

SUBJECT

Lot 2 Officer South Road, Officer South – Drainage Review

DATE

26th October 2023

OUR REF

30158708

CLIENT

Human Habitats on behalf of the Lumanovski family

Arcadis has been engaged by Human Habitats on behalf of the Lumanovski family to review Melbourne Water's (MW) proposed drainage scheme that forms part of the Officer South Employment Precinct Structure Plan (PSP) Public Exhibition. The Lumanovski family own Lot 2, Officer South (the site) which has been identified for commercial development, however the proposed drainage scheme includes a wetland that will occupy over half of the site. Figure 1 shows the site (outlined in red) and the proposed combined wetland and retarding basin. Arcadis has reviewed the proposed drainage scheme and investigated whether the size of the drainage assets could be reduced.

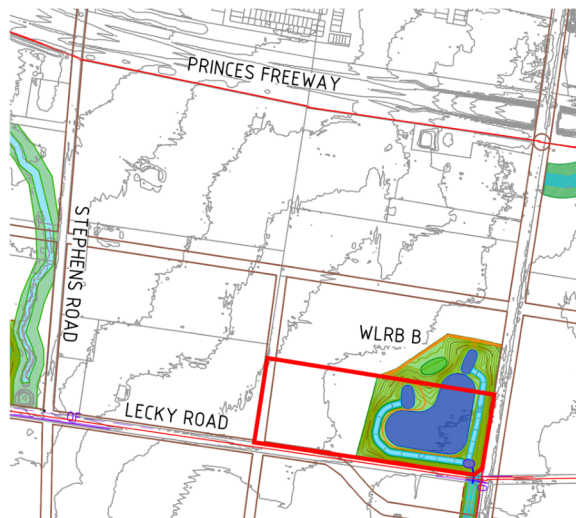


Figure 1: Lot 2, Officer South and the proposed wetland and retarding basin.

MUSIC Model

The drainage scheme proposes a wetland with reserve area of 9.1ha to treat a combined catchment of 94.63ha.

- The impervious percentage of the combined 94.63ha catchment is set to 90%. This figure does align with the typical value for industrial land stated in MW's MUSIC guidelines. However, 90% is conservative and MW's guidelines provide a range of 70-95% which may be adopted for industrial land. A reduction in the assumed impervious percentage of the catchment impacts the volumes and timing of runoff entering the wetland. There is an opportunity to optimise the modelling to decrease the size of the wetland.
- The initial storage of pervious areas is set to 25%. MW's guidelines do not include a typical value, however the MUSIC User Manual, which the MW's guidelines reference, includes a typical value of

36%. Adjusting the initial storage to 36% reduces initial runoff from pervious areas, with the significance of the impact increasing as the combined catchments impervious percentage is decreased.

- Table 1 compares the pollutant load reduction targets from the Best Practice Environmental Management (BPEM) Guidelines with the reductions achieved by the proposed wetland in MUSIC. The achieved reductions exceed the BPEM targets, indicating the wetland is oversized from a water quality perspective. When the surface area, pool volume, and initial volume were reduced by 24%, while maintaining a notional detention time of around 72 hours, the BPEM targets were still achieved. The size of the wetland could be reduced further than 24% if rainwater tanks are proposed as part of the future development, with recycled water being used for non-potable purposes.

	Suspended Solids Reduction (%)	Phosphorus Reduction (%)	Nitrogen Reduction (%)	Gross Pollutants Reduction (%)
BPEM Target	80	45	45	70
Wetland (100%)	86.5	74.8	53.4	100
Factored Wetland (76%)	80	67.9	46.3	100

Table 1: BPEM pollutant load reduction targets and modelled pollutant load reductions.

RORB Model

Arcadis' review indicates that the footprint of the combined wetland and retarding basin is dictated by the detention volume (water quantity) required rather than the water quality.

RORB modelling has been undertaken to inform the water quantity aspect of the drainage scheme. This is done on a catchment wide basis with the aim of reducing the developed scenario flows down to or below the 2010 pre-development flows at Patterson Road.

From a high-level review of the RORB modelling it appears that catchment land use is not in accordance with current AM STA 6200 Flood Mapping Project Specifications as it does not split the developed catchments into Effectively Impervious Area and Indirectly Connected Area. A detailed model review has not been undertaken.

The pre-developed results were not provided with the model and the model was re-run to obtain 1%+CC AEP (1 in 100 year event) peak flows at the sub-catchment level. This indicates that the flows are reduced to well below the pre-development levels for the 1%+CC event at the outlet of the retarding basin on Lot 2 Officer South Road (RB_B). This indicates that the retarding basin is oversized for the catchment it services by approximately 50% based on high level calculations.

1%+CC Pre-Development Peak Flow	1%+CC Developed Peak Flow	Difference
8.8 m ³ /s	4.1 m ³ /s	54%

Table 2: Peak Flow Results at the basin outlet based on RORB models provided by MW

While the 1%+CC peak flow is not the only factor in sizing the retarding basin, these results indicate that this retarding basin is being oversized to compensate for additional flows downstream which does not result in an equitable outcome for the landowners of this catchment.

No TUFLOW model has been provided for review. If TUFLOW modelling is undertaken of the proposed drainage scheme it may reduce the required detention volumes as it incorporates 2 dimensional flows within the catchment.

Wetland Location

The combined catchment that the wetland is to treat is shown in Figure 2 as B and B1. The southeast corner of the site contains the low point of this catchment; however, it is not equitable to burden the site with the loss of developable land to an extent not shared by any other lot in the catchment. Maintaining the current proposed reserve area of 9.1ha, the configuration of the wetland could be modified to share the loss of land equitably with the lot north of the site, as shown indicatively in Figure 3. Should the reserve area of 9.1ha be reduced, additional developable land would be available on both lots.

