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Our Ref: PSM2808-019L REV3

16 December 2024

Project Manager
Goodman Property Services (Aust) Pty Ltd
Level 10, 60 Castlereagh Street
Sydney NSW 2000
james.crouch@goodman.com

Attention: James Crouch

Dear James

**RE: WAREHOUSE DEVELOPMENT, 1-3 BURROWS ROAD, ST PETERS - RESULTS OF GROUNDWATER ASSESSMENT**

## 1. Preamble

### 1.1 Amended Project Description

The project description is to be updated to reflect the following:

- Demolition of all existing structures and buildings on site
- Tree removal both on site and for a limited number of trees in the public domain and adjoining lot
- Site remediation, and establishment works, including minor excavation / bulk earthworks
- Design, construction and operation of a two-storey warehouse and distribution centre building with ancillary offices for each warehouse tenancy, including:
  - Approximately 34,051sqm of total GFA, comprising:
    - 30,389sqm of warehouse and distribution centre GFA.
    - 3,353sqm of GFA for ancillary office space; and
    - End of Trip Facilities on the ground floor of 309 sqm GFA.
  - Maximum building height of RL 29.70 (maximum 25m from existing ground level).
  - Operation 24 hours per day seven days a week.
- Provision of on grade car parking accessed off Burrows Road which provides 145 tenant and visitor car parking spaces (including 8 accessible bays), 14 motorcycle spaces, and bicycle parking and end-of-trip facilities (including 66 bicycle parking spaces, showers, lockers and change rooms for occupants).
- New crossings to Burrows Road for truck and car access
- Single fire and utilities services ingress crossing off Canal Road
- Site landscaping works totalling approximately 6,856sqm (or 19.8% of the site), including
  - Two x 6-metre landscaped setback areas to both the Burrows Road and Canal Road site frontages.
  - 3,829sqm or 11.0% deep soil landscaping.

  - 3,027sqm or 8.7% of permeable paving; and
  - 5,450sqm or 15.7% tree canopy coverage.
- Provision of building / business identification and wayfinding signage.

## 1.2 Change to the Proposal

The proposed design has been amended in response to issues relating to site contamination, potential flood impacts, assessment of the local logistics market and construction cost escalation. The intent of the proposal remains the same, however there have been changes to the physical layout/ built form of the warehouse and distribution facility as outlined below:

- Reduction of the proposed warehouse from 3 storeys (30.14m) to 2 storeys (25m). Despite the reduction of 1 storey, the building height has been reduced by approximately 5m. The remaining 2 storeys have increased in height to provide a more efficient warehouse facility.
- Re-orientation of the layout from an east-west central hardstand with smaller warehouse tenancies on the north and south, to a north-south central hardstand with larger/deeper warehouse tenancies on the east and west. This provides for more efficient warehouse layouts and truck access.
- Previously, truck access to the warehouse tenancies was facilitated via north and south spiral ramps from Burrows Road, connecting to a north-south hardstand on each level. Under the amended proposal, truck access will be provided directly to the ground level from Burrows Road, and upper level hardstand access will be provided via a northern ramp, also from Burrows Road.
- Previously, the offices associated with the warehouse tenancies were arranged over six levels in a separate block at the northern end of the site, featuring a shared rooftop garden terrace. The revised design situates the offices in a mezzanine layout within each warehouse tenancy, each having direct access to an elevated garden terrace along the building's east and west facade.
- Previously carparking was located in an under croft basement below the warehouse and accessed from Burrows Road. The amended design situates car parking at ground level, either externally to the building's footprint or within a ground-level under croft at the site's southern end.
- The facade has been redesigned to simplify the raked cladding panels, making them predominantly vertical while still maintaining a stepped appearance. The prominent corners of the development at the south-east and south-west extents of the building continue to feature expressive detailing.
- The proposal maintains a 6m landscaped setback to Burrows Road with a curved façade and a minimum 6m landscaped setback to Canal Road.
- The landscape design has been modified to reflect the revised site arrangement and orientation. However, the design concept retains the use of native and endemic species, as a key aspect of Connecting with Country.

The numerical changes to the proposal are detailed in Table 1 below.

**Table 1 - Overview of Key Numeric Amendments**

| Element | Exhibited Proposal | Amended Proposal | Difference |
|---|---|---|---|
| Total Site Area | 34,614sqm | 34,614sqm | Nil |
| Total Warehouse Area | 47,076sqm | 30,389sqm | Decrease of 16,687 sqm |
| Total Office Area | 5,014sqm | 3,353sqm | Decrease of 1,661sqm |
| Total Café Area | 60sqm | 0sqm | Decrease of 60ssqm |
| Total GFA | 52,150sqm | 34,051sqm | Decrease of 18,099sqm |
| Carparking | 241 car parking spaces (including 12 accessible bays) | 145 car parking spaces (including 8 accessible bays) | Decrease of 96 car parking spaces |
| Maximum Building Height | 30.14m | 25m | Decrease of 5.14m |
| Landscaped Area | 7,464 sqm (or 21.6% of the site) | 6,856sqm (or 19.8% of the site) | Decrease of 608sqm |

## 2. Introduction

This letter presents the results of a groundwater assessment undertaken at the Site at 1-3 Burrows Road, St Peters (the Site). This letter addresses the warehouse and distribution centres for the Planning Secretary's Environmental Assessment Requirements (SEARs) item 12, in particular:

- Provide a Surface and Groundwater Impact Assessment that assess potential impacts on: *Groundwater resources in accordance with the Groundwater Guidelines.*

The works were undertaken in accordance with PSM proposal PSM2808-017L, dated 4 April 2023 (Item 2 and Item 3).

The current revision has been undertaken to reflect the updated development plans as of September 2024 for SSDA submission.

## 3. Background

PSM has previously undertaken geotechnical investigations and prepared the following reports for the Site:

- Geotechnical site investigation in 2015 and 2019 (Ref. PSM2808-005R REV4, dated 16 December 2024 and
- Soil salinity investigation in 2022 (Ref. PSM2808-012R REV3 dated 25 September 2024).

