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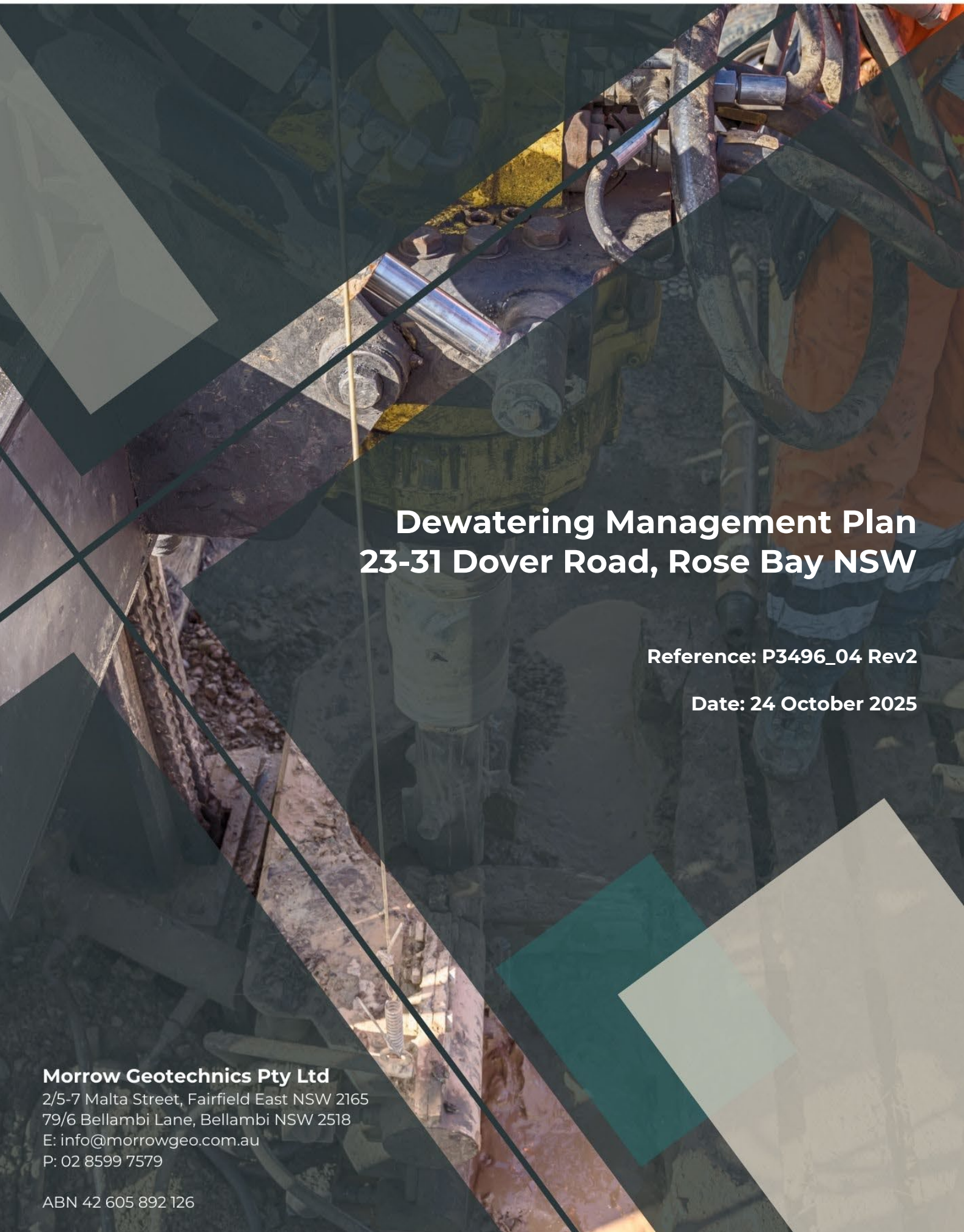

Dewatering Management Plan
23-31 Dover Road, Rose Bay NSW

Reference: P3496_04 Rev2

Date: 24 October 2025

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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 23-31 Dover Road, Rose Bay NSW (the site) otherwise known as Lot 10, 11 & 12 in DP 4244, Lot 13 in DP 663078 and Lot 1 in DP 105598.

The following geotechnical reports have been prepared for the site:

- Morrow Geotechnics Pty Ltd, *Geotechnical Investigation Report, 23-31 Dover Road, Rose Bay NSW*, referenced P3496_02 Rev1, and dated 16 September 2025 (MG 2025-1); and
- Morrow Geotechnics Pty Ltd, *Site Hydrogeology Report, 23-31 Dover Road, Rose Bay NSW*, referenced P3496_03 Rev2, and dated 22 September 2025 (MG 2025-2).

The following Acid Sulfate Soil Management Plan has been prepared for the site:

- EI Australia Pty Ltd, *Acid Sulfate Soil Management Plan, 23-31 Dover Road, Rose Bay NSW*, referenced E26745.E14_Rev1, and dated 18 June 2025 (EI 2025).

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 Drawings for the site have been prepared by MHN Design Union Pty Ltd for project number 25-020 and dated 10 September 2025. From the drawings provided, Morrow Geotechnics understands that the proposed development involves demolition of existing structures at the site and construction of a seven storey multi-dwelling structure over two levels of basement parking. Excavation for the proposed basement is expected to extend to a depth of approximately 6.5 m below ground level (mBGL) to RL 2.82 mAHD.

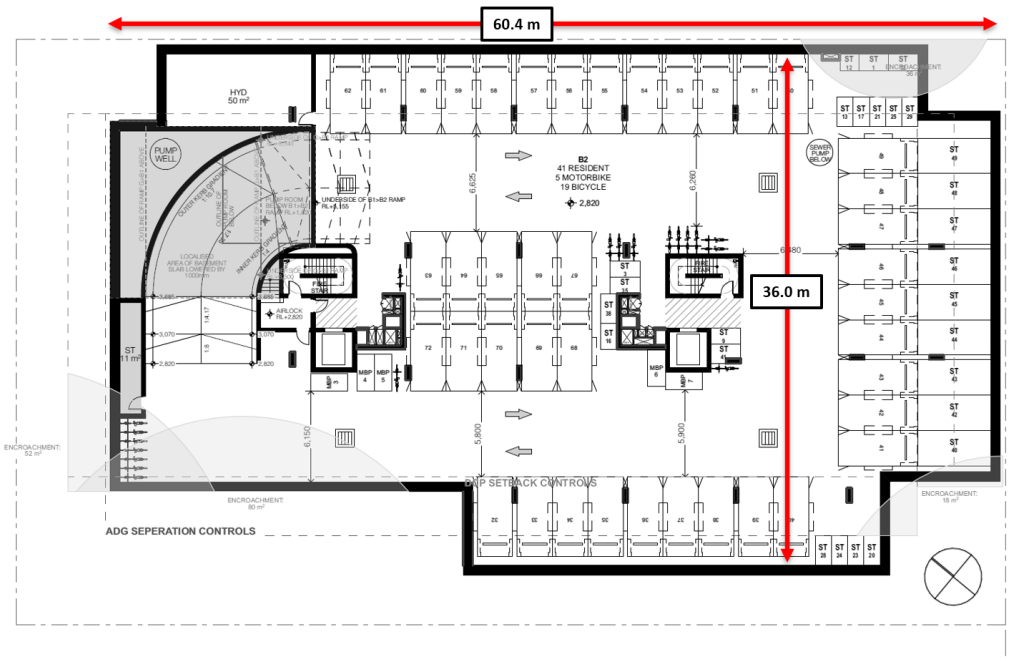


Figure 1: Proposed Basement Dimensions (area 1947.0 m², perimeter 193.0 m)

1.3 Proposed Dewatering Schedule

In order to minimise the seepage volumes during construction it is understood that a sheet pile wall will be constructed. The sheet pile wall will embed 3 m below bulk excavation level (BEL) to minimise groundwater flow. Dewatering wells will be installed within the excavation once the groundwater table is reached to drop the groundwater level within the sheet pile wall to below the proposed depth of excavation.

The intent of sheet pile wall and dewatering is shown on indicative sections presented below.

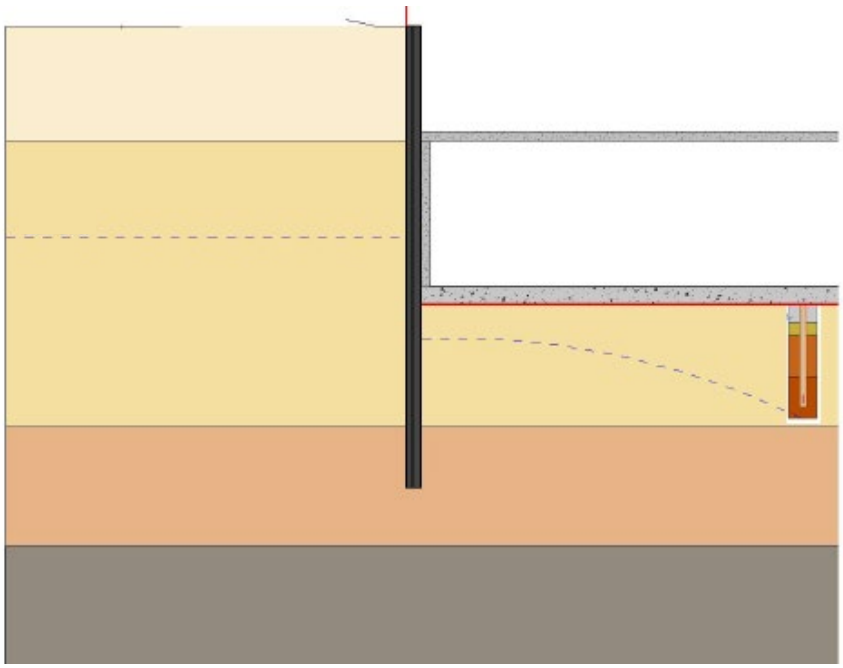


Figure 2: Indicative dewatering intent showing sheet pile wall and dewatering wells within excavation.

Water from the dewatering wells will be pumped to a holding tank before discharge to the stormwater system provided controls are put in place and contingency plans are initiated in the event the present water quality variation.

The excavation program for the proposed basement is expected to take up to 4 months. Temporary construction dewatering is expected to occur for construction seepage inflows during this 4 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 Woollahra Councils stormwater system.'

2. Geological Model

The Soil Conservation Service of NSW Sydney 1:100,000 Soil Landscapes Series Sheet 9130 (1st Edition) indicates that the aeolian landscape at the site likely comprises the Tuggerah Landscape. This landscape type typically includes gently undulating to rolling coastal dunefields. It generally comprises deep (> 2 m) podsols on dunes and podsol/humus podsol intergrades on swales. These soils are noted to present extreme wind erosion hazard, non-cohesive, highly permeable soils, localised flooding and permanently high-water tables.

Information on regional sub-surface conditions, referenced from the Department of Mineral Resources Geological Map Sydney 1:100,000 (Geological Series Sheet 9130) indicate that the site is located in (Qd (Qhd/Qpd)) Quaternary Holocene deposits which are typically comprised of medium to fine-grained "marine" sand with podsols.

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

3. Hydrogeological Model

3.1 Hydrogeological Summary

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

3.2 Summary of Groundwater Observations

On the basis of ongoing groundwater monitoring at the site it is recommended that a design groundwater level for site is taken at RL 4.6 mAHD.

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

The permeability levels recorded of approximately 9.5 x 10^{-5} m/s represent a soil which is highly permeable and will yield significant volumes of seepage water. In accordance with the NSW DPI Office of Water Aquifer Interference Policy the conditions at site represent an aquifer which can yield productive volumes of groundwater.

4. Groundwater Flow Modelling

4.1 Proposed Shoring and Groundwater Management

In order to minimise the seepage volumes during construction it is understood that a sheet pile wall will be constructed. The sheet pile wall will embed 3 m below bulk excavation level (BEL) to

minimise groundwater flow. Dewatering wells will be installed within the excavation once the groundwater table is reached to drop the groundwater level within the sheet pile wall to below the proposed depth of excavation. Water from the dewatering wells will be pumped to a holding tank before discharge to the stormwater system provided controls are put in place and contingency plans are initiated in the event the present water quality variation.

The excavation program for the proposed basement is expected to take up to 4 months. Temporary construction dewatering is expected to occur for construction seepage inflows during this 4 month period.

4.2 Analytical Seepage Modelling

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

The Plaxis Flow Module allows complex groundwater head distributions to be calculated at any point in time with time dependent groundwater flow calculations. PLAXIS Flow displays contours and vectors of groundwater flow, pore pressures, saturation, suction, and Darcy flux. For curves, options exist to visualize the development of groundwater head and pore pressures in time through various calculation phases, providing valuable insight in the groundwater flow process.

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

4.2.1 Modelling Inputs

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

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

Two cross sections have been modelled as shown on **Figure 3** below.

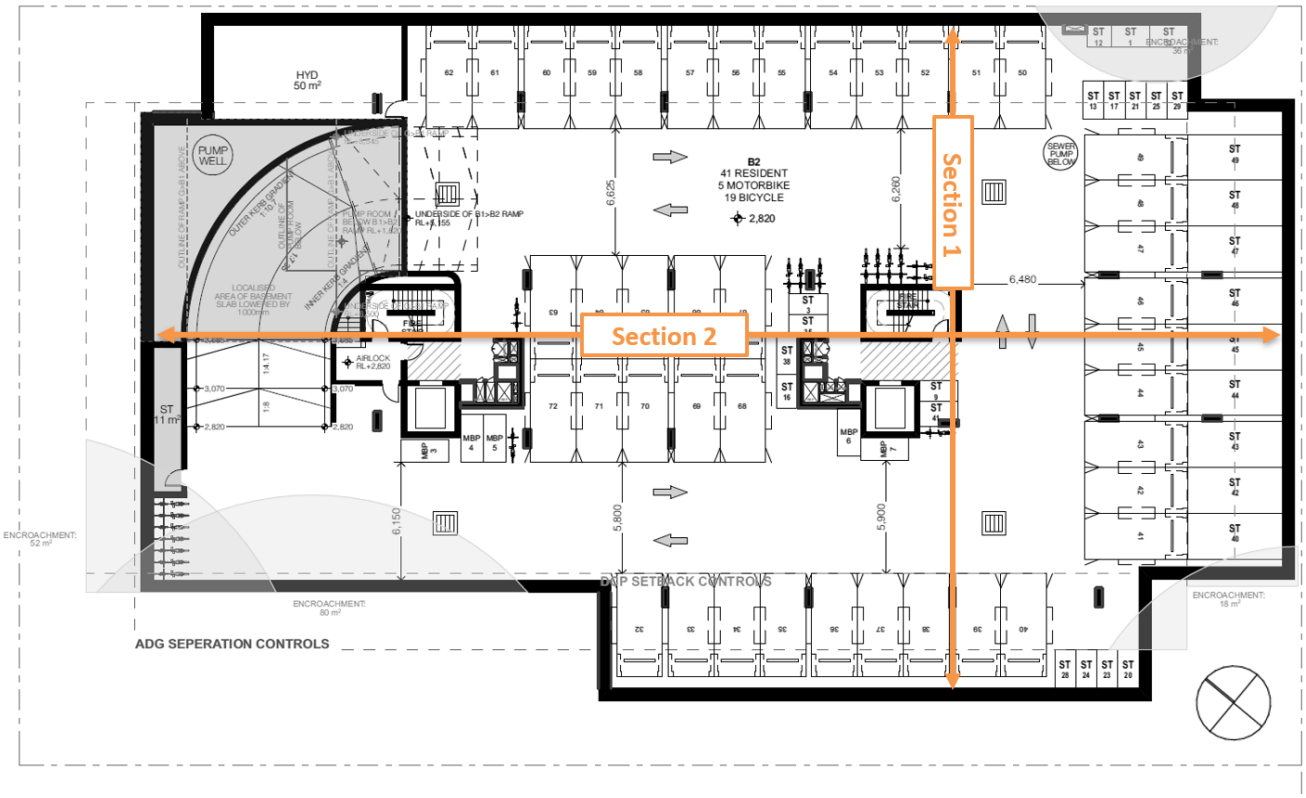


Figure 3: Modelling Sections 1 and 2

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 150 m and model depth of 75 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 is not required as the basement is proposed to be tanked for long-term conditions.

