G3 56 Delhi Road
North Ryde NSW 2113
P +61-2 9812 5000
F +61-2 9812 5001
E mailbox@psm.com.au
www.psm.com.au

Our Ref: PSM4367-003L REV0

21 April 2021

TMX
Level 1, 68 Moncur Street
Woollahra, NSW 2025
Ben.Caporale@tmx.global

Attention: Ben Caporale

Dear Ben

RE: SNACK BRANDS HORIZON - 585 - 649 MAMRE ROAD, ORCHARD HILLS - RESULTS OF GEOTECHNICAL INVESTIGATION

1. Introduction

This letter presents the results of geotechnical investigations and testing undertaken by PSM for the proposed industrial food manufacturing facility development referred to as Project Horizon for Snack Brands Australia (SBA) at 585-649 Mamre Road, Orchard Hills. The work has been undertaken in accordance with the PSM proposal PSM4367-001L Rev 1 dated 8th March 2021.

2. Background

To assist in the geotechnical investigation, we were provided with and reviewed the following documents:

- TM Insight Project Overview document TM7098 SBA Tardis 2 – Overview *"Snack Brands Horizon – Food Manufacturing Site"* dated 19 February 2021
- TM Insight document borehole Mark-up 2303_001 dated 19 March 2021

Based on the supplied documents, PSM note the following about the proposed development site:

- The design will require modifications to the existing distribution centre warehouse (i.e. Tradis Stage 1).
- The proposed development includes construction of a new industrial building adjoining the warehouse suitable to support the required manufacturing production.
- The proposed development is to be extended within the earthworks lots previously known as Lot 7 and Lot 9 with 'non-high bay' requirements.
- The proposed development includes:
  - Oil tanks (250,000L)
  - Potato bunkers and corn silos
  - Ballast tanks as part of a wastewater treatment plant (500,000L)
- The proposed locations of the high load areas (oil tanks, mezzanines, suspended offices and wastewater treatment) are known to PSM
- Details of the engineering requirements (e.g. structural loads, etc) are not known to PSM.

The earthworks on this site (previously known as Lot 7 and Lot 9) have been undertaken as part of the bulk earthworks for the "First Estate" sub-division development in accordance with PSM bulk earthworks specification (Ref. PSM2619-008S) which is intended for standard light weight warehouse facilities. The earthwork in Lot 7 was undertaken between 21 April 2017 and 18 July 2017 and the earthworks in Lot 9 was undertaken between 30 June 2017 and 15 September 2017.

For Lot 7 (current Snack Brands high bay facility), PSM have provided the following documents:

- PSM2619-044L dated 29 September 2017 – Lot 7 - Result of bulk earthworks audit (Earthworks period between 21 April 2017 and 18 July 2017)
- PSM2619-045L REV 2 dated 8 October 2018 – Lot 7 – Geotechnical design advice (including high bay facility)
- PSM2619-205L dated 8 October 2018 – Lot 7 – High bay facility geotechnical investigation factual report.
- PSM2619-203S REV 0 Dated September 2018 – Lot 7 – Detailed earthworks specification (level adjustment), filling, trimming, cutting and testing.

For Lot 9 (northern lot), PSM have provided the following documents:

- PSM2619-060L REV 1 dated 9 July 2018 – Lot 9 – Result of bulk earthworks audit (Earthworks period between 30 June 2017 and 15 September 2017)
- PSM2619-061L REV1 dated 9 July 2018 – Lot 9 – Geotechnical design advice.

The purpose of the geotechnical investigation is to identify depth to top of bedrock for the proposed development.

3. Field Work

Three days of fieldwork were undertaken on 25th of March, 1st April and 6th of April 2021. Following the access difficulties encountered on the first day of the site work, the drilling was postponed. The access issues was associated with significant rain events occurred on the days prior to the drilling commenced.

A total of eleven (11) augered holes were undertaken at the site using a 5-tonne track mounted drilling rig.

These boreholes were drilled on the following dates:

- 25/03/2021 - BH01 and BH05
- 1/04/2021 - BH08, BH09, BH10 and BH11
- 6/04/2021 - BH02, BH03, BH04, BH06 and BH07.

Prior to testing, on-site service location "scans" were undertaken by a service locator to check the test locations for buried utilities. Each borehole location was backfilled with excavated spoil and lightly compacted upon completion.

The borehole locations were recorded by a PSM geotechnical engineer using a hand-held GPS unit with a horizontal accuracy of approximately +/- 5 m. Figure 1 presents the approximate locations of the completed boreholes.

Figures 2 to 4 presents selected photos of the site.

3.1 Geotechnical Laboratory Results

3.1.1 California Bearing Ratio (CBR)

Two (2) bulk soil samples were recovered for California Bearing Ratio (CBR) testing.

The following sample preparation was undertaken prior to CBR testing:

- Compact to 98% Standard Maximum Dry Density (MDD), at optimum moisture content (OMC).
- Four (4) day-soaked sample; and
- 4.5 kg surcharge.

Table 1 presents a summary of the CBR test results. The test results are included in Appendix B.

Table 1 – CBR Test Results

Sample (Depth)	Material Description	Soaked CBR (%)	Optimum Moisture Content (%)	Standard Maximum Dry Density (t/m^3)	Swell (%)
BH09 (0.5 – 1.2 m)	Gravelly CLAY	2.0*	16.9	1.84	3.5
BH10 (0.8 – 2.0 m)	CLAY	2.5**	12.6	1.86	3.0

Note: * Indicates Soaked CBR value at 2.5 mm penetration.
** Indicates Soaked CBR value at 5.0 mm penetration.

3.1.2 Salinity and Aggressivity Assessment

A total of four (4) disturbed soil samples were collected by a PSM Geotechnical Engineer for testing in an environmental laboratory. The disturbed soil samples were sent to a National Association of Testing Authorities (NATA) accredited environmental laboratory and the following tests were undertaken:

- Soil pH
- Electrical conductivity
- Resistivity
- Chlorides
- Sulphates.

Table 2 presents a summary of the results. The laboratory reports are presented in Appendix C.

Table 2 – Summary of Salinity and Aggressivity Laboratory Testing Results

Sample ID (Depth)	pH	Moisture Content	Electrical Conductivity [µS/cm]	Resistivity (ohm.cm)	Chloride by Discrete Analyser [mg/kg]	Soluble Sulfate by ICPAES [mg/kg]
BH01 (1.3 m)	7.5	14.1	304	780	180	200
BH02 (2.7 m)	7.7	16.9	266	910	120	140
BH08 (4.2 m)	5.8	21.7	760	330	1040	100
BH12 (4.0 m)	5.8	15.4	346	580	320	30

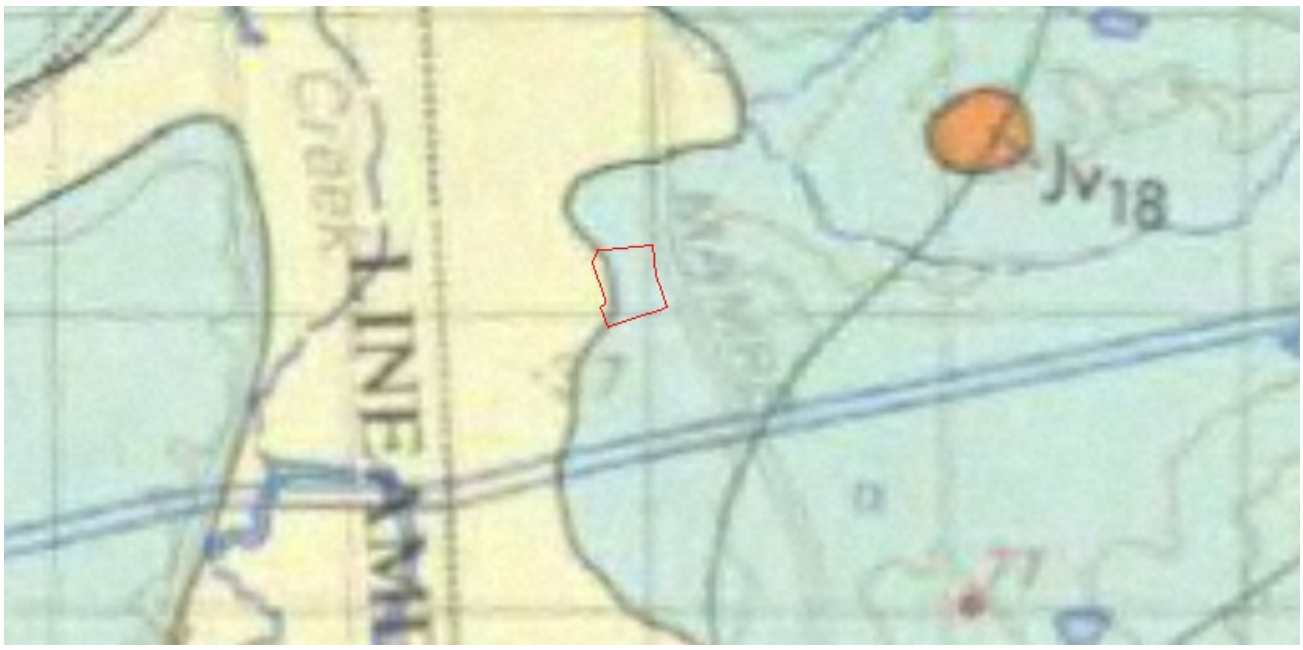
4. Site Conditions

4.1 Geological Setting

The 1:100,000 Penrith Geological Map indicates that the site is underlain by:

- (Rwb) Bringelly Shale of the Wianamatta Group consisting of shale, carbonaceous claystone, claystone, laminite, fine to medium-grained lithic sandstone, rare coal and tuff.