We have also previously undertaken groundwater monitoring between 24 April 2019 and 24 February 2020 (Ref. PSM2808-009L dated 26 Feb 2020).

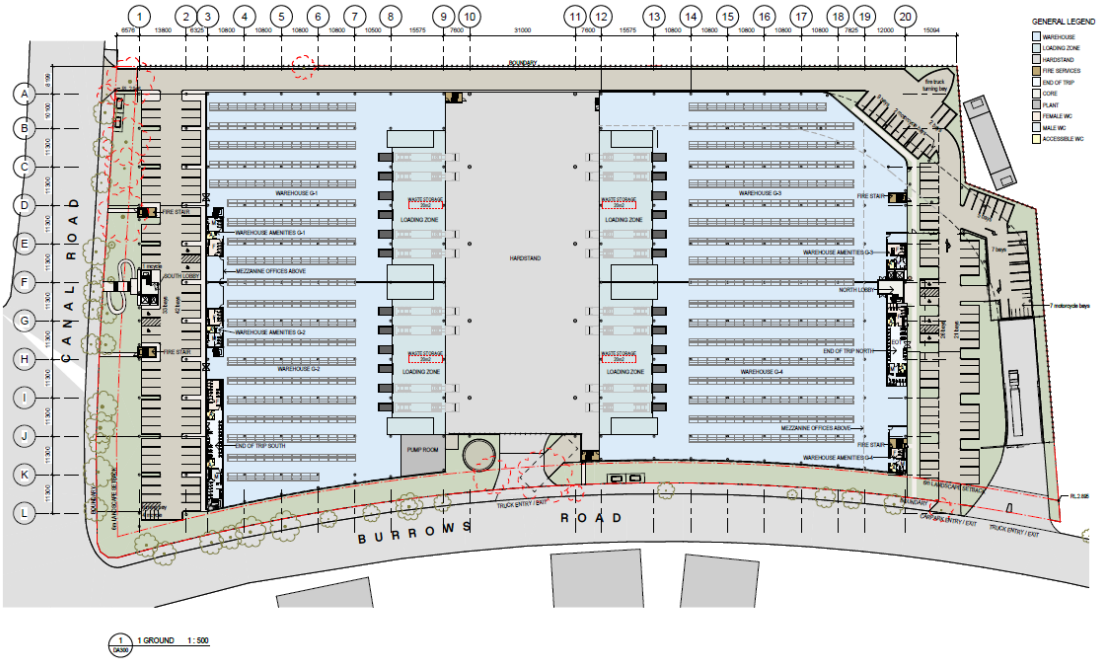
We have been provided the following drawings for the proposed development:

- Architectural Drawings by SBA (ref. 24132 DA000 to DA710 dated 13 September 2024)
- Civil Drawings by Costin Roe Consulting (ref. CO11035.05-SSDA100 to SSDA551 dated 17 October 2024)
- Structural Drawings by Costin Roe Consulting (ref. CO11035.05 – S010 to S504 dated 30 July 2024)

The provided documents indicate the following:

- The proposed development is to be located on currently occupied commercial property between Canal Road and Burrows Road
- All existing structures and buildings on site are to be demolished
- The development is proposed to comprise a two-storey warehouse facility with associated amenities and external carparks
- The bulk excavation level for the building is understood to be approximately RL 4.4.

Inset 1 below shows the proposed development.




**Inset 1: Site & Ground Floor Plan (ref. 24132 DA200 dated 29 November 2024)**

## 4. Fieldwork – 30 May 2023

The fieldwork was undertaken by PSM on 30 May 2023 and comprised the following:

- Manual dipping of the groundwater levels in the standpipe piezometers
- Undertaking of 'slug' tests in two (2) standpipe piezometers, and
- Installation of HOBO data loggers in two (2) standpipe piezometers.

The standpipe piezometers (BH01, BH02 and BH03) that were used to undertake the fieldwork were installed previously by PSM (ref. PSM2808-005R REV4, dated 16 December 2024. The construction records are attached in Appendix A and the approximate location of the standpipe piezometers shown in the attached Figure 1.

The standpipe piezometers were screened at the following depths:

- BH01: screened from 6 m to 12 m
- BH02: screened from 6 m to 12 m
- BH03: screened from 9 m to 15 m.

Based on the geotechnical investigation completed previously by PSM as described in PSM2808-005R REV4, it is inferred that the standpipe piezometers are screening the LOWER SILTY SAND and CLAY units located

directly above the weathered SHALE bedrock. The screened depth for BH03 appears to extend approximately 3 m into the SHALE bedrock.

### 4.1 Groundwater Monitoring (30 May 2023 to 3 July 2023)

Standing groundwater levels were recorded at the following depths below ground level (BGL) during the fieldwork and prior to completing the 'slug' tests:

- BH01: 1.52 mBGL
- BH02: 1.75 mBGL
- BH03: 3.11 mBGL.

Data loggers were installed on 30 May 2023 in BH01 and BH03 following completion of the 'slug' tests (Section 4.2 of this letter) to monitor ongoing groundwater levels and fluctuations with time. The loggers were set to record the water level in the piezometers at 1 hour intervals. The data was retrieved on 3 July 2023.

The measured groundwater levels recorded by the data loggers are presented in Appendix B.

The retrieved data shows relatively consistent groundwater at both borehole locations ranging from approximately RL 0.5 mAHD to RL 0.7 mAHD.

The retrieved data also shows minimal fluctuations of groundwater level with time in response to recorded rainfall events at both borehole locations.

### 4.2 Hydraulic Conductivity Tests

Two (2) 'slug' tests were performed on 30 May 2023 in the existing piezometers BH01 and BH03. As discussed in Section 3, the screens within the piezometers are in the SILTY SAND, CLAY and SHALE bedrock units.

'Slug' tests refer to either falling or rising head tests. Both tests undertaken were rising head tests, in which groundwater was bailed out of the standpipe piezometers, and the water recharge was monitored using the HOBO water level loggers.

