

Our Ref: PSM3739-005L Rev 6

13 October 2020

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Attention: Russell Hogan

Dear Russell

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**RE: 788-864 MAMRE ROAD KEMPS CREEK
INTERIM GEOTECHNICAL DESIGN ADVICE**

1. Introduction

This letter provides interim geotechnical design advice (IGDA) for the proposed development at 788-904 Mamre Road, Kemps Creek. This interim advice will be issued as final on completion of the bulk earthworks.

Figure 1 presents the locality plan.

We are not aware of any performance requirements for the proposed development.

2. Bulk Earthworks

The design advice in the following sections is provided on the basis that:

- The bulk earthworks on site to be completed in accordance with a PSM Specification, currently PSM3739-006S-REV5 (the Specification)
- PSM to audit the earthworks to confirm the advice in this letter at the completion of the bulk earthworks.

The Specification allows for a broad range of fill to be incorporated into the earthworks. Fill placed in accordance with the Specification will be well compacted under tight site supervision. The subgrade will be stiff or better.

The Specification complies with the intent of AS 3798-2007 "Guidelines on earthworks for commercial and residential developments" and is intended to specify the minimum requirements to achieve a fill with the properties provided in Section 3 of this letter. The Specification is generally in accordance with AS3798-2007, but for this site it allows Blended Topsoil Fill and Compacted Insitu Topsoil.

The Specification requires close inspection, frequent testing and external auditing of the earthworks to provide a high level of confidence that the completed work complies with the Specification. The Specification will only be varied with the consent of PSM to ensure that this interim design advice is able to be confirmed at the completion of the earthworks.

We have based our assessment of moduli on numerous plate load tests (PLTs) completed on VENM / ENM fills by PSM.

If the structural or civil engineer requires engineering properties different to those provided in Section 3 then the specification can be modified such that these properties will be obtained in the final earthworks.

This allows the additional cost of the earthworks to be balanced against any economies achieved in other parts of the works.

3. Design Advice

3.1 All Areas

This section provides interim design advice for all areas where the bulk earthworks has been undertaken in accordance with the Specification. Note, this advice allows for Blended Topsoil Fill and Compacted Insitu Topsoil Subgrade (Refer PSM3739-006S-REV5).

3.2 Site Classification

While the proposed development is out of scope of AS2870-2011 “Residential slabs and footings”, we assess that, for the natural site, cut and fill placed in accordance with the Specification, the characteristic surface movement, y_s , would be in the range 40 mm to 60 mm and thus would classify the site as Class H1. The civil and structural engineers should consider likely heave / settlement due to the effect of climatic factors in their designs.

We recommend that all structures and services be detailed such that they preclude any local wetting up or drying out of the subgrade after initial equilibrium is reached following construction of the slab and that the subgrade be within specification at the time of construction of the slab. We note that normal mounding or sagging away from the perimeter of covered areas will still occur and perimeters, or open joints, will still respond to environmental changes.

For effectively sealed areas away from the perimeter, the design should allow for the following:

- Differential mound movement, $y_m = 20$ mm. We note that this is not the total heave or settlement but the estimated local heave or settlement due to fill variability
- Tilts of up to approximately 1 in 300.

Mounds at perimeters or penetrations of slabs open to the environment can be taken to be as per AS2870-2011 for $y_s = 55$ mm.

The designer should consider variation of fill depth across any area. It is our opinion that creep settlements can be ignored for fill of this depth placed in accordance with the Specification. Further the designer should consider the impact of any delay in construction of slabs and pavements following completion of the bulk earthworks.

3.3 Foundations

The following section provides advice and parameters that may be used when proportioning footings.

Where adjacent foundation details differ (e.g. pile and pad, differing loads or ground conditions) differential settlement will need to be assessed.

3.3.1 Pad Footings

Pad footings can be proportioned on the basis of an allowable bearing pressure (ABP) for centric vertical loads presented in Table 1.

Table 1 - Engineering Parameters of Inferred Geotechnical Units

Inferred Unit	Bulk Unit Weight (kN/m ³)	Soil Effective Strength Parameters		Ultimate Bearing Pressure Under Vertical Centric Loading (kPa)	Allowable Bearing Pressure under Vertical Centric Loading (kPa)	Ultimate Shaft Adhesion Ultimate Shaft Adhesion (kPa)	Elastic Parameters	
		c' (kPa)	φ' (deg)				Young's Modulus (MPa)	Poisson's Ratio
Engineered Fill	18	0	30	420*	150*	N.A.	10	0.3
Natural Soil	18	0	30	420*	150*	N.A.	10	0.3
Bedrock	22	N.A.	N.A.	3000***	700**	50	50	0.25

Note: * Minimum plan dimension of 1 m and embedment depth of at least 0.5 m

** ABP for BEDROCK assumes a settlement of approximately 1% of the least footing dimension for footings in rock.

*** UBP for BEDROCK assumes a settlement of approximately 5% of the least footing dimension for footings in rock.

If the base of a pad footing is founded between 0 and 2 m above the “Compacted Insitu Topsoil”, then an additional 20 mm should be added to the settlement calculation.