Inset 1 presents the geological map of the site.



Inset 1: Geological Map for Sydney (The red boundaries mark the approximate site location)

4.2 Site Condition

The site is located at 585 – 649 Mamre Road, Orchard Hills and is approximately 5 ha in area.

At the time of the field work, the site has been levelled, an overlying layer of engineered fill placed between 1.2 m to 3.0 m thick and grassed areas existed at the ground surface. Some stockpiles were observed adjacent to the existing basin at the northern end.

Inset 2 shows the approximate site boundary of the investigative works.

Inset 2: Nearmap aerial photograph of site condition on 26 January 2021

4.3 Subsurface Condition

Table 3 shows the approximate depth to the top of the inferred geotechnical units encountered in the borehole locations.

Table 3 – Summary of inferred subsurface conditions encountered in borehole locations.

Inferred Unit	Inferred Top of unit depth below ground surface (m)	Description
ENGINEERED FILL	0.0	Gravelly CLAY; dark grey and brown, medium to high plasticity, fine to coarse grained, sub-angular, gravels up to 50 mm, dry, stiff consistency.
NATURAL SOIL	1.2 to 3.0	CLAY; yellow brown, high plasticity, moist to wet, generally stiff to very stiff (when moist) or firm consistency (when wet). Gravelly CLAY; yellow-brown, high plasticity, fine to medium grained, sub-rounded to sub-angular, gravels up to 20 mm, moist to wet, generally firm to stiff consistency.
BEDROCK	7.3 to 11.0	Siltstone yellow brown, extremely weathered to highly weathered, very low to low strength.

The general subsurface conditions encountered within the boreholes are summarised in Table 4. The reduced levels were estimated from the Bulk Earthwork Levels (BEL). Please note BH06 and BH07 is located at the toe of the batter between Lot 7 and Lot 9. Bedrock was inferred as the depth of refusal for a V-bit within the natural soil unit.

Table 4 – Depth to the Top of Inferred Geotechnical Units encountered in test locations.

Borehole ID	Area**	Approximate RL at Top of Inferred Geotechnical Units (m AHD)*			
		FILL	NATURAL SOIL	BEDROCK	EOH
BH01	Waste treatment plant	36.3	33.8	25.3	24.3
BH02	Oil tank storage	36.3	33.4	26.7	26.7
BH03	Heat exchanger room	36.3	33.3	27.2	27.2
BH04	Potato Prep	36.3	33.8	26.7	26.7
BH05	Proposed mezzanine office	36.3	33.7	25.3	25.3
BH06	Corn processing / Maintenance shop	34.9	32.8	26.1	26.1
BH07	Packaging	34.9	33.5	24.9	24.9
BH08	Silos and water tank area / Hardstand	34.9	32.9	27.0	27.0
BH09	Hardstand	34.9	33.7	27.6	27.6
BH10	Hardstand	34.9	33.5	26.3	26.3
BH11	Residual site	34.9	33.6	27.7	25.0

Note: EOH = End of Hole
N/E = Not Encountered
* RL adopted from Costin Roe Bulk Earthworks Cut/Fill plan "CO12042.00-C30-0" dated 22 February 2017
** The tabulated location of proposed structure / area is based on drawing number HLA-AR-A001- Rev P3 dated 26 March 2021

4.4 Groundwater

Groundwater was encountered in all boreholes. These observations were based on encountering saturated spoil material while auger drilling. Table 5 summarises the depths and elevations at which groundwater inflow was observed.

Table 5 – Observed Groundwater Inflow during Augering

Borehole ID	Approximate Surface RL (m AHD)*	Depth of Water Inflow from surface (m)	Approx. Level of observed water inflow (m AHD)
BH01	36.3	3.6	32.7
BH02	36.3	6.1	30.2
BH03	36.3	5.8	30.5
BH04	36.3	5.3	31.0
BH05	36.3	6.5	29.8
BH06	34.9	5.3	29.6
BH07	34.9	5.9	29.0
BH08	34.9	4.5	30.4
BH09	34.9	5.8	29.1
BH10	34.9	6.0	28.9
BH11	34.9	5.5	29.4

Note: * RL adopted from Costin Roe Bulk Earthworks Cut/Fill plan "CO12042.00-C30-0" dated 22 February 2017

No long-term groundwater monitoring has been undertaken for the site.

5. Soil Salinity and Aggressivity Assessment

5.1 Soil Chemistry

The salinity and aggressivity test results, summarised in Table 6 indicate the following:

- pH of the soil samples analysed was in the range of 5.8 to 7.7, with an average of 6.7
- The 1:5 soil to water extraction and subsequent electrical conductivity ($EC_{1:5}$) of the soil samples analysed to be in the range of 266 µS/cm to 760 µS/cm
- Concentrations of chlorides in samples analysed was in the range of 120 mg/kg to 1040 mg/kg
- Concentrations of soluble sulphate in samples analysed was in the range of less than 30 mg/kg to 200 mg/kg.

5.2 Salinity

Site Investigations for Urban Salinity (DLWC 2002) classify soil salinity based on electrical conductivity (EC_e) as per Richards (1954). The method of conversion from $EC_{1:5}$ to EC_e (electrical conductivity of saturated extract) is based on DLWC (2002) and given by $EC_e = EC_{1:5} \times M$, where M is the multiplication factor based on "Soil Texture Group".

The "Soil Texture Group" of the samples tested has been assessed during our investigation. The salinity classification for the soil samples that were tested are presented in Table 6.

Table 6 – Salinity Classification

Sample ID (Depth)	$EC_{1:5}$ (dS/m)	Soil Type	M	EC_e (dS/m)	Salinity Class
BH01 (1.3 m)	0.304	Light Medium Clay	8	2.432	Slightly Saline
BH02 (2.7 m)	0.266	Light Medium Clay	8	2.128	Slightly Saline
BH08 (4.2 m)	0.760	Light Clay	8.5	6.460	Moderately Saline
BH12 (4.0 m)	0.346	Light Clay	8.5	2.941	Slightly Saline

It is assessed that the majority of the soils on site are classified as “slightly saline”.

Table 4.8.2 of Australian Standard AS3600-2018 “Concrete Structures” provides an exposure classification for concrete structures in saline soils based on soil electrical conductivity (EC_e). We assess the exposure classification for this site is “A2”.

5.3 Corrosivity / Aggressivity

Table 4.8.1 of AS3600-2018 “Concrete Structures” provides criteria for exposure classification for concrete in sulphate soils based on sulphates in soil and groundwater, and pH of soil. On the basis of the sulphate and pH testing completed we assess the exposure classification for concrete in sulphate soils to be “A1”.

Similarly, Table 6.4.2(C) of Australian Standard AS2159:2009 Piling – Design and Installation provides criteria for exposure classification for concrete piles in soil, and here the exposure classification for concrete piles in soils is “non-aggressive”.

Table 6.5.2(C) of Australian Standard AS2159:2009, Piling – Design and Installation provides criteria for exposure classification for steel piles based on resistivity, soil and groundwater pH, and chlorides in soil and groundwater. On the basis of the resistivity, pH and chloride testing completed we assess the exposure classification for steel piles to be “moderate”.

6. Earthworks

Details of the proposed cut and fill is not known to PSM at this stage. Any earthworks and subgrade preparations shall be undertaken in accordance with PSM earthworks specification presented in Appendix D.

7. Geotechnical Design Advice for the Proposed Development

7.1 Site Classification

While the proposed development is out of the scope of “AS2870-2011 “Residential slabs and footings:, we assess that 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 climate 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.

7.2 Permanent and Temporary Batters

The batter slope angles shown in Table 7 are recommended for the design of batters up to 3 m height and above the groundwater table subject to the following recommendations:

- The batters shall be protected from erosion.
- Permanent batters shall be drained
- Temporary batters shall not be left unsupported for more than 2 months without further advice, and inspection by a geotechnical engineer should be undertaken following significant rain events.
- No buildings, loads, or services should be located within 1 batter height of the crest.