The test results were then analysed based on Hvorslev's equations to estimate the hydraulic conductivity *'k'* of the SILTY SAND, CLAY and SHALE units. The results indicate a hydraulic conductivity *'k'* of between 2 x $10^{-8}$ m/s and 4 x $10^{-8}$ m/s. The interpretation outputs are included in Appendix C.

## 5. Discussion

Based on the groundwater level data, we note:

- The results of the groundwater monitoring indicate depth to groundwater of between 1.5 mBGL and 3.11 mBGL which corresponds to elevations of between RL 0.5 mAHD to RL 0.7 mAHD
- These levels are considered to be consistent with the groundwater levels recorded during the initial geotechnical investigation in 2019
- We note the recorded water levels are below the currently proposed bulk earthworks level (BEL) at approximately RL 4.4 mAHD
- The retrieved data also shows minimal fluctuations of groundwater level with time in response to recorded rainfall events at both borehole locations
- The water level within the Site is expected to be affected by the water level at the Alexandra Canal.

### 5.1 Permeability

With regards to the ground permeability, the results of the 'slug' tests undertaken on the natural soil units indicate a hydraulic conductivity *'k'* in the order of 5x$10^{-8}$ m/s at depth. This is considered to be consistent with expected *'k'* values for a low to medium plasticity CLAY.

However, we note that the upper surface material (e.g. top 3 m of the existing material) comprises more sandy material. We recommend a higher hydraulic conductivity of $1x10^{-6}$ m/s be considered as the upper limit / "sensitivity" case.

If you have any questions, please do not hesitate to contact the undersigned.

**Yours Sincerely**

**KEN TONG LEE**
**GEOTECHNICAL ENGINEER**

**AGUSTRIA SALIM**
**PRINCIPAL**

Enc.

| | |
|---|---|
| Figure 1: | Site Locality Plan |
| Appendix A: | Standpipe Construction Records |
| Appendix B: | Groundwater Monitoring Levels |
| Appendix C: | Hydraulic Conductivity Analysis Output |


**Legend**

- Approximate Site Boundary
- Approximate Borehole Locations

Notes:
1. Aerial Imagery was taken from Nearmaps dated 31 May 2023.

N

Scale 1:1,500

0 10 20 30 40 50 m

Horizontal Datum: GDA2020
Grid: MGA Zone 56

| | | | |
|---|---|---|---|
| P S M | Created By: JBL | Revision: A | Goodman Property Services (Aust) Pty Ltd<br>Warehouse Developement<br>1-3 Burrows Road, St Peters<br><br>Site Locality Plan |
| | Date: 05 Jul 2023 | Paper Size: A3 | PSM2808-019L / Figure 1 |

P:\PSM2808\QGIS\02_WorkSpace\01_MXDs\PSM2808.qgz Layout: Site Plan

# Appendix A
# Standpipe Construction Records

**Pells Sullivan Meynink**
Engineering Consultants
Rock - Soil - Water

JOB no.: PSM2808

PROJECT: **Burrows Road**

# PIEZOMETER CONSTRUCTION RECORD

| | | | |
|---|---|---|---|
| HOLE NUMBER: | BH01 | DRILLING CONTRACTOR: | Rockwell Drilling |
| PIEZOMETER: | | DRILLING RIG: | Hanjin |
| COLLAR EASTING: | 331557 | DEPTH OF HOLE (m): | 15 m |
| COLLAR NORTHING: | 6245383 | BOREHOLE INCLINATION: | Vertical |
| COLLAR RL(m): | 2.1 | PIEZO INSTALLATION DATE: | 23/04/2019 |
| DATUM: | MGA 56 | SUPERVISED BY: | JsR |

*Tick boxes*

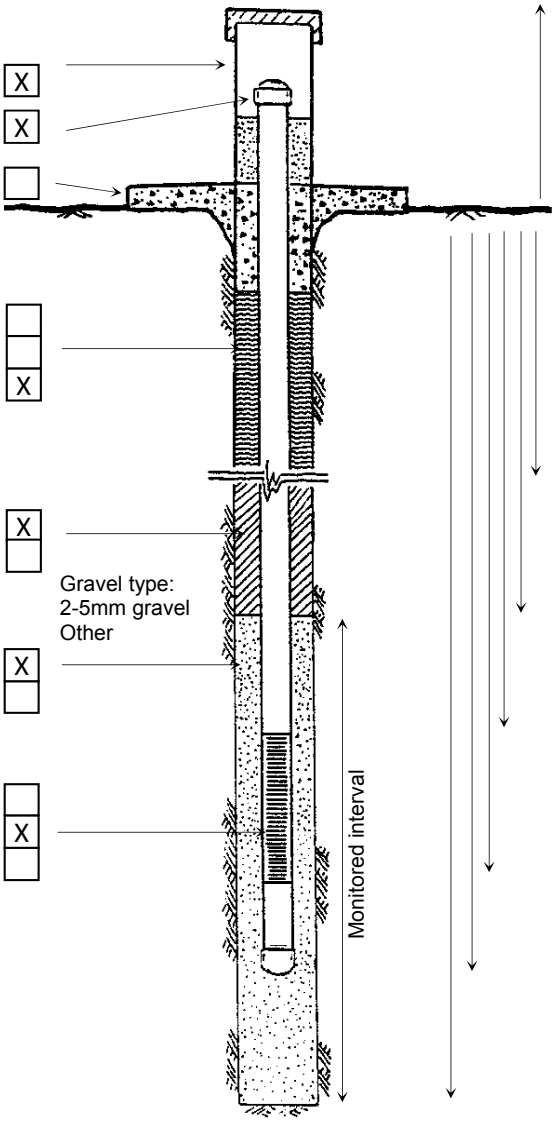
Steel protective **well cover** [X]
PVC cap [X]
Concrete Colar [ ]

Back Fill type
Cement bentonite [ ]
Soil [ ]
None [X]

Seal
Bentonite Pellets [X]
Other [ ]

