APPENDIX B3:M

Contaminated land documentation

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APPENDIX M

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APPENDIX M -

FILL EMBANKMENT SLOPE STABILITY ASSESSMENT, SUNSHINE COAST AIRPORT EXPANSION

Slope stability analyses of cross-sections perpendicular to the alignment of the proposed new runway has been undertaken. The analyses were undertaken to assess the short-term (undrained) stability of the embankment following construction of the embankment and the recommended surcharge loadings, as well as the long-term (drained) conditions.

The details of the analyses, including embankment geometry, soil profiles and strengths, are discussed below.

1.0 EMBANKMENT GEOMETRY

The generalised embankment and surcharge profile has been obtained from Aecom's drawing no. 60150287-Sk-120 (Sunshine Coast Airport MIP - Surcharge).

The profile includes a general embankment fill height in the order of 2 m to 3 m (pavement surface at RL 4.75 m AHD), a surcharge height of 2 m, and side slopes at 1V:4H.

A buttress 10 m wide has also been included in the slope stability modelling, where required, to provide a stabilising effect to the embankment edge in areas of thickest identified soft clays.

2.0 MODEL DERIVATION

The soil profiles used in the slope stability analyses were based on the results of the current geotechnical investigation (report 127683017-005-R-Rev0). The investigation results indicate that the thickest identified zone of very soft clay underlying the edges of the proposed fill embankment is 2.5 m thick (refer Figure 3).

Slope stability analyses were carried out to assess the requirements for buttressing and slope batters at areas underlain by 2 m to 6.5 m of very soft clay.

The buttress was incorporated as a 10 m wide layer of fill, and a height of 2 m, for the short term conditions. For the long term analysis, the buttress was not included, as we considered the 'worst' long term case, which would be removal of the buttress.

For the short term conditions, the groundwater level was taken at existing natural ground surface level. However, for the long term conditions, it is expected that capillary effects may result in a rising of the groundwater level.

The soil strength properties have been adopted from the results of the geotechnical investigation for the proposed development. The strength properties for each of the soil layers adopted for the analyses are given in Table M1.

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Table M1: Adopted Soil Strength Parameters

Material Type	Bulk Density γ (kN/m^3)	Soil Strength Parameters		
		c (kPa)	Ø (degrees)	c_u (kPa)
Surcharge & Fill	19	0(1)	34(1)	-
Loose Clayey SAND (Natural)	18	2	30	-
'Marine' CLAY (very soft)	16	2	24	12
Dense Silty SAND	19	0	32	-
Indurated SAND	19	0	40	-

Notes:

(1) Dependent on fill type and placement

3.0 RESULTS

Stability analyses were carried out using the range of the parameters discussed above. The analyses considered short term (undrained) and long term (drained) soil conditions. Stability analyses were carried out using the limiting equilibrium computer software package SLOPE/W, adopting Bishop's method.

The results of the slope stability analyses for the short-term conditions are summarised in Table M2. For the short-term (undrained) conditions, a minimum factor of safety (FOS) is usually taken as 1.3, indicating that buttressing is required in the fill embankment edge in areas underlain by 4.5 m to 6.5 m of very soft clay.

