

Dewatering Management Plan 21-25 McIntosh Street & 55 Werona Avenue, Gordon NSW

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Morrow Geotechnics Pty Ltd

2/5-7 Malta Street, Fairfield East NSW 2165

79/6 Bellambi Lane, Bellambi NSW 2518

E: info@morrowgeo.com.au

P: 02 8599 7579

ABN 42 605 892 126

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	Full Name & Title	Signature
Author	Andrew Butel Hydrogeologist/Senior Engineering Geologist	
Reviewer	Alan Morrow Principal Geotechnical Engineer	



Table of Contents

1. Introduction	1
1.1 Overview	1
1.2 Proposed Development	1
1.3 Proposed Dewatering Schedule.....	1
1.4 Objectives	2
2. Geological Model.....	2
3. Hydrogeological Model.....	3
3.1 Hydrogeological Summary	3
3.2 Summary of Groundwater Observations.....	3
4. Groundwater Flow Modelling	3
4.1 Proposed Shoring and Groundwater Management.....	3
4.2 Analytical Seepage Modelling.....	3
4.2.1 Modelling Inputs	4
4.2.2 Modelled Seepage	5
4.2.3 Modelled Groundwater Drawdown.....	6
5. NSW Aquifer Interference Policy Impact Assessment.....	7
6. Water Discharge Methodology	8
7. Groundwater Monitoring.....	10
7.1 Water Level Monitoring	10
7.2 Water Inflow Monitoring	12
7.3 Water Quality Monitoring.....	12
7.4 Contingency Measures.....	14
7.5 Reporting and Record Keeping	14
7.6 Project Stakeholders.....	14
8. Management of Ongoing Discharge	15
9. Conclusions and Recommendations	15
10. Statement of Limitations	15

1. Introduction

1.1 Overview

Morrow Geotechnics Pty Ltd has carried out a Groundwater Study and prepared a Site Hydrogeology Report for the proposed development at 21-25 McIntosh Street & 55 Werona Avenue, Gordon NSW (the site).

The following geotechnical report has been prepared for the site:

- Morrow Geotechnics Pty Ltd, *Geotechnical Investigation Report, 21-25 McIntosh Street & 55 Werona Avenue, Gordon NSW*, referenced P3540_02, and dated 7 August 2025 (MG 2025-1); and
- Morrow Geotechnics Pty Ltd, *Site Hydrogeology Report, 21-25 McIntosh Street & 55 Werona Avenue, Gordon NSW*, referenced P3540_02, and dated 12 November 2025 (MG 2025-2).

The geotechnical report presents the results of site investigations for the proposed development and geotechnical recommendations for design and construction.

1.2 Proposed Development

Architectural plans for the proposed development have been prepared by PMDL Architecture + Design Pty Ltd, project number 3303, revision C and dated 25 July 2025. From the drawings provided Morrow Geotechnics understands that the proposed development will involve demolition of the existing structures on site and the construction of three multi-storey, multi-dwelling structures over a shared two-level basement requiring excavation of approximately 9.1 metres below ground level (mBGL) to RL 102.87 mAHD.

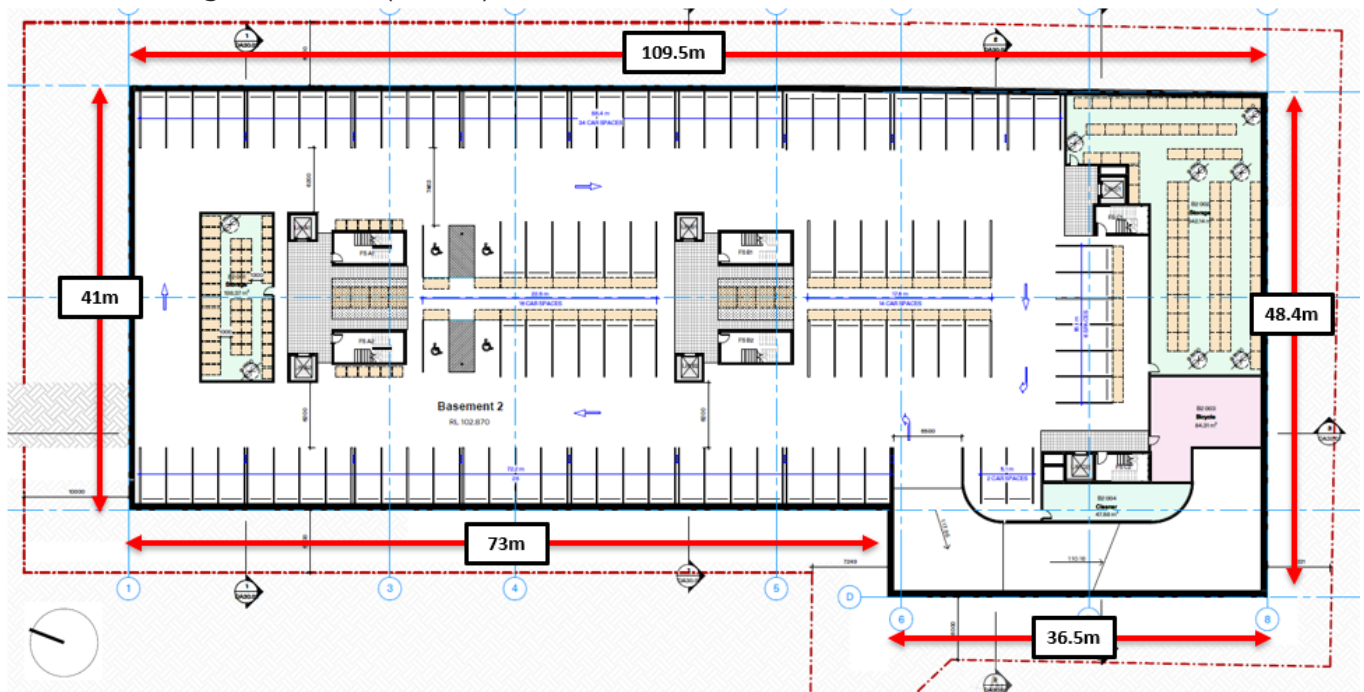


Figure 1: Proposed Basement Dimensions (area approx. 4760 m², perimeter approx. 316 m)

1.3 Proposed Dewatering Schedule

In order to minimise the seepage volumes during construction it is understood that a secant pile, cut-off wall will be constructed. The secant pile wall will socket a minimum of 3 m below bulk excavation level (BEL) to minimise groundwater flow. Dewatering through spear points and

pumping is not proposed for the construction period, rather any groundwater seepage will be collected by sump pits within the basement before being discharged from site.

The excavation program for the proposed basement is expected to take up to 9 months. Temporary construction dewatering is expected to occur for construction seepage inflows during this 9 month period.

1.4 Objectives

The objective of this Dewatering Management Plan is to identify a methodology for construction dewatering of the site such that:

- Construction dewatering volumes are quantified to be within acceptable thresholds;
- The location of any groundwater extraction works, if required, is clearly delineated;
- The process for disposal of extracted groundwater, if required, is clearly defined;
- The quality of any groundwater is assessed in accordance with ANZG/ANZECC guidelines for disposal off site, if required;
- The impact of groundwater drawdown on neighbouring properties is assessed;
- Provide a NSW Aquifer Interference Policy assessment of the proposed activity;
- Monitoring and contingency plans are outlined for safe management of construction dewatering;
- This Dewatering Management Plan will be used as the basis for approval to enable connection and discharge into North Sydney Councils stormwater system.

2. Geological Model

The Soil Conservation Service of NSW Sydney 1:100,000 Soil Landscapes Series Sheet 9029-9030 (2nd Edition) indicates that the site is located at the boundary of the Glenorie (9130gn) and Lucas Heights (9130lh) landscapes. The Glenorie Landscape generally comprises gently undulating to rolling low hills on Wianamatta Group shales with inclined slopes of typically 5-20%. Soils of Glenorie landscape generally comprises shallow to moderately deep (<1000cm) red and brown podzolic soil in the upper slopes. These soils are noted moderately reactive. The Lucas Heights Landscape comprises gently undulating crests and ridges on plateau surfaces of the Mittagong formation with slopes up to 10 %. Soils are generally moderately deep (0.5 to 1.5 m) hardsetting Yellow Podzolic Soils and Yellow Soloths. These soils are noted to present stony soil, and low available water capacity.

Information on regional sub-surface conditions, referenced from the Department of Mineral Resources Geological Map Sydney 1:100,000 (Geological Series Sheet 9130) indicate that the site is located in (Rwa) Ashfield Shale of the Wianamatta Group, which is typically comprised of black to dark-grey shale and laminite.

Further discussion of the geological and geotechnical conditions at the site is provided in the Geotechnical Investigation Report (MG 2025-1) and in the Site Hydrogeology Report (MG 2025-2).

3. Hydrogeological Model

3.1 Hydrogeological Summary

A full hydrogeological assessment of the site has been carried out by Morrow Geotechnics as referenced in Section 1.1 above and hereafter referred to as MG 2025-2.

3.2 Summary of Groundwater Observations

On the basis of the geotechnical investigation and ongoing monitoring it is possible to conclude that the soil and bedrock at the site are of moderate permeability and that groundwater will be encountered during basement excavation.

On the basis of ongoing groundwater monitoring at the site it is recommended that a design groundwater level for site is taken at the following;

- BH102 – 106.6 mAHD;
- BH104 – 109.1 mAHD;
- BH105 – 110.0 mAHD;

The following design permeabilities have been adopted for the site;

- Unit 1 Topsoil/Fill – N/A
- Unit 2 Residual Clay – 8.08×10^{-7}
- Unit 3 Class V/IV Shale – 8.08×10^{-7}
- Unit 4 Class III Shale – 1.0×10^{-7}
- Unit 5 Class III Sandstone – 1.0×10^{-7}
- Unit 6 Class II Sandstone – 1.0×10^{-7}

In accordance with Pells *Substance and Mass Properties for the Design of Engineering Structures in the Hawkesbury Sandstone* (2004) a mass permeability of 1 lugeons (approximately 1.0×10^{-7}) is a typical log mean permeability for Class III Shale & Sandstone.

4. Groundwater Flow Modelling

4.1 Proposed Shoring and Groundwater Management

Morrow Geotechnics understands that the structural design will be for a drained basement. No spear points or wells are proposed for extraction of groundwater at the site. Groundwater seepage will be allowed to drain to sump pits within the basement. Any accumulation of groundwater within the sump pit would be dewatered by pumping from the sump pit using appropriate environmental controls as discussed in this Dewatering Management Plan.

4.2 Analytical Seepage Modelling

Groundwater seepage analysis for flow into the drained basement has been calculated using a Plaxis 2D Flow Module. Plaxis is a 2D finite element and limit equilibrium software package used for design of geotechnical and hydrogeological design of structures such as excavations, dams, embankments and tunnels. PLAXIS 2D calculates deformations, soil stresses, water flow and groundwater pressures.

The Plaxis Flow Module allows complex groundwater head distributions to be calculated at any point in time with time dependent groundwater flow calculations. PLAXIS Flow displays contours and vectors of groundwater flow, pore pressures, saturation, suction, and Darcy flux. For curves,

options exist to visualize the development of groundwater head and pore pressures in time through various calculation phases, providing valuable insight in the groundwater flow process.

The limitation of the 2D Plaxis Flow module is that it is likely to overestimate the groundwater flow volumes and groundwater drawdown due to 2D cross sectional analysis.

4.2.1 Modelling Inputs

Geological profiles, groundwater levels and hydraulic permeabilities have been entered into the analytical model as per the hydrogeological model presented in the MC 2025-2 SHR for the site.

For the formation of the model a mean annual deep drainage groundwater recharge flux of 20 mm per year (Australian National Water Commission, 2005) has been assumed.

Two cross sections have been modelled as shown on **Figure 2** below.

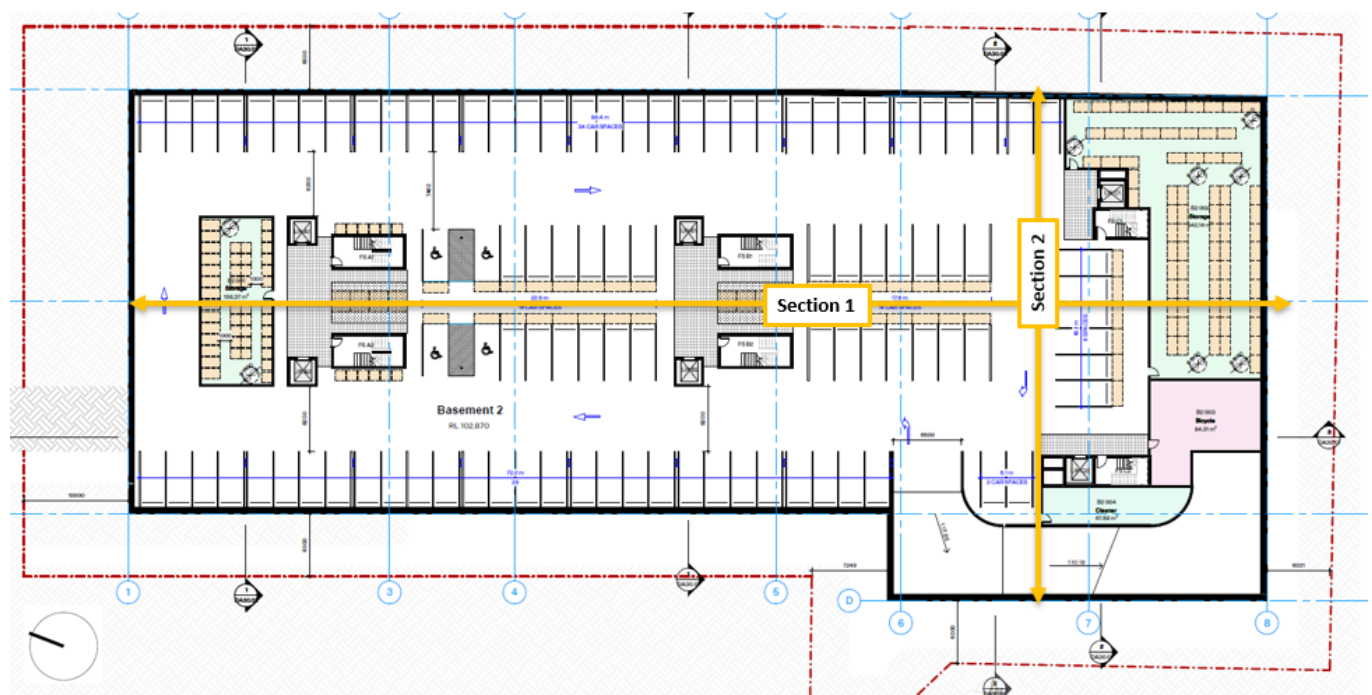


Figure 2: Modelling Cross Section 1 and 2

The Plaxis model has been set up as a “Flow Only” calculation using the “Transient Groundwater Flow” stage types. Given the relatively low permeability of soil and rock units obtained from the hydraulic conductivity testing, a model width of 200 m and model depth of 100 m was adequate for modelling the full extent of groundwater impacts from the proposed development.

Vertical model boundaries were set as open to allow infinite recharge of flow at model boundaries at the initial ground levels.

Short term flow modelling was based on the initial 24 hour period following excavation. The flow rates from short term modelling have been applied to the entire construction period as a worst case scenario given that flow rates reduce quickly after the initial 24 hour flow period. This has been taken as a conservative approach.

Long-term flow modelling was based off stabilised flow after allowing the model to run for a 100 day period. Steady flow rates for all models have been achieved at 100 days.

4.2.2 Modelled Seepage

Typical Plaxis outputs for each groundwater flow modelling and groundwater head drawdown curves are shown in **Figure 3** and **Figure 4** below.

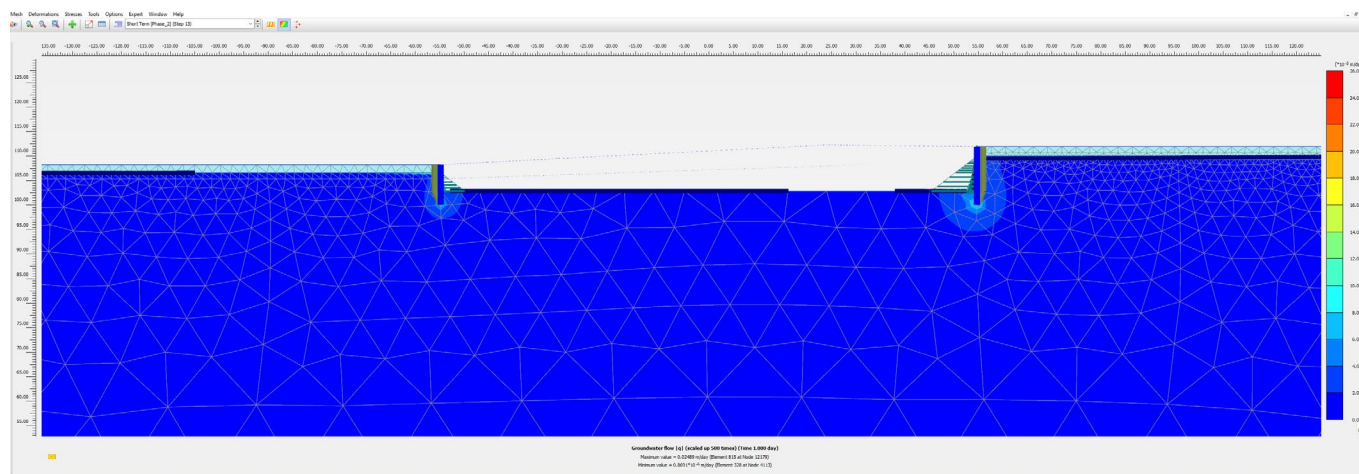


Figure 3: Typical aquifer flow conditions (Section 1 short term flow shown).

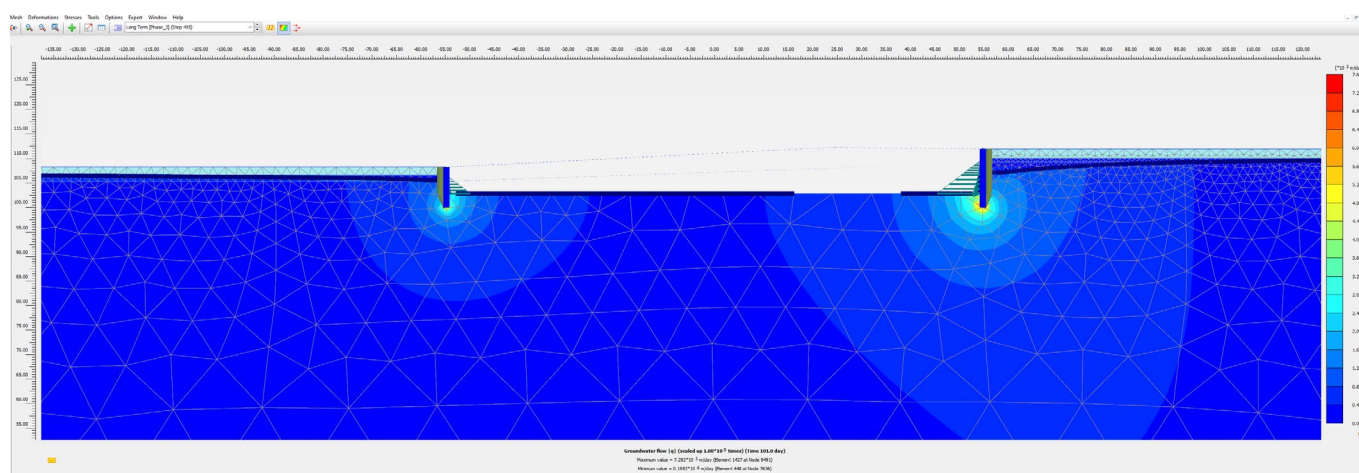


Figure 4: Typical aquifer flow conditions (Section 1 long term flow shown).

Full outputs of Plaxis results are included in the Plaxis output reports attached as **Appendix A**.

Tabulated results of seepage calculations for each of the above cases are presented in **Table 1**.

Table 1 Seepage Calculations

Analysis Case	Up Gradient Seepage to Excavation Face (L/day/m)	Down Gradient Seepage to Excavation Face (L/day/m)	Excavation Base Seepage (L/day/m ²)
Section 1 Short Term	0.00	0.00	0.978
Section 1 Long Term	0.00	0.00	0.758
Section 2 Short Term	0.00	0.00	1.915
Section 2 Long Term	0.00	0.00	1.558

Peak upgradient and downgradient seepage rates have been generalized across the 50% of the basement area each as a worst-case projection of groundwater flows. Calculations of total volume of seepage inflow have been based on an excavation perimeter of approximately 316 m and an excavation base area of approximately 4760 m².

Based on the above seepage rates and the size of the proposed excavation, the expected seepage to a drained basement is modelled to be:

- Short Term Flows for Temporary Dewatering During Construction
2.51 ML/year
- Long Term Flows during Service Life of Structure Following Completion of Construction
2.01 ML/year

Projected seepage inflows for a drained basement are below the WaterNSW threshold for exemption from the requirement of a Water Access License.

4.2.3 Modelled Groundwater Drawdown

Drawdown water level is within 2 m of preconstruction levels at a distance of less than 19 m from the excavation face on all boundaries. According to the Bureau of Meteorology (BOM) Australian Groundwater Explorer no “Water Supply Works” bores are present within 500 m of the site. The results of the drawdown modelling showed less than 200 mm groundwater drawdown at a maximum distance of 81 m from the excavation.

Groundwater drawdown as been assessed from the Plaxis model. Tabulated results of drawdown calculations for each of the above cases are presented in **Table 2**.

Table 2 Modelled Groundwater Drawdown

Analysis Case	Up Gradient Drawdown (m)				Down Gradient Drawdown (m)				Distance to Minimal Drawdown < (200 mm)
	Distance Behind Excavation Face				Distance Behind Excavation Face				
	0.5 m	5 m	10 m	20 m	0.5 m	5 m	10 m	20 m	
Section 1 Short Term	0.47	0.45	0.39	0.39	0.29	0.26	0.09	0.00	54.88
Section 1 Long Term	2.92	2.75	2.28	1.55	1.00	0.95	0.78	0.52	80.06
Section 2 Short Term	0.67	0.22	0.16	0.11	1.03	0.97	0.68	0.43	22.02
Section 2 Long Term	5.75	3.80	2.79	2.08	5.17	3.16	2.25	1.62	60.63

Based on the modelling the predicted groundwater drawdown impact on neighbouring properties is negligible.

5. NSW Aquifer Interference Policy Impact Assessment

The Water Management Act 2000 includes the concept of ensuring “no more than minimal harm” for the granting of approvals.

For the purposes of this assessment the Groundwater Source is assessed as a “Fracture Rock Water Source”.

The impact assessment has been based on the following three assessment criteria:

- **Water Table -**

Less than or equal to 10% cumulative variation in the water table, allowing for typical climatic “post-water sharing plan” variations, 40m from any:

- a) high priority groundwater dependent ecosystem; or
- b) high priority culturally significant site;

listed in the schedule of the relevant water sharing plan.

A maximum of a 2m decline cumulatively at any water supply work.

Measured variations in the water table were shown at between 0.90 m and 1.19 m over the monitoring period. Morrow Geotechnics has carried out a search of registered water supply works and none are present within 100 m of the proposed excavation.

Analysis presented within this DMP shows that all drawdown effects of the proposed works are less than 200 mm at less than approximately 81 m away from the excavation, therefore Morrow Geotechnics can confirm that the proposed works will have “minimal impact” on the Water Table.

- **Water Pressure -**

A cumulative pressure head decline of not more than 40% of the “post-water sharing plan” pressure head above the base of the water source to a maximum of a 2m decline, at any water supply work.

Analysis presented within this DMP shows that all drawdown effects of the proposed works are less than 200 mm at less than 81 m away from the excavation, therefore Morrow Geotechnics can confirm that the proposed works will have “minimal impact” on the Water Pressure at registered water supply works.

- **Water Quality -**

Any change in the groundwater quality should not lower the beneficial use category of the groundwater source beyond 40 m from the activity.

Water quality monitoring will be carried out throughout the works as indicated in **Section 7** of this report. The works are not projected to cause any detrimental effect to the water quality beyond 40 m from the activity.

Based on the assessment of the proposed works achieving the requirements of Level 1 minimal impact considerations, Morrow Geotechnics can confirm that the proposed works will do no more than minimal harm to Water Quality.

6. Water Discharge Methodology

During the works it is proposed to dewater for excavation below the water table. All water must be detained on site prior to discharge to ensure it meets the ANZG (2018) standards.

The process for assessing that water is safe for discharge to Council stormwater systems is as follows:

1. All seepage water within the proposed excavation must be detained on site for testing prior to discharge to stormwater. The site detention should comprise a sump pit which is a minimum 2 m x 2 m x 1 m deep, maintained at the location shown on **Figure 6** below (one sump pit per basement excavation). This will be excavated as the excavation level is lowered to maintain a sump point within the basement. In the event of a high period of rainfall the existing sump pit can be expanded to accommodate the increased volume of water. The sump is only required where existing stormwater systems are removed.
2. Prior to the discharge of water from the site, sampling of the discharge water must be undertaken by an environmental specialist. **Water quality testing must take place prior to the discharge of any stormwater/groundwater from the site.** The proposed sump pit volume of 4000L will be sufficient to hold the groundwater while awaiting the lab results for a period of up to 2 weeks, the water quality testing will be scheduled for a 24 hour turn around.

Water quality testing is to the published threshold values of the ANZG (2018) guidelines for marine water systems. Where thresholds for analytes are not given in ANZG (2018), ANZECC (2000) and NEPM (2013) guidelines have been used.

3. If water quality testing returns analyte values within ANZG, ANZECC and NEPM a threshold values then the detained water can be discharged to Council stormwater system in accordance with the following requirements:
 - a) The discharge rate will be limited to 10 L/sec per pump to ensure no damage is caused to Council infrastructure. The proposed pumping rate is low in comparison to the capacity of all but the smallest stormwater drains and is highly unlikely to cause overload at any point in the drainage system.
 - b) Water quality testing must be undertaken prior to discharge as per the schedule shown in **Table 4** below. No groundwater is to be discharged before the laboratory results are received and interpreted.
 - o If water quality testing exceeds ANZG, ANZECC and NEPM threshold values then water treatment facilities must be set up on site prior to any discharge from site. This can be achieved by either mixing the discharge water with fresh water to dilute the metal concentration. This may require water storage on site in tanks depending on the progression of the excavation works. Alternatively, water treatment facilities such as those shown below must be established on site to treat stormwater/groundwater prior to any discharge from site. The system must be verified to have reduced analyte levels to below relevant thresholds prior to discharge to stormwater. An indicative water treatment option prior to discharge to stormwater is shown in **Figure 6** below.

There are various water treatment solutions available for wastewater management, tailored to remove contaminants efficiently. A qualified contractor can design and implement the appropriate system based on specific needs. Potential treatment options include:

- **Sediment Tanks:** These tanks offer a simple and effective solution for water with high levels of suspended solids. Internal baffles increase settling time for continuous water flow, improving sediment separation. Chemical dosing units can also be integrated to enhance settling rates, effectively reducing Total Suspended Solids (TSS).
- **Siltstoppers:** Designed to accelerate the settling process, siltstoppers significantly reduce the time needed to remove sediment from impacted water, lowering TSS levels.
- **Chemical Dosing Units:** A variety of chemical dosing systems are available to manage pH levels, reduce TSS, and remove heavy metals from wastewater.
- **Chemically Enhanced Primary Treatment (CEPT):** CEPT systems combine clarification with chemical dosing and control to treat wastewater through a physio-chemical process. These systems manage pH levels, reduce TSS, remove heavy metals and hydrocarbons, and facilitate solids and sludge handling.
- **Media Filtration:** Media filtration systems are designed to treat contaminants that cannot be removed by physio-chemical methods. These systems adsorb dissolved-phase pollutants and can be used for particle filtration or water polishing (removal of colour and odour). The media type determines the contaminants removed, including heavy metals, hydrocarbons, Total Organic Carbon (TOC), nitrates, and ammonia.
- **Sludge Thickening Tanks:** These tanks are used to store and separate sludge and slurry by-products, facilitating efficient solids management and handling.

These solutions ensure efficient wastewater treatment, addressing a variety of contaminants and enabling safe discharge or reuse.

