

The background of the entire page is a photograph of a construction site. It shows a large, yellow excavator with a hydraulic arm and bucket, positioned over a deep excavation. The ground is dark and muddy. There are various pieces of construction equipment and materials visible. The image is overlaid with several semi-transparent geometric shapes in shades of grey, teal, and orange, which also serve as a design element for the text layout.

Dewatering Management Plan Building A – Lot 102, 3 Halifax Street, Macquarie Park NSW

Reference: P3006_19

Date: 23 February 2026

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Table of Contents

1. Introduction	1
1.1 Overview	1
1.2 Proposed Development	1
1.3 Proposed Dewatering Schedule.....	2
1.4 Objectives	2
2. Geological Model.....	3
3. Hydrogeological Model.....	3
3.1 Hydrogeological Summary	3
3.2 Summary of Groundwater Observations.....	3
4. Groundwater Flow Modelling	4
4.1 Proposed Shoring and Groundwater Management.....	4
4.2 Analytical Seepage Modelling.....	4
4.2.1 Modelling Inputs	4
4.2.2 Modelled Seepage	5
4.2.3 Modelled Groundwater Drawdown.....	7
5. NSW Aquifer Interference Policy Impact Assessment.....	7
6. Water Discharge Methodology	9
7. Groundwater Monitoring.....	11
7.1 Water Level Monitoring	12
7.2 Water Inflow Monitoring	13
7.3 Water Quality Monitoring.....	14
7.4 Contingency Measures.....	15
7.5 Reporting and Record Keeping	16
7.6 Project Stakeholders.....	16
8. Conclusions and Recommendations	16
9. Statement of Limitations	16

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 Building B - Lot 102, 3 Halifax Street, Macquarie Park NSW (the site) otherwise known as Lot 102 in DP 1224238.

The following geotechnical reports have been prepared for the site:

- JK Geotechnics, *Report to Urban Growth on Geotechnical Investigation for Proposed Multi-Storey Residential Subdivision at Waterloo Road, Macquarie Park, NSW*; ref 27484P Rev 1 and dated 9 July 2014;
- Alliance Geotechnical Pty Ltd, *Geotechnical Desktop Study Report; Project Lachlan's Line Macquarie Park Stage 2 & 3; 5 Halifax Street, Macquarie Park NSW*; ref 14707-GR-1-1-Rev 2 and dated 29 November 2022;
- Morrow Geotechnics, *Geotechnical Investigation Report, 3 Halifax Street, Macquarie Park, NSW*; ref P3006_01 rev1 and dated 17 May 2024 (MG 2024-1);
- Morrow Geotechnics Pty Ltd, *Site Hydrogeology Report, 3 Halifax Street, Macquarie Park NSW*, referenced P3006_02 rev1, and dated 17 May 2024 (MG 2024-2);
- Morrow Geotechnics Pty Ltd, *Dewatering Management Plan, 3 Halifax Street, Macquarie Park NSW*, referenced P3006_03 rev1, and dated 17 May 2024 (MG 2024-3);
- Morrow Geotechnics Pty Ltd, *Geotechnical Investigation Report, Building A – Lot 102, 3 Halifax Street, Macquarie Park NSW*, referenced P3006_18, and dated 23 February 2026 (MG 2026-1); and
- Morrow Geotechnics Pty Ltd, *Site Hydrogeology Reports, Building A – Lot 102, 3 Halifax Street, Macquarie Park NSW*, referenced P3006_18, and dated 23 February 2026 (MG 2026-2).

The geotechnical reports present 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 Francis-Jones Carpenter Pty Ltd, project code LGLAL, revision 2 and dated 7 August 2024. Morrow Geotechnics understands that the proposed development will involve construction of a fourty four storey multi-dwelling structure over eight levels of basement carpark with Bulk Excavation Level (BEL) at RL 12.80 mAHD.

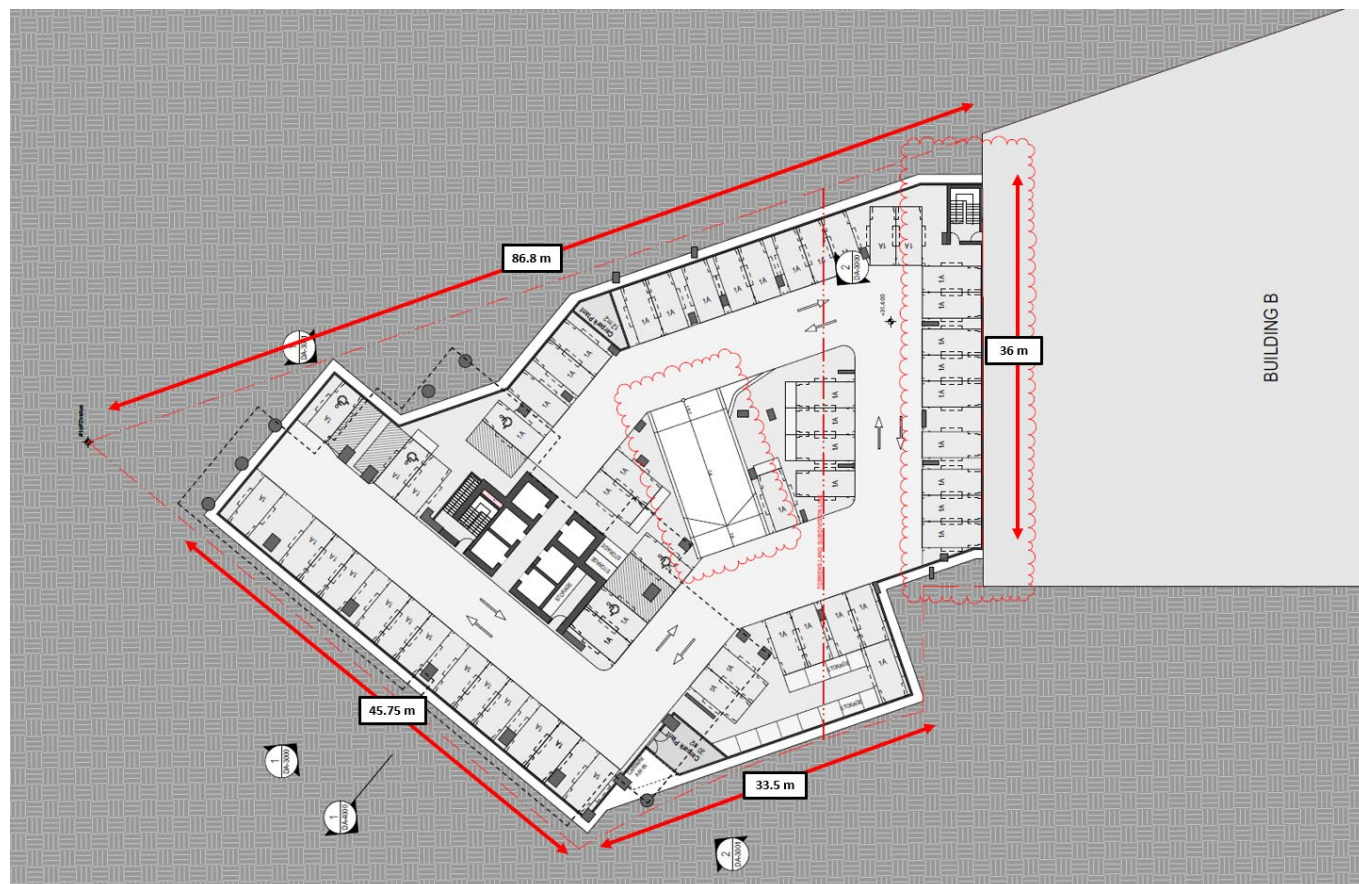


Figure 1: Proposed Basement Dimensions – Building A (area – 2470 m², perimeter – 222 m)

1.3 Proposed Dewatering Schedule

Given the low permeability of the sandstone profile encountered in the geotechnical investigation it is proposed to construct the basement as a drained excavation with vertical cuts in self-supporting rock. Dewatering through spear points and pumping is not proposed for the construction period, rather any groundwater seepage will be allowed to drain through the excavation face and be collected by sump pits within the basement.

The excavation program for the proposed basement is expected to take up to 6 months. Temporary construction dewatering is expected to occur for construction seepage inflows during this 6 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 fresh 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 Bayside Councils stormwater system.'

2. Geological Model

Information on regional sub-surface conditions, referenced from the Department of Mineral Resources Geological Map Sydney 1:100,000 (Geological Series Sheet 9130) indicates that the site is underlain by (Rh) Hawkesbury Sandstone, which is typically comprised of medium to coarse-grained quartz sandstone, with very minor shale and laminite lenses.

The Soil Conservation Service of NSW Sydney 1:100,000 Soil Landscapes Series Sheet 9130 (1st Edition) indicates that the soil landscape at the site likely comprises the Lucas Heights Landscape. 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.

Further discussion of the geological and geotechnical conditions at the site is provided in the Geotechnical Investigation Report (MG2026-1) and in the Site Hydrogeology Report (MG 2026-2).

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 2026-2.

3.2 Summary of Groundwater Observations

Measured groundwater levels at the three piezometers are within the following strata;

- BH2 - Unit 4 Class III Sandstone;
- BH4 - Unit 5 Class II/I Sandstone; and
- BH301 - Unit 5 Class II/I Sandstone.

Given that the water table was observed consistently within Class III or better Sandstone, the aquifer at site may be taken as a fractured rock aquifer.

The consistency of depth indicates that a water table is present across the site with a hydraulic gradient which roughly reflects the topological gradient of the site. That is, the hydraulic gradient dips across the site towards the north-west.

On the basis of ongoing groundwater monitoring at the site it is recommended that a design groundwater level accounting for extended wet weather conditions be taken at the highest measured groundwater level recorded during the monitoring period;

- BH2 – 33.70 mAHD;
- BH4 – 34.2 mAHD; and

- BH301 – 27.45 mAHD.

The generalised permeability of 5.37×10^{-8} m/s was used for the design based on testing data presented above. This represents a rock mass which is moderately permeability and will yield moderate volumes of seepage water.

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

Morrow Geotechnics understands that the structural design will be for a drained basement with vertical cuts in self-supporting sandstone. No spear points or wells are proposed for extraction of groundwater at the site. Dewatering through spear points and pumping is not proposed for the construction period, rather any groundwater seepage will be allowed to drain to spoon drains on the basement perimeter and collected by sump pits within the basement.

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

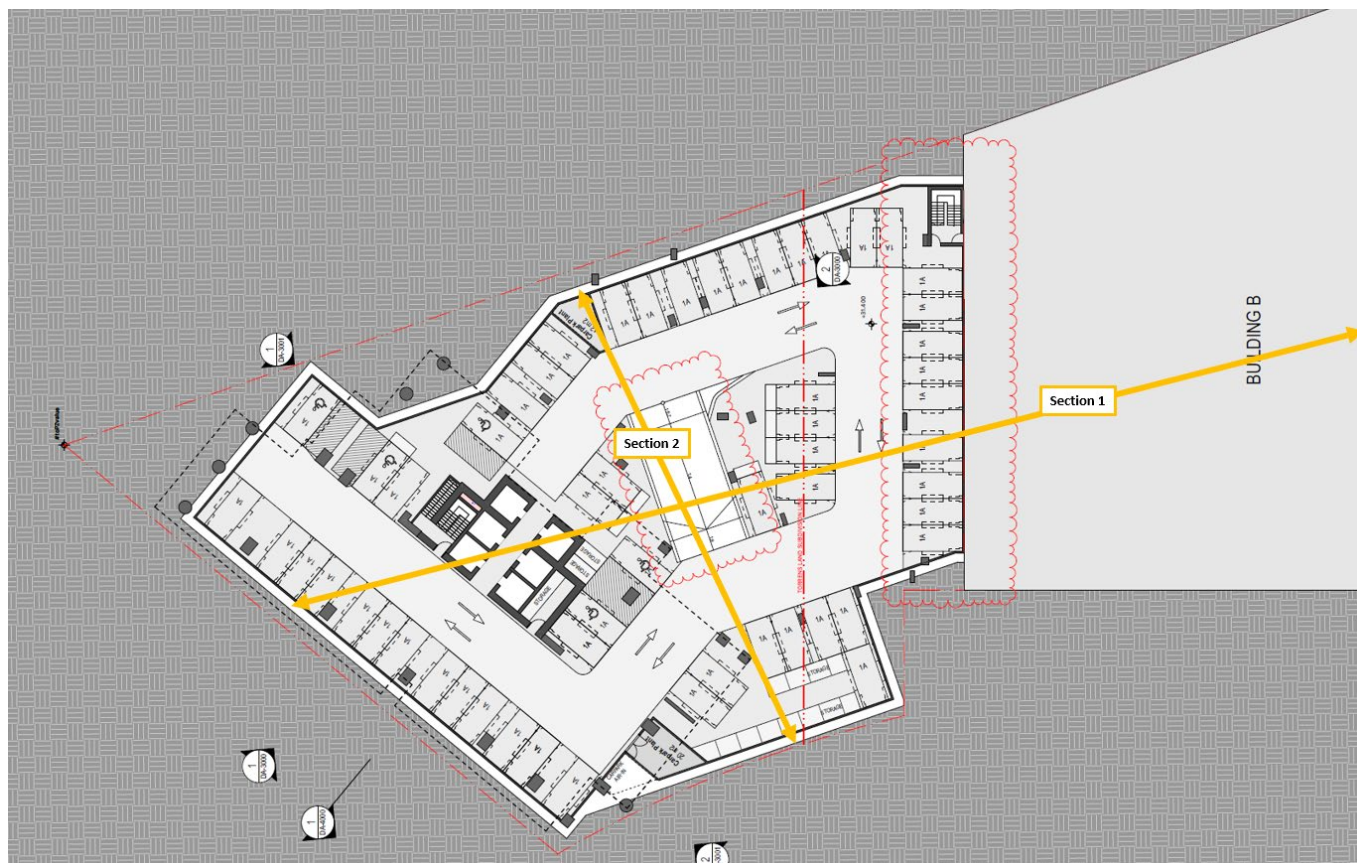


Figure 2: Modelling Sections 1 and 2

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 400 m and model depth of 150 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.

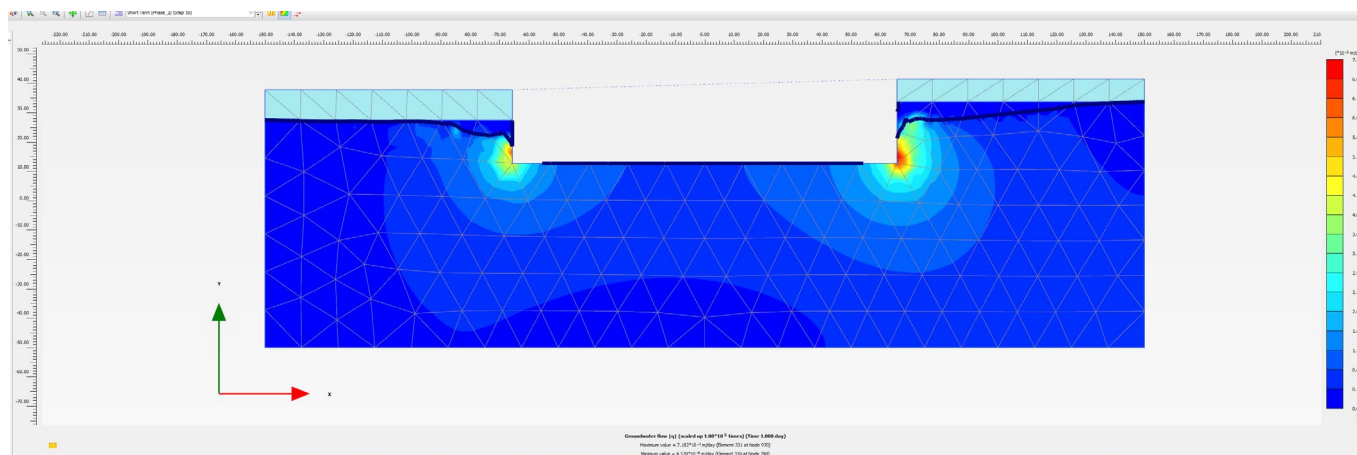


Figure 3: Typical aquifer flow conditions (Section 1 short term flow shown).

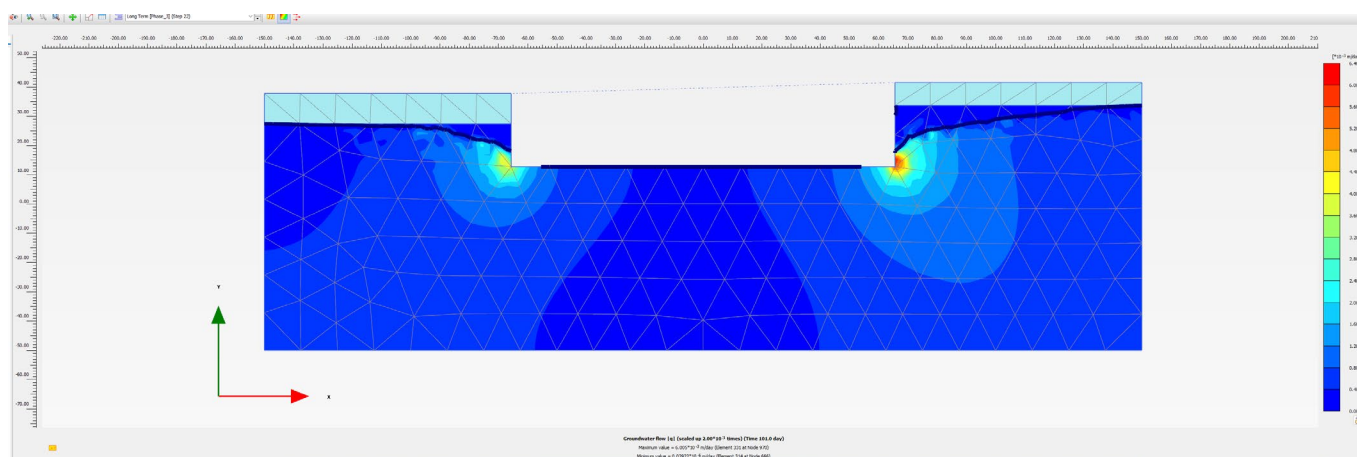


Figure 4: Typical aquifer flow conditions (Section 1 long term flow shown).

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	34.27	0.9976
Section 1 Long Term	0.00	14.73	0.6034
Section 2 Short Term	27.57	45.28	2.54
Section 2 Long Term	16.19	24.98	2.15

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 222 m and an excavation base area of approximately 2470 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
3.76 ML/year
- Long Term Flows during Service Life of Structure Following Completion of Construction
2.37 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 37 m from the excavation face on all boundaries. According to the Bureau of Meteorology (BOM) Australian Groundwater Explorer no “Water Supply Works” bores 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 76 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	N/A	N/A	N/A	N/A	7.42	12.03	11.17	8.01	7.23
Section 1 Long Term	N/A	N/A	N/A	N/A	9.07	6.59	11.98	9.45	73.62
Section 2 Short Term	8.48	6.52	5.58	3.30	6.90	3.30	2.96	2.25	35.87
Section 2 Long Term	15.52	10.60	8.51	4.82	9.49	6.79	4.72	2.76	73.50

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 0.53 m and 0.92 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 76 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”(2) 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 76 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) and the NSW Government “Blue Book” Soils and Construction, Managing Urban Stormwater, Volume 1 (2004) 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 5** 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 any water from site City of Ryde Councils Environmental health Officer must be notified 1 hour prior to any controlled discharge occurring.
3. 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 and at 30 minute intervals during discharge.** 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.

4. 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 odor). 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.

Construction Dewatering Flowpath

1. RED: Water drains in the site to sump pit in corner of excavation.
2. BLUE: Water pumped to Settlement Tank at Natural Ground Level for management of TSS.
3. GREEN: Water enters CEPT system and dosing unit (if required) for management of pH and dissolved metals.
4. Water discharged to council stormwater system.

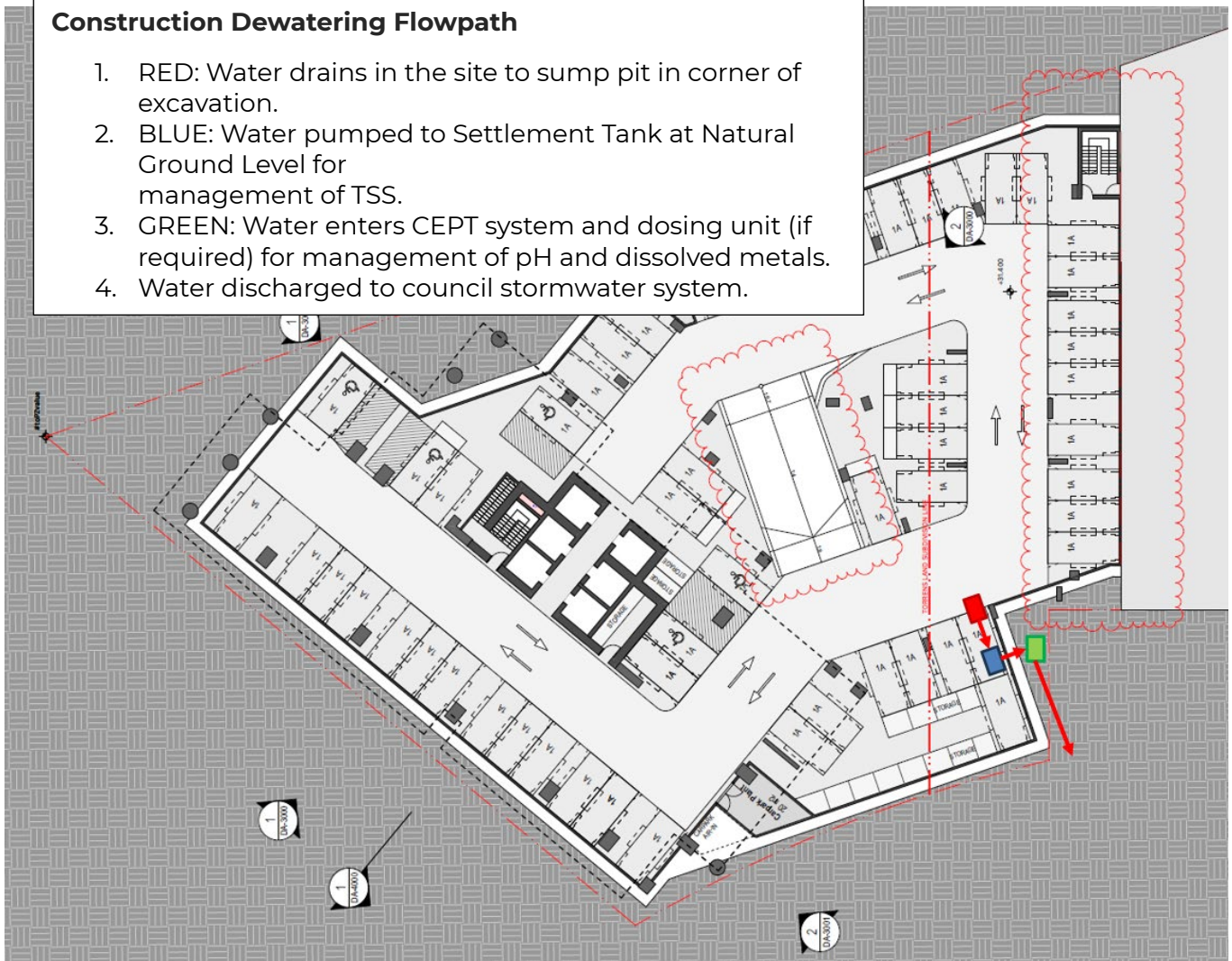


Figure 5: Proposed sump pit location shown in red



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.

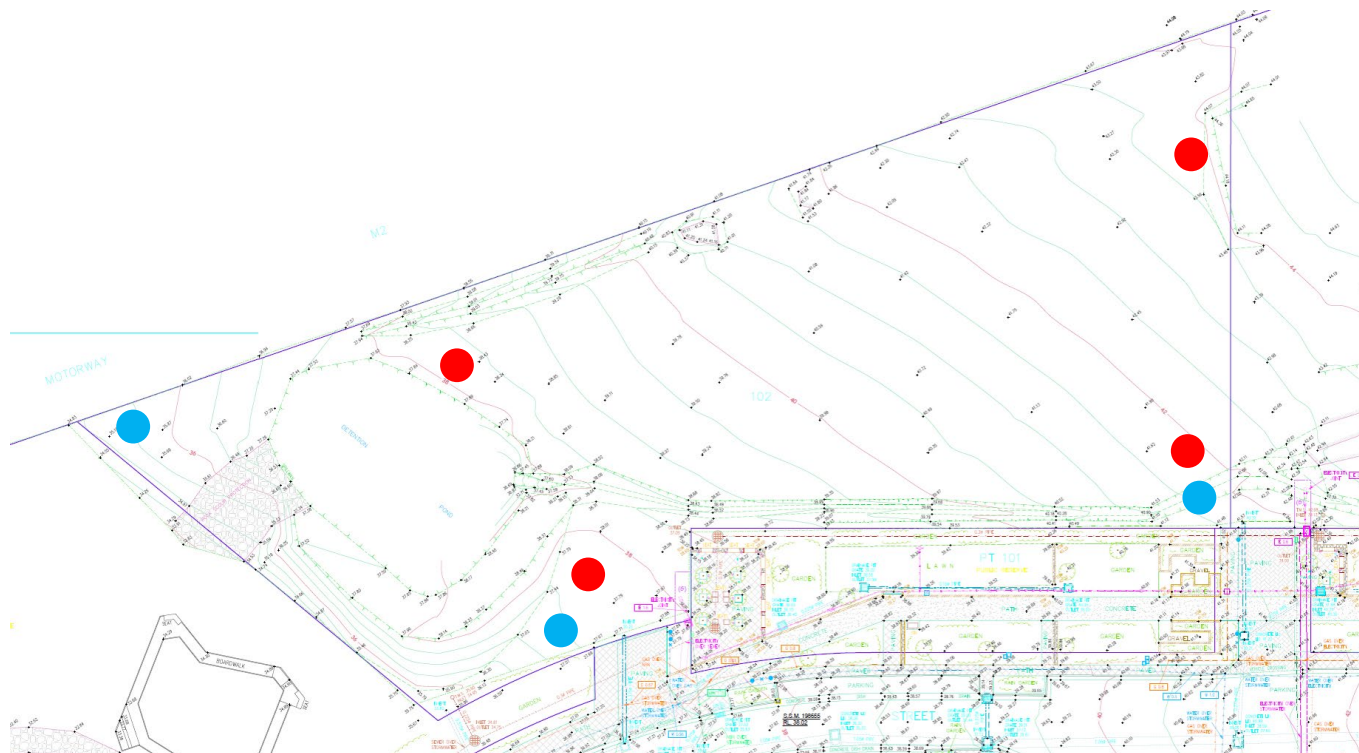


Figure 7: Groundwater level monitoring locations

- 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 2026-1 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 3500 mm below baseline readings. Groundwater modelling showed groundwater variation of up to approximately 8990 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	3500 mm
Alert Level	< 2450 mm
Alarm Level	2450 - 3500 mm
Action Level	> 3500 mm

7.2 Water Inflow Monitoring

Modelling of the site has shown a predicted groundwater inflow rate during construction of **72.30 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 7.22 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 (7.22 to 10.32 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 10.32 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, ANZG (2018), ANZECC (2000) and NEPM (2013) standards. Relevant water quality results are presented in **Table 7** to **Table 11** of the MG2026-2 report, lab results are attached in **Appendix B**.

