STORMWATER MANAGEMENT PLAN REVIEW

Western Freeway Commercial Area – Urban Design Framework

Date	1 October 2026
Project No.	24184
Version	02
Author	GP & SS
Client	Urban Design and Management

Project History

Project Number	24184
Author/s	GP & SS
Checked	GP
Approved	CMB
Issued to	Urban Design and Management

Document History

Version	Date	Description
01	20/11/2025	Initial issue
02	1/10/2026	Updated Report

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Climate Change Statement

A wide range of sources, including but not limited to the IPCC, CSIRO and BoM, unanimously agree that the global climate is changing. Unless otherwise stated, the information provided in this report does not take into consideration the varying nature of climate change and its consequences on our current engineering practices. The results presented may be significantly underestimated; flood characteristics shown (e.g. flood depths, extents and hazards) may be different once climate change is taken into account.

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1. Background

Urban Design and Management has engaged Afflux Consulting to complete a stormwater management plan review for the Western Freeway Commercial Area in Truganina (Figure 1 and Figure 2). The site is currently both within the Melbourne Water - Gardiner Lane and Deanside Drive Drainage Services Scheme (DSS) as per Figure 3. Within this DSS, the discharge location for this site is to the northwest, across the Western Fwy. Significant challenges are expected from this arrangement as well as a higher level of risk in three main facets;

- Safety risk in catastrophic event
- Construction timing of the freeway culvert crossing
- Cost of the culvert crossing

Hence, alternative options have been explored in detail.

To provide additional context, this memorandum shall be read in conjunction with the following references:

- **Appendix A** - 2-50 Meskos Road, Rockbank Stormwater Management Strategy – Issued by Engeny dated 04 October 2019
- **Appendix B** - 1789-1811 Western Hwy, Truganina Stormwater Management Plan – Issued by Afflux Consulting dated 09 April 2025 (neighbouring site)

This memorandum aims to provide a feasible and practical drainage solution in support of the proposed DSS change.

