Stormwater Impact Assessment Report

Project name:	Hicks Estate, 163 O'Kane's Rd Numurkah
Contract number	5060
Prepared by:	Damien Ginger – Civil Manager
Checked by:	Pell Meola – Senior Civil Designer

Onleys

ABN 15 452 548 610

PO Box 2120
Shepparton 3632
Tel 03 5821 7171
03 5821 5100
Fax 03 5821 2725
mail@onleys.com.au
www.onleys.com.au
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Introduction

Onleys Consulting has been engaged by Jason Hicks to prepare a Stormwater Impact Assessment Report for a proposed residential subdivision. The subject site is located at 163 O'Kane's Rd Numurkah.

Figure 1: Site of Works

Existing Conditions

The site area is 56.69 ha, with the southern half of the property currently zoned Low Density Residential Land (31.81 ha), and the remainder Farm Zone.

The site has been previously used as agricultural land, and the site remains largely vacant.

The site west of G-MW Channel 6/6 currently drains towards G-MW Drain 5/20 Inlet in the southwest corner, and the site east of G-MW Channel 6/6 drains east towards a drainage culvert in O'Kane's Road.

Drainage Assessment

Hydrology

Moira Shire Council is the responsible authority for the major and minor drainage networks. As outlined in the Infrastructure Design Manual, Moira Shire Council requires the developer to construct - at its own cost - drainage works between the subject site and the Council nominated point of discharge with the capacity to contain events up to and including 20% AEP. The developer must also ensure an overland flow path is provided for events at an Annual Exceedance Probability of 1%.

Internal drainage and method of disposal of stormwater from all roofed and sealed areas must be approved by Council.

Legal Point of Discharge (LPOD)

The legal point of discharge for the Low Density Residential development on the west side of G-MW Channel 6/6 is to the existing GMW Drain 5/20 inlet structure located in the southwest corner of the property, on the corner of Naring Rd and Numurkah Rd.

There is also a second point of discharge located on the east side of G-MW Channel 6/6, which comprises of a culvert which extends under O'Kane's Rd. As this culvert appears to discharge into the private farm drainage system on the east side of O'Kane's Rd, however, this is a far from ideal discharge point.

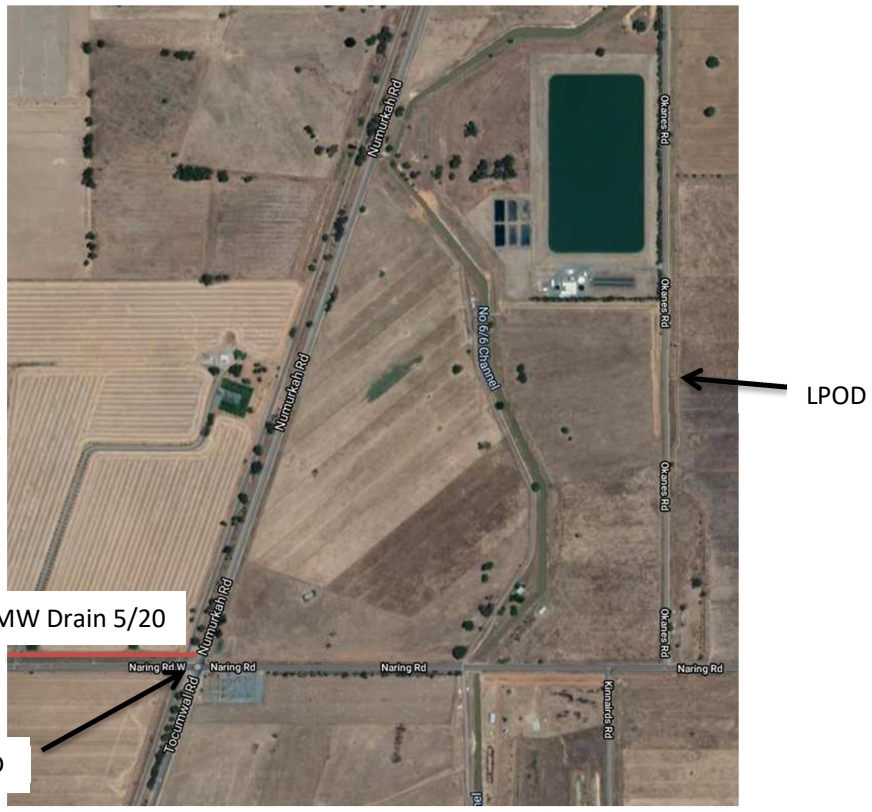

Figure 2: Legal Point of Discharge

Minor Drainage Network

As the development is Low Density Residential, the minor drainage system consist mainly of open drains capable of carrying runoff from minor storms to the point of discharge without encroaching on road pavements or lots.