If analyte values exceed the published threshold values of the council, 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 indicated that the natural groundwater concentrations of **Aluminium, Cadmium, Cobalt, Copper, Manganese, Nickel** and **Zinc** are above the ANZG (2018), ANZECC (2000) and NEPM (2013) freshwater guidelines. Baseline conditions at the site must be considered in preparation of a response to exceedances of 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

Type	Corresponding laboratory analyses	Testing requirements	Testing Frequency
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
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.

The completed Record of Groundwater Take Under Exemption (attached in Appendix B) form must be submitted to WaterNSW upon the completion of dewatering works.

The Dewatering Completion Report is a document to WaterNSW and DCCEEW to assess the actual volumes and impacts of the dewatering.

The dewatering completion report is to be completed within 60 days of the completion of construction.

7.6 Project Stakeholders

Table 5 Stakeholder Contacts

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

8. 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.

9. 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.



morrow

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
Lot 2, 3 Halifax Street, Macquarie Park NSW

Drawing Title
Figure 1

Client
Landmark Group Pty Ltd

Project Number
P3006

Scale:
Not To Scale

Figure

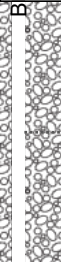
Drawn By:
MP

Date:
04 June 2025

1

APPENDIX A

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

morrow Morrow Geotechnics Bellambi, NSW Phone: 0405 843 933 Geotechnical Log - Borehole BH2											
UTM : 56H			Drill Rig : GEO305 - Comacchio			Job Number : P2968					
Easting (m) : 327283.0			Driller Supplier : MATRIX DRILLING			Client : Landmark Group Construction Australia Pty Ltd					
Northing (m) : 6259208.1			Logged By : Frank Li			Project : Macquarie Park					
Ground Elevation : 41.5 (m)			Reviewed By : Mark Peach			Location : 5 Halifax Street, Macquarie Park					
Total Depth : 20 m BGL			Date : 08/08/2023			Loc Comment :					
Drilling Method	Water	Well Diagram	Testing	Soil Origin	Graphic Log	Classification Code	Depth (m)	Elevation (m)	Material Description	Consistency/Density	Moisture
			DCP								
ADT		Backfill 50mm PVC Solid	1	Fill		ML		41.5	Fill sandy CLAY (ML) : non-plastic, light brown, fine grained sand, w < pl.	F	w < PL
			3 HB				0.2				
				Rock		SST			Extremely weathered,rock sandy CLAY (SST) : hard, low plasticity, light orange, fine to medium grained sand, inorganic, w ≈ pl.	H	w ≈ PL
							1	40.5	1m : Commenced NMLC Coring;		
							2	39.5			
							3	38.5			
							4	37.5			
							5	36.5			

Morrow Geotechnics										Geotechnical Log - Borehole					
Bellambi, NSW										BH2					
Phone: 0405 843 933															
UTM : 56H										Drill Rig : GEO305 - Comacchio					
Easting (m) : 327283.0										Driller Supplier : MATRIX DRILLING					
Northing (m) : 6259208.1										Logged By : Frank Li					
Ground Elevation : 41.5 (m)										Reviewed By : Mark Peach					
Total Depth : 20 m BGL										Date : 08/08/2023					
										Job Number : P2968					
										Client : Landmark Group Construction Australia Pty Ltd					
										Project : Macquarie Park					
										Location : 5 Halifax Street, Macquarie Park					
										Loc Comment :					
Drilling Method	Water	Well Diagram	RQD% and TCR%	Testing		Estimated Strength	Weathering	Depth (m)	Elevation (m)	Graphic Log	Classification Code	Material Description	Defect Spacing (mm)	Defect Depth	Defect Description
				Is(50)											
		B							41.5						

morrow Morrow Geotechnics Bellambi, NSW Phone: 0405 843 933 Geotechnical Log - Borehole BH2															
UTM : 56H				Drill Rig : GEO305 - Comacchio				Job Number : P2968							
Easting (m) : 327283.0				Driller Supplier : MATRIX DRILLING				Client : Landmark Group Construction Australia Pty Ltd							
Northing (m) : 6259208.1				Logged By : Frank Li				Project : Macquarie Park							
Ground Elevation : 41.5 (m)				Reviewed By : Mark Peach				Location : 5 Halifax Street, Macquarie Park							
Total Depth : 20 m BGL				Date : 08/08/2023				Loc Comment :							
Drilling Method	Water	Well Diagram	RQD% and TCR%	Testing	Estimated Strength	Weathering	Depth (m)	Elevation (m)	Graphic Log	Classification Code	Material Description	Defect Spacing (mm)	Defect Depth	Defect Description	
				Is(50)											
NMLC Coring	0% Water Loss		RQD = 90% TCR = 100%	d: 1.43, a: 2.15	VLS LS MS HS VHS EHS	MW-S	6.2	35.5		SST	rock SANDSTONE: moderately to slightly weathered, high strength, light orange red, medium grained, (massive, iron stained).	30			
						SW				SST	rock SANDSTONE: slightly weathered, high strength, orange red light orange, medium grained, (massive).	100		6.26-6.27, XWS, RO, PL, CT, 6.35, P, RO, PL, CL, CT, 6.36, J, 15°, RO, PL, CT, 6.37-6.38, XWS, 15°, RO, PL, CT, 6.38, P, RO, PL, CT, 6.71, P, RO, PL, STN, OP 6.75, P, 4°, RO, PL, CT	
			RQD = 83% TCR = 100%	d: 1.43, a: 1.4		7	34.5					7			
						F	7.3			SST	rock SANDSTONE: fresh weathered, medium strength, very light grey, medium grained, (massive, infilled bedding partings with extremely weathered sandstone and sandy clay).			7.4-7.43, IS, sandy clay, RO, PL, CT, 7.74, P, RO, PL, CL, CT	
				d: 0.03, a: 0.69		8	33.5					8		7.97, P, RO, PL, CL, CT, 8.06, P, 2mm seam, RO, PL, CT, 8.1, IS, sandy clay, RO, PL, CT, 8.2-8.22, IS, sandy clay, RO, PL, CT, 8.28, P, RO, PL, CL, CT	
			RQD = 94% TCR = 100%	d: 2.18, a: 2.28		F	8.1			SST	rock SANDSTONE: fresh weathered, medium strength, very light grey, medium grained, (cross bedded).				
						F	8.6			SST	rock SANDSTONE: fresh weathered, high strength, very light grey, medium grained, (cross bedded).				
						SW				SST	rock SANDSTONE: slightly weathered, high strength, orange grey, medium grained, (cross bedded).				
				d: 1.26, a: 1.38		F	9	32.5			SST	rock SANDSTONE: fresh weathered, high strength, grey, medium grained, (massive, minor carbonaceous laminations).			9.18, P, carbonaceous laminations, RO, PL, CL, OP 9.19, P, carbonaceous laminations, RO, PL, CL, OP 9.47, P, 5°, RO, PL, CL, OP 9.53, P, 5°, RO, PL, CL, OP 9.94, P, 5°, RO, PL, CL, OP 9.98-10, XWS, sandy clay seam, 5°, RO, PL, CT, 10.05, P, RO, PL, CL, OP 10.56-10.58, IS, sandy clay seam, 5°, RO, PL, CT, 10.79, P, 5°, RO, PL, CL, OP 10.81, P, 5°, RO, PL, CL, OP 11.38, P, 25°, RO, PL, CL, OP 11.7, P, RO, PL, STN, OP 11.72, P, RO, PL, STN, OP 11.82, P, 16°, RO, PL, CL, CT, OP
							10	31.5							
				d: 2.11, a: 2.1		SW	11	30.5							
				RQD = 96% TCR = 100%		d: 1.66, a: 2.2									

Page 2 of 4



Job Number : P2968
Client : Landmark Group Construction Australia Pty Ltd
Project : Macquarie Park
Location : 5 Halifax Street, Macquarie Park
Loc Comment :

Page 3 of 4



BH2

UTM : 56H
Easting (m) : 327283.0
Northing (m) : 6259208.1
Ground Elevation : 41.5 (m)
Total Depth : 20 m BGL

Drill Rig : GEO305 - Comacchio
Driller Supplier : MATRIX DRILLING
Logged By : Frank Li
Reviewed By : Mark Peach
Date : 08/08/2023

Job Number : P2968
Client : Landmark Group Construction Australia Pty Ltd
Project : Macquarie Park
Location : 5 Halifax Street, Macquarie Park
Loc Comment :

Page 4 of 4

morrow

CLIENT NAME: LANDMARK GROUP
PROJECT: 5 HALIFAX STREET
LOCATION: MACQUARIE PARK
JOB NUMBER: P2968
LOGGED BY: AB+FL

BOREHOLE ID: BH2
DEPTH: 1.09 - 6.00m
CORE TRAY NO.: 1 of 4
DATE: 8/8/23



morrow



0405 843 933



Bellambi, NSW



info@morrowgeo.com.au

Photo description

BH2 - Tray 1 of 4

Client

Landmark Group Construction Australia Pty Ltd

Location

5 Halifax Street, Macquarie Park

Project name

Macquarie Park

Project No

P2968

Scale

Not to Scale

BH No

BH2

BH Depth

CorePhoto

morrow

CLIENT NAME: LANDMARK GROUP

PROJECT: 5 HALIFAX STREET

LOCATION: MACQUARIE PARK

JOB NUMBER: P2968

LOGGED BY: AB+FL

BOREHOLE ID: BH2

DEPTH: 6-11m

CORE TRAY NO.: 2

DATE: 8/8/23



morrow



0405 843 933



Bellambi, NSW



info@morrowgeo.com.au

Photo description

BH2 - Tray 2 of 4

Client

Landmark Group Construction Australia Pty Ltd

Location

5 Halifax Street, Macquarie Park

Project name

Macquarie Park

Project No

P2968

Scale

Not to Scale

BH No

BH2

BH Depth

CorePhoto

morrow

CLIENT NAME: LANDMARK GROUP

PROJECT: 5 HALIFAX STREET

LOCATION: MACQUARIE PARK

JOB NUMBER: P2968

LOGGED BY: AB+FL

BOREHOLE ID: BH2

DEPTH: 11-16.0m

CORE TRAY NO.: 3

DATE: 8/8/23



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Bellambi, NSW



info@morrowgeo.com.au

Photo description

BH2 - Tray 3 of 4

Client

Landmark Group Construction Australia Pty Ltd

Location

5 Halifax Street, Macquarie Park

Project name

Macquarie Park

Project No

P2968

Scale

Not to Scale

BH No

BH2

BH Depth

CorePhoto

morrow

CLIENT NAME: LANDMARK GROUP

PROJECT: 5 HALIFAX STREET

LOCATION: MACQUARIE PARK

JOB NUMBER: P2968

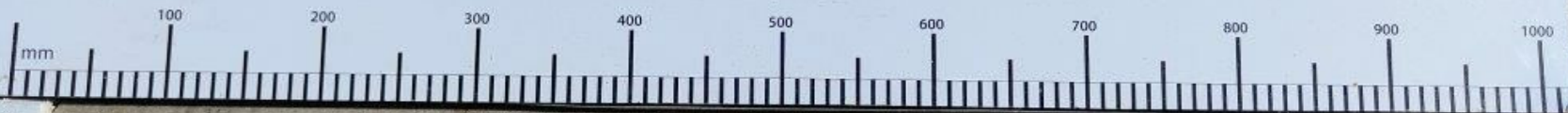
LOGGED BY: AB-FL

BOREHOLE ID: BH2

DEPTH: 16.0 → 20.0

CORE TRAY NO.: 4

DATE: 8/8/23



morrow



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Bellambi, NSW



info@morrowgeo.com.au

Photo description

BH2 - Tray 4 of 4

Client

Landmark Group Construction Australia Pty Ltd

Location

5 Halifax Street, Macquarie Park

Project name

Macquarie Park

Project No

P2968

Scale

Not to Scale

BH No

BH2

BH Depth

CorePhoto

Page 1 of 1



BH3

Job Number : P2968

Client : Landmark Group Construction Australia Pty Ltd

Project : Macquarie Park

Location : 5 Halifax Street, Macquarie Park

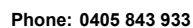
Loc Comment :

Date : 10/08/2023

SVV

Morrow Geotechnics										Geotechnical Log - Borehole				
Bellambi, NSW										BH3				
Phone: 0405 843 933														
UTM : 56H										Job Number : P2968				
Easting (m) : 327200.9										Client : Landmark Group Construction Australia Pty Ltd				
Northing (m) : 6259255.4										Project : Macquarie Park				
Ground Elevation : 44.1 (m)										Location : 5 Halifax Street, Macquarie Park				
Total Depth : 30.22 m BGL										Loc Comment :				
Drill Rig : GEO305 - Comacchio														
Driller Supplier : MATRIX DRILLING														
Logged By : Mark Peach														
Reviewed By : Alan Morrow														
Date : 10/08/2023														
Drilling Method	Water	Well Diagram	RQD% and TCR%	Testing	Estimated Strength	Weathering	Depth (m)	Elevation (m)	Graphic Log	Classification Code	Material Description	Defect Spacing (mm)	Defect Depth	Defect Description
				Is(50)										
NMLC Coring	0% Water Loss		50mm		VLS LS MS HS VHS EHS	SW		38.4		SST	rock SANDSTONE: slightly weathered, high strength, grey orange, fine to medium grained, (massive, iron stained minor clay coating on bedding partings).	30 100 300 1000 3000		
			RQD = 99% TCR = 100%											
				d: 1.88, a: 1.85				7	37.1				7	
				d: 1.89, a: 1.96										7.39, P, clay coating , 6", RO, CV, CT, OP
								8	36.1				8	7.74, P, clay coating , 5", IR, CT, OP

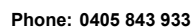
morrow			Morrow Geotechnics			Geotechnical Log - Borehole									
Bellambi, NSW			Phone: 0405 843 933			BH3									
UTM : 56H			Drill Rig : GEO305 - Comacchio			Job Number : P2968									
Easting (m) : 327200.9			Driller Supplier : MATRIX DRILLING			Client : Landmark Group Construction Australia Pty Ltd									
Northing (m) : 6259255.4			Logged By : Mark Peach			Project : Macquarie Park									
Ground Elevation : 44.1 (m)			Reviewed By : Alan Morrow			Location : 5 Halifax Street, Macquarie Park									
Total Depth : 30.22 m BGL			Date : 10/08/2023			Loc Comment :									
Drilling Method	Water	Well Diagram	RQD% and TCR%	Testing	Estimated Strength	Weathering	Depth (m)	Elevation (m)	Graphic Log	Classification Code	Material Description	Defect Spacing (mm)	Defect Depth	Defect Description	
				Is(50)											
NMLC Coring	0% Water Loss		RQD = 83% TCR = 100%			MW		32.1		SST	As above, but moderately , orange, (massive, iron stained).				
				d: 1.81, a: 2.06			13	31.1							13
				d: 1.83, a: 1.82											
							13.6								
							14	30.1							14
				d: 0.8, a: 2.06											
							15	29.1							15
				d: 2.04, a: 2.3											
							16	28.1							16
				d: 1.55, a: 1.63											
	17	27.1	17												



BH3

Job Number : P2968
Client : Landmark Group Construction Australia Pty Ltd
Project : Macquarie Park
Location : 5 Halifax Street, Macquarie Park
Loc Comment :

Page 4 of 6



Job Number : P2968
Client : Landmark Group Construction Australia Pty Ltd
Project : Macquarie Park
Location : 5 Halifax Street, Macquarie Park
Loc Comment :