Gravel type:
2-5 mm gravel [X]
Other [ ]

Perforation type:
Drill holes [ ]
Hack saw cuts [X]
40um machine slots [ ]




*Complete dimensions if appropriate*

| | |
|---|---|
| Height of stickup (m) | |
| Diameter of PVC (mm) | 50 |
| Depth to top of seal | 0.3 m |
| Depth to top of gravel pack | 1.5 m |
| Depth to top of screen | 6 m |
| Depth to base of screen | 12 m |
| Depth to base of piezo | 15 m |
| Depth to base of gravel | 15 m |

| COMMENTS: | Gatic cover were used for the protection |
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**Pells Sullivan Meynink**
Engineering Consultants
Rock - Soil - Water

JOB no.: PSM2808

PROJECT: **Burrows Road**

# PIEZOMETER CONSTRUCTION RECORD

| | | | |
|---|---|---|---|
| HOLE NUMBER: | BH02 | DRILLING CONTRACTOR: | Rockwell Drilling |
| PIEZOMETER: | | DRILLING RIG: | Hanjin |
| COLLAR EASTING: | 331729 | DEPTH OF HOLE (m): | 15 m |
| COLLAR NORTHING: | 6245470 | BOREHOLE INCLINATION: | Vertical |
| COLLAR RL(m): | 2.3 | PIEZO INSTALLATION DATE: | 24/04/2019 |
| DATUM: | MGA 56 | SUPERVISED BY: | JsR |

*Tick boxes*

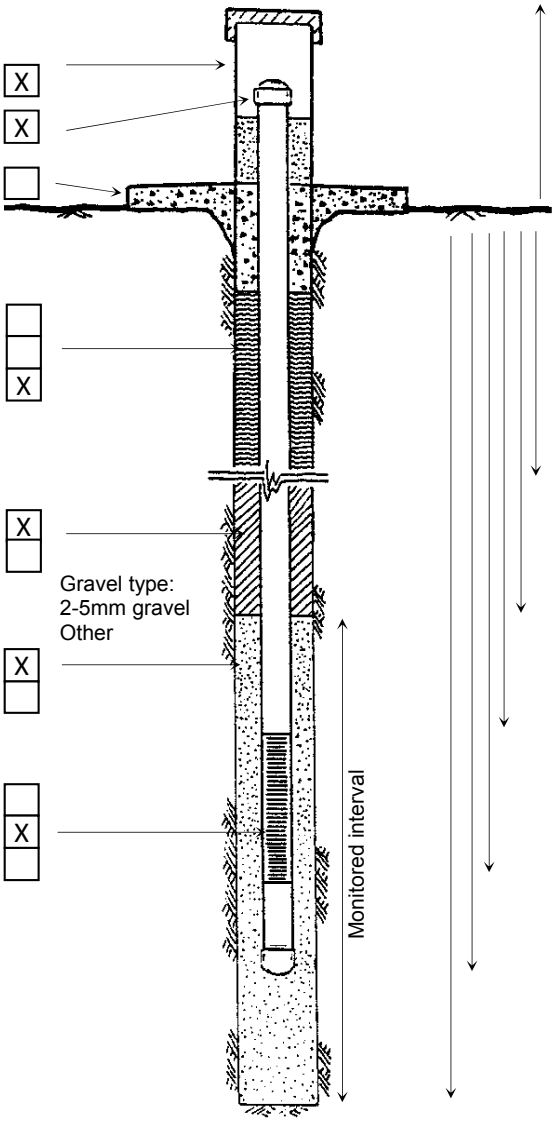
Steel protective **well cover** [X]
PVC cap [X]
Concrete Colar [ ]

Back Fill type
Cement bentonite [ ]
Soil [ ]
None [X]

Seal
Bentonite Pellets [X]
Other [ ]

Gravel type:
2-5 mm gravel [X]
Other [ ]

Perforation type:
Drill holes [ ]
Hack saw cuts [X]
40um machine slots [ ]




*Complete dimensions if appropriate*

| | |
|---|---|
| Height of stickup (m) | |
| Diameter of PVC (mm) | 50 |
| Depth to top of seal | 0.3 m |
| Depth to top of gravel pack | 1.5 m |
| Depth to top of screen | 6 m |
| Depth to base of screen | 12 m |
| Depth to base of piezo | 15 m |
| Depth to base of gravel | 15 m |

| COMMENTS: | Gatic cover were used for the protection |
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**Pells Sullivan Meynink**
Engineering Consultants
Rock - Soil - Water

JOB no.: PSM2808

PROJECT: **Burrows Road**

# PIEZOMETER CONSTRUCTION RECORD

| | | | |
|---|---|---|---|
| HOLE NUMBER: | BH03 | DRILLING CONTRACTOR: | Rockwell Drilling |
| PIEZOMETER: | | DRILLING RIG: | Hanjin |
| COLLAR EASTING: | 331680 | DEPTH OF HOLE (m): | 15 m |
| COLLAR NORTHING: | 6245385 | BOREHOLE INCLINATION: | Vertical |
| COLLAR RL(m): | 3.5 | PIEZO INSTALLATION DATE: | 24/04/2019 |
| DATUM: | MGA 56 | SUPERVISED BY: | JsR |

