Aitken Rowe
GEOTECHNICAL ENGINEERING

Geotechnical Engineering
Environmental Consultancy
Soil Concrete Aggregate Testing
NATA Accredited Laboratories

ABN 53 058 315 138 ACN 058 315 138

2 December 2024 Reg. No.: S24-364

Gray Surveyors
Surveying and Land Development Consultants
152 Wynyard Street
Tumut, NSW 2720

Attention: Mr. Michael Gray - Manager/Director & Registered Land Surveyor

Dear Sir,

GEOTECHNICAL INVESTIGATION – PROPOSED AQUACULTURAL FARM DEVELOPMENT, No. 364 RENO ROAD, GUNDAGAI, NSW

Further to your request in response to our quotation, Q24-594 dated 22 October 2024, the geotechnical field investigation was carried out across the site of the proposed aquacultural development at the above subject site on 28 October 2024.

It is noted that the proposed development includes the construction of a burial pit area and effluent ponds at the locations as shown in the attached borehole and DCP test location plans.

The purpose of the investigation was to determine the nature of the subsurface soil and groundwater conditions by augering, sampling and testing across the proposed subject site of the proposed aquacultural farm development. Based upon the information obtained, comments and recommendations for the suitability of the construction of the proposed burial pit area and effluent ponds are to be made.

1.0 SITE DESCRIPTION

The proposed aquacultural farm development site is located at the Lot 6, DP841293, No. 364 Reno Road, Gundagai, NSW which is approximately 7km north-west of Gundagai (refer to the attached site locality plan). The subject site currently consists of an existing rural residence, associated structures, water tanks, water storage dams and ponds and sheds.

The site has a general downward slope from north to south at approximately 1V (Vertical): 10-15H (Horizontal) and is covered with a thick ground cover of grass/weeds as noted at the time of the

investigation. It should also be noted that the site has been previously used for grazing land with scattered trees and rock outcrops noted across the subject site as noted at the time of the investigation.

2.0 GEOLOGY

The 1:250 000 Geological Series Sheet for Wagga Wagga (SI/55-15) indicates the area is underlain by Cainozoic aged terrestrial sedimentation associated with aggrading stream systems comprising unconsolidated clay, sand, silt and gravel (flood plain sediments) which in turn are underlain by Late Silurian aged sediments comprising chloritic phyllite, rhyolite, rhyodacitic tuff, andesite, conglomerate and occasional limestone associated with the Frampton Volcanics.

It should be noted that the bedrock was encountered in the borehole investigation from starting depths ranging from 0.4m to 2.0m below the existing surface level. It should also be noted that rock outcrops were witnessed across the subject site at the time of the investigation.

3.0 INVESTIGATION PROCEDURE

3.1 Fieldwork

The fieldwork for the drilling investigation was carried out on 28 October 2024 by our experienced Senior Geotechnician of Aitken Rowe Testing Laboratories Pty Ltd from Wagga Wagga, NSW who nominated the sampling and prepared engineering logs of the boreholes. The borehole logs with explanatory note are herewith attached.

The fieldwork for the drilling investigation consisted of the logging and sampling of one (1) borehole (BH1) at the proposed burial area site to the borehole termination depth of 6.0m below the existing surface level and two (2) boreholes (BH2 & BH3) across the proposed effluent ponds site to the borehole refusal depth of 1.7m at the location of BH2 and borehole termination depth of 3.0m at the location of BH3 (refer to the attached borehole & DCP test location plan).

The boreholes were augered with our trailer mounted and advanced through the soil profile using solid flight augers with disturbed samples recovered from the boreholes for relevant laboratory testing. Dynamic Cone Penetrometer testing (DCP) was carried out at the proposed burial area (BH1) from the existing surface level and at the depth of 1.0m below the existing surface level to assess the strength and consistency of the subsoil materials. The borehole and DCP test locations are shown in the attached borehole and DCP test location plan.

The detailed borehole logs with explanatory notes are herewith attached. The DCP test reports are also herewith attached. The descriptions in all borehole logs are provided in accordance with “AS 1726 – 2017 Geotechnical site investigations”.

3.2 Laboratory Testing

The laboratory testing, including particle size distribution, Atterberg Limit, moisture content, Standard Maximum Dry Density (SMDD), permeability and dispersion tests (Emerson Class) were performed on the selected samples recovered at various depths in the boreholes at our NATA accredited testing laboratory in Wagga Wagga, NSW. The samples for permeability testing were compacted at 95% of SMDD and at nearest 100% of Standard Optimum Moisture Content (SOMC). The laboratory test report is herewith attached.

External acid sulphate soil analysis was also carried out on two (2) disturbed samples recovered from the boreholes drilled at the NATA accredited Environmental Analysis Laboratory (EAL), Southern Cross University, Lismore, NSW. The test report as received from EAL is herewith attached.

4.0 SUBSURFACE CONDITIONS

4.1 Proposed Burial Area

BH1 represents the proposed burial area at the subject site. The borehole drilled revealed that the site, at the borehole location, is underlain by topsoil to 0.1m overlying natural alluvial material comprising low to medium and medium plasticity silty clay to 2.0m, which in turn is underlain by extremely weathered, extremely low strength and highly weathered, very low strength and low strength phyllite bedrock, extending to the borehole termination depth at 6.0m in BH1.

The moisture condition of the underlying natural alluvial material was generally less than plastic limit throughout the upper clay-based profile and greater than plastic limit throughout the underlying lower clay-based profile within the investigation depth and moist throughout the underlying upper bedrock profile and dry throughout the underlying lower bedrock profile where encountered within the investigation depth in BH1 at the time of the investigation.

No groundwater or seepage was encountered during the drilling in the borehole drilled, and the borehole was found dry on completion of the drilling at the time of the investigation. It should however be noted that variations to the water table level could fluctuate with changes to the season, temperature and rainfall.

As per the DCP test result and the visual observation of the resistance by auger TC bit, the underlying natural alluvial material (below topsoil) is assessed to be generally stiff and firm consistency throughout the upper clay-based profile to 0.9m then increasing to very stiff to hard consistency throughout the underlying clay-based profile within the investigation depth in BH1 at the time of the investigation (refer to attached borehole log).

The visual inspection of the rock cuttings from the augers and observation of the drilling resistance indicates the underlying phyllite bedrock where encountered within the borehole investigation depth is generally assessed to be extremely weathered, extremely low strength in the upper bedrock profile to 3.0m then increasing the highly weathered, very low to low strength with depth within the investigation depth in BH1 (refer to attached borehole log).

The borehole log with explanatory notes and DCP test reports are herewith attached.

4.2 Proposed Effluent Ponds

BH2 and BH3 represent the proposed effluent ponds at the subject site. The boreholes drilled revealed that the site is underlain by topsoil to 0.1m overlying natural alluvial material comprising low to medium and low plasticity silty clay to 0.4m in BH2 and 1.5m in BH3, which in turn is underlain by extremely to highly weathered, extremely low to very low strength and highly weathered, very low strength and low strength phyllite bedrock, extending to the borehole refusal depth at 1.7m in BH2 and extremely weathered, extremely low strength, extremely to highly weathered, extremely low to very low strength and highly weathered, very low strength phyllite bedrock, extending to the borehole termination depth at 3.0m in BH3. The borehole refusal encountered at the location of BH2 appeared to have been encountered on the underlying phyllite bedrock.