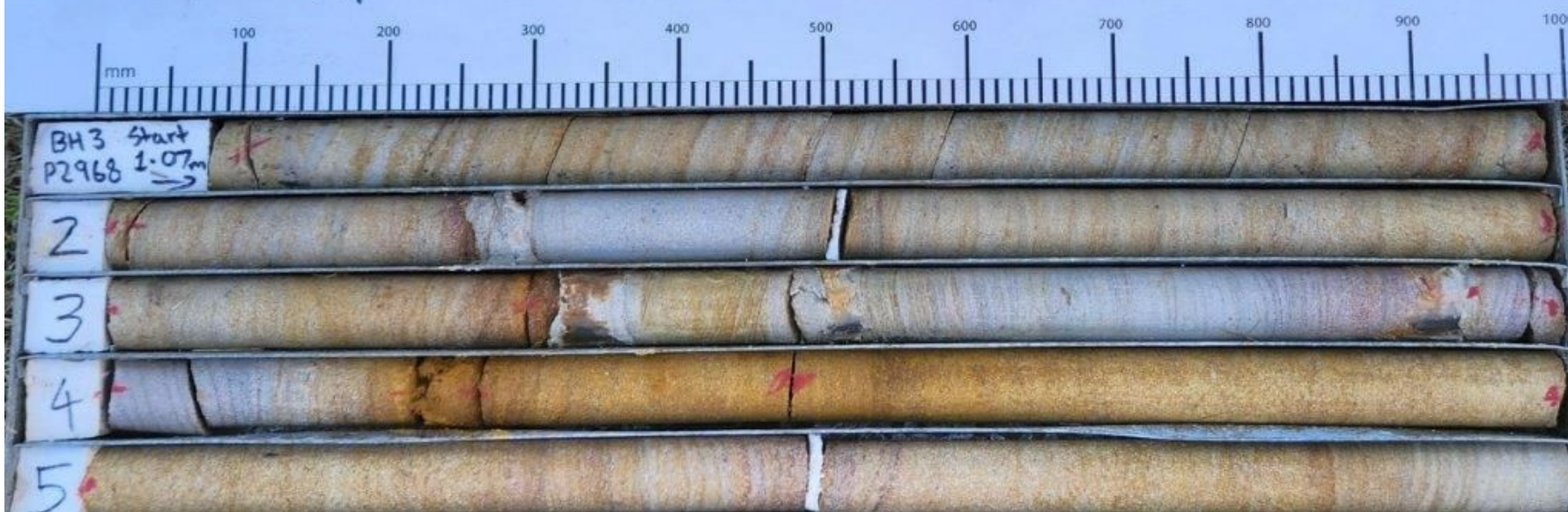
Page 5 of 6

Page 6 of 6

morrow

CLIENT NAME: LANDMARK GROUP
PROJECT: MACQUARIE PARK
LOCATION: 5 HALIFAX STREET
JOB NUMBER: P2968
LOGGED BY: MP

BOREHOLE ID: BH3
DEPTH: 1.07m to 6.0m
CORE TRAY NO: Box 1 of 6
DATE: 10/08/23



morrow



0405 843 933



Bellambi, NSW



info@morrowgeo.com.au

Photo description

BH3 - Tray 1 of 6

Client

Landmark Group Construction Australia Pty Ltd

Location

5 Halifax Street, Macquarie Park

Project name

Macquarie Park

Project No

P2968

Scale

Not to Scale

BH No

BH3

BH Depth

CorePhoto

morrow

CLIENT NAME: LANDMARK GROUP
PROJECT: MACQUARIE PARK
LOCATION: 5 HALIFAX STREET
JOB NUMBER: P2968
LOGGED BY: MP

BOREHOLE ID: BH3
DEPTH: 6.0m to 11.0m
CORE TRAY NO: Box 2 of 6
DATE: 10/08/23



morrow



0405 843 933



Bellambi, NSW



info@morrowgeo.com.au

Photo description

BH3 - Tray 2 of 6

Client

Landmark Group Construction Australia Pty Ltd

Location

5 Halifax Street, Macquarie Park

Project name

Macquarie Park

Project No

P2968

Scale

Not to Scale

BH No

BH3

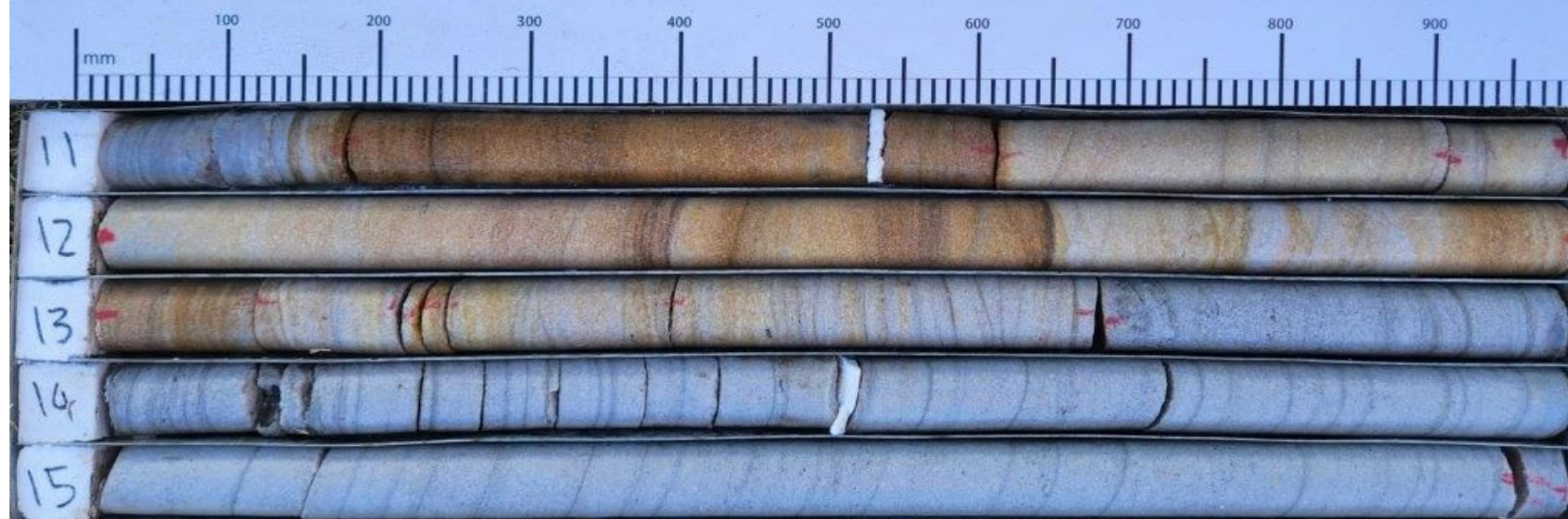
BH Depth

CorePhoto

morrow

CLIENT NAME: LANDMARK GROUP
PROJECT: MACQUARIE PARK
LOCATION: 5 HALIFAX STREET
JOB NUMBER: P2968
LOGGED BY: MP

BOREHOLE ID: BH3
DEPTH: 11.0m to 16.0m
CORE TRAY NO: Box 3 of 6
DATE: 10/08/23



morrow



0405 843 933



Bellambi, NSW



info@morrowgeo.com.au

Photo description

BH3 - Tray 3 of 6

Client

Landmark Group Construction Australia Pty Ltd

Location

5 Halifax Street, Macquarie Park

Project name

Macquarie Park

Project No

P2968

Scale

Not to Scale

BH No

BH3

BH Depth

CorePhoto

morrow

CLIENT NAME: LANDMARK GROUP
PROJECT: MACQUARIE PARK
LOCATION: 5 HALIFAX STREET
JOB NUMBER: P2968
LOGGED BY: MP

BOREHOLE ID: BH3
DEPTH: 16.0m to 21.0m
CORE TRAY NO: Box 4 of 6
DATE: 11/08/23



0405 843 933



Bellambi, NSW



info@morrowgeo.com.au

Photo description

BH3 - Tray 4 of 6

Client

Landmark Group Construction Australia Pty Ltd

Location

5 Halifax Street, Macquarie Park

Project name

Macquarie Park

Project No

P2968

Scale

Not to Scale

BH No

BH3

BH Depth

CorePhoto

morrow

CLIENT NAME: LANDMARK GROUP

PROJECT: MACQUARIE PARK

LOCATION: 5 HALIFAX STREET

JOB NUMBER: P2968

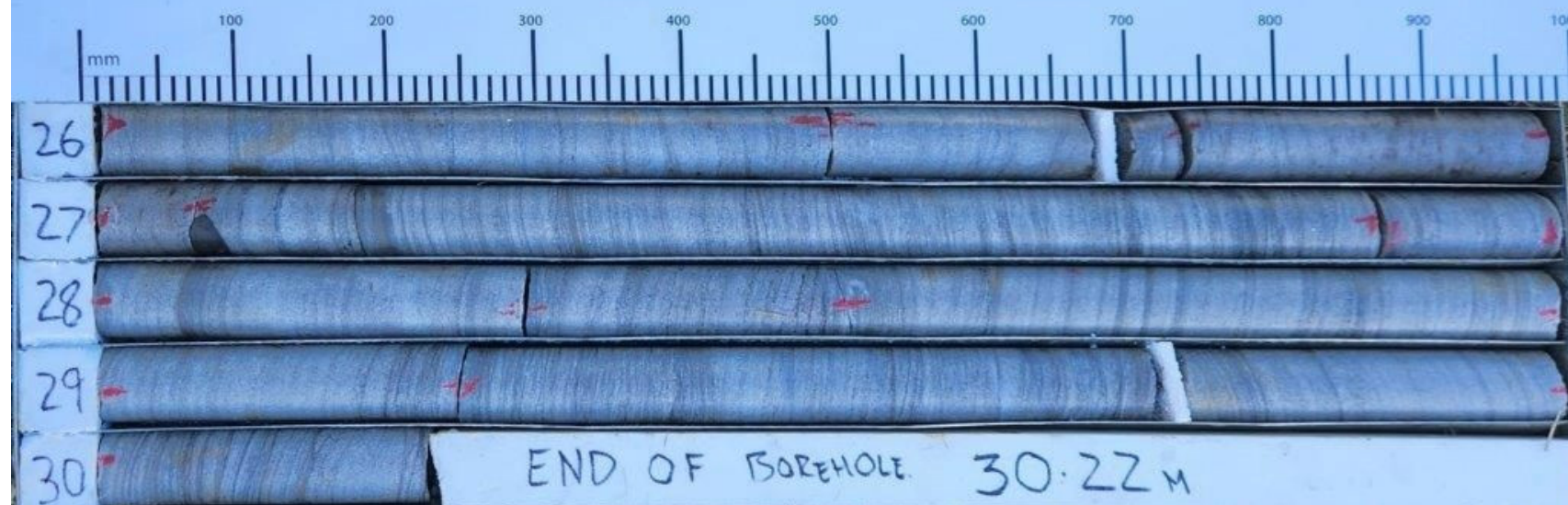
LOGGED BY: MP

BOREHOLE ID: BH3

DEPTH: 26.0m to 30.22m

CORE TRAY NO: Box 6 of 6

DATE: 11/08/23



morrow



0405 843 933



Bellambi, NSW



info@morrowgeo.com.au

Photo description

BH3 - Tray 5 of 6

Client

Landmark Group Construction Australia Pty Ltd

Location

5 Halifax Street, Macquarie Park

Project name

Macquarie Park

Project No

P2968

Scale

Not to Scale

BH No

BH3

BH Depth

CorePhoto

morrow

CLIENT NAME: LANDMARK GROUP

PROJECT: MACQUARIE PARK

LOCATION: 5 HALIFAX STREET

JOB NUMBER: P2968

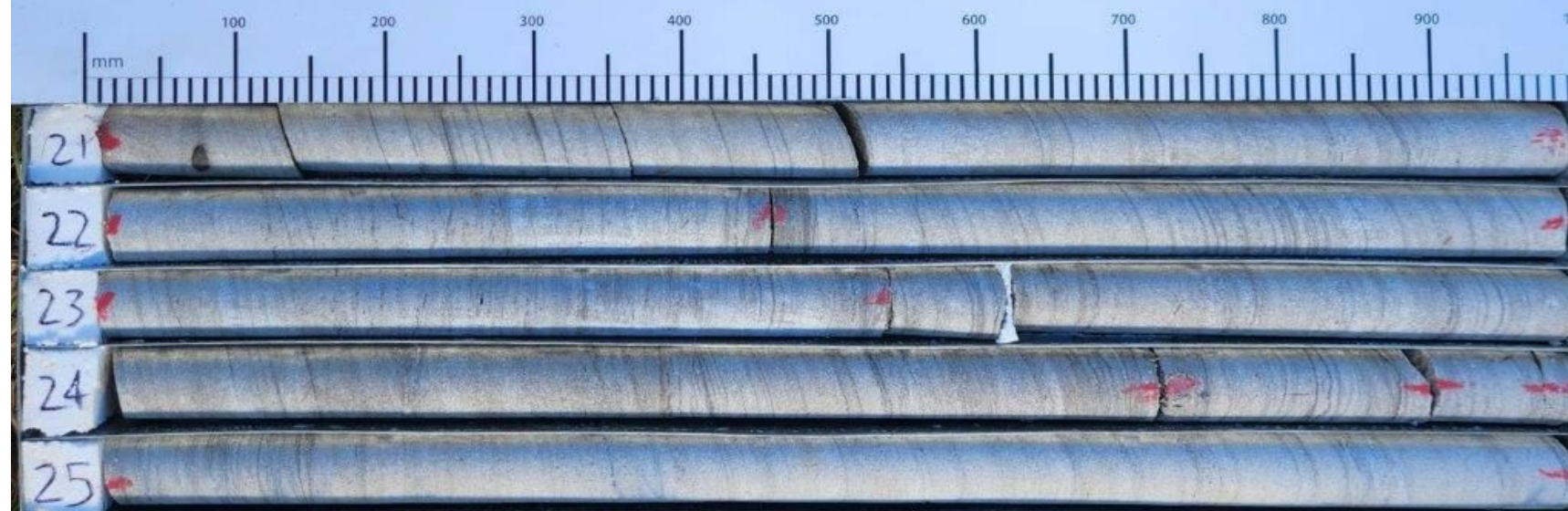
LOGGED BY: MP

BOREHOLE ID: BH3

DEPTH: 21.0m to 26.0m

CORE TRAY NO: Box 5 of 6

DATE: 11/08/23



morrow



0405 843 933



Bellambi, NSW



info@morrowgeo.com.au

Photo description

BH3 - Tray 6 of 6

Client

Landmark Group Construction Australia Pty Ltd

Location

5 Halifax Street, Macquarie Park

Project name

Macquarie Park

Project No

P2968

Scale

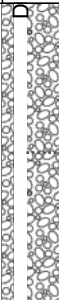
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BH No

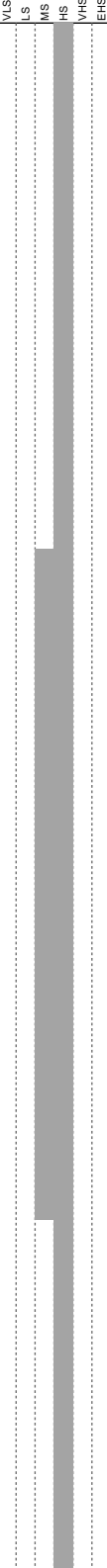
BH3

BH Depth

CorePhoto

Morrow Geotechnics						Geotechnical Log - Borehole					
Bellambi, NSW						BH4					
Phone: 0405 843 933											
UTM : 56H			Drill Rig : GEO305 - Comacchio			Job Number : P3006					
Easting (m) : 327183.7			Driller Supplier : MATRIX DRILLING			Client : Landmark Group Construction Australia Pty Ltd					
Northing (m) : 6259255.4			Logged By : Mark Peach			Project : Macquarie Park					
Ground Elevation : 39.7 (m)			Reviewed By : Alan Morrow			Location : 3 Halifax Street, Macquarie Park					
Total Depth : 20.41 m BGL			Date : 17/08/2023			Loc Comment :					
Drilling Method	Water	Well Diagram	Testing	Soil Origin	Graphic Log	Classification Code	Depth (m)	Elevation (m)	Material Description	Consistency/Density	Moisture
			DCP								
ADT			2 HB			CL-CI	0.05	39.7	Topsoil sandy CLAY (CL-CI) : soft, low to medium plasticity, brown, fine grained sand, trace fine sized gravel, w < pl. Rock SANDSTONE: moderately weathered, low to medium strength, grey orange, fine to medium grained, (high resistance).	S LS-MS	w < PL D
						SST	1	38.7			
							2	37.7	1.14m : Commenced NMLC Coring;		
							3	36.7			
							4	35.7			
							5	34.7			

morrow Morrow Geotechnics Bellambi, NSW Phone: 0405 843 933				Geotechnical Log - Borehole BH4												
UTM : 56H				Drill Rig : GEO305 - Comacchio				Job Number : P3006								
Easting (m) : 327183.7				Driller Supplier : MATRIX DRILLING				Client : Landmark Group Construction Australia Pty Ltd								
Northing (m) : 6259255.4				Logged By : Mark Peach				Project : Macquarie Park								
Ground Elevation : 39.7 (m)				Reviewed By : Alan Morrow				Location : 3 Halifax Street, Macquarie Park								
Total Depth : 20.41 m BGL				Date : 17/08/2023				Loc Comment :								
Drilling Method	Water	Well Diagram	RQD% and TCR%	Testing	Estimated Strength	Weathering	Depth (m)	Elevation (m)	Graphic Log	Classification Code	Material Description	Defect Spacing (mm)	Defect Depth	Defect Description		
				Is(50)												
NMLC Coring	0% Water Loss		RQD = 100% TCR = 100%		VLS LS MS HS VHS EHS		1	38.7					1			
			RQD = 93% TCR = 100%				2	37.7		SST	As above, but fresh , grey, (massive).		2			

Morrow Geotechnics										Geotechnical Log - Borehole												
Bellambi, NSW										BH4												
Phone: 0405 843 933																						
UTM : 56H										Job Number : P3006												
Easting (m) : 327183.7										Client : Landmark Group Construction Australia Pty Ltd												
Northing (m) : 6259255.4										Project : Macquarie Park												
Ground Elevation : 39.7 (m)										Location : 3 Halifax Street, Macquarie Park												
Total Depth : 20.41 m BGL										Loc Comment :												
Drill Rig : GEO305 - Comacchio																						
Driller Supplier : MATRIX DRILLING																						
Logged By : Mark Peach																						
Reviewed By : Alan Morrow																						
Date : 17/08/2023																						
Drilling Method	Water	Well Diagram	RQD% and TCR%	Testing	Estimated Strength	Weathering	Depth (m)	Elevation (m)	Graphic Log	Classification Code	Material Description	Defect Spacing (mm)	Defect Depth	Defect Description								
				Is(50)																		
NMLC Coring	0% Water Loss		RQD = 98% TCR = 100%			F		33.7		SST	rock SANDSTONE: fresh weathered, high strength, light grey, fine to medium grained, (generally massive, minor carbonaceous laminations).			6.27-6.29, IS, infilled extremely weathered sandstone, 6°, IR, CT,								
				d: 1.61, a: 1.73																		6.81, P, 10°, RO, PL, CL, OP
								7							32.7							7.19, P, carbonaceous staining, 4°, PL, STN OP
				d: 1.30, a: 1.01																		7.21, P, carbonaceous staining, 3°, PL, STN OP
																						7.6, P, carbonaceous staining, 2°, PL, STN OP



BH4

Job Number : P3006

Client : Landmark Group Construction Australia Pty Ltd

Project : Macquarie Park

Project : Macquarie Park

Location : 3 Halifax Street, Macquarie Park

Loc Comment :

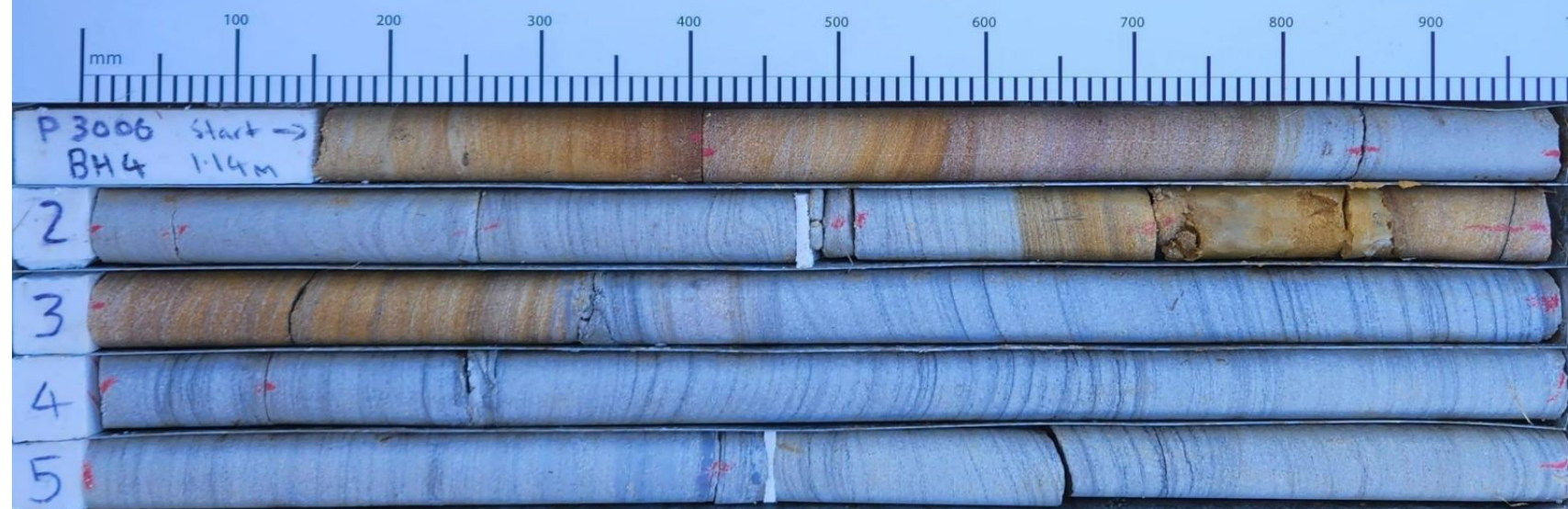
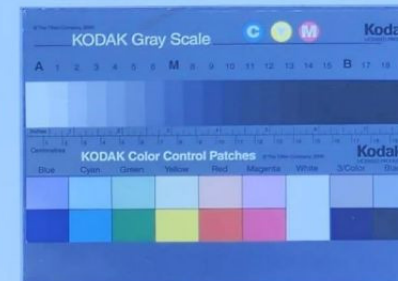
Page 3 of 4

Morrow Geotechnics										Geotechnical Log - Borehole									
Bellambi, NSW										BH4									
Phone: 0405 843 933																			
UTM : 56H										Job Number : P3006									
Easting (m) : 327183.7										Client : Landmark Group Construction Australia Pty Ltd									
Northing (m) : 6259255.4										Project : Macquarie Park									
Ground Elevation : 39.7 (m)										Location : 3 Halifax Street, Macquarie Park									
Total Depth : 20.41 m BGL										Loc Comment :									
Drill Rig : GEO305 - Comacchio																			
Driller Supplier : MATRIX DRILLING																			
Logged By : Mark Peach																			
Reviewed By : Alan Morrow																			
Date : 17/08/2023																			
</																			

morrow

CLIENT NAME: LANDMARK GROUP
PROJECT: MACQUARIE PARK
LOCATION: 5 HALIFAX STREET
JOB NUMBER: P3006
LOGGED BY: MP

BOREHOLE ID: BH4
DEPTH: 1.14m to 6.0m
CORE TRAY NO.: Box 1 of 4
DATE: 17-08-23



morrow



0405 843 933



Bellambi, NSW



info@morrowgeo.com.au

Photo description

BH4 - Tray 1 of 4

Client

Landmark Group Construction Australia Pty Ltd

Location

5 Halifax Street, Macquarie Park

Project name

Macquarie Park

Project No

P3006

Scale

Not to Scale

BH No

BH4

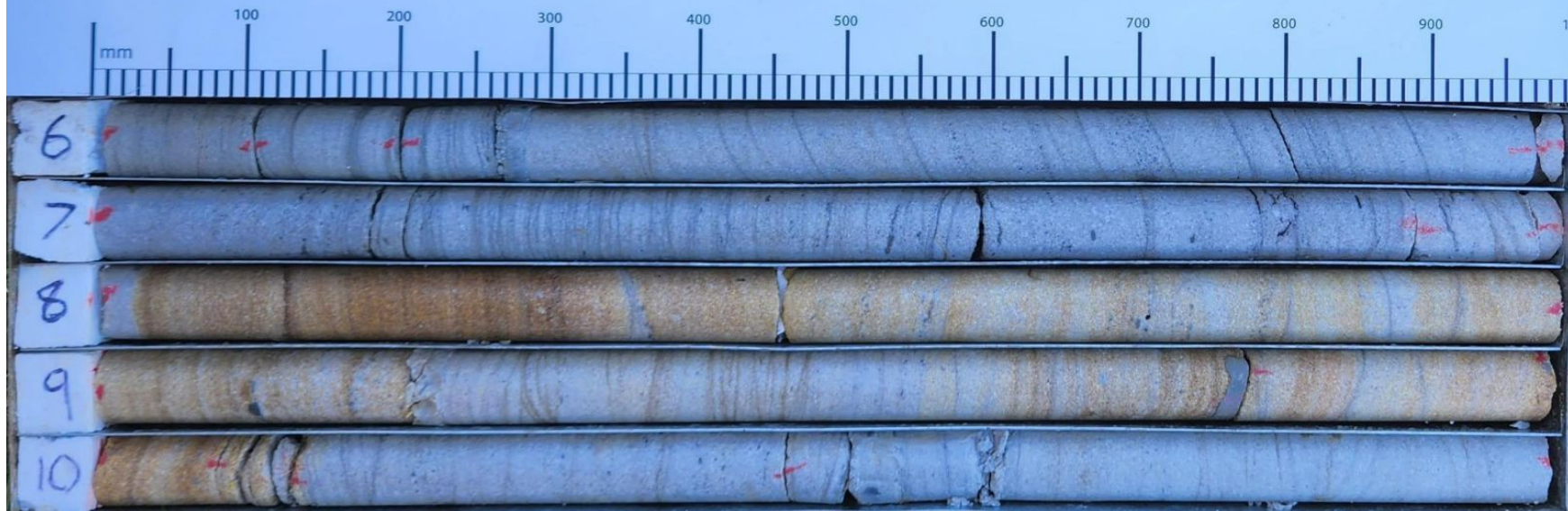
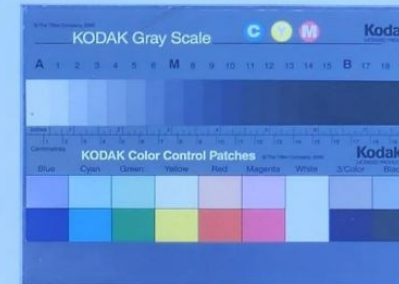
BH Depth

CorePhoto

morrow

CLIENT NAME: LANDMARK GROUP
PROJECT: MACQUARIE PARK
LOCATION: 5 HALIFAX STREET
JOB NUMBER: P3006
LOGGED BY: MP

BOREHOLE ID: BH4
DEPTH: 6.0m to 11.0m
CORE TRAY NO.: Box 2 of 4
DATE: 17-08-23



morrow



0405 843 933



Bellambi, NSW



info@morrowgeo.com.au

Photo description

BH4 - Tray 2 of 4

Client

Landmark Group Construction Australia Pty Ltd

Location

5 Halifax Street, Macquarie Park

Project name

Macquarie Park

Project No

P3006

Scale

Not to Scale

BH No

BH4

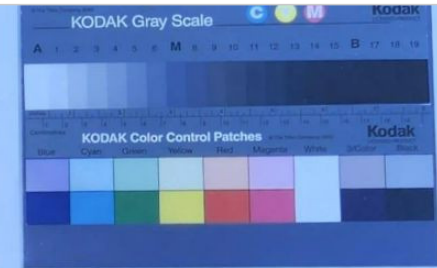
BH Depth

CorePhoto

morrow

CLIENT NAME: LANDMARK GROUP
PROJECT: MACQUARIE PARK
LOCATION: 5 HALIFAX STREET
JOB NUMBER: P3006
LOGGED BY: MP

BOREHOLE ID: BH4
DEPTH: 11.0m to 16.0m
CORE TRAY NO.: Box 3 of 4
DATE: 17.08.23



morrow



0405 843 933



Bellambi, NSW



info@morrowgeo.com.au

Photo description

BH4 - Tray 3 of 4

Client

Landmark Group Construction Australia Pty Ltd

Location

5 Halifax Street, Macquarie Park

Project name

Macquarie Park

Project No

P3006

Scale

Not to Scale

BH No

BH4

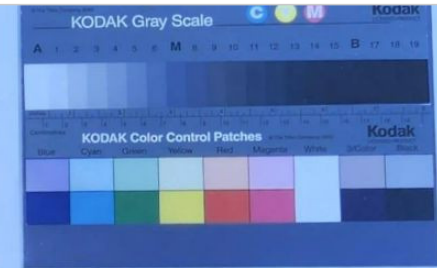
BH Depth

CorePhoto

morrow

CLIENT NAME: LANDMARK GROUP
PROJECT: MAQUARIE PARK
LOCATION: 5 HALIFAX STREET
JOB NUMBER: P3006
LOGGED BY: MP

BOREHOLE ID: BH4
DEPTH: 11.0m to 16.0m
CORE TRAY NO.: Box 3 of 4
DATE: 17.08.23



0405 843 933



Bellambi, NSW



info@morrowgeo.com.au

Photo description

BH4 - Tray 3 of 4

Client

Landmark Group Construction Australia Pty Ltd

Location

5 Halifax Street, Macquarie Park

Project name

Macquarie Park

Project No

P3006

Scale

Not to Scale

BH No

BH4

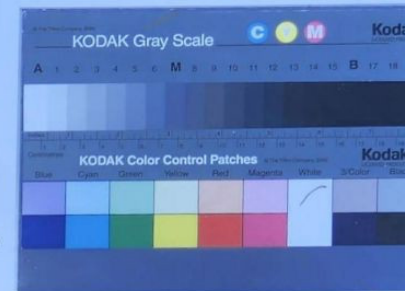
BH Depth

CorePhoto

morrow

CLIENT NAME: LANDMARK GROUP
PROJECT: MACQUARIE PARK
LOCATION: 5 HALIFAX STREET
JOB NUMBER: P3006
LOGGED BY: MP

BOREHOLE ID: BH4
DEPTH: 16.0 m to 20.41 m
CORE TRAY NO.: Box 4 of 4
DATE: 17.08.23



0405 843 933



Bellambi, NSW



info@morrowgeo.com.au

Photo description

BH4 - Tray 4 of 4

Client

Landmark Group Construction Australia Pty Ltd

Location

5 Halifax Street, Macquarie Park

Project name

Macquarie Park

Project No

P3006

Scale

Not to Scale

BH No

BH4

BH Depth

CorePhoto

Job Number : P3006
Client : Landmark Group Construction Australia Pty Ltd
Project : Macquarie Park
Location : 3 Halifax Street, Macquarie Park NSW
Loc Comment :

Commenced Coring at 6m

UTM : 56H	Driller Rig : Hanjin DB-8	Job Number : P3006
Easting : 327251.80	Driller Supplier : BG Drilling	Client : Landmark Group Construction Australia Pty Ltd
Northing : 6259661.09	Logged By : Mark Peach	Project : Macquarie Park
RL : 37.8(m)	Reviewed By : Rhiannon McKeon	Location : 3 Halifax Street, Macquarie Park NSW
Total Depth : 55.76 m	Date : 28/05/2025	Loc Comment :

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)					
HQ Coring		50mm PVC Solid 50mm PVC Slotted	29.2		SST	Rock; SANDSTONE moderately to slightly weathered, high strength, pale grey orange, fine grained, massive, with trace iron staining and sub-horizontal bedding partings.	7	MW-SW	d: 1.47, a: 1.77		RQD = 90.15% TCR = 100%		6.24, P, 4°, PL, RO, CL, OP 6.31, P, 10°, PL, RO, CL, OP 6.69, P, 3°, UN, VR, CL, OP 6.75, P, 2°, UN, VR, CL, OP 7.06, P, °, PL, VR, CT, OP 8.17, P, °, UN, VR, STN, OP 8.26, P, 4°, PL, RO, STN, OP 8.31, P, 2°, PL, RO, STN, OP 8.34-8.36, CS, 3°, UN, VR, CT, OP 8.42, P, 3°, PL, RO, CT, OP	
	8.55	d: 1.58, a: 2.06	8				d: 1.28, a: 0.99		8.55					F
	Loss - 0%				SST	Rock; SANDSTONE fresh weathered, high strength, pale grey, fine grained, massive, trace sub-horizontal bedding partings.	10		d: 1.81, a: 1.88		RQD = 100% TCR = 100%			

UTM : 56H	Driller Rig : Hanjin DB-8	Job Number : P3006
Easting : 327251.80	Driller Supplier : BG Drilling	Client : Landmark Group Construction Australia Pty Ltd
Northing : 6259661.09	Logged By : Mark Peach	Project : Macquarie Park
RL : 37.8(m)	Reviewed By : Rhiannon McKeon	Location : 3 Halifax Street, Macquarie Park NSW
Total Depth : 55.76 m	Date : 28/05/2025	Loc Comment :

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
									Is (50)	MS 0.1	US 0.3	Estimated Strength	MS 1.0			
HQ Coring	Loss - 0%	50mm PVC Slotted	SST			Rock; SANDSTONE fresh weathered, high strength, pale grey, fine grained, massive, trace sub-horizontal bedding partings.	13		d: 2.02, a: 2.26					RQD = 100% TCR = 100%		
							14		d: 1.59, a: 1.84					RQD = 100% TCR = 100%		13.45, P, 3°, PL, RO, STN, OP
							15	F	d: 1.43, a: 1.97					RQD = 100% TCR = 100%		
							16		d: 1.57, a: 1.37					RQD = 100% TCR = 100%		
							17		d: 1.06, a: 1.51					RQD = 100% TCR = 100%		
									d: 1.19, a: 2.08							17.69, P, 2°, PL, RO, CL, OP

UTM : 56H	Driller Rig : Hanjin DB-8	Job Number : P3006
Easting : 327251.80	Driller Supplier : BG Drilling	Client : Landmark Group Construction Australia Pty Ltd
Northing : 6259661.09	Logged By : Mark Peach	Project : Macquarie Park
RL : 37.8(m)	Reviewed By : Rhiannon McKeon	Location : 3 Halifax Street, Macquarie Park NSW
Total Depth : 55.76 m	Date : 28/05/2025	Loc Comment :

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
									Is(50)	Estimated Strength			
HQ Coring	Loss - 0%	50mm PVC Slotted		SST		Rock; SANDSTONE fresh weathered, high strength, pale grey, fine grained, massive, trace sub-horizontal bedding partings.	19	F	d: 0.99, a: 1.68	MS 0.1 US 0.3 HS 1.0 VHS 3 EHS 10	RQD = 100% TCR = 100%		18.96-19, IS, 12°, UN, RO, CL, I, infilled siltstone
									d: 1.04, a: 1.95				
	Loss - 0%						20		d: 1.12, a: 1.32		RQD = 100% TCR = 100%		20.07, P, °, PL, RO, CL, OP
									d: 1.04, a: 1.53				
							21		d: 1.00, a: 1.25		RQD = 100% TCR = 100%		22.33, P, 3°, PL, RO, CT, OP, With clay coating
									d: 1.18, a: 1.32				
							22						23.35, P, 6°, PL, RO, CL, OP

