Clarence City Council
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JSA Reference: 17L99-118-4

Stormwater Design Proposal

647 East Derwent Highway, Risdon (Clarence Lifestyle Village)

This stormwater design proposal is provided to support the rezoning application for the proposed development at 647 East Derwent Highway, Risdon. This proposal summarises the concept stormwater design for the site, including treatment, detention and management of overland flow. It is anticipated that prior to engineering approval a full Stormwater Management Plan (SWMP) would be required and submitted.

Existing Site Conditions and Overland Flow

647 East Derwent Highway is located adjoining the existing Clarence Lifestyle Village development at 2 Piper Road, Geilston Bay. The development site is approximately 2.6ha in area, and is predominantly undeveloped grassed area, with a single dwelling located on the property. Stormwater runoff from the existing site drains as distributed sheet flow towards the north-western property boundary and the existing above ground drainage path on the north-eastern side of the property. The development site is subject to a flood-prone area based on Clarence City Council flood mapping for 1% AEP inundation with climate change loading.

There are two sections of flood overlay relevant to the site. The north-eastern zone of the property is an existing drainage path, and is also subject to the waterway and coastal protection area. This drainage path is not a constructed swale or a permanent waterway, but is a natural low point where stormwater runoff accumulates in rainfall events, and forms part of the drainage system for the surrounding catchments and the East Derwent Highway. Council's flood model in this area indicates water depths in the 1% AEP storm event of up to 1.5m.

The section of the site from the south-western property boundary to the north-western property boundary is subject to the flood hazard zone associated with a concentration of overland flow south-west of the development site. The development site itself is relatively flat by comparison, resulting in the accumulated water spreading wide and shallow across the property. Council's flood model in this area indicates water depths in the 1% AEP storm event are generally in the range of less than 0.05m, and 0.05m to 0.2m.