If the conditions above cannot be met, further advice should be sought.

Table 7 – Batter Slope Angles

Unit	Temporary	Permanent
SOIL UNITS, e.g. ENGINEERED FILL, NATURAL SOIL	2H:1V	2.5H:1V

7.3 Excavation Support

Permanent cuts in the FILL, and NATURAL SOIL units steeper than the recommended permanent batter slopes in Section 7.2 will need to be supported by some form of retaining structure.

The selection of the appropriate retention system is a matter of design. The designer should consider the following factors in making its selection:

- Technical factors
  - Performance
  - Ground conditions (this is addressed below in Table 8 with the design parameters)
  - Surcharge loading and
  - Proximity of structures, buildings, roads etc.
- Non-technical factors
  - Cost (to build and to maintain)
  - Other constraints such as real estate, neighbouring site/boundary, aesthetics, legislation, etc.

The design of these structures should be based on the following geotechnical properties:

- Effective soil strength parameters in Table 8
- Proposed wall geometry
- Surcharge loads behind the retention
- Water pressure. The designer shall consider the information regarding groundwater in this report and the drainage features included in the design of the retention system.

Note that the design of retention systems may be based on either K_a or K_o earth pressures. Design using active earth pressures provides the minimum lateral earth pressure that must be supported to avoid failure and requires a wall that can rotate or translate to allow the pressures to reduce to these values (vertical and lateral movements up to 2% of height may occur, typical movements will be much less).

Where the design is based on K_o pressures, construction should be carefully controlled to avoid unwanted effects. It should be noted that designing for K_o pressures do not, of themselves, ensure that movement does not occur. Movements are controlled by the construction method, especially sequence.

Both surface and sub-surface drained needs to be designed and constructed properly to prevent pore water pressures from building up behind the retaining walls or appropriate water pressures must be included in the design.

7.4 Foundations

Footings can be proportioned on the basis of an allowable bearing pressure (ABP) for centric vertical loads provided in Table 8.

Table 8 - Engineering Parameters of Inferred Geotechnical Units

Inferred Unit	Bulk Unit Weight (kN/m³)	Soil Effective Strength Parameters		Ultimate Bearing Pressure Under Vertical Centric Loading (kPa)	Allowable Bearing Pressure Under Vertical Centric Loading (kPa)	Ultimate Shaft Adhesion (kPa)	Elastic Parameters	
		c' (kPa)	*Φ'* (deg)				Young's Modulus (MPa)	Poisson's Ratio
ENGINEERED FILL/NATURAL SOIL	18	0	30	420 (1)	150 (1)	N.A.	10	0.3
BEDROCK	22	NA	NA	3,000 (2)	1,000 (3)	150	100	0.25

1 Minimum plan dimension of 1.0 m and a minimum embedment depth of 0.5 m.

2 Ultimate bearing pressure for bedrock assumes a settlement of approximately 5% of the least footing dimension for footing in rock.

3 Allowable bearing pressure assumes a settlement of approximately 1% of the least footing dimension for footings in rock.

7.4.1 Shallow Foundations

We note that an allowable bearing pressure (ABP) is not a soil property. It depends on many factors such as the size of the footings, the embedment depth, the load direction and eccentricity, the stiffness of the footing, the adopted factor of safety (FOS), as well as the soil properties. As footings get bigger or deeper the capacity increases rapidly, as the load gains eccentricity or becomes inclined, the capacity reduces rapidly.

Settlements in soil units can be estimated using the elastic moduli provided in Table 8. When assessing the settlement of the shallow footings, the designer needs to consider the additional ground movement due to the total building load on both shallow and deeper units. The differential settlement due to the building load shall also be assessed. This should be considered by the designer.

Foundations conditions at the proposed shallow pad footings locations should be inspected by a suitable qualified geotechnical engineer prior to the pouring of concrete.

7.4.2 Piled Foundations

Piled foundation should be founded within the BEDROCK unit.

Piles should be designed in accordance with the requirements in AS 2159 (2009), Piling – Design and Installation. Selection of the pile system depends on many considerations and should be undertaken by the designer in conjunction with the Principal and contractor / builder. The parameters provided in Table 8 may be adopted in the design of piles founded in the BEDROCK units.

The foundation designer should note the following with regards to the pile design:

- The ABP needs to be confirmed by a geotechnical engineer during a pile inspection.

- Under permanent load, the contribution of side adhesion for soils including Fill and natural soil units should be ignored.
- Pile settlement needs to be checked using the recommended elastic parameters in Table 8.

The bearing capacities provided are contingent on piles or footings being vertically and centrally loaded. Further advice should be sought if the footings are not vertically centrically loaded. Should higher bearing capacities be required in Table 8, further advice should be sought from PSM.

With regards to the pile design, we recommend that:

- A geotechnical strength reduction factor, Φg = 0.60 (AS2159-2009 CL. 4.3.2) be adopted for a high redundancy for an assessed average risk rating (ARR) of 3.0. This should be reviewed to suit the specific design and construction methods proposed by the structural designers.
- It may be possible to increase the pile reduction factors, if the details of the proposed pile installation procedures indicate a high level of quality control with regards to concrete placement, base cleanliness, etc.
  - A geotechnical strength reduction factor Φg = 0.40 is adopted then no pile testing will be required (AS2159-2009 CL 8.2.4 (b)).

Where the pile is sized using the allowable bearing capacity in Table 8 (i.e. assuming all serviceability load is carried by the base), the settlement would be expected to be less than 1% of the pile diameter plus elastic shortening of the pile itself.

Further advice should be sought if piles are to be founded within a unit other than BEDROCK.

7.5 Slabs

The design of slabs on ground on the FILL unit can be based on a subgrade with a long-term Young's Modulus of 10 MPa. The short-term Young's Modulus can be taken to be 15 MPa. We note that the final bulk earthworks subgrade would require plate load testing to confirm the properties provided and may require some boxing out and refilling, etc.

The environmental effects (e.g. drying or wetting up of the finished surface) affecting the land prior to development should be taken into account by the various designers of the proposed development.

We understand that the structural engineer should be able to design efficient slabs. If assessed deformation and settlement is an issue, our advice can be further refined if required.

7.6 Pavements

The CBR tests undertaken by PSM in the geotechnical investigation indicate a CBR value ranging from 2% to 2.5%. We advise that a design subgrade CBR of 2% be adopted. We recommend that specific CBR testing be undertaken at finished subgrade level when pavement layouts are finalised.

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

Yours Sincerely

MOHAMMAD POURNAGHIAZAR
ASSOCIATE GEOTECHNICAL ENGINEER

AGUSTRIA SALIM
PRINCIPAL

Encl.	Figure 1	Locality Plan and Test Locations
	Figure 2	Selected Site Photos (1 of 3)
	Figure 3	Selected Site Photos (2 of 3)
	Figure 4	Selected Site Photos (3 of 3)
	Appendix A	Tabulated Borehole Logs
	Appendix B	CBR Test Results
	Appendix C	Salinity and Aggressivity Test Results
	Appendix D	PSM4367-004S – Bulk Earthworks Specification

Legend

Approximate Site Investigation Boundary

Borehole Locations

Note: Image obtained from Nearmap of the site conditions on 26 March 2021

Scale 1:2,000

N

0 50 100 m

P S M	Created By: PSM	Revision: 0	TMX 585-649 Mamre Road Kemps Creek, NSW GEOTECHNICAL INVESTIGATION LOCALITY PLAN AND TESTING LOCATIONS
	Date: 13 Apr 2021	Paper Size: A4	PSM4367-003L / Figure 1

Photo 1 - General Site Conditions (25/03/2021)

Photo 2 - General Site Conditions (1/04/2021)

TMX

585 - 649 Mamre Road

Kemps Creek, NSW 2178

SELECTED SITE PHOTOGRAPHS (1 of 3)

PSM4367-003L	**Figure 2**

Photo 3 - General Site Conditions (25/03/2021)

Photo 4 - Typical Rig Setup

TMX

585 - 649 Mamre Road

Kemps Creek, NSW 2178

SELECTED SITE PHOTOGRAPHS (2 of 3)