*Tick boxes*

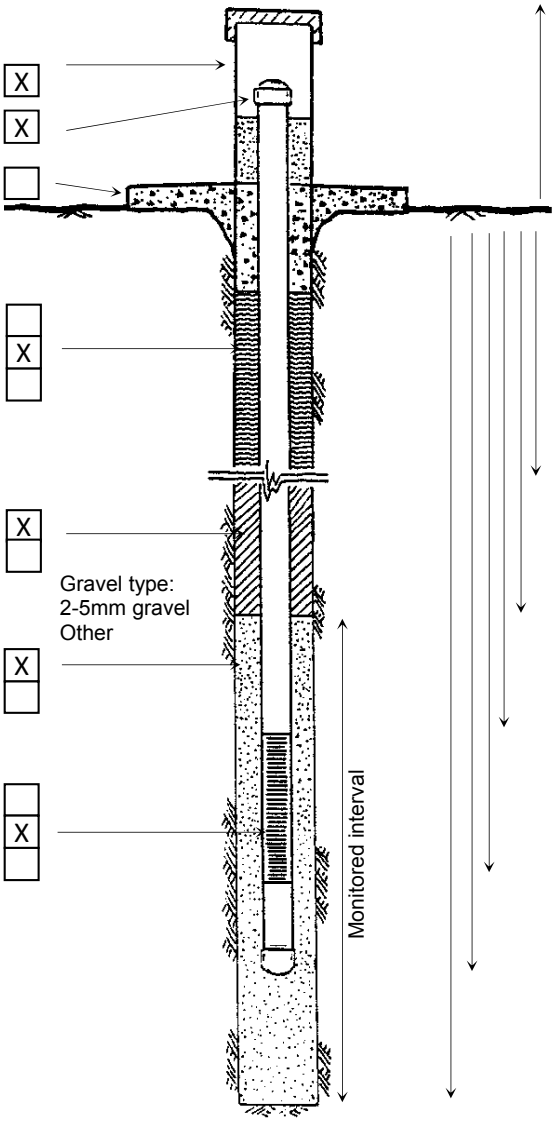
Steel protective **well cover** [X]
PVC cap [X]
Concrete Colar [ ]

Back Fill type
Cement bentonite [ ]
Soil [X]
None [ ]

Seal
Bentonite Pellets [X]
Other [ ]

Gravel type:
2-5 mm gravel [X]
Other [ ]

Perforation type:
Drill holes [ ]
Hack saw cuts [X]
40um machine slots [ ]




*Complete dimensions if appropriate*

| | |
|---|---|
| Height of stickup (m) | |
| Diameter of PVC (mm) | 50 |
| Depth to top of seal | 5 m |
| Depth to top of gravel pack | 7 m |
| Depth to top of screen | 9 m |
| Depth to base of screen | 15 m |
| Depth to base of piezo | 15 m |
| Depth to base of gravel | 15 m |

| COMMENTS: | Gatic cover were used for the protection |
|---|---|
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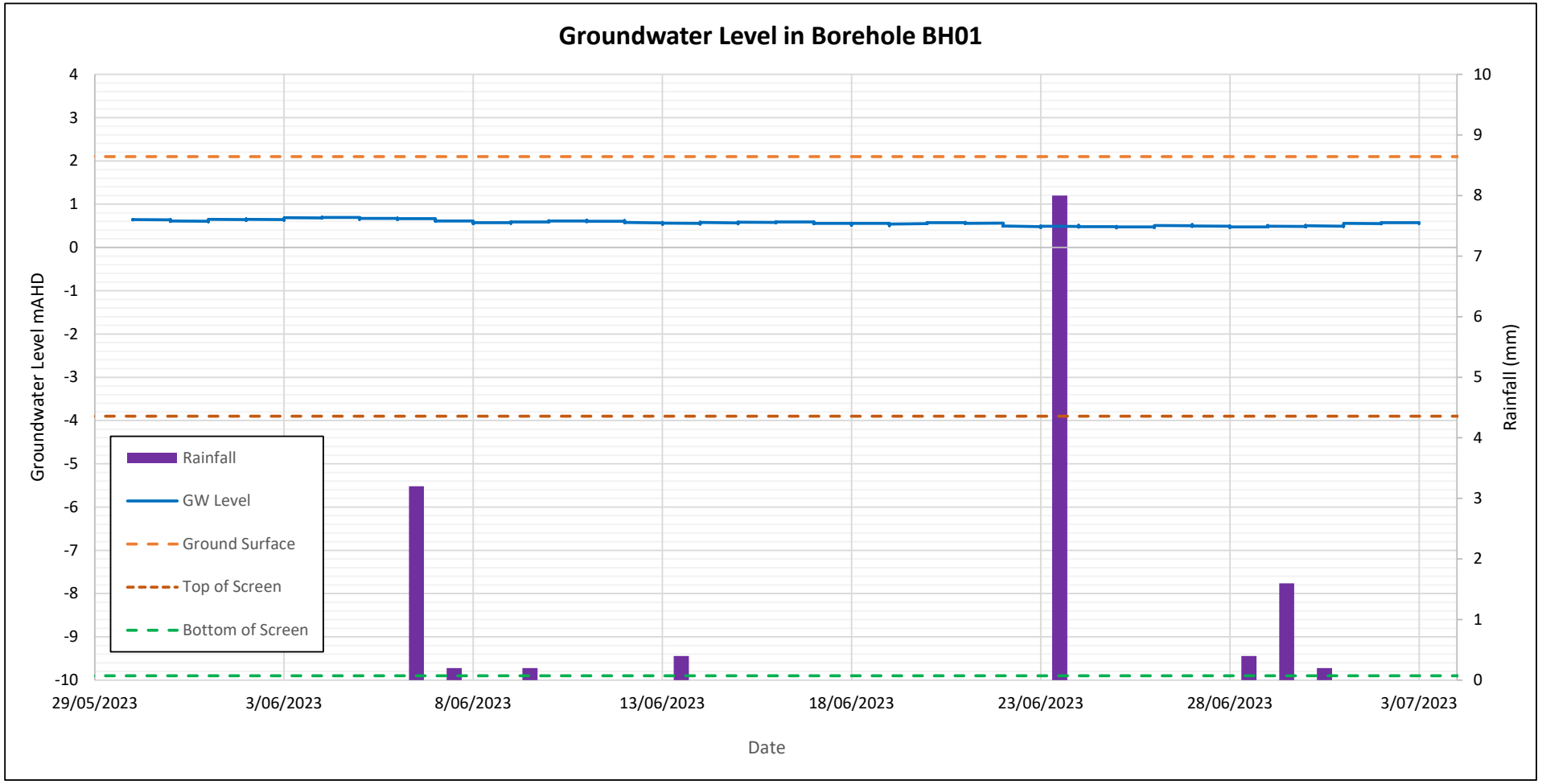
# Appendix B
# Groundwater Monitoring Levels