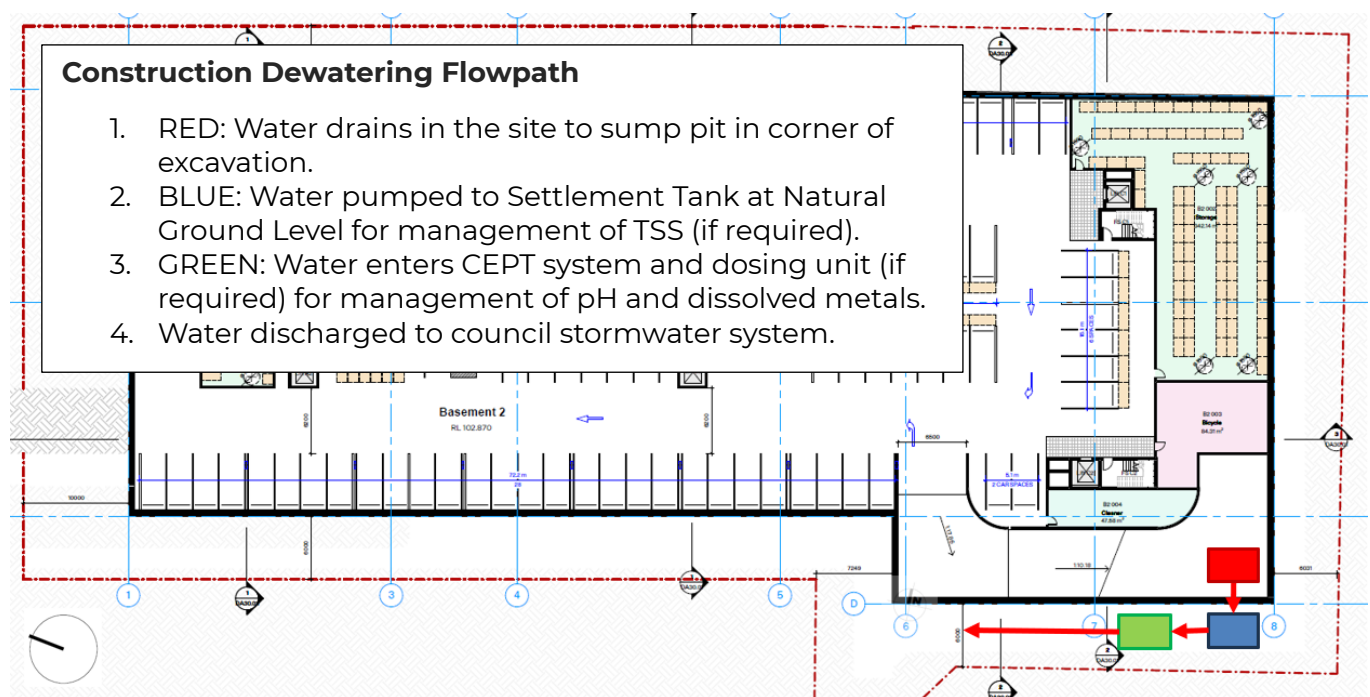


Figure 5: Construction Dewatering Flowpath

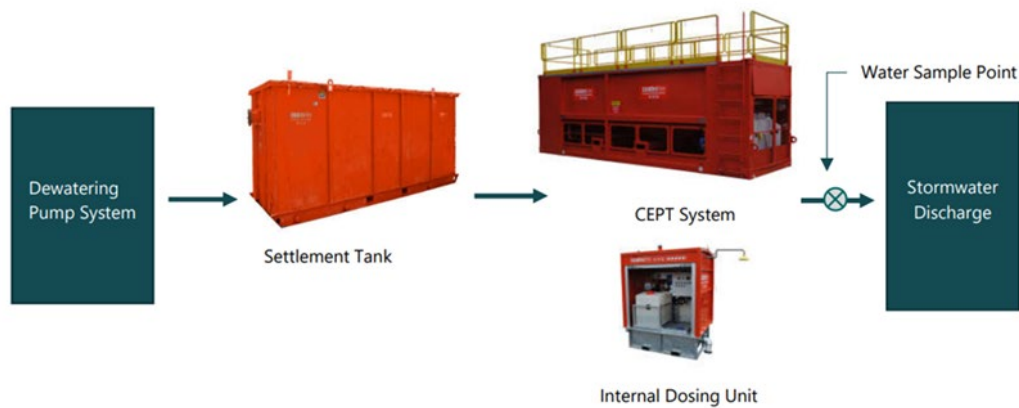


Figure 6: Indicative possible treatment system where analyte values exceed Council, ANZG or NEPM threshold values

7. Groundwater Monitoring

7.1 Water Level Monitoring

During the excavation period the water level must be monitored **daily** within the installed groundwater monitoring wells to ensure that excessive groundwater drawdown does not occur.

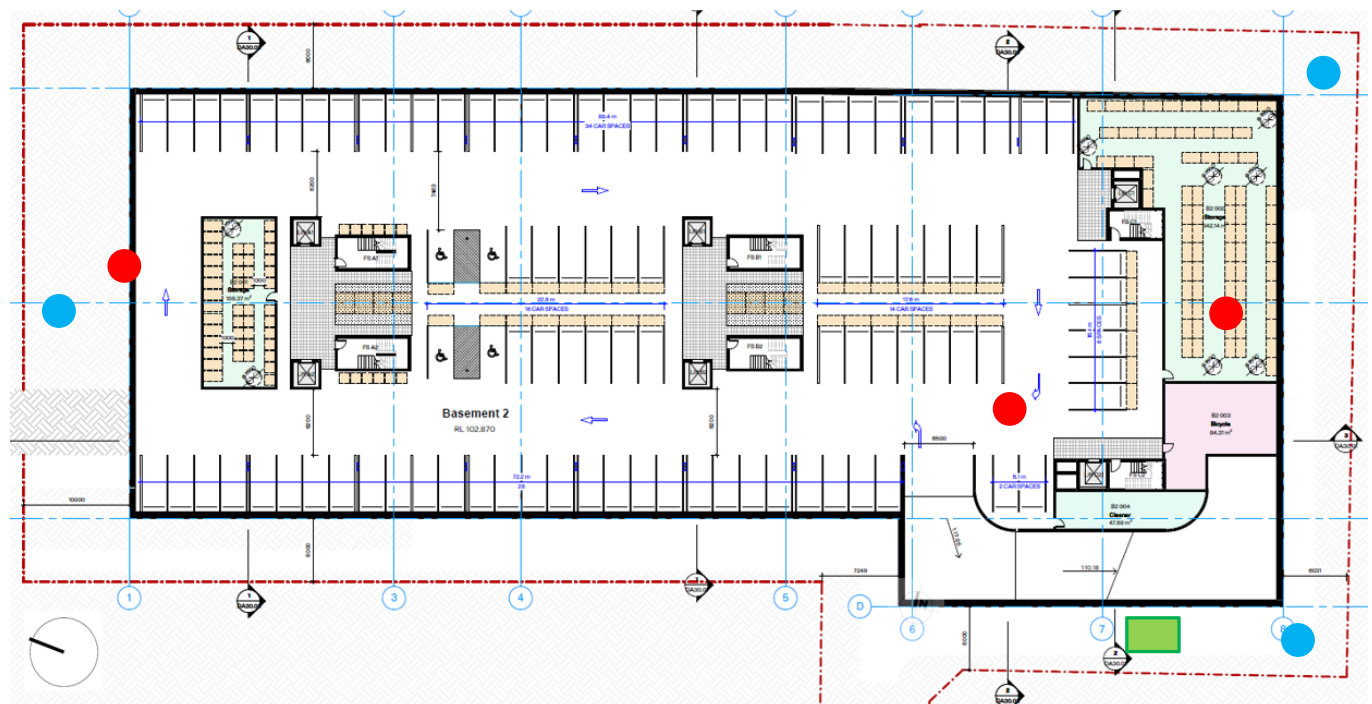


Figure 7: Groundwater level monitoring locations

- Existing Monitoring Well Location
- Proposed Monitoring Well Location

It is anticipated that the existing wells will be destroyed during excavation. Prior to excavation two additional wells must be installed as replacements.

Groundwater readings are to be taken at a minimum of three monitoring wells during construction. Due to the existing wells likely being damaged during demolition they must be replaced with a “like for like” well. “Like for like” protocols include all aspects of well construction such as well materials, screened zone, plug depth, etc. Installation details of the existing wells can be found in Section 3.1 of the MG 2025-2 Site Hydrogeology Report.

Prior to the commencement of bulk earthworks at least one round of monitoring should be undertaken to establish baseline readings. Pre works measurements should be forwarded to the project stakeholders outlined in **Table 5**. During the works phase readings should be taken daily until works have been completed and no further drawdown is detected.

All groundwater data is to be presented to the project geotechnical and structural engineers along with details of the monitoring visit including:

- date and time of monitoring;
- progress of works at time of monitoring;
- weather conditions during and preceding the monitoring; and
- any further comments relative to the monitoring.

Morrow Geotechnics recommends that drawdown limits are set at 2500 mm below baseline readings. Groundwater modelling showed groundwater variation of up to approximately 1190 mm over the 3 month monitoring period. The finite element modelling also showed that the impacts of groundwater drawdown are negligible on neighbouring structures within the geological profile encountered at the site.

The following threshold criteria should be adopted during construction:

- **Alert:** If drawdown levels are less than 70% of the agreed value, works should continue. Monitoring should continue to be carried out at the nominated intervals and monitoring reports forwarded to the relevant stakeholders as outlined in **Table 5**.
- **Alarm:** If drawdown levels are greater than 70% but less than 100% of the agreed value, the geotechnical engineer, structural engineer and client representatives should be notified and the monitoring data reviewed. Ongoing monitoring events should continue undertaken at 24 hour intervals until notified otherwise by nominated engineers in consultation with client and WaterNSW.
- **Action:** If drawdown levels are greater than 100% of the agreed value excavation should cease immediately. The geotechnical engineer, structural engineer, WaterNSW and client representatives should be notified and work should cease until a risk management/contingency plan is implemented to safeguard neighbouring structures. Monitoring should continue daily during this period.

Table 3 Summary of Monitoring Conditions

Criteria	
Monitoring Points	Well locations as shown in Figure 7 above
Agreed Drawdown Limit	2500 mm
Alert Level	< 1750 mm
Alarm Level	1750 - 2500 mm
Action Level	> 2500 mm

7.2 Water Inflow Monitoring

Modelling of the site has shown a predicted groundwater inflow rate during construction of **48.26 kL/week**. During the excavation period the pumpout volume must be monitored to ensure that excessive groundwater extraction does not occur.

The following threshold criteria should be adopted during construction:

- **Alert (less than 4.82 kL/day):** If extraction levels are less than 70% of the agreed value, works should continue. Monitoring should continue to be carried out at the nominated intervals and monitoring reports forwarded to the relevant stakeholders as outlined in **Table 5**.
- **Alarm (4.82 to 6.89 kL/day):** If extraction levels are greater than 70% but less than 100% of the agreed value, the geotechnical engineer, structural engineer and client representatives should be notified and the monitoring data reviewed. Ongoing monitoring events should continue undertaken at 24 hour intervals until notified otherwise by nominated engineers in consultation with client and WaterNSW.
- **Action (greater than 6.89 kL/day):** If extraction levels are greater than 100% of the agreed value excavation should cease immediately. The geotechnical engineer, structural engineer, WaterNSW and client representatives should be notified and work should cease until a risk management/contingency plan is implemented to safeguard neighbouring structures. Monitoring should continue daily during this period.

7.3 Water Quality Monitoring

During excavation works water quality samples from the discharged water must be tested according to the frequency outlined in **Table 4** below.

Water samples are to be sent to a NATA accredited laboratory for testing against council, NHMRC (2010), ANZG (2018), ANZECC (2000) and NEPM (2013) standards. Relevant water quality results are presented in **Table 7** to **Table 11** of the MG2025-2 report, lab results are attached in **Appendix B**.

If analyte values exceed the published threshold values of the council, NHMRC (2010), ANZG (2018), ANZECC (2000) and NEPM (2013) guidelines for marine water systems then the geotechnical engineer, structural engineer, WaterNSW and client representatives should be notified.

Initial water quality testing indicates Concentrations of **Aluminium, Cobalt, Copper, Manganese, Nickel** and **Zinc** exceed the **freshwater** threshold guideline values. **Escherichia Coli** concentrations 4 CFU/100 mL exceeds the criteria (no detection in 100 mL). The **Turbidity** value of 260 NTU exceeds the ANZECC (2000) guideline value (10 NTU).

Baseline conditions at the site must be considered in preparation of a response to exceedances of NHMRC, ANZG, ANZECC and NEPM thresholds.

Table 4 List of Required Laboratory Tests and Schedule

Type	Corresponding laboratory analyses	Testing requirements	Testing Frequency
Physical Parameters	Alkalinity (bicarbonate, carbonate, hydroxide and total), electrical conductivity (EC), pH, redox potential (Eh), total dissolved solids (TDS), total hardness, temperature, dissolved oxygen (DO)	Mandatory	Daily while discharging water
Other Physical Parameters	Turbidity* (NTU), total suspended solids* (TSS), total organic carbon* (TOC), sodium absorption ratio* (SAR)	Mandatory for discharge to any receiving waters	Weekly while discharging water
Major Anions	Sulfate (SO ₄), chloride (Cl), carbonates (CO ₃), bromide (Br), fluoride (F)	Mandatory	Weekly while discharging water
Major Cations	Calcium (Ca), magnesium (Mg), sodium (Na), potassium (K)	Mandatory	Weekly while discharging water
Ionic Balance	Cation/anion balance (as a percentage)	Mandatory	Weekly while discharging water
Dissolved Inorganics and Dissolved Heavy metals	Aluminium (Al), antimony (Sb), arsenic (As), barium (Ba), beryllium (Be), boron (B), cadmium (Cd), chromium (Cr), cobalt (Co), copper (Cu), iron (Fe), lead (Pb), lithium (Li), manganese (Mn), mercury (Hg), molybdenum (Mo), nickel (Ni), selenium (Se), silica (dissolved SiO ₂), silver (Ag), strontium (Sr), uranium (U), vanadium (V), zinc (Zn)	Mandatory for baseline thereafter negotiable, depending on site setting unless otherwise required by another regulatory body	Weekly while discharging water
Nutrients	Ammonia (NH ₃), nitrate (NO ₃), total nitrogen (N), oxidised nitrogen (N), total phosphorus (P), reactive phosphorus (P)	Mandatory for baseline thereafter negotiable, depending on site setting unless otherwise required by another regulatory body	As specified by WaterNSW
Microbiological Organisms	Faecal coliforms, faecal streptococci, Escherichia coli	Mandatory for baseline thereafter negotiable, depending on site setting unless otherwise required by another regulatory body	As specified by WaterNSW

Type	Corresponding laboratory analyses	Testing requirements	Testing Frequency
Organics	Benzene toluene ethylbenzene xylene (BTEX), polycyclic aromatic hydrocarbons (PAHs), total recoverable hydrocarbons (TRHs)	Mandatory for baseline thereafter negotiable, depending on site contamination status unless otherwise required by another regulatory body	As specified by WaterNSW
Other	Range of analytes relevant to site-specific contaminants of environmental concern—for example: • pesticides (OCPS, OPPs) • polychlorinated biphenyls (PCBs) • semivolatile chlorinated hydrocarbons (SVOCs) • volatile chlorinated hydrocarbons (VOCs) • chlorinated aliphatics • phenols • perfluoroalkyl and polyfluoroalkyl substances (PFAS)	As required by the NSW EPA or accredited site auditor (for properties regulated under the Contaminated Land Management Act 1997), on the advice of a specialist environmental consultant or as required by another regulatory body	As specified by WaterNSW

7.4 Contingency Measures

Contingency measures are to be determined by the project geotechnical and structural engineers in response to groundwater drawdown behaviour observed during the excavation. Possible contingency measures may include:

- Inspection of ground conditions on neighbouring sites;
- Ceasing excavation during updates to excavation support design;
- Groundwater reinjection;
- Permeation grouting to reduce the permeability of native material.

7.5 Reporting and Record Keeping

A record of groundwater taken under exemption is a condition of the Water Supply Works Approval and must be submitted when or before the approval is surrendered. The dewatering completion report must include;

- A record of metered volumes taken must be recorded either weekly or daily.
- A summary of water level measurements taken daily from monitoring bores.
- A record of water quality testing.

7.6 Project Stakeholders

Table 5 Stakeholder Contacts

	Contact Person	Contact Details
Hydrogeologist	Andrew Butel Morrow Geotechnics	andy@morrowgeo.com.au 0427 357 856
WaterNSW		enquiries@waternsw.com.au 1300 662 077

8. Management of Ongoing Discharge

Ongoing groundwater seepage has been modelled to be less than 2.01 ML/year for the service life of the structures. The design of the basement OSD and pump out system must allow for this volume of water in addition to stormwater volumes.

There are two other sources of water to the pump-out system which have been identified by the project hydraulic engineer:

1. Rainwater catchment to impermeable areas of the development.
2. Fire sprinkler pump tests.

The total volume of water which will flow into the OSD tank from rain water and fire system testing will dilute the groundwater at a sufficient rate to bring the groundwater exceedances for suspended metals to below ANZG guideline levels.

No further ongoing treatment of groundwater is necessary.

9. Conclusions and Recommendations

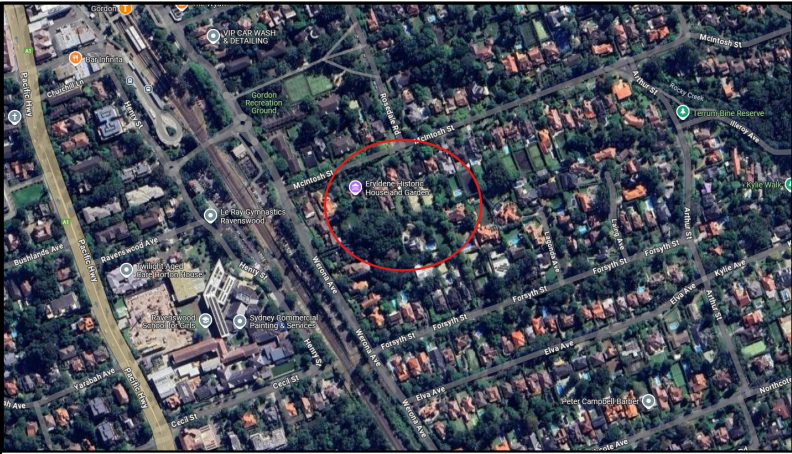
This report has been prepared in response to WaterNSW General Terms of Approval and the Water Management Act 2000. Licensing for temporary construction dewatering from WaterNSW and DPIE will be required for the excavation works at the site.

Seepage water will need to be managed within the open excavation during excavation. Approval by NSW DPI Office of Water for a Temporary Dewatering License will be required along with approval from local council to discharge water to the stormwater system.

10. Statement of Limitations

The advice and parameters presented in this Groundwater Management Plan are for assessment of the expected groundwater seepage based upon the proposed development and encountered site conditions at the investigation locations.

We draw your attention to the document "Important Information", which is attached to this letter. The statements presented in this document are intended to advise you of what your realistic expectations of this report should be. The document is not intended to reduce the level of responsibility accepted by Morrow Geotechnics, but rather to ensure that all parties who may rely on this report are aware of the responsibilities each assumes in so doing.



Site Locality



LEGEND

Approximate Site Boundary

Groundwater Monitoring Borehole Location

Borehole Location

1m Contours

NOTE:

1. Drawing projection in GDA2020 / MGA zone 56, adapted from aerial imagery from "SIX Maps", accessed 10/07/2025.

2. Elevation data sourced from ELVIS - Elevation and Depth - Foundation Spatial Data Framework, accessed 10/07/2025, provided by Geoscience Australia and NSW Government – Spatial Services.

0

25

50

75

100 m

morrow

Morrow Geotechnics Pty Ltd

ABN 42 605 892 126

2/5-7 Malta Street, Fairfield East NSW 2165

79/6 Bellambi Lane, Bellambi NSW 2518

E: info@morrowgeo.com.au

P: 02 8599 7579

DRAWN BY:

OAP

Approved:

KS

Date:

05/08/2025

Werona Residence DM Pty Ltd

Geotechnical Investigation

21-25 McIntosh Street & 55 Werona Avenue, Gordon NSW

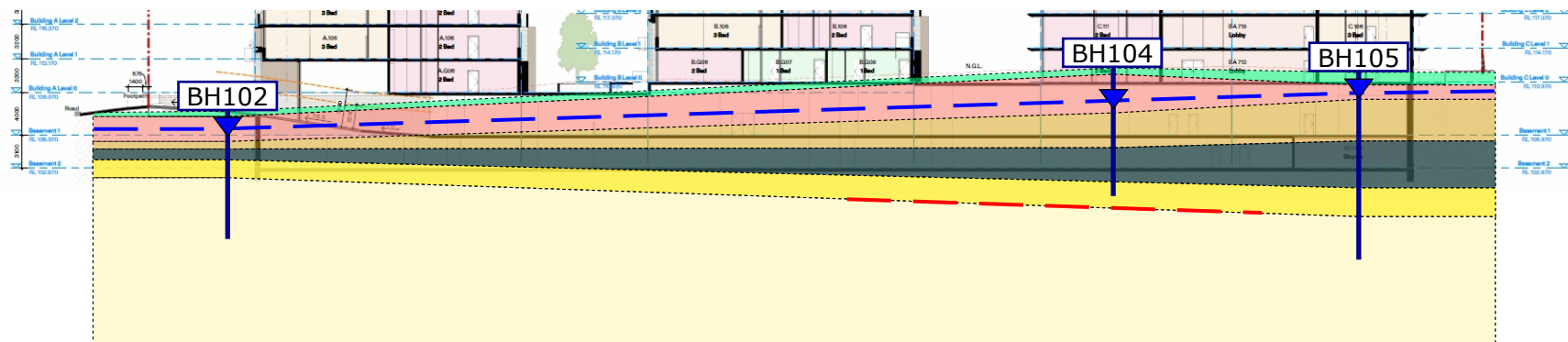
Borehole Location Plan

Drawing:

1

Project: P3540

Revision: 0



- Unit 1 - Topsoil/Fill
- Unit 2 - Residual Clay
- Unit 3 - Class V/IV Shale
- Unit 4 - Class III Shale
- Unit 5 - Class III Sandstone
- Unit 6 - Class II Sandstone
- Average Groundwater Level (BH102 - 105.98 mAHD, BH104 - 108.52 mAHD, BH105 - 109.47 mAHD)
- Design Groundwater Level (BH102 - 106.6 mAHD, BH104 - 109.1 mAHD, BH105 - 110.0 mAHD)
- Inferred Unit Boundary

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2/5-7 Malta Street, Fairfield East NSW 2165
79/6 Bellambi Lane, Bellambi NSW 2518
P: 02 8599 7579 | E: info@morrowgeo.com.au

Project
Geotechnical Investigation

Project Address
**21-25 McIntosh Street & 55 Werona Avenue,
Gordon NSW**

Drawing Title
Section 1

Client
CPDM Pty Ltd

Project Number
P3540

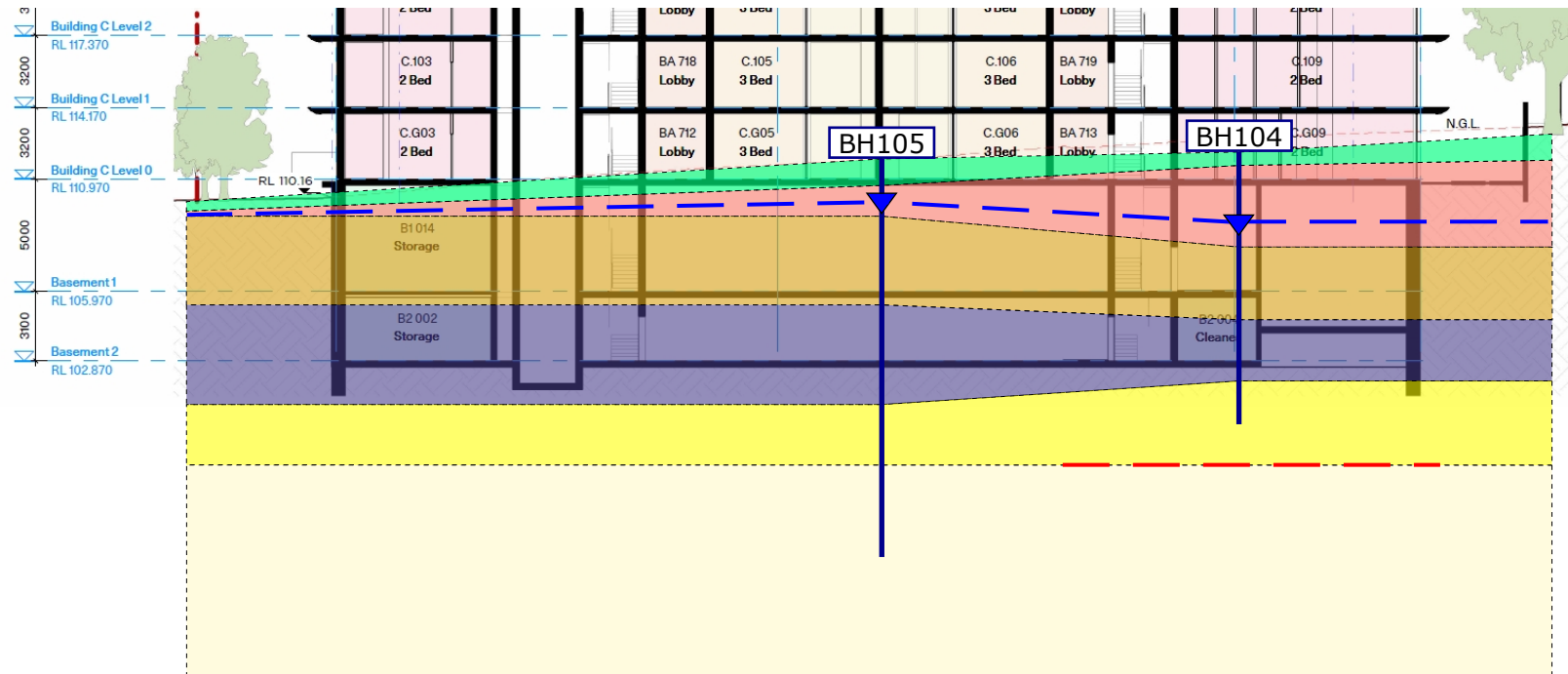
Figure

2

Scale:
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Drawn By:
AB

Date:
13 November 2025



- Unit 1 - Topsoil/Fill
- Unit 2 - Residual Clay
- Unit 3 - Class V/IV Shale
- Unit 4 - Class III Shale
- Unit 5 - Class III Sandstone
- Unit 6 - Class II Sandstone
- Average Groundwater Level (BH102 - 105.98 mAH, BH104 - 108.52 mAH, BH105 - 109.47 mAH)
- Design Groundwater Level (BH102 - 106.6 mAH, BH104 - 109.1 mAH, BH105 - 110.0 mAH)
- Inferred Unit Boundary

APPENDIX A

**BOREHOLE LOGS, EXPLANATORY NOTES AND SITE
PHOTOS**

UTM : 56H	Driller Rig : Man-Portable	Job Number : P3540
Easting : 329415.37	Driller Supplier : TIGHT Site	Client : Werona Residence DM Pty Ltd
Northing : 6263202.41	Logged By : Omkar Patil	Project : Gordon
RL : 110.00(m)	Reviewed By : Krishna Shakya	Location : 21 McIntosh Street, Gordon NSW 2072, Australia
Total Depth : 12 m	Date : 31/07/2025	Loc Comment : Front Lawn of No. 21 McIntosh Street

Drilling Method	Water	Testing	Depth (m)	Elevation (m)	Material Type	Graphic Log	Classification Code	Material Description	Elevation	Consistency/Density	Moisture
									Depth (m)		
					TOPSOIL		CL	SILTY CLAY: very soft to soft, low plasticity, dark black, Trace fine to medium sand, with medium gravel, w < pl, low resistance.	109.8 0.2	VS - S	w < PL
					FILL		FILL	FILL ORGANIC SILTY CLAY: soft, low to medium plasticity, dark brown, Trace fine to medium sand, trace fine to medium gravel, w < pl, low resistance.	109.3 0.7	S	w < PL
					Residual		CI - CH	SILTY CLAY: stiff, medium to high plasticity, red brown, Trace fine sand, trace fine gravel, w < pl, low to medium resistance, with high strength ironstone bands.	108.4 1.61	St	w < PL
								Commenced Coring at 1.61 m			

UTM : 56H
Easting : 329415.37
Northing : 6263202.41
RL : 109.97(m)
Total Depth : 12 m

Driller Rig : Man-Portable
Driller Supplier : TIGHT Site
Logged By : Omkar Patil
Reviewed By : Krishna Shakya
Date : 31/07/2025

Job Number : P3540
Client : Werona Residence DM Pty Ltd
Project : Gordon
Location : 21 McIntosh Street, Gordon NSW 2072, Australia
Loc Comment : Front Lawn of No. 21 McIntosh Street

Drilling Method	Water	Depth. (m)	Elevation (m)	Graphic Log	Classification Code	Material Description	Depth (m)	Weathering	Testing	Estimated Strength	RQD% and TCR%	Defect Spacing (mm)	Defect Description type, inclination, planarity, roughness, coating, thickness
									Is(50)				
		0.50	109.5			Commenced Coring at 1.61 m	0.50			Very Low		30	
		1	109.0	1				Low 0.3	100				
								Medium 1	300				
		1.50	108.5	1.50				High 3	1000				
										Very High		3000	
										Extremely High			
NMLC Coring	Outflow - 95%	2	108.0		LAM	LAMINITE: highly weathered, low to medium strength, dark red mottled pale grey, very fine to fine grained, generally ironstone (ferruginous siltstone or shale) and sandstone, with clay seams.	2	HW			RQD = 0.19% TCR = 100%		1.66-1.7, XWS, °
							1.72-1.76, CS, °						
							1.82-2.16, IS, °						
							2.21, JT, 2°, PL, RO, CT, I						
							2.23, JT, 2°, PL, RO, CT, I						
							2.31, JT, 2°, PL, RO, STN, I						
							2.32-3, IS, °						
		2.50	107.5	2.50									
		3	107.0	3								As above, but: LAMINITE: highly weathered, low to medium strength, pale grey, very fine to fine grained, generally sandstone and ironstone (ferruginous siltstone or shale), with clay bands.	3
												3.24, JT, 2°, PL, RO, VN, OP	
												3.26-3.29, SZ, °, PL, RO, CL, OP	
												3.32-3.41, CS, °	
													3.55, JT, 2°, PL, RO, CL, OP
													3.77, JT, 2°, PL, RO, VN, OP
													3.84, JT, 4°, STP, RO, CL, OP
													3.88, JT, 2°, PL, RO, CL, OP
													3.89, JT, 0°, PL, RO, CL, OP
													3.93, JT, 3°, PL, RO, 6INOP

UTM : 56H
Easting : 329415.37
Northing : 6263202.41
RL : 109.97(m)
Total Depth : 12 m

Driller Rig : Man-Portable
Driller Supplier : TIGHT Site
Logged By : Omkar Patil
Reviewed By : Krishna Shakya
Date : 31/07/2025

Job Number : P3540
Client : Werona Residence DM Pty Ltd
Project : Gordon
Location : 21 McIntosh Street, Gordon NSW 2072, Australia
Loc Comment : Front Lawn of No. 21 McIntosh Street