4.2.2 Modelled Seepage

Typical Plaxis outputs for each groundwater flow modelling and groundwater head drawdown curves are shown in **Figure 4** and **Figure 5** below.

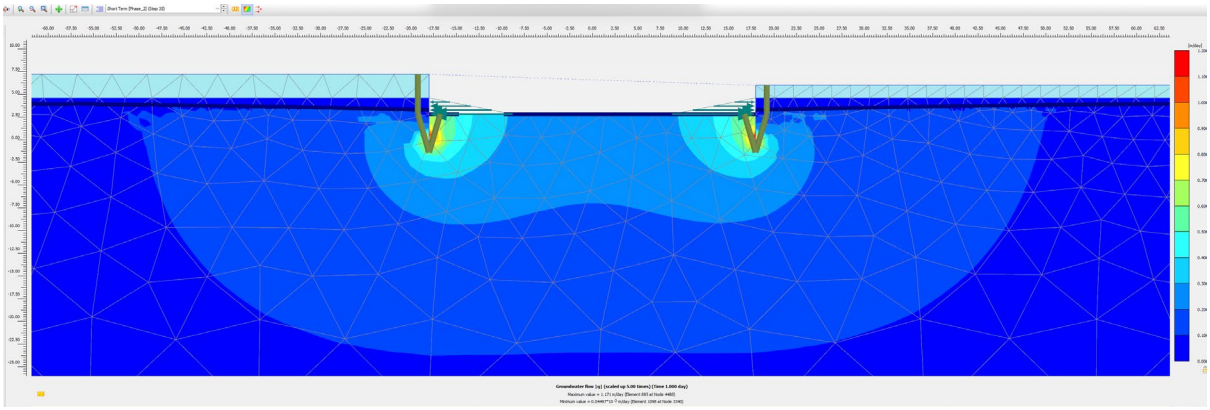


Figure 4: Typical aquifer flow conditions (Section 1 short term flow shown).

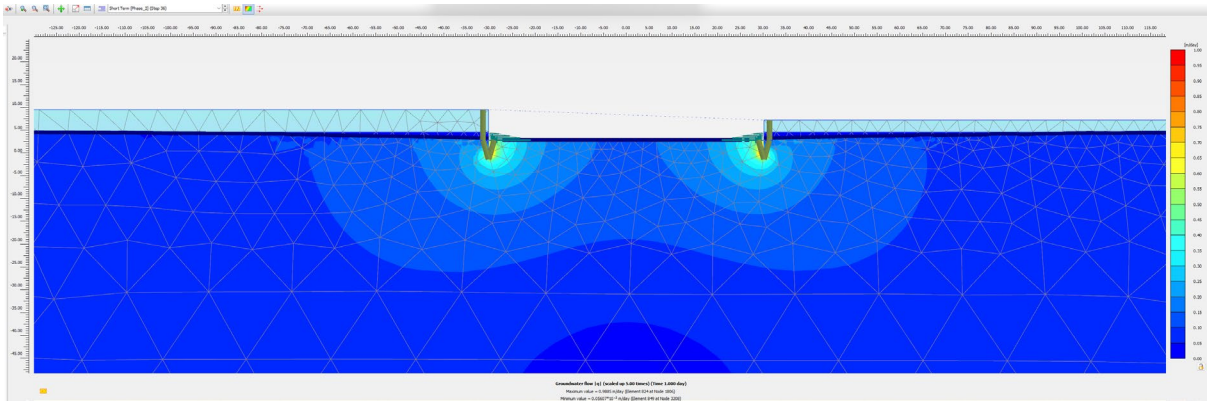


Figure 5: Typical aquifer flow conditions (Section 2 short term flow shown).

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/m²)
Section 1 Short Term	0.00	0.00	351.11
Section 2 Short Term	0.00	0.00	67.71

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 102.2 m and an excavation base area of approximately 648 m2.

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

- Short Term Flows for Temporary Dewatering During Construction

  148.82 ML/year

- Long Term Flows during Service Life of Structure Following Completion of Construction

  0.00 ML/year

Projected seepage inflows for a tanked basement are above 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 0 m from the excavation face on all boundaries. According to the Bureau of Meteorology (BOM) Australian Groundwater Explorer twelve "Water Supply Works" bores are present within 500 m of the site (GW108824.1.1, GW116353.1.1, GW111593.1.1, GW110857.1.1, GW107986.1.1, GW106407.1.1, GW106127.1.1, GW108706.1.1, GW016957.1.1, GW107848.1.1, GW111174.1.1, & GW108319.1.1). The results of the drawdown modelling showed less than 200 mm groundwater drawdown at a maximum distance of 80 m from the excavation.

Groundwater drawdown has 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	1.30	1.19	1.09	0.92	1.29	1.21	1.11	0.92	78.47
Section 2 Short Term	1.33	1.26	1.12	0.94	1.33	1.27	1.14	0.95	79.31

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. Minimal harm is assessed against *Table 1 – Minimal Impact Considerations* of the NSW Aquifer Interference Policy.

For the purposes of this assessment the Groundwater Source is assessed as a "Coastal Sands 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 0.37 m and 0.42 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 80 m away from the excavation, therefore Morrow Geotechnics can confirm that the proposed works will have "minimal impact" on the Water Table.

- **Water Pressure** -

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

Analysis presented within this DMP shows that all drawdown effects of the proposed works are less than 200 mm at less than 80 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 NHMRC (2011), ANZECC (2000) and ANZG (2018) standards.

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

1. All seepage water within the proposed excavation must be detained on site for testing prior to discharge to stormwater. The site detention should comprise a settlement tank which is a minimum 2 m x 2 m x 1 m deep, maintained at the location shown on **Figure 6** below.

2. Prior to the discharge of water from the site, sampling of the discharge water must be undertaken by an environmental specialist. **Water quality testing must take place prior to the discharge of any stormwater/groundwater from the site**. Water quality testing must be carried out by a suitably qualified person in accordance with documented protocols developed for that purpose.

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

3. If water quality testing returns analyte values within ANZG, ANZECC and NEPM a threshold values then the detained water can be discharged to Council stormwater system in accordance with the following requirements:

   a) A record of the take of groundwater must be maintained throughout the dewatering period. Water flow meters must meet WaterNSW standards and must be installed, maintained and used in accordance with relevant national standards.

   b) 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.

   c) 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 interpretated.

      - 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 7** 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.

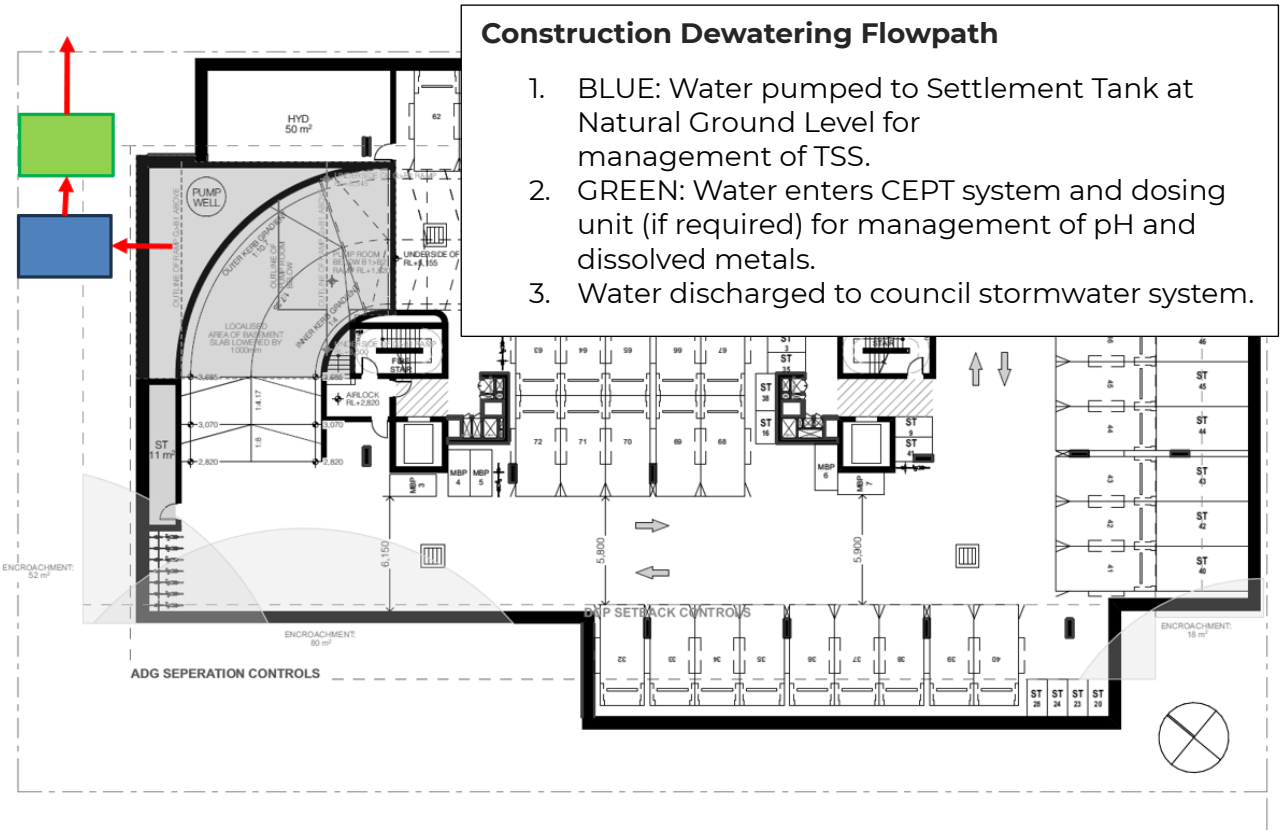


Figure 6: Proposed dewatering flowpath

Figure 7: 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.

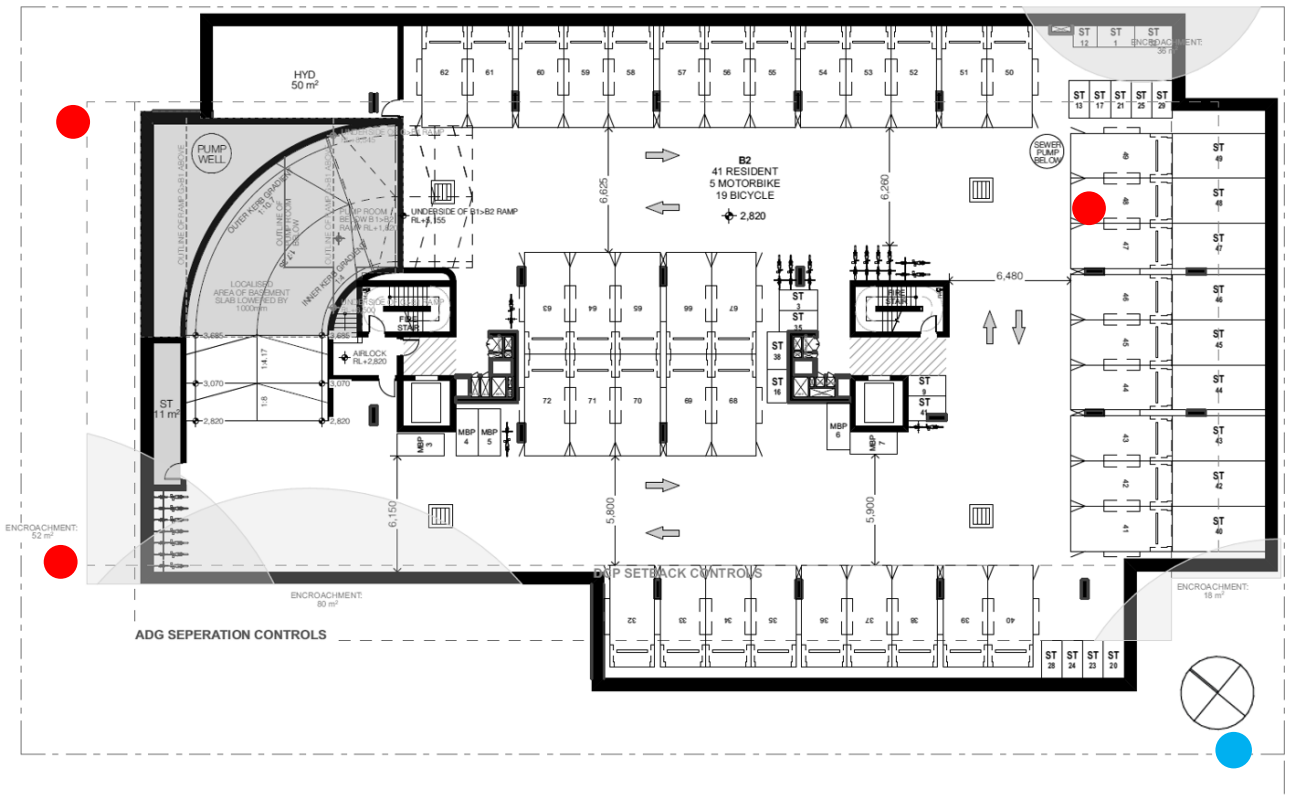


Figure 8: Groundwater level monitoring locations

- Existing Monitoring Well Location
- Proposed Monitoring Well Location

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

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

Prior to the commencement of bulk earthworks at least one round of monitoring should be undertaken to establish baseline readings. Pre works measurements should be forwarded to the project stakeholders outlined in **Table 5**. During the works phase readings should be taken daily until one month after 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 1500 mm below baseline readings. Groundwater modelling showed groundwater variation of up to approximately 790 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 8** above
Agreed Drawdown Limit	1500 mm
Alert Level	< 1050 mm
Alarm Level	1050 - 1500 mm
Action Level	> 1500 mm

7.2 Water Inflow Monitoring

Modelling of the site has shown a predicted groundwater inflow rate during construction of **2860 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 286 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 (286 to 409 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 409 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 8** to **Table 12** of the MG2025 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**, **Cobalt**, **Iron** and **Manganese** exceed the threshold guideline values. **Escherichia Coli**

concentrations 2 CFU/100 mL exceeds the criteria (no detection in 100 mL). The **Turbidity** value of 24 NTU exceeds the ANZECC (2000) guideline value (10 NTU).