UTM : 56H	Driller Rig : Hanjin DB-8	Job Number : P3006
Easting : 327251.80	Driller Supplier : BG Drilling	Client : Landmark Group Construction Australia Pty Ltd
Northing : 6259661.09	Logged By : Mark Peach	Project : Macquarie Park
RL : 37.8(m)	Reviewed By : Rhiannon McKeon	Location : 3 Halifax Street, Macquarie Park NSW
Total Depth : 55.76 m	Date : 28/05/2025	Loc Comment :

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
									Is(50)	Estimated Strength MS 0.1 LS 0.3 HS 1.0 VHS 3 EHS 10			
					SST	Rock; SANDSTONE fresh weathered, high strength, pale grey, fine grained, massive, trace sub-horizontal bedding partings.					RQD = 100% TCR = 100%		—24.08, P, 3°, PL, RO, CT, OP, With clay coating.
									d: 1.18, a: 1.51				
							25						
									d: 1.48, a: 1.17		RQD = 100% TCR = 100%		
							26						
					SST	Rock; SANDSTONE fresh weathered, high strength, pale grey, fine grained, massive, trace sub-horizontal bedding partings.							—26.69, P, 3°, PL, SO, CL, OP
									d: 1.17, a: 1.45				
							27	F					
									d: 0.72, a: 1.41		RQD = 100% TCR = 100%		
							28						
					SST	Rock; SANDSTONE fresh weathered, high strength, pale grey, fine grained, massive, trace sub-horizontal bedding partings.							—27.66, P, 2°, UN, RO, CT, OP, clay coating —28.03, P, 10°, PL, RO, CL, OP —29.33, P, 3°, PL, SO, CT, OP, With clay coating.
									d: 1.18, a: 1.18				
							29						

UTM : 56H	Driller Rig : Hanjin DB-8	Job Number : P3006
Easting : 327251.80	Driller Supplier : BG Drilling	Client : Landmark Group Construction Australia Pty Ltd
Northing : 6259661.09	Logged By : Mark Peach	Project : Macquarie Park
RL : 37.8(m)	Reviewed By : Rhiannon McKeon	Location : 3 Halifax Street, Macquarie Park NSW
Total Depth : 55.76 m	Date : 28/05/2025	Loc Comment :

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
									Is(50)	Estimated Strength			
HQ Coring	Loss - 0%	50mm PVC Slotted	5.0 32.83	SST	SST	Rock; SANDSTONE fresh weathered, high strength, pale grey, fine grained, massive, trace sub-horizontal bedding partings.	31	F	d: 0.82, a: 1.81	MS 0.1 US 0.3 HS 1.0 VHS 3 EHS 10	RQD = 100% TCR = 100%	30 100 300 1000 3000	
									d: 1.77, a: 1.73				
									d: 1.09, a: 1.15				
									d: 1.56, a: 1.85				
HQ Coring	Loss - 0%	50mm PVC Slotted	4.1 33.72	SST	SST	As above, but: pale grey grey, medium to coarse grained, massive with infilled claystone and carbonaceous staining.	33	F	d: 1.43, a: 1.39		RQD = 96.71% TCR = 100%	30 100 300 1000 3000	32.9, P, °, PL, SO, CL, OP 32.95, P, °, PL, RO, STN, OP, Carbonaceous Staining. 33.03, P, 3°, UN, VR, CL, OP 33.43, P, °, IR, VR, STN, OP, Carbonaceous Staining.
									d: 1.57, a: 1.61				

UTM : 56H Driller Rig : Hanjin DB-8 Job Number : P3006
 Easting : 327251.80 Driller Supplier : BG Drilling Client : Landmark Group Construction Australia Pty Ltd
 Northing : 6259661.09 Logged By : Mark Peach Project : Macquarie Park
 RL : 37.8(m) Reviewed By : Rhiannon McKeon Location : 3 Halifax Street, Macquarie Park NSW
 Total Depth : 55.76 m Date : 28/05/2025 Loc Comment :

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
									Is(50)	MS 0.1	US 0.3	HS 1.0	Estimated Strength VHS 3 EHS 10			
 HQ Coring	 Loss - 0%	 50mm PVC Slotted			SST	Rock; SANDSTONE fresh weathered, high strength, pale grey, fine grained, massive, trace sub-horizontal bedding partings.	37	F	d: 1.26, a: 1.62					RQD = 100% TCR = 100%		
							38	F	d: 1.55, a: 2.05					RQD = 100% TCR = 100%		—38.11, P, 2°, PL, RO, CL, OP
							39		d: 1.34, a: 1.30					RQD = 100% TCR = 100%		—38.29, P, 4°, PL, RO, CL, OP
							40		d: 1.21, a: 1.31							
							40.14		d: 1.47, a: 2.70							
			-2.3 40.14			As above, but: trace shale laminations and inclusions.	41	F	d: 1.50, a: 1.57					RQD = 97.05% TCR = 100%		—40.14, P, 2°, PL, RO, CL, OP —40.22, P, 2°, PL, RO, CL, OP

UTM : 56H	Driller Rig : Hanjin DB-8	Job Number : P3006
Easting : 327251.80	Driller Supplier : BG Drilling	Client : Landmark Group Construction Australia Pty Ltd
Northing : 6259661.09	Logged By : Mark Peach	Project : Macquarie Park
RL : 37.8(m)	Reviewed By : Rhiannon McKeon	Location : 3 Halifax Street, Macquarie Park NSW
Total Depth : 55.76 m	Date : 28/05/2025	Loc Comment :

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
									Is(50)	Estimated Strength			
HQ Coring	Loss - 0%	50mm PVC Slotted	-4.4 42.15		SST	As above, but: trace shale laminations and inclusions.	42.15	T		MS 0.1 US 0.3 HS 1.0 VHS 3 EHS 10	RQD = 97.05% TCR = 100%		
						Rock; SANDSTONE fresh weathered, high strength, pale grey, fine grained, massive, trace sub-horizontal bedding partings.			d: 1.68, a: 1.49				
							43						43.08, P, 2°, PL, RO, CT, OP
									d: 1.45, a: 1.92				
							44						
									d: 1.33, a: 1.31		RQD = 99.67% TCR = 100%		
							45	F					44.83, P, 5°, PL, RO, CT, OP
					SST				d: 1.27, a: 1.18				45.13, P, °, PL, RO, CL, OP
							46						
									d: 1.28, a: 1.18				
							47				RQD = 100% TCR = 100%		46.75, P, °, PL, RO, CL, OP
									d: 0.58, a: 1.23				

UTM : 56H	Driller Rig : Hanjin DB-8	Job Number : P3006
Easting : 327251.80	Driller Supplier : BG Drilling	Client : Landmark Group Construction Australia Pty Ltd
Northing : 6259661.09	Logged By : Mark Peach	Project : Macquarie Park
RL : 37.8(m)	Reviewed By : Rhiannon McKeon	Location : 3 Halifax Street, Macquarie Park NSW
Total Depth : 55.76 m	Date : 28/05/2025	Loc Comment :

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
									Is(50)	Estimated Strength			
HQ Coring	Loss - 0%	50mm PVC Slotted	-11.8	SST	Rock; SANDSTONE fresh weathered, high strength, pale grey, fine grained, massive, trace sub-horizontal bedding partings.	F	49	F	d: 1.35, a: 1.65	MS 0.1 US 0.3 HS 1.0 VHS 3 EHS 10	RQD = 100% TCR = 100%	30 100 300 1000 3000	48.28, P, ", UN, RO, CT, OP
			49.6				49.6		d: 1.44, a: 1.53				
HQ Coring	Loss - 0%	50mm PVC Slotted		SHA	Rock; SHALE fresh weathered, high strength, dark grey, fine grained, trace interbedded sandstone.	F	50	F	d: 0.51, a: 1.28		RQD = 100% TCR = 100%	30 100 300 1000 3000	49.6, P, 3", UN, RO, CL, OP
							51		d: 0.50, a: 2.01				
HQ Coring	Loss - 0%	50mm PVC Slotted		SHA	Rock; SHALE fresh weathered, high strength, dark grey, fine grained, trace interbedded sandstone.	F	52	F	d: 0.68, a: 1.53		RQD = 100% TCR = 100%	30 100 300 1000 3000	49.6, P, 3", UN, RO, CL, OP
							53		d: 0.96, a: 1.28				

UTM : 56H	Driller Rig : Hanjin DB-8	Job Number : P3006
Easting : 327251.80	Driller Supplier : BG Drilling	Client : Landmark Group Construction Australia Pty Ltd
Northing : 6259661.09	Logged By : Mark Peach	Project : Macquarie Park
RL : 37.8(m)	Reviewed By : Rhiannon McKeon	Location : 3 Halifax Street, Macquarie Park NSW
Total Depth : 55.76 m	Date : 28/05/2025	Loc Comment :

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
									Is(50)	Estimated Strength			
					SHA	Rock: SHALE fresh weathered, high strength, dark grey, fine grained, trace interbedded sandstone.	55	F	d: 0.73, a: 1.99	MS 0.1 US 0.3 HS 1.0 VHS 3 EHS 10	RQD = 100% TCR = 100%		
									d: 0.73, a: 1.13				
						BH301 Reached Target Depth at 55.76m							

morrow

CLIENT NAME: LANDMARK GROUP PTY LTD

PROJECT: MACQUARIE PARK

LOCATION: LOT 2, 3 HALIFAX STREET

JOB NUMBER: P3006

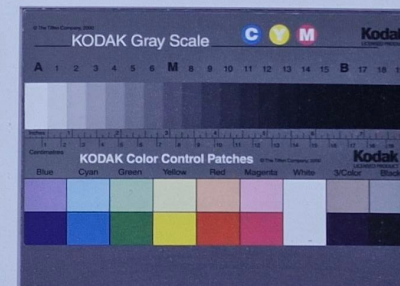
LOGGED BY: MP

BOREHOLE ID: BH 301

DEPTH: 6.0m to 10.0m

CORE TRAY NO.: Box 1

DATE: 28.05.25



morrow



02 8599 7579



Sydney Gadigal Land,
2/5-7 Malta Steet, Fairfield
East NSW 2155



info@morrowgeo.com.au

Photo description

BH301 Box 1 of 13

Client

Landmark Group Construction Australia Pty Ltd

Location

3 Halifax Street, Macquarie Park NSW

Project name

Macquarie Park

Project No

P3006

Scale

Not to Scale

BH No

BH301

BH Depth

6.0m to 10.0m

morrow

CLIENT NAME: LANDMARK GROUP PTY LTD

PROJECT: MACQUARIE PARK

LOCATION: LOT 2, 3 HALIFAX STREET

JOB NUMBER: P3006

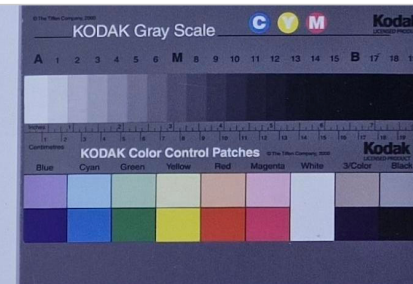
LOGGED BY: MP

BOREHOLE ID: BH301

DEPTH: 10.0m to 14.0m

CORE TRAY NO.: Box 2

DATE: 28.05.25



morrow



02 8599 7579



Sydney Gadigal Land,
2/5-7 Malta Steet, Fairfield
East NSW 2155



info@morrowgeo.com.au

Photo description

BH301 Box 2 of 13

Client

Landmark Group Construction Australia Pty Ltd

Location

3 Halifax Street, Macquarie Park NSW

Project name

Macquarie Park

Project No

P3006

Scale

Not to Scale

BH No

BH301

BH Depth

10.0m to 14.0m

morrow

CLIENT NAME: LANDMARK GROUP PTY LTD

PROJECT: MACQUARIE PARK

LOCATION: 3 HALIFAX STREET

JOB NUMBER: P3006

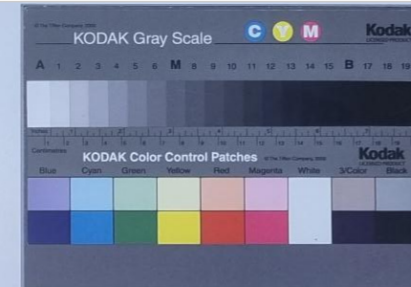
LOGGED BY: MP

BOREHOLE ID: BH301

DEPTH: 14.0m to 18.0m

CORE TRAY NO.: Box 3

DATE: 28.05.25



02 8599 7579



Sydney Gadigal Land,
2/5-7 Malta Steet, Fairfield
East NSW 2155



info@morrowgeo.com.au

Photo description

BH301 Box 3 of 13

Client

Landmark Group Construction Australia Pty Ltd

Location

3 Halifax Street, Macquarie Park NSW

Project name

Macquarie Park

Project No

P3006

Scale

Not to Scale

BH No

BH301

BH Depth

14.0m to 18.0m

morrow

CLIENT NAME: LANDMARK GROUP PTY LTD

PROJECT: MACQUARIE PARK

LOCATION: 3 HALIFAX STREET

JOB NUMBER: P3006

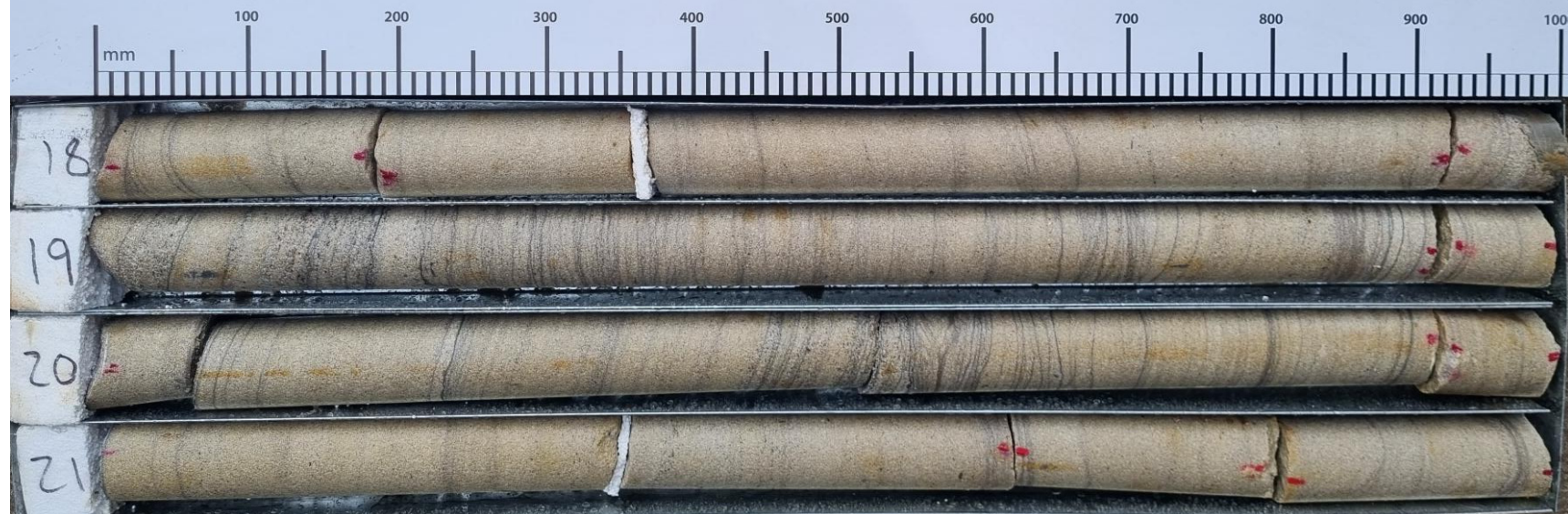
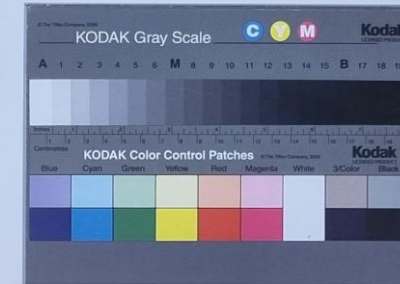
LOGGED BY: MP

BOREHOLE ID: BH301

DEPTH: 18.0-22.0m

CORE TRAY NO.: Box 4

DATE: 28.05.25



02 8599 7579



Sydney Gadigal Land,
2/5-7 Malta Steet, Fairfield
East NSW 2155



info@morrowgeo.com.au

Photo description

BH301 Box 4 of 13

Client

Landmark Group Construction Australia Pty Ltd

Location

3 Halifax Street, Macquarie Park NSW

Project name

Macquarie Park

Project No

P3006

Scale

Not to Scale

BH No

BH301

BH Depth

18.0m to 22.0m

morrow

CLIENT NAME: LANDMARK GROUP PTY LTD

PROJECT: MACQUARIE PARK

LOCATION: 3 HALIFAX STREET

JOB NUMBER: P3006

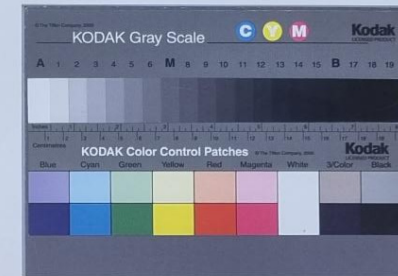
LOGGED BY: MP

BOREHOLE ID: BH301

DEPTH: 22.0 - 25.0m

CORE TRAY NO.: 5

DATE: 28/05/2025



morrow



02 8599 7579



Sydney Gadigal Land,
2/5-7 Malta Steet, Fairfield
East NSW 2155



info@morrowgeo.com.au

Photo description

BH301 Box 5 of 13

Client

Landmark Group Construction Australia Pty Ltd

Location

3 Halifax Street, Macquarie Park NSW

Project name

Macquarie Park

Project No

P3006

Scale

Not to Scale

BH No

BH301

BH Depth

22.0m to 26.0m

morrow

CLIENT NAME: LANDMARK GROUP PTY LTD

PROJECT: MACQUARIE PARK

LOCATION: 3 HALIFAX STREET

JOB NUMBER: P3006

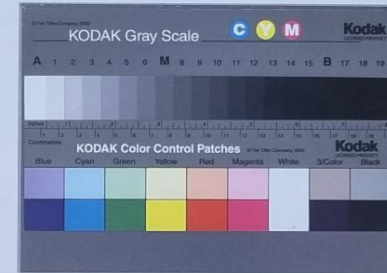
LOGGED BY: MP

BOREHOLE ID: BH301

DEPTH: 260 → 300 m

CORE TRAY NO.: 6

DATE: 28/05/2025



morrow



02 8599 7579



Sydney Gadigal Land,
2/5-7 Malta Steet, Fairfield
East NSW 2155



info@morrowgeo.com.au

Photo description

BH301 Box 6 of 13

Client

Landmark Group Construction Australia Pty Ltd

Location

3 Halifax Street, Macquarie Park NSW

Project name

Macquarie Park

Project No

P3006

Scale

Not to Scale

BH No

BH301

BH Depth

26.0m to 30.0m

morrow

CLIENT NAME: LANDMARK GROUP

PROJECT: MACQUARIE PARK

LOCATION: 3 HALIFAX STREET

JOB NUMBER: P3006

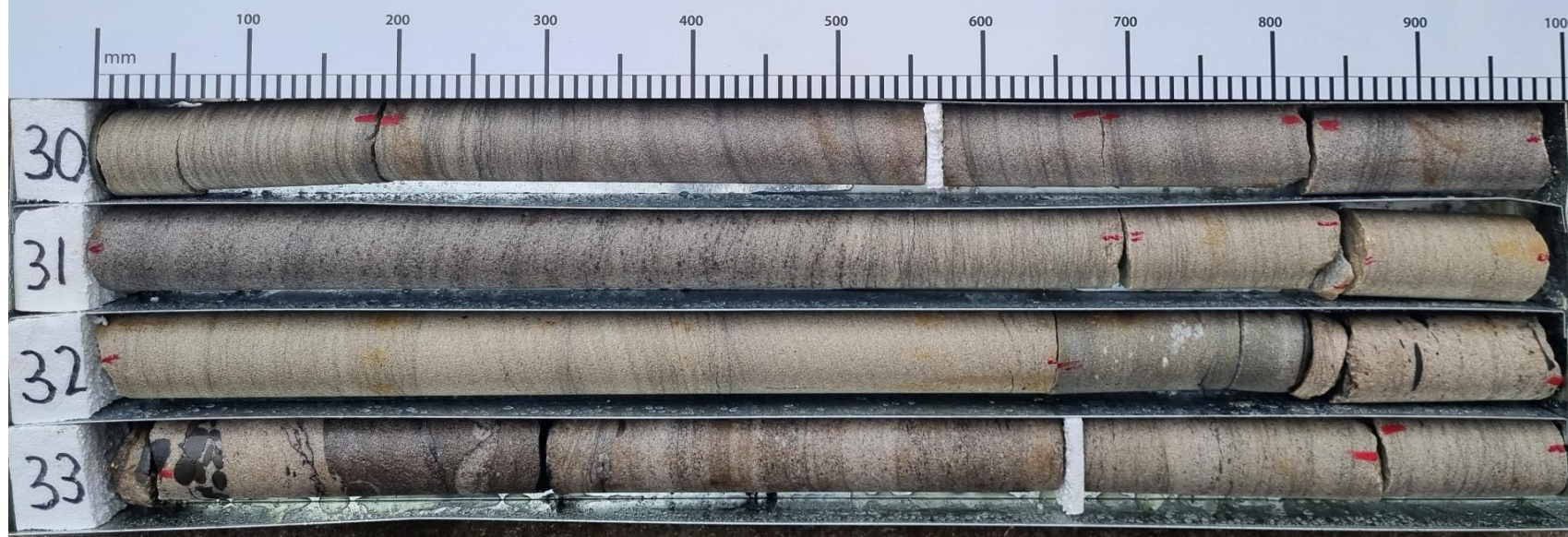
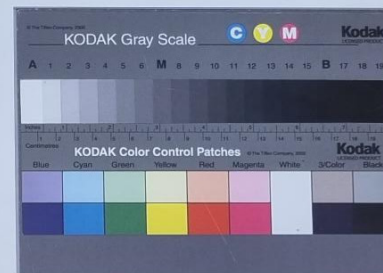
LOGGED BY: M.P.

BOREHOLE ID: BH301

DEPTH: 30 → 34 m

CORE TRAY NO.: 7

DATE: 28/05/2025



02 8599 7579



Sydney Gadigal Land,
2/5-7 Malta Steet, Fairfield
East NSW 2155



info@morrowgeo.com.au

Photo description

BH301 Box 7 of 13

Client

Landmark Group Construction Australia Pty Ltd

Location

3 Halifax Street, Macquarie Park NSW

Project name

Macquarie Park

Project No

P3006

Scale

Not to Scale

BH No

BH301

BH Depth

30.0m to 34.0m

morrow

CLIENT NAME: LANDMARK GROUP

PROJECT: MACQUARIE PARK

LOCATION: 3 HALIFAX STREET

JOB NUMBER: P3006

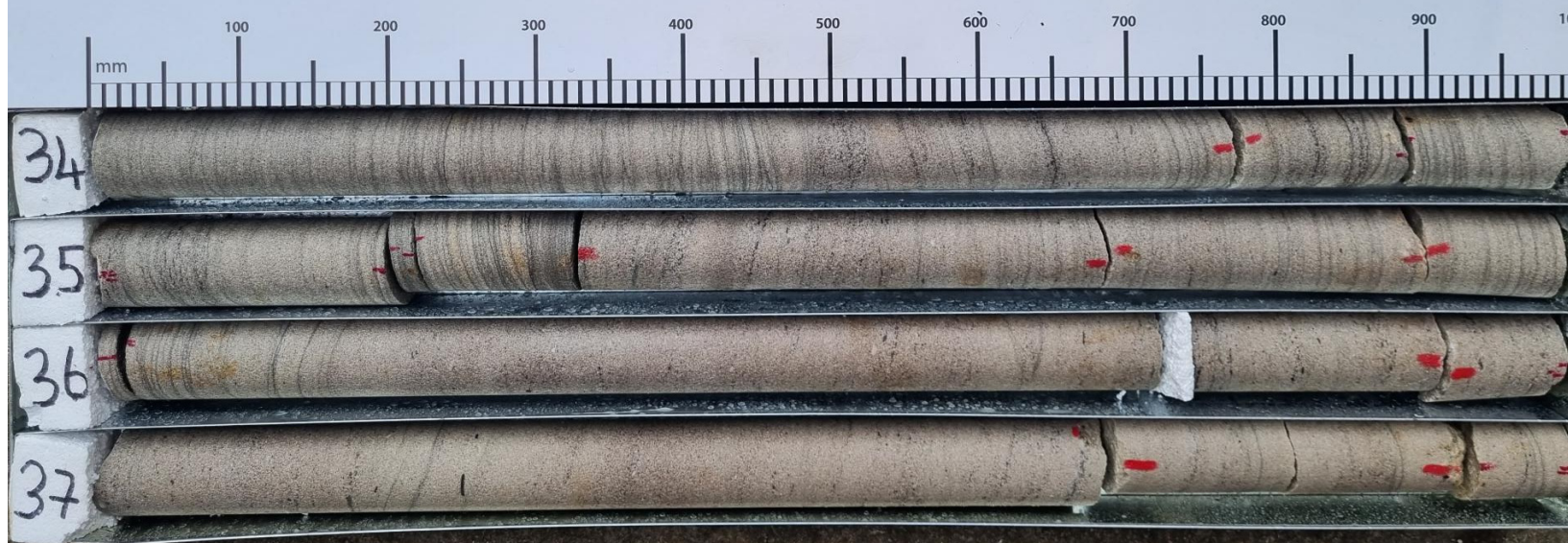
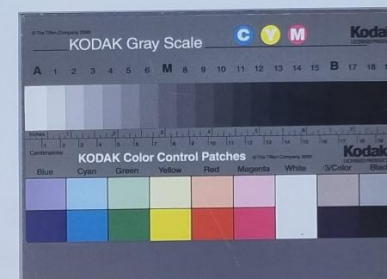
LOGGED BY: M.P.