Higher ABPs may be available, but these depend on the size, depth, loads, etc. and would be subject to specific advice.

Footing settlement can be assessed based on the subgrade Young's moduli provided in Table 1. We recommend that PSM inspect a representative sample of the footings during construction, to confirm the advice provided in this letter.

3.3.2 Slabs

The design of the slabs for the warehouse can be based on a subgrade with the following Young's moduli:

- For slabs founded on ENGINEERED FILL or NATURAL SOIL:
 - Long term Young's modulus (E_{LT}) of 10 MPa
 - Short term Young's modulus (E_{ST}) of 15 MPa.
- For slabs founded on BEDROCK:
 - Long term Young's modulus (E_{LT}) of 50 MPa
 - Short term Young's modulus (E_{ST}) of 75 MPa.

The design of the slabs on ground should consider the effects of differential settlement due to varying founding conditions, pattern loading, and the shrink swell effects discussed in Section 3.2.

3.4 Pavements

Results of CBR testing indicate a soaked CBR value of between 1.5% and 8% (Ref. PSM3739-004L).

We recommend a design CBR value of 2.0% is adopted for pavement design. Particular attention should be paid to preserving the equilibrium moisture content in the subgrade as zones that become saturated may exhibit lower CBR strengths.

Higher values, particularly in areas of significant cut, may be provided on completion of testing on the finished bulk earthworks or if, on request, the Specification is varied to obtain such higher value on fill.

3.5 General

We note that the final bulk earthworks subgrade will require proof rolling and plate load testing to confirm the properties provided and may require some boxing out and refilling, etc. Plate load testing during the filling will be required where blended topsoil has been used.

We understand that the structural engineer should be able to design an efficient slab and shallow footings for these geotechnical conditions. If assessed deformation and settlement is an issue, then our advice can be further refined if required.

We note that desiccation and/or wetting up of the pad surface is possible should it be exposed to the elements for an extended period of time, particularly at completion of the bulk earthworks prior to the builder taking responsibility for the pad. To reduce the likelihood of this and preserve the pad condition we recommend the following should be considered following completion of the bulk earthworks:

- Placement of a sacrificial layer comprising road base or other equivalent material
- Grade the pad surface to reduce the extent and severity of standing water during and after weather events
- Minimise the time between the completion of earthworks and the builder commencing construction of the warehouse roof
- Limit vehicular and plant access until a roof has been installed.

Alternately, the developer or builder may have to undertake some surficial remediation if the pad is to comply with the requirements of this IGDA (i.e. comply with the PSM Specification) at the time of construction.

It is PSM's opinion that it should be the builder's responsibility to maintain the condition of the pad after the handover date and accept the risk that comes with modifying excavation levels and weather. There should be a strict transfer of the risk. We recommend that building tenderers be required to indicate how they intend to manage this risk.

Should there be any queries, do not hesitate to contact the undersigned.

