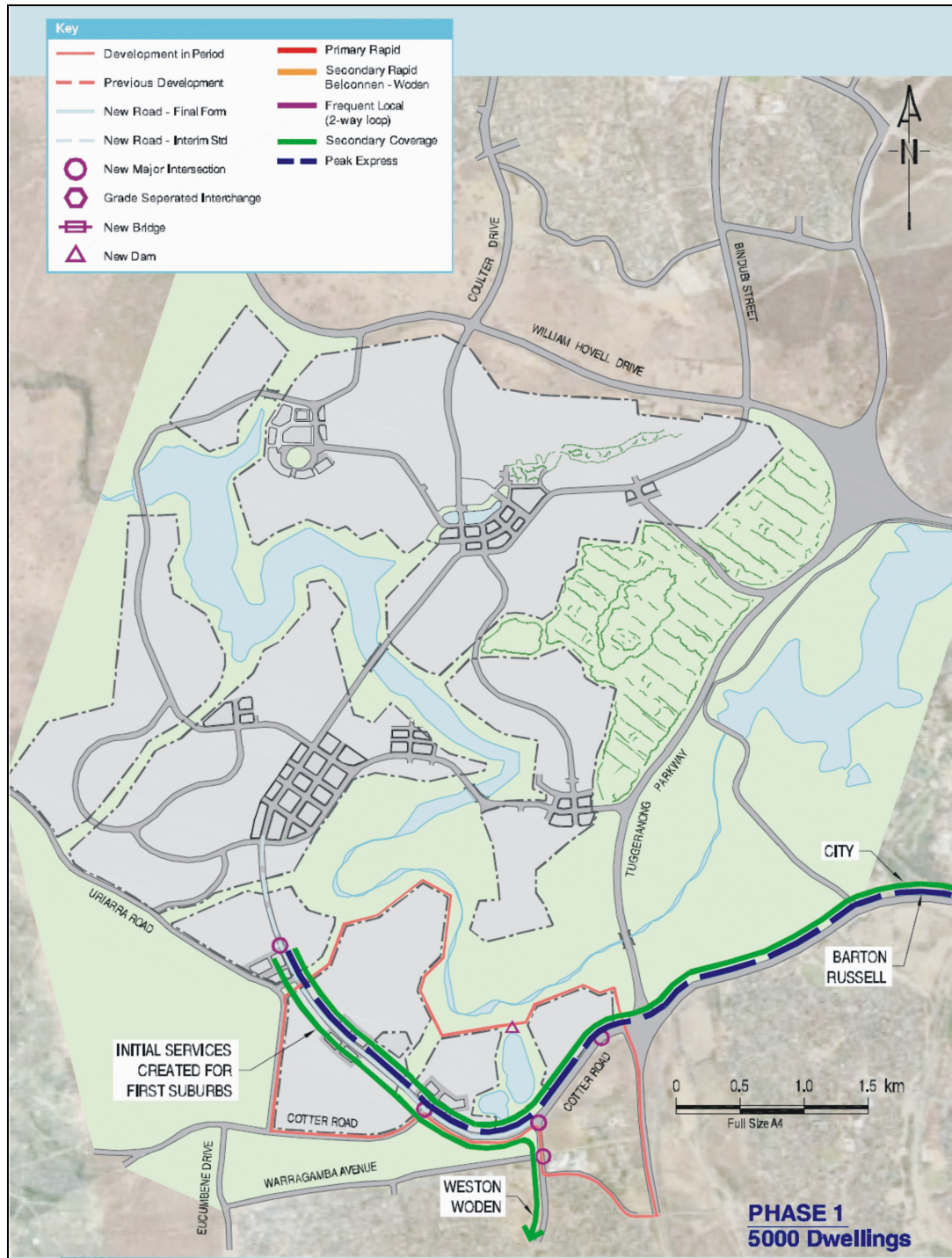


Figure 4.2 ACT STNP – Recommended Service Plan for Molonglo Phase 1



Source: ACT Strategic Public Transport Network Plan

Figure 4.3 Public Transport Network



4.3 ROAD NETWORK PERFORMANCE

Assessments were undertaken to examine the road network operational performance on both a mid block basis and at the identified key intersections of the higher order road network for both the assessed assignment methods.

4.3.1 ACT Classification of Residential Streets

Table 4.1 sets out the ACT Classification of Residential Streets.

Table 4.1 ACT Classification of Residential Streets

Residential Street level, type and function	Desirable speed environment (km/h)*	Indicative traffic volume (vehicles per day) **
LOCAL ACCESS STREETS		
Rear lane	25	Residents and service vehicles: 0–100
Local access A	40	0–300
Local access B	40	301–1000
Local access C	50	1001–2000
Local access streets are generally streets where the residential environment is dominant, traffic is subservient, speed and volume are low, and pedestrian and cycle movements are facilitated. Local access streets are categorised as A, B and C according to traffic volumes and width requirements for the road reservation as per Table 4. Rear lanes and Local Access A provide access to sites without any traffic generated by sites in other streets.		
COLLECTOR STREETS		
Minor collector	50	1000–3000
The collector street collects traffic from access streets and carries higher volumes of traffic. A reasonable level of residential amenity and safety is maintained by restricting traffic volumes and vehicle speeds. Vehicle speeds are controlled by street alignment, intersection design and, in some cases, by speed-control measures.		
Major collector	60	3000–6000
The major collector is generally short and connects the collector street with the corridor network. Fronting development should still be encouraged, but with siting conditions which ensure acceptable amenity and safety.		
* This is the intended maximum speed at which most drivers will travel given the inbuilt environmental speed controls created by the street layout and design. It is not a design speed for sight distance cornering or other geometric properties of the carriageway.		
** The indicative maximum traffic volume is a target volume that may be exceeded in a few cases where significant lack of economic or design quality would otherwise result.		

Based upon the traffic generation, distribution and assignment of the Masterplan each street had a daily traffic volume identified such that it could be assessed against the ACTPLA Residential Subdivision Development Code. Drawings 292347-C-RHP-01 to 04 provide a summary of the mid block volumes and road hierarchy for Coombs estate.

Road C03 northbound and southbound between JGD and C08W are classified as major collector roads and each carry approximately 3,600 – 4,400 vehicles a day. Similarly, C04 between JGD and C07 is classified as a major collector with the road carrying some 5,000 – 5,900 vehicles a day.

4.3.2 Intersection Performance

The intersections detailed below were assessed using the SIDRA 5.0 software package for the weekday AM peak and PM peak for internal intersections and AM peak for JGD intersections to determine the degree of saturation (DS), average delays (d), Level of Service (LoS) and queue lengths (QL) at each intersection:

- JGD/Road C03 / Road 01 (Wright) - Signalised.
- JGD/Cotter Road/Road C04 – Signalised.
- Road C03/Road C28 – Priority Controlled
- Road C03/Road C08 – Signalised and Roundabout.
- Road C08/Road C07 – Priority Controlled
- Road C20/Road C09 – Priority Controlled
- Road C07/Road C04 – Signalised, Priority Controlled and Roundabout.

The intersections with JGD were assessed with intersection configurations based on layouts developed by other consultants in the reports referenced. As it is proposed to construct JGD in stages as the Molonglo Valley is being progressively developed, SIDRA analyses for the interim stage for year 2021 and ultimate stage for year 2031 have been carried out as part of the intersection assessment. Through traffic volumes for the 2021 and 2031 were extracted from the Molonglo Transport Model review based on the highest mid-block modelled volumes on John Gorton Drive.

Internal intersections have been assessed based on the AM peak and PM peak hour traffic volumes generated from the proposed Coombs development for year 2031.

Not all internal intersections have been assessed using SIDRA, as most intersections carry very low volumes of traffic. We have analysed 5 internal intersections based on those with higher traffic volumes and where excessive queuing could adversely impact on John Gorton Drive. Although Road C28 will carry low volumes of traffic east of Road C03, this intersection has been assessed as it will be important to confirm that the surrounding intersections can cater for the redistribution of traffic.

The intersections located along JGD have been assessed for the following 3 scenarios in the AM Peak:

Year 2021 Interim

- Intersection layout based on GHD report on Molonglo Infrastructure Stage 1 Traffic report for Intersection 1 and Intersection 4 interim layouts.
- Through traffic volumes based on Molonglo Transport Model Review (AECOM) 2021 with construction of the East-West Arterial link to Tuggeranong Parkway scenario.