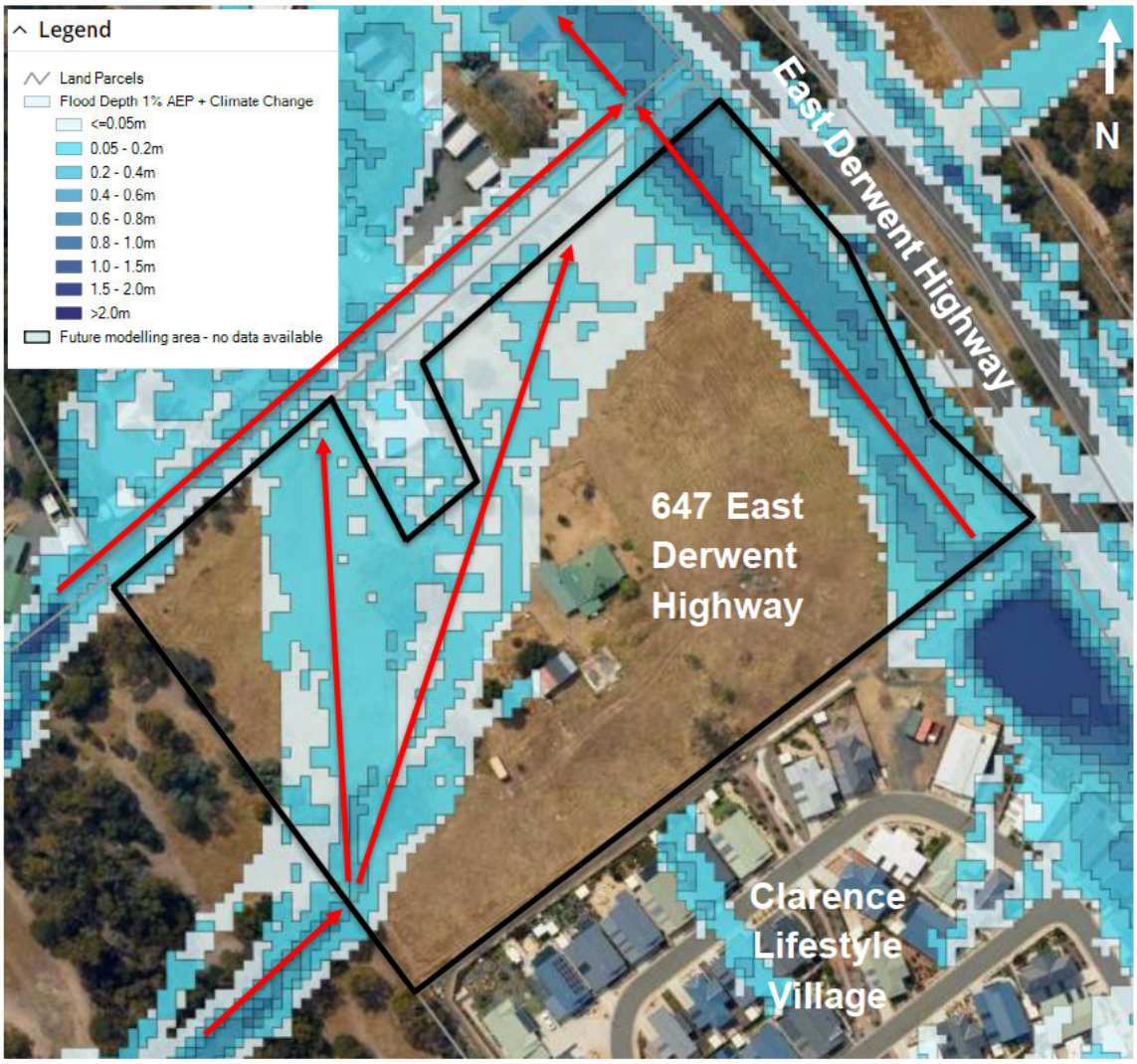


Figure 1: Council flood model depths at 647 East Derwent Highway, Risdon (red arrows show direction of flow)

Proposed Site Design and Management of Overland Flow

The proposed development has been designed with consideration of the flood hazard overlay and the movement of surface water across the site.

No buildings are proposed in the section of the property subject to flood hazard and waterway protection codes along the north-eastern side. Works in this area are limited to the driveway, stormwater detention systems, and water and sewer infrastructure.

The site design, including the layout of the roads and lots, stormwater swales, and pipe arrangement, have been designed to facilitate movement of water entering the site from the south-western boundary, and surface runoff generated on the developed site. The overland flow approaching the site from the south-west is proposed to be cut off by and collected in a proposed swale drain along the south-western boundary. From here, stormwater is directed to the underground piped system for the site through proposed inlet headwalls. The piped stormwater system runs underneath the road network and directs the water to the proposed detention basins along the north-eastern side of the property. The pipes are sized to accommodate the runoff from a 5% AEP storm event. The layout of the lots and roads has been designed to allow for overland flow in the event that the pipes do not have sufficient capacity for the water (due to blockage or major storm event). The road network forms the primary overland flow route for the developed site, with pedestrian walkways between the south-western lots to transfer overland flow from the swale along the south-western boundary through to the road network. The overland flow routes will be designed to

accommodate the overland flow anticipated in the 1% AEP event with climate change loading applied to the inundation rate.

The flood hazard overlay associated with this overland flow, covering a large portion of the western side of the property, is not applicable to the developed site. Dwellings in this part of the site will not be in a flood prone area and will not need to address the associated design criteria.