PSM4367-003L	**Figure 3**

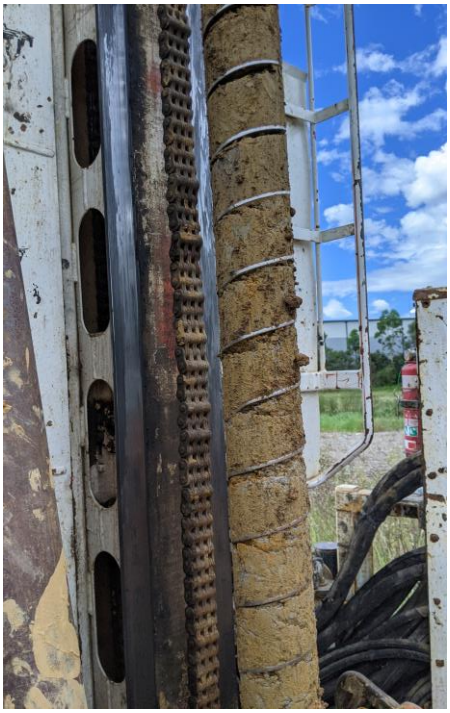


Photo 5 - Cuttings for BH01

Photo 6 - Typically Gravelly CLAY (natural) unit

TMX

585 - 649 Mamre Road

Kemps Creek, NSW 2178

SELECTED SITE PHOTOGRAPHS (3 of 3)

PSM4367-003L	**Figure 4**

Appendix A
Tabulated Borehole Logs

BH ID	Penetration Method	Approximate Depth (m)	Material Encountered	Notes
BH 01	T_c bit (0 - 1.5 m) V bit (1.5 - 1.9 m)	0 – 0.1	Unsealed GRAVEL; dark grey to black, fine to medium grained, sub-angular, gravels up 20 mm, dry.	
		0.1 – 0.3	FILL; Sandy GRAVEL; white to pale grey, fine to medium grained, sub-angular to angular, dry.	
		0.3 – 2.1	FILL; Gravelly CLAY, red brown with mottled pale grey, high plasticity, fine to coarse grained, gravels up to 40 mm, dry, stiff consistency. Becomes CLAY with gravel at 1.5 m. Becomes brown and light grey, shale fill at 1.6 m.	Jar Sample at 1.3 m. V-bit refusal in FILL at 1.9 m.
	T_c bit (1.9 - 12.0 m)	2.1 – 2.5	FILL; CLAY, dark brown, medium plasticity, trace gravel, fine grained up to 6 mm, moist, stiff consistency.	
		2.5 – 7.7	CLAY; red brown, medium plasticity, dry, stiff consistency. Becomes high plasticity, moist, firm consistency at 3.1 m. Becomes wet at 3.6 m. Becomes brown with mottled grey, firm to stiff consistency at 4.7 m. Becomes stiff to very stiff consistency at 5.3 m.	SPT (2.5 – 2.95 m) 4, 5, 9 (N = 14) Rootlets observed at 2.5 m. Groundwater at approximately 3.6 m.
		7.7 – 11.0	Gravelly CLAY; yellow brown with mottled pale grey, high plasticity, fine to coarse grained, sub-angular, gravels up to 40 mm, wet, stiff to very stiff consistency.	
		11 - 12	SILTSTONE; pale grey, extremely weathered, very low to low strength.	Inferred top of bedrock at 11.0 m.
		12.0	EOH terminated at 12.0 m.	

BH ID	Penetration Method	Approximate Depth (m)	Material Encountered	Notes
BH 02	T_c bit (0 - 2.9 m)	0 – 0.1	FILL; GRAVEL, pale grey, fine to coarse grained, with cobbles up to 80 mm, dry.	
		0.1 – 2.9	FILL; Gravelly CLAY, yellow-brown and brown, high plasticity, fine to medium grained gravels up to 10 mm, sub-angular, dry, stiff consistency. Becomes black grey, fine to medium grained gravels up to 20 mm at 0.3 m. Becomes dark brown and yellow brown with mottled pale grey at 1.1 m. Becomes CLAY trace gravel, dark brown, fine grained gravel up to 6 mm, moist at 2.5 m.	Rootlets observed at 2.5 m. Jar sampled at 2.7 m.
	V bit (2.9 - 9.6 m)	2.9 – 5.8	CLAY; yellow brown, high plasticity, moist, stiff to very stiff consistency. Becomes brown, stiff consistency at 3.7 m. Becomes moist to wet, firm consistency at 4.8 m.	Rootlets observed at 2.9 m.
		5.8 – 9.6	Gravelly CLAY; yellow-brown, high plasticity, wet, firm to stiff consistency. Becomes stiff to very stiff consistency at 8.8 m.	Groundwater at approximately 6.1 m.
		9.6	EOH: V bit refusal at 9.6 m	Inferred top of bedrock.

BH ID	Penetration Method	Approximate Depth (m)	Material Encountered	Notes
BH 03	T_c bit (0 - 3.0 m)	0 – 3.0	FILL; Gravelly CLAY, dark brown with inclusions of red brown and yellow brown, medium plasticity, fine to medium grained up to 20 mm, angular, dry, firm to stiff consistency. Becomes high plasticity and stiff to very stiff consistency at 0.6 m. Becomes CLAY trace gravel, fine grained up to 6 mm, very stiff consistency at 2.2 m.	Grass and rootlets observed at the surface and at 0.1 m.
	V bit (3.0 – 9.1 m)	3.0 – 5.9	CLAY; red brown and yellow brown, high plasticity, dry, very stiff consistency. Becomes yellow brown with mottled pale grey, moist to wet and firm consistency at 4.0 m. Becomes wet at 5.8 m.	Groundwater at approximately 5.8 m.
		5.9 – 9.1	Gravelly CLAY; yellow brown, high plasticity fine to medium grained up to 15 mm, wet, firm consistency. Becomes stiff to very stiff consistency at 7.5 m.	
		9.1	EOH: V-bit refusal at 9.1 m.	Inferred top of bedrock

BH ID	Penetration Method	Approximate Depth (m)	Material Encountered	Notes
BH 04	T_c bit (0 - 2.0 m) V bit (2.0 - 9.6 m)	0 – 2.5	FILL; Gravelly CLAY; brown with mottled red brown, high plasticity, fine to coarse grained, sub-angular, gravel up to 50 mm, dry, stiff consistency. Becomes dark brown with mottled yellow brown at 1.8 m. Becomes CLAY trace gravel, moist at 2.0 m.	Grass and rootlets observed at the surface and at 0.1 m. Rootlets observed at 1.8 m.
		2.5 – 5.9	CLAY; red brown, high plasticity, moist, very stiff consistency. Becomes red brown with mottled pale grey and firm to stiff consistency at 4.0 m. Becomes wet at 5.3 m.	Groundwater at approximately 5.3 m.
		5.9 – 9.6	Gravelly CLAY; yellow-brown, high plasticity, fine to coarse grained gravels up to 25 mm, sub-angular.	
		9.6	EOH: V-bit refusal at 9.6 m.	Inferred top of bedrock

BH ID	Penetration Method	Approximate Depth (m)	Material Encountered	Notes
BH 05	V bit (0 – 0.6 m) T_c bit (0.6 – 2.6 m)	0 – 2.6	FILL; Gravelly CLAY, high plasticity, fine to coarse grained, sub-angular, gravel pieces up to 30 mm, dry to moist. Becomes brown and pale grey, gravels up to 30 mm, shale fill at 0.6 m. Becomes brown with mottled-red brown, medium plasticity, gravels up to 30 mm at 1.5 m.	Grass and rootlets observed at the surface and at 0.1 m. V bit refusal in FILL at 0.6 m.
	V-bit (2.6 – 11.0 m)	2.6 – 8.3	CLAY; yellow brown with mottled red-brown, high plasticity, dry, stiff to very stiff consistency. Becomes red-brown at 3.0 m. Becomes CLAY trace gravel, fine-grained up to 6 mm at 3.3 m. Becomes CLAY at 4.2 m. Becomes grey with mottled red brown, moist at 5.4 m. Becomes traces of gravel, fine grained, stiff consistency at 6.0 m Becomes firm consistency, wet at 6.5 m.	Jar sampled at 3.7 m. Groundwater at approximately 6.5 m. SPT (8.0 – 8.45 m) 10, 9, 18 (N = 27)
		8.3 – 11.0	Gravelly CLAY; yellow brown, high plasticity, wet, stiff to very stiff consistency. Becomes more gravelly at 9.0 m.	SPT (10.0 – 10.45 m) 9, 15, 23 (N = 38)
		11.0	EOH: V-bit refusal at 11.0 m.	Inferred top of bedrock.

