

PROPOSED DEVELOPMENT FRASER DRIVE – SOUTH TWEED

ENGINEERING REPORT

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1.0 INTRODUCTION

This report has been prepared on behalf of Villa World Ltd in support of a proposed development located on Lot 9, DP1039569 and part of Lot 2, DP1000385, Fraser drive, South Tweed. The site covers an area of approximately 31 hectares and varies in elevation from approximately RL2.5 to over RL55 AHD. The northern end of the site is relatively flat while the southern area grades from the lower levels along Fraser drive up to the ridge located to the west of the site.

The site is well grassed, but mostly clear of major vegetation as a result of previous agricultural use. The lower, flat areas contain a wetland with mangroves and other plant species. Some of the low area has been subject to filling under an existing bulk earthworks approval.

The site is divided into two parts. Part A consists of the lower portion of the site, including the open space/detention area and the medium density housing area. Part B consists of the steeper portion of the site.

The report has been based on preliminary DA Drawing layouts prepared by PMM Drawing Reference 20934-5. The report will provide preliminary civil engineering advice on the proposed development suitable for the DA application phase.

2.0 DEVELOPMENT POPULATION

The proposal is for a development consisting of approximately 168 residential lots, 2ha of park area and a medium density housing area, consisting of approximately 66 dwellings. The overall equivalent tenements (ET) for design of water and sewer demands have been calculated at 234 ET or an equivalent population (EP) of 749.

3.0 SITE ACCESS

There will be a number of access points to the development due to its size and terrain. The main access to Part A of the development will be from Fraser Drive, where it is proposed to have one main controlled intersection at the northern end of the development. A secondary access 275m south of the main access will provide a 'left in, left out' turning movement. The existing Merlot Court will continue into the proposed development from the southern boundary, as will Ocean Street from the western boundary providing access to Part B of the development. A third access point will be incorporated at the northern end of Part B, connecting to Hillcrest Avenue. Due to the existing road geometry and limited site distance at the intersection with Hillcrest Avenue, turning movements at this intersection will be restricted.

The proposed access road running through Part B of the development includes sections with grades approaching the upper limits allowed by council (up to 16%). These grades are necessary to comply with all the geotechnical restraints regarding lot grading and retaining wall heights. Alternate routes to access the upper portion of the site are provided for heavy vehicles.

Cardno Eppell Olsen, specialist traffic engineers have provided a traffic assessment for this project. Please refer to their report titled "Fraser Drive Residential Development" dated December 2006 for further information regarding access, car parking, onsite manoeuvring for service vehicles and proposed turning restrictions for the Hillcrest Avenue intersection. The development access roads will generally have 9m, 7.5m and 6m carriageways depending on location and be formed to a high standard of finish.

4.0 SITE EARTHWORKS

A geotechnical investigation of the site has been carried out by Shaw-Urquhart Geotechnical Services. The principal Geotechnical Engineers of this company, Mr Phillip Shaw and Mr Keith Urquhart, reported on this site back in 2002. The findings of the report (see Appendix A) are summarised as follows:

- Existing slope varies from 10° to 25°;
- The site contains groundwater seepage and areas of existing slope instability in the higher regions;
- Building areas should not lie on land steeper than 1 in 3 slope and no areas on-site should have an un-supported slope steeper than 1 in 2;
- Areas of existing slope instability should be remediated;
- Retaining walls, meeting Council's criteria, are preferable to the excavating and potentially over steepening the hill slopes.

Due to the existing geography of the site, earthworks will be required for access to areas of the site and to ensure all allotments are graded according to Council's Development Design Specification D6 '*Site Regrading*'.

An area of Part A of the site is being filled under the existing TSC development application DA02/0837 and TSC construction certificate CC02/1692. Minor reshaping of the placed fill will be undertaken as part of the proposed civil works for Part A of the development. Part B of the site will require re-profiling to remove gullies and ridges and minor earthworks to tie the roadways in with the existing surface. Due to the slopes on the site, it is proposed to use some retaining wall structures in an effort to do away with excessive batters. The preliminary design of Part B has been done to achieve a balance of the earthworks cut/fill volumes. It is not envisaged that any imported fill will be required on the site.