BOREHOLE ID: BH301

DEPTH: 34.0 → 38.0m

CORE TRAY NO.: 8

DATE: 28/05/2025



morrow



02 8599 7579



Sydney Gadigal Land,
2/5-7 Malta Steet, Fairfield
East NSW 2155



info@morrowgeo.com.au

Photo description

BH301 Box 8 of 13

Client

Landmark Group Construction Australia Pty Ltd

Location

3 Halifax Street, Macquarie Park NSW

Project name

Macquarie Park

Project No

P3006

Scale

Not to Scale

BH No

BH301

BH Depth

34.0m to 38.0m

morrow

CLIENT NAME: LANDMARK GROUP

PROJECT: MACQUARIE PARK

LOCATION: 3 HALIFAX STREET

JOB NUMBER: P3006

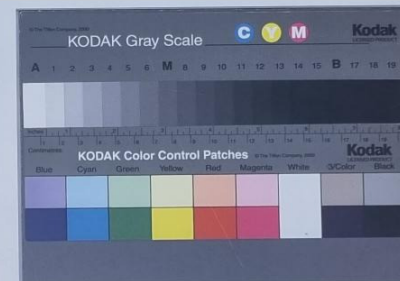
LOGGED BY: M.P.

BOREHOLE ID: BH301

DEPTH: 38.0 → 42.0m

CORE TRAY NO.: 9

DATE: 28/05/2025



morrow



02 8599 7579



Sydney Gadigal Land,
2/5-7 Malta Steet, Fairfield
East NSW 2155



info@morrowgeo.com.au

Photo description

BH301 Box 9 of 13

Client

Landmark Group Construction Australia Pty Ltd

Location

3 Halifax Street, Macquarie Park NSW

Project name

Macquarie Park

Project No

P3006

Scale

Not to Scale

BH No

BH301

BH Depth

38.0m to 42.0m

morrow

CLIENT NAME: LANDMARK GROUP

PROJECT: MACQUARIE PARK

LOCATION: 3 HALIFAX STREET

JOB NUMBER: P3006

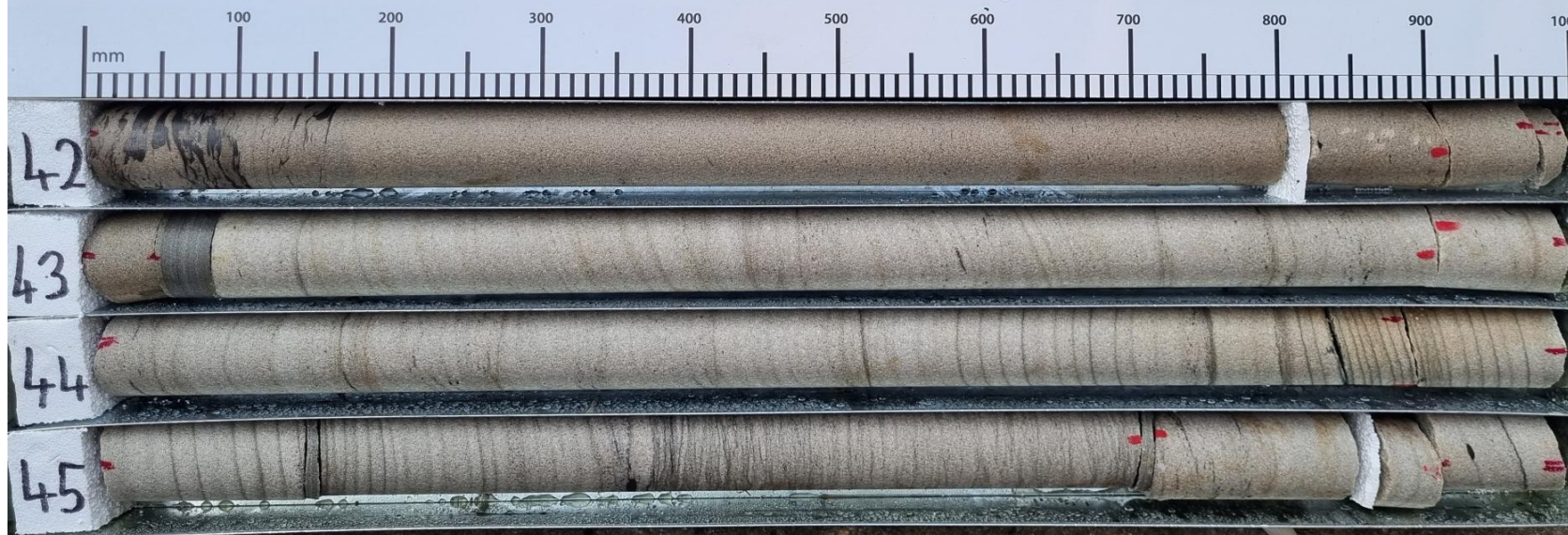
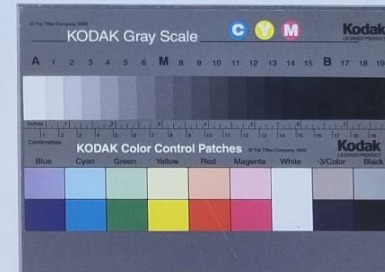
LOGGED BY: M.P.

BOREHOLE ID: BH301

DEPTH: 42.0 → 46.0m

CORE TRAY NO.: 10

DATE: 28/05/2025



morrow



02 8599 7579



Sydney Gadigal Land,
2/5-7 Malta Steet, Fairfield
East NSW 2155



info@morrowgeo.com.au

Photo description

BH301 Box 10 of 13

Client

Landmark Group Construction Australia Pty Ltd

Location

3 Halifax Street, Macquarie Park NSW

Project name

Macquarie Park

Project No

P3006

Scale

Not to Scale

BH No

BH301

BH Depth

42.0m to 46.0m

morrow

CLIENT NAME: LANDMARK GROUP

PROJECT: MACQUARIE PARK

LOCATION: 3 HALIFAX STREET

JOB NUMBER: P3006

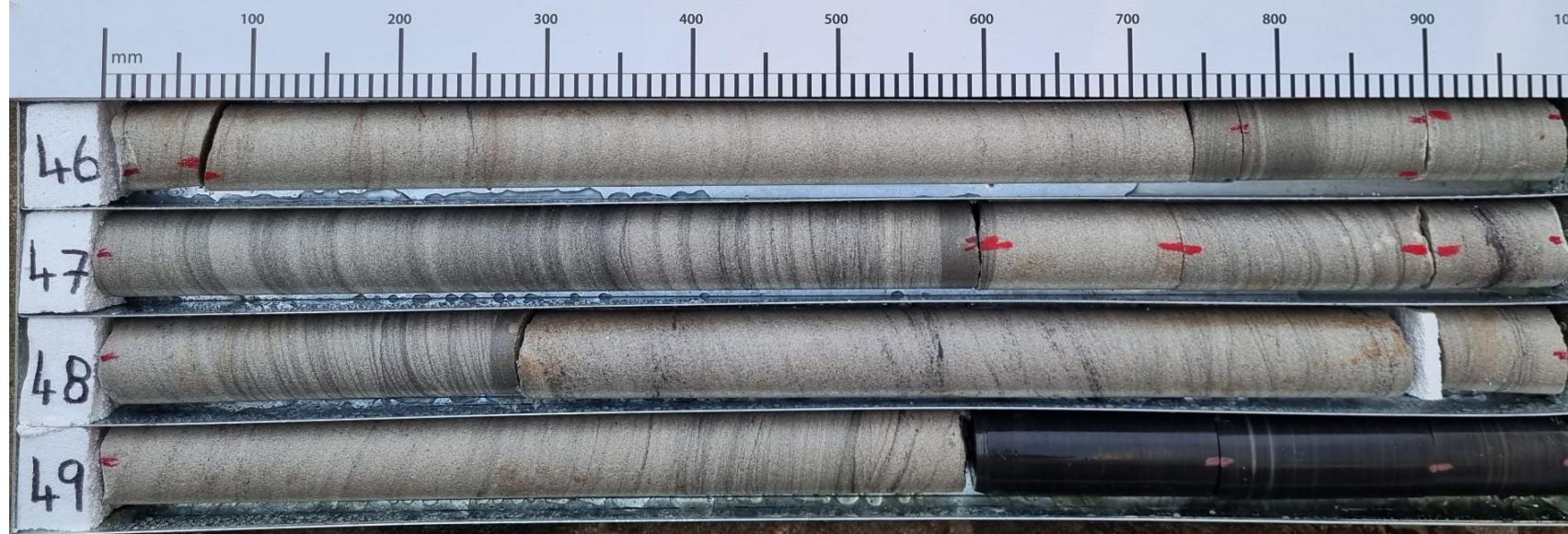
LOGGED BY: M.P.

BOREHOLE ID: BH301

DEPTH: 46.0-50.0m

CORE TRAY NO.: 11

DATE: 28/05/2025



morrow



02 8599 7579



Sydney Gadigal Land,
2/5-7 Malta Steet, Fairfield
East NSW 2155



info@morrowgeo.com.au

Photo description

BH301 Box 11 of 13

Client

Landmark Group Construction Australia Pty Ltd

Location

3 Halifax Street, Macquarie Park NSW

Project name

Macquarie Park

Project No

P3006

Scale

Not to Scale

BH No

BH301

BH Depth

46.0m to 50.0m

morrow

CLIENT NAME: LANDMARK GROUP

PROJECT: MACQUARIE PARK

LOCATION: 3 HALIFAX STREET

JOB NUMBER: P3006

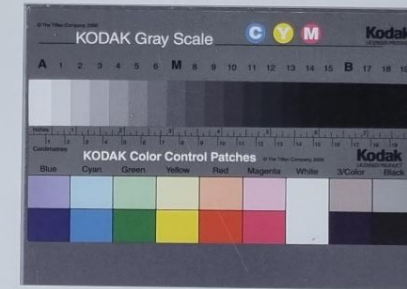
LOGGED BY: M.P.

BOREHOLE ID: BH301

DEPTH: 50.0 - 54.0

CORE TRAY NO.: 12

DATE: 28/05/2025



morrow



02 8599 7579



Sydney Gadigal Land,
2/5-7 Malta Steet, Fairfield
East NSW 2155



info@morrowgeo.com.au

Photo description

BH301 Box 12 of 13

Client

Landmark Group Construction Australia Pty Ltd

Location

3 Halifax Street, Macquarie Park NSW

Project name

Macquarie Park

Project No

P3006

Scale

Not to Scale

BH No

BH301

BH Depth

50.0m to 54.0m

morrow

CLIENT NAME: LANDMARK GROUP

PROJECT: MACQUARIE PARK

LOCATION: 3 HALIFAX STREET

JOB NUMBER: P3006

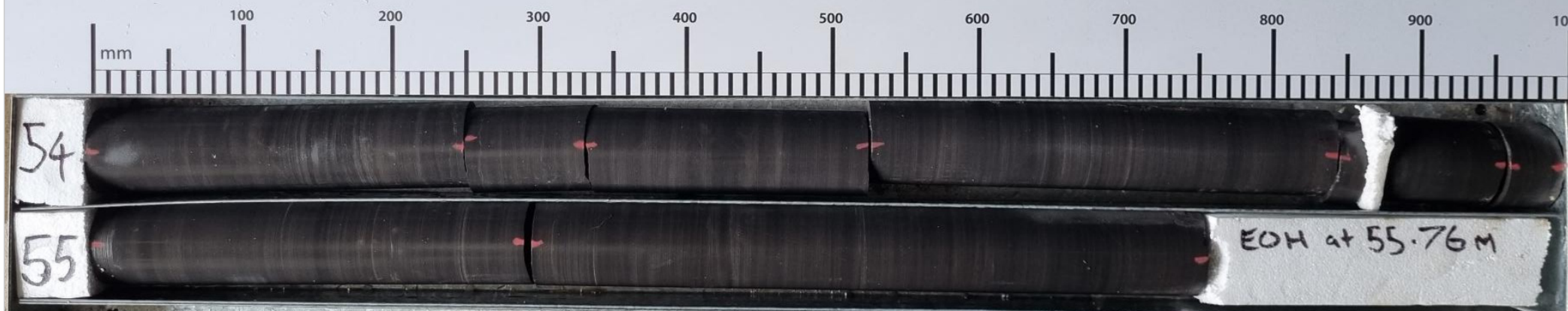
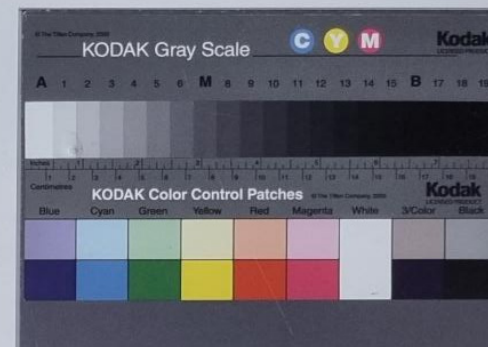
LOGGED BY: M.P.

BOREHOLE ID: BH301

DEPTH: 54.00 - 55.76

CORE TRAY NO.: 13

DATE: 28/05/2025



02 8599 7579



Sydney Gadigal Land,
2/5-7 Malta Street, Fairfield
East NSW 2155



info@morrowgeo.com.au

Photo description

BH301 Box 13 of 13

Client

Landmark Group Construction Australia Pty Ltd

Location

3 Halifax Street, Macquarie Park NSW

Project name

Macquarie Park

Project No

P3006

Scale

Not to Scale

BH No

BH301

BH Depth

54.0m to 55.76m

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

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 Slicksided 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

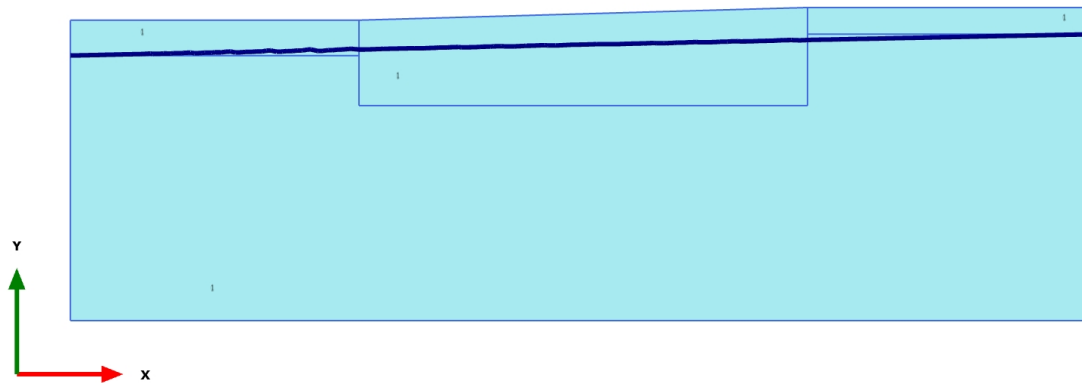
APPENDIX B

PLAXIS FLOW MODELLING REPORTS

PLAXIS Report

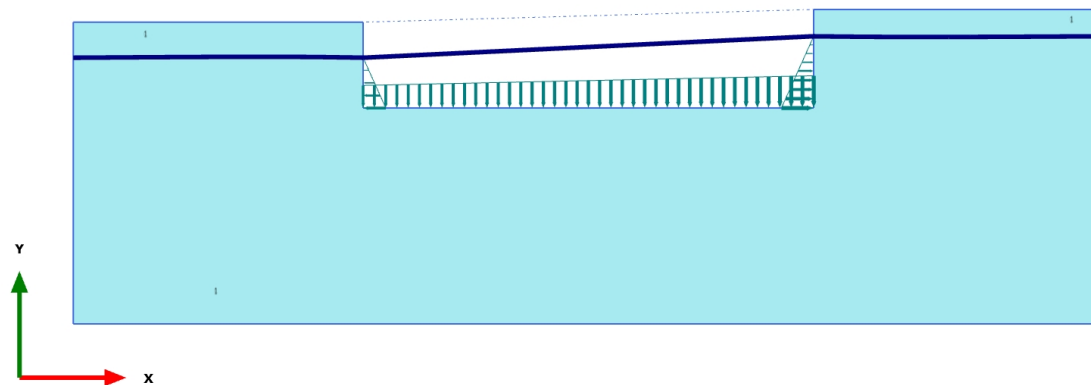
Filename	P3006_MacquariePark_Section1(8BL-BA-GW).p2dx
Directory	C:\Users\Plaxis\Morrow Geotechnics\MG - Documents\1. Projects\P3000-P3099\P3006_Macquarie Park, 3 Halifax St\08_Groundwater\
Title	P3006_MacquariePark_Section1(8BL-BA-GW)
Model	Plane strain
Elements	15-Noded
PLAXIS Version	Version 2024.2.0.1144

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



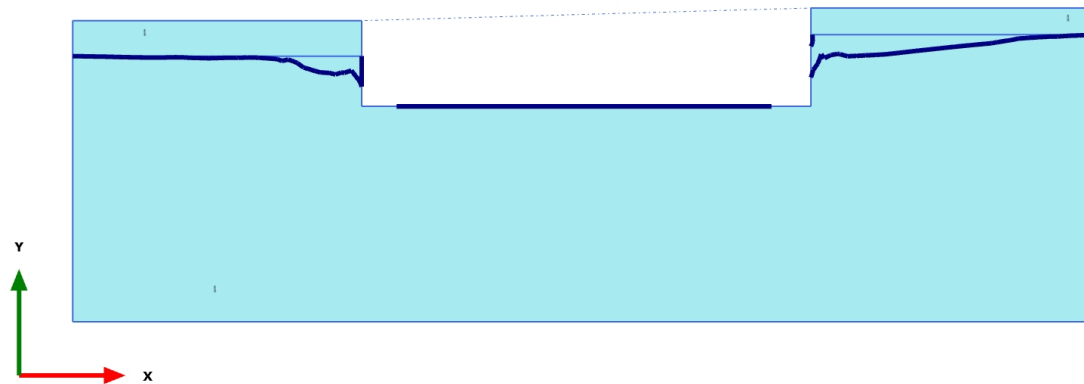
Materials plot

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



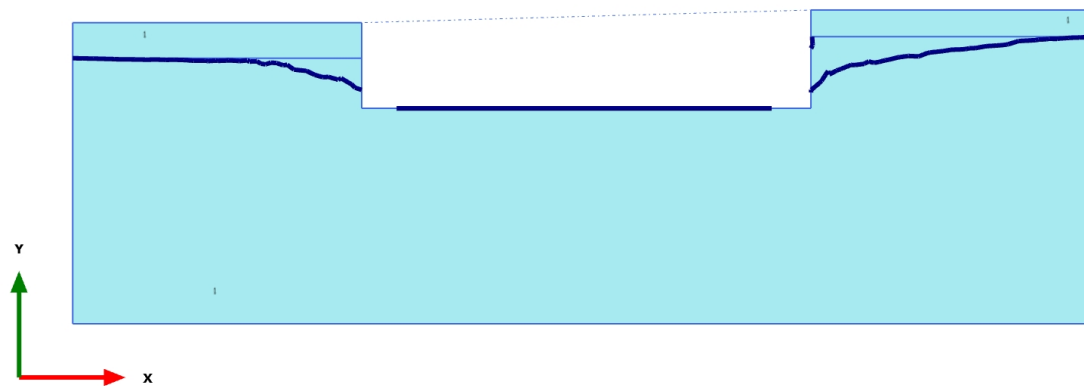
Materials plot

1.1.1.3 Calculation results, Short Term [Phase_2] (2/10), Materials plot



Materials plot

1.1.1.4 Calculation results, Long Term [Phase_3] (3/22), Materials plot



Materials plot

1.1.2.1.1 Materials - Soil and interfaces - Mohr-Coulomb

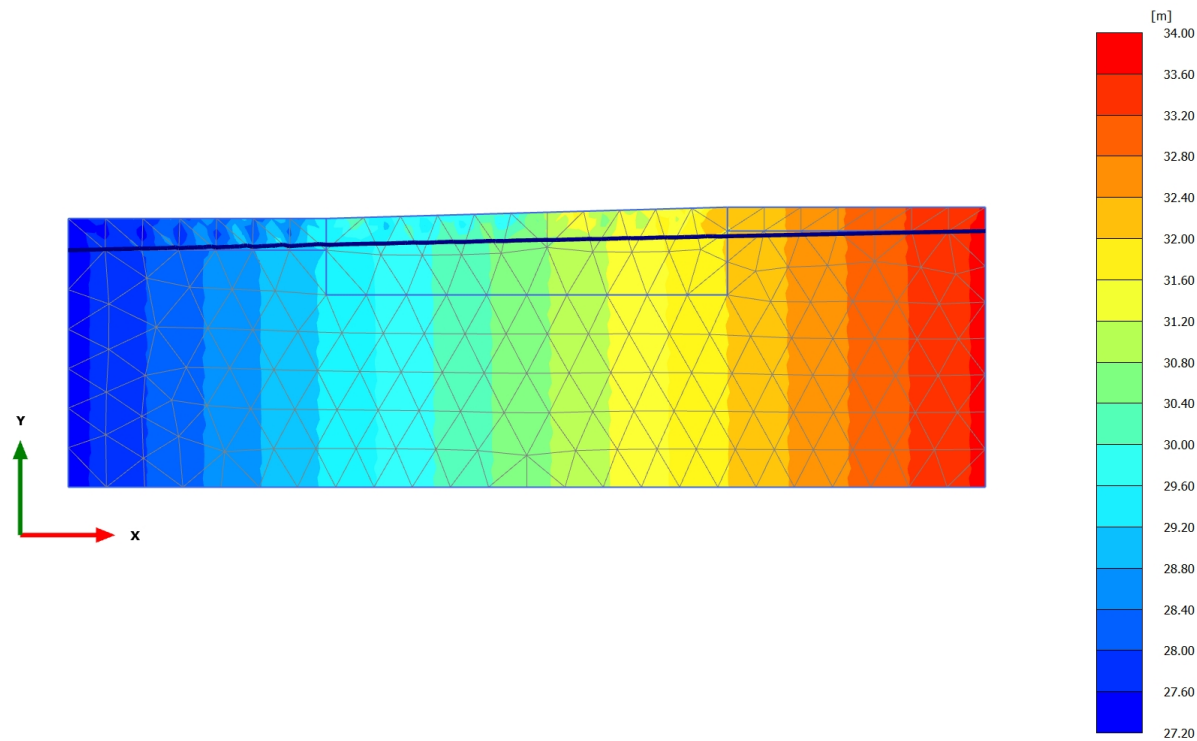
Identification number	1
Identification	Permeability
Soil model	Mohr-Coulomb
Drainage type	Drained
Colour	
Comments	
y_unsat	kN/m ³ 24.00
y_sat	kN/m ³ 24.00
e_init	0.5000
n_init	0.3333
Input method	SDOF equivalent
Rayleigh α	0.000
Rayleigh β	0.000
ξ_1	% 0.000
ξ_2	% 0.000
f_1	Hz 0.1000
f_2	Hz 1.000

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

Identification number		1
K _{w,ref/n}	kN/m ²	7.500E6
Classification type		Standard
Soil class (Standard)		Coarse
< 2 µm	%	10.00
2 µm - 50 µm	%	13.00
50 µm - 2 mm	%	77.00
Use defaults		False
k _x	m/day	4.639E-3
k _y	m/day	4.639E-3
Void ratio dependency		False
c _k		1000E12
n _{init}		0.3333
-ψ _{unsat}	m	10.00E3
c _s	kJ/t/K	0.000
λ _s	kW/m/K	0.000
ρ _s	t/m ³	2.600
Thermal expansion type		Isotropic
α _{sv}	1/K	0.000
Phase change		False

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

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

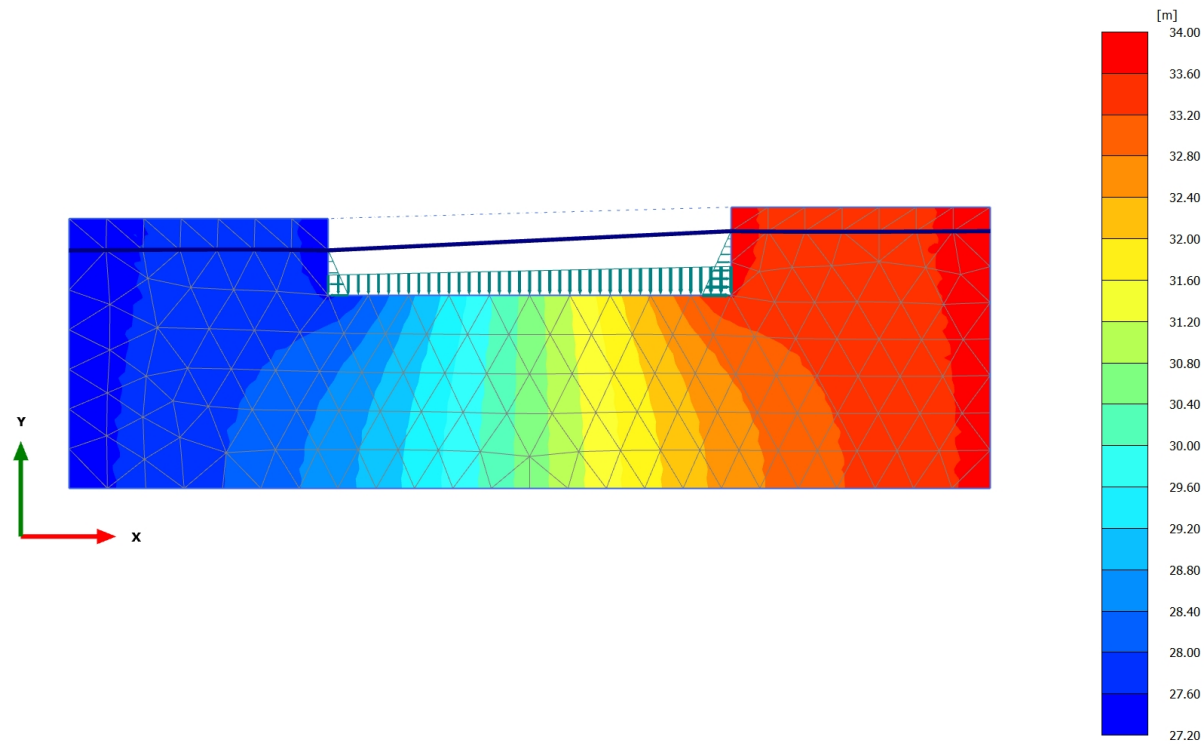


Groundwater head (scaled up 0.200 times) (Time 0.000 day)