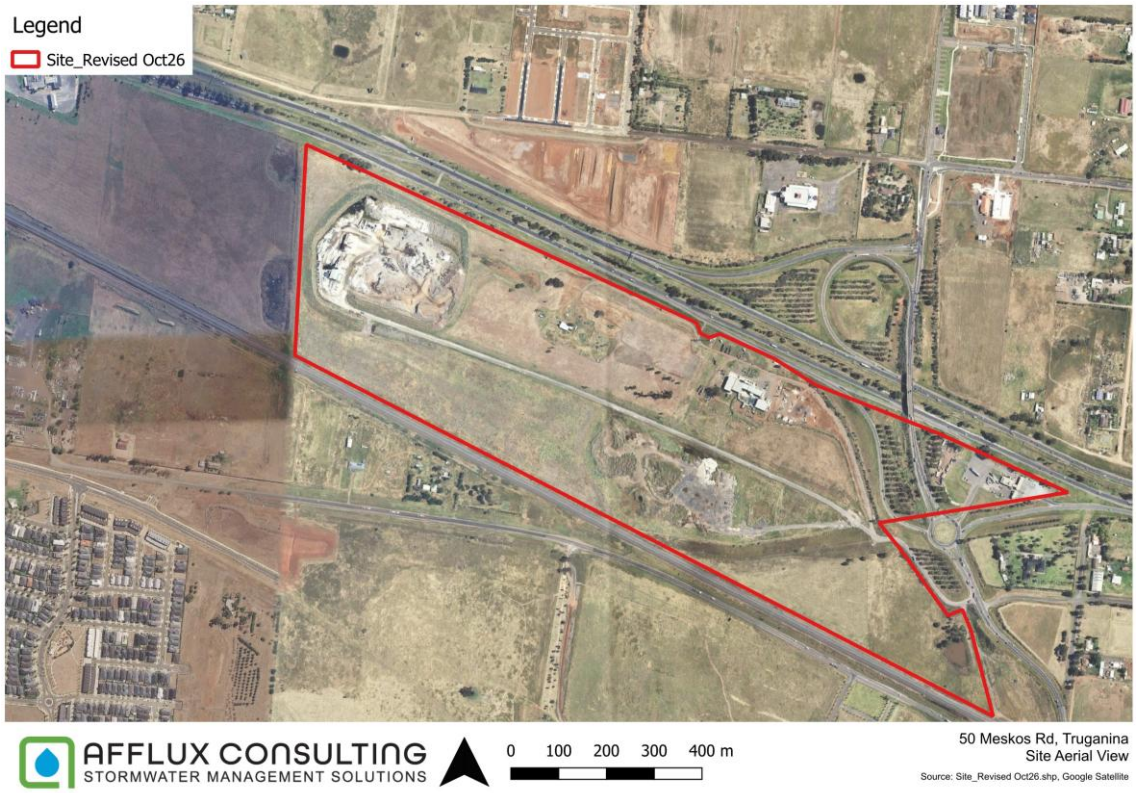


Figure 1. Location of works

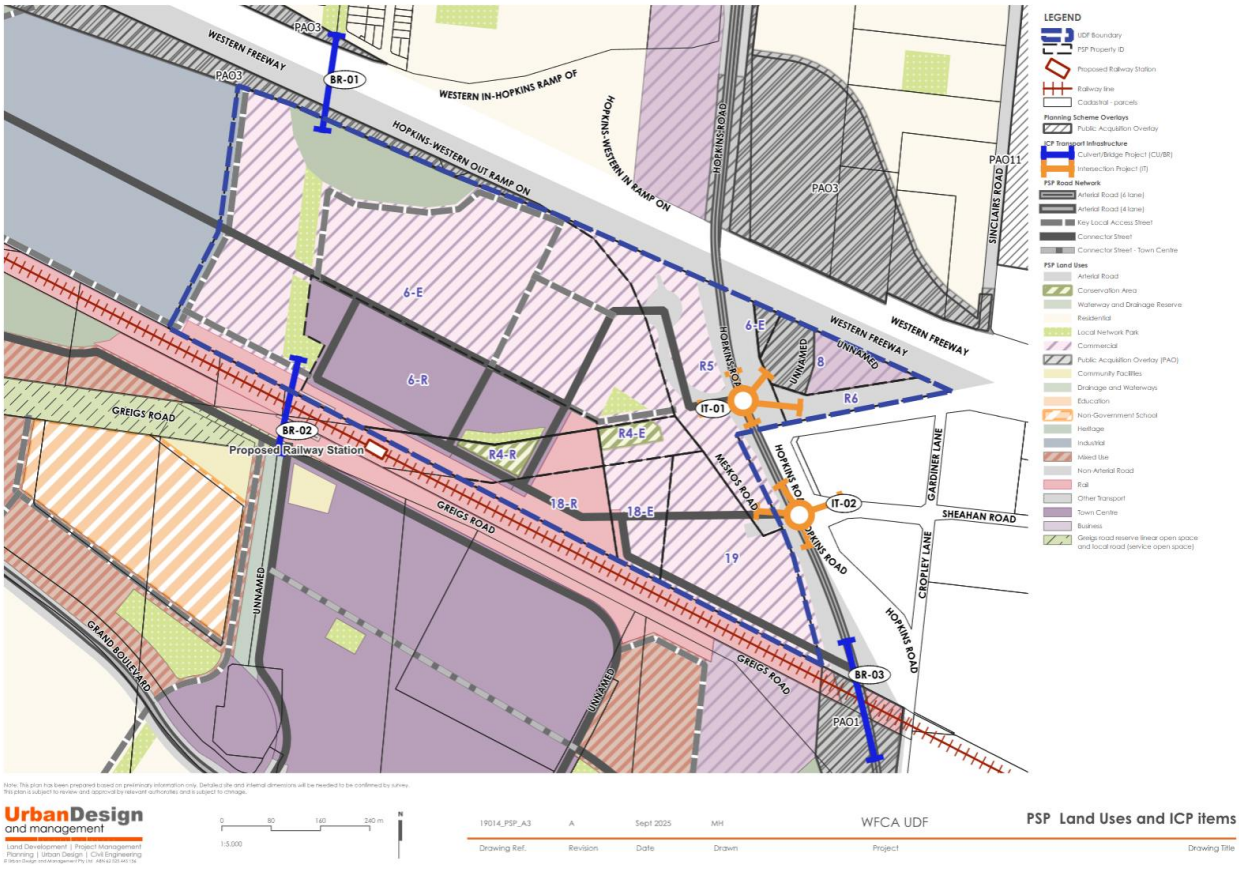


Figure 2. PSP Land Use Plan

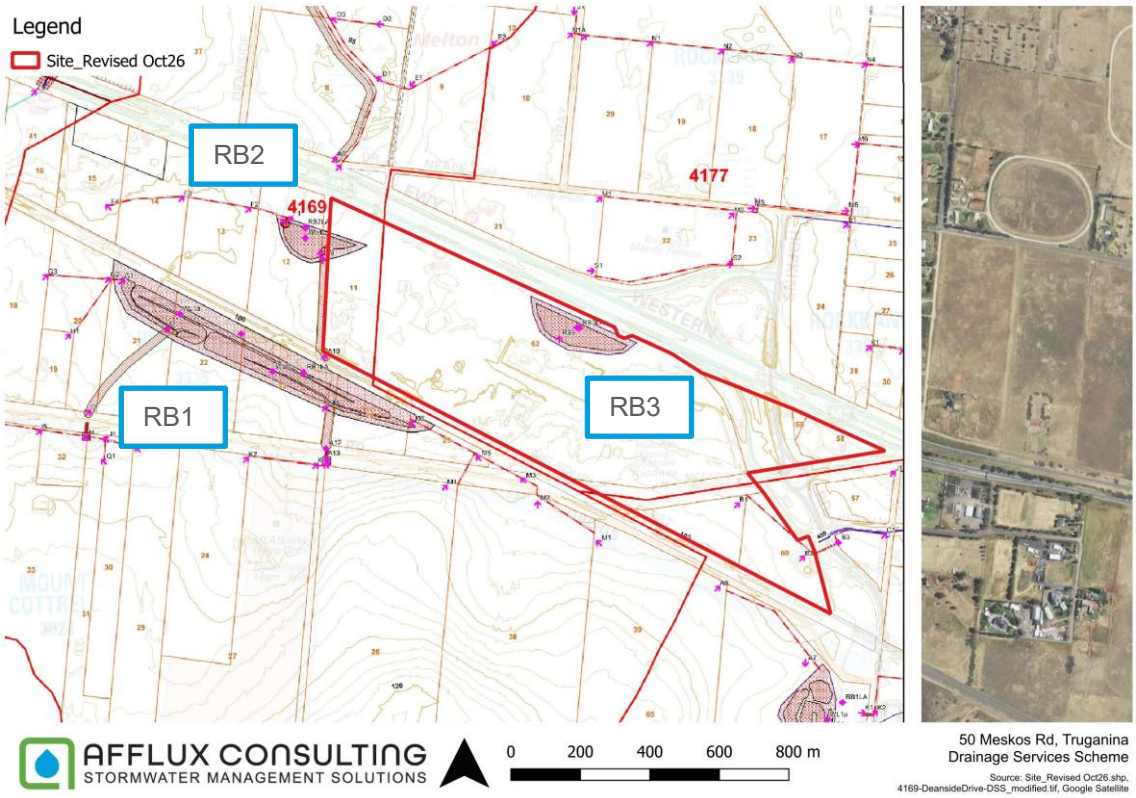


Figure 3. Current MW Drainage Services Scheme

2. MW DSS Review

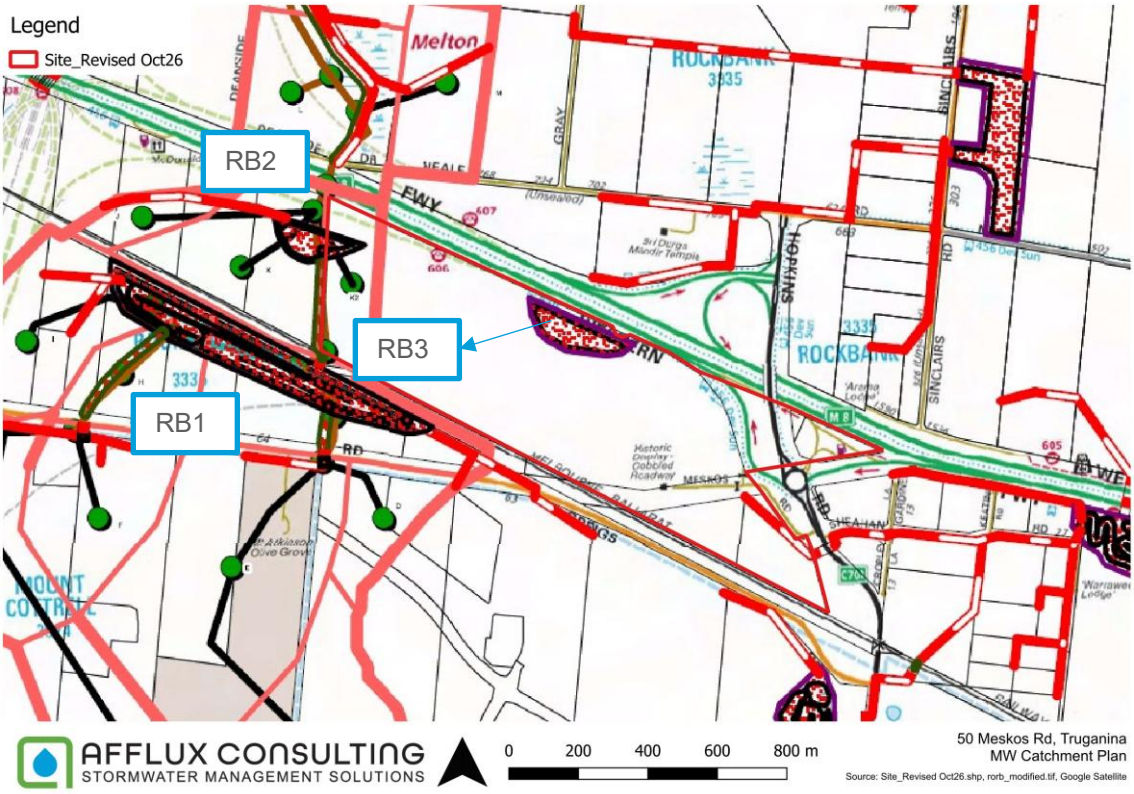
The preliminary Gardiner Lane DSS - 4177 - (Figure 3) indicates that the ultimate drainage discharge location for this site involves construction of RB3 at approximately the centre of the northern boundary of the site. This will provide attenuation of the flows originating from this site prior to discharge into the pipe networks across Western Fwy ultimately to Kororoit Creek.

Due to the reasons below, this approach is not practical and has inherent risk:

- The current discharge location is via a set of culverts (to be constructed) into a pipe system to the Wetland/RB along Sinclairs Rd. In the event of a catastrophic failure or an extreme storm event these flows would need to be conveyed through public streets to Kororoit Creek. Realigning this outlet into the Deanside Drive DSS would facilitate a lower risk by conveying these flows via a waterway rather than through the road network.
- Construction of culvert crossings on a freeway will cost significant time and resources. Additional culverts are currently proposed to be constructed under the Western Freeway from Deanside Drive DSS (4169). This would consolidate the number of crossings and reduce the impact on the local community due to this construction disruption.

As an alternative, the following is suggested for consideration:

- Realign this catchment outlet into the Deanside Drive DSS
- Relocate RB3 to the south-western corner of the site – subject to functional design



3. Engeny SWMS Review

A review of the Engeny-issued SWMS (Appendix A) has been conducted. The following points are highlighted:

- MW RORB model for Gardiner Lane DSS was run using ARR87 with the following parameters:

Table 1. Engeny RORB Model Parameters

RORB Parameter	Value
Predev Kc	1.84
Postdev Kc	2.19
IL	15mm
1%AEP RoC	0.6

- A catchment map is not provided in this SWMS
- Pre-development conditions flow at 1%AEP is 3.26 m^3/s in a 9 hr storm event at the assumed site outlet
- Post-development conditions outflow from the basin (RB3) is 2.98 m^3/s
- Ultimate drainage solution will be aligned to the preliminary Gardiner Lane DSS, which includes construction of culverts under Western Fwy
- The ultimate solution recommended indicates a high cost of construction

4. Recent Catchment Developments

Recent developments in the area are outlined below and are anticipated to influence future planning and construction within the vicinity. Notably, the installation of acoustic walls along the Western Freeway (Figure 4) makes it extremely difficult to construct culverts on the eastern side.

As mentioned in the Background section, a stormwater management plan was issued by Afflux for the proposed development at 1789-1811 Western Fwy, Truganina (adjacent lot to the west). Stormwater assets situated in the aforementioned property are expected to be constructed in line with the Deanside Drive DSS as shown in Figure 5 and are proposed to include a freeway crossing.