Year 2021 Ultimate

- Intersection layout based on GHD report on Molonglo Infrastructure Stage 1 Traffic report for Intersection 1 and Intersection 4 ultimate layouts.
- Through traffic volumes based on Molonglo Transport Model Review (AECOM) 2021 with construction of the East-West Arterial link to Tuggeranong Parkway.

Year 2031 Ultimate

- Intersection layout based on GHD report on Molonglo Infrastructure Stage 1 Traffic report for Intersection 1 and Intersection 4 ultimate layout.
- Through traffic volumes based on Molonglo Transport Model Review (AECOM) 2031 with construction of a third (western) road crossing of Molonglo River scenario. JGD/Road C03/Road 01 (Wright)

The signalised intersection is tested based on the following layouts as shown below in **Figure 4.4** and **Figure 4.5**:

Figure 4.4 JGD/Road C03/Road 01 Interim Stage Intersection Layout

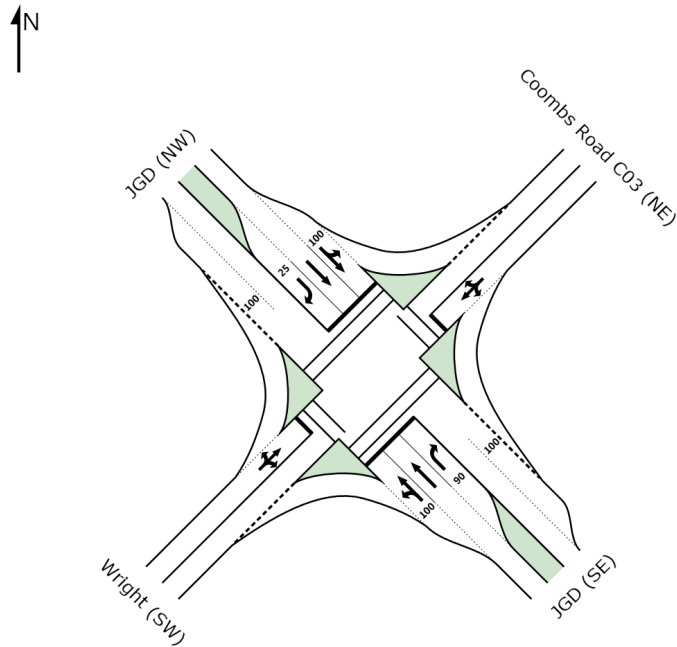


Figure 4.5 JGD/Road C03/Road 01 Ultimate Stage Intersection Layout

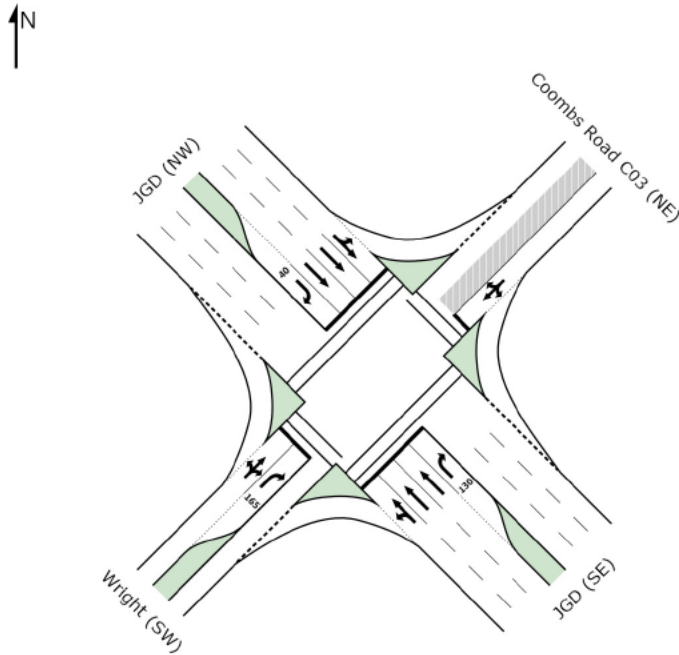


Table 4.2 details the intersection performance for JGD/Road C03/Road 01 (Wright) based on the full development of Coombs and Wright. Detailed results of this analysis are provided in **Appendix B**.

Table 4.2 AM Weekday Intersection Performance JGD/Road C03/ Road 01 (Wright)

Intersection Layout	Year	Performance Criteria			
		Degree of Saturation	Delays (s)	Level of Service	Queue Length (metres)
Interim	2021	>1.000	>120	F	>500
Ultimate	2021	0.792	25.3	B	155
Ultimate	2031	0.811	26.1	B	236

DS = Degree of Saturation d = Delay (seconds)
 Q = Queue Length (m) LoS = Level of Service

Results from the SIDRA analyses indicated:

- The intersection with the interim layout will be over capacity in 2021, operating at a Level of Service F with maximum delays and queue lengths due to the high through movements on JGD. It can be concluded that the Ultimate road upgrade for JGD will need to be implemented at an earlier date than Year 2031 to enable the intersections along JGS to operate satisfactorily.
- With the ultimate layout, the intersection performs satisfactorily at a LoS B in 2021 and 2031.
- It is important to note that the worst movement for the intersection is the right turn from JGD into Coombs development where delays of up to approximately 60 seconds are expected in 2031.

JGD/Cotter Road/Road C04

The signalised intersection has been assessed based on the following layout as shown below in **Figure 4.6** and **Figure 4.7**:

Figure 4.6 JGD/Cotter Road/Road C04 Interim Stage Intersection Layout

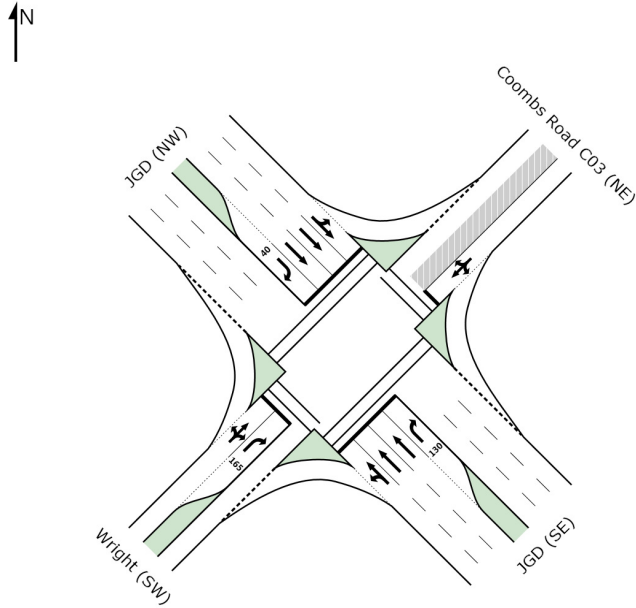


Figure 4.7 JGD/Cotter Road/Road C04 Ultimate Stage Intersection Layout

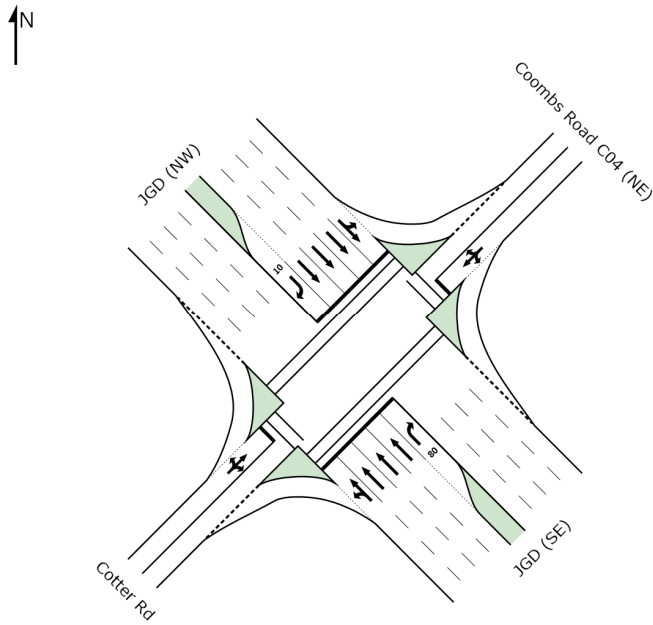


Table 4.3 details the intersection performance for JGD/Cotter Road/Road C04 based on the full development of Coombs and Wright. Detailed results of this analysis are provided in **Appendix B**.