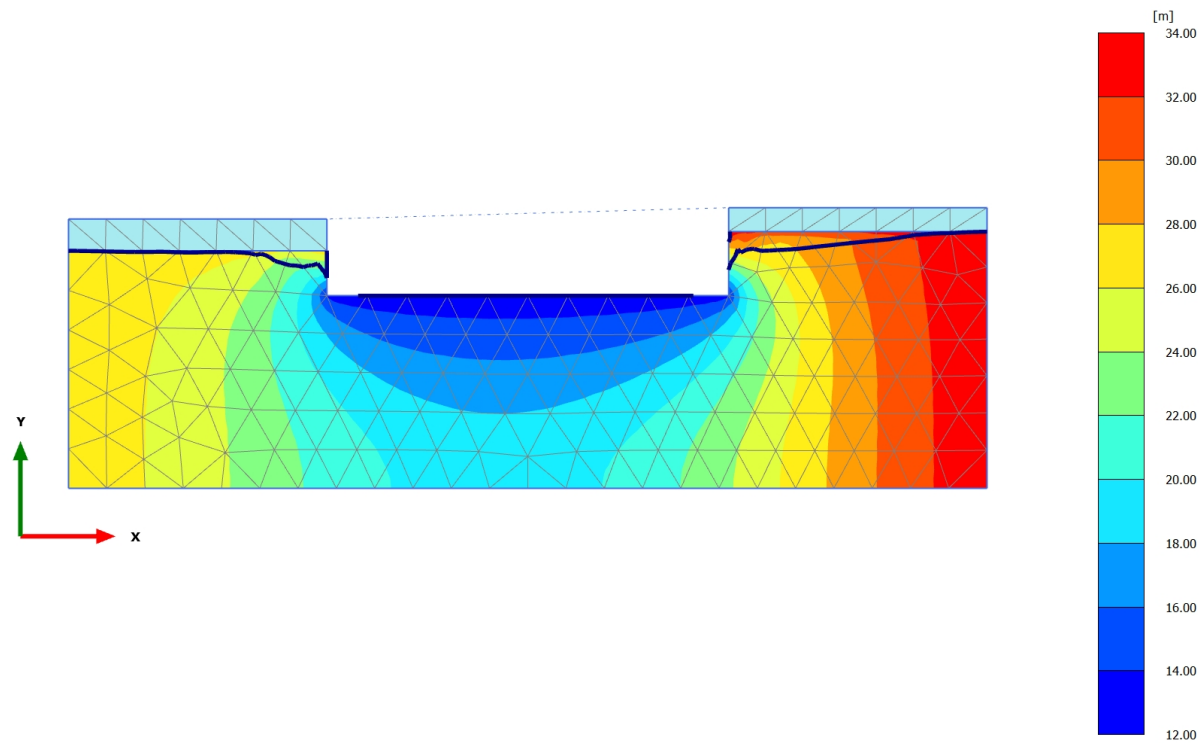
Maximum value = 33.70 m (Element 240 at Node 7)

Minimum value = 27.36 m (Element 15 at Node 2753)

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] (2/10), Groundwater head

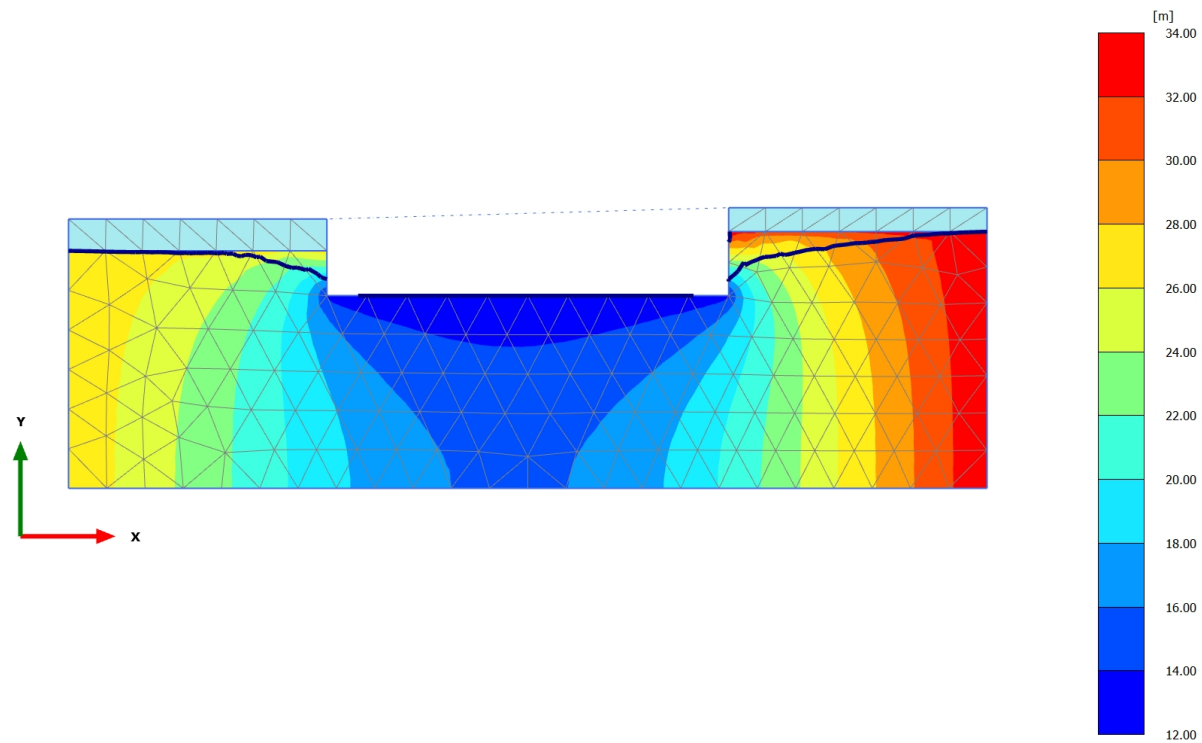


Groundwater head (scaled up 0.200 times) (Time 1.000 day)

Maximum value = 33.85 m (Element 329 at Node 1077)

Minimum value = 12.79 m (Element 72 at Node 2057)

2.1.1.1.4 Calculation results, Long Term [Phase_3] (3/22), Groundwater head

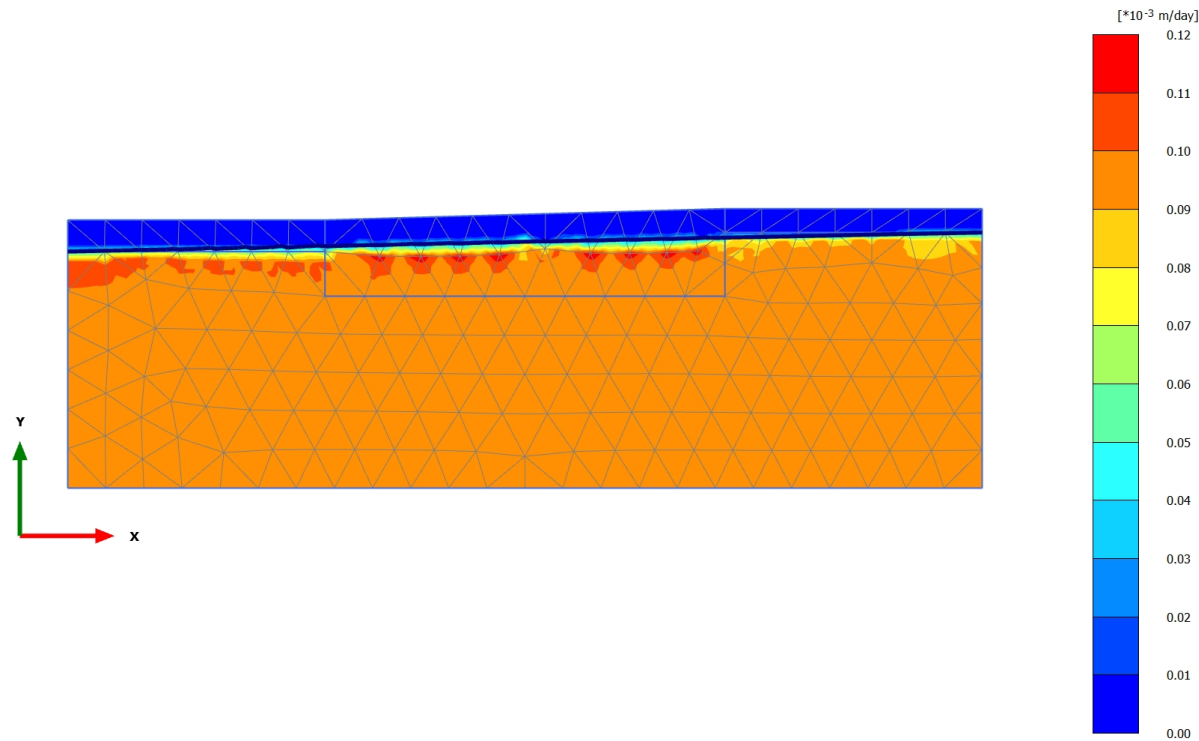


Groundwater head (scaled up 0.200 times) (Time 101.0 day)

Maximum value = 33.82 m (Element 329 at Node 1077)

Minimum value = 12.79 m (Element 72 at Node 2057)

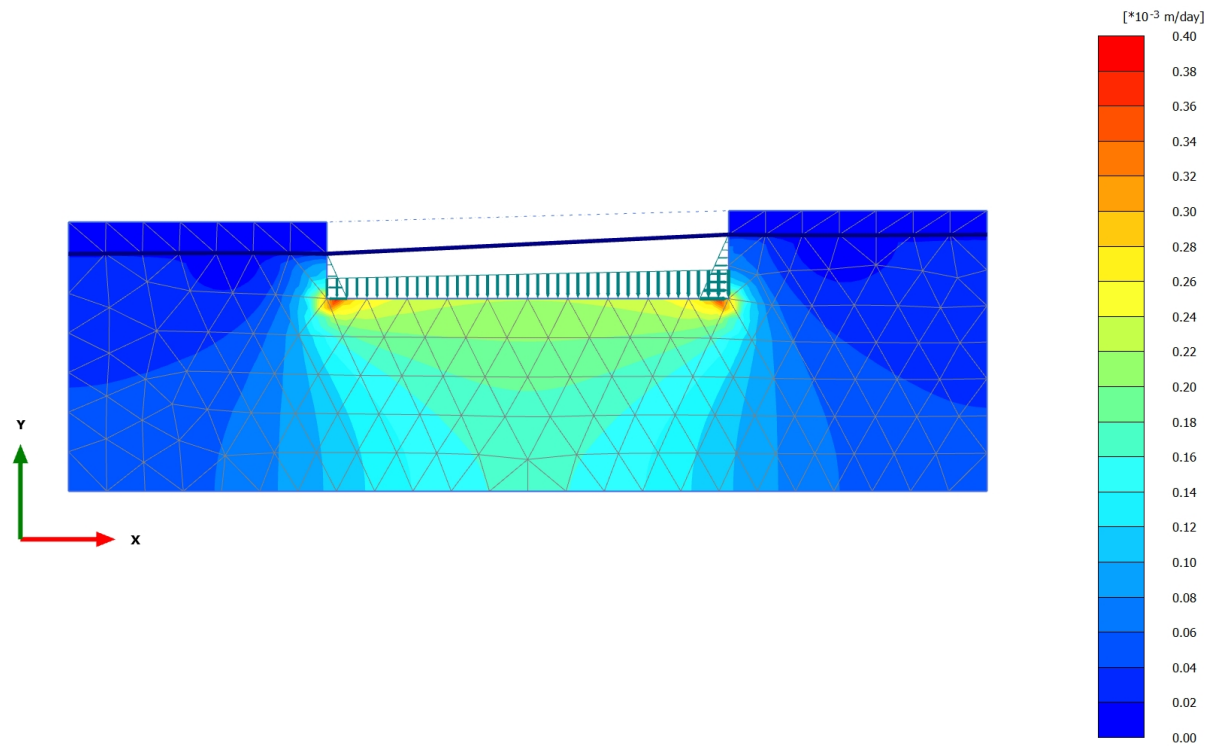
2.1.2.1.1 Calculation results, Initial phase [InitialPhase] (0/0), Groundwater flow $|q|$



Groundwater flow $|q|$ (scaled up $50.0 \cdot 10^3$ times) (Time 0.000 day)

Maximum value = $0.1193 \cdot 10^{-3}$ m/day (Element 33 at Node 1693)

Minimum value = $0.5774 \cdot 10^{-9}$ m/day (Element 14 at Node 931)

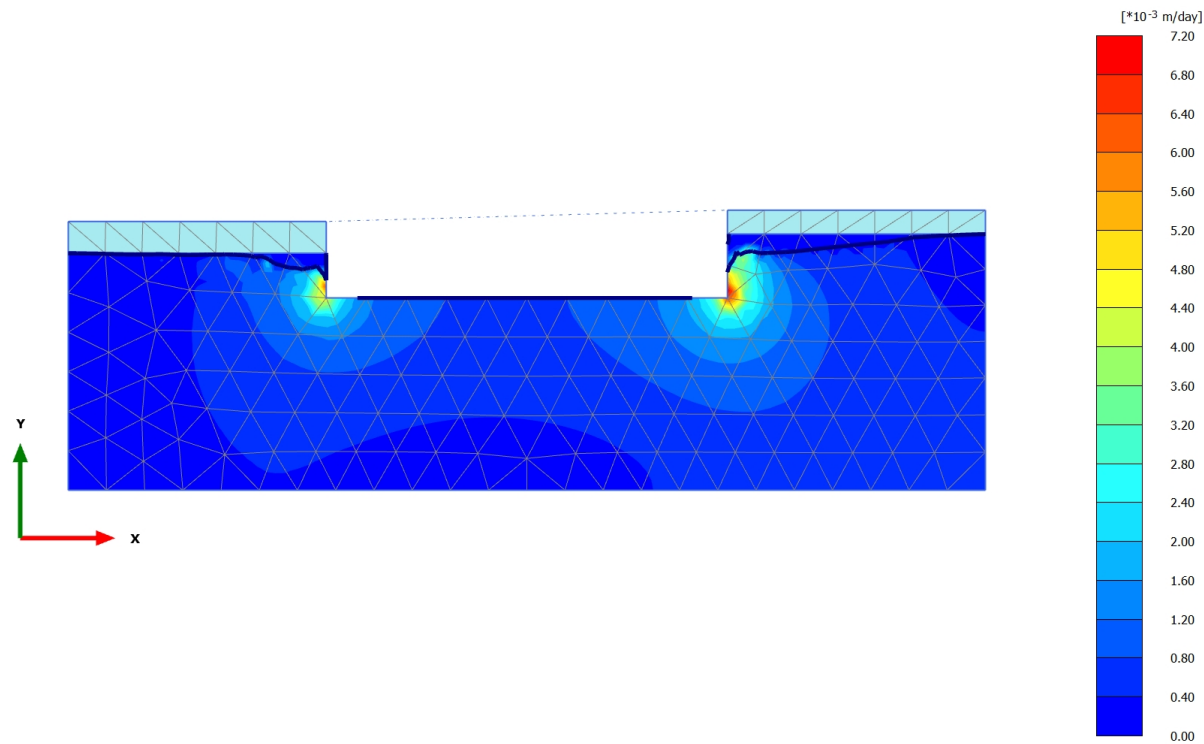
2.1.2.1.2 Calculation results, Phase_1 [Phase_1] (1/1), Groundwater flow $|q|$ 

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

Maximum value = 0.3812×10^{-3} m/day (Element 72 at Node 2061)

Minimum value = 0.02663×10^{-9} m/day (Element 24 at Node 2529)

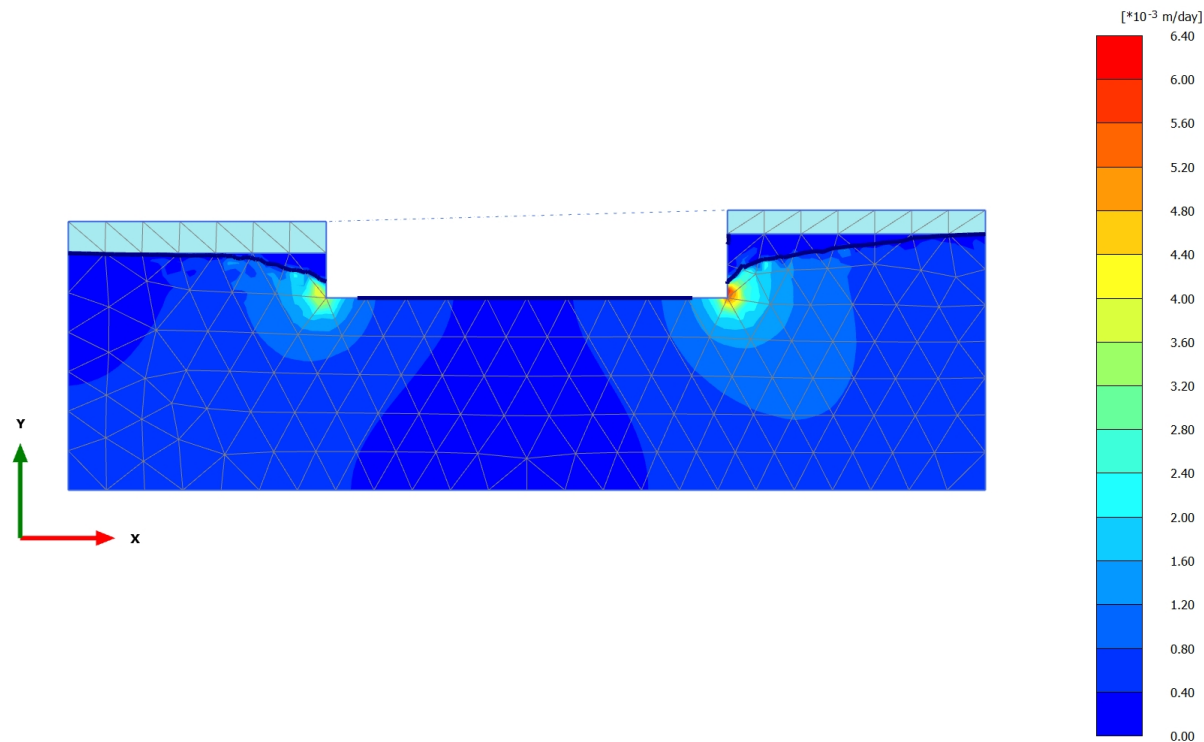
2.1.2.1.3 Calculation results, Short Term [Phase_2] (2/10), Groundwater flow $|q|$



Groundwater flow $|q|$ (scaled up 1.00×10^3 times) (Time 1.000 day)

Maximum value = 7.182×10^{-3} m/day (Element 331 at Node 970)

Minimum value = 4.578×10^{-9} m/day (Element 318 at Node 798)

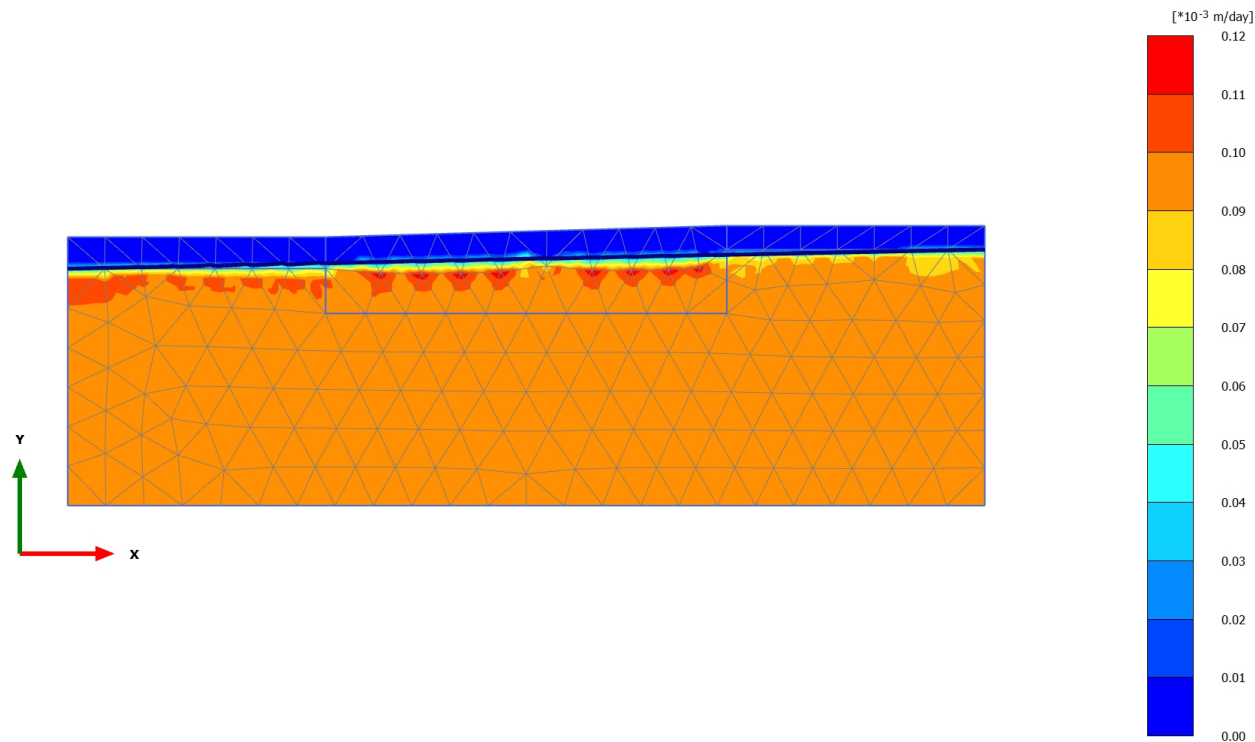
2.1.2.1.4 Calculation results, Long Term [Phase_3] (3/22), Groundwater flow $|q|$ 

Groundwater flow $|q|$ (scaled up 2.00×10^3 times) (Time 101.0 day)

Maximum value = 6.005×10^{-3} m/day (Element 331 at Node 970)

Minimum value = 0.02922×10^{-6} m/day (Element 314 at Node 666)

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

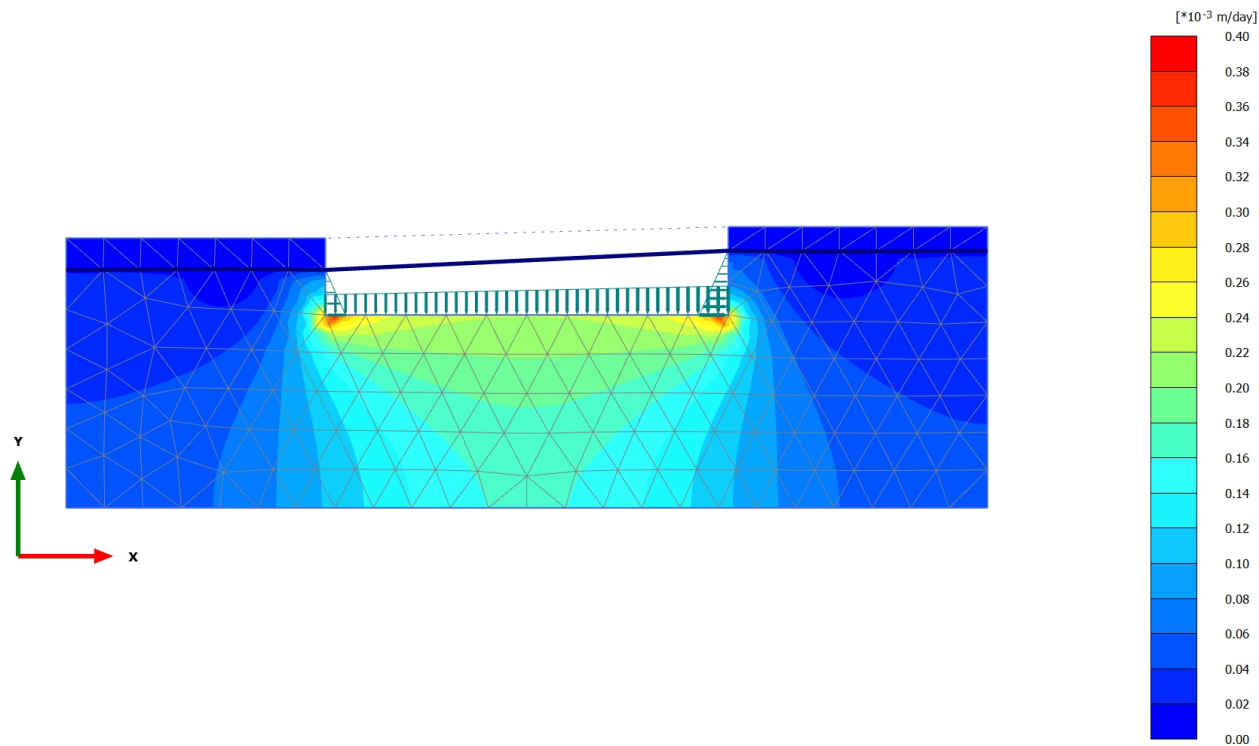


Groundwater flow $|q|$ (scaled up 50.0×10^3 times) (Time 0.000 day)

Maximum value = 0.1193×10^{-3} m/day (Element 33 at Node 1693)

Minimum value = 0.5774×10^{-9} m/day (Element 14 at Node 931)