Source: Nearmap, Google Street View

Figure 4. Acoustic walls along Western Fwy

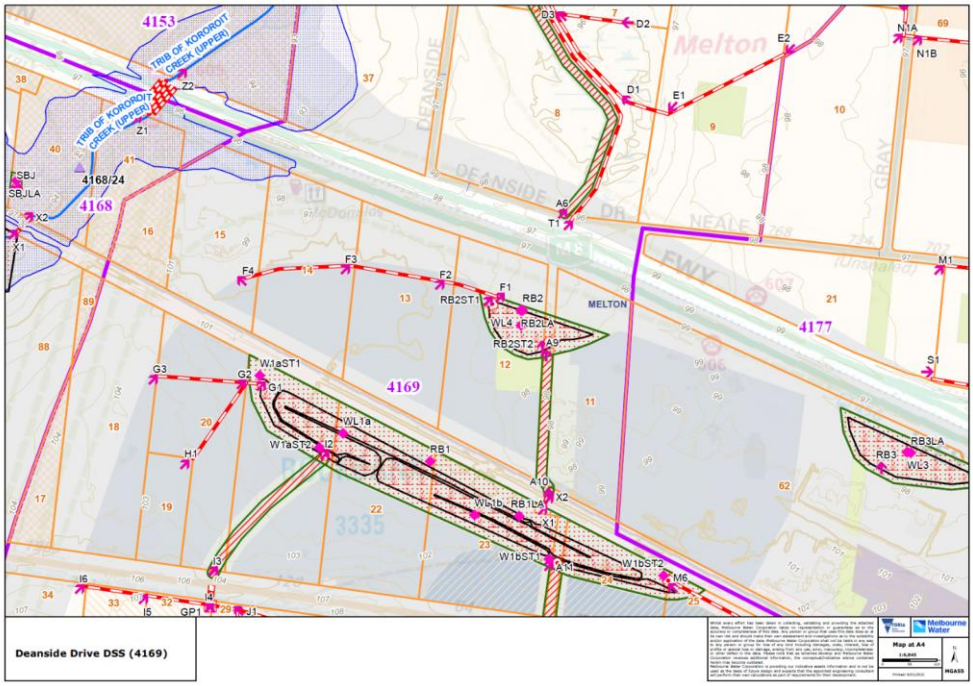


Figure 5. Deanside Drive DSS

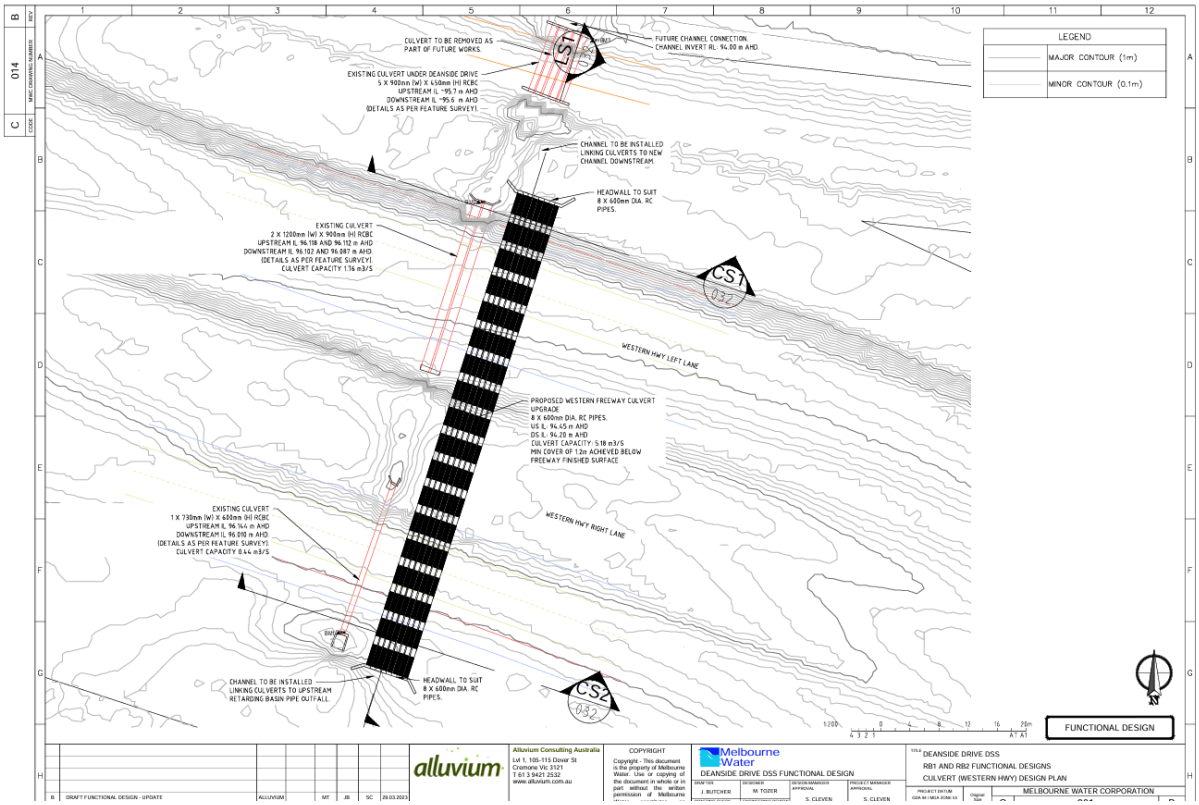


Figure 6. Proposed Culvert Upgrades Hilton Road Reserve crossing of Fwy

5. Hydrology

5.1. Deanside Drive DSS RORB Model

The Afflux-issued Stormwater Management Plan for 1789-1811 Western Fwy, Truganina includes hydrologic investigations conducted through RORB. Figure 6 shows the Afflux-modified RORB model catchments for the area.

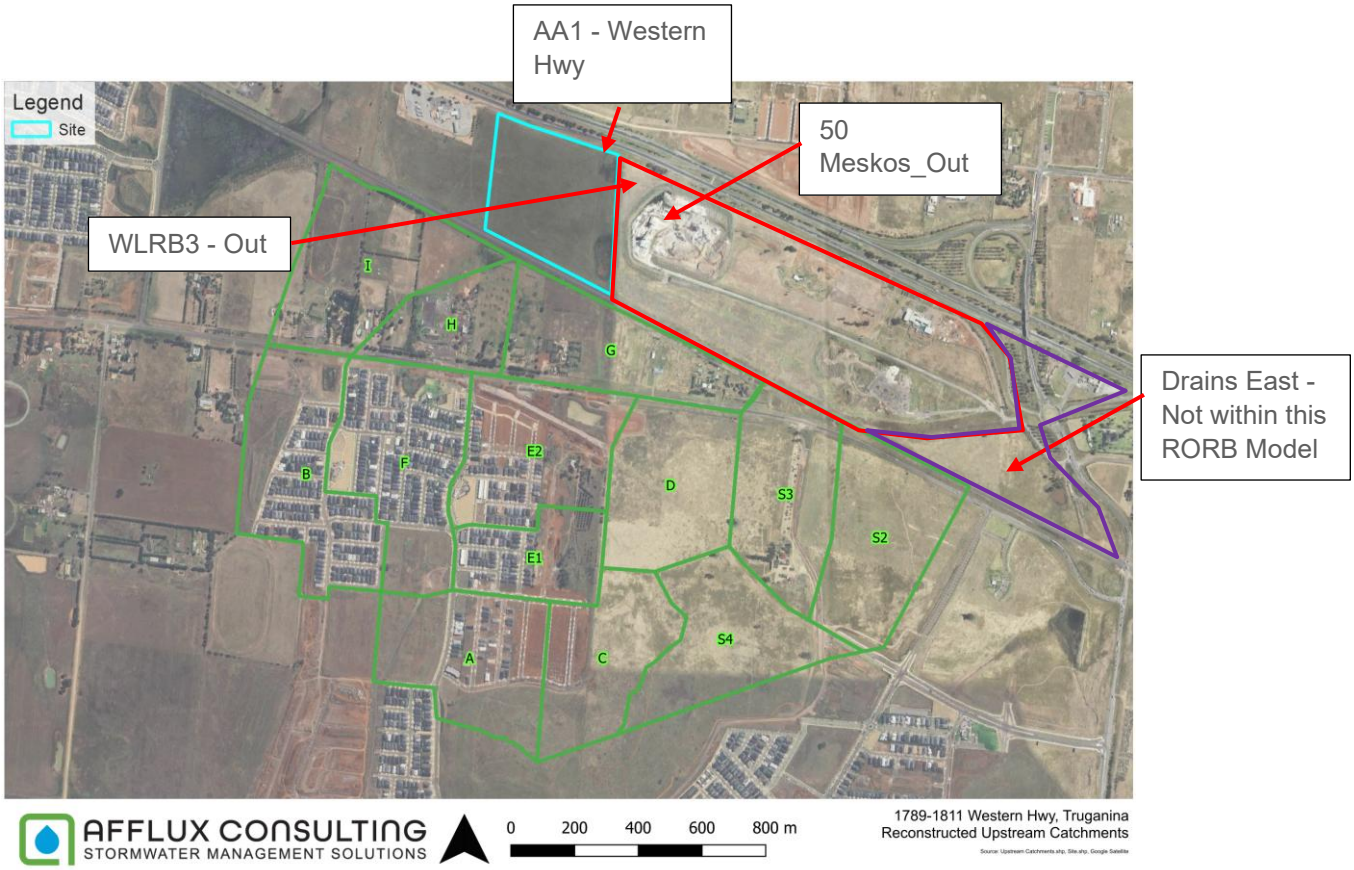


Figure 7. Afflux-modified Deanside Drive DSS RORB catchments

5.2. RORB Parameters

The project site (50 Meskos Road – Red Section in Figure 6) was added into the existing RORB model for assessment on the affect of including this area will have on the catchment hydrology. This involved splitting the site (50 Meskos Road – Red Section in Figure 6) into three catchments, having an area of 0.16 – 0.25 km². The Kc value was then adjusted using the equation below:

$$\frac{Kc_{previous}}{dav_{previous}} = \frac{Kc_{new}}{dav_{new}}$$

Table 2. Afflux-modified Deanside Drive DSS RORB Parameters

Parameter	Previous	New
Kc	2.57	2.53

dav	2.7	2.66
RoC	0.2-0.6 (Varies per %AEP)	N/A
IL (mm)	15	11
CL (mm)	N/A	0.3

5.3. Scenarios Modelled

Several modelling scenarios were modelled as listed in Table 3.

Table 3. Modelling Scenarios

Scenario	Description
Predev	Pre-development scenario, reflects current conditions at the model area
Interim	Assumes complete development of this site 50 Meskos Road – Red Section in Figure 6, all other properties remain reflecting current conditions
Interim - with RB2	Assumes complete development of site 50 Meskos Road – Red Section in Figure 6 as well as adjacent lot (1789-1811 Western Fwy – Blue Section Figure 6), all other properties remain reflecting current conditions
Ultimate	Assumes full development of the properties and assets within the model area

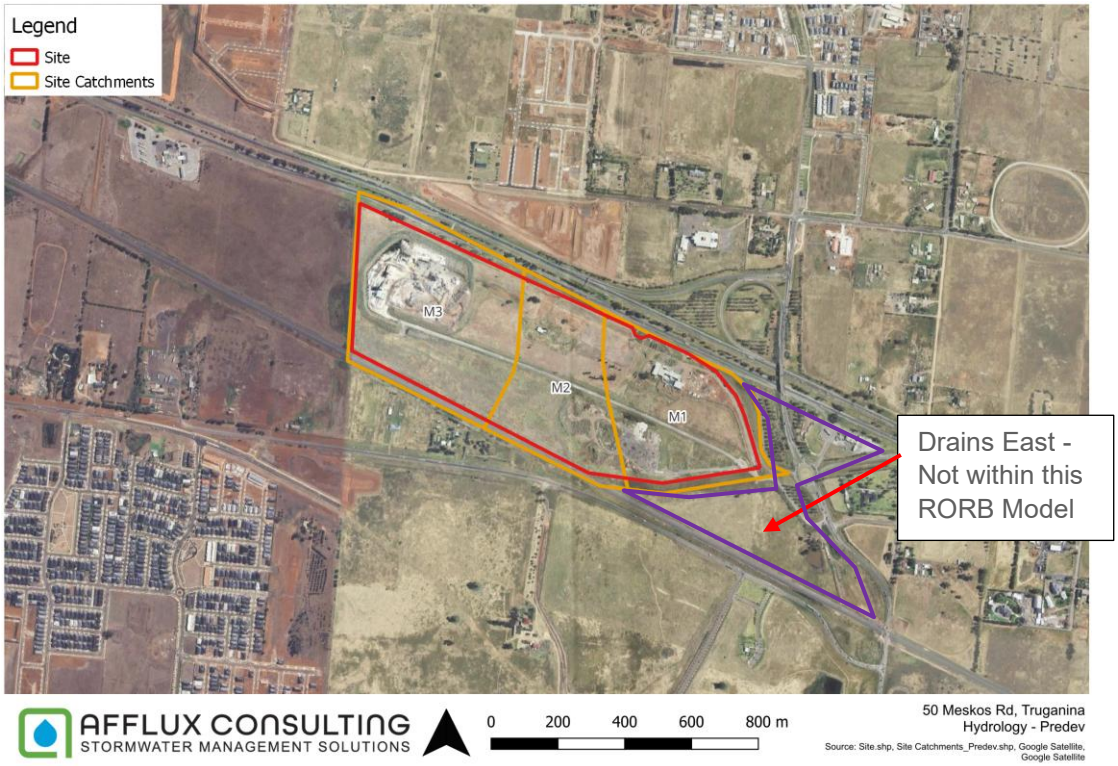


Figure 8. Predev Model Scenario

