TECHNICAL MEMORANDUM

PROJECT NO.: WGA241087
DOCUMENT NO.: WGA241087-MM-HG-0009_B
DATE: 18 NOVEMBER 2025

TO	Expert Consenting Panel - Ashbourne
SUBJECT	Response to Submitters – Ashbourne Fast Track
AUTHOR	Clare Houlbrooke

1. INTRODUCTION

This memorandum presents information in response to submitters in terms of hydrogeology relating to the Ashbourne Development. The hydrogeological topics are separated into the following general aspects:

- Winter Groundwater Levels
- Development Effects on Groundwater Levels
- Updated Modelling of Wastewater Disposal
- Updated Modelling of Soakage Basins
- Roadside Soakage Drawdown Assessment
- Water Supply Potential

2. WINTER GROUNDWATER LEVELS

2.1 Introduction

Groundwater levels during winter were initially derived from geotechnical investigations in June 2024 and monitored levels during the period from December 2024 to March 2025. Given winter water levels were not monitored, WGA assumed a seasonal fluctuation in groundwater level-based fluctuations observed at other Hinuera Aquifer monitoring sites. In September 2025, further drilling was carried out on site to establish winter groundwater levels as detailed in Section 2.2.

The results of the further winter groundwater level investigations (Section 2.2) indicated that groundwater levels are already seasonally very close to the ground surface in the northern areas of the planned Retirement Village and Residential area. WGA has carried out additional modelling of the wastewater disposal and soakage basins (Sections 4 and 5). The results from these updated assessments imply that during winter Basins C and D will be ineffective for stormwater discharge via soakage and therefore adjusted engineering solutions will be required. Groundwater levels at Basin A were lower than expected in winter, which means this basin could potentially be used for additional soakage.

In summary, the updated groundwater levels and modelling indicated that design changes were needed for the stormwater management at the site. Planned site subsoil drainage and construction of the greenway will act to lower winter groundwater levels at the site.

2.2 Results of Winter Groundwater Level Investigations

2.2.1 Machine-drilled Boreholes

On 16 September 2025, WGA undertook the installation of four piezometers at the Ashbourne Development (Figure 3, Appendix A) site alongside CMW Geosciences and Brown Bros Drilling using a Geoprobe drill rig. Drill cores were obtained from the drilling and geologically logged by CMW for each piezometer location. A prepacked screen with a sand filter pack was then installed at a designated depth with a bentonite seal and grouted headworks. Construction details for each piezometer are provided in Table 1.

Table 1: Piezometer Construction Details

PIEZOMETER NAME	DRILLED DEPTH (m)	SCREEN TOP (m bgl)	SCREEN BASE (m bgl)	EASTING (NZTM)	NORTHING (NZTM)
25-P1	6	5.2	6.7	5810591	1842196
25-P2	6	4	5.5	5810035	1842623
25-P3	9	6.7	8.2	5809889	1843130
25-P4	6	1.8	3.3	5810458	1841952

2.2.2 Hand Auger Piezometers

Prior to the machine-drilled boreholes installed in September 2025, a number of hand-drilled piezometers were installed by CMW. Of these piezometers, all but one were either destroyed or the automated monitoring equipment failed in measuring groundwater levels. The surviving piezometer is numbered HA24-16D. Data from HA24-16D contains peaks during weather events that do not appear to represent actual groundwater level responses to these events. The construction of the piezometer is permitting surface water ingress into the anulus between the piezometer casing and the in-situ soil.

2.2.3 Site Groundwater Level Time Series

Groundwater level data from all five piezometers have been downloaded on 30 September and 13 October 2025. The automatic data has been corrected using on-site barometric pressure data and calibrated against manual groundwater level readings taken on both download occasions.

Time series data from the five piezometers are presented in Figure 1. The updated interpreted piezometric surface is presented in Appendix A. The piezometric surface is based on the winter levels from winter 2025 monitoring and other information from numerous investigations across the site in winter 2024 as shown in CMW (2025) Figure 9. Piezometers 25-P1, 25-P4 and HA24-16D are all located in areas with shallow winter groundwater levels and show a correlation in the responses to rainfall, disregarding the water level spikes in HA24-16D as discussed in Section 2.2.2. Based on these records, it is clear that groundwater levels toward the north of the site have risen from approximately 2.7 m below ground level (bgl) in autumn 2025 to 0.5 m bgl in winter, an increase of approximately 2.2 m. This is a greater seasonal increase than has been observed at other Hinuera Aquifer monitoring sites.

In comparison, the groundwater levels in 25-P3 near Basin A were deeper than expected and were still approximately 6 m bgl, even following winter recharge.

2.2.4 Interpretation of Groundwater Levels

In addition to the updated groundwater levels, CMW has updated their ground model for the area based on additional testing and investigations at the site (CMW 2025).

CMW (2025) states that the site is underlain by interbedded sands/silts/clays of the Hinuera Formation. Pakihi Supergroup/Peria Formation deposits, which are typically fine-grained near the upper unit boundary, underlie the Hinuera Formation soils (Figure 2). There are two surface exposures of the Pakihi Supergroup/Peria Formation identified by CMW on site. These exposures are along the western and eastern edges the site. In the middle of the site, the overlying Hinuera Formation is considered to effectively form a leaky hydrogeological basin (Appendix B).

During winter conditions, groundwater levels rise within the hydrogeological basin as the recharge exceeds the slow discharge from the basin, and the basin fills with rainfall recharge. Effectively, the basin is acting like a bathtub with rainfall recharge (inflow) exceeding the discharge (outflow, including leakage) during winter. Groundwater levels recede in the basin during summer, as groundwater dissipates through slow discharge with downward leakage through the aquitard layer and lateral flow toward the north. WGA considers the system to have groundwater outflow toward the north and inflow from the south.

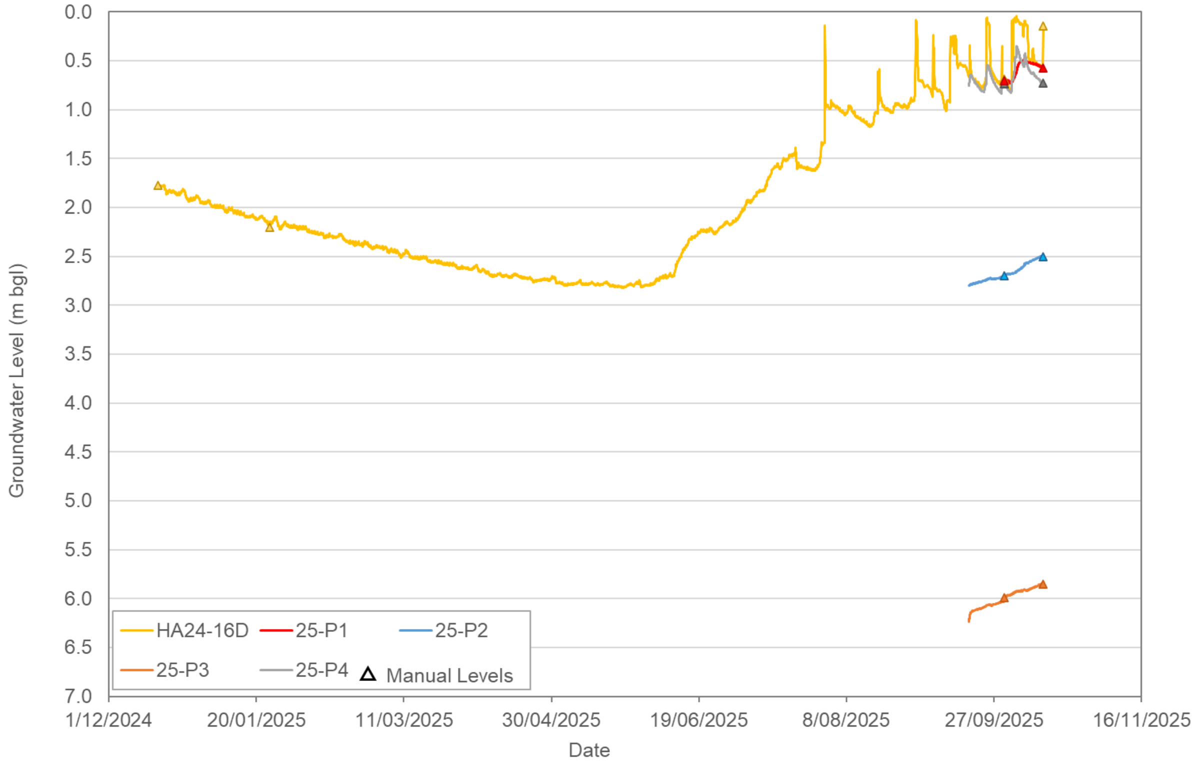

Figure 1: Time Series Groundwater Levels in Ashbourne Piezometers

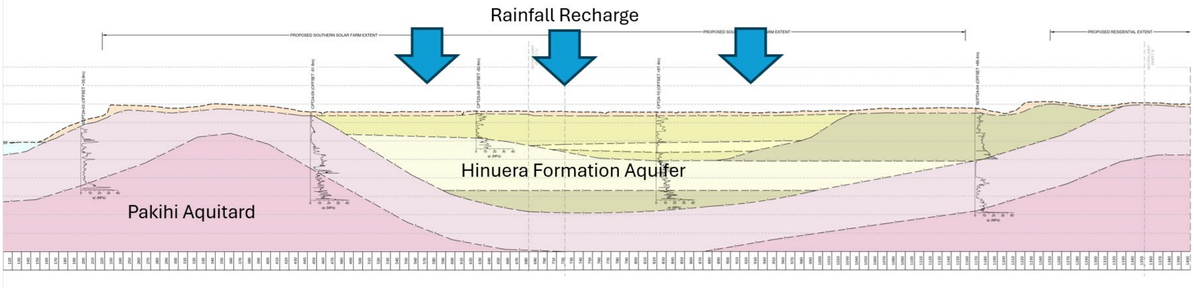

Figure 2: Groundwater Basin in Hinuera Formation Aquifer, formed by Underlying Low Permeability Silts and Clays (Pink Units), geology from CMW (2025).