Baseline conditions at the site must be considered in preparation of a response to exceedances of 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 (SO4), chloride (Cl), carbonates (CO3), bromide (Br), fluoride (F)	Mandatory	Weekly while discharging water
Major Cations	Calcium (Ca), magnesium (Mg), sodium (Na), potassium (K)	Mandatory	Weekly while discharging water
Ionic Balance	Cation/anion balance (as a percentage)	Mandatory	Weekly while discharging water
Dissolved Inorganics and Dissolved Heavy metals	Aluminium (Al), antimony (Sb), arsenic (As), barium (Ba), beryllium (Be), boron (B), cadmium (Cd), chromium (Cr), cobalt (Co), copper (Cu), iron (Fe), lead (Pb), lithium (Li), manganese (Mn), mercury (Hg), molybdenum (Mo), nickel (Ni), selenium (Se), silica (dissolved SiO2), 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 (NH3), nitrate (NO3), 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

Type	Corresponding laboratory analyses	Testing requirements	Testing Frequency
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 C**) 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
Structural Engineer	Johann Human NDY	j.huma@ndy.com 02 9928 6800
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.

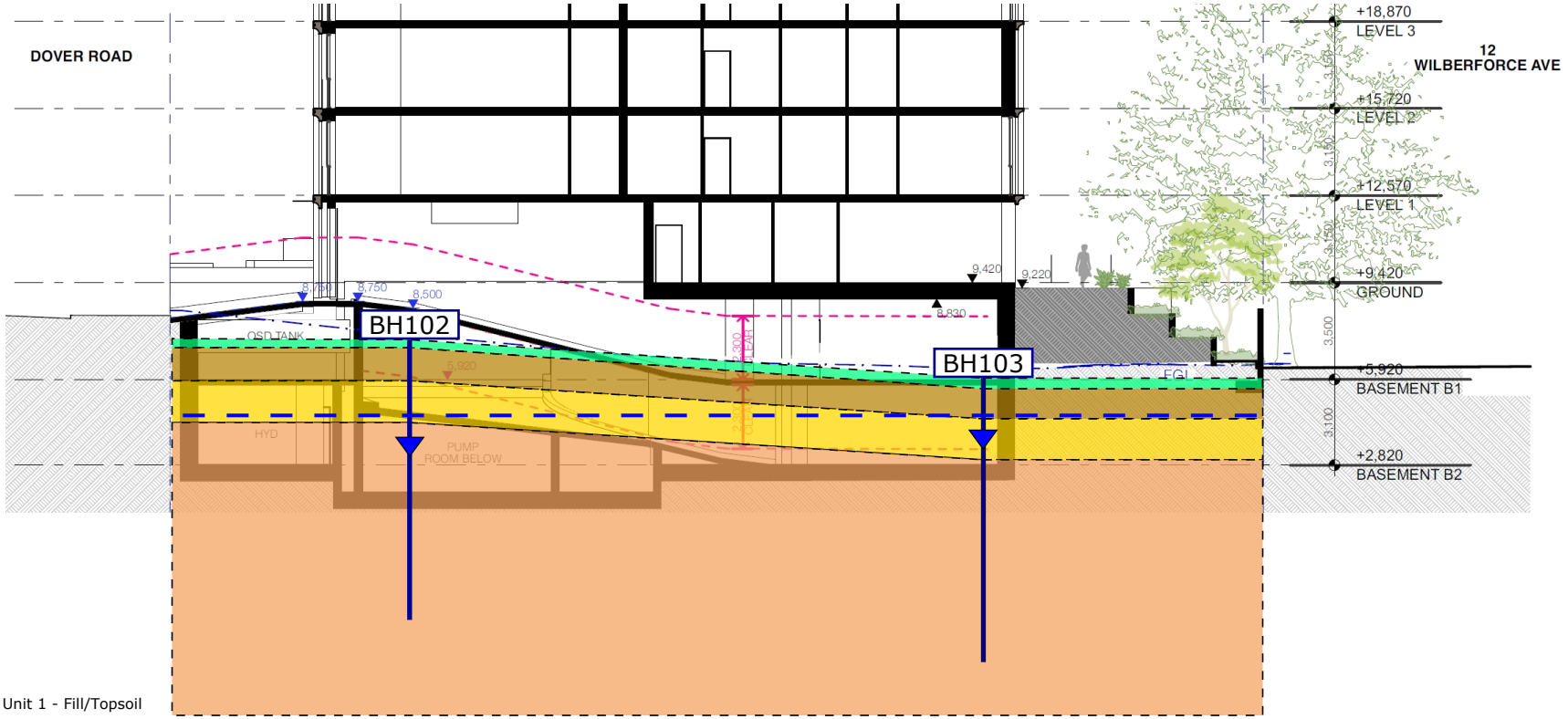
morrow
02 8599 7579
Sydney Gadigal Land:
2/5-7 Malta Steet, Fairfield East
NSW 2155
info@morrowgeo.com.au

Sydney Gadigal Land: 2/5-7 Malta Steet, Fairfield East NSW 2155	P: 02 8599 7579 F:
yy	
Client No:	Job No: P3496
Client: Fortis	
Project: Rose Bay	
Address: 23-31 Dover Road, Rose Bay NSW	

Legend:

Borehole Locations

Image Source: Google Maps		Viewed: 2025-05-05	
Drawn By: Mahmoud Jangidaryan	Checked By: Rhiannon McKeon	Date: 2025-05-05	Figure: 1



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
23-31 Dover Road, Rose Bay NSW

Drawing Title
Section 1

Client
Dover Street (Rose Bay) Developments Pty Ltd

Project Number
P3496

Figure
2

Scale:
Not To Scale

Drawn By:
AB

Date:
13 August 2025

APPENDIX A

BOREHOLE LOGS, EXPLANATORY NOTES AND SITE PHOTOS

morrow

Borehole No: BH101

UTM	**: 56H**	**Driller Rig**	**: Christie Rig**	**Job Number**	**: P3496**
Easting	**: 340063.81**	**Driller Supplier**	**: BG Drilling**	**Client**	**: Fortis**
Northing	**: 6250803.34**	**Logged By**	**: Mahmoud Jangidaryan**	**Project**	**: Rose Bay**
RL	**: 9.50(m)**	**Reviewed By**	**: Rhiannon McKeon**	**Location**	**: 23-31 Dover Road, Rose Bay NSW**
Total Depth	**: 16.1 m**	**Date**	**: 02/05/2025**	**Loc Comment**	**:**

Drilling Method	Water	Well Diagram	Testing SPT	Elevation / Depth (m)	Graphic Log	Material Type	Classification Code	Material Description	Depth (m)	Consistency	Weathering	Moisture
tube		A		9.4		Non-Soil	CCT	Non-Soil - Concrete	0.1			
				0.1		FILL	FILL	SILTY GRAVELLY SAND loose to medium dense, fine grained, fine to medium sized gravel, with construction waste.		L-MD		
				9.1					0.4			
			1,1,2 (N=3)	0.4		Marine	SP	SAND very loose, poorly graded, fine grained, pale grey, moist.	1	VL		M
ADT				8.0					1.5			
			2,3,3 (N=6)	1.5		Marine	SP	As above, but: loose.	2	L		
		50mm PVC Solid		7.0					2.5			
			3,6,6 (N=12)	2.5		Marine	SP	As above, but: medium dense, brown grey, moist.	3	MD		M
Washbore				5.0					4			
		50mm PVC Slotted	6,9,11 (N=20)	4.5		Marine	SP	As above, but: pale orange pale yellow.	4.5	MD		M

morrow

Borehole No: BH101

UTM	: 56H	**Driller Rig**	: Christie Rig	**Job Number**	: P3496
Easting	: 340063.81	**Driller Supplier**	: BG Drilling	**Client**	: Fortis
Northing	: 6250803.34	**Logged By**	: Mahmoud Jangidaryan	**Project**	: Rose Bay
RL	: 9.50(m)	**Reviewed By**	: Rhiannon McKeon	**Location**	: 23-31 Dover Road, Rose Bay NSW
Total Depth	: 16.1 m	**Date**	: 02/05/2025	**Loc Comment**	:

Drilling Method	Water	Well Diagram	Testing: SPT	Elevation / Depth (m)	Graphic Log	Material Type	Classification Code	Material Description	Depth (m)	Consistency	Weathering	Moisture
Washbore		50mm PVC Slotted				Marine	SP	As above, but: pale orange pale yellow.	6	MD		M
			7,10,11 (N=21)	3.5 6				SAND medium dense, poorly graded, fine grained, pale orange pale yellow, moist, trace low plasticity clay.	7			
			8,14,19 (N=33)			Marine	SP		8	MD		M
			4,4,5 (N=9)						9			

morrow

Borehole No: BH101

UTM	: 56H	**Driller Rig**	: Christie Rig	**Job Number**	: P3496
Easting	: 340063.81	**Driller Supplier**	: BG Drilling	**Client**	: Fortis
Northing	: 6250803.34	**Logged By**	: Mahmoud Jangidaryan	**Project**	: Rose Bay
RL	: 9.50(m)	**Reviewed By**	: Rhiannon McKeon	**Location**	: 23-31 Dover Road, Rose Bay NSW
Total Depth	: 16.1 m	**Date**	: 02/05/2025	**Loc Comment**	:

Drilling Method	Water	Well Diagram	Testing SPT	Elevation / Depth (m)	Graphic Log	Material Type	Classification Code	Material Description	Depth (m)	Consistency	Weathering	Moisture
Washbore		50mm PVC Slotted	7,11,15 (N=26)			Marine	SP	SAND medium dense, poorly graded, fine grained, pale orange pale yellow, moist, trace low plasticity clay.	11	MD		M
			11,14,20 (N=34)						12			
									13			
									14			

morrow

Borehole No: BH101

UTM	: 56H	**Driller Rig**	: Christie Rig	**Job Number**	: P3496
Easting	: 340063.81	**Driller Supplier**	: BG Drilling	**Client**	: Fortis
Northing	: 6250803.34	**Logged By**	: Mahmoud Jangidaryan	**Project**	: Rose Bay
RL	: 9.50(m)	**Reviewed By**	: Rhiannon McKeon	**Location**	: 23-31 Dover Road, Rose Bay NSW
Total Depth	: 16.1 m	**Date**	: 02/05/2025	**Loc Comment**	:

Drilling Method	Water	Well Diagram	Testing SPT	Elevation / Depth (m)	Graphic Log	Material Type	Classification Code	Material Description	Depth (m)	Consistency	Weathering	Moisture
Washbore		50mm PVC Slotted	4,6,12 (N=18)	-5.5 / 15		Residual	Cl	SANDY CLAY very stiff, medium plasticity, fine grained sand, pale orange pale yellow dark red, w > pl.	15	VSt		w > PL
			16/50mm (N=0)	-6.4 / 15.9		Rock	SST	Rock; SANDSTONE highly weathered, very low strength, pale orange pale yellow, fine to medium grained, generally massive.	15.9 / 16	VLS	HW	
								BH101 Reached Target Depth at 16.1m				

morrow

Borehole No: BH102

UTM	: 56H	**Driller Rig**	: Christie Rig	**Job Number**	: P3496
Easting	: 340033.03	**Driller Supplier**	: BG Drilling	**Client**	: Fortis
Northing	: 6250847.66	**Logged By**	: Mahmoud Jangidaryan	**Project**	: Rose Bay
RL	: 7.2(m)	**Reviewed By**	: Rhiannon McKeon	**Location**	: 23-31 Dover Road, Rose Bay NSW
Total Depth	: 10.15 m	**Date**	: 01/05/2025	**Loc Comment**	:

Drilling Method	Water	Well Diagram	Testing: SPT	Elevation / Depth (m)	Graphic Log	Material Type	Classification Code	Material Description	Depth (m)	Consistency	Weathering	Moisture
latube		B		7.1		Non-Soil	CCT	Non-Soil - Concrete	0.13			
ADT				0.13 6.9		FILL	FILL	GRAVELLY SAND loose, poorly graded, fine grained, fine sized gravel, trace.	0.3	L		
			1,0,0 (N=0)	0.3		Aeolian	SP	SAND very loose, poorly graded, pale grey with brown, With trace of coffee rocks.	1	VL		
			2,3,5 (N=8)	1.5		Marine	SP	SAND loose, poorly graded, fine grained, pale grey white, dry.	2	L		D
		50mm PVC Solid		4.2					3			
Washbore			4,5,7 (N=12)	3		Marine	SP	As above, but: medium dense, pale orange yellow, moist.	4	MD		M
		50mm PVC Slotted		2.7					4.5			
			4,8,10 (N=18)	4.5		Marine	SP	As above, but: wet, trace low plasticity clay.		MD		W

morrow

Borehole No: BH102

UTM	: 56H	**Driller Rig**	: Christie Rig	**Job Number**	: P3496
Easting	: 340033.03	**Driller Supplier**	: BG Drilling	**Client**	: Fortis
Northing	: 6250847.66	**Logged By**	: Mahmoud Jangidaryan	**Project**	: Rose Bay
RL	: 7.2(m)	**Reviewed By**	: Rhiannon McKeon	**Location**	: 23-31 Dover Road, Rose Bay NSW
Total Depth	: 10.15 m	**Date**	: 01/05/2025	**Loc Comment**	:

Drilling Method	Water	Well Diagram	Testing	Elevation / Depth (m)	Graphic Log	Material Type	Classification Code	Material Description	Depth (m)	Consistency	Weathering	Moisture
Washbore		50mm PVC Slotted	SPT 5,8,11 (N=19)	-0.3 / 7.5		Marine	SP	As above, but: wet, trace low plasticity clay.	6 – 7 – 7.5	MD		W
			SPT 8,11,13 (N=24)	-1.8 / 9		Marine	SP	As above, but: pale yellow.	8 – 9 – 9	MD		W
			SPT 9,11,14 (N=25)			Marine	SP	As above, but: brown grey.		MD		W

morrow

Borehole No: BH102

UTM	: 56H	**Driller Rig**	: Christie Rig	**Job Number**	: P3496
Easting	: 340033.03	**Driller Supplier**	: BG Drilling	**Client**	: Fortis
Northing	: 6250847.66	**Logged By**	: Mahmoud Jangidaryan	**Project**	: Rose Bay
RL	: 7.2(m)	**Reviewed By**	: Rhiannon McKeon	**Location**	: 23-31 Dover Road, Rose Bay NSW
Total Depth	: 10.15 m	**Date**	: 01/05/2025	**Loc Comment**	:

Drilling Method	Water	Well Diagram	Testing / SPT	Elevation / Depth (m)	Graphic Log	Material Type	Classification Code	Material Description	Depth (m)	Consistency	Weathering	Moisture
Coreshbore		50mm PVC Slotted				Marine	SP	As above, but: brown grey.		MD		W
								BH102 Reached Target Depth at 10.15m				

morrow

Borehole No: BH103

UTM	: 56H	**Driller Rig**	: Christie Rig	**Job Number**	: P3496
Easting	: 340016.97	**Driller Supplier**	: BG Drilling	**Client**	: Fortis
Northing	: 6250833.45	**Logged By**	: Mahmoud Jangidaryan	**Project**	: Rose Bay
RL	: 6.0(m)	**Reviewed By**	: Rhiannon McKeon	**Location**	: 23-31 Dover Road, Rose Bay NSW
Total Depth	: 10.3 m	**Date**	: 01/05/2025	**Loc Comment**	:

Drilling Method	Water	Well Diagram	Testing (SPT)	Elevation / Depth (m)	Graphic Log	Material Type	Classification Code	Material Description	Depth (m)	Consistency	Weathering	Moisture
tube				5.9		Non-Soil	CCT	Non-Soil - Concrete	0.11			
ADT				0.11		FILL	FILL	CLAYEY GRAVELLY SAND loose, fine grained, fine sized gravel, low plasticity clay.		L		
				5.6 / 0.4					0.4			
			1,1,2 (N=3)			Aeolian	SP	SAND very loose, poorly graded, fine grained, pale grey.	1	VL		
				4.5 / 1.5					1.5			
			2,3,2 (N=5)			Marine	SP	SAND very loose, poorly graded, fine grained, pale grey brown, moist, Trace indurated sands.	2	VL		M
		50mm PVC Solid		3.0 / 3					3			
Washbore			4,5,5 (N=10)			Marine	SP	SAND loose, poorly graded, fine grained, pale orange pale yellow, with trace of clays at some bands.	4	L		
		50mm PVC Slotted	3,3,5 (N=8)									

morrow

Borehole No: BH103

UTM	: 56H	**Driller Rig**	: Christie Rig	**Job Number**	: P3496
Easting	: 340016.97	**Driller Supplier**	: BG Drilling	**Client**	: Fortis
Northing	: 6250833.45	**Logged By**	: Mahmoud Jangidaryan	**Project**	: Rose Bay
RL	: 6.0(m)	**Reviewed By**	: Rhiannon McKeon	**Location**	: 23-31 Dover Road, Rose Bay NSW
Total Depth	: 10.3 m	**Date**	: 01/05/2025	**Loc Comment**	:

Drilling Method	Water	Well Diagram	Testing: SPT	Elevation / Depth (m)	Graphic Log	Material Type	Classification Code	Material Description	Depth (m)	Consistency	Weathering	Moisture
Washbore		50mm PVC Slotted		0.0		Marine	SP	SAND loose, poorly graded, fine grained, pale orange pale yellow, with trace of clays at some bands.	6	L		
			8,9,10 (N=19)	6				As above, but: medium dense.	7			
			7,9,12 (N=21)			Marine	SP		8	MD		
			7,12,16 (N=28)						9			

morrow

Borehole No: BH103

UTM	: 56H	**Driller Rig**	: Christie Rig	**Job Number**	: P3496
Easting	: 340016.97	**Driller Supplier**	: BG Drilling	**Client**	: Fortis
Northing	: 6250833.45	**Logged By**	: Mahmoud Jangidaryan	**Project**	: Rose Bay
RL	: 6.0(m)	**Reviewed By**	: Rhiannon McKeon	**Location**	: 23-31 Dover Road, Rose Bay NSW
Total Depth	: 10.3 m	**Date**	: 01/05/2025	**Loc Comment**	:

Drilling Method	Water	Well Diagram	Testing: SPT	Elevation / Depth (m)	Graphic Log	Material Type	Classification Code	Material Description	Depth (m)	Consistency	Weathering	Moisture
Washbore		50mm PVC Slotted				Marine	SP	As above, but: medium dense.		MD		
								BH103 Reached Target Depth at 10.3m				

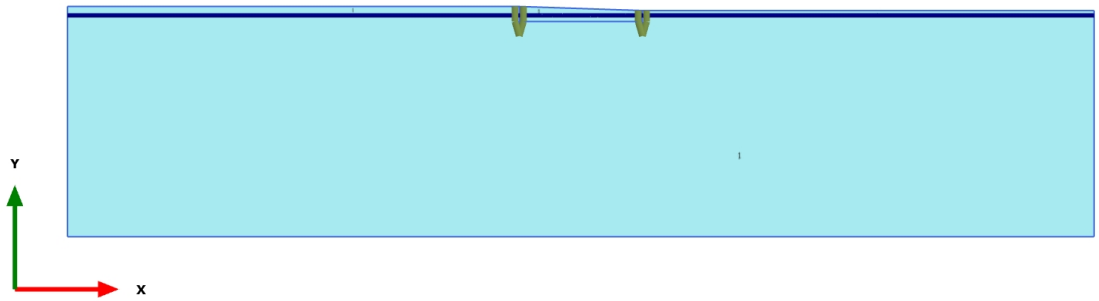
APPENDIX B

PLAXIS FLOW MODELLING REPORTS

PLAXIS Report

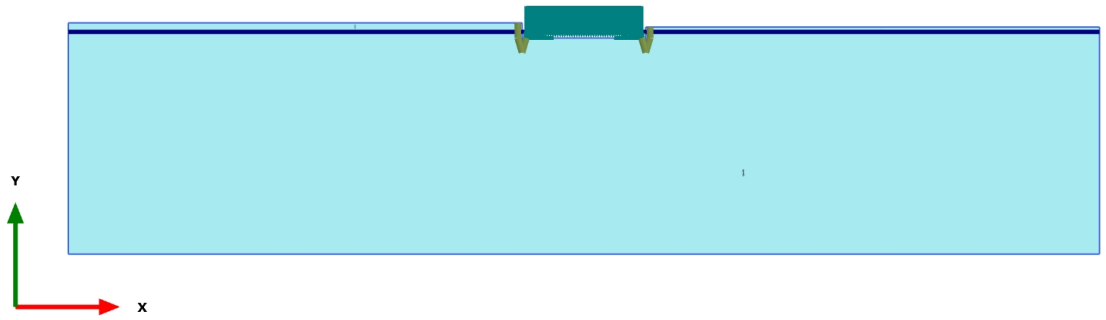
Filename	P3496_RoseBay_Section1.p2dx
Directory	C:\Users\Plaxis\Morrow Geotechnics\MG - Documents\1. Projects\P3400-P3499\P3496_Rose Bay, 23-31 Dover Rd\04_Analysis & Design\
Title	P3496_RoseBay_Section1
Model	Plane strain
Elements	15-Noded
PLAXIS Version	Version 2024.2.0.1144

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



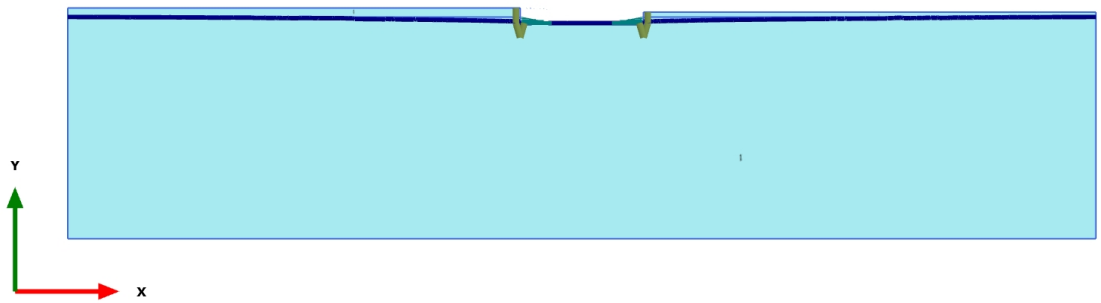
Materials plot

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] (2/35), Materials plot



Materials plot

1.1.2.1.1 Materials - Soil and interfaces - Mohr-Coulomb

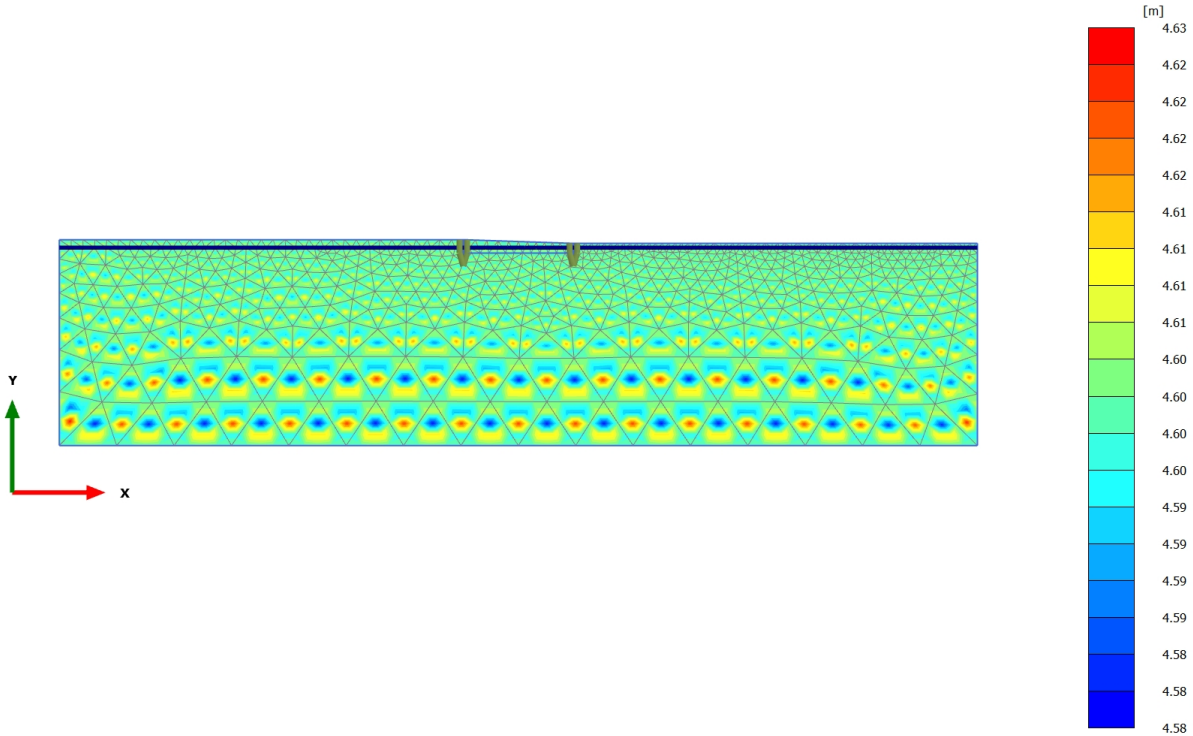
Identification number		1
Identification		Permeability
Soil model		Mohr-Coulomb
Drainage type		Drained
Colour		
Comments		
γ_unsat	kN/m³	18.00
γ_sat	kN/m³	19.00
e_init		0.5000
n_init		0.3333
Input method		SDOF equivalent
Rayleigh α		0.000
Rayleigh β		0.000
ξ_1	%	0.000
ξ_2	%	0.000
f_1	Hz	0.1000
f_2	Hz	1.000

Identification number		1
E'_ref	kN/m²	20.00E3
ν (nu)		0.3000
G_ref	kN/m²	7692
E_oed	kN/m²	26.92E3
E'_inc	kN/m²/m	0.000
y_ref	m	0.000
V_s	m/s	64.75
V_p	m/s	121.1
c'_ref	kN/m²	100.0
φ' (phi)	°	45.00
ψ (psi)	°	0.000
c'_inc	kN/m²/m	0.000
y_ref	m	0.000
Tension cut-off		True
Tensile strength	kN/m²	0.000
Determination		ν-undrained definition
ν_u definition method		Direct
ν_u,equivalent (nu)		0.4950
Skempton B		0.9783

Identification number		1
K_w,ref/n	kN/m²	750.0E3
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	8.208
k_y	m/day	8.208
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/m³	2.600
Thermal expansion type		Isotropic
α_sv	1/K	0.000
Phase change		False

Identification number		1
D_v	m²/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	m³/day/m	0.000
R_thermal	m² 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

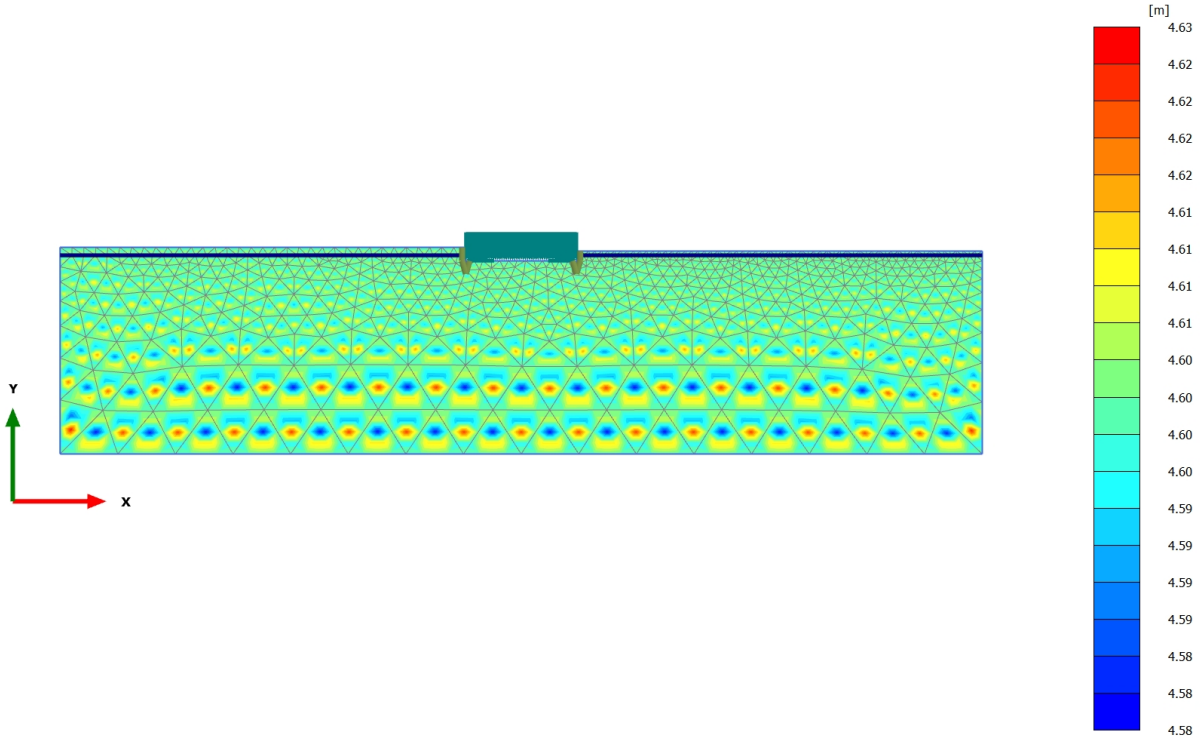


Groundwater head (scaled up 5.00 times) (Time 0.000 day)