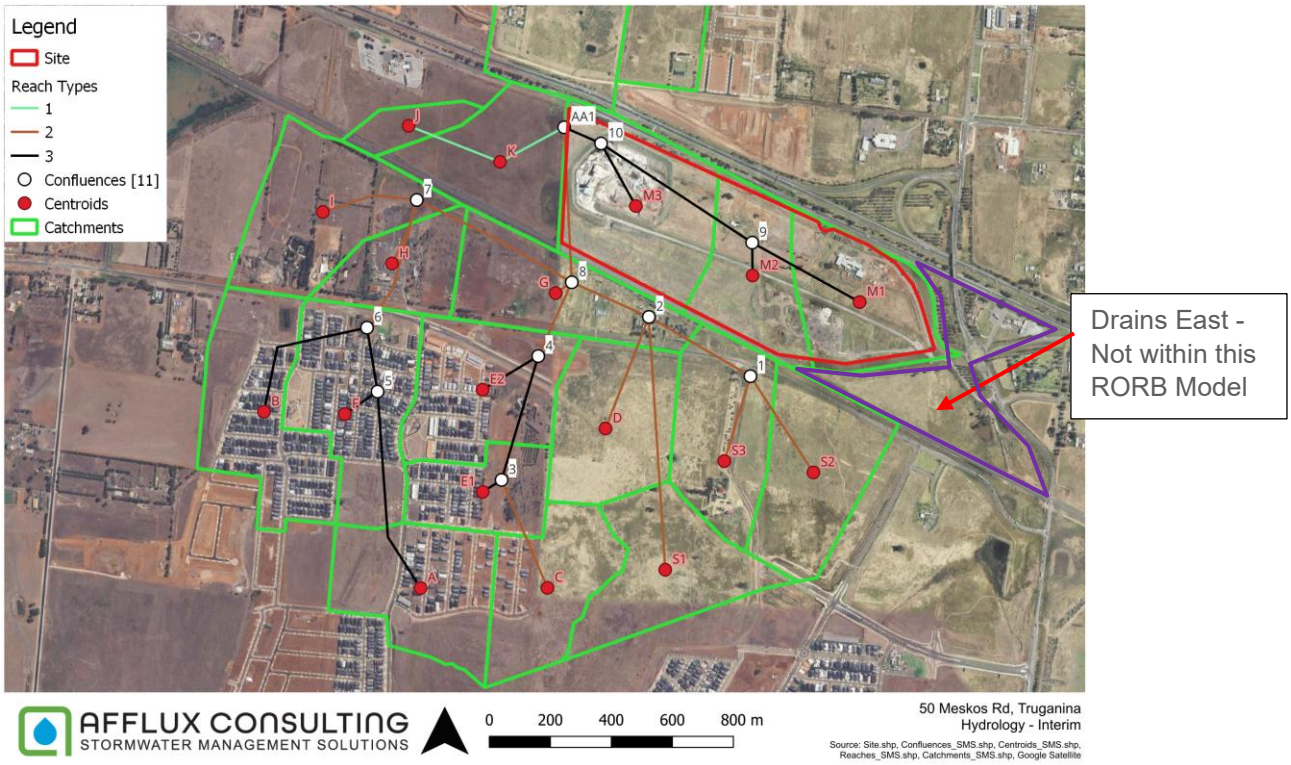


Figure 9. Interim Model Scenario

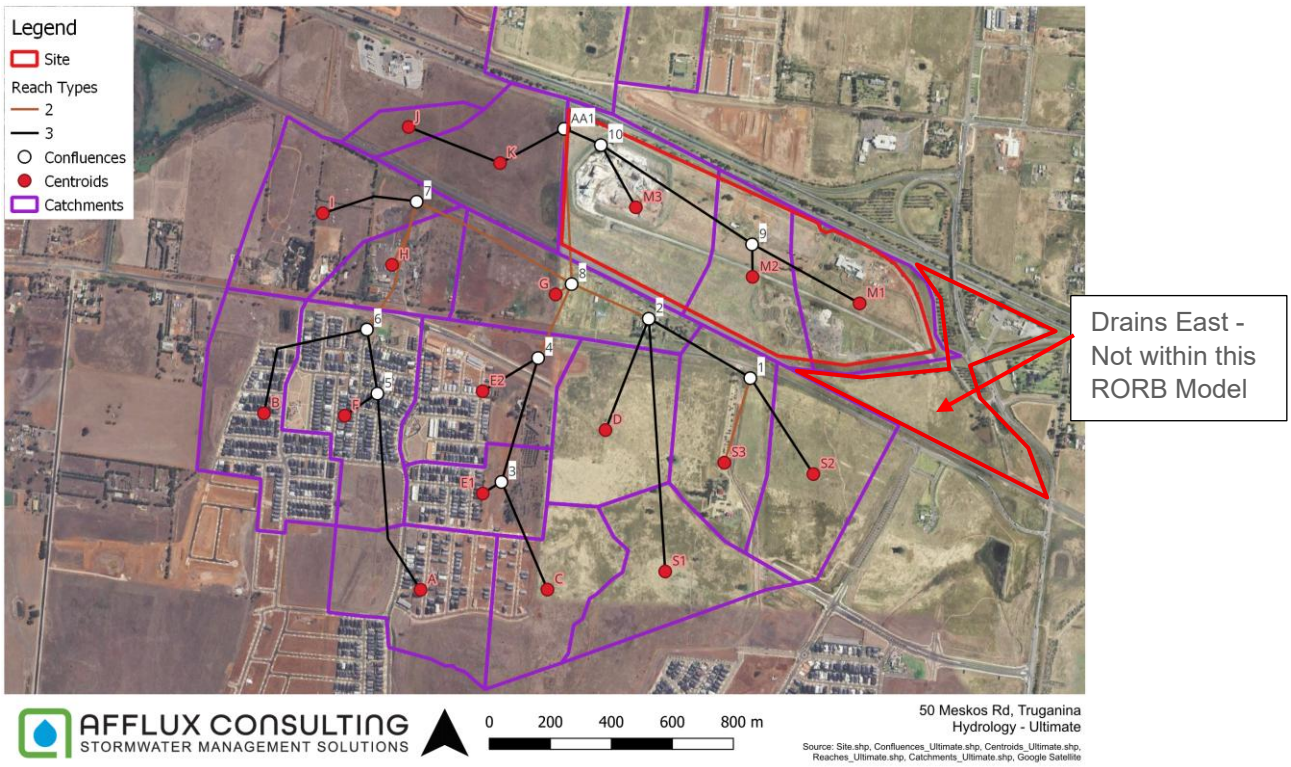
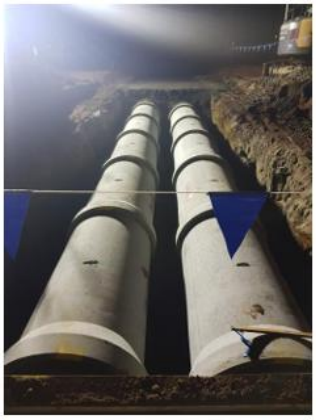


Figure 10. Ultimate Model Scenario

5.4. Underground Railway Culverts

During the construction of the duplicated railway line, Melbourne Water installed twin 1050mm pipes 1.3m deeper than the visible box culverts. They were then buried for later use, as seen in Figure 7.



Source: Melbourne Water (provided June 9th 2022)

Figure 14. Upstream buried Culverts during construction

Source: Melbourne Water (provided June 9th 2022)

Figure 15. Upstream buried Culverts during construction

Source: 1789-1811 WesternHwy, Truganina SWMP R03a, Afflux

Figure 11. Excerpt from Afflux-issued 1789-1811 Western Hwy,Truganina SWMP

5.5. Railway Storage

Pre-developed to Interim

The railway storage (RB1) had not been constructed as of the time this memorandum was issued. As such, it was modelled as an informal storage with the stage-storage relationship shown in Table 4.