Table 4.3 AM Weekday Intersection Performance for JGD/Cotter Road/Road C04

Intersection Layout	Year	Performance Criteria			
		Degree of Saturation	Delays (s)	Level of Service	Queue Length (metres)
Interim	2021	>1.000	71.3	F	>500
Ultimate	2021	0.695	22.0	B	137
Ultimate	2031	0.827	26.3	B	193

DS = Degree of Saturation

d = Delay (seconds)

Q = Queue Length (m)

LoS = Level of Service

Results from the SIDRA analysis indicated:

- The intersection with the interim layout will be over capacity in 2021, operating at a Level of Service F with maximum delays and queue lengths due to the high through movements on JGD.
- With the ultimate layout, the intersection performs satisfactorily at a LoS B in 2021 and LoS D in 2031.
- The highest delay for the intersection is the right turn from JGD into Coombs where delays of up to 98 seconds and queue lengths of 75 metres are expected in 2031.

Road C03/Road C28

The t-junction has been assessed assuming all movements are permitted.

Figure 4.8 Road 03/Road 28

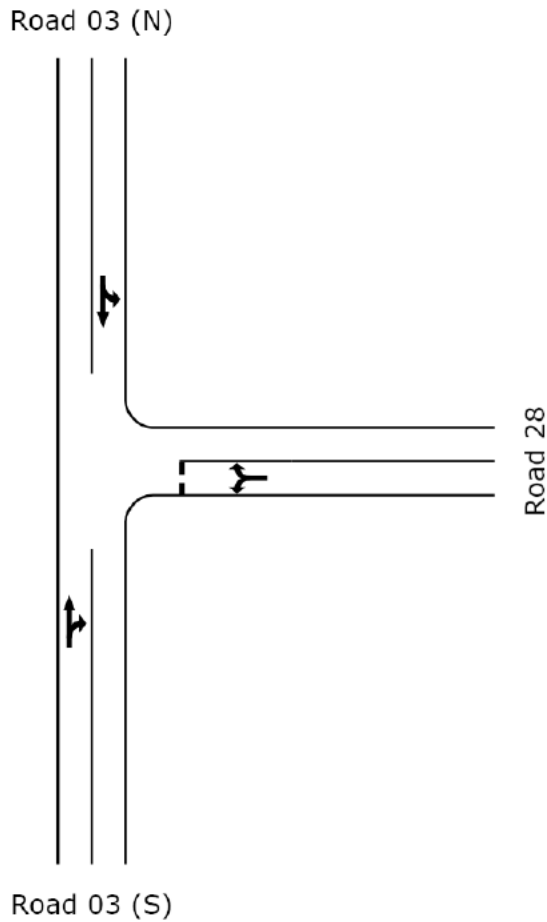


Table 4.4 AM Weekday Intersection Performance for Road 03/Road 28

Year	Performance Criteria			
	Degree of Saturation	Delays (s)	Level of Service	Queue Length (metres)
2031 AM	>1.000	>120	F	>500

DS = Degree of Saturation d = Delay (seconds)
 Q = Queue Length (m) LoS = Level of Service
 LoS values based on worst delay of any vehicle movement

The results have revealed that:

- Vehicles on Road 28 will experience high delays and significant queue lengths and operate a Level of Service F.

An alternative arrangement where only left in/left out movements are permitted has been assessed and internal traffic distributed at the surrounding intersections taking into consideration these changes.

The priority controlled intersection has been analysed based on the following configuration as shown below in **Figure 4.9**.

Figure 4.9 Road03/Road28 Intersection Layout

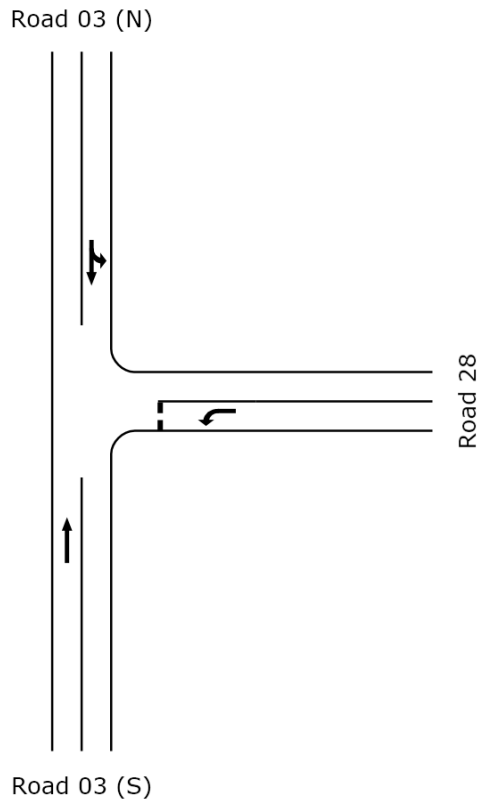


Table 4.5 shows the intersection performance for Road C03/Road C27 based on the full development of Coombs. Detailed results of this analysis are provided in **Appendix B**.

It is important to note that low traffic volumes are expected on Road 28, as this road will be designed to maximise pedestrian connectivity between the surrounding land uses. This can be achieved by LATM measures to reduce its attractiveness for through traffic and permitting left in left out movements only. The majority of vehicles travelling to the school or child care centre will use the roundabout (Road 08/Road07) and turn right into Road 07.

Table 4.5 Weekday Intersection Performance for Road 03/Road 28

Year	Performance Criteria			
	Degree of Saturation	Delays (s)	Level of Service	Queue Length (metres)
2031 AM	0.099	11.9	A	3
2031 PM	0.051	8.7	A	2

DS = Degree of Saturation d = Delay (seconds)
 Q = Queue Length (m) LoS = Level of Service
 LoS values based on worst delay of any vehicle movement

The results have revealed that:

- The priority-controlled intersection operates at good Level of Service A with minimal delays up to 12 seconds expected for vehicles turning from Road 28 onto Road 03 in the AM peak.
- In the PM peak, the intersection operates at a Level of Service A.

Road C03/Road C08

The roundabout intersection has been analysed based on the following configuration as shown below in **Figure 4.10**.

Figure 4.10 Road C03/Road C08 Intersection Layout

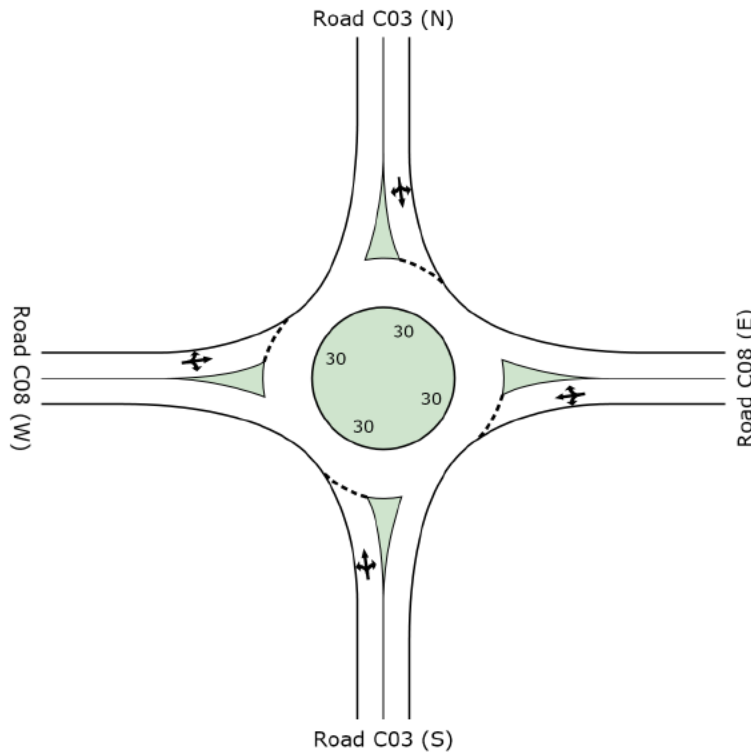


Table 4.6 shows the average intersection performance for Road C03/Road C08 based on the full development of Coombs and Wright. Detailed results of this analysis are provided in **Appendix B**.