Slope stabilisation works will also be carried out in the areas that require the same. These areas are located on the steep slopes towards the northern end of the site. Previous geotechnical investigations carried out on the site have indicated that, with the exception of topsoil, any material removed from the steeper, Part B portion of the site will be suitable for use as structural fill, providing proper pre-treatment (ie drying) is carried out prior to placement. Remediation of the existing slip areas located in Part B of the site will be carried out in accordance with the geotechnical reports. These works will be carried out during the earthworks for Part A of the site.

Details of the proposed earthworks and retaining walls are shown on Cardno Figure No's DA04 and DA09 in Appendix C.

All retaining wall heights will conform to Council's maximum permissible height Table 6.1, *Development Design Specification D6 Site Regrading, Version 1.3*.

5.0 STORMWATER MANAGEMENT

The site is divided into four main existing site catchment areas. Approximately 2.4 hectares (ha) of the subject site discharges south towards existing residential lots on Shiraz Place and Merlot Drive. Two site catchment areas of approximately 1.8ha and 5.3ha discharge east towards Fraser Drive. The largest existing site catchment of approximately 23ha discharges north towards James Street. A SEPP 14 wetland area (18b) has been identified in the north-western corner of the subject site at the downstream outlet of the existing northern catchment area. As it is intended to retain the existing wetland area within the SEPP 14 zone the northern catchment point of discharge will be situated along the southern boundary of the SEPP 14 zone.

The proposed drainage strategy for the Fraser Drive site is intended to incorporate water sensitive urban design (WSUD) wherever practical. The topography of much of the proposed development site limits the use of many WSUD techniques. It is proposed to utilise conventional street drainage to convey stormwater runoff from the upper reaches of the catchment areas down to the stormwater treatment and detention devices to be constructed around the lower parts of the development site.

Stormwater runoff from the northern and eastern catchment areas will be conveyed to detention and treatment devices to be located within open space areas situated at downstream outlet of each catchment. It is proposed to incorporate treatment devices such as gross pollutant traps and wetlands into the open space areas which will be sized to meet Council's 'deemed to comply' criteria outlined in the *Development Design Specification D7-Stormwater Quality*. Sufficient on-site detention storage volume will be provided within these open space areas to assist in maintaining peak flow rates equivalent to existing peak flows discharging off-site.

A Stormwater Management Plan has been produced for the proposed development. Refer to Cardno report "Proposed Development on Fraser Drive, South Tweed Stormwater Management Plan" dated 8th December 2006.

6.0 SEWER CONNECTION

The proposed development will increase sewerage discharge from the site. Cardno have produced a Sewer Reticulation Report for the site to show the impact the new development will have on the existing reticulation system. Refer to Sewer Reticulation report dated 8th December 2006.

The site and the surrounding areas are serviced by an existing sewer network. There are three sewer catchments to the west of the subject site, all of which gravitate through the subject site towards Fraser Drive.

The northern existing catchment runs through the subject site along the western boundary, gravitating north, eventually discharging into pump station PS3022 adjacent to the eastern boundary of the site. The central existing catchment gravitates from the rear of the lots on Ocean Avenue directly through the subject site to Fraser Drive, where it joins into the gravity line flowing to PS3021. The southern existing catchment gravitates through the subject site along the southern boundary towards Fraser Drive where it discharges into PS3021. Pump station PS3022 pumps through an existing rising main before discharging into the gravity main along Fraser Drive which gravitates to PS3021.

For the proposed sewer reticulation system, the development had been split into two catchments. The northern catchment will gravitate to pump station PS3022 while the southern catchment will gravitate to pump station PS3021.

Also, it is proposed to re-align the two existing gravity lines running through the centre and along the southern boundary of the site to accommodate the proposed lot layout.

7.0 WATER CONNECTION

The proposed development will increase the water demand on the existing reticulation system. Cardno have produced a Water Reticulation Report to detail how the proposed development will join into the existing system. Refer to Water Reticulation Report dated 8th December 2006.