Drainage Strategy

1084 Koo Wee Rup Road, Pakenham

KLM Reference No. 12692.00

Campbell Constructions Pty Ltd

July 2025

KLM SPATIAL

LAND DEVELOPMENT INTELLIGENCE

Contents

Document Control

Date Prepared	Version Number	Author	Reviewed	Distributed
30/07/2025	1	AS	MR	Internal Client Council

1.0 Background Information

KLM Spatial act on behalf of Campbell Constructions Developments in preparing and submitting this statement.

This report consists of preliminary engineering advice intended to be used to support an application to Council for a planning permit

1.1. Site & Surrounding Area

The pre-developed conditions of the site are flat grassed land with a single dwelling and sheds located in the southwestern corner of the property. The site is bounded by Koo Wee Rup Road to the west, Greenhills Road to the south and Exchange Drive to the east. Greenhills Road is a gravel roadway adjacent the site with bitumen stubs extending into Greenhills Road at both Koo Wee Rup Road and Exchange Drive. An industrial development exists along the northern boundary which has a private right-of-way, Spark Circuit, running along the site boundary. The area east of Exchange Drive is also industrial zoned land largely developed.

The only notable vegetation on the pre-developed site were trees surrounding the dwelling in the southwestern corner of the property. At the time of this report the site has been cleared of all structures and vegetation.

The site is located within the Cardinia Planning Scheme and is zoned Industrial 1 (INZ1). Land to the north, west and east of the site have largely been developed as industrial estates with land to the south remaining as undeveloped farmland zoned as Green Wedge (GWZ1).

1.2. Development Proposal

Broadly, the proposal is for redevelopment of the subject site in accordance with the submitted plans and documents. The site proposes to develop 9 No. industrial lots of sizes ranging from 1336m² to 2.715ha. All lots will front onto surrounding roads and there is therefore no internal road network included as part of the development. The proposed layout is shown in Figure 1 below and in more detail in Appendix A.

Figure 1: Proposed subdivision plan (Source: KLM Spatial)

1.3. Staging

The development is to be constructed in 3 No. stages as follows:

• Stage 1 – a single large lot 2.715ha in size in the northern part of the site spanning the full width between Koo Wee Rup Road and Exchange Drive,

• Stage 2 – 4 No. lots of sizes ranging from 1336m² to 1569m² in the southeastern corner of the site facing Exchange Drive,

• Stage 3 – 4 No. lots of sizes ranging from 1384m² to 9598m² along the southern boundary and southwestern corner facing Greenhills Road.

The strip of land along the western boundary R1 was reserved for the construction of a service lane along Koo Wee Rup Road which has since been completed. Assess to Stage 1 will be from the service lane along Koo Wee up Road and Exchange Drive, with access to Stage 2 from Exchange Drive. Access to Stage 3 will be from Greenhills Road. Road pavement stubs exist for short lengths from Koo Wee Rup Road and Exchange Drive which are linked by a gravel road currently closed to traffic. Construction of this roadway will be required prior to the completion of Stage 3.

1.4. Key Development Parameters

The key project parameters for assessment of Civil Engineering matters are as summarised in Table 1 below:

Table 1: Key project parameters

Item	Description	Value
1	Land Area (ha)	6.02*
2	Number of Dwellings / Lots	9
3	Development Density (lots / Ha)	0.67
4	Length of Roads / Service Corridors	N/A
5	Topography Characteristics	Level
6	Land Subject to Flooding / Inundation	No
7	Land Subject to MWC Drainage Scheme	Yes

*Land area excluding road reserve parcels along Koo Wee Rup Road (R1) and Greenhills Road

2.0 Site Levels

2.1. Topography

The subject site is generally level with its lowest point located along the southern boundary approximately 100 metres west of the intersection of Greenhills Road and Exchange Drive. Overland flows from both existing and developed conditions follow Greenhills Road for a distance of around 730m to the east of Exchange Drive where the road reverts to a single lane gavel road with open Melbourne Water drain which ultimately discharges to Deep Creek.

The land falls approximately 1.9 metres across its Koo Wee Rup Road frontage and 0.7 metres across its Greenhills Road frontage from Koo Wee Rup Road to the existing low point. The site grade is approximately 1 in 120 across the Koo Wee up Road frontage and 1 in 200 across the Greenhills Road frontage to the low point.

As noted in Section 1.1, the site has been cleared of all structures and vegetation. A pe-developed topographical view of the site is shown in Figure 2 below. A full copy of the topographical survey of the pre-developed site is attached as Appendix B.

Figure 2: Site topography (Source: Nearmap – May 2025)

2.2. Bulk Earthworks

The proposed design will require minor modification of surface levels to provide level building sites for each lot. As the site will remain generally sloping down towards Greenhills Road and Exchange Drive frontages of the site, major bulk earthworks are not envisaged or deemed required for the site.

To address the site levels and coordination with surrounding road levels, it is proposed to undertake minor earthworks to grade the site to allow sufficient freeboard to the lots to allow the passage of flows to the road frontages.

2.3. Road Grading

The proposed design will require modification of surface levels to provide level building sites for each lot and connect into existing road levels at the front and rear boundaries of the site. As the development lots mostly front onto existing roads this will be generally

achieved by minor earthworks to the site to ensure the passage of overland flows to the roads as discussed in Section 2.2. The lots contained in Stage 3 however front onto a section of Greenhills Road that is not yet constructed. This section of road will be constructed in conjunction with this development and will be graded sufficiently to allow for the passage of flows from the adjoining lots and connect to the existing road pavement stubs at Koo Wee Rup Road and Exchange Drive.

3.0 Existing Drainage Conditions

3.1. Flooding and Inundation

The land is not known to be prone to inundation or flooding events. The zoning for the site and surrounding area is shown in Figure 3 below along with the site's proximity to nearby Melbourne Water drains and the outfall to Deep Creek. Note that the land immediately south of Greenhills Road is under a Land Subject to Inundation Overlay (LSIO) which extends along the southern side of Greenhills Road past Deep Creek for a distance of around 2km. The area to the east of the site has already been developed as an Industrial estate with the area further east under a Floodway Overlay (FO).

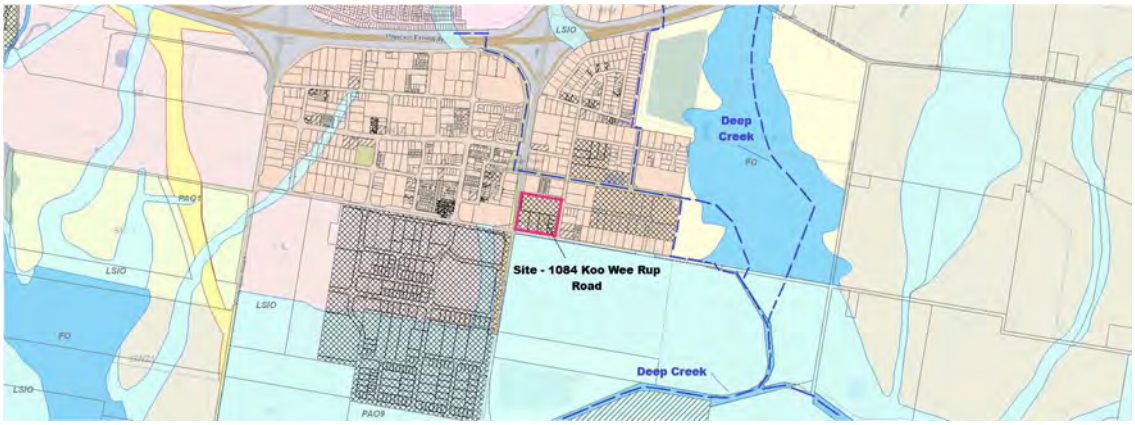

Figure 3: Site zoning with nearest LSIO along Deep Creek (Source: Vicplan)

3.2. Main Drainage

The subject land is located within the MWC Drainage Scheme (DS) No. 1601 – Deep Creek South

Main drainage infrastructure for the site is partly constructed, including past the site. The MW Scheme assets run from the low point along the unconstructed part of Greenhills Road described in Section 2.1. This asset is a DN675mm pipe running along the northern side of Greenhills Road which increases to DN825mm at Exchange Drive. The constructed portion of MW Scheme pipe runs for around 840 metres along Greenhills Road and services existing lots and terminates at the end of the constructed portion of road where it discharges to an open drain heading further east along the unbuilt portion of road. This in turn follows the road for another 240m before crossing under the road, heads a further 180m along the southern side of the road before turning southeast for 200 metres to outlet into Deep Creek. An extract of MW Drainage Scheme 1601 is shown in Figure 4 below, and in more detail in Appendix E:

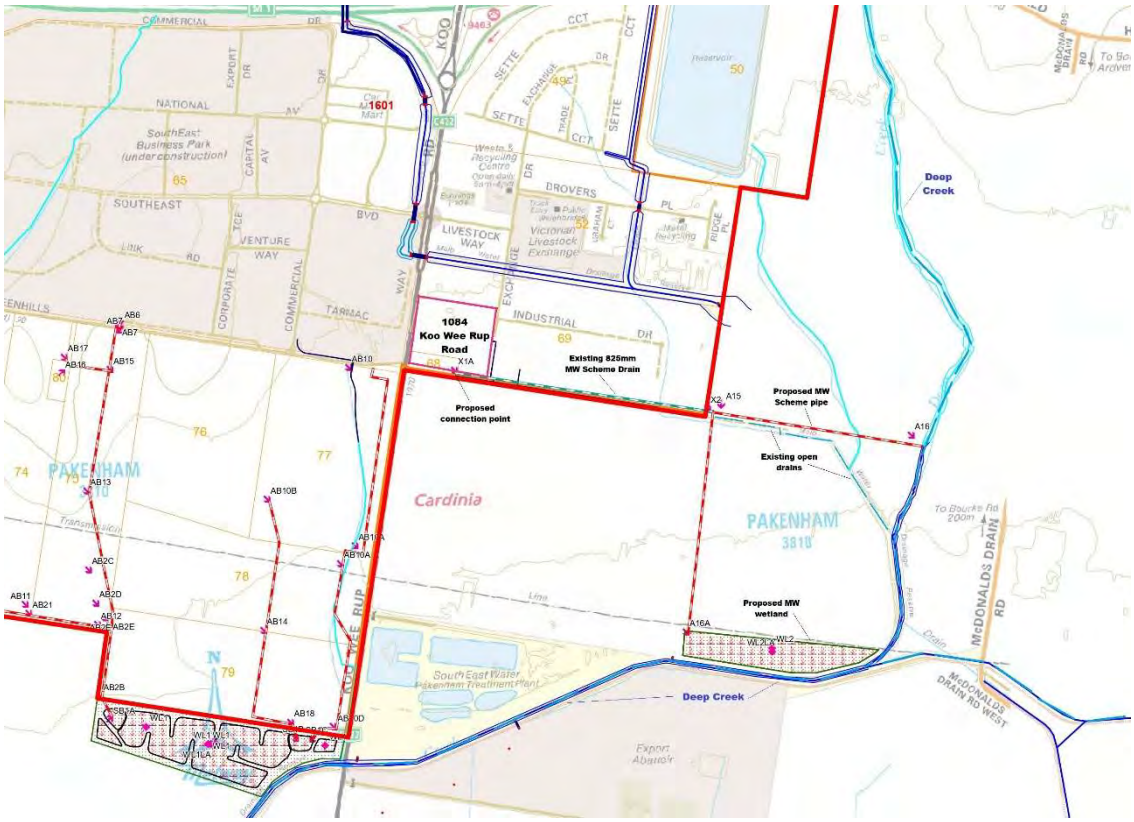

Figure 4: MW Drainage Scheme 1601 – Deep Creek South (Source: Melbourne Water)

The constructed portion of the MW Scheme Drain is identified in Figure 4 as the section of DN675mm/DN825mm pipe between the points X1A and X2. Extension of this drainage will be provided to service lots 8 and 9 as shown in Figure 1. The constructed piped system has been designed to accommodate flows from the developed industrial estate, including the area of the subject site. The network is therefore deemed to be of sufficient capacity to allow direct connection of the individual lots as outlined in Section 3.3.

Downstream of the constructed portion of Greenhills Road, the MW drain passes to an existing open channel that continues along an unbuilt portion of the roadway to the east of point X2 in Figure 4. The channel runs for around 230 metres along the northern side of an unsealed track in Greenhills Road before passing through a short culvert to the southern side of the road. The drain continues for another 180 metres before heading southeast to Deep Creek.

The existing open channel also caters for discharge from an existing DN1200mm pipe that runs north adjacent the eastern edge of the industrial land. The locations of the constructed MW pipes relative to the downstream channel are shown in Figure 5 below. Land along the unbuilt portion of Greenhills Road is open farmland both sides with the northern side part of Bald Hill Farm which is a demonstration farm owned by South East Water.

Figure 5: Current Melbourne Water constructed drains and open channels – Greenhills Road to Deep Creek. (Aerial image: Nearmap)

3.3. Legal Point of Discharge

The legal point of discharge (LPD) for this site is nominated by Cardinia Shire Council as the Responsible Authority.

An LPD request has not been lodged with Council.

The LPD is anticipated to be individual to each lot in the subdivision following the constructed drainage network as follows:

• Lot 1 will discharge to the existing DN600mm pipe crossing Exchange Drive located in the southeastern corner of the lot.

• Lots 2-4 will discharge to the existing DN300mm pipes crossing Exchange Drive located at the front of each lot.

• Lots 5-7 will discharge to the existing DN675mm MW pipe along Greenhills Road located at the front of each lot

• Lots 8 and 9 will connect to the extension of the DN675mm MW pipe

Site drainage will be directed to the LPD in a detailed drainage design.

3.4. Existing Drainage Infrastructure

As discussed in Section 3.3, lots 5-7 will connect to the existing MW Scheme drainage and remaining lots will connect to the Council system. Council drainage infrastructure servicing developments to the north and east of the site is constructed and runs via the eastern side of Exchange Drive with pits and cross pipes to the western side providing connection points to Lots 1-4. In each case there is a constructed pit located in the road reserve along the frontage of each lot.

Augmentation of the existing drainage infrastructure will be limited to a short extension of the MW DN675mm pipe at Greenhills Road to service lots 8 and 9. This extension discussed in Section 3.2 will also cater for discharge from two existing pits located near Koo Wee Rup Road that currently outlet to an open drain along the proposed roadway. The length of pipe required between the outlet near Koo Wee Rup Road and the start of the MW pipe is around 120m. Plans for existing Council and MW drainage systems are included in Appendix D.

4.0 Drainage Strategy

4.1. Precinct Catchments

The site's location in relation to surrounding developments, existing road networks and the area's natural topography has determined it is considered a single catchment with no upstream catchment contributing to the post-development flow.

For estimating the minor and major runoff volumes the drainage system catchment of 6.02ha will be captured and conveyed through the site before discharge to Greenhills Road. The minor and major event flows are discussed further in the sections below.

4.2. Minor Event Flows

Within the development, drainage of the minor flows shall be for the 10% Annual Exceedance Probability (AEP) event as per the Engineering Design and Construction Manual for Growth Areas (EDCM).

To address minor flow events, it is proposed to construct drainage infrastructure within the sites that will connect to the existing pit and pipe system within Exchange Drive and Greenhills Road adjacent the site with minor extension works as discussed in Section 3.2. An estimate for the 10% AEP runoff from the development at the downstream end using the Rational Method is shown in Table 2 below:

Table 2: 10% AEP Rational Method estimate for runoff at 1084 Koo Wee Rup Road

Parameter	Value
Catchment Area (ha)	6.02
Fraction Impervious	0.9
10% AEP Runoff Coefficient, $C_{10\%}$	0.822
Time of Concentration, T_c (min)	19
10% AEP Rainfall Intensity for T_c, I (mm/h)	59.5
Runoff, $Q_{10\%}$ (m^3/s)	**0.93**

4.3. Major Event Flows

The major flows for a 1% Annual Exceedance Probability (AEP) event are to be conveyed overland in accordance with Council & MWC design standards.

To address major flow events, it is proposed to allow gap flows to discharge from the site and south along Exchange Drive and east along Greenhills Road and to the existing drainage channel that flows into Deep Creek. The grading of existing Exchange Drive and the constructed section of Greenhills Road already allow for the passage of gap flows in this direction as they service adjoining developed properties. The design of the currently unmade section of Greenhills Road adjacent the site will be carried out to cater for the passage of gap flows from lots 6-9 to flow east along Greenhills Road, past Exchange Drive and towards the channel to Deep Creek. Prior to discharge into Deep Creek overland flows will split between the unmade road that continues east to Deep Creek and the open channel that heads southeast. This is illustrated in Figure 6 below:

Figure 6: Overland flow paths from site to Deep Creek (Aerial image: Nearmap)

An estimate of the 1% AEP runoff from the site using the Rational Method is shown in Table 3 below:

Table 3: 1% AEP Rational Method estimate for runoff at 1084 Koo Wee Rup Road

Parameter	Value
Catchment Area (ha)	6.02
Fraction Impervious	0.9
1% AEP Runoff Coefficient, $C_{1\%}$	0.986
Time of Concentration, T_c (min)	19
1% AEP Rainfall Intensity for T_c, I (mm/h)	97.7
Runoff, $Q_{1\%}$ (m^3/s)	**1.83**

The 1% AEP gap flow is estimated from the difference between the 1% AEP flow and 10% AEP flow 1.83m³/s – 0.930m³/s = 0.90m³/s. PC Convey used to provide an estimate of gap flow level at the most downstream section of the proposed development. This assumed a cross section of the existing portion of Greenhills Road at Exchange Drive, and the grade at that location, 1 in 400 with a conservative estimate of the 1% AEP gap flow (0.90 m³/s). The section of Greenhills Road modelled assumed kerb and channel on the northern side as is the case at present. The southern side has a shallow open channel with grated pits in lieu of the standard EDCM pits on the northern side. The results are summarised in Table 4 with full results in Appendix C.

Table 4: PC Convey results – 1% AEP gap flow estimate

Parameter	Value
Gap Flow (m³/s)	0.90
Road Grade	1 in 400
Average Depth (m)	0.10
Maximum Depth (m)	0.28
Average Velocity (m/s)	0.55
Maximum Depth × Velocity (m²/s)	0.15
Average Depth × Velocity (m²/s)	0.05

The resultant cross section is shown in Figure 7 below:

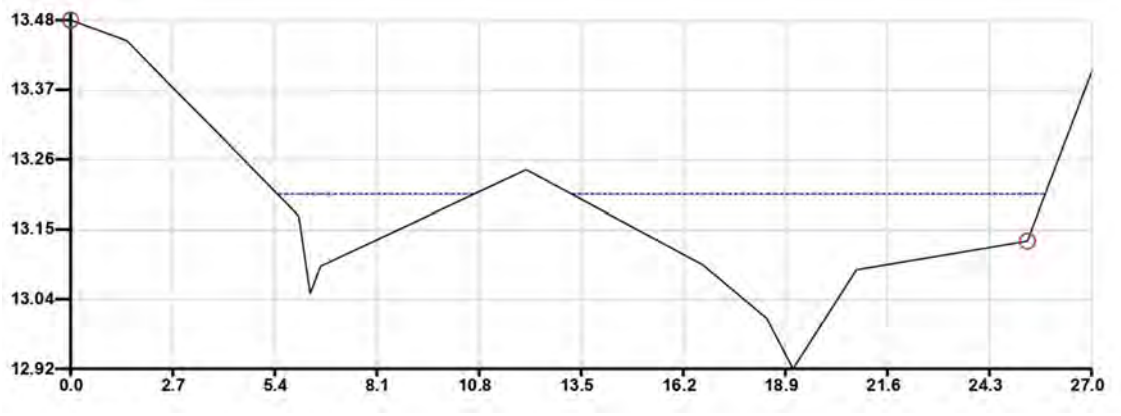

Figure 7: PC Convey estimate of maximum gap flow

The section shown in Figure 7 models Greenhills Road based on a surveyed section from the property boundary on the northern side to the open drain on the southern side. Surface runoff at depth will spill into the low-lying green wedge land along the southern boundary before inundating properties to the north.