Table 4.6 Weekday Intersection Performance for Road C03/Road C08

Year	Performance Criteria			
	Degree of Saturation	Delays (s)	Level of Service	Queue Length (metres)
2031 AM	0.370	8.1	A	22
2031 PM	0.027	11.0	A	2

DS = Degree of Saturation d = Delay (seconds)
 Q = Queue Length (m) LoS = Level of Service
 LoS values based on worst delay of any vehicle movement

The results have revealed that:

- The roundabout intersection operates at good Level of Service A with minimal delays or queues are experienced in the 2031 AM peak hour and PM peak hour.

Consideration has been given to signalising this intersection, principally driven by the anticipated pedestrian demand. There are a number of criteria that need to be considered in order to assess the warrant for signalisation. The minimum volume thresholds (600 vph on the main road and 200 vph on the minor road over 4 hours in a day) warrant for signalisation is met at this location. While pedestrian safety and amenity is superior at a signalised intersection over a roundabout, given the nature of the site (low speed environment, passively re-enforced by the short midblocks – <200m – on the busier southern legs) and the fact that pedestrians are only required to cross a single traffic lane with a wide median island provided with considerable area to store safely on the north south legs, many of the disadvantages are mitigated.

Signals could be considered at this location, the analysis indicated that without upgrading Road 3 to a four lane, two-way midblock between JGD and Road 8 (approximately 200m), the intersection will perform unsatisfactorily during the critical PM peak period in 2031. In particular, if signals were installed queues would occasionally develop beyond the midblock length present between JGD and Road 8. Measures could be developed to accommodate a signalised intersection at C3/C8 (duplicating the southern approach / constructing a long right turn slot) if considered necessary to meet other desired outcomes, however the roundabout is considered the more appropriate treatment from traffic point of view.

Road C08/Road C07

The give-way controlled intersection has been analysed based on the following configuration as shown below in

Figure 4.11. Road 08 (W) and Road 07 have been modelled with priority as they carry higher peak hour volumes compared to Road 08 (E). If the standard intersection priority of Road 08 having priority was to be provided, the intersection will experience excessive delays and is not recommended.

The intersection of Road C08/Road C07 has also been tested with an alternative configuration to analyse the operation under a roundabout configuration as shown in **Figure 4.12.**

Figure 4.11 Road C08/Road C07 Give-Way Intersection Layout

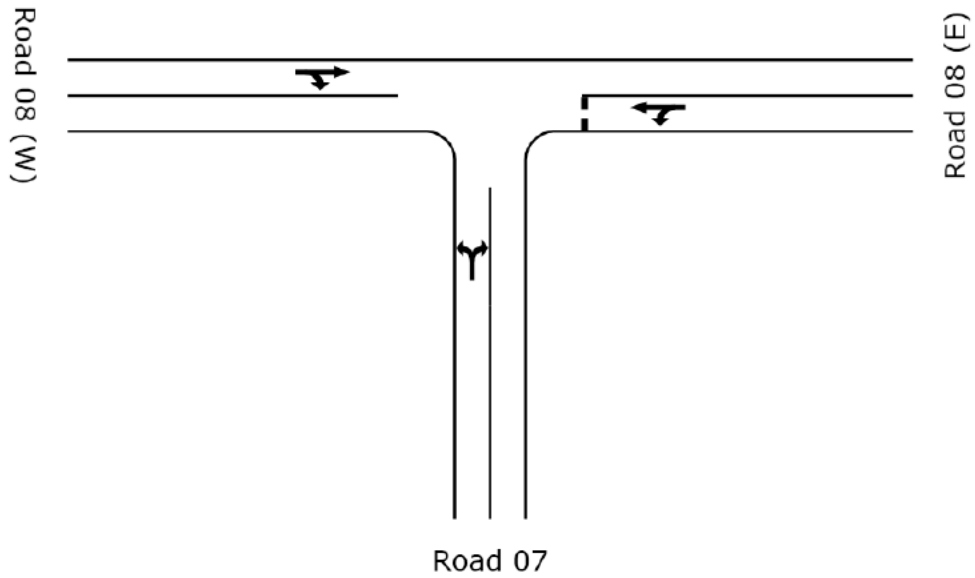


Figure 4.12 Road C08/Road C07 Roundabout Intersection Layout

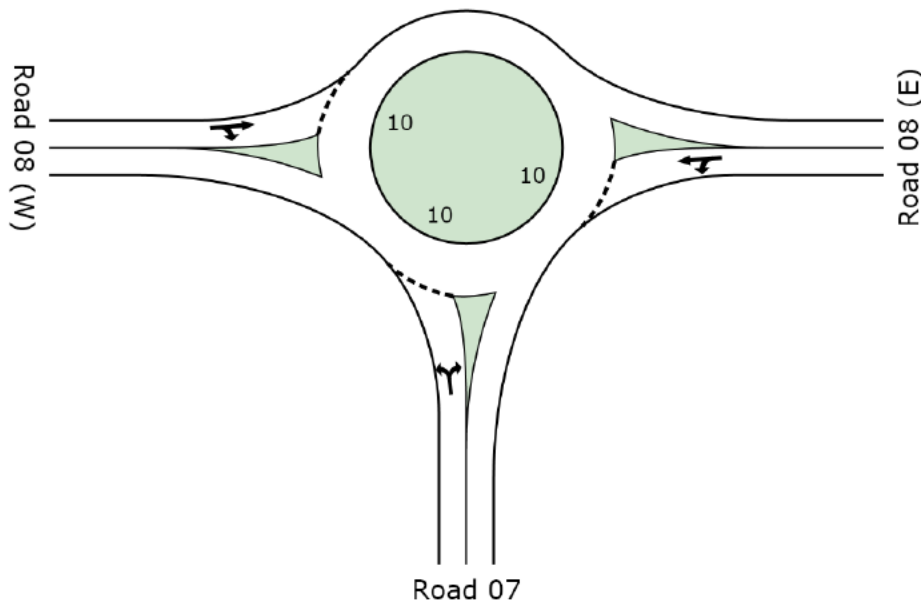


Table 4.7 shows the average intersection performance for Road C08/Road C07 based on the full development of Coombs and Wright. Detailed results of this analysis are provided in **Appendix B**.

Table 4.7 Weekday Intersection Performance for Road C08/Road C07

Intersection Layout	Year	Performance Criteria			
		Degree of	Delays (s)	Level of	Queue

		Saturation		Service	Length (metres)
Give Way	2031 AM	0.374	5.9	A	18
Give Way	2031 PM	0.324	7.5	A	14
Roundabout	2031 AM	0.463	8.6	A	32
Roundabout	2031 PM	0.384	9.1	A	24

DS = Degree of Saturation d = Delay (seconds)
 Q = Queue Length (m) LoS = Level of Service
 LoS values based on worst delay of any vehicle movement

The results have revealed that:

- The give-way intersection performs satisfactorily during the AM and PM peak hour period with minimal delays of less than 8 seconds for the worst approach at Road 08 (east).
- Similarly, the roundabout intersection operates satisfactorily with low delays and queue lengths in the AM peak and PM peak period.

Road C20/Road C09

The give-way intersection has been analysed based on the following configuration as shown below in **Figure 4.13**.

Figure 4.13 Road C20/Road C09 Intersection Layout

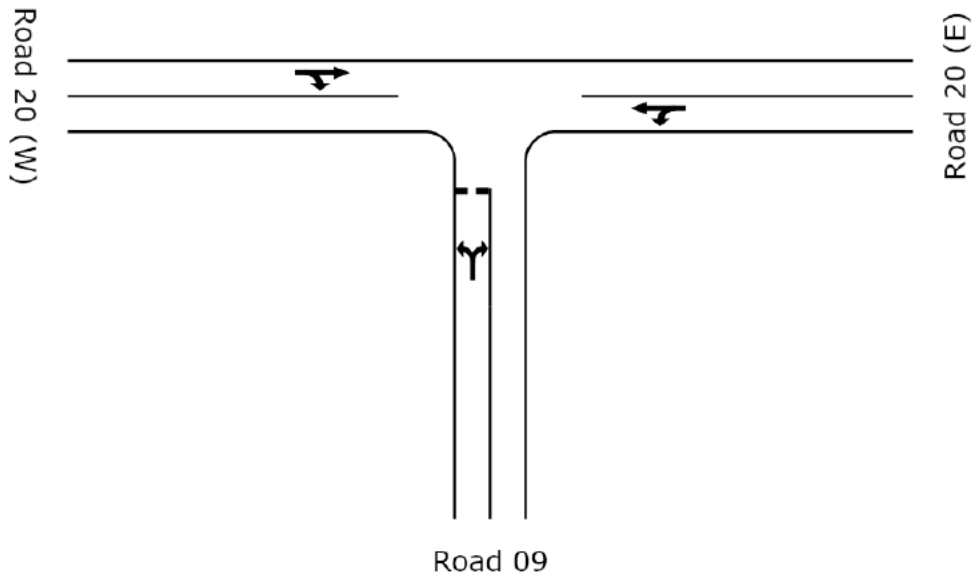


Table 4.8 shows the average intersection performance for Road C20/Road C09 based on the full development of Coombs and Wright. Detailed results of this analysis are provided in **Appendix B**.

