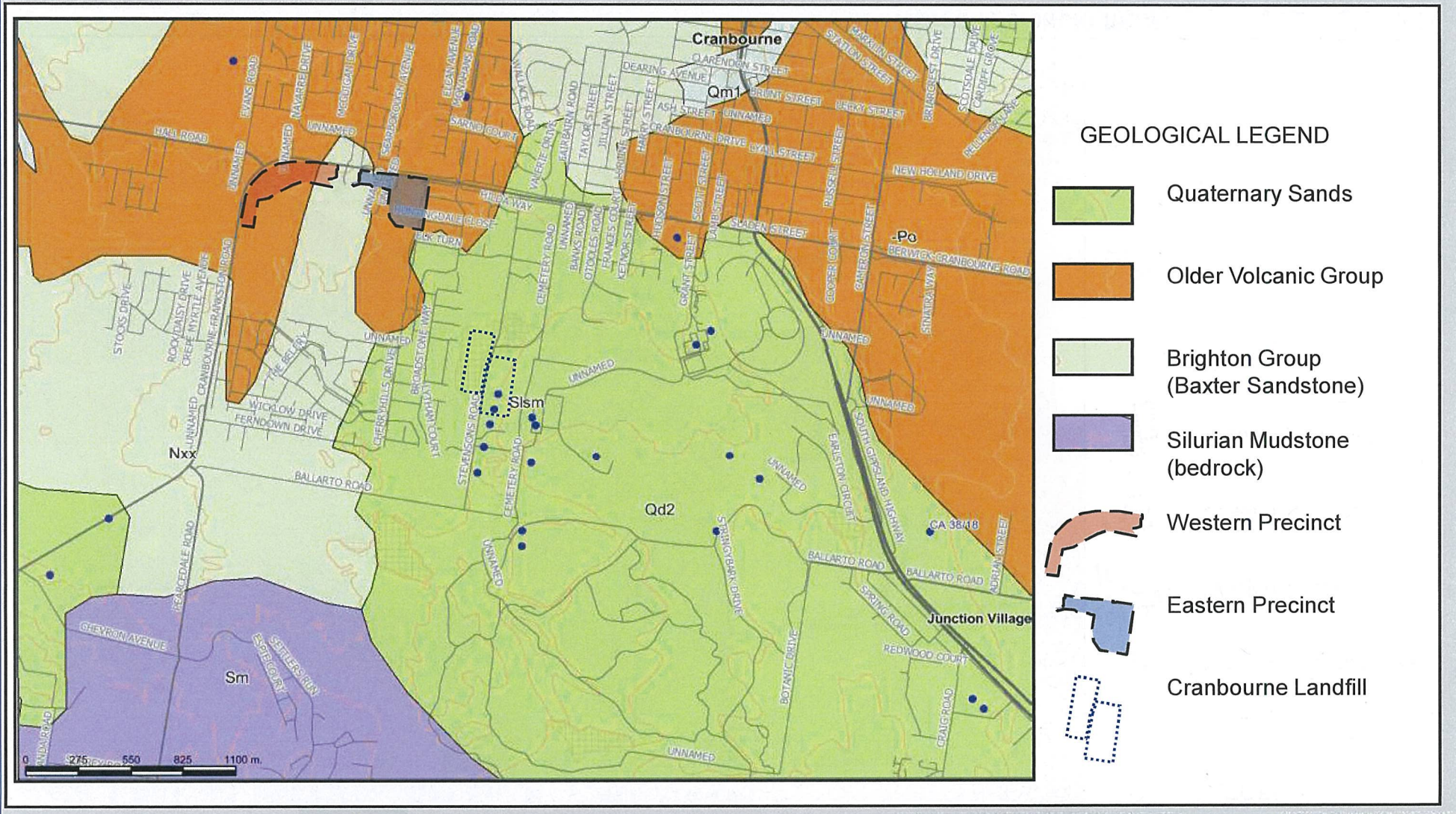
PARSONS BRINCKERHOFF

NCSI certified Quality System to ISO 9001

[redacted]

Stevensons Road Landfill, Casey City Council

Figure 4 – Regional Geology



0 1100m

Source:
GeoVic (DPI) website 2011

N W E S

Project No: 2171109A
Revision: 0
Drawn: CLS
Verify: CLS
Date: 11-03-11

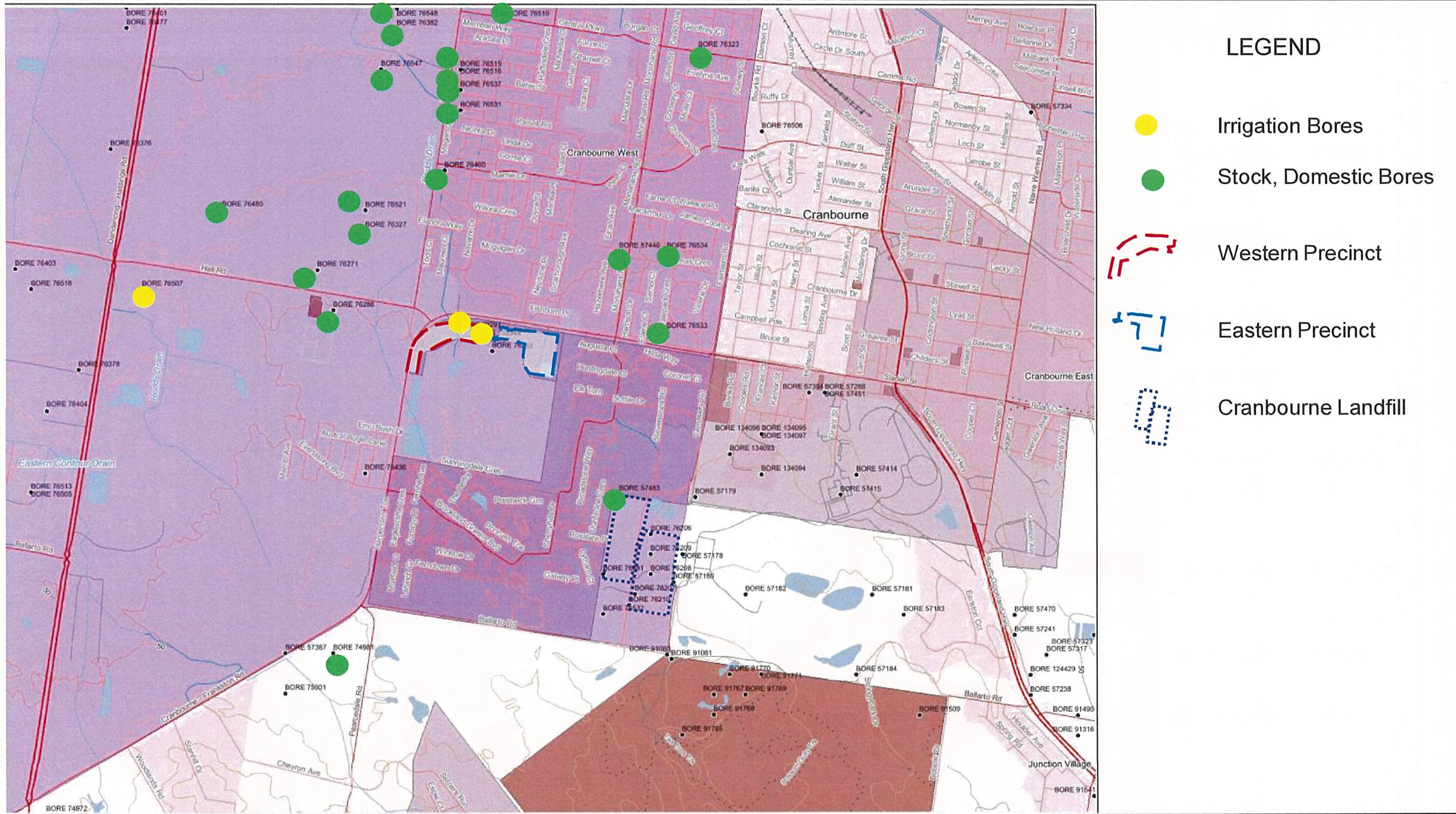
PARSONS BRINCKERHOFF

NCSI certified Quality System to ISO 9001

[redacted]

Stevensons Road Landfill, Casey City Council

Figure 5 – Registered Bores



Source:
GeoVic (DPI) website 2011

Project No: 2171109A
Revision: 0
Drawn: CLS
Verify: CLS
Date: 11-03-11

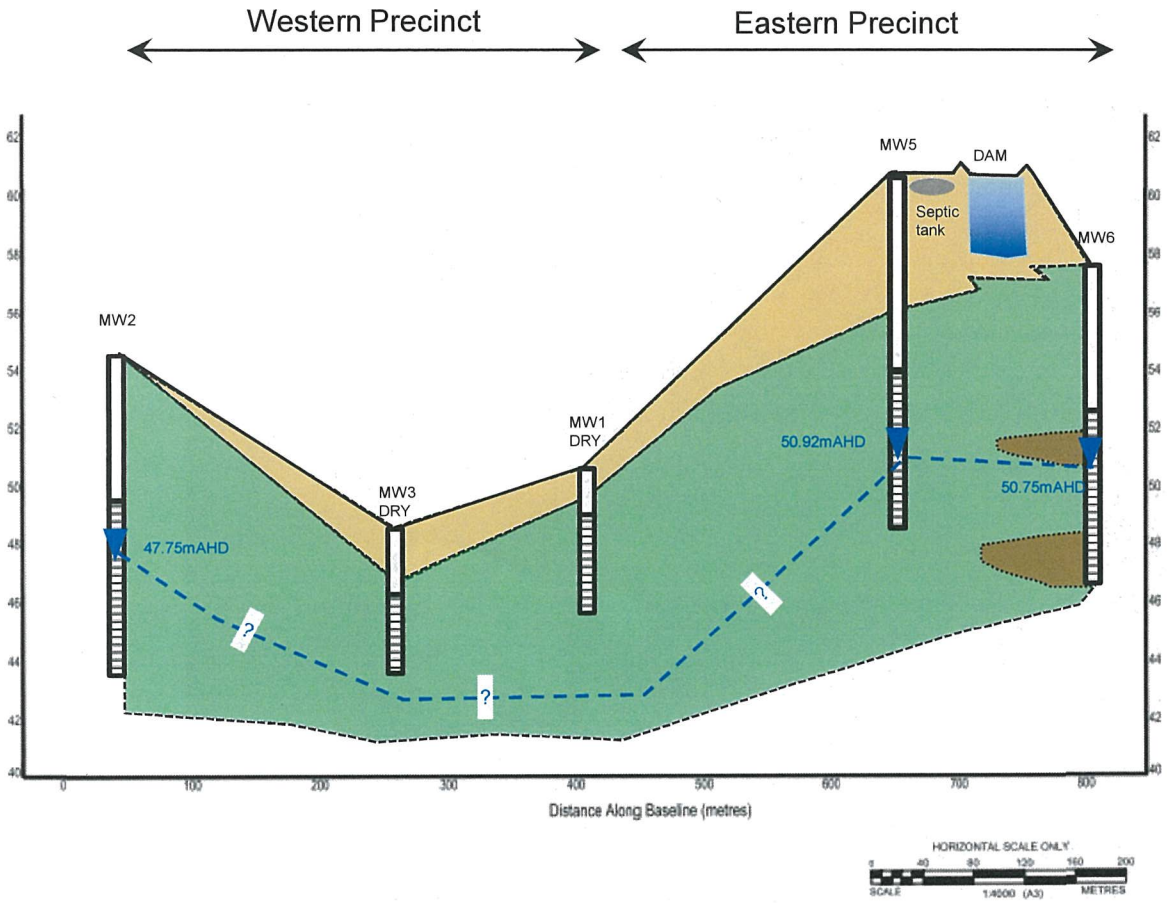
PARSONS BRINCKERHOFF

NCSI certified Quality System to ISO 9001

Cranbourne-Frankston Road, Cranbourne, Waraplus Pty Ltd

Figure 6 – Hydrogeological Cross Section (Sept 2011)

Cross Section A-A'



SITE PLAN
1:10,000 (A3)

LEGEND

- Sandy sediments
- Clayey sediments
- Highly weathered basalt
- SWL in mAHD

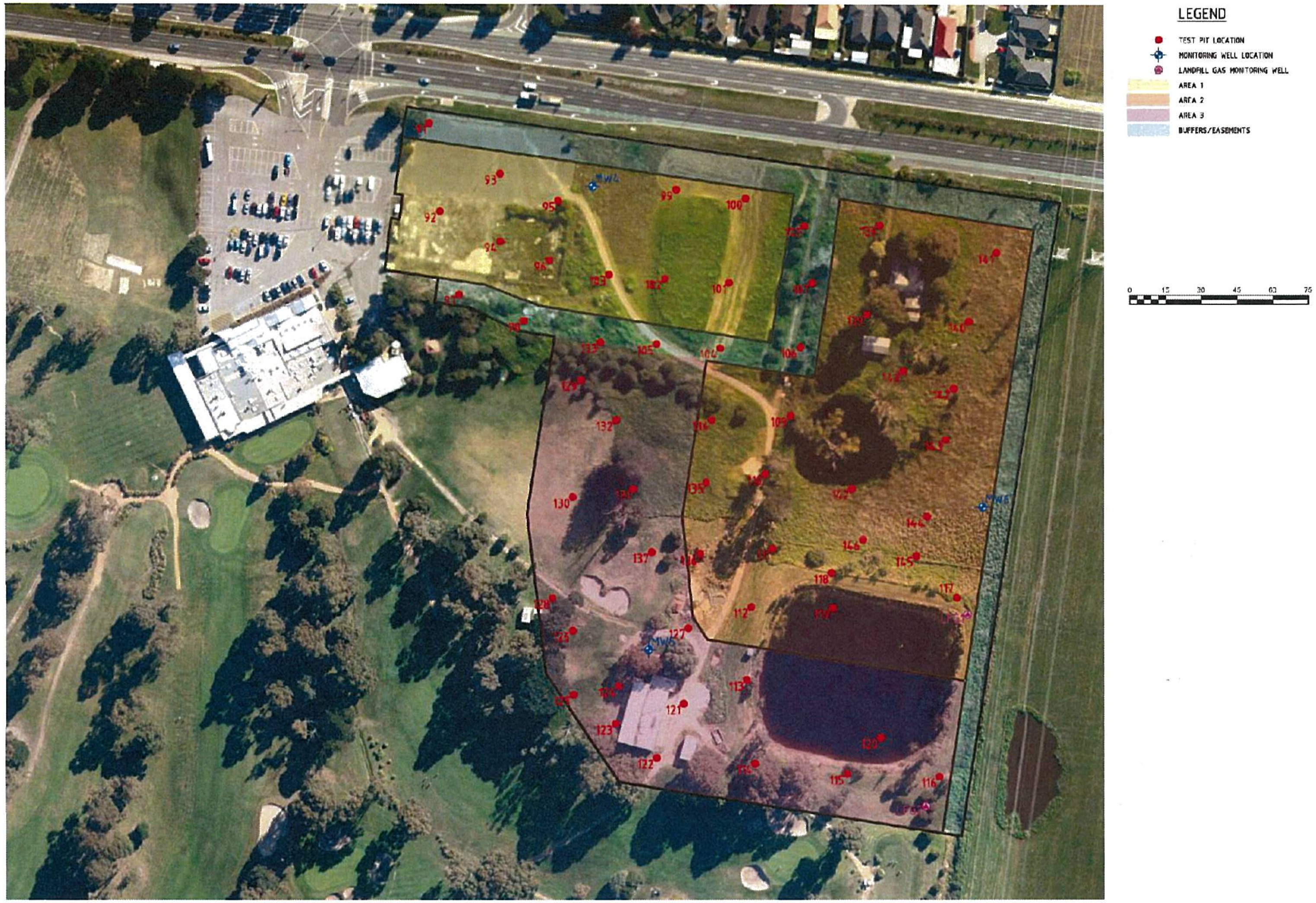
0 200m (approx.)

Source:
Coffey, Feb 2012

Project No: 2171147A
Revision: 0
Drawn: CLS
Verify: CLS
Date: 2012

PARSONS BRINCKERHOFF

NCSI certified Quality System to ISO 9001



THIS IS ONE INTERPRETATION ONLY
OTHER INTERPRETATIONS ARE POSSIBLE.

Data Source: -	Map No: 2171147B_GIS_001_A2	**Amstel Golf Course Environmental Site Asessment**
	Author: WK	**Figure 7**
	Approved by: RJ	Soil Sample Location Plan (Grid based sampling) Eastern Precinct
	Date: 19/02/13	1016-1030 Cranbourne-Frankston Road, Cranbourne

Data Source: Coffey (2012)

esri Partner Network Silver

Map No:	2171147B_GIS_002_A1
Author:	WK
Approved by:	RJ
Date:	07/01/13

Amstel Golf Course Environmental Site Asessment
Figure 8
Soil Sample Location Plan (Targeted sampling) Eastern Precinct
1016-1030 Cranbourne-Frankston Road, Cranbourne

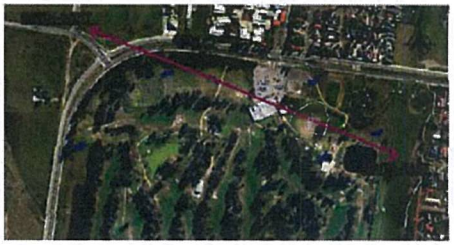
THIS IS ONE INTERPRETATION ONLY.
OTHER INTERPRETATIONS ARE POSSIBLE.

Data Source: Coffey (2012)

esri Partner Network Silver

Map No:	2171147B_GIS_003_A1
Author:	WK
Approved by:	RJ
Date:	07/01/13

Amstel Golf Course Environmental Site Assessment
Figure 9
Groundwater Gradient Plan - Eastern and Western Precincts (September 2011)
1016-1030 Cranbourne-Frankston Road, Cranbourne

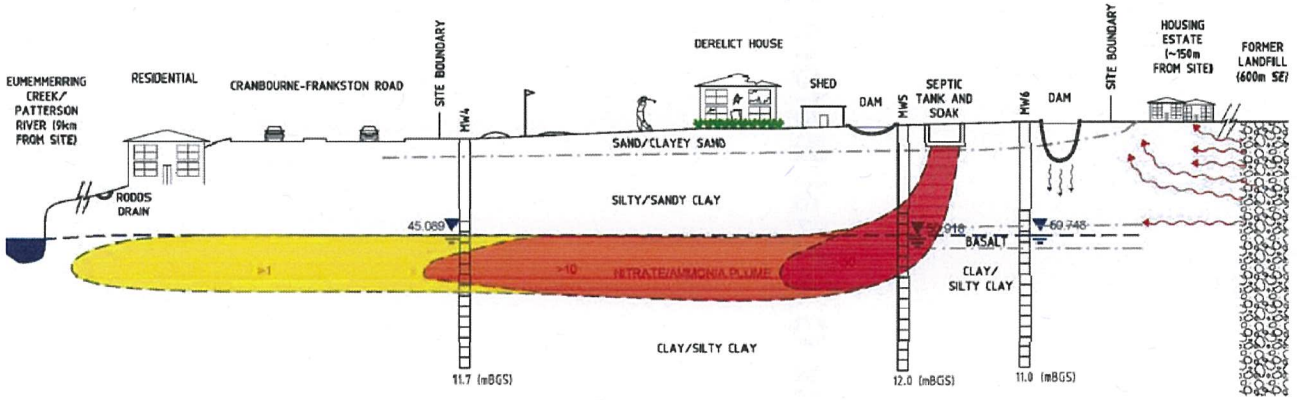


1:15,000 (A4)

SOUTH-EAST

NORTH-WEST

NOTE:
DIAGRAMMATIC-NOT TO SCALE



THIS IS ONE INTERPRETATION ONLY
OTHER INTERPRETATIONS ARE POSSIBLE.

Data Source: Coffey (2012)

esri Partner Network Silver

Map No:	2171147B_GIS_004_A1
Author:	WK
Approved by:	RJ
Date:	07/01/13

Amstel Golf Course Environmental Site Assessment
Figure 10
Site Conceptual Model
1016-1030 Cranbourne-Frankston Road, Cranbourne

Appendix G – Dial Before you Dig Plans

DIAL BEFORE YOU DIG www.1100.com.au
The Essential First Step

APA Group

APA Group
PO Box 171 Findon
South Australia 5023

03/02/2015

Company: Coffey Environments

Miss Phillipa Cances
126 Trenerry Crescent
ABBOTSFORD
3067

phillipa.cances@coffey.com

Dear Miss Phillipa Cances

Sequence Number: 43688253
Worksite Address: Ballarto Road
Cranbourne South
3977

Thank you for your Dial Before You Dig enquiry regarding the location of Gas Assets, we can confirm that the APA Group has **Gas Assets** in the vicinity of the above location.

You are hereby notified that the attached Duty of Care requirements apply to any activity in the vicinity of Gas Assets operated by APA, please ensure you read and comply with all the relevant requirements, if you require any assistance, please do not hesitate to contact the following APA Representative:

APA Representative Name	*APA Representative Contact Details*
Dial Before You Dig Officer	(08) 8159 1644

Caution - Damage to gas assets could result in possible explosion and fire with the risk of personal injury.
For Gas Emergencies please call 1800 676 300

Please find enclosed the following information:

- APA's Duty of Care, If you are unclear of your obligations under these requirements please contact the APA Representative listed above immediately
- An overview map with your requested area highlighted to assist in identifying the location of APA's Gas Assets
- A map(s) showing APA's Gas Assets in the requested area, this information is valid for one month from the date of this response, **please check this represents the area you requested**, if it does not, please contact the APA Representative listed above immediately

Finally, this response from the APA Group has been generated using a newly commissioned automated process and will look different and contain new information. Please take some time to review the entire response document and check the information supplied and please let us have any feedback by sending an email to *DBYDNetworksAPA@apa.com.au* or contacting us direct on (08) 8159 1644.

