

3.0 PRELIMINARY WATER QUANTITY ASSESSMENT

A preliminary water quantity assessment has been carried out by Cardno for the pre-development and post-development catchments of the site. The assessment was undertaken in accordance with Tweed Shire Council's Development Design Specification D5 'Stormwater Drainage Design' and QUDM Section 5, using the Rational Method.

3.1 On-site Detention

The proposed development is expected to increase the amount of impervious area on the site. The potential impacts of this increase in impervious area will be a larger volume of runoff, and possibly a shorter time of concentration. As a result there is expected to be an increase in the peak stormwater discharge leaving the site. To avoid impacts on the downstream properties and to maintain the existing peak flow rate of runoff discharging from the developed site for all rainfall events up to and including the local catchment 100 year ARI event, on-site detention is proposed to be incorporated into the development works to control the rate of discharge entering the downstream floodplain.

The on-site detention storage proposed for this site will be sized to maintain the equivalent pre-developed condition peak flows discharging from the subject site for the local catchment 100 year ARI rainfall event. To control the peak rate of discharge from the storage areas it will be necessary for the outlets to be designed for all events up to and including the 100 year event.

A preliminary assessment of the on-site detention storage requirements has been carried out for the proposed development area, using the initial sizing manual techniques in Section 6.06.1 of QUDM. These calculations indicate that estimated preliminary total storage volumes of approximately 956m³ and 11726m³ will be required to detain the increase in the 100 year ARI peak discharge and maintain the equivalent pre-developed 100 year ARI peak flow discharging off site for the Eastern and Northern catchments respectively. The calculations for the preliminary assessment of the detention storage volumes are included in Appendix B.

For the Northern catchment, it is proposed to provide this required storage volume within the proposed open space detention basin located in the open space area on-site. The storage volume would be provided above the permanent standing water level within the wetland. A controlled discharge point will be used in the open space detention basin to limit the flows exiting the storage area to ensure that flows discharging from the overall development site into the existing SEPP 14 wetland area are equivalent to the pre-development flows.

By utilising the wetland constructed within the open space area on the site for stormwater detention, the proposed development can be designed and constructed in such a manner that ensures there will be no increase in runoff for all storm events up to and including the local catchment 100 year ARI event, without compromising the water quality of the site.

During the detailed design phase (for the construction certificate) the required storage volume for each catchment will be optimised in conjunction with the final determination of the outlet and bypass flow structures in an effort to find a solution that best suits the layout of the site.

3.2 External Catchments

As mentioned above, there is an existing external catchment area of approximately 14.8ha contributing from the eastern side of Fraser Drive (refer Cardno Figure No DA19, Appendix A). The runoff from this catchment currently enters the subject site via 900mm diameter culvert under Fraser Drive. In larger storm events where the runoff volume is greater than the capacity of the culvert, Fraser Drive acts as a weir with the flow building up until it flows across the road into the development site.

It is proposed to catch the runoff overtopping Fraser Drive, up to the local 100 year ARI event, before it enters the subject site using sufficiently sized inlet pits. It is proposed to convey the external flow from the eastern catchment through the subject site as shown on Figure No DA21. The external catchment runoff will then be discharged into the south-east corner of the existing SEPP 14 zone in a dispersed manner in order to prevent erosion and scouring caused by high velocities. The intent of this proposed external flow by-pass network is to reduce the catchment area contributing to the proposed northern water quality treatment area, which is to be constructed as part of the proposed development.

Stormwater runoff contributing from the other external catchment areas to the west of the subject site has been allowed for in the preliminary detention calculations discussed in section 3.1.

4.0 PROPOSED TREATMENT DEVICES

To comply with Part 5.5 of Council's *Tweed Urban Stormwater Quality Management Plan* and Part 7.11 of the *Development Design Specification D7-Stormwater Quality* a number of stormwater quality management measures are proposed to be incorporated into the development of the site. To assist in minimising the expected increase in suspended solids and nutrients discharging from the developed subject site it is proposed to install and construct a number of gross pollutant traps and a wetland area into some of the open space areas proposed on-site.

The stormwater treatment process for each catchment of the project is described below.