Maximum value = 4.623 m (Element 254 at Node 1293)

Minimum value = 4.579 m (Element 265 at Node 2821)

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

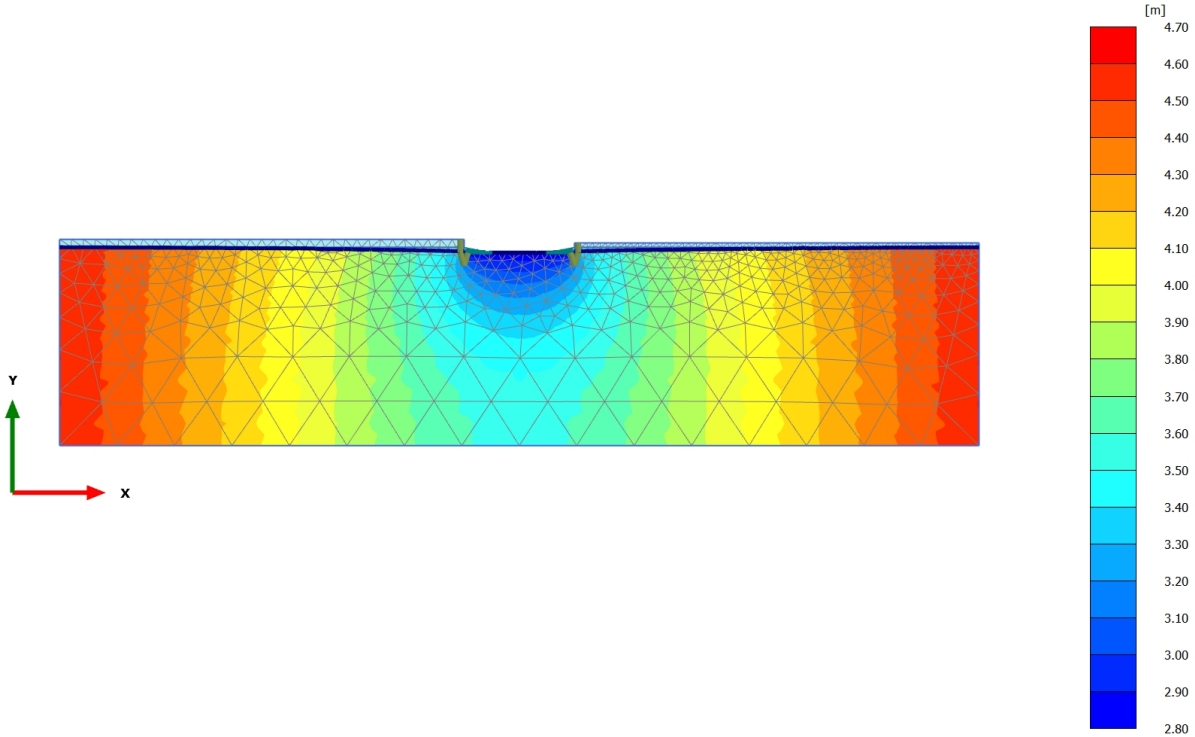


Groundwater head (scaled up 5.00 times) (Time 0.000 day)

Maximum value = 4.623 m (Element 254 at Node 1293)

Minimum value = 4.579 m (Element 265 at Node 2821)

2.1.1.1.3 Calculation results, Short Term [Phase_2] (2/35), Groundwater head

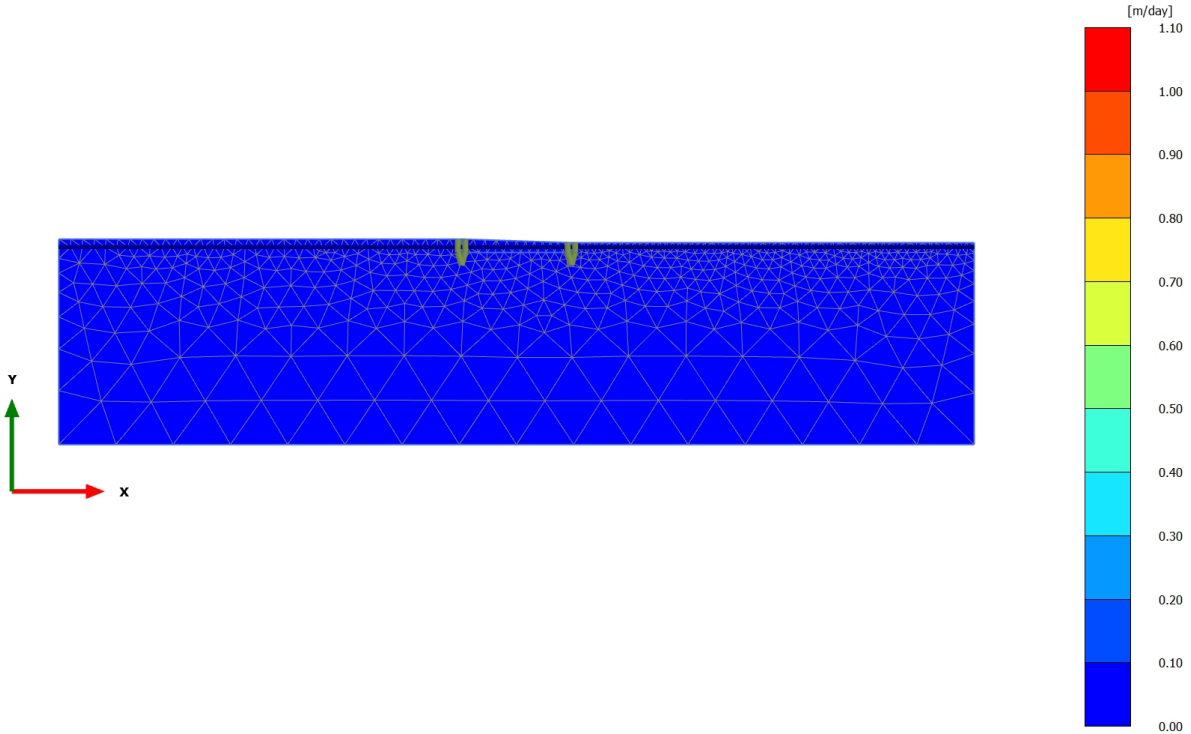


Groundwater head (scaled up 5.00 times) (Time 1.000 day)

Maximum value = 4.604 m (Element 254 at Node 1289)

Minimum value = 2.818 m (Element 964 at Node 2508)

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

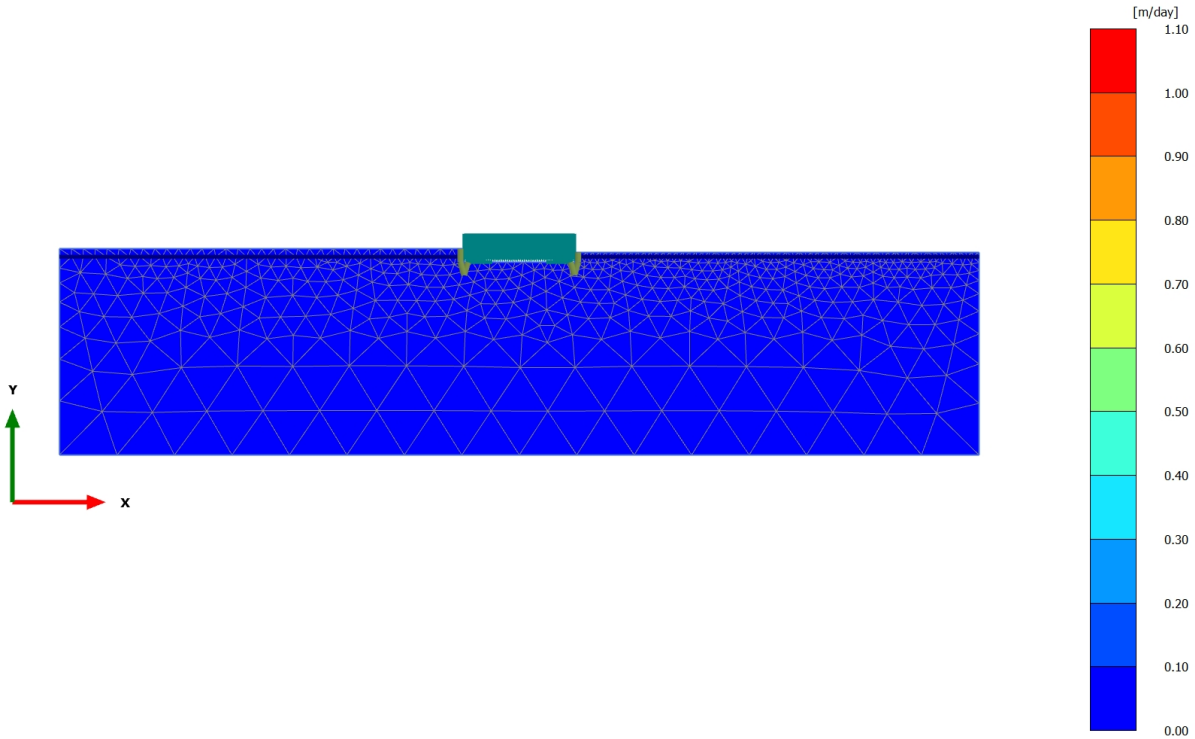


Groundwater flow |q| (scaled up 1.00*10⁹ times) (Time 0.000 day)

Maximum value = 0.1051*10^{-12} m/day (Element 243 at Node 7899)

Minimum value = 0.000 m/day (Element 247 at Node 2368)

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

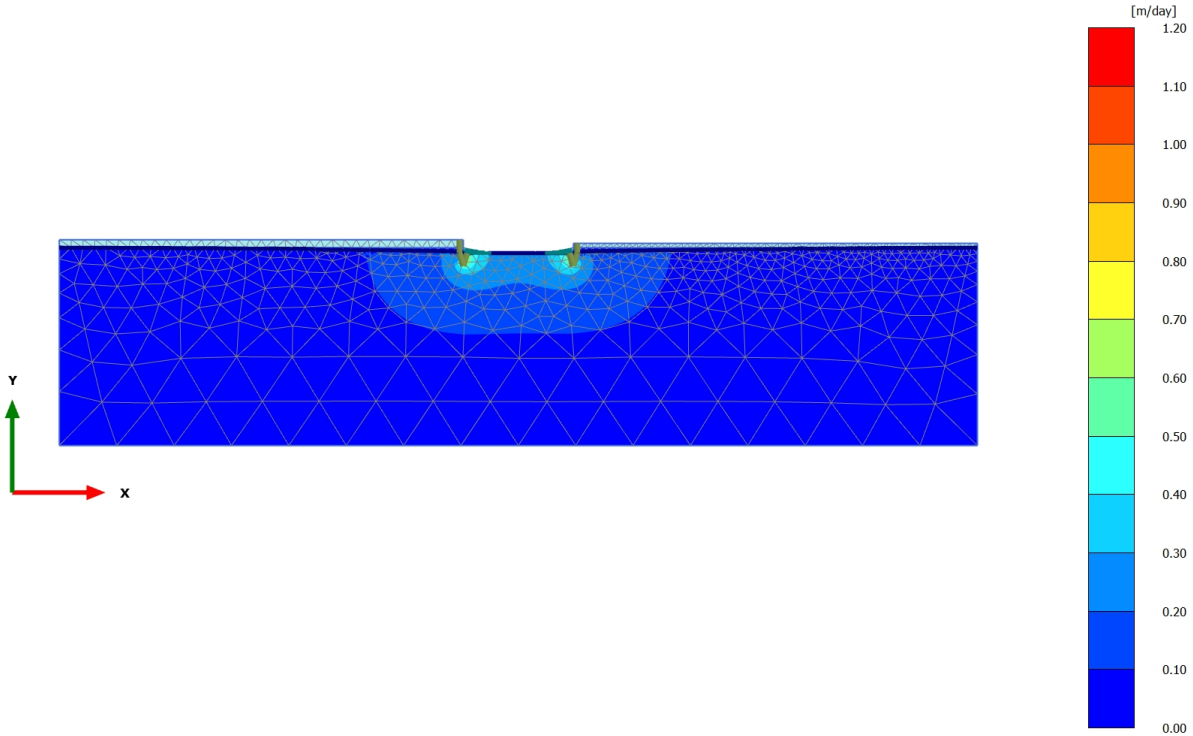


Groundwater flow |q| (scaled up 1.00*10⁹ times) (Time 0.000 day)

Maximum value = 0.1227*10^{-12} m/day (Element 243 at Node 7899)

Minimum value = 0.000 m/day (Element 247 at Node 2368)