Drilling Method	Water	Depth. (m)	Elevation (m)	Graphic Log	Classification Code	Material Description	Depth (m)	Weathering	Testing	Estimated Strength	RQD% and TCR%	Defect Spacing (mm)	Defect Description type, inclination, planarity, roughness, coating, thickness
									Is(50)				
NMLC Coring	Outflow - 50%		105.5		LAM	As above, but: LAMINITE: highly weathered, low to medium strength, pale grey, very fine to fine grained, generally sandstone and ironstone (ferruginous siltstone or shale), with clay bands. (continued) SANDSTONE: highly weathered, medium to high strength, orange brown mottled pale grey, fine grained, ironstained, with low strength shale bands, with sandy clay bands, with thinly embedded carbonaceous seams.	4.05	HW		RQD = 0.19% TCR = 100%		4-4.05, CS, °	
					SST		HW					4.1, P, 2°, PL, RO, STN, OP	
												4.19, JT, 2°, PL, RO, CT, I	
												4.24, JT, 2°, PL, RO, STN, OP	
												4.26, JT, 2°, PL, RO, STN, OP	
												4.34, P, 3°, PL, RO, STN, OP	
												4.41-4.55, CS, °	
	Outflow - 5%		105.0			As above, but: slightly weathered, pale grey, very fine to fine grained, lightly stained, with thinly embedded carbonaceous seams.	5		D: 1.06, A: 1.25	RQD = 0.63% TCR = 100%		4.81-4.85, XWS, °	
									4.87-4.91, XWS, °				
									5.06-5.08, CS, °				
									5.16, JT, 45°, PL, RO, STN, C				
									5.19, P, 2°, PL, RO, STN, OP				
									5.42, JT, 45°, PL, RO, STN, VN, OP				
									5.52, P, 5°, PL, RO, STN, VN, OP				
									5.58, P, 2°, PL, RO, CL, OP				
									5.6, P, 3°, PL, RO, STN, C				
		104.5			As above, but: slightly weathered, pale grey, very fine to fine grained, lightly stained, with thinly embedded carbonaceous seams.	5.50		D: 0.28, A: 0.85	RQD = 0.63% TCR = 100%		5.61-5.64, CS, °		
								5.75-5.79, XWS, °					
								5.82, P, 3°, PL, RO, STN, OP					
		104.0			As above, but: slightly weathered, pale grey, very fine to fine grained, lightly stained, with thinly embedded carbonaceous seams.	5.85		D: 1.09, A: 1.44	RQD = 0.63% TCR = 100%		6.29, P, 3°, PL, RO, CL, OP		
								6.39, JT, 3°, PL, RO, CL, OP					
								6.42, JT, 3°, PL, RO, CL, OP					
								6.49, P, 3°, PL, RO, CL, OP					
		103.5		SST	As above, but: slightly weathered, pale grey, very fine to fine grained, lightly stained, with thinly embedded carbonaceous seams.	6.50	SW	D: 0.57, A: 0.88	RQD = 0.63% TCR = 100%		6.71, P, 3°, PL, RO, STN, OP		
								6.79, JT, 3°, PL, RO, STN, OP					
								6.91, JT, 2°, PL, RO, STN, OP					
								6.93, JT, 45°, PL, RO, STN, OP					
		103.0			As above, but: slightly weathered, pale grey, very fine to fine grained, lightly stained, with thinly embedded carbonaceous seams.	7			RQD = 0.94% TCR = 100%		7.06, JT, 3°, PL, RO, CL, OP		
								7.08, JT, 2°, PL, RO, CL, OP					
								7.12, P, 2°, PL, RO, VN, OP					
								7.13, P, 2°, PL, RO, CL, OP					
		102.5		SST	As above, but: high strength.	7.1		D: 1.02, A: 0.78	RQD = 0.94% TCR = 100%		7.49, JT, 2°, PL, RO, CL, OP		
								7.59, P, 10°, PL, RO, CL, OP					
					As above, but: high strength.	7.50	SW		RQD = 0.94% TCR = 100%		7.95, P, 2°, PL, RO, CL, OP		

UTM : 56H	Driller Rig : Man-Portable	Job Number : P3540
Easting : 329415.37	Driller Supplier : TIGHT Site	Client : Werona Residence DM Pty Ltd
Northing : 6263202.41	Logged By : Omkar Patil	Project : Gordon
RL : 109.97(m)	Reviewed By : Krishna Shakya	Location : 21 McIntosh Street, Gordon NSW 2072, Australia
Total Depth : 12 m	Date : 31/07/2025	Loc Comment : Front Lawn of No. 21 McIntosh Street

Drilling Method	Water	Depth (m)	Elevation (m)	Graphic Log	Classification Code	Material Description	Depth (m)	Weathering	Testing		RQD% and TCR%	Defect Spacing (mm)	Defect Description type, inclination, planarity, roughness, coating, thickness
									Is(50)	Estimated Strength Very Low Low 0.3 Medium High 3 Very High Extremely High			
NMLC Coring		8.50	101.5		SST	As above, but: high strength. (continued)	8.50	SW			RQD = 0.94% TCR = 100%		
		9	101.0				9		D: 1.59, A: 1.83				8.95, P, 5°, PL, RO, CL, OP
		9.50	100.5				9.50		D: 1.44, A: 1.72				9.39, JT, 2°, PL, VR, CL, OP
		10	100.0				10		D: 0.97, A: 2.38				
		10.50	99.5				10.50						10.75, P, 2°, PL, RO, CL, OP
		11	99.0				11						11.05, JT, 2°, PL, RO, CL, OP
		11.50	98.5				11.50						11.62, P, 2°, PL, RO, CL, OP
									D: 1.03, A: 1.54				11.92, P, 3°, PL, RO, CL, OP
						BH101 Reached Target Depth at 12 m							

morrow

CLIENT NAME: **CPDM Pty Ltd**

PROJECT: **Gordon, NSW**

LOCATION: **21-25 McIntosh St & 55 Verona Ave**

JOB NUMBER: **P3540**

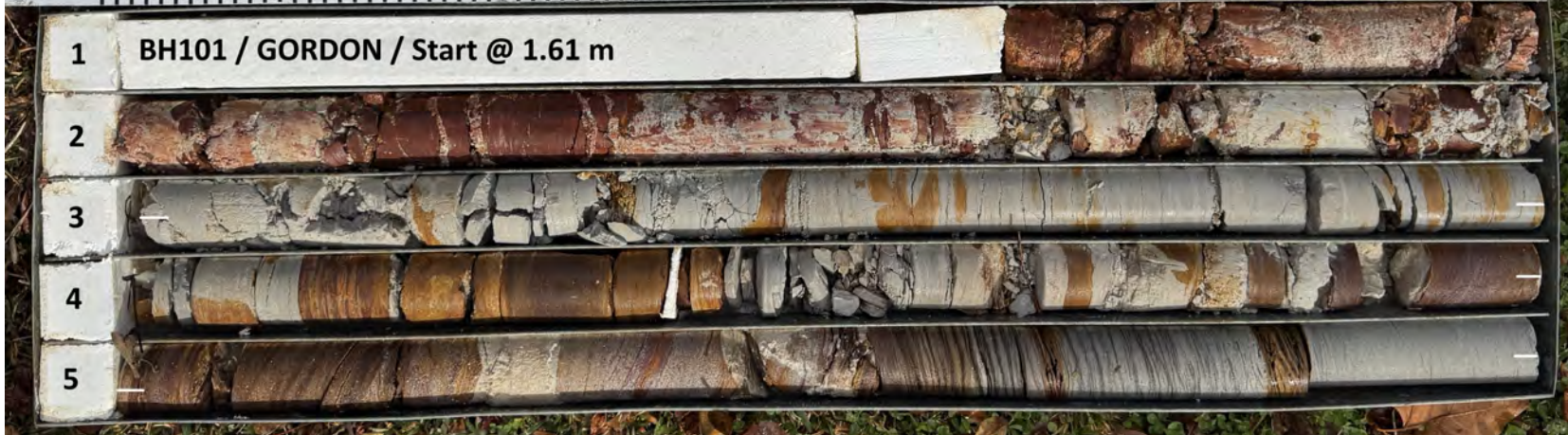
LOGGED BY: **OAP**

BOREHOLE ID: **BH101**

DEPTH: **1.61 m to 6 m**

CORE TRAY NO.: **Box 1 of 3**

DATE: **31 July 2025**



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Morrow Geotechnics Pty Ltd ABN 42 605 892 126
2/5-7 Malta Street, Fairfield East NSW 2165
79/6 Bellambi Lane, Bellambi NSW 2518
E: info@morrowgeo.com.au
P: 02 8599 7579

Photo description

BH101 Box 1 of 3

Client

Werona Residence DM Pty Ltd

Location

21 McIntosh Street, Gordon NSW 2072, Australia

Project name

Gordon

Project No

P3540

Scale

Not to Scale

BH No

BH101

BH Depth

12 m

morrow

CLIENT NAME: **CPDM Pty Ltd**

PROJECT: **Gordon, NSW**

LOCATION: **21-25 McIntosh St & 55 Verona Ave**

JOB NUMBER: **P3540**

LOGGED BY: **OAP**

BOREHOLE ID: **BH101**

DEPTH: **6 m to 12 m**

CORE TRAY NO.: **Box 2 & 3 of 3**

DATE: **31 July 2025**



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2/5-7 Malta Street, Fairfield East NSW 2165
79/6 Bellambi Lane, Bellambi NSW 2518
E: info@morrowgeo.com.au
P: 02 8599 7579

Photo description

BH101 Box 2 & 3 of 3

Client

Werona Residence DM Pty Ltd

Location

21 McIntosh Street, Gordon NSW 2072, Australia

Project name

Gordon

Project No

P3540

Scale

Not to Scale

BH No

BH101

BH Depth

12 m

UTM : 56H	Driller Rig : GEO205 - Comacchio	Job Number : P3540
Easting : 329412.36	Driller Supplier : GEOSENSE	Client : Werona Residence DM Pty Ltd
Northing : 6263216.22	Logged By : Omkar Patil	Project : Gordon
RL : 108.25(m)	Reviewed By : Krishna Shakya	Location : 23 McIntosh Street, Gordon NSW 2072, Australia
Total Depth : 12.24 m	Date : 22/07/2025	Loc Comment : Front Driveway of No. 23 McIntosh Street

Drilling Method	Water	Well Diagram	Testing		Graphic Log	Material Type	Classification Code	Material Description	Depth (m)	Consistency	Weathering	Moisture
			SPT	Elevation								
				Depth (m)								
				108.0		FILL	FILL	FILL SAND: well - graded, fine grained, pale yellow.	0.2			
				0.2		FILL	FILL	FILL firm, low plasticity, fine to medium grained sand, dark black, with fine to medium gravel, with silt, w < pl.		F		w < PL
				107.8		Residual	CL - CI	SILTY CLAY: firm, low to medium plasticity, brown, Trace fine sand, trace fine to medium gravel, w < pl, low resistance.	0.5	F		w < PL
			4,4,4 (N=8)	0.5								
				107.0		Residual	CL - CI	As above, but: firm to stiff, brown mottled red brown.	1.2	F - St		w < PL
				1.2								
				106.8		Residual	CL - CI	As above, but: stiff to very stiff, red brown mottled pale grey.	1.4	St - VSt		w < PL
				1.4								
			17,8,13 (N=21)			Residual	CL - CI	As above, but: very stiff, low resistance, with low to medium strength ironstone bands.	2	VSt		w < PL
				106.3								
				2		Residual	CL - CI	As above, but: high resistance, with high strength ironstone bands.	2.5	VSt		w < PL
				105.8								
				2.5		Residual	CL - CI	As above, but: high resistance, with high strength ironstone bands.	2.9	MS - HS	HW	
				105.3								
			7/50mm (N=0)	2.9		Rock	SST	SANDSTONE: highly weathered, medium to high strength, orange brown mottled pale grey, very fine to fine grained, ironstained, with clay bands.	3			
Commenced Coring at 3.1 m									3.1			

UTM : 56H
Easting : 329412.36
Northing : 6263216.22
RL : 108.25(m)
Total Depth : 12.24 m

Driller Rig : GEO205 - Comacchio
Driller Supplier : GEOSENSE
Logged By : Omkar Patil
Reviewed By : Krishna Shakya
Date : 22/07/2025

Job Number : P3540
Client : Werona Residence DM Pty Ltd
Project : Gordon
Location : 23 McIntosh Street, Gordon NSW 2072, Australia
Loc Comment : Front Driveway of No. 23 McIntosh Street

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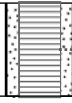
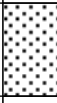
Job Number : P3540
Client : Werona Residence DM Pty Ltd
Project : Gordon
Location : 23 McIntosh Street, Gordon NSW 2072, Australia
Loc Comment : Front Driveway of No. 23 McIntosh Street

Drilling Method	Water	Well Diagram	Elevation	Graphic Log	Classification Code	Material Description	Depth (m)	Weathering	Testing	Estimated Strength	RQD% and TCR%	Defect Spacing (mm)	Defect Description
			Depth (m)						Is(50)				
NMLC Coring						SANDSTONE: highly weathered, medium to high strength, orange brown mottled pale grey, very fine to fine grained, ironstained, with clay bands. (continued)							
					SST			D:0.24, A:0.51					—4.26-4.27, XWS, °
													—4.36, P, 3°, PL, RO, STN, OP
													—4.44, P, 3°, PL, RO, STN, OP
													—4.55, P, 3°, PL, RO, STN, OP
													—4.58, P, 15°, PL, RO, STN, OP
													—4.7, P, 3°, PL, RO, STN, OP
								D:1.12, A:1.00			RQD = 86.9% TCR = 100%		
				102.8 5.4		As above, but: SANDSTONE: moderately weathered, medium to high strength, pale grey, very fine to fine grained, with thinly embedded shale bands, trace clay bands.	5.4						—5.33-5.34, XWS, °
									D:0.74, A:0.94				—5.47, JT, 15°, PL, RO, VN, I
												—5.63, P, 0°, PL, RO, STN, OP	
								D:1.18, A:1.40				—5.78, JT, 0°, PL, RO, STN, OP	
					SST							—6.24, P, 0°, PL, RO, CL, OP	
												—6.41, JT, 3°, PL, RO, CL, OP	
								D:0.84, A:0.96					
											RQD = 96.77% TCR = 100%		
													—7.7, P, 3°, PL, RO, CL, OP
					SST	As above, but: slightly weathered, with thinly embedded carbonaceous bands.	7.35						—7.82-7.83, P, 3°, PL, RO, CL, OP
													—7.98, JT, 3°, PL, RO, CL, OP
					SST	As above, but: high strength.	7.9		D:1.05, A:1.41				

UTM : 56H	Driller Rig : GEO205 - Comacchio	Job Number : P3540
Easting : 329412.36	Driller Supplier : GEOSENSE	Client : Werona Residence DM Pty Ltd
Northing : 6263216.22	Logged By : Omkar Patil	Project : Gordon
RL : 108.25(m)	Reviewed By : Krishna Shakya	Location : 23 McIntosh Street Gordon NSW 2072, Australia
Total Depth : 12.24 m	Date : 22/07/2025	Loc Comment : Front Driveway of No. 23 McIntosh Street

Drilling Method	Water	Well Diagram	Elevation	Graphic Log	Classification Code	Material Description	Depth (m)	Weathering	Testing	Estimated Strength	RQD% and TCR%	Defect Spacing (mm)	Defect Description type, inclination, planarity, roughness, coating, thickness
			Depth (m)						Is(50)				
					SST	As above, but: high strength. (continued)	9	SW			RQD = 96.77% TCR = 100%		
									D:1.25, A:1.56				
									D:1.53, A:1.57				
									D:1.31, A:1.50				
									D:1.36, A:1.95				
			96.8 11.4		SST	As above, but: trace carbonaceous inclusions.	11.4	SW			RQD = 92.3567% % TCR = 100%		10.62, P, 8°, PL, RO, CL, OP
													11.6, JT, 10°, PL, SO, CL, OP

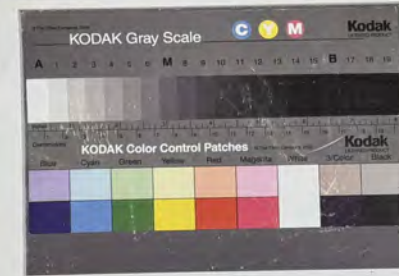
UTM : 56H	Driller Rig : GEO205 - Comacchio	Job Number : P3540
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Drilling Method	Water	Well Diagram	Elevation	Graphic Log	Classification Code	Material Description	Depth (m)	Weathering	Testing	Estimated Strength	RQD% and TCR%	Defect Spacing (mm)	Defect Description type, inclination, planarity, roughness, coating, thickness
			Depth (m)						Is(50)				
NMLC Coring		 50mm PVC Slotted			SST	As above, but: trace carbonaceous inclusions. (continued)		SW		Very Low Low Medium High Very High Extremely High	RQD = 92.3567 % TCR = 100%	30 100 300 1000 3000	
						BH102 Reached Target Depth at 12.24 m							

morrow

CLIENT NAME: CPDM Pty Ltd
PROJECT: Gordon, NSW
LOCATION: 21-25 McIntosh St and 55 Verona Ave
JOB NUMBER: P3540
LOGGED BY: OAP

BOREHOLE ID: BH102
DEPTH: 3.1m to 8m
CORE TRAY NO.: Box 1
DATE: 22 July 2025



morrow

Morrow Geotechnics Pty Ltd ABN 42 605 892 126
2/5-7 Malta Street, Fairfield East NSW 2165
79/6 Bellambi Lane, Bellambi NSW 2518
E: info@morrowgeo.com.au
P: 02 8599 7579

Photo description

BH102 Box 1 of 2

Client

Werona Residence DM Pty Ltd

Location

23 McIntosh Street, Gordon NSW 2072, Australia

Project name

Gordon

Project No

P3540

Scale

Not to Scale

BH No

BH102

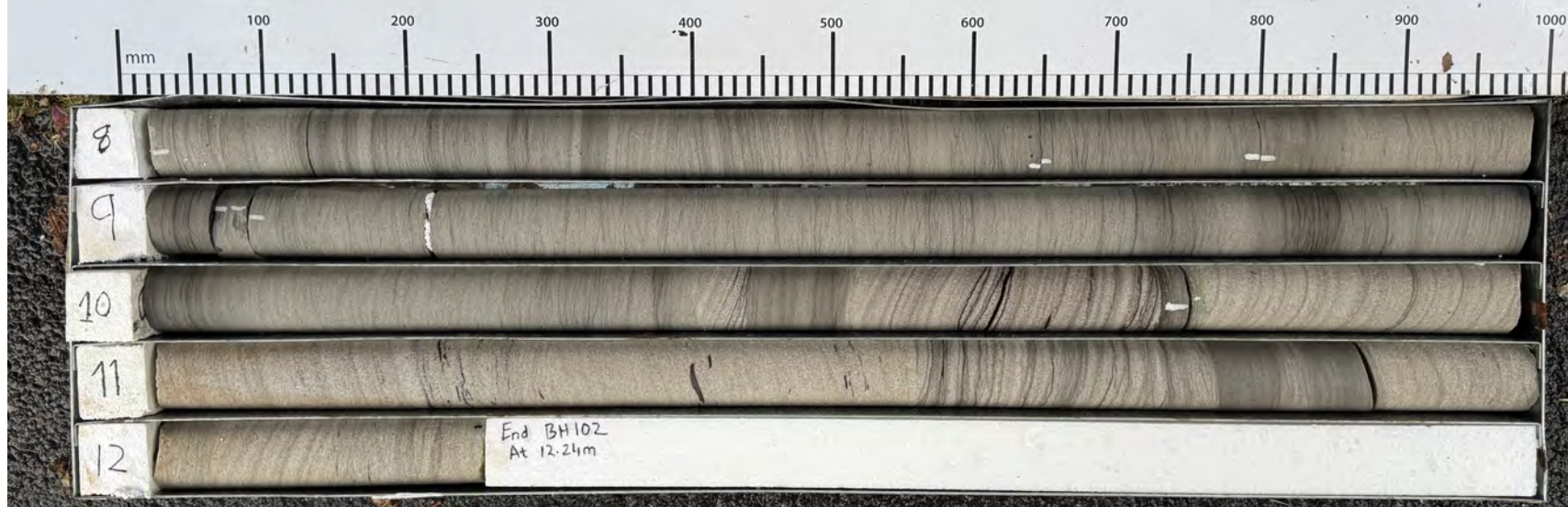
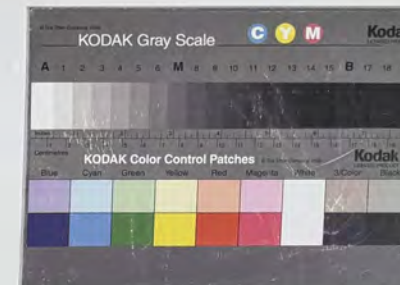
BH Depth

12.24 m

morrow

CLIENT NAME: CPDM Pty Ltd
PROJECT: Gordon, NSW
LOCATION: 21-25 McIntosh St and 55 Verona Ave
JOB NUMBER: P3540
LOGGED BY: OAP

BOREHOLE ID: BH102
DEPTH: 8 m to 12.24
CORE TRAY NO.: Box 2
DATE: 22 July 2025



morrow

Morrow Geotechnics Pty Ltd ABN 42 605 892 126
2/5-7 Malta Street, Fairfield East NSW 2165
79/6 Bellambi Lane, Bellambi NSW 2518
E: info@morrowgeo.com.au
P: 02 8599 7579

Photo description

BH102 Box 2 of 2

Client

Werona Residence DM Pty Ltd

Location

23 McIntosh Street, Gordon NSW 2072, Australia

Project name

Gordon

Project No

P3540

Scale

Not to Scale

BH No

BH102

BH Depth

12.24 m

UTM : 56H	Driller Rig : Man-Portable	Job Number : P3540
Easting : 329440.02	Driller Supplier : TIGHT Site	Client : Werona Residence DM Pty Ltd
Northing : 6263157.82	Logged By : Omkar Patil	Project : Gordon
RL : 110.58(m)	Reviewed By : Krishna Shakya	Location : 23 McIntosh Street, Gordon NSW 2072, Australia
Total Depth : 11.59 m	Date : 30/07/2025	Loc Comment : Tennis Court at No. 23 McIntosh Street

Drilling Method	Water	Testing	Depth (m)	Elevation (m)	Material Type	Graphic Log	Classification Code	Material Description	Elevation	Consistency/Density	Moisture
									Depth (m)		
					Non - Soil		CCT	Pavement Concrete.			
					FILL		FILL	FILL SILTY CLAY: very stiff to hard, low plasticity, dark black, Trace fine to medium sand, trace fine to medium gravel, w < pl, low resistance.	110.4 0.2	VSt - H	w < PL
				110.0	Residual		CI	SILTY CLAY: very stiff to hard, medium plasticity, orange brown, trace fine to medium gravel, w < pl, medium resistance.	110.0 0.6	VSt - H	w < PL
					Residual		OH	As above, but: hard to very stiff, pale grey.	109.8 0.8	VSt - H	w < PL
				1	Residual		OH	As above, but: hard to very stiff, medium resistance, with xw shale bands.	109.2 1.4	VSt - H	w < PL
				109.0	Residual		OH		108.9 1.71	VLS - LS	
					Rock		SHA	SHALE: highly weathered, very low to low strength, pale grey mottled orange, very fine to fine grained, ironstained, with clay bands.			
								Commenced Coring at 1.75 m			

UTM : 56H
Easting : 329440.02
Northing : 6263157.82
RL : 110.58(m)
Total Depth : 11.59 m

Driller Rig : Man-Portable
Driller Supplier : TIGHT Site
Logged By : Omkar Patil
Reviewed By : Krishna Shakya
Date : 30/07/2025

Job Number : P3540
Client : Werona Residence DM Pty Ltd
Project : Gordon
Location : 23 McIntosh Street Gordon NSW 2072, Australia
Loc Comment : Tennis Court at No. 23 McIntosh Street

Drilling Method	Water	Depth (m)	Elevation (m)	Graphic Log	Classification Code	Material Description	Depth (m)	Weathering	Testing	Estimated Strength	RQD% and TCR%	Defect Spacing (mm)	Defect Description type, inclination, planarity, roughness, coating, thickness
									Is (50)				
		0.50	110.1				0.50						
		1	109.6				1						
		1.50	109.1				1.50						
						Commenced Coring at 1.75 m							
NMLC Coring		2	108.6			SHALE: highly weathered, very low to low strength, pale grey mottled orange, very fine to fine grained, ironstained, with clay bands.	2						1.76, JT, 45°, PL, RO, VN, OP 1.8, JT, 2°, PL, CT, I 1.82-1.92, CS, ° 1.94, JT, 45°, PL, RO, STN, C 1.95, JT, 3°, PL, RO, VN, I 1.96-2.5, CS, ° 2.11, JT, °, PL, RO, CL, OP 2.13, JT, 2°, PL, RO, STN, C 2.19-2.25, CS, ° 2.3, JT, 10°, PL, RO, STN, I 2.4, JT, °, PL, RO, STN, I 2.48-2.54, CS, ° 2.67, P, 3°, PL, RO, STN, OP 2.67-2.86, CS, °
		2.50	108.1				2.50				RQD = 0.15% TCR = 100%		
		3	107.6				3				RQD = 0.48% TCR = 100%		3.12, JT, 3°, PL, RO, STN, OP 3.14, JT, 3°, PL, RO, STN, OP 3.15, JT, 45°, PL, RO, STN, C 3.38, JT, 35°, PL, RO, STN, OP 3.45-3.54, XWS, ° 3.57, XWS, °
		3.50	107.1				3.50				RQD = 0.66% TCR = 100%		3.7, P, 3°, PL, RO, VN, I 3.83-3.85, XWS, ° 3.93, P, 3°, PL, RO, STN, C 3.96-4.1, XWS, °

UTM : 56H	Driller Rig : Man-Portable	Job Number : P3540
Easting : 329440.02	Driller Supplier : TIGHT Site	Client : Werona Residence DM Pty Ltd
Northing : 6263157.82	Logged By : Omkar Patil	Project : Gordon
RL : 110.58(m)	Reviewed By : Krishna Shakya	Location : 23 McIntosh Street, Gordon NSW 2072, Australia
Total Depth : 11.59 m	Date : 30/07/2025	Loc Comment : Tennis Court at No. 23 McIntosh Street

Drilling Method	Water	Depth (m)	Elevation (m)	Graphic Log	Classification Code	Material Description	Depth (m)	Weathering	Testing		RQD% and TCR%	Defect Spacing (mm)	Defect Description type, inclination, planarity, roughness, coating, thickness
									Is (50)	Estimated Strength Very Low Low 0.3 Medium High 3 Very High Extremely High			
NMLC Coring	Outflow - 10% Water Loss	4.50	106.1	SHA	SHA	SHALE: highly weathered, very low to low strength, pale grey mottled orange, very fine to fine grained, ironstained, with clay bands. (continued)	4.50	HW			RQD = 0.66% TCR = 100%	30 100 300 1000 3000	4.1, P, 20°, PL, RO, STN, C
		4.50	106.1		SHA	As above, but: with ironstone bands, with clay bands.	4.50	HW					4.37, JT, 45°, PL, RO, STN, C
		5	105.6				5						4.61, P, 3°, PL, RO, STN, C
		5.1					5.1						4.72, P, 3°, PL, RO, CT, I
		5.50	105.1				5.50						4.89, P, 3°, PL, RO, CT, I, strained
						LAMINITE: moderately weathered, low to medium strength, pale grey mottled dark black, very fine to fine grained, generally shale with sandstone, stained, trace clay bands, with thinly embedded carbonaceous laminations.							4.9-4.93, XWS, °
													4.96-5, XWS, °
		6	104.6				6						5.16, JT, 3°, PL, RO, STN, OP
		6.50	104.1		LAM		6.50	MW	D: 0.48, A: 0.25				5.41, JT, 25°, PL, RO, CL, OP
		7	103.6				7						5.56-5.59, JT, 5°, PL, RO, STN, OP
		7.50	103.1				7.50						5.63, JT, 3°, PL, RO, STN, OP
													5.66, JT, 10°, STP, RO, STN, OP
													5.76, JT, 3°, PL, RO, STN, OP
													5.79, JT, 2°, PL, RO, STN, OP
													5.84, P, 3°, PL, RO, STN, OP
													6.25, JT, 3°, PL, RO, STN, OP
													6.3, JT, 3°, PL, RO, STN, OP
													6.36, JT, 3°, PL, RO, STN, OP
													6.44, JT, 3°, PL, RO, CL, OP
													6.56, JT, 2°, CV, RO, CL, OP
													6.81-6.83, CS, 0°
													6.99, JT, 2°, PL, RO, CT, I
													7.1, JT, 3°, PL, RO, CL, OP
													7.17, JT, 3°, PL, RO, CT, I
													7.24-7.3, SZ, 90°, PL, RO, CL, OP
													7.35, P, 3°, PL, RO, CL, OP
													7.53, P, 2°, PL, RO, CL, OP
													7.73, P, 3°, PL, RO, CL, OP
													7.81, JT, 2°, PL, RO, CL, OP
													7.86, P, 3°, PL, RO, CL, OP
													7.9, JT, 3°, PL, RO, CL, OP
													7.96-8, CORELOSS, °

UTM : 56H
Easting : 329440.02
Northing : 6263157.82
RL : 110.58(m)
Total Depth : 11.59 m

Driller Rig : Man-Portable
Driller Supplier : TIGHT Site
Logged By : Omkar Patil
Reviewed By : Krishna Shakya
Date : 30/07/2025

Job Number : P3540
Client : Werona Residence DM Pty Ltd
Project : Gordon
Location : 23 McIntosh Street, Gordon NSW 2072, Australia
Loc Comment : Tennis Court at No. 23 McIntosh Street