4.1 Stormwater Treatment Trains

The proposed stormwater runoff treatment trains for the different catchments of the site are as follows:

Northern Catchment

Gross Pollutant Trap / Trash Rack ⇒ Stormwater Wetland

Eastern Catchment

Proprietary Gross Pollutant Trap

Southern & South-Eastern Catchments

Roof Area Runoff ⇒ Inter Allotment Drainage

Surface Area Runoff ⇒ Vegetated Buffer Strips

4.2 Stormwater Treatment Devices

The correct design and implementation of the following stormwater treatment devices is 'deemed to comply' with the performance criteria and stormwater treatment objectives outlined in Council's *Tweed Urban Stormwater Quality Management Plan*.

Litter Baskets/Racks

Litter baskets and trash racks are generally located upstream of other treatment measures such as extended detention basins or constructed wetlands. They are primarily used as a pre-treatment device for stormwater runoff, removing litter, debris and other gross pollutants from the runoff before it discharges into other secondary and tertiary treatment devices located downstream. A trash rack is recommended for this site upstream of the proposed northern wetland. The trash rack/litter basket device will be sized to comply with the requirements outlined in Section 7.11-2.21 of Council's *Development Design Specification D7-Stormwater Quality*.

Gross Pollutant Traps

A proprietary Gross Pollutant Trap (GPT), capable of trapping oils and removing litter and sediment, will be used as the treatment device for pipe flows leaving the proposed eastern catchment area. This GPT device will be sized to have sufficient sediment and oil storage capacity to comply with the requirements outlined in Section 7.12.1 of Council's *Development Design Specification D7-Stormwater Quality*. As required by Council this GPT device will be designed to treat runoff generated by storm events up to the 3 month ARI event for the nominated catchment area.

Maintenance for these proprietary GPT units is generally minimal and will involve the periodic removal of the accumulated oils, litter and sediment. Typically this is done on a six monthly basis by the nominated maintenance staff.

Stormwater Wetlands

Stormwater wetlands are designed to help in the removal of sediments and nutrients from stormwater runoff. The slow movement of water through the wetland allows time for the sediments suspended in stormwater runoff to settle out, while macrophytes located within the wetland absorb the nutrients transported into the waterbody via the stormwater runoff.

Stormwater wetlands work most effectively when used in-conjunction with a pre-treatment device such as a trash rack or GPT provided upstream of the wetland to remove litter and trap oils.

Sections D7.9 and D7.11 and Table 7.11-WS of Council's *D7-Stormwater Quality* specification provide design criteria for the construction of wetlands. Provided that the stormwater wetlands are appropriately designed and constructed to meet these criteria then the wetlands are 'Deemed to Comply' with the performance criteria outlined in Part 5.5 of Council's *Tweed Urban Stormwater Quality Management Plan*.

Table 7.11-WS indicates that where no formal sedimentation or pre-treatment processes are installed, such as sedimentation basins, the total wetland surface area including deep water zone and macrophyte zone shall be a minimum of 500m² per 1ha of urban development catchment area. This equates to 5% of the contributing development catchment area. Table 7.11-WS provides other pre-treatment processes that may be adopted within the development to assist in reducing the total wetland size.

Rainwater Tanks

Rainwater tanks can not only provide property owners with a low cost supply of water, but can also be used to assist in the reduction of peak flow rates from runoff events. However, as rainwater tanks are installed at a lot scale and become the responsibility of the property owner, incorporating these devices into the stormwater management scheme cannot be relied upon. Property owners in Part B of the development should be encouraged to install rainwater tanks to assist in complying with the Basix assessment set by the New South Wales Government. Water collected in the rainwater tanks can be re-used within the dwellings for outdoor water use, toilet flushing and/or laundry use.

For the proposed allotments where the roof drainage cannot be connected directly to the road drainage network, the concentrating of roof water runoff at a single discharge outlet can lead to erosion and scour problems. As roof water runoff is considered to be relatively 'clean' the roof water drainage should be connected directly to the proposed inter-allotment drainage network to minimise the potential for the runoff to become contaminated with general sediments and nutrients associated with surface runoff from other hardstand areas.

Vegetated Buffers / Filter Strips

Vegetated buffers / filter strips can be either areas of planted vegetation or strips of retained vegetation left in its natural state. These vegetated areas may provide an effective way of reducing peak flows and improving stormwater runoff quality.

During the construction phase of the development, including house construction, the retention of existing vegetation in-conjunction with other erosion control measures can help to stabilise exposed areas.