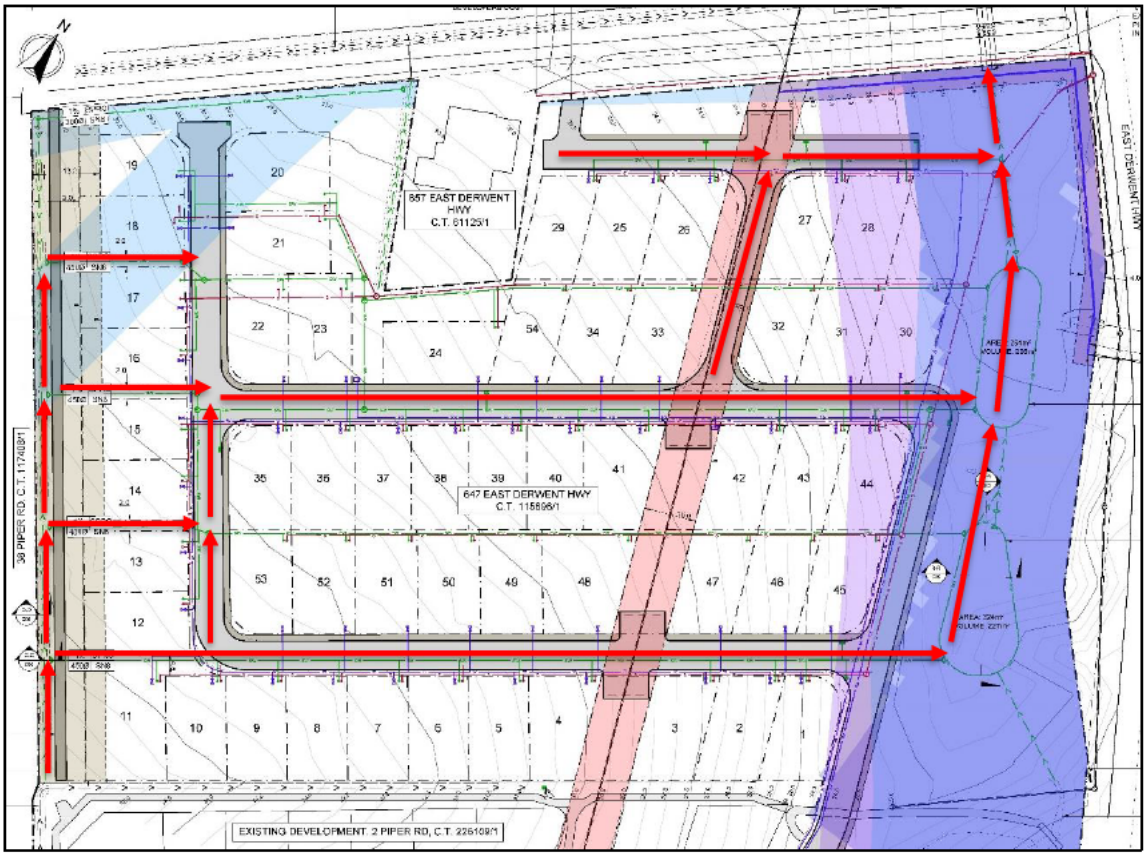


Figure 2: Part of proposed site plan C02 (red arrows show direction of overland flow)

Stormwater System Design – Detention and Treatment

The proposed development results in an intensification of stormwater discharged from the property, and has therefore been designed to meet the requirements of Council's Stormwater Management Procedure for New Developments. Combined detention and bioretention basin systems are proposed to provide detention and treatment of stormwater runoff collected from the site.

Stormwater Detention

DRAINS software was utilised to run an initial loss - continuing loss (IL-CL) model of the development site, to ensure peak runoff rate from the developed site does not exceed peak pre-development runoff rate in the 5% AEP event. Ensembles of storms in the 5% event were modelled in accordance with ARR 2019 procedures using the following inputs and assumptions:

- Design rainfalls were imported from BOM 2016 IFD design rainfalls for Risdon, with pervious area initial and continuing losses, pre-burst rainfall and temporal patterns imported from ARR data hub.
- Pre-development catchment is modelled as 1% impervious area and 99% pervious area, based on existing site conditions.
- Post-development catchment is modelled as 62% impervious area and 38% pervious area, as determined based on proposed site plans and assuming similar dwelling sizes as the existing Clarence Lifestyle Village development.

Two 200m^3 stormwater detention basins are proposed to collect the runoff from the majority of the new impervious areas and provide combined treatment and detention for the stormwater runoff collected on the site. The detention basins are provided with DN300 concrete headwall outlet to limit the outflow from the detention basins. The overflow weir level is 400mm above the base of the detention basin, to limit the water depth in the detention basin in frequent rainfall events.

The peak post-development flow rate (with detention) in a 5% AEP storm event is 134L/s, occurring in the 1 hour duration storm burst. This does not exceed the peak pre-development flow rate for the site of 167L/s.

Stormwater Treatment

The following reductions in average annual load based on typical urban stormwater concentrations are required under the Council's Stormwater Management Procedure for New Developments: 90% reduction in gross pollutants (GP), 80% reduction in total suspended solids (TSS), 45% reduction in total phosphorous (TP), and 45% reduction in total nitrogen (TN).