The moisture condition of the underlying natural alluvial material was generally less than plastic limit throughout the upper clay-based profile within the investigation depth in BH2 and greater than plastic limit throughout the upper clay-based profile within the investigation depth in BH3 and dry throughout the underlying bedrock profile within the investigation depth in BH2 and moist throughout the underlying upper bedrock profile and dry throughout the underlying lower bedrock profile where encountered within the investigation depth in BH3 at the time of the investigation

No groundwater or seepage was encountered during the drilling in the boreholes drilled, and the boreholes were found dry on completion of the drilling at the time of the investigation. It should however be noted that variations to the water table level could fluctuate with changes to the season, temperature and rainfall.

As per the visual observation of the resistance by auger TC bit, the underlying natural material (below topsoil) is assessed to be generally very stiff consistency throughout the upper clay-based within the investigation depth in BH2 and stiff consistency throughout the upper clay-based profile to 1.0m then increasing to very stiff consistency throughout the underlying clay-based profile within the investigation depth in BH3 at the time of the investigation (refer to attached borehole logs).

The visual inspection of the rock cuttings from the augers and observation of the drilling resistance indicates the underlying phyllite bedrock where encountered within the borehole investigation depth is generally assessed to be extremely to highly weathered, extremely low to very low strength in the upper bedrock profile to 1.0m then highly weathered, very low to low strength with depth within the investigation depth in BH2 and extremely weathered, extremely low strength, in the upper bedrock profile to 2.2m then extremely to highly weathered, extremely low to very low strength and highly weathered, very low strength phyllite bedrock within the investigation depth in BH3 (refer to attached borehole log).

The borehole logs with explanatory notes are herewith attached.

5.0 DISCUSSIONS AND COMMENTS

5.1 Proposed Burial Area

5.1.1 Acid Sulfate Soil Analysis

There are known areas within the Gundagai area of Acid Sulfate Soil risk, however it should be noted that a significantly large area has not been assessed and not identified at the subject site. The underlying material in the upper profile where tested (0.1m to 0.3m within BH1) was classified as fine textured. An acid sulfate management plan is triggered by net acidity results greater than the fine texture dependent criteria of 62 mol H+/t. The tests performed on the underlying silty clay material showed Net Acidity of 34 mol H+/t. Therefore, an acid sulfate management plan is not required for the subject site.

5.1.2 Excavation and Support

It is noted that excavation is required for the levelling of the site and construction of the burial area. Based upon the subsurface conditions encountered in the borehole drilled (BH1), it is expected that the materials to be excavated will comprise layers of natural topsoil and clay-based materials and bedrock ranging from extremely weathered, extremely low strength phyllite bedrock to highly weathered, low strength phyllite bedrock, depending on the extent of the proposed cut and depth of burial area.

It is therefore anticipated that all the required earthworks within soil material and extremely weathered, extremely low to highly weathered, very low strength phyllite bedrock material should be capable of being performed by conventional earthmoving plant such as a backhoe or excavator.

However, any excavation within low or medium strength phyllite bedrock, if encountered, is likely to be undertaken by a large tracked hydraulic excavator or medium weight tracked dozer both fitted with a ripping tyne/jackhammer or high-powered machinery. The excavation within the moderately weathered, high strength phyllite bedrock or better, if encountered, is likely to require the use of blasting technique (refer to the attached borehole logs). **It should be noted that rock outcrops were witnessed across the subject site and the area may be prone to shallow bedrock floaters.**

It is anticipated that the natural clay-based material would be stable during the excavation where the clay-based material is assessed to be equal to stiff consistency or better. However, instability or side collapse may be experienced within the natural firm to stiff consistency natural clay-based material if excavation is undertaken through this material (refer to the attached borehole logs for the material description).

It would be essential to maintain drainage of the site area during earthworks to prevent rainfall from adversely affecting the material such that they become unsuitable for direct re-use. It should be noted that trafficability in the clay-based material and extremely weathered bedrock material (soil properties) for wheeled vehicles can be expected to be slightly difficult during and following rainfall when it is exposed.

The temporary batter slopes of 1(V): 1(H) is recommended for unsupported cuts of up to 3.0m depth within the natural material. The followings are recommended for permanent batter slopes for unsupported cuts of up to 3.0m depth in the following material:

- Natural alluvial clay-based soils 1(V): 2(H)
- Extremely weathered bedrock 1(V): 1.5(H)
- Highly weathered bedrock 1(V): 1(H)

The permanent batter slope of the unsupported structural fill of up to 3.0m in height should not exceed 1(V): 2(H).

Any excavation depth exceeding 1.5m should have benches of at least 1.0m wide at 1.5m height intervals with retaining structures. It should be noted that surcharge loadings should not be placed within a distance equivalent to the excavation depth form the crest of a batter cut or fill.

Care would be required to ensure excavation bases are cleaned of loosened and remoulded debris. The exposed subgrade base should be proof rolled to detect any soft, loose or heaving areas. Any soft, loose or heave areas should be removed. The excavation base, particularly of clay-based material or extremely weathered bedrock, should not be left exposed for prolonged periods as deterioration of bases may occur when subjected to wetting and drying processes. Care should be exercised during the construction to ensure water ponding does not occur in the excavations since this may lead to subsequent softening of the founding materials.

It would be prudent to expect some seepage, even at shallower depth of the excavation during the excavation. Any such seepage should be readily controllable by conventional sump and pump dewatering systems installed at the base of the excavation.

The excavated clay-based materials can be used as common fill provided moisture is conditioned accordingly and the weathered bedrock material can be used as structural fill provided particles larger than 75mm in the weathered rock are broken down or excluded.

It should be noted that, no matter what method of excavation support is used, some ground displacement will occur within and immediately surrounding the excavation. We recommend that the risk of structural damage to nearby buried services or building structures as a result of such excavation-induced movements, be carefully evaluated. We believe it is unlikely that excavation induced movements will significantly affect structures situated back from the excavation perimeter a distance greater than the excavation depth.

5.2 Proposed Effluent Ponds

5.2.1 Acid Sulfate Soil Analysis

There are known areas within the Gundagai area of Acid Sulfate Soil risk, however it should be noted that a significantly large area has not been assessed and not identified at the subject site. The

underlying material in the upper profile where tested (0.1m to 0.3m within BH2) was classified as fine textured. An acid sulfate management plan is triggered by net acidity results greater than the fine texture dependent criteria of 62 mol H+/t. The test performed on the underlying silty clay material showed Net Acidity of 38 mol H+/t. Therefore, an acid sulfate management plan is not required for the subject site.

5.2.2 Soil Properties

The laboratory tests carried out on the underlying clay-based material recovered from BH3 indicated that the material generally contains 16 to 26% sand and 74 to 84% silt and clay content with Plasticity Index (PI) ranging from 17 to 20% on the samples tested. The material is generally classified as "CL – low plasticity silt clay, with fine to coarse sand" and "CL-CI – low to medium plasticity silty clay, with fine to coarse sand" in accordance with "AS1726 - 2017 Geotechnical Site Investigations.

The permeability tests carried out on the selected samples from BH3 indicates the permeability of 2×10^{-9} m/sec on low to medium plasticity silty clay and 5×10^{-9} m/sec on low plasticity silty clay, which were compacted at 95% of SMDD at nearest 100% of SOMC. The dispersion (Emerson Class) tests carried out on the same selected samples from BH3 showed "Emerson Class 2 & 5" and therefore considered generally "potentially highly to slightly dispersive" respectively.

5.2.3 Proposed Effluent Ponds Excavation & Preparation

Based on the subsurface type and condition encountered in the boreholes drilled (BH2 & BH3) and assuming similar soil profile across the subject site, the proposed effluent ponds can be built at the subject site **provided some treatment of the material with strict compaction control at the floor and sides of the proposed effluent ponds are undertaken.**

It should be noted that the excavation depth of the proposed effluent ponds would be approximately 1.5m below existing surface level as suggested by the client. Citing the occurrence of low and low to medium plasticity clay-based material to the depth of 0.4m (BH1) and 1.5m (BH2) below the existing surface level and phyllite bedrock from the depth of 0.4m to 1.7m (borehole refusal depth) at the location of BH1 and 1.5m to 3.0m (borehole termination depth) at the location of BH3 below the existing surface level at the proposed effluent ponds site, i**t is therefore highly recommended to remove the low and low to medium plasticity clay-based material and phyllite bedrock where exposed on the sides and floor of the excavation to a minimum depth of 0.9m as required. Approved clay liner material shall then be replaced to a minimum thickness of 0.9m perpendicular to the final excavated surface.**

The clay liner thickness is defined based on the acceptability of the leakage rate and the overall hydraulic conductivity of the liner. The careful selection of the material for the clay liner is vital to ensure that there is no gravel incorporated in the liner. It is anticipated that the natural low to medium plasticity clay-based materials encountered across the site or similar materials may be used for clay liner. The overall performance of the clay liner is influenced by the construction

performance of the contractor, degree of compaction and conditioning of the right moisture in the material.

It is recommended that the clay liner, using low to medium plasticity silty clay materials should have a minimum thickness of 900mm (effluent storage), measured perpendicular to the exposed surface. The permeability of the clay liner should be less than 1.0 x 10^{-9} m/sec to have a minimum seepage loss.

The clay liner utilising the clay-based materials as discussed above, shall be placed and compacted as specified below:

- The exposed natural clay-based material should be scarified to a depth of about 200mm at both sides and floor of the proposed effluent pond; moisture conditioned to within -2 to 0% of SOMC and compacted to a minimum of 100% of SMDD once excavation is taken to the required depth.
- Any soft or heave areas, if detected during the process, should be excavated down at least 0.5m and backfilled with appropriate approved materials compacted in 150mm thick layers to the minimum equivalent density of 100% of SMDD.
- Any area of exposed subgrade which exhibits shrinkage cracking and does not require recompaction, should be watered and rolled until the shrinkage cracks do not reappear. During this undertaking, care should be exercised to ensure the surface does not become soft.
- Once the exposed surface is treated as specified above, the clay materials for liner shall be placed in horizontal layers, compacted in 150mm thick layers to the equivalent density of 100% of SMDD at a moisture content within the range of -2 to 0% of SOMC. Care shall be taken in the placement of compacted materials to avoid laminations occurring between compacted layers. Compacted surfaces shall not be allowed to dry and crack before placing subsequent layers. If this should occur, then all dried clays shall be stripped off and replaced or alternatively, scarified and conditioned to the recommended moisture condition before placing the next layer. To prevent such laminations from occurring between compacted layers, each subsequent layer shall be compacted and kneaded into the underlying layer using a sheepsfoot roller.
- The batters incorporating clay liner should not be steeper than 1V:2H (1 Vertical to 2 Horizontal).
- The clays are liable to crack if they are subject to drying and wetting and to prevent this, they may be covered with about 200 mm of topsoil or sand-based materials. The topsoil is generally non-dispersive, and acts as a protective filter zone and it could minimize interaction of water with clay materials as part of the dispersive action. An adequate cover of topsoil will also promote grass cover and prevents internal clay materials from drying out and cracking during dry circles. The topsoil should be sown with grass, which generally protects the embankment from erosion.

Alternatively, any other type of liner material, such as plastic liner may be used provided it is approved by the relevant authority.

5.2.4 Pond Embankment Construction

It is noted that the new embankments for the proposed effluent ponds would be built using the excavated borrow low, low to medium and medium plasticity clay-based materials. It is anticipated that the maximum height of the embankments above natural surface would be no greater than approximately 3.0m and the maximum fetch would be less than 500m and the total water depth would be maximum 3.5m with 2.0m maximum above natural surface.

It should be noted that no embankment construction details were provided by the client and the above figures are assumption only. Based on these design assumptions and using the clay-based material encountered on site, we recommend the followings for the embankment construction;

- Topsoil and fill, if any, shall be stripped in the foundation area of the proposed embankments. The stripping depth for the topsoil is noted to be approximately 0.1m across the site (refer to the attached borehole logs).
- Proof roll the exposed subgrade to detect any soft, loose or heaving areas.
- Any wet, soft or heave areas, if detected, should be excavated down at least 0.5m and backfilled with appropriate approved excavated materials compacted in 150mm thick layers to the minimum equivalent density of 100% of SMDD for low to medium plasticity clay-based site-won material at a moisture content within the range of –2% to 0% of SOMC.
- Any area of exposed subgrade, which exhibits shrinkage cracking and does not require recompaction, should be watered and rolled until the shrinkage cracks do not reappear. During this undertaking, care should be exercised to ensure the surface does not become soft.
- Cut-off trench excavation should be extended at least 500mm into the impervious clay material and the side batters of 1V: 1H (one vertical to one horizontal) may be adopted.
- It should be noted a cut-off trench may not be required if a clay liner, as specified in section 5.2.3, is constructed.
- Once the foundation subgrade is prepared, low and medium plasticity clay-based material encountered on site or imported similar clay-based material shall be placed in horizontal layers and compacted in 200mm thickness to the equivalent density of 95 to 100% of SMDD at a moisture content within the range of -2% to 0% of SOMC.
- The compaction of the inside batter of the embankment extending to the top of the outside batter, should be strictly controlled in such a way that it achieves relative compaction of at least 100% of SMDD as specified above.
- If the embankment inside batter is to be protected by applying and mixing with hydrated lime or gypsum, then a minimum of 95% of SMDD at OMC between -2% and 0% for the entire embankment may be adopted.

- The compaction of outside batter shall be compacted not less than 98% of SMDD at moisture content within the range of -2% to 0% of SOMC.
- A topsoil layer or less reactive, such as sandy silty clay/silty clayey sand material and non-dispersive soil layer of at least 200mm thick should be placed on the inside batter at a minimum of 95% of SMDD or better as appropriate, which also serves to reduce surface erosion and prevent cracking. The crest and outside batter should also be protected with a topsoil layer or less reactive and non-dispersive soil layer.
- Care shall be taken in the placement of compacted materials to avoid laminations occurring between compacted layers.
- Embankment using the above clay-based material should have a maximum batter of 2.5H: 1V for the upstream (inside batter) and 2.0H: 1V for the downstream (outside batter).
- It should be noted that for any embankments higher than 4.0m, the inside batters as a minimum should be constructed to 1V:3.5 to 4.0H overall or with benches of 1m for every 4.0m high embankment at 1V:2.5H.
- A minimum crest width of 3.0m is recommended.
- A minimum freeboard of 1.0m is recommended.

The compaction with correct moisture content would also provide structural stability to the embankment and reduces the potential seepage losses due to the tendency of the dispersion of the materials. Care shall be exercised to ensure that the moisture is conditioned accordingly as discussed above.

It would be essential to maintain drainage of the site area during any earthworks to prevent rainfall from adversely affecting the material such that they become unsuitable for direct re-use.

Some settlements may occur from the consolidation of the founding material and therefore the designer is recommended to take appropriate design consideration to maintain the settlement within tolerable limit.