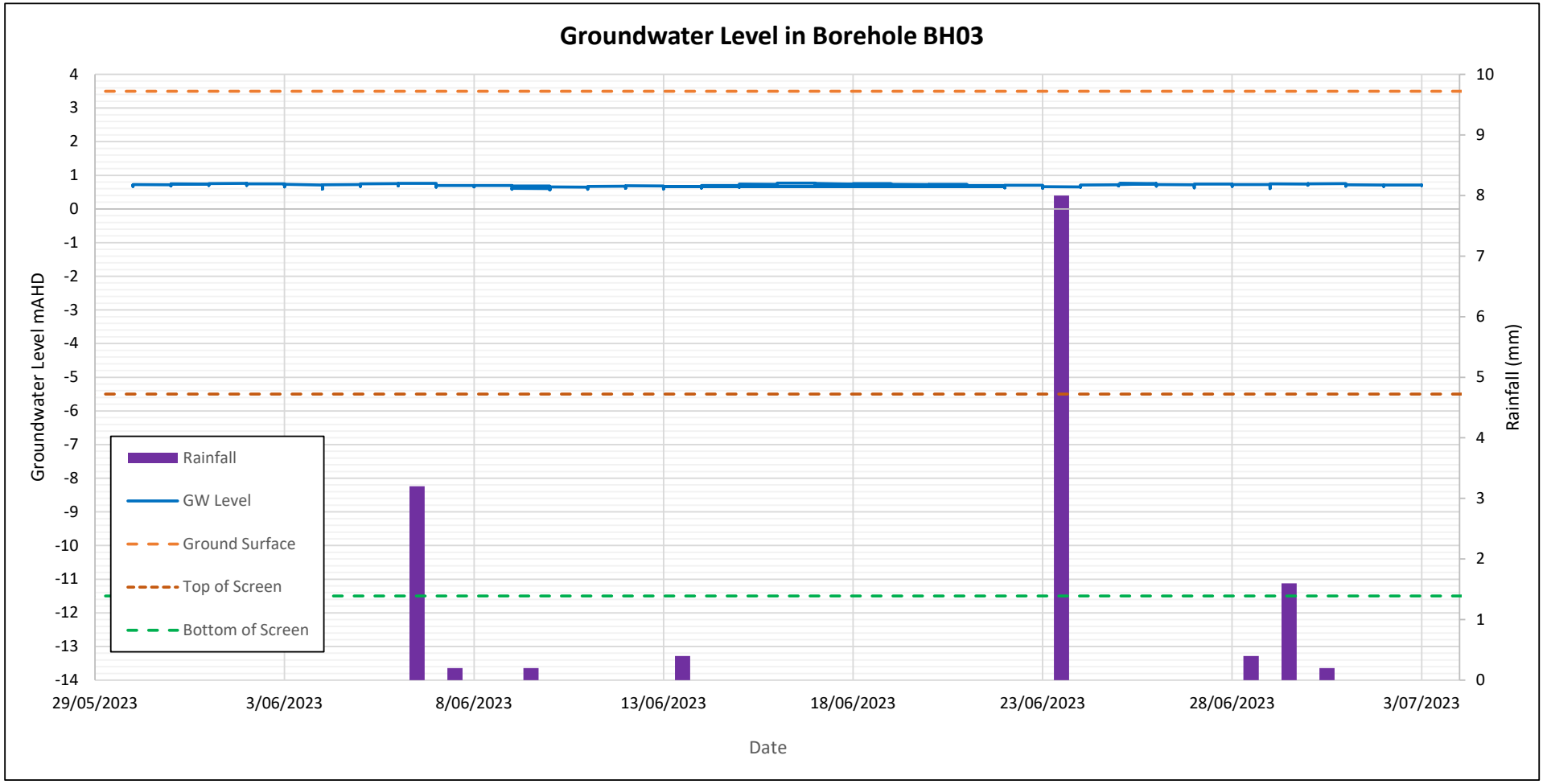

Notes:

1. Instrument Elevation (m RL) -11.1
2. Ground Surface Elevation 2.1
3. Data Logger Instrument Installed on 30/05/2023
4. Top of Screen (m RL) -3.9
5. Bottom of Screen (m RL) -9.9
6. Rainfall data from BOM station 066037 , downloaded 4/07/2023

Goodman Property Services (Aust) Pty Ltd
Warehouse Development
1-3 Burrows Road, St Peters
BH01
Groundwater Levels

PSM2808-019L | Appendix B

\\anf.psm.local\anf-files\2600\PSM2808\Eng\Groundwater Monitoring\20230703 JBL HOBO readings\[BH01 process.xlsx]BH01




Notes:

1. Instrument Elevation (m RL) -0.2
2. Ground Surface Elevation 3.5
3. Data Logger Instrument Installed on 30/05/2023
4. Top of Screen (m RL) -5.5
5. Bottom of Screen (m RL) -11.5
6. Rainfall data from BOM station 066037 , downloaded 4/07/2023

Goodman Property Services (Aust) Pty Ltd
Warehouse Development
1-3 Burrows Road, St Peters
BH03
Groundwater Levels

| PSM2808-019L | Appendix B |
|---|---|

\\anf.psm.local\anf-files\2600\PSM2808\Eng\Groundwater Monitoring\20230703 JBL HOBO readings\[BH03 process.xlsx]BH03