For and on behalf of
PELLS SULLIVAN MEYNINK

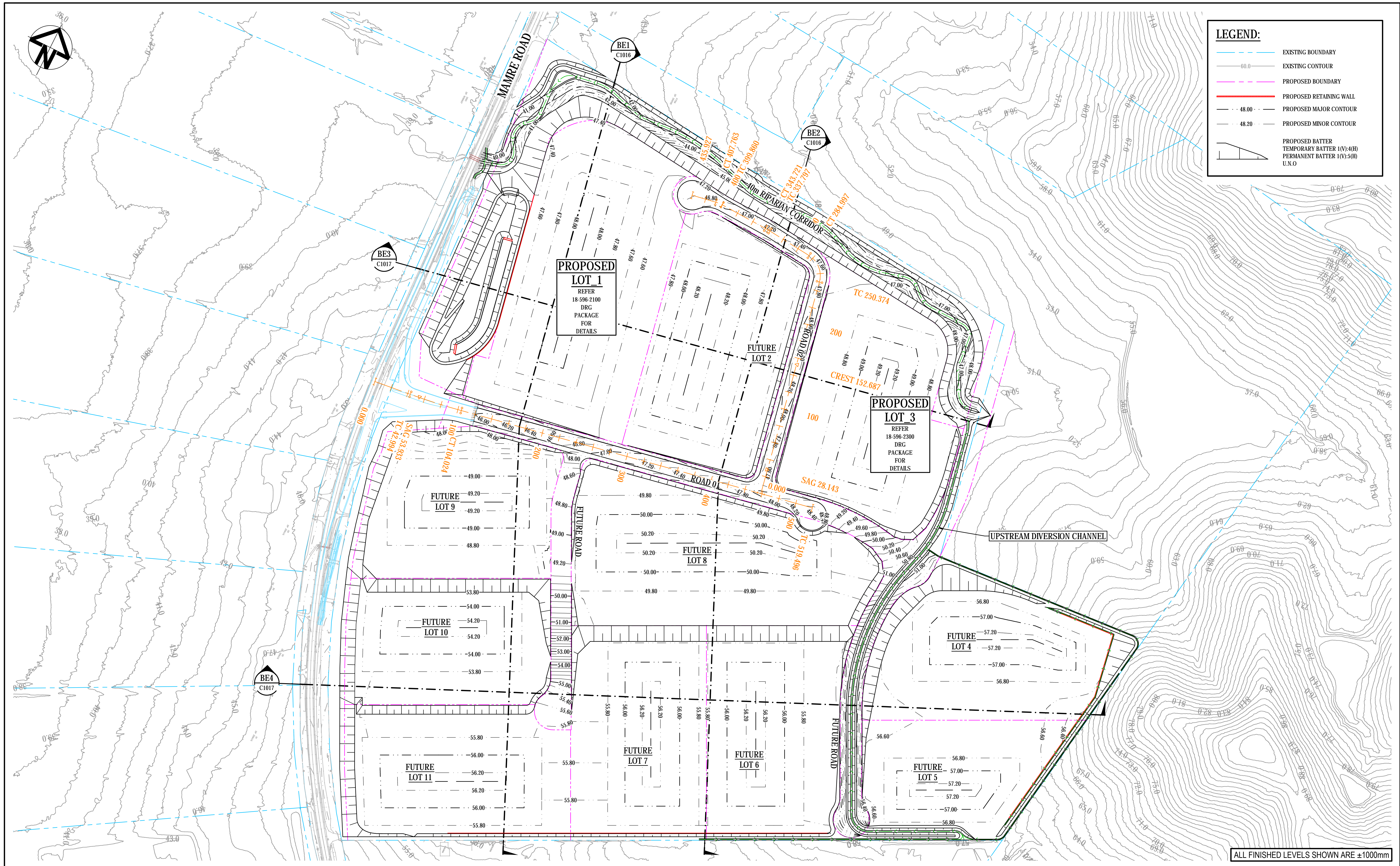




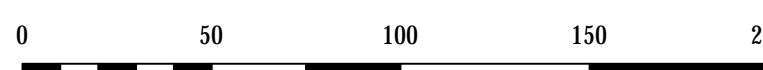
MATIAS BRAGA
GEOTECHNICAL ENGINEER



AGUSTRIA SALIM
PRINCIPAL

Encl. Figure 1 Locality Plan



			Bar Scales		THIS DRAWING CANNOT BE COPIED OR REPRODUCED IN ANY FORM OR USED FOR ANY OTHER PURPOSE OTHER THAN THAT ORIGINALLY INTENDED WITHOUT THE WRITTEN PERMISSION OF AT&L	Client <div></div>	Scales 1:2000		Drawn PDK		Project ASPECT INDUSTRIAL ESTATE MAMRE ROAD, KEMPS CREEK STAGE 1	Civil Engineers and Project Managers <div></div> <div>Level 7, 153 Walker Street North Sydney NSW 2060 ABN 96 130 882 405 Tel: 02 9439 1777 Fax: 02 9923 1055 www.atl.net.au info@atl.net.au</div>			
			<div> 1 : 2000 @ A1</div>				Grid MGA		Checked AT			Title BULK EARTHWORKS CONTOUR PLAN	Status FOR APPROVAL		A1
B ISSUED FOR DEVELOPMENT APPLICATION			12-10-20				Height Datum AHD		Approved AM				NOT TO BE USED FOR CONSTRUCTION		Issue
A ISSUED FOR DEVELOPMENT APPLICATION			15-05-20									Project - Drawing No. 18-596-C1020		B	
Issue	Description		Date												