Table 4.8 Weekday Intersection Performance for Road C20/Road C09

Year	Performance Criteria			
	Degree of Saturation	Delays (s)	Level of Service	Queue Length (metres)
2031 AM	0.098	11.9	A	3
2031 PM	0.054	15.3	B	2

DS = Degree of Saturation d = Delay (seconds)
 Q = Queue Length (m) LoS = Level of Service
 LoS values based on worst delay of any vehicle movement

The results have revealed that:

- The intersection operates at good Level of Service A with minimal delays or queues are experienced in the 2031 AM peak hour.
- In the PM peak hour, the intersection operates a Level of Service B.

Road C04/Road C07

The intersection of Road C04/Road C07 has been assessed based on 3 intersection configurations, a roundabout, a give-way intersection with priority to the N-S traffic and a signalised concept. The roundabout and giveway configurations are shown below in **Figure 4.14** and **Figure 4.15**.

Figure 4.14 Road C04/Road C07 Roundabout Intersection

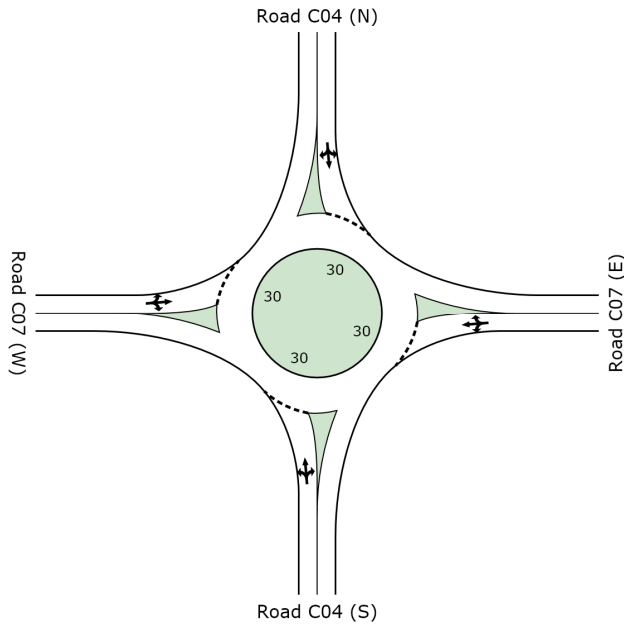


Figure 4.15 Road C04/Road C07 Give-Way Intersection

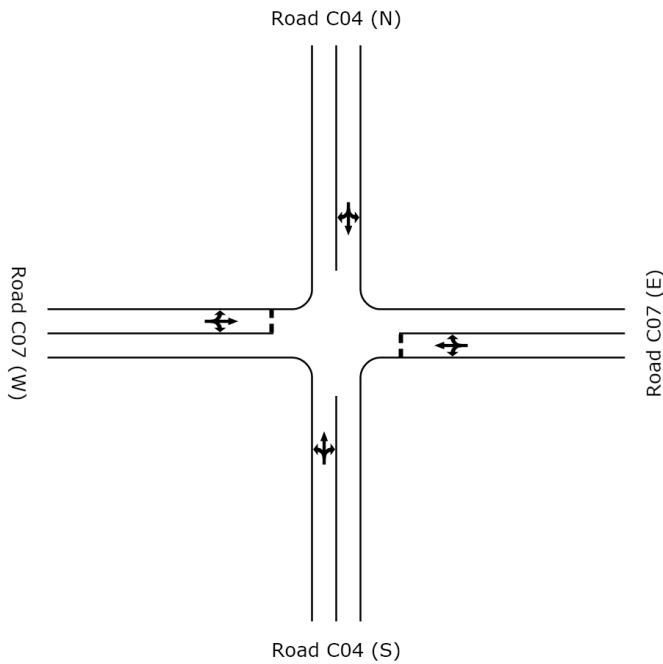


Table 4.9 shows the average intersection performance for both configurations for Road C04/Road C07 based on the full development of Coombs and Wright. Detailed results of this analysis are provided in **Appendix B**.

Table 4.9 Weekday Intersection Performance for Road C07/Road C04

Intersection Layout	Year	Performance Criteria			
		Degree of Saturation	Delays (s)	Level of Service	Queue Length (metres)
Give Way	2031 AM	>1.000	>120	F	>500
Give Way	2031 PM	>1.000	>120	F	279
Roundabout	2031 AM	0.129	9.7	A	8
Roundabout	2031 PM	0.056	8.5	A	3

DS = Degree of Saturation d = Delay (seconds)
 Q = Queue Length (m) LoS = Level of Service
 LoS values based on worst delay of any vehicle movement

The results have revealed that:

- With a priority-controlled intersection, the heavy right turn movement from Road C07 (W) will experience significant delays causing the intersection leg to fail at a Level of Service F.
- The roundabout intersection analysis showed that the junction will operate satisfactorily at a Level of Service A with minimal delays and queue lengths.

Signalisation of this intersection was considered for similar reasons as are discussed for the intersection between Road 3 / Road 8. Ultimately, similar disadvantages exist at this site as were discussed for Road 3 / Road 8, however signalisation can be achieved if additional road infrastructure is provided.

5 SUMMARY & CONCLUSIONS

This road hierarchy and traffic analysis report has been undertaken to assist in the formulation of the residential development of Coombs which is a precinct within Stage 1 of the Molonglo Valley Development.

The study is summarised as follows:

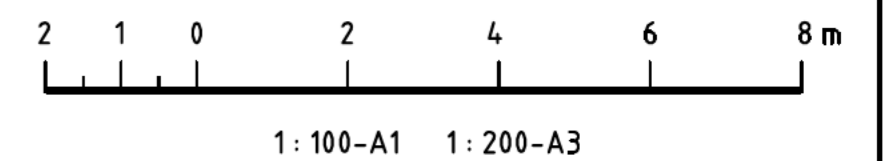
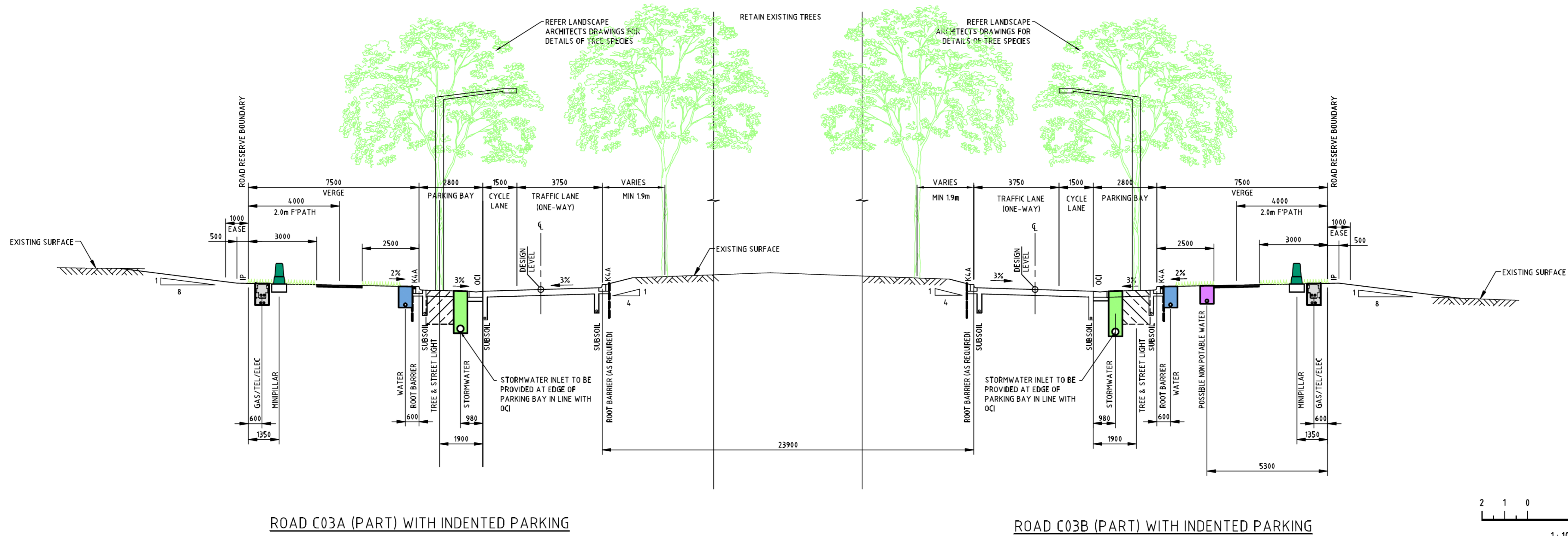
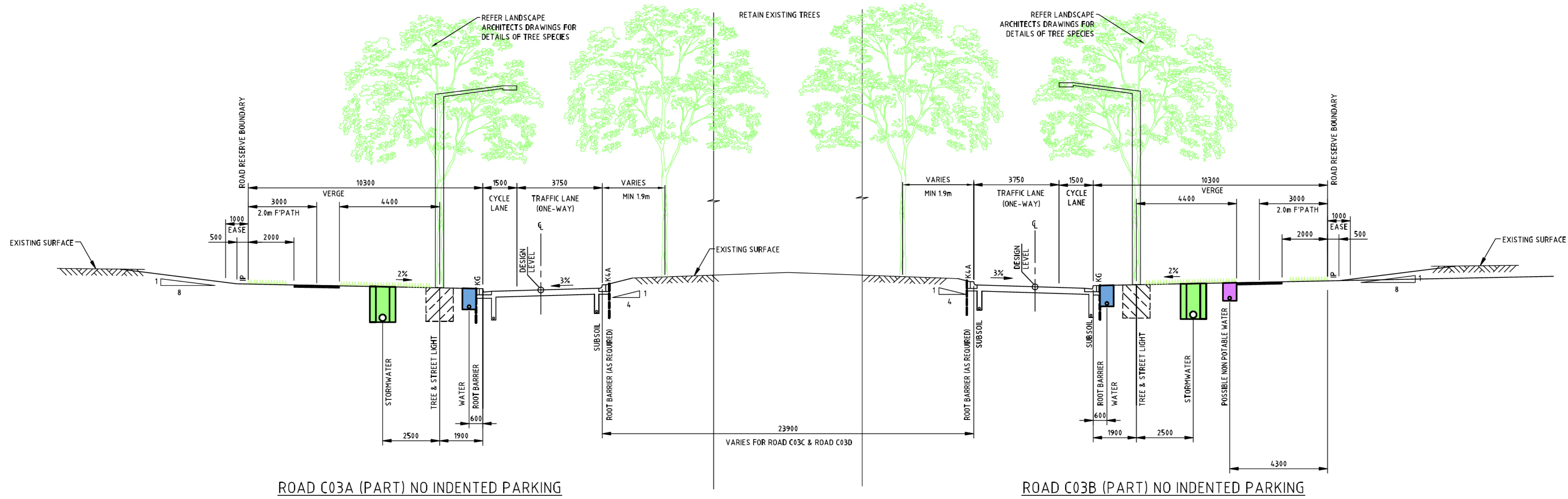
- The Coombs Estate Development Plan is proposed as an initial stage of development of the wider Molonglo Valley development.
- Access to the proposed land release areas located along the Molonglo Valley will be via JGD which will be constructed in stages as land is progressively developed.
- Stage 1A, 1B & 1C of the JGD construction will provide the principal access route for the Coombs Estate Development Plan area.
- The Coombs Estate Development Plan envisages residential, commercial and community facilities.
- Conservative forecast traffic volumes were estimated based upon likely and maximum permissible development yields.
- An assessment of the operational performance at a number of identified key intersection locations along JGD was undertaken and identified acceptable levels of operation in 2021 with the ultimate layout configuration.
- The Road C03/C28 operates at Level of Service F in the 2031 AM peak if all movements are permitted as per the Masterplan proposal. Hence this intersection has been modified to allow left in/left out movements only at Road C03 and traffic distributed to the surrounding intersections accordingly.
- The operational performance of the roundabout intersection of Road C03/C08 in 2031 operates satisfactorily at a Level of Service A. Signalisation at this intersection is only achievable if additional road infrastructure is provided.
- The Road C07/Road C04 intersection operates a Level of Service F in 2031 with a give-way intersection configuration. Installing a one lane roundabout at the intersection will result in satisfactory operation for all movements. Signalisation at this intersection is only achievable if additional road infrastructure is provided.
- The intersection of Road C08/RoadC07 needs priority to be allocated to Road C08E (west) and Road C07 in order to operate at a satisfactory Level of Service in 2031, or alternatively requires a one lane roundabout, which is considered more appropriate.
- The section of Road C28 between C03 and Road C07 should be designed to minimise traffic volumes, enhancing pedestrian amenity between the park and the Town Centre. The analysis confirms that the surrounding intersection and midblock capacities can cater for this.
- Intersections within the lower order residential road network volumes are consistent with AUSTRROADS minimum for acceptable operational performance. LATM measures consisting of road narrowings and pedestrian refuges could assist in reducing vehicle speeds to improve potential safety performance. It is recommended that LATM measures other than pedestrian refuges are favoured unless a genuine pedestrian desire line exists.
- A set of road hierarchy principles were established.
- The proposed road hierarchy was described.
- Public transport routes and bus / cycle facilities within the internal precinct were described.

In summary the proposed internal road network will provide an acceptable level of peak hour road network operation and the road network will carry daily traffic volumes appropriate to their design geometry.



Appendix A

Proposed Road Cross Sections



DRAWING PRACTICE TO AS 1100

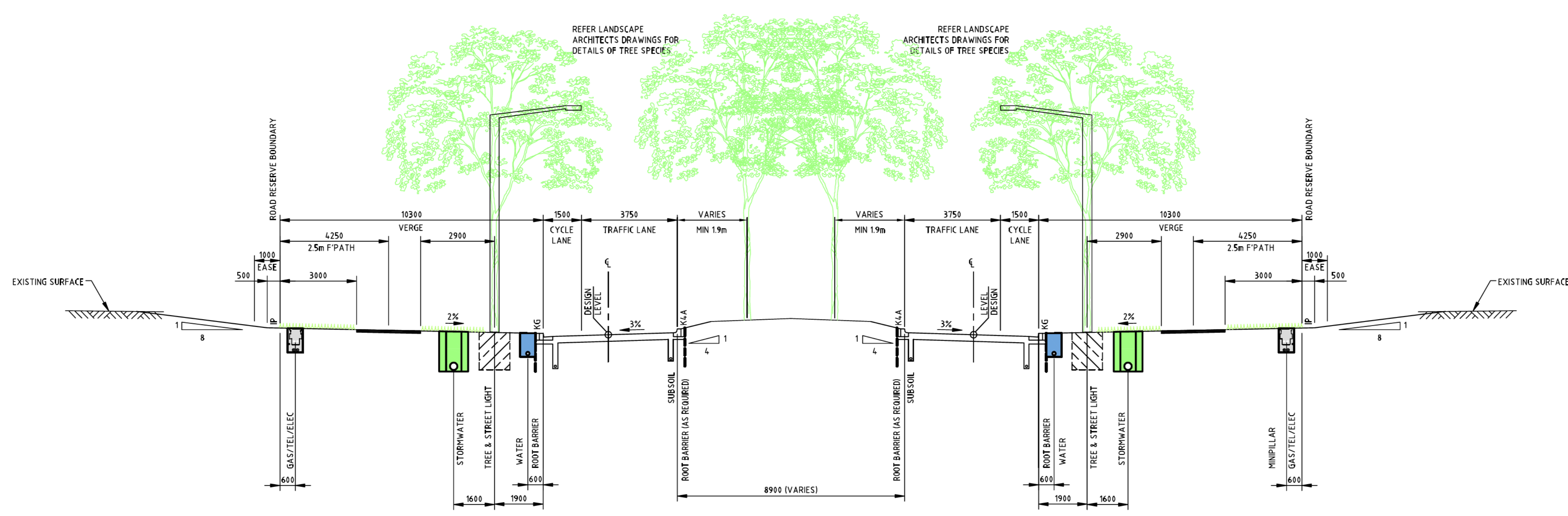
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Verified	RC	Date	MAR 2011
Approved	GL	Date	MAR 2011