The gap flow estimate is within the guidelines set by the Victorian Department of Environment, Land, Water and Planning (DELWP) and the Melbourne Water Land Development Manual for gap flow depth (d_{ave}) and average depth-velocity product ($d_{ave} \times v_{ave}$) in residential streets:

$$\text{Maximum } d_{ave} = 0.3\text{m}, \text{ Maximum } d_{ave} \times v_{ave} = 0.35\text{m}^2/\text{s}$$

4.4. Proposed Drainage Network

As discussed in Sections 3.2, 3.3 and 3.4 the site connections are proposed to be catered for by existing MW and Council piped systems with a short extension along Greenhills Road to service lots 6-9. Minor flows will be catered for by these piped assets and via open channels to Deep Creek. Overland gap flows for major events will follow Greenhills Road and the existing open drain to Deep Creek. The proposed drainage network for the site is demonstrated in Figure 8 below. Existing Council pipes are shown in red, MW Scheme pipes in blue and proposed additional pipes in green. Drainage along Koo Wee Rup Road (Department of Transport) shown at left in orange which will not be altered or connected to as part of the development.

Figure 8: Existing and proposed drainage network. Existing Council pipes (red), Existing MW pipes (blue) and Proposed augmentation (green) (Source: Nearmap)

The 10% AEP post-developed runoff estimates have been checked for each lot against the capacity of the outlet pipe to check for adequate capacity. Existing pipe size and grades were obtained based on survey and supplied as-constructed information. These capacities are listed in Table 5 below:

Table 5: 1% AEP Lot runoff vs pipe capacity estimates

Lot Number	Lot Area (ha)	Pipe Outlet Diameter (mm)	10% AEP Runoff (m^3/s)	Pipe Capacity (m^3/s)
1	2.71	600	0.369	0.488
2	0.157	300	0.028	0.078
3	0.157	300	0.028	0.105
4	0.157	300	0.028	0.106
5	0.133	300	0.024	0.084
6	0.138	675*	0.454*	0.506*
7	0.801			
8	0.801			
9	0.959			

*Lots 6 – 9 are proposed to connect to a common 675mm pipe which is constructed past Lots 6 and 7 and will be extended to Lots 8 and 9

The pipe capacity summary in Table 5 shows that the existing pipe connections have sufficient capacity for the 10% AEP discharge.

5.0 Water Quality

5.1. Water Quality Requirements

The site is located within the MW Drainage Scheme (DS) No. 1601 – Deep Creek South. The permit requires that stormwater quality measures are applied to this site in accordance with the Clause 44 of the State Environmental Protection Policy (SEPP).

To meet minimum SEPP requirements, developments should meet the Best Practice Environmental Management Guidelines for Urban Stormwater, available from CSIRO Publishing.

Best practice stipulates the following outcomes for both construction, and post-construction phases of the project:

Pollutant type	Receiving water objective	Current best practice performance objective
Suspended solids (SS)	Comply with SEPP (not to exceed the 90th percentile of 80 mg/L) (1)	80% retention of the typical urban annual load
Total phosphorus (TP)	Comply with SEPP (base flow concentration not to exceed 0.08 mg/L) (2)	45% retention of the typical urban annual load
Total nitrogen (TN)	Comply with SEPP (base flow concentration not to exceed 0.9 mg/L) (2)	45% retention of the typical urban annual load
Litter	Comply with SEPP (No litter in waterways) (1)	70% reduction of typical urban annual load (3)
Flows	Maintain flows at pre-urbanisation levels	Maintain discharges for the 1.5 year ARI at pre-development levels

The Deep Creek South DS nominates stormwater quality treatment downstream of the site with a regional asset. This is a future wetland-retarding basin located adjacent to Deep Creek (WL2 as shown in Figure 4 and in Appendix E) currently not constructed. It is therefore recommended to provide onsite treatment for the for the proposed development prior to discharge to the existing system. This is proposed to be in the form of a Gross Pollutant Trap (GPT) for each individual lot installed prior to connection to the downstream pipe network.

6.0 Preservation of Existing Waterways

This development does not have direct proximity to existing waterways as part of the internal drainage solution or proposed outfall infrastructure for the site

Preservation of the natural ecology of waterways is fundamental to an assessment of the overall impact of development on the water cycle.

The following conditions will be implemented to ensure water way health is maintained or enhanced:

- Construction phase protection to the waterway will be ensured through the implementation of a Site Environmental Management Plan approved by the relevant authorities and implemented by the contractor outlining appropriate measured to avoid contamination or degradation of the waterway during construction activities.

To this extent, the proposed development makes ample provision for existing waterway health.

7.0 Conclusion

This report demonstrates the principles by which the proposed development can be provided with drainage infrastructure to cater for both major and minor flow events once developed. This statement enables the responsible authority to issue a Planning Permit, granting permission for the development proposal, subject to permit conditions for further detailed documentation of the proposed design solutions.

7.1. Registered Engineers Statement

This advice has been authorised by a Registered Engineer in accordance with The Professional Engineers Registration Act 2019.

Andrew Scanlon – Water Resources Engineer

B.Eng (civil)/B Sc; MIEAust;

NER 9785967

Appendix A

Development Proposal

PROPOSED SUBDIVISION 01

1084 Koo Wee Rup Road, Pakenham 3810

LEGEND:

- SITE BOUNDARIES
- LOT BOUNDARIES
- EXISTING LOT BOUNDARIES
- STAGE BOUNDARIES
- SALEABLE LAND
- ROAD RESERVE

PARCEL DETAILS

TOTAL SITE AREA:	5.252ha
SALEABLE LAND AREA:	5.109ha
ROAD RESERVE:	1430m²

* PARCEL INFORMATION SHOWN HEREON IS BASED ON KLMS SURVEY - SEE 12692 DE01 V1 DATED 17/01/2025.

PROPOSED DEVELOPMENT LAYOUT SUBJECT TO FURTHER INVESTIGATION ON SITE CONSTRAINTS RELATING TO ENVIRONMENTAL AND SERVICEABILITY.

KLM SPATIAL CAN THEREFORE ACCEPT NO RESPONSIBILITY FOR RELIANCE ON THIS PLAN FOR ANY FINANCIAL DEALINGS INVOLVING THE LAND.

Nearmap PHOTOMAP FLOWN: 13/10/2024

REF: 12692 PP02 Version: 2 Date: 5-01-2025

12.5 0 12.5 25 37.5 50 62.5

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PROPOSED SUBDIVISION 01

1084 Koo Wee Rup Road, Pakenham 3810

LEGEND:

- SITE BOUNDARIES
- LOT BOUNDARIES
- EXISTING LOT BOUNDARIES
- STAGE BOUNDARIES
- SALEABLE LAND
- ROAD RESERVE

PARCEL DETAILS

TOTAL SITE AREA:	3.389ha
SALEABLE LAND AREA:	3.305ha
ROAD RESERVE:	833m²

* PARCEL INFORMATION SHOWN HEREON IS BASED ON KLMS SURVEY - SEE 12692 DE01 V1 DATED 17/01/2025.

PROPOSED DEVELOPMENT LAYOUT SUBJECT TO FURTHER INVESTIGATION ON SITE CONSTRAINTS RELATING TO ENVIRONMENTAL AND SERVICEABILITY.

KLM SPATIAL CAN THEREFORE ACCEPT NO RESPONSIBILITY FOR RELIANCE ON THIS PLAN FOR ANY FINANCIAL DEALINGS INVOLVING THE LAND.

Nearmap PHOTOMAP FLOWN: 13/10/2024

REF: 12692.01 PP02 Version: 1 Date: 06-02-2025

12.5 0 12.5 25 37.5 50 62.5

1:1250 @ A3 Sheet 1 of 1

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Appendix B

Topographic Site Survey

LEGEND

LP	LIGHT POLE	S.E.P	SIDE ENTRY PIT
PP	POWER POLE	J.P.	JUNCTION PIT
ELP	POLE & LIGHT	GRATE	GRATED PIT
	STAY POLE	SV	STOP VALVE
SEW	SEWER PIT	SVR	STOP VALVE RECYCLED
	TELECOMMUNICATIONS PIT	HYD	FIRE HYDRANT
	ELECTICAL PIT	HYDR	FIRE HYDRANT
	GAS MARKER POST		MARKER POST
	TELECOM. PILLAR	WM	WATER METER
	SIGN		BOREHOLE
	LETTER BOX		BOLLARD
TSP	TRAFFIC SIGNAL PIT		TREE
	TRAFFIC SIGNAL POLE		DEAD TREE
	UNCLASSIFIED PIT		

SCALE

15 0 15 30 45

LENGTHS ARE IN METRES

IMPORTANT NOTE

This plan/digital information is prepared for Campbell Construction Developments from a combination of field survey and existing records for the purpose of designing and developing the land and should not be used for any other purpose.

UNDERGROUND SERVICES
Underground utility services shown hereon have been identified in accordance with Australian Standard 5488-2013 and summarised below.

QL-D is very low accuracy with an unspecified horizontal and vertical accuracy. QL-D information does not involve any field verification or direct measurements and as such can only considered to be a broad indication of the location and type of utility.

QL-C is low accuracy with a specified horizontal accuracy of ±300mm and an unspecified vertical accuracy. QL-C is compiled from field measurements or direct observations of the utility at a specific location. The location of the utility between the observed location can only be considered to be a broad indication of the location and type of utility.

QL-B is medium accuracy with a specified horizontal accuracy of ±300mm and vertical accuracy of ±500mm. QL-B is obtained via tracing/electromagnetic detection and the utility has not been directly observed. No Non-Destructive Digging has occurred to validate the location or type of the utility.