The stormwater treatment system for 647 East Derwent Highway, Risdon has been modelled utilising Model for Urban Stormwater Improvement Conceptualisation (MUSIC) software using the following inputs and assumptions:

- The model input was based on the Hobart Ellerslie Rd 1/5/1996 – 1/10/2001 6-minute rainfall, which includes only valid data (no accumulated or missing data).
- The catchment area was split into three source node types (roof, hardstand and landscape), with three separate catchment zones to model the catchment areas collected to the two bioretention basins and the smaller catchment at the north of the site which bypasses the detention and treatment systems.
- In the absence of standard pollutant generation rates supplied for use in MUSIC modelling in Tasmania, the catchment source nodes have been set up with the default pollutant generation rates provided in MUSIC, in accordance with the MUSIC user manual.

The modelled reductions in average annual load based on typical urban stormwater concentrations for the proposed treatment system are: 90.8% reduction in GP, 86.4% reduction in TSS, 45.5% reduction in TP, and 66.5% reduction in TN.

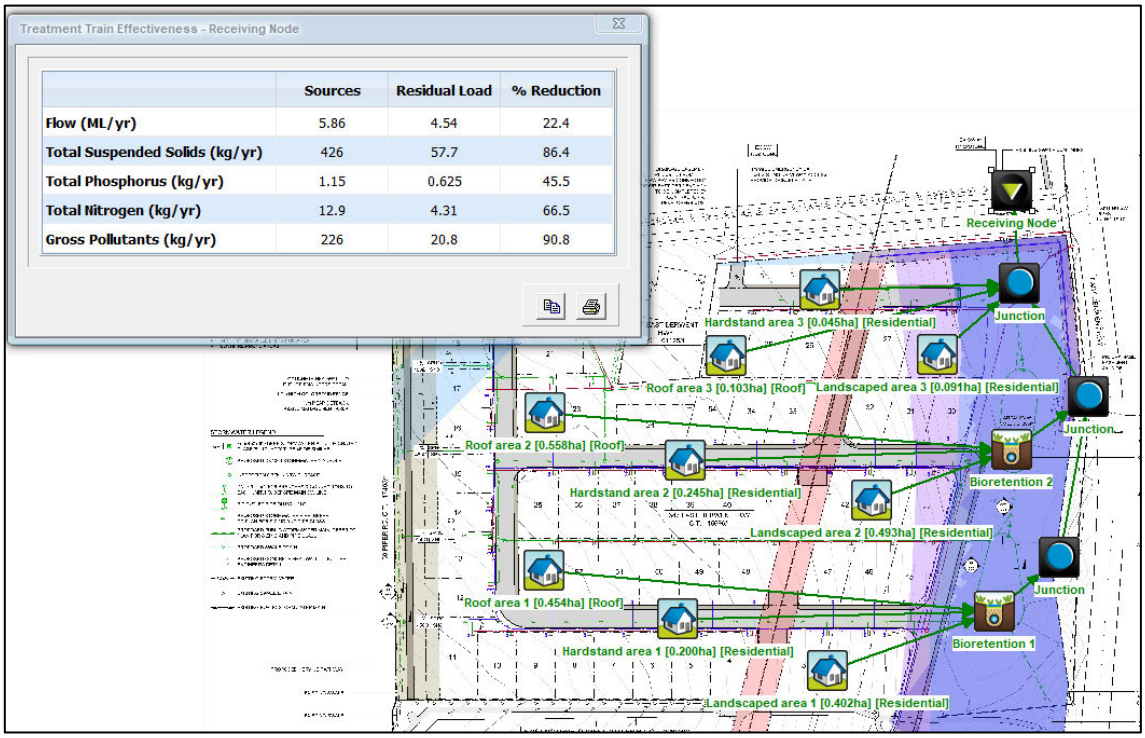


Figure 3: MUSIC model and treatment train effectiveness

Please contact Rachel Horner on 6240 9911 or rachel@jsa.com.au if you require any further information.

Yours sincerely,



Rachel Horner

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