Document Path: \\wga-fs01\projects\2024\241000 - 241999\241087 - Station Road Hydrogeo Support\Data\GIS\Figures\Doc0007-Ashbourne_Piezometers-Fig01-v2.pdf

WGA

Figure 3

Ashbourne Development

Ashbourne
Piezometers

3. DEVELOPMENT EFFECTS ON GROUNDWATER LEVELS

Groundwater recharge to the Hinuera Aquifer near Matamata has been modelled in the Nationwide Groundwater Recharge model as between 500 mm and 200 mm for rural land[1]. The recharge to the shallow Hinuera Aquifer at the site is considered to be currently toward the higher end of recharge rates, due to the relatively flat topography and current land use (dairy pasture).

Groundwater levels will be lowered through the use of subsoil drains, stormwater systems and greenway as modelled in Section 6. Additionally, the proposed development will result in partial sealing of the ground surface. WGA understands that the Retirement Village is proposed to have 46% impervious surfaces over approximately 20 ha, and the Residential development will have approximately 43% impervious surfaces over 42 ha. The development will involve significant recharge reduction through the installation of these impervious surfaces. This sealing will have the effect of generally lowering shallow groundwater levels due to reduced surface recharge. Other areas of the development will not have such large reductions in recharge (solar farm). However, the addition of the stormwater system will enable rainfall runoff to move to the proposed artificial wetlands rather than ponding and recharging the underlying shallow aquifer.

Wastewater disposal will add some recharge to the system. However, this artificial recharge at a rate of 5 mm per day over 2.4 ha is relatively small compared to annual rainfall recharge over the wider area.

WGA understands that soakage disposal of stormwater is now only proposed for periods when groundwater levels are lower and is no longer proposed in the Retirement Village or the northern catchment of the residential development.

In summary, the proposed development is considered to have an overall reduction in recharge that is expected to reduce winter groundwater levels under the site.

4. UPDATED MODELLING OF WASTEWATER DISPOSAL

4.1.1 Wastewater Modelling with Higher Groundwater Levels

The pathogen attenuation calculations for the treated wastewater discharge have been updated to reflect the new static water levels obtained on site and updated design of the disposal field. The new static water level has been taken from the piezometer 25-P4 at 0.52 m bgl. In terms of the wastewater attenuation modelling, this has led to a reduction of the vadose zone thickness from 1.3 m to 0.22 m. WGA understands that the design of the wastewater disposal field updated to raise the field by 0.6 m using local soils. For attenuation modelling, this has increased the soil zone thickness from 0.1 m to 0.7 m. No other factors have been altered.

The updated faecal coliform attenuation calculations (Table 2) indicate that coliform counts in the discharged treated wastewater become negligible shortly after the recharged water passes through the topsoil horizon. At a distance of 200 m from the discharge field, counts were calculated to be effectively zero (1.9×10^{-12} cfu/100 mL). For faecal coliform concentrations to exceed the New Zealand drinking water standard of 1 cfu/100 mL at a distance of 200 m from the disposal field, a source concentration in the order of 1×10^{14} cfu/100 mL would be required. This value is far in excess of faecal coliform counts expected in raw wastewater (Table 2).

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[1] https://rogierwesterhoff.users.earthengine.app/view/nzrainfallrecharge

The Production Bore 72_12812 drilled on site will be located near the disposal zone. Faecal coliform attenuation has been modelled vertically to the depth of the screen. The screen for the production bore is located 92.75 m below the top of the saturated zone. Over this distance, there are multiple clay aquitards; therefore, log removal rates are expected to potentially be significantly higher than the rate applied. To be conservative, an attenuation rate of 0.05 log/m, representative of fine sands, has been applied for the assessment of potential effects on the Production Bore 72_12812. Results for the assessment for Production Bore 72_12812 show less than minor effects on Table 2 (< 6.1 x 10^{-7} cfu/100 mL).

Table 2: Faecal Coliform Attenuation

ATTENUATION COMPONENT	ATTENUATION FACTOR	FAECAL COLIFORM COUNT CFU/100 mL
Raw wastewater	N/A	1 x 10^6 to 1 x 10^8
Wastewater treatment plant discharge	N/A	< 200
Topsoil seepage horizon	0.7 m at 5.48 log/m	< 0.03
Vadose zone	0.22 m at 0.84 log/m	< 0.02
Saturated zone	200 m at 0.05 log/m	< 1.9 x 10^{-12}
Saturated zone (vertical assessment for Production Bore 72_12812)	90 m at 0.05 log/m	< 6.1 x 10^{-7}

4.1.2 Virus Attenuation Modelling

WGA has assessed virus attenuation under the ESR guidance for wastewater virus attenuation (2010). The sediments found across the site and specifically below the proposed wastewater discharge field consist of pumiceous sand, silt and clay. The pumice sands are specifically identified in the lithological log for 25-P4 and the production bore lithological log (WGA 2025). The ESR (2010) guidance states that for pumice sands, “A separation distance of 20 m will provide an adequate log reduction” when assessing the required distance between a wastewater disposal system and a shallow bore. The specific reductions are not provided in the guidelines for pumice sands, given such high removal rates. As the separation distance between the soakage field and any nearby bore, including the production bore onsite (72_12812), is 50 m, WGA considers that the virus load would be sufficiently attenuated.

In addition, the water supply bore screen starts at 109 m below ground level, adding further distance between the disposal and the water supply.

5. UPDATED MODELLING OF SOAKAGE BASINS

5.1.1 Introduction

Based on the updated winter groundwater level data, WGA has re-assessed groundwater mounding under the three stormwater infiltration basins within the main development (Basins A, C and D). WGA understands that Basin B will be designed to drain into the Waitoa River via the greenway and, as such, will not retain water or cause mounding.

Mounding assessments documented in this memo have been performed using MOUNDSOLV software package, Version v3.0, developed by HydroSOLVE, Inc. MOUNDSOLV calculates the transient response of an unconfined groundwater table beneath a rectangular recharge source to a defined recharge event. The package applies a simulation methodology published by Zlotnik et al. (2017) for this purpose. The use of the MOUNDSOLV package is widely accepted by professional hydrogeologists for the assessment of groundwater mounding.

The infiltration rate applied to each model is the rate that results in the mounding reaching the stormwater basin spillway elevation (Appendix C).

Results for each basin are presented in Appendix C. The modelled scenario applied a transient model with a simulated continuous recharge period of three days and a 47-day recovery period to assess the effects of a large one-off storm event. Most values were kept consistent with the original assessment included in the application, and the highlighted cells in the tables presented in Appendix C have been updated with the new values.

The two basins located within the proposed retirement village were not reassessed as the updated groundwater levels caused the stormwater basin designs to be inundated. WGA understands that these stormwater basins have been redesigned and replaced with artificial wetlands by Maven.

5.1.2 Updated Infiltration Rates

With the updated winter groundwater levels, Basins C and D have half the allowable mounding depth as previously modelled and therefore a much lower modelled infiltration rate (Table 3). Note that the reported infiltration rates represent the maximum rate achievable in a three-day event before mounding reaches the top of the infiltration basin.

Table 3: Updated Parameters and Outputs of Groundwater Mounding Models

	BASIN A		BASIN C		BASIN D	
	June 2024 Ground Water Level	October 2025 Ground Water Level	June 2024 Ground Water Level	October 2025 Ground Water Level	June 2024 Ground Water Level	October 2025 Ground Water Level
Groundwater Level (m RL)	63	60.5	64	65	64	64.8
Allowable Mounding	3.5	6	2	1	2	1.2
Aquifer Saturated Thickness	11.05	8.55	15	16	15	15.8
Recharge Rate (m3/d)	1,246	2,145	454	227	928	555
Infiltration Rate (m/d)	0.29	0.49	0.15	Less than 0.1	0.15	Less than 0.1

6. ROADSIDE SOAKAGE DRAIN DRAWDOWN ASSESSMENT

6.1.1 Introduction

An array of roadside subsoil drainage devices have been proposed for the residential side of the Ashbourne development. Each device will penetrate 0.9 m to 1.2 m below the road level and be drained by a perforated pipe at the base of the device. Where groundwater is shallower than these levels, water will flow into these devices. WGA has assessed drawdown between two such devices across a typical lot size in order to quantify resulting groundwater levels.

6.1.2 Methodology

The groundwater drawdown resulting from the construction of the Greenway and the proposed drainage trenches along the roads in the residential area of the development has been evaluated using the Hooghoudt (1940) method. The method is based on calculating groundwater drawdown along a cross-section defined perpendicular to the alignment of the drainage system.

In applying this method, the steady state initial groundwater level, saturated aquifer thickness, hydraulic conductivity for the aquifer and distributed surface recharge rate are defined. Then the geometry of the single drain or paired drains is defined together with the expected groundwater drawdown at each drain. A length of drawdown influence (L_0), which is the distance from the drain to a point where no drawdown is occurring, is then calculated using the Hooghoudt equation. Finally, based on the cumulative surface recharge along the cross-section, the hydraulic gradient, groundwater drawdown, saturated aquifer thickness and aquifer transmissivity are calculated stepwise starting from the L_0 point and moving toward the drain. For an area between two parallel drains, where the drawdown curves could overlap, the drawdowns are not added together. Rather, the drawdown curve is calculated stepwise from each side, starting from the groundwater level at the drain and finishing at the midpoint between the drains.

6.1.3 Results

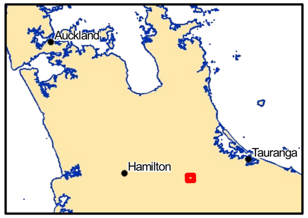
Groundwater drawdown has been modelled along five different cross-sections that are considered to be representative of the drawdown effects across the entire development (Figure 5). The drawdown calculated for Sections A, C, D and E have been based on an assumed single trench, with the drawdown extending out to L_0 on each side. Cross-section B is based on two parallel trenches, positioned on either side of the residential block, with the drawdowns calculated for both the area between the trenches and extending out to L_0 outside the block. In each case, a hydraulic conductivity of the Hinuera Formation is applied at 1.37×10^{-6} m/s, which is the median value from the soakage tests performed on Hinuera Formation sediments.

Section A (Figure 5). The northern road is planned to have drains approximately 2.3 m deep on either side. This layout can effectively be simulated as a single trench of this depth. The depth to groundwater is approximately 2 m below the design surface in this area, leading to a drawdown of approximately 0.3 m below peak winter levels. Although the calculated L_0 is 42 m from the road, the calculated drawdown drops to less than 0.1 m approximately 15 m from the road, on each side.

Section B (Figure 6). The simulated residential block is approximately 75 m in width between the road drains. These drains are installed to depths of 1 m below the design level and result in a groundwater drawdown at each drain of approximately 0.4 m. Although the calculated L_0 is 34 m from each drain, the calculated drawdown drops to less than 0.1 m approximately 17 m from the road verge, on each side. The drawdown induced by these drains does not reach the centre of the residential block. However, we note that sealing of the surface will result in a degree of drawdown independent of the drainage system, which has not been included in the drawdown calculation. Additionally, this simulated drawdown is consistent with most of the other planned residential blocks in the development.

Section C (Figure 7). At the eastern cross-section across the proposed greenway, the excavation is approximately 2 m deep. The groundwater level is approximately 1.1 m below the design level in this area, leading to a drawdown of approximately 0.9 m at the greenway. Although the calculated L_0 is 73 m from the Greenway, the calculated drawdown drops to less than 0.1 m approximately 48 m from the Greenway, on each side. As there are no existing structures or other infrastructure within this area, the drawdown effects of the Greenway in this area are considered to be less than minor.

Section D (Figure 8). At the middle cross-section across the proposed Greenway, the excavation is approximately 1.95 m deep. The groundwater table is approximately at surface during winter so the drawdown is approximately 1.95 m at the greenway in this area. Although the calculated L_0 is 74 m from the greenway, the calculated drawdown drops to less than 0.1 m approximately 54 m from the greenway, on each side. As there are no existing structures or other infrastructure within this area, the drawdown effects of the greenway in this area are considered to be less than minor.



LEGEND

Drawdown Cross Section

Depth to Groundwater From Design Surface

🟥	0
🟧	0.5
🟧	1.0
🟨	1.5
🟨	2.0
🟩	2.5
🟩	3.0
🟩	3.5
🟩	> 4

N

0 60 120 180 m

Scale 1:6 000 @A4

Coordinate System: NZGD 2000 New Zealand Transverse Mercator

WGA

Figure **4**

Ashbourne Development

Cross Section Locations and Depth to GW

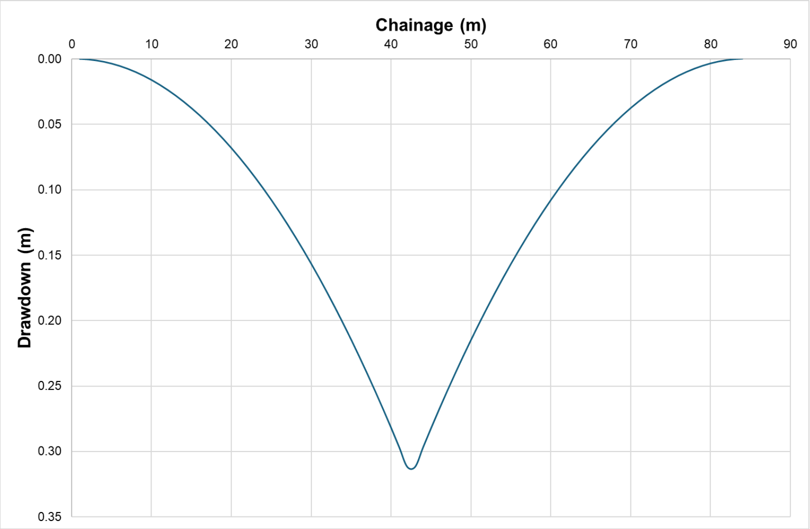


Figure 5: Groundwater Drawdown Along Section A

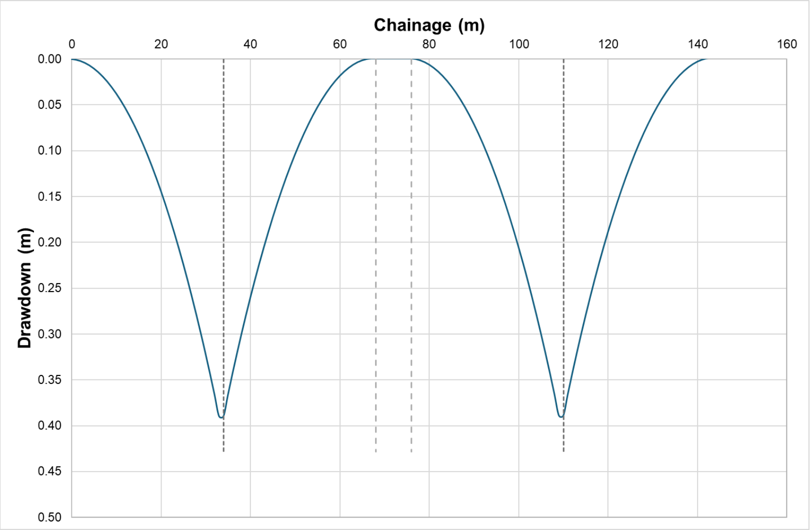


Figure 6: Groundwater Drawdown Along Section B

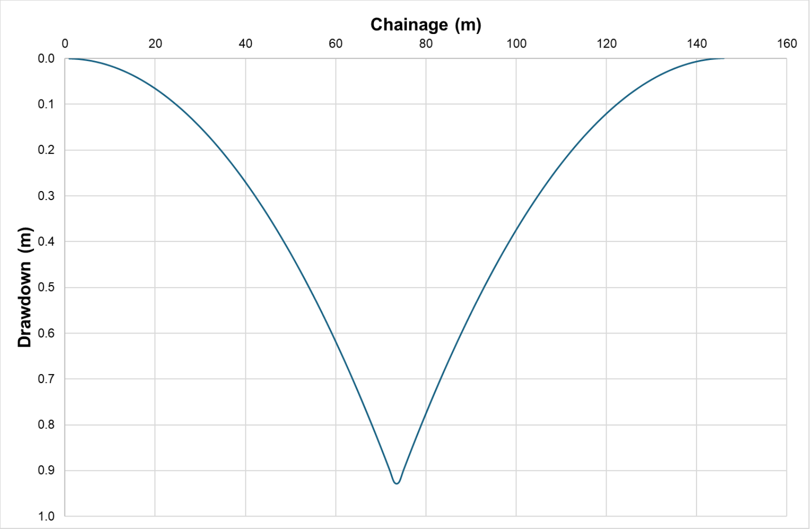


Figure 7: Groundwater Drawdown Along Section C

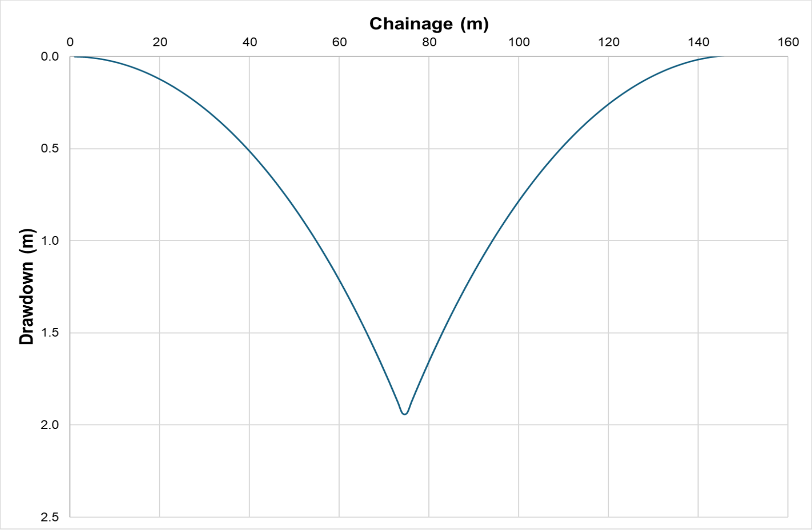


Figure 8: Groundwater Drawdown Along Section D

Section E (Figure 9). At the western cross-section across the proposed greenway, the excavation is approximately 3 m deep. The groundwater table is approximately 0.8 m below the design level during winter, so the drawdown is approximately 2.2 m at the greenway in this area. The hydraulic conductivity applied to this calculation of drawdown is 7.84 x 10^{-8} m/s, which is consistent with the behaviour of the Pakihi Supergroup/Peria Formation sediments. The calculated L_0 is 28 m from the Greenway, which is small compared to the other cross-sections across the greenway. This small L_0 is a consequence of the lower hydraulic conductivity of the Pakihi Supergroup/Peria Formation compared to the Hinuera Formation. The calculated drawdown drops to less than 0.1 m approximately 20 m from the greenway, on each side. As there are no existing structures or other infrastructure within this area, the drawdown effects of the greenway in this area are considered to be less than minor.

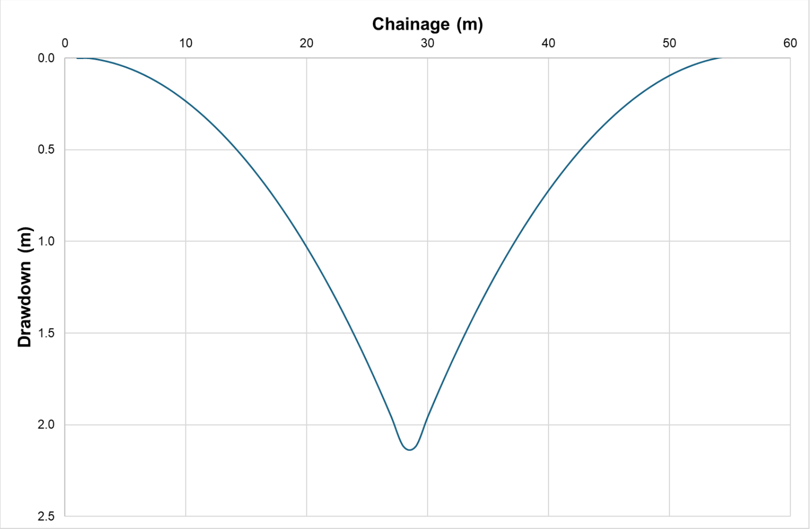
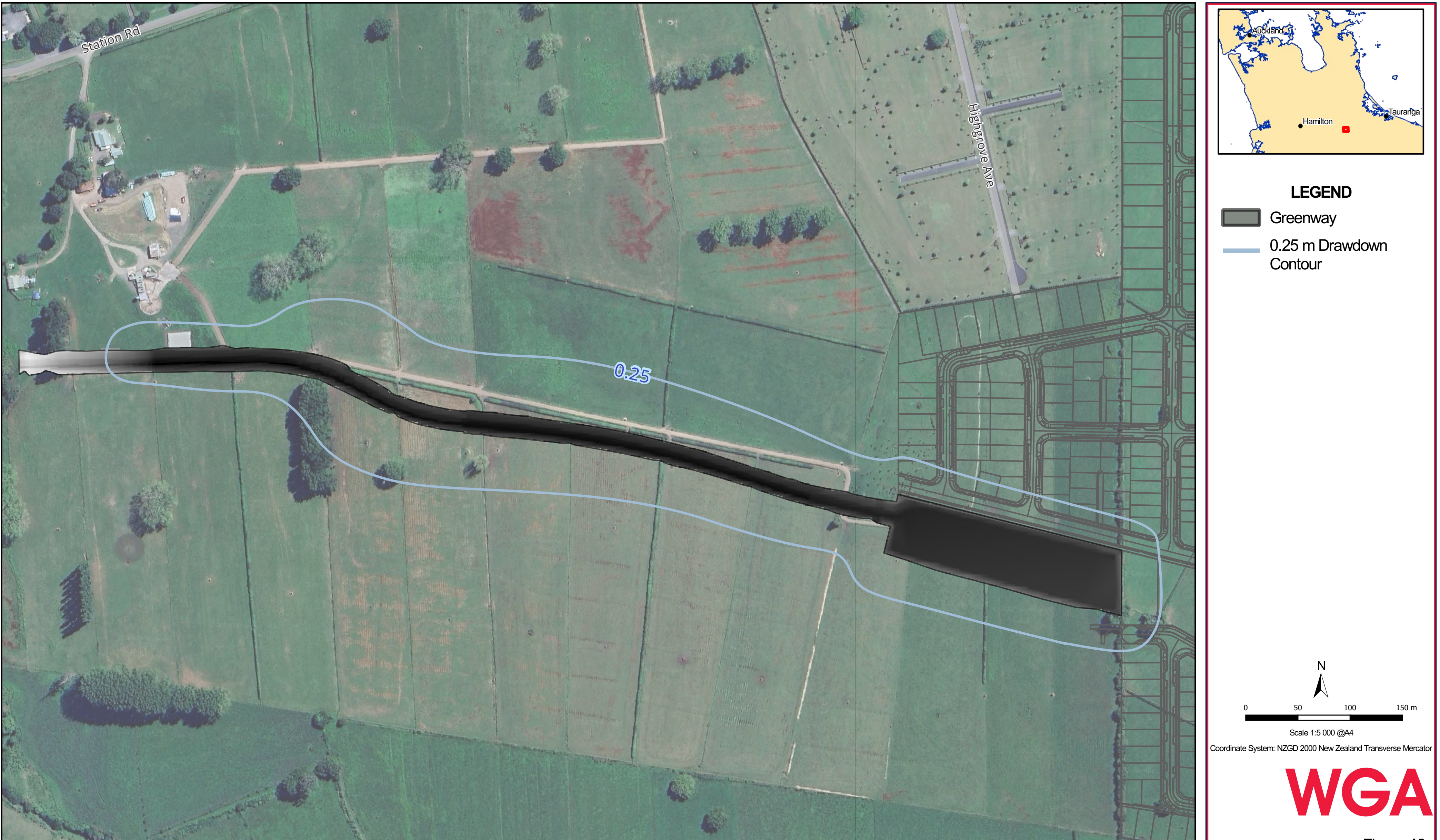


Figure 9: Groundwater Drawdown Along Section E

A map indicating the extent of calculated drawdown around the proposed Greenway (Figure 10) provides guidance on how the depth to groundwater and the change in lithological unit from Hinuera Formation to Pakihi Supergroup/Peria Formation influences the drawdown area. A drawdown isoline of 0.25 m has been used in Figure 10 to indicate the area of potential effects. A drawdown of less than 0.25 m is highly unlikely to lead to an effect on any existing infrastructure due to ground settlement. It is also important to note that the indicated drawdown is from a winter high static water level.



WGA

Figure **10**

Ashbourne Development

Greenway Drawdown

7. WATER SUPPLY POTENTIAL

Following flow and quality testing of the RV Production Bore and the associated aquifer, WGA considers that a larger diameter bore may be able to provide a significant supply to the surrounding area and contribute to the Matamata town water supply. The target aquifer is confined by several thick and reasonably low permeability confining layers. As a result, the aquifer is well protected from surface activities. In addition, a bore targeting the aforementioned aquifer will have a minimal interference effect on nearby shallow bores due to these confining layers.

Given the estimated transmissivity and assumed storativity of the aquifer, WGA has estimated potential maximum production volumes based on a range of parameters. These estimates are preliminary only and further testing would be required for any larger diameter production bore.

WGA used a range of values for transmissivity (70 – 80 m^2/day) and storativity (0.0001 – 0.00001) based on the Production Bore test results. Based on the aquifer depth (109 m bgl), a maximum allowable drawdown was defined as 74.5 m. This value accounts for 70% well efficiency, a static water level of 6.8 m below ground, 2 m length for a pump equipment and 2 m for seasonal fluctuations in water level. The drawdown has been calculated for one year of continuous pumping. Using the aforementioned parameters an abstraction rate of 2,600 m^3/day is potentially feasible from a larger diameter bore. WGA notes that the estimate is based on preliminary data and a number of assumptions. Following the installation of any larger bore a step rate test and multi-day continuous pumping test is recommended to give a fuller understanding of the production capacity of the aquifer.

Yours Sincerely

Clare Houlbrooke

Clare Houlbrooke
Principal Hydrogeologist
WALLBRIDGE GILBERT AZTEC

REFERENCES

CMW 2025. Geotechnical Investigation Report. Ashbourne Development Station Road, Matamata. HAM2023-0124AI Rev 2. Report dated 17 October 2025.

ESR 2010. Guidelines for separation distances based on virus transport between on-site domestic wastewater systems and wells. ESR Client Report No. CSC1001. ISBN 978-1-877166-08-2 (PDF).

Hooghoudt, S. B. 1940. General consideration of the problem of field drainage by parallel drains, ditches, watercourses, and channels. Bodemkundig Instituut, Groningen, Netherlands.

APPENDIX A UPDATED PIEZOMETRIC SURFACE
APPENDIX B GEOLOGICAL CROSS-SECTION
APPENDIX C STORMWATER BASIN GROUNDWATER MOUNDING ASSESSMENT

APPENDIX A

LITHOLOGICAL LOGS AND UPDATED PIEZOMETRIC SURFACE

BOREHOLE LOG - 25-P1

Client: Maven Associates Ltd
Project: Station Road
Site Location: Station Road, Matamata
Project No.: HAM2023-0124
Date: 16/09/2025
Borehole Location: Refer to Site Plan   Logged by: LA   Checked by: BM   Scale: 1:25   Sheet 1 of 2

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Position: 486932.7mE; 695205.7mN   Projection: Mt Eden 2000
Datum: Moturiki 1953   Survey Source: Hand Held GPS

Well	Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description Soil: Soil symbol; soil type; colour; structure; bedding; plasticity; sensitivity; additional comments. (origin/geological unit) Rock: Colour; fabric; rock name; additional comments. (origin/geological unit)	Moisture Condition	Consistency/ Relative Density	Recovery	Drilling Method/ Support	Dynamic Cone Penetrometer (Blows/100mm) 5 10 15	Structure & Other Observations Discontinuities: Depth; Defect Number; Defect Type; Dip; Defect Shape; Roughness; Aperture; Infill; Seepage; Spacing; Block Size; Block Shape; Remarks
							OL: Organic SILT: dark brown. No plasticity. (Topsoil)						
	▼				1		CH: CLAY: light brownish grey mottled orange brown. Moderately to severely iron stained. High plasticity. (Hinuera Formation)	M		80			
							SW: Fine to coarse lithic SAND: light brownish grey mottled orange brown. Subrounded, well graded. (Hinuera Formation)						
					2		SP: Silty fine lithic SAND: Light grey. Poorly graded. (Hinuera Formation)						
							ML: Fine lithic sandy SILT: grey. Low plasticity. (Hinuera Formation)			87			
					3		ML: SILT: grey. Low platsicity. (Hinuera Formation)	S			SNC		
							... at 3.25m, becoming grey mottled dark brown.			83			
					4		*... at 3.92m, containing minor fine pumiceous sand.*						
							SW: Fine to coarse lithic SAND: with some fine to medium pumiceous gravel. Light grey. Well graded, subrounded. (Hinuera Formation)						
							ML: Clayey SILT: grey. Low plasticity. (Hinuera Formation)						
					5		*... at 5.01m, becoming grey mottled dark brown.*						

Termination Reason: Target Depth Reached
Shear Vane No: -   DCP No: -

Remarks: Groundwater encountered at 1.05m.

This report is based on the attached field description for soil and rock, CMW Geosciences - Field Logging Guide, Revision 3 - April 2018.

BOREHOLE LOG - 25-P1

Client: Maven Associates Ltd
Project: Station Road
Site Location: Station Road, Matamata
Project No.: HAM2023-0124
Date: 16/09/2025
Borehole Location: Refer to Site Plan Logged by: LA Checked by: BM Scale: 1:25 Sheet 2 of 2

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Position: 486932.7mE; 695205.7mN Projection: Mt Eden 2000
Datum: Moturiki 1953 Survey Source: Hand Held GPS

Well	Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description Soil: Soil symbol; soil type; colour; structure; bedding; plasticity; sensitivity; additional comments. (origin/geological unit) Rock: Colour; fabric; rock name; additional comments. (origin/geological unit)	Moisture Condition	Consistency/ Relative Density	Recovery	Drilling Method/ Support	Dynamic Cone Penetrometer (Blows/100mm) 5 10 15	Structure & Other Observations Discontinuities: Depth; Defect Number; Defect Type; Dip; Defect Shape; Roughness; Aperture; Infill; Seepage; Spacing; Block Size; Block Shape; Remarks
					6		SW: Fine to coarse lithic SAND: with some fine pumiceous gravel. Dark grey. Well graded, subrounded. (Hinuera Formation) *... at 5.60m, becoming light grey.*			95			
Ⓦ							ML: Clayey SILT: dark grey. Low plasticity. (Hinuera Formation)			86			
					7		Borehole terminated at 7.0 m						
					8								
					9								
					10								

Termination Reason: Target Depth Reached
Shear Vane No: - DCP No: -
Remarks: Groundwater encountered at 1.05m.

This report is based on the attached field description for soil and rock, CMW Geosciences - Field Logging Guide, Revision 3 - April 2018.

BOREHOLE LOG - 25-P2

Client: Maven Associates Ltd
Project: Station Road
Site Location: Station Road, Matamata
Project No.: HAM2023-0124
Date: 16/09/2025
Borehole Location: Refer to Site Plan Logged by: LA Checked by: BM Scale: 1:25 Sheet 1 of 2

Great People | Practical Solutions

Position: 487381.7mE; 694646.1mN Projection: Mt Eden 2000
Datum: Moturiki 1953 Survey Source: Hand Held GPS

Well	Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description Soil: Soil symbol; soil type; colour; structure; bedding; plasticity; sensitivity; additional comments. (origin/geological unit) Rock: Colour; fabric; rock name; additional comments. (origin/geological unit)	Moisture Condition	Consistency/ Relative Density	Recovery	Drilling Method/ Support	Dynamic Cone Penetrometer (Blows/100mm) 5 10 15	Structure & Other Observations Discontinuities: Depth; Defect Number; Defect Type; Dip; Defect Shape; Roughness; Aperture; Infill; Seepage; Spacing; Block Size; Block Shape; Remarks
							OL: Organic SILT: dark brown. No plasticity. (Topsoil)	M		69	SNC		
							ML: SILT: with some fine lithic sand. Light orange brown. Low plasticity. (Hinuera Formation)						
					1		*... at 1.05m, becoming some fine to coarse lithic sand.*						
							SW: Fine to coarse lithic SAND: with minor fine lithic gravel and trace fine pumiceous gravel. Light greyish brown. Well graded, subrounded. (Hinuera Formation)			73			
					2		*... from 1.91m to 2.24m, becoming minor fine to medium lithic gravel and fine pumiceous gravel.*						
							... from 2.28m to 2.36m, becoming interbedded with some silt; orange brown.						
							... from 2.45m to 2.74m, bands of moderate iron staining.						
					3					69			
	▼							S					
							... from 3.88m to 3.90m, containing some coarse pumiceous gravel.						
					4		*... at 3.96m, becoming dark grey and containing some fine to coarse pumiceous sand.*						
					5								

Termination Reason: Target Depth Reached
Shear Vane No: - DCP No: -

Remarks: Groundwater encountered at 3.47m.

This report is based on the attached field description for soil and rock, CMW Geosciences - Field Logging Guide, Revision 3 - April 2018.

BOREHOLE LOG - 25-P2

Client: Maven Associates Ltd
Project: Station Road
Site Location: Station Road, Matamata
Project No.: HAM2023-0124
Date: 16/09/2025

CMW Geosciences
Great People | Practical Solutions

Borehole Location: Refer to Site Plan Logged by: LA Checked by: BM Scale: 1:25 Sheet 2 of 2

Position: 487381.7mE; 694646.1mN Projection: Mt Eden 2000
Datum: Moturiki 1953 Survey Source: Hand Held GPS

Well	Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description Soil: Soil symbol; soil type; colour; structure; bedding; plasticity; sensitivity; additional comments. (origin/geological unit) Rock: Colour; fabric; rock name; additional comments. (origin/geological unit)	Moisture Condition	Consistency/ Relative Density	Recovery	Drilling Method/ Support	Dynamic Cone Penetrometer (Blows/100mm) 5 10 15	Structure & Other Observations Discontinuities: Depth; Defect Number; Defect Type; Dip; Defect Shape; Roughness; Aperture; Infill; Seepage; Spacing; Block Size; Block Shape; Remarks
Ⓦ										77			
					6		Borehole terminated at 6.0 m						
					7								
					8								
					9								
					10								

Termination Reason: Target Depth Reached
Shear Vane No: - DCP No: -
Remarks: Groundwater encountered at 3.47m.

This report is based on the attached field description for soil and rock, CMW Geosciences - Field Logging Guide, Revision 3 - April 2018.

BOREHOLE LOG - 25-P3

Client: Maven Associates Ltd
Project: Station Road
Site Location: Station Road, Matamata
Project No.: HAM2023-0124
Date: 16/09/2025
Borehole Location: Refer to Site Plan
Logged by: LA
Checked by: BM
Scale: 1:25
Sheet 1 of 2

CMW Geosciences
Great People | Practical Solutions

Position: 487884.2mE; 694515.4mN
Projection: Mt Eden 2000
Datum: Moturiki 1953
Survey Source: Hand Held GPS

Column headings: Well | Groundwater | Samples & Insitu Tests (Depth; Type & Results) | RL (m) | Depth (m) | Graphic Log | Material Description (Soil: Soil symbol; soil type; colour; structure; bedding; plasticity; sensitivity; additional comments. (origin/geological unit) Rock: Colour; fabric; rock name; additional comments. (origin/geological unit)) | Moisture Condition | Consistency/ Relative Density | Recovery | Drilling Method/ Support | Dynamic Cone Penetrometer (Blows/100mm) 5 10 15 | Structure & Other Observations (Discontinuities: Depth; Defect Number; Defect Type; Dip; Defect Shape; Roughness; Aperture; Infill; Seepage; Spacing; Block Size; Block Shape; Remarks)

Material Description	Moisture Condition
OL: Organic SILT: dark brown. No plasticity. (Topsoil)	M
ML: SILT: light orange brown. Low plasticity. (Hinuera Formation)	M
CH: CLAY: light brownish grey. High plasticity. (Hinuera Formation)	M
ML: Fine sandy SILT: with minor medium to coarse sand. Light brownish grey. Low plasticity. (Hinuera Formation)	S
ML: SILT: with some fine sand. Light brownish grey. Low plasticity. (Hinuera Formation)	S
SP: Silty fine lithic SAND: light brownish grey mottled orange brown. Poorly graded. (Hinuera Formation) ... at 3.20m, containing minor coarse pumiceous gravel.	M
ML: SILT: light brownish grey. Low plasticity. (Hinuera Formation) ... from 3.96m to 3.99m, lens of silty fine sand; dark grey.	S
SW: Fine to coarse lithic SAND: with minor medium to coarse pumiceous gravel and trace medium pumiceous sand. Light brownish grey mottled orange brown. Well graded, subrounded. (Hinuera Formation)	M
SP: Silty fine lithic SAND: light brownish grey. Poorly graded. (Hinuera Formation)	M
SP: Fine lithic SAND: with trace silt. Light grey mottled orange brown. Poorly graded. (Hinuera Formation) ... at 4.87m, becoming silty fine sand.	M

Groundwater: Perched (about 2.1 m); Perched (about 3.7 m)

Recovery: 95; 83; 80

Drilling Method/ Support: SNC

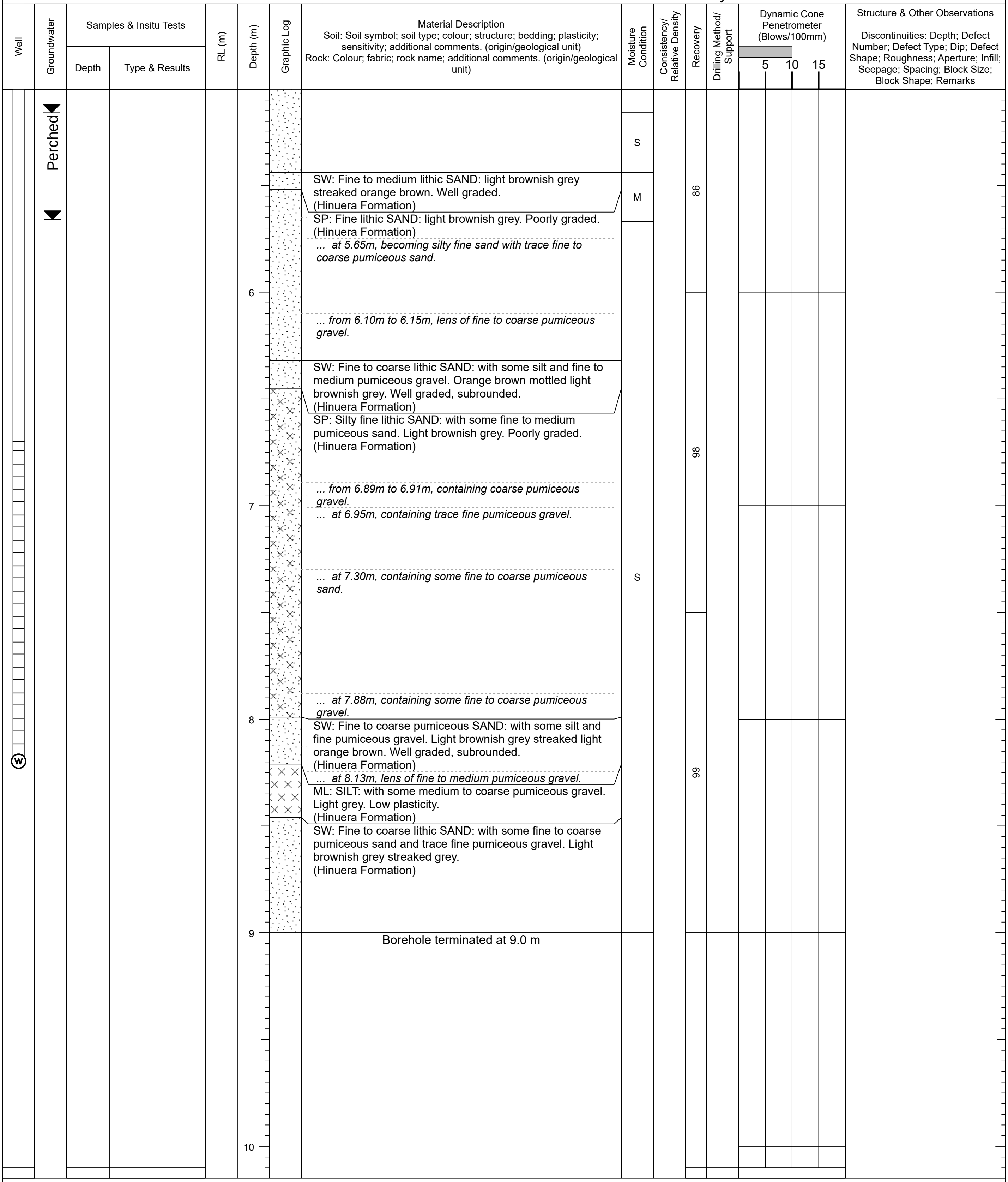
Termination Reason: Target Depth Reached
Shear Vane No: -
DCP No: -

Remarks: Perched groundwater encountered in discrete layers between 2.11m to 2.63m, 3.73m to 4.05m, 5.16m to 5.44m and regional groundwater encountered at 5.67m.

This report is based on the attached field description for soil and rock, CMW Geosciences - Field Logging Guide, Revision 3 - April 2018.

BOREHOLE LOG - 25-P3

Client: Maven Associates Ltd
Project: Station Road
Site Location: Station Road, Matamata
Project No.: HAM2023-0124
Date: 16/09/2025
Borehole Location: Refer to Site Plan Logged by: LA Checked by: BM Scale: 1:25 Sheet 2 of 2
Position: 487884.2mE; 694515.4mN Projection: Mt Eden 2000
Datum: Moturiki 1953 Survey Source: Hand Held GPS



SW: Fine to medium lithic SAND: light brownish grey streaked orange brown. Well graded.
(Hinuera Formation)

SP: Fine lithic SAND: light brownish grey. Poorly graded.
(Hinuera Formation)
... at 5.65m, becoming silty fine sand with trace fine to coarse pumiceous sand.
... from 6.10m to 6.15m, lens of fine to coarse pumiceous gravel.

SW: Fine to coarse lithic SAND: with some silt and fine to medium pumiceous gravel. Orange brown mottled light brownish grey. Well graded, subrounded.
(Hinuera Formation)

SP: Silty fine lithic SAND: with some fine to medium pumiceous sand. Light brownish grey. Poorly graded.
(Hinuera Formation)
... from 6.89m to 6.91m, containing coarse pumiceous gravel.
... at 6.95m, containing trace fine pumiceous gravel.
... at 7.30m, containing some fine to coarse pumiceous sand.
... at 7.88m, containing some fine to coarse pumiceous gravel.

SW: Fine to coarse pumiceous SAND: with some silt and fine pumiceous gravel. Light brownish grey streaked light orange brown. Well graded, subrounded.
(Hinuera Formation)
... at 8.13m, lens of fine to medium pumiceous gravel.

ML: SILT: with some medium to coarse pumiceous gravel. Light grey. Low plasticity.
(Hinuera Formation)

SW: Fine to coarse lithic SAND: with some fine to coarse pumiceous sand and trace fine pumiceous gravel. Light brownish grey streaked grey.
(Hinuera Formation)

Borehole terminated at 9.0 m

Termination Reason: Target Depth Reached
Shear Vane No: - DCP No: -
Remarks: Perched groundwater encountered in discrete layers between 2.11m to 2.63m, 3.73m to 4.05m, 5.16m to 5.44m and regional groundwater encountered at 5.67m.

This report is based on the attached field description for soil and rock, CMW Geosciences - Field Logging Guide, Revision 3 - April 2018.

BOREHOLE LOG - 25-P4

Client: Maven Associates Ltd
Project: Station Road
Site Location: Station Road, Matamata
Project No.: HAM2023-0124
Date: 16/09/2025
Borehole Location: Refer to Site Plan   Logged by: LA   Checked by: BM   Scale: 1:25   Sheet 1 of 2

CMW Geosciences
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Position: 486691.3mE; 695070.8mN   Projection: Mt Eden 2000
Datum: Moturiki 1953   Survey Source: Hand Held GPS

Well	Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description Soil: Soil symbol; soil type; colour; structure; bedding; plasticity; sensitivity; additional comments. (origin/geological unit) Rock: Colour; fabric; rock name; additional comments. (origin/geological unit)	Moisture Condition	Consistency/ Relative Density	Recovery	Drilling Method/ Support	Dynamic Cone Penetrometer (Blows/100mm) 5 10 15	Structure & Other Observations Discontinuities: Depth; Defect Number; Defect Type; Dip; Defect Shape; Roughness; Aperture; Infill; Seepage; Spacing; Block Size; Block Shape; Remarks
							OL: Organic SILT: dark brown. No plasticity. (Topsoil)	M		73			
							ML: SILT: with some clay. Orange brown. Low plasticity. (Hinuera Formation)						
	Perched				1								
							SW: Fine to coarse lithic SAND: with some minor silt. Light brownish grey. Well graded, subrounded. (Hinuera Formation) *... at 1.27m, no longer containing some silt and becoming moderately iron stained.*	S		78			
					2								
							... at 2.25m, containing minor fine lithic gravel.						
							... at 2.53m, containing some silt.				SNC		
							ML: Fine lithic sandy SILT: light brownish grey. Low plasticity. (Hinuera Formation)						
					3					91			
W							ML: SILT: light brownish grey mottled orange brown. Low plasticity. (Hinuera Formation)						
	Perched						*... at 3.53m, becoming dark brown mottled brownish grey.*	M					
							SW: Fine lithic SAND: with some fine to coarse pumiceous sand. Dark grey. Well graded, subrounded. (Hinuera Formation)	S					
					4		*... at 4.00m, no longer containing pumiceous sand.*						
							ML: Fine lithic sandy SILT: dark grey. Low plasticity. (Hinuera Formation)						
							... from 4.51m to 4.62m, containing medium pumiceous sand.						
					5		ML: Clayey SILT: dark grey. Low plasticity. (Hinuera Formation)						

Termination Reason: Target Depth Reached
Shear Vane No: -   DCP No: -

Remarks: Perched groundwater encountered at 1.22m to 3.53m, 3.70m to 5.03m and 5.65m to 5.85m.

This report is based on the attached field description for soil and rock, CMW Geosciences - Field Logging Guide, Revision 3 - April 2018.

BOREHOLE LOG - 25-P4

Client: Maven Associates Ltd
Project: Station Road
Site Location: Station Road, Matamata
Project No.: HAM2023-0124
Date: 16/09/2025
Borehole Location: Refer to Site Plan Logged by: LA Checked by: BM Scale: 1:25 Sheet 2 of 2

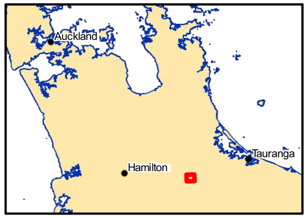
Position: 486691.3mE; 695070.8mN Projection: Mt Eden 2000
Datum: Moturiki 1953 Survey Source: Hand Held GPS

Well	Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil: Soil symbol; soil type; colour; structure; bedding; plasticity; sensitivity; additional comments. (origin/geological unit) Rock: Colour; fabric; rock name; additional comments. (origin/geological unit)	Moisture Condition	Consistency/ Relative Density	Recovery	Drilling Method/ Support	Dynamic Cone Penetrometer (Blows/100mm) 5 10 15	Structure & Other Observations Discontinuities: Depth; Defect Number; Defect Type; Dip; Defect Shape; Roughness; Aperture; Infill; Seepage; Spacing; Block Size; Block Shape; Remarks
		Depth	Type & Results										
	Perched							M		99			
							ML: SILT: with trace fine to coarse sand. Light brownish grey. Low plasticity. (Hinuera Formation)	S					
							CH: Silty CLAY: dark grey. High plasticity. (Hinuera Formation)	M					
					6		Borehole terminated at 6.0 m						
					7								
					8								
					9								
					10								

Termination Reason: Target Depth Reached
Shear Vane No: - DCP No: -

Remarks: Perched groundwater encountered at 1.22m to 3.53m, 3.70m to 5.03m and 5.65m to 5.85m.

This report is based on the attached field description for soil and rock, CMW Geosciences - Field Logging Guide, Revision 3 - April 2018.



LEGEND

▲	Piezometer (GWL in m RL)
—	Piezometric Surface (m RL)
▭	Wastewater Disposal Site

N

0 90 180 270 m

Scale 1:9 000 @A4

Coordinate System: NZGD 2000 New Zealand Transverse Mercator

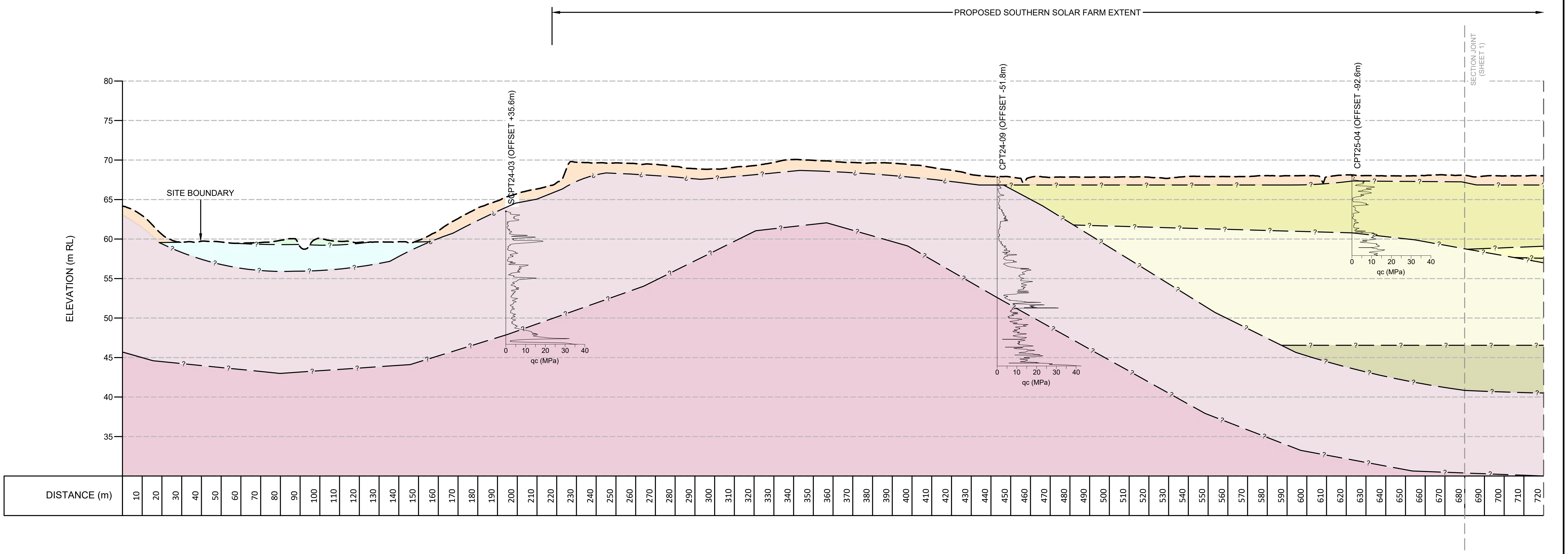
WGA

Figure **A1**

Ashbourne Development

Piezometric Surface

APPENDIX B
GEOLOGICAL CROSS-SECTION



SECTION A-A'

SCALE- H:1000 V:250

LEGEND:

— — — EXISTING GROUND PROFILE

—?— — INFERRED GEOLOGY BOUNDARY

▭ SILT/CLAY/SAND (UNCONTROLLED FILL)

▭ LOOSE TO MEDIUM DENSE INTERBEDDED SILT/SAND (RECENT ALLUVIUM)

▭ STIFF SILT/CLAY (RECENT DEPOSITS)

▭ MEDIUM DENSE SAND (HINUERA FORMATION)

▭ STIFF TO VERY STIFF CLAY/SILT (HINUERA FORMATION)

▭ INTERBEDDED LOOSE TO MEDIUM DENSE SAND/STIFF SILT (HINUERA FORMATION)

▭ MEDIUM DENSE TO DENSE SAND (HINUERA FORMATION)

▭ STIFF TO VERY STIFF CLAY/SILT (PAKAHI SUPERGROUP/PERIA FORMATION)

▭ VERY STIFF TO HARD CLAY/SILT WITH SOME SAND (PAKAHI SUPERGROUP/PERIA FORMATION)

NOTES:

1. EXISTING GROUND PROFILE CREATED USING LIDAR CONTOURS OBTAINED FROM LINZ DATA SERVICE.
2. VERTICAL DATUM IN TERMS OF NZVD2016.
3. TEST LOCATIONS ARE INDICATIVE ONLY.
4. PROPOSED SUBDIVISION BOUNDARIES ARE INDICATIVE ONLY.

1:2000 0 20 40 60 80 100 m

PRINT IN COLOUR

CMW Geosciences
Great People | Practical Solutions

CLIENT: MAVEN ASSOCIATES LTD

PROJECT: ASHBOURNE DEVELOPMENT MATAMATA

TITLE: CROSS SECTION A-A' (SHEET 1 OF 3)

DRAWN: HV

CHECKED: BM

REVISION: 0

DATE: 16/10/2025

PROJECT: HAM2023-0124

DRAWING: 11

SCALE: 1:2000

SHEET: A3 L

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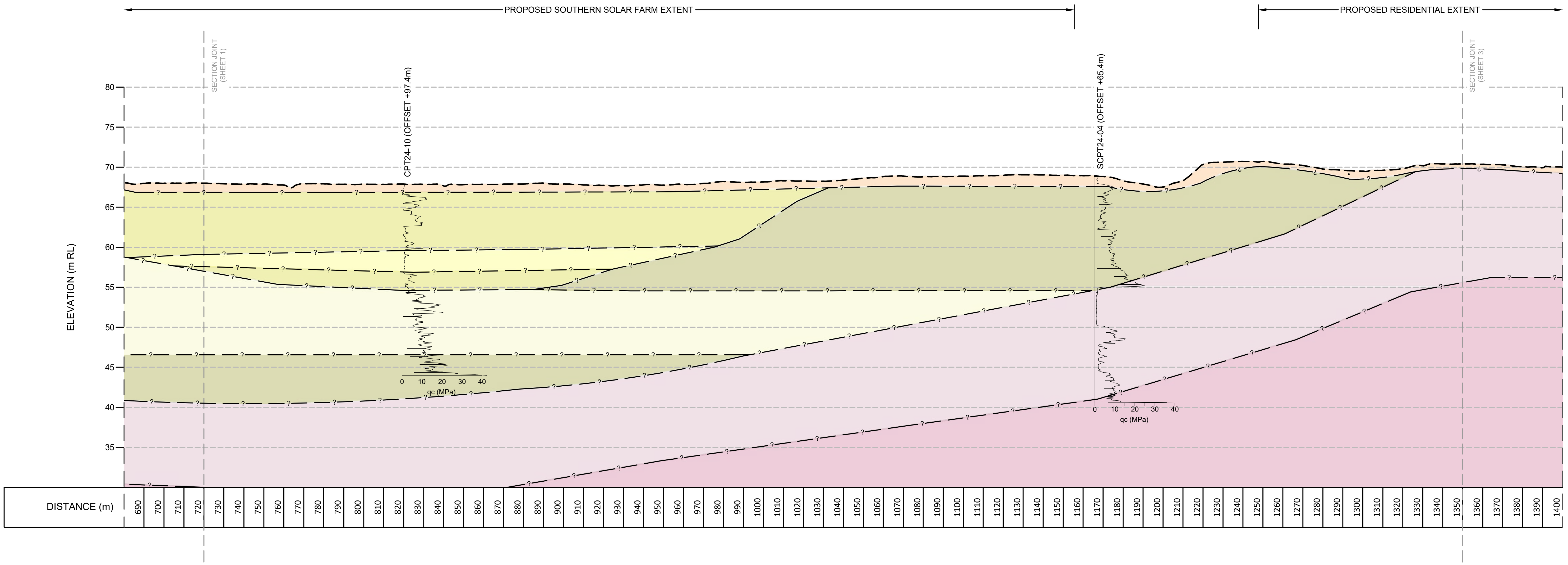

SECTION A-A'

SCALE- H:1000 V:250

LEGEND:

— — — EXISTING GROUND PROFILE

—?— — INFERRED GEOLOGY BOUNDARY

🟩 SILT/CLAY/SAND (UNCONTROLLED FILL)

🟦 LOOSE TO MEDIUM DENSE INTERBEDDED SILT/SAND (RECENT ALLUVIUM)

🟧 STIFF SILT/CLAY (RECENT DEPOSITS)

🟨 MEDIUM DENSE SAND (HINUERA FORMATION)

🟨 STIFF TO VERY STIFF CLAY/SILT (HINUERA FORMATION)

🟨 INTERBEDDED LOOSE TO MEDIUM DENSE SAND/STIFF SILT (HINUERA FORMATION)

🟫 MEDIUM DENSE TO DENSE SAND (HINUERA FORMATION)

🟪 STIFF TO VERY STIFF CLAY/SILT (PAKAHI SUPERGROUP/PERIA FORMATION)

🟥 VERY STIFF TO HARD CLAY/SILT WITH SOME SAND (PAKAHI SUPERGROUP/PERIA FORMATION)

NOTES:

1. EXISTING GROUND PROFILE CREATED USING LIDAR CONTOURS OBTAINED FROM LINZ DATA SERVICE.
2. VERTICAL DATUM IN TERMS OF NZVD2016.
3. TEST LOCATIONS ARE INDICATIVE ONLY.
4. PROPOSED SUBDIVISION BOUNDARIES ARE INDICATIVE ONLY.

0 20 40 60 80 100 m

1:2000

PRINT IN COLOUR

CMW Geosciences
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CLIENT: MAVEN ASSOCIATES LTD

PROJECT: ASHBOURNE DEVELOPMENT MATAMATA

TITLE: CROSS SECTION A-A' (SHEET 2 OF 3)

DRAWN: HV

CHECKED: BM

REVISION: 0

DATE: 16/10/2025

PROJECT: HAM2023-0124

DRAWING: 12

SCALE: 1:2000

SHEET: A3 L

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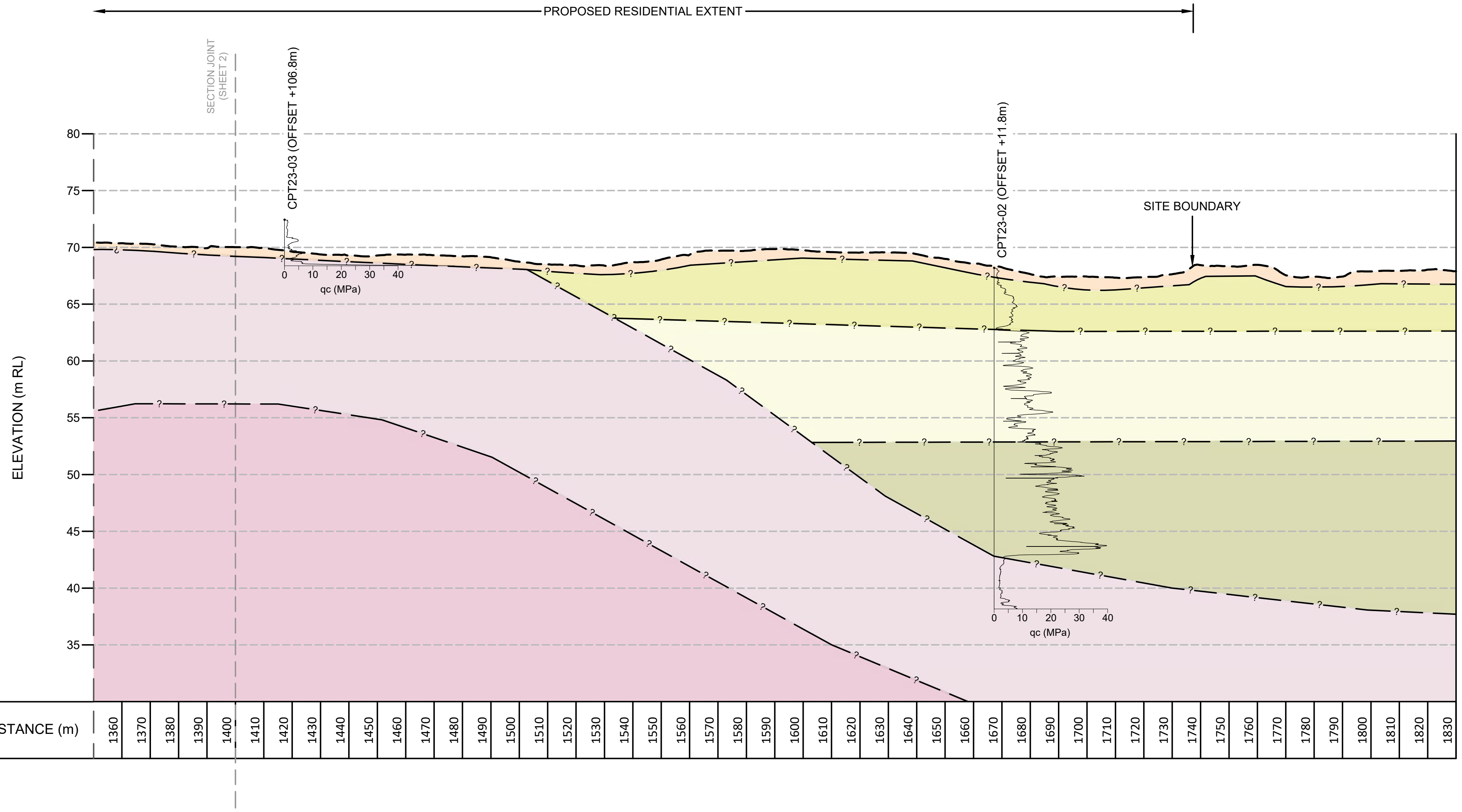

SECTION A-A'

SCALE- H:1000 V:250

LEGEND:

— — — EXISTING GROUND PROFILE
—?— — INFERRED GEOLOGY BOUNDARY
🟩 SILT/CLAY/SAND (UNCONTROLLED FILL)
🟦 LOOSE TO MEDIUM DENSE INTERBEDDED SILT/SAND (RECENT ALLUVIUM)
🟧 STIFF SILT/CLAY (RECENT DEPOSITS)
🟨 MEDIUM DENSE SAND (HINUERA FORMATION)
🟨 STIFF TO VERY STIFF CLAY/SILT (HINUERA FORMATION)
🟨 INTERBEDDED LOOSE TO MEDIUM DENSE SAND/STIFF SILT (HINUERA FORMATION)
🟫 MEDIUM DENSE TO DENSE SAND (HINUERA FORMATION)
🟪 STIFF TO VERY STIFF CLAY/SILT (PAKAHI SUPERGROUP/PERIA FORMATION)
🟥 VERY STIFF TO HARD CLAY/SILT WITH SOME SAND (PAKAHI SUPERGROUP/PERIA FORMATION)

NOTES:

1. EXISTING GROUND PROFILE CREATED USING LIDAR CONTOURS OBTAINED FROM LINZ DATA SERVICE.
2. VERTICAL DATUM IN TERMS OF NZVD2016.
3. TEST LOCATIONS ARE INDICATIVE ONLY.
4. PROPOSED SUBDIVISION BOUNDARIES ARE INDICATIVE ONLY.

0 20 40 60 80 100 m
1:2000

PRINT IN COLOUR

CMW Geosciences
Great People | Practical Solutions

CLIENT: **MAVEN ASSOCIATES LTD**
PROJECT: **ASHBOURNE DEVELOPMENT MATAMATA**
TITLE: **CROSS SECTION A-A' (SHEET 3 OF 3)**
DRAWN: HV
CHECKED: BM
REVISION: 0
DATE: 16/10/2025
PROJECT: HAM2023-0124
DRAWING: 13
SCALE: 1:2000
SHEET: A3 L

APPENDIX C

STORMWATER BASIN GROUNDWATER MOUNDING ASSESSMENT

Table C1: Groundwater Mounding Assessment Basin A

MODEL INPUT PARAMETER		VALUE	INFORMATION SOURCE	UNIT CONVERSION	
Length (m)		100	Maven basin design cross-sections		
Width (m)		43.5			
Event Duration (days)		3	3-day 100-year ARI storm event duration.		
Initial Aquifer Saturated Thickness		8.55	Average aquifer thickness from CPT24-06 and SCPT24-04		
Aquifer Specific Yield (m^3/m^3)		0.22	Typical for aquifer type (Morris and Johnson 1967).		
Aquifer Gradient		-0.0022	Calculated from interpreted winter piezometric surface.		
Aquifer Dip Direction (degrees)	Cardinal	60°E			
	Moundsolv ()	30			
Rotation of the Infiltration Basin Length (degrees)	Cardinal	23.7°E	From Maven basin design plans		
	Moundsolv ()	36.3			
Hydraulic Conductivity (m/s)	CMW k (k^1)	6.27	Taken from CMW soakage tests (CIRIA 113 method), in pit, SOA24-23/24		
	Conservative k (k^2)	1.53	Calculated as the average of the last 4 values from CMW's soakage tests undertaken at SOA23 and SOA24 (CIRIA method.)		
Maximum Acceptable Groundwater Mounding Height (m)		6.0	Taken as the distance from the winter water table (derived from the piezometric surface) to the top of the basin specified in Maven basin design plans.		
Recharge Rate (Q) (m^3/d)		2,145	Model Output		
Infiltration Rate (q) (m/d)		0.49	Model Output	mm/hr	20.5

Table C2: Groundwater Mounding Assessment Basin C

MODEL INPUT PARAMETER		VALUE	INFORMATION SOURCE	UNIT CONVERSION	
Length (m)		109	Maven basin design cross-sections		
Width (m)		28			
Duration (days)		3	3-day 100-year ARI storm event duration.		
Initial Aquifer Saturated Thickness		16	Estimated from CPT24-06.		
Aquifer Specific Yield		0.22	Typical for aquifer type (Morris and Johnson 1967).		
Aquifer Gradient		-0.0022	Calculated from interpreted winter piezometric surface.		
Aquifer Dip Direction (degrees)	Cardinal	60°E			
	Moundsolv ()	30			
Rotation of the Infiltration Basin Length (degrees)	Cardinal	88.4°E	Taken from Maven basin design plans.		
	Moundsolv ()	-28.4			
Hydraulic Conductivity (m/s)	CMW k (k^1)	0.64	Taken from CMW soakage tests (CIRIA 113 method), in pit, SOA24-13/14		
	Conservative k (k^2)	0.126	Calculated as the average of the last 4 values from CMW's soakage tests undertaken at SOA13 and SOA14 (CIRIA method).		
Maximum Acceptable Groundwater Mounding Height (m)		1.0	Taken as the distance from the winter water table (derived from the piezometric surface) to the top of the basin specified in Maven basin design plans.		
Recharge Rate (Q) (m^3/d)		227	Model Output		
Infiltration Rate (q) (m/d)		0.07	Model Output	mm/hr	3.1

Table C3: Groundwater Mounding Assessment Basin D

MODEL INPUT PARAMETER		VALUE	INFORMATION SOURCE	UNIT CONVERSION	
Length (m)		107	Maven basin design cross-sections		
Width (m)		59			
Event Duration (days)		3	3-day 100-year ARI storm event duration.		
Initial Aquifer Saturated Thickness		15.8	Estimated from CPT24-06		
Aquifer Specific Yield		0.22	Typical for aquifer type (Morris and Johnson 1967).		
Aquifer Gradient		-0.0022	Calculated from interpreted winter piezometric surface.		
Aquifer Dip Direction (degrees)	Cardinal	60°E			
	Moundsolv ()	30			
Rotation of the Infiltration Basin Length (degrees)	Cardinal	89.4°E	Taken from Maven basin design plans.		
	Moundsolv ()	-55			
Hydraulic Conductivity (m/s)	CMW k (k^1)	1.3	Taken from CMW soakage tests (CIRIA 113 method), in pit, SOA24-15/16		
	Conservative k (k^2)	0.24	Calculated as the average of the last 4 values from CMW's soakage tests undertaken at SOA15 and SOA16 (CIRIA method).		
Maximum Acceptable Groundwater Mounding Height (m)		1.2	Taken as the distance from the winter water table (derived from the piezometric surface) to the top of the basin specified in Maven basin design plans.		
Recharge Rate (Q) (m^3/d)		555	Model Output		
Infiltration Rate (q) (m/d)		0.09	Model Output	mm/hr	3.7