The clay-based material is considered slightly to moderately reactive and therefore they are liable to crack if they are subjected to drying and wetting. The dispersion test results showed that the clays are “potentially slightly to highly dispersive”. Similarly, the application of lime into the clay-based materials, if adopted, may develop shrinkage cracks when they are subjected to drying and wetting. Therefore, there is the potential for embankment slope and crest to develop tension cracks. In the long term, these tension cracks will subject to open and close due to drying and wetting cycles, resulting in fretting of the embankment slope and crest and consequently slope stability failure.

It is therefore required to ensure that the inner and outer face of the embankment and crest are given adequate protection. It is therefore recommended that the outer face and crest be covered with topsoil or less reactive materials, such as sandy silty clay/clayey sand material to a minimum thickness of 200mm, measured perpendicular to the slope upon the completion of the embankment. The topsoil is generally non-dispersive, and acts as a protective filter zone and it could

minimise interaction of water with clay-based materials as part of the dispersive action. An adequate cover of topsoil will also promote grass cover and prevents internal clay-based materials from drying out and cracking during dry circles. The topsoil should be sown with grass, which generally protects the embankment from erosion.

When topdressing an embankment, care shall be taken to achieve an even crest and batter finish, free of irregularities and tyre marks etc. Runoff water concentrating in these areas can result in rilling, which can expose the underlying clay-based materials and lead to more serious erosion problem. The embankment should be fenced off from stock to prevent grass cover being eaten, and to prevent the formation of deep cattle pads, which promotes scouring. It is also important to carry out regular inspection and maintenance to ensure topsoil cover is maintained. Some form of protection is recommended to prevent surface run-off into the proposed effluent ponds.

5.0 GENERAL COMMENT

Occasionally, the subsurface soil conditions in the completed boreholes may be found different (or may be interpreted to be different) from those expected. This can also occur with groundwater conditions, especially after climatic changes. If such differences appear to exist, we recommend that you immediately contact us.

The degree of compaction should be verified by a NATA accredited testing authority to ensure that it achieves required density in the placement of clay-based material and construction of embankments. The failure in undertaking the strict control compaction during the construction would eventually result the collapse of the embankment and consequently face seepage problems.

Verification is also required that the clay-based material is being placed in 150mm thick compacted layers for the embankment and there is no lamination occurring between clay-based layers. Remoulding of the clay-based material is most important during the placement and compaction of clay-based material to ensure a low isotropic permeability.

In designing the effluent ponds, the designer should try to minimise the number of pipes through the embankment, as it is difficult to get adequate compaction around the pipes. Backfilling around the pipes is particularly susceptible to piping failure if poorly compacted. Reinforced concrete cut-off walls at suitable intervals, should be provided around the pipe, and particularly concentrated in the inner face half of the embankment.

The excavations for pipe installations should not be left open for long periods allowing the exposed clays to dry and develop shrinkage cracks. The excavation through the completed embankment creates a point of weakness, which may result in failure. After the pipe is in place, care must be taken to ensure that the excavation trench is backfilled with selected clay-based materials and compacted thoroughly as specified above. Care must also be taken to ensure the required degree of compaction is achieved below the midline of the pipe. This normally involves the use of handheld compaction equipment. As the embankment is to be constructed from a dispersive soil, lime or gypsum stabilisation around the pipe shall be considered.

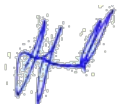
It is recommended that the clay-based material be compacted using a vibrating sheepsfoot roller or tamping roller. Rubber tyred or steel drum rollers are not recommended, as they tend to create horizontal laminations between layers. Care shall be taken in the preparation of the embankment foundation and the placement of compacted materials to avoid laminations occurring between compacted layers as discussed above.

It is highly recommended that topsoil cover should be of less reactive materials. It should also be noted that the material used for topsoil cover needs to have proper nutrients and be suitable to promote vegetation growth.

It is also highly recommended the regular routine inspection and maintenance of the embankment throughout its life as it is vital for the stability and long-term performance of the ponds and dam. The routine inspection and maintenance may include the immediate repairing and reshaping of the batters once any signs of erosion, shrinkage and tension cracks are evident, irrigation of batter faces when batter faces become dry to maintain vegetation growth and or re-sowing vegetation as required in order to prevent further deterioration of the embankment in resulting complete embankment failures.

It is also recommended that the ponds and dam should not be left empty for long periods of time as shrinkage cracks may develop which may result in seepage loss (once it is filled again) and consequently creating instability of the embankment. If the shrinkage cracks are significant, we highly recommend repairing these cracks prior to refilling of the effluent ponds.

Yours truly,



Jarrod Gornall
Senior Geotechnical Engineer

Tin Maung
Principal Geotechnical Engineer

Attachments:

- Addendum
- Site Locality Plan
- Plan showing borehole & DCP test locations
- Borehole logs with explanatory notes
- Dynamic Cone Penetrometer test reports
- Laboratory test reports

ADDENDUM

LIMITS OF INVESTIGATION

The recommendations made in this report are based on the assumption that the test results are representative of the overall subsurface conditions. However, it should be noted that even under optimum circumstances, actual conditions in some parts of the building site may differ from those said to exist, because no geotechnical engineer, no matter how qualified, and no subsurface exploration program, no matter how comprehensive, can reveal all that is hidden by earth, rock and time.

The client should also be aware that our recommendations refer only to our test site locations and the ground level at the time of testing.

The recommendations in this report are based on the following: -

a) The information gained from our investigation.
b) The present "state of the art" in testing and design.
c) The building type and site treatment conveyed to us by the client.
d) Historical information.

Should the client or their agent have omitted to supply us with the correct relevant information, or make significant changes to the building type and/or building envelope, our report may not take responsibility for any consequences and we reserve the right to make an additional charge if more testing is necessary.

Not withstanding the recommendations made in this report, we also recommend that whenever footings are close to any excavations or easements, that consideration should be given to deepening the footings.

Unless otherwise stated in our commission, any dimensions or slope direction and magnitude should not be used for any building costing calculations and/or positioning. Any sketch supplied should be considered as only an approximate pictorial evidence of our work.

Aitken Rowe Testing Laboratories Pty Ltd

Registration Number: S24-364

Client: GRAY SURVEYORS - TUMUT, NSW

Project: GEOTECHNICAL INVESTIGATION
PROPOSED AQUACULTURAL FARM DEVELOPMENT,
No. 364 RENO ROAD, GUNDAGAI, NSW
SITE LOCALITY PLAN

Aitken Rowe Testing Laboratories Pty Ltd

Registration Number: S24-364

Client: GRAY SURVEYORS - TUMUT, NSW

Project: GEOTECHNICAL INVESTIGATION
PROPOSED AQUACULTURAL FARM DEVELOPMENT,
No. 364 RENO ROAD, GUNDAGAI, NSW
BOREHOLE & DCP TEST LOCATION PLAN

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **1**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: ***28/10/2024***
GPS N: ***6123380***
E: ***0595087***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test L.S % -425µm	Remarks & Field Records
ML	TOPSOIL: Sandy SILT; low plasticity, fine to coarse sand, brown		MC<PL	F				NATURAL
CL-CI	Silty CLAY; low to medium plasticity, with fine to coarse sand, brown			St.	D	1A		FMC = 7.9%
CL-CI	Silty CLAY; low to medium plasticity, with fine to coarse sand, brown	0.5	MC>PL	F	D	1B		FMC = 20.8%
CI	Silty CLAY; medium plasticity, with fine to coarse sand, mottled yellow orange brown	1.0		VSt.-H	D	1C		FMC = 20.2%
	PHYLLITE; extremely weathered, extremely low strength, creamy yellow	1.5	M		D	1D		
	PHYLLITE; highly weathered, very low strength, cream	2.5	D		D	1E		
	PHYLLITE; highly weathered, low strength, white cream	3.5			D	1F		
	End of Borehole (BH1) @ 6.0m	6.0						