BH ID	Penetration Method	Approximate Depth (m)	Material Encountered	Notes
BH 06	T_c bit (0 - 2.1 m)	0 – 1.6	FILL; Gravelly CLAY, brown, high plasticity, fine to coarse grained, sub-angular, gravels up to 40 mm, dry, stiff consistency. Becomes red brown with mottled pale grey, very stiff to hard consistency at 0.5 m. Becomes more gravelly, shale fill at 1.2 m.	Grass and rootlets observed at the surface and at 0.1 m.
		1.6 – 2.1	FILL; CLAY trace gravel; dark brown and yellow brown, high plasticity, fine to medium grained, sub-angular, gravels up to 10 mm. dry, stiff consistency. Becomes moist at 1.9 m.	Rootlets observed at 1.6 m.
	V bit (2.1 – 8.8 m)	2.1 – 3.7	CLAY; yellow brown and pale grey, high plasticity, moist, firm to stiff consistency. Becomes yellow brown at 2.4 m. Becomes trace gravel at 3.7 m.	
		4.0 – 8.8	Gravelly CLAY; yellow-brown, high plasticity, fine to medium grained, sub-angular, gravels up to 20 mm, moist, stiff consistency. Becomes wet at 5.3 m. Becomes very stiff consistency at 8.0 m.	Groundwater at approximately 5.3 m.
		8.8	EOH: V-bit refusal at 8.8 m.	Inferred top of bedrock

BH ID	Penetration Method	Approximate Depth (m)	Material Encountered	Notes
BH 07	T_c bit (0 – 1.4 m)	0 – 1.4	FILL; CLAY with gravel, dark brown with mottled pale grey, high plasticity, fine to coarse grained, sub-angular, gravels up to 25 mm, moist, stiff consistency. Becomes Gravelly CLAY at 0.5 m. Becomes very stiff consistency at 0.7 m. Becomes gravels up to 30 mm, siltstone gravel pieces at 1.2 m.	Grass and rootlets observed at the surface and at 0.1 m. Crushed boulder at 1.3 m.
	V-bit (1.4 – 10.0)	1.4 – 4.0	CLAY; yellow brown, high plasticity, moist to wet, stiff to very stiff consistency. Becomes moist at 2.0 m.	Perched Water Table at 1.5 m.
		4.0	Gravelly CLAY; red brown, high plasticity, fine to medium grained, sub-rounded, gravels up to 10 mm, moist, very stiff consistency. Becomes pale grey at 5.7 m. Becomes wet at 5.9 m. Becomes firm consistency at 6.0 m. Becomes stiff to very stiff consistency and gravels up to 15 mm at 8.0 m.	Jar sampled at 4.2 m. Groundwater at approximately 5.9 m.
		10.0	EOH: V-bit refusal at 10.0 m.	

BH ID	Penetration Method	Approximate Depth (m)	Material Encountered	Notes
BH 08	T_c bit (0 – 2.0 m)	0 – 1.7	FILL; Gravelly CLAY, dark brown, medium plasticity, fine to coarse grained, angular, gravels up to 50 mm, dry, very stiff consistency. Becomes fine grained gravel up to 6 mm, moist at 0.8 m. Becomes CLAY with gravel, stiff consistency at 1.6 m.	Grass and rootlets observed at the surface and at 0.1 m.
		1.7 – 2.0	FILL; CLAY; dark brown, high plasticity, moist, stiff consistency.	Contains rootlets
	V bit (2.0 – 7.9 m)	2.0 – 4.8	CLAY; yellow brown with inclusions of red brown and dark grey, high plasticity, moist, very stiff consistency. Becomes CLAY trace gravels, fine to medium grained, sub-angular, gravels up to 10 mm. Becomes wet at 4.5 m.	Groundwater at approximately 4.5 m.
		4.8 – 7.9	Gravelly CLAY; yellow brown, high plasticity, fine grained, sub-rounded, gravels up to 6 mm, wet, firm to stiff consistency.	
		7.9	EOH: V-bit refusal at 7.9 m.	Inferred top of bedrock.

BH ID	Penetration Method	Approximate Depth (m)	Material Encountered	Notes
BH 09	T_c bit (0 – 1.2 m)	0 – 1.2	FILL; Gravelly CLAY, dark brown, medium plasticity, fine to coarse grained, sub-angular, gravels up to 50 mm, dry, firm to stiff consistency. Becomes CLAY with gravel at 0.5 m. Becomes CLAY trace gravel, fine to medium grained, gravels up to 20 mm, moist at 0.8 m.	Grass and rootlets observed at the surface and at 0.1 m. CBR samples retrieved at 0.5 – 1.2 m.
	V bit (1.2 – 7.3 m)	1.2 – 6.0	CLAY; dark brown, high plasticity, dry, stiff consistency. Becomes moist at 1.6 m. Becomes red brown at 2.7 m. Becomes yellow brown at 3.0 m. Becomes CLAY trace gravel, fine to medium grained, gravels up to 10 mm at 3.7 m. Becomes yellow brown, wet at 5.8 m.	Groundwater at approximately 5.8 m.
		6.0 – 7.3	Gravelly CLAY; yellow brown and pale grey, high plasticity, fine to medium grained, sub-angular, gravels up to 20 mm, moist to wet, firm to stiff consistency.	
		7.3	EOH: V-bit refusal at 7.3 m.	Inferred top of bedrock.

BH ID	Penetration Method	Approximate Depth (m)	Material Encountered	Notes
BH 10	T_c bit (0 – 1.4 m)	0 – 1.2	FILL; Gravelly CLAY; red brown and black grey, medium plasticity, fine to medium grained, sub-angular, gravels up to 10 mm, dry. Becomes CLAY with gravel, dark grey, fine grained up to 5 mm at 0.9 m.	Grass and rootlets observed at the surface and at 0.1 m. CBR samples retrieved at 0.8 – 2.0 m.
		1.2 – 1.4	FILL; CLAY, yellow brown and dark brown, high plasticity, dry, stiff to very stiff consistency.	Rootlets observed at 0.9 m. .
	V bit (1.4 – 8.6 m)	1.4 – 6.6	CLAY; yellow brown, high plasticity, dry, stiff to very stiff consistency. Becomes red brown at 1.6 m. Becomes yellow brown and pale grey, firm to stiff consistency at 2.6 m. Becomes wet at 6.0 m.	Groundwater at approximately 6.0 m.
		6.6 – 8.6	Gravelly CLAY; yellow brown, high plasticity, fine grained, sub-rounded, gravels up to 5 mm, wet, stiff consistency.	
		8.6	EOH: V-bit refusal at 8.6 m.	Inferred top of bedrock.

BH ID	Penetration Method	Approximate Depth (m)	Material Encountered	Notes
BH 11	T_c bit (0 – 1.3 m)	0 – 1.3	FILL; Gravelly CLAY, pale grey with mottled red brown, high plasticity, fine to coarse grained, sub-angular, gravels up to 60 mm, moist, firm consistency.	Grass and rootlets observed at the surface and at 0.1 m.
	V bit (1.3 – 7.2 m) T_c bit (7.2 – 9.9 m)	1.3 – 6.2	CLAY; dark brown with inclusions of yellow brown, medium plasticity, moist, stiff consistency. Becomes yellow brown with mottled red brown, high plasticity, stiff consistency at 1.7 m. Becomes very stiff consistency at 2.0 m. Becomes yellow brown and pale grey at 3.5 m. Becomes wet at 5.5 m.	Jar sampled at 4.0 m. Groundwater at approximately 5.5 m.
		6.2 – 9.9	CLAY with gravel, yellow brown, high plasticity, fine to medium grained, sub-rounded, gravels up to 20 mm, wet, stiff consistency. Becomes Gravelly CLAY, dark grey, gravels up to 10 mm, very stiff consistency at 6.5 m.	V-bit refusal at 7.2 m. Inferred top of bedrock.
		9.9	EOH: Tc bit refusal at 9.9 m.	

Appendix B
CBR Test Results

115 Wicks Road
Macquarie Park, NSW 2113
PO Box 976
North Ryde, Bc 1670
Telephone: 02 9888 5000
Facsimile: 02 9888 5001

SOIL TEST SERVICES

ABN 43 002 145 173

FOUR DAY SOAKED CALIFORNIA BEARING RATIO TEST REPORT

Client: Pells Sullivan Meynink
PSM Job No.: PSM4367

Ref No: L4595E
Report: 1
Report Date: 14/04/2021
Page 1 of 1

BOREHOLE NUMBER		BH 9	BH 10
DEPTH (m)		0.50 - 1.20	0.80 - 2.00
Surcharge (kg)		4.5	4.5
Maximum Dry Density (t/m^3)		1.84 STD	1.86 STD
Optimum Moisture Content (%)		16.9	12.6
Moulded Dry Density (t/m^3)		1.81	1.82
Sample Density Ratio (%)		98	98
Sample Moisture Ratio (%)		100	104
Moisture Contents			
Insitu (%)		17.4	13.1
Moulded (%)		16.8	13.1
After soaking and			
After Test, Top 30mm(%)		24.6	22.6
Remaining Depth (%)		20.2	18.1
Material Retained on 19mm Sieve (%)		7*	0
Swell (%)		3.5	3.0
C.B.R. value:	@2.5mm penetration	2.0	
	@5.0mm penetration		2.5

NOTES: Sampled and supplied by client. Samples tested as received.

- Refer to appropriate Borehole logs for soil descriptions
- Test Methods : AS 1289 6.1.1, 5.1.1 & 2.1.1.
- Date of receipt of sample: 07/04/2021.
- * Denotes not used in test sample.