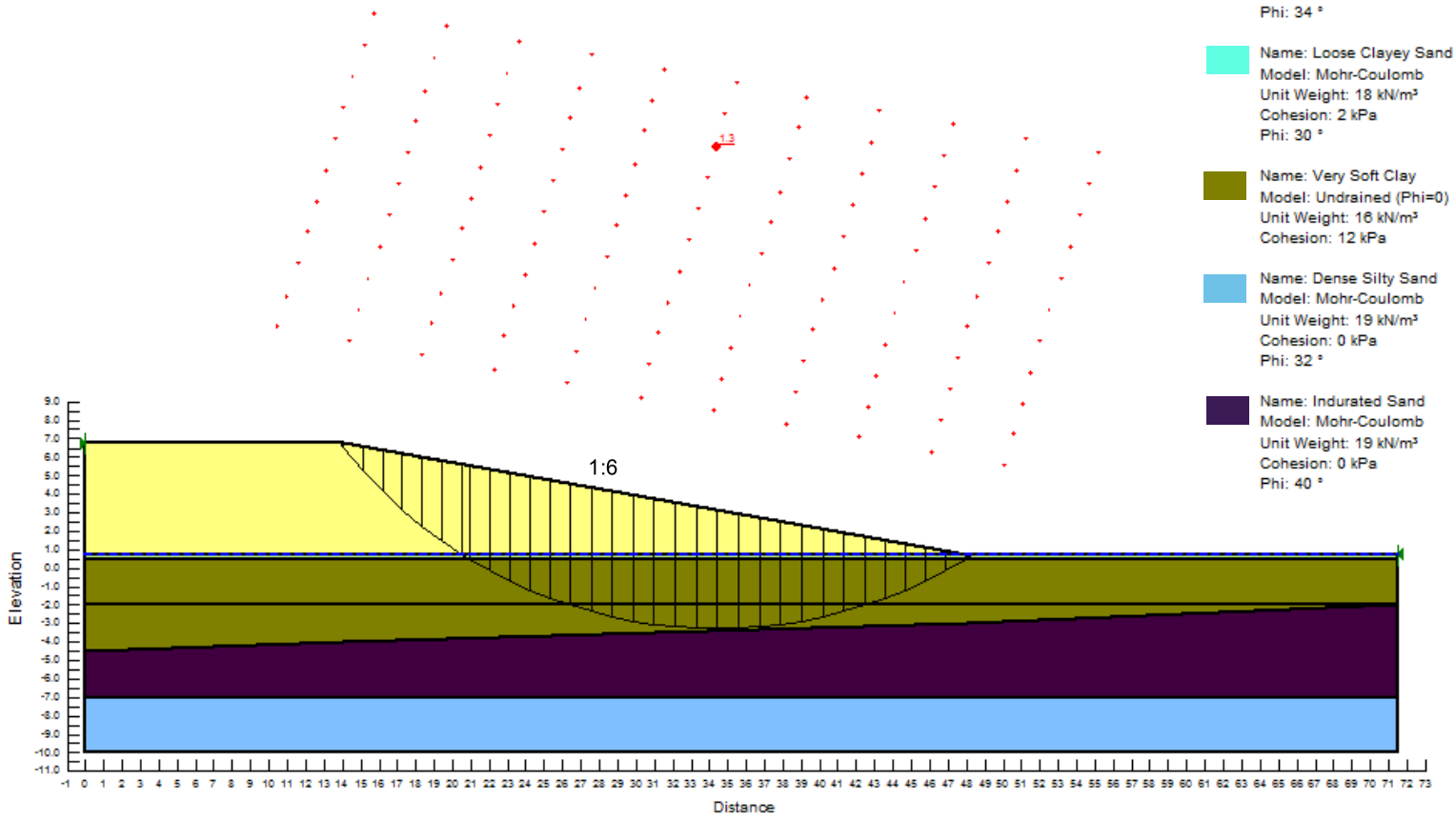
The buttress should comprise a fill platform up to about 2 m high and 10 m wide, with slope angles of 1V:4H above and 1V:5H below the buttress respectively.

In the areas underlain by 4.5 m or less of very soft clay, the fill embankment edges should be battered at a minimum slopes ranging between 1V:4H and 1V:6H.

The results for the long term (or drained) conditions indicate that an acceptable Factor of Safety (FOS>1.5) exists, even without the buttress.

Table M2: Summary of fill embankment stability analysis for short-term conditions.