Registration No.: S24-364

Location: Geotechnical Investigation - Proposed Aquacultural Farm Development, No. 364 Reno Road, Gundagai, NSW

Client: Gray Surveyors - Tumut, NSW

Logged By: JAG

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **2**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: ***28/10/2024***
GPS N: ***6123525***
E: ***0595260***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test L.S % -425µm	Remarks & Field Records
ML	TOPSOIL: Sandy SILT; low plasticity, fine to coarse sand, brown		MC<PL	St.				NATURAL
CL-CI	Silty CLAY; low to medium plasticity, with fine to coarse sand, orange			VSt.	D	2A		FMC = 9.5%
	PHYLLITE; extremely to highly weathered, extremely low to very low strength, grey white	0.5	D		D	2B		
	PHYLLITE; highly weathered, very low strength, grey	1.0			D	2C		
	PHYLLITE; highly weathered, low strength, grey brown	1.5			D	2D		
	End of Borehole (BH2) @ 1.7m	2.0						Refusal on Phyllite Bedrock
		2.5						
		3.0						
		3.5						
		4.0						
		4.5						
		5.0						
		5.5						
		6.0						

Registration No.: S24-364

Location: Geotechnical Investigation - Proposed Aquacultural Farm Development, No. 364 Reno Road, Gundagai, NSW

Client: Gray Surveyors - Tumut, NSW

Logged By: JAG

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **3**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: ***28/10/2024***
GPS N: ***6123521***
E: ***0595280***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test L.S % -425µm	Remarks & Field Records
ML	TOPSOIL: Sandy SILT; low plasticity, fine to coarse sand, brown		MC<PL	St.				NATURAL
CL-CI	Silty CLAY; low to medium plasticity, with fine to coarse sand, mottled yellow orange	0.5	MC>PL		D	3A		FMC = 18.8% SOMC = 20.1%
		1.0						
CL	Silty CLAY; low plasticity, with fine to coarse sand, cream grey	1.5		VSt.	D	3B		FMC = 15.8% SOMC = 18.3%
	PHYLLITE; extremely weathered, extremely low strength, brown grey	2.0	M		D	3C		
	PHYLLITE; extremely to highly weathered, extremely low to very low strength, grey	2.5			D	3D		
	PHYLLITE; highly weathered, very low strength, grey	3.0	D					
	End of Borehole (BH3) @ 3.0m	3.5 4.0 4.5 5.0 5.5 6.0						

Registration No.: S24-364

Location: Geotechnical Investigation - Proposed Aquacultural Farm Development, No. 364 Reno Road, Gundagai, NSW

Client: Gray Surveyors - Tumut, NSW

Logged By: JAG

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

LOG SYMBOLS

LOG COLUMN	SYMBOL	DEFINITION
Groundwater Record	▼	Standing water level. Time delay following completion of drilling may be shown.
	▶	Groundwater seepage into borehole or excavation noted during drilling or excavation.
Samples	D	Disturbed bag sample taken between the depths indicated by lines.
	U	Undisturbed 50mm diameter tube sample taken between the depths indicated by lines
Field Tests	4, 7, 10 N=17	Standard Penetration Test (S.P.T.) performed between depths indicated by lines. Individual figures show blows per 150mm penetration driven by SPT hammer.
	5 7 3	Dynamic Cone Penetration Test performed between depths indicated by lines. Individual figures show blows per 100mm penetration for 60 degree solid cone driven by 9 kg hammer.
Moisture Condition (Silt or Clay based)	MC<PL	Moisture content estimated to be less than plastic limit.
	MC=PL	Moisture content estimated to be approx. equal to plastic limit.
	MC>PL	Moisture content estimated to be greater than plastic limit.
Moisture Condition (Gravel or Sand based)	D	DRY – runs freely through fingers.
	M	MOIST – does not run freely but no free water visible on soil surface.
	W	WET – free water visible on soil surface.
Consistency (Silt or Clay based)	VS	VERY SOFT – unconfined compressive strength less than 25kPa.
	S	SOFT – unconfined compressive strength 25-50 kPa.
	F	FIRM – unconfined compressive strength 50-100kPa.
	St.	STIFF – unconfined compressive strength 100-200kPa.
	VSt.	VERY STIFF – unconfined compressive strength 200-400kPa.
	H	HARD – unconfined compressive strength greater than 400kPa.

Relative Density (Gravel or Sand based)		Description	Density Index Range %	'N' Value Range Blows/300mm
	VL	VERY LOOSE	<15	0-5
	L	LOOSE	15-35	6-10
	MD	MEDIUM DENSE	35-65	11-30
	D	DENSE	65-85	31-50
	VD	VERY DENSE	>85	>50

Hand Penetrometer Readings	300 250 280	Numbers indicate individual test results in kPa on representative undisturbed material.
Laboratory Test	L.S. %	Linear Shrinkage (As per TfNSW Method T113)
	M.C. %	Field Moisture Content (As per Australian Standard AS1289.2.1.1 or TfNSW Method T120)
	Iss	Shrink-Swell Index (As per Australian Standard AS1289.7.1.1)

Piezometer Construction	Fill		Piezometer	
		Bentonite		Solid Pipe
		Washed Fine Graded Gravel		Slotted Screen

Remarks	'V' bit	Hardened steel 'V' shaped bit.
	'TC' bit	Tungsten Carbide wing bit.

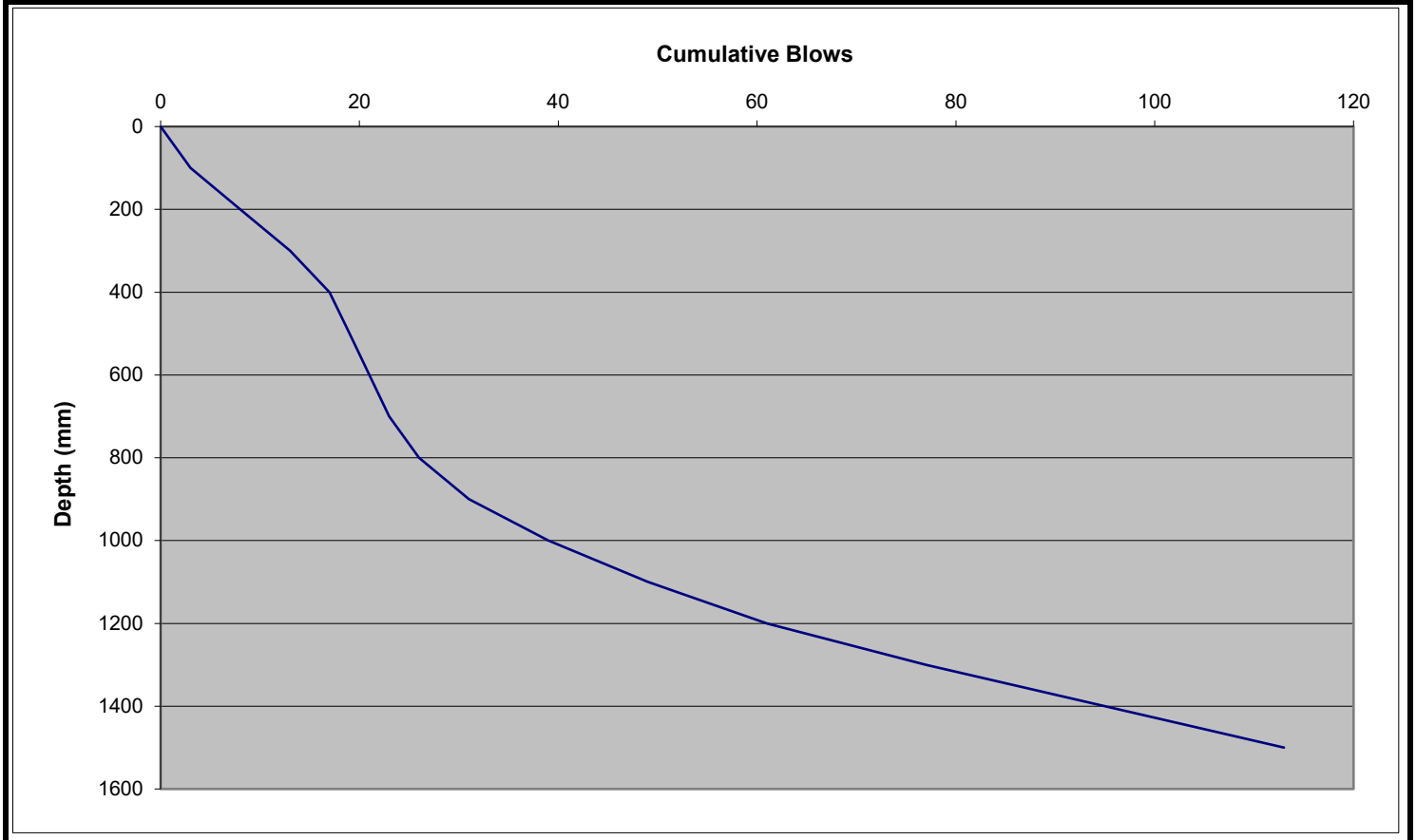
Aitken Rowe Testing Laboratories Pty Ltd

ARTL Wagga: 1/5 Dangar Place, East Wagga Wagga NSW 2650

DYNAMIC CONE PENETROMETER REPORT

CLIENT: GRAY SURVEYORS - TUMUT, NSW	PAGE: 1 OF: 2 ***DCP: 1 (BH1)***
PROJECT: GEOTECHNICAL INVESTIGATION	REGISTRATION NO: **S24-364**
PROPOSED AQUACULTURAL FARM DEVELOPMENT	DATE OF TEST: 28/10/2024
LOCATION: No. 364 RENO ROAD, GUNDAGAI, NSW	DEPTH BELOW ESL (mm): NIL
SOIL DESCRIPTION: REFER TO BOREHOLE LOGS	MOISTURE CONDITION: REFER TO LOGS
DEPTH OF GROUND WATER TABLE IF INTERSECTED: N/A	TEST METHOD: AS 1289.6.3.2

Depth(m)	Blows	Est. CBR	Depth(m)	Blows	Est. CBR	Depth(m)	Blows	Est. CBR	Depth(m)	Blows	Est. CBR
0.0 - 0.1	3	5	1.5 - 1.6	END	*	3.0 - 3.1	*	*	4.5 - 4.6	*	*
0.1 - 0.2	5	9	1.6 - 1.7	*	*	3.1 - 3.2	*	*	4.6 - 4.7	*	*
0.2 - 0.3	5	9	1.7 - 1.8	*	*	3.2 - 3.3	*	*	4.7 - 4.8	*	*
0.3 - 0.4	4	7	1.8 - 1.9	*	*	3.3 - 3.4	*	*	4.8 - 4.9	*	*
0.4 - 0.5	2	3	1.9 - 2.0	*	*	3.4 - 3.5	*	*	4.9 - 5.0	*	*
0.5 - 0.6	2	3	2.0 - 2.1	*	*	3.5 - 3.6	*	*	5.0 - 5.1	*	*
0.6 - 0.7	2	3	2.1 - 2.2	*	*	3.6 - 3.7	*	*	5.1 - 5.2	*	*
0.7 - 0.8	3	5	2.2 - 2.3	*	*	3.7 - 3.8	*	*	5.2 - 5.3	*	*
0.8 - 0.9	5	9	2.3 - 2.4	*	*	3.8 - 3.9	*	*	5.3 - 5.4	*	*
0.9 - 1.0	8	17	2.4 - 2.5	*	*	3.9 - 4.0	*	*	5.4 - 5.5	*	*
1.0 - 1.1	10	23	2.5 - 2.6	*	*	4.0 - 4.1	*	*	5.5 - 5.6	*	*
1.1 - 1.2	12	28	2.6 - 2.7	*	*	4.1 - 4.2	*	*	5.6 - 5.7	*	*
1.2 - 1.3	16	41	2.7 - 2.8	*	*	4.2 - 4.3	*	*	5.7 - 5.8	*	*
1.3 - 1.4	18	48	2.8 - 2.9	*	*	4.3 - 4.4	*	*	5.8 - 5.9	*	*
1.4 - 1.5	18	48	2.9 - 3.0	*	*	4.4 - 4.5	*	*	5.9 - 6.0	*	*



NATA
WORLD RECOGNISED ACCREDITATION

Accredited for compliance with ISO/IEC 17025 - Testing.

ACCREDITATION NUMBER: 4679

REMARKS:

APPROVED SIGNATORY: Jarrod Gornall

DATE: 2/12/2024

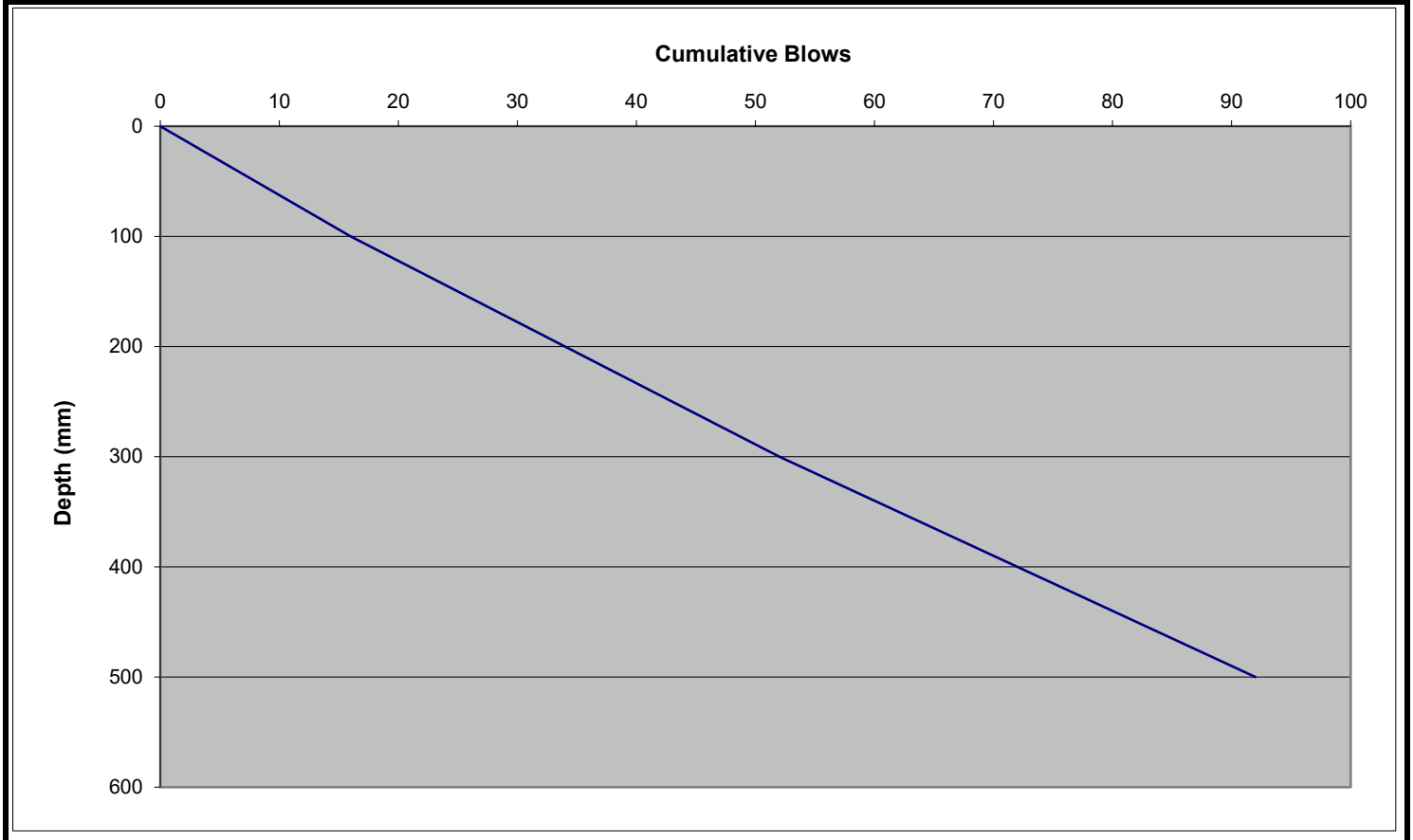
Aitken Rowe Testing Laboratories Pty Ltd

ARTL Wagga: 1/5 Dangar Place, East Wagga Wagga NSW 2650

DYNAMIC CONE PENETROMETER REPORT

CLIENT: GRAY SURVEYORS - TUMUT, NSW	PAGE: 2 OF: 2 ***DCP: 2 (BH1)***
PROJECT: GEOTECHNICAL INVESTIGATION	REGISTRATION NO: **S24-364**
PROPOSED AQUACULTURAL FARM DEVELOPMENT	DATE OF TEST: 28/10/2024
LOCATION: No. 364 RENO ROAD, GUNDAGAI, NSW	DEPTH BELOW ESL (mm): 1600
SOIL DESCRIPTION: REFER TO BOREHOLE LOGS	MOISTURE CONDITION: REFER TO LOGS
DEPTH OF GROUND WATER TABLE IF INTERSECTED: N/A	TEST METHOD: AS 1289.6.3.2

Depth(m)	Blows	Est. CBR	Depth(m)	Blows	Est. CBR	Depth(m)	Blows	Est. CBR	Depth(m)	Blows	Est. CBR
0.0 - 0.1	16	41	1.5 - 1.6	*	*	3.0 - 3.1	*	*	4.5 - 4.6	*	*
0.1 - 0.2	18	48	1.6 - 1.7	*	*	3.1 - 3.2	*	*	4.6 - 4.7	*	*
0.2 - 0.3	18	48	1.7 - 1.8	*	*	3.2 - 3.3	*	*	4.7 - 4.8	*	*
0.3 - 0.4	20	55	1.8 - 1.9	*	*	3.3 - 3.4	*	*	4.8 - 4.9	*	*
0.4 - 0.5	20	55	1.9 - 2.0	*	*	3.4 - 3.5	*	*	4.9 - 5.0	*	*
0.5 - 0.6	END	*	2.0 - 2.1	*	*	3.5 - 3.6	*	*	5.0 - 5.1	*	*
0.6 - 0.7	*	*	2.1 - 2.2	*	*	3.6 - 3.7	*	*	5.1 - 5.2	*	*
0.7 - 0.8	*	*	2.2 - 2.3	*	*	3.7 - 3.8	*	*	5.2 - 5.3	*	*
0.8 - 0.9	*	*	2.3 - 2.4	*	*	3.8 - 3.9	*	*	5.3 - 5.4	*	*
0.9 - 1.0	*	*	2.4 - 2.5	*	*	3.9 - 4.0	*	*	5.4 - 5.5	*	*
1.0 - 1.1	*	*	2.5 - 2.6	*	*	4.0 - 4.1	*	*	5.5 - 5.6	*	*
1.1 - 1.2	*	*	2.6 - 2.7	*	*	4.1 - 4.2	*	*	5.6 - 5.7	*	*
1.2 - 1.3	*	*	2.7 - 2.8	*	*	4.2 - 4.3	*	*	5.7 - 5.8	*	*
1.3 - 1.4	*	*	2.8 - 2.9	*	*	4.3 - 4.4	*	*	5.8 - 5.9	*	*
1.4 - 1.5	*	*	2.9 - 3.0	*	*	4.4 - 4.5	*	*	5.9 - 6.0	*	*



NATA
WORLD RECOGNISED ACCREDITATION

Accredited for compliance with ISO/IEC 17025 - Testing.

ACCREDITATION NUMBER: 4679

REMARKS:

APPROVED SIGNATORY: Jarrod Gornall

DATE: 2/12/2024

AITKEN ROWE Testing Laboratories Pty Ltd

ARTL Wagga: 1/5 Dangar Place, East Wagga Wagga NSW 2650

*

PAGE 1 OF 1

TEST REPORT: GEOTECHNICAL INVESTIGATION - SOIL ANALYSIS

CLIENT : GRAY SURVEYORS - TUMUT, NSW
JOB DESCRIPTION : GEOTECHNICAL INVESTIGATION
PROPOSED AQUACULTURAL FARM DEVELOPMENT,
No. 364 RENO ROAD, GUNDAGAI, NSW

SAMPLED BY: ARTL
DATE SAMPLED: 28/10/2024
DATE SUBMITTED: 30/10/2024
SAMPLING METHOD: AS1289.1.2.1
SAMPLING CLAUSE: 6.5.3
DATES TESTED: 31/10/24-24/11/24
ORDER No.: *

MATERIAL SOURCE : IN-SITU BOREHOLES
MATERIAL TYPE : REFER TO BOREHOLE LOGS
PROPOSED USE : DESIGN

REGISTRATION No : R28 **S24-364**

		SAMPLE NUMBER :	1A	1B	1C	2A	3A	3B
		SAMPLING LOCATION :	BH1	BH1	BH1	BH2	BH3	BH3
		DEPTHS BETWEEN WHICH SAMPLES TAKEN (mm) :	100-300	600-800	1300-1500	100-300	100-1000	1000-1500
TESTS	TEST ELEMENT		*	*	*	*	*	*
AS1289.3.6.1		PASS 100.0mm SIEVE %	*	*	*	*	*	*
		PASS 75.0mm SIEVE %	*	*	*	*	*	*
		PASS 53.0mm SIEVE %	*	*	*	*	*	*
		PASS 37.5mm SIEVE %	*	*	*	*	*	*
		PASS 26.5mm SIEVE %	*	*	*	*	*	*
		PASS 19.0mm SIEVE %	*	*	*	*	*	*
		PASS 13.2mm SIEVE %	*	*	*	*	*	*
		PASS 9.50mm SIEVE %	*	*	*	*	100	*
		PASS 6.70mm SIEVE %	*	*	*	*	99	*
		PASS 4.75mm SIEVE %	*	*	*	*	99	100
		PASS 2.36mm SIEVE %	*	*	*	*	99	99
AS1141.19	WHOLE SAMPLE	PASS 425 µm SIEVE %	*	*	*	*	98	97
		PASS 75 µm SIEVE %	*	*	*	*	83	73
		LESS THAN 13.5 µm %	*	*	*	*	59	49
AS1141.19	-2.36mm	PASS 425 µm SIEVE %	*	*	*	*	99	98
		PASS 75 µm SIEVE %	*	*	*	*	84	74
		LESS THAN 13.5 µm %	*	*	*	*	60	50
		OBSERVATIONS	*	*	*	*	*	*
AS1289.3.1.2		LIQUID LIMIT %	*	*	*	*	37	32
AS1289.3.2.1		PLASTIC LIMIT %	*	*	*	*	17	15
AS1289.3.3.1		PLASTICITY INDEX	*	*	*	*	20	17
		PREPARATION METHOD	*	*	*	*	AS1289.1.1-5.3	AS1289.1.1-5.3
AS1289.5.1.1		STANDARD MAX. DRY DENSITY t/m^3	*	*	*	*	1.67	1.73
(NOT DRY PREPPED)		OPTIMUM MOISTURE CONTENT %	*	*	*	*	20.1	18.3
		OVERSIZE MATERIAL % RETAINED ON 19.0mm	*	*	*	*	0	0
		LL METHOD OF CURING TIME DETERMINATION	*	*	*	*	VISUAL	VISUAL
		CURING DURATION HOURS	*	*	*	*	25	96
AS1289.3.4.1		LINEAR SHRINKAGE %	*	*	*	*	*	*
(PREP-AIR DRIED)		LENGTH OF MOULD mm	*	*	*	*	*	*
		MOULDING MOISTURE CONDITIONING METHOD	*	*	*	*	*	*
		CRACKING (CA), CRUMBLING (CR) OR CURLING (CU) OCCURRED	*	*	*	*	*	*
AS1289.2.1.1		FIELD MOISTURE CONTENT %	7.9	20.8	20.2	9.5	18.8	15.8
AS1289.3.8.1		EMERSON CLASS	*	*	*	*	5	2
(AIR DRIED)		TYPE OF WATER	*	*	*	*	DISTILLED	DISTILLED
AS1289.6.7.2		COEFFICIENT OF PERMEABILITY m/sec.	*	*	*	*	$2x10^{-9}$	$5x10^{-9}$
(NOT DRY PREPPED)		LABORATORY MOISTURE RATIO %	*	*	*	*	101	101
FALLING		LABORATORY DENSITY RATIO %	*	*	*	*	95	95
HEAD		% OVERSIZE DISCARDED (+19.0mm)	*	*	*	*	0.0	0.0
		SURCHARGE MASS APPLIED (1L MOULD, 3kPa)	*	*	*	*	2.65	2.65

NATA
WORLD RECOGNISED ACCREDITATION

Accredited for compliance with ISO/IEC 17025 - Testing.

ACCREDITATION NUMBER: 4679

*
*
*
All samples are oven dried and dry sieved during prep. unless otherwise stated

APPROVED SIGNATORY : .....
Jarrod Gornall

DATE: 2/12/2024

Certificate of Analysis E24-00-0673

Client:	Aitken Rowe Testing Laboratories	Laboratory:	Environmental Analysis Laboratory
Contact:	Lab Results	Contact:	EAL Customer Service Team
Address:	2 Riedell Street, Wagga Wagga, NSW 2650, Australia	Address:	PO Box 157, East Lismore NSW 2480 Australia
Telephone:	02 6939 5555	Telephone:	(02) 6620 3678
Email:	admin@artl.com.au	Email:	eal@scu.edu.au

Customer reference:	S24-364	Request ID:	EAL /E24-00-0673
Number of samples:	2	Report ID:	E24-00-0673_RCOAP1_1
Date samples received:	07 November 2024	Issue date:	13 November 2024

Authorised by:	Nick Ward
Position:	Technical Team Leader

Accreditation No. 14960

Comments: EAL is a NATA accredited laboratory (14960), accredited for compliance with ISO/IEC 17025 - Testing.

Certificate of Analysis

Request ID: EAL/E24-00-0673 Report ID: E24-00-0673_RCOAP1_1 Issue date: 13 November 2024

			Client Sample ID:	S24-364/1A	S24-364/2A
			Sample Depth:	100-300	100-300
			Sample Date:	28 October 2024	28 October 2024
			Sampled By:	ARTL	ARTL
			Your Client:	Gray Surveyors	Gray Surveyors
			EAL Sample ID:	E24-00-0673-0001	E24-00-0673-0002
Parameter	**Unit**	**Method Reference**	**LOR**	---	---
Moisture Content (80°C)	% of water in sample	** Inhouse S2c	<0.1	6.8	8.7
Moisture Content (80°C)	g water/ g oven-dry mass	** Inhouse S2c	<0.1	< 0.1	< 0.1
Texture	---	** Inhouse S81	---	Fine	Fine
Chromium Reducible Sulfur	% SCR	Inhouse S20	<0.005	0.045	0.031
Chromium Reducible Sulfur	mol H+/t	Inhouse S20	<3	28	20
pH KCl	---	Inhouse S16b	---	5.94	5.42
Titratable Actual Acidity	mol H+/t	Inhouse S16b	<1	6	19
Net Acidity	mol H+/t	** Sullivan et al. 2018	<3	34	38
Lime Calculation	kg CaCO3/t DW	** Sullivan et al. 2018	<1	3	3

Notes:

- Where Acid Neutralising Capacity has been corroborated by other data, Net Acidity = Potential Acidity + Actual Acidity + Retained Acidity - Acid Neutralising Capacity (Eq. 3.1; Sullivan et al. 2018).
- Where Acid Neutralising Capacity has not been corroborated by other data, Net Acidity = Potential Acidity + Actual Acidity + Retained Acidity (Eq. 3.2; Sullivan et al. 2018).
- The Acid Base Accounting Equation for post-limed soil materials is Net Acidity = Potential Acidity + Actual Acidity + Retained Acidity - (post treatment Acid Neutralising Capacity - initial Acid Neutralising Capacity) (Eq. 3.3; Sullivan et al. 2018.
- A 1.5 Safety Factor is applied to positive Liming Rates.
- NSCT (2009) texture: coarse and peats = sands to loamy sands; medium = clayey sand to light clays; fine = light medium to heavy clays.
- A management plan triggered by Net Acidity results greater than the texture dependent criterion: coarse ≥ 18 mol H+/t; medium ≥ 36 mol H+/t; fine ≥ 62 mol H+/t.
- Where > 1000 t soil disturbed, coarse trigger used.
- Bulk density required to convert laboratory data to field liming rates.
- ** denotes NATA accreditation does not cover the performance of this service.
- .. denotes not requested, no data/information or no guidelines available.
- All services undertaken by EAL are covered by the EAL Laboratory Services Terms and Conditions (available on request or at scu.edu.au/eal).
- Analysis conducted between sample arrival date and reporting date.
- This report is not to be reproduced except in full.
- Results only relate to the item tested.
- Methods sourced from Sullivan L, Ward N, Toppler N and Lancaster G. 2018. National acid sulfate soils guidance: national acid sulfate soils identification and laboratory methods manual, Department of Agriculture and Water Resources, Canberra, ACT.
- Samples dried and ground immediately on arrival (unless supplied dried and ground).
- Analysis reported on a dry weight (DW) basis, unless wet weight (WW) specified.