NATA

NATA Accredited Laboratory Number:1327

14/04/2021
Authorised Signature / Date
(D. Treweek)

Appendix C
Salinity and Aggressivity Test Results

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES2112397**	Page	: 1 of 2
Client	: **PELLS SULLIVAN MEYNINK T/A PSM Admin PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: HENRY ZHANG	Contact	: Customer Services ES
Address	: G3, 56 DELHI ROAD NORTH RYDE NSW, AUSTRALIA 2113	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: 585-649 Mamre Road, Kemps Creek	Date Samples Received	: 06-Apr-2021 18:10
Order number	: ----	Date Analysis Commenced	: 12-Apr-2021
C-O-C number	: ----	Issue Date	: 19-Apr-2021 15:05
Sampler	: HENRY ZHANG		
Site	: ----		
Quote number	: EN/333		
No. of samples received	: 4		
No. of samples analysed	: 4		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EA032 (Saturated Paste EC): NATA accreditation does not cover the performance of this service.
- ALS is not NATA accredited for the calculation of saturated resistivity in a soil.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH01_1.3m	BH02_2.7m	BH08_4.2m	BH12_4.0m	----
				Sampling date / time	25-Mar-2021 09:00	06-Apr-2021 06:30	06-Apr-2021 09:00	06-Apr-2021 08:30	----
Compound	CAS Number	LOR	Unit		ES2112397-001	ES2112397-002	ES2112397-003	ES2112397-004	--------
					Result	Result	Result	Result	----
EA002: pH 1:5 (Soils)									
pH Value	----	0.1	pH Unit		**7.5**	**7.7**	**5.8**	**5.8**	**----**
EA010: Conductivity (1:5)									
Electrical Conductivity @ 25°C	----	1	µS/cm		**304**	**266**	**760**	**346**	**----**
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		**14.1**	**16.9**	**21.7**	**15.4**	**----**
EA084: Saturated Resistivity									
Resistivity at 25°C	----	10	ohm cm		**780**	**910**	**330**	**580**	**----**
ED040S : Soluble Sulfate by ICPAES									
Sulfate as SO4 2-	14808-79-8	10	mg/kg		**200**	**140**	**100**	**30**	**----**
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	10	mg/kg		**180**	**120**	**1040**	**320**	**----**

Appendix D
PSM4367-004S – Bulk Earthworks Specification

TMX

585-649 MAMRE ROAD, ORCHARD HILLS NSW

PROPOSED SNACK BRANDS FOOD MANUFACTURING SITE

Detailed Earthworks (Level Adjustment) Filling, Trimming, Cutting and Testing

PSM4367-004S REV0 21 April 2021

PSM Consult Pty Limited ABN 47 134 739 496

www.psm.com.au

Table of Contents

List of Figures

List of Appendices

1. Scope

This specification details the requirements for the detailed earthworks to be undertaken for the proposed Snack Brands Horizon Food Manufacturing site at 585 – 649 Mamre Road, Orchard Hills. This includes areas where material is filled or cut to bulk excavation level (BEL) within the site.

Fill placed in accordance with this specification is denoted as Select Fill.

This specification does not address any environmental, contamination or erosion issues with respect to the fill material.

2. Filling Works

2.1 Subgrade Preparation

The condition of the subgrade should be assessed immediately prior to filling commencing.

All Select Fill is to be placed on one of the following four (4) materials:

1. Bedrock.
2. Natural insitu material of at least stiff consistency.
3. Engineered compacted fill placed in accordance with this or other approved specifications for which the Geotechnical Inspection and Testing Authority (GITA) has a Level 1 certificate certifying compliance with that approved specification.
4. Other materials as approved by PSM.

Any sediment at the bottom of basins shall be removed, cleaned, and inspected as per the subgrade type above prior to filling.

Proof rolling shall only be undertaken under the direction of PSM. PSM may also direct a bridging layer of Select Fill be placed and compacted to a Dry or Hilf Density Ratio (Standard Compaction) of between 95% and 102%. Any such layer shall be a Lot under Clause 5.3.

The GITA should satisfy itself that the subgrade has not been desiccated, affected by rain or disturbed. If the GITA cannot so satisfy itself, then the subgrade should be moisture conditioned and compacted to be in accordance with Clauses 2.5 and 2.6 of this specification.

Select Fill shall be placed only on subgrade approved by the GITA as being in accordance with this specification.

2.2 Base Geometry

The slope of any buried batter shall be less than 2H:1V unless otherwise directed by PSM.

The contractor shall remove or flatten any geometrical obstructions (e.g. protrusions or holes) such that subsequent Select Fill can be placed to achieve the requirements of this specification.

Select Fill shall be placed only on areas where the base geometry has been approved by the GITA and conforming to this specification.

2.3 Material

2.3.1 Imported Fill

Imported Engineered Fill is to conform to one of the following definitions:

1. "Virgin excavated natural material" (VENM) as defined by the Protection of the Environment Operations Act 1997 No 156, Schedule 1, on Page 209:

   "Virgin excavated natural material (eg clay, gravel, sand, soil and rock) that is not mixed with any other waste and that:

   a. has been excavated from areas that are not contaminated, as a result of industrial, commercial, mining or agricultural activities, with manufactured chemicals and that does not contain sulphide ores or soils, or

b. consists of excavated natural materials that meet such criteria as may be approved by the EPA".

2. "Excavated natural material" (ENM) as defined by the Protection of the Environment Operations (Waste) Regulation 2005 – General Exemption Under Part 6, Clause 51 and 51A, the excavated natural material exemption 2012:

   "Excavated natural material is naturally occurring rock and soil (including but not limited to materials such as sandstone, shale, clay and soil) that has:

   a. been excavated from the ground, and

   b. contains at least 98% (by weight) natural material, and

   c. does not meet the definition of Virgin Excavated Natural Material in the Act.

   d. Excavated Natural Material does not include material that has been located in a hotspot; that has been processed; or that contains asbestos, Acid Sulphate Soils (ASS), Potential Acid Sulphate soils (PASS) or sulfidic ores."

   and which meets the requirements of this exemption.

2.3.2 All Fill

The Select Fill shall be approved by the GITA as suitable for use in a structural fill.

All Select Fill particles shall be able to be incorporated within a single layer. Further, less than 30% of particles shall be retained on the 37.5 mm sieve. The proportion of particles retained on the 37.5 mm sieve shall be assessed using the rock correction method in AS1289.5.4.1 and AS1289.5.7.1.

Select Fill shall be able to be tested in accordance with the Standard Compaction method (AS1289.5.4.1) or Hilf test method (AS1289.5.7.1). These methods require less than 20% retained on the 37.5 mm sieve. Where between 20% and 30% of particles are retained on the 37.5 mm sieve the above test methods shall still be adopted and test reports annotated appropriately.

These requirements should be met by the material after placement and compaction.

The GITA shall assess that the proportion of deleterious material in each Lot is not greater than 0.25% by weight and that all particles of deleterious material have a maximum dimension smaller than 300 mm.

Deleterious material is defined by Table 3015.3 of the RTA QA Specification 3051 (Edition 5 June 1998) as:

"Type III: Rubber, Plastic, Bitumen, Paper, Cloth, Paint, Wood and Other Vegetable Matter"

If the GITA is not able to visually assess the above criterion, the GITA shall arrange appropriate testing. The owner may elect to undertake its own audit testing of the fill for deleterious material content. Should this testing indicate that the quantity of deleterious is higher than 0.25% the Contractor shall be required to remove and replace the fill at its own cost.

Only material approved by the GITA shall be placed as Select Fill.

2.4 Fill Zonation and Placement

Select Fill shall be placed in accordance with the following requirements:

1. In near horizontal, laterally extensive layers of uniform material and thickness, deposited systematically across the work area as determined by the GITA.
2. The compacted thickness of each layer shall be equal to or less than 300 mm.

Select Fill shall only be placed on subgrade in accordance with this specification and approved by the GITA.

2.5 Compaction

Select Fill shall be placed and compacted to a Dry or Hilf Density Ratio (Standard Compaction) of between 98% and 102%.

The insitu density shall be measured over the full depth of each layer placed.

2.6 Moisture Control

The placement moisture variation or Hilf moisture variation shall be controlled to be between 2% dry of optimum and 2% wet of optimum.

Placement moisture content of the Select Fill shall be measured.

3. Cutting

3.1 Subgrade Condition

The subgrade is to comprise one of the following materials:

1. Bedrock.
2. Natural insitu material of at least stiff consistency.
3. Other materials as approved by PSM.

Proof rolling shall only be undertaken under the direction of PSM.

The GITA should satisfy itself that the subgrade has not been desiccated, affected by rain or disturbed. If the GITA cannot so satisfy itself, then the subgrade should be excavated and filled to the BEL in accordance with this specification.