# Appendix C
# Hydraulic Conductivity Analysis Output

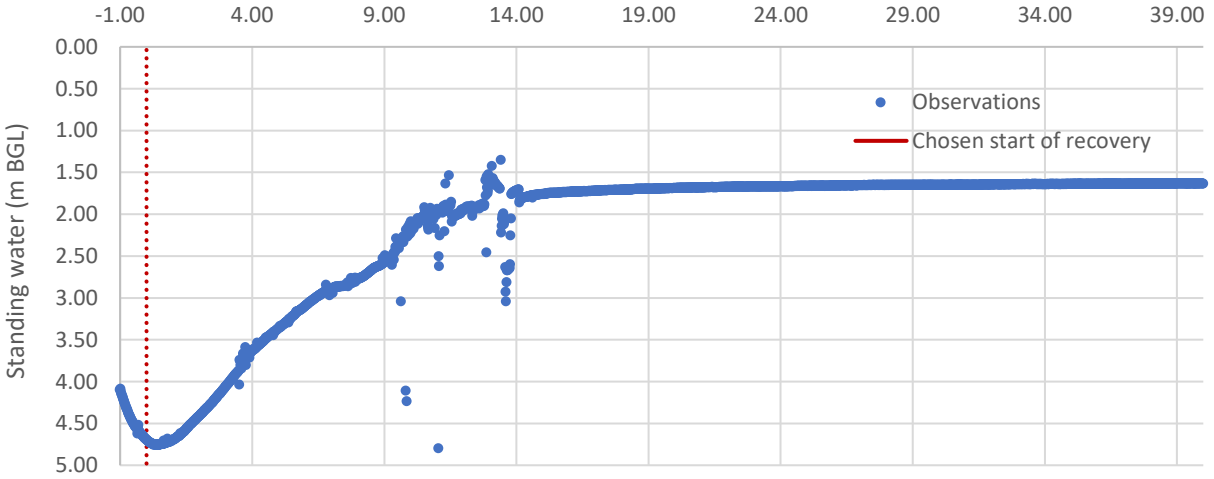
**Pells Sullivan Meynink**
Engineering Consultants
Rock - Soil - Water

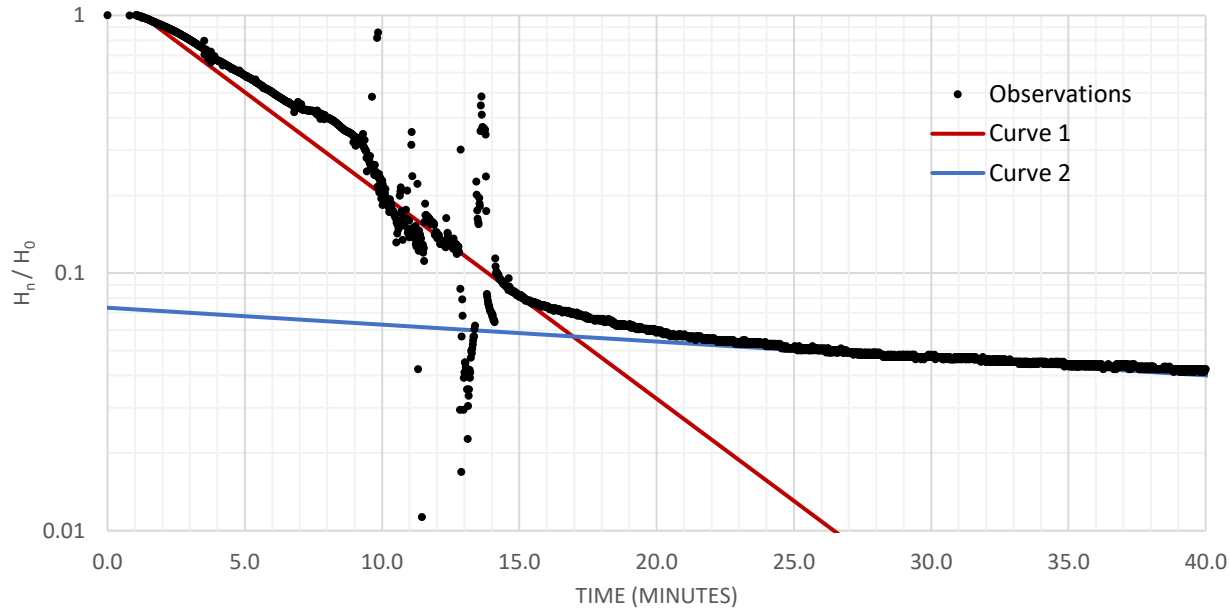
JOB no.: **PSM2808**

PROJECT: **1-3 Burrows Road**

# Slug Test

| | | | |
|---|---|---|---|
| HOLE NUMBER: | **BH01** | DEPTH OF HOLE (m): | **15.00** |
| BORE EASTING: | **331557.0** | SCREEN LENGTH 'L' (m): | **6.0** |
| BORE NORTHING: | **6245383.0** | INTERNAL DIAMETER '$D_I$' (m): | **0.04** |
| COLLAR RL(m): | **2.10** | EXTERNAL DIAMETER 'Do' (m): | **0.05** |
| DATUM: | **m AHD** | SCREEN SHAPE FACTOR 'F' | **6.88** |
| CONTRACTOR | | WATER DIP (m below collar) | **1.50** |
| WELL TESTED BY: | **JBL** | STANDING WATER (m AHD) | **0.60** |
| SCREENED LITHOLOGY: | **Silty sand, clay and shale** | DATE | **30-May-23** |




| | Time lag 'T' | Hydraulic conductivity 'k' | |
|---|---|---|---|
| | mins | m/s | m/day |
| Curve 1 | 5.5 | 5.0E-07 | 4.34E-02 |
| Curve 2 | 66.1 | 4.2E-08 | 3.59E-03 |

From Hvorslev (1951) $k = \frac{A}{FT}$

where $A = \pi D_I^2/4$

$$F = \frac{2\pi L}{\ln\left(\frac{L}{D_o} + \sqrt{1 + \left(\frac{L}{D_o}\right)^2}\right)}$$

$$T = \frac{t_2 - t_1}{\ln(H_1/H_0) - \ln(H_2/H_0)}$$

$H_n$ = drawdown at time $t_n$

COMMENTS:

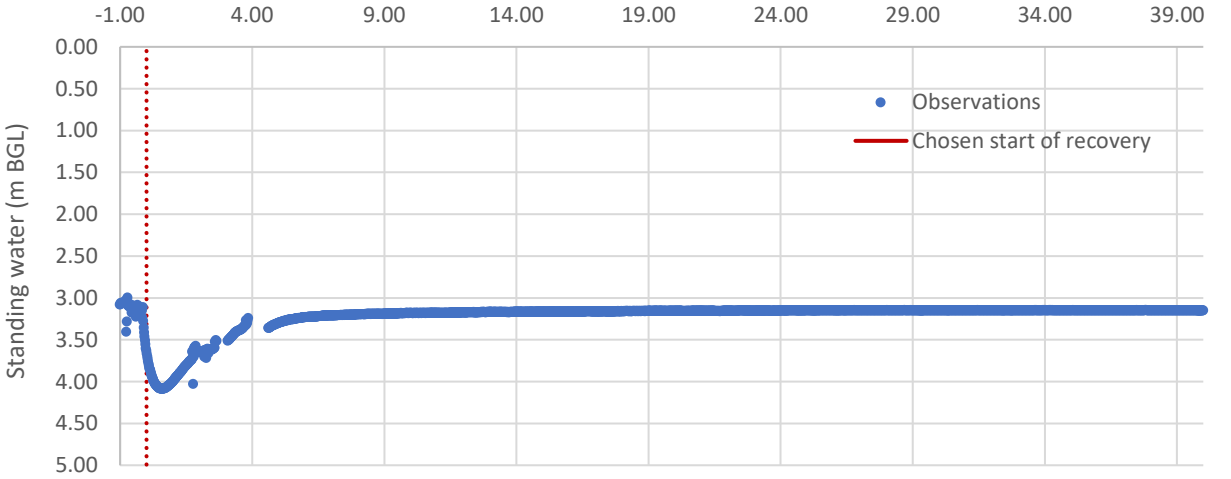
**Pells Sullivan Meynink**
Engineering Consultants
Rock - Soil - Water

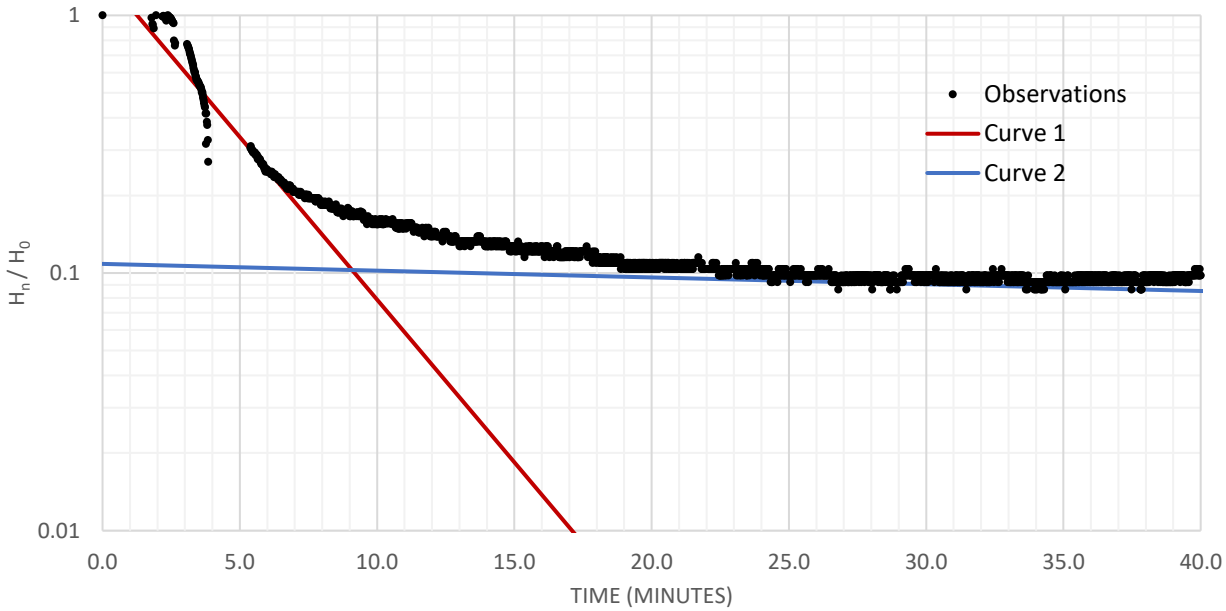
JOB no.: **PSM2808**

PROJECT: **1-3 Burrows Road**

# Slug Test

| | | | |
|---|---|---|---|
| HOLE NUMBER: | **BH03** | DEPTH OF HOLE (m): | **15.00** |
| BORE EASTING: | **331680.0** | SCREEN LENGTH 'L' (m): | **6.0** |
| BORE NORTHING: | **6245385.0** | INTERNAL DIAMETER '$D_I$' (m): | **0.04** |
| COLLAR RL(m): | **3.50** | EXTERNAL DIAMETER 'Do' (m): | **0.05** |
| DATUM: | **m AHD** | SCREEN SHAPE FACTOR 'F' | **6.88** |
| CONTRACTOR | | WATER DIP (m below collar) | **3.10** |
| WELL TESTED BY: | **JBL** | STANDING WATER (m AHD) | **0.40** |
| SCREENED LITHOLOGY: | **Clay and shale** | DATE | **30-May-23** |




| | Time lag 'T' | Hydraulic conductivity 'k' | |
|---|---|---|---|
| | mins | m/s | m/day |
| Curve 1 | 3.4 | 8.0E-07 | 6.90E-02 |
| Curve 2 | 165.1 | 1.7E-08 | 1.44E-03 |

From Hvorslev (1951) $k = \frac{A}{FT}$

where $A = \pi D_I^2/4$

$$F = \frac{2\pi L}{\ln\left(\frac{L}{D_o} + \sqrt{1 + \left(\frac{L}{D_o}\right)^2}\right)}$$

$$T = \frac{t_2 - t_1}{\ln(H_1/H_0) - \ln(H_2/H_0)}$$

$H_n$ = drawdown at time $t_n$

COMMENTS: