



21 December 2020

Level 4

25 Atchison Street

Wollongong NSW 2500

**Phone:** 02 4288 4401

**Web:** [www.makereng.com.au](http://www.makereng.com.au)

**Email:** [info@makereng.com.au](mailto:info@makereng.com.au)

ABN: 50 628 452 719

ACN: 628 452 719

The Manager  
DAA Development Corporation  
Via email: [catherinearapali@gmail.com](mailto:catherinearapali@gmail.com)

Dear Catherine,

**LOT 402 DP1254873 FAIRWATER DRIVE, CLEVELAND AND LOT 200 DP803810 144 CLEVELAND ROAD, CLEVELAND**

**Preliminary On Site Detention Sizing**

It was requested that Maker ENG Pty Ltd ('Maker') calculate the OSD volumes required for Lot 200 DP803810 and Lot 402 DP1254783 considered separately.

Preliminary OSD sizing was undertaken in WBNM.

The pre- and post-development catchments are summarised in **Table 1** below. The analysed catchment on Lot 200 (Catchment 'A') does not include the area demarcated as E2 on the Cleveland Road Developments Proposed Land Zoning Plan prepared by Craig & Rhodes (Dwg Ref 164-19P L01 [06] dated 24/09/2020) which is not subject to development. The analysed catchment on Lot 402 (Catchment 'B') only includes the area shown as developed directly west of the intersection of Fairwater Drive and Fowlers Rd on the conceptual layout provided to Maker by Michael Rodger on 18 December 2020 – roughly corresponding to the area shown as R3 and B2 on the Craig & Rhodes Land Zoning Plan. It does not include the E2 area or the area to be developed on the western part of the lot.

The impervious percentage of the lots was estimated as a gross imperviousness of 70% on those areas shown as R2, 80% on those areas shown as R3 and 95% on areas shown as B2.

**Table 1: Catchment details**

Sub-catchment	Area (ha)	% impervious – pre-development	% impervious – post-development
Catchment A (Lot 200)	17.5	1	75
Catchment B (Lot 402)	4.84	0	84

The hydrological parameters used for input to the WBNM model are listed in **Table 2**.

Rainfall IFD data was sourced from the Bureau of Meteorology ARR1987 IFD generator tool for the site.

The OSD was sized so that post-development flows do not exceed pre-developed levels in both the 5-year ARI and 100-year ARI storms.

A range of storm durations were run to assess which duration was the critical storm for the catchment. For both catchments the 90-minute storm burst was critical for both the 5 and 100 year ARI.

**Table 2: Adopted WBNM hydrological parameters**

Parameter	Adopted Value	Comment
Lag parameter (C)	1.6	WBNM default for ungauged catchments
Initial Loss (pervious)	0	Considers the effect of a storm burst within a longer storm
Continuing loss (pervious)	2.5	Consistent with Rienco Floodplain Risk and Water Cycle Management Plan for Proposed Development at Cleveland Road, Cleveland (REF 20054 dated 19.10.20)
Stream Routing Factor	1	Model default for natural streams

The OSD was modelled as a single inlet controlled basin on each catchment. Both basins were set up with a low level piped outlet and a weir 300mm below the basin top water level.

Initially both basins were sized to have a water depth of 1.5m in the 100 year ARI storm. The basin volumes were as shown in **Table 3**. To check for a smaller footprint the basin on Catchment A was also sized for a water depth of 2.0m. The total volume was unchanged.

**Table 3: OSD volumes**

Sub-catchment	Modelled OSD volume (m <sup>3</sup> )	100 year ARI peak depth (m from base)	Example footprint area (m <sup>2</sup> )
Catchment A (Lot 200)	6400	1.992	2,300
Catchment B (Lot 402)	1300	1.496	540

The peak site discharges are shown in **Table 4**. The basins are sufficiently sized to detain post-developed flows to pre-developed levels.

**Table 4: Peak runoff**

Sub-catchment	5 year ARI peak flows (m <sup>3</sup> /s)		100 year ARI peak flows (m <sup>3</sup> /s)	
	Pre-developed	Post-developed	Pre-developed	Post-developed
Catchment A (Lot 200)	3.52	3.37	6.68	6.67
Catchment B (Lot 402)	1.31	1.30	2.42	2.42

Yours faithfully,

Maker ENG.

Angus Dyson

Civil Engineer