QL-A is high accuracy with a specified horizontal and vertical accuracy of ±50mm. QL-A refers to verifying the asset from direct observation, but may not identify the internal structure or content of the asset.

The survey date provided in this plan represents the last day a KLM Spatial surveyor was on site to perform field measurements. Any additional servicing works completed after this date cannot be represented on this plan.

In all instances, it is essential that the position of underground services (whether or not shown on this plan) be verified on site and abutting sites prior to any critical design or commencement of works. This should be done in consultation with all relevant service authorities.

All dimensions and survey marks shown on this Plan should be verified/confirmed by all contractors and consultants prior to any future construction and site works.

Any reproduction of this information in other plans requires the authorship of KLM Spatial to be noted on that plan and a statement that the information has not been altered.

This note is an integral part of this plan.

DATE OF SURVEY:

The fieldwork for this survey was completed on 18-12-2024

TITLE: PS824526Q

The Title boundaries shown hereon have been re-established by field survey vide PS806463 & BP229414. The Title boundaries shown hereon were not marked by the author at the time of survey.

LAND SUBJECT TO EASEMENTS
E-1 - 5 Metre Wide Easement for GAS SUPPLY & THE RIGHTS IN CONNECTION WITH MCP AA126I created in AK412675L in favour of VIC GAS DISTRIBUTION PTY. LTD.

LICENSED SURVEYORS CERTIFICATION:

I, Damien Marc Rivalland of Level 4, 31 Dalmore Drive, Scorsby certify that this plan has been prepared from a survey made under my direction and supervision in accordance with the Surveying Act 2004 and completed on 15.01.2024, that this plan is accurate and correctly represents the adopted boundaries and that the survey accuracy accords with that required by regulation 7(1) of the Surveying (Cadastral Surveys) Regulations 2015.

Date: 15.01.2024

Licensed Surveyor
Surveying Act 2004

DATUM NOTATION:

HORIZONTAL DATUM
Co-ordinates are plane co-ordinates computed from the following:

Orientation:
This survey was oriented to MGA2020 Zone 55 using GNSS observations.

Origin of Co-ordinates:
PM 144 has been used as the origin for MGA2020 Zone 55 co-ordinates.
SMES Nominated Horizontal Order Accuracy:3

HEIGHT DATUM
Heights are to the Australian Height Datum, derived from the following:

Origin of AHD Levels from PM 144 with RL 17.384.
SMES Nominated Vertical Order Accuracy:3
Confirmed by: PM 515 with RL 16.427
Height Difference: 0.01

Contour Interval is 0.20 metres.

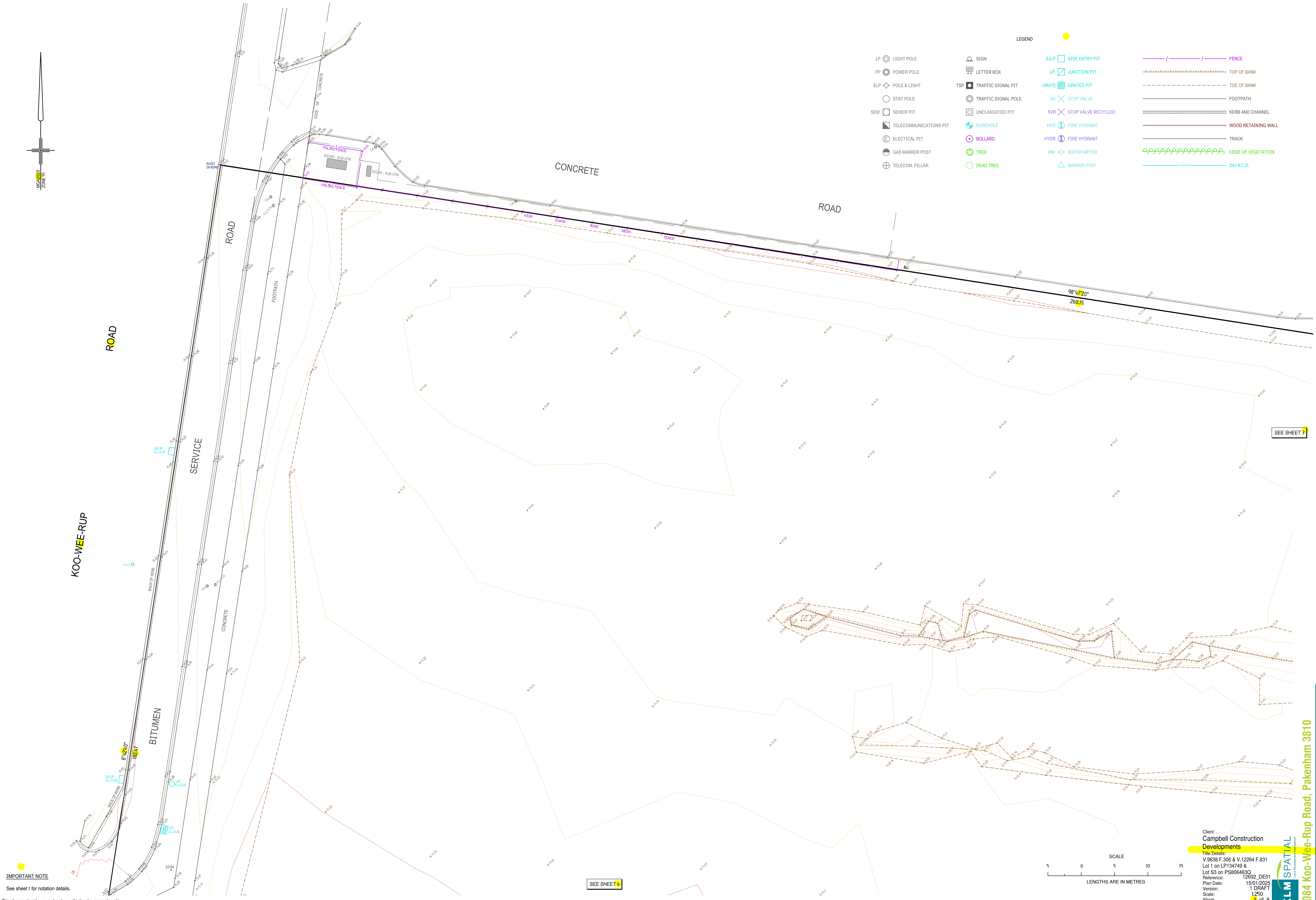
PRELIMINARY DRAFT FOR INTERNAL PURPOSES ONLY

Client:
Campbell Construction Developments
Title Details:
V.9638 F.306 & V.12264 F.831
Lot 1 on LP134749 &
Lot S3 on PS806463Q
Reference: 12692_DE01
Plan Date: 15/01/2025
Version: 1 DRAFT
Scale: 1:250
Sheet 1 of 8
Sheet Size: A1

KLM SPATIAL Land Development Intelligence

1084 Koo-Wee-Rup Road, Pakenham 3810

Plan of Survey



CONCRETE ROAD
KOO-WEE-RUP ROAD
SERVICE ROAD
BITUMEN
FOOTPATH
CONCRETE
EDGE OF CONCRETE
KIOSK - SUB STN
PALING FENCE
HIGH CHAIN WIRE MESH FENCE
RIVET IN KERB
BACK OF KERB
98°47'20"
260.15
8°42'00"
182.47
SEE SHEET 3
SEE SHEET 4
MGA2020 ZONE 55
LEGEND
LP LIGHT POLE
PP POWER POLE
ELP POLE & LIGHT
STAY POLE
SEW SEWER PIT
TELECOMMUNICATIONS PIT
ELECTICAL PIT
GAS MARKER POST
TELECOM. PILLAR
SIGN
LETTER BOX
TSP TRAFFIC SIGNAL PIT
TRAFFIC SIGNAL POLE
UNCLASSIFIED PIT
BOREHOLE
BOLLARD
TREE
DEAD TREE
S.E.P SIDE ENTRY PIT
J.P. JUNCTION PIT
GRATE GRATED PIT
SV STOP VALVE
SVR STOP VALVE RECYCLED
HYD FIRE HYDRANT
HYDR FIRE HYDRANT
WM WATER METER
MARKER POST
FENCE
TOP OF BANK
TOE OF BANK
FOOTPATH
KERB AND CHANNEL
WOOD RETAINING WALL
TRACK
EDGE OF VEGETATION
INV R.C.P.
SCALE
5 0 5 10 15
LENGTHS ARE IN METRES

PRELIMINARY DRAFT FOR INTERNAL PURPOSES ONLY

IMPORTANT NOTE

See sheet 1 for notation details.

Client:
Campbell Construction Developments

Title Details:
V.9638 F.306 & V.12264 F.831
Lot 1 on LP134749 &
Lot S3 on PS806463Q

Reference:	12692_DE01
Plan Date:	15/01/2025
Version:	1 DRAFT
Scale:	1:250
Sheet	2 of 8
Sheet Size:	A1

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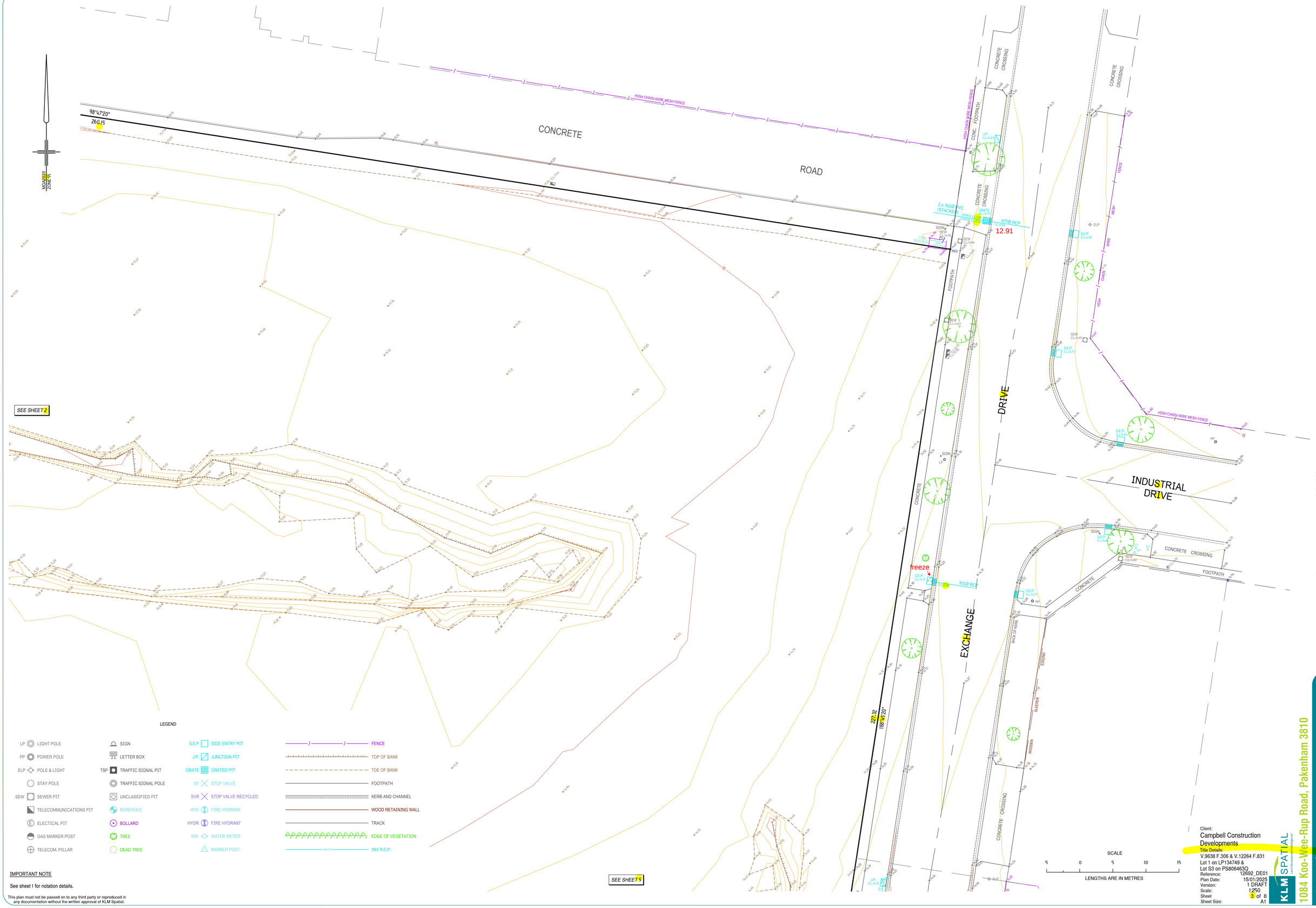
1084 Koo-Wee-Rup Road, Pakenham 3810

Plan of Survey



LEGEND

LP LIGHT POLE	SIGN	S.E.P. SIDE ENTRY PIT	FENCE
PP POWER POLE	LETTER BOX	J.P. JUNCTION PIT	TOP OF BANK
ELP POLE & LIGHT	TSP TRAFFIC SIGNAL PIT	GRATE GRATED PIT	TOE OF BANK
STAY POLE	TRAFFIC SIGNAL POLE	SV STOP VALVE	FOOTPATH
SEW SEWER PIT	UNCLASSIFIED PIT	SVR STOP VALVE RECYCLED	KERB AND CHANNEL
TELECOMMUNICATIONS PIT	BOREHOLE	HYD FIRE HYDRANT	WOOD RETAINING WALL
ELECTICAL PIT	BOLLARD	HYDR FIRE HYDRANT	TRACK
GAS MARKER POST	TREE	WM WATER METER	EDGE OF VEGETATION
TELECOM. PILLAR	DEAD TREE	MARKER POST	INV R.C.P.

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SCALE

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Sheet Size:	A1

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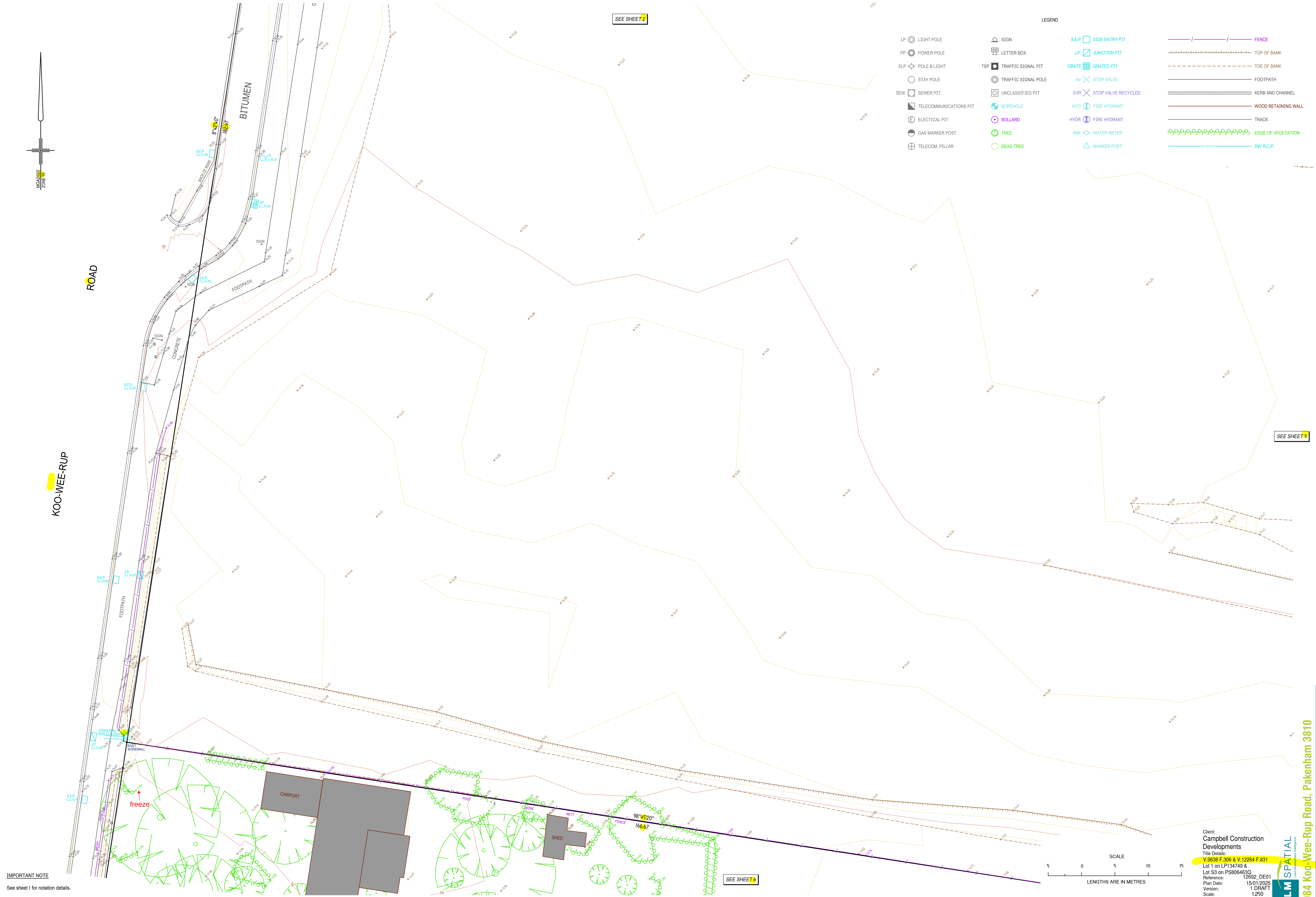

SEE SHEET 2
SEE SHEET 5
SEE SHEET 6
MGA2020 ZONE 55
BITUMEN
8°42'40"
182.47
FOOTPATH
CONCRETE
ROAD
KOO-WEE-RUP
FOOTPATH
CARPORT
SHED
FENCE
POST
freeze
98°45'20"
166.67
LEGEND
LP LIGHT POLE
PP POWER POLE
ELP POLE & LIGHT
STAY POLE
SEW SEWER PIT
TELECOMMUNICATIONS PIT
ELECTICAL PIT
GAS MARKER POST
TELECOM. PILLAR
SIGN
LETTER BOX
TSP TRAFFIC SIGNAL PIT
TRAFFIC SIGNAL POLE
UNCLASSIFIED PIT
BOREHOLE
BOLLARD
TREE
DEAD TREE
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SVR STOP VALVE RECYCLED
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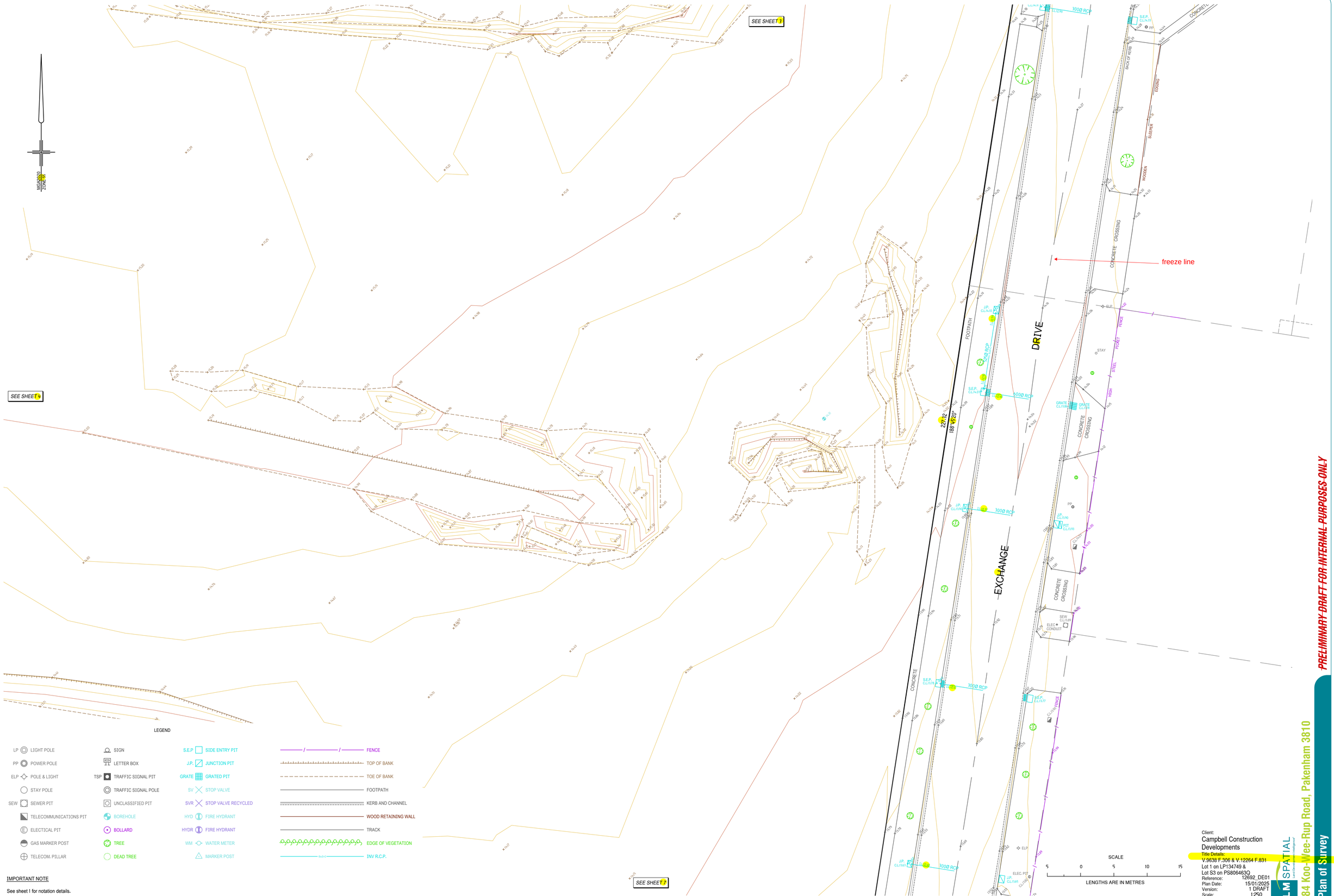

LEGEND

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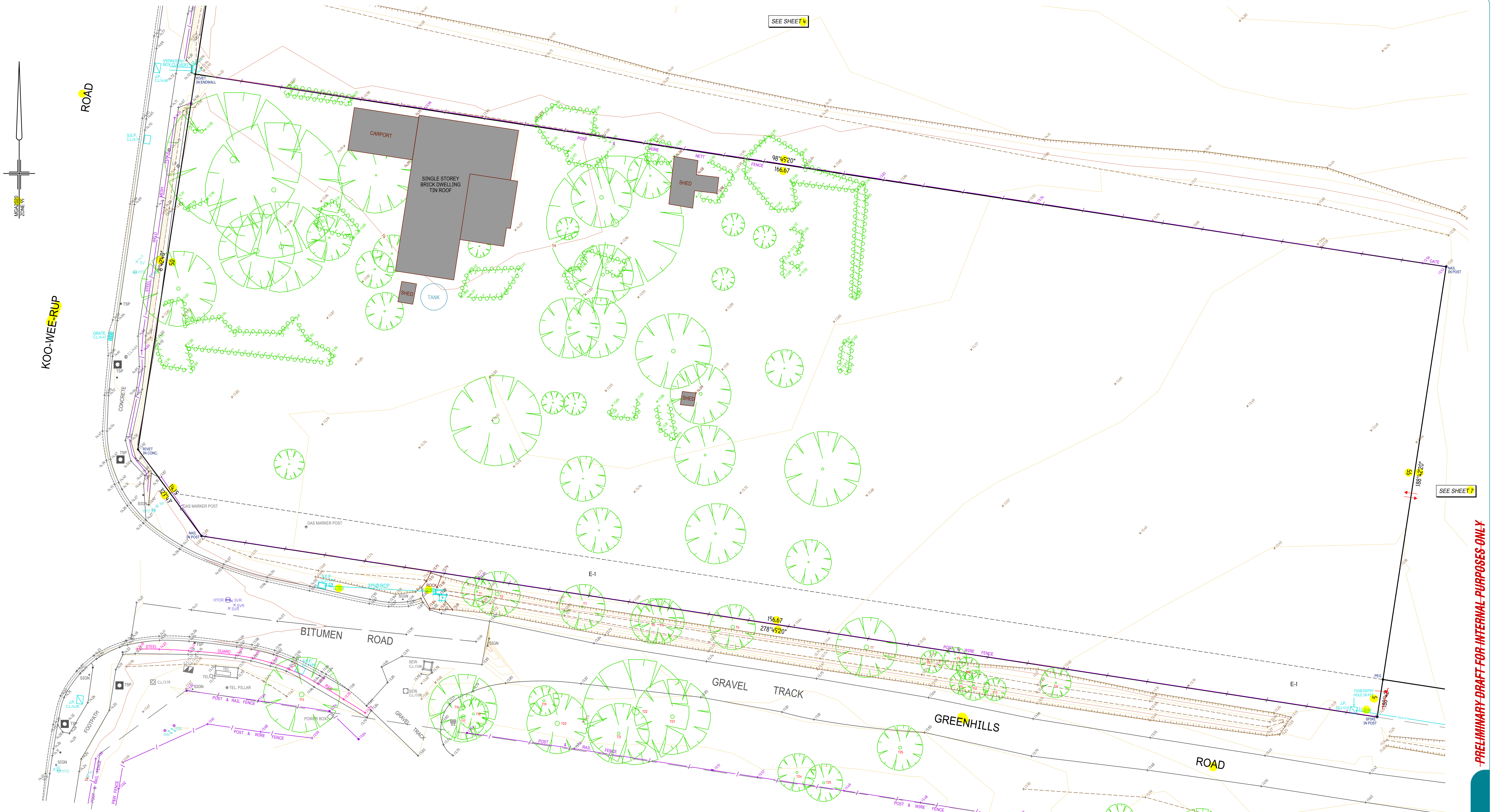

LEGEND

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PP POWER POLE	LETTER BOX	J.P. JUNCTION PIT
ELP POLE & LIGHT	TSP TRAFFIC SIGNAL PIT	GRATE GRATED PIT
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ELECTRICAL PIT	BOLLARD	HYDR FIRE HYDRANT
GAS MARKER POST	TREE	WM WATER METER
TELECOM. PILLAR	DEAD TREE	MARKER POST

FENCE
TOP OF BANK
TOE OF BANK
FOOTPATH
KERB AND CHANNEL
WOOD RETAINING WALL
TRACK
EDGE OF VEGETATION
INV R.C.P.

IMPORTANT NOTE

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Version: 1 DRAFT
Scale: 1:250
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Plan of Survey

SEE SHEET 5

SEE SHEET 6

MGA2020 ZONE 55

LEGEND

LP	LIGHT POLE		SIGN	S.E.P	SIDE ENTRY PIT	FENCE
PP	POWER POLE		LETTER BOX	J.P.	JUNCTION PIT	TOP OF BANK
ELP	POLE & LIGHT	TSP	TRAFFIC SIGNAL PIT	GRATE	GRATED PIT	TOE OF BANK
	STAY POLE		TRAFFIC SIGNAL POLE	SV	STOP VALVE	FOOTPATH
SEW	SEWER PIT		UNCLASSIFIED PIT	SVR	STOP VALVE RECYCLED	KERB AND CHANNEL
	TELECOMMUNICATIONS PIT		BOREHOLE	HYD	FIRE HYDRANT	WOOD RETAINING WALL
	ELECTICAL PIT		BOLLARD	HYDR	FIRE HYDRANT	TRACK
	GAS MARKER POST		TREE	WM	WATER METER	EDGE OF VEGETATION
	TELECOM. PILLAR		DEAD TREE		MARKER POST	INV R.C.P.

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Version:	1 DRAFT
Scale:	1:250
Sheet	7 of 8
Sheet Size:	A1

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1084 Koo-Wee-Rup Road, Pakenham 3810

Plan of Survey

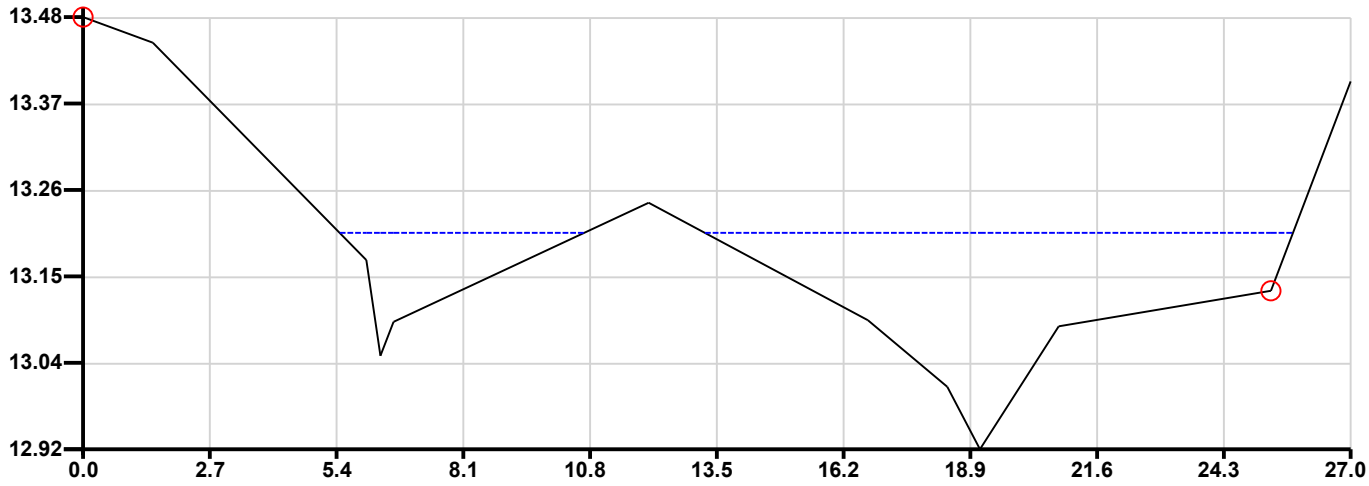
PRELIMINARY DRAFT FOR INTERNAL PURPOSES ONLY

Appendix C

PC Convey Results

PROJECT: 12692.00 - 1084 Koo Wee Rup Rd
Greenhills Rd Gap Flow - Existing Road
Print-out date: 30/07/2025 - Time: 9:36
Data File: 12692 Gap Flow Est Existing Section.dat

1. CROSS-SECTION:



2. DISCHARGE INFORMATION:

100 year (1%) storm event
1080 Koo Wee Rup Rd

Total discharge = 0.9 cumecs

There is no pipe discharge
Overland / Channel / Watercourse discharge = 0.900 cumecs

3. RESULTS: Water surface elevation = 13.204m

Grade = 1 in 400

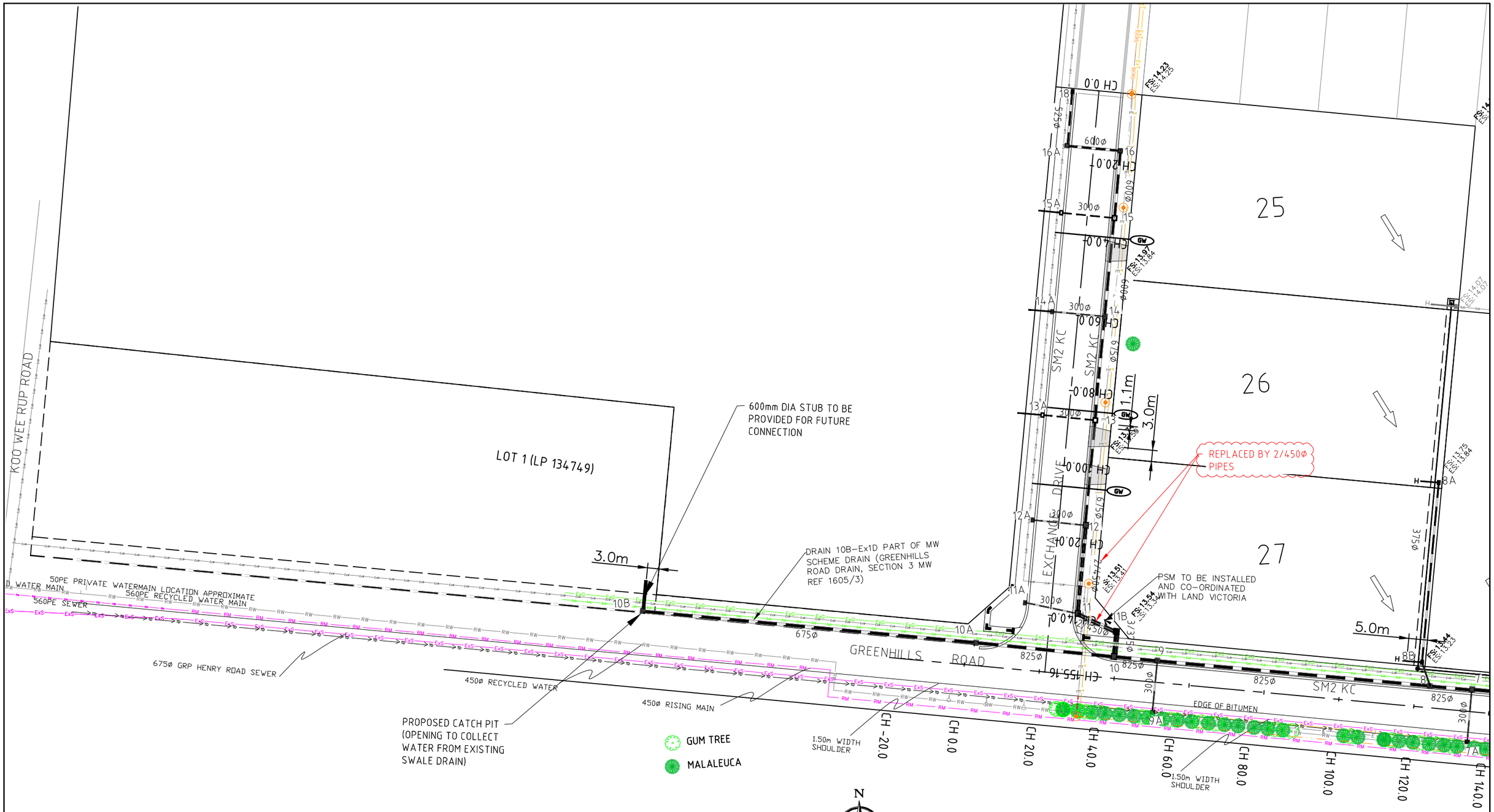
	LEFT OVERBANK	MAIN CHANNEL	RIGHT OVERBANK	TOTAL CROSS-SECTION
Discharge (cumecs):	0.00	0.95	0.00	0.96
D(Max) = Max. Depth (m):	0.00	0.28	0.08	0.28
D(Ave) = Ave. Depth (m):	0.00	0.10	0.04	0.10
V = Ave. Velocity (m/s):	0.00	0.56	0.19	0.55
D(Max) x V (cumecs/m):	0.00	0.16	0.01	0.15
D(Ave) x V (cumecs/m):	0.00	0.06	0.01	0.05
Froude Number:	0.00	0.56	0.31	N/A
Area (m^2):	0.00	1.72	0.02	1.73
Wetted Perimeter (m):	0.00	17.31	0.48	17.78
Flow Width (m):	0.00	17.26	0.47	17.73
Hydraulic Radius (m):	0.00	0.10	0.04	0.10
Composite Manning's n:	0.000	0.019	0.030	N/A
Split Flow?	-	-	-	Yes

4. CROSS-SECTION DATA:

	LEFT HAND POINT		RIGHT HAND POINT		
SEGMENT NO.	CHAINAGE (m)	R.L. (m)	CHAINAGE (m)	R.L. (m)	MANNING'S N
1	0.000	13.483	1.480	13.450	0.012
2	1.480	13.450	6.032	13.169	0.030
3	6.032	13.169	6.334	13.045	0.012
4	6.334	13.045	6.610	13.089	0.012
5	6.610	13.089	12.047	13.243	0.013
6	12.047	13.243	16.712	13.091	0.013
7	16.712	13.091	18.403	13.005	0.012
8	18.403	13.005	19.101	12.924	0.025
9	19.101	12.924	20.782	13.083	0.025
10	20.782	13.083	25.297	13.129	0.025
11	25.297	13.129	27.000	13.400	0.030

Appendix D

Surrounding Drainage Infrastructure Information



ALIGNMENT PLAN
SCALE 1:1000 (A3)

AS CONSTRUCTED

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DATE	REV	AMENDMENT
03.05.2019	H	EXCHANGE DRIVE WESTERN KERB RETURN AMENDED
29.07.2019	I	AMENDED DRAINAGE WORKS
06.08.2019	J	AMENDED DRAINAGE WORKS
09.08.2019	K	AMENDED DRAINAGE PIPE SIZE
14.11.2019	K2	DRAINAGE AMENDED AT ROAD INTERSECTIONS x 2
18.12.2019	K3	DRAINAGE AMENDED EXCHANGE DRIVE

LEGEND

EXISTING KERB AND CHANNEL	WATER MAINS AND FITTINGS	EX. / PROP.
PROPOSED KERB AND CHANNEL	SEWER MAINS AND ENTITIES	EX. / PROP.
EXISTING DRAINS AND PITS	GAS MAINS AND PITS	EX. / PROP.
PROPOSED DRAINS AND PITS	TELECOM CABLES AND PITS	EX. / PROP.
PROPOSED PROPERTY INLET	ELEC. CABLES AND PITS	EX. / PROP.

DESIGNED	V.N.	SCALE	AS SHOWN		
DATE	AUGUST 2018				
CHECKED		APPROVED			
DATE	AUGUST 2018	DATE	AUGUST 2018		
DATUM	AHD	MELWAYS REFERENCE	323 G&H		

Craig Civil Design
CIVIL ENGINEERING CONSULTANTS & PROJECT MANAGERS
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P.O. BOX 1207, NARRE WARREN 3805 PHONE: 5995 4388
mail@craigcivil.com.au FAX: 5995 5330