2.1.2.1.3 Calculation results, Short Term [Phase_2] (2/35), Groundwater flow |q|

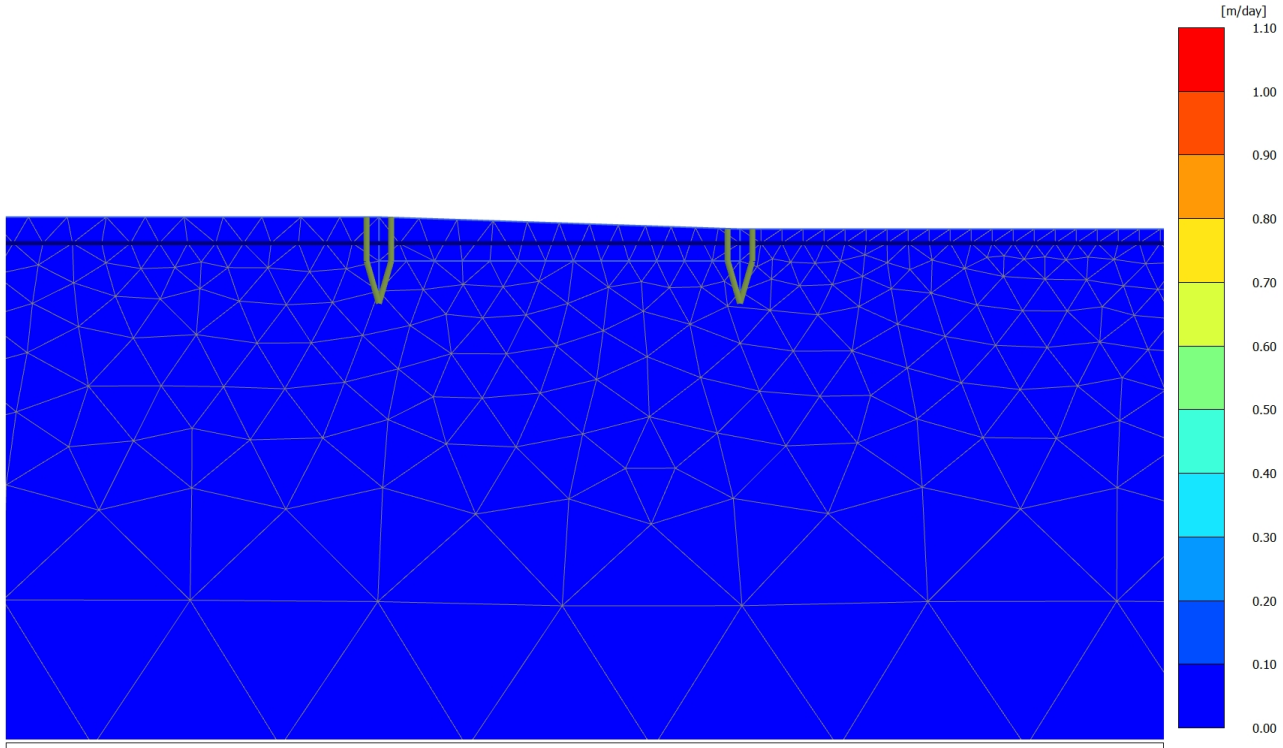


Groundwater flow |q| (scaled up 5.00 times) (Time 1.000 day)

Maximum value = 1.171 m/day (Element 895 at Node 4488)

Minimum value = $0.04497*10^{-3}$ m/day (Element 1098 at Node 3340)

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

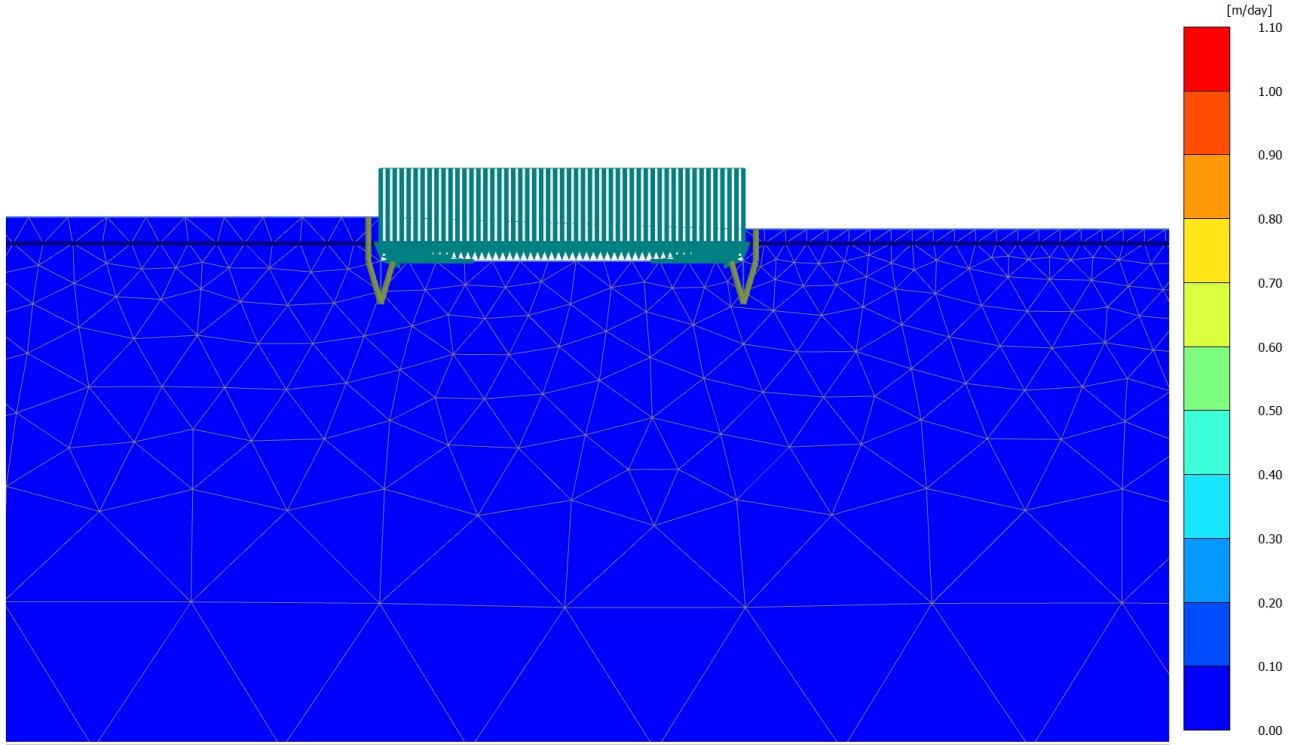


Groundwater flow |q| (scaled up 1.00*10⁹ times) (Time 0.000 day)

Maximum value = 0.1051*10^{-12} m/day (Element 243 at Node 7899)

Minimum value = 0.000 m/day (Element 247 at Node 2368)

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

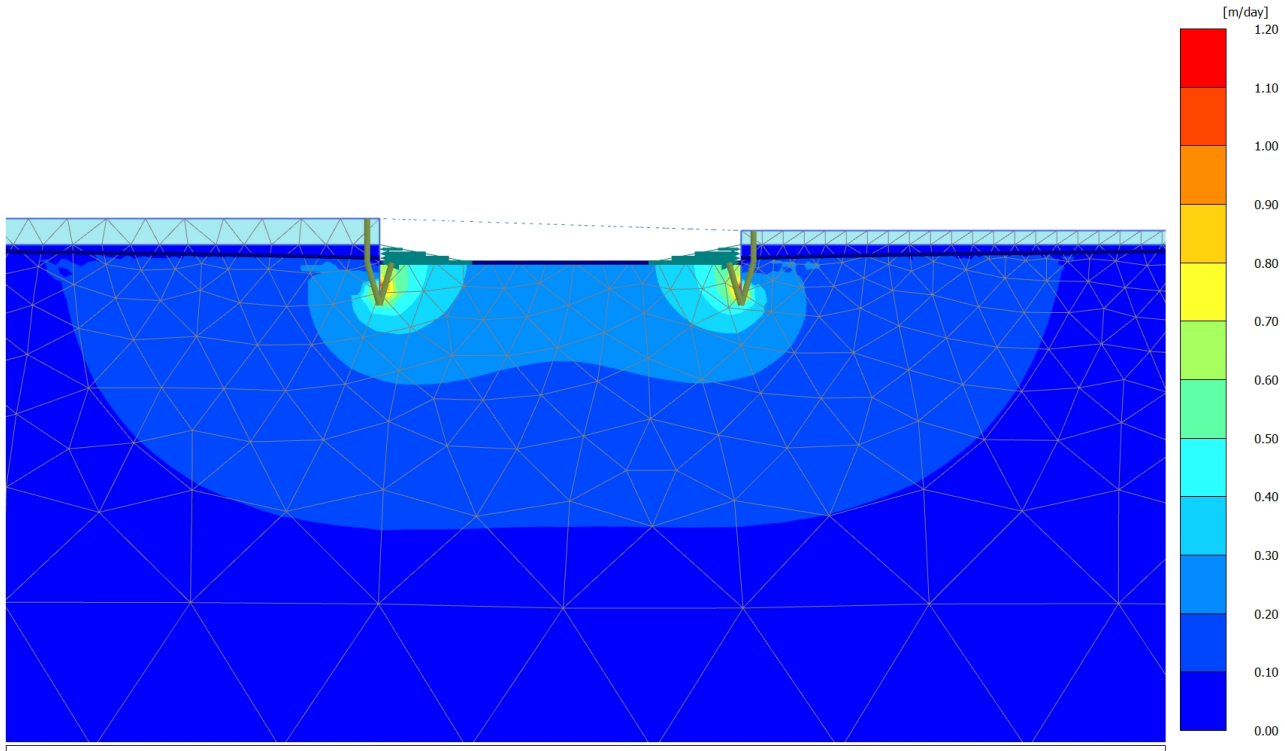


Groundwater flow |q| (scaled up 1.00*10⁹ times) (Time 0.000 day)

Maximum value = 0.1227*10^{-12} m/day (Element 243 at Node 7899)

Minimum value = 0.000 m/day (Element 247 at Node 2368)

4.1.3 Calculation results, Short Term [Phase_2] (2/35), Groundwater flow |q|



Groundwater flow |q| (scaled up 5.00 times) (Time 1.000 day)

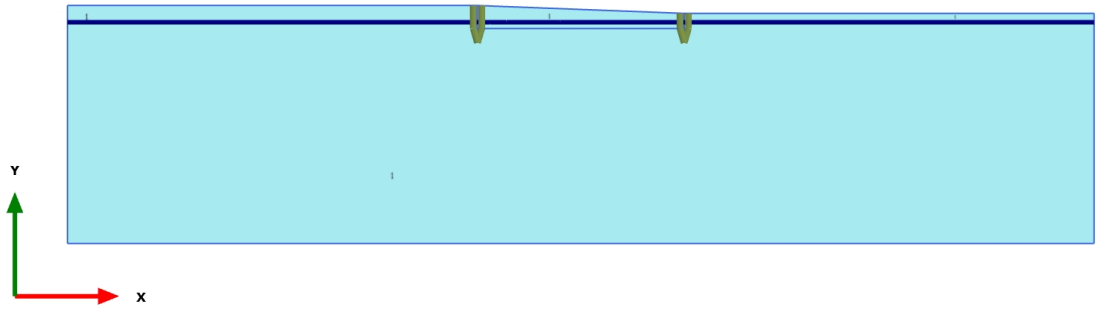
Maximum value = 1.171 m/day (Element 895 at Node 4488)

Minimum value = $0.04497*10^{-3}$ m/day (Element 1098 at Node 3340)

PLAXIS Report

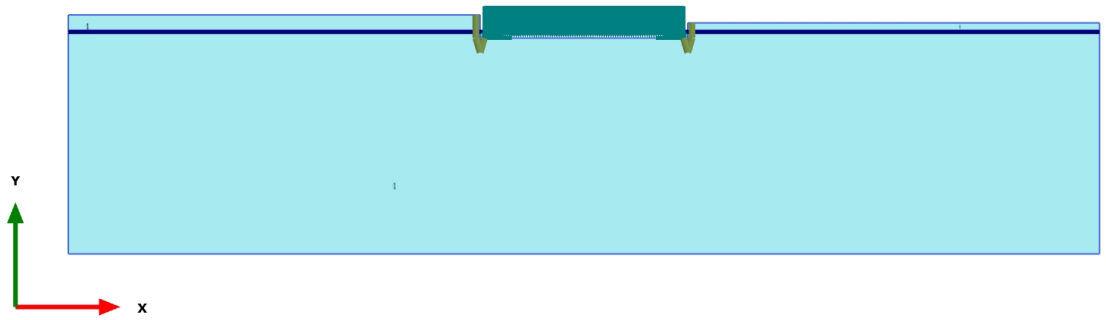
Filename	P3496_RoseBay_Section2.p2dx
Directory	C:\Users\Plaxis\Morrow Geotechnics\MG - Documents\1. Projects\P3400-P3499\P3496_Rose Bay, 23-31 Dover Rd\04_Analysis & Design\
Title	P3496_RoseBay_Section2
Model	Plane strain
Elements	15-Noded
PLAXIS Version	Version 2024.2.0.1144

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



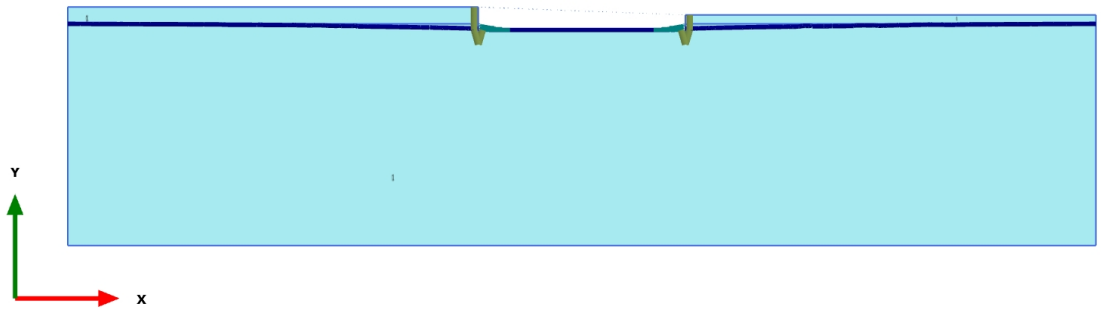
Materials plot

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] (2/36), Materials plot



Materials plot

1.1.2.1.1 Materials - Soil and interfaces - Mohr-Coulomb

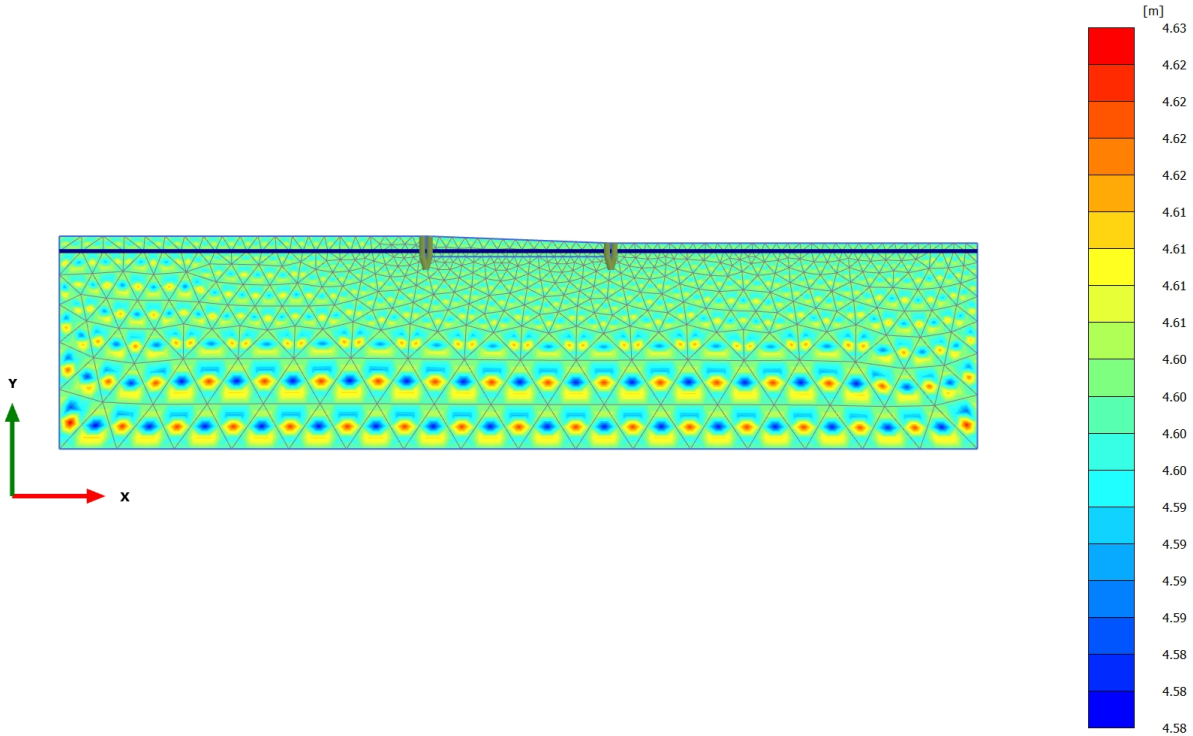
Identification number		1
Identification		Permeability
Soil model		Mohr-Coulomb
Drainage type		Drained
Colour		
Comments		
γ_unsat	kN/m³	18.00
γ_sat	kN/m³	19.00
e_init		0.5000
n_init		0.3333
Input method		SDOF equivalent
Rayleigh α		0.000
Rayleigh β		0.000
ξ_1	%	0.000
ξ_2	%	0.000
f_1	Hz	0.1000
f_2	Hz	1.000

Identification number		1
E'_ref	kN/m²	20.00E3
ν (nu)		0.3000
G_ref	kN/m²	7692
E_oed	kN/m²	26.92E3
E'_inc	kN/m²/m	0.000
y_ref	m	0.000
V_s	m/s	64.75
V_p	m/s	121.1
c'_ref	kN/m²	100.0
φ' (phi)	°	45.00
ψ (psi)	°	0.000
c'_inc	kN/m²/m	0.000
y_ref	m	0.000
Tension cut-off		True
Tensile strength	kN/m²	0.000
Determination		ν-undrained definition
ν_u definition method		Direct
ν_u,equivalent (nu)		0.4950
Skempton B		0.9783

Identification number		1
K_w,ref/n	kN/m²	750.0E3
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	8.208
k_y	m/day	8.208
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/m³	2.600
Thermal expansion type		Isotropic
α_sv	1/K	0.000
Phase change		False

Identification number		1
D_v	m²/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	m³/day/m	0.000
R_thermal	m² 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

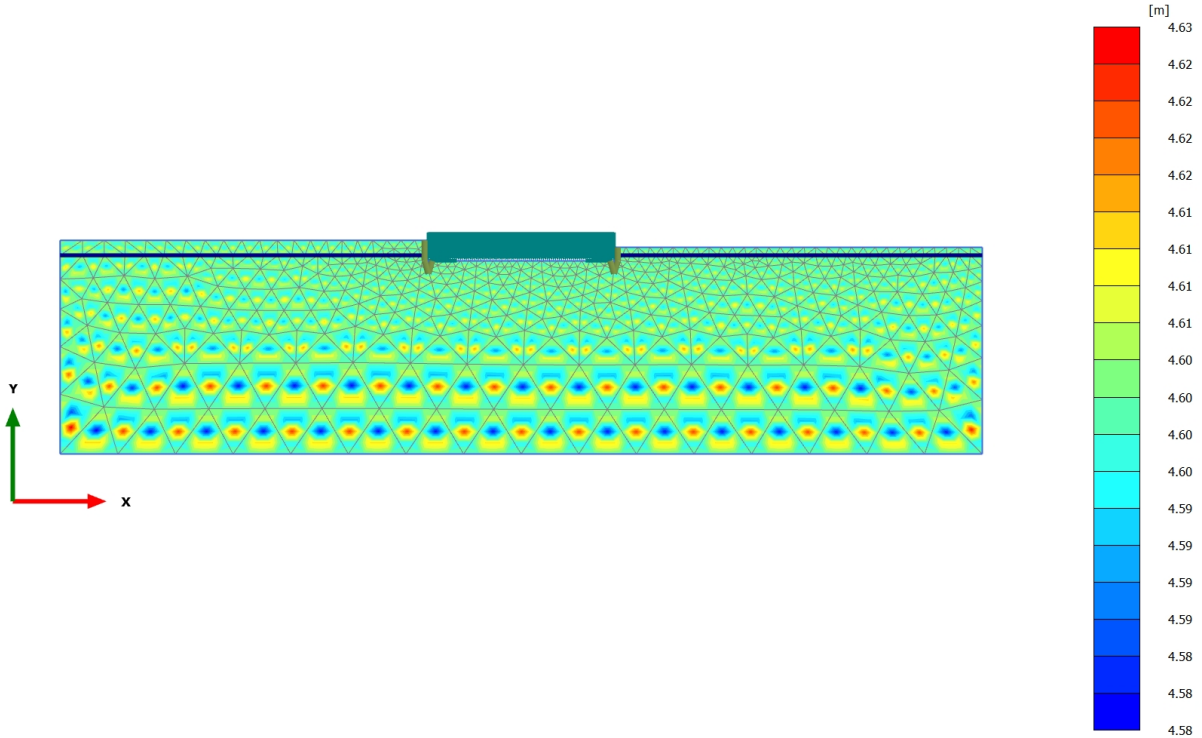


Groundwater head (scaled up 5.00 times) (Time 0.000 day)

Maximum value = 4.625 m (Element 210 at Node 433)

Minimum value = 4.578 m (Element 194 at Node 550)

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

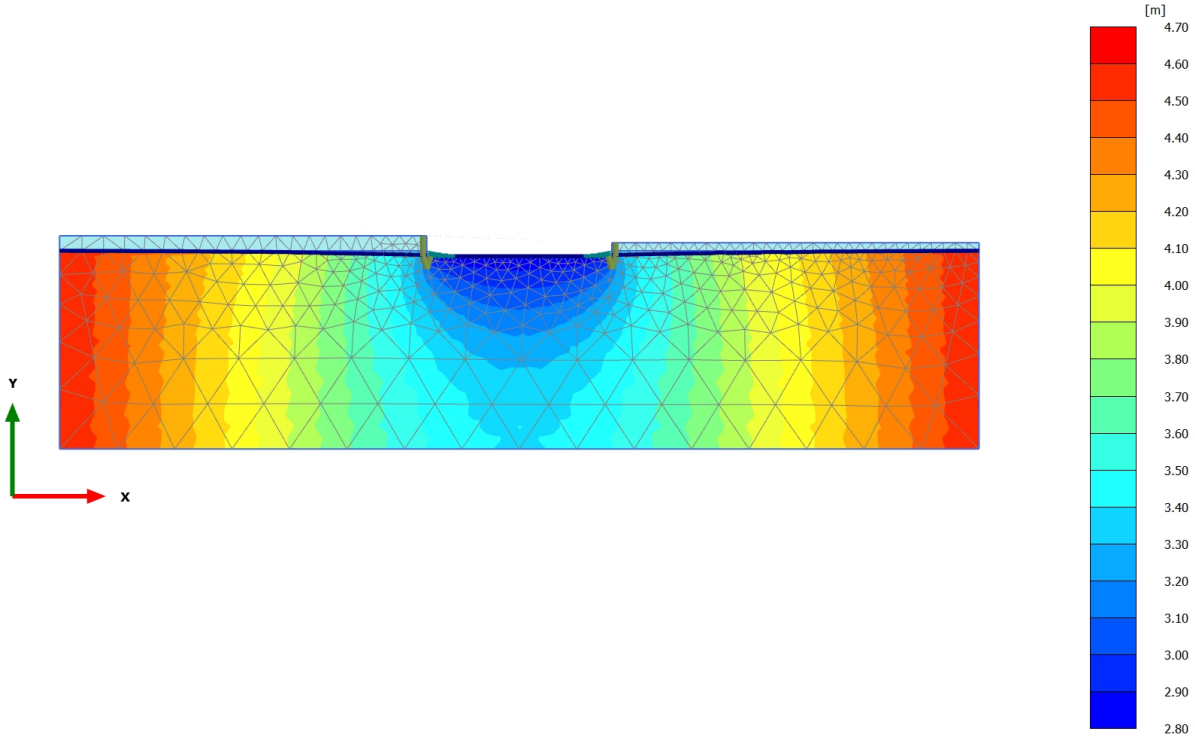


Groundwater head (scaled up 5.00 times) (Time 0.000 day)

Maximum value = 4.625 m (Element 210 at Node 433)

Minimum value = 4.578 m (Element 194 at Node 550)

2.1.1.1.3 Calculation results, Short Term [Phase_2] (2/36), Groundwater head

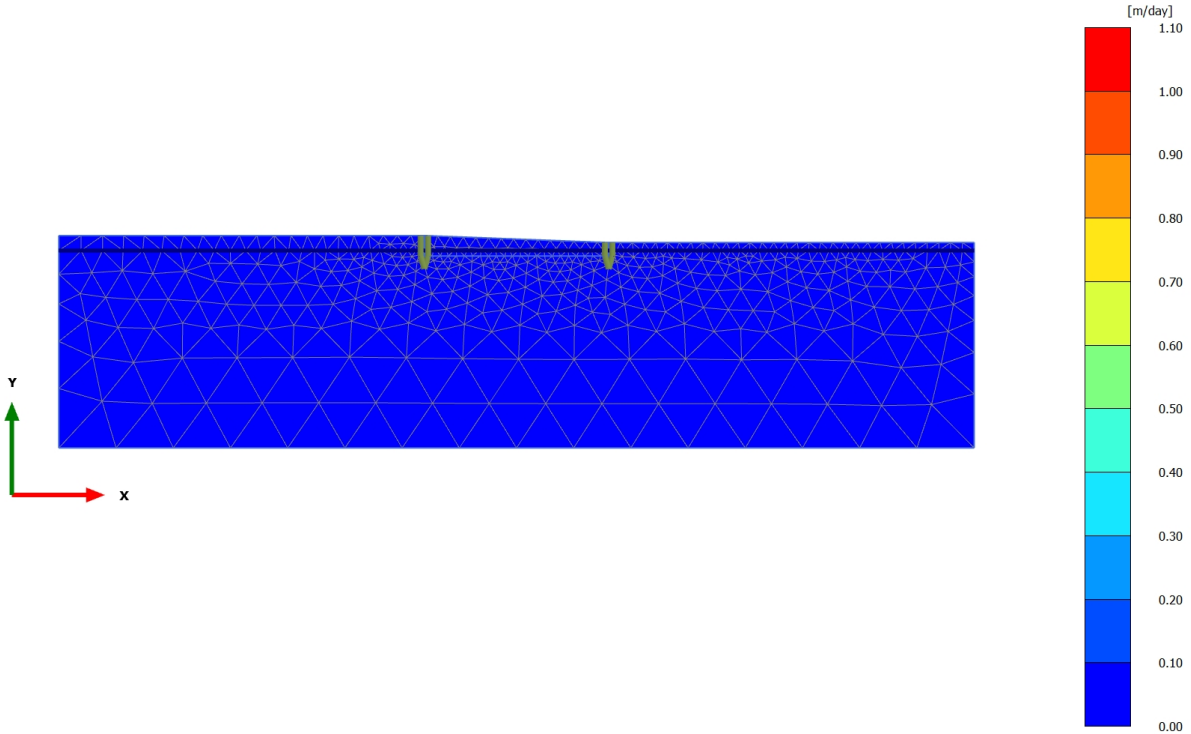


Groundwater head (scaled up 5.00 times) (Time 1.000 day)

Maximum value = 4.605 m (Element 210 at Node 429)

Minimum value = 2.820 m (Element 836 at Node 3174)

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

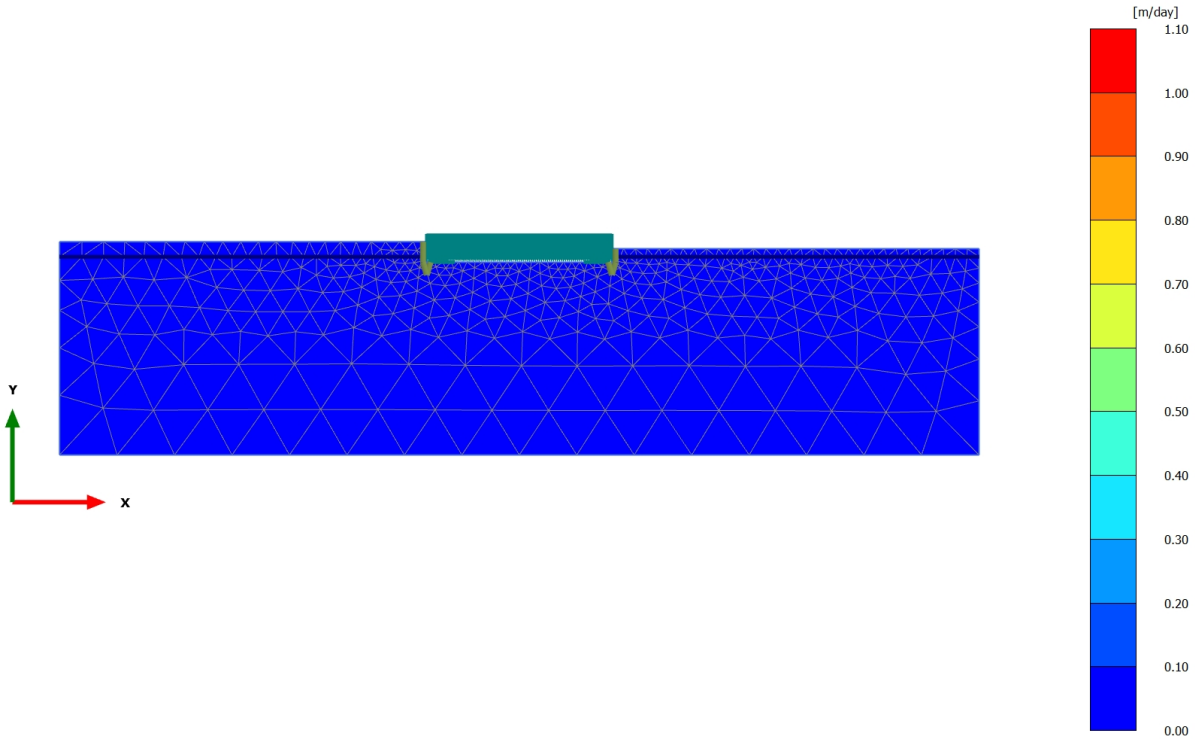


Groundwater flow |q| (scaled up 1.00*10⁹ times) (Time 0.000 day)

Maximum value = 0.1347*10^{-12} m/day (Element 209 at Node 6346)

Minimum value = 0.000 m/day (Element 28 at Node 514)

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

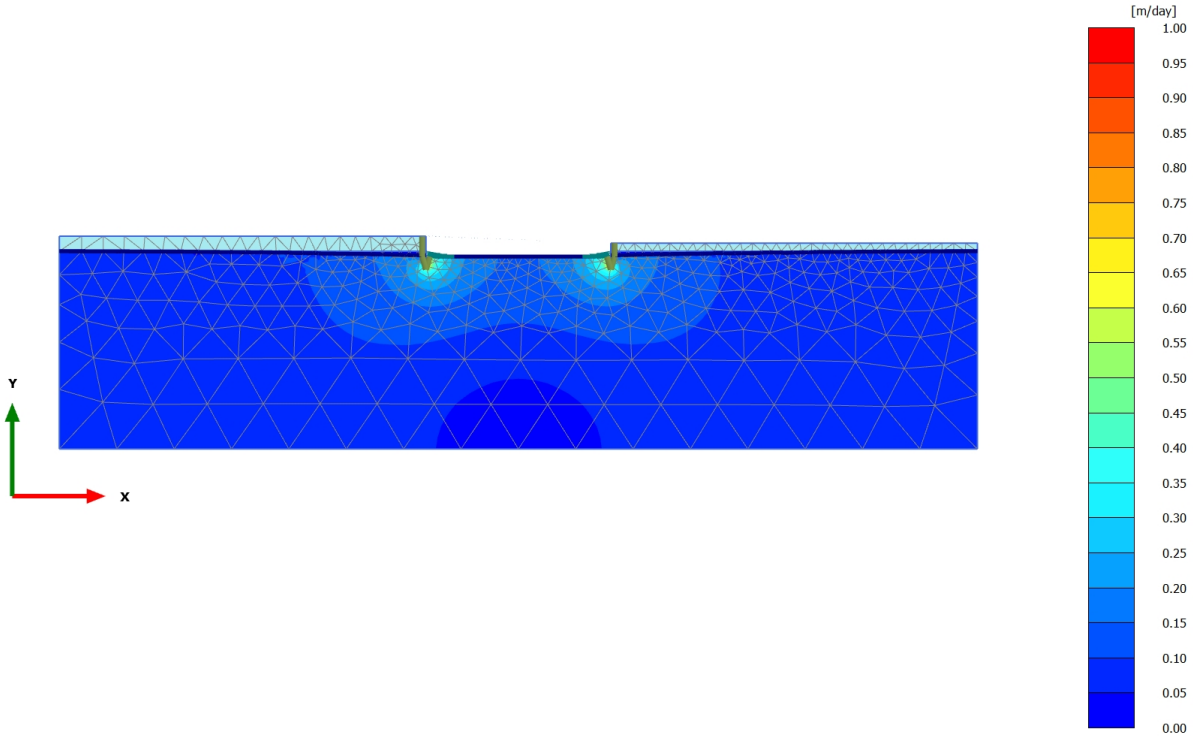


Groundwater flow |q| (scaled up 1.00*10⁹ times) (Time 0.000 day)

Maximum value = 0.1076*10^{-12} m/day (Element 225 at Node 6503)

Minimum value = 0.000 m/day (Element 24 at Node 296)

2.1.2.1.3 Calculation results, Short Term [Phase_2] (2/36), Groundwater flow |q|

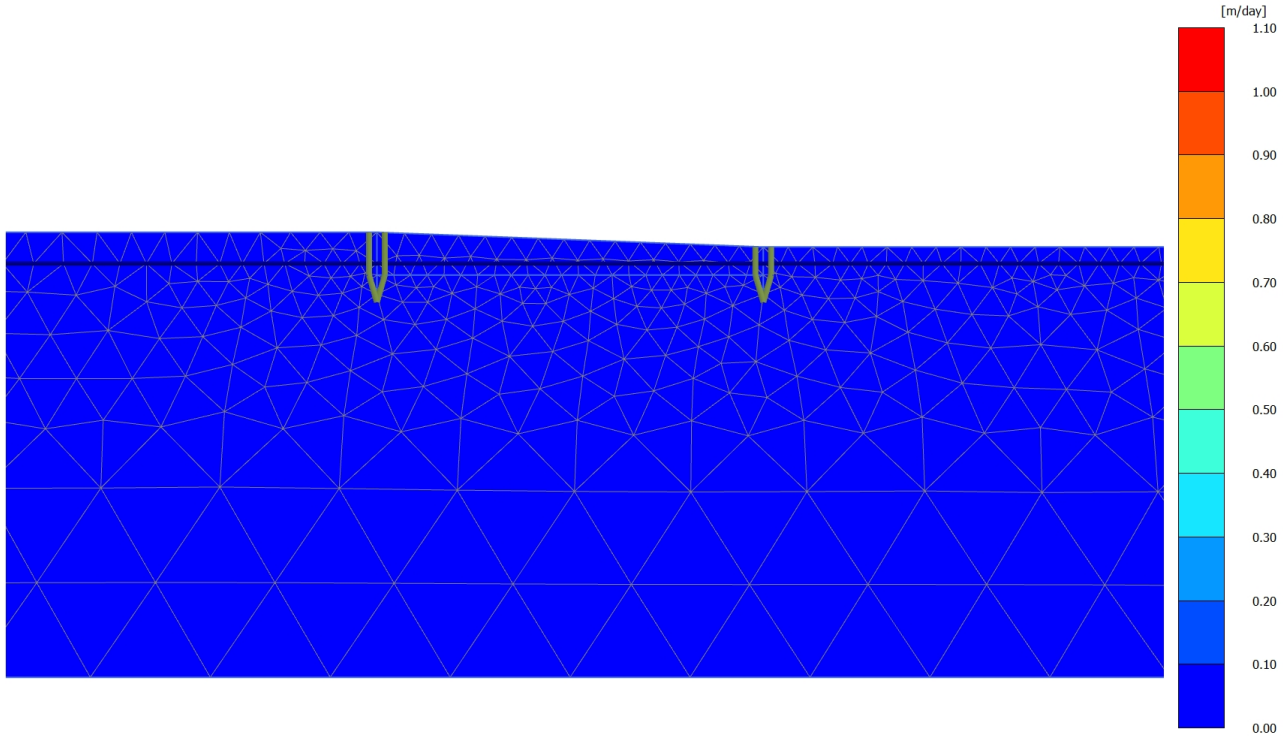


Groundwater flow |q| (scaled up 5.00 times) (Time 1.000 day)

Maximum value = 0.9885 m/day (Element 824 at Node 1806)

Minimum value = $0.05607*10^{-3}$ m/day (Element 849 at Node 3208)

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

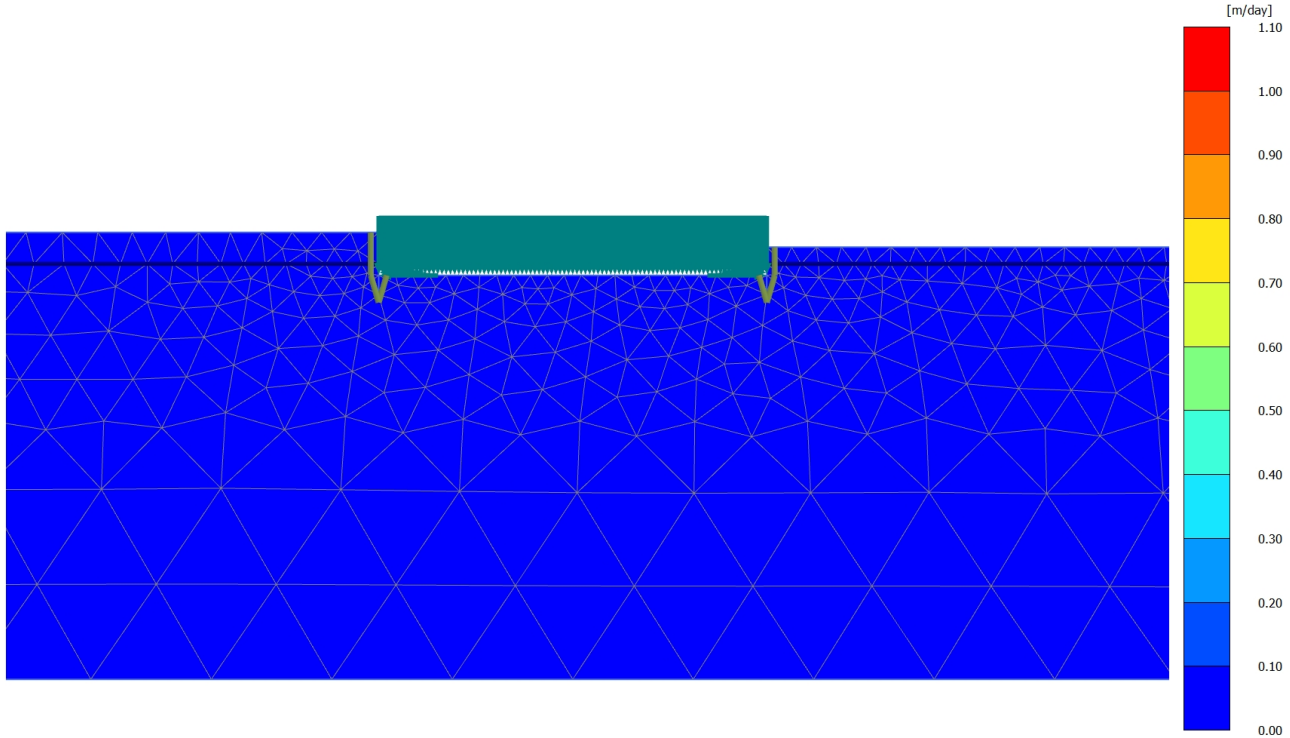


Groundwater flow |q| (scaled up 1.00*10⁹ times) (Time 0.000 day)

Maximum value = 0.1347*10^{-12} m/day (Element 209 at Node 6346)

Minimum value = 0.000 m/day (Element 28 at Node 514)

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

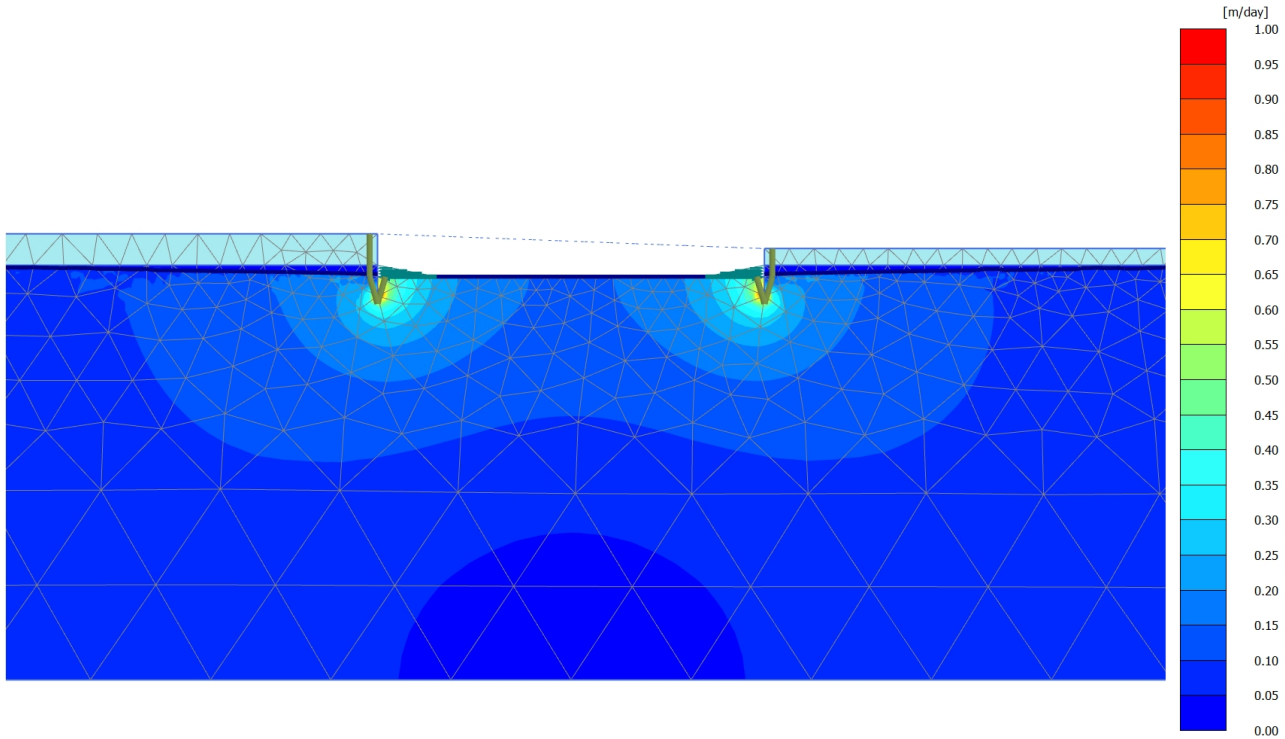


Groundwater flow |q| (scaled up 1.00*10⁹ times) (Time 0.000 day)

Maximum value = 0.1076*10^{-12} m/day (Element 225 at Node 6503)

Minimum value = 0.000 m/day (Element 24 at Node 296)

4.1.3 Calculation results, Short Term [Phase_2] (2/36), Groundwater flow |q|



Groundwater flow |q| (scaled up 5.00 times) (Time 1.000 day)

Maximum value = 0.9885 m/day (Element 824 at Node 1806)

Minimum value = $0.05607*10^{-3}$ m/day (Element 849 at Node 3208)

APPENDIX C

RECORD OF GROUNDWATER TAKE UNDER EXEMPTION

Clear form Print

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 activities[1] 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 certain[2] aquifer interference activities in connection with an authorised project[3] ('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 requested[20]. 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 volume[4] 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 authorisation[7]

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 approval[9].

B4 Annual extraction limit (ML)	

Section C: Details of person taking water[10]

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 numbers[13] if known

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

E2 Locality or suburb[14] (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 coordinates[15] ***(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 equipment[17] must be used to record the groundwater taken.

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

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

F3

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

Section F: Record of metered volumes taken (cont)

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

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

F3

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 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 taken[19]

G2

Start date of take	**End date of take**	**Volume taken**	**Units** (L, ML)	**Date record made**

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

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

G2

Start date of take	**End date of take**	**Volume taken**	**Units** (L, ML)	**Date record made**

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:

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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.

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