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

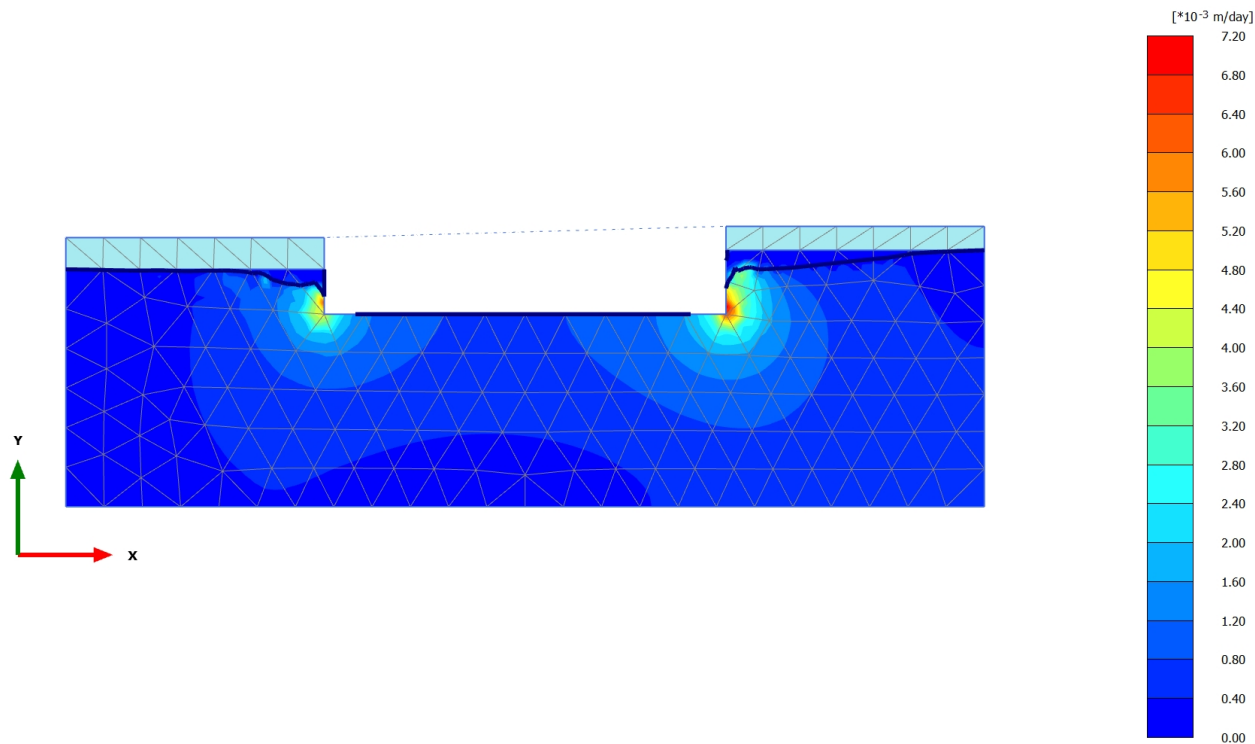


Groundwater flow |q| (scaled up 20.0*10³ times) (Time 0.000 day)

Maximum value = 0.3812*10⁻³ m/day (Element 72 at Node 2061)

Minimum value = 0.02663*10⁻⁹ m/day (Element 24 at Node 2529)

4.1.3 Calculation results, Short Term [Phase_2] (2/10), Groundwater flow $|q|$

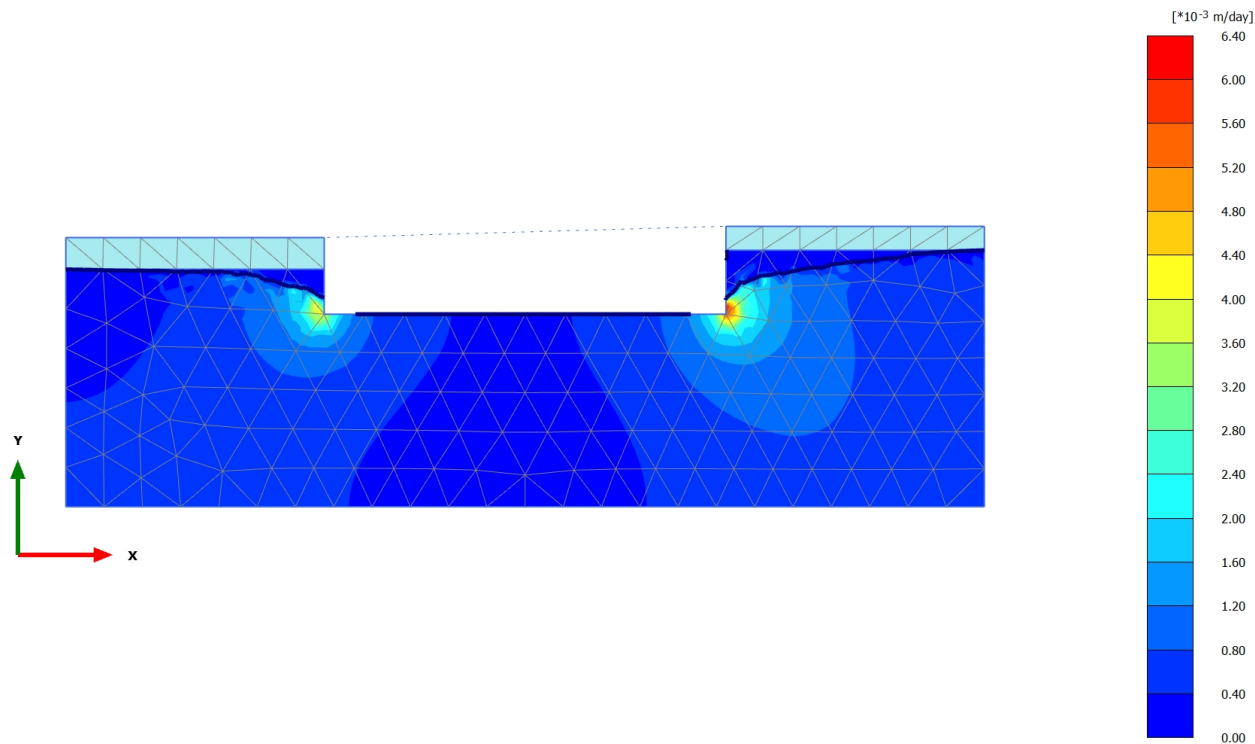


Groundwater flow $|q|$ (scaled up 1.00×10^3 times) (Time 1.000 day)

Maximum value = 7.182×10^{-3} m/day (Element 331 at Node 970)

Minimum value = 4.578×10^{-9} m/day (Element 318 at Node 798)

4.1.4 Calculation results, Long Term [Phase_3] (3/22), Groundwater flow $|q|$



Groundwater flow $|q|$ (scaled up 2.00×10^3 times) (Time 101.0 day)

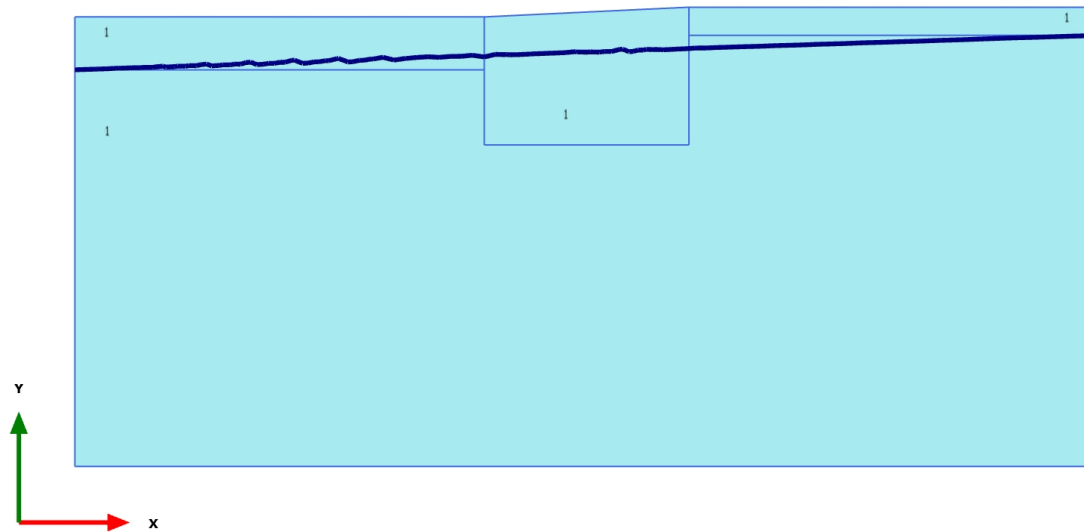
Maximum value = 6.005×10^{-3} m/day (Element 331 at Node 970)

Minimum value = 0.02922×10^{-6} m/day (Element 314 at Node 666)

PLAXIS Report

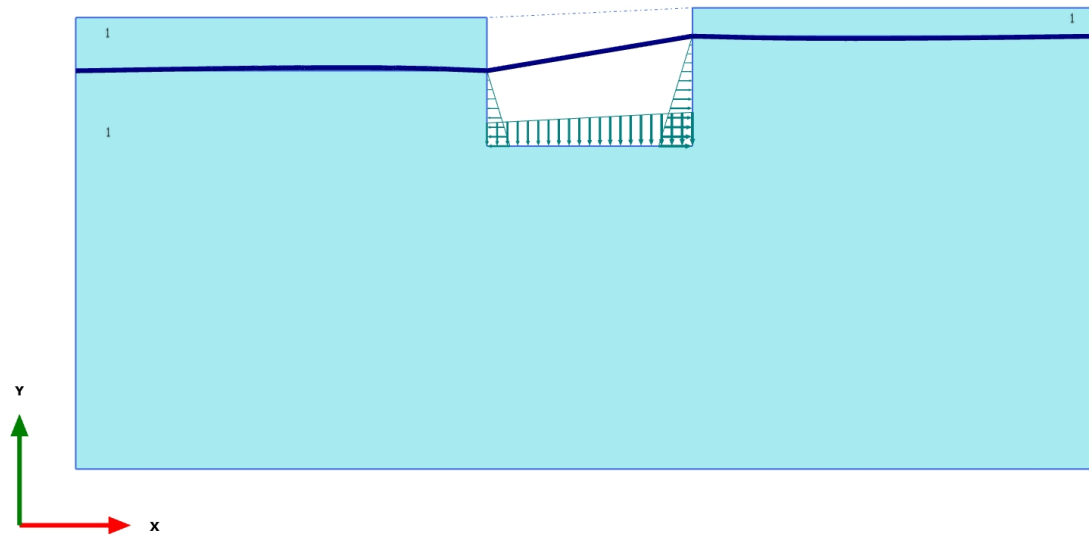
Filename	P3006_MacquariePark_Section2(8BL-BA-GW).p2dx
Directory	C:\Users\Plaxis\Morrow Geotechnics\MG - Documents\1. Projects\P3000-P3099\P3006_Macquarie Park, 3 Halifax St\08_Groundwater\
Title	P3006_MacquariePark_Section2(8BL-BA-GW)
Model	Plane strain
Elements	15-Noded
PLAXIS Version	Version 2024.2.0.1144

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



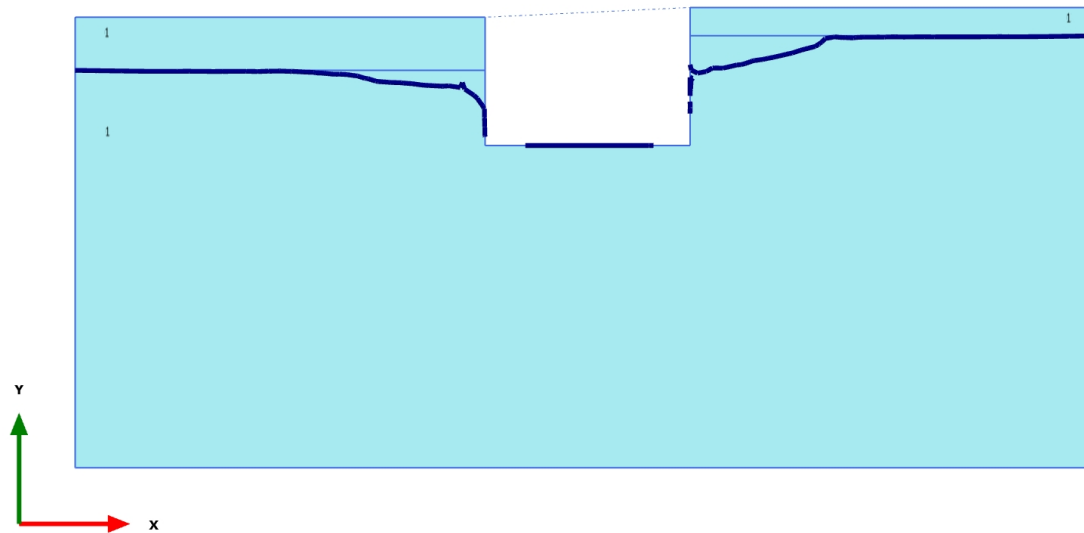
Materials plot

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



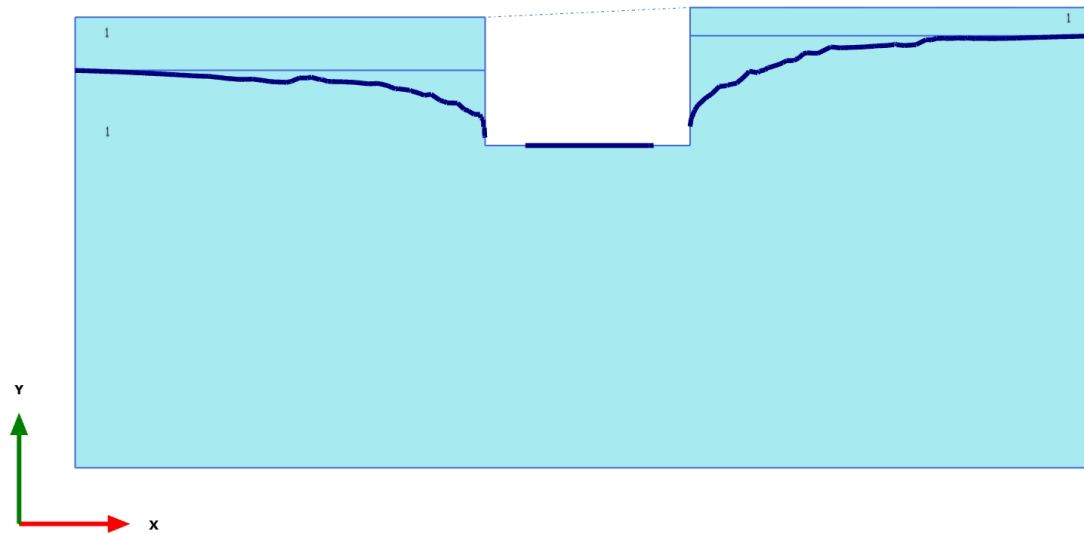
Materials plot

1.1.1.3 Calculation results, Short Term [Phase_2] (2/9), Materials plot



Materials plot

1.1.1.4 Calculation results, Long Term [Phase_3] (3/23), Materials plot



Materials plot

1.1.2.1.1 Materials - Soil and interfaces - Mohr-Coulomb

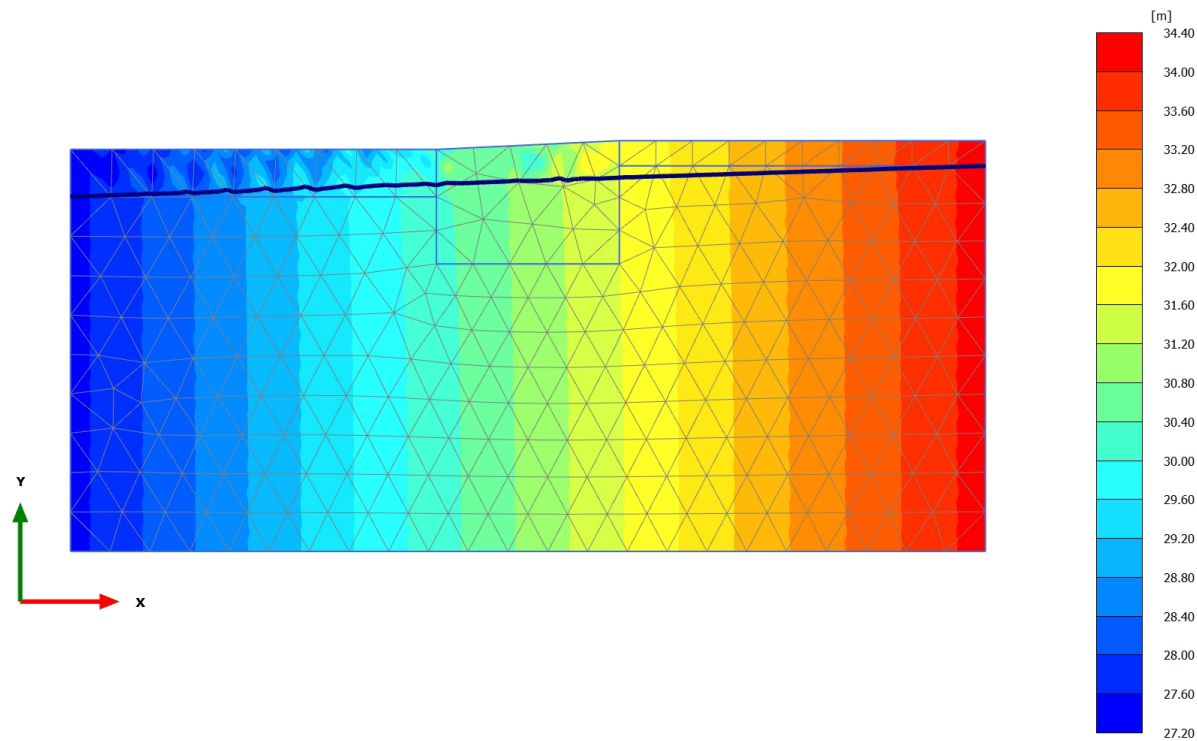
Identification number	1
Identification	Permeability
Soil model	Mohr-Coulomb
Drainage type	Drained
Colour	
Comments	
y_unsat	kN/m ³ 24.00
y_sat	kN/m ³ 24.00
e_init	0.5000
n_init	0.3333
Input method	SDOF equivalent
Rayleigh α	0.000
Rayleigh β	0.000
ξ_1	% 0.000
ξ_2	% 0.000
f_1	Hz 0.1000
f_2	Hz 1.000

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

Identification number		1
K _{w,ref/n}	kN/m ²	7.500E6
Classification type		Standard
Soil class (Standard)		Coarse
< 2 µm	%	10.00
2 µm - 50 µm	%	13.00
50 µm - 2 mm	%	77.00
Use defaults		False
k _x	m/day	4.639E-3
k _y	m/day	4.639E-3
Void ratio dependency		False
c _k		1000E12
n _{init}		0.3333
-ψ _{unsat}	m	10.00E3
c _s	kJ/t/K	0.000
λ _s	kW/m/K	0.000
ρ _s	t/m ³	2.600
Thermal expansion type		Isotropic
α _{sv}	1/K	0.000
Phase change		False

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

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

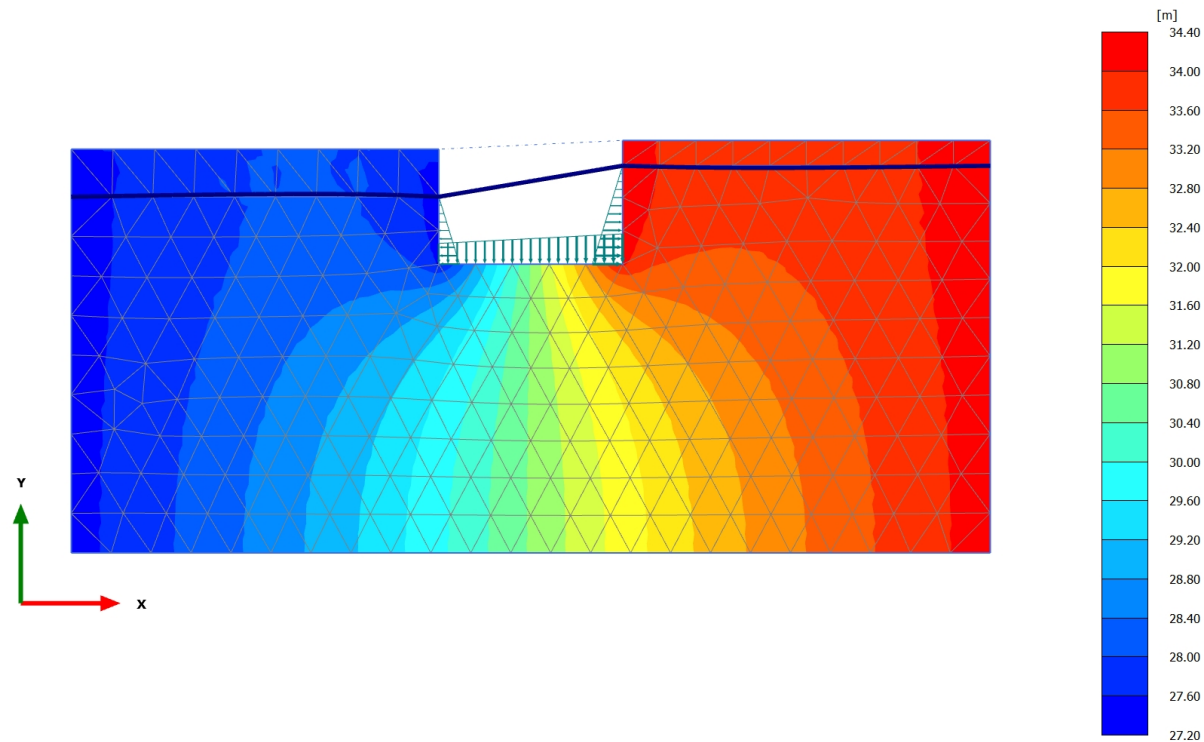


Groundwater head (scaled up 0.200 times) (Time 0.000 day)

Maximum value = 34.20 m (Element 116 at Node 7)

Minimum value = 27.34 m (Element 25 at Node 3781)

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

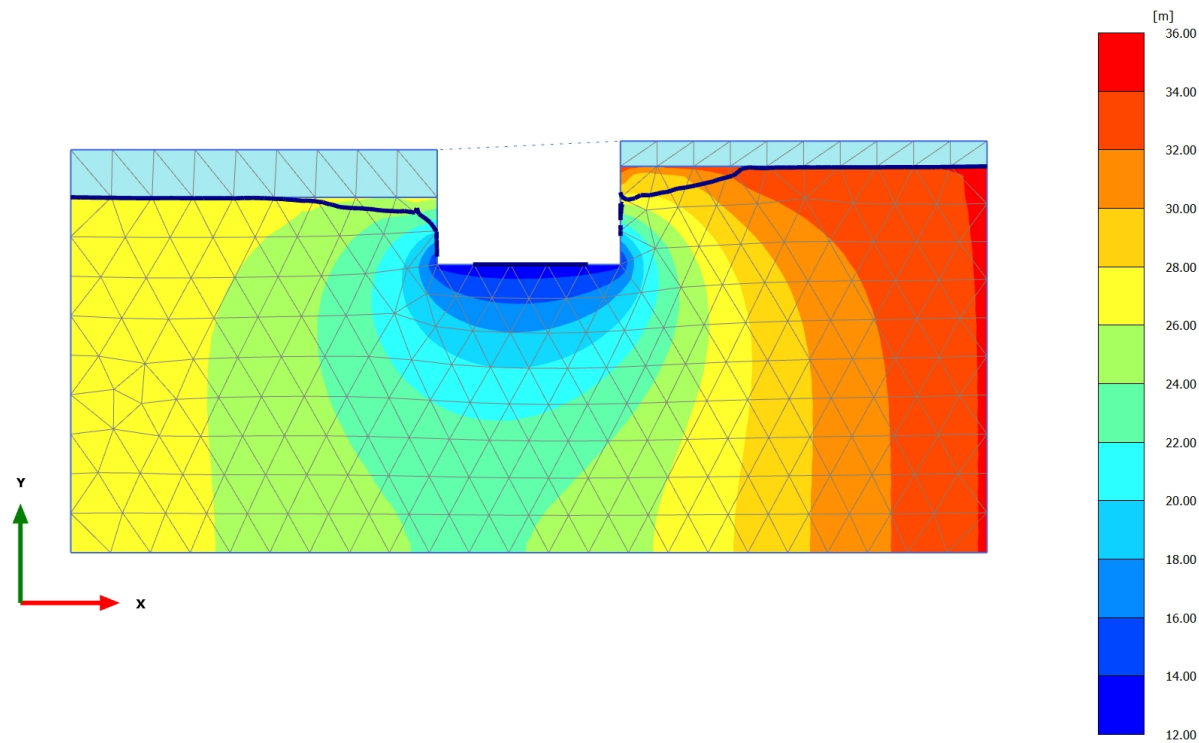


Groundwater head (scaled up 0.200 times) (Time 0.000 day)

Maximum value = 34.20 m (Element 240 at Node 49)

Minimum value = 27.45 m (Element 477 at Node 2832)

2.1.1.1.3 Calculation results, Short Term [Phase_2] (2/9), Groundwater head

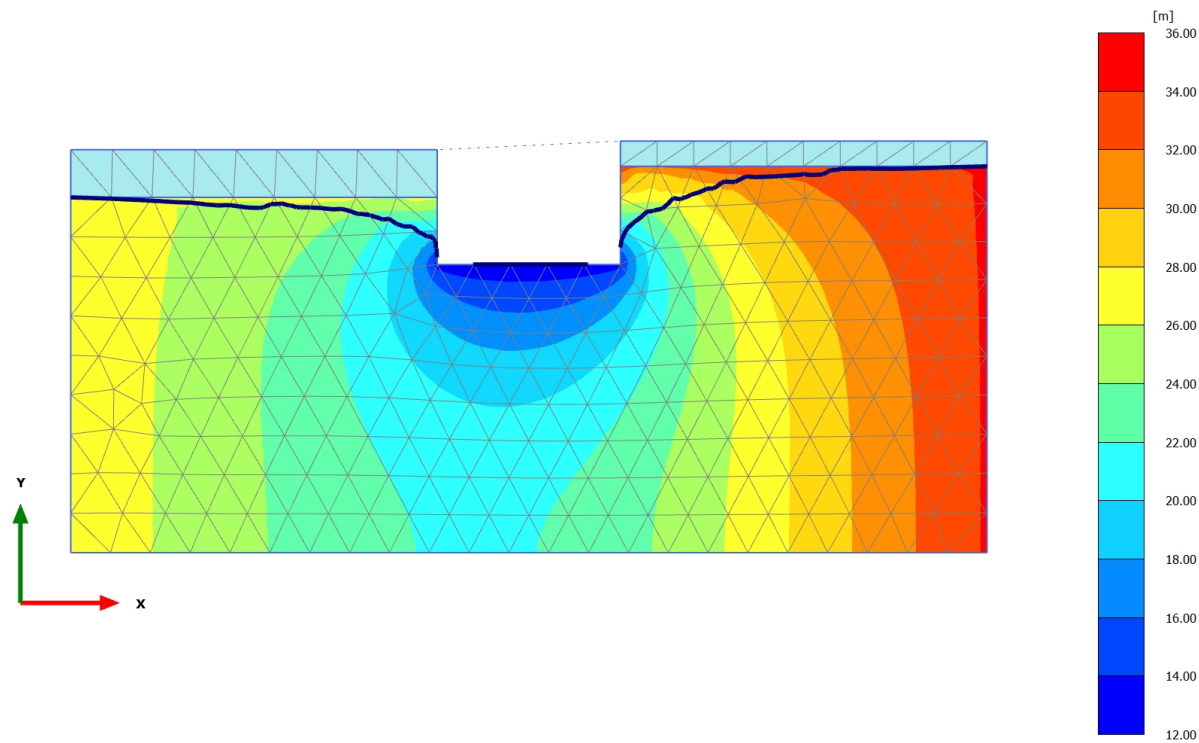


Groundwater head (scaled up 0.200 times) (Time 1.000 day)