The design of the minor drainage system is to ensure the system is capable of conveying flows up to and including events equivalent of 20% AEP.

The minor drainage systems on both sides of G-MW Channel 6/6 connect to proposed detention basins, as shown on Plan 5060-D01.

Most of the lots shall be graded to fall towards the internal roads. This runoff shall be collected in swale drains within the road reserves. A proportion of the site shall drain towards the existing table drains in the Numurkah Rd and Naring Rd reserves. In these locations the swale drains shall be re-sized where required to accommodate the site flows, and re-graded to direct the flows towards the proposed detention basin. The remainder of the road reserve swales shall drain towards a proposed easement drain located in Lots 7 and 32, to be constructed as per the requirements set out in the Infrastructure Design Manual, Clause 17.5.

As the site generally falls from G-MW Channel 6/6 to the southwest, there are a number of lots that fall to the rear, away from the proposed internal road (refer Lots 28-37 and 50-55). These lots shall have easement drains located along the rear boundaries, discharging through to the larger drainage easement located within lots 7 and 32. The capacity of these drains shall be sized to ensure no nuisance flooding occurs in larger events.

Major Drainage Network

The major drainage system shall contain planned drainage routes and overland flow paths. The system is designed to manage runoff on-site to avoid the increase of overland flow to adjacent drainage systems, as well as ensuring overland flows do not encroach on the lots themselves.

The road reserves shall be profiled to ensure runoff is contained within the road reserves, whilst also ensuring access to all lots is provided in accordance with the requirements of GBCMA (2014) *Floodplain Management Principles and Best Practice Assessment for Land Use and Development*.

The easement drain located in Lots 7 and 32 shall be sized to accommodate 1% AEP flows with a minimum 300mm freeboard to the lots.

Drainage flow paths are shown in Appendix A, drawing 5060-D01.

Detention Storage

Council are currently in negotiations with the landowner to acquire a portion of the land in the southwest corner of the property, in order to realign Numurkah Rd and improve the intersection with Naring Rd. A proposed detention basin shall be constructed in the corner of land to the west of the proposed Numurkah Rd alignment.

The detention basin size required for the portion of land zoned LDRZ fits adequately inside the section of land allocated for this. Should the land to the north currently zoned Farm Zone be re-zoned and subdivided, either the basin could be extended into the old Numurkah road reserve, or the basin deepened in order to achieve the necessary storage volume.

A section of land in the Farm Zone area has been earmarked for the location of the Eastern Basin, and the area determined based upon the storage volume required. As previously mentioned, the point of discharge from the eastern side is not an ideal discharge point, so we have proposed the pump station and rising main be constructed to direct the flows into G-MW Drain 5/20.

Detention storage requirements have been determined using Ensemble simulations and ARR2016 rainfall data sourced from BOM for the area and temporal patterns sourced from the ARR Datahub. Capacity of the detention basin has been calculated from survey data and Digital Terrain Model; surveyed profile has been projected along the total basin length to find an estimated volume.

Table 1: Detention volume summary

Location	Catchment Area (ha)	Runoff coefficient	1% AEP Detention volume required (m^3)	Estimated Basin volume (m^3)	(Assumed) Total Discharge Flow (l/s)
West side, LDRZ area	19.52	0.40	14,153 – based on 24 hour no outflow	16,578	23.42
East side, LDRZ area	9.25	0.40	5,997 – based on 24 hour no outflow	6,020	11.10
West side, Total area	35.02	0.40	17,932 – based on 24 hour no outfall	19,037	42.02
East side, total area	17.59	0.40	11,402 – based on 24 hour no outfall	11.450	21.10

Details of 1% AEP drainage system

Details of the proposed open drains are to be found in Apendix A, Drawing 5060-D01.

This system also forms part of the same system used to convey 20% AEP flows to the proposed detention basins, and have been designed to accommodate full 1% AEP flows.

Conclusions

The above report illustrates that the proposed development complies with Moira Shire Council's drainage requirements as well as GBCMA's requirements.

The overland flows are controlled within the development area and adequately transferred via open drains where proposed, and hence do not encroach on the lots or proposed roads.

Based upon an assumed worst-case permissible site discharge (PSD) of no discharge for 24 hours as well as 1.2 l/s/ha for all storm events, the detention volume storage is adequately sized for post-development flows for all storm events up to and including 1% AEP.

300mm freeboard has been provided for all major drainage structures, and there is also provision for storage in the road reserves, should there be an event in excess of 1% AEP, thus minimising the risk of flooding in this development.

Appendix A

Drawing 5060-D01