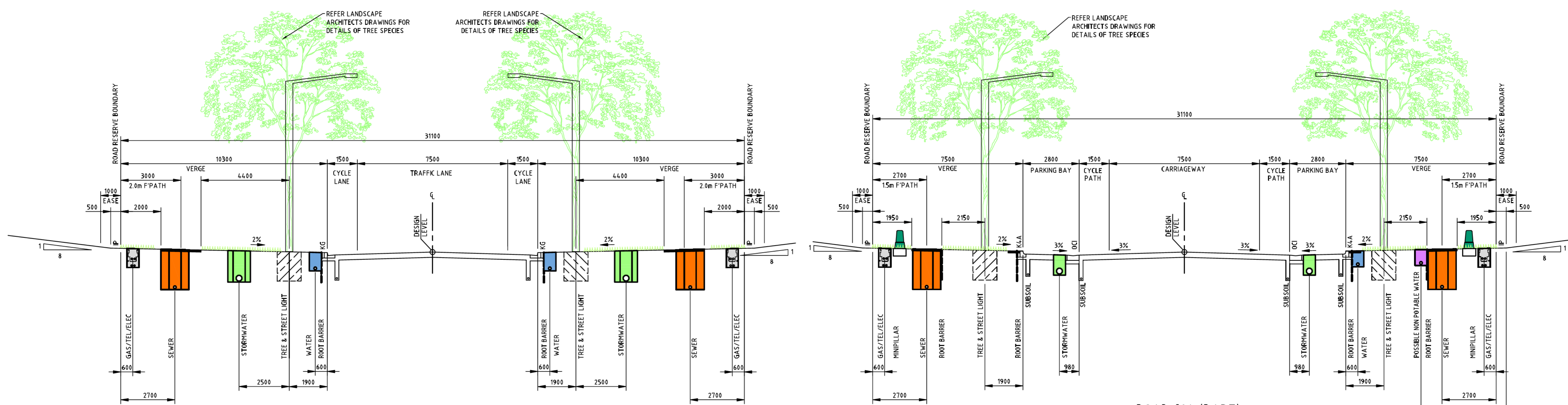
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COOMBS RESIDENTIAL ESTATE
ESTATE DEVELOPMENT PLAN
 TYPICAL SECTIONS
 SHEET 1 OF 7

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292347-TYP-01		63	1



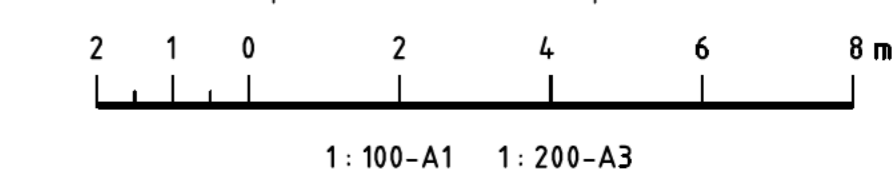
ROAD C03C

ROAD C03D



ROAD C04 (PART) MAJOR COLLECTOR

ROAD C04 (PART)



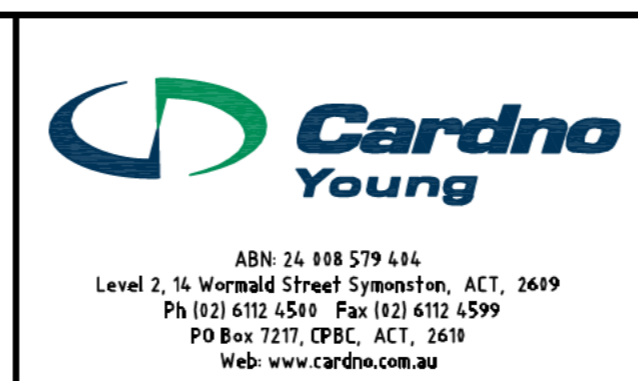
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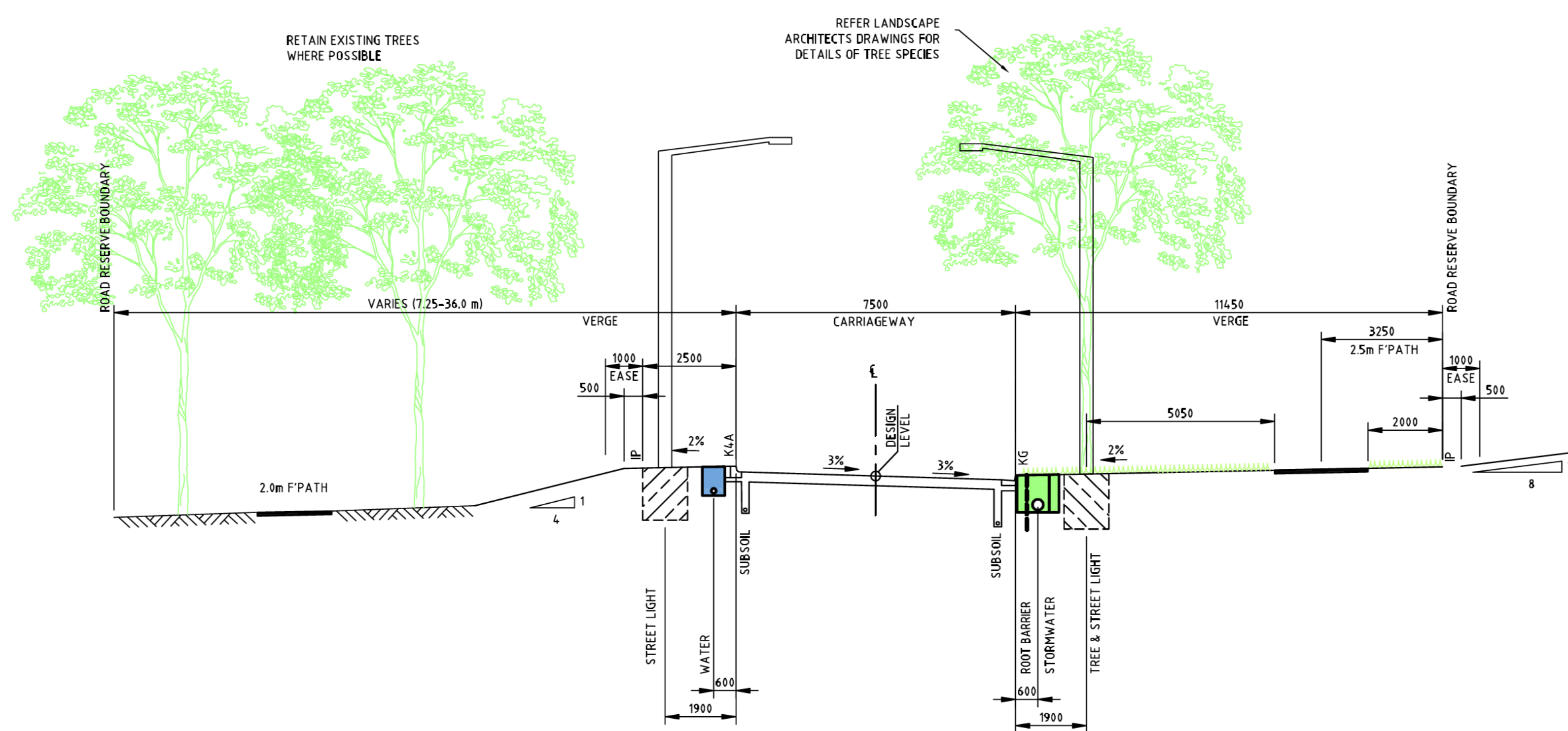