4. Survey

4.1 Filling Areas

The survey requirements are as follows:

1. Any approved subgrade shall be surveyed prior to first filling such that subgrade levels are established to within ± 0.1 m. The area subject to approval shall be assessed and shown on a plan drawing to an accuracy of at least +/- 5 m in plan.
2. The Lot boundaries shall be surveyed and shown on a plan drawing to an accuracy of at least +/- 5 m in plan.
3. The location of the field density tests shall be surveyed and shown on the Lot boundary plan drawing to an accuracy of at least +/-5 m in plan.
4. The elevation of the field density tests shall be surveyed to an accuracy of +/-0.05 m.

The plan drawing shall show at the boundaries of the site and other identifiable site features, so as to allow the location of the lots and the test to be recoverable.

4.2 Cutting Areas

Any approved subgrade for cut areas shall be surveyed such that subgrade levels are established to within ± 0.1 m.

5. Inspection and Testing

5.1 Role of the GITA

The Geotechnical Inspection and Testing Authority (GITA) shall be contracted to document and certify that the works undertaken by the contractor has been completed in accordance with the relevant design and specifications.

5.2 Level 1 Control

The GITA shall adopt Level 1 responsibility as described in Section 8.2 of AS 3798-2007 "Guidelines on earthworks for commercial and residential developments":

> *"The primary objective of Level 1 Inspection and Testing is for the geotechnical inspection and testing authority (GITA) to be able to express an opinion on the compliance of the work. The GITA is responsible for ensuring that the inspection and testing are sufficient for this purpose.*

The geotechnical inspection and testing authority needs to have competent personnel on site at all times while earthwork operations are undertaken. Such operations include:

- *Completion of removal of top soil*
- *Placing of imported or cut material*
- *Compaction and adding/removal of moisture*
- *Trenching and backfilling*
- *Test rolling*
- *Testing.*

The superintendent should agree a suitable inspection and testing plan prior to commencement of the works.

On completion of the earthworks, the GITA will usually be required to provide a report setting out the inspections, sampling and testing it has carried out, and the locations and results thereof. Unless very unusual conditions apply, the GITA should also be able to express an opinion that the works (as far as it has been able to determine) comply with the requirements of the specification and drawings."

For this particular contract, Level 1 responsibility includes:

1. Lot testing as per Clause 5.3 of this specification.
2. A frequency of testing not less than that specified in Clause 5.4 of this specification.
3. The GITA documenting and reporting its activity in the terms required by Clause 6 of this specification.
4. The GITA undertaking adequate inspections and testing to comply with the above requirements and to be able to certify the fill in the terms required by Clause 6 of this specification.

5.3 Lot Testing

This specification requires lot testing to be undertaken.

A Lot is defined as a single layer of Select Fill consisting of uniform material which has undergone similar treatment.

Lot testing comprises the following:

1. A Lot shall be identified by the Contractor or the GITA with a Lot Number and presented for testing.
2. A Lot shall be deemed to be in accordance with the specification if all the tests undertaken within the Lot are in accordance with the specification, i.e. "a none to fail basis".
3. If any one test undertaken within a Lot fails, the whole of the Lot shall be reworked and retested.

Any portion of the placed Select Fill must be part of a single lot and all Lots will require approval by the GITA.

5.4 Testing Frequency

The frequency of compaction testing for each lot shall not be less than the greater of:

- 1 test per 500 m3 of material placed.
- 3 tests per lot.

A laboratory moisture content test shall be undertaken for each field density test.

5.5 Proof Rolling and Plate Load Testing

Proof rolling, together with minor boxing out and refilling, of the upper surface of the bulk earthworks will be undertaken as directed by PSM. The plant to be adopted depends upon the design loads adopted by the structural engineers for each portion of the site.

Plate load testing shall be undertaken at the direction of PSM at the following stage:

1. At final bulk earthworks level (BEL). Expected test frequency is approximately a day of testing for each building pad.

The contractor is to make a suitable reaction (eg 20 tonne excavator) available for the tests.

5.6 Inspection, Testing and Survey

The GITA shall at least undertake the following tasks:

Cut areas

1. For cut areas, identify the subgrade as one of the three (3) subgrade types listed in Clause 3.1 of this specification and assess that the subgrade condition of cut areas is in accordance with the subgrade condition requirements of Clause 3.1 of this specification. If the cut subgrade has been approved by PSM, the GITA will be required to reference the approval in its weekly report.
2. Should Select Fill be required to fill overcut areas, assess that filling has been placed in accordance with this specification.

Fill areas

1. For fill areas, identify the subgrade as one of the four (4) subgrade types listed in Clause 2.1 of this specification and assess that the subgrade condition of any area prior to placement of fill material is in accordance with the subgrade preparation requirements of Clause 2.1 of this specification. Where other materials have been approved by PSM, GITA needs to include / refer to PSM approval in its weekly report.
2. Assess that the base geometry of any area prior to placement of fill material is in accordance with the base geometry requirements of Clause 2.2 of this specification.
3. For each Lot, identify the material as defined in Clause 2.3 of this specification and assess that the material placed is in accordance with the fill material requirements of Clause 2.3 of this specification.
4. Assess the proportion of deleterious material for each Lot is in accordance with Clause 2.3 of this specification.
5. Assess that the Select Fill has been placed in accordance with the requirements for fill zonation and placement of Clause 2.4 of this specification.
6. Assess that each Lot as presented for approval by the contractor is in accordance with the requirements for Lot definition of Clause 5.3 of this specification.
7. Ensure that the survey requirements in Clause 4 of this specification have been completed.
8. Estimate the approximate volume of Select Fill placed in each Lot presented for approval.
9. Conduct Lot testing in accordance with the construction control testing requirements of Clauses 5.3 and 5.4 of this specification.
10. Assess that the compaction of each Lot is in accordance with the requirements of Clause 2.5 of this specification. The GITA shall select a depth of insitu density tests that allows the density of the full layer to be assessed.
11. Assess that the moisture variation of each Lot is in accordance with the requirements for moisture control in Clause 2.6 of this specification.
12. Conduct material property testing in accordance with the material testing requirements in this specification (eg Deleterious material testing if required).

6. Reporting and Certification

6.1 Reporting

The GITA shall produce at least the following reports:

1. *VENM / ENM Validation Reports*. Such a report shall transmit the VENM or ENM validation certificates for the fill imported to site.
2. *Subgrade Approval Reports* (a sample is attached). Such a report shall:

- Document assessments undertaken for tasks 1 and 3 of Clause 5.6 including reporting the subgrade type.
- Document the subgrade survey that has been undertaken.
- Approve or reject the subgrade condition for cut areas based on task 1 of Clause 5.6.
- Approve or reject the subgrade condition and base geometry for filling, based on tasks 3 and 4 of Clause 5.6.

3. *Lot Approval Reports (a sample is attached).* Such a report shall:

- Document assessments, testing and survey undertaken for tasks 5 to 15 of Clause 5.6.
- Report material identification undertaken for task 5 of Clause 5.6.
- Report the assessed proportion of deleterious material for task 7 of Clause 5.6.
- Report the results of testing undertaken for task 12 of Clause 5.6.
- Approve or reject lots based on tasks 13 and 14 of Clause 5.6.

4. *Material Testing Reports*. Such a report shall:

- Report the results of material property testing undertaken for task 15 of Clause 5.6.

5. *Daily Reports (a sample is attached).* Such a report shall be completed daily and shall:

- Document time spent on site by the GITA personnel.
- List subgrade assessments and approvals undertaken each day with reference to relevant Subgrade Approval Report(s).
- List Lots presented, accepted and approved or rejected each day, with reference to relevant Lot Approval Report(s).
- List survey undertaken each day as for task 10 of Clause 5.6 and not already documented in the Subgrade or Lot Approval Reports.
- Document other relevant activities undertaken on site that day (site instructions, breakdowns, compaction equipment used, etc.).

6.2 Certification

6.2.1 Interim or Final Filling Certificate

At the completion of the bulk earthworks, or as requested by the Client, the GITA shall provide an Interim or Final Filling Certificate which shall:

1. Transmit the following:
   a. *Copy or reference to the complete specification document(s).*
   b. *Subgrade Approval Reports.*
   c. *Lot Approval Reports.*
   d. *Material property testing reports.*
   e. *Daily Reports.*
   f. *Survey of subgrade geometry prior to filling or in cut areas.*
   g. *Plan survey drawing showing lot boundaries and location of density tests.*
   h. *Survey documenting filling undertaken to date and showing location of testing.*
   i. *VENM/ENM validation reports.*
   j. Chain of custody certificates.
2. Provide an Excel spreadsheet presenting the results of all the acceptance testing completed by the GITA.
3. Certify that *"All the earthworks undertaken and the subgrade condition in the cut areas [in the stated period] are documented in the above reports and have been undertaken in accordance with the Specification (Ref. PSM2619-203S RevXX dated XXXX)."*

Yours Sincerely

MOHAMMAD POURNAGHIAZER
ASSOCIATE GEOTECHNICAL ENGINEER

AGUSTRIA SALIM
PRINCIPAL

SITE AREA SUMMARY (LOT 11 & 10)

LOT 11 SITE AREA (Existing Facilities)	52,612 sqm
LOT 10 SITE AREA (Proposed Additions)	51,711 sqm
TOTAL SITE AREA	104,323 sqm
EXISTING HIGH BAY WAREHOUSE	11,123 sqm
EXISTING LOW BAY WAREHOUSE (Warehouse 1)	18 536 sqm
EXISTING OFFICE (2 Levels)	503 sqm
EXISTING DOCK OFFICE (2 levels)	136 sqm
TOTAL AREA OF EXISTING BUILDINGS	30,298 sqm
EXISTING CAR SPACE PROVIDED	114 sqm
PROPOSED WAREHOUSE 2A ADDITION	15,612 sqm
PROPOSED WAREHOUS 2B ADDITION (STAGE 2)	2,813 sqm
PROPOSED OFFICE (2 levels)	1,800 sqm
TOTAL AREA OF NEW BUILDINGS	20,225 sqm
PROPOSED NEW CAR PARKING	35 spaces
TOTAL AREA OF NEW & EXISTING BUILDINGS	50,523 sqm

Type	Description	Spaces
PK-CP1	PK-CP1-5.5 x 2.5m - 90 deg (Disable)	2
PK-CP2	PK-CP2-5.5 x 2.5m - 90 deg	33
Grand total		35

DISTRIBUTION DRIVE

SITE BOUNDARY

EXISITNG TRUCK ENTRY/EXIT

EXISITNG CAR ENTRY/EXIT

EXISTING HARDSTAND AREA

EXISTING HARDSTAND AREA

WASTE TREATMENT PLANT

PROPOSED NEW HARDSTAND EXTENSION

Proposed awning extension

TRUCK EXIT

CAR EXIT

Proposed silos and water tank area

PROPOSED NEW HARDSTAND EXTENSION

RESIDUAL SITE

Proposed compactors area

WH 2B (Stage 2)

RAW MATERIAL WH

CARTON PICKING AREA - MAN TRUCK

WASH CARTON PICKING RACKING - FORK ACCESS

CARTON PICKING AREA - MAN TRUCK

REPLENISH CARTON PICKING RACKING - FORK ACCESS

Airlock 1

Airlock 2

Airlock 3

Oberin Rm

Starch Area

Maintenance Access

HEAT EXCHANGER ROOM

CORN UNLOADING

CEREAL PROCESSING

POTATO PREP

CORN PROCESSING

MAINTENANCE SHOP

CORN PROCESSING

MHE Corridor

PALLETISING AREA

VARIETY PACKING

Ex. HIGH BAY AS/RS AREA

PACKAGING

WORKSHOP & LAB

CEREAL PACKAGING

MONOPACK

PROPOSED MEZZANINE OFFICE

EXISTING PARKING AREA

PROPOSED NEW PARKING EXTENSION

MAMRE ROAD

(NEW MEZZANINE OFFICE)

NEW WAREHOUSE 2A ADDITION

FUTURE WAREHOUSE 2B ADDITION (STAGE 2)

No.2 DISTRIBUTION DRIVE ORCHARD HILLS (Lot 11 DP271141)

No.14 DISTRIBUTION DRIVE ORCHARD HILLS (Lot 10 DP271141)

1 A200 Site Plan (Overall)

1 : 500 @A0

PRELIMINARY

BIM 360://Snack Brand Horizon01_Snack Brand.rvt

26/03/2021 6:39:58 PM

PROJECT MANAGER

PROJECT	PROPOSED MANUFACTURING FACILITIES ADDITIONS
ADDRESS	685-649 MAMRE ROAD ORCHARD HILLS 2748 NSW
PROJECT NUMBER	210216

Rev	Description	Date
P1	Issue for discussion	17.03.21
P2	Preliminary Issue	23.03.21
P3	SEARS submission issue.	26.03.21

General Notes:
Architectural drawings to be read in conjunction with all other consultants detailed drawings, specifications & reports.
Do not scale this drawing. Verify all dimensions on site.
Refer all discrepancies to HL Architects commencing any work.

HL Architects Pty Ltd A.C.N. 161 638 320
nominated architect: Kok Hong LAU
(Reg.No. NSW/7509, QLD 6500, TAS 4101)

e admin@hlarchitects.com.au
t. 02 9166 6962
m 0424 160 305
w www.hlarchitects.com.au
a Level 1, 5 George St, North Strathfield NSW 2137

DRAWING TITLE: Site Plan (Overall)

DRAWN: AB
CHK: HL

DRAWING NUMBER: HLA-AR-A001 -

ISSUE: P3

Appendix A Subgrade Approval Report (Sample only)

GEOTECHNICAL INSPECTION AND TESTING AUTHORITY

NATA accreditation number

SUBGRADE APPROVAL REPORT

Client:	Contractor:
Job number:	Report number:
Project:	Technician:

Subgrade areas assessed:

Area ID	Date	Approximate extent	Subgrade description	Geometry summary	Specification reference	Compliance (Pass/Fail)	Survey reference	Approved (Yes/No)

COMMENTS:

Signed: Date:

Appendix B Lot Approval Report (Sample only)

GEOTECHNICAL INSPECTION AND TESTING AUTHORITY

NATA accreditation number

LOT APPROVAL REPORT

Client:	Report number:
Job number:	Report date:
Project:	Technician:
Contractor:	Test methods:

LOT ID:			**Sheet**	**of**
Retest (Yes/No)			Original test report number:	
Specification reference				
Location:				
Lot boundary survey reference/location:				
Materials description:	*(MATERIAL TYPE, colour, minor components, maximum particle size)*			
Material identification:	*(Identify the material as defined in Clause 2.3.1, Clause 2.3.2 or Clause 2.3.3 of the Specification)*			
Deleterious material assessment:	*(Report proportion of deleterious material)*			
Layer thickness:				
Accepted as Lot: (Yes/No)			Date:	
Approximate volume (m3)			Number of tests required:	

Test ID No.				
Test soil description				
Date tested:				
Grid reference				
Surveyed test locations (RL,E,N)				
Test depth (mm)				
Max size (mm)				
% Oversize material (wet)				
Field wet density (t/m^3)				
Field moisture content (%)				
PWCD (t/m^3)				
Compactive effort				
Moisture variation (%)				
HILF density ratio (%)				
TEST (Pass/Fail)				

LOT APPROVAL	(Pass/Fail)	Signed:	Date:

Appendix C Daily report (Sample only)

GEOTECHNICAL INSPECTION AND TESTING AUTHORITY

NATA accreditation number

DAILY REPORT

Client:	Report number:
Job number:	Report date:
Project:	
Location:	Level of testing: Level 1
Contractor	Technician:
Time on site:	
Time off site:	

1. Subgrade Approval

Areas ID	Subgrade Approval Report No:	Comments

2. Lot Approval

Lot ID	Lot Approval Report No:	Comments

3. Survey

Type of survey	Survey undertaken by:	Reference

4. Instructions received on site

5. Instructions given on site

COMMENTS:

Signed: Date:

Appendix D Certification letter (Sample only)

Our Ref:

Date:

Addressed to: Earthwork Contractor

Attention: Earthwork Contractor Representative

Dear

RE: SAMPLE INTERIM (OR FINAL) FILLING CERTIFICATE
INDUSTRIAL DEVELOPMENT, BULK EARTHWORKS
CERTIFICATION OF EARTHWORKS
BETWEEN [DATE OF COMMENCEMENT] AND [DATE OF COMPLETION]

In the period between [date start] and [date finish] the contractor has undertaken earthworks in areas XXX and XXX.

During the above period:

- The GITA has prepared the following Subgrade Approval Reports:

1. Subgrade Approval Report No 1
2. ……

- The GITA has prepared the following Lot Approval Reports:

1. Lot Approval Report No 1
2. ……

- The GITA has prepared the following Daily Reports:

1. Daily Report No 1……
2. ……

- The following subgrade survey was undertaken:

1. Subgrade Survey reference……
2. ……

- The following weekly survey was undertaken:

1. Weekly survey of week ending …….reference……..
2. ……

Copies of all the above documents are attached.

The GITA certifies that all the earthworks undertaken in the above stated period are documented in the above reports and have been undertaken in accordance with the Specifications (ref. PSM3820-005S, dated XXX) a copy of which is attached, with the exception of:

1. List outstanding issues (not approved subgrade, lots, unsuitable material, failed tests etc.)
2. ……..

Signed

GITA