Table 4. Stage-Storage Relationship for Informal Railway Storage

H (mAHD)	S (m³)	Remarks
97	0	Basin invert
97.1	0.45	
97.2	1.26	
97.3	2.38	
97.4	3.77	
97.5	5.44	
97.6	7.39	
97.7	9.59	
97.8	12.02	
97.9	14.68	

98	17.54	
98.1	20.61	
98.2	23.9	
98.3	27.4	
98.4	31.77	
98.5	37.32	
98.6	43.67	
98.7	51.37	
98.8	63.07	Pipes engaged
98.9	92.94	
99	152.04	
99.1	248.48	
99.2	417.2	
99.3	730.89	
99.4	1492.1	
99.5	2706	
99.6	4419	
99.7	6638.8	
99.8	9428.3	
99.9	13025	
100	17826	
100.1	23869	
100.2	31016	
100.3	39147	
100.4	48215	Spillway (railway) engaged
100.5	58241	
100.6	68886	
100.7	79739	
100.8	90638	
100.9	1.02E+05	
101	1.13E+05	

Ultimate Conditions

As expected, the constructed RB1's storage capacity is significantly higher than that of the informal storage (Table 5). This also reflects the additional railway culverts shown in the previous section.

Table 5. Stage-Storage Relationship for the Constructed Railway Storage

H (mAHD)	S (m^3)	Remarks
98.74	0	Assumed invert of the existing outlet pipes. Underground culverts engaged
99.24	65808	
99.74	1.38E+05	
100.24	2.18E+05	Spillway engaged
100.84	3.20E+05	

5.6. RORB Results

Table 6 summarises the results of the 1%AEP RORB simulations. The difference between the calculated pre-development flows from the site (5.34 m^3/s) and the Engeny-provided flow (3.26 m^3/s) is attributed to the different RORB model and assumptions used. The latter stems from a model that cannot be reviewed due to the lack of information provided.

Table 6. RORB Modelling Results at 1%AEP

Node	Predev		Interim		Interim - with RB2		Ultimate	
	Peak Flows (m^3/s)	Critical Event	Peak Flows (m^3/s)	Critical Event	Peak Flows (m^3/s)	Critical Event	Peak Flows (m^3/s)	Critical Event
AA1 - Western Hwy	14.23 (does not include 2-50 Meskos Rd site)	3hTP8	16.25	3hTP8	16.27	3hTP6	**6.26**	3hTP8
50 Meskos Out	5.34	30minTP6	9.14	20minTP6	9.14	20minTP6	15.4	10minTP6
WLRB3 - Out	N/A	N/A	2.46	1.5hTP7	2.46	1.5hTP7	4.61	1.5hTP9

6. WLRB3 Relocation

As discussed in the previous sections, relocation of WLRB3 must be considered. Generally, it is recommended to position wetlands and/or retarding basins near the proposed site outlet. In this case, it would be the northwest corner of the site. However, it is understood that a concrete plant currently exists at the recommended location, and it is expected to remain there for a significant period. Figure 11 shows the proposed asset location. Figure 12 shows the long-section for the existing terrain.

