



Job No: 8611/1
Our Ref: 8611/1-AB
7 January 2019

Group Development Services Pty Ltd
P O Box 498
PENNANT HILLS NSW 1717
Email: daniel@gdsland.com.au

Attention: Mr D Chow

Dear Sir

re: **Proposed Residential Subdivision - Stage 7
Caddens Road, Caddens
Pavement Design Report**

This pavement design report is carried out for the residential subdivision, Stage 7. The report includes pavement thickness design for Roads 18 & 19 as requested by Mr D Chow of Group Development Services (GDS) Pty Ltd (Email dated 3 January 2019).

From the information supplied, the following roads would be included for Stage 7.

| Road No / Name | Chainage |
|----------------|--------------|
| Road 18 | Ch 0 - 212 |
| Road 19 | Ch 146 - 290 |
| Road 19 | Ch 300 - End |

Review of Available Information

The pavement thickness is based on Report 8611/1-AA R4 which included the roads in Stages 2 to 6.

Field work for the foregoing investigation was carried out on 13 March, 17 May and 16 June 2017. During field work, a total of 13 sub-grade samples were recovered for Soaked California Bearing Ratio (CBR) tests. The soaked CBR values (obtained from laboratory testing) results are between 3% and 10% with an average value of 6%. Relatively high swelling was reported for some sub-grade samples. Based on the test results, a design CBR of 4% has been adopted for the pavement design for all the proposed roads with the assumption that the fill material (used to bring the existing ground level to the design pavement level) also has a CBR value of at least 4%.

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Design Traffic Loading

Based on the supplied development application (Ref: No DA-17/1157), the following design traffic loading (expressed in Equivalent Standard Axles) is adopted for the pavement design considering the requirement of Penrith City Council.

| Road No / Name | Chainage | Design Traffic Loading (ESA) |
|----------------|--------------|------------------------------|
| Road 18 | Ch 0 - 212 | 5x10 ⁴ |
| Road 19 | Ch 146 - 290 | 5x10 ⁴ |
| Road 19 | Ch 300 - End | 5x10 ⁴ |

Recommended Pavement Composition

The pavement design is based on the Austroads publication "Guide to Pavement Technology, Part 2: "Pavement Structural design", (2010).

| Road No / Name | Design Traffic Loading (ESA) | Design CBR (%) | AC (mm)+ | Base Course (mm) | Sub-base Course (mm) | Total (mm) |
|----------------|------------------------------|----------------|----------|------------------|----------------------|------------|
| Road 18 | 5x10 ⁴ | 4 | 50 | 150 | 175 | 375 |
| Road 19 | 5x10 ⁴ | 4 | 50 | 150 | 175 | 375 |

+ Over single coat hot bitumen flush seal and compacted in two layers of 25mm each

The pavement depths are only valid if the subgrade and pavement materials are compacted to the following Minimum Dry Density Ratios (AS1289 5.4.1) as per Penrith City Council Specifications.

| | |
|----------------|---------------|
| Basecourse | 98% Modified |
| Sub-basecourse | 95% Modified |
| Subgrade | 100% Standard |

The pavement design assumes provision of adequate surface and sub-surface drainage of the pavement and adjacent areas. It is recommended that a sub-surface drainage system is installed, as directed by Council Engineers.

We recommend the following procedures for placement of controlled fill as subgrade for road pavement:

- Strip existing topsoil and stockpile for possible future use in landscaping. This will mostly be required in areas which will require grade raise fill.
- Undertake proof rolling (using an 8 to 10 tonnes roller) of the exposed natural clays (cut areas) or compacted subgrade (fill areas) to detect potentially weak spots (ground heave). Excavate areas of localised heaving to depth of about 300mm and replace with granular materials or low plasticity clay, compacted as described below. Proof rolling will not be required if bedrock is exposed during stripping of topsoil/fill.
- Repeat proof rolling of soft spots backfilled with granular materials or low plasticity clay. If the backfilled area shows movement during proof rolling, this office should be contacted for further recommendations.

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- Place suitable fill materials where required on proof rolled residual soils or bedrock. The fill should be placed in horizontal layers of 200mm to 250mm maximum loose thickness (depending on the size of equipment) and compacted to achieve a Minimum Dry Density Ratio (MDDR) of 100% Modified, at moisture content within 2% of Optimum Moisture Content (OMC). Suitable fill materials may comprise crushed sandstone or low plasticity clay. However, residual soils and shale obtained from excavations within the site may also be used, after removal of unsuitable materials, if any, crushing to sizes finer than 75mm and moisture conditioning.
- Fill placement should be supervised to ensure that material quality, layer thickness, testing frequency and compaction criteria conform to the specifications. We recommend "Level 2" or better supervision, in accordance with AS3798-2007. It should be noted that a Geotechnical Inspection and Testing Authority will generally provide certification on quality of compacted fill only if Level 1 supervision and testing is carried out.

General

As the recommendations presented in this report are based on information gained from previous investigations at the site. Confirmation of CBR values would be required after completion of bulk site works.

If you have any questions, please do not hesitate to contact the undersigned.

Yours faithfully

GEOTECH TESTING PTY LTD



EMGED RIZKALLA

Director