Drilling Method	Water	Depth (m)	Elevation (m)	Graphic Log	Classification Code	Material Description	Depth (m)	Weathering	Testing	Estimated Strength	RQD% and TCR%	Defect Spacing (mm)	Defect Description type, inclination, planarity, roughness, coating, thickness																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
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NMLC Coring	Outflow - 10% Water Loss	8.50	102.1		LAM	LAMINITE: moderately weathered, medium to high strength, pale grey, very fine to fine grained, generally shale with sandstone, lightly stained, with thinly embedded carbonaceous laminations.	8.50	MW			RQD = 0.58% TCR = 97.91%		8.07-8.11, CS, °																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	

morrow

CLIENT NAME: **CPDM Pty Ltd**

PROJECT: **Gordon, NSW**

LOCATION: **21-25 McIntosh St & 55 Verona Ave**

JOB NUMBER: **P3540**

LOGGED BY: **OAP**

BOREHOLE ID: **BH103**

DEPTH: **1.71 m to 11 m**

CORE TRAY NO.: **Box 1 & 2 of 3**

DATE: **30 July 2025**



morrow

Morrow Geotechnics Pty Ltd ABN 42 605 892 126
2/5-7 Malta Street, Fairfield East NSW 2165
79/6 Bellambi Lane, Bellambi NSW 2518
E: info@morrowgeo.com.au
P: 02 8599 7579

Photo description

BH103 Box 1 & 2 of 3

Client

Werona Residence DM Pty Ltd

Location

23 McIntosh Street, Gordon NSW 2072, Australia

Project name

Gordon

Project No

P3540

Scale

Not to Scale

BH No

BH103

BH Depth

11.59 m

morrow

CLIENT NAME: **CPDM Pty Ltd**

PROJECT: **Gordon, NSW**

LOCATION: **21-25 McIntosh St & 55 Verona Ave**

JOB NUMBER: **P3540**

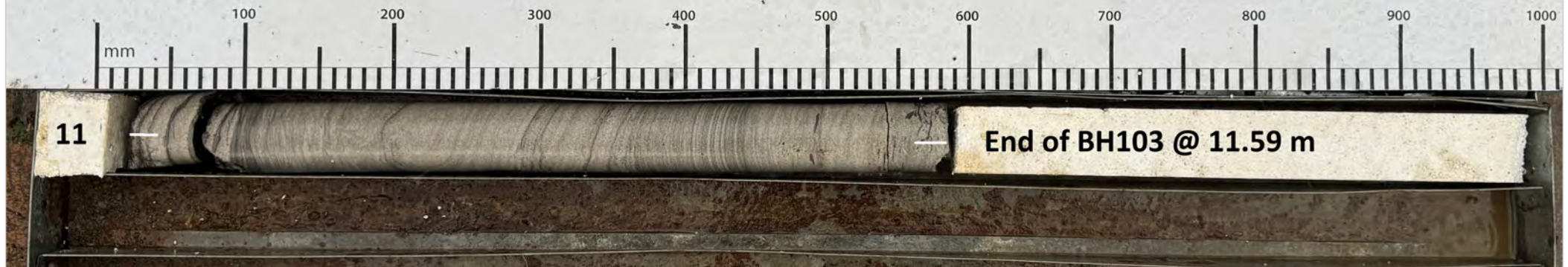
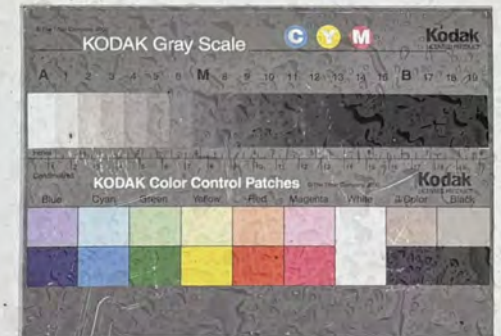
LOGGED BY: **OAP**

BOREHOLE ID: **BH103**

DEPTH: **11 m to 11.59 m**

CORE TRAY NO.: **Box 3 of 3**

DATE: **30 July 2025**



morrow

Morrow Geotechnics Pty Ltd ABN 42 605 892 126
2/5-7 Malta Street, Fairfield East NSW 2165
79/6 Bellambi Lane, Bellambi NSW 2518
E: info@morrowgeo.com.au
P: 02 8599 7579

Photo description

BH103 Box 3 of 3

Client

Werona Residence DM Pty Ltd

Location

23 McIntosh Street, Gordon NSW 2072, Australia

Project name

Gordon

Project No

P3540

Scale

Not to Scale

BH No

BH103

BH Depth

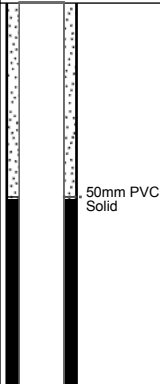
11.59 m

UTM : 56H	Driller Rig : GEO205 - Comacchio	Job Number : P3540
Easting : 329432.74	Driller Supplier : GEOSENSE	Client : Werona Residence DM Pty Ltd
Northing : 6263119.60	Logged By : Omkar Patil	Project : Gordon
RL : 112.28(m)	Reviewed By : Krishna Shakya	Location : 55 Werona Ave, Gordon NSW 2072, Australia
Total Depth : 12.3 m	Date : 22/07/2025	Loc Comment : Next to Round-about at No. 55 Werona Avenue

Drilling Method	Water	Well Diagram	Testing	Elevation Depth (m)	Graphic Log	Material Type	Classification Code	Material Description	Depth (m)	Consistency	Weathering XW DW HW SW L	Moisture
			SPT									
				112.1		TOPSOIL	CL	SILTY CLAY: soft, low plasticity, dark brown, Trace fine to medium sand, trace fine to medium gravel, w < pl, low resistance.	0.2	S		w < PL
				0.2		FILL	FILL	FILL SILTY CLAY: soft, low plasticity, dark brown, Trace fine to medium sand, trace fine to medium gravel, w < pl, low resistance.	0.6	S		w < PL
				111.7		Residual	CI	SILTY CLAY: very stiff to stiff, medium plasticity, pale grey mottled orange, trace fine gravel, w < pl, low resistance.	1	St - VSt		w < PL
				110.9		Residual	CI	As above, but: medium to high plasticity, medium resistance, with xw shale bands, ironstained, with low to medium strength shale bands.	1.4			
			5,13,14 (N=27)						2			
						Residual	CI - CH		3	St - VSt		w < PL
			15/50mm (N=0)									
				108.8		Residual	CI - CH	As above, but: dark black and pale grey, fine to medium gravel.	3.5	St - VSt		w < PL

3.70 m
Seepage

UTM : 56H	Driller Rig : GEO205 - Comacchio	Job Number : P3540
Easting : 329432.74	Driller Supplier : GEOSENSE	Client : Werona Residence DM Pty Ltd
Northing : 6263119.60	Logged By : Omkar Patil	Project : Gordon
RL : 112.28(m)	Reviewed By : Krishna Shakya	Location : 55 Werona Ave, Gordon NSW 2072, Australia
Total Depth : 12.3 m	Date : 22/07/2025	Loc Comment : Next to Round-about at No. 55 Werona Avenue

Drilling Method	Water	Well Diagram	Testing	Elevation Depth (m)	Graphic Log	Material Type	Classification Code	Material Description	Depth (m)	Consistency	Weathering XV DW HW LHW SW L	Moisture
			SPT									
				108.0		Residual	CI - CH	As above, but: dark black and pale grey, fine to medium gravel. (continued)	4.3	St - VSt		w < PL
				4.3								
			4,14,5/20mm (N=19) bounce			Rock	SHA	SHALE: highly weathered, very low to low strength, dark black mottled orange brown, very fine to fine grained, ironstained, with clay bands.	5	VLS - LS	HW	
								Commenced Coring at 5 m				

UTM : 56H	Driller Rig : GEO205 - Comacchio	Job Number : P3540
Easting : 329432.74	Driller Supplier : GEOSENSE	Client : Werona Residence DM Pty Ltd
Northing : 6263119.60	Logged By : Omkar Patil	Project : Gordon
RL : 112.28(m)	Reviewed By : Krishna Shakya	Location : 55 Werona Ave, Gordon NSW 2072, Australia
Total Depth : 12.3 m	Date : 22/07/2025	Loc Comment : Next to Round-about at No. 55 Werona Avenue

Drilling Method	Water	Well Diagram	Elevation Depth (m)	Graphic Log	Classification Code	Material Description	Depth (m)	Weathering	Testing		RQD% and TCR%	Defect Spacing (mm)	Defect Description type, inclination, planarity, roughness, coating, thickness
									Is (50)	Estimated Strength			
						Commenced Coring at 5 m							
						SHALE: highly weathered, very low to low strength, dark black mottled orange brown, very fine to fine grained, ironstained, with clay bands.	5						5. CS, °, I
													5.07, JT, 3°, PL, RO, STN, OP
													5.11, JT, 3°, PL, RO, STN, OP
													5.15, JT, 10°, PL, RO, STN, OP
													5.24-5.42, XWS, °, with v-l strength shale
													5.25, P, 2°, PL, RO, STN, C
													5.28, P, 2°, PL, RO, STN, C
													5.46, P, 3°, PL, RO, STN, OP
													5.48, P, 3°, PL, RO, STN, OP
													5.5, P, 3°, PL, RO, STN, OP
													5.57-5.59, XWS, °
													5.62-5.65, CS, °, IR, RO
									A:0.01				5.75-5.78, XWS, °, I
													5.8, P, 3°, PL, RO, CL, OP
													5.84, JT, 15°, PL, RO, STN, OP
													5.87, JT, 3°, PL, RO, STN, OP
													5.91, CS, 0°, IR, STN
													6-6.03, CS, °, VR, STN
													6.26, P, 3°, PL, RO, STN, OP
													6.27, P, 3°, PL, RO, STN, OP
													6.38, P, 3°, PL, RO, STN, OP
													6.45, P, 3°, PL, RO, STN, C
													6.5, P, 15°, PL, RO, STN, C
													6.7, P, 3°, PL, RO, STN, C
													6.73, P, 3°, PL, RO, STN, C
													6.75, P, 3°, PL, RO, STN, C
													6.78, P, 3°, PL, RO, STN, OP
													6.8, P, 2°, PL, RO, STN, C
													6.84, P, 2°, PL, RO, STN, C
													6.9, P, 3°, PL, RO, STN, OP
													6.94-7, SS, °, IR
													7-7.03, SZ, °
													7.03-7.06, CS, °
													7.06-7.07, XWS, °
													7.1-7.11, P, °, PL, RO, STN, C
													7.15, JT, 5°, PL, RO, STN, OP
													7.18-7.23, CORELOSS, °
													7.33, P, 3°, PL, RO, CL, OP
													7.34, P, 3°, PL, RO, STN, OP
													7.35-7.37, CS, °
													7.39, P, 3°, PL, RO, STN, OP
													7.41-7.46, SZ, 90°, PL, RO, STN
													7.47, P, 3°, PL, RO, CL, OP
													7.48, P, 3°, PL, RO, CL, C
													7.52, P, 3°, PL, RO, CL, OP
													7.54-7.56, CS, °
													7.61, JT, 45°, PL, RO, CL, OP
									D:0.35, A:0.41				

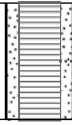
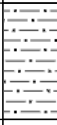
UTM : 56H
Easting : 329432.74
Northing : 6263119.60
RL : 112.28(m)
Total Depth : 12.3 m

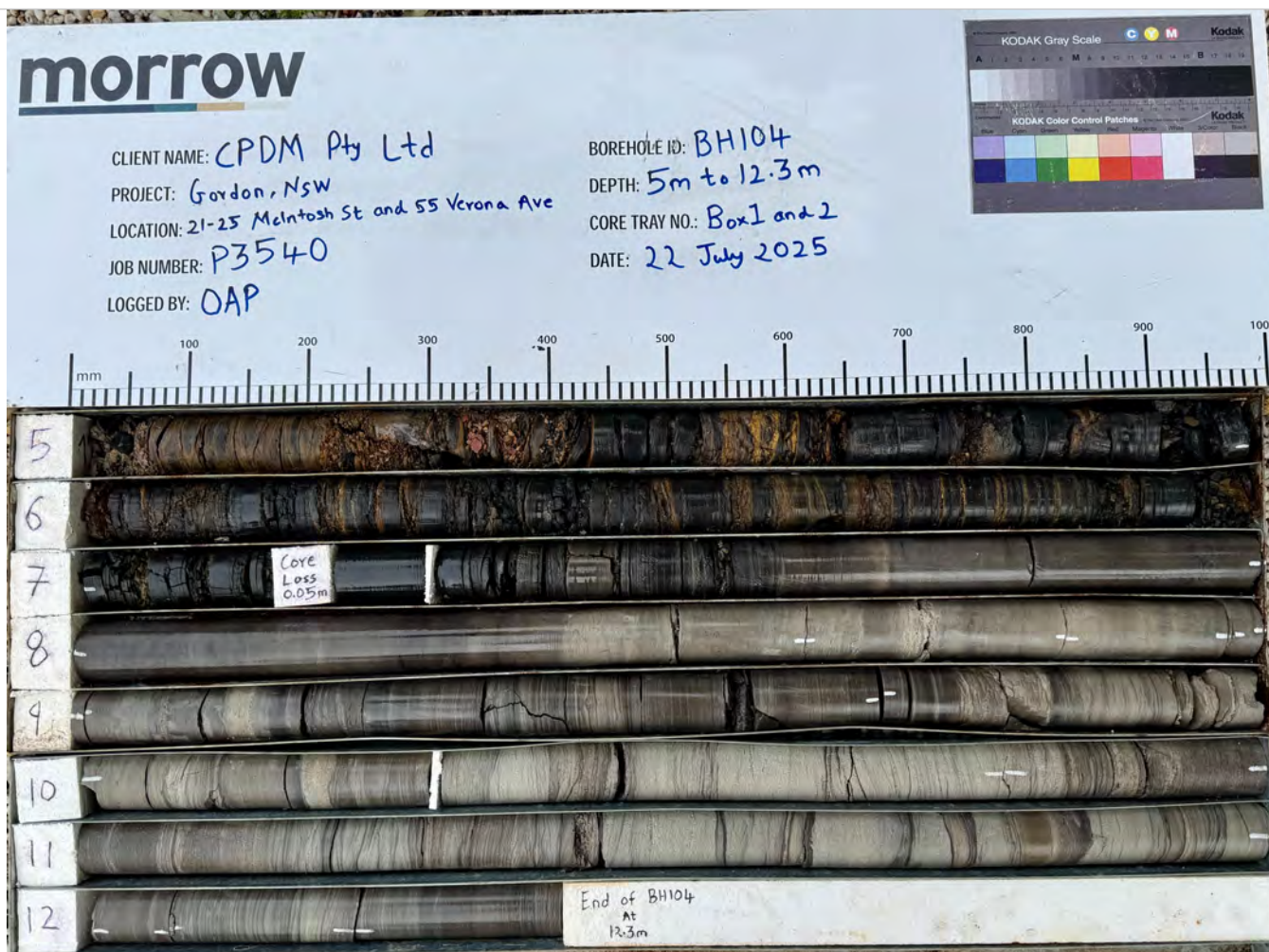
Driller Rig : GEO205 - Comacchio
Driller Supplier : GEOSENSE
Logged By : Omkar Patil
Reviewed By : Krishna Shakya
Date : 22/07/2025

Job Number : P3540
Client : Werona Residence DM Pty Ltd
Project : Gordon
Location : 55 Werona Ave, Gordon NSW 2072, Australia
Loc Comment : Next to Round-about at No. 55 Werona Avenue

Drilling Method	Water	Well Diagram	Elevation	Graphic Log	Classification Code	Material Description	Depth (m)	Weathering	Testing	Estimated Strength	RQD% and TCR%	Defect Spacing (mm)	Defect Description type, inclination, planarity, roughness, coating, thickness																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
			Depth (m)						Is(50)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
NMLC Coring		50mm PVC Slotted			LAM	LAMINITE: moderately to slightly weathered, medium to high strength, pale grey, very fine to fine grained, generally shale with embedded sandstone and thin carbonaceous laminations. (continued)	8.5	MW - SW	D:0.35, A:0.41	Very Low Low Med High Very High Extremely High	RQD = 55% TCR = 100%	30 100 300 1000 3000																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
			D:1.55, A:1.36																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
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UTM : 56H	Driller Rig : GEO205 - Comacchio	Job Number : P3540
Easting : 329432.74	Driller Supplier : GEOSENSE	Client : Werona Residence DM Pty Ltd
Northing : 6263119.60	Logged By : Omkar Patil	Project : Gordon
RL : 112.28(m)	Reviewed By : Krishna Shakya	Location : 55 Werona Ave, Gordon NSW 2072, Australia
Total Depth : 12.3 m	Date : 22/07/2025	Loc Comment : Next to Round-about at No. 55 Werona Avenue

Drilling Method	Water	Well Diagram	Elevation	Graphic Log	Classification Code	Material Description	Depth (m)	Weathering	Testing	Estimated Strength	RQD% and TCR%	Defect Spacing (mm)	Defect Description type, inclination, planarity, roughness, coating, thickness
			Depth (m)						Is(50)				
NMC Coring					LAM	LAMINITE: slightly weathered, medium to high strength, pale grey, very fine to fine grained, generally shale with embedded sandstone, with thinly embedded carbonaceous seams. (continued)		SW	D:0.13, A:0.37		RQD = 73% TCR = 100%		
						BH104 Reached Target Depth at 12.3 m							



morrow

Morrow Geotechnics Pty Ltd ABN 42 605 892 126
 2/5-7 Malta Street, Fairfield East NSW 2165
 79/6 Bellambi Lane, Bellambi NSW 2518
 E: info@morrowgeo.com.au
 P: 02 8599 7579

Photo description

BH104 Box 1 & 2 of 2

Client

Werona Residence DM Pty Ltd

Location

55 Werona Ave, Gordon NSW 2072, Australia

Project name

Gordon

Project No

P3540

Scale

Not to Scale

BH No

BH104

BH Depth

12.3 m

UTM : 56H
Easting : 329408.09
Northing : 6263140.64
RL : 111.94(m)
Total Depth : 18 m

Driller Rig : GEO205 - Comacchio
Driller Supplier : GEOSENSE
Logged By : Omkar Patil
Reviewed By : Krishna Shakya
Date : 21/07/2025

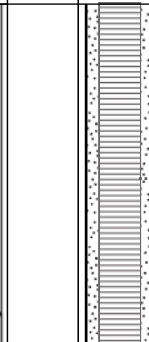
Job Number : P3540
Client : Werona Residence DM Pty Ltd
Project : Gordon
Location : 55 Werona Ave, Gordon NSW 2072, Australia
Loc Comment : Next to Swimming Pool at No. 55 Werona Avenue

Drilling Method	Water	Well Diagram	Testing	Elevation Depth (m)	Graphic Log	Material Type	Classification Code	Material Description	Depth (m)	Consistency	Weathering XW DW HW SW L	Moisture
			SPT									
			3,3,3 (N=6)	111.7 0.2	TOPSOIL	CL	CL	SILTY CLAY: low plasticity, dark brown, Trace fine sand, with fine to medium gravel, w < pl, low resistance.	0.2			w < PL
				111.5 0.4		FILL	FILL	FILL CLAYEY SAND: very loose to loose, well - graded, fine grained, low plasticity clay, pale yellow mottled brown, trace silt, with fine gravel, moist, Low resistance.	0.4	VL - L - -		M
				110.7 1.2		FILL	FILL	FILL SILTY CLAY: firm, low plasticity, brown, With fine to medium sand, with fine gravel, w < pl, low resistance.	1.2	F		w < PL
				110.3 1.6		Residual	CI	SILTY CLAY: very stiff to stiff, medium plasticity, pale grey mottled orange, Trace fine sand, trace fine gravel, w < pl, low - medium resistance.	1.6	St - VSt		w < PL
				109.3 2.6		Residual	CI	As above, but: very stiff, orange brown mottled pale grey, with xw shale bands, with vl - l strength shale bands.	2.6	VSt		w < PL
				108.8 3.1		Rock	SHA	SHALE: highly weathered, low to medium strength, pale grey mottled orange, with clay bands, iron stained.	3.1	LS - MS	HW	
			10,5/50mm (N=30) Bounce	3.1				Commenced Coring at 3.1 m				

UTM : 56H
Easting : 329408.09
Northing : 6263140.64
RL : 111.94(m)
Total Depth : 18 m

Driller Rig : GEO205 - Comacchio
Driller Supplier : GEOSENSE
Logged By : Omkar Patil
Reviewed By : Krishna Shakya
Date : 21/07/2025

Job Number : P3540
Client : Werona Residence DM Pty Ltd
Project : Gordon
Location : 55 Werona Ave, Gordon NSW 2072, Australia
Loc Comment : Next to Swimming Pool at No. 55 Werona Avenue

 NMLC Coring	 50mm PVC Slotted			CL	Core Loss.			RQD = 3.33% TCR = 53.33%		3.1.4.51. CORELOSS, °
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UTM : 56H	Driller Rig : GEO205 - Comacchio	Job Number : P3540
Easting : 329408.09	Driller Supplier : GEOSENSE	Client : Werona Residence DM Pty Ltd
Northing : 6263140.64	Logged By : Omkar Patil	Project : Gordon
RL : 111.94(m)	Reviewed By : Krishna Shakya	Location : 55 Werona Ave, Gordon NSW 2072, Australia
Total Depth : 18 m	Date : 21/07/2025	Loc Comment : Next to Swimming Pool at No. 55 Werona Avenue

Drilling Method	Water	Well Diagram	Elevation	Graphic Log	Classification Code	Material Description	Depth (m)	Weathering	Testing		Estimated Strength	RQD% and TCR%	Defect Spacing (mm)	Defect Description type, inclination, planarity, roughness, coating, thickness
			Depth (m)						Is(50)					
NMLC Coring		50mm PVC Slotted	107.4		CL	Core Loss. (continued)	4.51	HW						
			4.51		SHA	SHALE: highly weathered, very low to low strength, dark black mottled orange brown, very fine to fine grained, iron stained, with clay bands.	5							4.51-4.59, XWS, °, I, 0.8 mm clay seam 4.59-4.71, CS, °, IR, VR, STN, OP
														4.76, P, 3°, PL, RO, STN, C 4.81, JS, 3°, PL, RO, CT, I, 0.2 mm clay seam infill 4.84-4.89, JT, 45°, CV, RO, STN, C 4.9-4.91, JT, 2°, PL, RO, CT, I 4.94-5.06, XWS, °, I
														5.12-5.14, XWS, °, I 5.16, P, 2°, PL, RO, STN, OP 5.25-5.28, CS, °, IR, VR, STN, OP 5.29-5.32, XWS, °, I 5.35, P, 3°, PL, RO, STN, C 5.41, P, 4°, PL, RO, STN, C
														5.63-5.8, XWS, °, I
														5.83-5.87, XWS, °, I 5.89-6.04, CS, °, IR, VR, STN, OP
			105.8		CL	Core Loss.	6.09							6.1-6.31, CORELOSS, °
			105.6		SHA	SHALE: highly weathered, low to medium strength, dark black with pale grey, very fine to fine grained, ironstained, with xw shale bands.	6.31							6.31-6.61, XWS, °, I, with v-l strength shale bands
														6.69-6.72, CS, °, IR, VR, STN, OP
									A:0.40					6.81, JT, 5°, PL, VR, CL, OP 6.85-6.88, JT, 90°, PL, VR, STN, OP 6.91, P, 3°, PL, RO, STN, OP 6.94-7, CS, °, IR, VR, STN, OP 7.04, P, 3°, PL, RO, VN, OP 7.09-7.15, CS, °, IR, VR, STN, OP
			104.6		LAM	LAMINITE: highly to moderately weathered, low to medium strength, pale grey, fine grained, generally shale with interbedded sandstone and carbonaceous laminations.	7.32	HW - MW						7.21, JT, 3°, PL, RO, VN, I 7.27, P, 3°, PL, RO, STN, OP 7.34, JT, 3°, PL, RO, STN, C 7.34-7.42, SS, 90°, PL, RO, CL, C
			7.32											7.66, JT, 3°, PL, RO, CL, OP
									D:0.18, A:0.52					7.76, P, 3°, PL, RO, CL, OP 7.85, P, 3°, PL, RO, CL, OP

UTM : 56H
Easting : 329408.09
Northing : 6263140.64
RL : 111.94(m)
Total Depth : 18 m

Driller Rig : GEO205 - Comacchio
Driller Supplier : GEOSENSE
Logged By : Omkar Patil
Reviewed By : Krishna Shakya
Date : 21/07/2025

Job Number : P3540
Client : Werona Residence DM Pty Ltd
Project : Gordon
Location : 55 Werona Ave, Gordon NSW 2072, Australia
Loc Comment : Next to Swimming Pool at No. 55 Werona Avenue

Drilling Method	Water	Well Diagram	Elevation	Graphic Log	Classification Code	Material Description	Depth (m)	Weathering	Testing	Estimated Strength	RQD% and TCR%	Defect Spacing (mm)	Defect Description type, inclination, planarity, roughness, coating, thickness
			Depth (m)						Is(50)				
NMLC Coring		50mm PVC Slotted			LAM	LAMINITE: highly to moderately weathered, low to medium strength, pale grey, fine grained, generally shale with interbedded sandstone and carbonaceous laminations. (continued)							
							9	HW - MW	D:0.35, A:0.88				8.07, JT, 3°, PL, RO, CL, C
													8.32, JT, 3°, PL, RO, VN, I
													8.55, P, 5°, PL, RO, CL, OP
													8.61, P, 3°, PL, RO, CL, OP
													8.65, P, 3°, PL, RO, CL, C
													8.96, JT, 2°, PL, RO, VN, I
													9.15, P, 3°, PL, SO, CL, OP
													9.3, P, 2°, PL, RO, CL, OP
													9.66, P, 2°, PL, RO, VN, I
													9.84, P, 2°, PL, RO, CL, OP
													9.85, P, 0°, PL, RO, CL, OP
													10.15-10.18, JT, 2°, PL, RO, CL, OP
													10.32-10.33, JT, 2°, PL, RO, CT, I
													10.41, JT, 2°, PL, RO, CL, OP
													10.49-10.61, JT, 90°, PL, RO, CL, OP
													10.63, P, 3°, PL, RO, CL, OP
													10.64, P, 3°, PL, RO, CL, OP
													10.65, P, 3°, PL, RO, CL, OP
													10.7, P, 2°, PL, RO, CL, OP
													10.73, P, 3°, PL, RO, CL, OP
													10.74, P, 3°, PL, RO, CL, OP
													10.8, P, 3°, PL, RO, CL, OP
													10.86, JT, 5°, PL, RO, CL, OP
													10.91-11, CS, °
													11.06, JT, 15°, PL, RO, CL, OP
													11.37, P, 3°, PL, RO, CL, OP
													11.54, P, °, PL, RO, CL, OP
													11.6, P, 3°, PL, IR, RO, CL, C
													11.73, JT, 3°, PL, RO, CL, OP

UTM : 56H	Driller Rig : GEO205 - Comacchio	Job Number : P3540
Easting : 329408.09	Driller Supplier : GEOSENSE	Client : Werona Residence DM Pty Ltd
Northing : 6263140.64	Logged By : Omkar Patil	Project : Gordon
RL : 111.94(m)	Reviewed By : Krishna Shakya	Location : 55 Werona Ave, Gordon NSW 2072, Australia
Total Depth : 18 m	Date : 21/07/2025	Loc Comment : Next to Swimming Pool at No. 55 Werona Avenue

Drilling Method	Water	Well Diagram	Elevation	Graphic Log	Classification Code	Material Description	Depth (m)	Weathering	Testing	Estimated Strength	RQD% and TCR%	Defect Spacing (mm)	Defect Description type, inclination, planarity, roughness, coating, thickness
			Depth (m)						Is(50)				
				SST	SANDSTONE: moderately to slightly weathered, medium to high strength, pale grey, very fine to fine grained, with thinly embedded carbonaceous laminations, trace shale bands. (continued)		MW - SW		D:0.33, A:1.91		RQD = 87.26% TCR = 100%		12.16, P, 5°, PL, RO, CL, OP
			97.6 14.3	SST	SANDSTONE: slightly to fresh weathered, high strength, pale grey, very fine to fine grained, with thinly embedded carbonaceous laminations.		SW - F		D:1.37, A:1.50		RQD = 96.77% TCR = 100%		14.6, P, 3°, PL, RO, CL, OP
									D:0.97, A:2.71				
									D:1.71, A:1.94				
									D:0.90, A:1.19				
									D:1.14, A:1.47				

UTM : 56H	Driller Rig : GEO205 - Comacchio	Job Number : P3540
Easting : 329408.09	Driller Supplier : GEOSENSE	Client : Werona Residence DM Pty Ltd
Northing : 6263140.64	Logged By : Omkar Patil	Project : Gordon
RL : 111.94(m)	Reviewed By : Krishna Shakya	Location : 55 Werona Ave, Gordon NSW 2072, Australia
Total Depth : 18 m	Date : 21/07/2025	Loc Comment : Next to Swimming Pool at No. 55 Werona Avenue

Drilling Method	Water	Well Diagram	Elevation	Graphic Log	Classification Code	Material Description	Depth (m)	Weathering	Testing	Estimated Strength	RQD% and TCR%	Defect Spacing (mm)	Defect Description type, inclination, planarity, roughness, coating, thickness
			Depth (m)						Is(50)				
					SST	SANDSTONE: slightly to fresh weathered, high strength, pale grey, very fine to fine grained, with thinly embedded carbonaceous laminations. (continued)	17	SW - F	D:1.14, A:1.47		RQD = 96.77% TCR = 100%		
									D:1.11, A:1.23				
									D:1.69, A:1.75				
											RQD = 100% TCR = 100%		
						BH105 Reached Target Depth at 18 m							



morrow

Morrow Geotechnics Pty Ltd ABN 42 605 892 126
 2/5-7 Malta Street, Fairfield East NSW 2165
 79/6 Bellambi Lane, Bellambi NSW 2518
 E: info@morrowgeo.com.au
 P: 02 8599 7579

Photo description

Box 1 & 2 of 3

Client	Werona Residence DM Pty Ltd		
Location	55 Werona Ave, Gordon NSW 2072, Australia		
Project name	Gordon		
Project No	P3540	Scale	Not to Scale
BH No	BH105	BH Depth	18 m



morrow

Morrow Geotechnics Pty Ltd ABN 42 605 892 126
 2/5-7 Malta Street, Fairfield East NSW 2165
 79/6 Bellambi Lane, Bellambi NSW 2518
 E: info@morrowgeo.com.au
 P: 02 8599 7579

Photo description

Box 3 of 3

Client

Werona Residence DM Pty Ltd

Location

55 Werona Ave, Gordon NSW 2072, Australia

Project name

Gordon

Project No

P3540

Scale

Not to Scale

BH No

BH105

BH Depth

18 m

GENERAL

Information obtained from site investigations is recorded on log sheets. The "Cored Drill Hole Log" presents data from an operation where a core barrel has been used to recover material - commonly rock. The "Non-Core Drill Hole - Geological Log" presents data from an operation where coring has not been used and information is based on a combination of regular sampling and insitu testing. The material penetrated in non-core drilling is commonly soil but may include rock. The "Excavation - Geological Log" presents data and drawings from exposures of soil and rock resulting from excavation of pits, trenches, etc.

