REGIONAL GEOTECHNICAL SOLUTIONS

Manning-Great Lakes
Port Macquarie
Coffs Harbour

RGS03137.1-AD

29 June 2023

Allam Property Group
PO Box 7385
BAULKHAM HILLS BC NSW 2153

Attention: Mark Cerone

Dear Mark,

RE: Proposed Manufactured Home Estate – 40-80 Chapmans Road, Tuncurry
Addendum to Detailed Site Investigation – Contamination Assessment

Regional Geotechnical Solutions (RGS) has prepared this addendum to the Detailed Site Investigation contamination assessment (DSI) report (Ref.RGS03137.1-AC, dated 14 November 2022) in response to issues identified by Midcoast Council (Council) during the DA approvals process for the proposed Manufactured Home Estate (MHE) at 40-80 Chapmans Road, Tuncurry.

This addendum should be read in conjunction with the RGS DSI report outlined above.

The issues outlined by Council with respect to the DSI report are presented in Council Assessment Report (Ref. DA2022/0214) are reproduced below along with additional information and remarks by RGS:

Item 1. – A copy of the groundwater monitoring well logs have not been provided.

Response:

Logs of the boreholes drilled for the installation of groundwater monitoring wells were prepared in the field at the time of the drilling. However, these were inadvertently omitted from the DSI report. The borehole logs for groundwater monitoring wells MW1 to MW4 are appended to this addendum.

Construction of the groundwater monitoring wells comprised the following:

- 1.5m length of slotted pipe with push-on end cap from the bottom of the borehole that was joined to 1.2m (MW1), 1.3m (MW2), 1.1m (MW3) and 1.0m (MW4) of cased pipe respectively;
- The well casing finished at about 0.7m (MW1), 0.8m (MW2), 0.6m (MW3) and 0.5m (MW4) above the ground surface respectively;

- The annulus around the slotted and cased pipe was backfilled with a 5mm aggregate gravel pack to about 300mm below ground surface;
- A bentonite clay seal was added on top the gravel pack to 100mm to 200mm below ground surface followed by grout to just below ground surface level;
- A screw-on end cap was placed inside the well casing; and
- The wells were completed by grouting in a cast iron monument over the casing stick-up above ground surface.

Item 2. – The DSI found that "the groundwater quality results indicated that there are elevated concentrations of heavy metals at the site" however concluded that it is likely that "the elevated heavy metals are due to naturally occurring processes associated with the underlying hydrogeology and hydrogeological conditions". It was noted that arsenic exceeded the recreational human health screening criteria however, potential exposure pathways presented in the DSI did not identify the potential for bore water to be used within the proposed MHE, nor other potential exposure pathways to the groundwater.

Response:

At this stage, it is understood that the site will be extensively filled. As such, contact with groundwater is likely to be limited. It is also understood that bore water will not be used within the proposed MHE.

In addition, groundwater should be precluded from potential use due to the presence of elevated levels of arsenic in the groundwater until such time that it can be demonstrated that it is either no longer a risk to residents or site users based upon the results of periodic groundwater monitoring as discussed below, or alternatively, an onsite treatment plant has been installed which can effectively treat extracted groundwater such that arsenic is reduced to acceptable levels in order for it to be used onsite.

Based on the above, Table 6 in Section 7.4.1 and Table 7 in Section 7.4.2 of the DSI have been updated respectively and are presented below. The additional information is shown in bold type.

Table 6: Potential AECs and COCs

AEC	Mode of Potential Contamination	Potential COCs	Likelihood of Contamination
AEC1: Soils in vicinity of old sheds/structures	Potential spillage or leaks of chemicals from stored containers including cleaning fluids, fuels/oils, herbicides/pesticides. Potential hazardous building materials.	Heavy Metals, TPH, BTEX, PAH, PCB, OC/OPP, and asbestos	Moderate

AEC	Mode of Potential Contamination	Potential COCs	Likelihood of Contamination
AEC2: Stored concrete pipes and bollards	Potential hazardous building materials.	Asbestos and lead	Low
AEC3: Stored roof sheeting	Potential hazardous building materials.	Heavy Metals, and asbestos	Low
AEC4: Stored pontoons and vegetation	Potential runoff of fuels/oils and herbicides/pesticides into site soils	Heavy Metals, TPH, BTEX, PAH, and OC/OPP	Low
AEC5: Stored treated pine	Potential runoff of timber preservative contaminants into site soils	CCA and OC/OPP	Low to moderate
AEC6: Fill stockpiles	Presence of stockpiles of imported fill of unknown origin	Heavy Metals, TPH, BTEX, PAH, PCB, OC/OPP and asbestos	Low
AEC7: Former abattoir	Suggestion from Midcoast Council that the site or part thereof may have been used as an abattoir or slaughterhouse. Presence of contaminated soils from vehicles, machinery, livestock, facility washdowns, waste products etc.	Heavy Metals, TPH, BTEX, PAH, Pathogens	Low to very low
AEC8: Groundwater	**Exposure to groundwater containing elevated arsenic concentrations**	**Arsenic**	**Low to moderate**

Table 7: Potential Exposure Pathways and Receptors

Chemicals of Concern	Key Pathways	Key Receptors
Asbestos, heavy metals, pathogens	Generation of dust during earthworks which is inhaled	Onsite - Construction and site workers Offsite – Humans on adjacent sites
Asbestos, heavy metals, TPH, BTEX, PAH, PCB, OC/OPP, CCA, pathogens	Skin contact / ingestion, inhalation, plant uptake	Onsite - Construction and site workers, future site users, vegetation in landscaped areas
Heavy metals, TPH, BTEX, PAH, PCB, OC/OPP, CCA, pathogens	Surface runoff and leaching of soils	Offsite - Surface water ecosystems and users
Arsenic (groundwater)	**Skin contact / ingestion**	**Onsite - Construction and site workers, future site users, potentially vegetation in landscaped areas**
Heavy Metals - Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Nickel and Zinc *BTEX - Benzene, Toluene, Ethylbenzene and Xylene* *TPH - Total Petroleum Hydrocarbons* *PAH – Polycyclic Aromatic Hydrocarbons* *PCB – Polychlorinated Biphenyls* *OC/OPP – Organochlorine and Organophophorus Pesticides* *CCA – Copper Chrome Arsenate*		

From an Occupational Health and Safety (OHS) perspective, exposure to groundwater should be included in the OHS Management Plan during the construction phase of the proposed development and should include the following measures:

- Gloves are to be worn if/when site workers come into contact with groundwater;
- Exposed skin should be washed thoroughly with soap and water where contact with groundwater has occurred;
- Consumption of groundwater is prohibited; and
- Use of groundwater for irrigation, dust suppression and in machinery is prohibited.

Item 3. – The DSI recommends that "some ongoing periodic groundwater monitoring be undertaken to identify trend changes in groundwater quality", however the report provides no specific information in relation to when this monitoring is to occur, who is to undertake the monitoring, who will monitor the results or what action should be taken if appropriate trigger values are exceeded.

Response:

It is recommended that periodic Groundwater Monitoring Events (GME's) be undertaken from the four existing groundwater wells identified as MW1 to MW4 on a 4 monthly basis until such time as it becomes impractical for the GME's to continue; for example bulk earthworks commencing.

Groundwater samples should be analysed for heavy metals, pH, Electrical Conductivity, Dissolved Oxygen and Total Suspended Solids. Quality control and quality assurance procedures should include duplicate and equipment rinsate samples.

The GME's should be undertaken by an environmental consultant experienced in groundwater quality assessments.

As stated above, at this stage bore water is not proposed to be used at the MHE and procedures for managing exposure to groundwater during construction should be included in the project OH&S Management Plan.

Where successive GME's indicate the presence of arsenic trending down to within acceptable levels for site use then groundwater for irrigation (bore water) can be reconsidered.

Should bore water be required either during construction or within the MHE with existing elevated concentrations of arsenic and/or other heavy metals then an onsite water treatment plan capable of removing or reducing such contaminants to acceptable levels should be sought and installed. Water quality monitoring should be undertaken by an experienced environmental consultant to demonstrate the effectiveness of the onsite treatment to plant to reduce or remove the subject contaminants.

Item 4. – The DSI found that stockpiled material present near the entrance of the site had previously been tested and results of the testing found that the material meets the Recovered Aggregate Exemption (2014). The DSI concluded that these materials could be re-used in future road making activities on the site, however the DSAI test pit logs indicate that there are additional areas of fill which contain asphalt and road base. The DSI provides no information or recommendations as to how the extent of fill (which contains material that is not suitable for residential use in accordance with EPA Waste Order and Exemptions) should be delineated, separated, and used on site or disposed of.

Response:

Roadbase was encountered in 5 of 55 test pits excavated and asphalt was encountered in 4 of 55 test pits indicating that the presence of these materials is in low volumes relative to the size of the site and volume of fill present. Figure 3A has been added to show which test pits and at what depths these materials were encountered during the DSI and is appended to this addendum.

Samples of these materials were obtained during the investigation with results being presented in the summary table shown in Appendix B which compares the results to health-based investigation criteria for a Residential land use scenario.

Each of the results of samples obtained from these materials were either below the laboratory reporting limit or below residential land use health investigation criteria.

Based on the soil profiles outlined on the test pits logs and referenced against the test pit locations shown on Figure 3 in the DSI report and Figure 3A appended to this addendum, these materials can be identified, separated and stockpiled during earthworks and re-used onsite in road construction or landscaping works, or alternatively be disposed of to land fill as General Solid Waste.

It is noted that each of the sample results meet the criteria for General Solid Waste as discussed in Section 8.1 of the DSI report. Waste classification results are shown in the summary table in Appendix B.

Should additional asphalt or roadbase material be encountered during the development of the site which were not identified and sampled during the DSI, they should be separated and stockpiled on thick black plastic and undergo sampling and analysis for waste classification purposes. Additional waste classification sampling and reporting should be undertaken by an experienced environmental consultant.

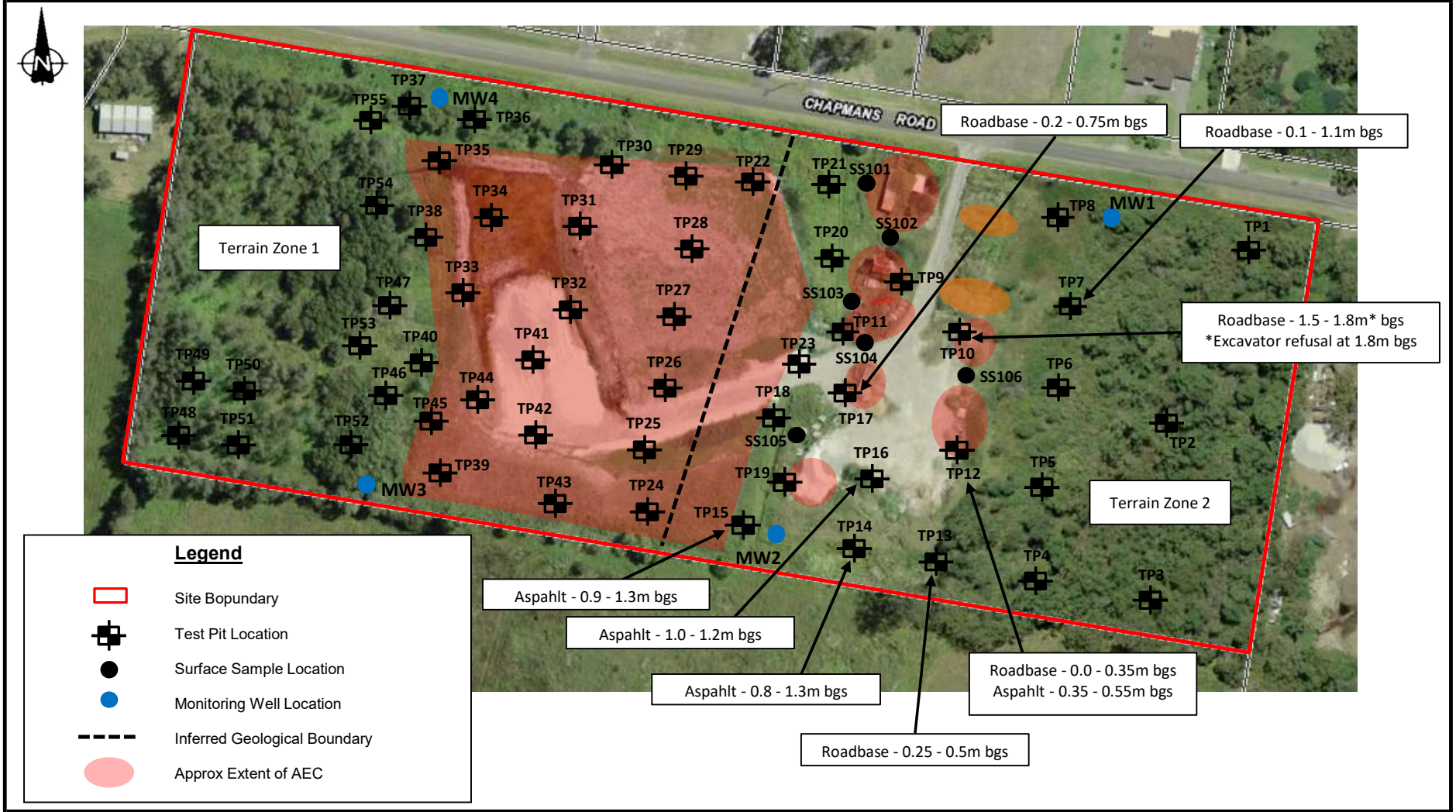
If you have any questions regarding this project, or require any additional consultations, please contact the undersigned.

For and on behalf of **Regional Geotechnical Solutions Pty Ltd**

Prepared by	Reviewed by
Andrew Hills	**Steve Morton**
Senior Environmental Engineer	Principal

Attached: Figure 3A – Sample Location Plan – Asphalt and Roadbase

Groundwater Well Borehole Logs (MW1 to MW4)



REGIONAL GEOTECHNICAL SOLUTIONS	**Client:**	Allam Property Group	Job No. RGS03137.1
	Project:	Proposed Manufactured Home Estate 40-80 Chapmans Road, Tuncurry	Drawn By: APH Scale: As Shown Date: 27-Jun-23
	Title:	Sample Location Plan - Asphalt and Roadbase	Drawing No. **Figure 3A**

REGIONAL GEOTECHNICAL SOLUTIONS

ENGINEERING LOG - BOREHOLE

BOREHOLE NO: MW1

CLIENT: Allam Property Group
PAGE: 1 of 1
PROJECT NAME: Proposed MHE
JOB NO: RGS03137.1
SITE LOCATION: 40-80 Chapmans Road, Tuncurry
LOGGED BY: APH
TEST LOCATION: See Figure 3
DATE: 7/10/22

DRILL TYPE: 6T Kubota Excavator
EASTING:
SURFACE RL:
BOREHOLE DIAMETER: 100 mm
INCLINATION: 90°
NORTHING:
DATUM: AHD

Drilling and Sampling					Material description and profile information					Field Test		
METHOD	WATER	SAMPLES	RL (Not measured)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics,colour,minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result	Structure and additional observations
AD/T	7/10/2022			0.2		SC	**TOPSOIL:** Clayey SAND, fine to medium grained, dark grey/black, clay, low plasticity, some roots	M				TOPSOIL
				0.4		SP	**SAND:** Fine to medium grained, grey/pale grey					AEOLIAN
				0.6								
				0.8								
				1.0								
				1.2								
				1.4								
				1.6								
				1.8								
				2.00m			Hole Terminated at 2.00 m					

LEGEND:

Water
- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

Strata Changes
- Gradational or transitional strata
- Definitive or distict strata change

Notes, Samples and Tests

U_{50}	50mm Diameter tube sample
CBR	Bulk sample for CBR testing
E	Environmental sample
ASS	Acid Sulfate Soil Sample
B	Bulk Sample

Field Tests

PID	Photoionisation detector reading (ppm)
DCP(x-y)	Dynamic penetrometer test (test depth interval shown)
HP	Hand Penetrometer test (UCS kPa)

Consistency

		UCS (kPa)
VS	Very Soft	<25
S	Soft	25 - 50
F	Firm	50 - 100
St	Stiff	100 - 200
VSt	Very Stiff	200 - 400
H	Hard	>400
Fb	Friable	

Density

V	Very Loose	Density Index <15%
L	Loose	Density Index 15 - 35%
MD	Medium Dense	Density Index 35 - 65%
D	Dense	Density Index 65 - 85%
VD	Very Dense	Density Index 85 - 100%

Moisture Condition

D	Dry
M	Moist
W	Wet
W_p	Plastic Limit
W_L	Liquid Limit

REGIONAL GEOTECHNICAL SOLUTIONS

ENGINEERING LOG - BOREHOLE

BOREHOLE NO: MW2

CLIENT: Allam Property Group
PAGE: 1 of 1
PROJECT NAME: Proposed MHE
JOB NO: RGS03137.1
SITE LOCATION: 40-80 Chapmans Road, Tuncurry
LOGGED BY: APH
TEST LOCATION: See Figure 3
DATE: 7/10/22

DRILL TYPE: 6T Kubota Excavator
EASTING:
SURFACE RL:
BOREHOLE DIAMETER: 100 mm
INCLINATION: 90°
NORTHING:
DATUM: AHD

Drilling and Sampling					Material description and profile information					Field Test		
METHOD	WATER	SAMPLES	RL (Not measured)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics,colour,minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result	Structure and additional observations
AD/T	7/10/2022			0.2		SC	**TOPSOIL:** Clayey SAND, fine to medium grained, dark grey/black, clay, low plasticity, some roots 0.20m	M				TOPSOIL
				0.4		SC	**Clayey SAND:** Fine to coarse grained, brown/dark brown, clay, low plasticity, trace roots					LIGHTLY INDURATED SAND
				0.6								
				0.8								
				1.0		SP	**SAND:** Fine to medium grained, grey/pale grey/pale brown 1.00m	W				AEOLIAN
				1.2								
				1.4								
				1.6								
				1.8								
							2.00m Hole Terminated at 2.00 m					

LEGEND:

Water
- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

Strata Changes
- Gradational or transitional strata
- Definitive or distict strata change

Notes, Samples and Tests

U_{50}	50mm Diameter tube sample
CBR	Bulk sample for CBR testing
E	Environmental sample
ASS	Acid Sulfate Soil Sample
B	Bulk Sample

Field Tests

PID	Photoionisation detector reading (ppm)
DCP(x-y)	Dynamic penetrometer test (test depth interval shown)
HP	Hand Penetrometer test (UCS kPa)

Consistency

		UCS (kPa)
VS	Very Soft	<25
S	Soft	25 - 50
F	Firm	50 - 100
St	Stiff	100 - 200
VSt	Very Stiff	200 - 400
H	Hard	>400
Fb	Friable	

Density

V	Very Loose	Density Index <15%
L	Loose	Density Index 15 - 35%
MD	Medium Dense	Density Index 35 - 65%
D	Dense	Density Index 65 - 85%
VD	Very Dense	Density Index 85 - 100%

Moisture Condition

D	Dry
M	Moist
W	Wet
W_p	Plastic Limit
W_L	Liquid Limit

REGIONAL GEOTECHNICAL SOLUTIONS

ENGINEERING LOG - BOREHOLE

BOREHOLE NO: MW3

CLIENT: Allam Property Group
PAGE: 1 of 1
PROJECT NAME: Proposed MHE
JOB NO: RGS03137.1
SITE LOCATION: 40-80 Chapmans Road, Tuncurry
LOGGED BY: APH
TEST LOCATION: See Figure 3
DATE: 7/10/22

DRILL TYPE: 6T Kubota Excavator
EASTING:
SURFACE RL:
BOREHOLE DIAMETER: 100 mm
INCLINATION: 90°
NORTHING:
DATUM: AHD

Drilling and Sampling					Material description and profile information					Field Test		
METHOD	WATER	SAMPLES	RL (Not measured)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics,colour,minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result	Structure and additional observations
AD/T	7/10/2022			0.2		CL	**TOPSOIL:** Silty CLAY, low plasticity, dark grey/black, some sand, fine to medium grained, some roots	M				TOPSOIL
				0.4		SC	**Clayey SAND:** Fine to coarse grained, pale grey/pale brown, clay, low plasticity, some roots					ALLUVIAL SOIL
				0.6								
				0.8								
				1.0								
				1.2								
				1.4								
				1.6								
				1.8								
				2.00			Hole Terminated at 2.00 m					

0.25m

LEGEND:

Water
- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

Strata Changes
- Gradational or transitional strata
- Definitive or distict strata change

Notes, Samples and Tests

U_{50}	50mm Diameter tube sample
CBR	Bulk sample for CBR testing
E	Environmental sample
ASS	Acid Sulfate Soil Sample
B	Bulk Sample

Field Tests

PID	Photoionisation detector reading (ppm)
DCP(x-y)	Dynamic penetrometer test (test depth interval shown)
HP	Hand Penetrometer test (UCS kPa)

Consistency

		UCS (kPa)
VS	Very Soft	<25
S	Soft	25 - 50
F	Firm	50 - 100
St	Stiff	100 - 200
VSt	Very Stiff	200 - 400
H	Hard	>400
Fb	Friable	

Density

V	Very Loose	Density Index <15%
L	Loose	Density Index 15 - 35%
MD	Medium Dense	Density Index 35 - 65%
D	Dense	Density Index 65 - 85%
VD	Very Dense	Density Index 85 - 100%

Moisture Condition

D	Dry
M	Moist
W	Wet
W_p	Plastic Limit
W_L	Liquid Limit

REGIONAL GEOTECHNICAL SOLUTIONS

ENGINEERING LOG - BOREHOLE

BOREHOLE NO: MW4

CLIENT: Allam Property Group
PAGE: 1 of 1
PROJECT NAME: Proposed MHE
JOB NO: RGS03137.1
SITE LOCATION: 40-80 Chapmans Road, Tuncurry
LOGGED BY: APH
TEST LOCATION: See Figure 3
DATE: 7/10/22

DRILL TYPE: 6T Kubota Excavator
EASTING:
SURFACE RL:
BOREHOLE DIAMETER: 100 mm
INCLINATION: 90°
NORTHING:
DATUM: AHD

Drilling and Sampling					Material description and profile information					Field Test		
METHOD	WATER	SAMPLES	RL (Not measured)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics,colour,minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result	Structure and additional observations
AD/T	▽ 7/10/2022			0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8		SC	**FILL:** Clayey SAND, fine to medium grained, dark grey/black, clay, low plasticity, some roots	M				FILL/TOPSOIL
						SC	0.50m **TOPSOIL:** Clayey SAND, fine to medium grained, dark grey/black, some roots					TOPSOIL
						SC	0.70m **Clayey SAND:** Fine to coarse grained, brown/pale brown, clay, low plasticity	W				LIGHTLY INDURATED SAND
						SC	1.20m **Clayey SAND:** Fine to coarse grained, pale grey/pale brown, clay, low plasticity					ALLUVIAL SOIL
							2.00m Hole Terminated at 2.00 m					

LEGEND:

Water
- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

Strata Changes
- Gradational or transitional strata
- Definitive or distict strata change

Notes, Samples and Tests

U_{50}	50mm Diameter tube sample
CBR	Bulk sample for CBR testing
E	Environmental sample
ASS	Acid Sulfate Soil Sample
B	Bulk Sample

Field Tests

PID	Photoionisation detector reading (ppm)
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HP	Hand Penetrometer test (UCS kPa)

Consistency

		UCS (kPa)
VS	Very Soft	<25
S	Soft	25 - 50
F	Firm	50 - 100
St	Stiff	100 - 200
VSt	Very Stiff	200 - 400
H	Hard	>400
Fb	Friable	

Density

V	Very Loose	Density Index <15%
L	Loose	Density Index 15 - 35%
MD	Medium Dense	Density Index 35 - 65%
D	Dense	Density Index 65 - 85%
VD	Very Dense	Density Index 85 - 100%

Moisture Condition

D	Dry
M	Moist
W	Wet
W_p	Plastic Limit
W_L	Liquid Limit