CARDINIA SHIRE COUNCIL

GREENHILLS ESTATE

INDUSTRIAL DRIVE- GREENHILLS ROAD

PAKENHAM

ALIGNMENT SHEET 1 OF 2

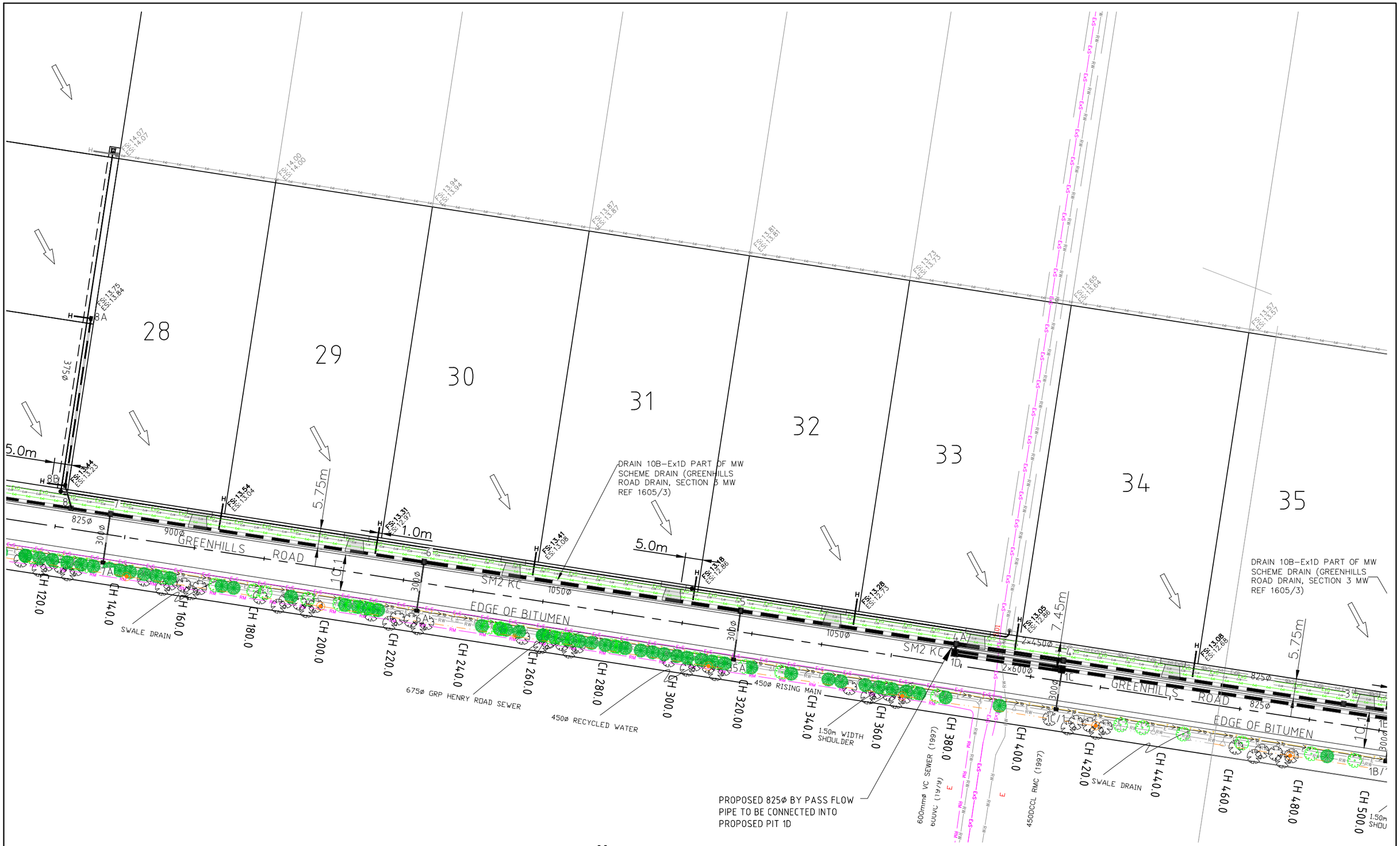
DRAWING NO.- 17083-03

SHEET - 3 OF 27

REVISION - K3

CCD REF. NO. - 17083 A3

Dwg. Location: Z:\CRAIG CIVIL DESIGN\CURRENT PROJECTS\2017\17083 - Greenhills Industrial Stage 2\Drawings\CCD Design\17083_Rev K3 - As constructed.dwg; Editor: Vasanthy



ALIGNMENT PLAN
SCALE 1:1000 (A3)

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DATE	REV	AMENDMENT
03.05.2019	H	EXCHANGE DRIVE WESTERN KERB RETURN AMENDED
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14.11.2019	K2	DRAINAGE AMENDED AT ROAD INTERSECTIONS x 2
18.12.2019	K3	DRAINAGE AMENDED EXCHANGE DRIVE

LEGEND

EXISTING KERB AND CHANNEL	
PROPOSED KERB AND CHANNEL	
EXISTING DRAINS AND PITS	
PROPOSED DRAINS AND PITS	
PROPOSED PROPERTY INLET	

WATER MAINS AND FITTINGS	EX.	
	PROP.	
SEWER MAINS AND ENTITIES	EX.	
	PROP.	
GAS MAINS AND PITS	EX.	
	PROP.	
TELECOM CABLES AND PITS	EX.	
	PROP.	
ELEC. CABLES AND PITS	EX.	
	PROP.	

DESIGNED	V.N.	SCALE	AS SHOWN
DATE	AUGUST 2018		
CHECKED		APPROVED	
DATE	AUGUST 2018	DATE	AUGUST 2018
DATUM	AHD	MELWAYS REFERENCE	323 G&H

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DRAWING NO.- 17083-04

SHEET - 4 OF 27

REVISION - K3

CCD REF. NO. - 17083 A3

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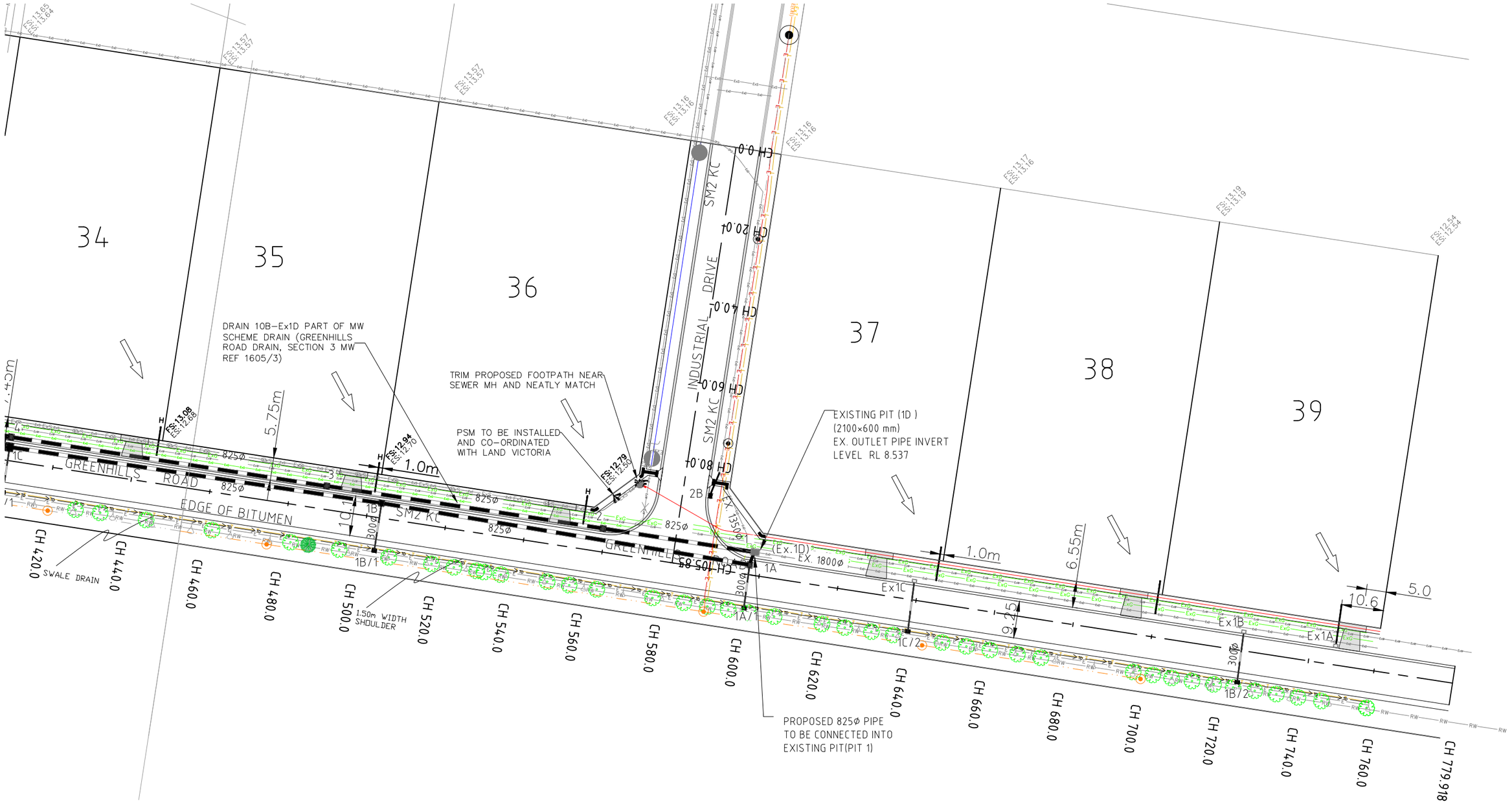

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SCALE 1:1000 (A3)

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SHEET - 5 OF 27
REVISION - K3
CCD REF. NO. - 17083
A3

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CATCHMENT PLAN

SCALE 1:2500 (A3)

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PROPOSED KERB AND CHANNEL	SEWER MAINS AND ENTITIES	EX. / PROP.
EXISTING DRAINS AND PITS	GAS MAINS AND PITS	EX. / PROP.
PROPOSED DRAINS AND PITS	TELECOM CABLES AND PITS	EX. / PROP.
PROPOSED PROPERTY INLET	ELEC. CABLES AND PITS	EX. / PROP.

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DATE	AUGUST 2018		
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CATCHMENT PLAN

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SHEET -26 OF 27

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Appendix E

MWC Drainage Scheme Map

1601 - Deep Creek South DSS

Legend

- Development Services Scheme Boundary
- Development Services Strategy Boundary
- Development Services Precinct Renewal Scheme Boundary
- Development Services Precinct Renewal Strategy Boundary
- Scheme Property Boundary
- Project - Allocated
- Project - Works in Progress
- Project – Finalised
- Overland Flow Path

Future Works

- Sediment Pond
- Litter Trap
- Culvert
- Pipeline
- Soft Engineering
- Bio-Retention Swale
- Channel
- Cleanout Works
- Low Flow Pipe with Channel
- Swale
- Bio-Retention Basin
- Buffer Strip
- Related Works
- Wetland
- Retarding Basin
- Nodes

Existing Assets

- Wetland
- Sed Trap
- Bioretention
- Structure
- Retarding Basins
- Underground Drain
- Channel
- Natural Waterway
- Melbourne Water Water Main
- Melbourne Water Sewer Main
- Melbourne Water Reclaim Main

Map at A1

1:8,000

0 85 170 340 m

Printed: 6/07/2022

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