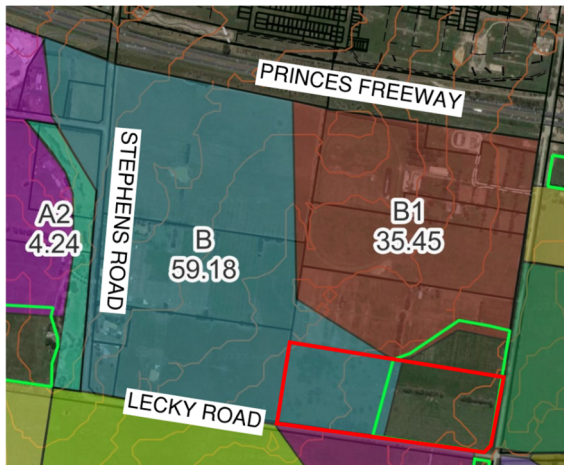


Figure 2: MUSIC model catchment plan excerpt.

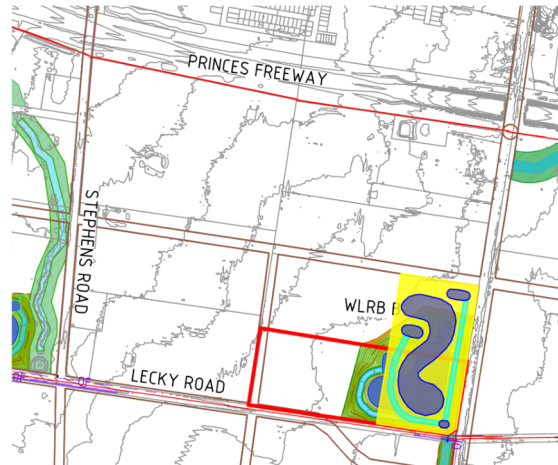


Figure 3: Alternative configuration of wetland reserve.

Lecky Road will be realigned and shifted south as it approaches Officer South Road from the west as marked up in yellow in Figure 4, creating a parcel of land to the south of the site that is highlighted purple in Figure 4. This parcel of land, between the wetland, Officer South Road, and realigned Lecky Road could be incorporated into the reserve area. This would share the loss of land associated with the wetland with an additional landowner and improve the accessibility of the reserve area by introducing access along Lecky Road. The realignment of Lecky Road was not proposed when the Officer South DSS Options Assessment (Jacobs, 2022) was completed. It is noted that there is an existing gas utility running north-south along Officer South Road.

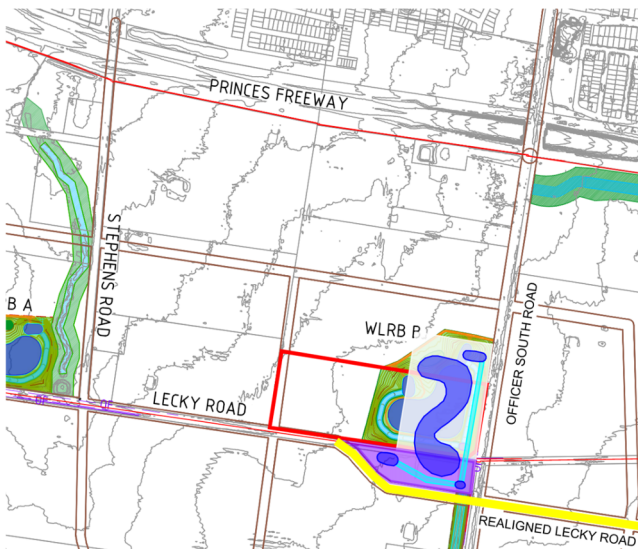


Figure 4: Mark up of realigned Lecky Road and remnant land to the south of the site.

Optioneering

The preferred option (Option 1F) from the Officer South DSS Options Assessment (Jacobs, 2022) set the reserve area in question to 10.3ha. Only one of the options (Option 1B) explored in detail as part of the options assessment considered an alternative reserve area of 7.81ha, and this option was dismissed as it did not satisfy the predeveloped flow criteria at Patterson Road. The proposed reserve area has since been reduced to 9.1ha, however this remains significantly higher than 7.81ha. Patterson Road is a long way downstream from the site, and there are many factors that could have contributed to Option 1B not achieving the predeveloped flow targets at Patterson Road. It should be noted that the preferred option (Option 1F) also does not meet all predeveloped flow targets at Officer South Road upstream of Cardinia Creek. A reduction in the size of the reserve has not been given sufficient consideration and needs to be investigated further.

Summary

- Conservative parameters have been adopted in the MUSIC modelling and can be further optimised.
- The wetland area could be reduced by 24% and still achieve the water quality targets required.
- An assessment of the RORB modelling indicates that retarding basin is being oversized to compensate for additional flows downstream which does not result in an equitable outcome for the landowners of this catchment. It may be possible to reduce the detention volume by roughly 50% based on high level calculations.
- The combined wetland and retarding basin configuration can be optimised to increase developable land on the lot. The area of land created by the re-aligned Lecky Road south of Lot 2 Officer South Road should be considered.

According to MW's Principles for Creating Development Services Schemes, proposed infrastructure to service development should be optimal in terms of cost and performance. The proposed reserve, however, falls short in both aspects as it is excessively large when considering both water quality and on-site detention.