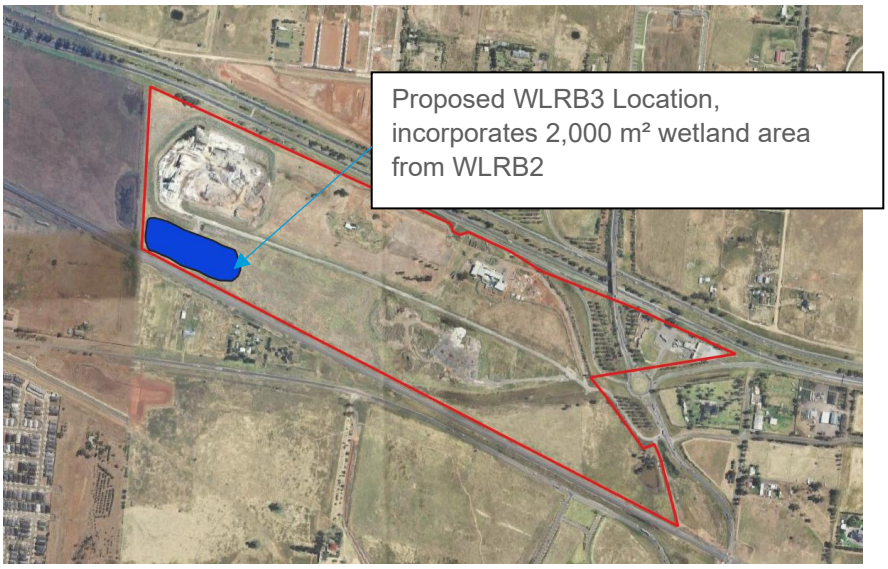


Figure 12. Proposed WLRB3 location

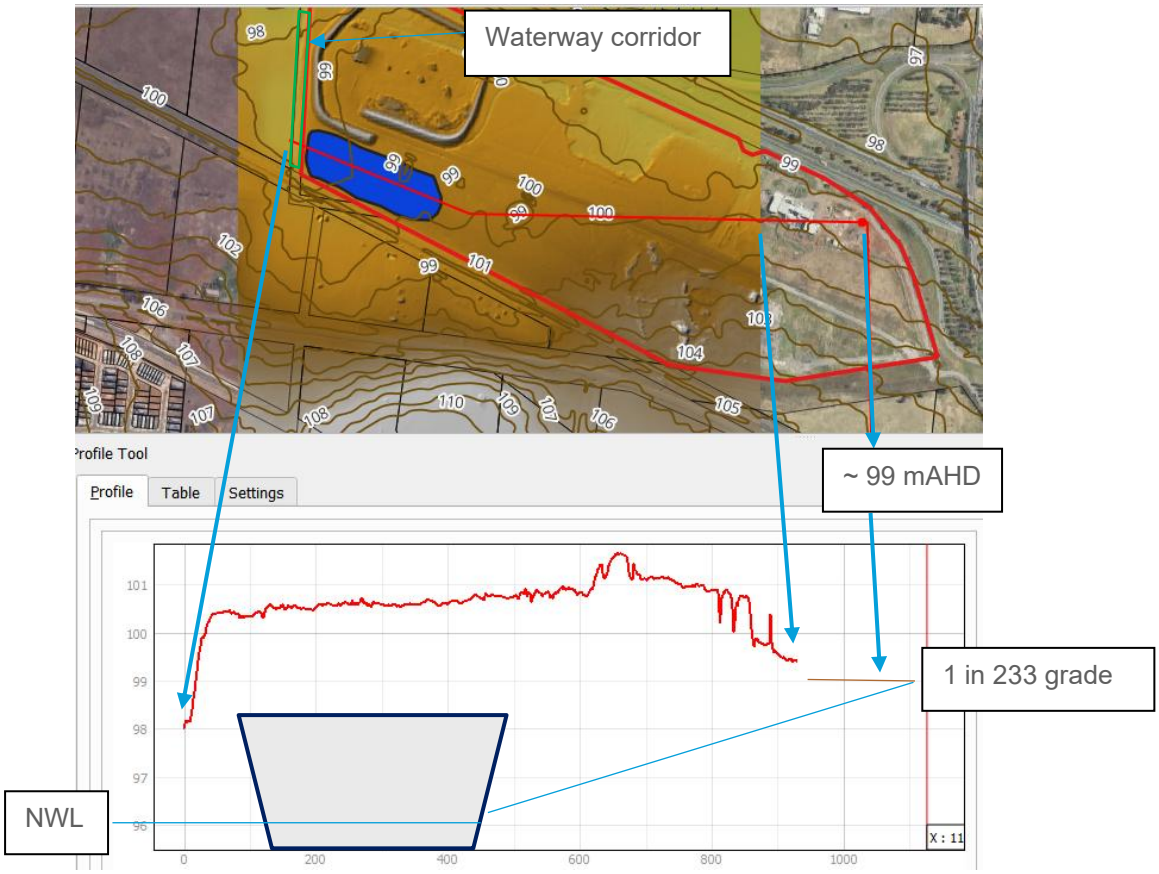


Figure 13. Existing terrain long-section

Consequently, this implies that an amendment of the PSP should be undertaken, particularly the alignment of the drainage reserve along the site. Figure 13 shows the proposed amendment from UDM.

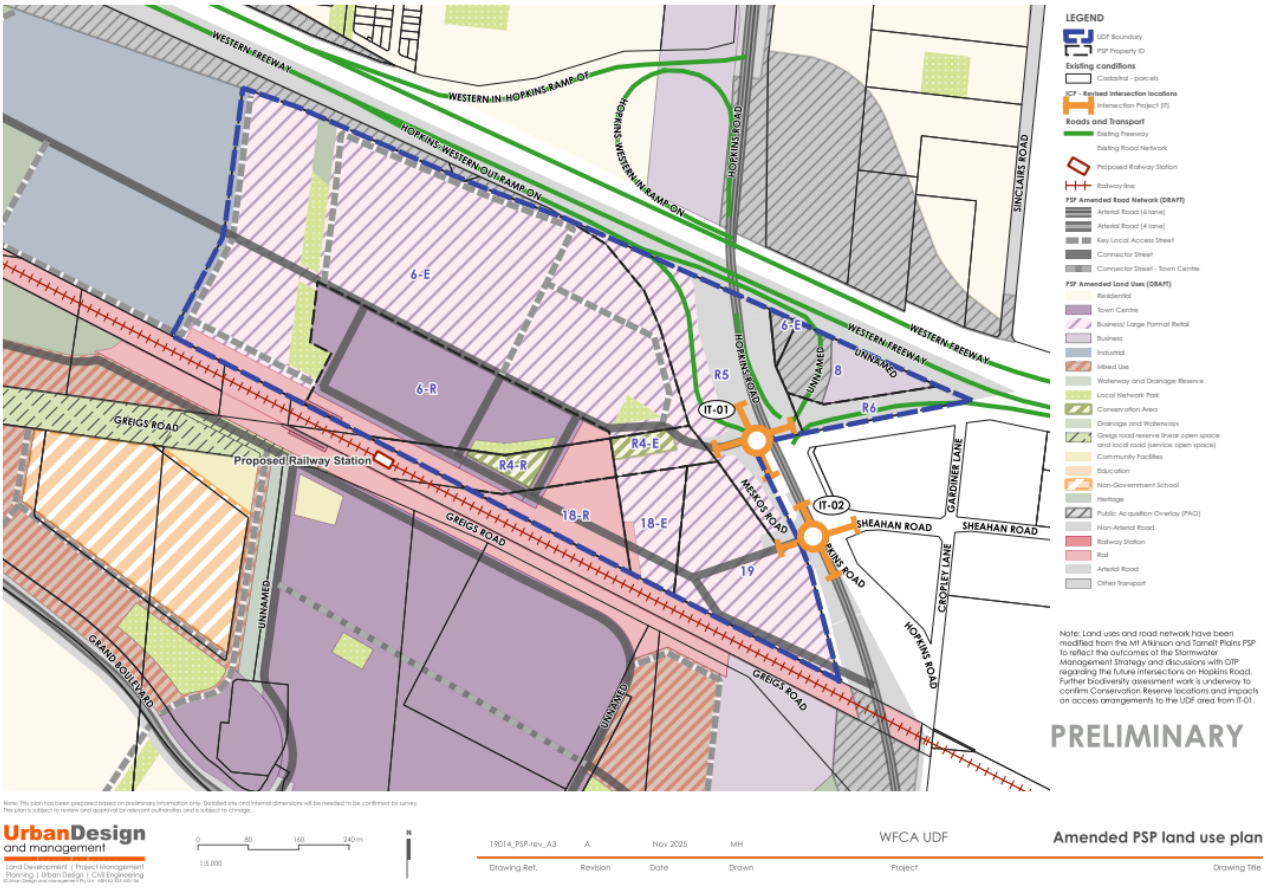


Figure 14. Proposed Draft PSP amendment

7. Discussion

The results of the hydrologic modelling indicate that in the current conditions, the railway basin (informal storage) overtops on 1%AEP events while the constructed RB1 significantly reduces the flow at the outlet node. This implies that the railway basin is the main driver of the local flooding.

In this exercise, identification of the optimal drainage solution for all stakeholders is the main goal, with focus on the safety implications, timing and cost. Analysis of the results suggests that the most practical approach will be to discharge RB3 into the proposed outlet from the Deanside Drive DSS under Western Highway due to the following:

- The ultimate assets in the area can sufficiently convey the additional 2.46 m^3/s from the site (50 Meskos) once RB3 is constructed
- The point of discharge of the site is a future stormwater asset
- There will be no requirement need to construct another culvert across the freeway, which will take significant time, cost and disruption to the public
- The acoustic walls along the freeway provide additional layers of complexity to the previously-recommended drainage solution
- The ultimate discharge point across the freeway is an existing constructed waterway, which provides a **lower safety risk** than a pipe and pit system

8. Recommendations

To achieve the drainage requirements for the development, the following measures are recommended:

- Begin consultation with Council and Melbourne Water to realign both the DSS and confirm the changes are generally in accordance with the PSP. There is no overall land use change, just a rearrangement of land uses within parcels.
- Update the two DSS's to reflect the realignment of ultimate discharge from the 50 Meskos Site via the Deanside Drive DSS.

9. References

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Appendix A: Engeny-issued SWMS

Appendix B: Afflux-issued SWMS for 1789-1811 Western Hwy, Truganina

Appendix C: Deanside Drive DSS – PSP WUSD Assets

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