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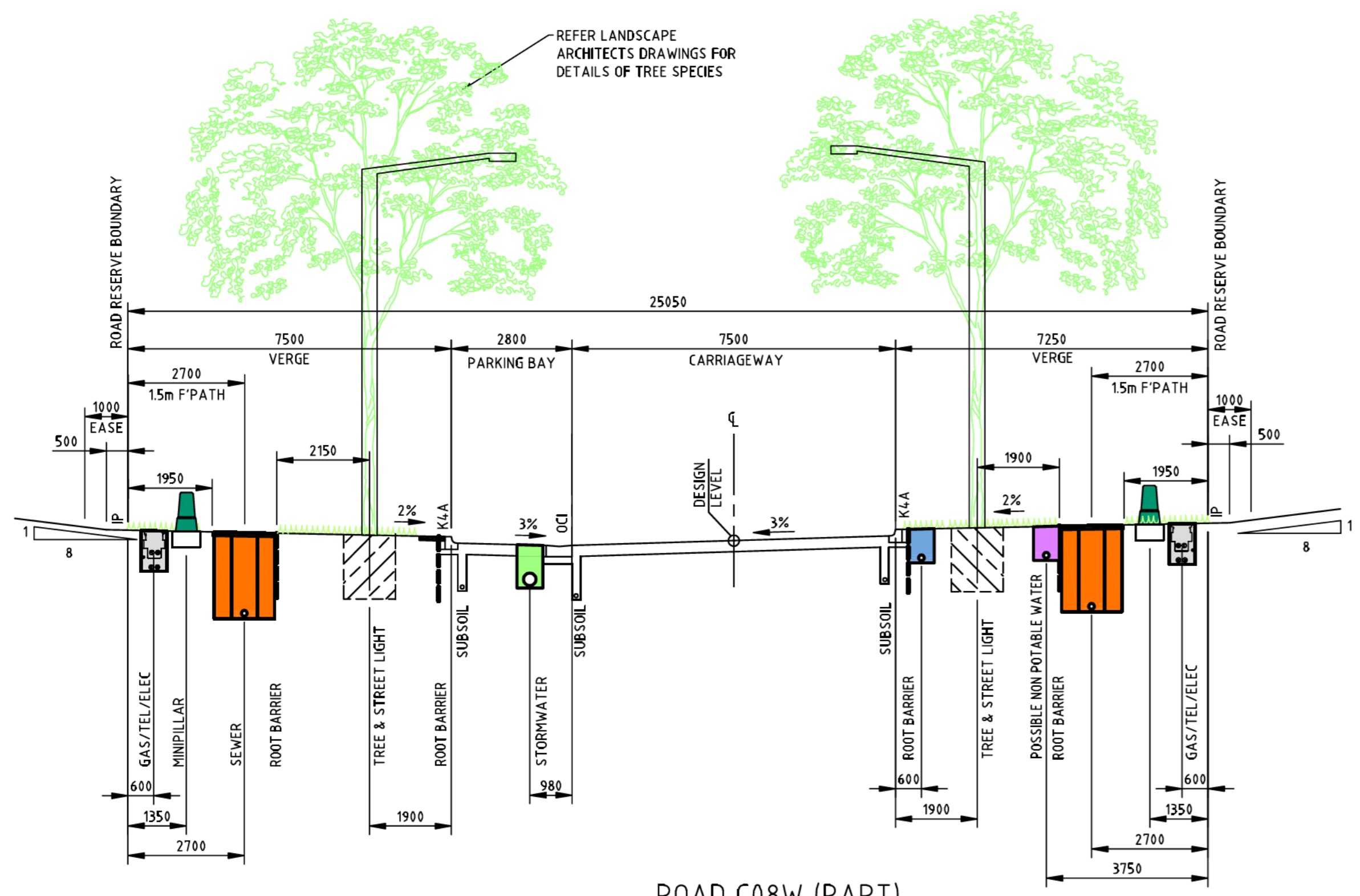
Client: **LAND DEVELOPMENT AGENCY**
COOMBS RESIDENTIAL ESTATE
ESTATE DEVELOPMENT PLAN
 Typical Sections
 SHEET 2 OF 7

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Revision				1

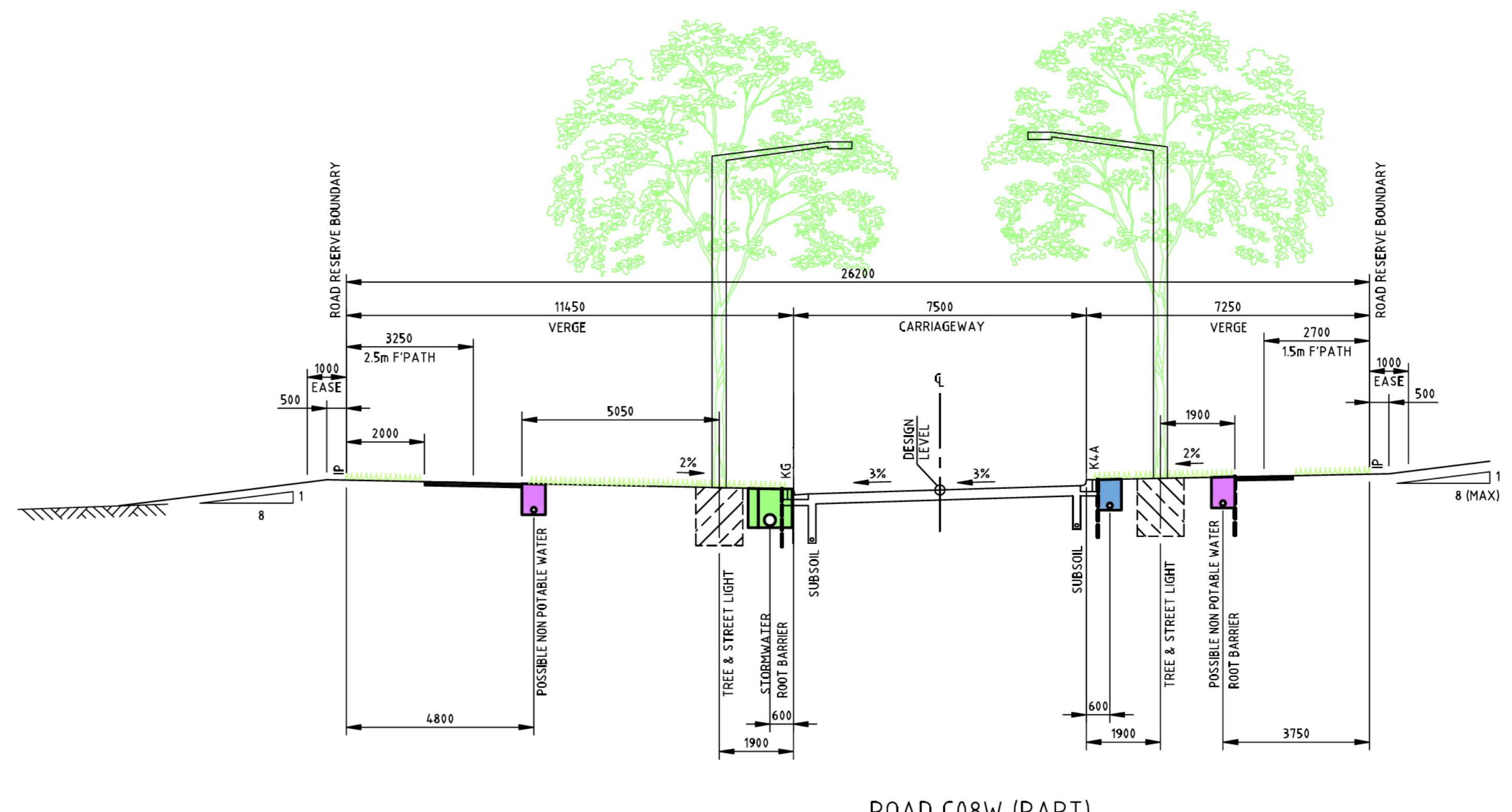
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150mm ON A1 ORIGINAL



ROAD C08E (PART), ROAD C08W (MIRRORED) WITH WIDENED VERGE



ROAD C08W (PART)



ROAD C08W (PART)



DRAWING PRACTICE TO AS 1100

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Designed	GZ	Date	DEC 2010
Verified	RC	Date	MAR 2011
Approved	GL	Date	MAR 2011

Client **LAND DEVELOPMENT AGENCY**
COOMBS RESIDENTIAL ESTATE
ESTATE DEVELOPMENT PLAN
TYPICAL SECTIONS
SHEET 4 OF 7

Status	EDP SUBMISSION			
Date	DEC 2010	Datum	AHD	Scale
				AS SHOWN
Size				A1
Drawing Number	292347-C-TYP-04	Page No	66	Revision
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