Figure No.	Clay thickness	Buttress	Slope angle	Factor of Safety
M1	4.5 m	None	1V:6H	1.3
M2	3.5 m	None	1V:5H	1.5
M3	2 m	None	1V:4H	1.6



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	CHECKED: DJQ*	DATE: 30-01-2013		
	SCALE: As Shown	**A4**	PROJECT No: 137632097	FIGURE No: **M1**

NOTE: THE * TYPED BESIDE THE INTIAL DENOTES THAT THE ORIGINAL DRAWING WAS SIGNED OR INITIALLED BY THAT RESPECTIVE PERSON

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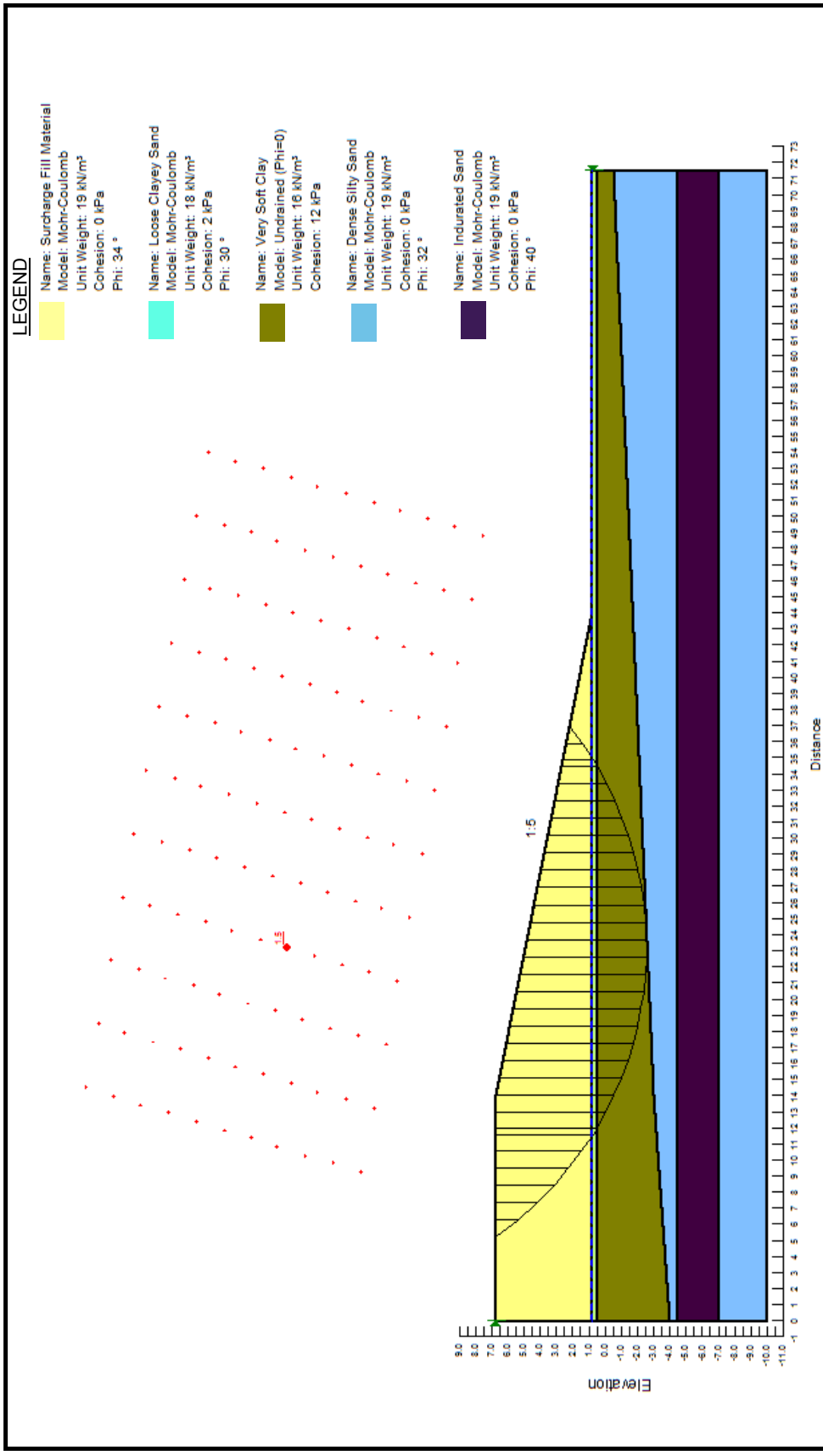

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