Maximum value = 34.20 m (Element 340 at Node 229)

Minimum value = 12.80 m (Element 463 at Node 2113)

2.1.1.1.4 Calculation results, Long Term [Phase_3] (3/23), Groundwater head

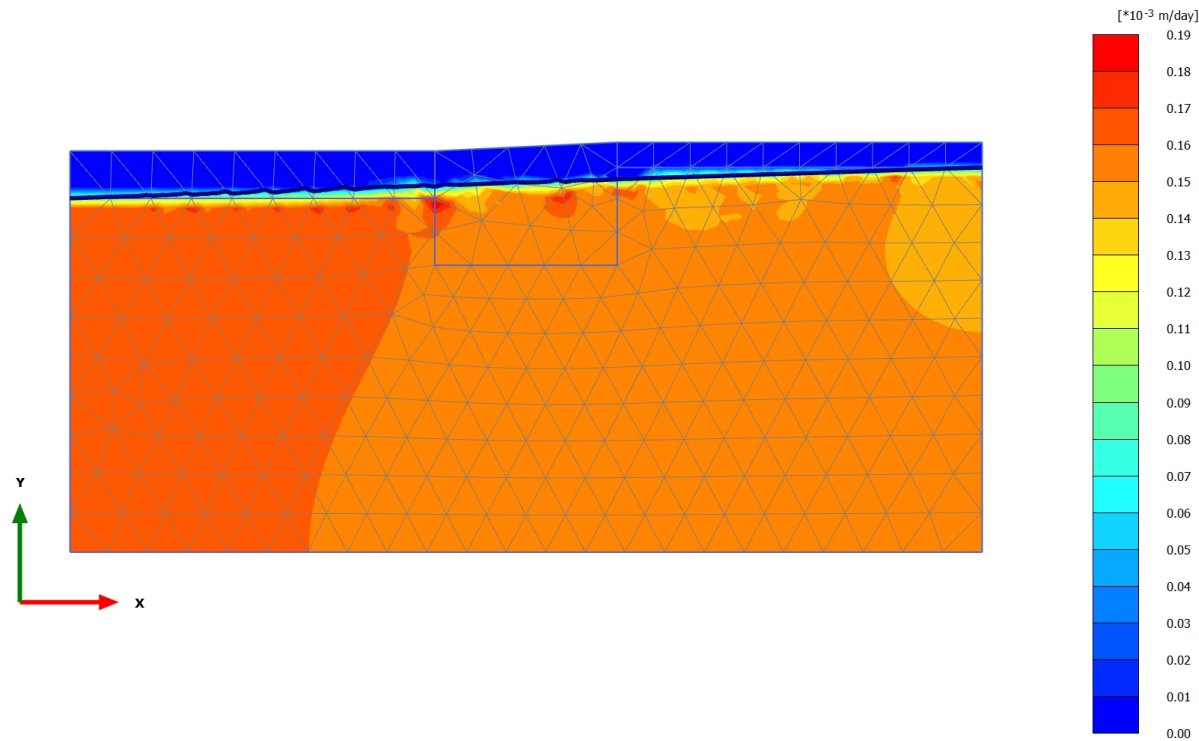


Groundwater head (scaled up 0.200 times) (Time 101.0 day)

Maximum value = 34.20 m (Element 340 at Node 229)

Minimum value = 12.80 m (Element 463 at Node 2113)

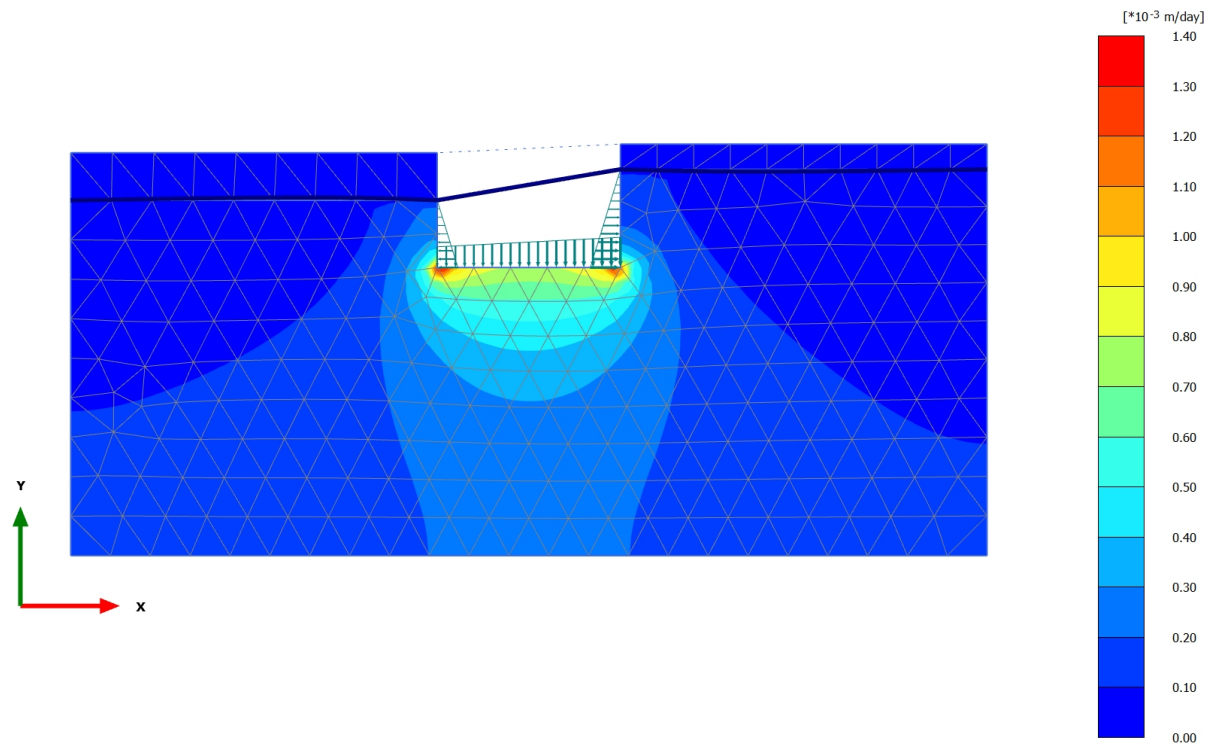
2.1.2.1.1 Calculation results, Initial phase [InitialPhase] (0/0), Groundwater flow $|q|$



Groundwater flow $|q|$ (scaled up 50.0×10^3 times) (Time 0.000 day)

Maximum value = 0.1851×10^{-3} m/day (Element 42 at Node 2690)

Minimum value = 1.224×10^{-9} m/day (Element 43 at Node 2341)

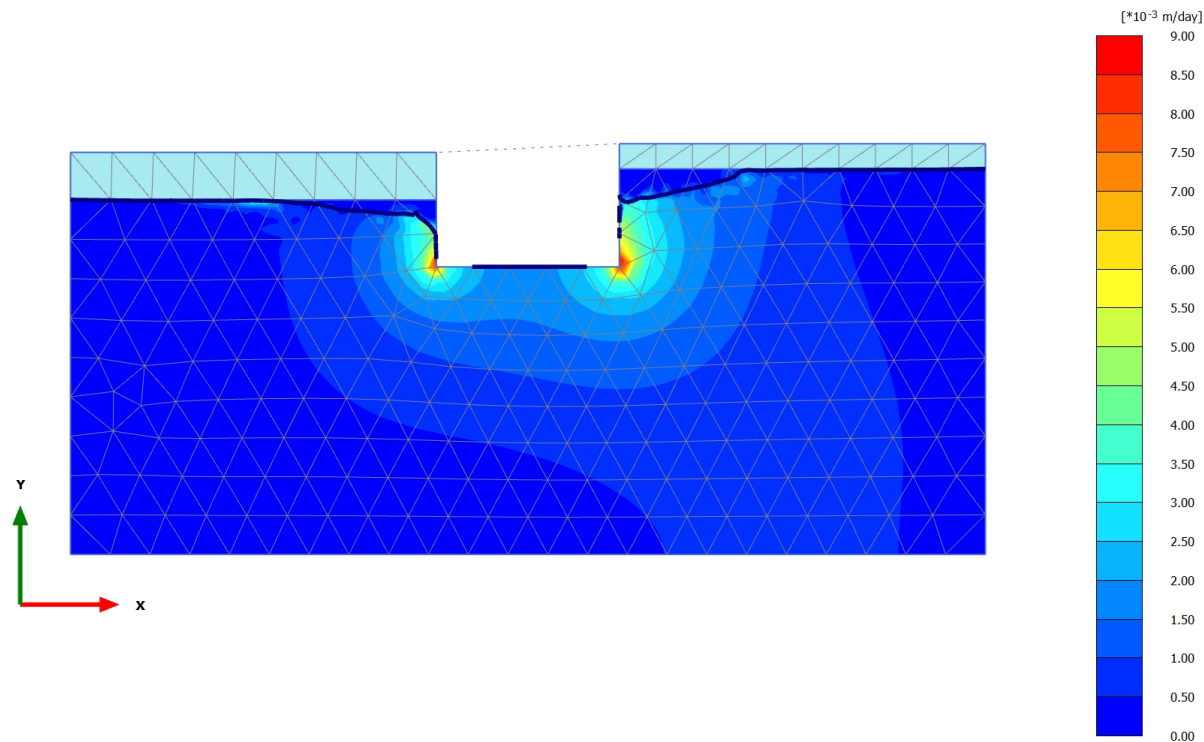
2.1.2.1.2 Calculation results, Phase_1 [Phase_1] (1/1), Groundwater flow $|q|$ 

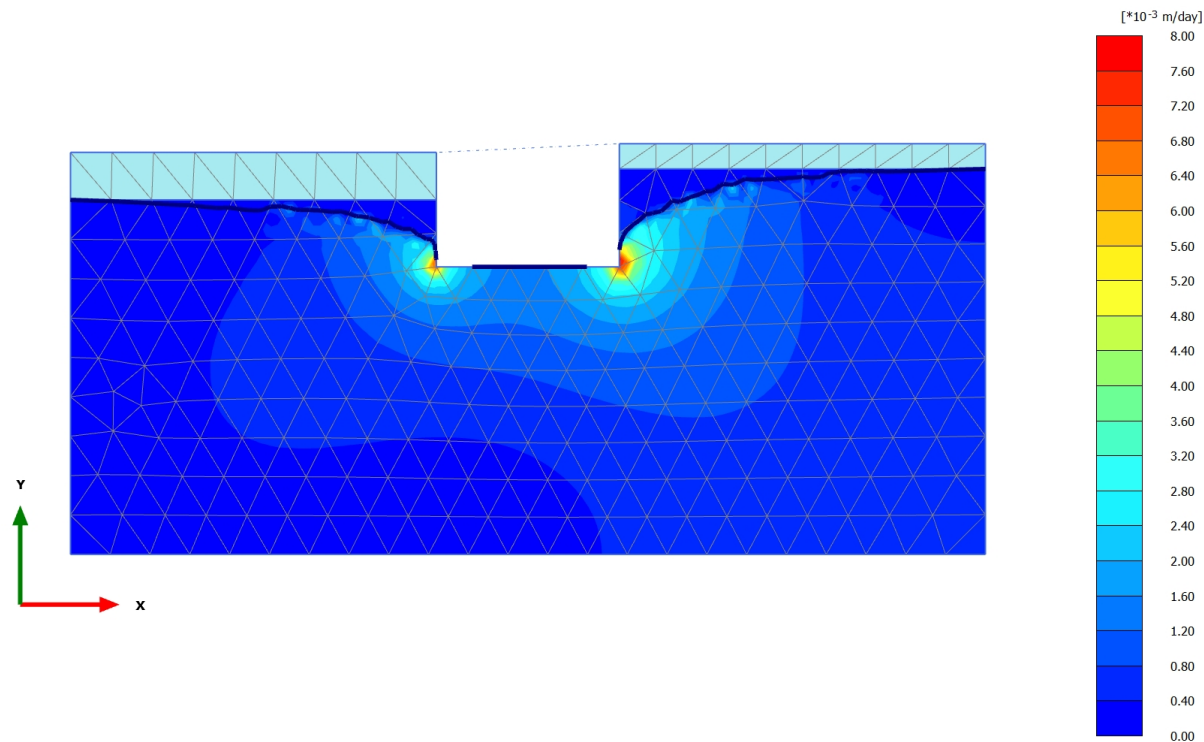
Groundwater flow $|q|$ (scaled up 5.00×10^3 times) (Time 0.000 day)

Maximum value = 1.322×10^{-3} m/day (Element 454 at Node 2837)

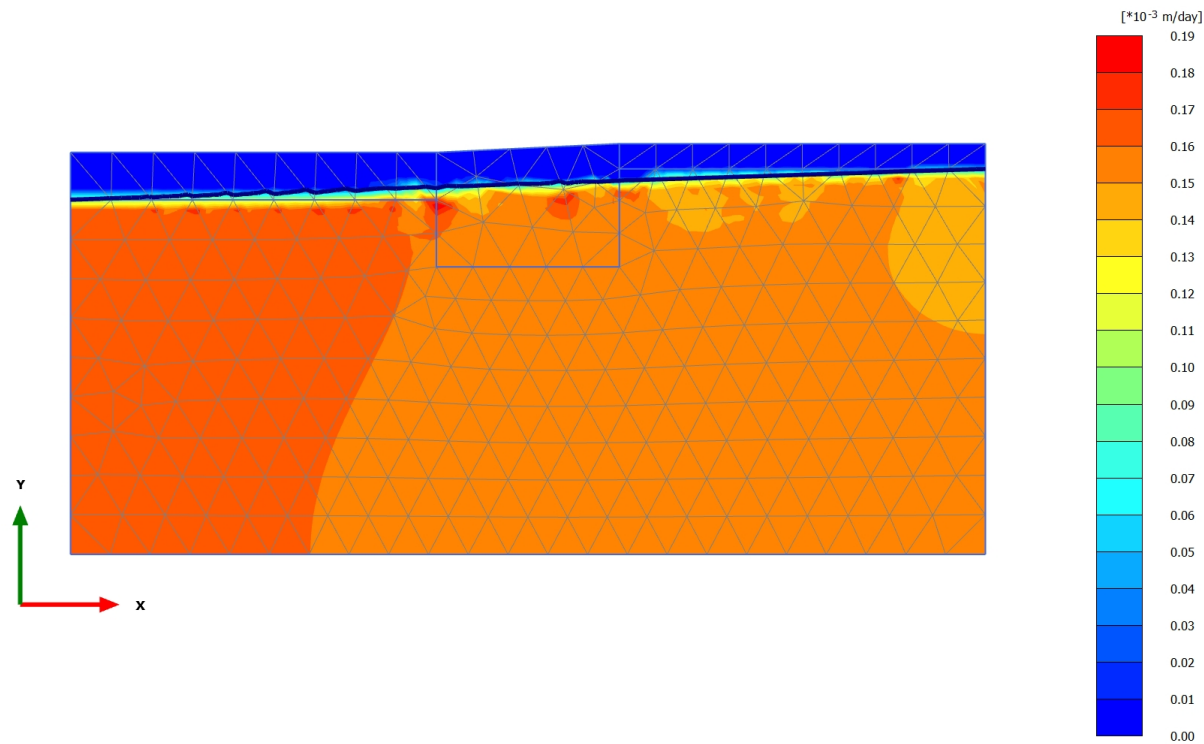
Minimum value = 0.3723×10^{-9} m/day (Element 11 at Node 1175)

2.1.2.1.3 Calculation results, Short Term [Phase_2] (2/9), Groundwater flow $|q|$



2.1.2.1.4 Calculation results, Long Term [Phase_3] (3/23), Groundwater flow $|q|$ **Groundwater flow $|q|$ (scaled up 500 times) (Time 101.0 day)**Maximum value = 7.821×10^{-3} m/day (Element 481 at Node 1920)Minimum value = 0.02040×10^{-6} m/day (Element 483 at Node 1750)

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

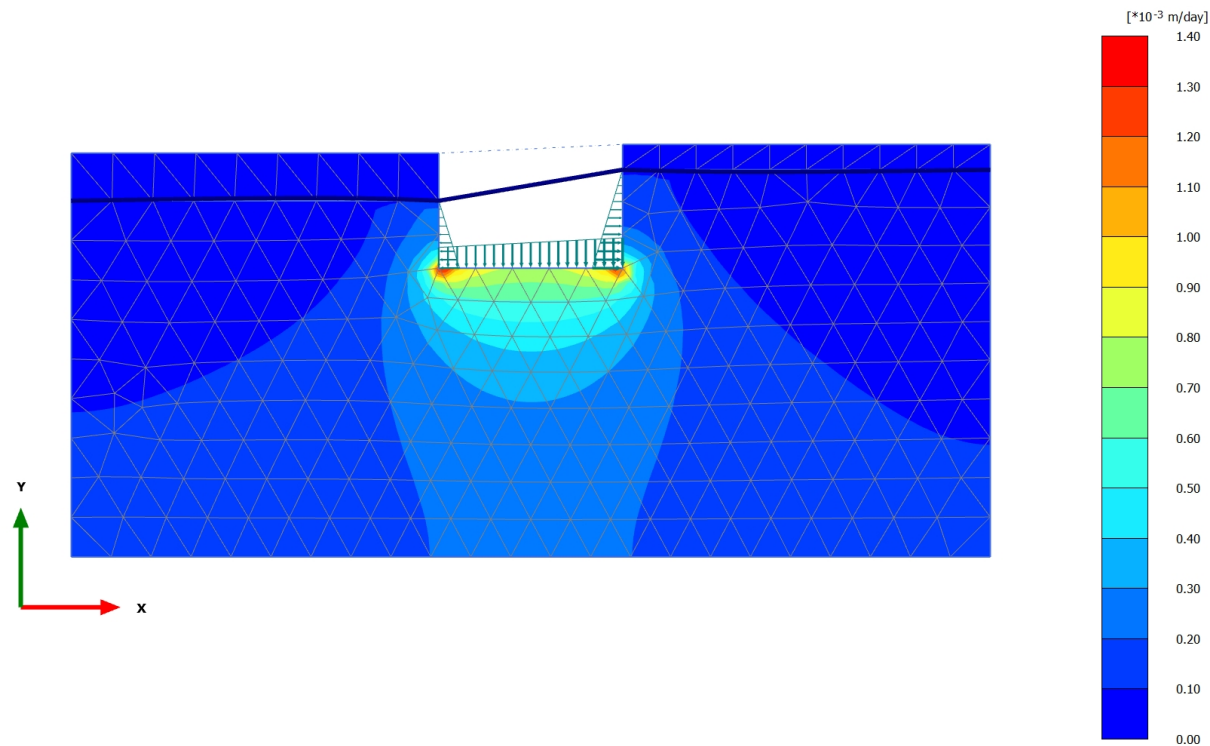


Groundwater flow $|q|$ (scaled up 50.0×10^3 times) (Time 0.000 day)

Maximum value = $0.1851 \times 10^{-3} \text{ m/day}$ (Element 42 at Node 2690)

Minimum value = $1.224 \times 10^{-9} \text{ m/day}$ (Element 43 at Node 2341)

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

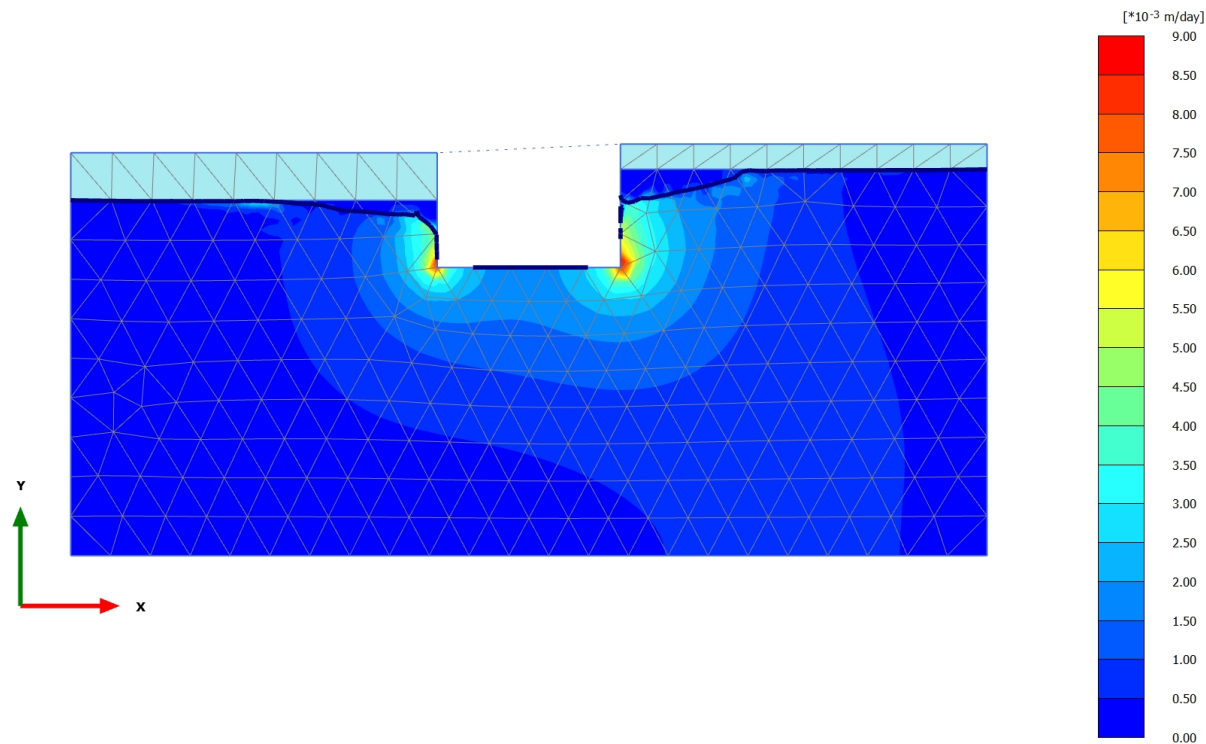


Groundwater flow |q| (scaled up 5.00×10^3 times) (Time 0.000 day)

Maximum value = 1.322×10^{-3} m/day (Element 454 at Node 2837)

Minimum value = 0.3723×10^{-9} m/day (Element 11 at Node 1175)

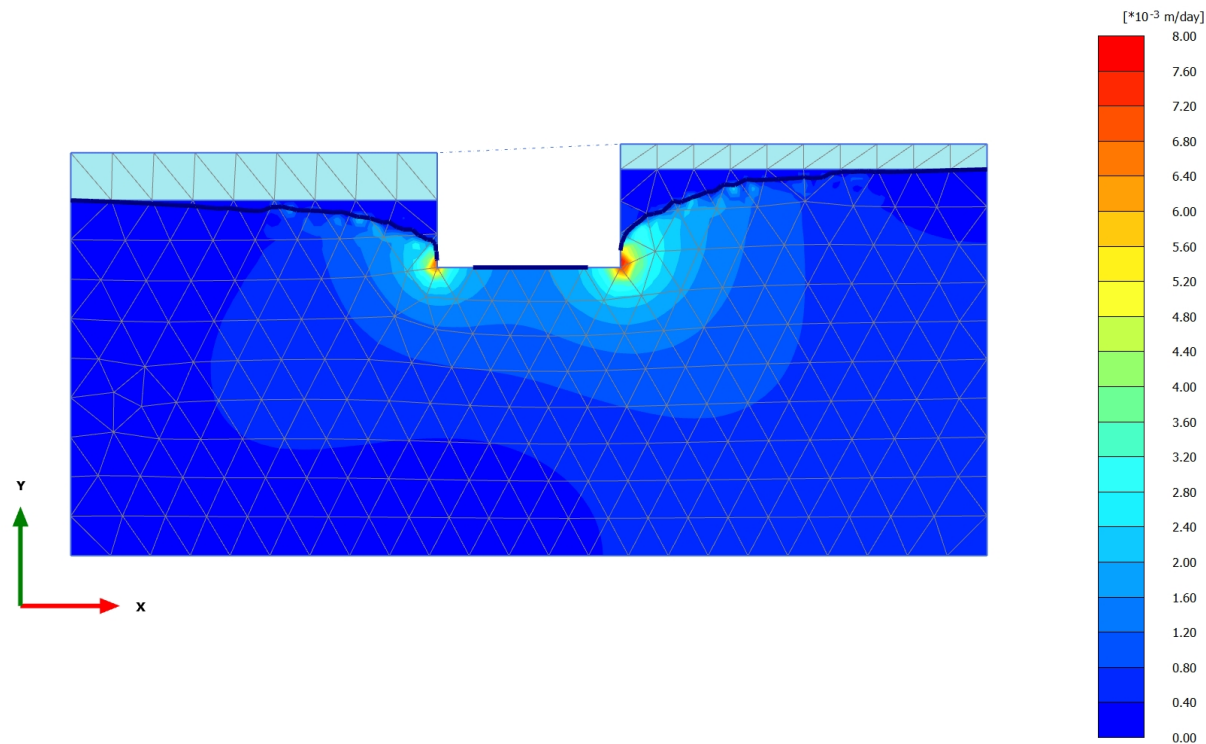
4.1.3 Calculation results, Short Term [Phase_2] (2/9), Groundwater flow $|q|$

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

Maximum value = 8.735×10^{-3} m/day (Element 481 at Node 1920)

Minimum value = 0.01677×10^{-6} m/day (Element 466 at Node 1531)

4.1.4 Calculation results, Long Term [Phase_3] (3/23), Groundwater flow $|q|$

**Groundwater flow $|q|$ (scaled up 500 times) (Time 101.0 day)**

Maximum value = 7.821×10^{-3} m/day (Element 481 at Node 1920)

Minimum value = 0.02040×10^{-6} m/day (Element 483 at Node 1750)

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	
--------------------------------	--	-------------------------------	--

[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

G2

[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.

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