Yours Faithfully,

Dial Before You Dig Officer
APA Group
Email: DBYDNetworksAPA@apa.com.au

Duty Of Care - Working Around Gas Assets

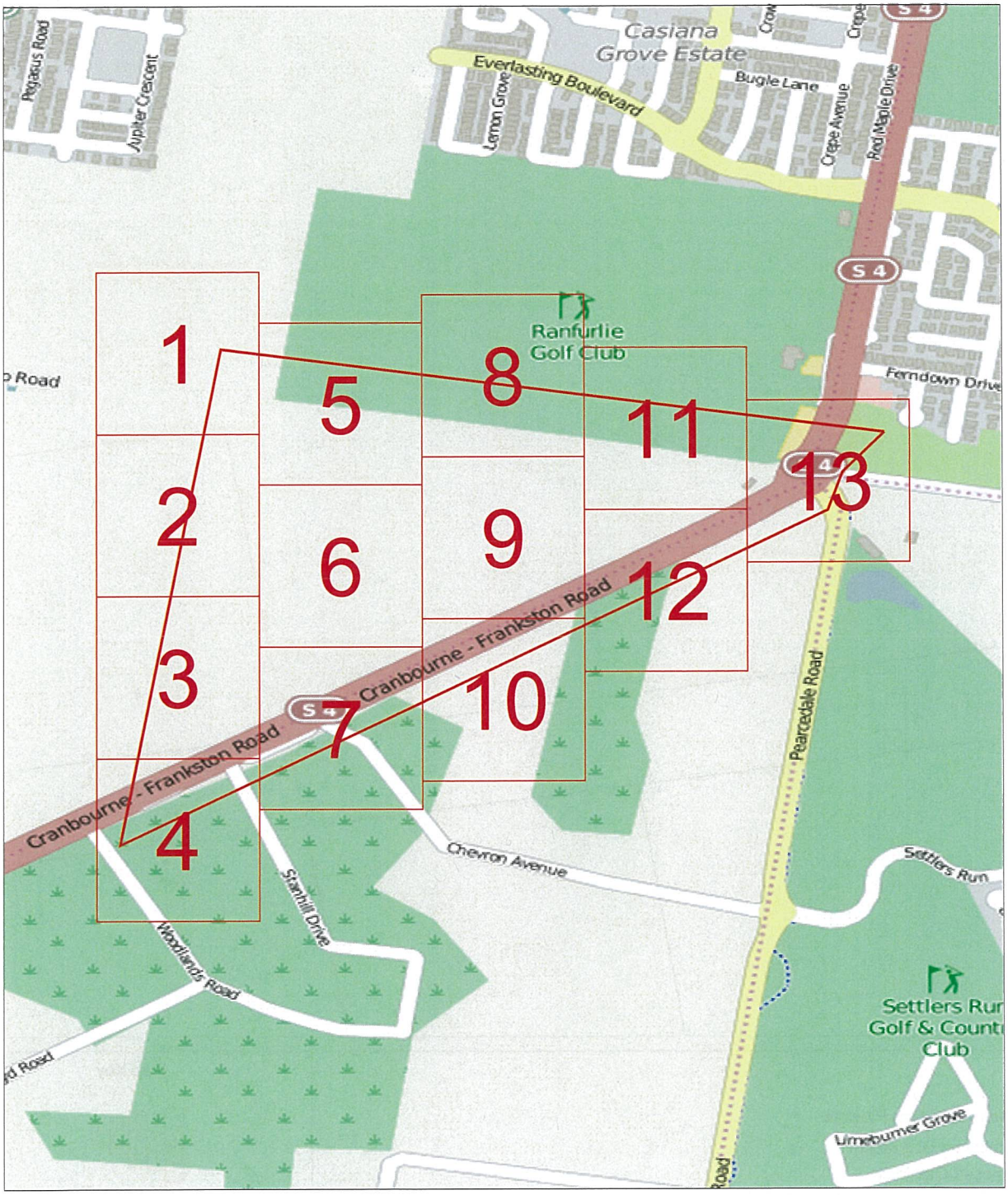
General Conditions

- This location enquiry is valid for 30 days from the enquiry date
- Expired locations over 30 days require a new Dial Before You Dig request to validate location information for the site listed above
- The location information supplied in this document shall be used as a guide only. APA Group shall not be liable or responsible for the accuracy of any such information supplied pursuant to this request
- It is the responsibility of the excavator to expose all Gas Assets, including Gas Services pipelines (See below), **by hand** (Please Note: Do not use vacuum excavation systems as damage to Gas Assets may occur). Gas Asset depths may vary according to ground conditions
- Gas Service pipelines (inlet service) connecting Gas Assets in the street to the gas meter on the property are typically **not** marked on the map
- This information has been generated by an automated system based on the area highlighted in your DBYD request and has not been independently verified. It is your responsibility to ensure that the information supplied in this response matches the dig site you defined when submitting your Dial Before You Dig enquiry. If the information does not match the dig site or you have any question, please contact APA immediately using the details listed on the first page and / or please resubmit your enquiry
- For Gas Emergencies please call 1800 676 300

DIAL BEFORE YOU DIG www.1100.com.au
The Essential First Step

APA Group

Site Address	Ballarto Road Cranbourne South 3977	**Sequence No**	43688253
Name	Miss Phillipa Cances		
Email	phillipa.cances@coffey.com		

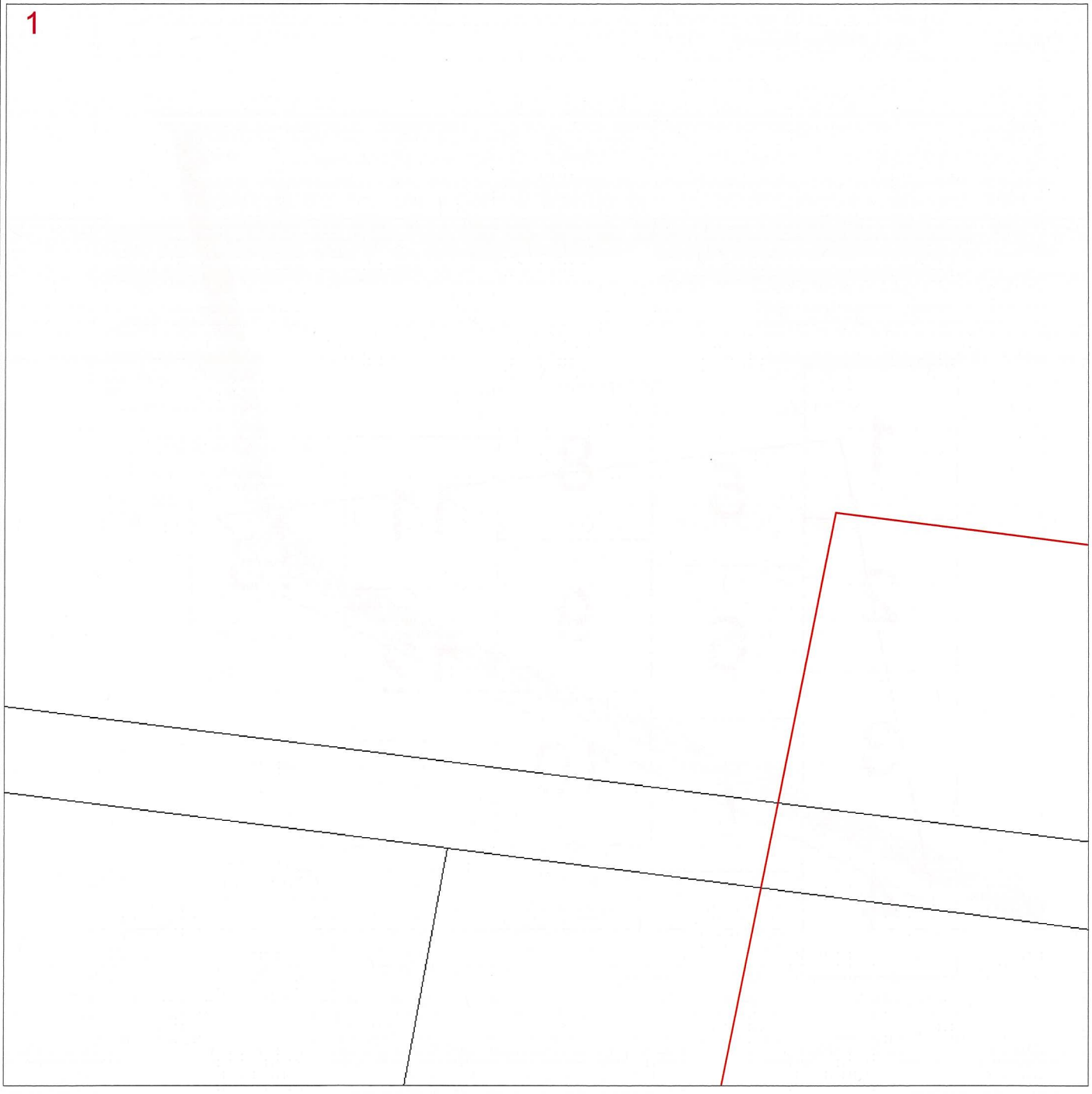


Scale 1: 10000	NORTH	Enquiry Area / Map Key Area

DIAL BEFORE YOU DIG www.1100.com.au
The Essential First Step

APA Group

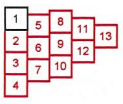
Site Address	Ballarto Road Cranbourne South 3977	**Sequence No**	43688253
Email	phillipa.cances@coffey.com	**Map Reference**	Melways 132J10,132J11,132J8,132J9,132K10,132K8,132K9,133A10,



LEGEND

- Transmission Gas Pipeline
- Distribution Gas Main
- Proposed Gas Main

Map Key



Scale 1:1000

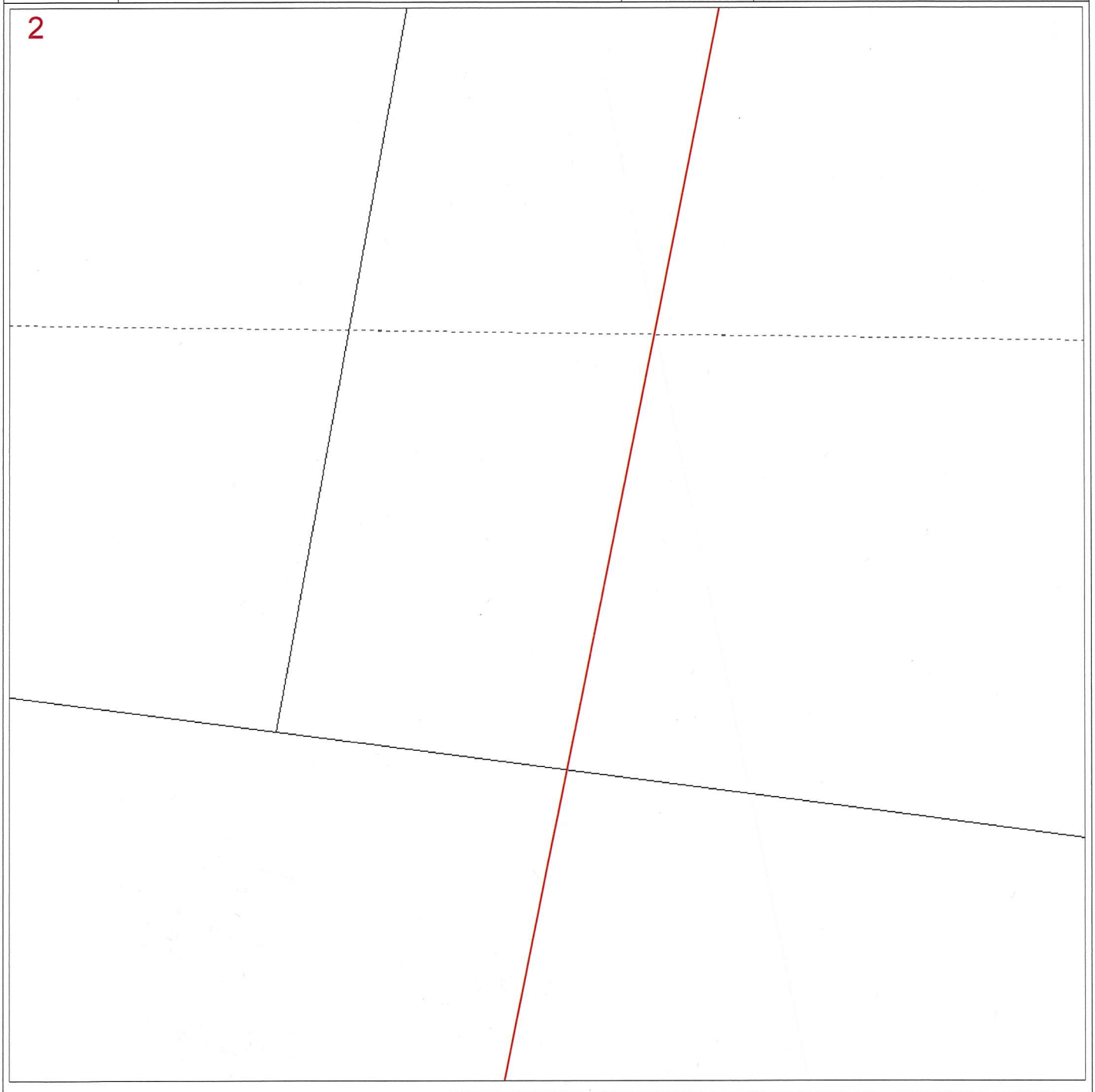
0 0.01km

NORTH

DIAL BEFORE YOU DIG www.1100.com.au
The Essential First Step

APA Group

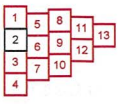
Site Address	Ballarto Road Cranbourne South 3977	**Sequence No**	43688253
Email	phillipa.cances@coffey.com	**Map Reference**	Melways 132J10,132J11,132J8,132J9,132K10,132K8,132K9,133A10,



LEGEND

- Transmission Gas Pipeline
- Distribution Gas Main
- Proposed Gas Main

Map Key



Scale 1:1000

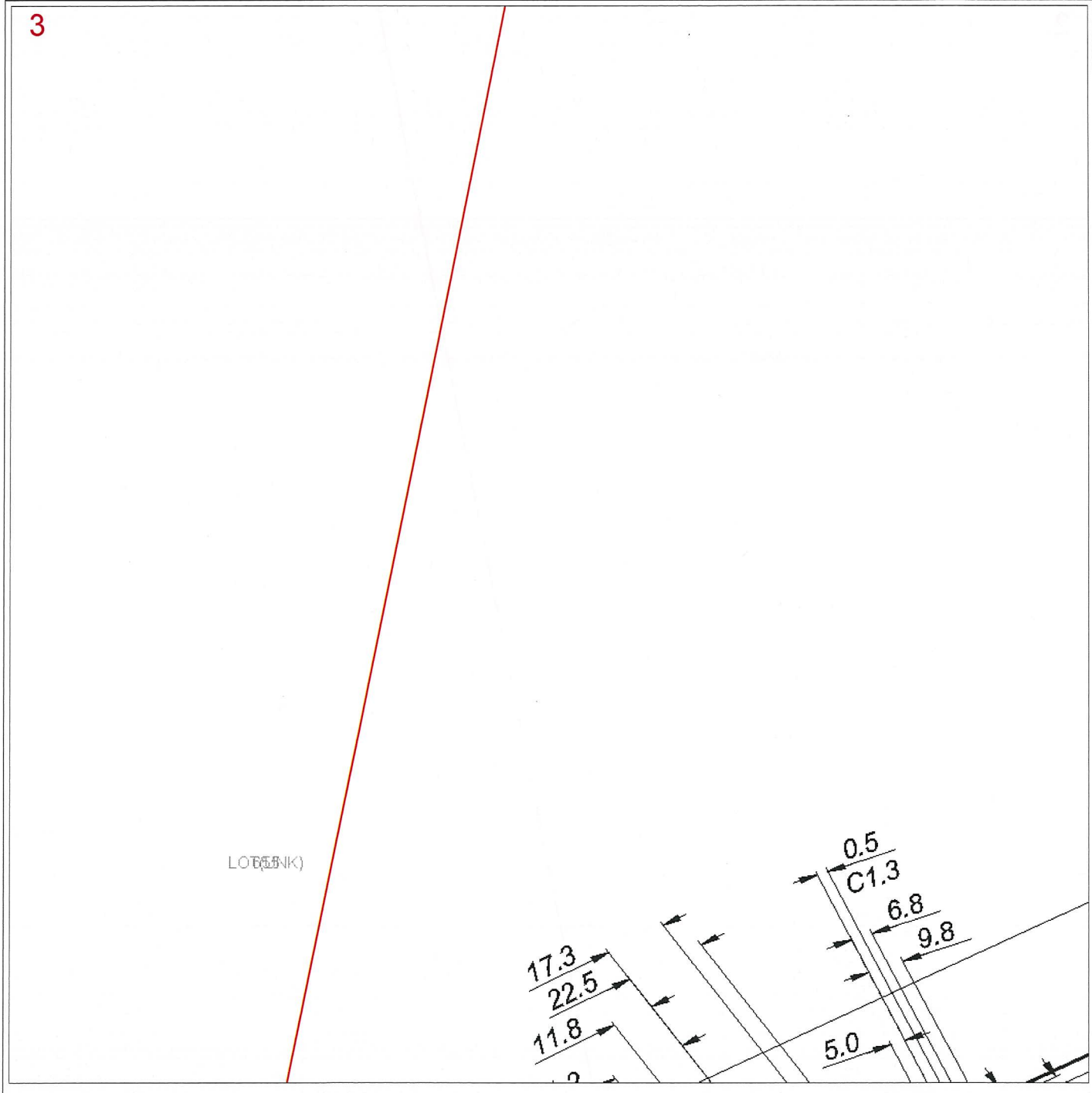
0 0.01km

NORTH

DIAL BEFORE YOU DIG www.1100.com.au
The Essential First Step

APA Group

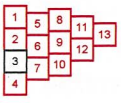
Site Address	Ballarto Road Cranbourne South 3977	**Sequence No**	43688253
Email	phillipa.cances@coffey.com	**Map Reference**	Melways 132J10,132J11,132J8,132J9,132K10,132K8,132K9,133A10,



LEGEND

- Transmission Gas Pipeline
- Distribution Gas Main
- Proposed Gas Main

Map Key



Scale 1:1000

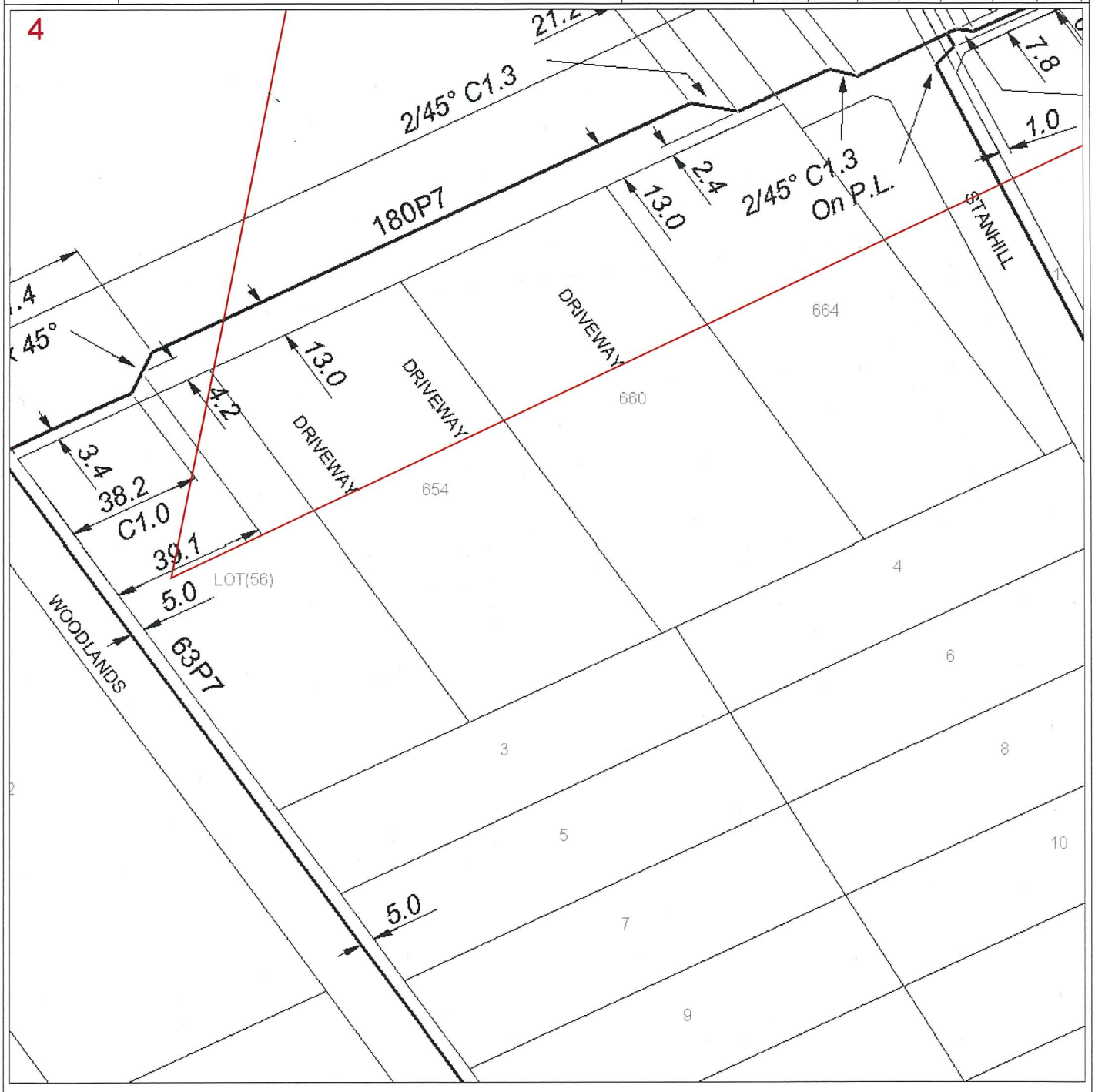
0 0.01km

NORTH

DIAL BEFORE YOU DIG www.1100.com.au
The Essential First Step

APA Group

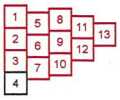
Site Address	Ballarto Road Cranbourne South 3977	**Sequence No**	43688253
Email	phillipa.cances@coffey.com	**Map Reference**	Melways 132J10,132J11,132J8,132J9,132K10,132K8,132K9,133A10,



LEGEND

- Transmission Gas Pipeline
- Distribution Gas Main
- Proposed Gas Main

Map Key



Scale 1:1000

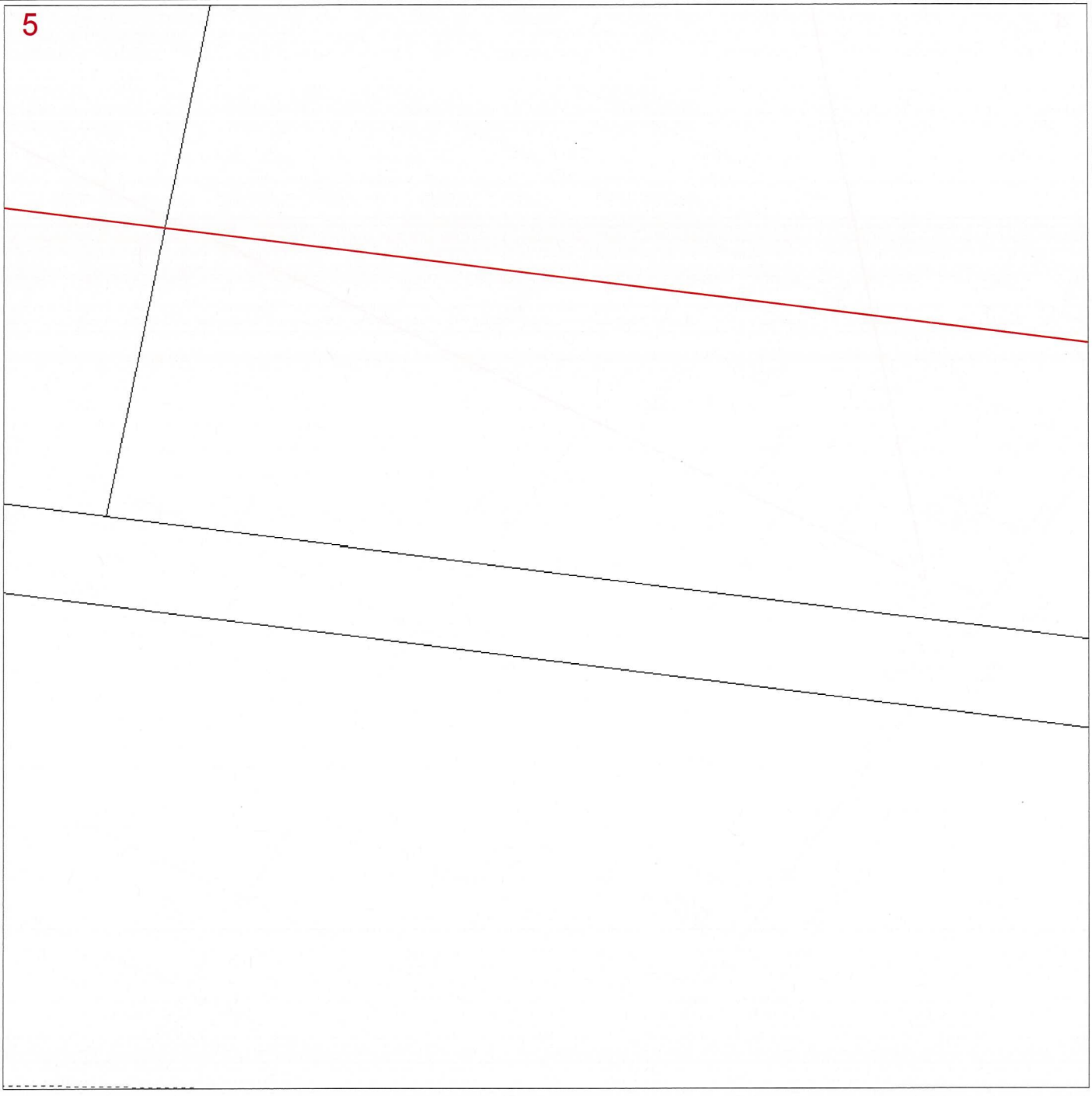
0 0.01km

NORTH

DIAL BEFORE YOU DIG www.1100.com.au
The Essential First Step

APA Group

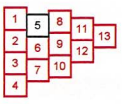
Site Address	Ballarto Road Cranbourne South 3977	**Sequence No**	43688253
Email	phillipa.cances@coffey.com	**Map Reference**	Melways 132J10,132J11,132J8,132J9,132K10,132K8,132K9,133A10,



LEGEND

- Transmission Gas Pipeline
- Distribution Gas Main
- Proposed Gas Main

Map Key



Scale 1:1000

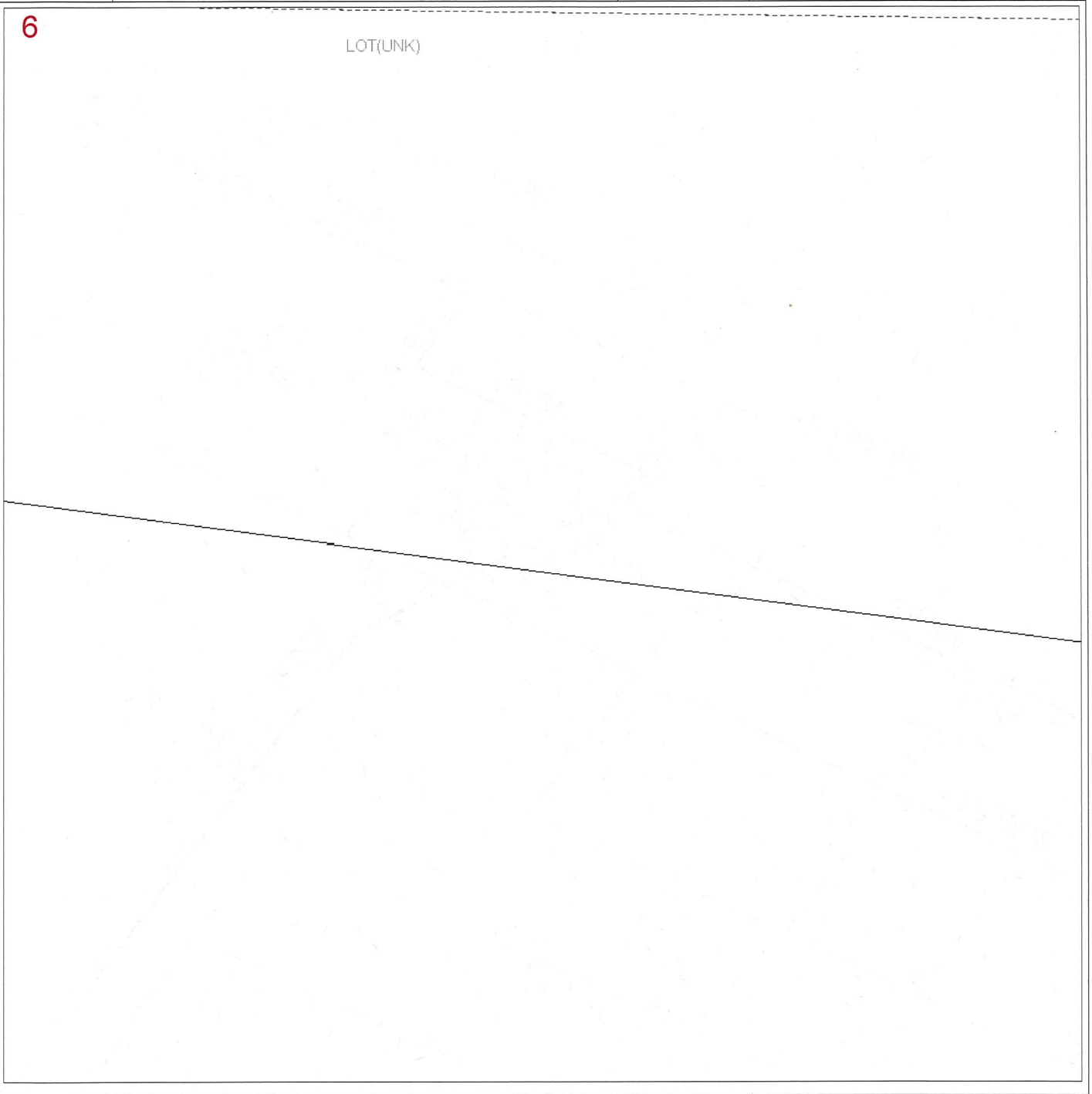
0 0.01km

NORTH

DIAL BEFORE YOU DIG www.1100.com.au
The Essential First Step

APA Group

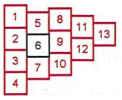
Site Address	Ballarto Road Cranbourne South 3977	**Sequence No**	43688253
Email	phillipa.cances@coffey.com	**Map Reference**	Melways 132J10,132J11,132J8,132J9,132K10,132K8,132K9,133A10,



LEGEND

- Transmission Gas Pipeline
- Distribution Gas Main
- Proposed Gas Main

Map Key



Scale 1:1000

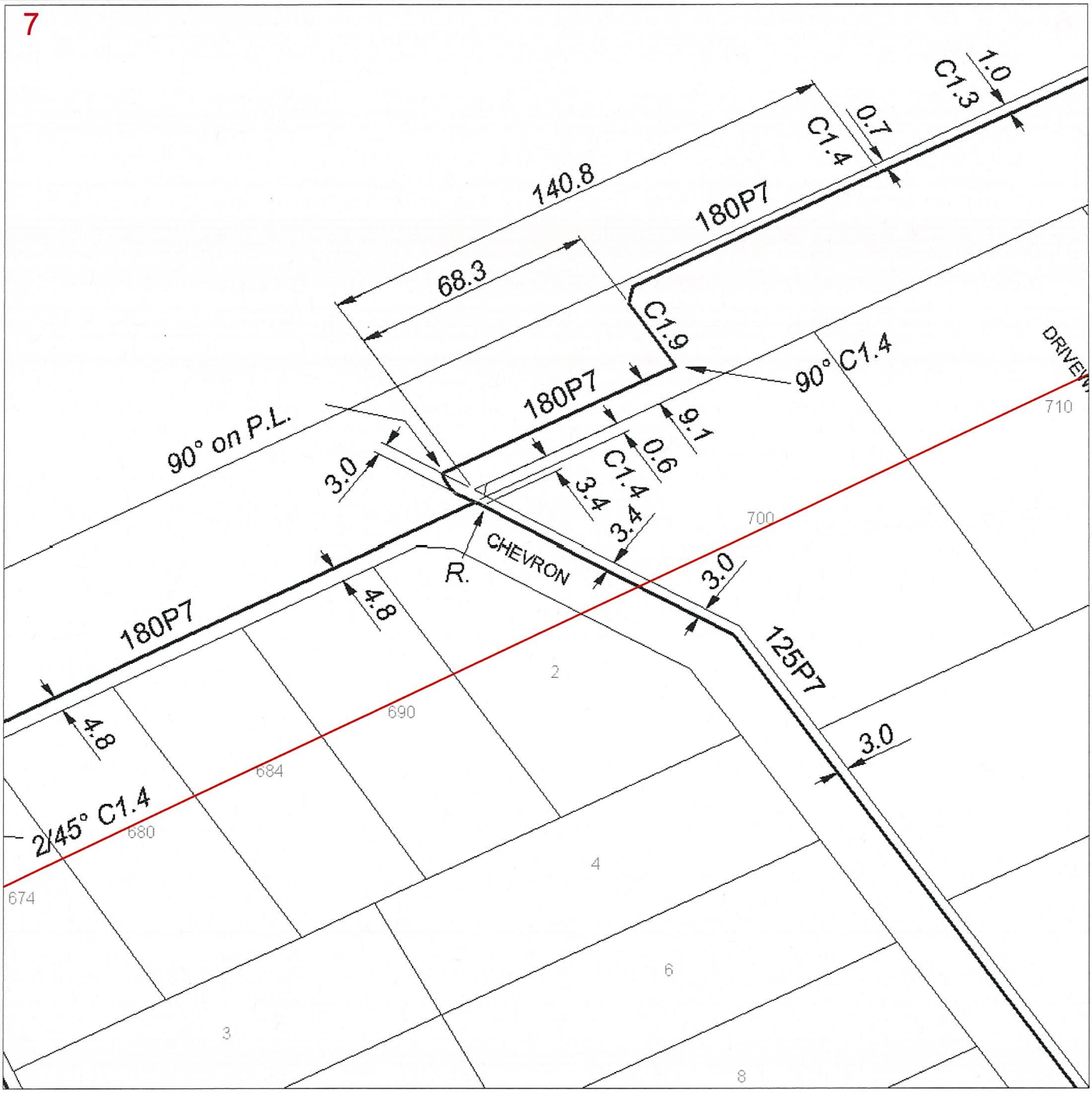
0 0.01km

NORTH

DIAL BEFORE YOU DIG www.1100.com.au
The Essential First Step

APA Group

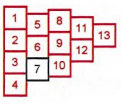
Site Address	Ballarto Road Cranbourne South 3977	**Sequence No**	43688253
Email	phillipa.cances@coffey.com	**Map Reference**	Melways 132J10,132J11,132J8,132J9,132K10,132K8,132K9,133A10,



LEGEND

- Transmission Gas Pipeline
- Distribution Gas Main
- Proposed Gas Main

Map Key



Scale 1:1000

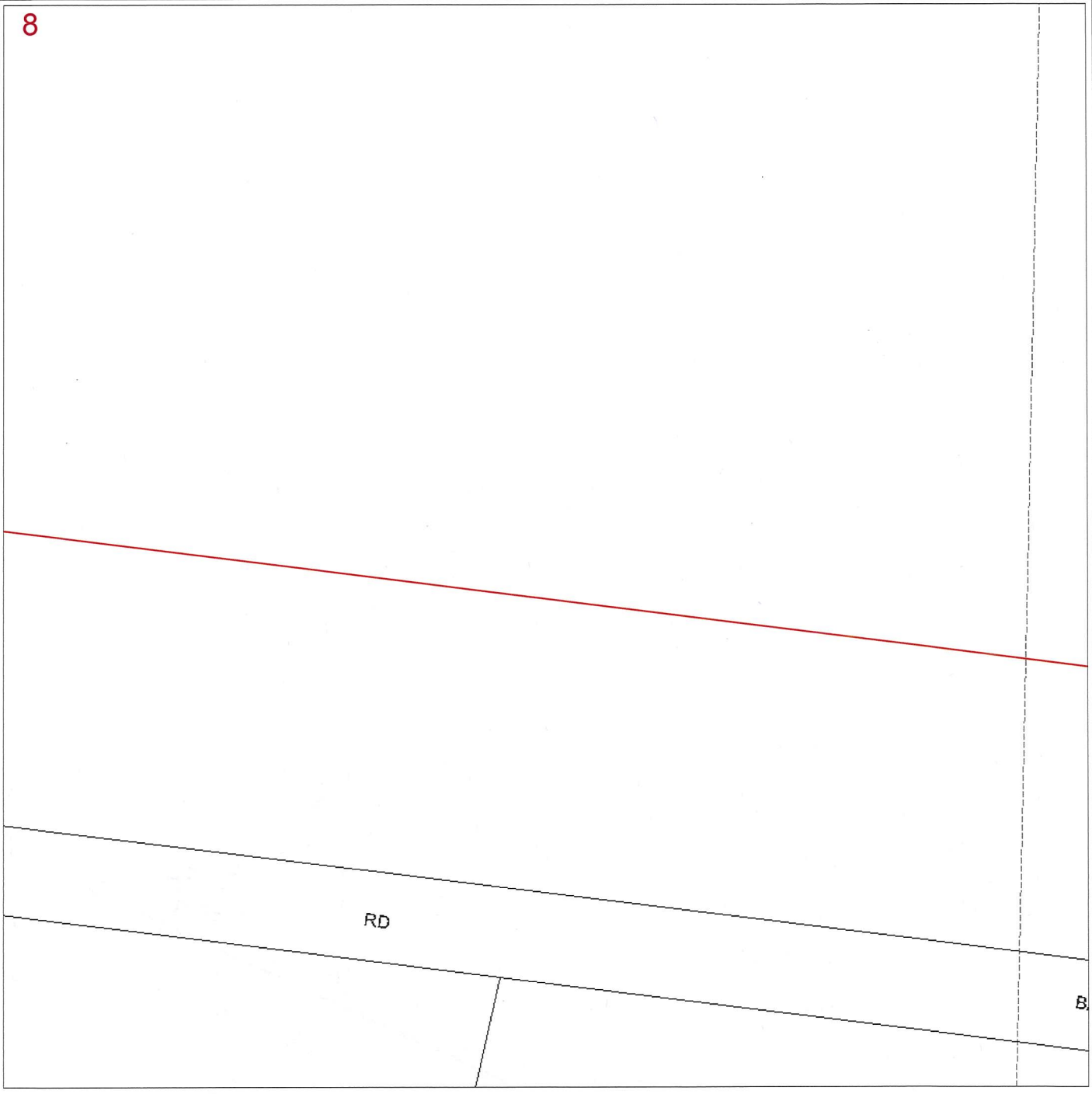
0 0.01km

NORTH

DIAL BEFORE YOU DIG www.1100.com.au
The Essential First Step

APA Group

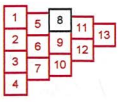
Site Address	Ballarto Road Cranbourne South 3977	**Sequence No**	43688253
Email	phillipa.cances@coffey.com	**Map Reference**	Melways 132J10,132J11,132J8,132J9,132K10,132K8,132K9,133A10,



LEGEND

- Transmission Gas Pipeline
- Distribution Gas Main
- Proposed Gas Main

Map Key



Scale 1:1000

0 0.01km

NORTH

DIAL BEFORE YOU DIG www.1100.com.au
The Essential First Step

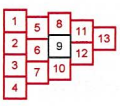
APA Group

Site Address	Ballarto Road Cranbourne South 3977	**Sequence No**	43688253
Email	phillipa.cances@coffey.com	**Map Reference**	Melways 132J10,132J11,132J8,132J9,132K10,132K8,132K9,133A10,

LEGEND

- Transmission Gas Pipeline
- Distribution Gas Main
- Proposed Gas Main

Map Key



Scale 1:1000

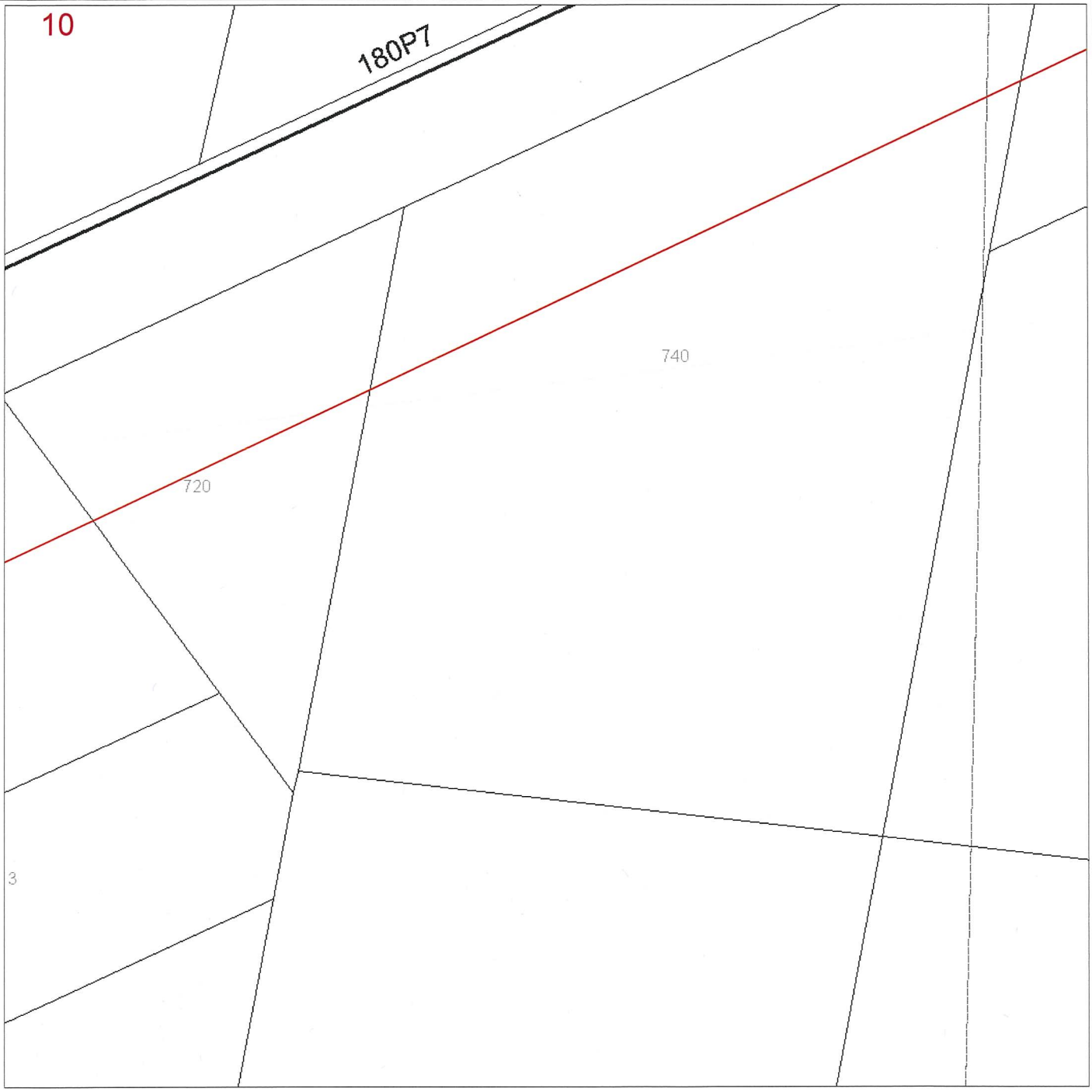
0 0.01km

NORTH

DIAL BEFORE YOU DIG www.1100.com.au
The Essential First Step

APA Group

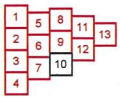
Site Address	Ballarto Road Cranbourne South 3977	**Sequence No**	43688253
Email	phillipa.cances@coffey.com	**Map Reference**	Melways 132J10,132J11,132J8,132J9,132K10,132K8,132K9,133A10,



LEGEND

- Transmission Gas Pipeline
- Distribution Gas Main
- Proposed Gas Main

Map Key



Scale 1:1000

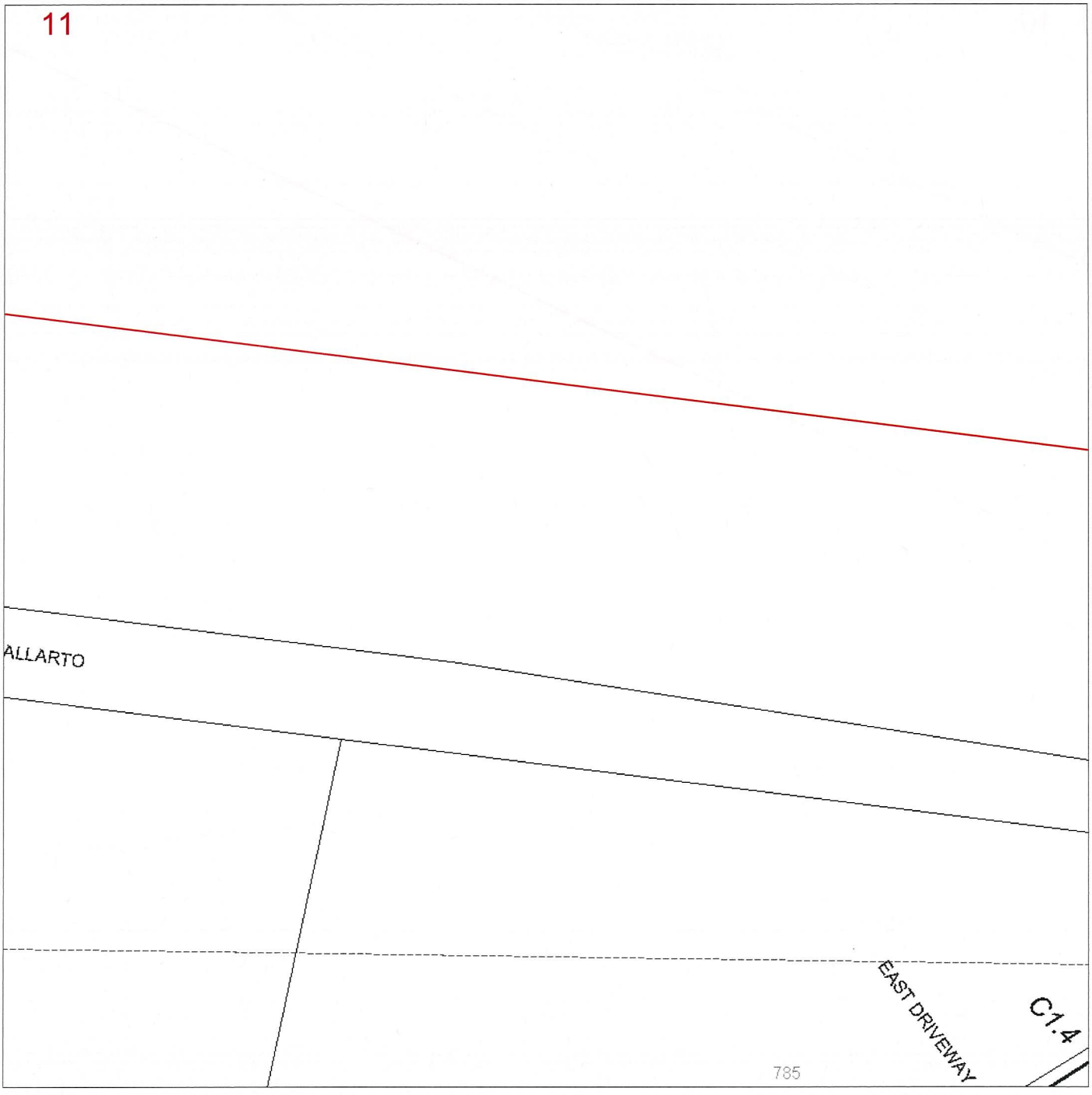
0 0.01km

NORTH

DIAL BEFORE YOU DIG www.1100.com.au
The Essential First Step

APA Group

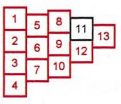
Site Address	Ballarto Road Cranbourne South 3977	**Sequence No**	43688253
Email	phillipa.cances@coffey.com	**Map Reference**	Melways 132J10,132J11,132J8,132J9,132K10,132K8,132K9,133A10,



LEGEND

- Transmission Gas Pipeline
- Distribution Gas Main
- Proposed Gas Main

Map Key



Scale 1:1000

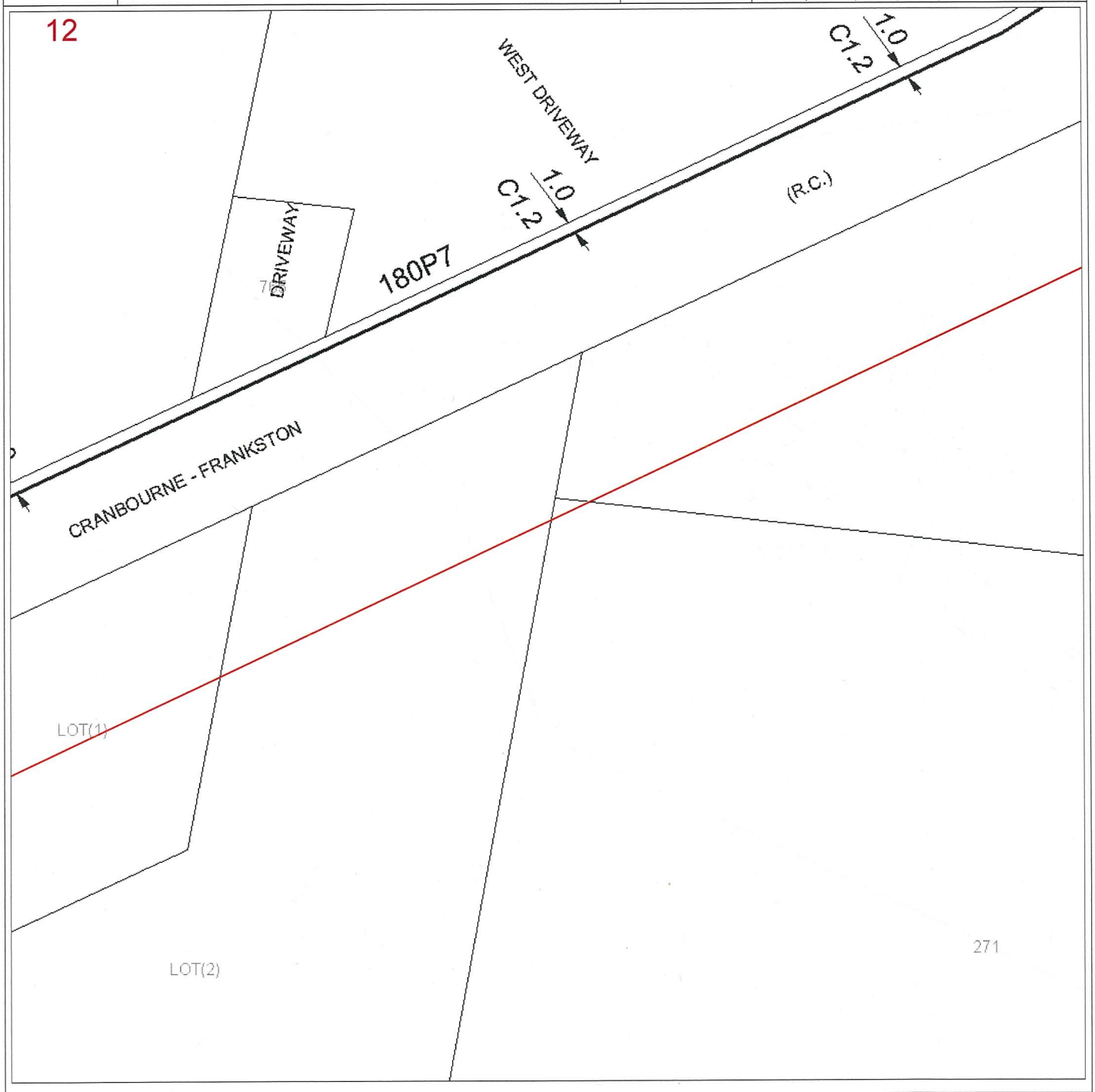
0 0.01km

NORTH

DIAL BEFORE YOU DIG www.1100.com.au
The Essential First Step

APA Group

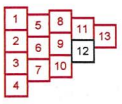
Site Address	Ballarto Road Cranbourne South 3977	**Sequence No**	43688253
Email	phillipa.cances@coffey.com	**Map Reference**	Melways 132J10,132J11,132J8,132J9,132K10,132K8,132K9,133A10,



LEGEND

- Transmission Gas Pipeline
- Distribution Gas Main
- Proposed Gas Main

Map Key



Scale 1:1000

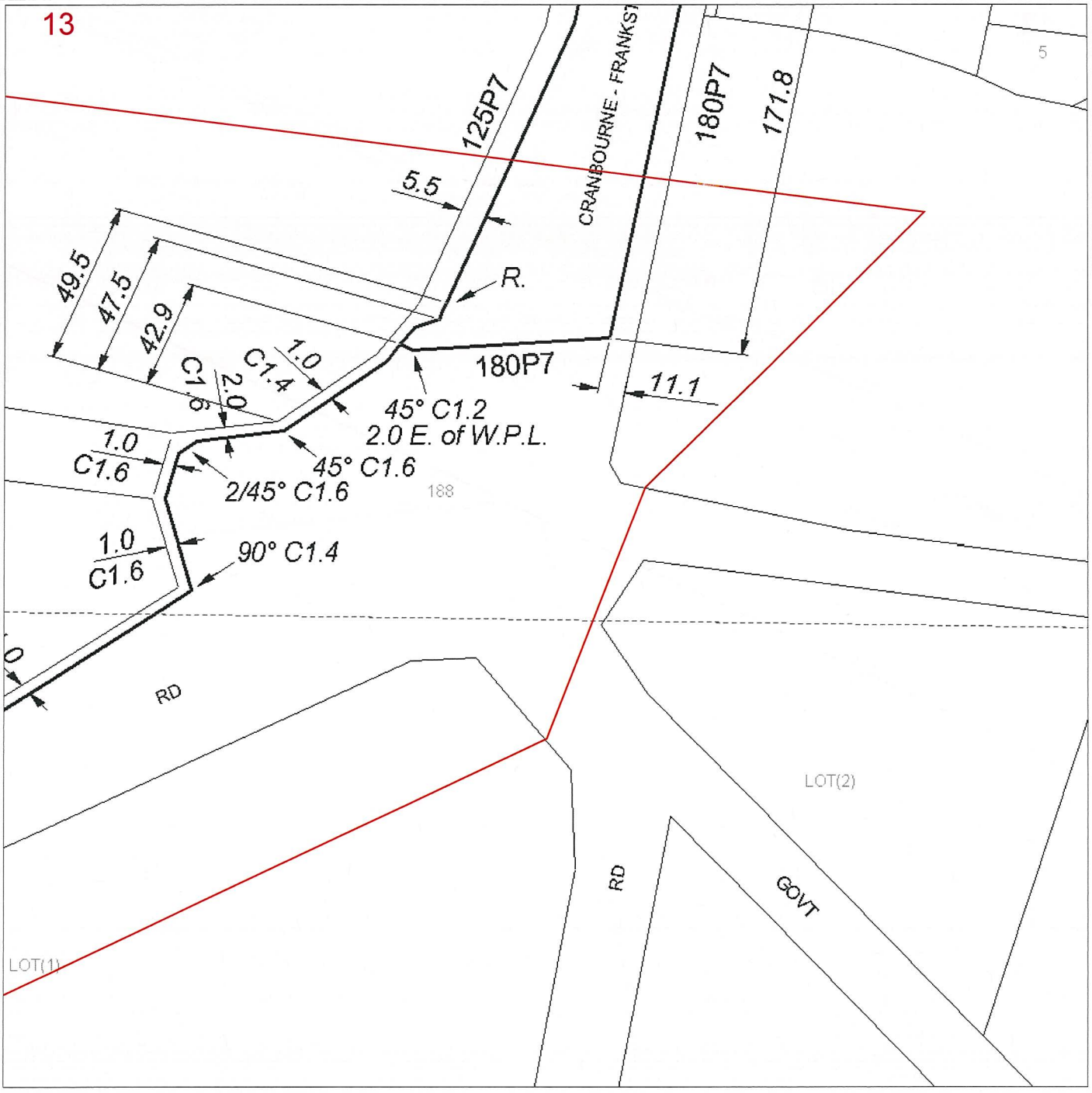
0 0.01km

NORTH

DIAL BEFORE YOU DIG www.1100.com.au
The Essential First Step

APA Group

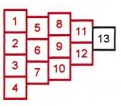
Site Address	Ballarto Road Cranbourne South 3977	**Sequence No**	43688253
Email	phillipa.cances@coffey.com	**Map Reference**	Melways 132J10,132J11,132J8,132J9,132K10,132K8,132K9,133A10,



LEGEND

- Transmission Gas Pipeline
- Distribution Gas Main
- Proposed Gas Main

Map Key



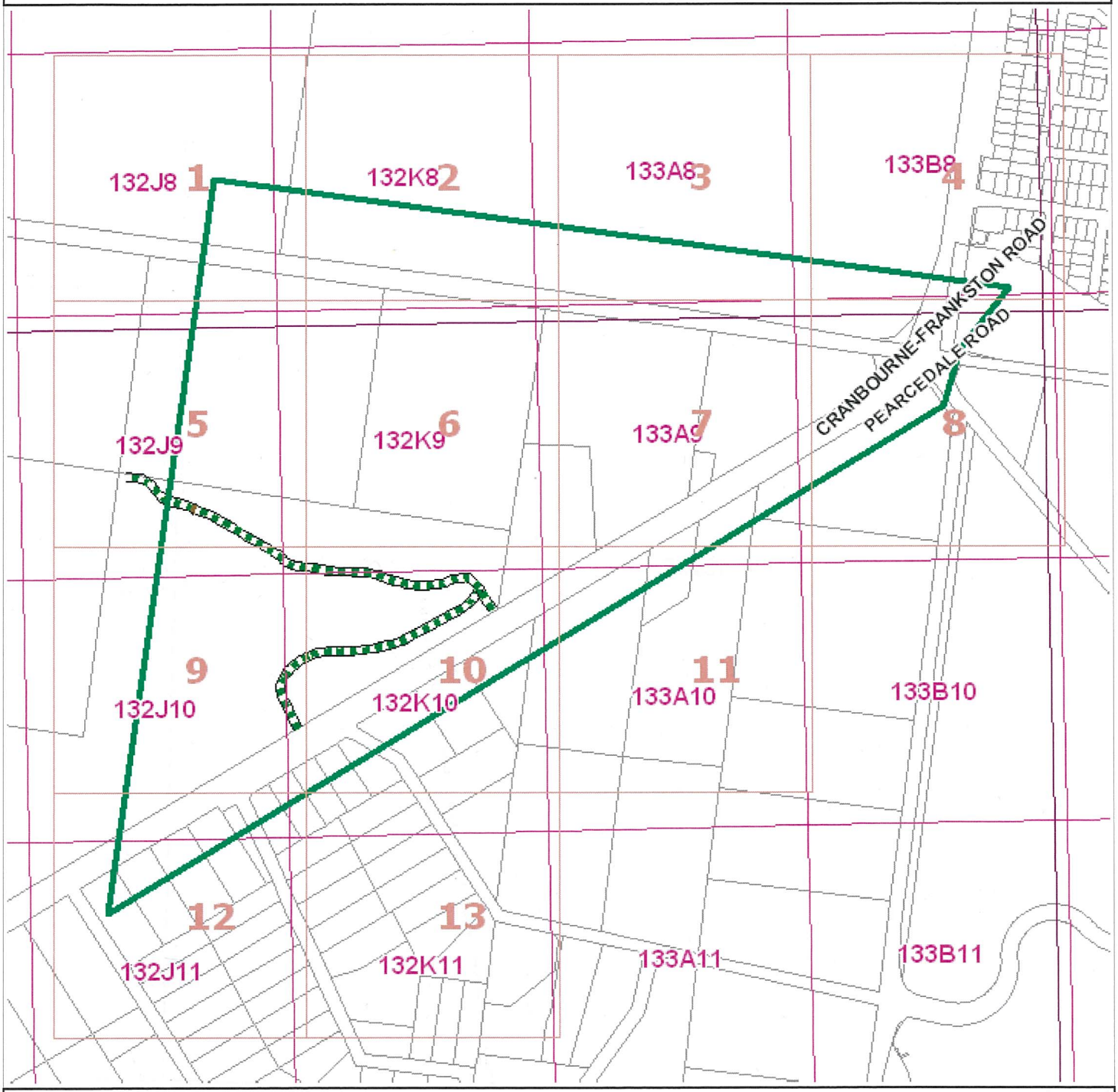
Scale 1:1000

0 0.01km

NORTH

Drainage Assets Plan

DBYD Sequence Number: 43688256
DBYD Job No. 8786694



Address: Ballarto Road, Cranbourne South, VIC, 3977
Map Ref: Melways 132J10, 132J11, 132J8, 132J9, 132K10, 132K8,
Date Supplied: 03/02/2015

1:2000

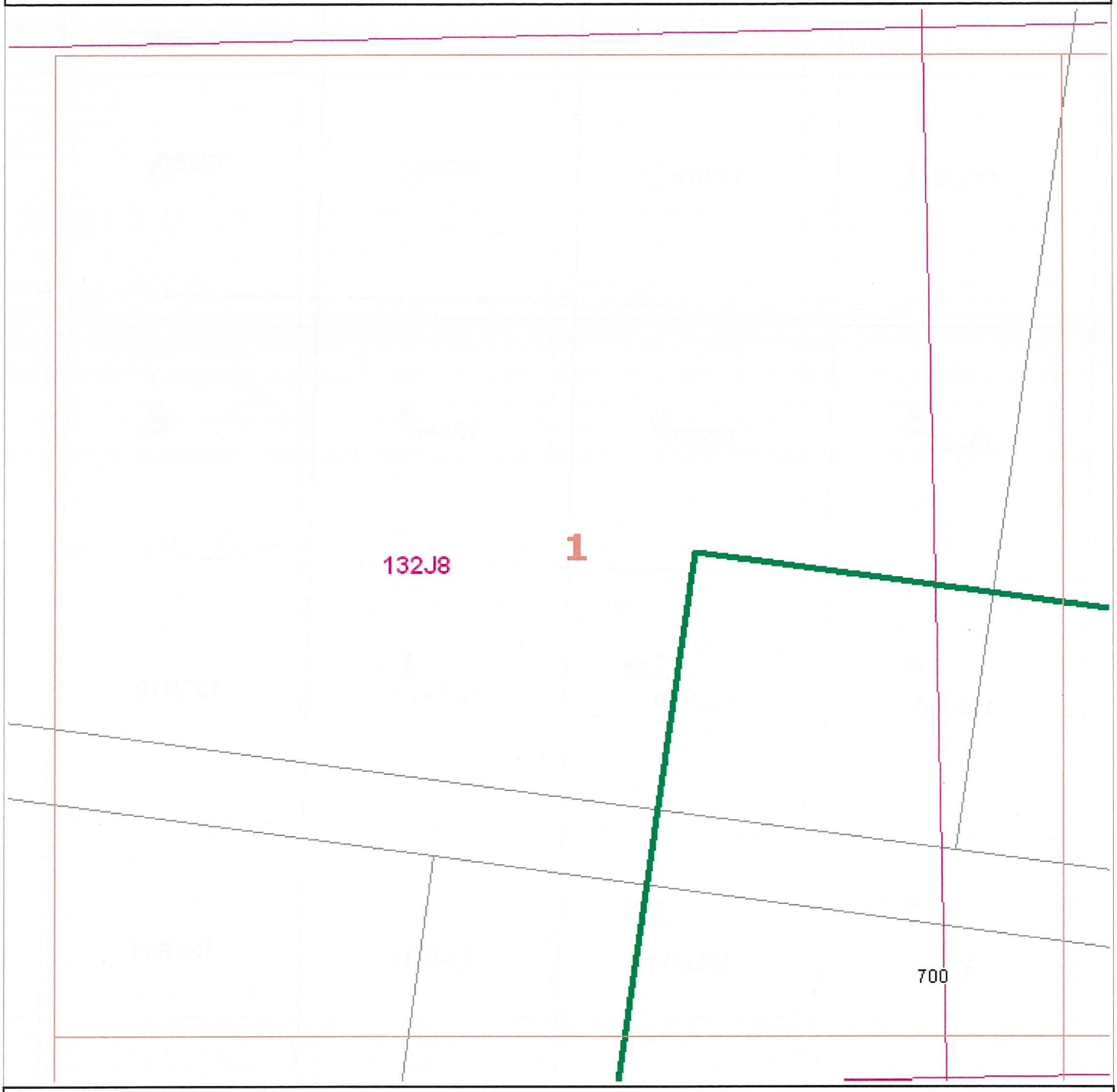
- Drainage pipeline
- Open drainage channel
- Natural waterway (River/Creek)
- Area of interest
- Easement
- Property boundary
- X — House number unknown
- 345F4 — VicRoads map reference
- 27D4 — Melway map reference

DIAL BEFORE YOU DIG www.1100.com.au

Melbourne Water

Drainage Assets Plan

DBYD Sequence Number: 43688256
DBYD Job No. 8786694



Address: Ballarto Road, Cranbourne South, VIC, 3977
Map Ref: Melways 132J10, 132J11, 132J8, 132J9, 132K10, 132K8,
Date Supplied: 03/02/2015

1:2000

Drainage pipeline
Open drainage channel
Natural waterway (River/Creek)

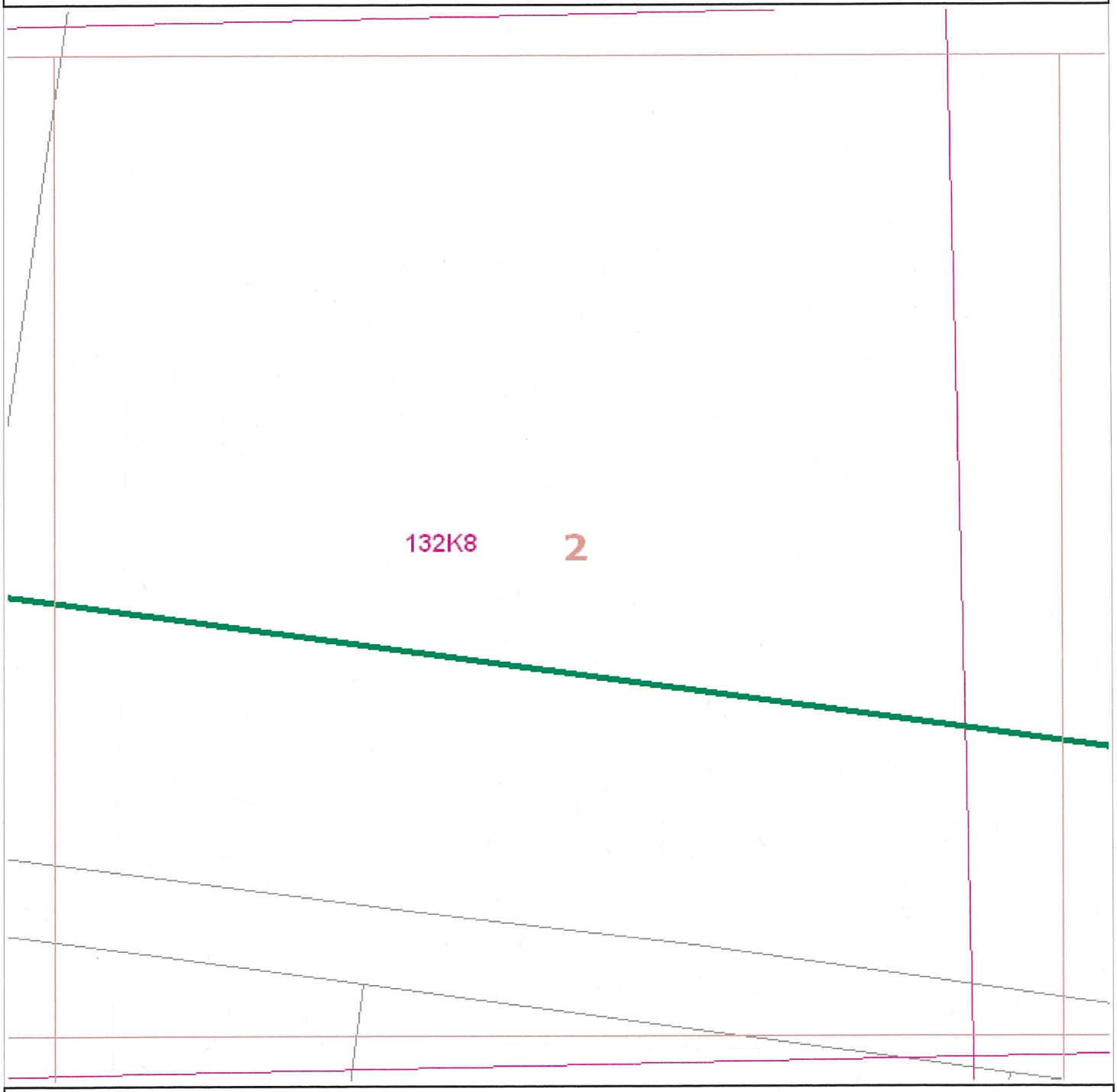
Area of interest
Easement
Property boundary
X House number unknown
345F4 VicRoads map reference
27D4 Melway map reference

DIAL BEFORE YOU DIG www.1100.com.au

Melbourne Water

Drainage Assets Plan

DBYD Sequence Number: 43688256
DBYD Job No. 8786694



Address: Ballarto Road, Cranbourne South, VIC, 3977
Map Ref: Melways 132J10, 132J11, 132J8, 132J9, 132K10, 132K8,
Date Supplied: 03/02/2015

1:2000

Drainage pipeline
Open drainage channel
Natural waterway (River/Creek)

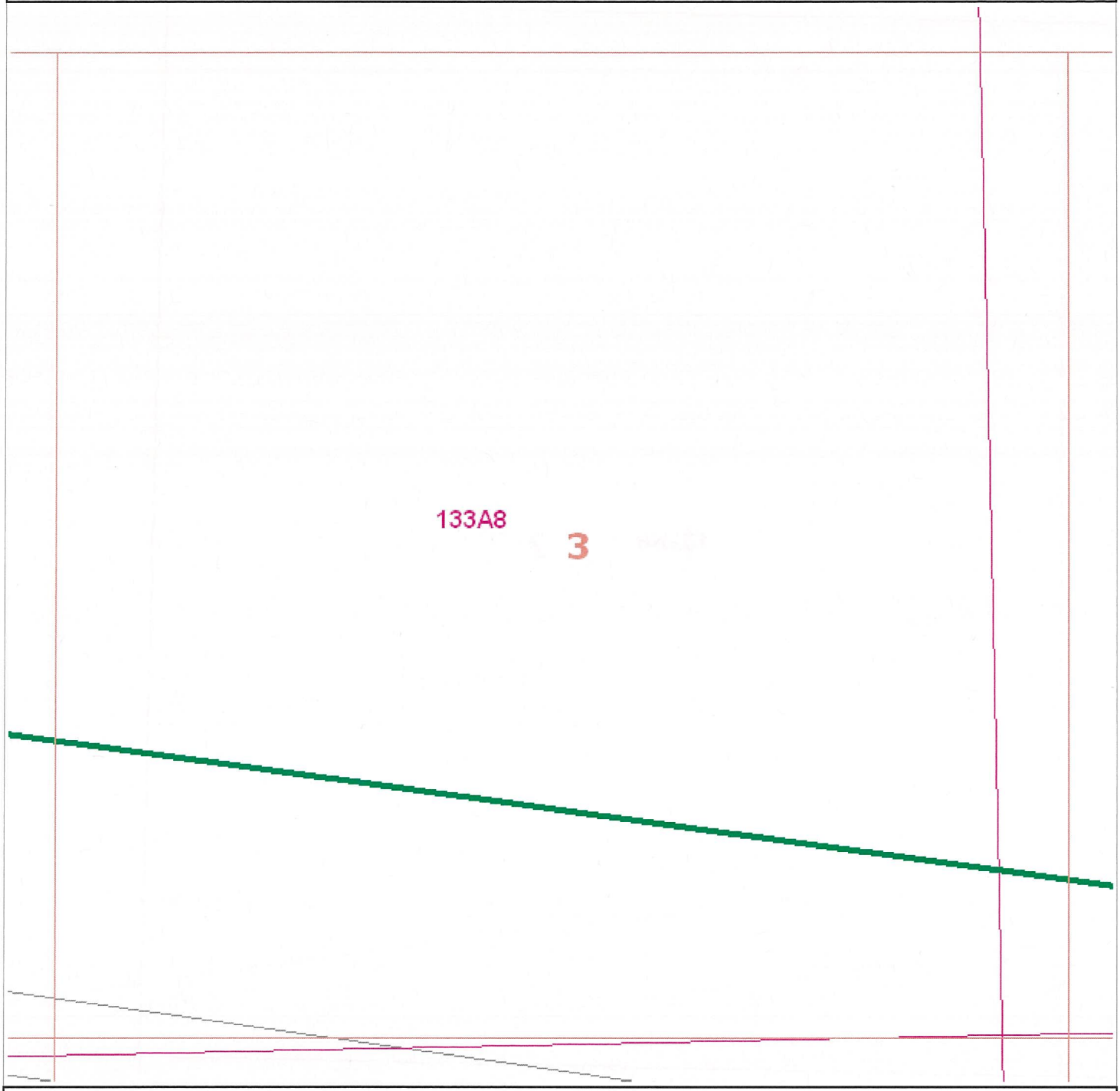
Area of interest
Easement
Property boundary
X House number unknown
345F4 VicRoads map reference
27D4 Melway map reference

DIAL BEFORE YOU DIG www.1100.com.au

Melbourne Water

Drainage Assets Plan

DBYD Sequence Number: 43688256
DBYD Job No. 8786694



Address: Ballarto Road, Cranbourne South, VIC, 3977
Map Ref: Melways 132J10, 132J11, 132J8, 132J9, 132K10, 132K8,
Date Supplied: 03/02/2015

1:2000

Drainage pipeline
Open drainage channel
Natural waterway (River/Creek)

Area of interest
Easement
Property boundary
X House number unknown
345F4 VicRoads map reference
27D4 Melway map reference

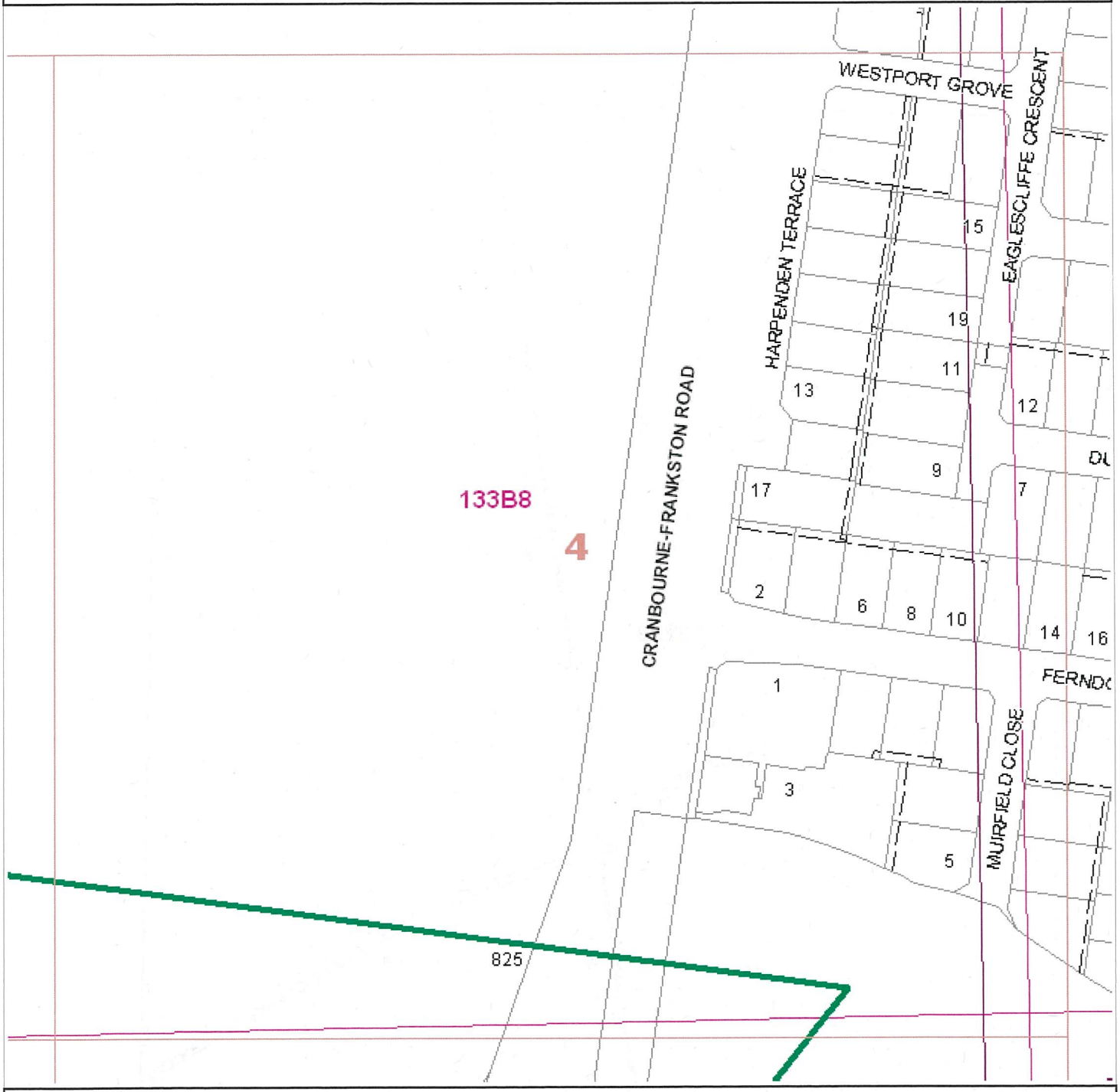
N

DIAL BEFORE YOU DIG www.1100.com.au

Melbourne Water

Drainage Assets Plan

DBYD Sequence Number: 43688256
DBYD Job No. 8786694



Address: Ballarto Road, Cranbourne South, VIC, 3977
Map Ref: Melways 132J10, 132J11, 132J8, 132J9, 132K10, 132K8,
Date Supplied: 03/02/2015

1:2000

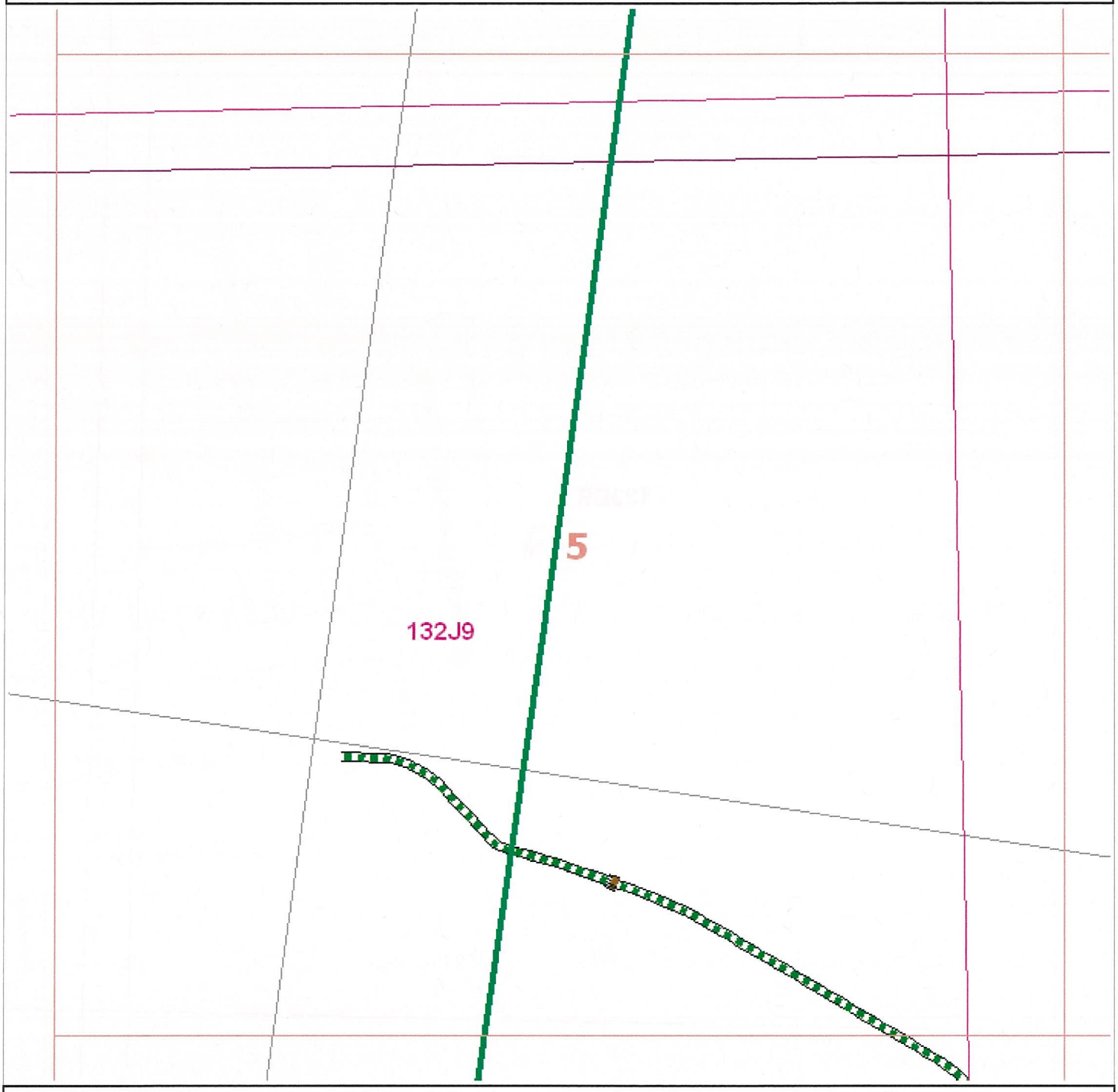
Drainage pipeline
Open drainage channel
Natural waterway (River/Creek)
Area of interest
Easement
Property boundary
X House number unknown
345F4 VicRoads map reference
27D4 Melway map reference

DIAL BEFORE YOU DIG www.1100.com.au

Melbourne Water

Drainage Assets Plan

DBYD Sequence Number: 43688256
DBYD Job No. 8786694



Address: Ballarto Road, Cranbourne South, VIC, 3977
Map Ref: Melways 132J10, 132J11, 132J8, 132J9, 132K10, 132K8,
Date Supplied: 03/02/2015

1:2000

Drainage pipeline
Open drainage channel
Natural waterway (River/Creek)

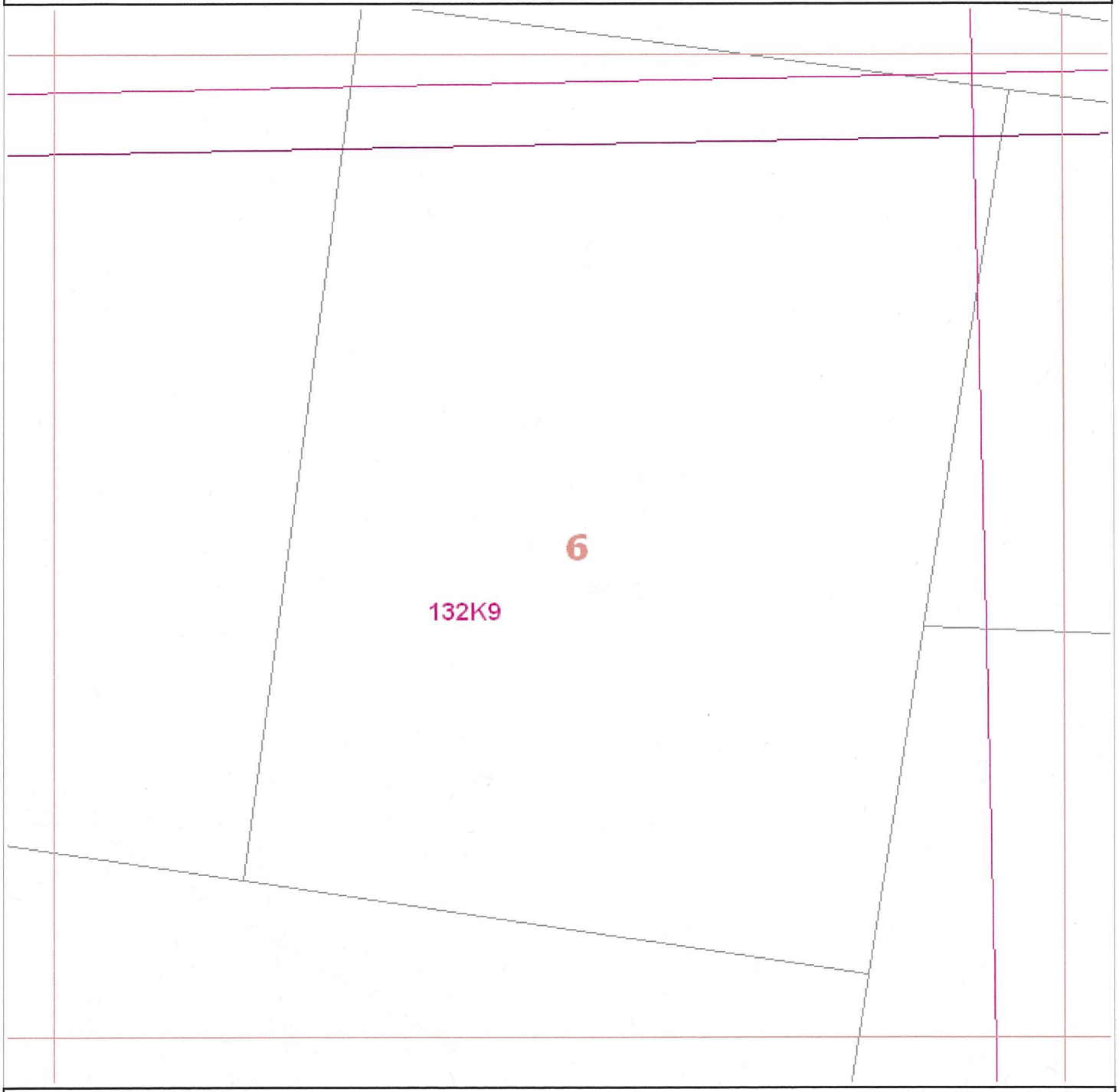
Area of interest
Easement
Property boundary
X House number unknown
345F4 VicRoads map reference
27D4 Melway map reference

DIAL BEFORE YOU DIG www.1100.com.au

Melbourne Water

Drainage Assets Plan

DBYD Sequence Number: 43688256
DBYD Job No. 8786694



Address: Ballarto Road, Cranbourne South, VIC, 3977
Map Ref: Melways 132J10, 132J11, 132J8, 132J9, 132K10, 132K8,
Date Supplied: 03/02/2015

1:2000

Drainage pipeline
Open drainage channel
Natural waterway (River/Creek)

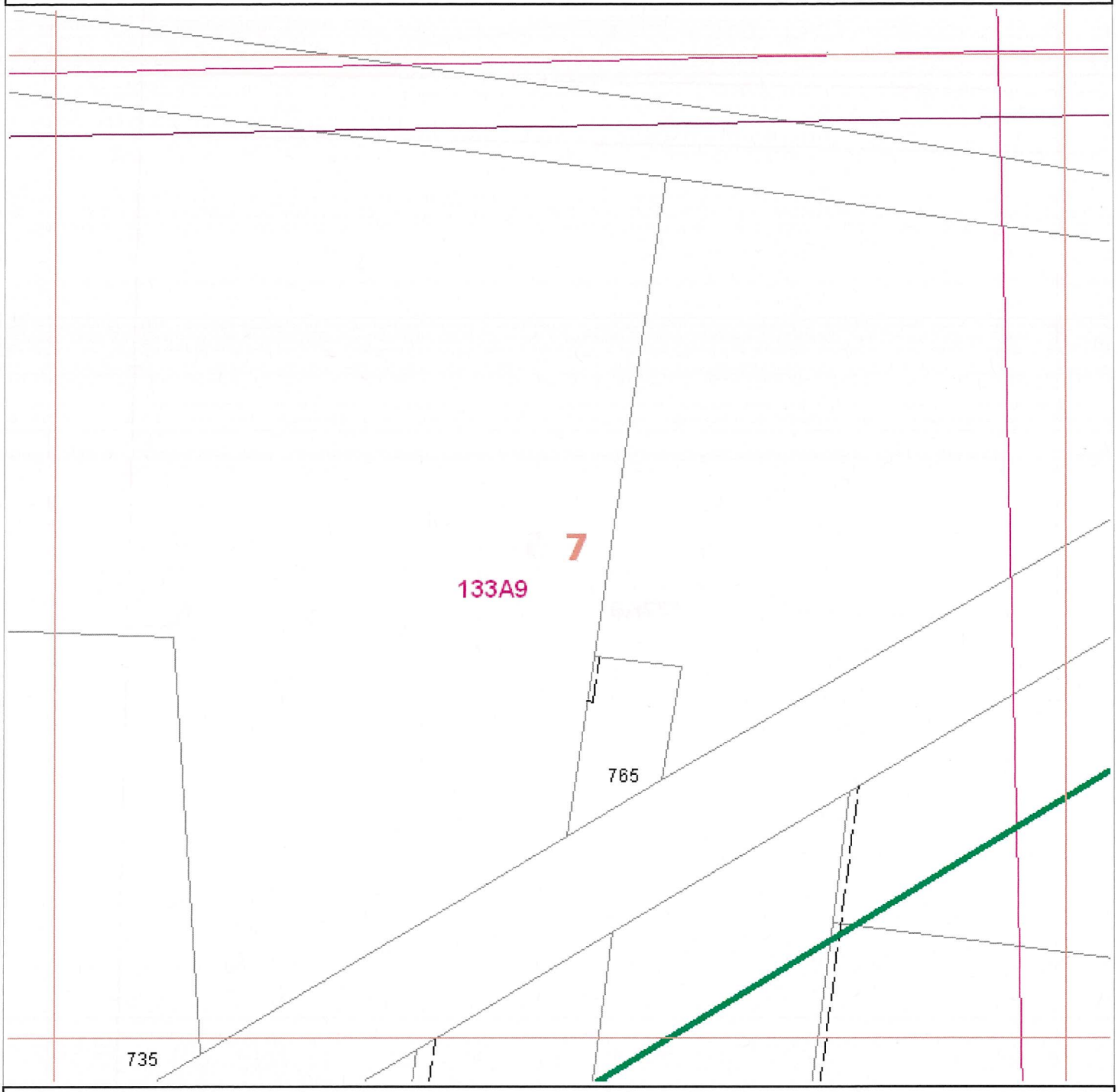
Area of interest
Easement
Property boundary
X House number unknown
345F4 VicRoads map reference
27D4 Melway map reference

DIAL BEFORE YOU DIG www.1100.com.au

Melbourne Water

Drainage Assets Plan

DBYD Sequence Number: 43688256
DBYD Job No. 8786694



Address: Ballarto Road, Cranbourne South, VIC, 3977
Map Ref: Melways 132J10, 132J11, 132J8, 132J9, 132K10, 132K8,
Date Supplied: 03/02/2015

1:2000

Drainage pipeline
Open drainage channel
Natural waterway (River/Creek)

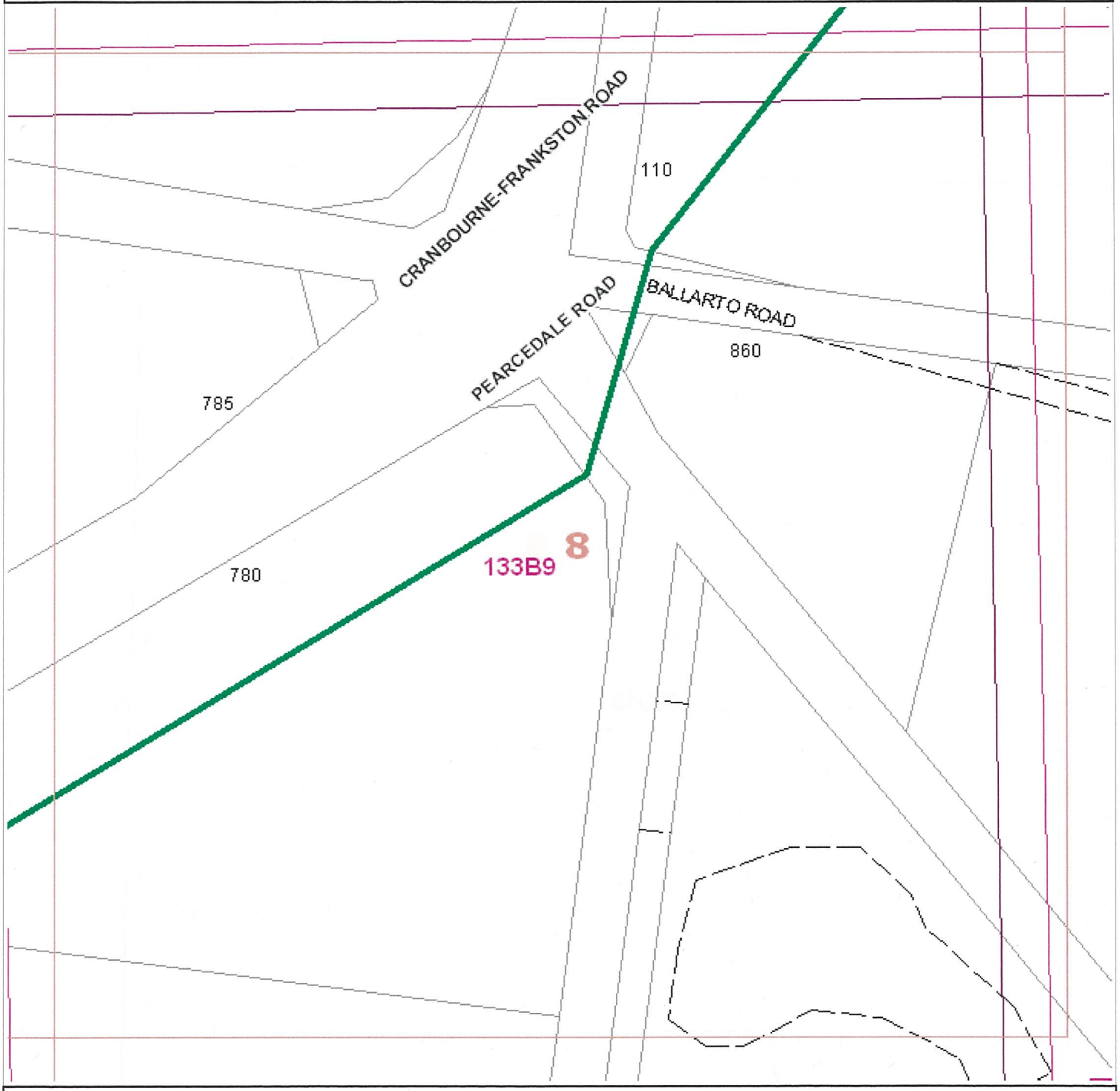
Area of interest
Easement
Property boundary
X House number unknown
345F4 VicRoads map reference
27D4 Melway map reference

DIAL BEFORE YOU DIG www.1100.com.au

Melbourne Water

Drainage Assets Plan

DBYD Sequence Number: 43688256
DBYD Job No. 8786694



Address: Ballarto Road, Cranbourne South, VIC, 3977
Map Ref: Melways 132J10, 132J11, 132J8, 132J9, 132K10, 132K8,
Date Supplied: 03/02/2015

1:2000

Drainage pipeline
Open drainage channel
Natural waterway (River/Creek)

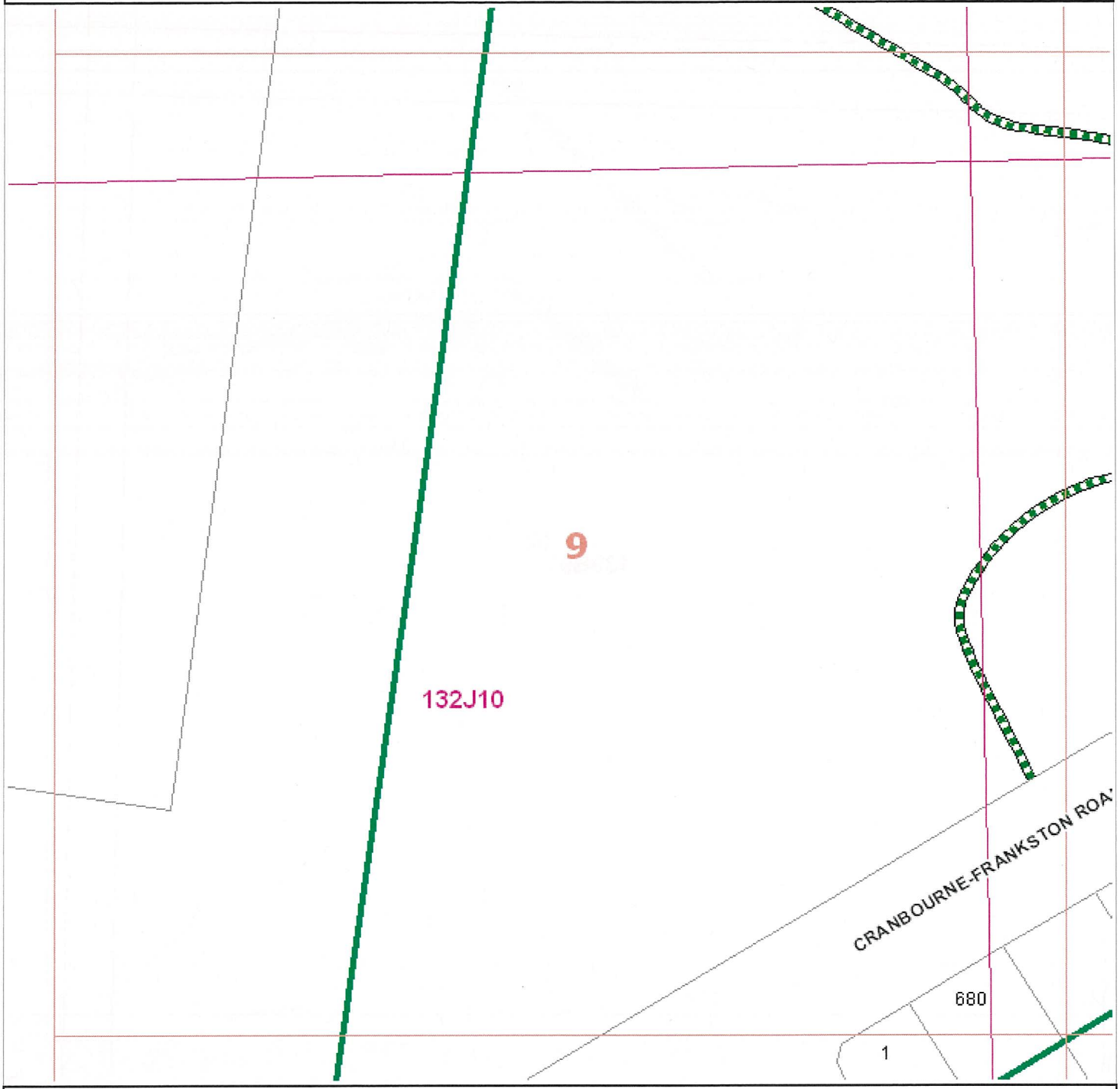
Area of interest
Easement
Property boundary
X House number unknown
345F4 VicRoads map reference
27D4 Melway map reference

DIAL BEFORE YOU DIG www.1100.com.au

Melbourne Water

Drainage Assets Plan

DBYD Sequence Number: 43688256
DBYD Job No. 8786694



Address: Ballarto Road, Cranbourne South, VIC, 3977
Map Ref: Melways 132J10, 132J11, 132J8, 132J9, 132K10, 132K8,
Date Supplied: 03/02/2015

1:2000

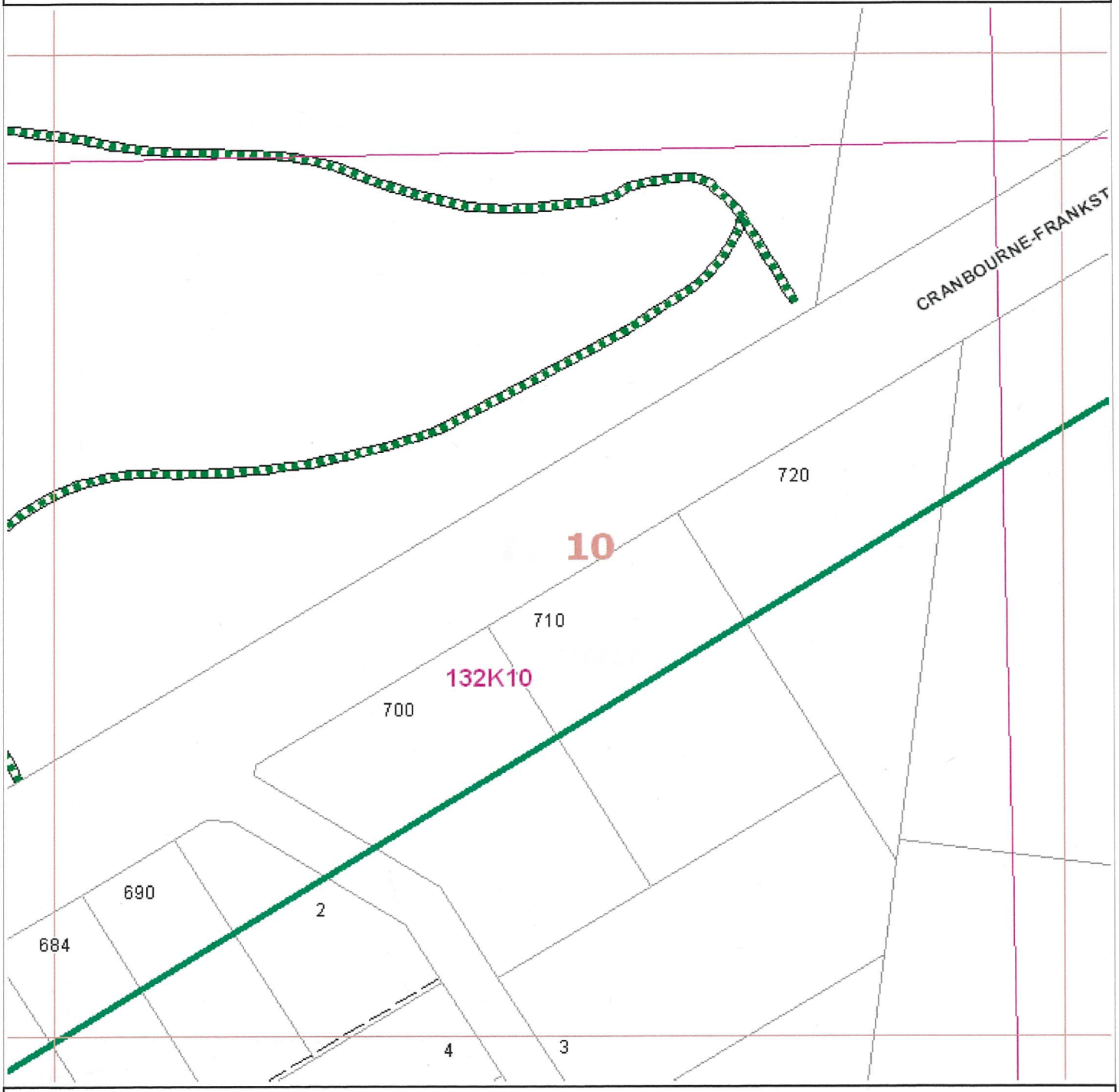
Drainage pipeline
Open drainage channel
Natural waterway (River/Creek)
Area of interest
Easement
Property boundary
X House number unknown
345F4 VicRoads map reference
27D4 Melway map reference

DIAL BEFORE YOU DIG www.1100.com.au

Melbourne Water

Drainage Assets Plan

DBYD Sequence Number: 43688256
DBYD Job No. 8786694



Address: Ballarto Road, Cranbourne South, VIC, 3977
Map Ref: Melways 132J10, 132J11, 132J8, 132J9, 132K10, 132K8,
Date Supplied: 03/02/2015

1:2000

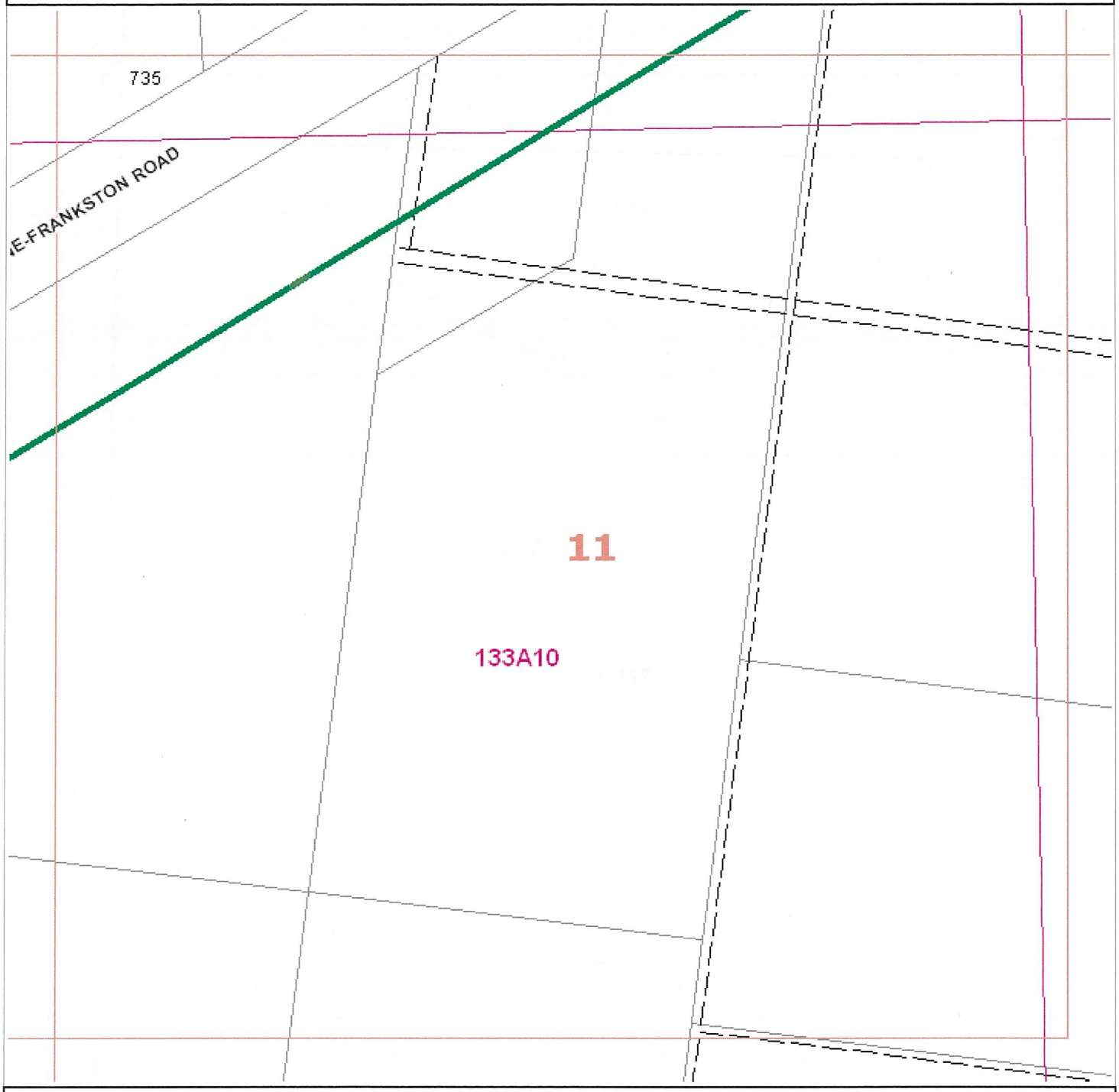
Drainage pipeline
Open drainage channel
Natural waterway (River/Creek)
Area of interest
Easement
Property boundary
X House number unknown
345F4 VicRoads map reference
27D4 Melway map reference

DIAL BEFORE YOU DIG www.1100.com.au

Melbourne Water

Drainage Assets Plan

DBYD Sequence Number: 43688256
DBYD Job No. 8786694



Address: Ballarto Road, Cranbourne South, VIC, 3977
Map Ref: Melways 132J10, 132J11, 132J8, 132J9, 132K10, 132K8,
Date Supplied: 03/02/2015

1:2000

Drainage pipeline
Open drainage channel
Natural waterway (River/Creek)

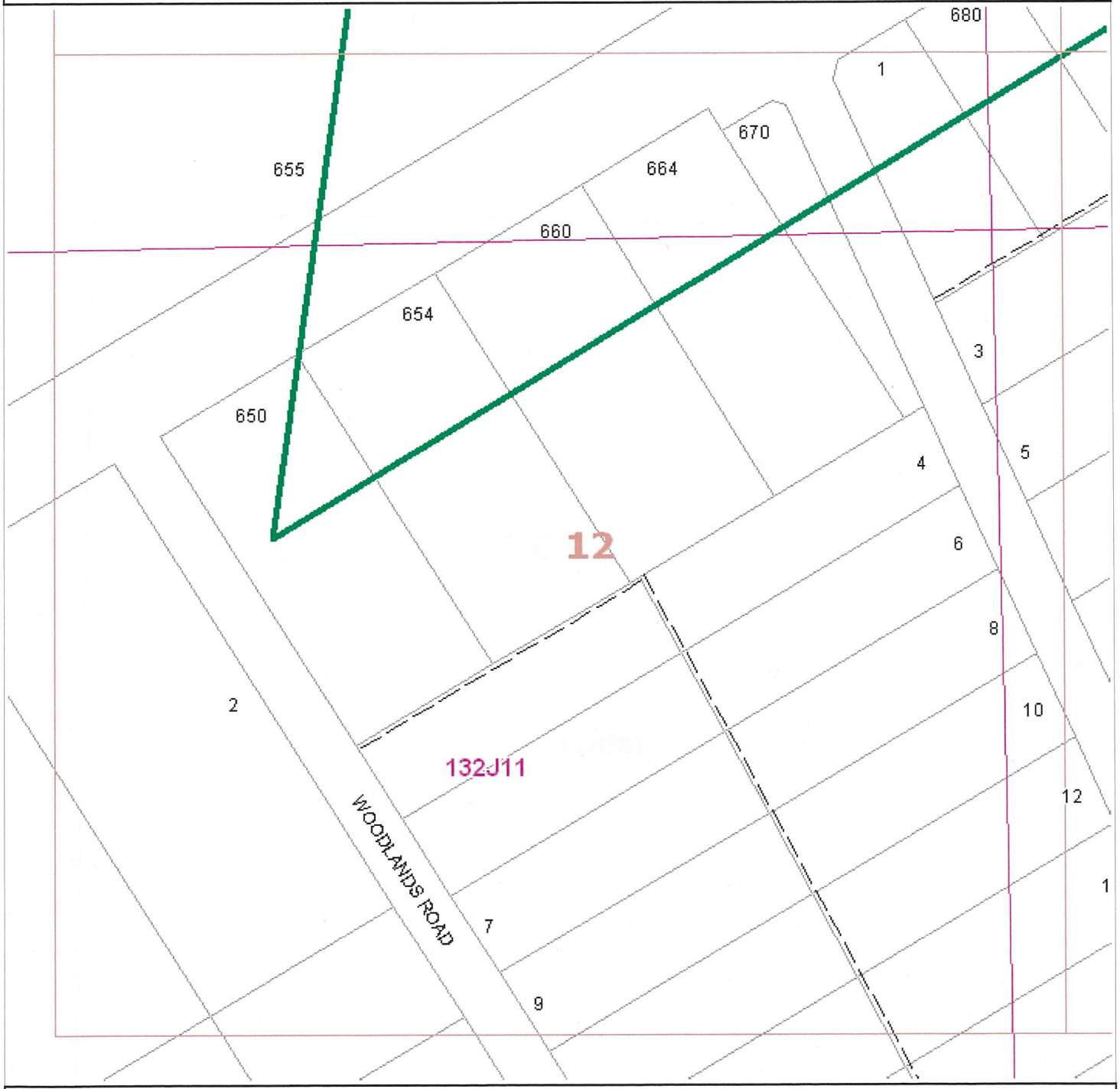
Area of interest
Easement
Property boundary
X House number unknown
345F4 VicRoads map reference
27D4 Melway map reference

DIAL BEFORE YOU DIG www.1100.com.au

Melbourne Water

Drainage Assets Plan

DBYD Sequence Number: 43688256
DBYD Job No. 8786694



Address: Ballarto Road, Cranbourne South, VIC, 3977
Map Ref: Melways 132J10, 132J11, 132J8, 132J9, 132K10, 132K8,
Date Supplied: 03/02/2015

1:2000

Drainage pipeline
Open drainage channel
Natural waterway (River/Creek)

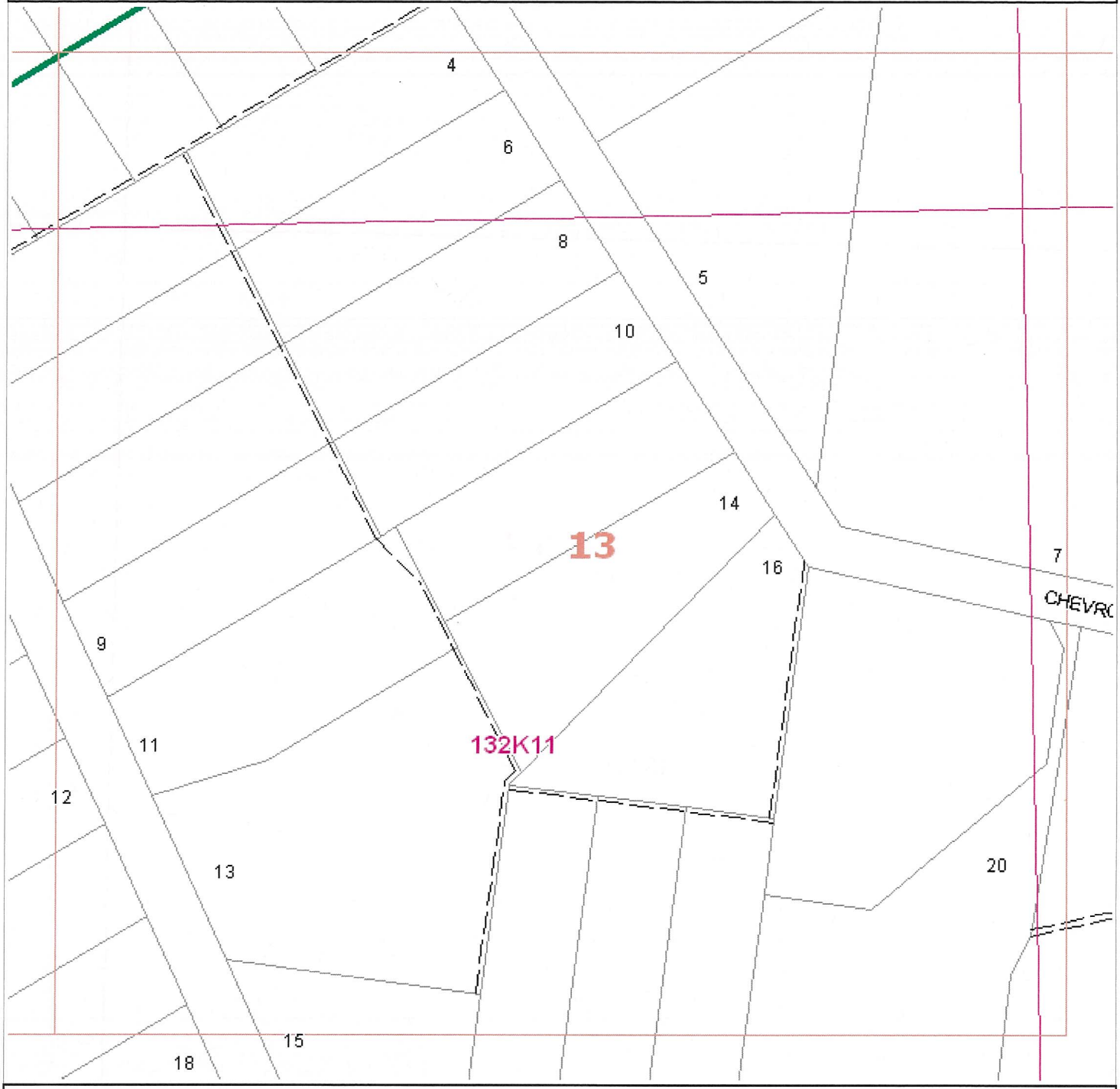
Area of interest
Easement
Property boundary
X House number unknown
345F4 VicRoads map reference
27D4 Melway map reference

DIAL BEFORE YOU DIG www.1100.com.au

Melbourne Water

Drainage Assets Plan

DBYD Sequence Number: 43688256
DBYD Job No. 8786694



Address: Ballarto Road, Cranbourne South, VIC, 3977
Map Ref: Melways 132J10, 132J11, 132J8, 132J9, 132K10, 132K8,
Date Supplied: 03/02/2015

1:2000

Drainage pipeline
Open drainage channel
Natural waterway (River/Creek)

Area of interest
Easement
Property boundary
X House number unknown
345F4 VicRoads map reference
27D4 Melway map reference

DIAL BEFORE YOU DIG www.1100.com.au

Melbourne Water

Melbourne Water

03/02/2015

Miss Phillipa Cances
Coffey Environments
126 Trenerry Crescent
ABBOTSFORD, VIC 3067

Dear Miss Phillipa Cances,

Re: Dial Before You Dig – Sequence No 43688256

Location Details -
Address: Ballarto Road, Cranbourne South, VIC 3977
Map Ref: 132J10, 132J11, 132J8, 132J9, 132K10, 132K8, 132K9, 133A10, 133A8, 133A9, 1
Activity: Vertical Boring
Commencement Date: 09/02/2015 12:00:00 AM

Attached are plans showing Melbourne Water's assets in relation to the area of your enquiry. Melbourne Water's records indicate that there ARE underground assets in the vicinity of the above enquiry area.

Please note, the attached plans do not constitute approval from Melbourne Water.

If there are **transmission problems**, please call **Colin Loft on 9679 7589.**
For **detailed asset locations**, please call **Colin Loft on 9679 7589** allowing **at least 2 business days** for detailed plans to be provided.
If planning to undertake work over, under or near any Melbourne Water asset please contact the **Asset Services team** on **9679 6614** or at http://melbournewater.com.au/constructingnearassets **at least 14 days prior** to the **commencement** of **any** work.

Melbourne Water Corporation (MWC) shall not be responsible or otherwise liable in anyway for loss of any kind including, without limiting the generality of the foregoing damages, costs, interest, loss of profits or special loss or damage arising from any error, inaccuracy, incompleteness or other defect in this information.
By receiving and accepting this information the recipient acknowledges that Melbourne Water Corporation makes no representation as to the accuracy or completeness of this information. The exact location of Melbourne Water Corporation's assets as set out in this information should be confirmed on site by the recipient prior to the commencement of work.

Please Note: Due to ongoing potential asset changes the attached plan/s is/are valid for 28 days from the date of issue. After that period the plan/s should not be used, rather a new plan should be obtained. Warning: Pipelines (including coating) may contain asbestos material. Please ensure appropriate safety procedures are used.

Melbourne Water Corporation provides wholesale Water Supply and Sewerage services to City West Water, South East Water and Yarra Valley Water, who in turn provide local residents with Water Supply and Sewerage services.
MWC, in conjunction with Local Government, manage Melbourne's drainage infrastructure. Local councils maintain the local drainage infrastructure, while MWC provides the major infrastructure.
The attached plans only show MWC's assets and not all Water Supply, Sewerage and Drainage pipelines.

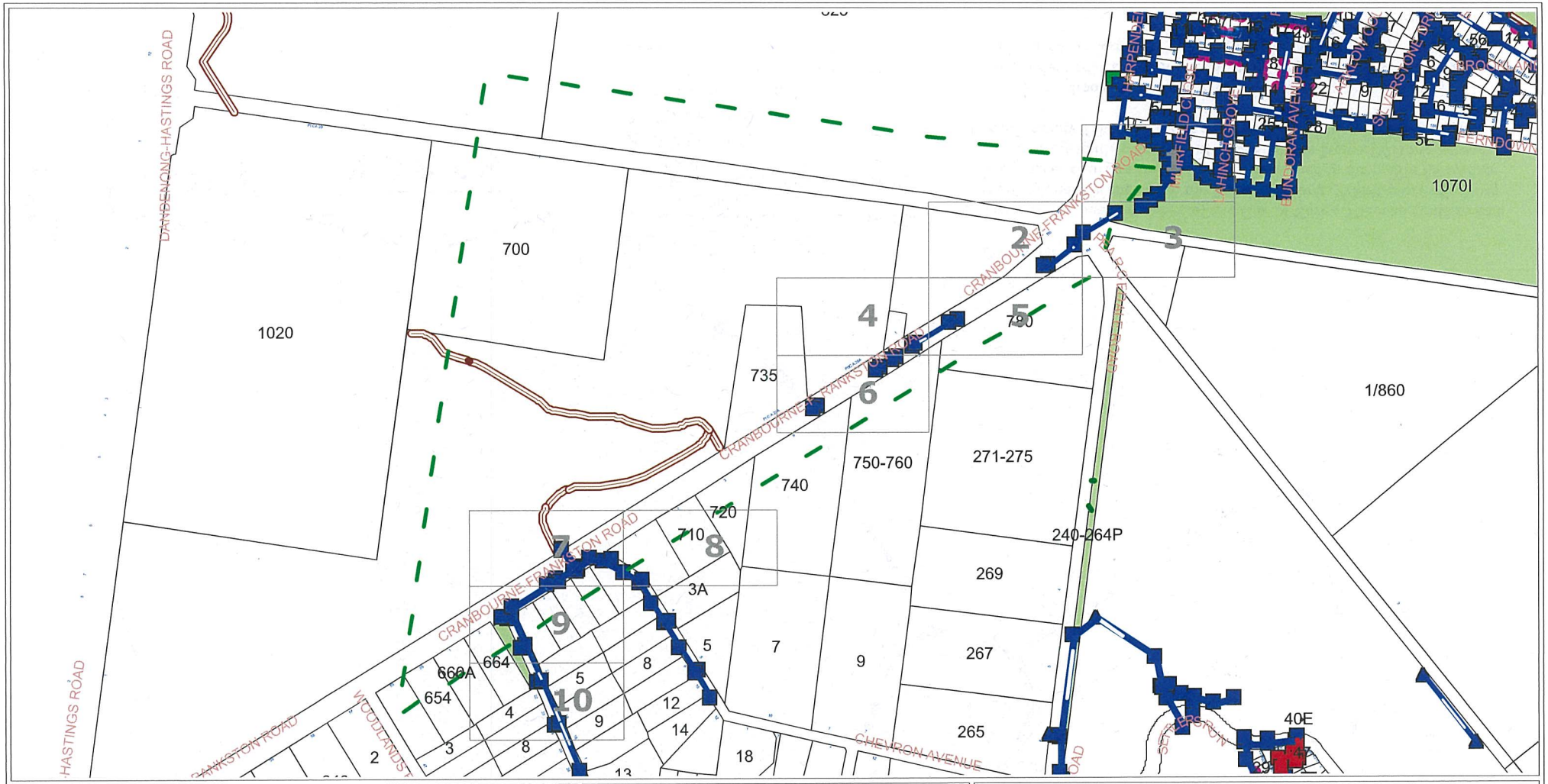
For location of local Water Supply and Sewer pipelines please contact:

City West Water	**13 26 42**
South East Water	**9552 3770**
Yarra Valley Water	**13 16 95**

For location of local Drainage pipelines please contact the relevant Council.

DIAL BEFORE YOU DIG www.1100.com.au

Melbourne Water Corporation
Address: 990 La Trobe Street, Docklands
Postal Address: PO Box 4342, Melbourne, VIC 3001
T (VIC): 131 722
T (AUS): (03) 9679 7100
F: (+61-3) 9679 7200



City of Casey

NORTH

REF: 43688249

Approx. Scale: 1:1000

Plan Printed on 03/02/2015

DRAINAGE LEGEND

- LEGAL POINT OF DISCHARGE (HOUSE DRAIN)
- LEGAL POINT OF DISCHARGE (DSPEC)
- CASEY PITS
- CASEY ENDWALL
- CASEY PIPES
- MELBOURNE WATER PIPES
- FIBRE OPTIC CABLE

City of Casey

NORTH

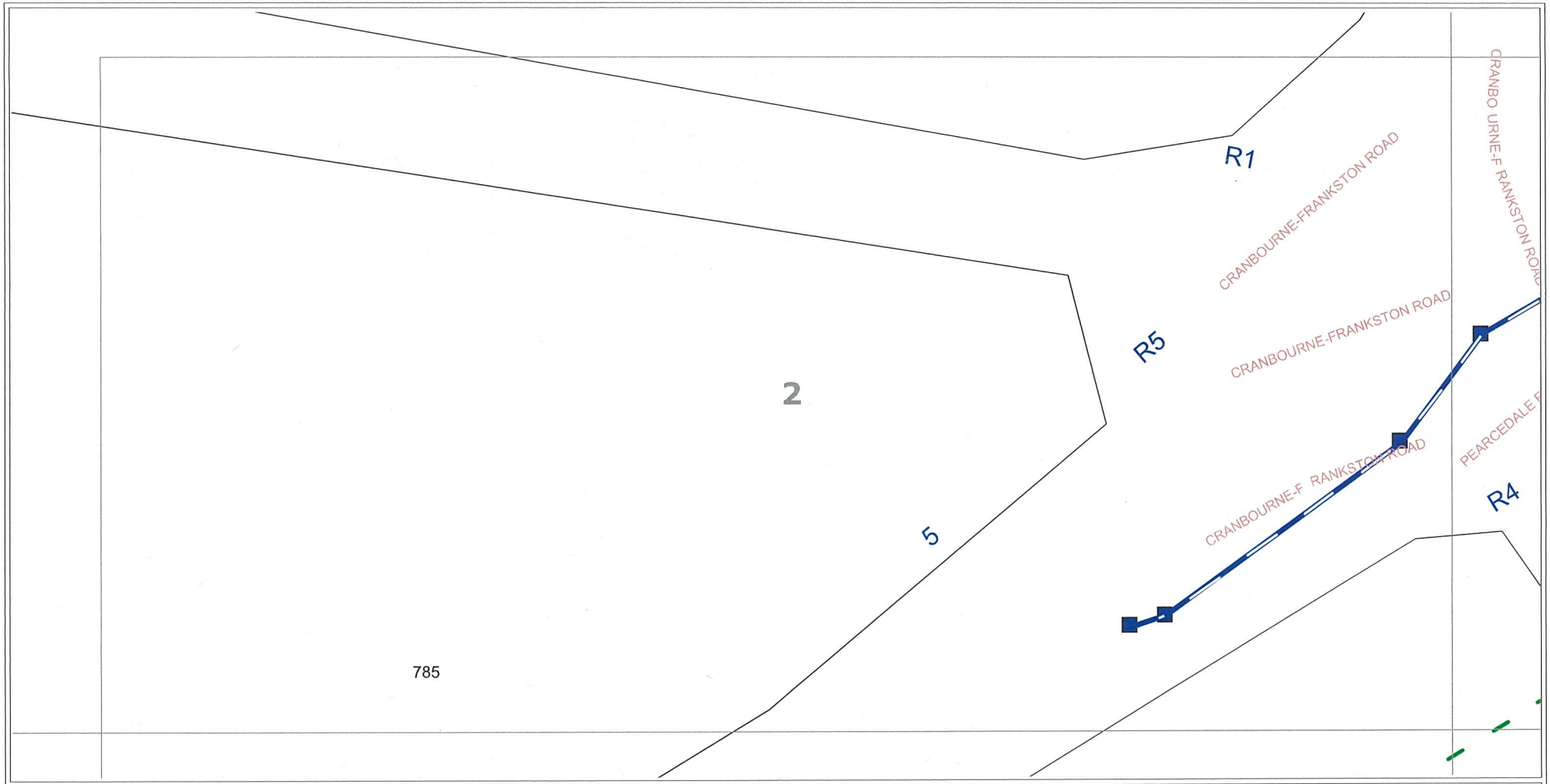
REF: 43688249

Approx. Scale: 1:1000

Plan Printed on 03/02/2015

DRAINAGE LEGEND

- LEGAL POINT OF DISCHARGE (HOUSE DRAIN)
- LEGAL POINT OF DISCHARGE (DSPEC)
- CASEY PITS
- CASEY ENDWALL
- CASEY PIPES
- MELBOURNE WATER PIPES
- FIBRE OPTIC CABLE



City of Casey

NORTH

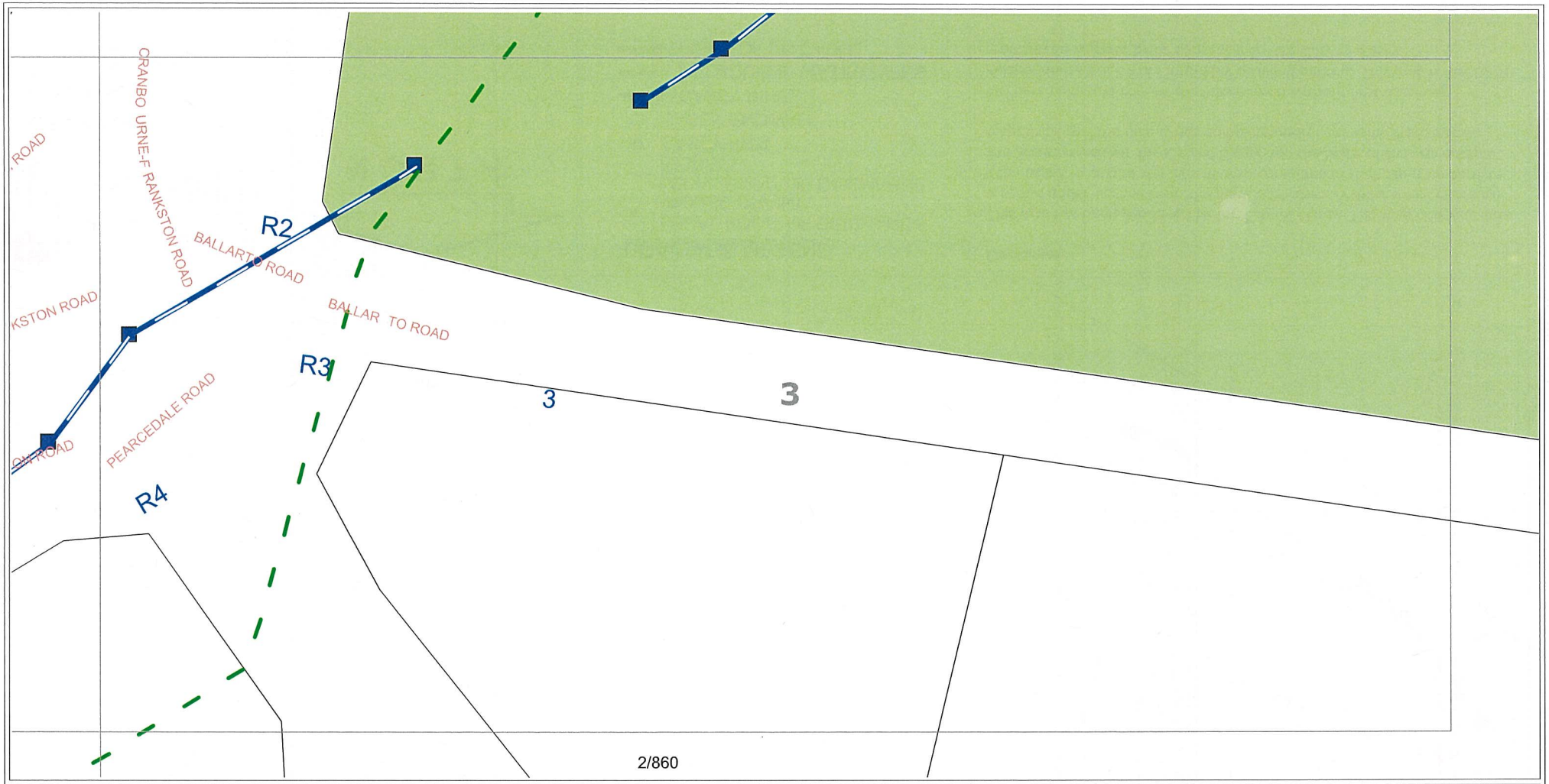
REF: 43688249

Approx. Scale: 1:1000

Plan Printed on 03/02/2015

DRAINAGE LEGEND

- LEGAL POINT OF DISCHARGE (HOUSE DRAIN)
- LEGAL POINT OF DISCHARGE (DSPEC)
- CASEY PITS
- CASEY ENDWALL
- CASEY PIPES
- MELBOURNE WATER PIPES
- FIBRE OPTIC CABLE



City of Casey

NORTH

REF: 43688249

Approx. Scale: 1:1000

Plan Printed on 03/02/2015

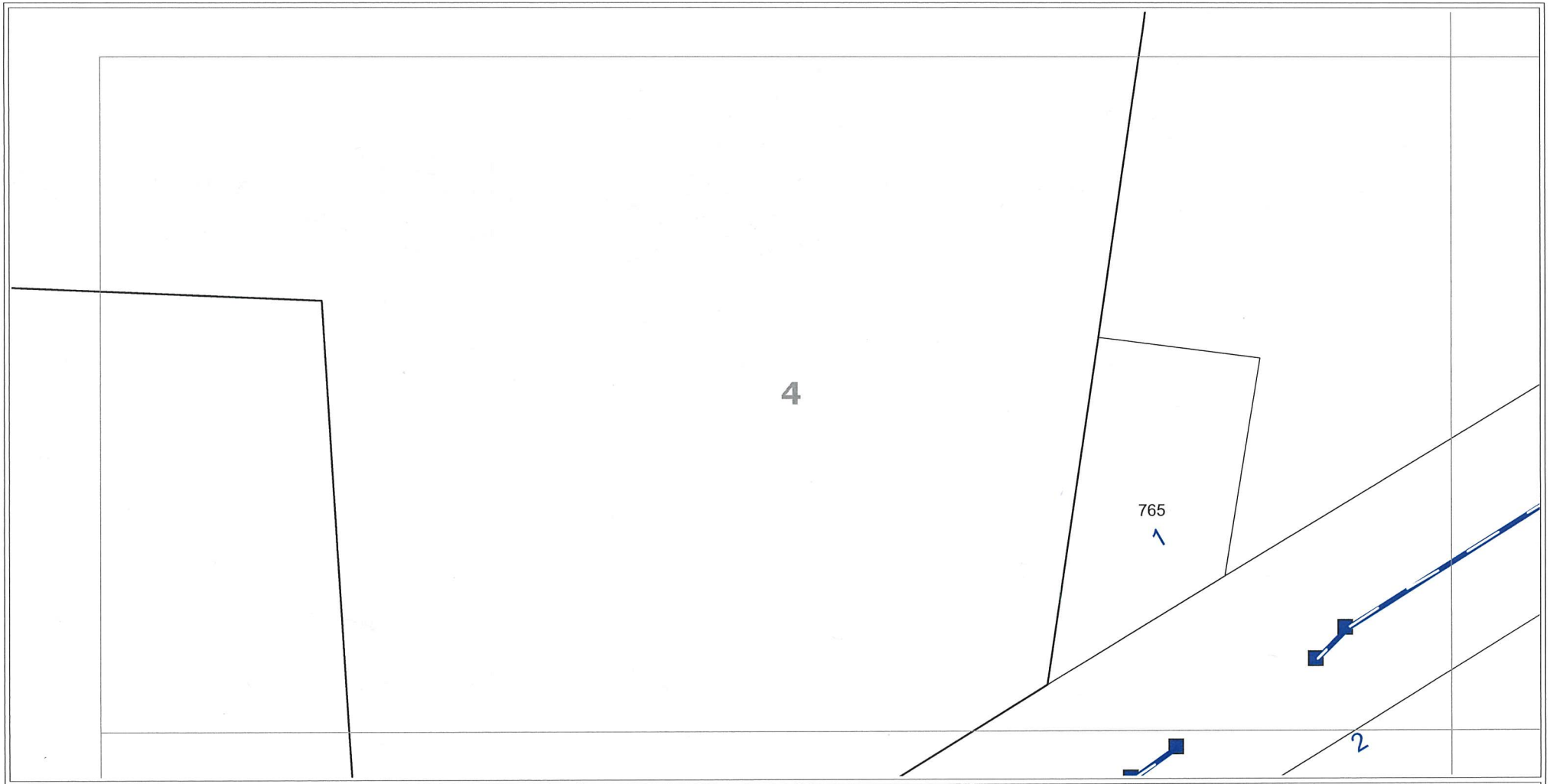
DRAINAGE LEGEND

- LEGAL POINT OF DISCHARGE (HOUSE DRAIN)
- LEGAL POINT OF DISCHARGE (DSPEC)
- CASEY PITS
- CASEY ENDWALL
- CASEY PIPES
- MELBOURNE WATER PIPES
- FIBRE OPTIC CABLE

Disclaimer

This map has been produced by the City of Casey. The map contains data supplied under licence from the State of Victoria. Whilst every effort has been made to ensure the information contained in the map is up-to-date and accurate neither the City of Casey nor the State of Victoria accepts responsibility if the map is not complete and/or contains inaccuracies.

No person should rely on the information without first obtaining independent advice from a suitably qualified person. This map is not to be reproduced without prior consent from the City of Casey.



City of Casey

NORTH

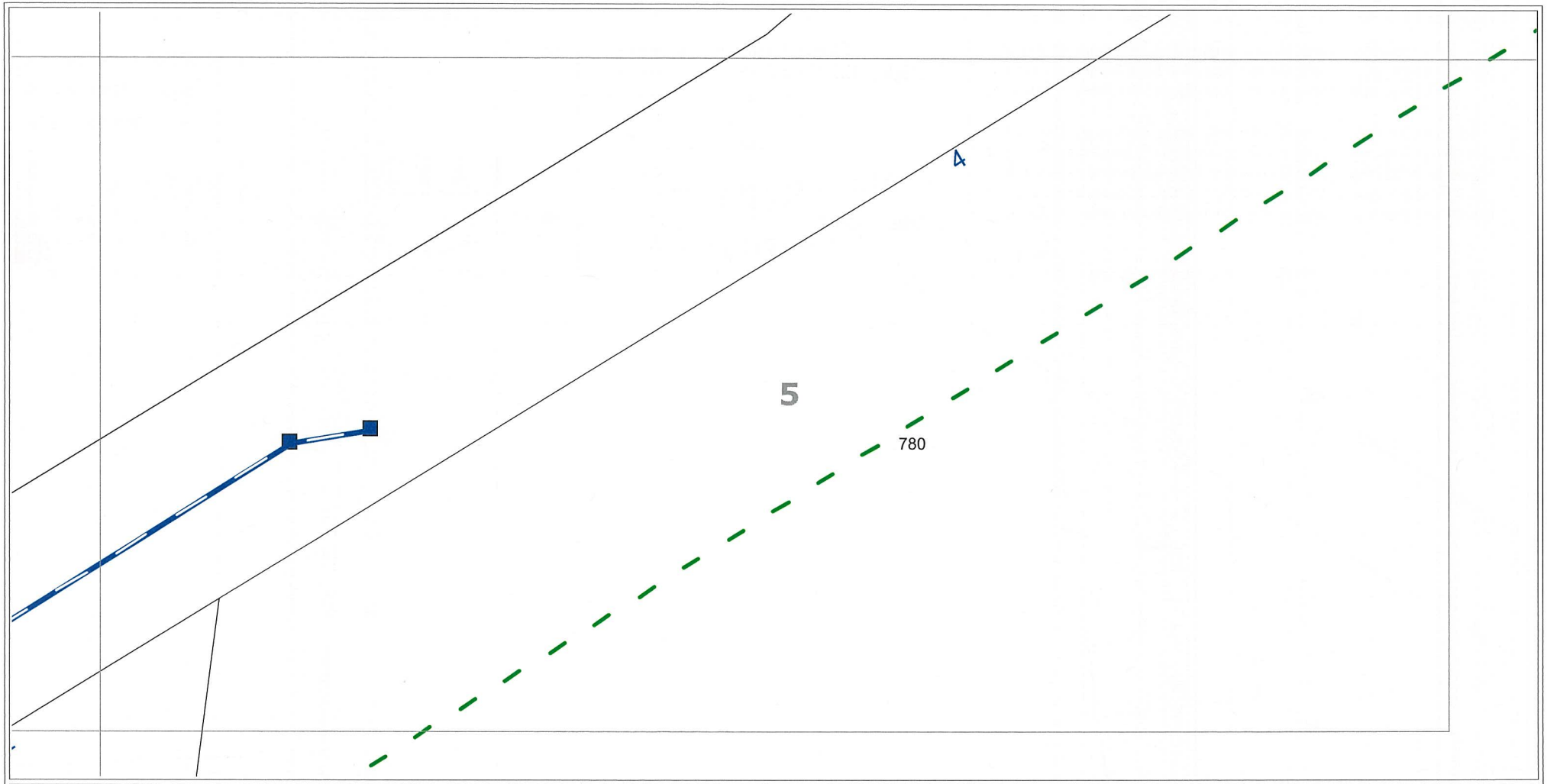
REF: 43688249

Approx. Scale: 1:1000

Plan Printed on 03/02/2015

DRAINAGE LEGEND

- LEGAL POINT OF DISCHARGE (HOUSE DRAIN)
- LEGAL POINT OF DISCHARGE (DSPEC)
- CASEY PITS
- CASEY ENDWALL
- CASEY PIPES
- MELBOURNE WATER PIPES
- FIBRE OPTIC CABLE



City of Casey

NORTH

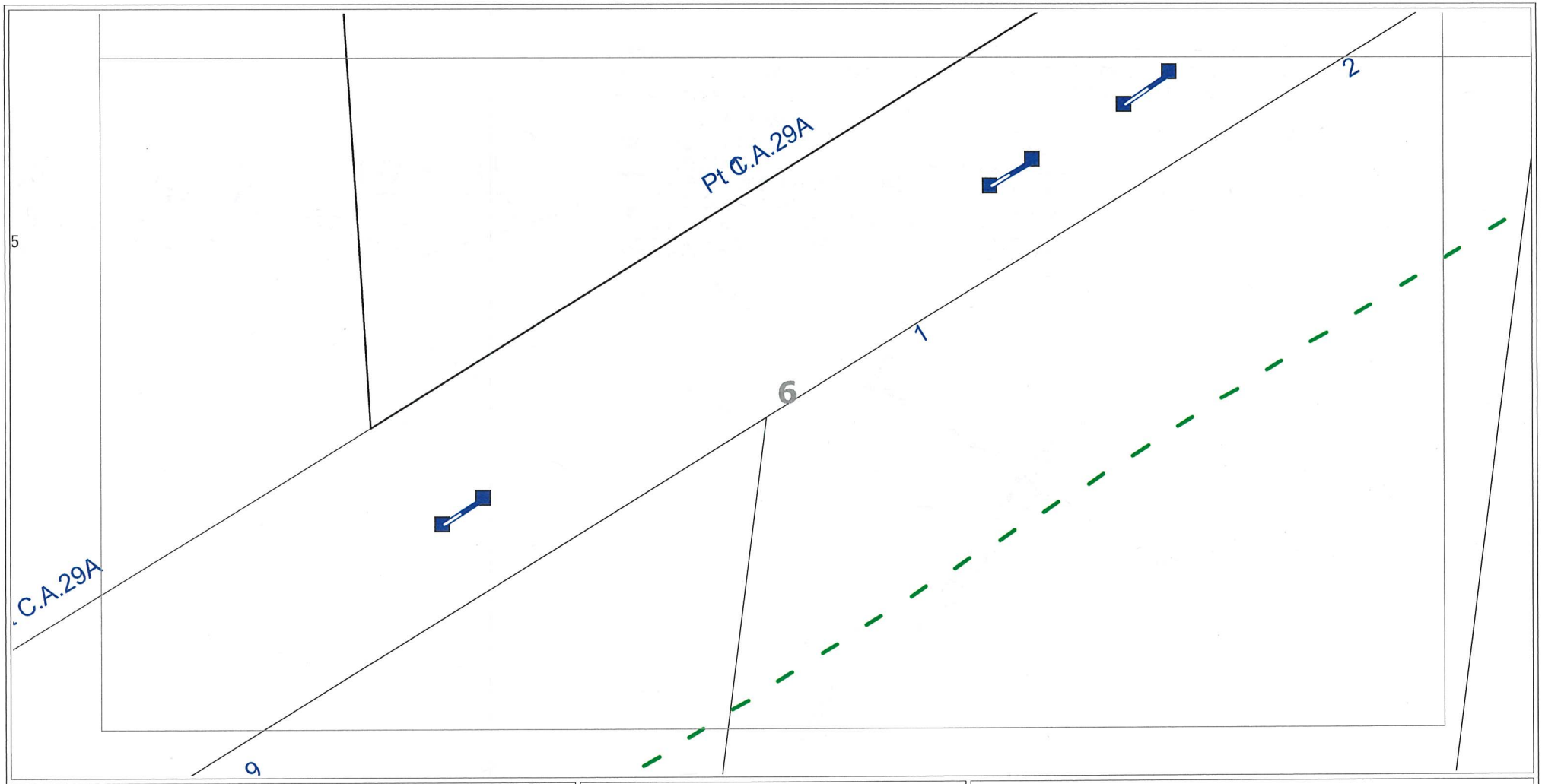
REF: 43688249

Approx. Scale: 1:1000

Plan Printed on 03/02/2015

DRAINAGE LEGEND

- LEGAL POINT OF DISCHARGE (HOUSE DRAIN)
- LEGAL POINT OF DISCHARGE (DSPEC)
- CASEY PITS
- CASEY ENDWALL
- CASEY PIPES
- MELBOURNE WATER PIPES
- FIBRE OPTIC CABLE



City of Casey

NORTH

REF: 43688249

Approx. Scale: 1:1000

Plan Printed on 03/02/2015

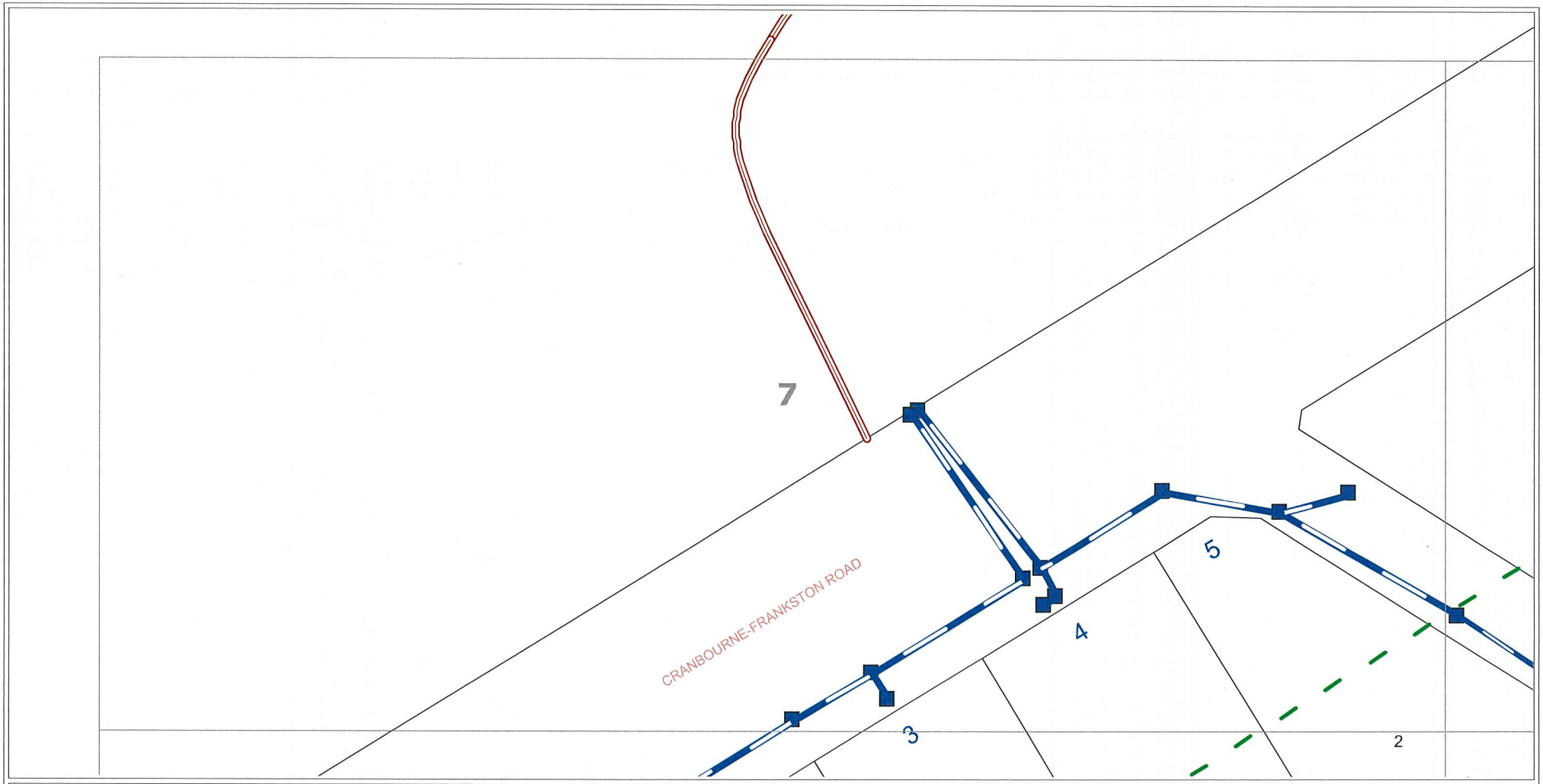
DRAINAGE LEGEND

- LEGAL POINT OF DISCHARGE (HOUSE DRAIN)
- LEGAL POINT OF DISCHARGE (DSPEC)
- CASEY PITS
- CASEY ENDWALL
- CASEY PIPES
- MELBOURNE WATER PIPES
- FIBRE OPTIC CABLE

Disclaimer

This map has been produced by the City of Casey. The map contains data supplied under licence from the State of Victoria. Whilst every effort has been made to ensure the information contained in the map is up-to-date and accurate neither the City of Casey nor the State of Victoria accepts responsibility if the map is not complete and/or contains inaccuracies.

No person should rely on the information without first obtaining independent advice from a suitably qualified person. This map is not to be reproduced without prior consent from the City of Casey.



City of Casey

NORTH

REF: 43688249

Approx. Scale: 1:1000

Plan Printed on 03/02/2015

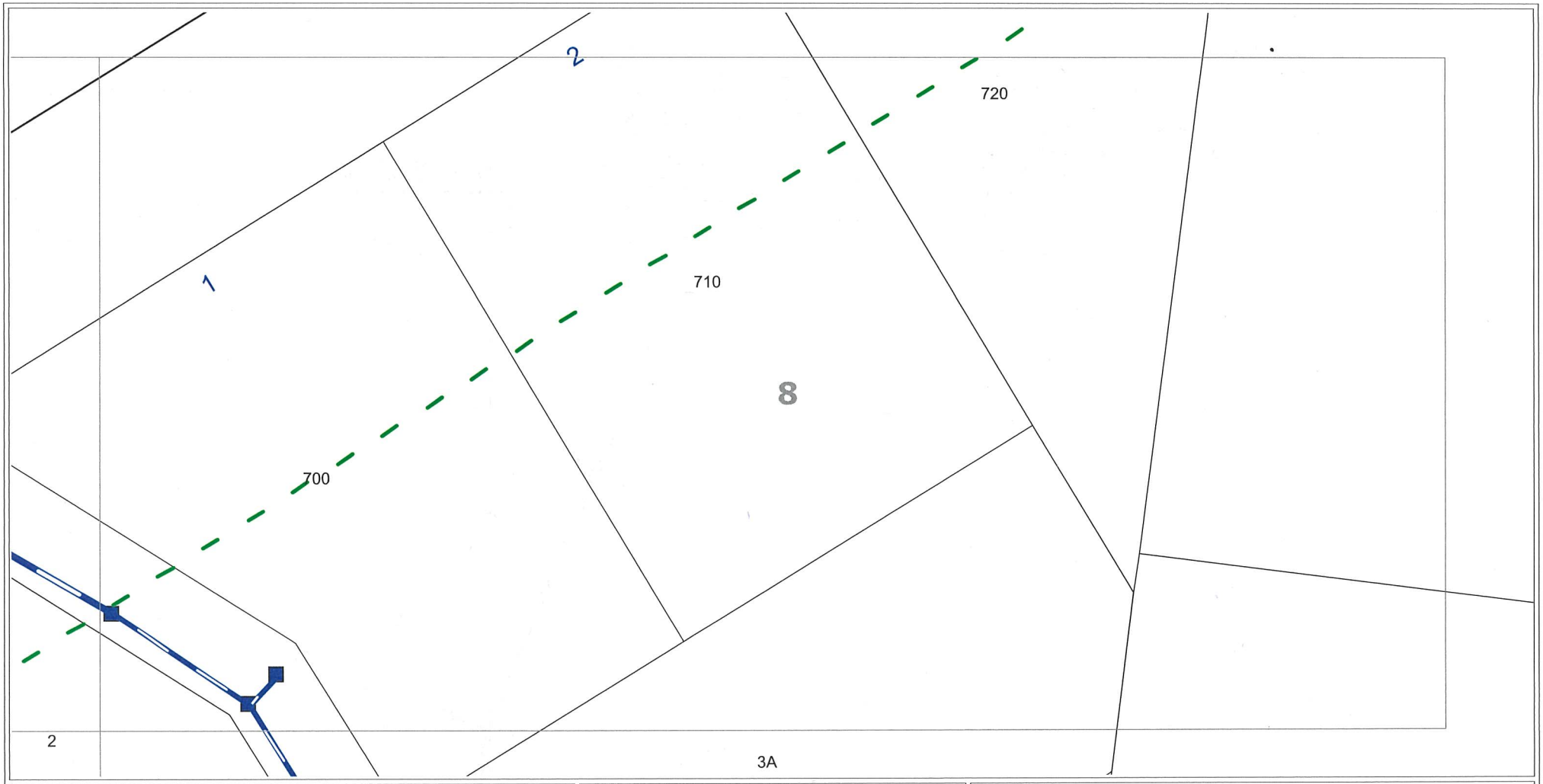
DRAINAGE LEGEND

- LEGAL POINT OF DISCHARGE (HOUSE DRAIN)
- LEGAL POINT OF DISCHARGE (DSPEC)
- CASEY PITS
- CASEY ENDWALL
- CASEY PIPES
- MELBOURNE WATER PIPES
- FIBRE OPTIC CABLE

Disclaimer

This map has been produced by the City of Casey. The map contains data supplied under licence from the State of Victoria. Whilst every effort has been made to ensure the information contained in the map is up-to-date and accurate neither the City of Casey nor the State of Victoria accepts responsibility if the map is not complete and/or contains inaccuracies.

No person should rely on the information without first obtaining independent advice from a suitably qualified person. This map is not to be reproduced without prior consent from the City of Casey.



City of Casey

NORTH

REF: 43688249

Approx. Scale: 1:1000

Plan Printed on 03/02/2015

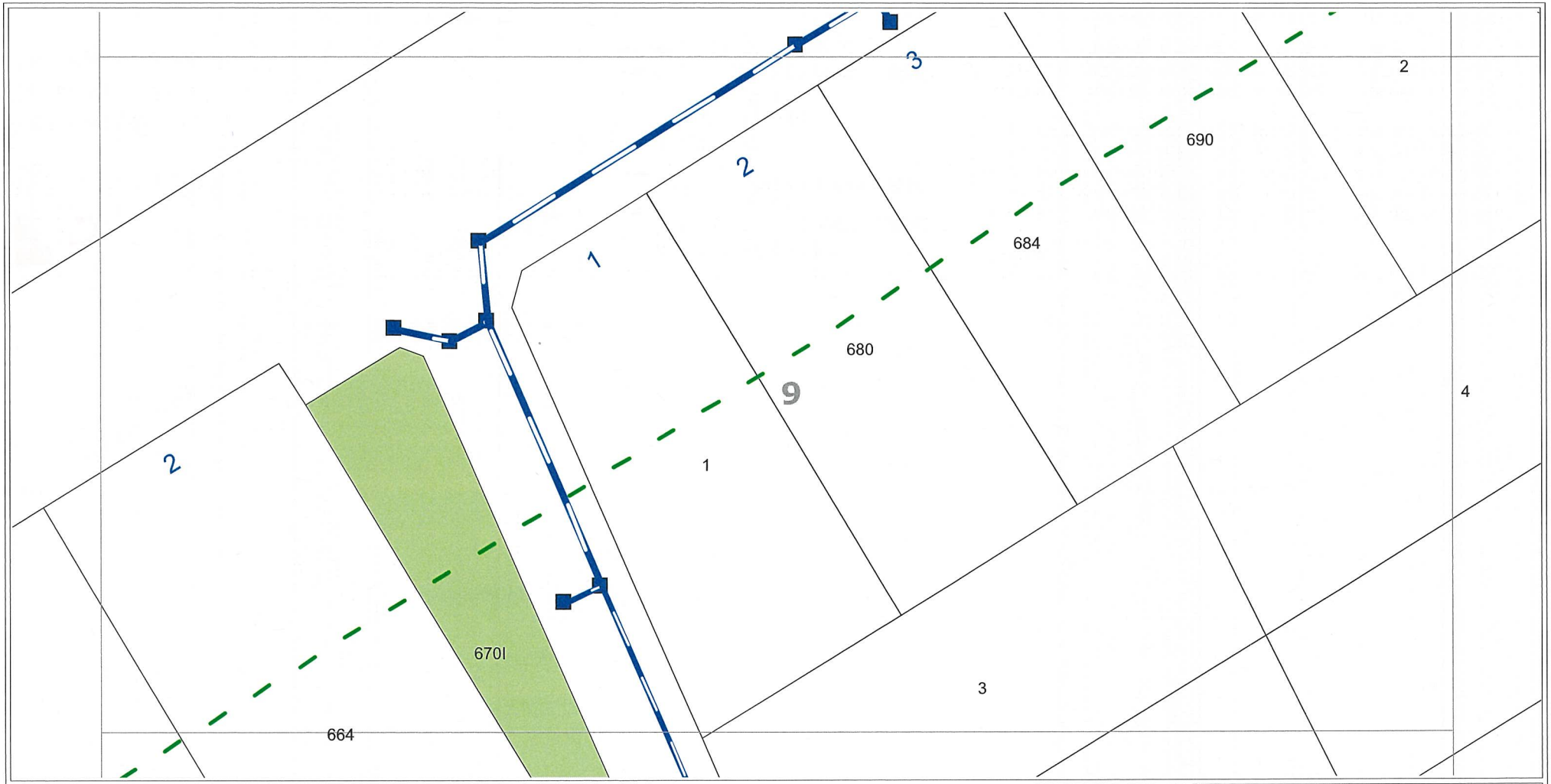
DRAINAGE LEGEND

- LEGAL POINT OF DISCHARGE (HOUSE DRAIN)
- LEGAL POINT OF DISCHARGE (DSPEC)
- CASEY PITS
- CASEY ENDWALL
- CASEY PIPES
- MELBOURNE WATER PIPES
- FIBRE OPTIC CABLE

Disclaimer

This map has been produced by the City of Casey. The map contains data supplied under licence from the State of Victoria. Whilst every effort has been made to ensure the information contained in the map is up-to-date and accurate neither the City of Casey nor the State of Victoria accepts responsibility if the map is not complete and/or contains inaccuracies.

No person should rely on the information without first obtaining independent advice from a suitably qualified person. This map is not to be reproduced without prior consent from the City of Casey.



City of Casey

NORTH

REF: 43688249

Approx. Scale: 1:1000

Plan Printed on 03/02/2015

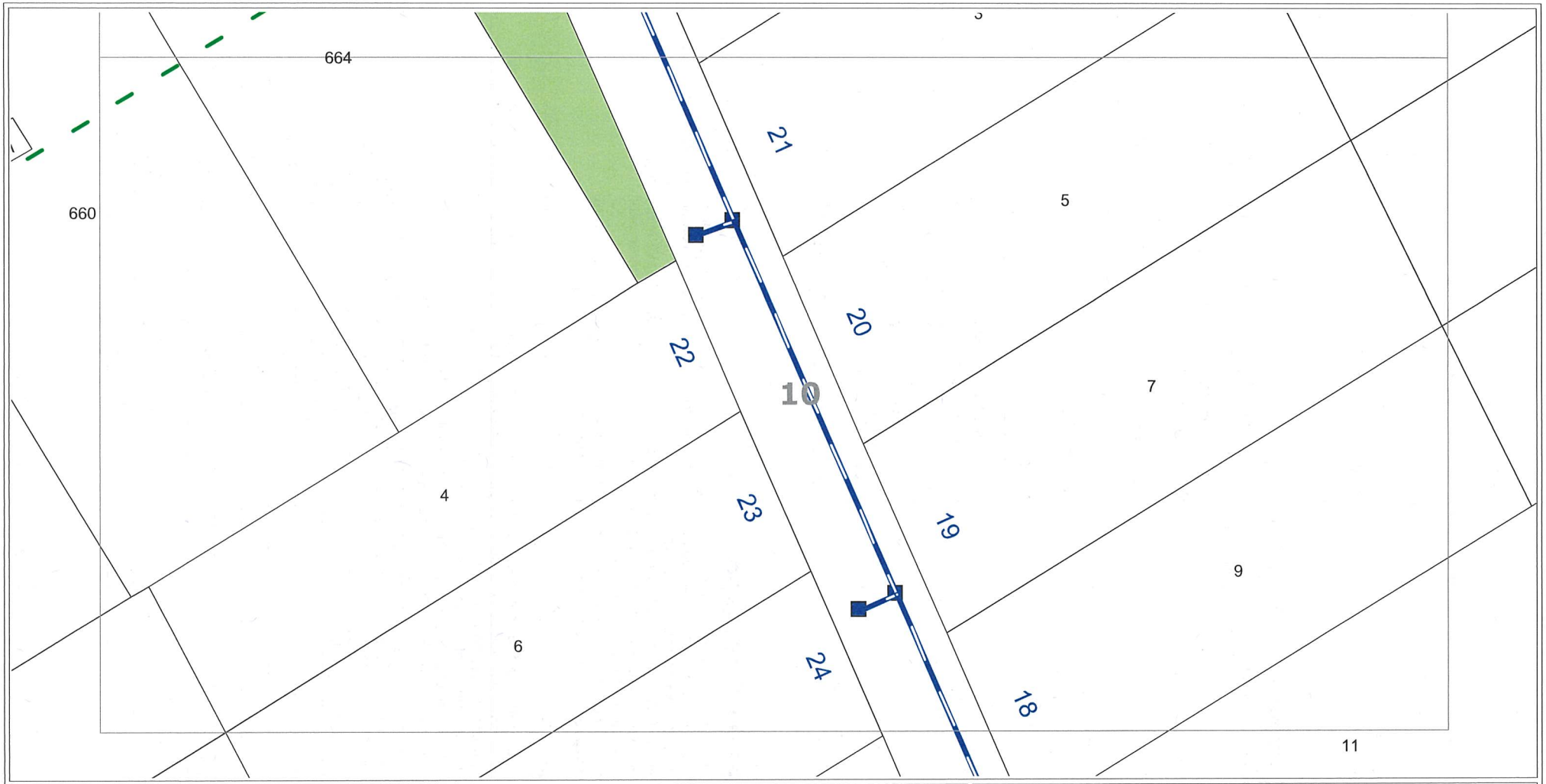
DRAINAGE LEGEND

- LEGAL POINT OF DISCHARGE (HOUSE DRAIN)
- LEGAL POINT OF DISCHARGE (DSPEC)
- CASEY PITS
- CASEY ENDWALL
- CASEY PIPES
- MELBOURNE WATER PIPES
- FIBRE OPTIC CABLE

Disclaimer

This map has been produced by the City of Casey. The map contains data supplied under licence from the State of Victoria. Whilst every effort has been made to ensure the information contained in the map is up-to-date and accurate neither the City of Casey nor the State of Victoria accepts responsibility if the map is not complete and/or contains inaccuracies.

No person should rely on the information without first obtaining independent advice from a suitably qualified person. This map is not to be reproduced without prior consent from the City of Casey.



City of Casey

NORTH

REF: 43688249

Approx. Scale: 1:1000

Plan Printed on 03/02/2015

DRAINAGE LEGEND

- LEGAL POINT OF DISCHARGE (HOUSE DRAIN)
- LEGAL POINT OF DISCHARGE (DSPEC)
- CASEY PITS
- CASEY ENDWALL
- CASEY PIPES
- MELBOURNE WATER PIPES
- FIBRE OPTIC CABLE

Disclaimer

This map has been produced by the City of Casey. The map contains data supplied under licence from the State of Victoria. Whilst every effort has been made to ensure the information contained in the map is up-to-date and accurate neither the City of Casey nor the State of Victoria accepts responsibility if the map is not complete and/or contains inaccuracies.

No person should rely on the information without first obtaining independent advice from a suitably qualified person. This map is not to be reproduced without prior consent from the City of Casey.

Job No 8786694

Phone: 1100
www.1100.com.au

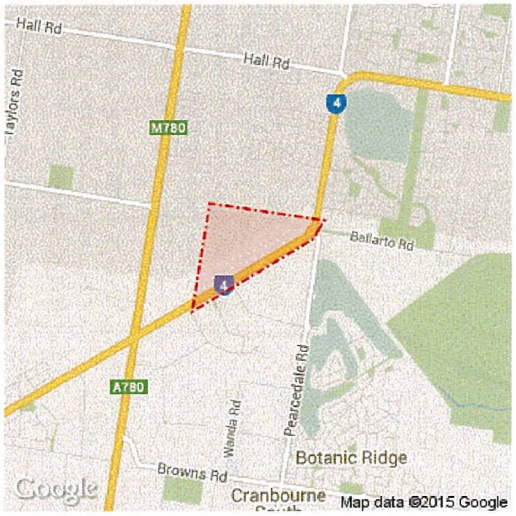
Caller Details

Contact: Miss Phillipa Cances
Company: Coffey Environments
Address: 126 Trenerry Crescent
ABBOTSFORD VIC 3067

Caller Id: 802650 **Phone:** 0394731400
Mobile: Not Supplied **Fax:** Not Supplied
Email: phillipa.cances@coffey.com

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: Brompton Lodge PSP
Working on Behalf of:
Other

Enquiry Date:	Start Date:	End Date:
03/02/2015	09/02/2015	31/03/2015

Address:
Ballarto Road
Cranbourne South VIC 3977
Job Purpose: Excavation
Onsite Activity: Vertical Boring
Location of Workplace: Private Property
Location in Road: Not Supplied

- Check that the location of the dig site is correct. If not you must submit a new enquiry.
- Should the scope of works change, or plan validity dates expire, you must submit a new 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:
Not Supplied

Your Responsibilities and Duty of Care

- 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
43688253	APA Group Networks, Mornington	0881591644	NOTIFIED
43688251	AusNet Electricity Services Pty Ltd	1800088208	NOTIFIED
43688249	Casey	0397055200	NOTIFIED
43688256	Melbourne Water	0396797589	NOTIFIED
43688258	NBN Co, VicTas	1800626762	NOTIFIED
43688257	PIPE Networks, Vic	1800201100	NOTIFIED
43688254	South East Water Corporation	0395523459	NOTIFIED
43688255	South East Water Corporation	0395523459	NOTIFIED
43688252	Telstra VICTAS	1800653935	NOTIFIED
43688250	United Energy South	0359702440	NOTIFIED

END OF UTILITIES LIST

Response Cover Letter

Date: 03/02/2015

PIPE Networks
Level 17, 127 Creek St
Brisbane QLD 4000
Phone: +61 732339895
Fax: +61 732339880

To:
Miss Phillipa Cances - Customer ID: 802650
Coffey Environments - Miss Phillipa Cances
126 Trenerry Crescent
ABBOTSFORD
VIC
3067

Email: phillipa.cances@coffey.com
Phone: 0394731400
Fax: Not Supplied
Mobile: Not Supplied

Dear Miss Phillipa Cances

The following is our response to your Dial Before You Dig enquiry.

Assets Affected: Telstra

Sequence Number: 43688257

Location: Ballarto Road
Cranbourne South
VIC 3977

Commencement Date: 09/02/2015

Please read over the attached documents for more information about your enquiry.

South East Water

ASSET INFORMATION - WATER

DIAL BEFORE YOU DIG www.1100.com.au

Property: Ballarto Road, Cranbourne South VIC 3977

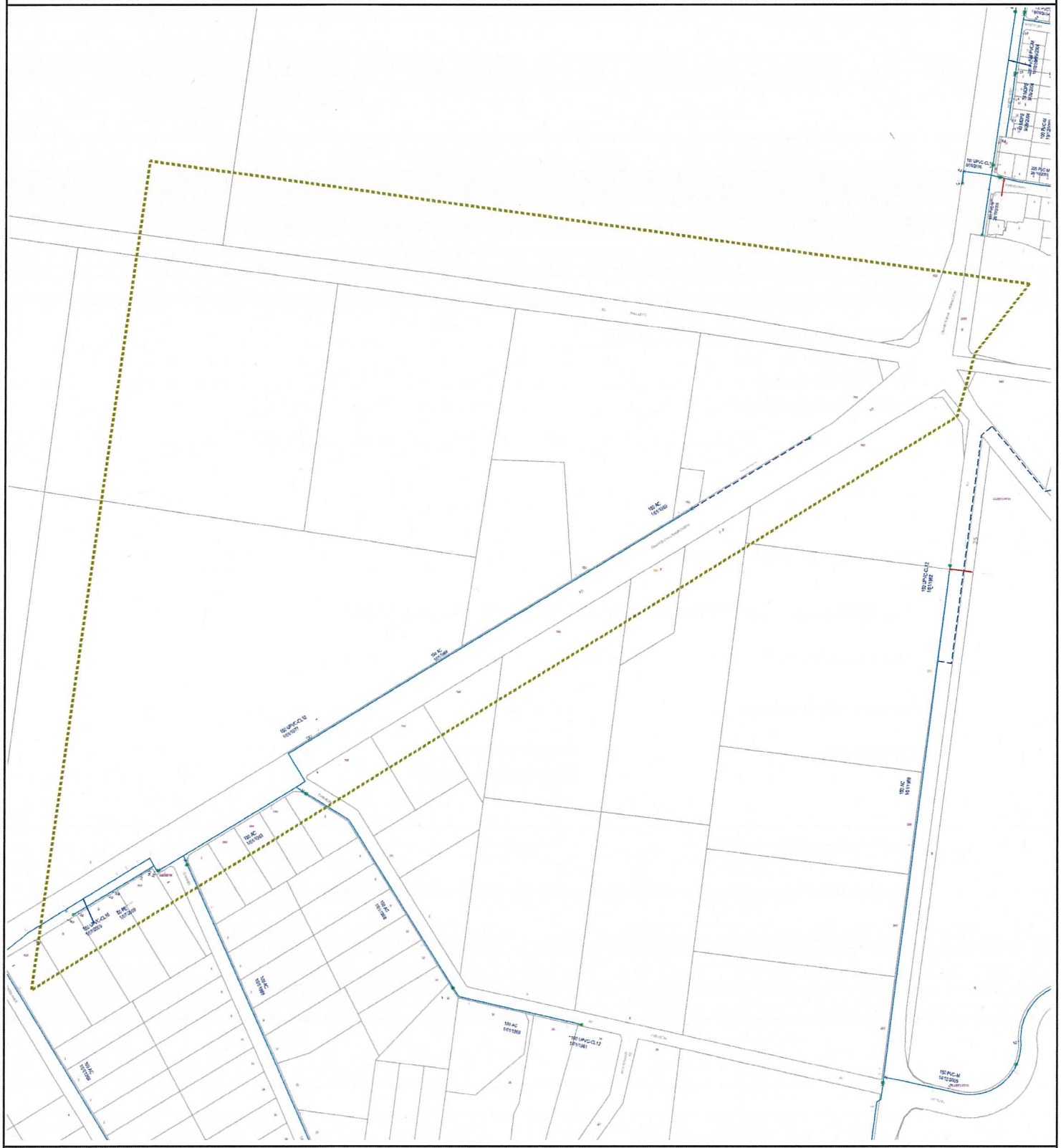
Case Number:

Sequence Number: 43688255

20 0 20 40
Scale in Metres

Date: 04 February 2015

133A10



WARNING : This plan is issued solely for the purpose of assisting you in identifying South East Water's specified assets through further investigation only. It is not to be used for any other purpose, including to identify any other assets, property boundaries or dimensions. Accordingly, the location of all assets should be proven by hand on site prior to the commencement of any work. (Refer to attached letter for further details). Assets labelled AC may contain asbestos and therefore works on these assets must be undertaken in accordance with OH&S Regulations

Title/Road Boundary		Chlorination Assembly		Hydrant	
Proposed Title/Road		Water Main Valve		Fireplug/Washout	
Easement	100 CICL 26.9.1975	Water Main	~ 1.0	Offset from Boundary	

South East Water

ASSET INFORMATION - SEWER

DIAL BEFORE YOU DIG www.1100.com.au

Property: Ballarto Road, Cranbourne South VIC 3977

Case Number:

Sequence Number: 43688255

20 0 20 40
Scale in Metres

Date: 04 February 2015

133A10

WARNING: This plan is issued solely for the purpose of assisting you in identifying South East Water's specified assets through further investigation only. It is not to be used for any other purpose, including to identify any other assets, property boundaries or dimensions. Accordingly, the location of all assets should be proven by hand on site prior to the commencement of any work. (Refer to attached letter for further details). Assets labelled AC may contain asbestos and therefore works on these assets must be undertaken in accordance with OH&S Regulations

Title/Road Boundary	End of Pipe	Maintenance Hole
Proposed Title/Road	Sewer Main	Inspection Shaft
Easement	225 VC / 280 MOR — Direction of Flow	<1.0> Offset from Boundary

South East Water

ASSET INFORMATION - RECYCLED WATER

DIAL BEFORE YOU DIG www.1100.com.au

Property: Ballarto Road, Cranbourne South VIC 3977

Case Number:

Sequence Number: 43688255

20 0 20 40

Scale in Metres

Date: 04 February 2015

133A10

WARNING : This plan is issued solely for the purpose of assisting you in identifying South East Water's specified assets through further investigation only. It is not to be used for any other purpose, including to identify any other assets, property boundaries or dimensions. Accordingly, the location of all assets should be proven by hand on site prior to the commencement of any work. (Refer to attached letter for further details). Assets labelled AC may contain asbestos and therefore works on these assets must be undertaken in accordance with OH&S Regulations

Title/Road Boundary	Chlorination Assembly	Hydrant	
Proposed Title/Road	Recycled Water Main Valve	Fireplug/Washout	
Easement	100 CICL 26.9.1975 Recycled Water Main	~ 1.0	Offset from Boundary

This page has been left intentionally blank

Zoning Map

Sunbury South & Lancefield Precinct Structure Plan

1:40,000 @ A4

0 400 600 800 1,000 1,200m