The heading of the log sheets contains information on Project Identification, Hole or Pit Identification, Location and Elevation. The main section of the logs contains information on methods and conditions, material substance description and structure presented as a series of columns in relation to depth below the ground surface which is plotted on the left side of the log sheet. The common depth scale is 8m per drill log sheet and about 3-5m for excavation logs sheets.

As far as is practicable the data contained on the log sheets is factual. Some interpretation is inevitable in the identification of material boundaries in areas of partial sampling, the location of areas of core loss, description and classification of material, estimation of strength and identification of drilling induced fractures. Material description and classifications are based on SAA Site Investigation Code AS 1726 - 1993 with some modifications as defined below.

These notes contain an explanation of the terms and abbreviations commonly used on the log sheets.

DRILLING

Drilling & Casing

ADV	Auger Drilling with V-Bit
ADT	Auger Drilling with TC Bit
WB	Wash-bore drilling
RR	Rock Roller
NMLC	NMLC core barrel
NQ	NQ core barrel
HMLC	HMLC core barrel
HQ	HQ core barrel

Drilling Fluid/Water

The drilling fluid used is identified and loss of return to the surface estimated as a percentage.

Drilling Penetration/Drill Depth

Core lifts are identified by a line and depth with core loss per run as a percentage. Ease of penetration in non-core drilling is abbreviated as follows:

VE	Very Easy
E	Easy
M	Medium
H	High
VH	Very High

Groundwater Levels

Date of measurement is shown.

Standing water level measured in completed boreholeLevel taken during or immediately after drilling

D	Disturbed
B	Bulk
U	Undisturbed
SPT	Standard Penetration Test
N	Result of SPT (sample taken)
PBT	Plate Bearing Test
PZ	Piezometer Installation
HP	Hand Penetrometer Test

EXCAVATION LOGS

Explanatory notes are provided at the bottom of drill log sheets. Information about the origin, geology and pedology may be entered in the "Structure and other Observations" column. The depth of the base of excavation (for the logged section) at the appropriate depth in the "Material Description" column. Refusal of excavation plant is noted should it occur. A sketch of the exposure may be added.

MATERIAL DESCRIPTION – SOIL

Classification Symbol - In accordance with the Unified Classification System (AS 1726-1993, Appendix A, Table A1)

Material Description - In accordance with AS 1726-1993, Appendix A2.3

Moisture Condition

D	Dry, looks and feels dry
M	Moist, No free water on remoulding
W	Wet, free water on remoulding

Consistency - In accordance with AS 1726-1993, Appendix A2.5

VS	Very Soft	< 12.5 kPa
S	Soft	12.5 – 25 kPa
F	Firm	25 – 50 kPa
St	Stiff	50 – 100 kPa
VSt	Very Stiff	100 – 200 kPa
H	Hard	> 200 kPa

Strength figures quoted are the approximate range of undrained shear strength for each class.

Density Index. (%) is estimated or is based on SPT results.

VL	Very Loose	< 15 %
L	Loose	15 – 35 %
MD	Medium Dense	35 – 65 %
D	Dense	65 – 85 %
VD	Very Dense	> 85 %

MATERIAL DESCRIPTION -ROCK

Material Description

Identification of rock type, composition and texture based on visual features in accordance with AS 1726-1993, Appendix A3.1-A3.3 and Tables A6a, A6b and A7.

Core Loss

Is shown at the bottom of the run unless otherwise indicated.

Bedding

Thinly Laminated	< 6 mm
Laminated	6 - 20
Very Thinly Bedded	20 - 60
Thinly Bedded	60 - 200
Medium Bedded	200 - 600
Thickly Bedded	600 - 2000
Very Thickly Bedded	> 2000

Weathering - No distinction is made between weathering and alteration. Weathering classification assists in identification but does not imply engineering properties.

Fresh (F)	Rock substance unaffected by weathering
Slightly Weathered (SW)	Rock substance partly stained or discoloured. Colour and texture of fresh rock recognisable.
Moderately Weathered (MW)	Staining or discolouration extends throughout rock substance. Fresh rock colour not recognisable.
Highly Weathered (HW)	Stained or discoloured throughout. Signs of chemical or physical alteration. Rock texture retained.
Extremely Weathered (EW)	Rock texture evident but material has soil properties and can be remoulded.

Strength - The following terms are used to described rock strength:

Rock Strength Class	Abbreviation	Point Load Strength Index, Is(50) (MPa)
Extremely Low	EL	< 0.03
Very Low	VL	0.03 to 0.1
Low	L	0.1 to 0.3
Medium	M	0.3 to 1
High	H	1 to 3
Very High	VH	3 to 10
Extremely High	EH	≥ 10

Strengths are estimated and where possible supported by Point Load Index Testing of representative samples. Test results are plotted on the graphical estimated strength by using Diametral Point Load Test and Axial Point Load Test.

Where the estimated strength log covers more than one range it indicates the rock strength varies between the limits shown.

MATERIALS STRUCTURE/FRACTURES

ROCK

Natural Fracture Spacing - A plot of average fracture spacing excluding defects known or suspected to be due to drilling, core boxing or testing. Closed or cemented joints, drilling breaks and handling breaks are not included in the Natural Fracture Spacing.

Visual Log - A diagrammatic plot of defects showing type, spacing and orientation in relation to core axis.

Defects		Defects open in-situ or clay sealed Defects closed in-situ Breaks through rock substance
	  	

Additional Data - Description of individual defects by type, orientation, in-filling, shape and roughness in accordance with AS 1726-1993, Appendix A Table A10, notes and Figure A2.

Orientation - angle relative to the plane normal to the core axis.

Type	BP JT SM FZ SZ VN FL CL DL HB DB	Bedding Parting Joint Seam Fracture Zone Shear Zone Vein Foliation Cleavage Drill Lift Handling Break Drilling Break
Infilling	CN X Clay KT CA Fe Qz MS MU	Clean Carbonaceous Clay Chlorite Calcite Iron Oxide Quartz Secondary Mineral Unidentified Mineral
Shape	PR CU UN ST IR DIS	Planar Curved Undulose Stepped Irregular Discontinuous
Roughness	POL SL S RF VR	Polished Slickensided Smooth Rough Very Rough

SOIL

Structures - Fissuring and other defects are described in accordance with AS 1726-1993, Appendix A2.6, using the terminology for rock defects.

Origin - Where practicable an assessment is provided of the probable origin of the soil, eg fill, topsoil, alluvium, colluvium, residual soil

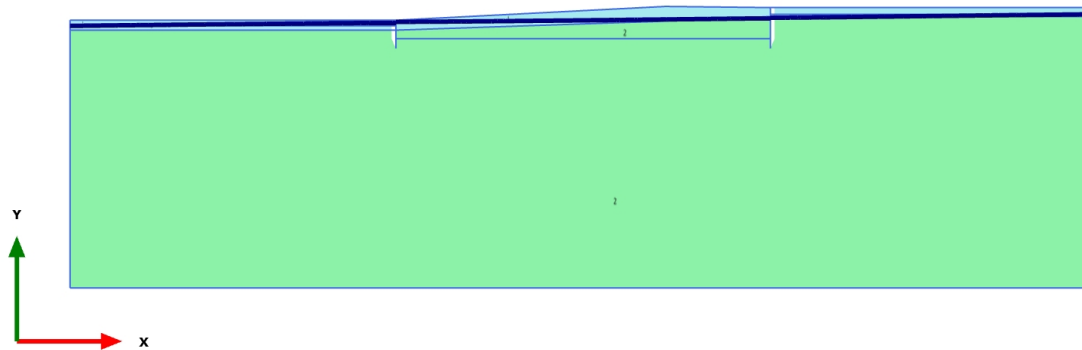
APPENDIX B

PLAXIS FLOW MODELLING REPORTS

PLAXIS Report

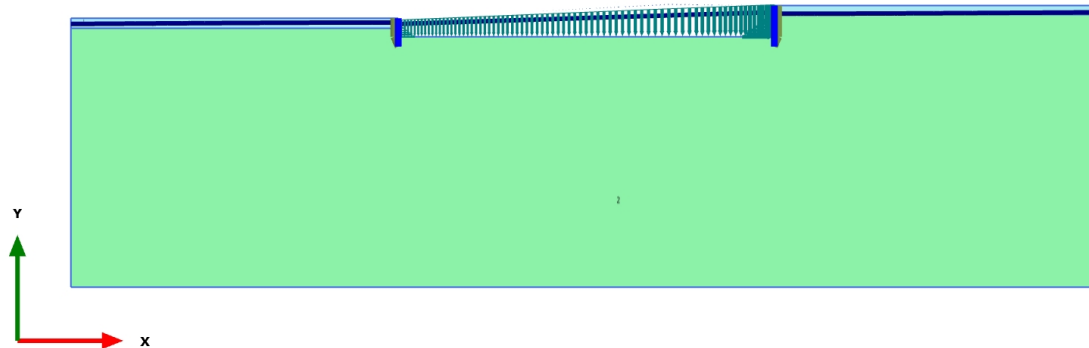
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Title	P3540_Gordon_Section1(GW)
Model	Plane strain
Elements	15-Noded
PLAXIS Version	Version 2024.2.0.1144

1.1.1.1 Calculation results, Initial phase [InitialPhase] (0/0), Materials plot



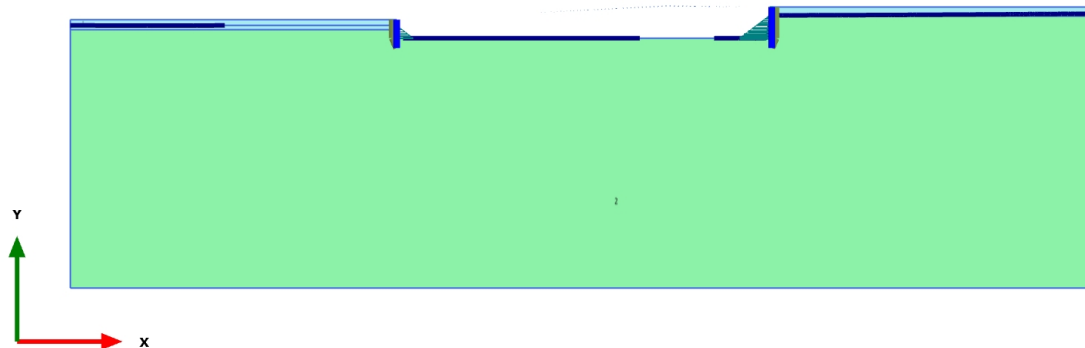
Materials plot

1.1.1.2 Calculation results, Phase_1 [Phase_1] (1 / 1), Materials plot



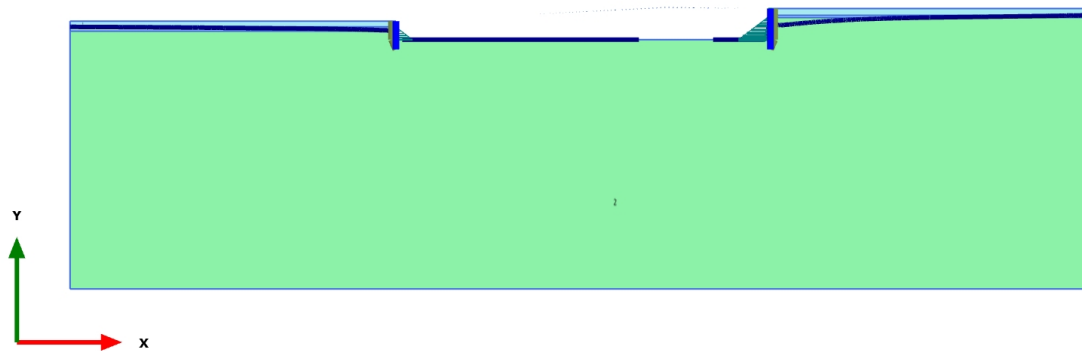
Materials plot

1.1.1.3 Calculation results, Short Term [Phase_2] (2/13), Materials plot



Materials plot

1.1.1.4 Calculation results, Long Term [Phase_3] (3/495), Materials plot



Materials plot

1.1.2.1.1 Materials - Soil and interfaces - Mohr-Coulomb

Identification number		1	2
Identification		Soil	Rock
Soil model		Mohr-Coulomb	Mohr-Coulomb
Drainage type		Drained	Drained
Colour			
Comments			
y_unsat	kN/m ³	18.00	24.00
y_sat	kN/m ³	19.00	24.00
e_init		0.5000	0.5000
n_init		0.3333	0.3333
Input method		SDOF equivalent	SDOF equivalent
Rayleigh α		0.000	0.000
Rayleigh β		0.000	0.000
ξ_1	%	0.000	0.000
ξ_2	%	0.000	0.000
f_1	Hz	0.1000	0.1000
f_2	Hz	1.000	1.000

Identification number		1	2
E'_ref	kN/m ²	20.00E3	200.0E3
v (nu)		0.3000	0.3000
G_ref	kN/m ²	7692	76.92E3
E_oed	kN/m ²	26.92E3	269.2E3
E'_inc	kN/m ² /m	0.000	0.000
y_ref	m	0.000	0.000
V_s	m/s	64.75	177.3
V_p	m/s	121.1	331.7
c'_ref	kN/m ²	100.0	100.0
φ' (phi)	°	45.00	45.00
ψ (psi)	°	0.000	0.000
c'_inc	kN/m ² /m	0.000	0.000
y_ref	m	0.000	0.000
Tension cut-off		True	True
Tensile strength	kN/m ²	0.000	0.000
Determination		v-undrained definition	v-undrained definition
v_u definition method		Direct	Direct
v_u, equivalent (nu)		0.4950	0.4950
Skempton B		0.9783	0.9783

Identification number		1	2
K _{w,ref/n}	kN/m ²	750.0E3	7.500E6
Classification type		Standard	Standard
Soil class (Standard)		Coarse	Coarse
< 2 μm	%	10.00	10.00
2 μm - 50 μm	%	13.00	13.00
50 μm - 2 mm	%	77.00	77.00
Use defaults		False	False
k _x	m/day	0.06981	8.640E-3
k _y	m/day	0.06981	8.640E-3
Void ratio dependency		False	False
c _k		1000E12	1000E12
n _{init}		0.3333	0.3333
-ψ _{unsat}	m	10.00E3	10.00E3
c _s	kJ/t/K	0.000	0.000
λ _s	kW/m/K	0.000	0.000
ρ _s	t/m ³	2.600	2.600
Thermal expansion type		Isotropic	Isotropic
α _{sv}	1/K	0.000	0.000
Phase change		False	False

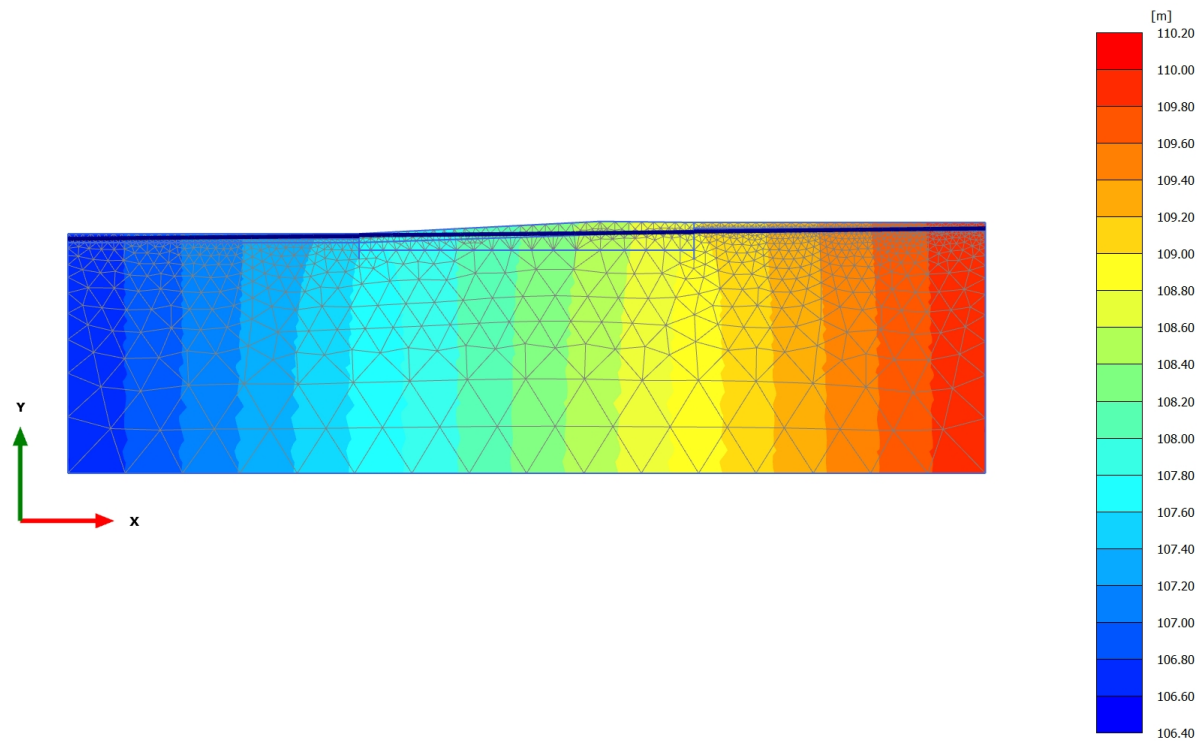
Identification number		1	2
D_v	m ² /day	0.000	0.000
f_Tv		0.000	0.000
Stiffness determination		Derived	Derived
Strength determination		Rigid	Rigid
R_inter		1.000	1.000
Consider gap closure		True	True
Cross permeability		Impermeable	Impermeable
Drainage conductivity, dk	m ³ /day/m	0.000	0.000
R_thermal	m ² K/kW	0.000	0.000
K_0 determination		Automatic	Automatic
K_0,x		0.2929	0.2929
K_0,z		0.2929	0.2929

1.1.2.2 Materials - Plates

Identification number		1
Identification		Cut off wall
Material type		Elastic
Colour		
Comments		
w	kN/m/m	0.000
Input method		Direct
Rayleigh α		0.000
Rayleigh β		0.000
Prevent punching		False
Isotropic		True
EA_1	kN/m	1.894E6
EA_2	kN/m	1.894E6
E_1	kN/m ²	5.392E6
E_2	kN/m ²	5.392E6
EI	kN m ² /m	19.46E3
v (nu)		0.2000

Identification number		1
d	m	0.3512
c	kJ/t/K	0.000
λ	kW/m/K	0.000
ρ	t/m ³	0.000
α	1/K	0.000
A_eff,T	m ²	0.000

2.1.1.1.1 Calculation results, Initial phase [InitialPhase] (0/0), Groundwater head

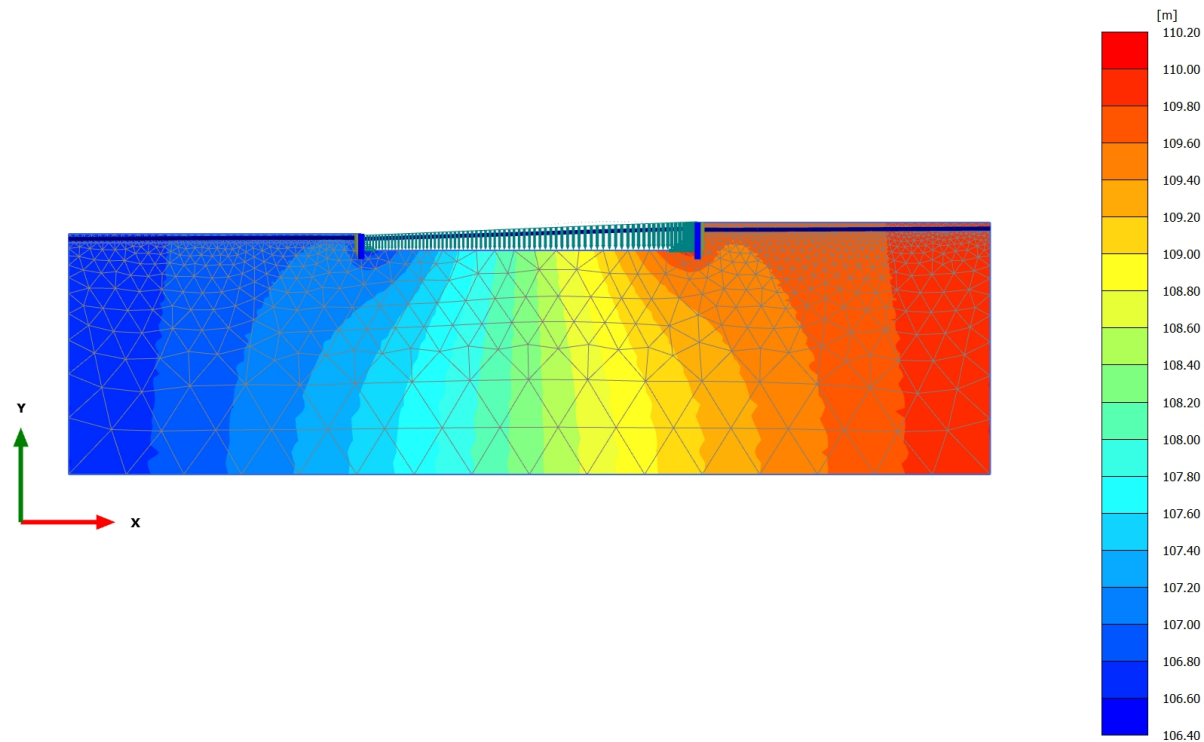


Groundwater head (scaled up 0.0500 times) (Time 0.000 day)

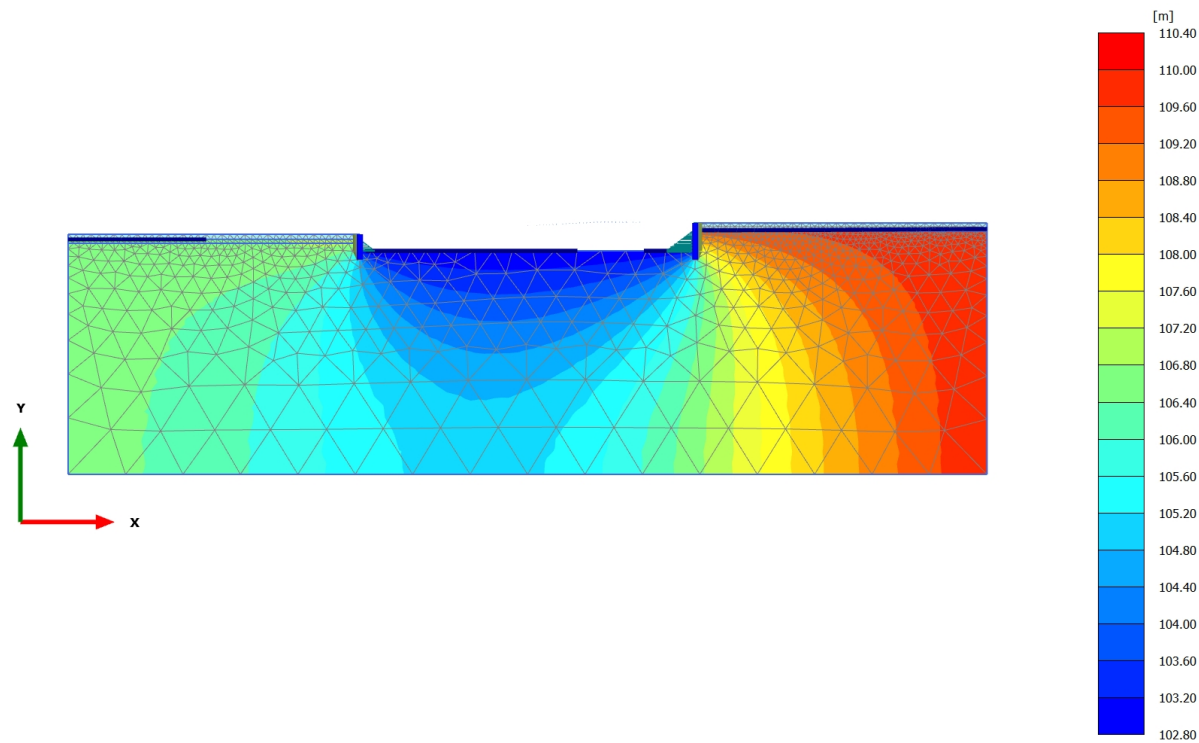
Maximum value = 110.0 m (Element 979 at Node 9221)

Minimum value = 106.6 m (Element 963 at Node 16579)

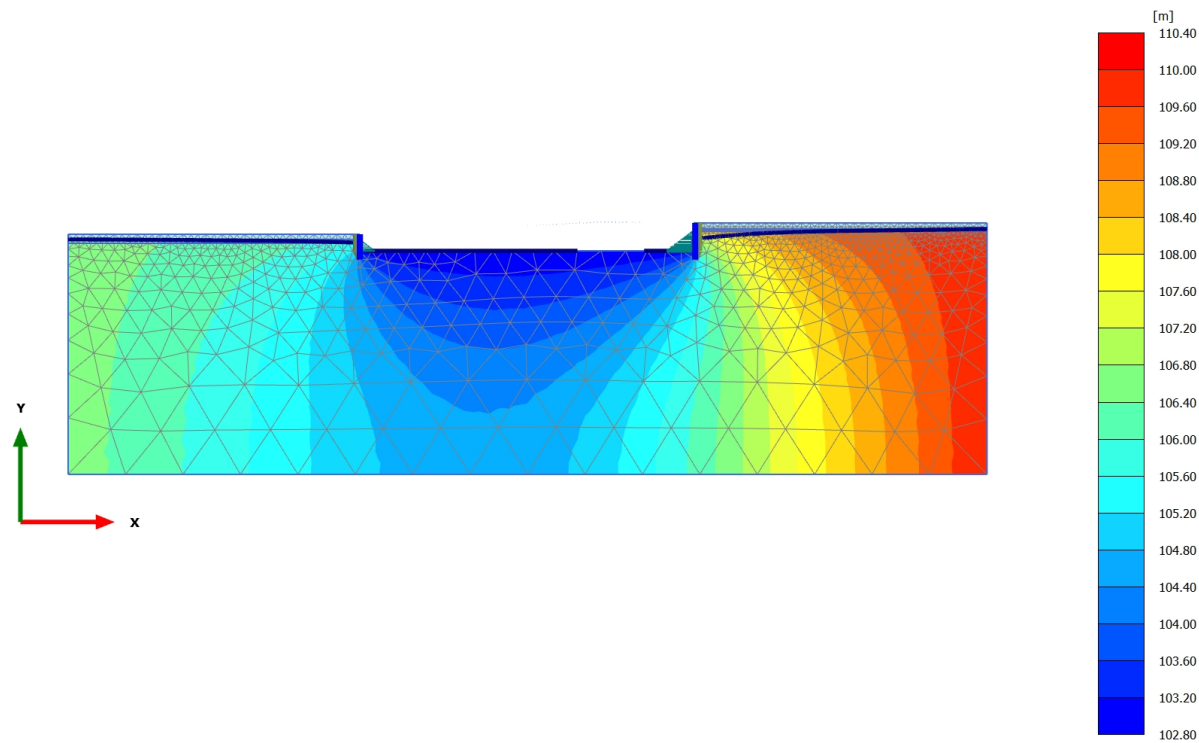
2.1.1.1.2 Calculation results, Phase_1 [Phase_1] (1/1), Groundwater head



2.1.1.1.3 Calculation results, Short Term [Phase_2] (2/13), Groundwater head



2.1.1.1.4 Calculation results, Long Term [Phase_3] (3/495), Groundwater head

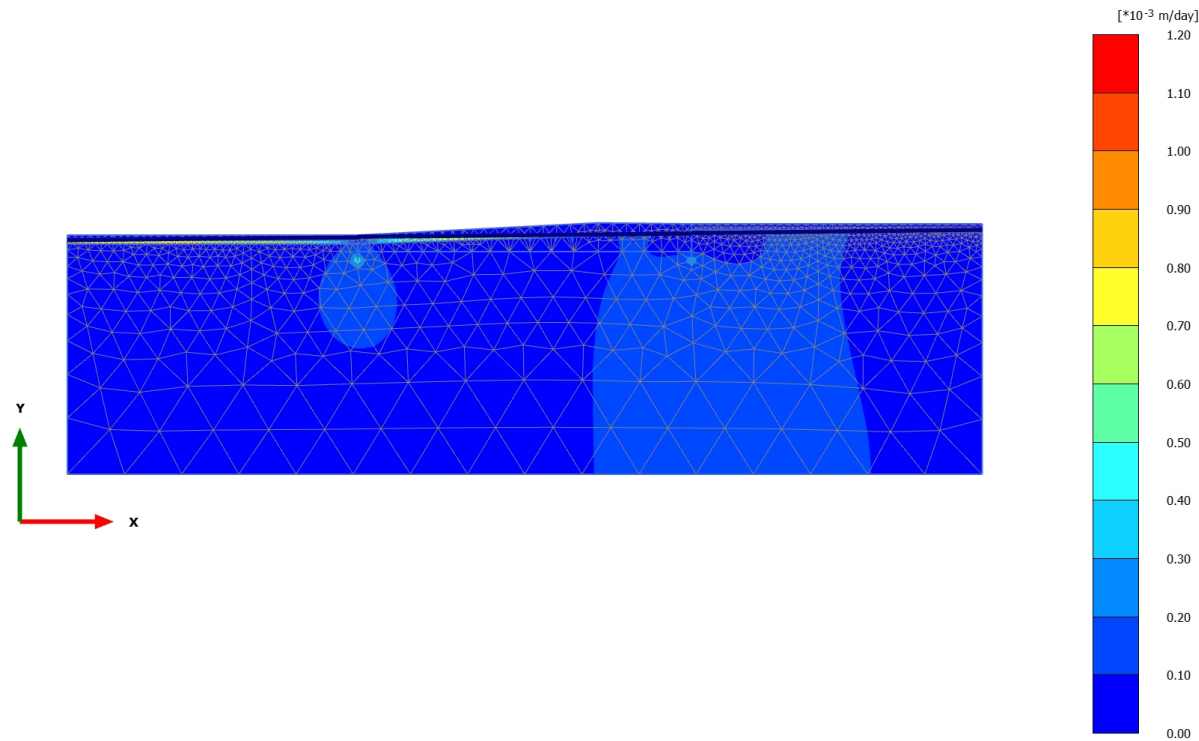


Groundwater head (scaled up 0.0500 times) (Time 101.0 day)

Maximum value = 110.0 m (Element 979 at Node 9221)

Minimum value = 102.8 m (Element 1327 at Node 10219)

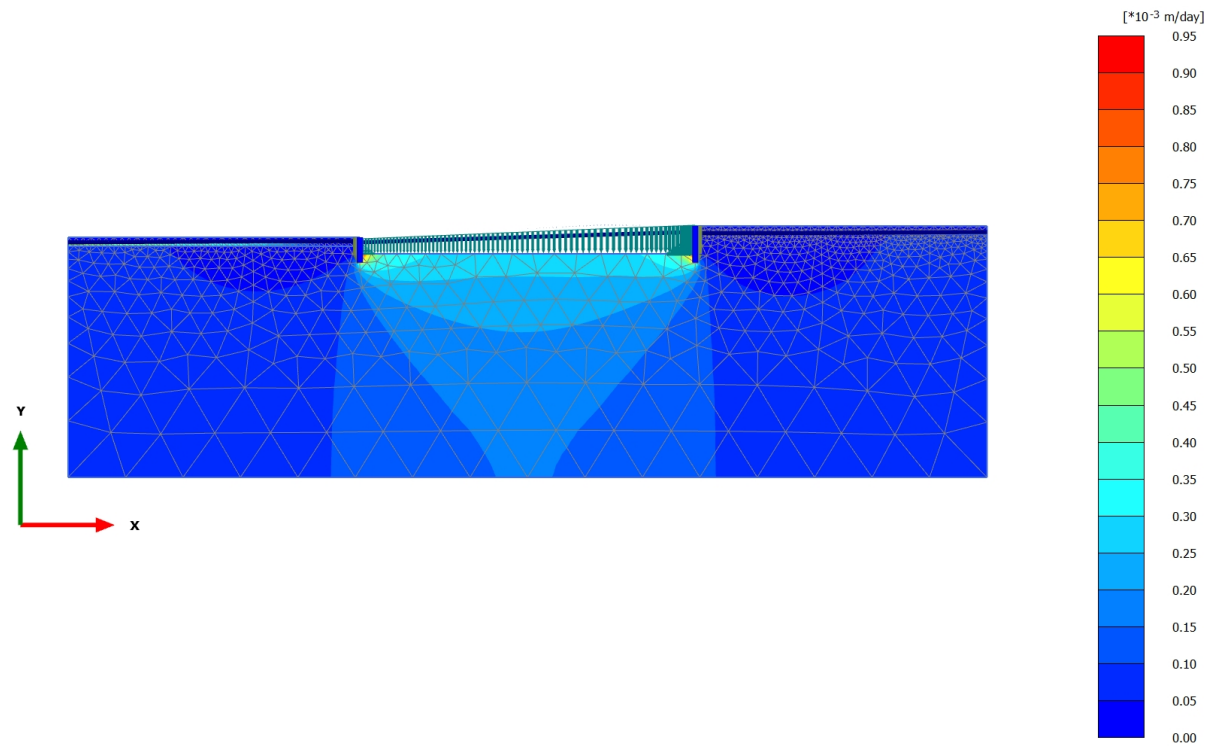
2.1.2.1.1 Calculation results, Initial phase [InitialPhase] (0/0), Groundwater flow $|q|$



Groundwater flow $|q|$ (scaled up 5.00×10^3 times) (Time 0.000 day)

Maximum value = $1.177 \times 10^{-3} \text{ m/day}$ (Element 358 at Node 2889)

Minimum value = $0.2683 \times 10^{-9} \text{ m/day}$ (Element 503 at Node 7721)

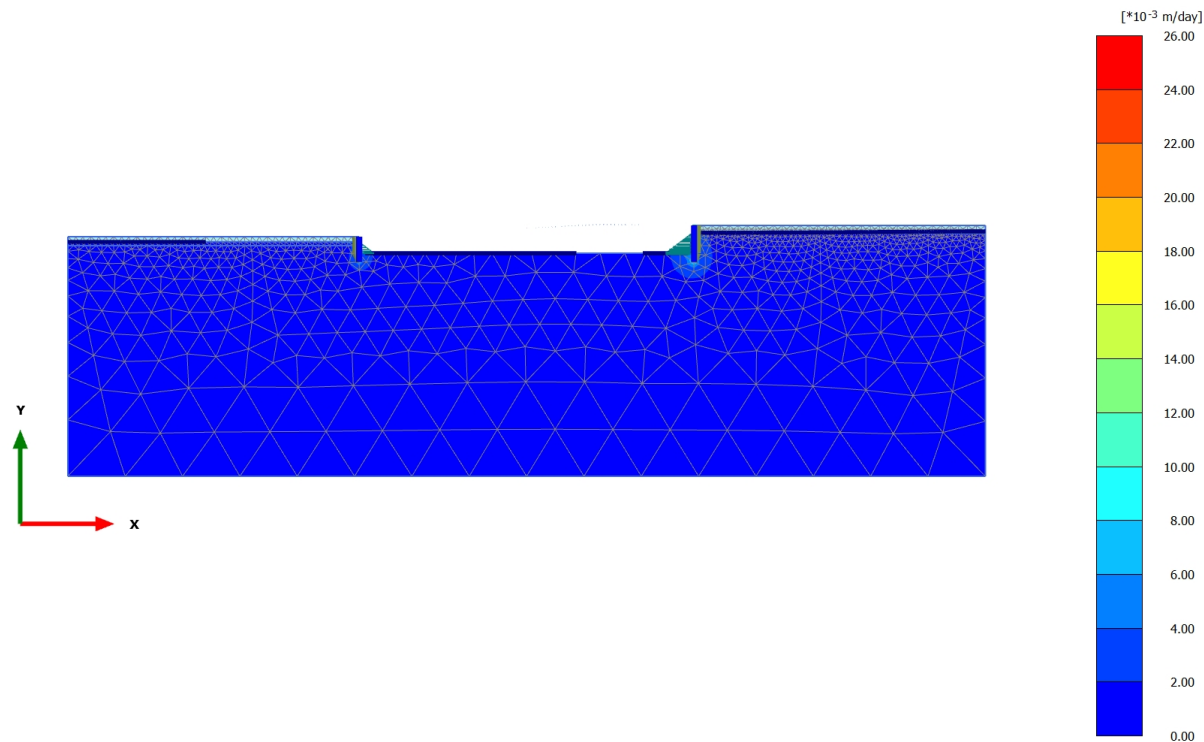
2.1.2.1.2 Calculation results, Phase_1 [Phase_1] (1/1), Groundwater flow $|q|$ 

Groundwater flow $|q|$ (scaled up $10.0 \cdot 10^3$ times) (Time 0.000 day)

Maximum value = $0.9304 \cdot 10^{-3}$ m/day (Element 1509 at Node 13337)

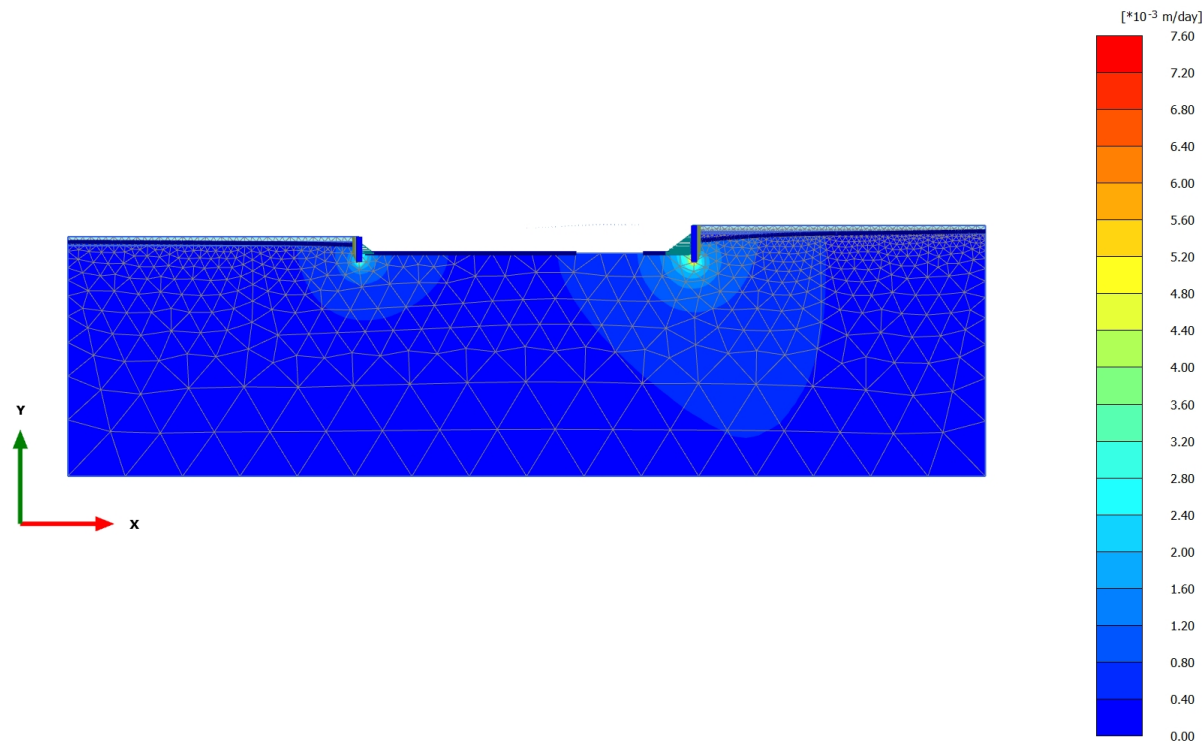
Minimum value = $0.1502 \cdot 10^{-9}$ m/day (Element 32 at Node 7021)

2.1.2.1.3 Calculation results, Short Term [Phase_2] (2/13), Groundwater flow $|q|$

**Groundwater flow $|q|$ (scaled up 500 times) (Time 1.000 day)**

Maximum value = 0.02489 m/day (Element 815 at Node 12179)

Minimum value = 0.8691×10^{-6} m/day (Element 328 at Node 4113)

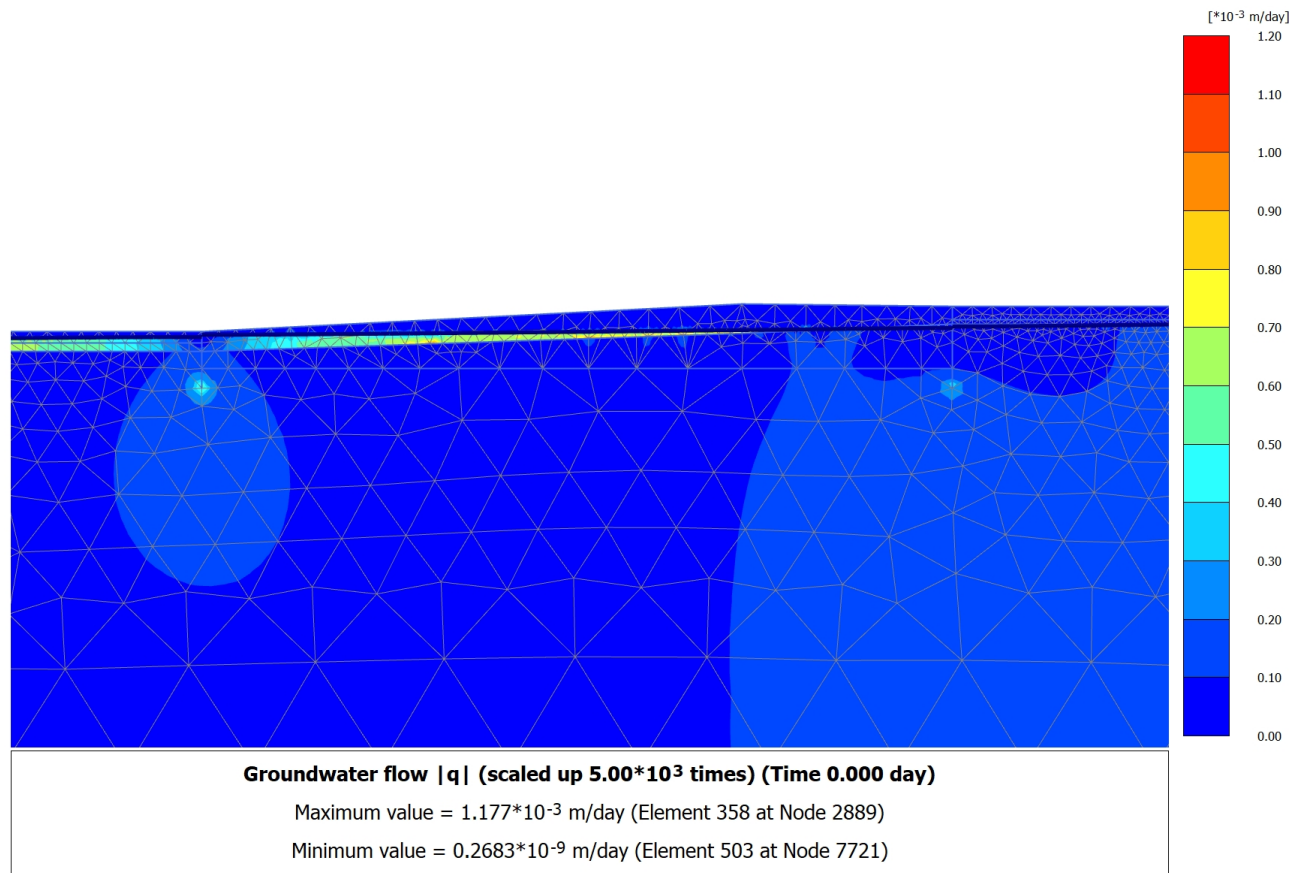
2.1.2.1.4 Calculation results, Long Term [Phase_3] (3/495), Groundwater flow $|q|$ 

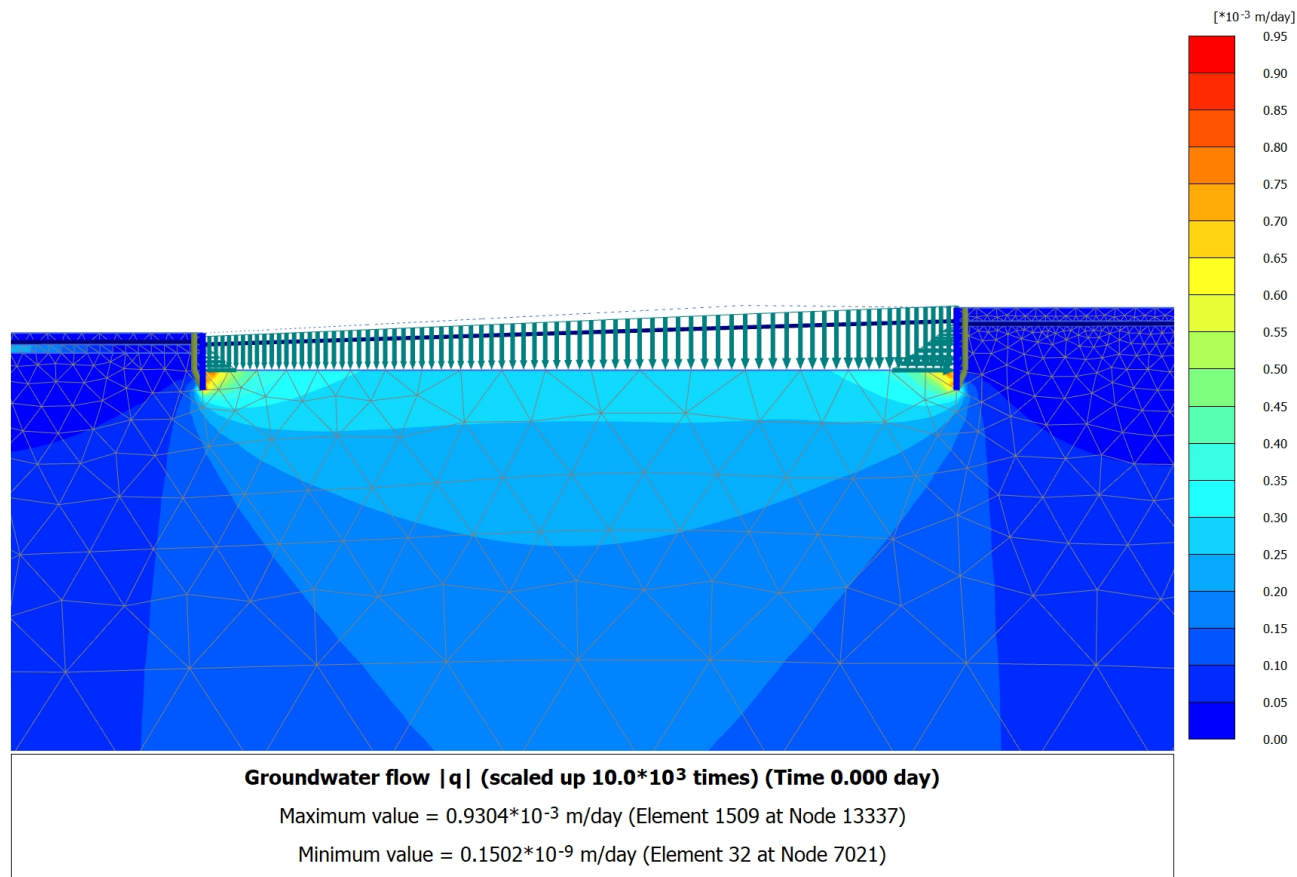
Groundwater flow $|q|$ (scaled up $1.00 \cdot 10^3$ times) (Time 101.0 day)

Maximum value = $7.292 \cdot 10^{-3}$ m/day (Element 1427 at Node 9491)

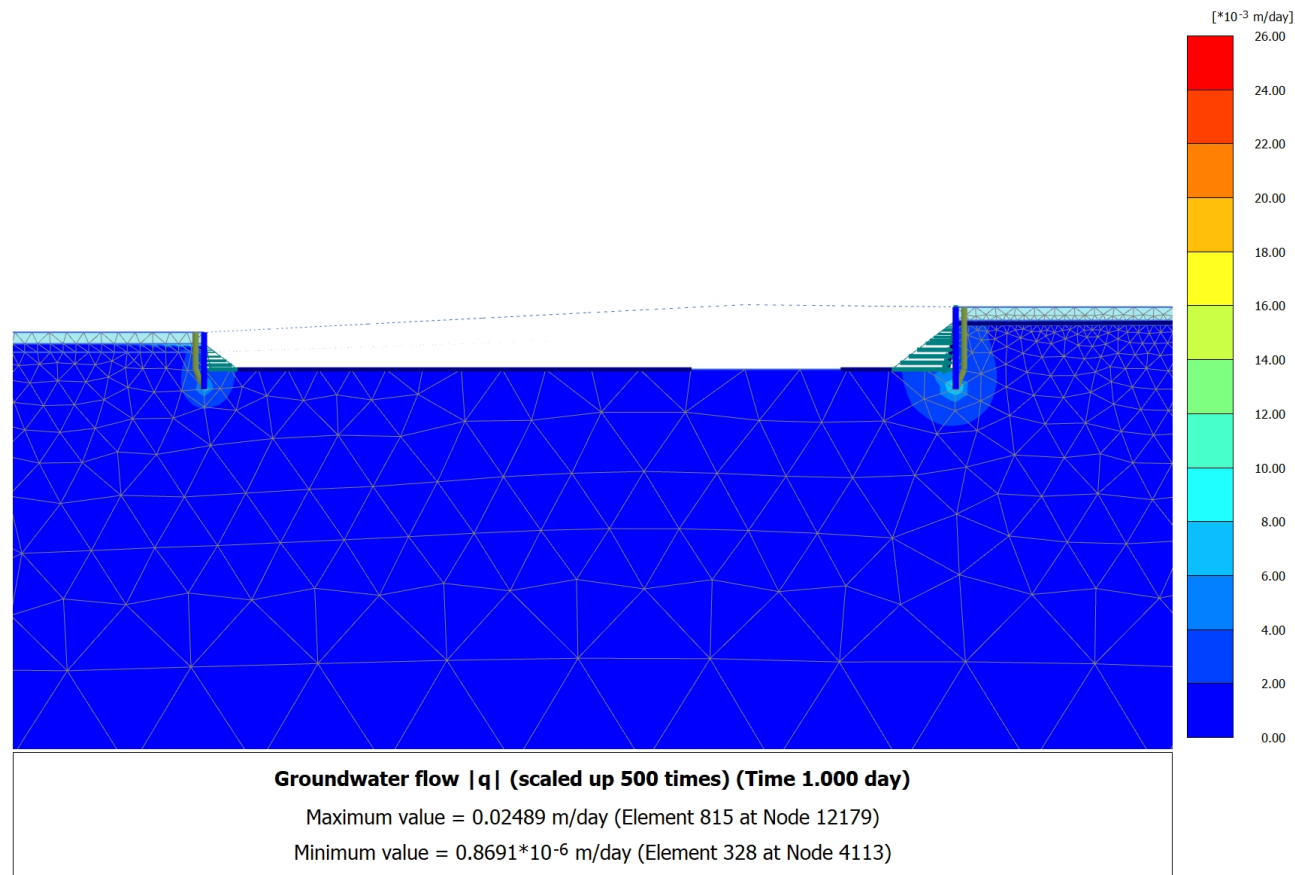
Minimum value = $0.1952 \cdot 10^{-6}$ m/day (Element 448 at Node 7636)

4.1.1 Calculation results, Initial phase [InitialPhase] (0/0), Groundwater flow $|q|$

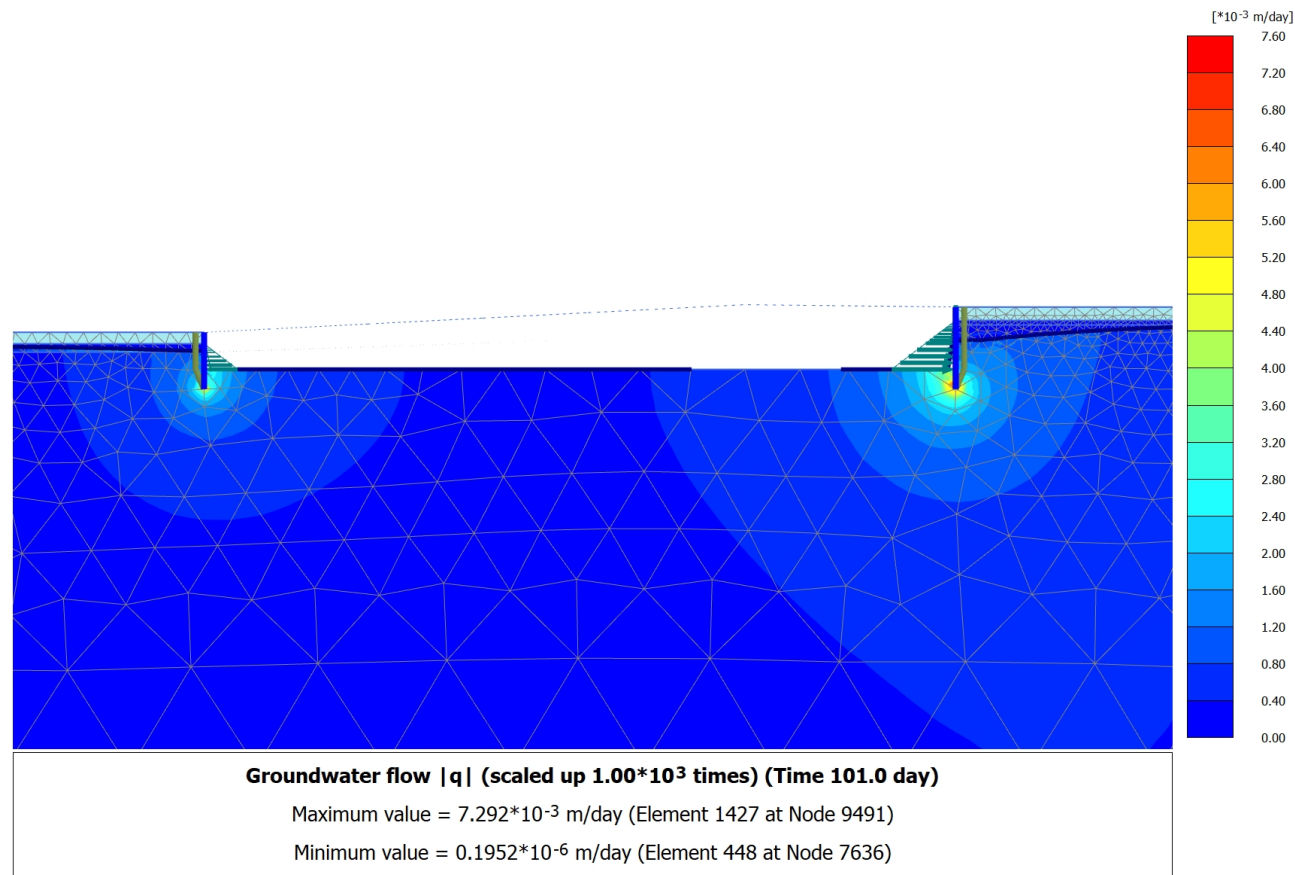


4.1.2 Calculation results, Phase_1 [Phase_1] (1/1), Groundwater flow $|q|$ 

4.1.3 Calculation results, Short Term [Phase_2] (2/13), Groundwater flow |q|



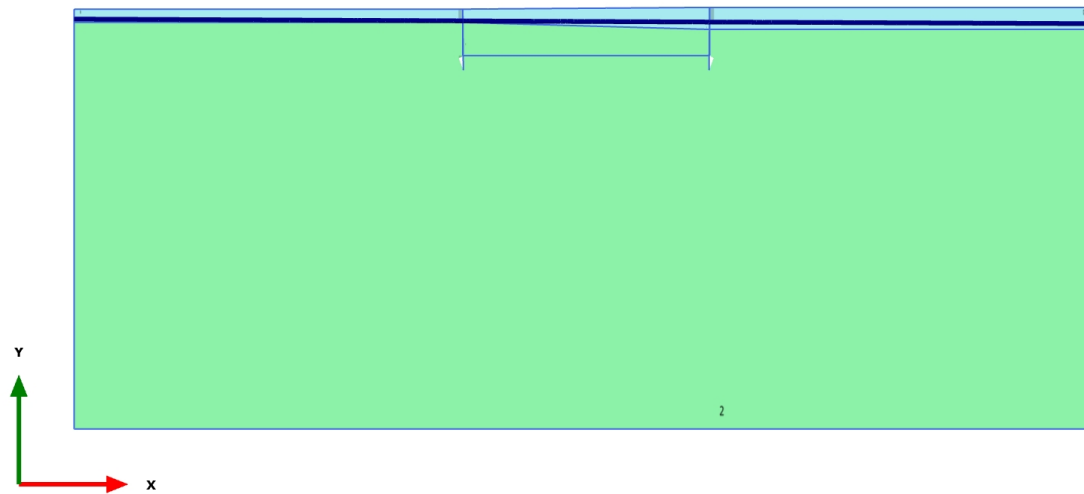
4.1.4 Calculation results, Long Term [Phase_3] (3/495), Groundwater flow $|q|$



PLAXIS Report

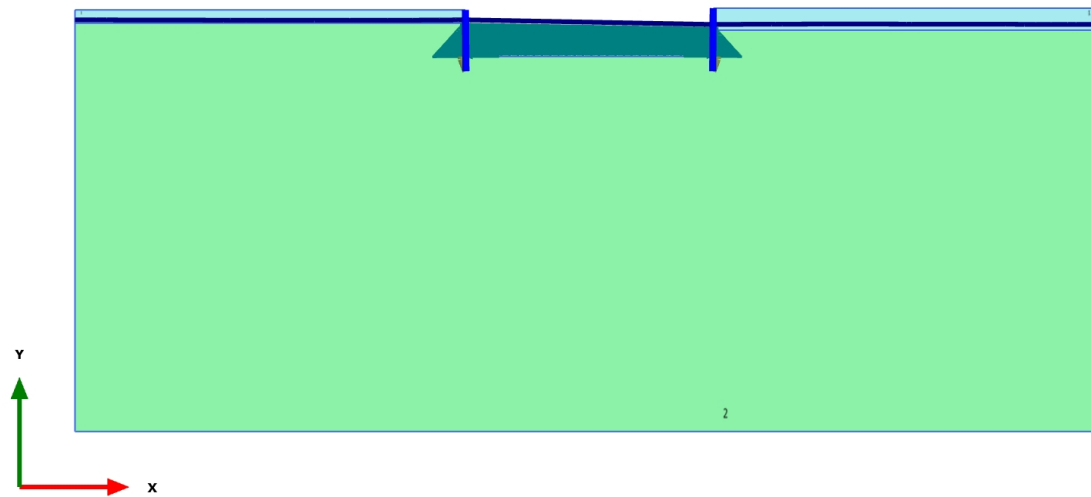
Filename	P3540_Gordon_Section2 cut off.p2dx
Directory	C:\Users\Plaxis\Morrow Geotechnics\MG - Documents\1. Projects\P3500-P3599\P3540_Gordon, 21-25 McIntosh St & 55 Werona Ave\08_Groundwater\
Title	P3540_Gordon_Section2(GW)
Model	Plane strain
Elements	15-Noded
PLAXIS Version	Version 2024.2.0.1144

1.1.1.1 Calculation results, Initial phase [InitialPhase] (0/0), Materials plot



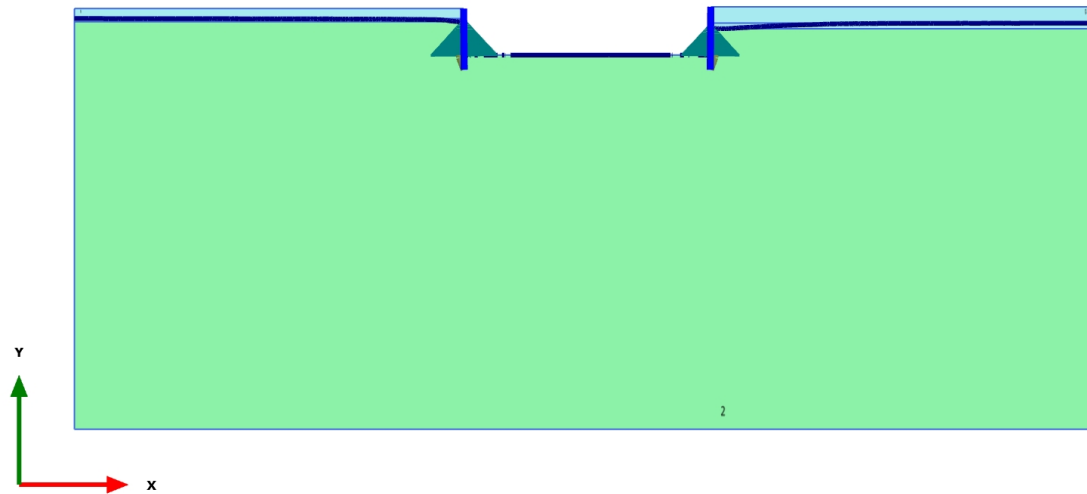
Materials plot

1.1.1.2 Calculation results, Phase_1 [Phase_1] (1/1), Materials plot



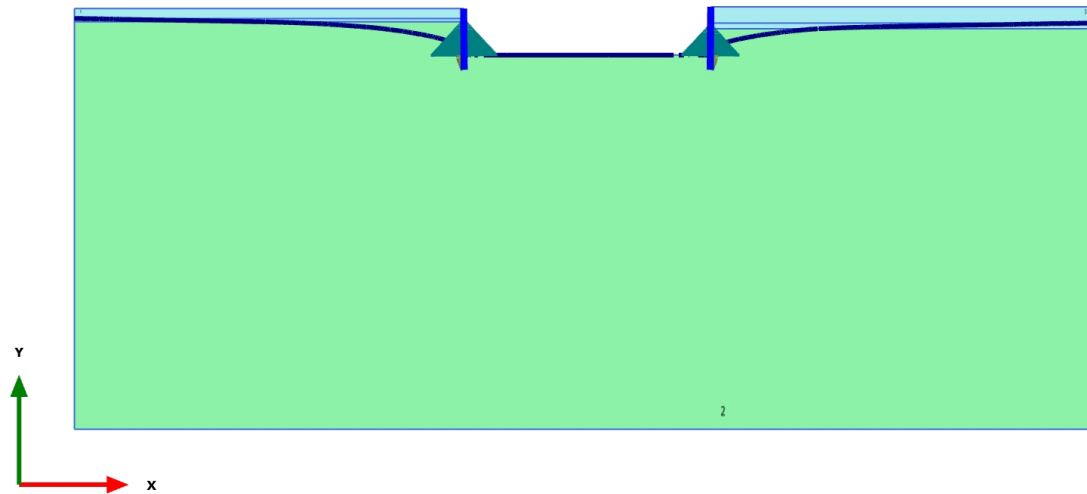
Materials plot

1.1.1.3 Calculation results, Short Term [Phase_2] (2/21), Materials plot



Materials plot

1.1.1.4 Calculation results, Long Term [Phase_3] (3/40), Materials plot



Materials plot

1.1.2.1.1 Materials - Soil and interfaces - Mohr-Coulomb

Identification number		1	2
Identification		Soil	Rock
Soil model		Mohr-Coulomb	Mohr-Coulomb
Drainage type		Drained	Drained
Colour			
Comments			
y_unsat	kN/m ³	18.00	24.00
y_sat	kN/m ³	19.00	24.00
e_init		0.5000	0.5000
n_init		0.3333	0.3333
Input method		SDOF equivalent	SDOF equivalent
Rayleigh α		0.000	0.000
Rayleigh β		0.000	0.000
ξ_1	%	0.000	0.000
ξ_2	%	0.000	0.000
f_1	Hz	0.1000	0.1000
f_2	Hz	1.000	1.000

Identification number		1	2
E'_ref	kN/m ²	20.00E3	200.0E3
v (nu)		0.3000	0.3000
G_ref	kN/m ²	7692	76.92E3
E_oed	kN/m ²	26.92E3	269.2E3
E'_inc	kN/m ² /m	0.000	0.000
y_ref	m	0.000	0.000
V_s	m/s	64.75	177.3
V_p	m/s	121.1	331.7
c'_ref	kN/m ²	100.0	100.0
φ' (phi)	°	45.00	45.00
ψ (psi)	°	0.000	0.000
c'_inc	kN/m ² /m	0.000	0.000
y_ref	m	0.000	0.000
Tension cut-off		True	True
Tensile strength	kN/m ²	0.000	0.000
Determination		v-undrained definition	v-undrained definition
v_u definition method		Direct	Direct
v_u, equivalent (nu)		0.4950	0.4950
Skempton B		0.9783	0.9783

Identification number		1	2
K _{w,ref/n}	kN/m ²	750.0E3	7.500E6
Classification type		Standard	Standard
Soil class (Standard)		Coarse	Coarse
< 2 μm	%	10.00	10.00
2 μm - 50 μm	%	13.00	13.00
50 μm - 2 mm	%	77.00	77.00
Use defaults		False	False
k _x	m/day	0.06981	8.640E-3
k _y	m/day	0.06981	8.640E-3
Void ratio dependency		False	False
c _k		1000E12	1000E12
n _{init}		0.3333	0.3333
-ψ _{unsat}	m	10.00E3	10.00E3
c _s	kJ/t/K	0.000	0.000
λ _s	kW/m/K	0.000	0.000
ρ _s	t/m ³	2.600	2.600
Thermal expansion type		Isotropic	Isotropic
α _{sv}	1/K	0.000	0.000
Phase change		False	False

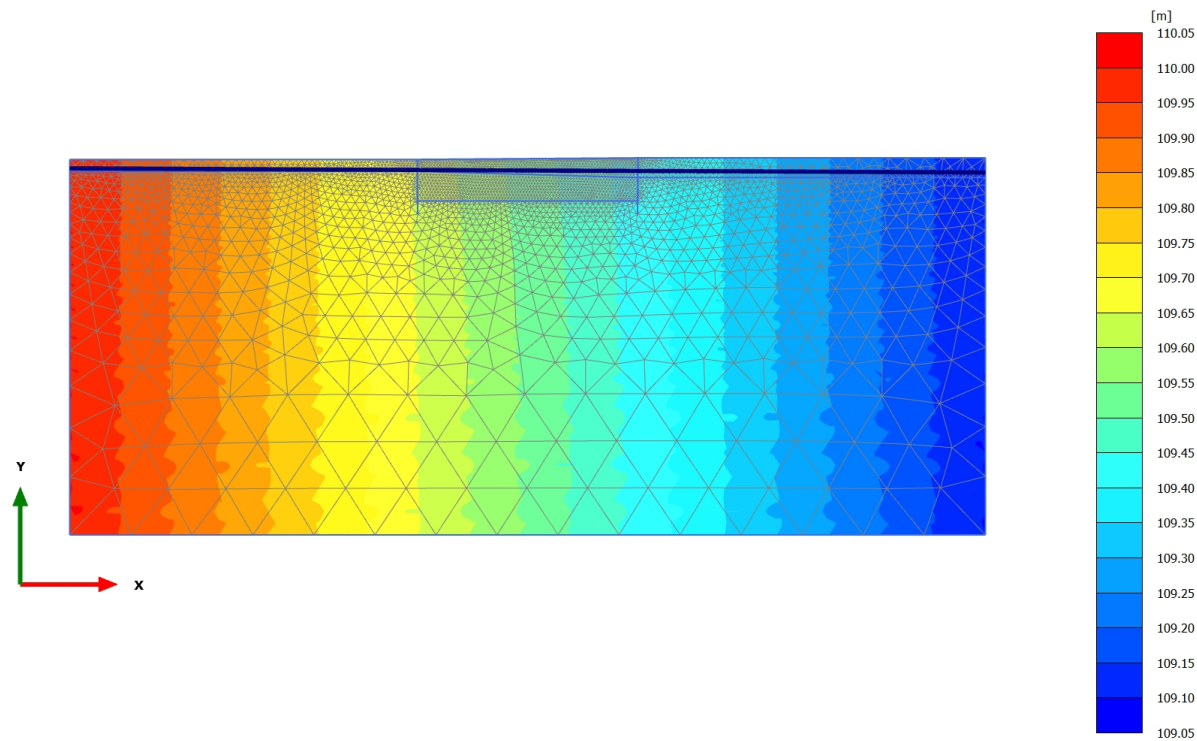
Identification number		1	2
D_v	m ² /day	0.000	0.000
f_Tv		0.000	0.000
Stiffness determination		Derived	Derived
Strength determination		Rigid	Rigid
R_inter		1.000	1.000
Consider gap closure		True	True
Cross permeability		Impermeable	Impermeable
Drainage conductivity, dk	m ³ /day/m	0.000	0.000
R_thermal	m ² K/kW	0.000	0.000
K_0 determination		Automatic	Automatic
K_0,x		0.2929	0.2929
K_0,z		0.2929	0.2929

1.1.2.2 Materials - Plates

Identification number		1
Identification		Cut off wall
Material type		Elastic
Colour		
Comments		
w	kN/m/m	0.000
Input method		Direct
Rayleigh α		0.000
Rayleigh β		0.000
Prevent punching		False
Isotropic		True
EA_1	kN/m	1.894E6
EA_2	kN/m	1.894E6
E_1	kN/m ²	5.392E6
E_2	kN/m ²	5.392E6
EI	kN m ² /m	19.46E3
v (nu)		0.2000

Identification number		1
d	m	0.3512
c	kJ/t/K	0.000
λ	kW/m/K	0.000
ρ	t/m ³	0.000
α	1/K	0.000
A_eff,T	m ²	0.000

2.1.1.1.1 Calculation results, Initial phase [InitialPhase] (0/0), Groundwater head

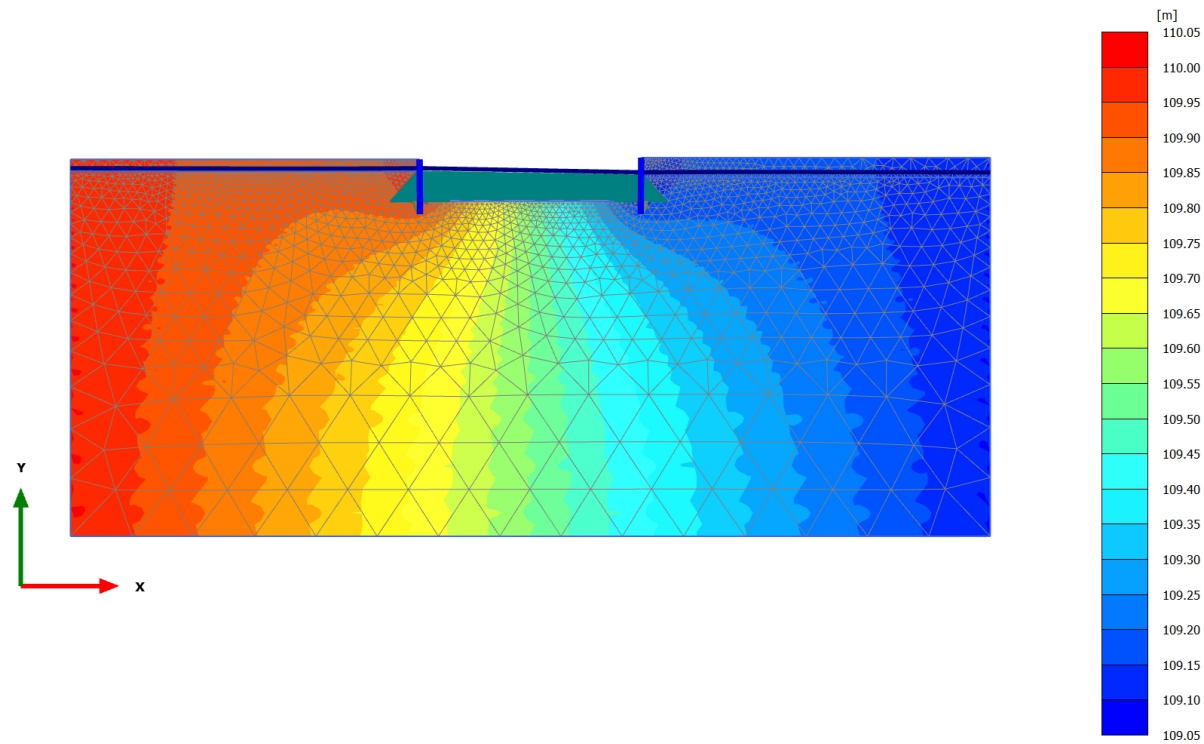


Groundwater head (scaled up 0.0500 times) (Time 0.000 day)

Maximum value = 110.0 m (Element 3636 at Node 15903)

Minimum value = 109.1 m (Element 3631 at Node 20491)

2.1.1.1.2 Calculation results, Phase_1 [Phase_1] (1/1), Groundwater head

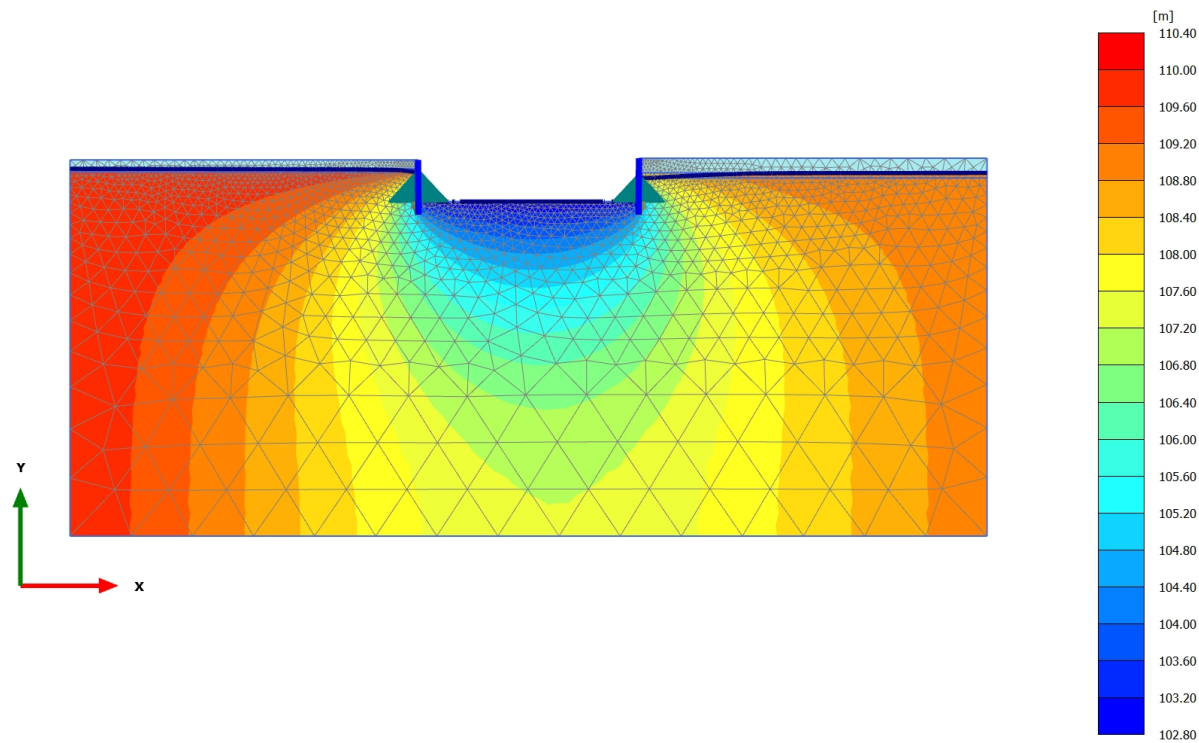


Groundwater head (scaled up 0.0500 times) (Time 0.000 day)

Maximum value = 110.0 m (Element 3636 at Node 15903)

Minimum value = 109.1 m (Element 3653 at Node 20511)

2.1.1.1.3 Calculation results, Short Term [Phase_2] (2/21), Groundwater head

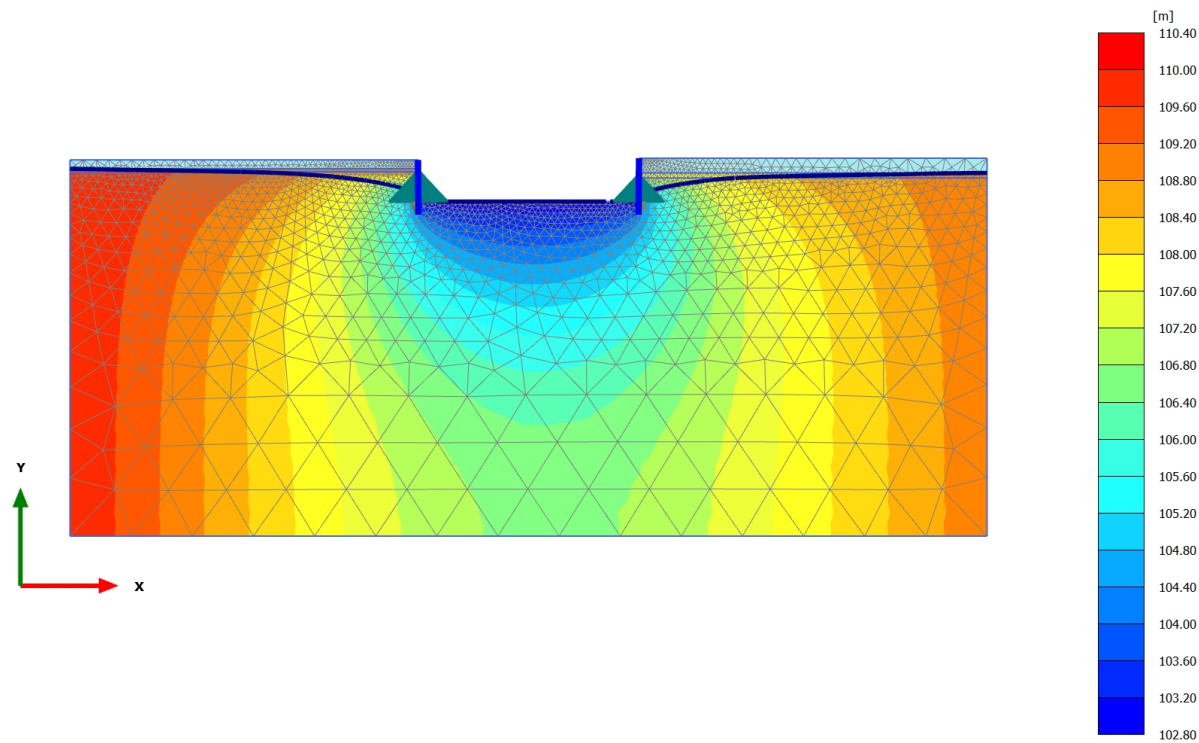


Groundwater head (scaled up 0.0500 times) (Time 1.000 day)

Maximum value = 110.0 m (Element 3636 at Node 15899)

Minimum value = 102.9 m (Element 5646 at Node 17325)

2.1.1.1.4 Calculation results, Long Term [Phase_3] (3/40), Groundwater head

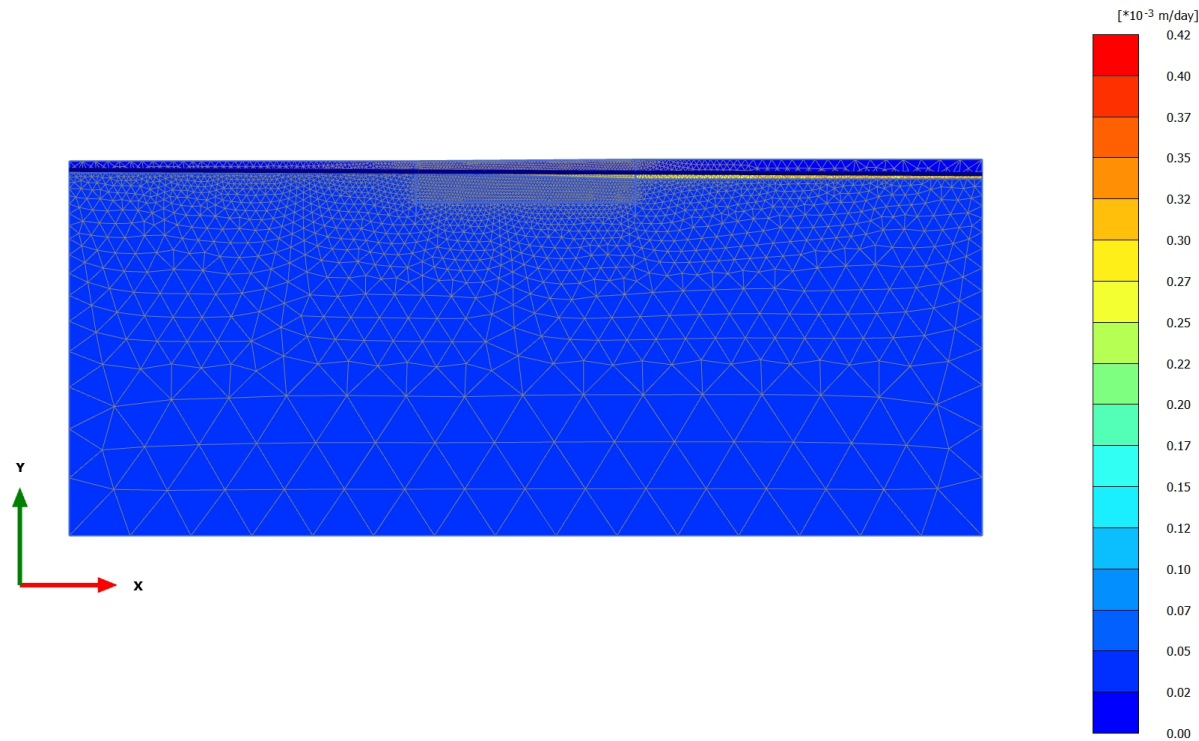


Groundwater head (scaled up 0.0500 times) (Time 101.0 day)

Maximum value = 110.0 m (Element 3636 at Node 15899)

Minimum value = 102.9 m (Element 5646 at Node 17325)

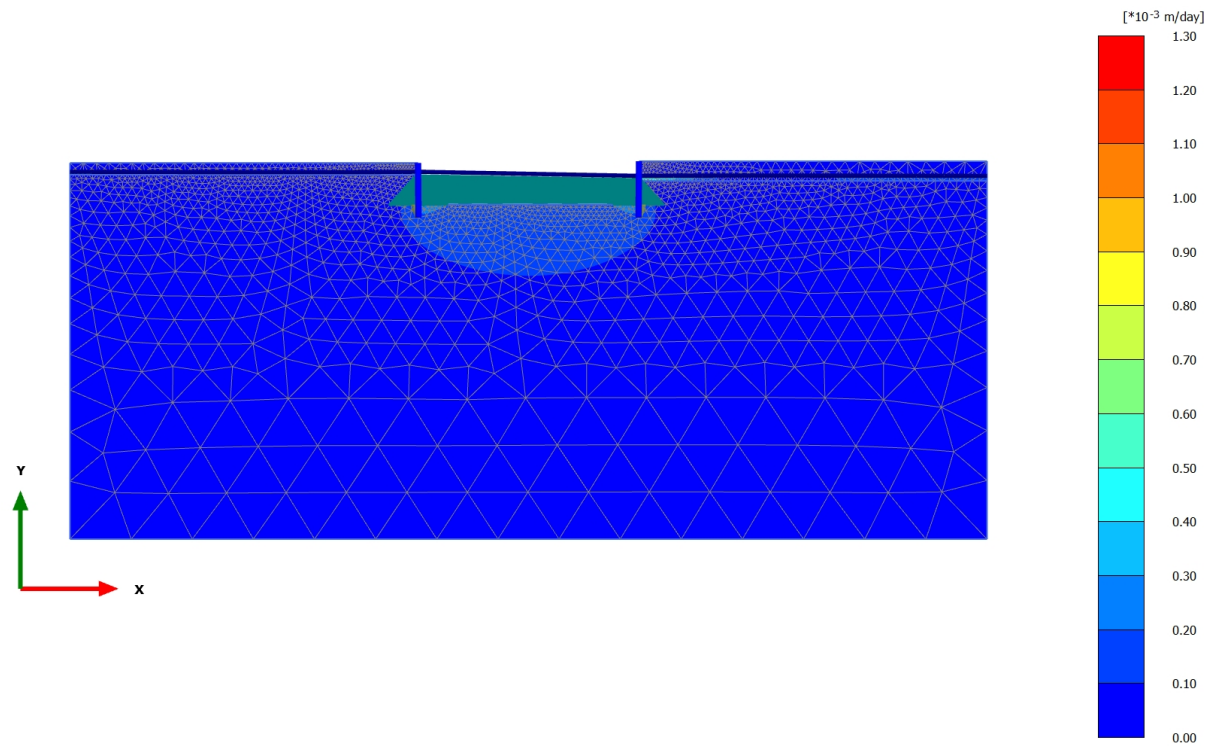
2.1.2.1.1 Calculation results, Initial phase [InitialPhase] (0/0), Groundwater flow $|q|$



Groundwater flow $|q|$ (scaled up 20.0×10^3 times) (Time 0.000 day)

Maximum value = 0.4237×10^{-3} m/day (Element 792 at Node 7269)

Minimum value = 5.282×10^{-9} m/day (Element 2 at Node 215)

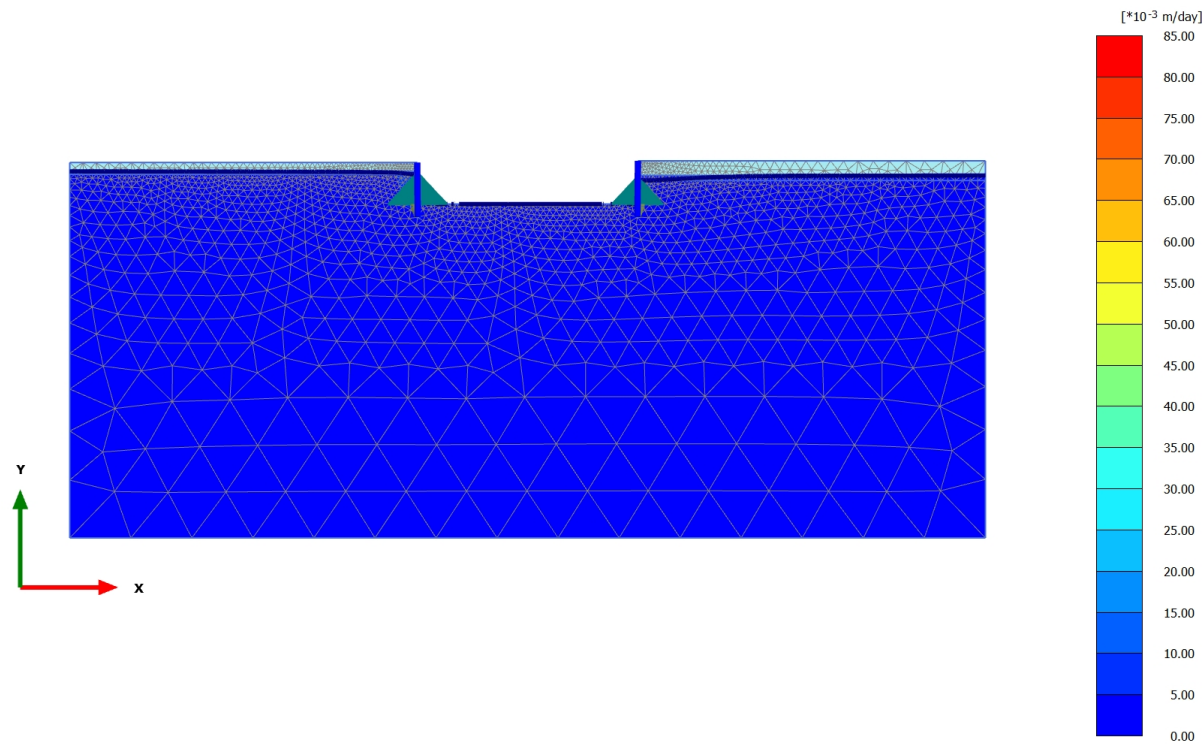
2.1.2.1.2 Calculation results, Phase_1 [Phase_1] (1/1), Groundwater flow $|q|$ 

Groundwater flow $|q|$ (scaled up 5.00×10^3 times) (Time 0.000 day)

Maximum value = 1.293×10^{-3} m/day (Element 6059 at Node 16949)

Minimum value = 0.4436×10^{-12} m/day (Element 634 at Node 37626)

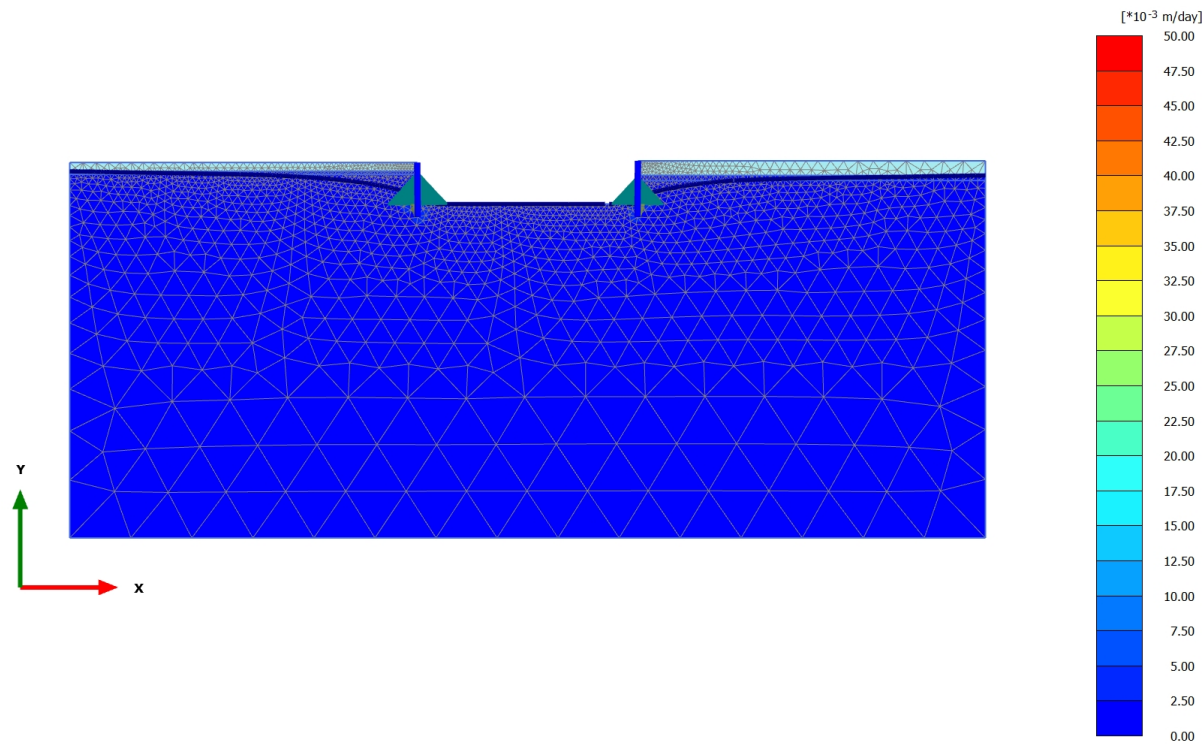
2.1.2.1.3 Calculation results, Short Term [Phase_2] (2/21), Groundwater flow $|q|$



Groundwater flow $|q|$ (scaled up 50.0 times) (Time 1.000 day)

Maximum value = 0.08105 m/day (Element 2244 at Node 36360)

Minimum value = 4.641×10^{-6} m/day (Element 2225 at Node 28020)

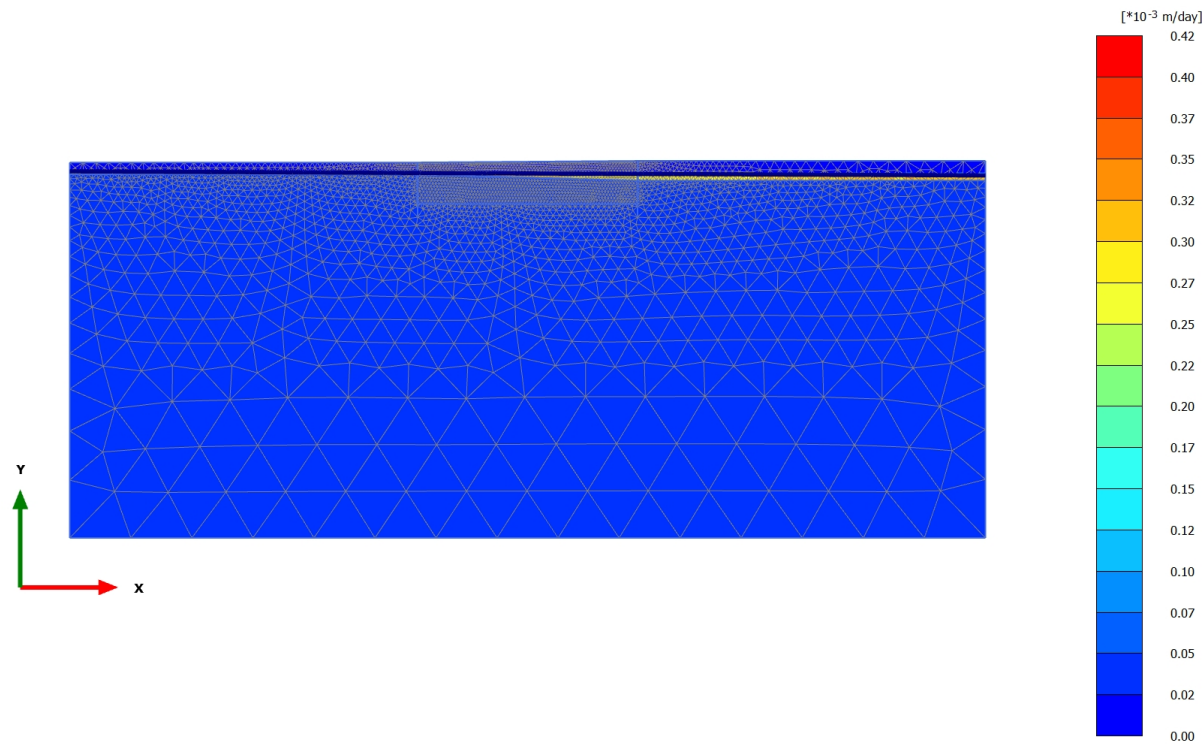
2.1.2.1.4 Calculation results, Long Term [Phase_3] (3/40), Groundwater flow $|q|$ 

Groundwater flow $|q|$ (scaled up 100 times) (Time 101.0 day)

Maximum value = 0.04978 m/day (Element 6059 at Node 16949)

Minimum value = 0.2686×10^{-6} m/day (Element 2083 at Node 8402)

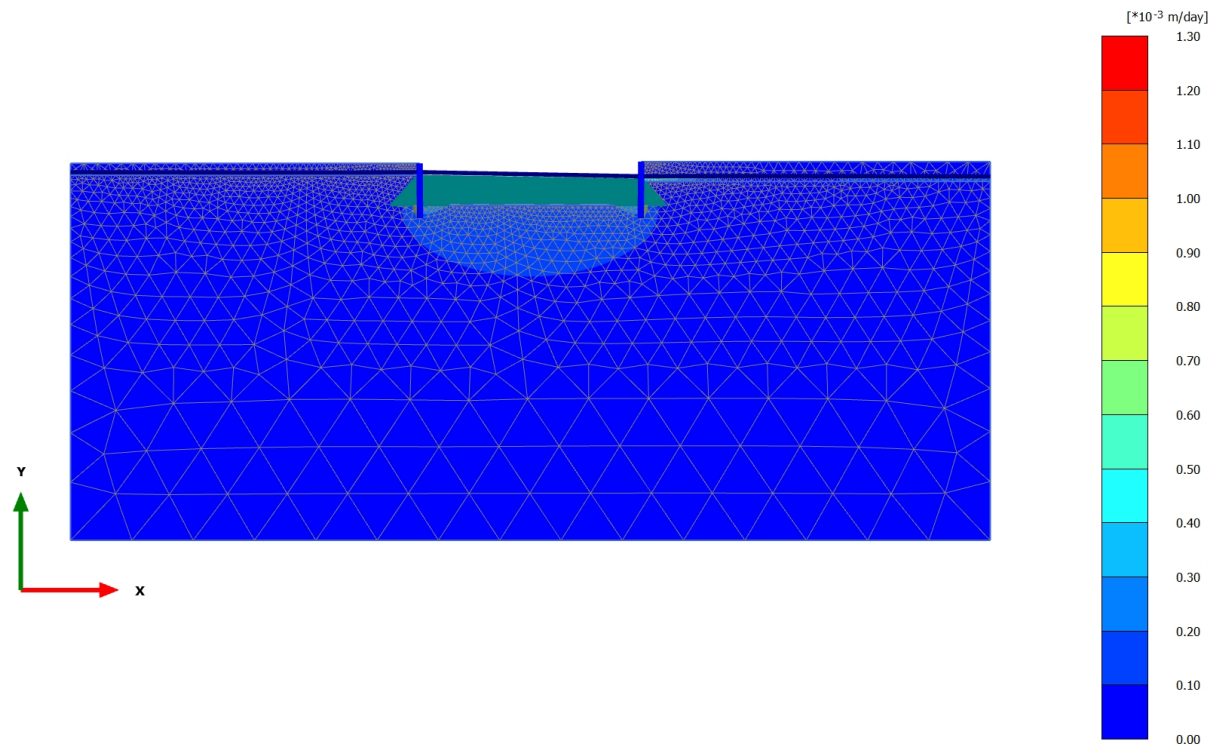
4.1.1 Calculation results, Initial phase [InitialPhase] (0/0), Groundwater flow $|q|$



Groundwater flow $|q|$ (scaled up 20.0×10^3 times) (Time 0.000 day)

Maximum value = 0.4237×10^{-3} m/day (Element 792 at Node 7269)

Minimum value = 5.282×10^{-9} m/day (Element 2 at Node 215)

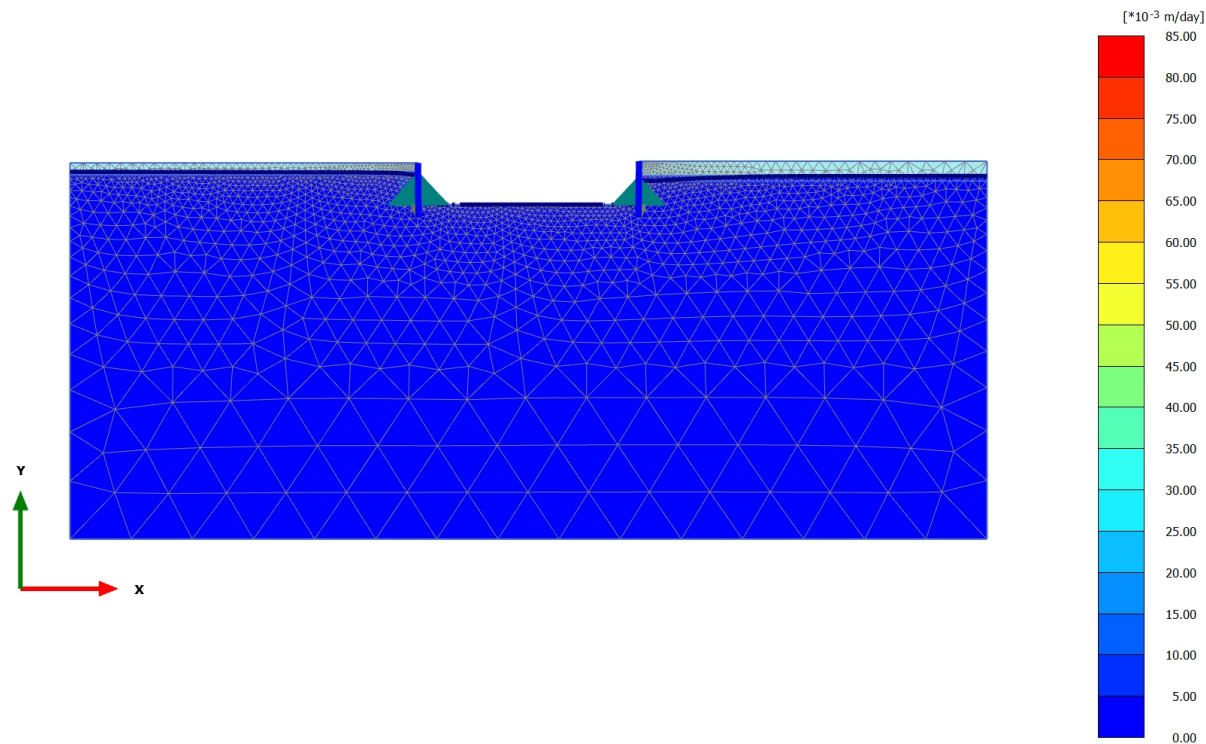
4.1.2 Calculation results, Phase_1 [Phase_1] (1/1), Groundwater flow $|q|$ 

Groundwater flow $|q|$ (scaled up $5.00*10^3$ times) (Time 0.000 day)

Maximum value = $1.293*10^{-3} \text{ m/day}$ (Element 6059 at Node 16949)

Minimum value = $0.4436*10^{-12} \text{ m/day}$ (Element 634 at Node 37626)

4.1.3 Calculation results, Short Term [Phase_2] (2/21), Groundwater flow $|q|$

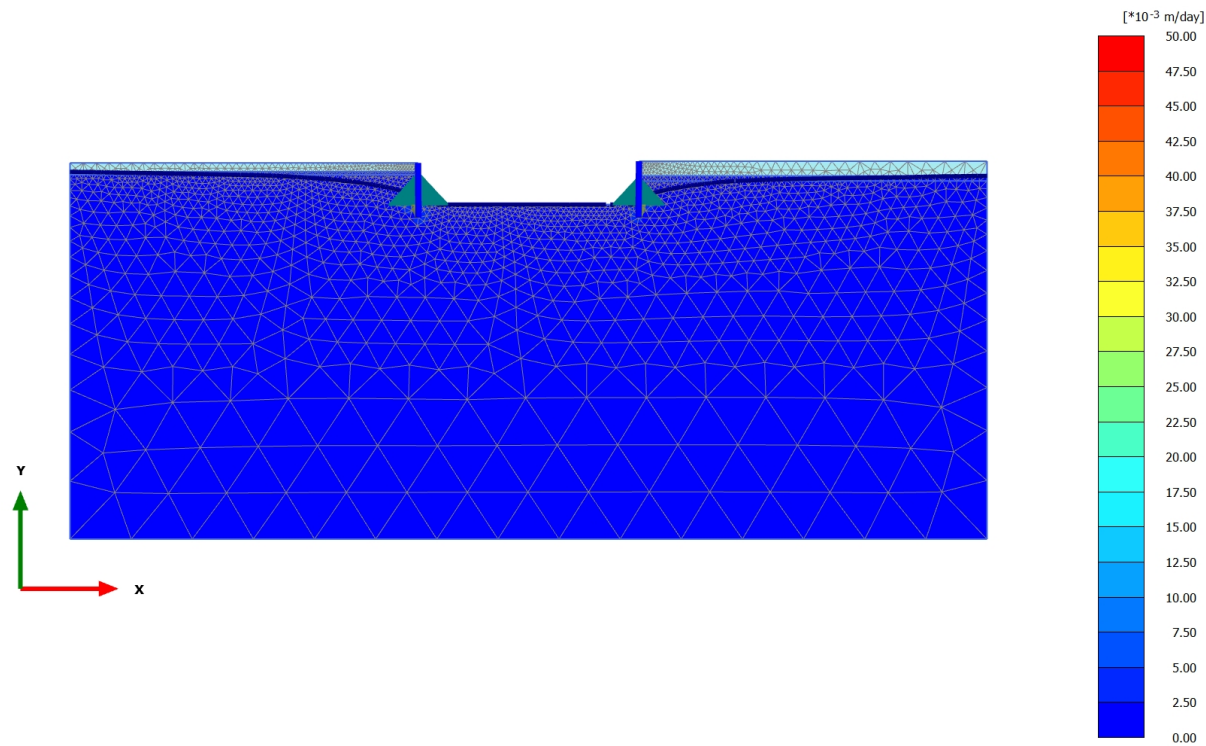


Groundwater flow $|q|$ (scaled up 50.0 times) (Time 1.000 day)

Maximum value = 0.08105 m/day (Element 2244 at Node 36360)

Minimum value = 4.641×10^{-6} m/day (Element 2225 at Node 28020)

4.1.4 Calculation results, Long Term [Phase_3] (3/40), Groundwater flow $|q|$



Groundwater flow $|q|$ (scaled up 100 times) (Time 101.0 day)

Maximum value = 0.04978 m/day (Element 6059 at Node 16949)

Minimum value = 0.2686×10^{-6} m/day (Element 2083 at Node 8402)

APPENDIX C

RECORD OF GROUNDWATER TAKE UNDER EXEMPTION

Record of groundwater take under exemption

For groundwater taken under a water access licence exemption for certain aquifer interference activities

Use this form to record and report groundwater taken by aquifer interference activities¹ when claiming either of the following water access licence exemptions (*please mark which exemption you are claiming*):

☐ Taking up to 3 ML per water year per groundwater source through certain² aquifer interference activities in connection with an authorised project³ ('the **<3 ML aquifer interference exemption**') (see clauses 21 (1), 21 (6), 231 (1) and clause 7 of Schedule 4 of the *Water Management (General) Regulation 2018*),

or

☐ Taking more than 3 ML of groundwater per water year from the Botany Sands Groundwater Source for the purposes of excavation dewatering ('the **>3 ML excavation exemption**') (see clauses 21 (1), 230 (5) and 231 (6) and clause 17A of Schedule 4 of the *Water Management (General) Regulation 2018*).

What you need to do

You will need to complete and submit a separate form for each authorised project and each groundwater source that you take water from every water year (1 July – 30 June) that you take water.

To claim the **>3 ML excavation exemption**, a meter must be used to record the take but telemetry is not required.

To claim either of the exemptions, you must meet the conditions of the relevant exemption, including record-keeping and reporting requirements set out in the *Water Management (General) Regulation 2018* and in this form. These requirements are in addition to any record-making and reporting requirements of any related approvals or authorisations you hold for your project.

This form is the approved form and manner for the purpose of clauses 21 (6) (c), 21 (6) (e), 230 (5) (b) (i) and 231 (6) (b) (i) of the *Water Management (General) Regulation 2018*.

Please read the **additional information** contained in the notes on pages 8 and 10. If there is insufficient room in any field please provide the information as an attachment.

Ensure you complete Sections A-E and H, and Section F or G as applicable.

Please complete the form with a black/blue ink pen and use BLOCK letters. You can also type directly in this form. Once completed, please print and sign the form. If there is not enough space in the form, please attach additional pages to the back of the form.

Submit your application form

You must submit a copy of the completed form no later than 28 days after the end of the water year in which the water was taken (that is by 29th July) or earlier if requested²⁰. Please return your completed form/s and any attachments

- by post to **WaterNSW, PO Box 398, Parramatta NSW 2124**, or
- email a scanned copy to **suellen.howe@waternsw.com.au**

Section A: Summary of water taken under exemption

Identify the water year that applies to this record and the total volume of groundwater that was taken under the exemption in that water year.

A1 Water year (1 July - 30 June 20xx)	A2 Total recorded volume⁴ taken within the water year (in megalitres or litres)		ML
			L
A3 Groundwater source ⁵ Sydney Basin Central Groundwater Source			
A4 Reference number ⁶ 10WA125007			

Section B: Project authorisation⁷

B1 ☐ Complying development ⁸ ☐ Exemption applies	
or If your project is not a complying development or exempt from authorisation please provide details of the approval, consent, licence, permit or other form of authorisation for your project .	
B2 Authorisation number/s	B3 Determining authority

If claiming the **>3 ML excavation exemption** please provide the annual water extraction limit stated on your water supply work approval⁹.

B4 Annual extraction limit (ML)	
---------------------------------	--

Section C: Details of person taking water¹⁰

C1 Name		
C2 Company/organisation (including ACN)		
C3 Postal address		
C4 Suburb	C5 State	C6 Postcode
C7 Phone	C8 Mobile phone	
C9 Email		

Section D: Activity description

D1 Project name
D2 Describe the activity/s resulting in groundwater being taken ¹¹
D3 Describe the means by which the groundwater is being taken ¹²

Section E: Activity location

E1 Provide relevant groundwater work numbers¹³ if known

Please complete **either** E2 **or** E3.

E2 Locality or suburb¹⁴ (for explorers/large linear infrastructure only)

E3 For all other activities please complete one of the following:

Address

Suburb

State

Postcode

or

Lot/Deposited Plan/Section

or

GPS coordinates¹⁵ (*For example, 32.25316 S 148.60022 E*)

Section F: Record of metered volumes taken

Complete **either** Section F **or** Section G.

Complete this section to record metered volumes taken under either exemption.

For the **>3 ML excavation exemption** make a record in this section **for each week that water is taken**¹⁶. To claim this exemption, metering equipment¹⁷ must be used to record the groundwater taken.

For the **<3 ML aquifer interference exemption**, if a meter has been used to record the groundwater taken, record in this section the water taken for **each period of take** (rather than for each week) **no later than 24 hours after the water is taken**¹⁸. If the groundwater take was not measured using metering equipment, do not complete this section, **go to Section G**.

F1 **Meter brand and type**

F2 **Meter serial number**

F3

Week ending (only complete column for the >3 ML excavation exemption)	Start date and time	Start meter reading	End date and time	End meter reading	Volume taken	Units (L, ML)	Date and time record made

Section F: Record of metered volumes taken (cont)

This page provides additional space and may be copied multiple times, if needed.

F1 Meter brand and type		F2 Meter serial number	
--------------------------------	--	-------------------------------	--

F3

[illegible]

Section G: Record of non-metered volumes taken

Complete this section to record non-metered volumes taken under the **<3 ML aquifer interference exemption only**. Make a record of the water **taken for each period of take no later than 24 hours after water is taken**.

G1 Describe the method used to **measure** the volume of groundwater taken¹⁹

[illegible]

Section G: Record of non-metered volumes taken (cont)

This page provides additional space and may be copied multiple times, if needed.

[illegible]

Section H: Declaration

I declare all information contained in this record is accurate, true and complete.

H1 Signature	H2 Date	
H3 Name/Company officeholder		
H4 Position		
H5 Address		
H6 Suburb	H7 State	H8 Postcode
H9 Email		

Privacy statement

The personal information that is provided in this form will be managed by WaterNSW in accordance with its [Privacy Procedure](#), or other such Policy document as updated from time to time. The information provided in this form is being collected and used for purposes relating to the Water Access Licence Exemptions described in this form pursuant to the **Water Management Act 2000 (NSW)**. The information provided in this form may be disclosed to public authorities and other authorised parties as required.

If you choose not to provide the requested information in this form, you may not be able to take water under the relevant water licence exemption and you may be in breach of the **Water Management Act 2000**. You have the right to request access to, and correct details of, your personal information held by the NSW Department of Climate Change, Energy, the Environment and Water (NSW DCCEEW). Further information regarding privacy can be obtained from NSW DCCEEW's [website](#).

Offences

Giving false or misleading information is a serious offence under Part 5A of the **Crimes Act 1900**. It is an offence under section 91J of the **Water Management Act 2000** for a person to make a statement or furnish information in or in connection with a metering record required to be kept that the person knows to be false or misleading in a material particular.

Need help?

More information is available at waternsw.com.au/dewatering. If you need further assistance, please contact our Customer Service Centre on 1300 662 077, Monday to Friday from 8am - 5pm or email Customer.Helpdesk@waternsw.com.au

Notes

- 1** **Aquifer interference activity** has the same meaning as set out in the Dictionary to the **Water Management Act 2000** which is an activity involving any of the following:
 - a) the penetration of an aquifer,
 - b) the interference with water in an aquifer
 - c) the obstruction of the flow of water in an aquifer,
 - d) the taking of water from an aquifer in the course of carrying out mining, or any other activity prescribed by the regulations,
 - e) the disposal of water taken from an aquifer as referred to in paragraph d).
- 2** The activities to which the **<3 ML aquifer interference exemption** applies are listed in clause 7 (2) of Schedule 4 to the **Water Management (General) Regulation 2018**.
- 3** **Authorised project** is defined in clause 7 (5) of Schedule 4 to the **Water Management (General) Regulation 2018**, being an activity –
 - a) that is the subject of a consent, approval or other lawful authority conferred by or under an Act, or
 - b) to which Division 5.1 of the **Environmental Planning and Assessment Act 1979** applies, or
 - c) that is exempt development under that Act.
- 4** Record the **total volume of groundwater** taken in the water year for the groundwater source in either megalitres (ML) or litres (L).
- 5** If you are unsure which groundwater source you are taking water from check at:
<https://water.dpie.nsw.gov.au/our-work/plans-and-strategies/water-sharing-plans/status> or please contact WaterNSW or NRAR for assistance.

Note, if your project takes groundwater from more than one groundwater source, you will need to complete a form for each groundwater source from which you are taking water and claiming an exemption for.
- 6** As these exemptions commenced in December 2019 no **reference number** is available for the 2019/20 water year. In following years, provide the reference number that will be issued to you by WaterNSW or NRAR after submitting this record for a previous water year.
- 7** **Examples of authorisations** may include:
 - water supply work approvals granted under the **Water Management Act 2000**
 - water licences granted under the **Water Act 1912**
 - exploration licences or assessment leases granted under the **Mining Act 1992**
 - petroleum exploration licences and petroleum assessment leases granted under the **Petroleum (Onshore) Act 1991**
 - development consents granted under the **Environmental Planning and Assessment Act 1979**
- 8** **Complying development** is a combined planning and construction approval for straightforward development that can be determined through a fast-track assessment by a council or an accredited certifier.

- 9 It is a requirement of the **>3 ML excavation exemption** that the water supply work approval be subject to an annual extraction limit (see clause 17A (1) (a) of Schedule 4 to the **Water Management (General) Regulation 2018**).
- 10 For infrastructure or construction projects this may be the **proponent's representative** for example a contractor.
- 11 **Describe the activity/s taking groundwater** while conducting the aquifer interference activity, and the number of works involved.

For example:

- extraction using a battery of 15 spear points to dewater a building construction site
 - drilling 25 reverse circulation mineral exploration drillholes
 - groundwater extracted from a permanent sump in a building basement
 - pump-and-treat of contaminated groundwater from four extraction bores
 - evaporation from two artificial lakes that fill from groundwater
 - investigating a contaminated site
 - geotechnical or geoenvironmental investigation
 - groundwater extracted from a temporary trench or excavation
 - groundwater seepage from a cutting
 - water quality sampling from eight monitoring bores
 - conducting a pumping test on a bore
 - dewatering from six coal seam gas pilot production bores
 - groundwater extracted while drilling a ground source heating system
 - investigating groundwater resources
- 12 Examples of the **means by which the groundwater is taken** include surface pump, airlift, downhole/submersible pump, bailer, water removed with ground materials, water freely draining from a cutting, pit seepage / inflow, evaporation from artificial lake that has filled from groundwater. Where several means of take are involved please identify the number and type of each.
- 13 This is a departmental reference number 'GWxxxxxx'. For government owned monitoring bores this number is stamped on the bore headworks.
- 14 Provide name of locality or suburb that relates to the project.
- 15 Please provide GPS coordinates as longitude and latitude in decimal degrees.
- 16 For the **>3 ML excavation exemption**, the person claiming the exemption must record water taken on this record and keep a copy of this record for five years (see clauses 230 (5), 230 (6) and 238 (1) of the **Water Management (General) Regulation 2018**).
- 17 It is a condition of the **>3 ML excavation exemption** that the **mandatory metering equipment condition is required to be complied with** in respect of a water supply work being used to take the groundwater, except for clause 4 (3) of Schedule 8 to the **Water Management (General) Regulation 2018**. For the purposes of this exemption, metering equipment consists of a meter and a data logger. **Telemetry is not required under this exemption**. However, other metering equipment and standards may be specified by a condition of the water supply work approval.

In the **event metering equipment becomes faulty**, you must report within 24 hours to WaterNSW at waternsw.com.au/s91i. An offence applies under section 91IA of the **Water Management Act 2000** for failing to report faulty metering equipment within 24 hours.

- 18 For Section F (or Section G if using) you must make a new record for each period of take during your activity. The **period of take** is either the date groundwater was taken, or the start and end dates for a period of continuous take. This record must be retained for five years.
- 19 Examples of **non-metered methods used to measure** the volume of water taken include: v-notch weir or velocity times area; borehole, sump, bailer or bucket volume; evaporation or seepage calculation.
- 20 You may be required to give a copy of this form to the Minister or delegate earlier if requested (see clauses 21 (6), 230 (5) and 231 (6) of the **Water Management (General) Regulation 2018**).

APPENDIX D

IMPORTANT INFORMATION

This Document has been provided by Morrow Geotechnics Pty Ltd subject to the following limitations:

This Document has been prepared for the particular purpose outlined in Morrow Geotechnics' proposal and no responsibility is accepted for the use of this Document, in whole or in part, in other contexts or for any other purpose.

The scope and the period of Morrow Geotechnics' Services are as described in Morrow Geotechnics' proposal and are subject to restrictions and limitations. Morrow Geotechnics did not perform a complete assessment of all possible conditions or circumstances that may exist at the site referenced in the Document. The scope of services may have been limited by such factors as time, budget, site access or other site conditions. If a service is not expressly indicated, do not assume it has been provided. If a matter is not addressed, do not assume that any determination has been made by Morrow Geotechnics in regards to it. Any advice given within this document is limited to geotechnical considerations only. Other constraints particular to the project, including but not limited to architectural, environment, heritage and planning matters may apply and should be assessed independently of this advice.

Conditions may exist which were undetectable given the limited nature of the enquiry Morrow Geotechnics was retained to undertake with respect to the site. Variations in conditions may occur between investigatory locations, and there may be special conditions pertaining to the site which have not been revealed by the investigation and which have not therefore been taken into account in the Document. Accordingly, additional studies and actions may be required. No geotechnical investigation can provide a full understanding of all possible subsurface details and anomalies at a site.

In addition, it is recognised that the passage of time affects the information and assessment provided in this Document. Morrow Geotechnics' opinions are based upon information that existed at the time of the production of the Document. It is understood that the Services provided allowed Morrow Geotechnics to form no more than an opinion of the actual conditions of the site at the time the site was visited and cannot be used to assess the effect of any subsequent changes in the quality of the site, or its surroundings, or any laws or regulations.

Any assessments made in this Document are based on the conditions indicated from published sources and the investigation described. No warranty is included, either express or implied, that the actual conditions will conform exactly to the assessments contained in this Document.

Where data supplied by the client or other external sources, including previous site investigation data, have been used, it has been assumed that the information is correct unless otherwise stated. No responsibility is accepted by Morrow Geotechnics for incomplete or inaccurate data supplied by others.

Where ground conditions encountered at the site differ significantly from those anticipated in the report, either due to natural variability of subsurface conditions or construction activities, it is a condition of the report that Morrow Geotechnics be notified of any variations and be provided with an opportunity to review the recommendations of this report.

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