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Proposed Industrial Development

Southern Links 1

GEOTECHNICAL EFFECTS PRELIMINARY MANAGEMENT PLAN

Colliers Project Leaders

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1.0 INTRODUCTION

CMW Geosciences (CMW) was engaged to provide geotechnical engineering services, including the preparation of a geotechnical effects management plan (“GEMP”) to support the substantive application for the Southern Links 1 project (“SL1” or the “Project”) under the Fast-track Approvals Act 2024 (“FTAA”) in Hamilton. This GEMP relates to the industrial component of the wider SL1 Project, referred to as the “Industrial Development” and “Industrial Area”.

CMW has also prepared a Geotechnical Investigation Report (“GIR”) to accompany the application, which is attached as **Appendix C**.

The SL1 Project is a combined 106ha development, including residential and industrial activities. The Industrial Area comprises an approximately 60ha block of pastoral and industrial land which is proposed to be further developed for industrial purposes. The Industrial Development comprises the establishment of large industrial lots, roading and wetlands.

This GEMP outlines the potential risks, mitigation and contingency measures relating to groundwater drawdown and the potential for induced ground settlement. This GEMP is based on the information provided in the documents outlined in Table 2.1 below and should be read in conjunction with the GIR.

This GEMP is a live document, and relies on the design and assessment information available at the date of preparation. Accordingly, this GEMP must be reviewed and updated as appropriate.

Where this GEMP differs from a subsequently issued consent condition or certified technical design, the more stringent requirement applies until the discrepancy has been resolved and the GEMP formally updated.

2.0 REPORT PURPOSE

The key purpose of the GEMP is to manage the effects of ground settlement and increase in seismic hazard from the formation of the artificial wetlands and overall landform within the Industrial Development.

This GEMP outlines the potential risks, mitigation and contingency measures relating to groundwater drawdown and the potential for ground settlement.

The geotechnical aims of the GEMP are to:

- Minimise effects on nearby infrastructure and occupied buildings;
- Implement a Trigger Action Response Plan (TARP) to monitor ground settlement in the vicinity of the artificial wetlands and Stage 2 infilling; and
- Identify actions and mitigation measures to rectify any minor or more than minor effects created by ground settlement in the vicinity of the artificial wetlands and within the Stage 2 area.

This GEMP is based on the information provided in the documents outlined in **Table 2.1**.

Table 2.1: Project Documentation

Report Type	Reference and/or Comments	Author
Geotechnical Investigation Report – Industrial Area (GIR)	HAM2024-0120AE Rev 5	CMW, August 2026
Hydrogeological Effects Assessment (HEA)	WGA242463-RP-HG-0012_B	WGA, June 2026
Current civil and earthworks drawings	298002-I1 SL1	Maven, June 2026

¹ CMW (July 2026) Geotechnical Investigation Report – Residential Area (GIR) HAM2024-0120AE Rev 4

3.0 SITE DESCRIPTION AND LANDFORM

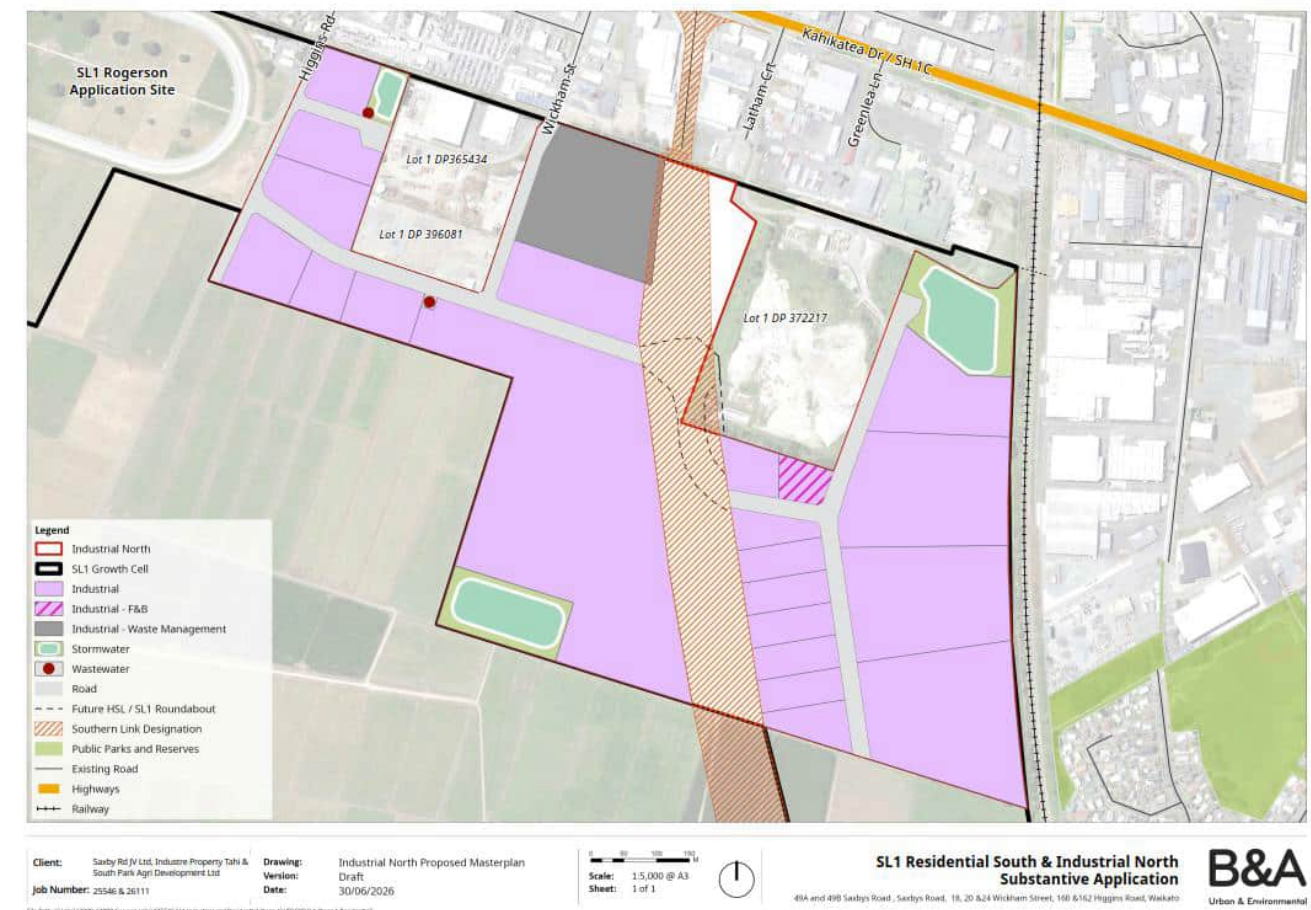
The Industrial Area is bound to the north by industrial sites off Kahikatea Drive, to the south by pastoral land, to the east by the North Island Main Trunk (NIMT) rail line, and to the west by the G.A. Rogerson Racing Stables. The Industrial Area is currently utilised for pastoral grazing (southern portion) and industrial use (northern portion) including storage yards, and waste dumps for green waste and construction material.

The general landform can be described as gently grading peatland with elevations ranging from RL39m to RL41m. The northern portion of the Industrial Area has been extensively developed with gravel yards covering the majority of the central portion and large stockpiles on the eastern corner. Key surrounding infrastructure is described in more detail within the GIR¹.

We understand the earthworks across the Industrial Area is to be undertaken under a phased approach with three artificial stormwater wetlands proposed within the development extent. These wetlands are depicted as shown in **Figure 3.1**.

Calculation of the drawdown effects has been provided by WGA to inform the writing of this report. The basin specific drawdown analyses have been provided in **Appendix A**.

Figure 3.1: Industrial Development Industrial Master Plan (Prepared by B&A)



4.0 PROPOSED DEVELOPMENT

Enabling works are required to establish developable land, including bulk earthworks across the site. The details for the Industrial Development are as follows:

- Establishment of industrial lots with sites ranging 4,600m² to 136,000m² in size;
- Bulk earthworks with cuts of up to approximately 22m comprising the removal of a large stockpile on the northeastern corner, and fills of up to approximately 6m in the southeastern corner;
- The proposed Industrial Development is designated as Stage 1A and B, 2 and 3 with construction sequencing understood to be in descending order;
- The formation of three artificial stormwater wetlands (numbered 1 to 3), with depths of up to approximately 2m, with wetland batter slopes up to 1V:3H; and
- Construction of roads providing access to the industrial lots.

5.0 POTENTIAL GEOTECHNICAL EFFECTS

5.1 Drawdown and Drawdown Induced Ground Settlements

The groundwater modelling carried out as part of the WGA HEA² provides details of potential environmental effects during and following drawdown as part of the formation of the artificial wetlands.

With reference to Wetland 1, the closest building is noted to be a distance of 28m from the crest of the slope. With the radius of drawdown (defined by a 0.25m drawdown) occurs between 10m to 20m from the crest of Wetland 1 and as such no groundwater drawdown is predicted for the building to the east of Wetland 1.

The maximum dewatering depth should be in accordance with the WGA HEA². If for any reason an increase is required in the dewatering depth, settlement calculations should be undertaken and this GEMP updated to reflect these changes.

5.2 Static and Seismic Slope Stability

Static and seismic analyses were undertaken within the GIR¹ for the proposed artificial wetlands and fill batters within the Stage 2 area adjacent to the NZTA road corridor where a maximum gradient of 1V:3.5H is noted. Results indicate that where cutting into the peat is proposed, the requisite factor of safety is not met where slope gradients of 1V:3H are detailed. The fill on the southeastern corner of the Industrial Area is detailed to a maximum depth of 6m. An offset distance of approximately 35m from the eastern site boundary is applicable with slope gradients of 1V:3.5H noted. Design mitigation measures including rock buttresses at the toe of the slope or a reduction in slope gradient (1V:4H) are recommended in the GIR¹. Buildings proposed within 50m of wetlands require specific foundation design to withstand the predicted lateral displacements (up to 70mm). Additional comments around mitigation measures are provided within the GIR¹.

Survey monitoring devices will be installed and utilised during construction to monitor the temporary construction stability of the earthfill embankments being constructed on soft soil. The specific layout of these devices will be scheduled during detailed design, however they will likely comprise pins that can be surveyed to monitor vertical and lateral ground movement, and vibrating wire piezometers to monitor pore pressures within the underlying soft soil.

5.3 Load Induced Settlement

Proposed fill within the Stage 2 area is anticipated to depths of up to 6m on the southeastern portion of the site. To the east is the NIMT railway line at a distance of 20m from the site boundary. A preliminary settlement analyses was undertaken with a settlement timeframe of 3 to 15 months provided within the GIR¹. Cross-boundary effects from settlement to neighbouring properties is anticipated to be negligible due to the offset distances.

Negligible cut/fill earthworks is proposed within 35m of the KiwiRail boundary. The negligible nature of the earthworks, and the offset of 35m from the railway embankment, means that ground settlement is unlikely to be a risk for the railway. However, ground settlement monitoring along the rail corridor boundary is proposed to validate this assessment.

Significant load induced settlement is anticipated to occur across the Industrial Development as a result of bulk earthworks. Specific construction monitoring settlement devices, including settlement plates, vibrating wire piezometers, and extensometers, will be scheduled during detailed design to monitor this settlement. This settlement is predicted to occur within the Industrial Area and not have any adverse impacts on neighbouring properties.

The above assessment is subject to review at the detailed design stage.

6.0 MONITORING AND REPORTING REQUIREMENTS

6.1 Instrumentation

Instruments shall be installed and monitored as per the GEMP for the proposed Industrial Development is listed in **Table 6.1** below and depicted on **Drawing 01**.

Table 6.1: Required Monitoring Instrumentation

Type	Monitoring ID
Groundwater Monitoring Piezometers with standpipes with downhole datalogger (divers) (Wetland 1)	Proposed MP01 and MP02
Ground Settlement Markers	Proposed SM01 to SM06

Piezometers that will be installed for geotechnical monitoring purposes must be constructed as double standpipes (nested). Each nested borehole will monitor a shallow groundwater level (approximately RL37m) and deeper groundwater (at a depth of RL35m). These depths are indicative and will be confirmed on-site during borehole drilling with screen depths installed to match site conditions encountered. A single barologger should be installed at the site office to compensate all level loggers installed across the project (30km radius).

Monitoring results shall be submitted to Colliers and the Geotechnical Engineer in electronic format (excel spreadsheet or similar) within 24 hours of the monitoring being undertaken, at the intervals set out herein to confirm compliance with the Resource Consent conditions.

Should any of the monitoring instruments be damaged and become inoperable, then the Geotechnical Engineer, Colliers and HCC is to be informed, and a new monitoring instrument may be required to be installed at a nearby location as agreed in consultation with the Geotechnical Engineer and Asset owner.

² WGA (June 2026), Hydrogeological Effects Assessment (HEA) Ref: WGA242463-RP-HG-0012_B

6.2 Pre-Condition and Post-Condition Surveys

Due to the anticipated negligible groundwater drawdown and fill induced settlements for the existing industrial development and rail infrastructure following the proposed earthworks it is determined that conditional surveys for the adjacent properties are not required. However, it should be anticipated that Kiwirail may have specific requirements for pre- and post-condition surveys for projects of this nature adjacent to their rail corridor.

6.3 Groundwater Level Monitoring

To supplement the existing piezometers, two additional boreholes with standpipe piezometers are to be installed adjacent to Wetland 1, with groundwater monitoring to be undertaken due to the adjacent industrial development to the east of the wetland. Groundwater levels are to be monitored during the works. The locations of proposed monitoring sites (MP01 and MP02) are presented on **Drawing 01**.

Groundwater levels from piezometers with dataloggers will be collected at 15-minute automated intervals. Data will be downloaded and the remaining piezometers manually measured at the monitoring frequency presented in **Table 6.2**.

Table 6.2: Groundwater Monitoring Frequency – Wetland 1 Monitoring Points

Timeframe	Duration	Frequency
Pre-construction	At least 6 months prior to construction to obtain baseline seasonal fluctuations	Every 4 to 6 weeks
During construction	For the full duration of construction of Wetland 1	Once a week
Post-construction	For 2 years following construction	Every 4 weeks for 6 months and then 6 monthly
Note: The monitoring frequency may be amended should anomalous or concerning data be recorded.		

6.4 Ground Settlement Monitoring

Settlement monitoring of neighbouring critical infrastructure (**Tables 6.4 and 6.5**) will be required where any buildings, utilities or assets are present to measure any drawdown or fill induced settlement. A suitably qualified and certified surveyor will be responsible for installing settlement monitoring points and providing survey results at the locations indicated on the plans presented in **Appendix B**.

The proposed monitoring frequency for settlement is presented in **Table 6.3**.

Table 6.3: Settlement Monitoring Frequency (1)

Timeframe	Duration	Frequency
Pre-construction	Minimum of 3 readings for each point to be taken over a 3-week period prior to dewatering / filling	3 readings to obtain baseline
During construction	For the full duration of construction of Wetland 1 / Stage 2 fill placement	Once a week for first 4 weeks, reducing to once every 4 weeks during earthworks
Post-construction	For 2 years following construction	Every 4 weeks for 6 months and then only when drawdown / settlement amber or red triggers are exceeded ⁽²⁾
Notes:		

Timeframe	Duration	Frequency
⁽¹⁾ The frequencies above may be decreased or increased by the Geotechnical Engineer depending on the results of the monitoring.		
⁽²⁾ Six Monthly groundwater monitoring will be undertaken for 2 years post construction, settlement is linked directly to the drawdown, therefore monitoring is only required when drawdowns exceed what is anticipated.		

Required settlement monitoring points are outlined for each respective excavation (construction phase) in **Table 6.4** below and presented on **Drawings 01**. It is noted that during the detailed design process, Kiwirail may provide additional information on specific monitoring requirements in relation to their rail corridor (if any).

Table 6.4: Required Settlement Monitoring Points for Each Respective Excavation

Construction Phase	Potentially Affected Structures	Monitoring Points
Wetland 1	Industrial development to the east of the proposed wetland	SM01 and SM02
Stage 2 Fill	Railway line adjacent to eastern site boundary	SM03 to SM06

Settlement markers shall be levelled by precise survey to an accuracy of $\pm 2\text{mm}$ at the frequencies outlined above. All survey data must be provided to the Geotechnical Engineer as soon as possible following completion.

These levels may be amended subject to approval by the relevant party (Colliers, HCC, and Waikato Regional Council) as part of the GEMP approval process, and, after the receipt of pre-dewatering monitoring data and recommendations from a Suitably Qualified Engineering Professional (SQEP), but only to the extent that avoidance of damage to building, structures and services can still be achieved.

6.5 Post-Construction Monitoring

Following the formation of artificial wetlands and the placement of fill within Stage 2, monitoring will shift to frequencies outlined in **Table 6.2 and 6.3**. **Table 6.5** outlines the structures that will require monitoring post construction.

Table 6.5: Post-construction Monitoring Trigger

Construction Phase	Structures
Wetland 3	None
Stage 2 Fill	Railway line adjacent to eastern site boundary
Wetland 2	None
Wetland 1	Industrial development to the east of the wetland
Note: The above outlined timeframes are based on construction sequencing of the development Stages. If any changes are made where earthworks Stages are undertaken out of order this table should be reconsidered.	

6.6 Groundwater Flows and Volume

To verify that soil permeabilities, inflow rates and volumes can be compared with the estimates outlined within the WGA HEA.

Pump capacities are to be recorded, and daily pumping records kept by the contractor. These records are to be provided to CMW on a monthly basis for review.

Daily rainfall records are also to be maintained by the contractor and presented with the monthly pumping records.

6.7 Data Processing and Reporting

Groundwater and survey monitoring data will be entered into a database, typically within 24 hours of being provided. The data will be compared to anticipated effects and levels. Any trends will be noted and implications considered with respect to future and current activities and effects.

During construction groundwater monitoring and settlement monitoring, data should be provided to Waikato Regional Council on a fortnightly basis. These results should be presented in a format which shows the monitoring results compared against trigger levels, along with a summary analysis of any data trends and forecasts.

In the event of an alarm level being triggered, the Consent Holder shall notify Waikato Regional Council in writing within 48 hours of the event.

An annual groundwater monitoring report should be prepared by the Consent Holder within one calendar month following completion of construction of each basin for a period of 2 years and provided to Waikato Regional Council and HCC.

7.0 TRIGGER ACTION RESPONSE PLAN (TARP)

7.1 Groundwater Monitoring Triggers

The groundwater triggers have been set as:

- Green – drawdown (below baseline) is within predicted range (<80% of predicted)
- Amber – drawdown is at the upper end of the predicted range (within 80% - 100% of predicted)
- Red – drawdown exceeding the predicted range (exceeded 100% of predicted)

Specific trigger levels are to be determined at the detailed design phase.

To better understand the groundwater regime and potential drawdown effects associated with the construction of Wetland 1, piezometers are to be installed to monitor groundwater levels throughout the construction. A nested piezometer may be required should a perched groundwater table be identified at the detailed design phase.

7.2 Settlement Monitoring Triggers

The ground settlement triggers have been set as:

- Green – settlement that is within predicted range and is below the threshold for expected damage or loss of service
- Amber – settlement at the upper end of the predicted range
- Red – drawdown exceeding the predicted range, and/or reaching potentially damaging magnitudes

Specific trigger levels are to be determined at the detailed design phase.

Differential settlements across structures should be back calculated where amber trigger level are exceeded. Red level trigger actions should be followed where any back calculated differential settlement across a platform exceeds 1:300, with structural condition surveys undertaken within 48 hours of exceedance of this differential settlement tolerance.

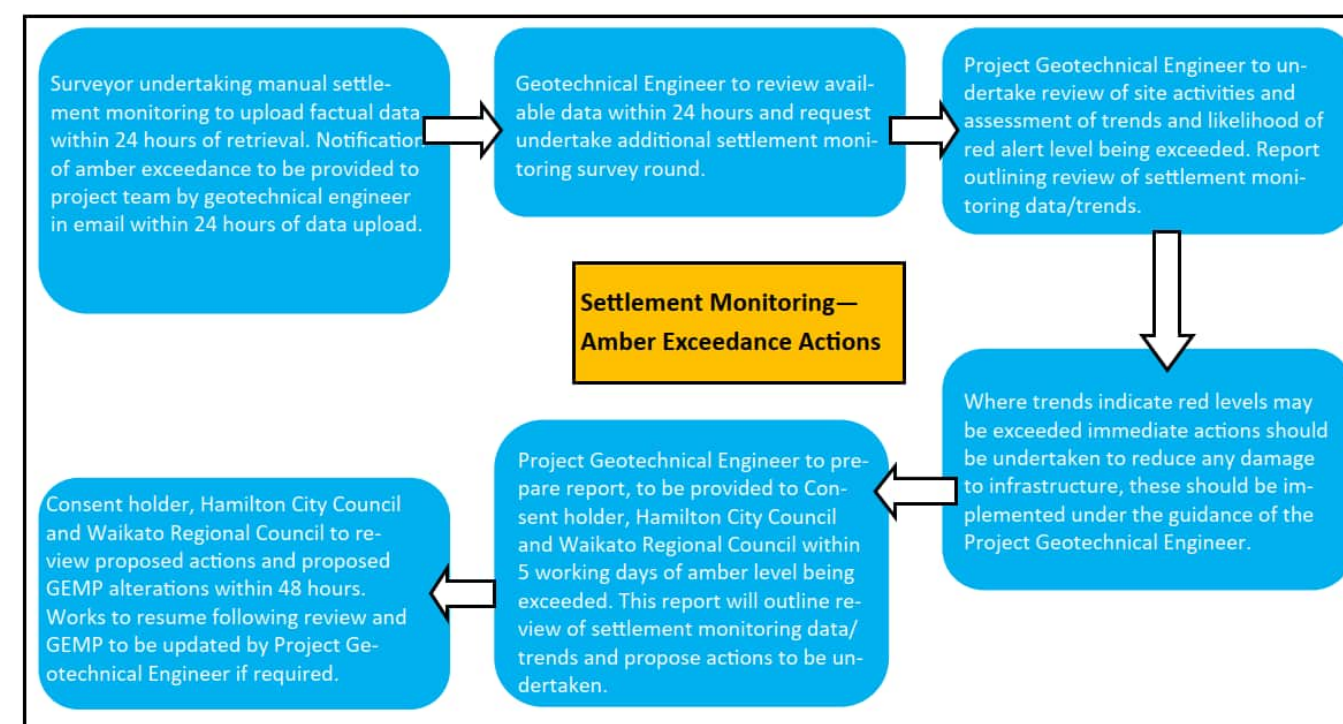
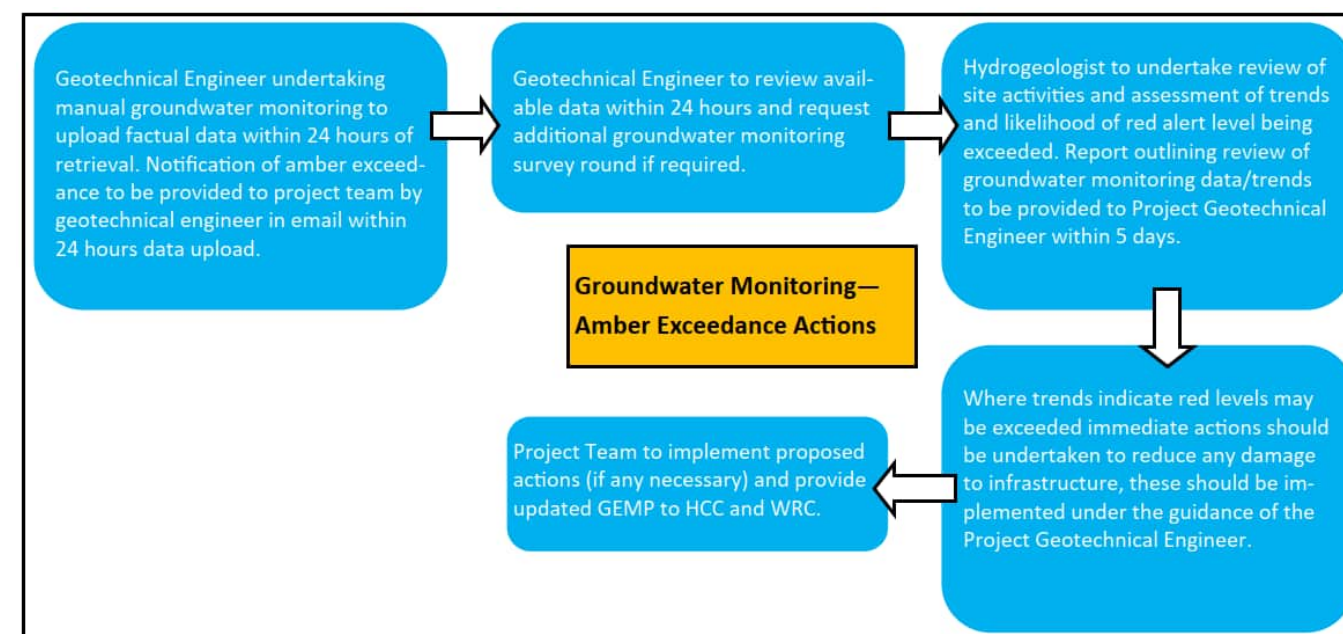
7.3 Contingency Measures

7.3.1 Response Procedure

Any trigger exceedances for Amber and Red Levels, with recommended actions, will be communicated immediately to the project team by either the contractor or the project geotechnical engineer.

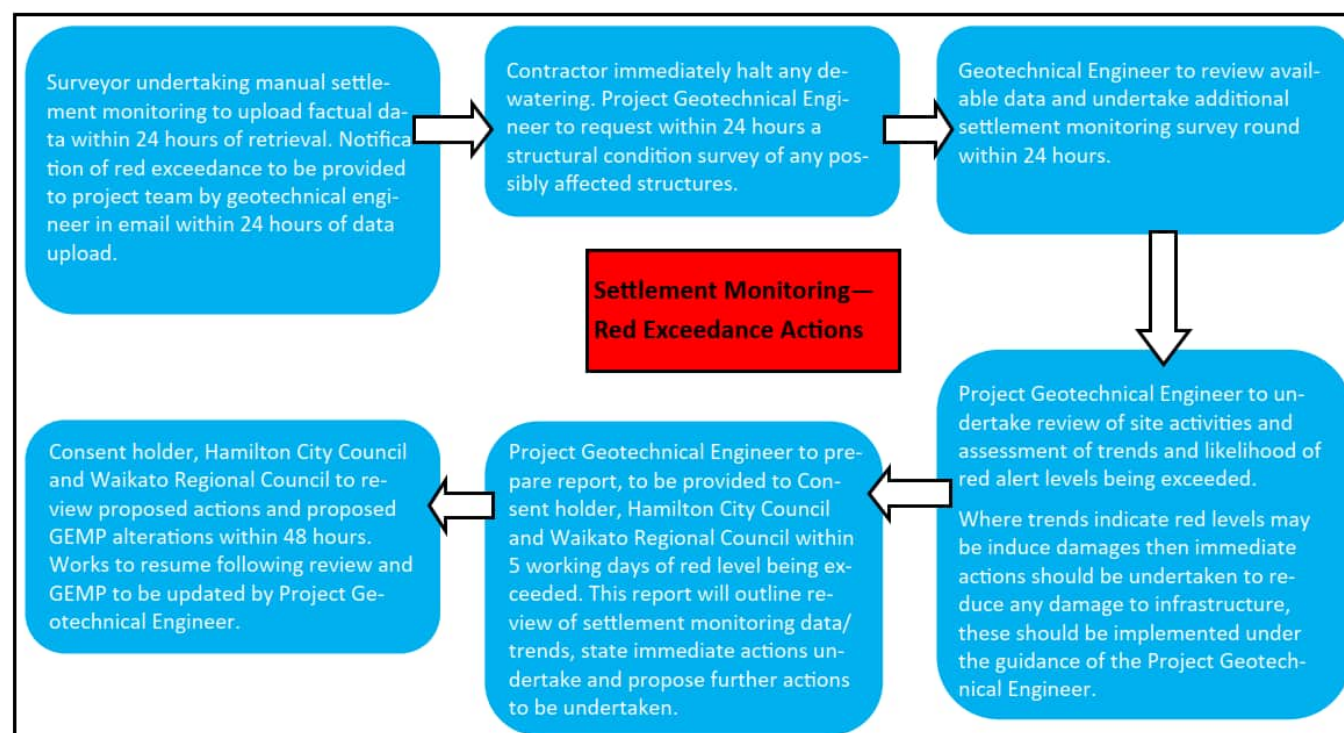
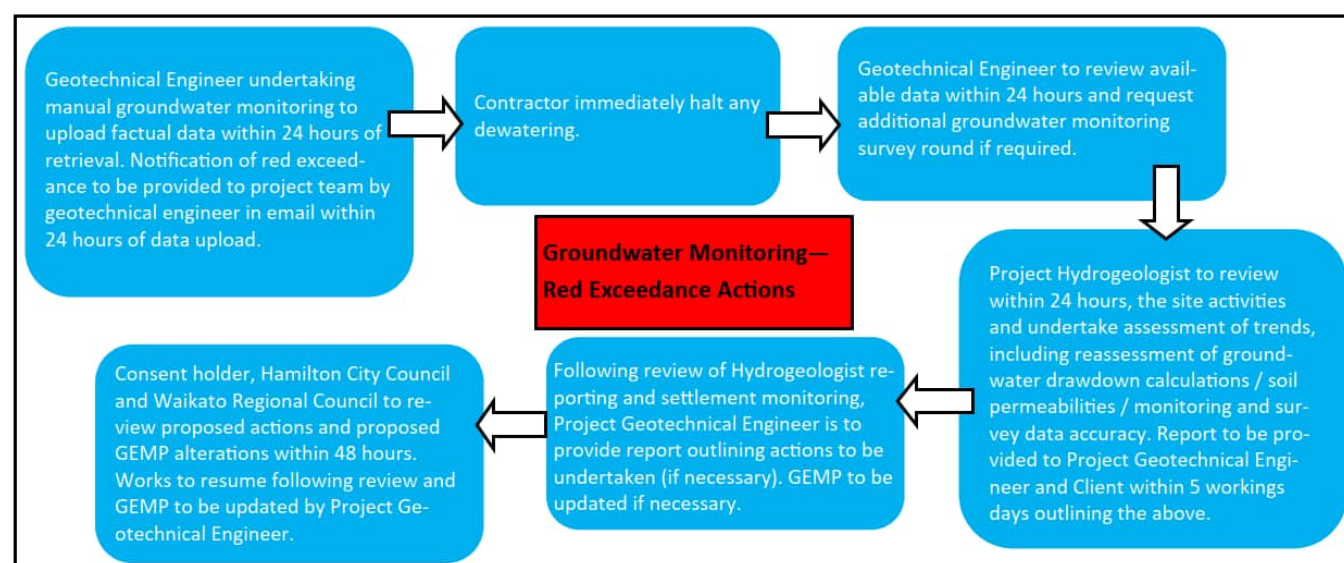
7.3.2 Amber Level Responses

Following exceedance of any Amber Level the actions are to be undertaken in steps are outlined in the flowcharts below.



7.3.3 Red Level Responses

Following exceedance of any Red Level the actions to be undertaken in steps are outlined in the flowcharts below.



Red level example actions following review by Project Geotechnical Engineer may involve the following steps:

- Alert to contractors to cease or reduce dewatering and/or construction works;
- Further review of construction methodology including reducing areas of excavation / dewatering, potential for groundwater recharge options;
- Possible further geotechnical investigation to confirm ground conditions; and
- Revise construction methodology based on appropriate review of data.

7.4 Mitigation Measures

Although not anticipated, if any damage to buildings, road or infrastructure is observed or reported we propose the following steps to be taken:

- A register of notifications/contacts and complaints to be maintained by Colliers (or delegated body) with details of all correspondence regarding issues raised;
- Notification of issues to stakeholders / asset owners as appropriate;
- Appropriate team member to liaise with asset owner, inspect asset and report on findings to Colliers;
- If any issues raised are found to be related to settlement induced damage, then remedial actions to be agreed, final decision to be made by Colliers, and implemented; and
- Following construction of each basin the results from groundwater and settlement monitoring will be reviewed and the risk to third party assets should be re-assessed.

8.0 ROLES AND RESPONSIBILITIES

A list of key stakeholders, roles and responsibilities in obtaining data, processing the data and alerting the design team and relevant stakeholder to exceedances and trends of concern, instructing and carrying out actions is provided in the below tables.

Table 8.1: Roles and Responsibilities

Stakeholder	Role	Personnel	Responsibility
Colliers Project Leaders	Client / developer	Dillon Kellier Dillon.Kelliher@colliers.com 022 033 7705	Site ownership, approval for additional works if required.
CMW Geosciences	Geotechnical engineer	Mark McVinnie markmcv@cmwgeo.com 022 166 1865	Data review, alert/action notifications, proposed additional works as required
Wallbridge Gilbert Aztec (WGA)	Hydrogeologist	Catherine Howell chowell@wgan.co.nz	Data review, review of groundwater drawdown trends following alerts
TBD	Contractor in control of site	Contractor representative	Data review, alert/action notifications, daily pump records, daily rainfall records, proposed additional works as required
TBD	Site surveyor	Surveyor Representative	Settlement monitoring survey
Maven	Civil engineer	Min Shon mins@maven.co.nz	Earthworks and civil design inputs if any additional works are required

Stakeholder	Role	Personnel	Responsibility
		022 198 6876	
Hamilton City Council	Governing agency	Project Sponsor or delegate	Approving of monitoring plan, and any modifications if necessary
Waikato Regional Council	Governing agency	Fiona Forrest Fiona.Forrest@waikatoregion.govt.nz 021 483 005 After Hours – 0800 800 401	Approving of monitoring plan, and any modifications if necessary

Table 8.2: Responsibilities

Stakeholder	Responsibility
Colliers Project Leaders	Site ownership and liaison with Council (HCC & WRC) approval for additional works if required. Instruction to contractor for additional works if required.
CMW Geosciences (CMW)	Data review of groundwater monitoring and settlement monitoring, alert / actions notifications to Colliers, proposed additional works if required following alert / action notifications, review and modifications to GEMP as required.
Wallbridge Gilbert Aztec (WGA)	Data review of groundwater monitoring, re-assessment of groundwater monitoring trends following alert / action notifications.
Contractor	Review of data (groundwater drawdown pumping), daily rainfall monitoring, undertake proposed additional works as required as instructed by Colliers.
Surveyor	Settlement monitoring survey, review of monitoring data, alert / action notifications to CMW and Colliers within 24 hours of taking reading. Set up of groundwater / settlement monitoring systems.
Maven	Earthworks and civil design inputs if any additional works are required.
Hamilton City Council (HCC)	Approval of management plans, approval of any updates to management plans following monitoring, and any modifications if necessary.
Waikato Regional Council (WRC)	Approval of management plans, approval of any updates to management plans following monitoring, and any modifications if necessary.

9.0 GEMP AND TARP REVIEW

Upon completion of detailed design, the GEMP should be revised to reflect the geotechnical effects and proposed construction methodology.

Following construction of each respective basin, this GEMP will be reviewed and updated prior to construction of the following basin and following analyses of data obtained during the completed phase of works. At that time, the Project Geotechnical Engineer must assess and report predicted groundwater drawdown, predicted ground settlements, and predicted differential settlement gradients. The review of the monitoring results and plan must outline whether the shift from construction monitoring to post construction monitoring frequencies for each piezometer and settlement marker is appropriate at that time.

If any key design elements change then this GEMP will require review and updating to ensure it adequately manages the risk to environment, existing buildings and existing infrastructure.

³ Ministry of Business, Innovation and Employment (2025) *Acceptable Solutions and Verification Methods for NZ Building Code Clause B1 Structure, B1/VM2*, Second Edition

Following pre-construction monitoring and at least 20 working days prior to the commencement of any construction works in relation to the project site, this GEMP and the TARP must be updated with baseline monitoring levels and provided to Waikato Regional Council.

10.0 FUTURE INDUSTRIAL DEVELOPMENT

We recognise that industrial development may occur concurrently with, or prior to, the construction of the artificial wetlands. It is important to note that these structures may be impacted by settlement caused by groundwater drawdown. Any future geotechnical assessments for any development within the drawdown-affected area must consider cumulative settlements, both drawdown-induced and static settlements, to ensure compliance with B1/VM2³ of the New Zealand Building Code Handbook.

APPENDIX A

WGA Drawdown Calculations



South Park Agri Development Limited

Southern Links 1, Industrial Stage 1, Northern Block Hydrogeological Effects Assessment

ASSESSMENT OF EFFECTS

WGA242463-RP-HG-0012_B

June 2026



Revision History

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A	27/05/2026	Draft to Client	JM, JF	BS	CHO
B	19/06/2026	Final	JF	BS	CHO

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Toby Beisly	BSc (Tech), Environmental Sciences and Geology, MSc (Research), Environmental Sciences	Toby is a Graduate Hydrogeologist with a passion about the natural environment and the informed management of natural resources.
Joanne Ferry	BSc. Geology and Biology, endorsed in Environmental Science. MSc. (Hons) Engineering Geology.	Hydrogeologist with over 12 years of experience in hydrogeological drilling, conceptualisations and managing large scale groundwater projects in industry and local government.
James Manning	BSc. Environmental Science and Geography. MWaterRM (Research), Master of Water Resource Management.	James is a hydrogeologist with over 3 years of experience. James has been involved in a wide range of projects around Australia and New Zealand ranging from stopbank seepage modelling to water bore drilling in remote communities.

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1 INTRODUCTION

1.1 Background

South Park Agri Development Limited and Industrie Property Tahi have engaged Wallbridge Gilbert Aztec (WGA NZ Pty Ltd; WGA) to provide technical services in support of the resource consent and approvals process for the Southern Links 1 (SL1) Industrial Stage 1 Northern Block (Northern Block; the Site). This includes preparation of the hydrogeological assessment required to inform the consent applications. The wider SL1 project aims to deliver a range of housing typologies and land tenure options to support housing affordability, while also enhancing the region's industrial capacity (Figure 2). This assessment of effects relates only to the Northern Block.

1.2 Site Description

The entire SL1 site is approximately 440 ha in size and is situated between the established Hamilton suburbs of Dinsdale, Frankton, Deanwell and Glenview to the northeast, and rural land within Waipa to the southwest (Figure 1). The SL1 site is currently zoned rural under the Waipa District Plan and consists of pasture, rural lifestyle, equine industry and peri-industrial use.

The SL1 development will consist of both residential and industrial areas with green spaces scattered throughout the development. Stormwater across the SL1 area will be managed by naturalised streams, rain gardens, grass lined swales and constructed wetlands. The SL1 site has been divided into two blocks, known as the 'Northern Block' and the 'Southern Block'. This assessment of effects focuses only on the Northern Block (Figure 2).

1.2.1 Northern Block

The Northern Block covers an area of approximately 60 ha, currently utilised for light industrial and farming purposes. Farmland areas occur over extensively drained peat soils (Figure 3). Industrial areas are predominantly underlain by gravel hardstand over peat. The site topography is generally flat, with localised areas of uncontrolled fill forming elevated features. Notably, a significant accumulation of heavily vegetated building and demolition waste and vehicle bodies known locally as "Latham's Mountain" is present at the north-eastern end of the site (Figure 3).

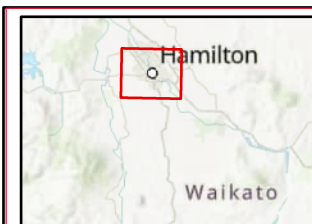
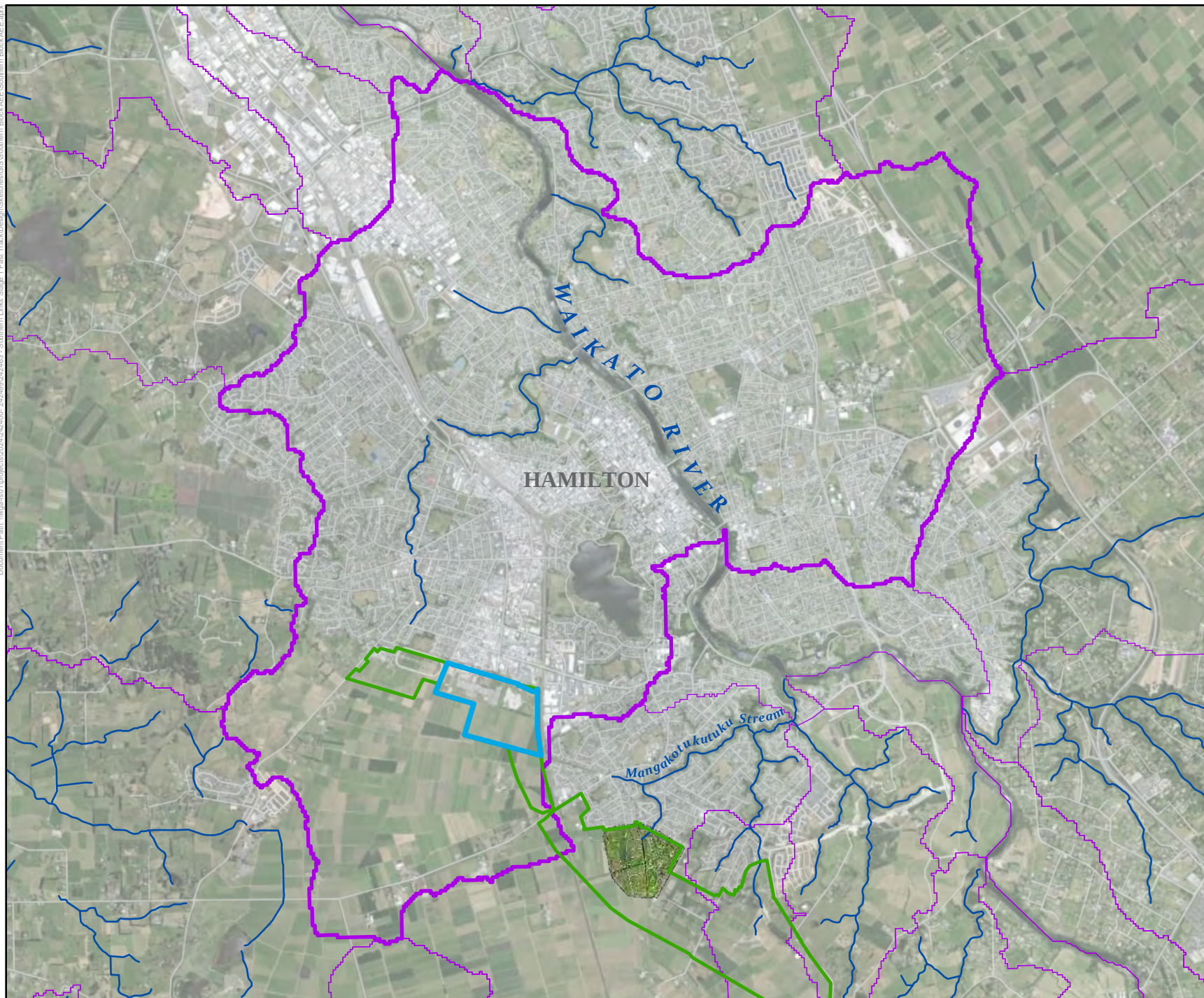
1.3 Proposed Activity

For the Northern Block, the proposed activity comprises:

- Extensive cut and fill to re-contour the site.
- Construction of three stormwater wetlands (Figure 3).
- Installation of wastewater pipelines and two wastewater pump stations (Figure 3).
- Installation of drains and swales.
- Localised pre-construction preloading of peat soils to accelerate peat compaction and stabilisation, thereby supporting site development.

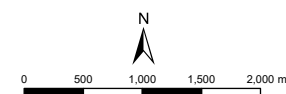
From a hydrogeological perspective, the proposed activity has four principal components with potential to influence the local groundwater system:

1. Removal of existing in-paddock farm drainage and reconfiguration of the site drainage network, replaced by a combination of engineered fill and roadside swales integrated within the proposed roading network.
2. Short-term dewatering during construction earthworks. Dewatering is anticipated to be localised and temporary, with groundwater managed and discharged in accordance with the site erosion and sediment control framework and any relevant consent requirements.
3. Potential groundwater mounding due to increased recharge from the Stormwater Wetlands, which are to be permanent features within the developed catchment.
4. Pre-construction preloading on peat soils, resulting in compaction of these soils. This process, which is intended to improve ground stability prior to construction on site, may influence the hydraulic characteristics of shallow or sensitive soils. Changes in the hydraulic characteristics of shallow lithologies may have an effect on groundwater levels, groundwater flow directions and flow rates.



LEGEND

- River
- Catchment Outlines
- Waikato River at CMA Catchment
- Site Specific Drains
- Northern Block
- Southern Links Boundary



Scale 1:64,000 @ A4

Coordinate System: NZGD 2000 Mount Eden Circuit

WGA

Figure 1

Southern Links Stage 1

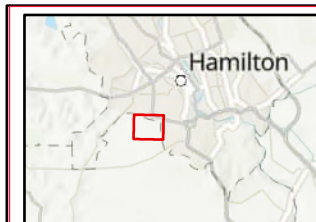
Site Location and
Catchment Map

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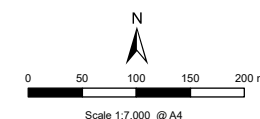


Figure 2: Northern Block Industrial Master Plan



LEGEND

- Proposed Wastewater Pipelines
- Southern Links Boundary
- Northern Block
- Proposed Wastewater Pump Stations
- Proposed Stormwater Wetlands
- Contour 1m



Coordinate System: NZGD 2000 Mount Eden Circuit

WGA

Figure 3

Southern Links Stage 1 Proposed Stormwater Wetlands and Wastewater Infrastructure

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2 EXISTING ENVIRONMENT

2.1 Topography

Ground levels within the Northern Block range in elevation from 36 mRL at the northwestern corner to 61 mRL in the “Latham’s Mountain” area in the northeastern quadrant of the Site. Prior to historical development, the Site would have been near level, grading gently downward from 41 mRL in the south to 39 mRL in the northwest. This profile is generally still reflected across the southern half of the site, which has been drained and recontoured for use as pasture (CMW 2026).

The northern half of the site has been extensively developed, recontoured and resurfaced to meet the demands of the industrial uses. The key feature of this area is “Latham’s Mountain”, with stored wastes producing an uneven top surface with heights of up to 21 m (between 40 mRL and 61 mRL) and slope angles up to 60 degrees to the horizontal (CMW 2026).

2.2 Rainfall

Rainfall data are recorded at the Ruakura weather station, which is located approximately 5.7 km northeast of the Site. The available record spans from November 2005 to the present. The long-term mean annual rainfall recorded at the station is approximately 1,018 mm, with a peak daily rainfall of 87.8 mm recorded during this period (Figure 4).

During the period of groundwater level monitoring undertaken at the Northern Block for this assessment (28 January to 23 February 2026; see Section 2.6.3), the peak daily rainfall recorded at Ruakura was 14 mm. Total rainfall over the groundwater monitoring period was approximately 60 mm. When annualised, this equates to an annual rainfall of approximately 804 mm/year. This value reflects a relatively dry period, and therefore, field data may not be representative of conditions during long-term mean annual rainfall. This difference is considered further in Section 2.6.4.

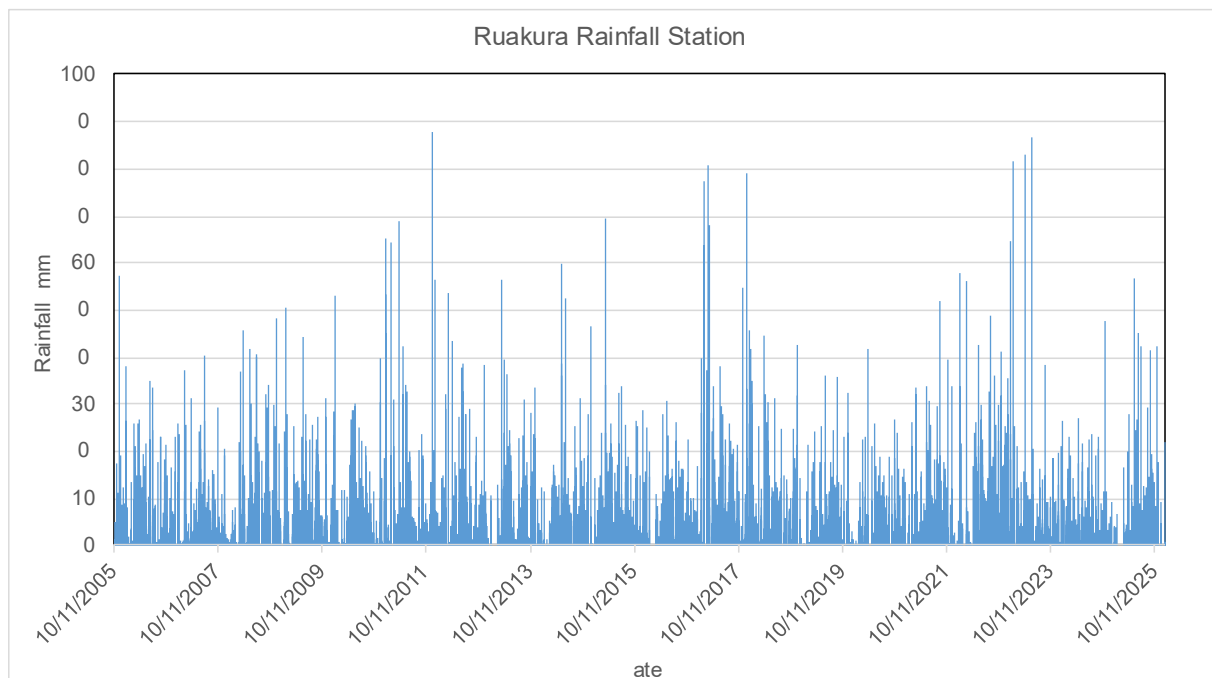


Figure 4: Rainfall Record at Ruakura (5.7 km Northeast)

2.3 Surface Water Bodies and Catchment Boundary

EcoLogical Solutions Ltd (EcoLogical) undertook freshwater ecology investigations at the Northern Block during 2025. Outcomes from these investigations included the conclusions that there are no RMA-qualifying wetlands on the Site (EcoLogical, 2026) and no watercourses supporting valuable on-site ecologies have been identified (EcoLogical, pers. comm., March 2026).

EcoLogical 06 assessed the ecological value of the Site's artificial drains as low, reflecting poor habitat quality, uncertain flow regimes, and limited fish diversity.

Existing farm drainage channels are estimated to be 0.5 to 1 m deep and occur along the northern and southern boundaries of the Site, as well as within the Site (Figure 5 and Figure 6). Recorded drain water levels are relative to ground levels immediately adjacent to the drains. Ground levels across the paddocks are typically higher than those beside the drains, reflecting intentional or incidental shaping of the peat surface to direct runoff toward the drainage network (Figure 4).

Water levels recorded in farm drains during November 2025 were approximately 0.5 m bgl. EcoLogical (2026) also noted that some drainage canals observed to be dry during the November site visit showed evidence that they may only hold water during wetter periods of the year.

Figure 1 shows the catchment according to Waikato Regional Council (WRC) database. The Site is within the "Waikato River at CMA" catchment boundary and is being developed for an Integrated Catchment Management Plan (ICMP) for Waitawhiriwhiri area. However, the estimated catchment outline provided by EcoLogical (2025) places the Site within the Mangakotukutuku catchment. Groundwater and surface water observations from the following assessment acknowledge both catchments as drainage and flow can appear to go in both directions (refer also to Section 2.6.4)



Figure 5: Central Farmland Drain Within the Northern Block (WGA Field Visit, 11/11/2025)



Figure 6: Artificial Watercourses and Locations of Eels reported by EcoLogical Solutions (2026)

2.4 Regional Geology

The Hamilton Basin, in which the proposed SL1 Development is located, is a large tectonic basin centred on Hamilton City with an area of approximately 2,000 km² and traversed by the Waikato River. The basin is surrounded by ranges of Mesozoic (Manaia Hill Group) and Tertiary age rocks (Te Kuiti and Waitemata Groups). At depth, basement greywacke underlies the sedimentary deposits that infill the basin (GNS 2005).

The basin is infilled with Tauranga Group alluvial sediments, dating from the Pliocene to the middle Holocene. The Tauranga Group sediments are up to 300 m thick and include gravels, sands, silt, muds and peats of fluvial, lacustrine and distal ignimbritic origin. Underlying the low hills within the basin are older ignimbrites, tephra fall deposits and alluvium of the Walton Subgroup (Lowe 2021; Figure 7).

The younger Hinuera Formation of the Tauranga Group underlies much of the Hamilton basin (Figure 7). This formation was deposited by braided river systems of the Waikato River, initiated by the supply of large volumes of sediment from volcanism in the Taupo Volcanic Zone (Petch 1987). Within this formation, the most productive aquifers consist of well sorted coarse sands and gravels. Discontinuous sequences of rhyolitic and pumiceous gravelly sands and gravels are interspersed with pumiceous silt, clay and peat layers. Lithological variability generally results in zones of higher permeability within the formation rather than a single, continuous aquifer (Scholfield, 1972). Low lying areas comprise younger Holocene Swamp Deposits of the Tauranga Group.

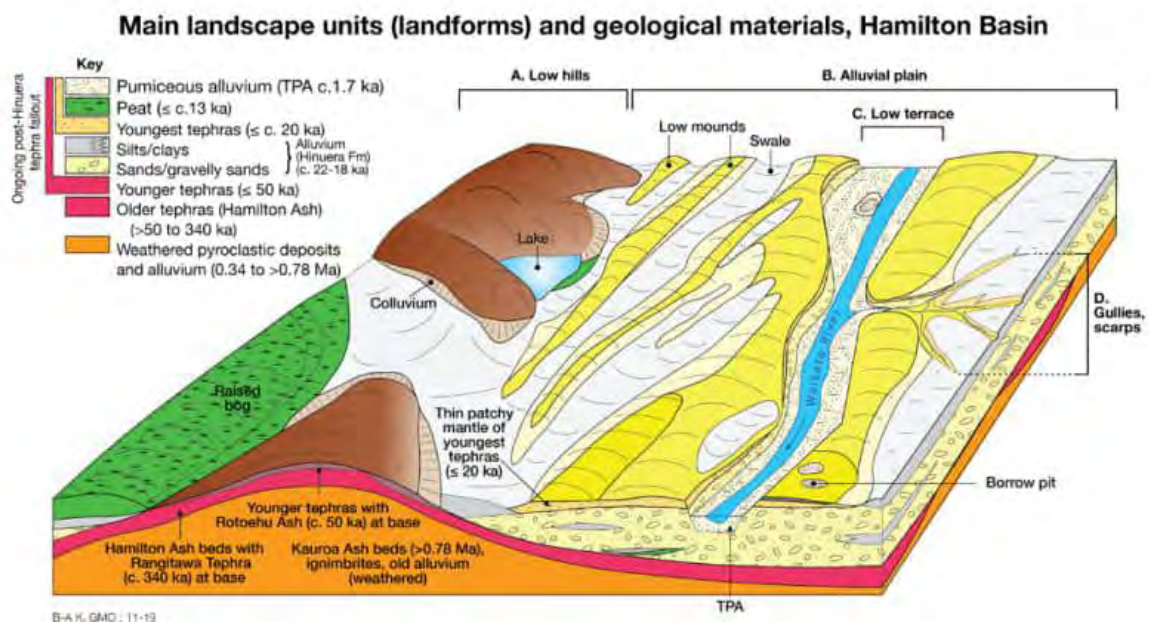
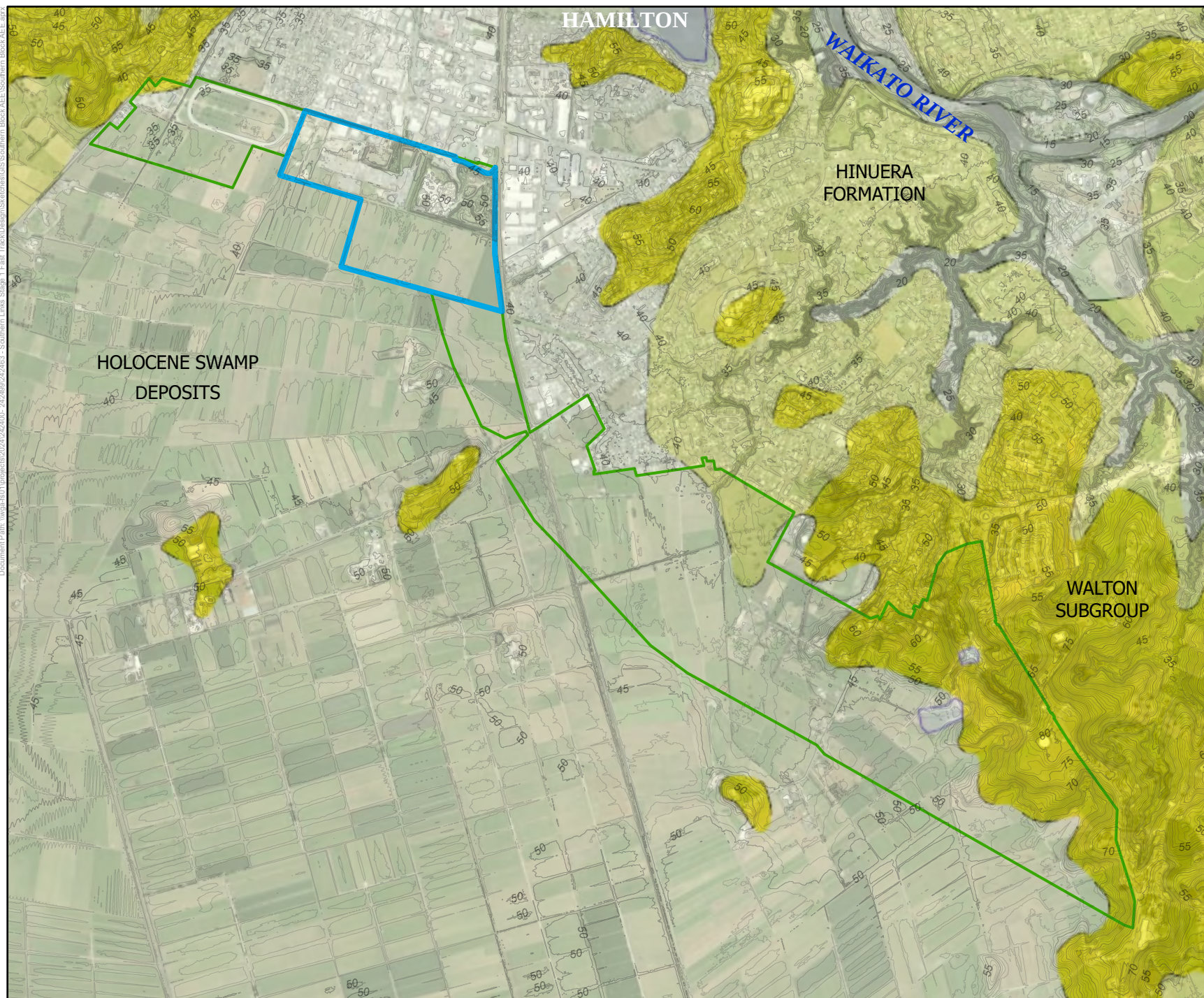


Figure 7: Geological Setting of the Hamilton Basin (Lowe 2021)

2.5 Local Geology

The Site is characterised by peat derived from Holocene Swamp Deposits (Figure 8). The peat is predominantly underlain by sediments of the Hinuera Formation. The Hinuera Formation consists of Late Pleistocene River deposits including cross-bedded pumice sand, silt and gravel with interbedded peat.



LEGEND

- Northern Block
- Southern Links Boundary
- 1m Contours



Scale 1:30,000 @ A4

Coordinate System: NZGD 2000 Mount Eden Circuit

WGA

Figure 8

Southern Links Stage 1
Underlying Geological Units

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Geotechnical investigations to determine near surface lithologies across the site have been conducted by CMW Geosciences (CMW) and documented in a separate report (CMW, 2026). Extracts from the CMW report are provided in Appendix A to support the hydrogeological assessment for the Site. The CMW report identifies the presence of imported gravel fill in the yard areas and the elevated areas of uncontrolled fill, specifically a waste storage site in the north-eastern corner of the site (Map and cross sections provided in Appendix A). A summary of the underlying geology interpreted from the CMW site investigations is presented in Table 1.

Table 1: Stratigraphic Units of the Northern Block (CMW 2026)

UNIT	TOP OF UNIT (mbgl)		THICKNESS (m)	
	Min	Max	Min	Max
Stiff to very stiff clayey silt and medium dense sand. Construction and landfill waste in the area of "Latham's Mountain" (Uncontrolled Fill)	0.0	0.2	0.5	3.2 ⁽¹⁾
Firm to very stiff fibrous organic peat (Holocene Swamp Deposits)	0.1	1.0	0.3	12.0
Loose to medium dense sand with interbedded stiff to very stiff silt, and lenses of organic silt (Hinuera Formation)	0.1	7.0	3.3	17.5
Stiff to hard clay/silt and dense to very dense sand (Walton Subgroup)	5.2	19.8	0.2	>14.8

Note: 1) Investigation holes were unable to penetrate full depth of fill. Based on interpreted natural ground contours, the maximum thickness of uncontrolled fill in the construction waste storage area is likely to be in the order of 19 m.

2.6 Local Hydrogeology

2.6.1 Recharge

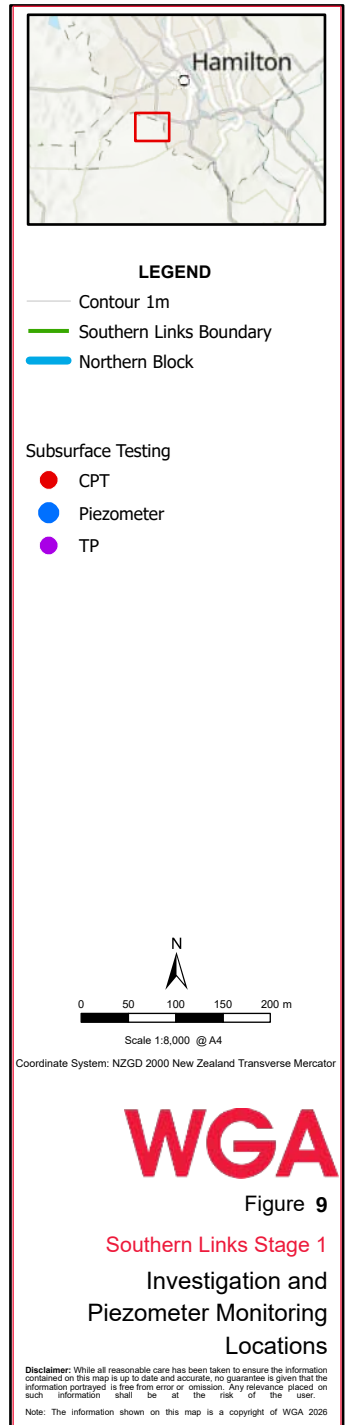
The shallow groundwater and surface waterbodies of the catchment are predominantly recharged directly by local rainfall. Annual recharge (soil drainage) is generally expected to be in the range of 235 mm to 428 mm¹. For the purposes of this assessment, a recharge rate of 350 mm per year has been used in WGA's groundwater modelling, to assess potential effects under elevated groundwater levels within the peat.

2.6.2 Hydrogeological Parameters

In December 2025, WGA oversaw the installation of four piezometers (Figure 9). Piezometers P1, P2, P3 and P4 were installed to a target depth of 6 m. Drilling samples were logged on-site by CMW in order to have consistent results with other geological tests undertaken at the site. Drill core photos and drillhole logs are provided in Appendix A.

¹ WRC estimates that rainfall recharge is 22% to 40% in the Waikato region. Based on the normal annual rainfall for Waikato of 1,072 mm, this results in a recharge rate of 235 mm to 428 mm.

[https://www.waikatoregion.govt.nz/environment/water/groundwater-monitoring/flow5a-report/#:~:text=Pr%20%3D%20estimate%20of%20rainfall,percent\)%20in%20the%20Waikato%20region.](https://www.waikatoregion.govt.nz/environment/water/groundwater-monitoring/flow5a-report/#:~:text=Pr%20%3D%20estimate%20of%20rainfall,percent)%20in%20the%20Waikato%20region.)



The surficial geological unit encountered across the site was a peat layer of Holocene Swamp Deposits. Beneath the peat, each piezometer intersected fine silt and sand, also interpreted to be of Holocene Swamp Deposits. Piezometers P1 and P2 were screened in the Holocene Swamp Deposits. Piezometers P3 and P4 were screened in the clays, silts and sands of the upper Hinuera Formation beneath the Holocene Swamp Deposits.

Hydraulic conductivity values for the Holocene Swamp Deposits and Hinuera Formation were estimated from slug tests completed in the screened intervals of the four piezometers. Both falling-head and rising-head tests were performed on each piezometer and the data from each analysed. The average hydraulic conductivity for each lithology and location is summarised in Table 2, with the full analyses provided in Appendix C.

Table 2: Hydraulic Conductivity Values from Testing of Northern Block Sediments

MATERIAL NAME	LOCATION	HYDRAULIC CONDUCTIVITY RESULT/RANGE (m/s)	ADOPTED HYDRAULIC CONDUCTIVITY FOR MODELLING (m/s) ⁽³⁾
Unsaturated zone ⁽¹⁾ (Peat)	CMW Soakage Test Sites	SO1 = 5.95×10^{-7} SO2 = 2.44×10^{-6} SO3 = 1.36×10^{-6}	4.48×10^{-7}
Peat, low plasticity. (Holocene Swamp Deposits) ⁽²⁾	P2	2.04×10^{-8}	
Peat, low plasticity and fine to coarse sands. (Holocene Swamp Deposits) ⁽²⁾	P1	1.02×10^{-5}	N/A
Interbedded fine to coarse sands and silt, low plasticity. (Hinuera Formation) ⁽²⁾	P3	1.26×10^{-4}	2.79×10^{-5}
Interbedded clayey organic silt, fine to coarse sands and minor gravel. (Hinuera Formation) ⁽²⁾	P4	6.17×10^{-6}	

Notes: 1) CMW soakage tests (CMW 2026). At 1 m depth it is assumed this could be considered for unsaturated zone in peat or potential shallow groundwater in peat.
2) Average result derived from WGA aquifer hydraulic slug testing.
3) Geometric mean of all Kh results available.

Soakage tests in the unsaturated zone undertaken by CMW also recorded low soakage rates (Table 4). Full documentation of these tests is provided in the CMW Geotechnical Investigation Report (2026).

Preloading and compaction of peat within roading and infrastructure corridors is expected to reduce peat porosity and hydraulic conductivity relative to current conditions in the Holocene Swamp Deposits (Table 4). Because the modelling in this report uses pre-compaction hydraulic conductivity values, groundwater inflows and drawdown effects for construction dewatering in preloaded areas are likely to be overestimated. No reduction factors have been applied at this stage because the extent of peat compaction and the resulting change in permeability have not yet been confirmed. This approach is conservative for assessing dewatering effects.

2.6.3 Groundwater Levels

WGA installed pressure transducers in all four piezometers to record fluctuations in groundwater levels from January 28 to February 23, 2026 (Appendix B). At the time of reporting, devices remain down-hole, and monitoring has continued beyond the timeframe specified in this report. The continuous monitoring showed similar responses in groundwater levels from each bore (Figure 10).

Water level measurements were also made by CMW at numerous investigation sites in November 2025 (Appendix B) and were acknowledged by WGA staff during assessments.

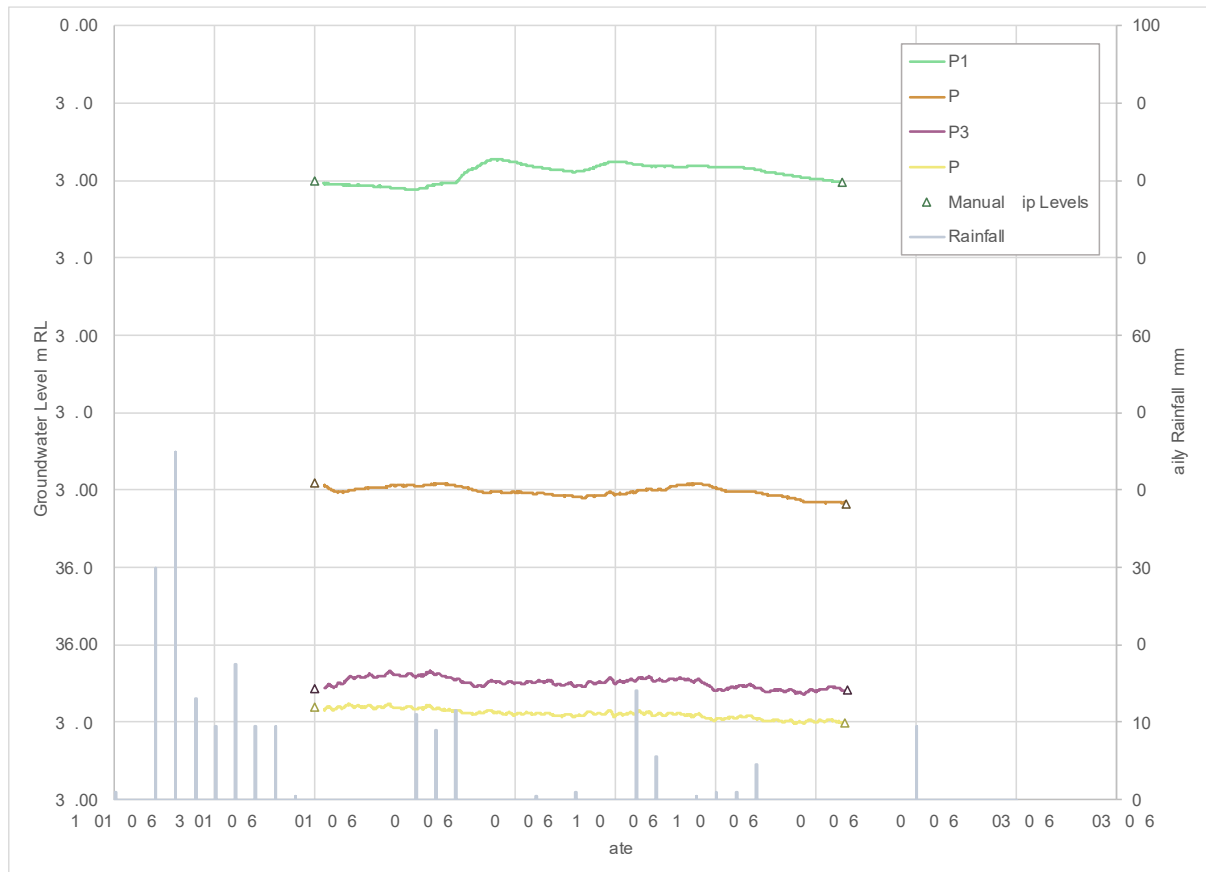


Figure 10: Groundwater Level Responses in the Northern Blocks Piezometers

Despite rainfall being the predominant recharge source, the silty, peaty strata did not show a clear consistent response to rainfall events (Figure 10). This lack of response may be because the largest rainfall event during the two-month monitoring period was only 14 mm.

Due to the nature of the uncontrolled fill placed in the “Latham’s Mountain” area of Northern Block, it was not possible to obtain groundwater level measurements in this area. Therefore, piezometric maps for the Northern Block either exclude this area or use extrapolations to provide an indication of groundwater levels (refer to Section 2.6.4).

2.6.4 Ground and Surface Water Flow Paths

Groundwater flow across the Northern Block has been interpreted using a combination of subsurface piezometric data and surface water observations. Due to the effects of extensive peat drainage across the Site, two piezometric maps have been produced for the purposes of this assessment, as described below.

The first piezometric surface (Figure 11) represents groundwater levels measured by WGA and CMW within the Northern Block. As the groundwater monitoring was undertaken during a dry summer period, continuous water level records from these piezometers were compared with the longer-term monitoring record from the Southern Block to infer a representative winter piezometric surface (Figure 8). This saw an increase of 0.5 m in groundwater levels. Inclusion of an interpreted winter piezometric surface is important for characterising the seasonal upper bound of groundwater levels and provides a conservative basis for the assessment, notwithstanding the absence of direct winter monitoring data from the Northern Block.

The second piezometric surface, which represents the free phreatic surface (Figure 12), is derived from water level observations in long-standing artificial drains. These observations suggest that the phreatic surface within the peat is shallower than the piezometric surface described above. Water levels recorded in farm drains during November were approximately 0.5 m bgl, which is shallower than the groundwater levels measured in the piezometers and therefore not represented by that monitoring network. Together, these observations indicate that a shallow phreatic surface occurs within the peat deposits and reflects near-surface groundwater conditions across the Site. Figure 12 therefore represents a conceptual phreatic surface occurring at approximately 0.5 m below existing ground level under the current drainage regime.

Both groundwater surfaces are therefore considered in subsequent assessments:

- The deeper piezometric surface (Figure 11), representing sub-peat groundwater flow conditions.
- The shallow phreatic surface (Figure 12), representing local, drainage-controlled groundwater conditions within the peat.

The difference in water levels between the shallow phreatic surface and the deeper piezometric surface represents a vertical hydraulic gradient across the site. This gradient reflects downward leakage from the shallow, drainage-controlled groundwater into the underlying aquifer, with the magnitude of the gradient controlled by the low hydraulic conductivity of the peat.

2.6.5 Shallow Groundwater Assumptions

For the purposes of this report, shallow groundwater levels (phreatic surface) have been utilised as the basis for most of the following site dewatering assessments. This approach is conservative for the assessment of construction-phase effects, as most infrastructure within pre-loaded areas will be installed within this shallow groundwater zone. It is possible the shallow (phreatic surface) groundwater will not be intersected by excavations during dry construction conditions.

Peat compaction associated with pre-loading may locally modify shallow groundwater conditions by reducing storage capacity and vertical permeability within the peat sequence. In some locations, this process may result in a relative raising of the shallow phreatic surface with respect to ground level once pre-loading is completed.



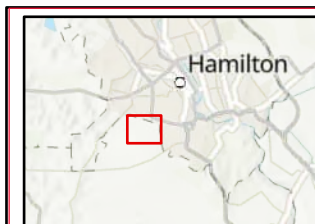
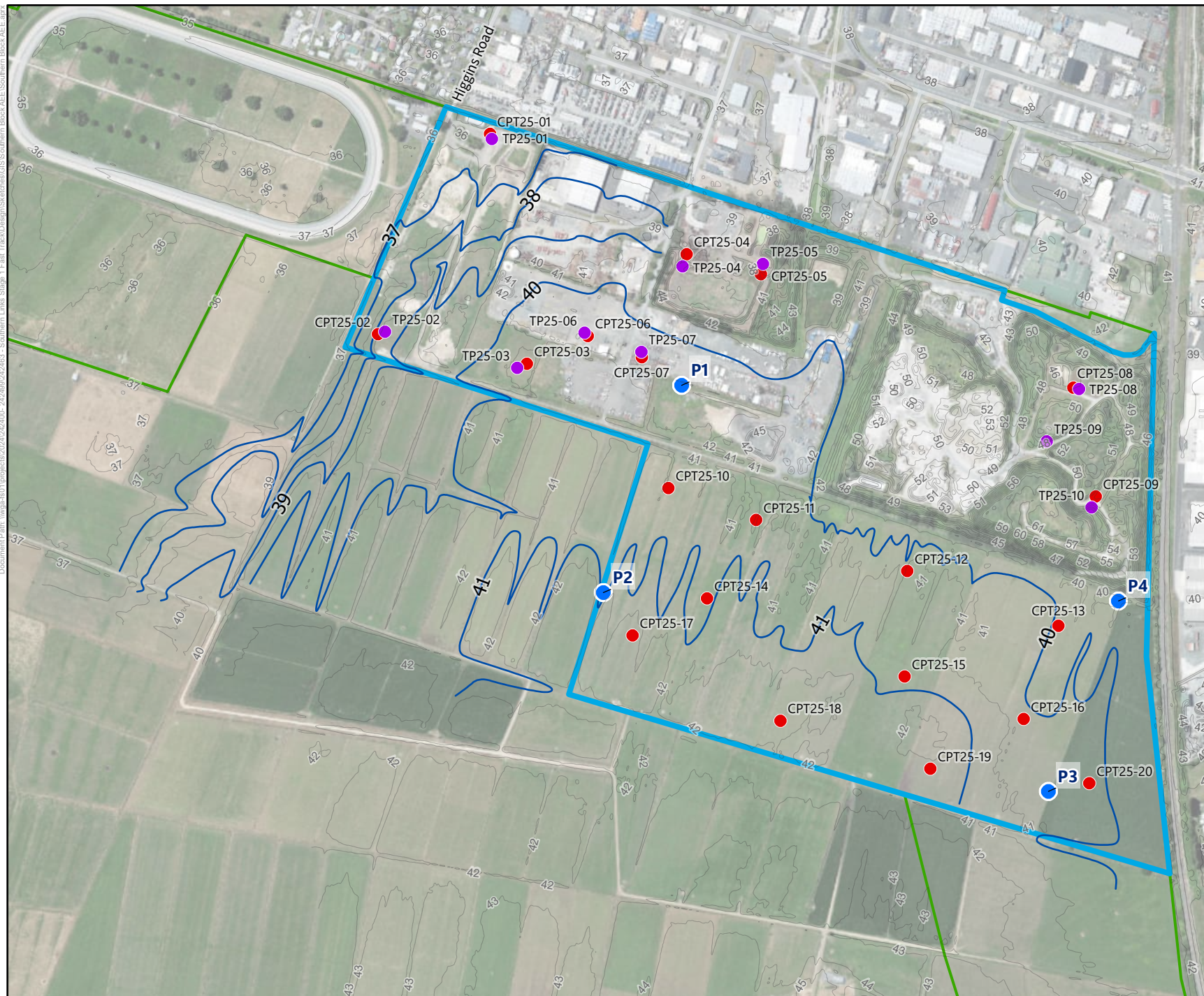
Figure 11

Southern Links Stage 1

Investigation Locations
Piezometric Surface
Groundwater Monitoring

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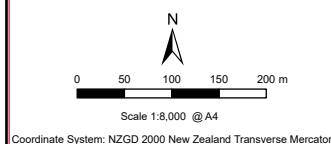


LEGEND

- Shallow Groundwater Table
- Contour 1m
- Southern Links Boundary
- Northern Block

Subsurface Testing

- CPT
- Piezometer
- TP



WGA

Figure 12
Southern Links Stage 1
Shallow Phreatic Surface

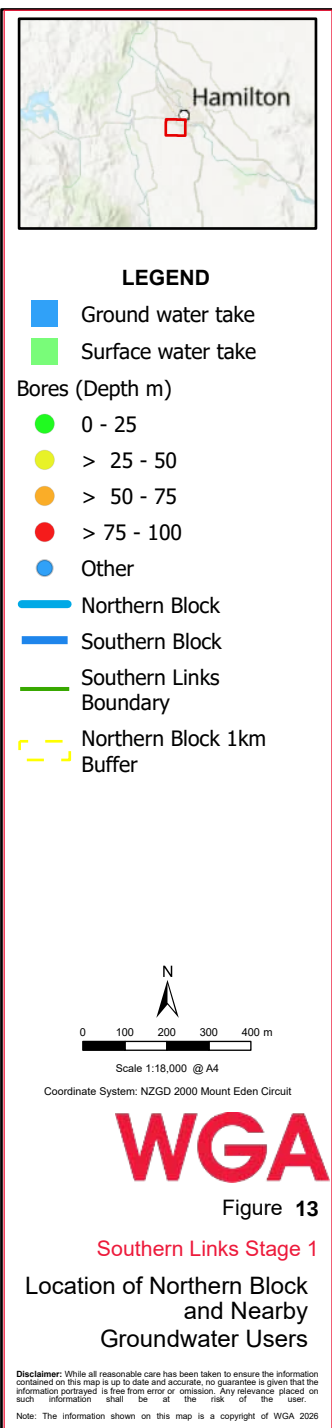
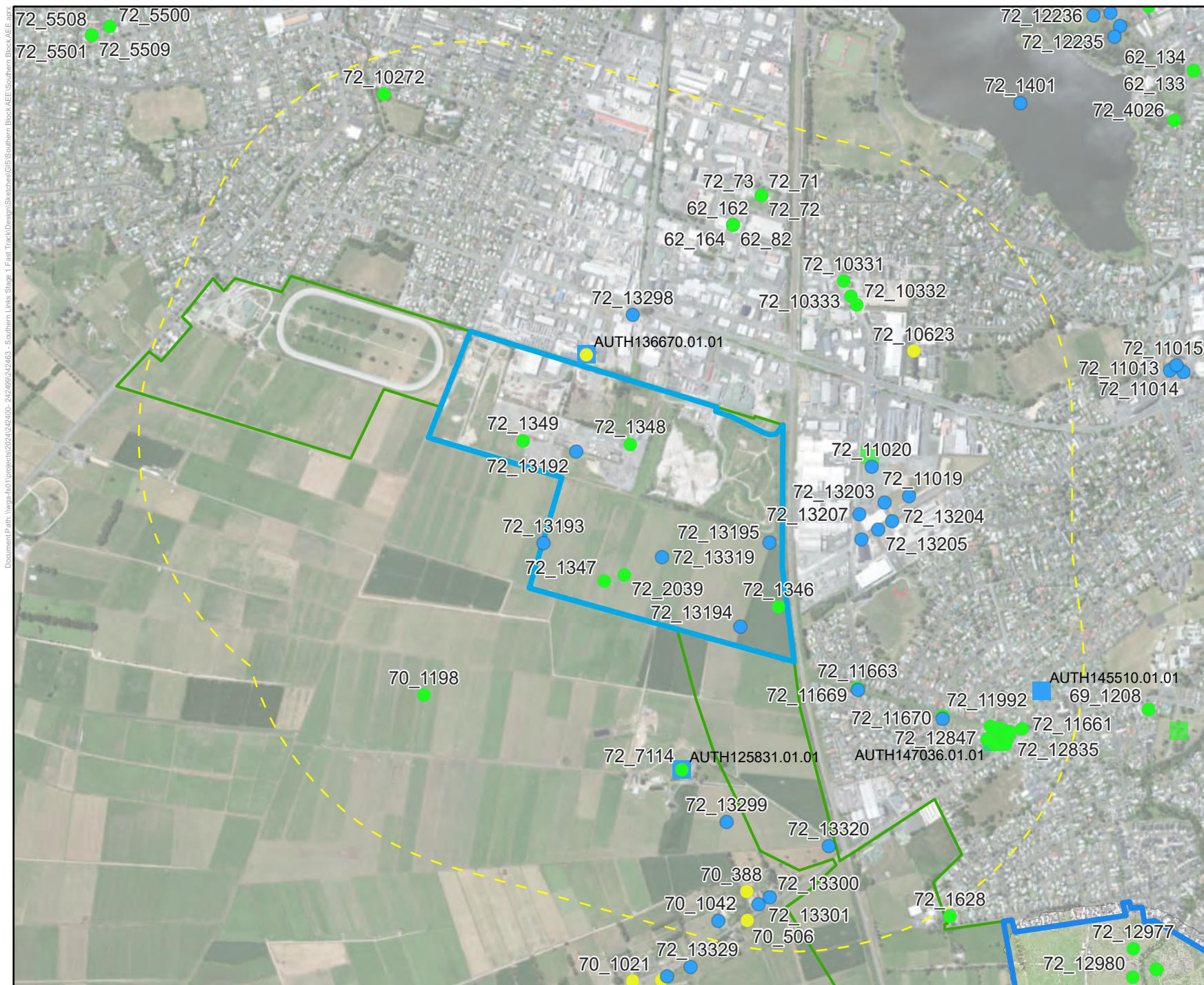
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2.7 Surrounding Groundwater Users

According to the WRC database, there are four groundwater abstraction consents linked to bores located within a 1 km radius of the Northern Block site boundary (Figure 13). Of these, one is related to agriculture, one is related to potable water supply and the remaining are related to a site dewatering programme that is considered to be a 'zero' net take (Table 3).

Table 3: Nearby Groundwater Takes

CONSENT NUMBER	USER	PERMITTED VOLUME (m ³ /day)	PURPOSE
AUTH125831.01.01	J B Ford Limited	31.5	Agricultural farming - dairy
AUTH136670.01.01	Enviro NZ Services Limited	85	Water supply - municipal/community
AUTH145510.01.01	Hamilton City Council AECOM New Zealand Limited (Auckland) (Holders' Representative)	0	Land development (Dewatering)
AUTH147036.01.01	Hamilton City Council Potentialis Limited (Holders' Representative)	0	Land development (Dewatering)



3 GROUNDWATER DRAWDOWN AROUND ARTIFICIAL WETLANDS

3.1 Introduction

Three stormwater wetlands are proposed within the Northern Block development (Figure 3 and Appendix D). To assess their potential hydrogeological effects, WGA considered two groundwater conditions and evaluated both construction and operational scenarios.

Groundwater conditions considered for the following assessment are:

- a shallow phreatic surface for dewatering impacts
- a deeper piezometric surface for mounding impacts

Wetland-specific considerations:

- **Stormwater Wetland 2** is to be constructed into engineered fill, which will be emplaced to a height of approximately 2 metres in the wetland area. The wetland basin is to be excavated to an elevation of 40.20 m RL, which is approximately 2 m below the current ground surface (Figure 12). The basin floor is below the interpreted local winter phreatic groundwater surface (Figure 12). However, the phreatic surface is currently maintained at an artificially low level by intensive drainage. Many of these drains are expected to be infilled during placement of the engineered fill. Reduction in the intensity of drainage may therefore result in the winter phreatic surface rising to be within the engineered fill.

This wetland basin may intercept groundwater and receive small groundwater inflows from within the engineered fill during operation. However, the flow rates are expected to be small due to the compacted nature of the fill. Any drawdown of the phreatic table within the fill would not result in a drawdown of groundwater levels below the current phreatic surface.

Construction of the wetland may require temporary localised dewatering of the peat to maintain a dry working depth of 1 m below the basin invert (as requested by Maven, pers comm 12 May 2026).
- **Stormwater Wetlands 1 and 3** are proposed to intersect peat and, under winter conditions, may intercept shallow groundwater within the peat. Construction may also require dewatering to maintain a dry working depth of 1 m below the basin invert.

WGA undertook analytical pit modelling to estimate anticipated groundwater inflows and the extent of temporary drawdown associated with the proposed stormwater wetlands, including potential effects on neighbouring properties. The assessment conservatively considered:

- Operational groundwater inflow to Stormwater Wetlands 1 and 3 from a potential shallow groundwater table within the peat; and
- Temporary groundwater drawdown associated with construction dewatering to approximately 1 m below the basin inverts for Stormwater Wetlands 1, 2 and 3.

The groundwater modelling is based on site-specific hydrogeological parameters derived from on-site testing (Section 2.4) and wetland design information provided by Maven (Appendix D).

3.2 Analytical Pit Modelling Methodology for Stormwater Wetlands

The assessment has been undertaken using a published method of estimating groundwater inflows to open-cut pits (Marinelli & Niccoli 2000). This methodology uses analogue equations to approximate horizontal groundwater inflows through the sides of the pit and vertical groundwater inflows through the floor of the pit (Appendix E).

The equations applied in this method assume laterally radial groundwater flows toward a circular pit. In applying this methodology to the proposed stormwater wetlands, each wetland layout is simplified by converting to an equivalent circular pond. This has been done by taking the full footprint area of the wetland, including forebays and rain gardens, assuming the area is circular and calculating the radius of the “equivalent” area (Table 4). To assess inflows during the construction phase, the base of each Stormwater Wetland has been modelled as dry, with active dewatering to 1 m below the invert. Each model used surrounding conservative shallow phreatic groundwater levels as the starting conditions to identify peak potential inflow rates. The methodology applied to assess the construction dewatering rates and extent of effects is generic and takes no account to the field techniques used to achieve the required dewatering.

For long-term scenarios, Stormwater Wetlands 1 and 3 have been modelled with an operational ‘pit lake’ representing the potential intersecting shallow groundwater in the peat (Table 5). For Stormwater Wetland 3, the proposed pit depth has now been revised to 38.10 mRL, which extends the excavation below the interpreted base of the peat. WGA has nonetheless retained the existing pit model for this assessment because it accounts for the saturated peat sequence, while underdraining of the Hinuera Formation occurs, until the piezometric groundwater level is intersected at approximately 36 m RL. On that basis, the existing model is considered appropriate for estimating drawdown effects associated with the revised depth.

Table 4: Inputs for Construction Dewatering Pit Models

STORMWATER WETLAND	WINTER GROUNDWATER LEVEL (mRL) ⁽¹⁾	DESIGN INVERT ELEVATION (mRL) ⁽²⁾	DEWATERED GROUNDWATER ELEVATION FOR DRY CONSTRUCTION (mRL) ⁽³⁾	DESIGN AREA AT RIM (m ²) ⁽²⁾	EFFECTIVE PIT RADIUS (m) ⁽²⁾
1	35.50	33.10	32.10	2,289	26.9
2	41.5	40.20	39.20	11,008	59.2
3	40.7 ⁽⁴⁾	38.10	39.2 (base of peat)	10,455	57.7

- Notes:**
- 1) Based on conservative shallow phreatic surface (Figure 12)
 - 2) As provided by Maven Ltd (pers. comm., 8 June 2026)
 - 3) As provided by Maven Ltd (pers. comm., 6 March 2026)
 - 4) Assuming ponded area is treated as a circle
 - 5) Extrapolation of phreatic surface in Peat in BH_152683, due to lack of data from “Latham’s Mountain” area of the site.
 - 6) Assumption all 3 stormwater wetlands are unlined.

Table 5: Input for Long-Term Groundwater Inflow Pit Models

STORMWATER WETLAND	WINTER GROUNDWATER LEVEL (mRL) ⁽¹⁾	DESIGN INVERT ELEVATION (mRL) ⁽²⁾	MAVEN DESIGNED PERMANENT OPERATIONAL WATER LEVEL (mRL) ⁽²⁾	DESIGN AREA AT RIM (m ²) ⁽²⁾	EFFECTIVE PIT RADIUS (m) ⁽²⁾
1	35.50	33.10	34.80	2,289	26.9
2	41.50	40.20	41.70 ⁽³⁾	11,008	59.2
3	40.70 ⁽⁴⁾	39.2 (saturated base of peat) occurs above invert 38.10	39.60	10,455	57.7

Notes: 1) Conservative shallow phreatic surface (Figure 12)
2) As provided by Maven Ltd (pers. comm., 8 June 2026)
3) Not assessed as only small inflows may occur from within engineered fill, due to PWL height above winter groundwater level.
4) Assuming ponded area is treated as a circle
5) Extrapolation of phreatic surface in Peat in BH_152683, due to lack of data from “Latham’s Mountain” area of the site.
6) Assumption all 3 stormwater wetlands are unlined and will act as recharge points to the peat.

3.3 Results

The projected groundwater inflow and drawdown effects have been modelled for Stormwater Wetlands 1, 2 and 3, (as detailed in Appendix E) and the results summarised in Table 6. The groundwater inflows (groundwater abstraction during construction) at each of the Stormwater Wetlands have been calculated assuming the drawdowns generated by each of the wetlands do not intersect during individual basin construction. The radius of groundwater drawdown influence and the groundwater inflows are presented separately for construction (dry pit) and for long-term (operational) effects in Table 6.

The key points arising out of this drawdown assessment are:

1. The calculated drawdown relating to both the construction and the long-term operation of each wetland does not extend outward far enough to significantly impact the nearest buildings (Table 6).
2. The calculated groundwater inflow for each of the scenarios considered is less than 12 m³/day (0.14 L/s). This flow rate is not expected to make a significant difference to flows in any receiving drain, unless the drain was initially dry during the construction period.
3. The drawdown assessments were conducted using groundwater levels from the interpreted shallow phreatic surface as a starting condition to provide estimates of inflows and drawdown extents. Therefore, the calculated results are considered to represent conservatively large outcomes.
4. It is likely wetland construction would occur during a summer period when earthmoving operations and water management would be easier. The groundwater levels are reasonably expected to be lower during such periods, with correspondingly reduced requirements for groundwater drawdown and abstraction rates.

Table 6: Projected Effects of Proposed Stormwater Wetlands

STORMWATER WETLAND	SCENARIO	INITIAL SATURATED THICKNESS ABOVE BASIN FLOOR (m)	DEWATERING REQUIRED (m) ⁽³⁾	RADIUS OF DRAWDOWN INFLUENCE (m) ^(1,2)	CALCULATED GROUNDWATER INFLOW (m ³ /day) ⁽²⁾	DRAWDOWN AT NEAREST BUILDING (m)	DISTANCE TO NEAREST BUILDING FROM PIT EDGE (m)
Wetland 1	Winter Construction Dry	2.4	3.4	47	9	0	28
	Winter Operational Groundwater Inflow	2.4	0.7	37	3	0	28
Wetland 2	Winter Construction Dry	1.3	2.3	73	12	N/A	N/A
	Winter Operational Groundwater Inflow	1.3	0	N/A	Not assessed. Only small inflows may occur below the permanent operational water level.	N/A	N/A
Wetland 3	Winter Construction Dry	1.5 (peat thickness)	1.5	67	8	0	37
	Winter Operational Groundwater Inflow	1.5 (peat thickness)	1.1	67	6.5	0	37

Notes: 1) Radius of influence considered to be defined by 0.25 m drawdown.

2) Drawdown extents and inflows do not take account of changes in permeability such as Walton Subgroup sediments underlying the Hinuera Formation. Assumption all 3 stormwater wetlands are unlined and will act as recharge points to the peat.

3) Winter Construction for dry conditions, includes 1 m dewatering below invert.

4 GROUNDWATER MOUNDING FROM ARTIFICIAL WETLANDS

4.1 Introduction

Stormwater runoff from much of the Northern Block is to be directed to the three proposed stormwater wetlands. Of these, Stormwater Wetland 3 is proposed to be excavated through the peat such that the invert is underlain by the Hinuera Formation. In the scenario where a phreatic surface within the peat does not exist, Wetland 3 has the potential to increase groundwater levels to approximately 3.6 m above the deeper piezometric surface (36 m RL Figure 11). Should this occur, there is potential for groundwater mounding beneath the basin invert. Due to the proximity of proposed Stormwater Wetland 3 to neighbouring buildings and the railway, groundwater mounding simulations have been undertaken to evaluate potential groundwater table mounding in the surrounding area. These simulations are intended to reflect wetland operation during a storm event or continuous wet period. The analysis methodology and results are summarised in this section, with the detailed analyses presented in Appendix F.

WGA understands that Proposed Stormwater Wetlands 1 and 2 do not require similar assessments as:

- Proposed Stormwater Wetland 2 has no current infrastructure of concern in the close vicinity.
- Proposed Stormwater Wetland 1 is unlikely to have an unsaturated zone beneath it that would exceed natural groundwater fluctuations. Additionally, Stormwater Wetland 1 directly neighbours a drain that should reduce any risk of mounding impacts.

Stormwater Wetland designs have been provided by Maven (2026). A copy of the design drawings for the proposed basins is presented in Appendix D.

4.2 Methodology for Mounding Assessment on Stormwater Wetland 3

Mounding assessments documented in this report 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.

For the mounding assessments undertaken at proposed Stormwater Wetland 3, two scenarios were modelled:

1. Simulation of an extreme continuous recharge period of one day.
2. Simulation of a prolonged continuous recharge event of 30 days with a 335-day recovery period.

Assumptions applied in each simulation with respect to the aquifer characteristics for the transient solutions are:

- Aquifer properties (horizontal hydraulic conductivity, specific yield, and dip) are homogeneous and isotropic and remain constant over time.
- Saturated thickness of the aquifer is uniform and constant prior to the start of the recharge event.
- There is no potential confining layer above the receiving aquifer.
- The infiltration rate over a rectangular recharge source is uniform and constant.
- The aquifer base has a constant slope.

For the purposes of modelling both short term and long-term scenarios, it has been assumed that water levels within the basin do not exceed the permanent water level (39.60 m RL Maven pers comm. 2026).

The average number of rain days through the winter months of a year recorded by the long-term climate station at Hamilton (NIWA Hamilton, AWS rainfall station 2122) is approximately 30. The 30-day model incorporates an assumption that all the average winter rainfall/inflow occurs within one continuous period. This is a conservative basis for modelling, as it assumes a high frequency of rain events and does not allow time for ponded water levels to drop between rainfall events. In reality, water levels will fluctuate, and the ponded water will often drain down between rainfall events, resulting in less mounding.

The interpreted winter phreatic surface (Figure 12) is at or above each of the floor elevations for the planned wetlands. This feature implies that it is likely the wetlands will contain water continuously through the winter months, even if there are extended periods of no rain.

The infiltration rate applied to each model is the rate that results in the mounding reaching the permanent water level (overflow invert elevation provided by Maven pers comm. 2026) by the end of the storm event/wet period. In considering the scenarios, the infiltration rates would initially be high. However, these rates will drop off substantially as the groundwater mounding starts to reach the floor of the basin. Consequently, the Scenario 2 infiltration rates are much lower than the Scenario 1 (one-day event) infiltration rates.

Stormwater Wetland 3 is proposed to have an invert level of 38.10 m RL. On that basis, this wetland would intersect the Hinuera Formation, as indicated by the Hinuera Formation intersected in nearby BH_152683. Therefore, the hydraulic conductivity value for the Hinuera Formation (Table 2) has been used for the Stormwater Wetland 3 mounding simulations. This focus on the soakage acceptance potential for the saturated aquifer only results in a conservatively low projection of recharge rate.

4.3 Mounding Assessment Results

Results for the two modelling scenarios are reported in Appendix F and summarised in Table 7. Overall, the modelling indicates that mounding induced by Stormwater Wetland 3 reduces with increasing distance from the centre of the wetland, with substantially smaller effects predicted at nearby infrastructure:

- The highest modelled mounding occurs beneath Stormwater Wetland 3, at 3.6 m for Scenario 1 and 3.6 m for Scenario 2.
- During the 335-day recovery period modelled for Scenario 2, mounding at Stormwater Wetland 3 reduces to 0.23 m.
- Figure 14 shows that peak mounding occurs at about day 50, following the 30-day wet period. Maximum modelled mounding at nearby infrastructure remains below 1 m in all reported cases for the 30-day wet period and recovery scenario.

Table 7: Summary of Mounding Assessment Results for Stormwater Wetland 3

MODEL OUTPUT	SCENARIO 1: 1 DAY EVENT	SCENARIO 2: 30 DAY WET PERIOD	SCENARIO 2: 335 DAY RECOVERY ⁽¹⁾	NOTES
Modelled Infiltration Rate (m/day)	0.72	0.04 (total of 1.2 m over 30 days)		Modelled with water levels in the basin reaching the permanent water level (outflow point).
Modelled Mounding at Stormwater Wetland 3 (m)	3.6	3.6	0.23	
Maximum Modelled Mounding at Neighbouring Infrastructure (m)	< 0.01	0.49	0.21	Northern Building
	< 0.01	0.39	0.21	Railway Line
	< 0.01	0.14	0.19	Eastern Building

Notes: 1) This residual mound should not be interpreted as cumulative between seasons (i.e. successive increases of ~0.2 m), but rather as a conservative representation using MOUNDSOLV software. Refer to Appendix F for a more detailed explanation.

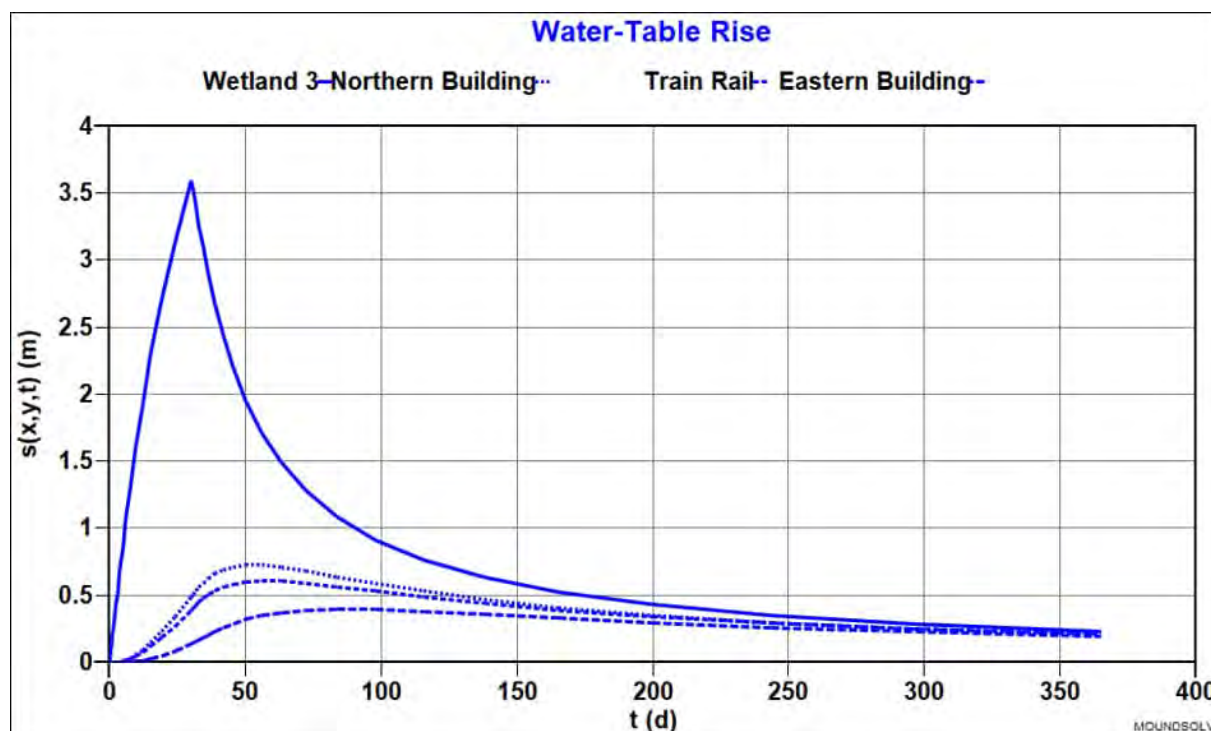


Figure 14: Groundwater Hydrographs from Stormwater Wetland 3 in Response to 30 Day Event

5 GROUNDWATER DRAWDOWN FROM WASTEWATER AND DRAIN INFRASTRUCTURE

5.1 Introduction

WGA has modelled the construction dewatering, drawdown and inflow assessments for wastewater pipelines, wastewater pump stations and drains or swales. The modelling used hydrogeological parameters from on-site testing (Section 2.4) and the updated design provided by Maven for wastewater pipeline design locations and depths and wastewater pump station locations (Appendix D and Appendix G).

The assessments have been undertaken assuming existing hydraulic properties of the peat. Where infrastructure is located within areas subject to peat pre-loading, these assessments are considered conservative, as peat compaction is expected to reduce hydraulic conductivity and limit groundwater inflows during excavation. While peat compaction may result in localised changes to shallow groundwater levels, including potential increases in groundwater level relative to ground surface, these changes are not expected to result in materially greater adverse effects than those assessed, given the temporary nature of dewatering activities. Wetland areas (assessed in Section 3) are not currently proposed to be pre-loaded and have therefore been assessed assuming existing peat conditions.

This assessment does not include dewatering associated with the installation of the proposed water supply pipeline, as design information for that infrastructure was not available at the time of reporting.

5.2 Drawdown Effects of Wastewater Pump Station Installation

5.2.1 Construction

Two wastewater pumping stations (WWPS) are planned for construction at the Northern Block. Engineering designs are provided in Appendix G. Consequently, WGA has made the following assumptions to support an assessment of the dewatering required to support construction of each WWPS and the associated drawdown:

- The **Northern WWPS B**, planned near Stormwater Wetland 1 (Figure 3), requires excavation to a depth of **6 m** below proposed ground level and a width of approximately **2.5 m**.
- The **Central WWPS A** (Figure 3), requires excavation to a depth of **6.5 m** below proposed ground level and a width of approximately **3.1 m**.
- Both excavations assume:
 - An additional 1 m dewatering radius for bore offset distance from excavation width. Hence, Northern WWPS B requires dewatering to a radius of 3.5 m and Central WWPS A requires dewatering to radius of 4.1 m.
 - 0.5 m of dewatering will be achieved below the excavation invert for construction purposes.
 - Respective depths should ensure excavation of the peat beneath the wet well. Should peat be encountered at greater depths, further excavation and installation of engineered fill or a drainage blanket required to stabilise the peat beneath the wet well floor for construction purposes (Maven pers comm 26 May 2026).
 - Any additional excavations required for WWPS infrastructure have been designed to have dewatering requirements similar to, or less than, the trench dewatering requirements assessed in Section 5.3 and Table 9, based on the design information provided in Appendix G.

Earthworks associated with both wastewater pumping stations will involve excavation below the groundwater table. Therefore, it has been assumed that a shield pile wall will be used to support the walls of each excavation, to minimize the excavation size and the associated groundwater dewatering required. The shield pile wall is expected to minimise horizontal groundwater inflows to the excavation from the shallowest lithologies. As the shield pile wall is expected to cut off the shallow phreatic surface within the peat, dewatering for the wet well excavation has focused on the Hinuera Formation. Therefore, the required drawdown is assessed with reference to the deeper piezometric surface beneath the excavation.

WGA has assumed that the dewatering at the base of the shield pile wall would be achieved using a single dewatering bore outside the pile wall. This bore would induce drawdown primarily from the underlying Hinuera Formation, drawing groundwater from beneath the shield piles and excavation base, although a delayed reduction in pressure within the shallow peat groundwater should also be expected.

The schedule for the construction of these pumping stations remains flexible at this stage. For the purposes of this assessment, it is assumed that installation of the wet well will require 10 days until the well is fully sealed and active dewatering can cease. For groundwater drawdown assessment purposes, dewatering has been modelled to be achieved within three days. The targeted dewatering depth is assumed to increase through the 10 day dewatering and construction period, consistent with the progressive increase in the excavation depth.

5.2.2 Shallow Aquifer Dewatering During Wet Well Excavation

The excavation dewatering has been assessed using the published Hantush-Jacob function to calculate drawdown from a pumping well under leaky aquifer conditions. The assessment accounts for a leakage coefficient using the site specific vertical hydraulic conductivity of the peat ($K_v 4.48 \times 10^{-8}$ m/s, using an anisotropy factor of 10) and the horizontal hydraulic conductivity of the silty Hinuera Formation ($K_h 2.79 \times 10^{-5}$ m/s). The geometric input parameters for the assessments are summarised in Figure 15 and Figure 16.

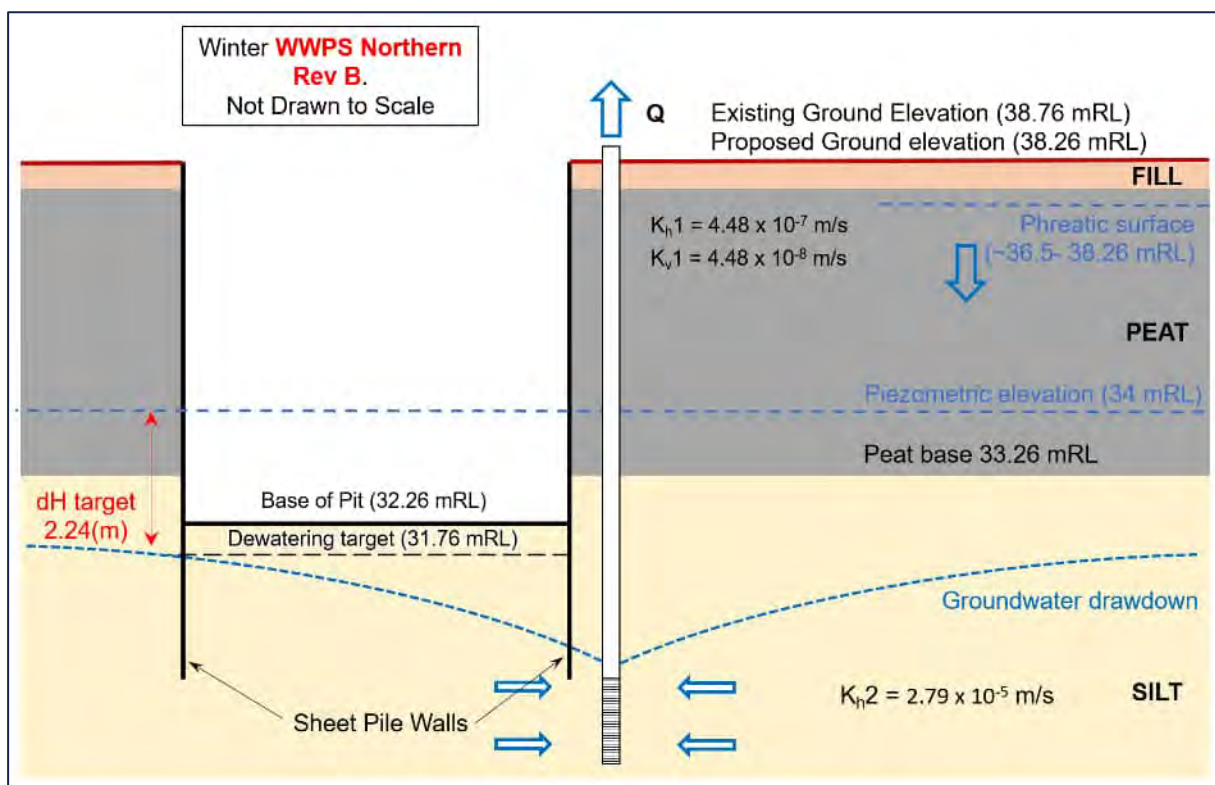


Figure 15: Conceptual Pit Dewatering Model for Proposed Northern WWPS

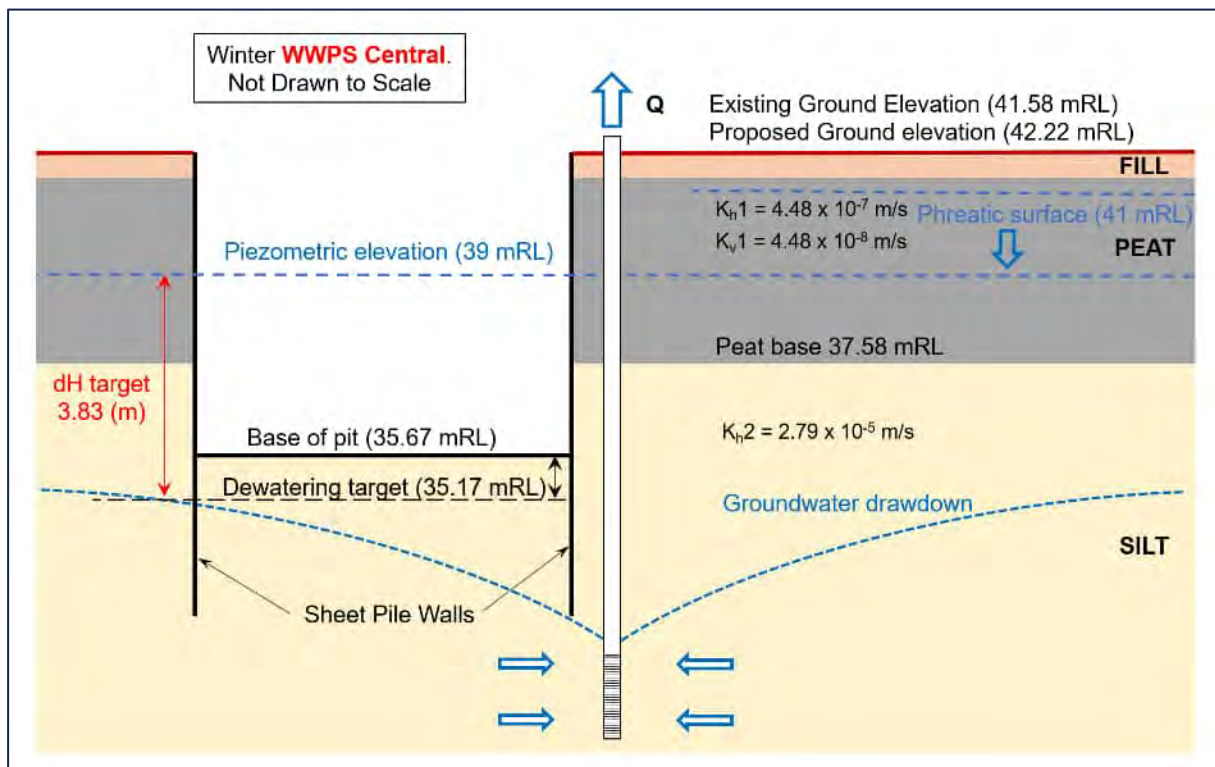


Figure 16: Conceptual Pit Dewatering Model for Proposed Central WWPS

The dewatering model applied in this assessment functions on a transient basis. The pumping rate identified in Table 8 is defined to achieve the dewatering target within three days. After that time, the pumping rate would be reduced to a rate sufficient to simply maintain the level of drawdown through the wet well construction period. On that basis:

1. The pumping rate required has been calculated based on achieving the drawdown target within three days.
2. The calculated drawdown effects in Table 8 have been assessed based on an assumed constant flow rate that would achieve the targeted drawdown over 10 days.

Table 8: Projected Effects of Wet Well Dewatering

PARAMETER	NORTHERN WWPS	CENTRAL WWPS
Static groundwater elevation (mRL)	34	39
Targeted drawdown (m) ⁽¹⁾	2.24	3.83
Pumping rate to achieve dewatering within three days (L/s)	1.65	2.97
Pumping rate to achieve dewatering within 10 days (L/s)	1.39	2.42
Calculated radius of influence after 10 days pumping (m) ⁽²⁾	57	78
Distance to nearest building (m)	100	48
Calculated drawdown at nearest building after 10 days (m) ⁽²⁾	0.06	0.66

Note: 1) Targeted drawdown required at a 1 m offset distance from excavation width. Hence, Northern WWPS B requires dewatering to a radius of 3.5 m and Central WWPS A requires dewatering to radius of 4.1 m.
2) Radius of influence is based on calculated drawdown of 0.25 m of the piezometric surface, on the assumption that pumping is continuous at a constant rate over a 10 day period.

5.3 Drawdown Effects of Wastewater Pipeline, Drain and Swale Construction.

5.3.1 Trench Modelling Methodology

Construction of the planned wastewater pipeline network will require trench excavations, some of which may extend below the shallow water table within the peat (Appendix D). There is a construction requirement that these trenches are maintained in a dry state, up to 0.5 m below the invert, until backfilling starts. WGA understands that the wastewater pipeline is likely to be constructed in 20 m sections, and that each section will be completed within a period of 10 days (M. Shon pers. comm., 24 March 2026). This guidance has been used as the basis of the groundwater drawdown and inflow modelling. The trench excavation depths have been provided by Maven to WGA (version 16 March 2026).

WGA also understand there are proposed roadside drains to be constructed across the site, which are anticipated to have an invert depth of 1 m bgl. The same approach of trench dewatering for pipelines will be applied to consider the construction of roadside drains, and additionally, an assessment of the potential shallow groundwater through-flow anticipated during operation.

An analytical modelling approach was used to calculate temporary groundwater drawdown curves and expected inflows to the trenches. The analytical model used the following equations from McWhorter and Sunada (1977), which estimate transient drawdown and groundwater inflows into trenches.

Drawdown with respect to time and distance: $s(x, t) = s_0 \cdot \text{erfc} \left(\frac{x}{2\sqrt{Tt/S}} \right)$

Inflow rate with respect to time: $Q_{TOTAL}(t) = 2s_0 \sqrt{\frac{TS}{\pi t}}$

Where:

$s(x, t)$	=	Drawdown at a defined distance from the trench after a defined time
s_0	=	Drawdown at the trench
t	=	Time since start of drawdown
T	=	aquifer transmissivity
S	=	aquifer storativity (equivalent to specific yield)
erfc	=	complementary error function
Q	=	total inflow to a one metre length of trench at a defined time drainage initiated

WGA understands that due to planned placement of engineered fill covering some areas of the site, the trenches will be constructed at varying depths with respect to existing ground levels across the Site. This means the trenches will either be excavated wholly within engineered fill or through any emplaced fill into the shallow peat. WGA has completed the following conservative scenarios for the drawdown of the shallow groundwater table within the peat (Table 9):

1. A section of 20 m trench for a 4.55 m bgl pipeline at the design level indicated for manhole inlet 1 (MH Inlet 1 as shown on Maven Design long sections drawn April 2026, Appendix D), including dewatering to 0.5 m below the drain invert, impacting the shallow phreatic groundwater table within the peat.
2. A section of 20 m trench for a 1 m bgl roadside drain (or swale) at the design ground levels (below the phreatic surface) at manhole 15 (MH 15 as shown on Maven Design long sections drawn April 2026 Appendix D), including dewatering to 0.5 m below the invert, impacting the shallow phreatic groundwater table within the peat.
3. A section of 20 m trench for a 1 m bgl roadside drain (or swale) at the design ground levels (below the phreatic surface) at manhole 15 (MH 15 as shown on Maven Design long sections drawn April 2026 Appendix D), impacting the shallow phreatic groundwater table within the peat on a permanent basis.

These locations were chosen for assessment of potential groundwater drawdown as representing the largest potential interaction between the planned trenches and the shallow phreatic groundwater table within the peat.

Table 9: Input Parameters for Trench Analytical Modelling

TRENCH FOR PIPELINE OR DRAIN/SWALE	HYDRAULIC CONDUCTIVITY (m/s)	AQUIFER SPECIFIC YIELD	NUMBER OF DAYS TRENCH OPEN	TRENCH DRAWDOWN REQUIRED (m)
Scenario 1 – Pipeline Construction	4.48×10^{-7}	0.2	10	3.91
Scenario 2 – Drain/Swale Construction				1.5
Scenario 3 – Drain/Swale Operation				1

5.3.2 Wastewater Pipeline Analytical Modelling Results

The extent of project drawdowns arising from the trench scenarios described in Section 5.3.1 are summarised in Table 10. A minimum drawdown criterion of 0.25 m, indicating the distance of influence, has been applied. Drawdown less than this value is within the expected range of uncertainty of the analysis method and is within the expected variability of groundwater levels through the winter season.

Table 10: Projected Distance of Influence from Trench or Drain Construction

TRENCH FOR PIPELINE OR DRAIN/SWALE	0.25 m DRAWDOWN DISTANCE OF INFLUENCE (m)
Scenario 1 – Pipeline Construction	9
Scenario 2 – Roadside Drain/Swale Construction	6
Scenario 3 – Roadside Drain/Swale Operation	5

The drawdown curves relating to modelled scenarios (Figure 17, Figure 18 and Figure 19) shows a relatively rapid decline in drawdown within the first 6 m to 9 m distance from the trench. Beyond that distance, the drawdown drops quickly to a level that would be effectively non-detectable.

The projected groundwater inflow rates to the simulated 20 m sections of trenches over time (Figure 20 to Figure 22) decline over time as the area of groundwater drawdown expands. The initial calculated inflows are likely to be overestimates as the equation applied assumes the 20 m trench is constructed instantaneously to its full depth.

At this stage, the number of trenching teams that may be operating concurrently has not been confirmed, and the cumulative discharge rate during construction therefore remains uncertain. The trench scenarios assessed have been selected from the Maven designs to represent locations with the greatest likely interaction with groundwater; while some overlap of drawdown effects may occur where multiple trenches are constructed at the same time, other sections of the alignment are expected to require less dewatering due to shallower excavation depths or reduced groundwater interaction.

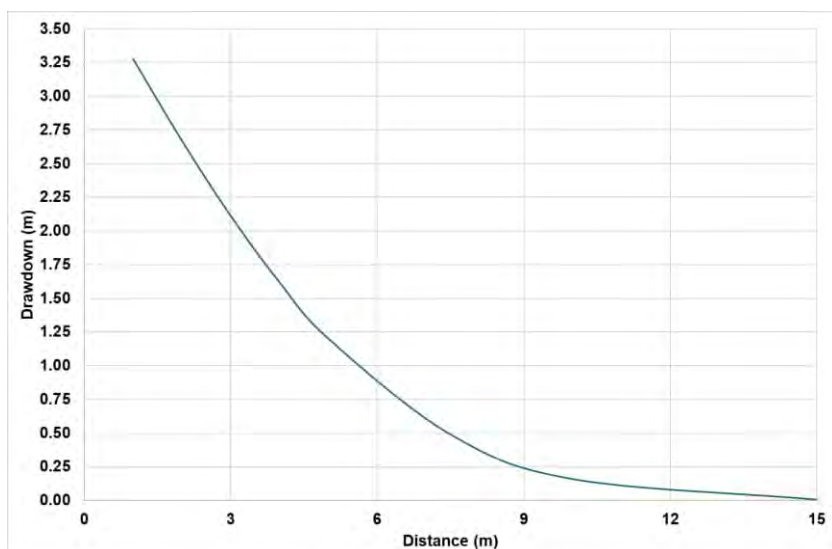


Figure 17: Scenario 1 Projected Drawdown from Wastewater Pipeline Installation

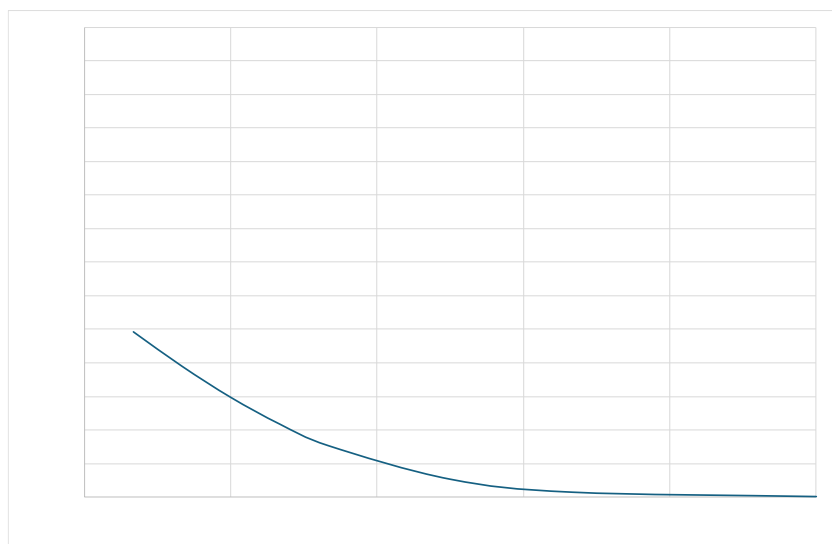


Figure 18: Scenario 2 Projected Drawdown from Drain/Swale Installation

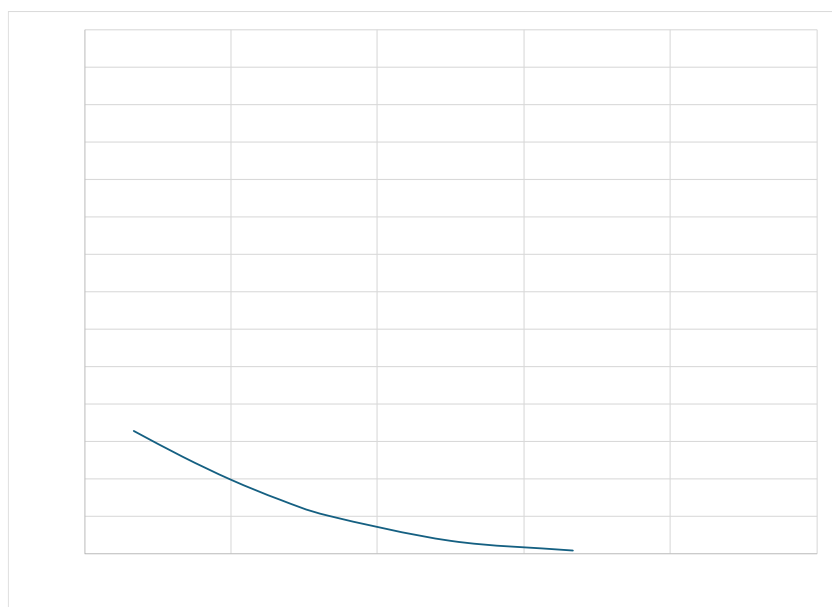


Figure 19: Scenario 3 Projected Long-Term Drawdown from Drain/Swale Installation

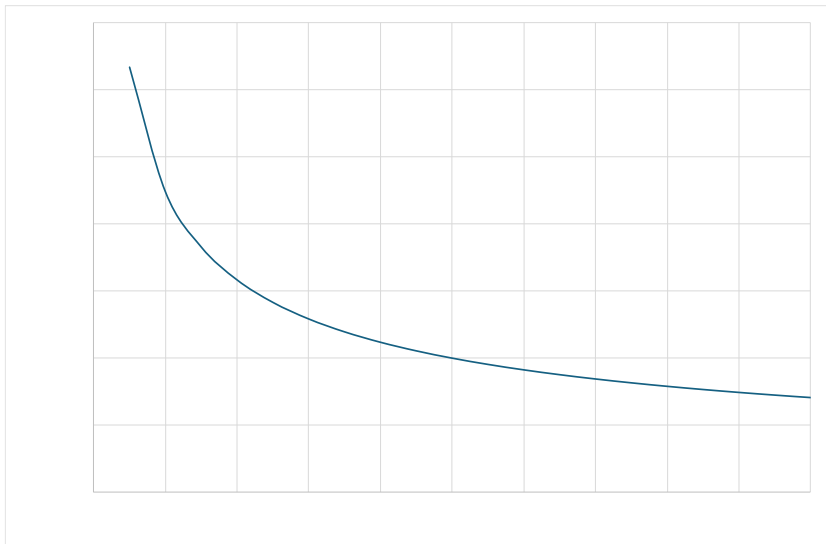


Figure 20: Scenario 1 Projected Groundwater Inflows Over Time into a 20 m Trench

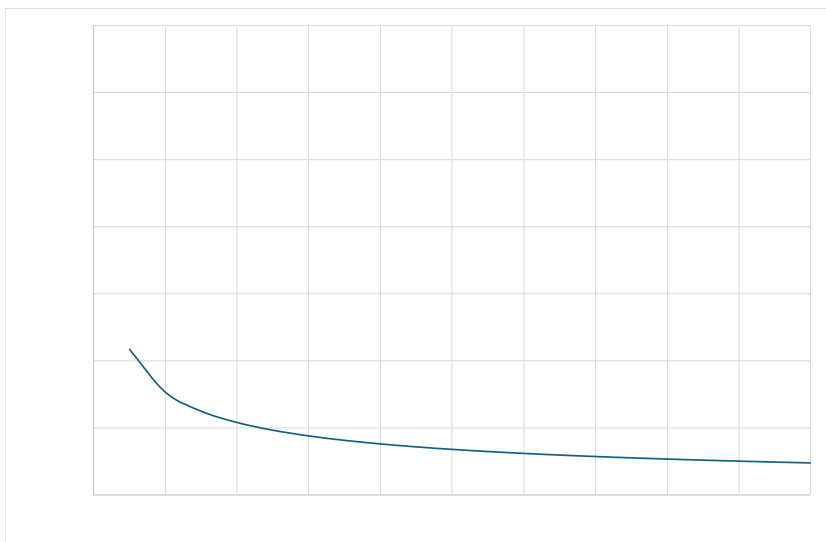


Figure 21: Scenario 2 Projected Groundwater Inflows Over Time into a 20 m Trench

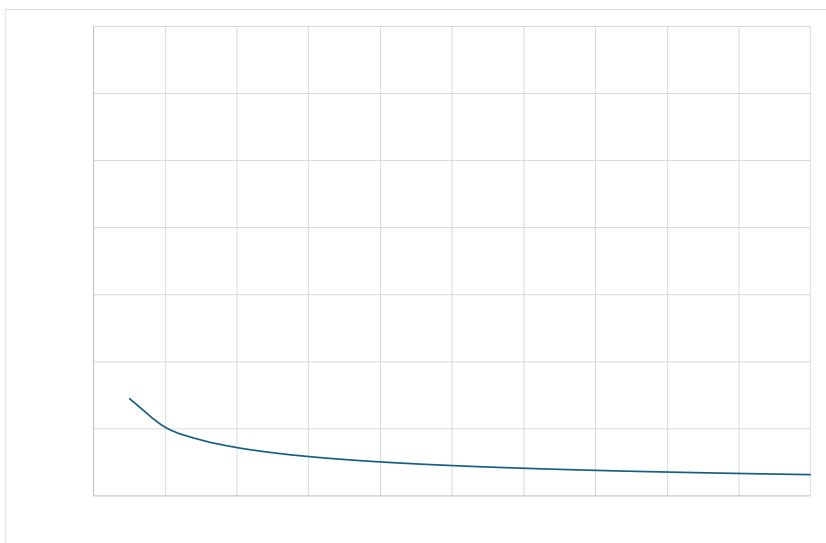


Figure 22: Scenario 3 Projected Groundwater Inflows Over Time into a 20 m Trench

6 GROUNDWATER EFFECTS ASSESSMENT

6.1 Effects Overview on Catchment Water Balance

The proposed Northern Block development includes:

- Placement of engineered fill on top of peat across much of the site.
- Pre-construction pre-loading of peat in areas of planned roading and associated infrastructure to help stabilise the ground surface in these areas.
- Construction of wastewater infrastructure and stormwater management features.

These activities have the potential to influence shallow groundwater conditions locally during construction and over the long term. However, no long-term adverse effects on the catchment-scale groundwater balance are anticipated.

Groundwater conditions across the Site are characterised by two hydrogeologically distinct surfaces. A shallow phreatic surface within the peat and a deeper piezometric surface within the underlying Hinuera Formation. Recharge to the shallow groundwater system is primarily rainfall-driven and will continue following development, although redistributed spatially through engineered drainage, fill placement, and stormwater management features. Groundwater flow across the Site is generally directed toward drains, which act as key discharge features, particularly during wetter conditions. The proposed development is not expected to alter this overall flow regime or materially affect discharge to these drains.

Peat compaction associated with pre-loading is expected to reduce the storage capacity and hydraulic conductivity of peat soils within treated areas. As a result, groundwater inflows to excavations and trenches during construction are likely to be less than those predicted using pre-compaction hydraulic parameters. The groundwater assessments presented in this report have been undertaken assuming existing (pre-compaction) peat conditions, providing a conservative representation of potential dewatering demands, drawdown effects, and groundwater interactions.

Localised groundwater mounding beneath Stormwater Wetland 3 has also been assessed (Section 4). While mounding is predicted to occur immediately beneath the wetland during recharge events, the magnitude of mounding attenuates rapidly with distance and does not represent a net increase in groundwater storage at the catchment scale. Instead, this process reflects a redistribution of recharge within the shallow groundwater system.

Overall, the development is not expected to result in a measurable long-term change to the catchment water balance.

Note: not drawn to scale

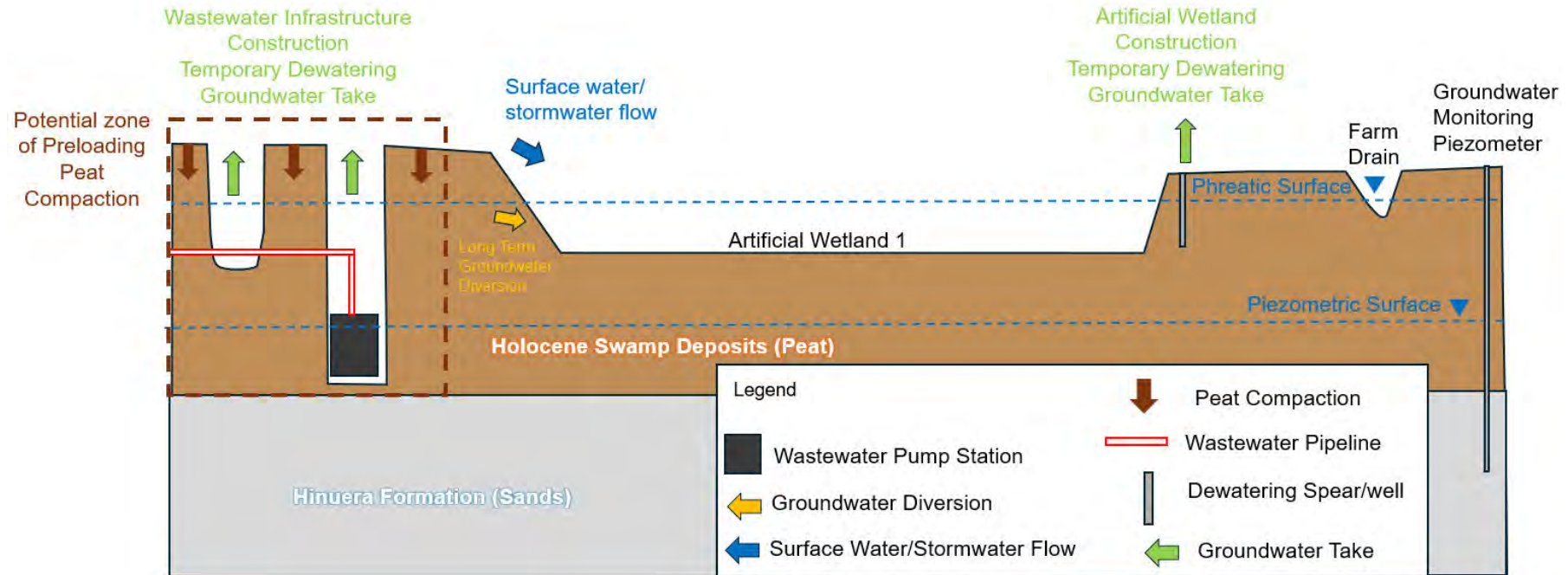


Figure 23: Conceptual Schematic of Water Interactions of the Combined Proposed Activities

6.2 Dewatering Effects Assessment

Stormwater Wetland construction is planned to be staged. The combined rate of groundwater abstraction during the construction phase is expected to vary as each wetland is excavated and brought online (Table 11). Conservative dewatering assessments were undertaken by considering the groundwater table exists at the phreatic surface (approximately 0.5 m bgl in some areas). Based on current design and staging, the largest construction groundwater abstraction is expected to occur between **8 m³/day to 12 m³/day** during construction). Pumped groundwater (where required during construction) and diverted inflows will be managed under a water management plan and an erosion and sediment control plan for the project.

Wastewater infrastructure may be planned to be constructed progressively or overlapping, based on the installation of consecutive 20 m lengths of pipeline in similar dewatered trench sections. The WWPS's will be constructed separately, with construction schedules that will probably overlap the construction schedule for the pipelines. Based on the current design, the largest individual groundwater abstraction to enable for wastewater infrastructure construction is expected to occur for WWPS Central (**209 m³/day** Table 8). Similarly, the largest abstraction for pipeline and drain installations is expected to occur for the deepest sections, at **< 0.5 L/s** (Figure 20 to Figure 22). However, it is understood overlapping construction operations may increase cumulative dewatering rates for pipeline installation (Table 11). Other sites with sandy aquifers have reported combined and overlapping trench dewatering rates of up to **1,500 m³/day** (Beca 2022). Although Northern Block is unlikely to require dewatering at these rates, this value could be adopted as a conservative upper limit for daily abstraction during overlapping construction activities. The nature of effects associated with this higher daily rate would remain consistent with those considered in this report, provided the abstraction is temporary, managed within the construction dewatering methodology, and subject to appropriate monitoring.

Table 11: Summary of Construction Dewatering Flow Rates and Operational Cumulative Groundwater Diversions

EXCAVATION TYPE	TOTAL INFLOW (WINTER) CONSTRUCTION (m³/day) ⁽¹⁾	TOTAL INFLOW (WINTER) OPERATIONAL GROUNDWATER DIVERSION (m³/day)	CUMULATIVE OPERATIONAL GROUNDWATER DIVERSION (m³/day)
See Section 3			
Stormwater Wetland 1	9	3	9.5
Stormwater Wetland 2	12	N/A	
Stormwater Wetland 3	8	6.5	
See Section 5			
WWPS Northern	119	N/A	
WWPS Central	209		
See Section 5			
20 m Trench for Wastewater Pipeline	< 28	N/A	N/A
20 m Trench for Drain/Swale Construction	< 10	< 6	

Notes: Table 11 combines results from different groundwater assessment methods, including steady state and transient dewatering analyses. These values are not directly comparable and should be interpreted with reference to the relevant methodology in Sections 3 to 5. Those listed with "<" are the max starting rates for dewatering analyses.

6.2.1 Effects on Nearby Bores

Of the surrounding groundwater users, there are only four current groundwater take consents within one kilometre of the Site (Table 3 and Figure 13). The furthest radial extent of dewatering impacts from proposed Site activities assessed in this report did not extend to the distance of any of the existing groundwater takes.

Of the existing groundwater bores within one kilometre of the Site, two bores may be impacted by drawdown during construction of Central WWPS A and associated network trenching, during winter conditions of high groundwater levels. Bore 72_1349 is located 5 m from Central WWPS A and bore 72_13192 is 10 m from associated pipeline trenches. At this distance, both bores may experience drawdown during construction dewatering (Table 8 and Table 10). As this drawdown effect would only be temporary, the impact on water availability at each bore is expected to be less than minor. However, these effects are unlikely to result in adverse effects on existing groundwater users. 72_1349 is a shallow bore and likely to be removed during construction. Bore 72_13192 is the Council identification number for monitoring piezometer P1, of this study, and may be used for monitoring of the construction drawdown impacts.

There are no other drawdown effects, assessed in this report, that extend to nearby bores.

6.2.2 Effects on Nearby Surface Water Features and Wetlands

There are no RMA-qualifying wetlands across the Site (EcoLogical, 2025) and no valuable watercourses have been identified (EcoLogical, pers. comm., March 2026). No substantial changes to downstream hydrology are expected. Modelled groundwater mounding beneath Stormwater Wetland 3 is not predicted to extend to existing surface water features or site drainage channels at levels that would alter surface water flow regimes or create new areas of groundwater emergence.

Overall effects are assessed to be temporary and minor.

6.2.3 Effects on Ground Subsidence

The effect of the conservative drawdown associated with construction dewatering has the potential to induce ground subsidence, particularly where drawdown occurs within compressible near surface soils. For the proposed construction of wastewater pipelines and construction and operation of proposed drains, it is not anticipated that there will be any seasonal groundwater levels temporarily lowered beyond naturally experienced fluctuations. However, for the construction dewatering required for Stormwater Wetlands the calculated radius of influence of 0.25 m drawdown occurs between 10 m to 20 m maximum distance from Stormwater Wetland edges causing no impact to nearby buildings. For WWPS installation the calculated radius of influence occurs at 57 m in the Northern WWPS and 78 m in the Central WWPS, also causing no impact to nearby buildings (Table 8).

It is likely construction would occur during a summer period when earthmoving operations and water management would be easier. The groundwater levels are reasonably expected to be lower during such periods, with correspondingly reduced requirements for groundwater drawdown and abstraction rates.

Modelled groundwater mounding associated with Stormwater Wetland 3 is generally less than 1 m at nearby infrastructure and, given its temporary nature within the piezometric groundwater levels, is not expected to cause uplift or instability in surrounding soils.

While this assessment has quantified the extent and magnitude of groundwater drawdown and mounding, it does not evaluate the resulting subsidence response of underlying soils or foundations. It is therefore recommended that the predicted results in this report are reviewed by suitably qualified geotechnical specialists to assess peat compressibility and potential subsidence risk and to determine whether any mitigation or monitoring measures are required during construction consistent with RITS requirements. A detailed monitoring network could be proposed with automatic monitoring and reporting to allow adaption to any unforeseen effect (i.e. reduced pumping during construction if needed).

6.3 Anticipated Implications for Water Quality

The change in land use from farming to industrial activity, together with the introduction of stormwater wetlands, is expected to reduce nutrient inputs to shallow groundwater. However, measures such as bunding and other site controls will be required to prevent industrial contaminants from entering drainage systems and surrounding water catchments. Construction activities may temporarily increase sediment-related risks, but these will be managed through the implementation of an erosion and sediment control plan.

A potential localised source of contamination is present at “Latham’s Mountain”, an area of historic uncontrolled fill comprising building and demolition waste located in the north-eastern portion of the Site (Section 2.5). Contaminated land investigations identified asbestos-containing material (ACM) fragments within the fill, with contamination considered heterogeneous and associated with discrete waste materials rather than widespread soil contamination. WGA understands that the base of the proposed Stormwater Wetland 3 will be constructed following removal of existing fill materials and will extend into the underlying natural lithology, thereby reducing the potential for ongoing contaminant interaction with shallow groundwater. In addition, the Latham’s Mountain area is proposed to be capped in accordance with the geotechnical design (CMW 2026), which is expected to limit infiltration through residual fill and reduce the risk of contaminant mobilisation. On this basis, the potential for contaminated stormwater recharge to groundwater is considered low, and any effects are expected to relate primarily to legacy infiltration that may have occurred prior to development rather than ongoing inputs.

7 MONITORING AND MITIGATION

7.1 Groundwater Monitoring

Groundwater levels across the Northern Block have been characterised using a network of four piezometers installed and monitored during January 2026. This monitoring period captured both summer groundwater conditions and, combined with site observations, confirmed the presence of a shallow phreatic surface overlying a deeper piezometric surface. The monitoring data, combined with observations from Southern Block monitoring bores, were sufficient to define potential seasonal groundwater level variability and baseline groundwater conditions for the purposes of the effects assessment.

The predicted groundwater drawdown effects associated with construction dewatering and long-term operation of the proposed stormwater wetlands are localised, temporary (during construction), and have been conservatively assessed using site-specific hydraulic parameters. Groundwater drawdown effects do not impact the availability of water at nearby bores. The long-term groundwater diversion to the stormwater wetlands represents a redistribution of groundwater discharge within the Site catchment rather than a net loss.

Permanent post-construction monitoring is not considered necessary. However, existing piezometers should be monitored through pre-construction and active dewatering periods to verify assumptions and support adaptive management. In addition, should subsidence risks be identified by the geotechnical specialists due to the groundwater drawdown, a detailed monitoring network may be proposed with automatic monitoring and reporting to allow adaption to any unforeseen effect.

Given the predicted localised nature of groundwater mounding beneath Stormwater Wetland 3, no specific monitoring of mounding effects is considered necessary beyond the general groundwater monitoring approach. However, monitoring data collected during operation could be used to verify that groundwater levels remain within the range predicted by the mounding assessment.

7.2 Surface Water Monitoring

Surface water features within and downstream of the Northern Block consist of farm drains that, during wet periods, are likely to discharge to the boundary drains and the headwaters of the Mangakotukutuku catchment. This is consistent with the catchment boundary reported by EcoLogical (2025), which places the Site within the Mangakotukutuku Stream catchment.

Visual inspections of drains and streams during construction, as part of standard environmental compliance checks, are considered sufficient to confirm expected performance.

Given the short duration of dewatering, the absence of predicted long-term surface water effects, and the use of erosion and sediment controls under the project's construction management framework, additional monitoring of surface water flow or levels is not considered necessary during operation.

Potential effects on surface water are limited, as no RMA-qualifying wetlands have been identified on the Site (EcoLogical, 2025) and no valuable watercourses have been identified (EcoLogical, pers. comm., March 2026). No substantial changes to downstream hydrology are expected, and overall effects are assessed as temporary and minor.

8 CONCLUSIONS

The assessment concludes that the proposed Northern Block development works are expected to result in temporary and localised groundwater effects that are no more than minor and can be appropriately managed. Construction-related effects are expected to be temporary and localised, with the greatest effects associated with dewatering for wastewater pumping station excavations and deeper trenching. Operational effects are expected to comprise minor localised groundwater redistribution rather than any material long-term reduction in catchment groundwater resources.

Site investigations and groundwater monitoring confirm that the Northern Block contains a shallow groundwater system within the peat that is overlying deeper Hinuera Formation sediments. Groundwater conditions are controlled by rainfall recharge, artificial drainage, and the low permeability of peat, resulting in a shallow phreatic surface above a deeper piezometric surface.

The assessment is based on site-specific investigations, monitoring data, and conservative analytical methods, and assumes existing pre-compaction peat conditions. This provides a conservative basis for evaluating groundwater drawdown and inflows with the proposed works.

The assessment indicates that groundwater effects during construction will be temporary, localised, or within the range of natural seasonal fluctuations, with negligible effects on nearby bores, surface water features, and surrounding land. During operation, the stormwater wetlands will act as persistent hydraulic features within the catchment. Predicted groundwater interactions are minor and include small ongoing inflows and localised event mounding beneath Stormwater Wetland 3, with mounding largely confined to the immediate vicinity of the wetland and reducing rapidly with distance.

Overall, our assessment indicates that actual effects are likely to be equal to or less than those predicted including conservative assumptions of a shallow phreatic surface during wet conditions and pre-compaction hydraulic parameters. Potential risks associated with groundwater drawdown and mounding can be managed through standard construction practices, erosion and sediment controls, and targeted monitoring where required. On this basis, the proposed works are considered acceptable and consistent with the sustainable management of groundwater resources within the catchment.

9 REFERENCES

- Beca 2022. Rotokauri – Hydrogeological Interpretive Report. 2022 revision. Report prepared for Hamilton City Council by Beca Limited. Report 4287371-526186471-2392. September 2022.
- Bouwer H, Rice R C 1976. A slug test method for determining hydraulic conductivity of unconfined aquifers with completely or partially penetrating wells, *Water Resources Research* 12 (3) 423-428.
- CMW 2026. Southern Links Industrial Stage 1 – Resource Consent/Substantive Fast Track Application. Hamilton New Zealand. Geotechnical Investigation Report. Report produced by CMW Geosciences for Colliers Project Leaders. Report No. HAM2024-0120 Version 2. Dated 24 March 2026.
- EcoLogical Solutions 2025. Southern Links Residential Development, Ecological Impact Assessment. September 2025. Draft v6. Report produced by EcoLogical Solutions Ltd
- EcoLogical Solutions 2026. Southern Links Industrial Development, Ecological Impact Assessment. January 2026. Draft v1. Report produced by EcoLogical Solutions Ltd
- GNS 2005. Geology of the Waikato Area. Edbrooke SW (Ed). Institute of Geological and Nuclear Sciences.
- Hamilton City Council 2023. Water Conservation and Demand Management Plan – Draft Consultation June 2023.
- Hantush M S, Jacob, C E 1955. Non-steady radial flow in an infinite leaky aquifer. *Eos, Transactions American Geophysical Union* 36(1) 95 - 100.
- Heath R C 1983. Basic Ground-Water Hydrology. U.S Geological Survey Water-Supply Paper 2220, 86p.
- Lowe D J 2010. Introduction to the landscapes and soils of the Hamilton Basin. In: Lowe, D.J.; Neall, V.E., Hedley, M; Clothier, B.; Mackay, A. 2010. Guidebook for Pre-conference North Island, New Zealand “Volcanoes to Oceans” field tour (–30 July). 19th World Soils Congress, International Union of Soil Sciences, Brisbane. Soil and Earth Sciences Occasional Publication No. 3, Massey University, Palmerston North, pp. 1.24 – 1.61.
- Marinelli F, Niccoli W L 2000. Simple analytical equations for estimating ground water inflow to a mine pit. *Groundwater* 38(2) 311-314.
- Maven 2025. Southern Links 1: Water Supply Impact Assessment Technical Memorandum, Southern Links Consortium Development. Dated 20 August 2025.
- McWhorter D B, Sunada D K 1977. Ground-water hydrology and hydraulics. Water Resources Publications, LLC. Colorado, USA.
- Morris D A, Johnson A I 1967. Summary of hydrologic and physical properties of rock and soil materials, as analyzed by the hydrologic laboratory of the US Geological Survey 1948-60. Geological Survey Water-Supply Paper 1839-D.
- Petch R A 1987. Water Resources of the Mangaonua Catchment. In: Mangaonua Catchment Management Plan. Waikato Valley Authority Technical Publication N0.30.
- Schofield J C 1972. Groundwater of the Hamilton Lowland. New Zealand Geological Survey Bulletin No. 89.
- WGA 2025. Southern Links Consortium Development Surface Water Take. Report No, WGA242463-RP-HG-0007_D.

10 LIMITATIONS

This report has been based on data provided to WGANZ by others. WGANZ has not attempted to resolve data quality issues except where clearly stated. The data has been analysed on an “as provided” basis. No liability is accepted for incorrect or misleading analysis results arising from data provided to WGANZ.

While this assessment has quantified the extent and magnitude of groundwater drawdown, it does not evaluate the resulting subsidence response of underlying soils or foundations. It is therefore recommended that the predicted drawdown contours and timeframes presented in this report are reviewed by suitably qualified geotechnical specialists to assess potential subsidence risk and to determine whether any mitigation or monitoring measures are required during construction consistent with RITS requirements.

This assessment does not explicitly quantify changes in peat hydraulic conductivity or groundwater level response resulting from pre-loading and consolidation. Should preload thicknesses, surcharge magnitudes or consolidation monitoring data become available at a later stage, a refinement of hydraulic parameters may be appropriate for detailed design.

This assessment does not include dewatering associated with installation of the proposed water supply pipeline, as design information for that infrastructure was not available at the time of reporting.

APPENDIX A

LITHOLOGICAL DATA AND GEOLOGICAL CROSS SECTIONS



BOREHOLE LOG - P1

Client: Colliers Project Leaders
Project: Southern Links - Industrial Block
Site Location: Wickham Street, Hamilton
Project No.: HAM2024-0120
Date: 19/12/2025
Borehole Location: Refer to Site Plan



Logged by: PM Checked by: MM Scale: 1:40 Sheet 1 of 1

Position: 443410.0mE; 696673.8mN Projection: Mount Eden 2000 Datum: Survey Source: Hand Held GPS

Well	Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description		Moisture Condition	Consistency/ Relative Density	Weathering						Recovery	RQD	Estimated Strength						Defect Spacing (mm)						Drilling Method/ Support	Structure & Other Observations																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
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Termination Reason: Target Depth Reached
Shear Vane No: DCP No:
Remarks: Piezometer installed with a screen depth between 3.7m and 5.2m.

BOREHOLE LOG - P2

Client: Colliers Project Leaders
Project: Southern Links - Industrial Block
Site Location: Wickham Street, Hamilton
Project No.: HAM2024-0120
Date: 18/12/2025
Borehole Location: Refer to Site Plan



Logged by: OP Checked by: MM Scale: 1:40 Sheet 1 of 1

Position: 443295.9mE; 696365.5mN Projection: Mount Eden 2000 Datum: 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	Weathering						Recovery	RQD	Estimated Strength					Defect Spacing (mm)					Drilling Method/ Support	Structure & Other Observations Discontinuities: Depth; Defect Number; Defect Type; Dip; Defect Shape; Roughness; Aperture; Infill; Seepage; Spacing; Block Size; Block Shape; Remarks																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
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Termination Reason: Target Depth Reached
Shear Vane No: DCP No:
Remarks: Piezometer installed with a screen depth between 4.5m and 6.0m.

BOREHOLE LOG - P3

Client: Colliers Project Leaders
Project: Southern Links - Industrial Block
Site Location: Wickham Street, Hamilton
Project No.: HAM2024-0120
Date: 19/12/2025
Borehole Location: Refer to Site Plan



Logged by: PM Checked by: MM Scale: 1:40 Sheet 1 of 1

Position: 443973.3mE; 696066.3mN Projection: Mount Eden 2000 Datum: 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	Weathering						Recovery	RQD	Estimated Strength					Defect Spacing (mm)					Drilling Method/ Support	Structure & Other Observations Discontinuities: Depth; Defect Number; Defect Type; Dip; Defect Shape; Roughness; Aperture; Infill; Seepage; Spacing; Block Size; Block Shape; Remarks																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
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Termination Reason: Target Depth Reached
Shear Vane No: DCP No:
Remarks: Piezometer installed with a screen depth between 4.3m and 5.8m.

BOREHOLE LOG - P4

Client: Colliers Project Leaders
Project: Southern Links - Industrial Block
Site Location: Wickham Street, Hamilton
Project No.: HAM2024-0120
Date: 18/12/2025
Borehole Location: Refer to Site Plan



Logged by: OP Checked by: MM Scale: 1:40 Sheet 1 of 1

Position: 444078.5mE; 696359.5mN Projection: Mount Eden 2000 Datum: Survey Source: Handheld 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	Weathering					Recovery	RQD	Estimated Strength					Defect Spacing (mm)					Drilling Method/ Support	Structure & Other Observations Discontinuities: Depth; Defect Number; Defect Type; Dip; Defect Shape; Roughness; Aperture; Infill; Seepage; Spacing; Block Size; Block Shape; Remarks																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
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Termination Reason: Target Depth Reached.
Shear Vane No: DCP No:
Remarks: Piezometer installed with a screen depth between 3.8m 5.3m.

DAILY DRILLING REPORT

Phone: 07 849 2919 | Freephone 0800 533 330



DATE	18/12/25	DRILLING METHOD	Peizo's
CLIENT	NGA	BORE DIAMETER	
STREET/LOCATION	Nickern Street	DRILLING FROM	
TOWN/CITY	Hamilton	CASING FROM	
BORE #	P1/P2/P3/P4	S.W.L. (m)	
CONSENT AUTH #		BORE ID #	
LOCATION CO-ORDINATES			

METHOD	FROM	TO	RUN	RECOVERY
	P1 (40mm) S.W.L = 2.01m Bentonite = 0.30 - 3.00m Sand = 3.00 - 3.20m K2 = 3.20 - 5.20m Blank = 0.00 - 3.70m Screen = 3.70 - 5.20m			
	P2 (40mm) S.W.L = 5.40m Bentonite = 0.30 - 4.00m Sand = 4.00 - 4.20m K2 = 4.20 - 6.00m Blank = 0.00 - 4.50m Screen = 4.50 - 6.00m			

COMMENTS AND MATERIALS

<u>DRILLER</u>	<u>KILOMETRES</u>	<u>TIME</u>	<u>WORK HRS</u>	<u>TOTAL HRS</u>
Drilling Rig <u>05</u>	Drill Rig _____	Rig Working _____	Start _____	
Driller _____	Heavy Tender _____	Stand-by _____	Finish _____	
Assistant _____	Light Tender _____	Compressor _____	Total _____	
Assistant _____	Transporter _____	Travel _____		
Other _____	Utility _____	After Hours _____		
Clients Rep _____	Other _____	Other _____	Motel _____	



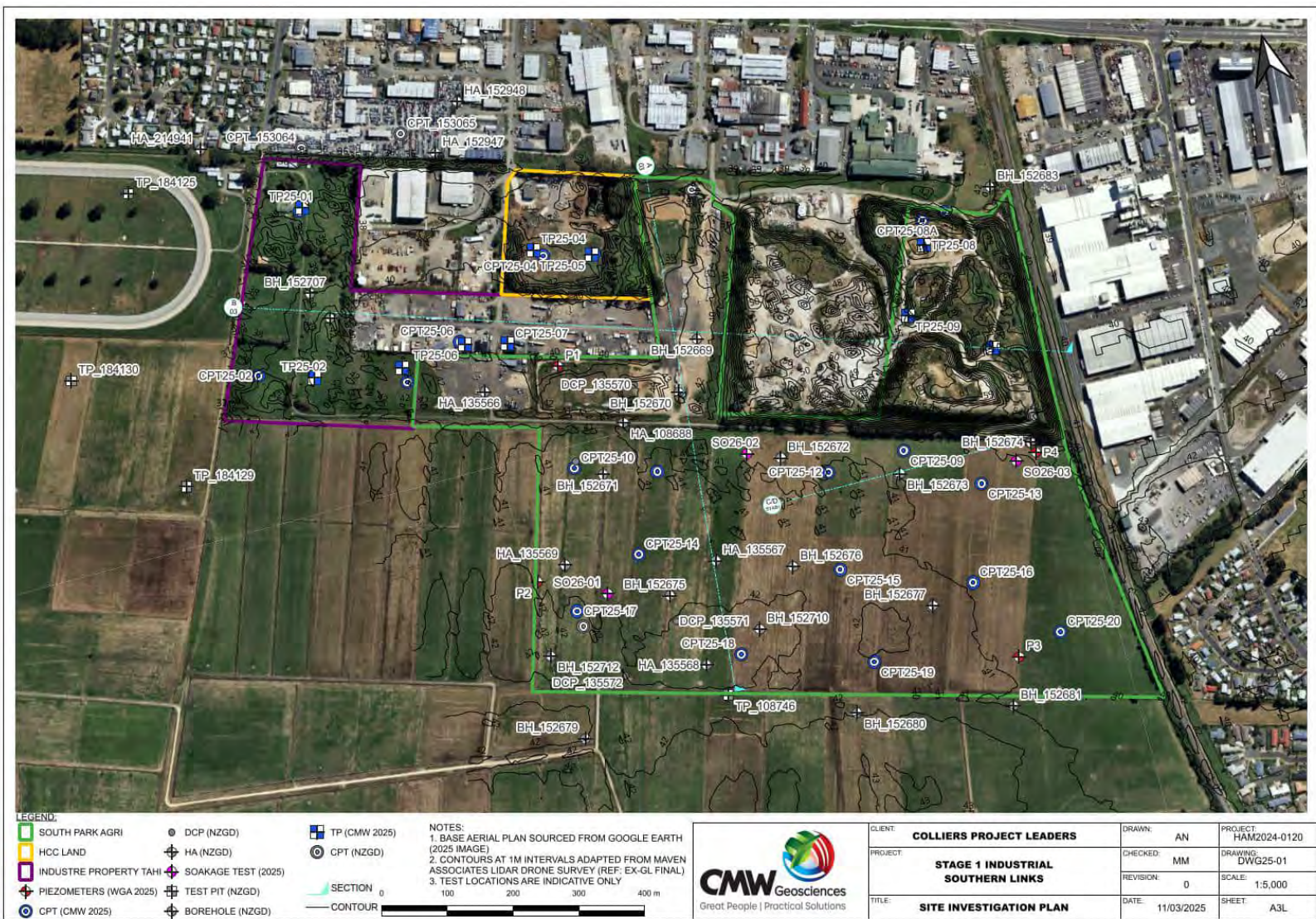
Figure A1: Piezometer P2

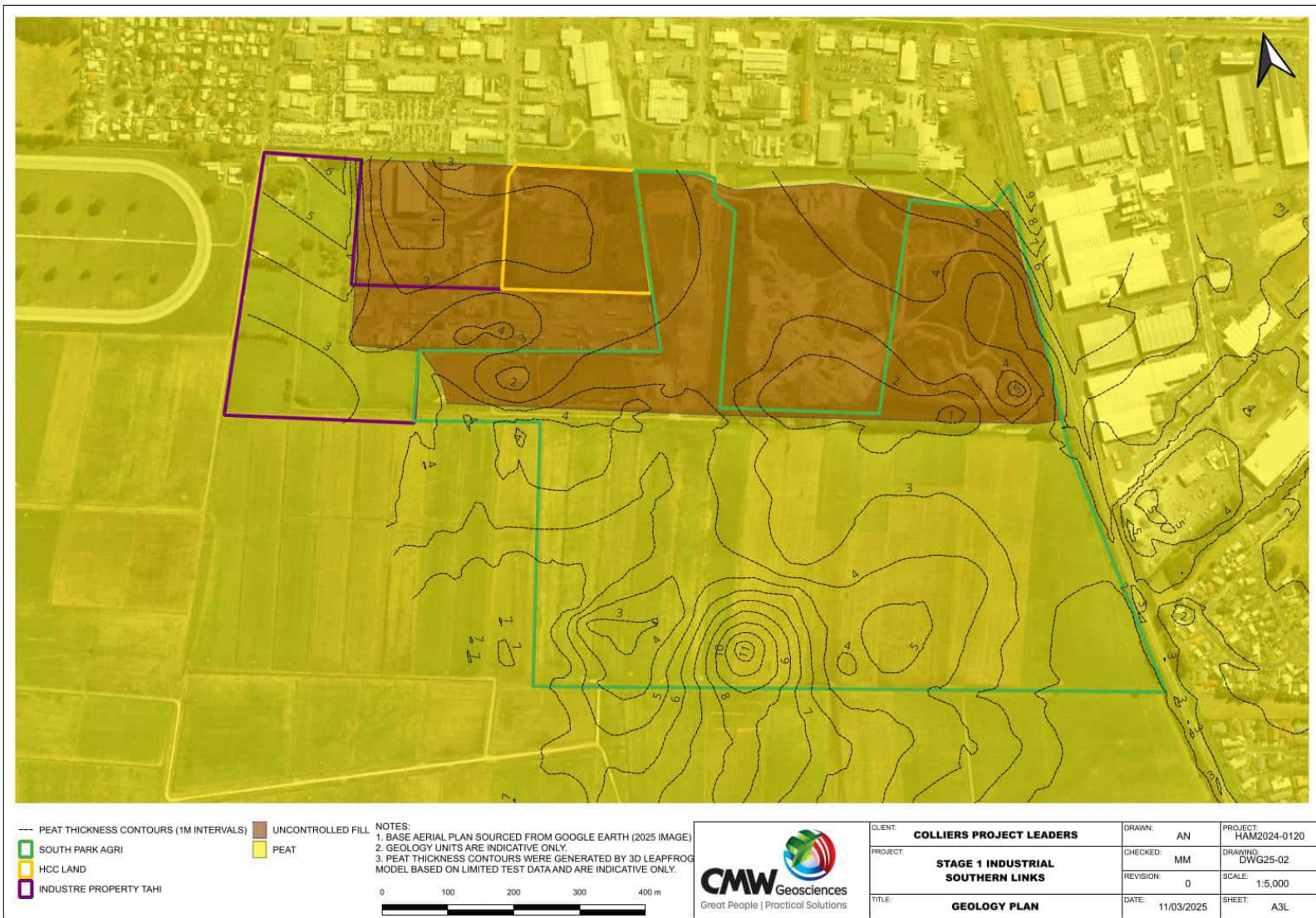
Table A1: Piezometer Construction Details

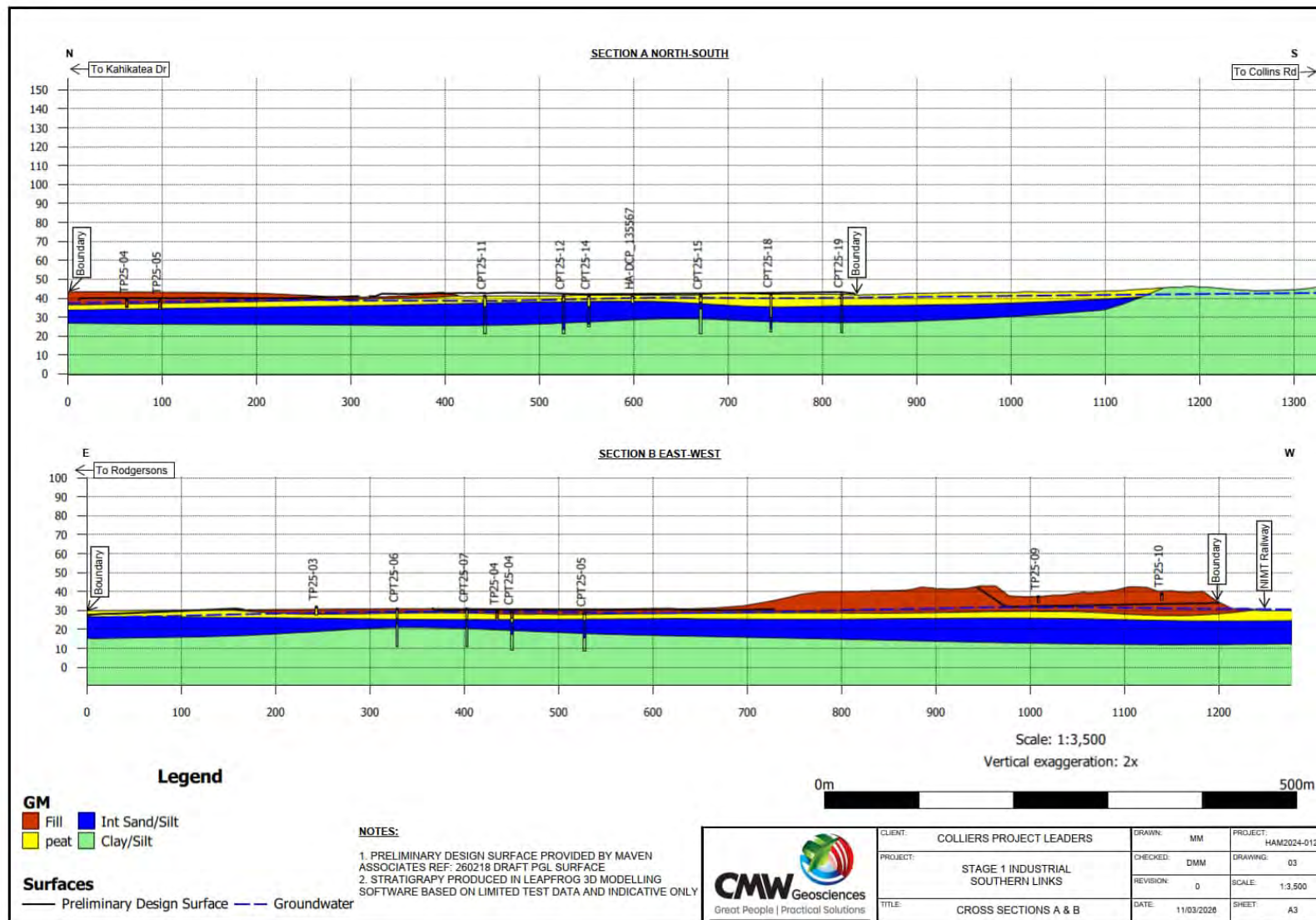
PIEZOMETER	DEPTH (m bgl)	CASING DIAMETER (mm)	SCREEN LENGTH (m)	EASTING (NZTM)	NORTHING (NZTM)
P1	5.2	40	1.5	1798702	5812897
P2	6	40	1.5	1798583	5812583
P3	5.8	40	1.5	1799257	5812282
P4	5.3	40	1.5	1799363	5812570

Table A2: Drill core sample photos, piezometer P1 and P4

Drill Core Photo	Comment
	Holocene Swamp Deposits in P1
	Holocene Swamp Deposits drilled through to Hinuera Formation in P4







APPENDIX B

GROUNDWATER LEVEL DATA



Table B1: Groundwater Levels Intersected in CMW CPT Holes (CM 2026)

TEST LOCATION	EASTING (MT EDEN 2000)	NORTHING (MT EDEN 2000)	ELEVATION	MAXIMUM INVESTIGATION DEPTH (m)	DEPTH TO GROUNDWATER (m bgl)	DATE
CPT25-01	443091.7	697003.31	37.32	20	2.4	17/11/2025
CPT25-02	442965.96	696777.93	40.47	20	2.9	17/11/2025
CPT25-03	443182.24	696710.01	41.95	20	0.1	17/11/2025
CPT25-04	443431.76	696841.73	39.27	20	Collapsed dry @ 1.0 m	17/11/2025
CPT25-05	443507.07	696825.15	38.50	20	Collapsed dry @ 1.8 m	17/11/2025
CPT25-06	443275.51	696748.77	40.73	20	Hole positioned in puddle	17/11/2025
CPT25-07	443345.94	696726.1	40.80	20	Hole positioned in puddle	17/11/2025
CPT25-08	444038.53	696748.18	42.60	0.1	Collapsed dry @ 0.1 m	24/11/2025
CPT25-09	443884.84	696414.28	40.81	20.2	3.4	24/11/2025
CPT25-10	443393.87	696518.01	41.45	1.7	1.0	18/11/2025
CPT25-11	443514.59	696480.29	41.14	20	1.7	18/11/2025
CPT25-12	443765.88	696412.03	41.12	20	2.5	18/11/2025
CPT25-13	443986.33	696335.19	40.37	20	2.4	18/11/2025
CPT25-14	443454.74	696366.15	41.28	16.3	0.8	18/11/2025
CPT25-15	443744.66	696264.63	41.25	20	3.0	18/11/2025
CPT25-16	443935.01	696193.22	40.87	20	1.7	18/11/2025
CPT25-17	443341.86	696307.02	42.15	20	1.8	18/11/2025
CPT25-18	443566.27	696179.26	42.18	20	2.0	18/11/2025
CPT25-19	443758.47	696115.89	41.88	20	1.5	18/11/2025
CPT25-20	444044.04	696086.28	40.41	20	0.7	18/11/2025

Notes: 1) Coordinates in Mt Eden Metric 2000 projection.

Table B2: Groundwater Levels Intersected in CMW Test Pits (CM 2026)

TEST LOCATION	EASTING (MT EDEN 2000)	NORTHING (MT EDEN 2000)	ELEVATION (M RL)	MAXIMUM INVESTIGATION DEPTH (m)	DEPTH TO GROUNDWATER (m bgl)	DATE
TP25-01	443096.23	697007.54	37.23	4.2	1.3	14/11/2025
TP25-02	443047.66	696752.84	41.39	4.3	Not encountered (1.0 on graphic log)	14/11/2025
TP25-03	443180.76	696732.39	41.81	4.4	1.0	14/11/2025
TP25-04	443419.47	696854.37	39.25	4.2	4.1	17/11/2025
TP25-05	443503.4	696824.77	38.62	4.2	2.0	17/11/2025
TP25-06	443281.9	696743.15	40.77	0.8	Not encountered	14/11/2025
TP25-07	443345.12	696727.76	40.80	1.0	0.6	14/11/2025
TP25-08	443994.97	696707.38	45.69	2.5	Not encountered	14/11/2025
TP25-09	443944.39	696610.75	47.19	3.2	Not encountered	14/11/2025
TP25-10	444056.37	696529.25	48.79	3.1	Not encountered	14/11/2025

Notes: 1) Data sourced from CMW test pit logs
2) Coordinates in Mt Eden Metric 2000 projection.

Table B3: Manual Groundwater Level Measurements from WGA Piezometers

PIEZOMETER ID	EASTING (NZTM)	NORTHING (NZTM)	ELEVATION (M RL)	DEPTH (m bgl)	SCREEN LENGTH (m)	GROUNDWATER DEPTH (m bgl)	GROUNDWATER ELEVATION (m RL)	MEASUREMENT DATE
P1	1798702	5812897	40.88	5.37	1.5	1.89	38.45	28/1/2026
						1.94	38.4	1/02/2026
						1.74	38.6	5/02/2026
						1.895	38.445	23/2/2026
P2	1798583	5812583	41.63	6.06	1.5	4.59	37.12	28/1/2026
						4.59	37.12	3/02/2026
						4.718	36.992	23/02/2026
P3	1799257	5812282	40.57	5.93	1.5	4.86	35.01	28/1/2026
						4.74	35.22	31/01/2026
						4.89	35.07	21/02/2026
						4.86	35.10	23/2/2026
P4	1799363	5812570	39.90	5.49	1.5	4.30	36.36	28/1/2026
						4.28	36.38	31/01/2026
						4.41	36.25	23/02/2026

APPENDIX C

HYDRAULIC TESTS



Introduction

The hydraulic conductivity of the shallow geological strata underlying the Northern Block has been tested by WGA using slug tests in piezometers. These tests and the analysis results are documented in this appendix.

Additionally, CMW has undertaken three soakage tests at the Northern Block. Copies of the CMW analysis sheets and the analysis results are provided in this appendix.

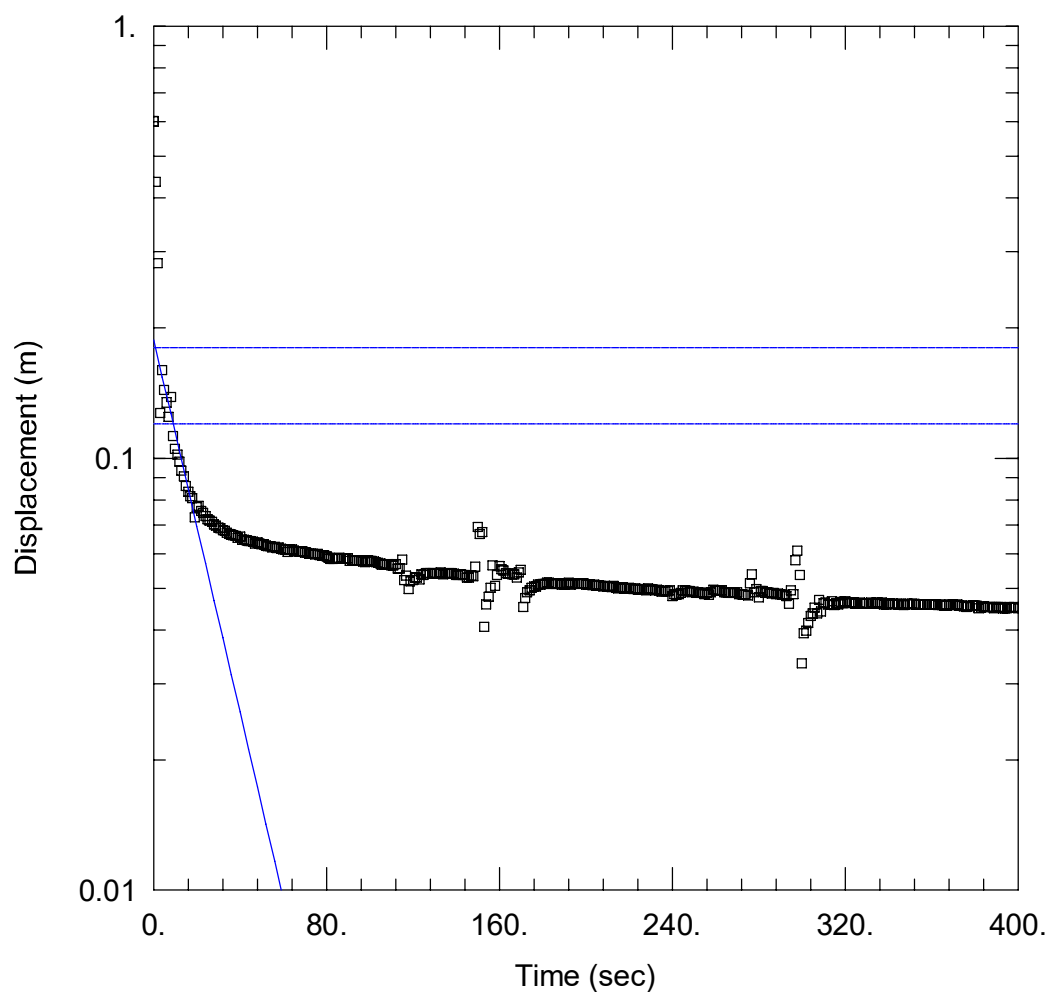
WGA Slug Tests

WGA conducted slug tests on the four piezometers installed within the Site area. These piezometers are screened within the Holocene Swamp Deposits (peat, silt and sand) or the Hinuera Formation (silt and sands). Both falling head and rising head tests were performed on each piezometer, if possible. The hydraulic test results were analysed using the Bouwer and Rice (1974) method. The AQTESOLV Pro v4.5 software package from HydroSolve Inc was used to analyse the datasets.

The analysis sheets for these hydraulic tests are provided in this appendix, below. The hydraulic conductivity results derived from these tests are summarised in Table B1. For each piezometer where more than one test was undertaken, an average of the test analysis results is also provided, and the average value has been used in the assessments documented in the body of the main report.

Table C1: Results of WGA Hydraulic Tests

Bore	Test Type	Hydraulic Conductivity (m/sec)	Average
P1 (Holocene Swamp Deposits)	FHT 1	1.85×10^{-5}	1.02×10^{-5}
	RHT 1	4.16×10^{-6}	
	FHT 2	1.49×10^{-5}	
	RHT 2	3.34×10^{-6}	
P2 (Holocene Swamp Deposits)	FHT 1	2.04×10^{-8}	2.04×10^{-8}
P3 (Hinuera Formation)	FHT 1	1.47×10^{-4}	1.26×10^{-4}
	RHT 1	1.20×10^{-4}	
	FHT 2	1.32×10^{-4}	
	RHT 2	1.25×10^{-4}	
	FHT 3	1.19×10^{-4}	
	RHT 3	1.16×10^{-4}	
P4 (Hinuera Formation)	FHT 1	1.01×10^{-5}	6.17×10^{-6}
	RHT 1	2.39×10^{-6}	
	FHT 2	9.41×10^{-6}	
	RHT 2	2.72×10^{-6}	



WELL TEST ANALYSIS

Data Set: V:\...\P1-Test1-Falling Head.aqt

Date: 03/13/26

Time: 07:23:37

PROJECT INFORMATION

Company: WGA

Project: WGA242463

Location: SL1 - Industrial North

Test Well: P1

Test Date: 23/02/2026

AQUIFER DATA

Saturated Thickness: 5.64 m

Anisotropy Ratio (K_z/K_r): 1.

WELL DATA (P1)

Initial Displacement: 0.5999 m

Total Well Penetration Depth: 3.475 m

Casing Radius: 0.02 m

Static Water Column Height: 3.475 m

Screen Length: 1.5 m

Well Radius: 0.0375 m

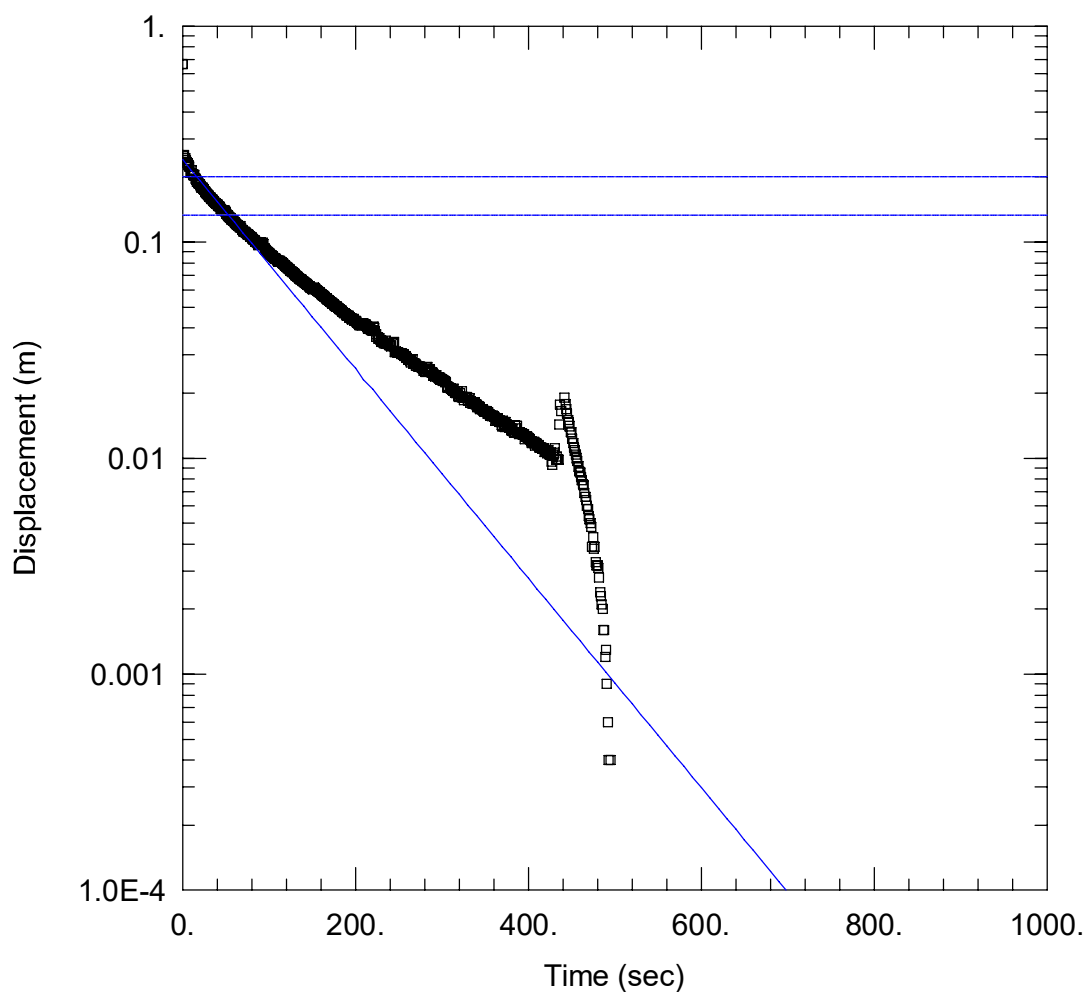
SOLUTION

Aquifer Model: Unconfined

$K = 1.598$ m/day

Solution Method: Bouwer-Rice

$y_0 = 0.1876$ m



WELL TEST ANALYSIS

Data Set: V:\...\P1-Test1-Rising Head.aqt

Date: 03/13/26

Time: 07:23:40

PROJECT INFORMATION

Company: WGA

Project: WGA242463

Location: SL1 - Industrial North

Test Well: P1

Test Date: 23/02/2026

AQUIFER DATA

Saturated Thickness: 5.64 m

Anisotropy Ratio (K_z/K_r): 1.

WELL DATA (P1)

Initial Displacement: 0.6669 m

Total Well Penetration Depth: 3.475 m

Casing Radius: 0.02 m

Static Water Column Height: 3.475 m

Screen Length: 1.5 m

Well Radius: 0.0375 m

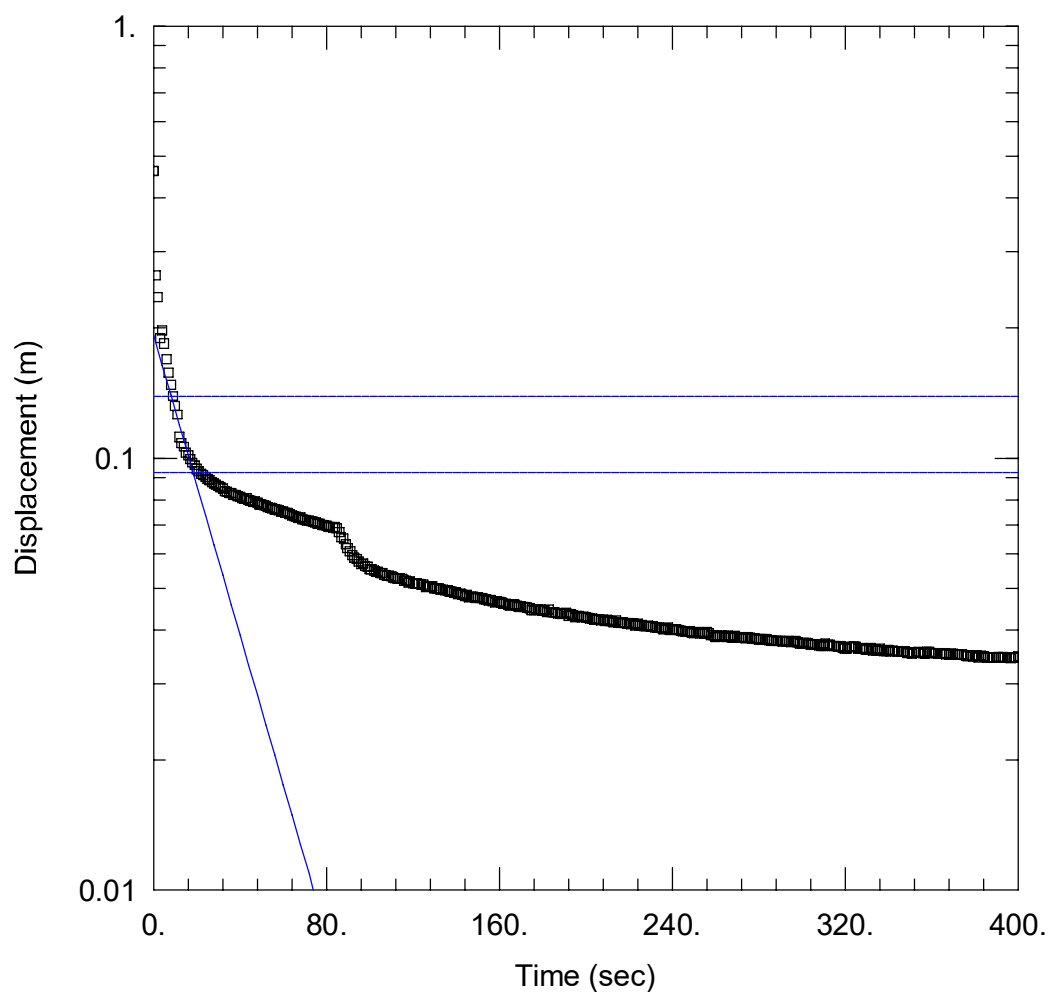
SOLUTION

Aquifer Model: Unconfined

$K = 0.3596$ m/day

Solution Method: Bouwer-Rice

$y_0 = 0.2405$ m



WELL TEST ANALYSIS

Data Set: V:\...\P1-Test2-Falling_Head.aqt

Date: 03/13/26

Time: 07:23:42

PROJECT INFORMATION

Company: WGA

Project: WGA242463

Location: SL1 - Industrial North

Test Well: P1

Test Date: 23/02/2026

AQUIFER DATA

Saturated Thickness: 5.64 m

Anisotropy Ratio (K_z/K_r): 1.

WELL DATA (P1)

Initial Displacement: 0.4625 m

Total Well Penetration Depth: 3.475 m

Casing Radius: 0.02 m

Static Water Column Height: 3.475 m

Screen Length: 1.5 m

Well Radius: 0.0375 m

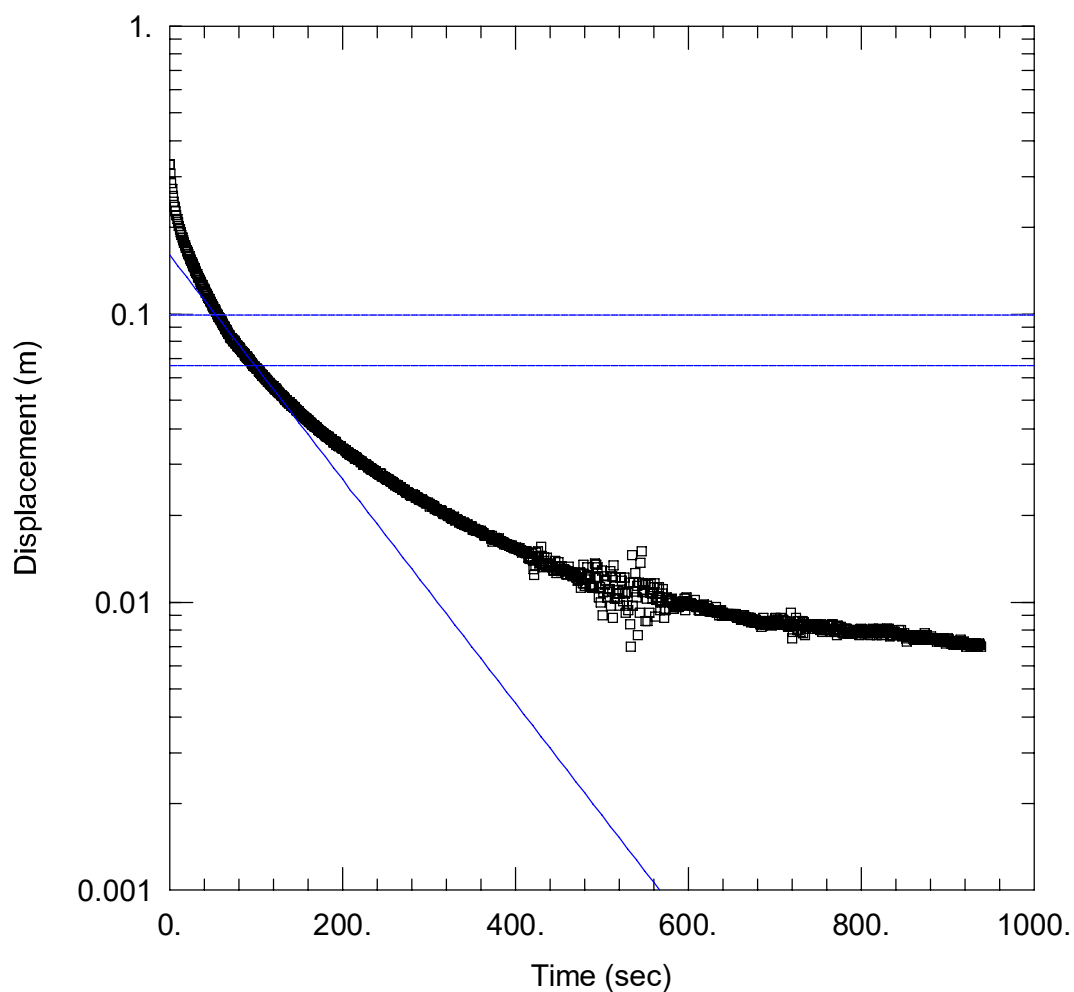
SOLUTION

Aquifer Model: Unconfined

$K = 1.287$ m/day

Solution Method: Bouwer-Rice

$y_0 = 0.1924$ m



WELL TEST ANALYSIS

Data Set: V:\...\P1-Test2-Rising Head.aqt

Date: 03/13/26

Time: 07:23:45

PROJECT INFORMATION

Company: WGA

Project: WGA242463

Location: SL1 - Industrial North

Test Well: P1

Test Date: 23/02/2026

AQUIFER DATA

Saturated Thickness: 5.64 m

Anisotropy Ratio (K_z/K_r): 1.

WELL DATA (P1)

Initial Displacement: 0.3309 m

Total Well Penetration Depth: 3.475 m

Casing Radius: 0.02 m

Static Water Column Height: 3.475 m

Screen Length: 1.5 m

Well Radius: 0.0375 m

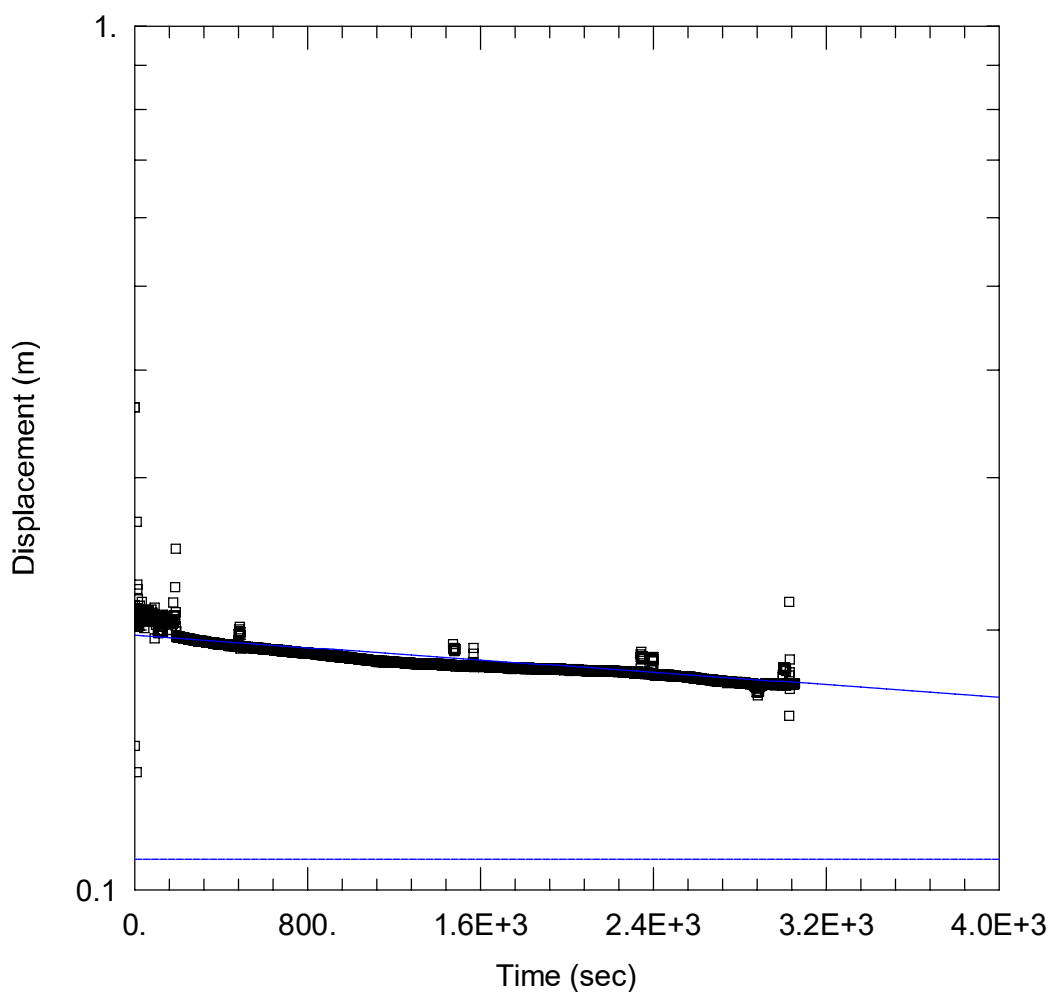
SOLUTION

Aquifer Model: Unconfined

$K = 0.2888$ m/day

Solution Method: Bouwer-Rice

$y_0 = 0.1605$ m



WELL TEST ANALYSIS

Data Set: V:\...\P2-Test1-Falling_Head.aqt

Date: 03/13/26

Time: 07:26:03

PROJECT INFORMATION

Company: WGA

Project: WGA242463

Location: SL1 - Industrial North

Test Well: P1

Test Date: 23/02/2026

AQUIFER DATA

Saturated Thickness: 13.54 m

Anisotropy Ratio (K_z/K_r): 1.

WELL DATA (P2)

Initial Displacement: 0.362 m

Total Well Penetration Depth: 1.347 m

Casing Radius: 0.02 m

Static Water Column Height: 1.347 m

Screen Length: 1.347 m

Well Radius: 0.0375 m

Gravel Pack Porosity: 0.2

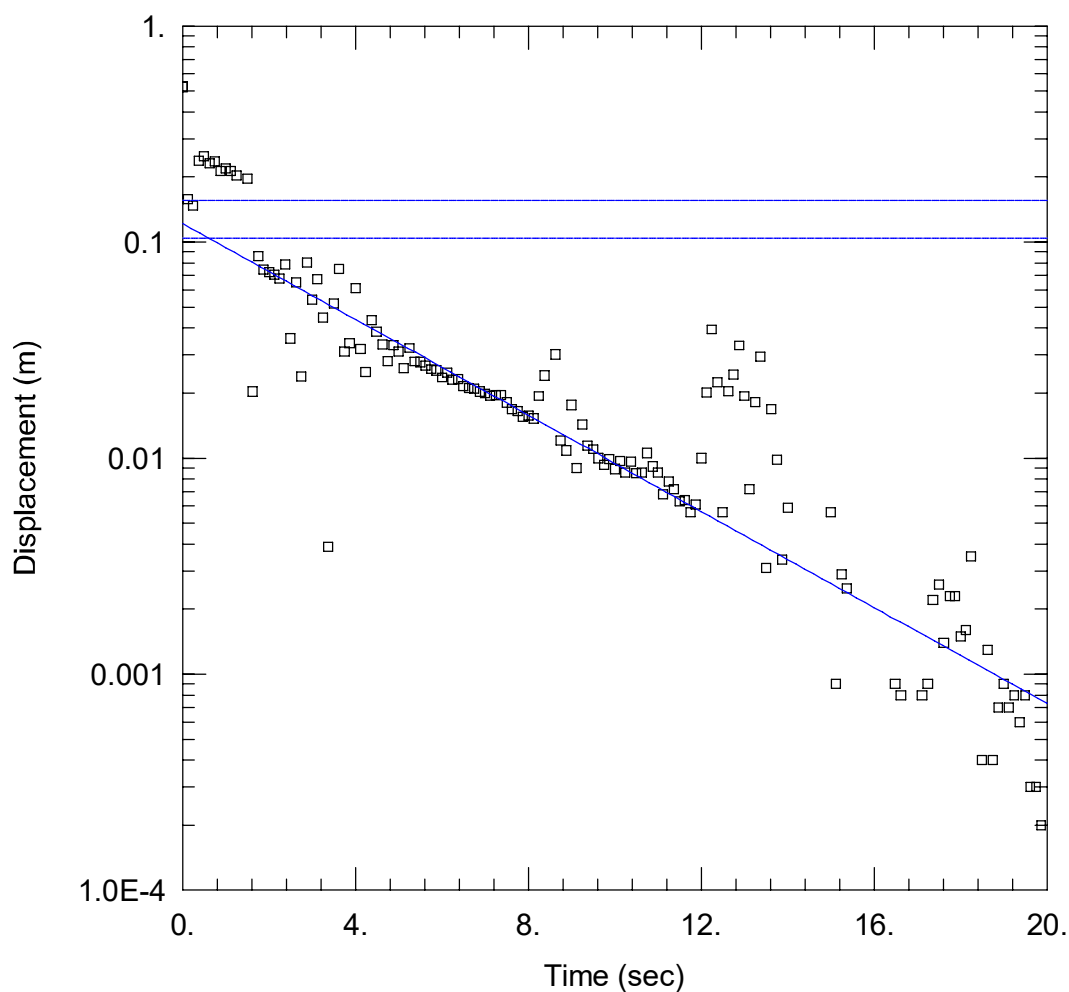
SOLUTION

Aquifer Model: Unconfined

$K = 0.001761$ m/day

Solution Method: Bouwer-Rice

$y_0 = 0.1972$ m



WELL TEST ANALYSIS

Data Set: V:\...\P3-Test1-Falling Head.aqt

Date: 03/13/26

Time: 07:26:07

PROJECT INFORMATION

Company: WGA

Project: WGA242463

Location: SL1 - Industrial North

Test Well: P1

Test Date: 23/02/2026

AQUIFER DATA

Saturated Thickness: 12.55 m

Anisotropy Ratio (K_z/K_r): 1.

WELL DATA (P3)

Initial Displacement: 0.5209 m

Total Well Penetration Depth: 1.067 m

Casing Radius: 0.02 m

Static Water Column Height: 1.067 m

Screen Length: 1.067 m

Well Radius: 0.0375 m

Gravel Pack Porosity: 0.2

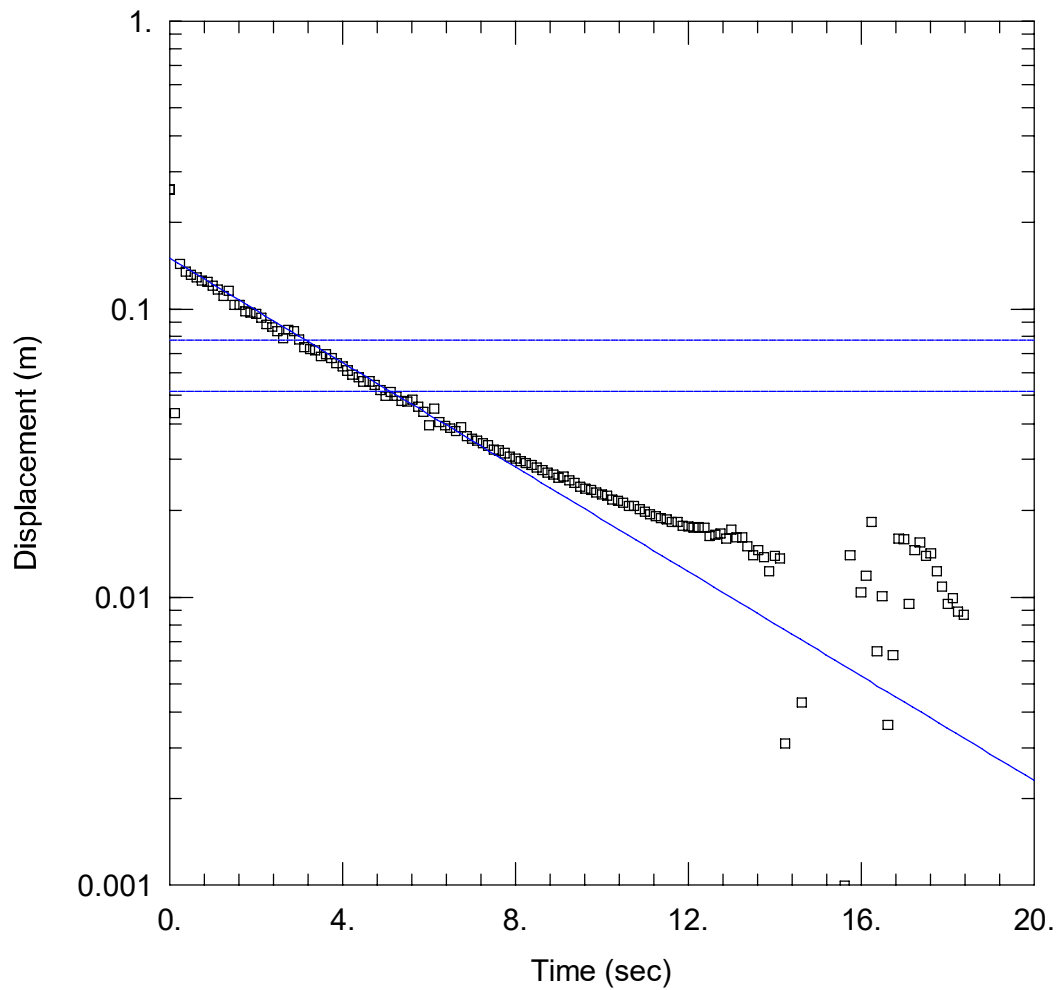
SOLUTION

Aquifer Model: Unconfined

$K = 12.67$ m/day

Solution Method: Bouwer-Rice

$y_0 = 0.1218$ m



WELL TEST ANALYSIS

Data Set: V:\...\P3-Test1-Rising Head.aqt

Date: 03/13/26

Time: 07:26:10

PROJECT INFORMATION

Company: WGA

Project: WGA242463

Location: SL1 - Industrial North

Test Well: P1

Test Date: 23/02/2026

AQUIFER DATA

Saturated Thickness: 12.55 m

Anisotropy Ratio (K_z/K_r): 1.

WELL DATA (P3)

Initial Displacement: 0.2596 m

Total Well Penetration Depth: 1.067 m

Casing Radius: 0.02 m

Static Water Column Height: 1.067 m

Screen Length: 1.067 m

Well Radius: 0.0375 m

Gravel Pack Porosity: 0.2

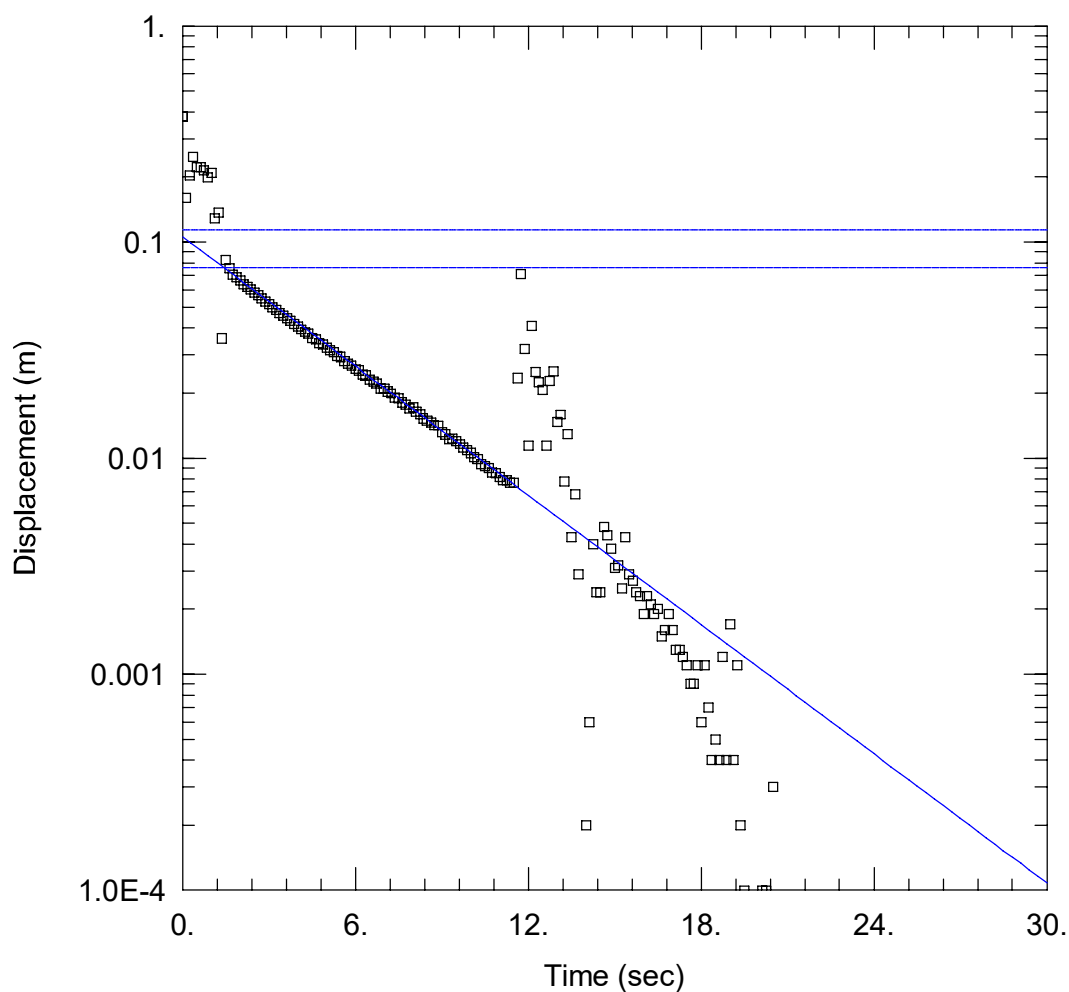
SOLUTION

Aquifer Model: Unconfined

$K = 10.34$ m/day

Solution Method: Bouwer-Rice

$y_0 = 0.1503$ m



WELL TEST ANALYSIS

Data Set: V:\...\P3-Test2-Falling Head.aqt

Date: 03/13/26

Time: 07:26:12

PROJECT INFORMATION

Company: WGA

Project: WGA242463

Location: SL1 - Industrial North

Test Well: P1

Test Date: 23/02/2026

AQUIFER DATA

Saturated Thickness: 12.55 m

Anisotropy Ratio (K_z/K_r): 1.

WELL DATA (P3)

Initial Displacement: 0.3799 m

Total Well Penetration Depth: 1.067 m

Casing Radius: 0.02 m

Static Water Column Height: 1.067 m

Screen Length: 1.067 m

Well Radius: 0.0375 m

Gravel Pack Porosity: 0.2

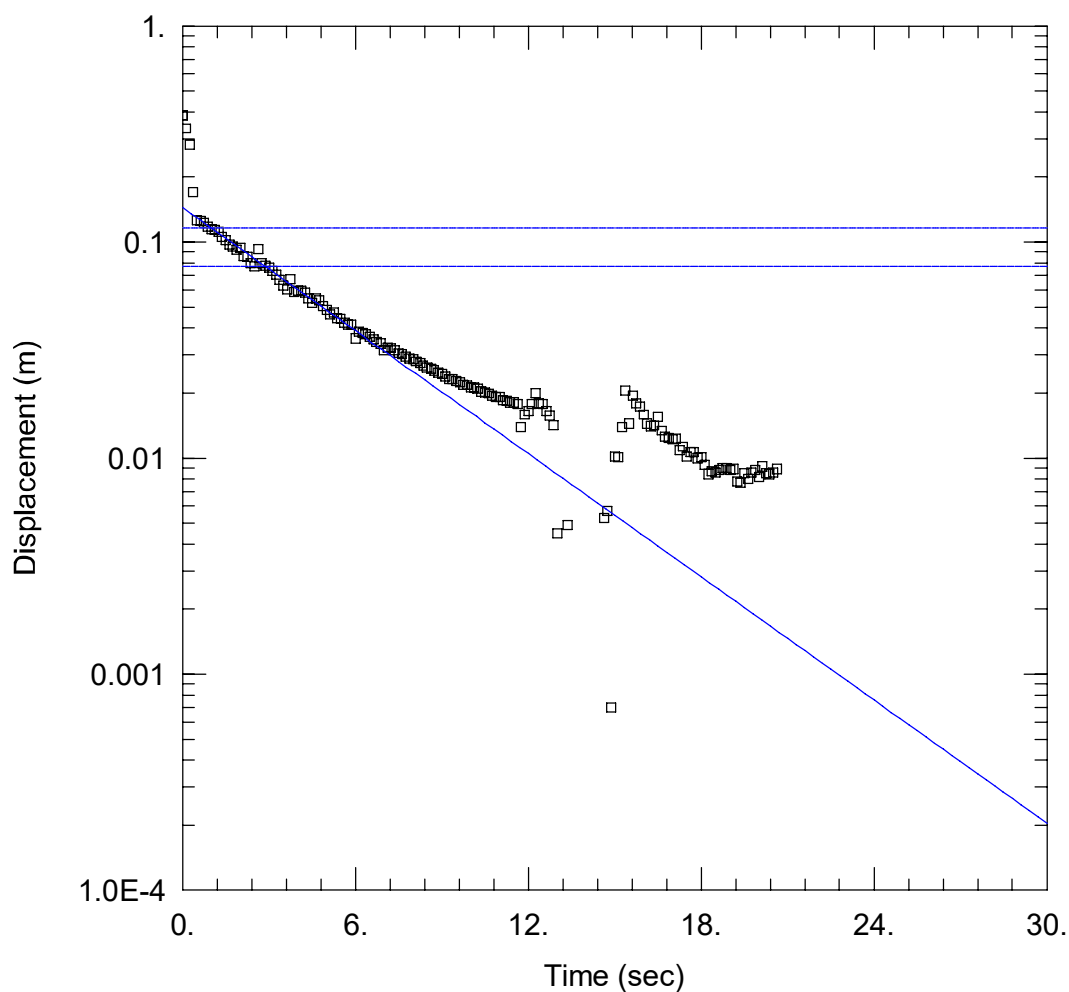
SOLUTION

Aquifer Model: Unconfined

$K = 11.38$ m/day

Solution Method: Bouwer-Rice

$y_0 = 0.1057$ m



WELL TEST ANALYSIS

Data Set: V:\...\P3-Test2-Rising Head.aqt

Date: 03/13/26

Time: 07:27:37

PROJECT INFORMATION

Company: WGA

Project: WGA242463

Location: SL1 - Industrial North

Test Well: P1

Test Date: 23/02/2026

AQUIFER DATA

Saturated Thickness: 12.55 m

Anisotropy Ratio (K_z/K_r): 1.

WELL DATA (P3)

Initial Displacement: 0.3864 m

Total Well Penetration Depth: 1.067 m

Casing Radius: 0.02 m

Static Water Column Height: 1.067 m

Screen Length: 1.067 m

Well Radius: 0.0375 m

Gravel Pack Porosity: 0.2

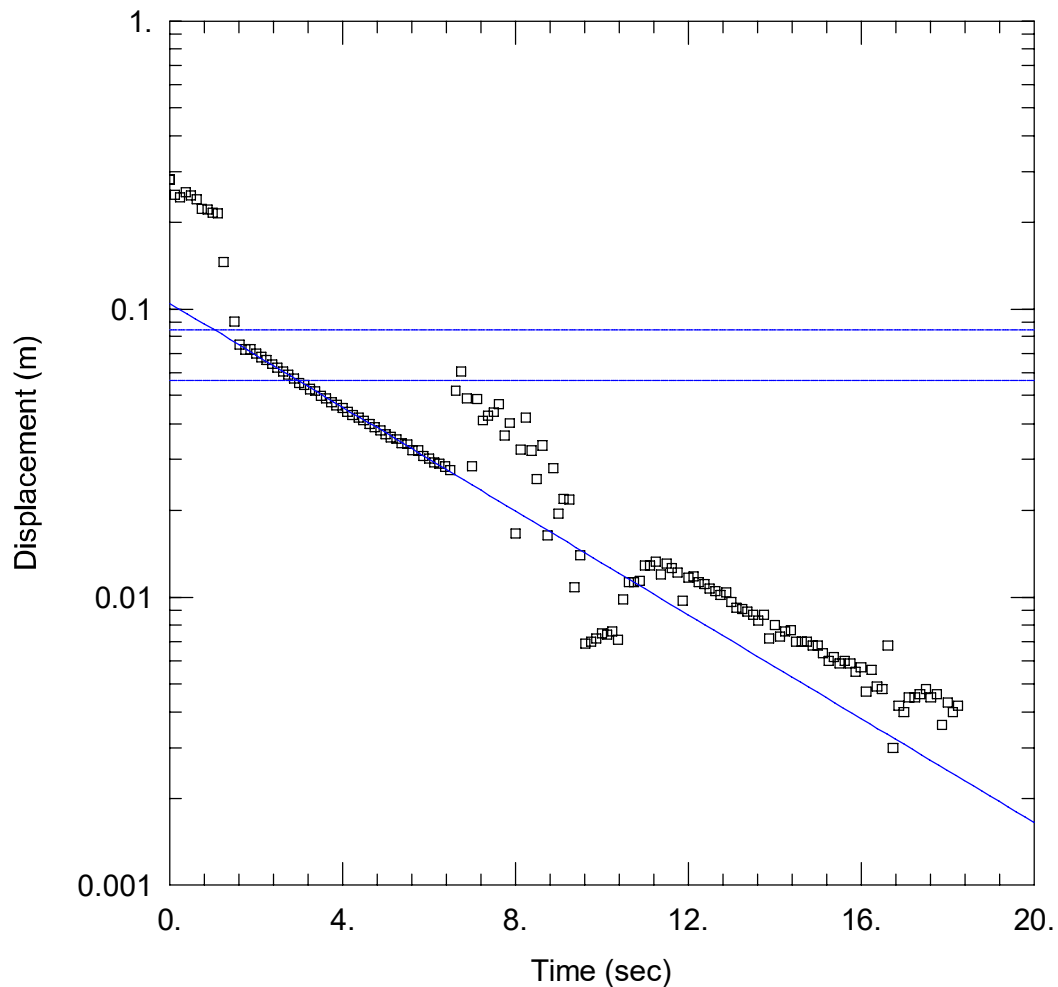
SOLUTION

Aquifer Model: Unconfined

$K = 10.84$ m/day

Solution Method: Bouwer-Rice

$y_0 = 0.1444$ m



WELL TEST ANALYSIS

Data Set: V:\...\P3-Test3-Falling Head.aqt

Date: 03/13/26

Time: 07:27:40

PROJECT INFORMATION

Company: WGA

Project: WGA242463

Location: SL1 - Industrial North

Test Well: P1

Test Date: 23/02/2026

AQUIFER DATA

Saturated Thickness: 12.55 m

Anisotropy Ratio (K_z/K_r): 1.

WELL DATA (P3)

Initial Displacement: 0.2823 m

Total Well Penetration Depth: 1.067 m

Casing Radius: 0.02 m

Static Water Column Height: 1.067 m

Screen Length: 1.067 m

Well Radius: 0.0375 m

Gravel Pack Porosity: 0.2

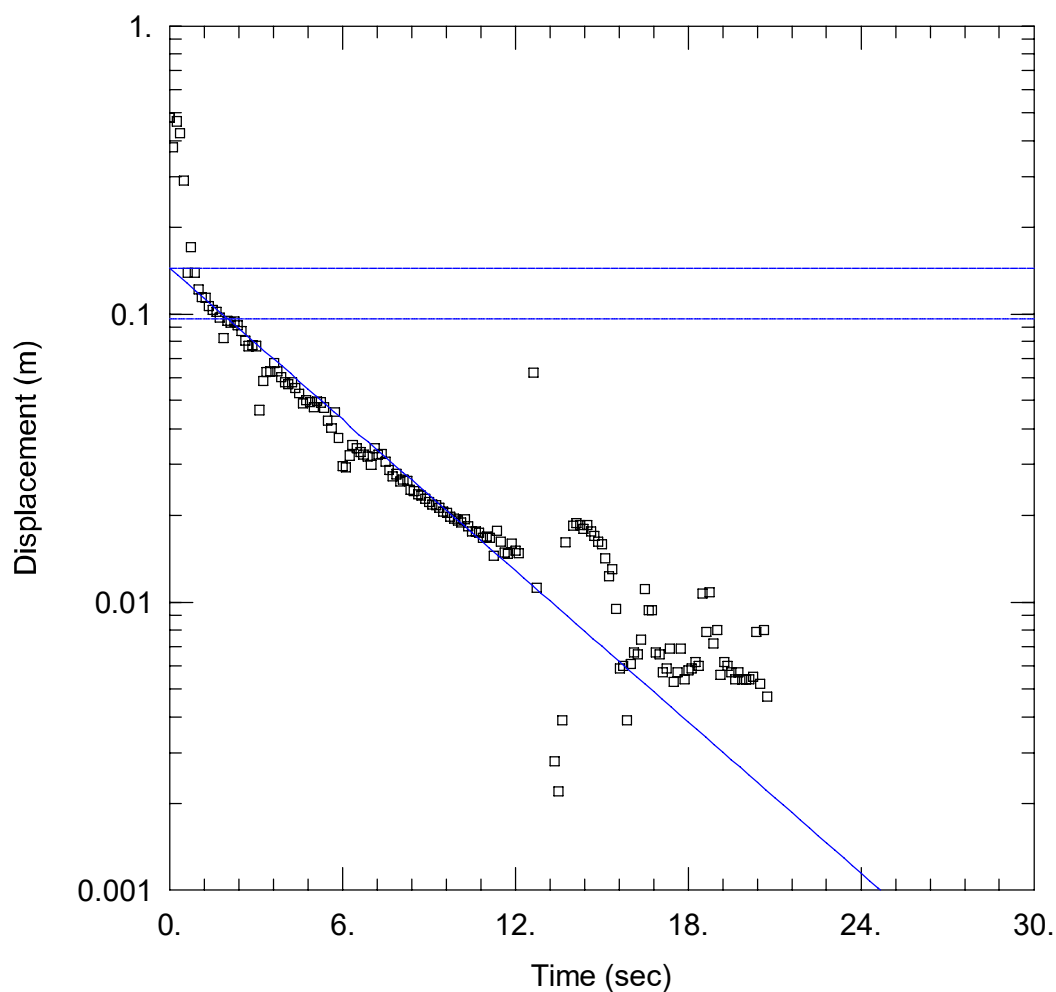
SOLUTION

Aquifer Model: Unconfined

$K = 10.28$ m/day

Solution Method: Bouwer-Rice

$y_0 = 0.1046$ m



WELL TEST ANALYSIS

Data Set: V:\...\P3-Test3-Rising Head.aqt

Date: 03/13/26

Time: 07:27:43

PROJECT INFORMATION

Company: WGA

Project: WGA242463

Location: SL1 - Industrial North

Test Well: P1

Test Date: 23/02/2026

AQUIFER DATA

Saturated Thickness: 12.55 m

Anisotropy Ratio (K_z/K_r): 1.

WELL DATA (P3)

Initial Displacement: 0.4806 m

Total Well Penetration Depth: 1.067 m

Casing Radius: 0.02 m

Static Water Column Height: 1.067 m

Screen Length: 1.067 m

Well Radius: 0.0375 m

Gravel Pack Porosity: 0.2

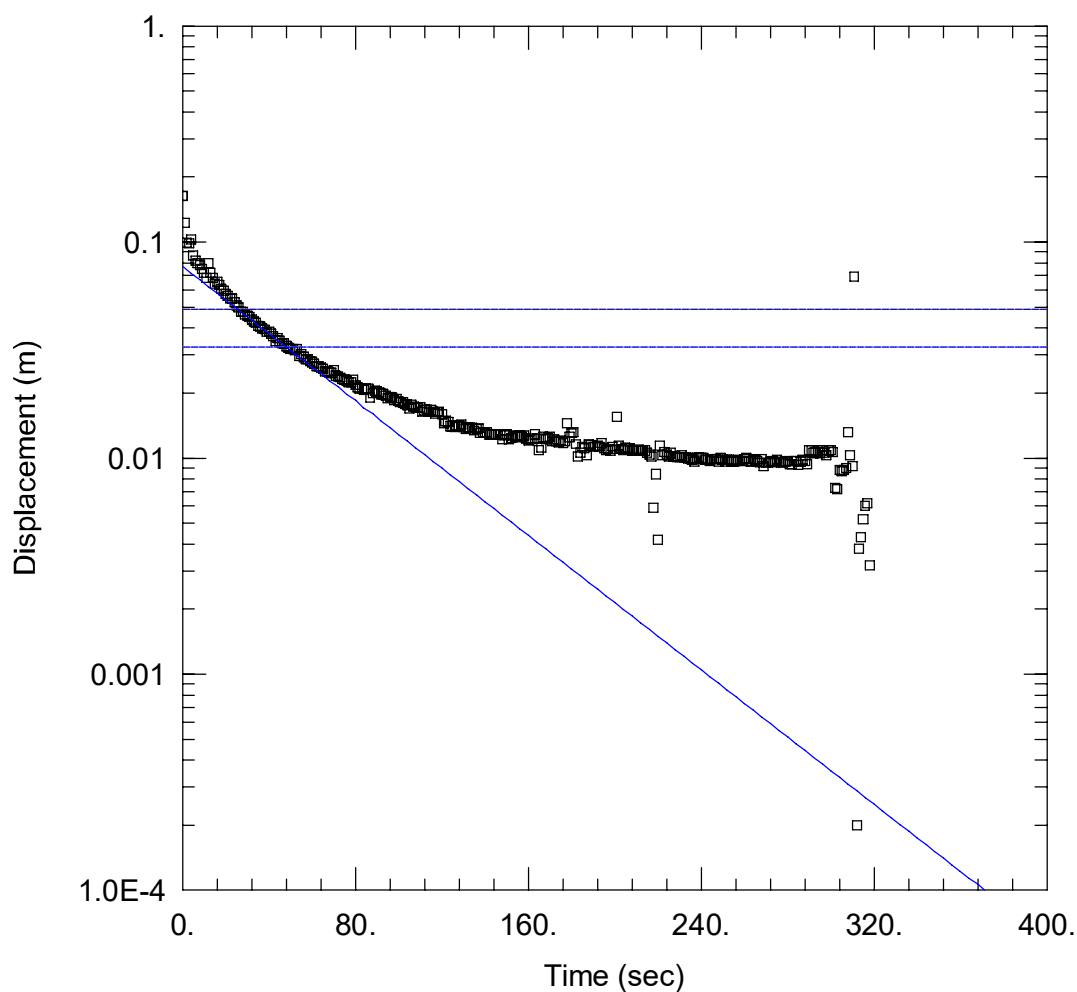
SOLUTION

Aquifer Model: Unconfined

$K = 9.991$ m/day

Solution Method: Bouwer-Rice

$y_0 = 0.1445$ m



WELL TEST ANALYSIS

Data Set: V:\...\P4-Test1-Falling Head.aqt

Date: 03/13/26

Time: 07:28:34

PROJECT INFORMATION

Company: WGA

Project: WGA242463

Location: SL1 - Industrial North

Test Well: P1

Test Date: 23/02/2026

AQUIFER DATA

Saturated Thickness: 14.71 m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (P4)

Initial Displacement: 0.1629 m

Total Well Penetration Depth: 1.084 m

Casing Radius: 0.02 m

Static Water Column Height: 1.084 m

Screen Length: 1.084 m

Well Radius: 0.0375 m

Gravel Pack Porosity: 0.2

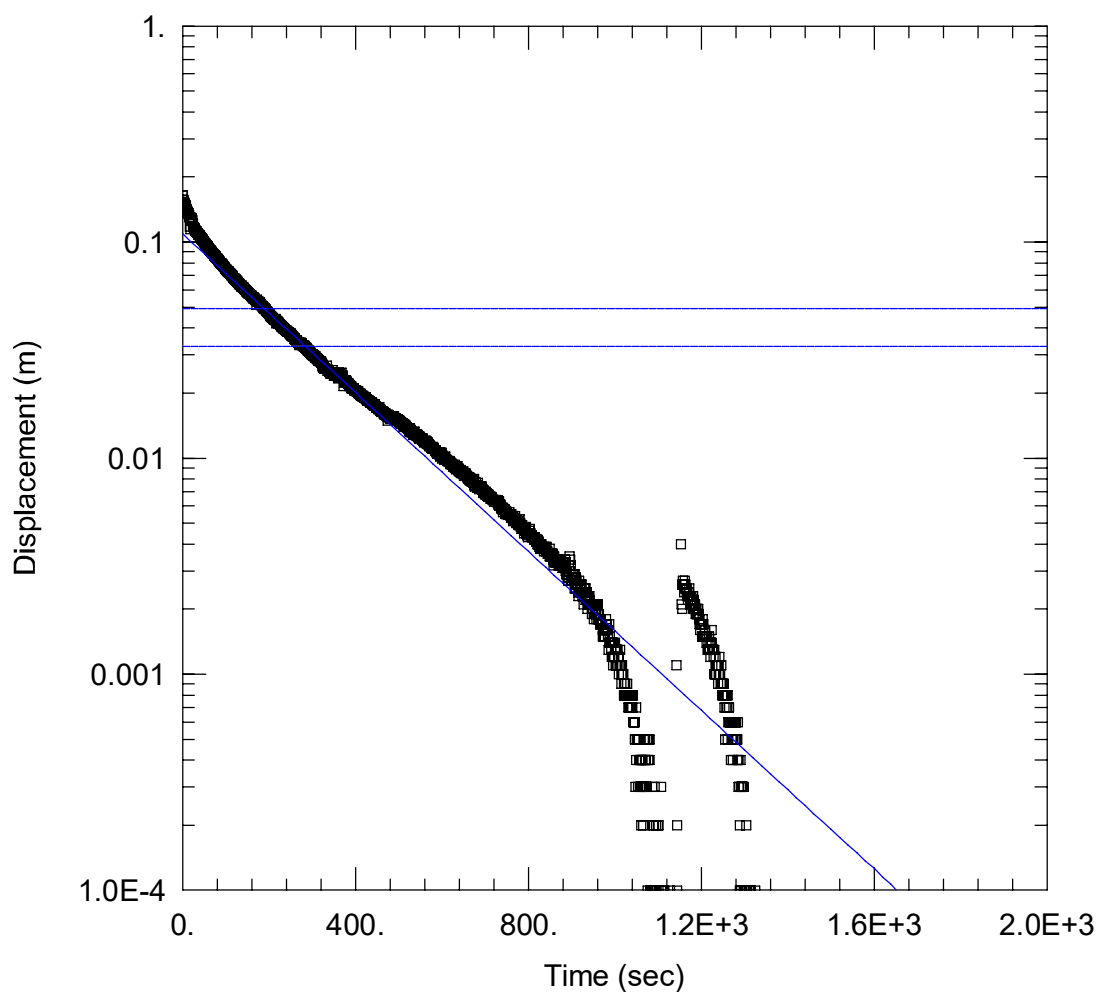
SOLUTION

Aquifer Model: Unconfined

K = 0.8756 m/day

Solution Method: Bouwer-Rice

y0 = 0.07706 m



WELL TEST ANALYSIS

Data Set: V:\...\P4-Test1-Rising Head.aqt

Date: 03/13/26

Time: 07:28:37

PROJECT INFORMATION

Company: WGA

Project: WGA242463

Location: SL1 - Industrial North

Test Well: P1

Test Date: 23/02/2026

AQUIFER DATA

Saturated Thickness: 14.71 m

Anisotropy Ratio (K_z/K_r): 1.

WELL DATA (P4)

Initial Displacement: 0.1643 m

Total Well Penetration Depth: 1.084 m

Casing Radius: 0.02 m

Static Water Column Height: 1.084 m

Screen Length: 1.084 m

Well Radius: 0.0375 m

Gravel Pack Porosity: 0.2

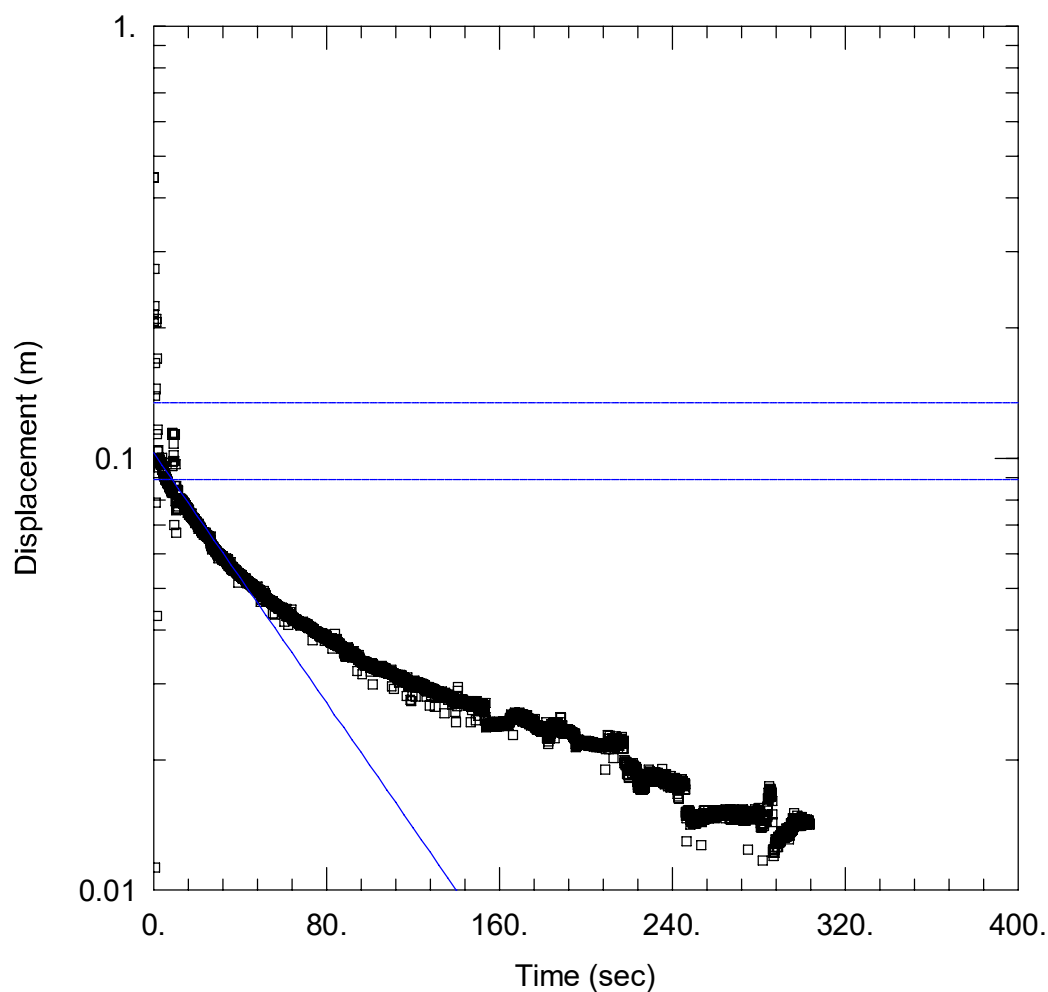
SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

$K = 0.2068$ m/day

$y_0 = 0.1091$ m



WELL TEST ANALYSIS

Data Set: V:\...\P4-Test2-Falling Head.aqt

Date: 03/13/26

Time: 07:28:41

PROJECT INFORMATION

Company: WGA

Project: WGA242463

Location: SL1 - Industrial North

Test Well: P1

Test Date: 23/02/2026

AQUIFER DATA

Saturated Thickness: 14.71 m

Anisotropy Ratio (K_z/K_r): 1.

WELL DATA (P4)

Initial Displacement: 0.4467 m

Total Well Penetration Depth: 1.084 m

Casing Radius: 0.02 m

Static Water Column Height: 1.084 m

Screen Length: 1.084 m

Well Radius: 0.0375 m

Gravel Pack Porosity: 0.2

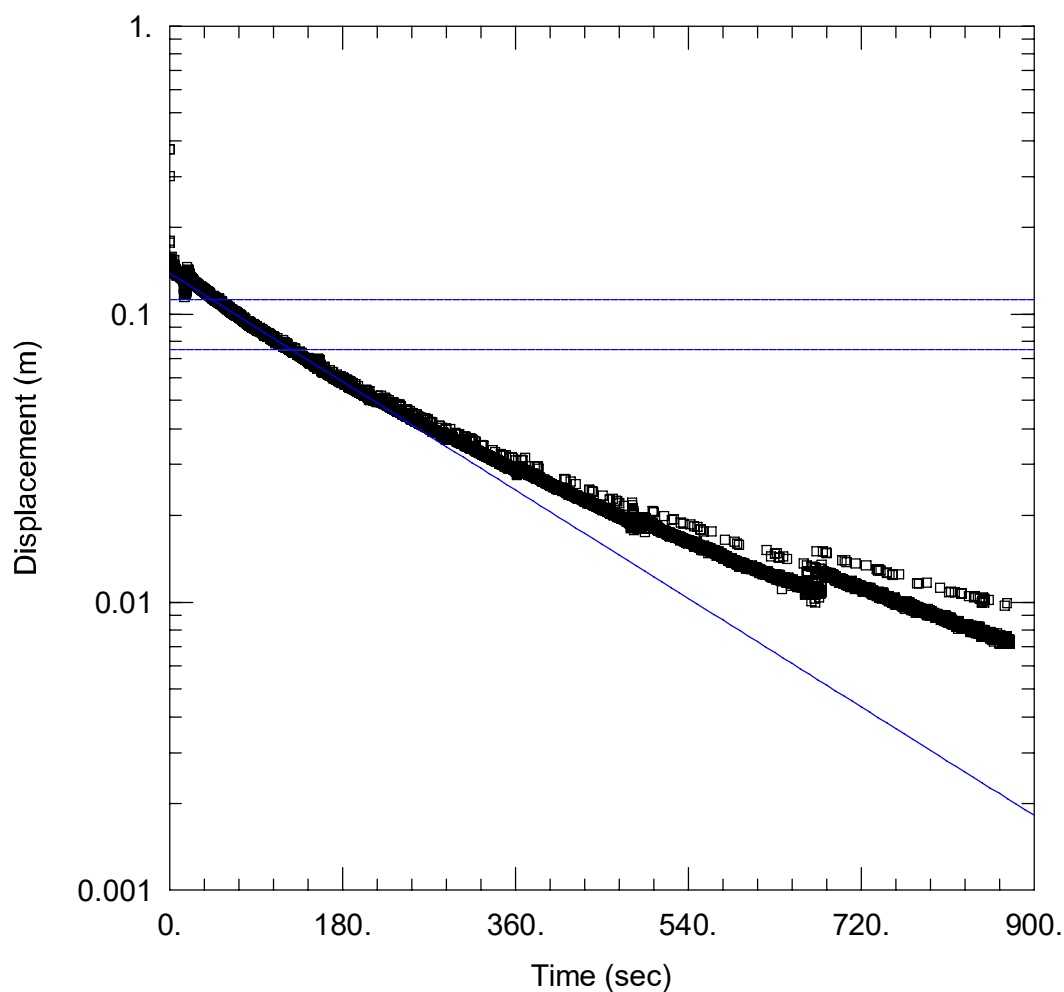
SOLUTION

Aquifer Model: Unconfined

$K = 0.813$ m/day

Solution Method: Bouwer-Rice

$y_0 = 0.1028$ m



WELL TEST ANALYSIS

Data Set: V:\...\P4-Test2-Rising Head.aqt

Date: 03/13/26

Time: 07:28:46

PROJECT INFORMATION

Company: WGA

Project: WGA242463

Location: SL1 - Industrial North

Test Well: P1

Test Date: 23/02/2026

AQUIFER DATA

Saturated Thickness: 14.71 m

Anisotropy Ratio (K_z/K_r): 1.

WELL DATA (P4)

Initial Displacement: 0.3743 m

Total Well Penetration Depth: 1.084 m

Casing Radius: 0.02 m

Static Water Column Height: 1.084 m

Screen Length: 1.084 m

Well Radius: 0.0375 m

Gravel Pack Porosity: 0.2

SOLUTION

Aquifer Model: Unconfined

$K = 0.2353$ m/day

Solution Method: Bouwer-Rice

$y_0 = 0.1387$ m

CMW Soakage Tests

On 6 March 2026, CMW performed falling head soakage tests in three open hand auger holes in the Northern Block (CMW 2026). The data from the falling head tests was analysed using two methods: the CIRIA 113 method and the Hvorslev (1951) method. Although both analysis methods are widely used and accepted, the Hvorslev analyses generated significantly lower hydraulic conductivity results than the CIRIA analyses.

Table C2: Results of CMW Hydraulic Tests

SITE ID	TEST HOLE DEPTH (m)	CIRIA 113 ANALYSIS RESULT (m/s)	HVORSLEV (1951) ANALYSIS RESULT (m/s)	LITHOLOGY
SO1	1.0	2.98×10^{-6}	5.95×10^{-7}	Silt
SO2	1.0	1.0×10^{-5}	2.44×10^{-6}	Silt
SO3	2.0	1.02×10^{-5}	1.36×10^{-6}	Silt



CLIENT: Colliers Project Leaders

PROJECT: Southern Links Industrial Block

TITLE: SO1 Falling Head Permeability Test

DESIGNER: PT

CHECKED: MM

REVISION: 0

DATE: 6/03/2026

PROJECT: HAM2024-0120

Specifications - Open-Ended Tube

Length L_1 : 1 m
Diameter: 90 mm
Non-Perm L_2 : 0 m
Above Gnd L_3 : 0 m

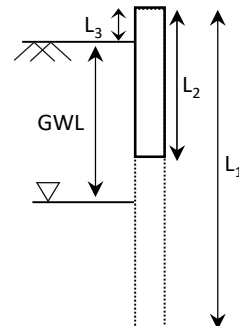
Ground Conditions

GWL: m BGL (Blank = Bottom of hole)

Permeability Anisotropy

m: 1 $m = \sqrt{k_h/k_v}$

Bottom of Test Hole: 1.00 m BGL

**Hydraulic Conductivity (k)**

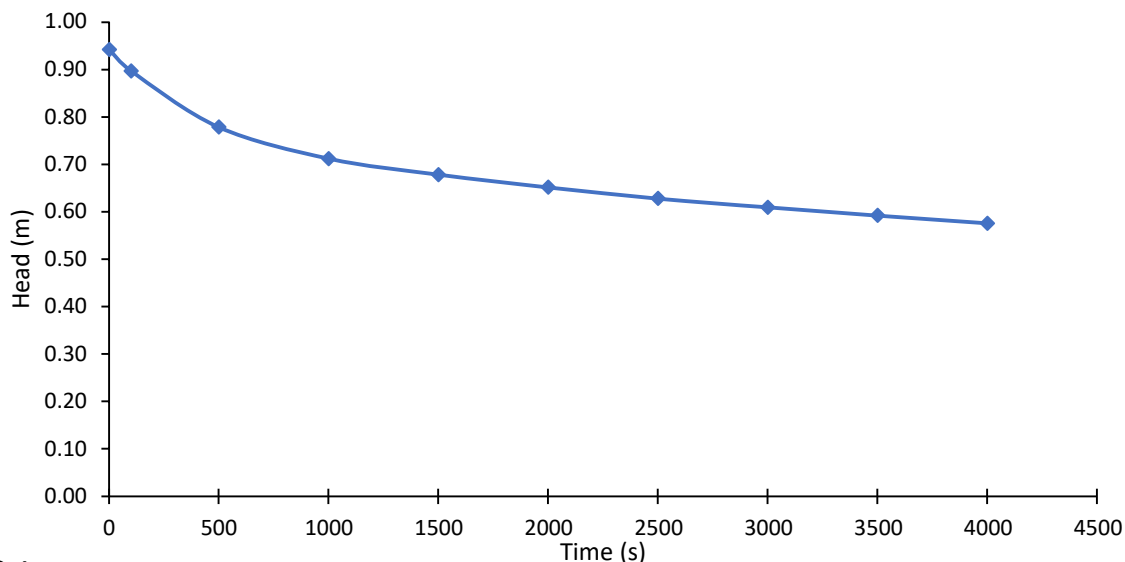
Note: CMW considers the CIRIA 113 value the most appropriate method for most purposes, but also provides the analysis method as outlined by Hvorslev if desired.

CIRIA 113: Somerville (1986), Control of groundwater for temporary works, CIRIA Report 113, Appendix 4

$$k = \left(\log \frac{h_1}{h_2} - \log \frac{2h_1 + d}{2h_2 + d} \right) \cdot \frac{(h_1 + h_2)}{2(t_2 - t_1)} = 2.98\text{E-}06 \text{ ms}^{-1} = 0.26 \text{ m/day}$$

Hvorslev: Hvorslev (1951) Time Lag and Soil Permeability in Ground-Water Observations, Fig 18, p49

$$k = \frac{d^2 \ln \left(\frac{mL}{d} + \sqrt{\left(\frac{mL}{d} \right)^2 + 1} \right)}{8L(t_2 - t_1)} \ln \frac{H_1}{H_2} = 5.95\text{E-}07 \text{ ms}^{-1} = 0.05 \text{ m/day}$$

**STRATIGRAPHIC LOG**

Silt

EOH @ 1m

Data

Time (s)	Tape Avg (m)	Head (m)	Perm. Length (m)	Hvorslev 'k' Case G (ms ⁻¹)	CIRIA 113 'k' (ms ⁻¹)
0	0.058	0.942	0.920	1.63E-06	9.16E-06
100	0.103	0.897	0.838	1.25E-06	6.59E-06
500	0.221	0.779	0.745	6.82E-07	3.29E-06
1000	0.288	0.712	0.695	3.88E-07	1.79E-06
1500	0.322	0.678	0.665	3.30E-07	1.47E-06
2000	0.348	0.652	0.640	3.10E-07	1.35E-06
2500	0.372	0.628	0.619	2.60E-07	1.10E-06
3000	0.391	0.609	0.601	2.48E-07	1.03E-06
3500	0.408	0.592	0.584	2.55E-07	1.04E-06
4000	0.424	0.576			



CLIENT: **Colliers Project Leaders**

PROJECT: **Southern Links Industrial Block**

TITLE: **SO2 Falling Head Permeability Test**

DESIGNER: **PT**

CHECKED: **MM**

REVISION: **0**

DATE: **6/03/2026**

PROJECT: **HAM2024-0120**

Specifications - Open-Ended Tube

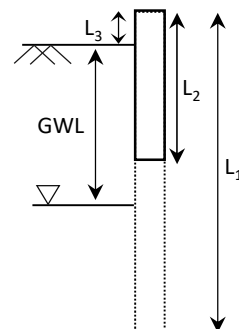
Length L_1 : **1 m**
 Diameter: **90 mm**
 Non-Perm L_2 : **0 m**
 Above Gnd L_3 : **0 m**

Ground Conditions

GWL: **1.00 m BGL** (Blank = Bottom of hole)

Permeability Anisotropy
 $m = \sqrt{k_h/k_v}$
 m : **1**

Bottom of Test Hole: **1.00 m BGL**



Hydraulic Conductivity (k)

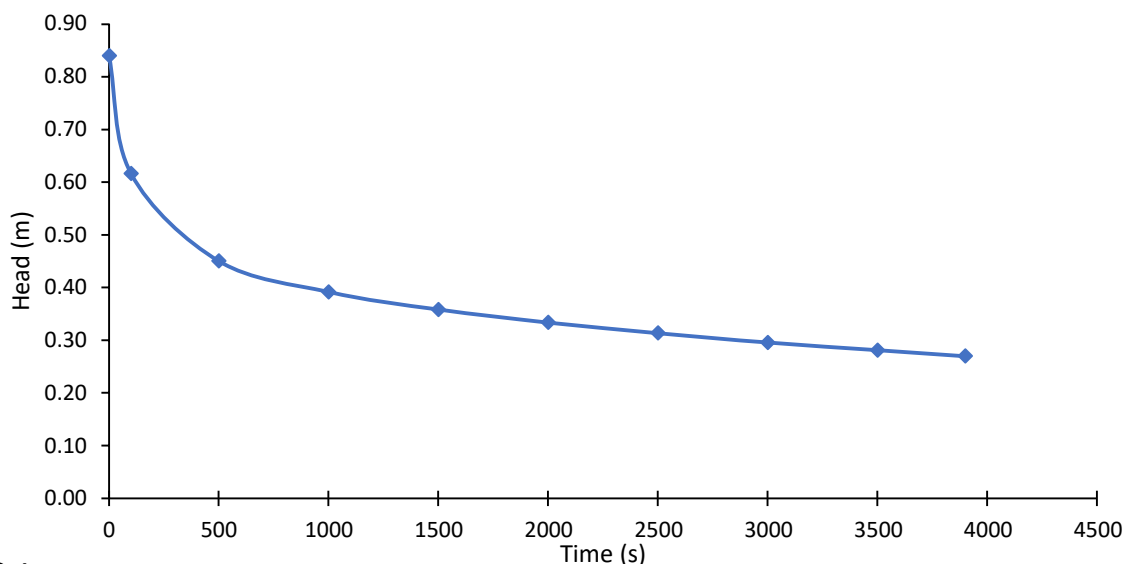
Note: CMW considers the CIRIA 113 value the most appropriate method for most purposes, but also provides the analysis method as outlined by Hvorslev if desired.

CIRIA 113: Somerville (1986), Control of groundwater for temporary works, CIRIA Report 113, Appendix 4

$$k = \left(\log \frac{h_1}{h_2} - \log \frac{2h_1 + d}{2h_2 + d} \right) \cdot \frac{(h_1 + h_2)}{2(t_2 - t_1)} = 1.00\text{E-05 ms}^{-1} = 0.87 \text{ m/day}$$

Hvorslev: Hvorslev (1951) Time Lag and Soil Permeability in Ground-Water Observations, Fig 18, p49

$$k = \frac{d^2 \ln \left(\frac{mL}{d} + \sqrt{\left(\frac{mL}{d} \right)^2 + 1} \right)}{8L(t_2 - t_1)} \ln \frac{H_1}{H_2} = 2.44\text{E-06 ms}^{-1} = 0.21 \text{ m/day}$$



STRATIGRAPHIC LOG

Silt

EOH @ 1m

Data

Time (s)	Tape Avg (m)	Head (m)	Perm. Length (m)	Hvorslev 'k' Case G (ms ⁻¹)	CIRIA 113 'k' (ms ⁻¹)
0	0.160	0.840	0.728	1.20E-05	5.78E-05
100	0.384	0.616	0.533	3.69E-06	1.43E-05
500	0.550	0.451	0.421	1.51E-06	4.96E-06
1000	0.608	0.392	0.375	1.03E-06	3.11E-06
1500	0.642	0.358	0.346	8.49E-07	2.44E-06
2000	0.666	0.334	0.324	7.70E-07	2.12E-06
2500	0.686	0.314	0.305	7.68E-07	2.04E-06
3000	0.704	0.296	0.288	6.60E-07	1.69E-06
3500	0.719	0.281	0.276	6.86E-07	1.71E-06
3900	0.730	0.270			



CLIENT: Colliers Project Leaders

PROJECT: Southern Links Industrial Block

TITLE: SO3 Falling Head Permeability Test

DESIGNER: PT

CHECKED: MM

REVISION: 0

DATE: 6/03/2026

PROJECT: HAM2024-0120

Specifications - Open-Ended Tube

Length L_1 : 2 m
Diameter: 90 mm
Non-Perm L_2 : 0 m
Above Gnd L_3 : 0 m

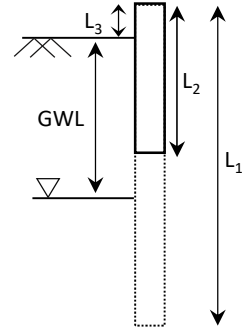
Ground Conditions

GWL: m BGL (Blank = Bottom of hole)

Permeability Anisotropy

m: 1 $m = \sqrt{k_h/k_v}$

Bottom of Test Hole: 2.00 m BGL

**Hydraulic Conductivity (k)**

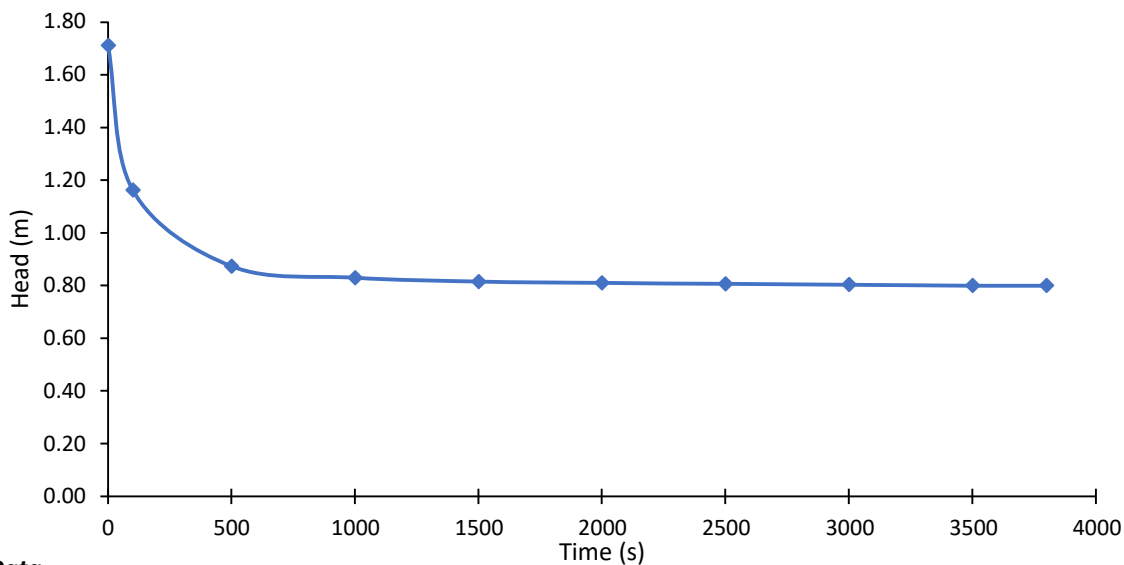
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CIRIA 113: Somerville (1986), Control of groundwater for temporary works, CIRIA Report 113, Appendix 4

$$k = \left(\log \frac{h_1}{h_2} - \log \frac{2h_1 + d}{2h_2 + d} \right) \cdot \frac{(h_1 + h_2)}{2(t_2 - t_1)} = 1.02\text{E-}05 \text{ ms}^{-1} = 0.88 \text{ m/day}$$

Hvorslev: Hvorslev (1951) Time Lag and Soil Permeability in Ground-Water Observations, Fig 18, p49

$$k = \frac{d^2 \ln \left(\frac{mL}{d} + \sqrt{\left(\frac{mL}{d} \right)^2 + 1} \right)}{8L(t_2 - t_1)} \ln \frac{H_1}{H_2} = 1.36\text{E-}06 \text{ ms}^{-1} = 0.12 \text{ m/day}$$

**STRATIGRAPHIC LOG**

Silt

EOH @ 2m

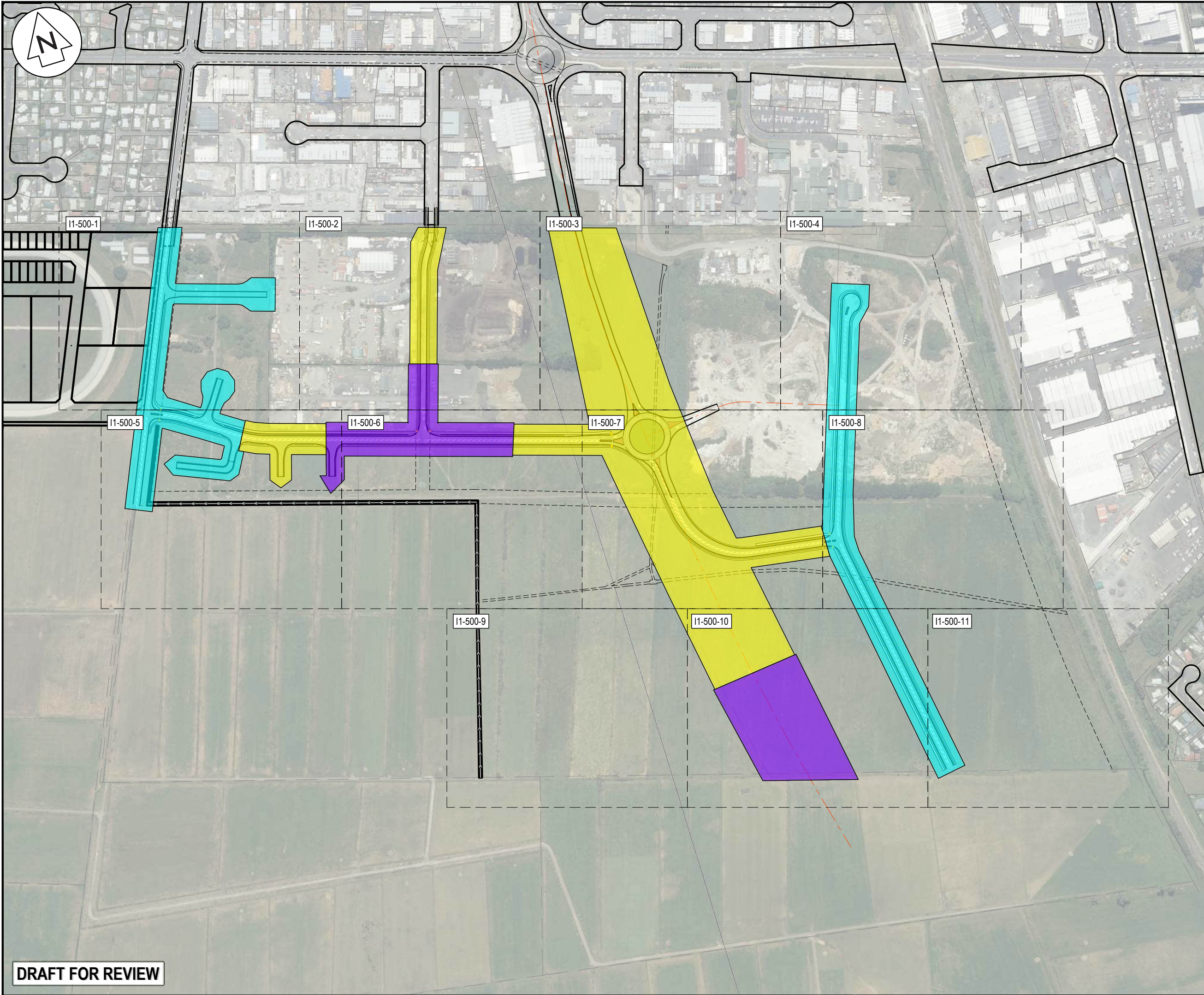
Data

Time (s)	Tape Avg (m)	Head (m)	Perm. Length (m)	Hvorslev 'k' Case G (ms ⁻¹)	CIRIA 113 'k' (ms ⁻¹)
0	0.289	1.711	1.437	9.44E-06	7.50E-05
100	0.837	1.163	1.018	2.22E-06	1.36E-05
500	1.127	0.873	0.851	3.61E-07	1.92E-06
1000	1.171	0.830	0.822	1.23E-07	6.35E-07
1500	1.185	0.815	0.813	4.80E-08	2.46E-07
2000	1.190	0.810	0.808	3.14E-08	1.60E-07
2500	1.194	0.807	0.805	2.71E-08	1.38E-07
3000	1.197	0.804	0.802	3.18E-08	1.62E-07
3500	1.200	0.800	0.800	3.04E-09	1.54E-08
3800	1.200	0.800			

APPENDIX D

MAVEN DESIGNS





- NOTES
1. ALL WORKS TO BE IN ACCORDANCE WITH WAIKATO REGIONAL INFRASTRUCTURE TECHNICAL SPECIFICATIONS.
 2. CO-ORDINATES IN TERMS OF NZ GEODETIC DATUM MT EDEN 2000.
 3. LEVELS IN TERMS OF THE NEW ZEALAND VERTICAL DATUM 2016.
 4. IT IS THE CONTRACTORS RESPONSIBILITY TO LOCATE ALL SERVICES THAT MAY BE AFFECTED BY HIS OPERATIONS.

LEGEND

EX BDY
PROP BDY

A	DRAFT	MKS	04/2026
Rev	Description	By	Date
		By	Date
Survey	MAVEN		05/2025
Design	MKS		04/2026
Drawn	MKS		04/2026
Checked	SM		04/2026

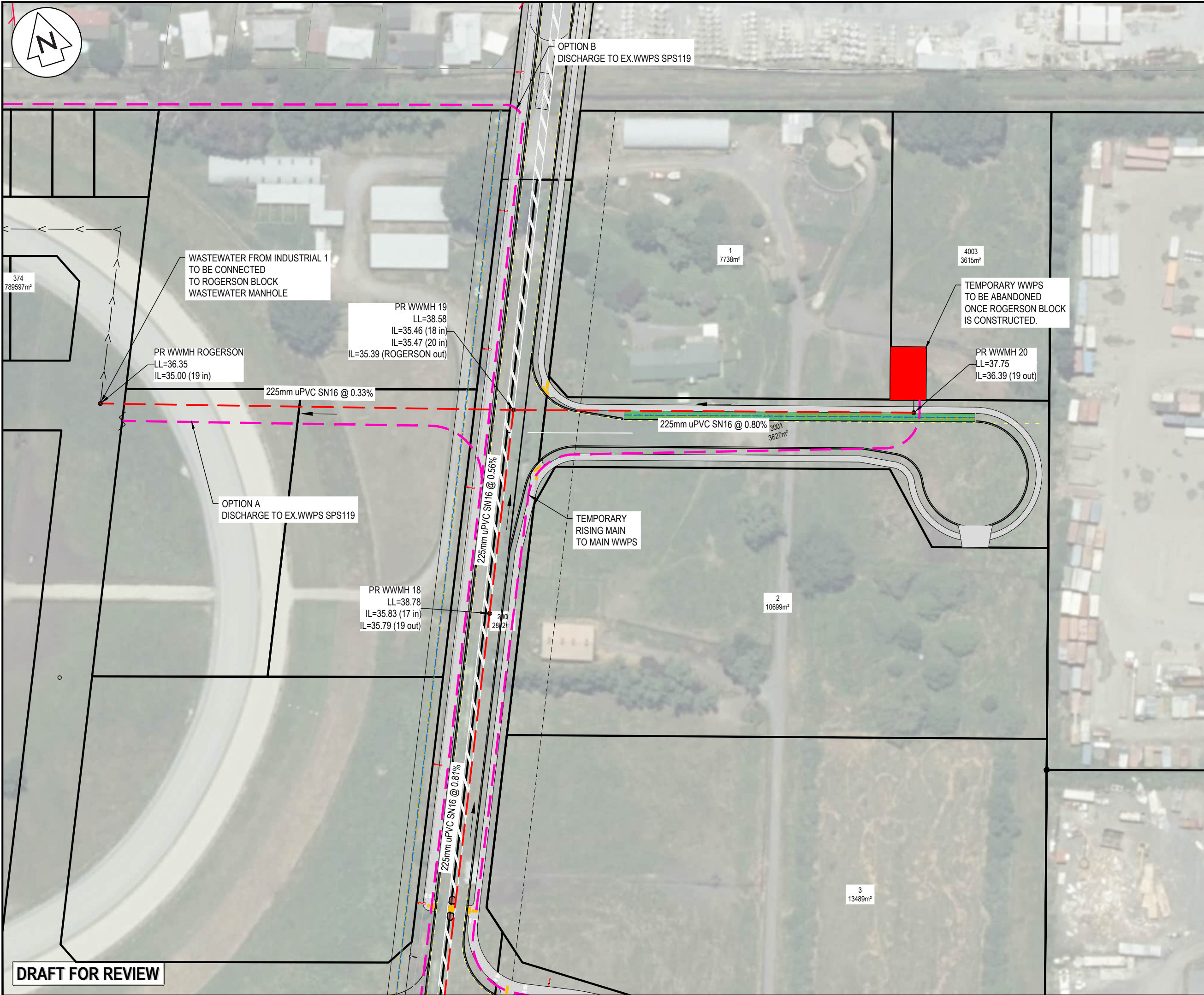
M Maven Waikato
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New Zealand

Project
**SOUTHERN LINKS 1
INDUSTRIAL STAGE 1
HAMILTON, WAIKATO
FOR
SL1 CONSORTIUM GROUP**

Title
**PROPOSED
PEAT PRELOAD
OVERVIEW PLAN**

Project no.	298002-IND SL1		
Scale	1:5000 @ A3		
Cad file	WIP-298002-11-PEAT PRELOAD.DWG		
Drawing no.	WIP	Rev	A

DRAFT FOR REVIEW



NOTES

- ALL WORKS TO BE IN ACCORDANCE WITH WAIKATO REGIONAL INFRASTRUCTURE TECHNICAL SPECIFICATIONS.
- CO-ORDINATES IN TERMS OF NZ GEODETIC DATUM MT EDEN 2000. LEVELS IN TERMS OF THE NEW ZEALAND VERTICAL DATUM 2016. CONVERSION TO MOTURIKI 1953 CAN BE ACHIEVED BY ADDING 0.2594M
- IT IS THE CONTRACTORS RESPONSIBILITY TO LOCATE ALL SERVICES THAT MAY BE AFFECTED BY HIS OPERATIONS.
- APPROVED HARDFILL IS TO BE USED IN BACKFILLING OF ALL ROAD CROSSINGS TO COUNCIL STANDARDS.
- HEAVY DUTY MANHOLE LIDS AND FRAMES TO BE USED IN TRAFFICKED AREAS, ALL MANHOLES SHALL HAVE STAINLESS GRATES INSTALLED.
- ALL LINES ARE TO BE 150mmØ PVC CLASS SN16 UNLESS SHOWN OTHERWISE.
- 150mmØ PIPES THAT DO NOT TERMINATE IN A MANHOLE MUST BE TERMINATED WITH A 100mmØ ON A 150mmØ LONDON JUNCTION AND BLANK CAP.
- MANHOLE DIAMETERS SHOWN ON STRUCTURE LABEL ARE INTERNAL DIAMETER.
- MEASUREMENTS SHOWN ON LOT CONNECTIONS ARE DISTANCE TO CENTER OF LOT CONNECTION FROM THE NEAREST DOWNSTREAM MANHOLE.

LEGEND

—	EX BDY
—	PROP BDY
---	EX WASTEWATER
---	PROP WASTEWATER
---	PROP RISING MAIN
○	EX/PROP WWMH
+	PR WW LOT CON

A	DRAFT	MKS	06/2026
Rev	Description	By	Date
	Survey	MAVEN	20/05/25
	Design	MKS	04/2026
	Drawn	MKS	04/2026
	Checked	SM	04/2026

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Project

**SOUTHERN LINKS 1
INDUSTRIAL STAGE 1
HAMILTON, WAIKATO
FOR
SL1 CONSORTIUM GROUP**

Title

**PROPOSED
WASTEWATER
PLAN**

Project no.	298002-IND SL1		
Scale	1:1000 @ A3		
Cad file	298002-11-C500 WW.DWG		
Drawing no.	I1-C500-OPTIONS	Rev	A

DRAFT FOR REVIEW



- NOTES
1. ALL WORKS TO BE IN ACCORDANCE WITH WAIKATO REGIONAL INFRASTRUCTURE TECHNICAL SPECIFICATIONS.
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LEGEND

	EX BDY
	PROP BDY
	EX WASTEWATER
	PROP WASTEWATER
	PROP RISING MAIN
	EX/PROP WWMH
	PR WW LOT CON

A	DRAFT	MKS	04/2026
Rev	Description	By	Date
	By	Date	
Survey	MAVEN	20/05/25	
Design	MKS	04/2026	
Drawn	MKS	04/2026	
Checked	SM	04/2026	

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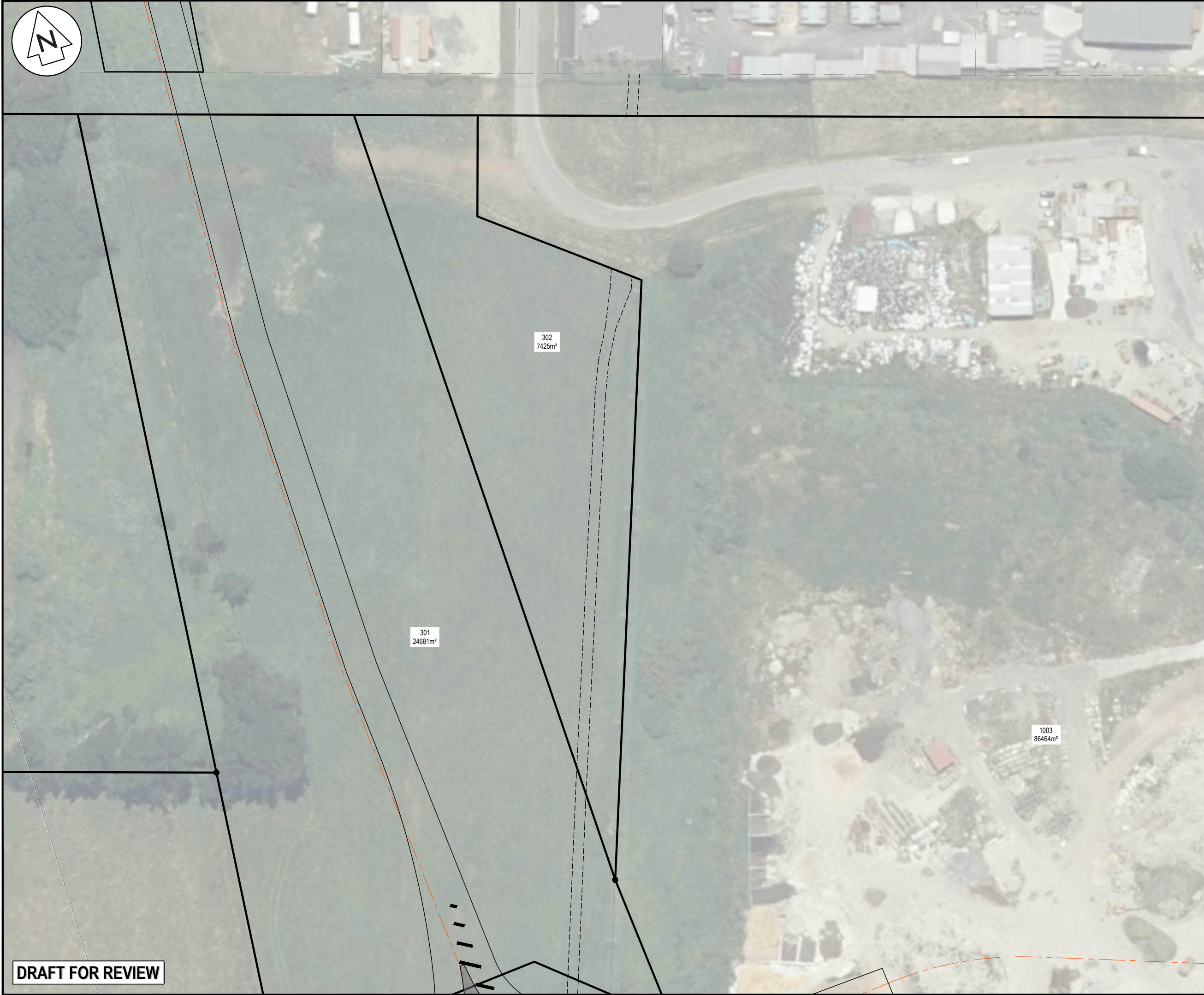
Project

**SOUTHERN LINKS 1
INDUSTRIAL STAGE 1
HAMILTON, WAIKATO
FOR
SL1 CONSORTIUM GROUP**

Title

**PROPOSED
WASTEWATER
PLAN**

Project no.	298002-IND SL1		
Scale	1:1000 @ A3		
Cad file	298002-11-C500 WW.DWG		
Drawing no.	I1-C500-2	Rev	A



NOTES

1. ALL WORKS TO BE IN ACCORDANCE WITH WAIKATO REGIONAL INFRASTRUCTURE TECHNICAL SPECIFICATIONS.
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7. 150mmØ PIPES THAT DO NOT TERMINATE IN A MANHOLE MUST BE TERMINATED WITH A 100mmØ ON A 150mmØ LONDON JUNCTION AND BLANK CAP.
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LEGEND

	EX BDY
	PROP BDY
	EX WASTEWATER
	PROP WASTEWATER
	PROP RISING MAIN
	EX/PROP WWMH
	PR WW LOT CON

A	DRAFT	MKS	04/2026
Rev	Description	By	Date
	By	Date	
Survey	MAVEN	20/05/25	
Design	MKS	04/2026	
Drawn	MKS	04/2026	
Checked	SM	04/2026	

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Project

**SOUTHERN LINKS 1
INDUSTRIAL STAGE 1
HAMILTON, WAIKATO
FOR
SL1 CONSORTIUM GROUP**

Title

**PROPOSED
WASTEWATER
PLAN**

Project no.	298002-IND SL1		
Scale	1:1000 @ A3		
Cad file	298002-I1-C500 WW.DWG		
Drawing no.	I1-C500-3	Rev	A



- NOTES
1. ALL WORKS TO BE IN ACCORDANCE WITH WAIKATO REGIONAL INFRASTRUCTURE TECHNICAL SPECIFICATIONS.
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LEGEND

	EX BDY
	PROP BDY
	EX WASTEWATER
	PROP WASTEWATER
	PROP RISING MAIN
	EX/PROP WWMH
	PR WW LOT CON

A	DRAFT	MKS	04/2026
Rev	Description	By	Date
	By	Date	
Survey	MAVEN	20/05/25	
Design	MKS	04/2026	
Drawn	MKS	04/2026	
Checked	SM	04/2026	

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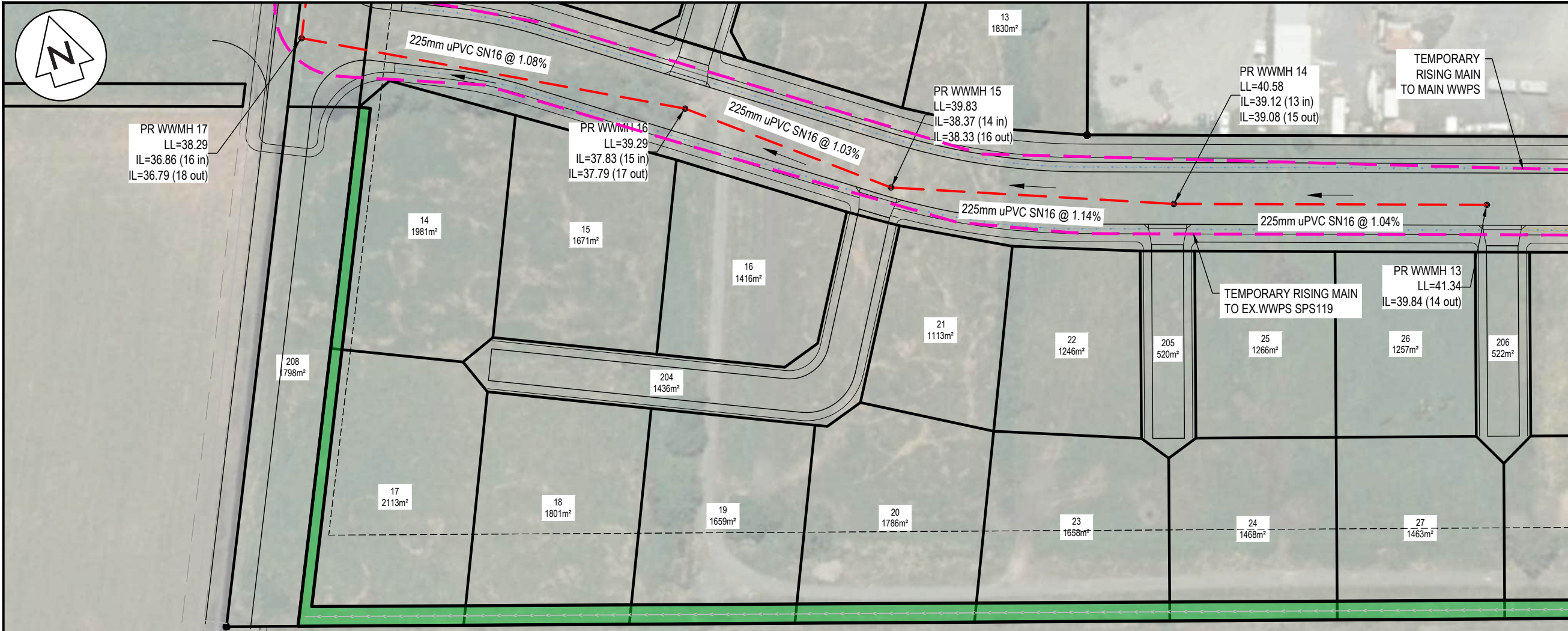
Project
**SOUTHERN LINKS 1
INDUSTRIAL STAGE 1
HAMILTON, WAIKATO
FOR
SL1 CONSORTIUM GROUP**

Title
**PROPOSED
WASTEWATER
PLAN**

Project no.	298002-IND SL1		
Scale	1:1000 @ A3		
Cad file	298002-11-C500 WW.DWG		
Drawing no.	I1-C500-4	Rev	A

49
44234m²

DRAFT FOR REVIEW



- NOTES
1. ALL WORKS TO BE IN ACCORDANCE WITH WAIKATO REGIONAL INFRASTRUCTURE TECHNICAL SPECIFICATIONS.
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LEGEND

	EX BDY
	PROP BDY
	EX WASTEWATER
	PROP WASTEWATER
	PROP RISING MAIN
	EX/PROP WWMH
	PR WW LOT CON

A	DRAFT	MKS	04/2026
Rev	Description	By	Date
	By	Date	
Survey	MAVEN	20/05/25	
Design	MKS	04/2026	
Drawn	MKS	04/2026	
Checked	SM	04/2026	



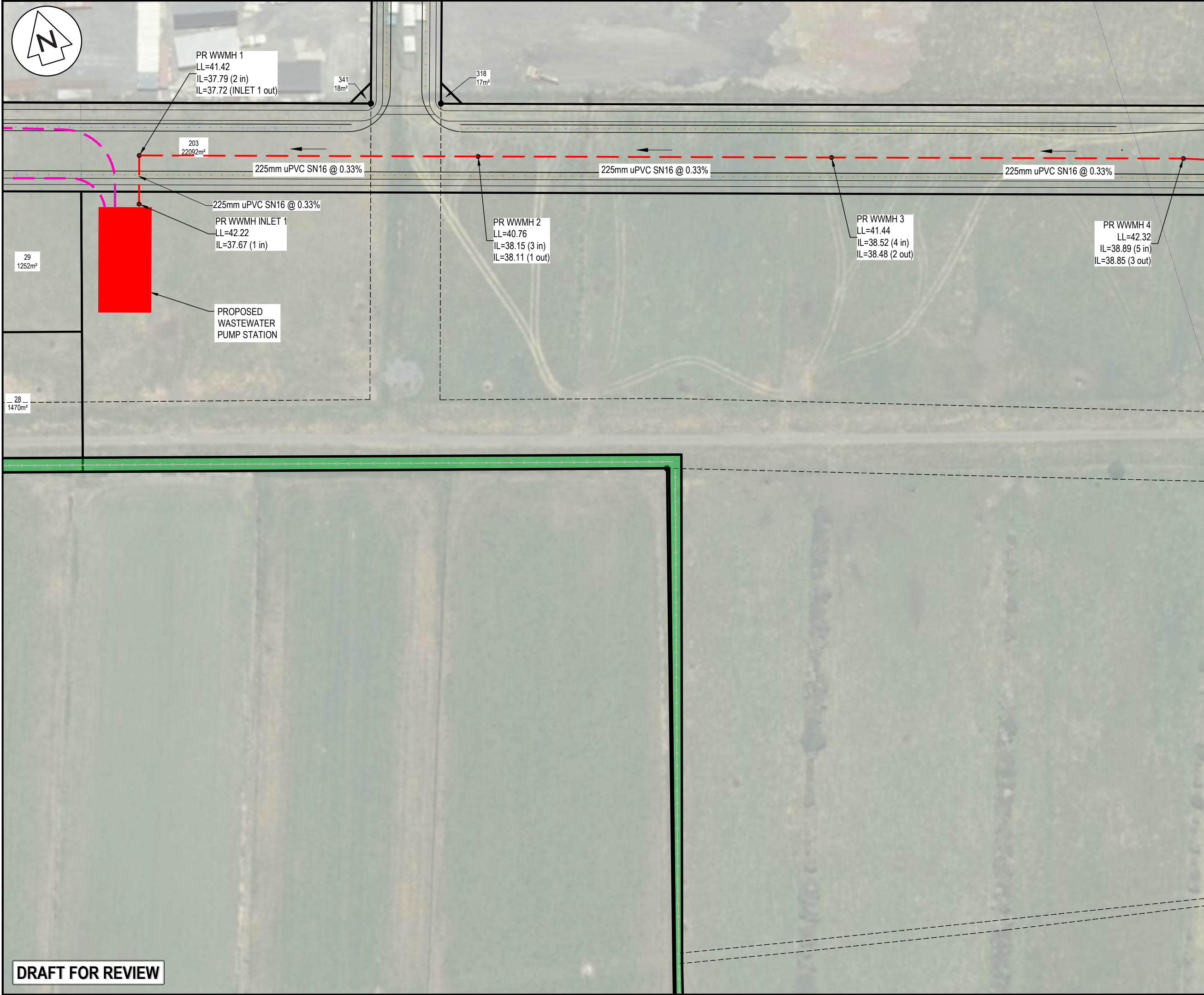
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Project
**SOUTHERN LINKS 1
INDUSTRIAL STAGE 1
HAMILTON, WAIKATO
FOR
SL1 CONSORTIUM GROUP**

Title
**PROPOSED
WASTEWATER
PLAN**

Project no.	298002-IND SL1		
Scale	1:1000 @ A3		
Cad file	298002-11-C500 WW.DWG		
Drawing no.	I1-C500-5	Rev	A

DRAFT FOR REVIEW



NOTES

1. ALL WORKS TO BE IN ACCORDANCE WITH WAIKATO REGIONAL INFRASTRUCTURE TECHNICAL SPECIFICATIONS.

2. CO-ORDINATES IN TERMS OF NZ GEODETIC DATUM MT EDEN 2000. LEVELS IN TERMS OF THE NEW ZEALAND VERTICAL DATUM 2016. CONVERSION TO MOTURIKI 1953 CAN BE ACHIEVED BY ADDING 0.2594M

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LEGEND

EX BDY

PROP BDY

EX WASTEWATER

PROP WASTEWATER

PROP RISING MAIN

EX/PROP WWMH

PR WW LOT CON

A	DRAFT	MKS	04/2026
Rev	Description	By	Date
	By	Date	
Survey	MAVEN	20/05/25	
Design	MKS	04/2026	
Drawn	MKS	04/2026	
Checked	SM	04/2026	

M

MAVEN

Maven Waikato

07 242 0601

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www.maven.co.nz

Level 1 286 Victoria Street, Hamilton

New Zealand

Project

SOUTHERN LINKS 1

INDUSTRIAL STAGE 1

HAMILTON, WAIKATO

FOR

SL1 CONSORTIUM GROUP

Title

PROPOSED

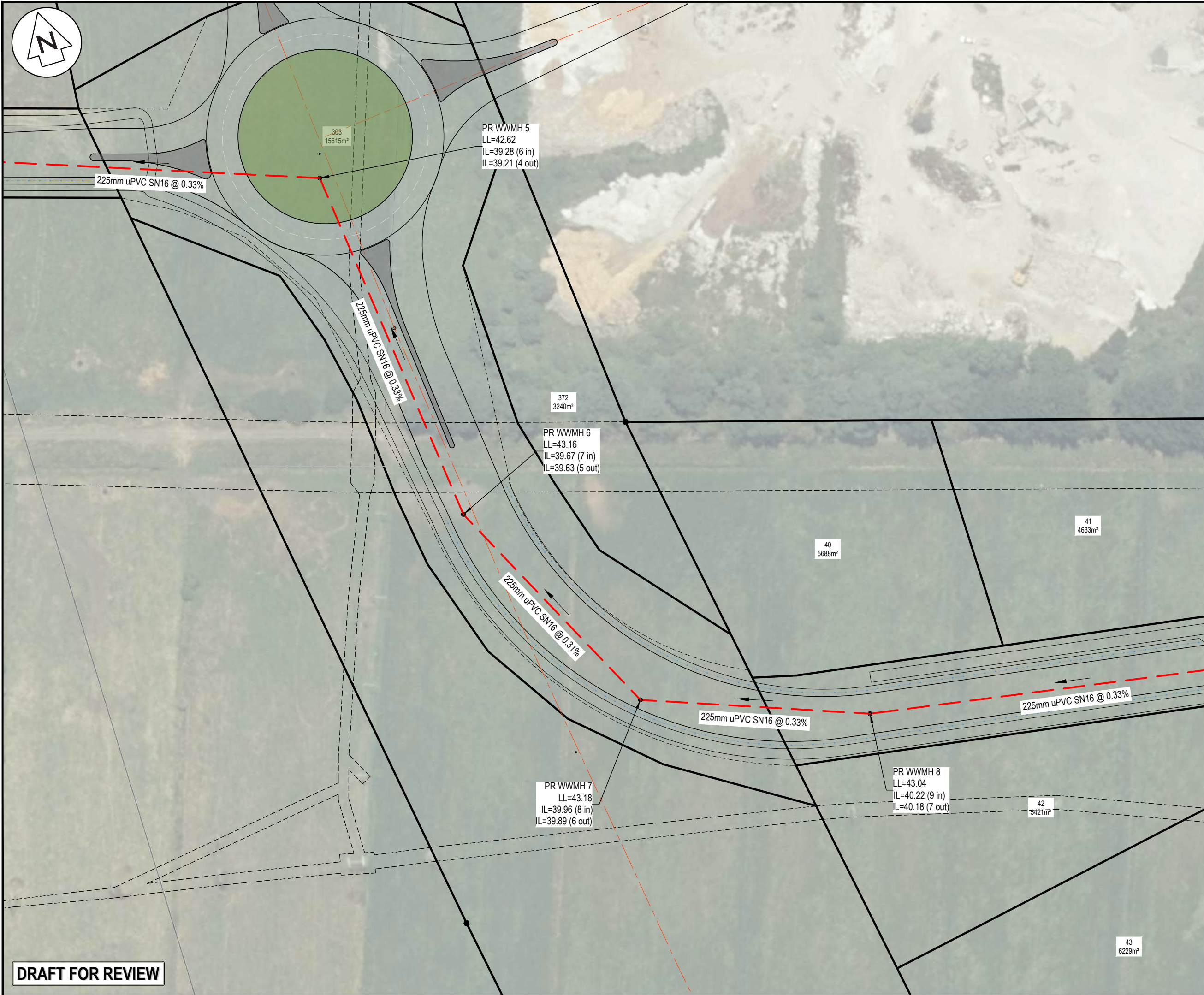
WASTEWATER

PLAN

Project no.	298002-IND SL1		
Scale	1:1000 @ A3		
Cad file	298002-11-C500 WW.DWG		
Drawing no.	I1-C500-6	Rev	A

DRAFT FOR REVIEW

DATE: 4/5/26 FILE PATH: F:\MAVEN\HAMILTON6 PROJECTS\298002- SL1\STG 11\DWG\298002-11-C500 WW.DWG



NOTES

- ALL WORKS TO BE IN ACCORDANCE WITH WAIKATO REGIONAL INFRASTRUCTURE TECHNICAL SPECIFICATIONS.
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LEGEND

- EX BDY
- PROP BDY
- EX WASTEWATER
- PROP WASTEWATER
- PROP RISING MAIN
- EX/PROP WWMH
- PR WW LOT CON

A	DRAFT	MKS	04/2026
Rev	Description	By	Date
	Survey	MAVEN	20/05/25
	Design	MKS	04/2026
	Drawn	MKS	04/2026
	Checked	SM	04/2026

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Project

**SOUTHERN LINKS 1
INDUSTRIAL STAGE 1
HAMILTON, WAIKATO
FOR
SL1 CONSORTIUM GROUP**

Title

**PROPOSED
WASTEWATER
PLAN**

Project no.	298002-IND SL1		
Scale	1:1000 @ A3		
Cad file	298002-11-C500 WW.DWG		
Drawing no.	I1-C500-7	Rev	A

DRAFT FOR REVIEW



NOTES

1. ALL WORKS TO BE IN ACCORDANCE WITH WAIKATO REGIONAL INFRASTRUCTURE TECHNICAL SPECIFICATIONS.
2. CO-ORDINATES IN TERMS OF NZ GEODETIC DATUM MT EDEN 2000. LEVELS IN TERMS OF THE NEW ZEALAND VERTICAL DATUM 2016. CONVERSION TO MOTURIKI 1953 CAN BE ACHIEVED BY ADDING 0.2594M
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7. 150mmØ PIPES THAT DO NOT TERMINATE IN A MANHOLE MUST BE TERMINATED WITH A 100mmØ ON A 150mmØ LONDON JUNCTION AND BLANK CAP.
8. MANHOLE DIAMETERS SHOWN ON STRUCTURE LABEL ARE INTERNAL DIAMETER.
9. MEASUREMENTS SHOWN ON LOT CONNECTIONS ARE DISTANCE TO CENTER OF LOT CONNECTION FROM THE NEAREST DOWNSTREAM MANHOLE.

LEGEND

—	EX BDY
—	PROP BDY
---	EX WASTEWATER
---	PROP WASTEWATER
---	PROP RISING MAIN
○	EX/PROP WWMH
●	PR WW LOT CON

A	DRAFT	MKS	04/2026
Rev	Description	By	Date
	By	Date	
Survey	MAVEN	20/05/25	
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Drawn	MKS	04/2026	
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**SOUTHERN LINKS 1
INDUSTRIAL STAGE 1
HAMILTON, WAIKATO
FOR
SL1 CONSORTIUM GROUP**

Title

**PROPOSED
WASTEWATER
PLAN**

Project no.	298002-IND SL1		
Scale	1:1000 @ A3		
Cad file	298002-11-C500 WW.DWG		
Drawing no.	I1-C500-8	Rev	A



30
153773m²

- NOTES
1. ALL WORKS TO BE IN ACCORDANCE WITH WAIKATO REGIONAL INFRASTRUCTURE TECHNICAL SPECIFICATIONS.
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	EX BDY
	PROP BDY
	EX WASTEWATER
	PROP WASTEWATER
	PROP RISING MAIN
	EX/PROP WWMH
	PR WW LOT CON

A	DRAFT	MKS	04/2026
Rev	Description	By	Date
	By	Date	
Survey	MAVEN	20/05/25	
Design	MKS	04/2026	
Drawn	MKS	04/2026	
Checked	SM	04/2026	



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Project

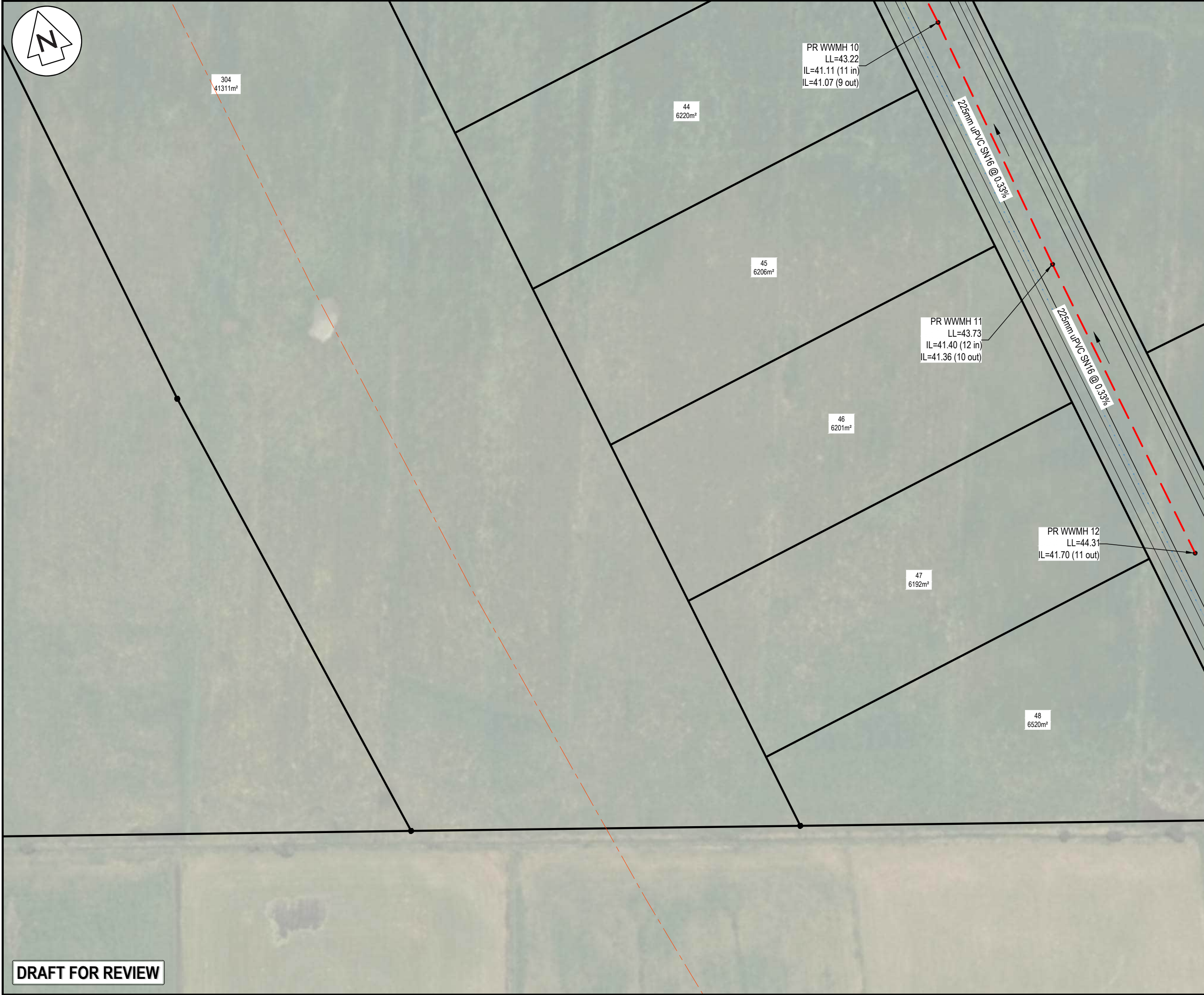
**SOUTHERN LINKS 1
INDUSTRIAL STAGE 1
HAMILTON, WAIKATO
FOR
SL1 CONSORTIUM GROUP**

Title

**PROPOSED
WASTEWATER
PLAN**

Project no.	298002-IND SL1		
Scale	1:1000 @ A3		
Cad file	298002-11-C500 WW.DWG		
Drawing no.	I1-C500-9	Rev	A

DRAFT FOR REVIEW



NOTES

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LEGEND

	EX BDY
	PROP BDY
	EX WASTEWATER
	PROP WASTEWATER
	PROP RISING MAIN
	EX/PROP WWMH
	PR WW LOT CON

A	DRAFT	MKS	04/2026
Rev	Description	By	Date
		By	Date
Survey	MAVEN		20/05/25
Design	MKS		04/2026
Drawn	MKS		04/2026
Checked	SM		04/2026

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Project

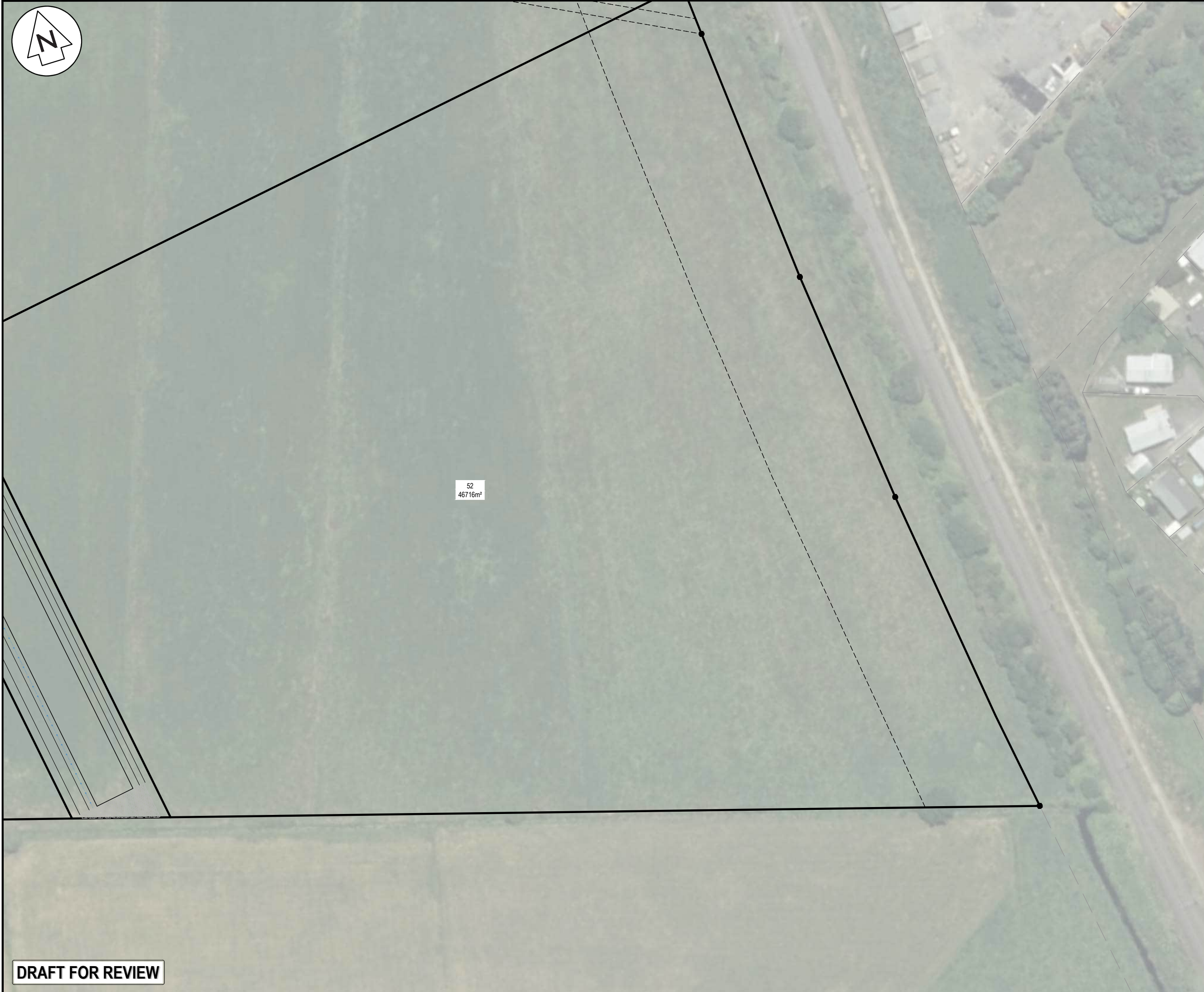
**SOUTHERN LINKS 1
INDUSTRIAL STAGE 1
HAMILTON, WAIKATO
FOR
SL1 CONSORTIUM GROUP**

Title

**PROPOSED
WASTEWATER
PLAN**

Project no.	298002-IND SL1		
Scale	1:1000 @ A3		
Cad file	298002-11-C500 WW.DWG		
Drawing no.	I1-C500-10	Rev	A

DRAFT FOR REVIEW



DRAFT FOR REVIEW

NOTES

1. ALL WORKS TO BE IN ACCORDANCE WITH WAIKATO REGIONAL INFRASTRUCTURE TECHNICAL SPECIFICATIONS.

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LEGEND

EX BDY

PROP BDY

EX WASTEWATER

PROP WASTEWATER

PROP RISING MAIN

EX/PROP WWMH

PR WW LOT CON

A	DRAFT	MKS	04/2026
Rev	Description	By	Date
	By	Date	
Survey	MAVEN	20/05/25	
Design	MKS	04/2026	
Drawn	MKS	04/2026	
Checked	SM	04/2026	

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Project

SOUTHERN LINKS 1

INDUSTRIAL STAGE 1

HAMILTON, WAIKATO

FOR

SL1 CONSORTIUM GROUP

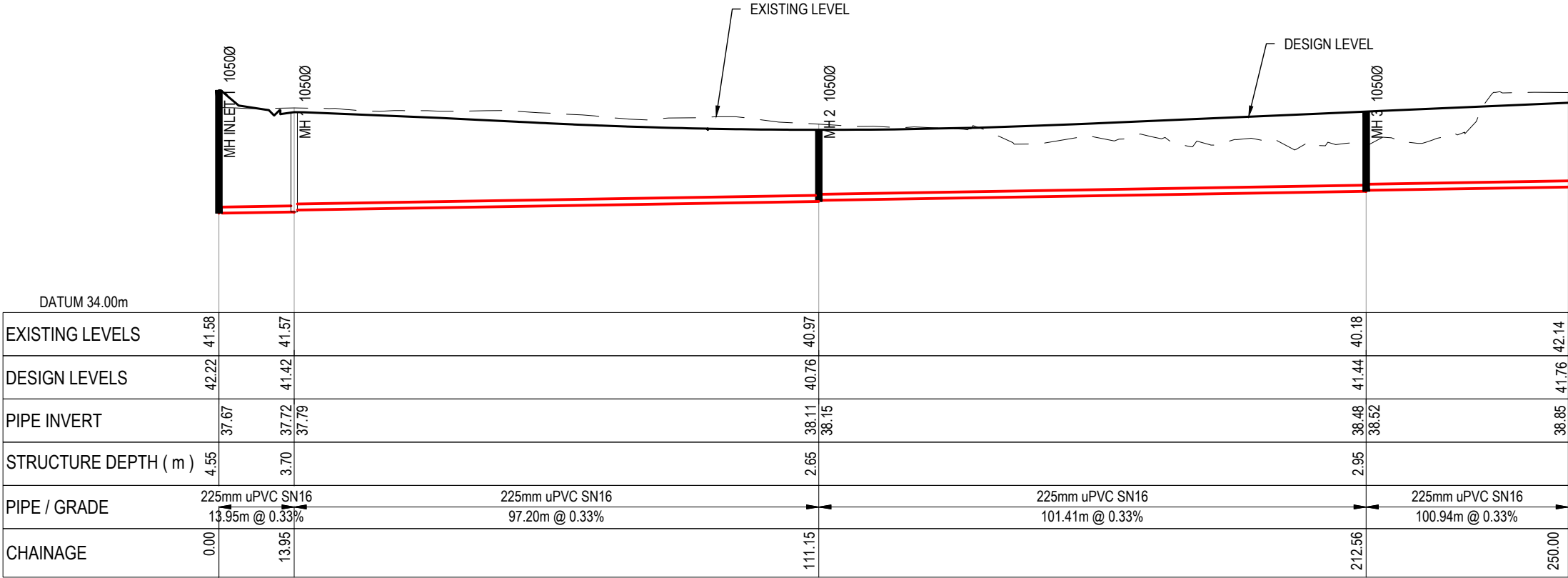
Title

PROPOSED

WASTEWATER

PLAN

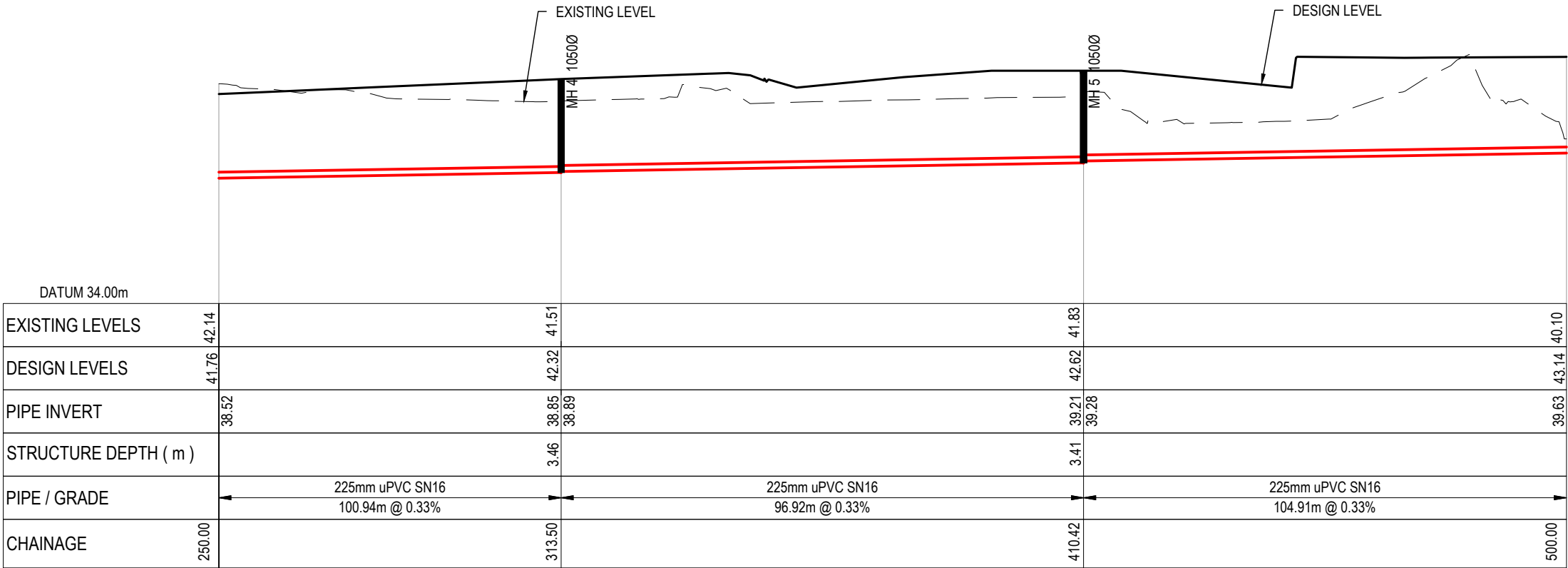
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Scale	1:1000 @ A3		
Cad file	298002-11-C500 WW.DWG		
Drawing no.	I1-C500-11	Rev	A



LONGSECTION - CATCHMENT WW 1
SCALE 1:1000 HORI & 1:200 VERTICAL @ A3

- NOTES
1. ALL WORKS TO BE IN ACCORDANCE WITH WAIKATO REGIONAL INFRASTRUCTURE TECHNICAL SPECIFICATIONS.
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Legend
EX GROUND LEVEL
PROP GROUND LEVEL



LONGSECTION - CATCHMENT WW 1 CONT.
SCALE 1:1000 HORI & 1:200 VERTICAL @ A3

DRAFT FOR REVIEW

A	DRAFT	MKS	04/2026
Rev	Description	By	Date
		By	Date
Survey	MAVEN		20/05/25
Design	MKS		04/2026
Drawn	MKS		04/2026
Checked	SM		04/2026

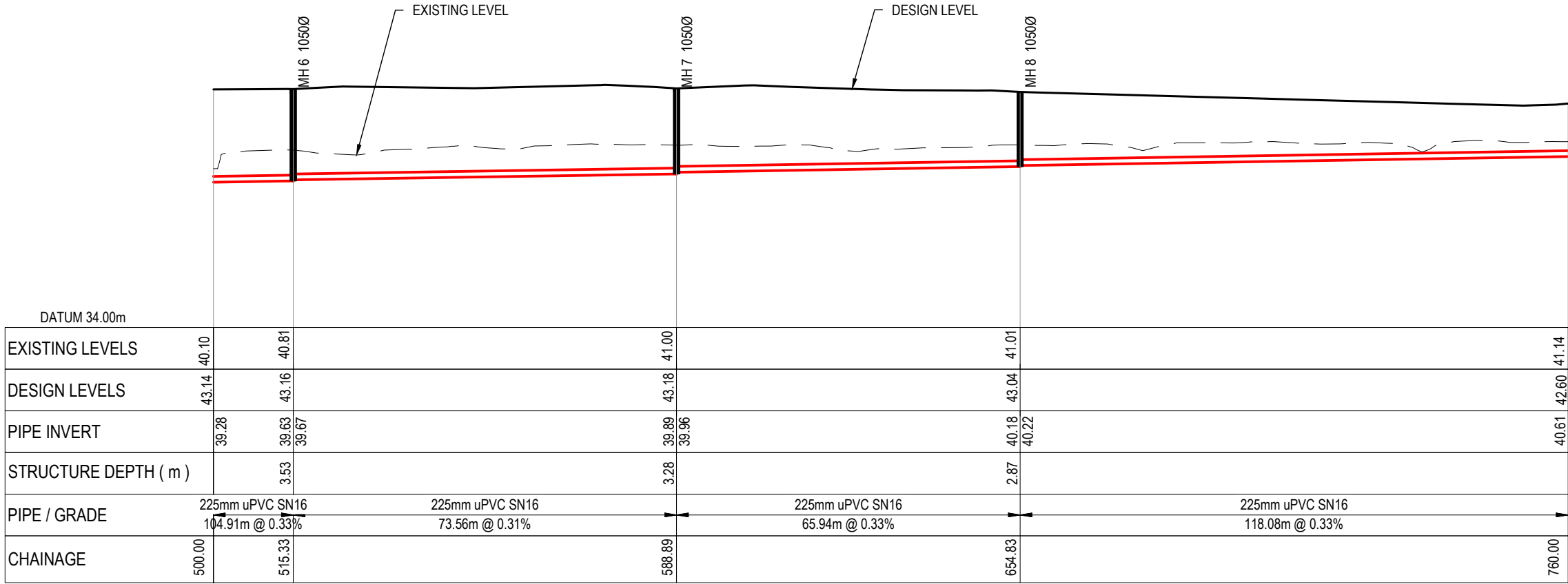


Project
**SOUTHERN LINKS 1
INDUSTRIAL STAGE 1
HAMILTON, WAIKATO
FOR
SL1 CONSORTIUM GROUP**

Title
**PROPOSED
WASTEWATER
LONGSECTION**

Project no.	298002-IND SL1
Scale	AS SHOWN
Cad file	298002-11-C500 WW.DWG
Drawing no.	I1-C520-1
Rev	A

DATE: 4/24/26 FILEPATH: F:\MVEN\HAMILTON\6 PROJECTS\298002 - SL1\STG1\11-C500 WW.DWG



LONGSECTION - CATCHMENT WW 1 CONT.
SCALE 1:1000 HORI & 1:200 VERTICAL @ A3

- NOTES
1. ALL WORKS TO BE IN ACCORDANCE WITH WAIKATO REGIONAL INFRASTRUCTURE TECHNICAL SPECIFICATIONS.
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Legend
EX GROUND LEVEL
PROP GROUND LEVEL

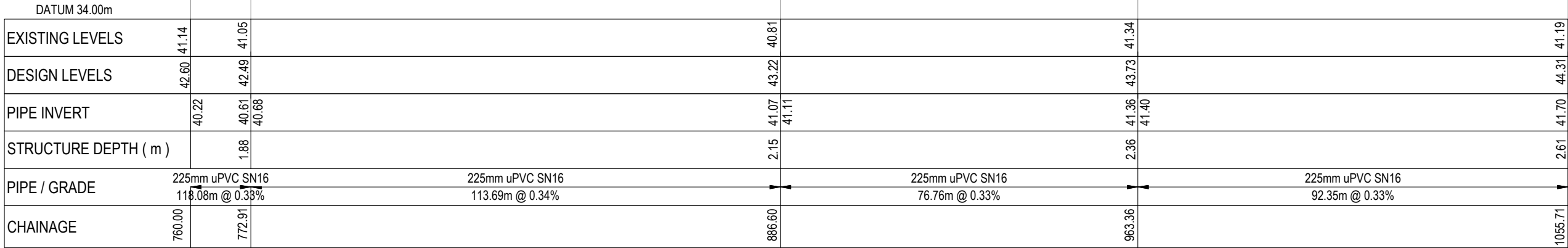
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Rev	Description	By	Date
		By	Date
Survey	MAVEN		20/05/25
Design	MKS		04/2026
Drawn	MKS		04/2026
Checked	SM		04/2026



Project
**SOUTHERN LINKS 1
INDUSTRIAL STAGE 1
HAMILTON, WAIKATO
FOR
SL1 CONSORTIUM GROUP**

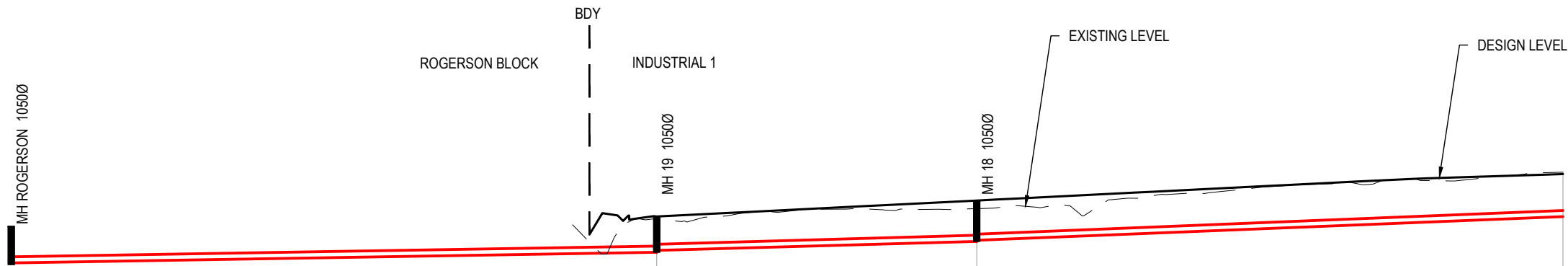
Title
**PROPOSED
WASTEWATER
LONGSECTION**

Project no.	298002-IND SL1		
Scale	AS SHOWN		
Cad file	298002-I1-C500 WW.DWG		
Drawing no.	I1-C520-2	Rev	A



DRAFT FOR REVIEW

LONGSECTION - CATCHMENT WW 1 CONT.
SCALE 1:1000 HORI & 1:200 VERTICAL @ A3



DATUM 32.00m				
EXISTING LEVELS			36.63	36.99
DESIGN LEVELS			36.70	37.29
PIPE INVERT	35.00		35.39 35.46	35.79 35.83
STRUCTURE DEPTH (m)	1.41		1.31	1.50
PIPE / GRADE		225mm uPVC SN16 118.55m @ 0.33%	225mm uPVC SN16 58.78m @ 0.56%	225mm uPVC SN16 118.88m @ 0.81%
CHAINAGE	0.00	118.55	177.33	285.00

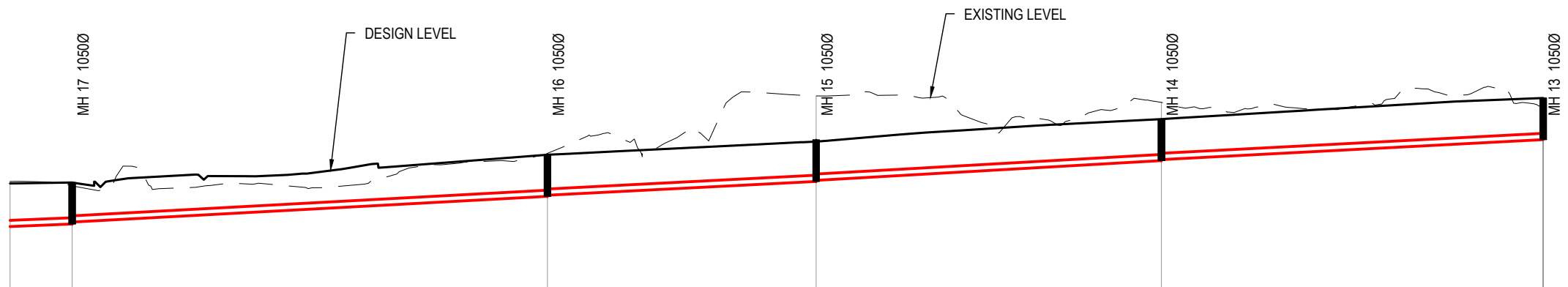
LONGSECTION - CATCHMENT WW 2
SCALE 1:1000 HORI & 1:200 VERTICAL @ A3

- NOTES
1. ALL WORKS TO BE IN ACCORDANCE WITH WAIKATO REGIONAL INFRASTRUCTURE TECHNICAL SPECIFICATIONS.
 2. CO-ORDINATES IN TERMS OF NZ GEODETIC DATUM MT EDEN 2000. LEVELS IN TERMS OF THE NEW ZEALAND VERTICAL DATUM 2016. CONVERSION TO MOTURIKI 1953 CAN BE ACHIEVED BY ADDING 0.2594M
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Legend

EX GROUND LEVEL

PROP GROUND LEVEL



DATUM 32.00m						
EXISTING LEVELS	38.33	38.19	39.34	41.42	41.18	41.04
DESIGN LEVELS	38.26	38.29	39.29	39.83	40.58	41.34
PIPE INVERT	35.83	36.79 36.86	37.79 37.83	38.33 38.37	39.08 39.12	39.84
STRUCTURE DEPTH (m)		1.50	1.50	1.50	1.50	1.50
PIPE / GRADE	225mm uPVC SN16 118.88m @ 0.81%	225mm uPVC SN16 85.89m @ 1.08%	225mm uPVC SN16 48.55m @ 1.03%	225mm uPVC SN16 62.41m @ 1.14%	225mm uPVC SN16 68.98m @ 1.04%	
CHAINAGE	285.00	296.21	382.11	430.66	493.06	562.04

LONGSECTION - CATCHMENT WW 2 CONT.
SCALE 1:1000 HORI & 1:200 VERTICAL @ A3

DRAFT FOR REVIEW

A	DRAFT	MKS	04/2026
Rev	Description	By	Date
		By	Date
Survey	MAVEN		20/05/25
Design	MKS		04/2026
Drawn	MKS		04/2026
Checked	SM		04/2026



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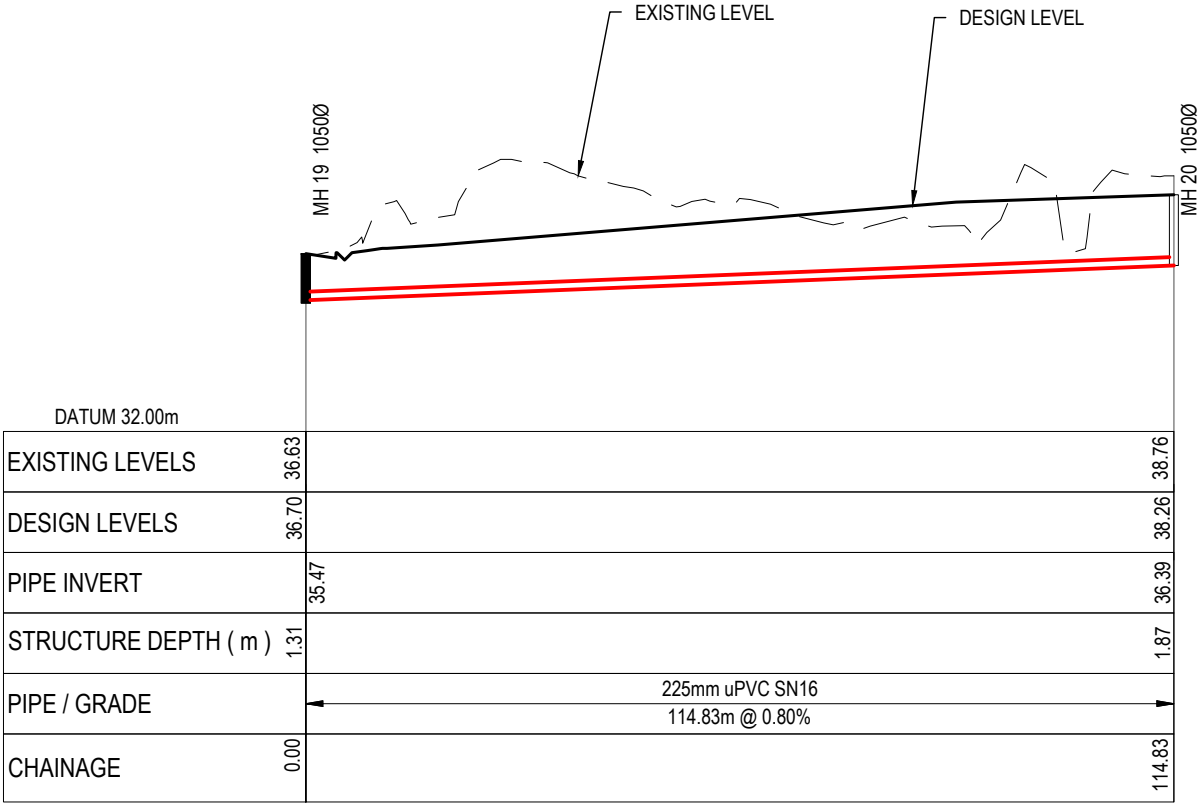
Project

**SOUTHERN LINKS 1
INDUSTRIAL STAGE 1
HAMILTON, WAIKATO
FOR
SL1 CONSORTIUM GROUP**

Title

**PROPOSED
WASTEWATER
LONGSECTION**

Project no.	298002-IND SL1		
Scale	AS SHOWN		
Cad file	298002-11-C500 WW.DWG		
Drawing no.	I1-C520-3	Rev	A



LONGSECTION - CATCHMENT WW 3
SCALE 1:1000 HORI & 1:200 VERTICAL @ A3

- NOTES
1. ALL WORKS TO BE IN ACCORDANCE WITH WAIKATO REGIONAL INFRASTRUCTURE TECHNICAL SPECIFICATIONS.
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Legend
—— EX GROUND LEVEL
—— PROP GROUND LEVEL

A	DRAFT	MKS	04/2026
Rev	Description	By	Date
	By	Date	
Survey	MAVEN	20/05/25	
Design	MKS	04/2026	
Drawn	MKS	04/2026	
Checked	SM	04/2026	

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Project

SOUTHERN LINKS 1

INDUSTRIAL STAGE 1

HAMILTON, WAIKATO

FOR

SL1 CONSORTIUM GROUP

Title

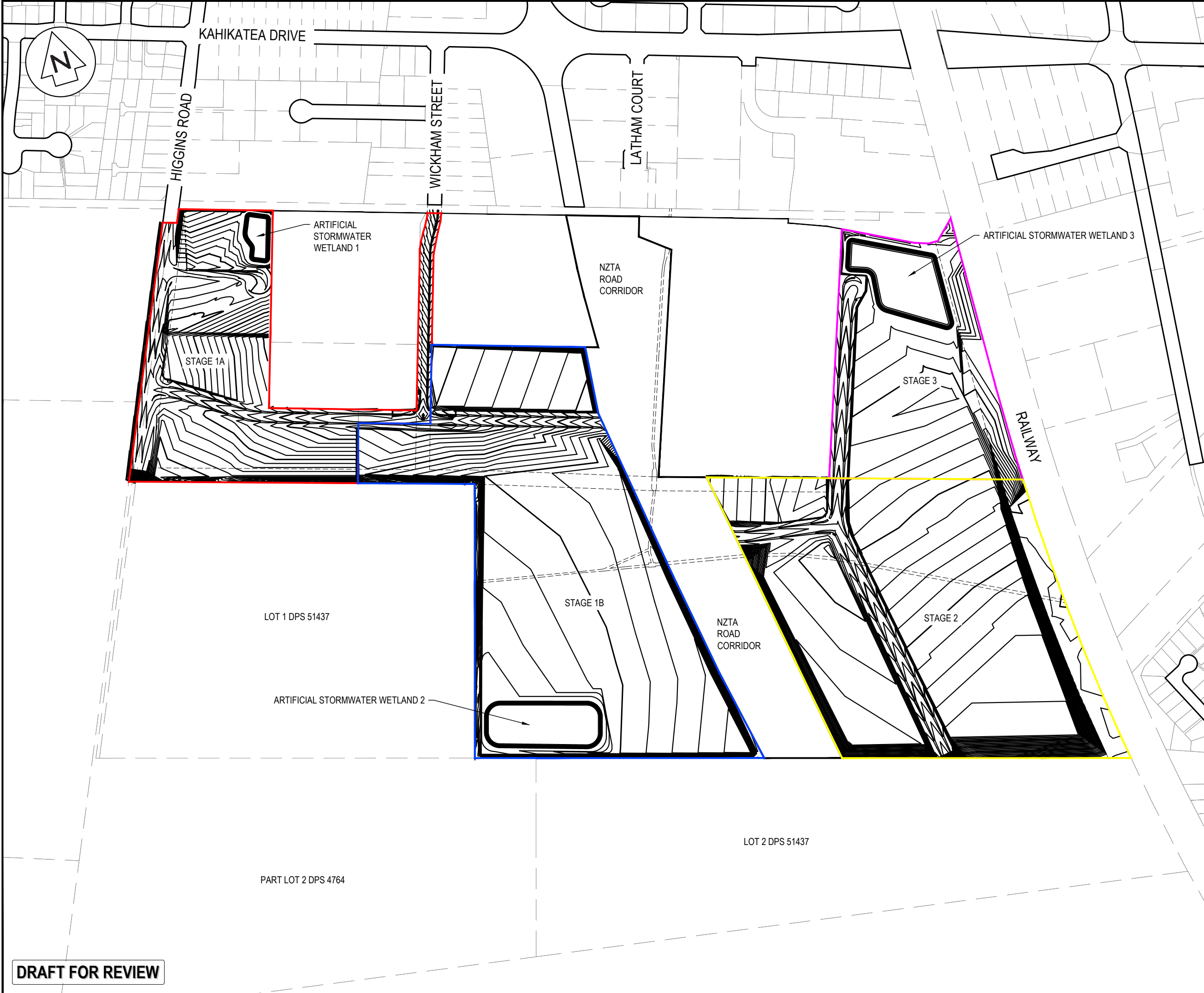
PROPOSED

WASTEWATER

LONGSECTION

Project no.	298002-IND SL1		
Scale	AS SHOWN		
Cad file	298002-11-C500 WW.DWG		
Drawing no.	I1-C520-4	Rev	A

DRAFT FOR REVIEW



- NOTES
1. ALL WORKS TO BE IN ACCORDANCE WITH WAIKATO REGIONAL COUNCIL EROSION AND SEDIMENT CONTROL: GUIDELINES FOR SOIL DISTURBING ACTIVITIES TR 2009/02.
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 7. CONTRACTOR SHALL PROVIDE AS-BUILT OF WORKING SEDIMENT CONTROL DEVICES AND CONFIRMATION OF POND/DECENT VOLUMES TO ENGINEER.

LEGEND

---	EX BDY
---	PROP BDY
---	PR MAJOR CONTOUR
---	PR MINOR CONTOUR

B	DRAFT	MKS	06/2026
A	DRAFT	MKS	06/2026
Rev	Description	By	Date
Survey	MAVEN		05/2025
Design	MKS		06/2026
Drawn	MKS		06/2026
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Project
**SOUTHERN LINKS 1
INDUSTRIAL STAGE 1
HAMILTON, WAIKATO
FOR
SL1 CONSORTIUM GROUP**

Title
**PROPOSED
CONTOUR
OVERVIEW PLAN**

Project no.	298002		
Scale	1:5000 @ A3		
Cad file	298002-11-C200 EARTHWORKS.DWG		
Drawing no.	C200	Rev	B

DRAFT FOR REVIEW



HIGGINS ROAD

WICKHAM STREET

ARTIFICIAL
STORMWATER
WETLAND 1

- NOTES
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LEGEND

---	EX BDY
---	PROP BDY
---	PR MAJOR CONTOUR
---	PR MINOR CONTOUR

B	DRAFT	MKS	06/2026
A	DRAFT	MKS	06/2026
Rev	Description	By	Date
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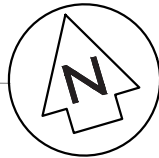
Project
**SOUTHERN LINKS 1
INDUSTRIAL STAGE 1
HAMILTON, WAIKATO
FOR
SL1 CONSORTIUM GROUP**

Title
**PROPOSED
CONTOUR PLAN
STAGE 1A**

Project no.	298002		
Scale	1:2000 @ A3		
Cad file	298002-11-C200 EARTHWORKS.DWG		
Drawing no.	C200-1	Rev	B

LOT 1 DPS 51437

DRAFT FOR REVIEW



LOT 1 DPS 51437

PART LOT 2 DPS 4764

LOT 2 DPS 51437

ARTIFICIAL STORMWATER WETLAND 2

- NOTES
1. ALL WORKS TO BE IN ACCORDANCE WITH WAIKATO REGIONAL COUNCIL EROSION AND SEDIMENT CONTROL: GUIDELINES FOR SOIL DISTURBING ACTIVITIES TR 2009/02.
 2. COORDINATES IN TERMS OF NZ GEODETIC DATUM MT EDEN 2000
 3. LEVELS IN TERMS OF THE NEW ZEALAND VERTICAL DATUM 2016.
 4. IT IS THE CONTRACTORS RESPONSIBILITY TO LOCATE ALL SERVICES THAT MAY BE AFFECTED BY THEIR OPERATIONS.
 5. THE CONTRACTOR SHALL COMPLY WITH ALL RELEVANT HEALTH AND SAFETY REQUIREMENTS.
 6. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY APPROVAL FROM UTILITY OPERATORS BEFORE COMMENCING WORK UNDER OR NEAR THEIR SERVICES.
 7. CONTRACTOR SHALL PROVIDE AS-BUILT OF WORKING SEDIMENT CONTROL DEVICES AND CONFIRMATION OF POND/DECENT VOLUMES TO ENGINEER.

LEGEND

---	EX BDY
---	PROP BDY
---	PR MAJOR CONTOUR
---	PR MINOR CONTOUR

B	DRAFT	MKS	06/2026
A	DRAFT	MKS	06/2026
Rev	Description	By	Date
		By	Date
Survey	MAVEN		05/2025
Design	MKS		06/2026
Drawn	MKS		06/2026
Checked	SM		06/2026



Maven Waikato
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Hamilton 3200
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Project

**SOUTHERN LINKS 1
INDUSTRIAL STAGE 1
HAMILTON, WAIKATO
FOR
SL1 CONSORTIUM GROUP**

Title

**PROPOSED
CONTOUR PLAN
STAGE 1B**

Project no.	298002		
Scale	1:2500 @ A3		
Cad file	298002-11-C200 EARTHWORKS.DWG		
Drawing no.	C200-2	Rev	B

DRAFT FOR REVIEW



- NOTES
1. ALL WORKS TO BE IN ACCORDANCE WITH WAIKATO REGIONAL COUNCIL EROSION AND SEDIMENT CONTROL: GUIDELINES FOR SOIL DISTURBING ACTIVITIES TR 2009/02.
 2. COORDINATES IN TERMS OF NZ GEODETIC DATUM MT EDEN 2000
 3. LEVELS IN TERMS OF THE NEW ZEALAND VERTICAL DATUM 2016.
 4. IT IS THE CONTRACTORS RESPONSIBILITY TO LOCATE ALL SERVICES THAT MAY BE AFFECTED BY THEIR OPERATIONS.
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 7. CONTRACTOR SHALL PROVIDE AS-BUILT OF WORKING SEDIMENT CONTROL DEVICES AND CONFIRMATION OF POND/DECENT VOLUMES TO ENGINEER.

LEGEND

	EX BDY
	PROP BDY
	PR MAJOR CONTOUR
	PR MINOR CONTOUR

B	DRAFT	MKS	06/2026
A	DRAFT	MKS	06/2026
Rev	Description	By	Date
		By	Date
Survey	MAVEN		05/2025
Design	MKS		06/2026
Drawn	MKS		06/2026
Checked	SM		06/2026

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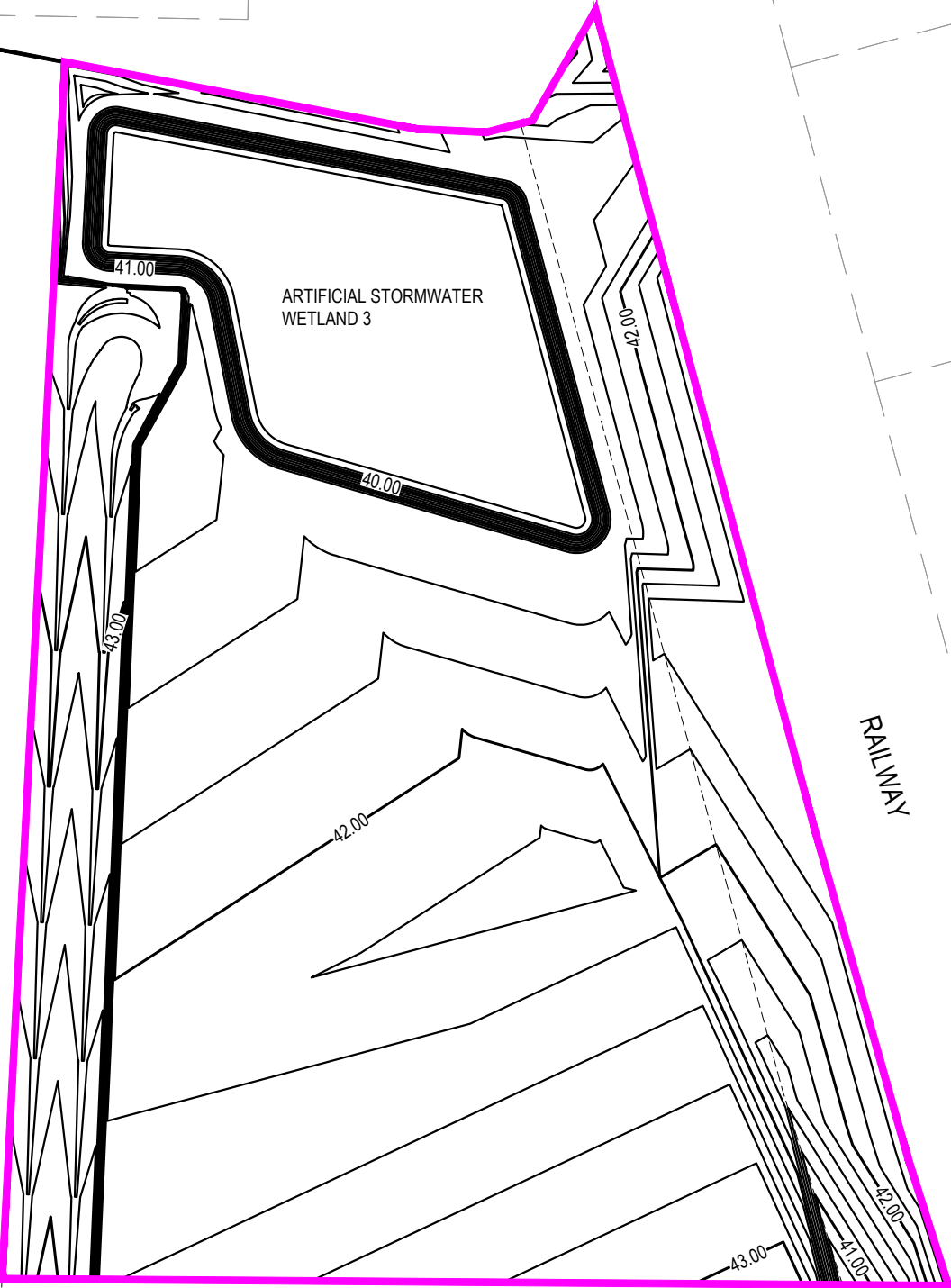
Project
**SOUTHERN LINKS 1
INDUSTRIAL STAGE 1
HAMILTON, WAIKATO
FOR
SL1 CONSORTIUM GROUP**

Title
**PROPOSED
CONTOUR PLAN
STAGE 2**

Project no.	298002		
Scale	1:2500 @ A3		
Cad file	298002-11-C200 EARTHWORKS.DWG		
Drawing no.	C200-3	Rev	B

LOT 2 DPS 51437

DRAFT FOR REVIEW



- NOTES
1. ALL WORKS TO BE IN ACCORDANCE WITH WAIKATO REGIONAL COUNCIL EROSION AND SEDIMENT CONTROL: GUIDELINES FOR SOIL DISTURBING ACTIVITIES TR 2009/02.
 2. COORDINATES IN TERMS OF NZ GEODETIC DATUM MT EDEN 2000
 3. LEVELS IN TERMS OF THE NEW ZEALAND VERTICAL DATUM 2016.
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LEGEND

---	EX BDY
---	PROP BDY
---	PR MAJOR CONTOUR
---	PR MINOR CONTOUR

B	DRAFT	MKS	06/2026
A	DRAFT	MKS	06/2026
Rev	Description	By	Date
		By	Date
Survey	MAVEN	05/2025	
Design	MKS	06/2026	
Drawn	MKS	06/2026	
Checked	SM	06/2026	



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Project
**SOUTHERN LINKS 1
INDUSTRIAL STAGE 1
HAMILTON, WAIKATO
FOR
SL1 CONSORTIUM GROUP**

Title
**PROPOSED
CONTOUR PLAN
STAGE 3**

Project no.	298002		
Scale	1:2000 @ A3		
Cad file	298002-11-C200 EARTHWORKS.DWG		
Drawing no.	C200-4	Rev	B

DRAFT FOR REVIEW

APPENDIX E

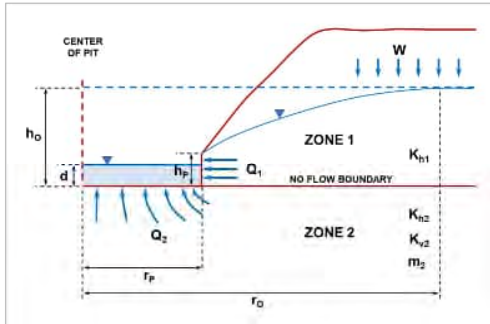
DRAWDOWN CALCULATIONS FOR STORMWATER WETLANDS



INFLOW TO OPEN PIT - APPROXIMATION

WGA

CLIENT: Barker & Associates
 PROJECT: Southern Links - Northern Block
 Project #: WGA242463
 Location: Stormwater Wetland 1 - Conservative Dry Pit
 Date: Monday, 8 June 2026
 Document #: WGA242463-RP-HG-0012_B



$$A \quad h_o = \sqrt{h_p^2 + \frac{W}{K_{h1}} \left[r_o^2 \ln \left(\frac{r_o}{r_p} \right) - \frac{(r_o^2 - r_p^2)}{2} \right]}$$

$$B \quad Q_1 = W \pi (r_o^2 - r_p^2)$$

$$C \quad Q_2 = 4 r_p \left(\frac{K_{h2}}{m_2} \right) (h_o - d)$$

$$D \quad m_2 = \sqrt{\frac{K_{h2}}{K_{v2}}}$$

W	1.11E-08	m/s	recharge flux
K _{h1}	4.48E-07	m/s	horizontal hydraulic conductivity in Zone 1
K _{h2}	4.48E-07	m/s	horizontal hydraulic conductivity in Zone 2
K _{v2}	4.48E-08	m/s	vertical hydraulic conductivity in Zone 2
h _o	3.4	m	initial saturated thickness above the base of Zone 1
h _p	0	m	saturated thickness at the pit wall
r _p	26.99	m	effective pit radius
d	0	m	depth of the pit lake

r_o is the radius of influence measured from the center of the pit beyond which groundwater drawdown is nil.

Inflow from Zone 1

Radius of influence r_o calculated by iterating equation A

47 m

Known h_o

3.40 m

h_o calculated using Equation A

3.40 m

Q₁ 5.0E-05 m³/s
4.4E+00 m³/day

Inflow from Zone 2

Anisotropy parameter calculated using equation D

3.162278

Q₂ 5.2E-05 m³/s
4.5E+00 m³/day

Total Pit Inflow

Q_{TOT} 1.0E-04 m³/s
8.85 m³/day

Reference: Marinelli, F. & Niccoli W. L. 2000.
Simple analytical equations for estimating ground water inflow
to a mine pit. Ground Water 38, no. 2: 311-314.

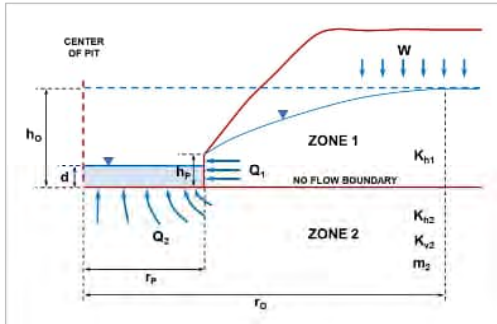
Analysed by: J. Ferry 8/06/2026
 Checked by: B. Sinclair 12/06/2026

Notes:

GROUNDWATER DRAWDOWN AROUND OPEN PIT - APPROXIMATION

WGA

CLIENT: Barker & Associates
PROJECT: Southern Links - Northern Block
Project #: WGA242463
Location: Stormwater Wetland 1 - Conservative Dry Pit
Date: Monday, 8 June 2026
Document #: WGA242463-RP-HG-0012_B



$$dH_{Zone1} = h_0 - \sqrt{h_p^2 + \frac{W}{k_{h1}} \left[r_0^2 \ln\left(\frac{r}{r_p}\right) - \frac{(r^2 - r_p^2)}{2} \right]}$$

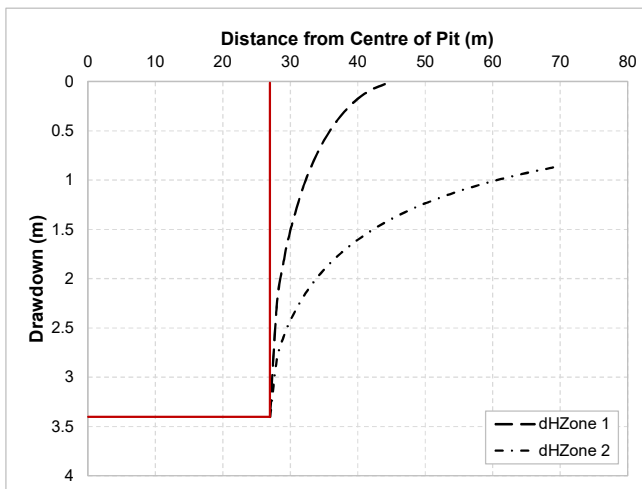
$$dH_{Zone2} = \frac{2(h_0 - d)}{\pi} \sin^{-1}\left(\frac{r_p}{r}\right)$$

$$m_2 = \sqrt{\frac{K_{h2}}{K_{v2}}}$$

W	1.11E-08	m/s	recharge flux
K_{h1}	4.48E-07	m/s	horizontal hydraulic conductivity in Zone 1
K_{h2}	4.48E-07	m/s	horizontal hydraulic conductivity in Zone 2
K_{v2}	4.48E-08	m/s	vertical hydraulic conductivity in Zone 2
h_0	3.4	m	initial saturated thickness above the base of Zone 1
h_p	0	m	saturated thickness at the pit wall
r_p	26.99065	m	effective pit radius
d	0	m	depth of the pit lake

r_0 is the radius of influence measured from the center of the pit beyond which groundwater drawdown is nil.

Radius of influence r_0 calculated by iterating equation A in analysis sheet 1 47 m



Drawdown curves		
r	dH _{Zone 1}	dH _{Zone 2}
26.99065	3.4	3.4
28.0	2.3	2.8
29.0	1.8	2.6
30.0	1.5	2.4
32.0	1.1	2.2
34.0	0.7	2.0
36.0	0.5	1.8
38.0	0.3	1.7
40.0	0.2	1.6
42.0	0.1	1.5
44.0	0.0	1.4
46.0		1.4
48.0		1.3
50.0		1.2
55.0		1.1
60.0		1.0
65.0		0.9
70.0		0.9

Reference: Marinelli, F. & Niccoli W. L. 2000.
 Simple analytical equations for estimating ground water inflow
 to a mine pit. Ground Water 38, no. 2: 311-314.

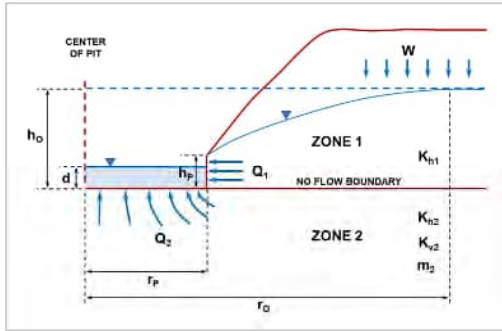
Analysed by: J. Ferry 8/06/2026
Checked by: B. Sinclair 12/06/2026

Notes: The drawdown curves apply along the no-flow boundary line at an elevation equivalent to the base of the pit. The dH_{Zone2} line does not take into account recharge from above. In this situation represents an overly conservative projection. Drawdown projections are initial approximations only.

INFLOW TO OPEN PIT - APPROXIMATION

WGA

CLIENT: Barker & Associates
PROJECT: Southern Links - Northern Block
Project #: WGA242463
Location: Stormwater Wetland 1 - Operational GW Inflows
Date: Monday, 8 June 2026
Document #: WGA242463-RP-HG-0012_B



$$\begin{aligned}
 \text{A } h_o &= \sqrt{h_p^2 + \frac{W}{K_{h1}} \left[r_o^2 \ln \left(\frac{r_o}{r_p} \right) - \frac{(r_o^2 - r_p^2)}{2} \right]}, \\
 \text{B } Q_1 &= W \pi (r_o^2 - r_p^2), \\
 \text{C } Q_2 &= 4 r_p \left(\frac{K_{h2}}{m_2} \right) (h_o - d), \\
 \text{D } m_2 &= \sqrt{\frac{K_{h2}}{K_{v2}}}
 \end{aligned}$$

W	1.11E-08	m/s	recharge flux
K _{h1}	4.48E-07	m/s	horizontal hydraulic conductivity in Zone 1
K _{h2}	4.48E-07	m/s	horizontal hydraulic conductivity in Zone 2
K _{v2}	4.48E-08	m/s	vertical hydraulic conductivity in Zone 2
h _o	2.4	m	initial saturated thickness above the base of Zone 1
h _p	1.7	m	saturated thickness at the pit wall
r _p	26.99	m	effective pit radius
d	1.7	m	depth of the pit lake

r_o is the radius of influence measured from the center of the pit beyond which groundwater drawdown is nil.

Inflow from Zone 1

Radius of influence r_o calculated by iterating equation A 37 m

Known h_o 2.40 m

h_o calculated using Equation A 2.40 m

Q₁ 2.3E-05 m³/s
2.0E+00 m³/day

Inflow from Zone 2

Anisotropy parameter calculated using equation D 3.162278

Q₂ 1.1E-05 m³/s
9.3E-01 m³/day

Total Pit Inflow

Q_{TOT} 3.4E-05 m³/s
2.90 m³/day

Reference: Marinelli, F. & Niccoli W. L. 2000.
 Simple analytical equations for estimating ground water inflow
 to a mine pit. Ground Water 38, no. 2: 311-314.

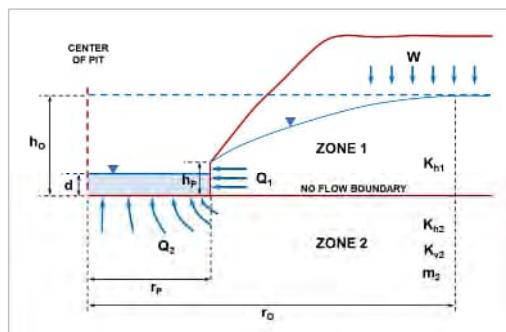
Analysed by: Joanne Ferry 8/06/2026
Checked by: B. Sinclair 12/06/2026

Notes:

GROUNDWATER DRAWDOWN AROUND OPEN PIT - APPROXIMATION

WGA

CLIENT: Barker & Associates
PROJECT: Southern Links - Northern Block
Project #: WGA242463
Location: Stormwater Wetland 1 - Operational GW Inflows
Date: Monday, 8 June 2026
Document #: WGA242463-RP-HG-0012_B



$$dH_{Zone1} = h_o - \sqrt{h_p^2 + \frac{W}{K_{h1}} \left[r_o^2 \ln\left(\frac{r}{r_p}\right) - \frac{(r^2 - r_p^2)}{2} \right]}$$

$$dH_{Zone2} = \frac{2(h_o - d)}{\pi} \sin^{-1}\left(\frac{r_p}{r}\right)$$

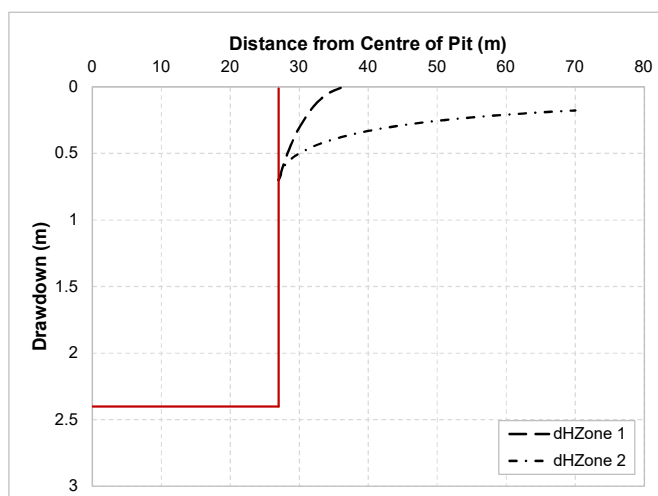
$$m_2 = \sqrt{\frac{K_{h2}}{K_{v2}}}$$

W	1.11E-08	m/s	recharge flux
K_{h1}	4.48E-07	m/s	horizontal hydraulic conductivity in Zone 1
K_{h2}	4.48E-07	m/s	horizontal hydraulic conductivity in Zone 2
K_{v2}	4.48E-08	m/s	vertical hydraulic conductivity in Zone 2
h_o	2.4	m	initial saturated thickness above the base of Zone 1
h_p	1.7	m	saturated thickness at the pit wall
r_p	26.99065	m	effective pit radius
d	1.7	m	depth of the pit lake

r_o is the radius of influence measured from the center of the pit beyond which groundwater drawdown is nil.

Radius of influence r_o calculated by iterating equation A in analysis sheet 1

37 m



Drawdown curves

r	dH _{Zone 1}	dH _{Zone 2}
26.99065	0.7	0.7
28.0	0.5	0.6
29.0	0.4	0.5
30.0	0.3	0.5
32.0	0.2	0.4
34.0	0.1	0.4
36.0	0.0	0.4
38.0		0.4
40.0		0.3
42.0		0.3
44.0		0.3
46.0		0.3
48.0		0.3
50.0		0.3
55.0		0.2
60.0		0.2
65.0		0.2
70.0		0.2

Reference: Marinelli, F. & Niccoli W. L. 2000.
 Simple analytical equations for estimating ground water inflow
 to a mine pit. Ground Water 38, no. 2: 311-314.

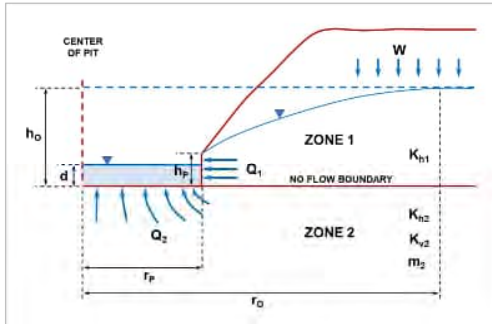
Analysed by: Joanne Ferry 8/06/2026
Checked by: B. Sinclair 12/06/2026

Notes: The drawdown curves apply along the no-flow boundary line at an elevation equivalent to the base of the pit.
 The dH_{Zone2} line does not take into account recharge from above.
 Drawdown projections are initial approximations only.

INFLOW TO OPEN PIT - APPROXIMATION

WGA

CLIENT: Barker & Associates
PROJECT: Southern Links - Southern Block
Project #: WGA242463
Location: Stormwater Wetland 2 Dewatering for Dry Construction
Date: Monday, 8 June 2026
Document #: WGA242463-RP-HG-0012_B



$$\begin{aligned}
 \text{A } h_o &= \sqrt{h_p^2 + \frac{W}{K_{h1}} \left[r_o^2 \ln \left(\frac{r_o}{r_p} \right) - \frac{(r_o^2 - r_p^2)}{2} \right]}, \\
 \text{B } Q_1 &= W \pi (r_o^2 - r_p^2) \\
 \text{C } Q_2 &= 4 r_p \left(\frac{K_{h2}}{m_2} \right) (h_o - d), \\
 \text{D } m_2 &= \sqrt{\frac{K_{h2}}{K_{v2}}}
 \end{aligned}$$

W	1.11E-08	m/s	recharge flux
K _{h1}	4.48E-07	m/s	horizontal hydraulic conductivity in Zone 1
K _{h2}	4.48E-07	m/s	horizontal hydraulic conductivity in Zone 2
K _{v2}	4.48E-08	m/s	vertical hydraulic conductivity in Zone 2
h _o	2.3	m	initial saturated thickness above the base of Zone 1
h _p	0	m	saturated thickness at the pit wall
r _p	59.2	m	effective pit radius
d	0	m	depth of the pit lake

r_o is the radius of influence measured from the center of the pit beyond which groundwater drawdown is nil.

Inflow from Zone 1

Radius of influence r_o calculated by iterating equation A 73 m

Known h_o 2.3 m

h_o calculated using Equation A 2.3 m

Q₁ 6.5E-05 m³/s
5.62 m³/day

Inflow from Zone 2

Anisotropy parameter calculated using equation D 3.162278

Q₂ 7.7E-05 m³/s
6.67 m³/day

Total Pit Inflow

Q_{TOT} 1.4E-04 m³/s
12.29 m³/day

Reference: Marinelli, F. & Niccoli W. L. 2000.
 Simple analytical equations for estimating ground water inflow
 to a mine pit. Ground Water 38, no. 2: 311-314.

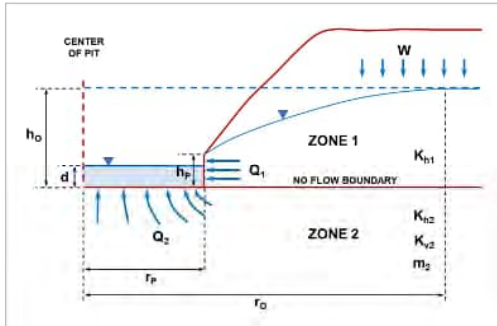
Analysed by: J. Ferry 8/06/2026
Checked by: B. Sinclair 12/06/2026

Notes:

GROUNDWATER DRAWDOWN AROUND OPEN PIT - APPROXIMATION

WGA

CLIENT: Barker & Associates
 PROJECT: Southern Links - Southern Block
 Project #: WGA242463
 Location: Stormwater Wetland 2 Dewatering for Dry Construction
 Date: Monday, 8 June 2026
 Document #: WGA242463-RP-HG-0012_B



$$dH_{Zone1} = h_0 - \sqrt{h_p^2 + \frac{W}{k_{h1}} \left[r_0^2 \ln \left(\frac{r}{r_p} \right) - \frac{(r^2 - r_p^2)}{2} \right]}$$

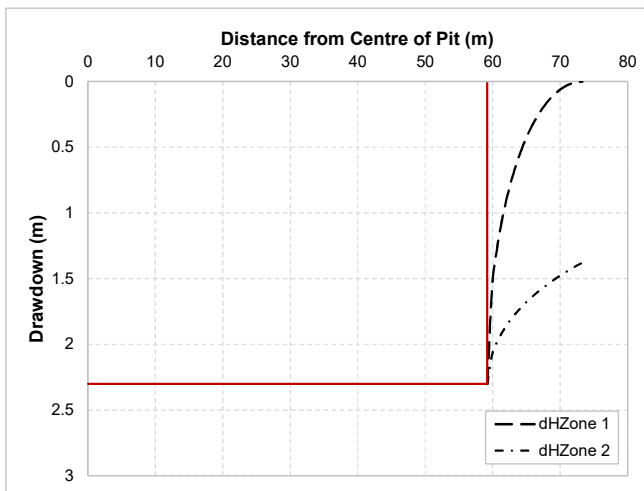
$$dH_{Zone2} = \frac{2(h_0 - d)}{\pi} \sin^{-1} \left(\frac{r_p}{r} \right)$$

$$m_2 = \sqrt{\frac{K_{h2}}{K_{v2}}}$$

W	1.11E-08	m/s	recharge flux
K _{h1}	4.48E-07	m/s	horizontal hydraulic conductivity in Zone 1
K _{h2}	4.48E-07	m/s	horizontal hydraulic conductivity in Zone 2
K _{v2}	4.48E-08	m/s	vertical hydraulic conductivity in Zone 2
h ₀	2.3	m	initial saturated thickness above the base of Zone 1
h _p	0	m	saturated thickness at the pit wall
r _p	59.19487	m	effective pit radius
d	0	m	depth of the pit lake

r₀ is the radius of influence measured from the center of the pit beyond which groundwater drawdown is nil.

Radius of influence r₀ calculated by iterating equation A in analysis sheet 1 73 m



Drawdown curves		
r	dH _{Zone 1}	dH _{Zone 2}
59.19487	2.3	2.3
59.9	1.6	2.1
60.6	1.3	2.0
61.3	1.1	1.9
62.0	0.9	1.9
62.7	0.8	1.8
63.4	0.6	1.8
64.1	0.5	1.7
64.8	0.4	1.7
65.5	0.4	1.7
66.2	0.3	1.6
66.9	0.2	1.6
67.7	0.2	1.6
68.4	0.14	1.5
69.1	0.10	1.5
69.8	0.07	1.5
70.5	0.04	1.5
71.2	0.02	1.4
71.9	0.01	1.4
72.6	0.00	1.4
73.3	0.00	1.4

Reference: Marinelli, F. & Niccoli W. L. 2000.
 Simple analytical equations for estimating ground water inflow
 to a mine pit. Ground Water 38, no. 2: 311-314.

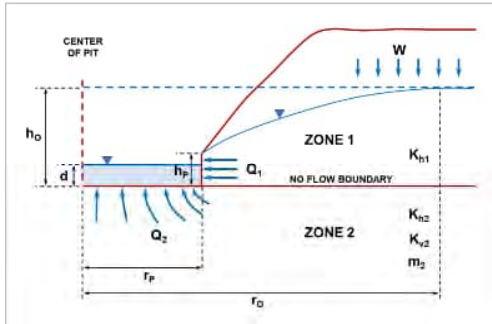
Analysed by: J. Ferry 8/06/2026
 Checked by: B. Sinclair 12/06/2026

Notes: The drawdown curves apply along the no-flow boundary line at an elevation equivalent to the base of the pit.
 The dH_{Zone2} line does not take into account recharge from above. In this situation the dH_{Zone 2} line is overly conservative.
 Drawdown projections are initial approximations only.

INFLOW TO OPEN PIT - APPROXIMATION

WGA

CLIENT: Barker & Associates
PROJECT: Southern Links - Southern Block
Project #: WGA242463
Location: Stormwater Wetland 2 Operational groundwater inflow
Date: Monday, 8 June 2026
Document #: WGA242463-RP-HG-0012_B



$$A \quad h_o = \sqrt{h_p^2 + \frac{W}{K_{h1}} \left[r_o^2 \ln \left(\frac{r_o}{r_p} \right) - \frac{(r_o^2 - r_p^2)}{2} \right] },$$

$$B \quad Q_1 = W \pi (r_o^2 - r_p^2)$$

$$C \quad Q_2 = 4 r_p \left(\frac{K_{h2}}{m_2} \right) (h_o - d),$$

$$D \quad m_2 = \sqrt{\frac{K_{h2}}{K_{v2}}}$$

W	1.11E-08	m/s	recharge flux
K _{h1}	4.48E-07	m/s	horizontal hydraulic conductivity in Zone 1
K _{h2}	4.48E-07	m/s	horizontal hydraulic conductivity in Zone 2
K _{v2}	4.48E-08	m/s	vertical hydraulic conductivity in Zone 2
h _o	1.3	m	initial saturated thickness above the base of Zone 1
h _p	1.3	m	saturated thickness at the pit wall
r _p	59.2	m	effective pit radius
d	1.3	m	depth of the pit lake

r_o is the radius of influence measured from the center of the pit beyond which groundwater drawdown is nil.

Inflow from Zone 1

Radius of influence r_o calculated by iterating equation A 59 m

Known h_o 1.3 m

h_o calculated using Equation A 1.3 m

Q₁ 1.2E-06 m³/s
0.11 m³/day

Inflow from Zone 2

Anisotropy parameter calculated using equation D 3.162278

Q₂ 0.0E+00 m³/s
0.00 m³/day

Total Pit Inflow

Q_{TOT} 1.2E-06 m³/s
0.11 m³/day

Reference: Marinelli, F. & Niccoli W. L. 2000.
 Simple analytical equations for estimating ground water inflow
 to a mine pit. Ground Water 38, no. 2: 311-314.

Analysed by: J. Ferry 8/06/2026
Checked by: B. Sinclair 12/06/2026

Notes:

WGA

$$m_2 = \sqrt{\frac{K_{h2}}{K_{v2}}}$$

59 m

Figure 10 is a line graph showing Drawdown (m) versus Distance from Centre of Pit (m). The x-axis ranges from 0 to 70 meters, and the y-axis ranges from 0 to 3 meters. Two data series are plotted: dHZone 1 (solid red line) and dHZone 2 (dashed black line). dHZone 1 shows a constant drawdown of approximately 1.3 meters from 0 to 60 meters, then drops sharply to 0 at 60 meters. dHZone 2 shows a constant drawdown of approximately 1.3 meters from 0 to 60 meters, then drops sharply to 0 at 60 meters.

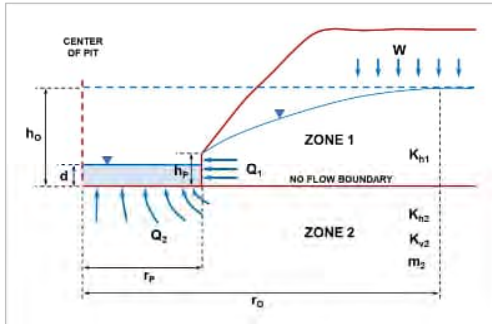
r	dH _{Zone 1}	dH _{Zone 2}
59.19487	0	0.0
59.2	0.0	0.0
59.2	0.0	0.0
59.2	0.0	0.0
59.3	0.0	0.0
59.3	0.0	0.0
59.3	0.0	0.0
59.3	0.0	0.0
59.3	0.0	0.0
59.3	0.0	0.0
59.4	0.0	0.0
59.4	0.0	0.0
59.4	0.00	0.0
59.4	0.00	0.0
59.4	0.00	0.0
59.4	0.00	0.0
59.5	0.00	0.0
59.5	0.00	0.0
59.5	0.00	0.0
59.5	0.00	0.0

Notes: The drawdown curves apply along the no-flow boundary line at an elevation equivalent to the base of the pit. The dH_{Zone2} line does not take into account recharge from above. In this situation the dHZone 2 line is overly conservative. Drawdown projections are initial approximations only.

INFLOW TO OPEN PIT - APPROXIMATION

WGA

CLIENT: Barker & Associates
PROJECT: Southern Links - Southern Block
Project #: WGA242463
Location: Stormwater Wetland 3 Dewatering for Dry Construction
Date: Monday, 8 June 2026
Document #: WGA242463-RP-HG-0012_B



$$\begin{aligned}
 \text{A } h_o &= \sqrt{h_p^2 + \frac{W}{K_{h1}} \left[r_o^2 \ln \left(\frac{r_o}{r_p} \right) - \frac{(r_o^2 - r_p^2)}{2} \right]}, \\
 \text{B } Q_1 &= W \pi (r_o^2 - r_p^2) \\
 \text{C } Q_2 &= 4 r_p \left(\frac{K_{h2}}{m_2} \right) (h_o - d), \\
 \text{D } m_2 &= \sqrt{\frac{K_{h2}}{K_{v2}}}
 \end{aligned}$$

W	1.11E-08	m/s	recharge flux
K _{h1}	4.48E-07	m/s	horizontal hydraulic conductivity in Zone 1
K _{h2}	4.48E-07	m/s	horizontal hydraulic conductivity in Zone 2
K _{v2}	4.48E-08	m/s	vertical hydraulic conductivity in Zone 2
h _o	1.5	m	initial saturated thickness above the base of Zone 1
h _p	0	m	saturated thickness at the pit wall
r _p	57.7	m	effective pit radius
d	0	m	depth of the pit lake

r_o is the radius of influence measured from the center of the pit beyond which groundwater drawdown is nil.

Inflow from Zone 1

Radius of influence r_o calculated by iterating equation A

67 m

Known h_o

1.5 m

h_o calculated using Equation A

1.5 m

Q₁ 4.0E-05 m³/s
 3.49 m³/day

Inflow from Zone 2

Anisotropy parameter calculated using equation D

3.162278

Q₂ 4.9E-05 m³/s
 4.24 m³/day

Total Pit Inflow

Q_{TOT} 8.9E-05 m³/s
 7.73 m³/day

Reference: Marinelli, F. & Niccoli W. L. 2000.
 Simple analytical equations for estimating ground water inflow
 to a mine pit. Ground Water 38, no. 2: 311-314.

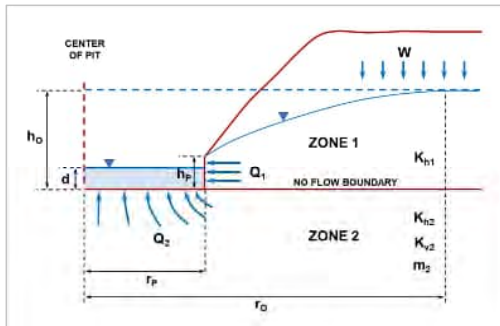
Analysed by: J. Ferry 8/06/2026
Checked by: B. Sinclair 12/06/2026

Notes:

GROUNDWATER DRAWDOWN AROUND OPEN PIT - APPROXIMATION

WGA

CLIENT: Barker & Associates
PROJECT: Southern Links - Southern Block
Project #: WGA242463
Location: Stormwater Wetland 3 Dewatering for Dry Construction
Date: Monday, 8 June 2026
Document #: WGA242463-RP-HG-0012_B



$$dH_{Zone1} = h_o - \sqrt{h_p^2 + \frac{W}{k_{h1}} \left[r_o^2 \ln\left(\frac{r}{r_p}\right) - \frac{(r^2 - r_p^2)}{2} \right]}$$

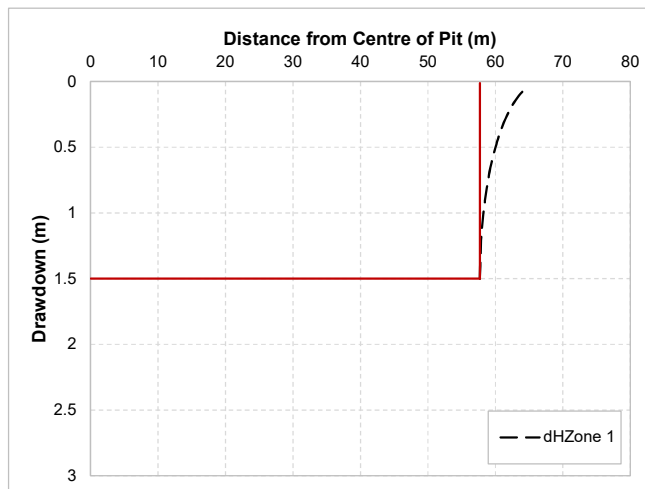
$$dH_{Zone2} = \frac{2(h_o - d)}{\pi} \sin^{-1}\left(\frac{r_p}{r}\right)$$

$$m_2 = \sqrt{\frac{K_{h2}}{K_{v2}}}$$

W	1.11E-08	m/s	recharge flux
K _{h1}	4.48E-07	m/s	horizontal hydraulic conductivity in Zone 1
K _{h2}	4.48E-07	m/s	horizontal hydraulic conductivity in Zone 2
K _{v2}	4.48E-08	m/s	vertical hydraulic conductivity in Zone 2
h _o	1.5	m	initial saturated thickness above the base of Zone 1
h _p	0	m	saturated thickness at the pit wall
r _p	57.68946	m	effective pit radius
d	0	m	depth of the pit lake

r_o is the radius of influence measured from the center of the pit beyond which groundwater drawdown is nil.

Radius of influence r_o calculated by iterating equation A in analysis sheet 1 67 m



r	dH _{Zone 1}	dH _{Zone 2}
57.68946	1.5	1.5
58.0	1.1	1.4
59.0	0.7	1.3
60.0	0.5	1.2
61.0	0.3	1.2
62.0	0.2	1.1
63.0	0.1	1.1
64.0	0.1	1.1
65.0	0.0	1.0
66.0		1.0
67.0		1.0
68.0		1.0
69.0		0.9
70.0		0.9
71.0		0.9
72.0		0.9
73.0		0.9
74.0		0.9
75.0		0.8
76.0		0.8

Reference: Marinelli, F. & Niccoli W. L. 2000.
 Simple analytical equations for estimating ground water inflow
 to a mine pit. Ground Water 38, no. 2: 311-314.

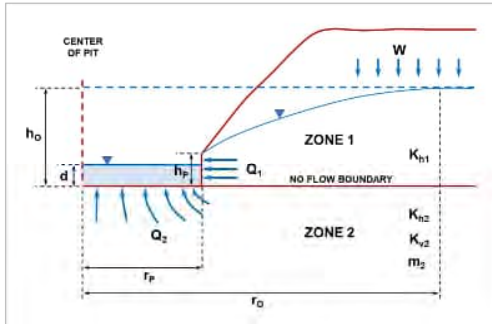
Analysed by: J. Ferry 8/06/2026
Checked by: B. Sinclair 12/06/2026

Notes: The drawdown curves apply along the no-flow boundary line at an elevation equivalent to the base of the pit.
 The dH_{Zone2} line does not take into account recharge from above.
 Drawdown projections are initial approximations only.

INFLOW TO OPEN PIT - APPROXIMATION

WGA

CLIENT: Barker & Associates
PROJECT: Southern Links - Southern Block
Project #: WGA242463
Location: Stormwater Wetland 3 Operational Groundwater Inflow
Date: Monday, 8 June 2026
Document #: WGA242463-RP-HG-0012_B



$$\begin{aligned}
 \text{A } h_o &= \sqrt{h_p^2 + \frac{W}{K_{h1}} \left[r_o^2 \ln \left(\frac{r_o}{r_p} \right) - \frac{(r_o^2 - r_p^2)}{2} \right]}, \\
 \text{B } Q_1 &= W \pi (r_o^2 - r_p^2) \\
 \text{C } Q_2 &= 4 r_p \left(\frac{K_{h2}}{m_2} \right) (h_o - d), \\
 \text{D } m_2 &= \sqrt{\frac{K_{h2}}{K_{v2}}}
 \end{aligned}$$

W	1.1E-08	m/s	recharge flux
K _{h1}	4.48E-07	m/s	horizontal hydraulic conductivity in Zone 1
K _{h2}	4.48E-07	m/s	horizontal hydraulic conductivity in Zone 2
K _{v2}	4.48E-08	m/s	vertical hydraulic conductivity in Zone 2
h _o	1.5	m	initial saturated thickness above the base of Zone 1
h _p	0.4	m	saturated thickness at the pit wall
r _p	57.7	m	effective pit radius
d	0.4	m	depth of the pit lake

r_o is the radius of influence measured from the center of the pit beyond which groundwater drawdown is nil.

Inflow from Zone 1

Radius of influence r_o calculated by iterating equation A 67 m

Known h_o 1.5 m

h_o calculated using Equation A 1.5 m

Q₁ 3.9E-05 m³/s
3.4E+00 m³/day

Inflow from Zone 2

Anisotropy parameter calculated using equation D 3.162278

Q₂ 3.6E-05 m³/s
3.1E+00 m³/day

Total Pit Inflow

Q_{TOT} 7.5E-05 m³/s
6.5E+00 m³/day

Reference: Marinelli, F. & Niccoli W. L. 2000.
 Simple analytical equations for estimating ground water inflow
 to a mine pit. Ground Water 38, no. 2: 311-314.

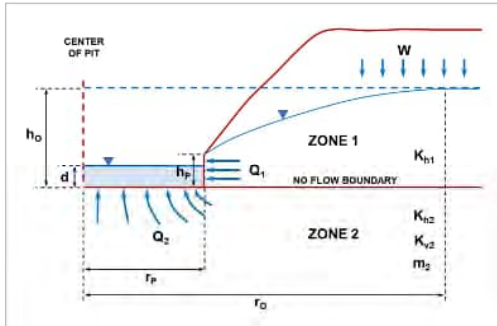
Analysed by: J. Ferry 8/06/2026
Checked by: B. Sinclair 12/06/2026

Notes: The hydraulic conductivity of 4.04E-04 used in this assessment is a minimum estimate.

GROUNDWATER DRAWDOWN AROUND OPEN PIT - APPROXIMATION

WGA

CLIENT: Barker & Associates
PROJECT: Southern Links - Southern Block
Project #: WGA242463
Location: Stormwater Wetland 3 Operational Groundwater Inflow
Date: Monday, 8 June 2026
Document #: WGA242463-RP-HG-0012_B



$$dH_{Zone1} = h_0 - \sqrt{h_p^2 + \frac{W}{k_{h1}} \left[r_0^2 \ln\left(\frac{r}{r_p}\right) - \frac{(r^2 - r_p^2)}{2} \right]}$$

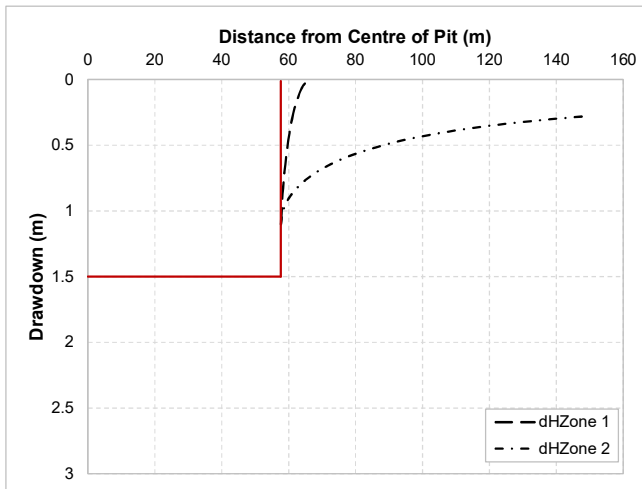
$$dH_{Zone2} = \frac{2(h_0 - d)}{\pi} \sin^{-1}\left(\frac{r_p}{r}\right)$$

$$m_2 = \sqrt{\frac{K_{h2}}{K_{v2}}}$$

W	1.11E-08	m/s	recharge flux
K_{h1}	4.48E-07	m/s	horizontal hydraulic conductivity in Zone 1
K_{h2}	4.48E-07	m/s	horizontal hydraulic conductivity in Zone 2
K_{v2}	4.48E-08	m/s	vertical hydraulic conductivity in Zone 2
h_0	1.5	m	initial saturated thickness above the base of Zone 1
h_p	0.4	m	saturated thickness at the pit wall
r_p	57.68946	m	effective pit radius
d	0.4	m	depth of the pit lake

r_0 is the radius of influence measured from the center of the pit beyond which groundwater drawdown is nil.

Radius of influence r_0 calculated by iterating equation A in analysis sheet 1 67 m



Drawdown curves		
r	dH_{Zone1}	dH_{Zone2}
57.68946	1.1	1.1
58.0	0.9	1.0
58.4	0.8	1.0
59.0	0.6	1.0
60.0	0.4	0.9
61.0	0.3	0.9
62.0	0.2	0.8
64.0	0.1	0.8
66.0	0.0	0.7
68.0		0.7
70.0		0.7
72.0		0.7
75.0		0.6
80.0		0.6
90.0		0.5
100.0		0.4
110.0		0.4
120.0		0.4
130.0		0.3
140.0		0.3
150.0		0.3

Reference: Marinelli, F. & Niccoli W. L. 2000.
 Simple analytical equations for estimating ground water inflow
 to a mine pit. Ground Water 38, no. 2: 311-314.

Analysed by: J. Ferry 8/06/2026
Checked by: B. Sinclair 12/06/2026

Notes: The drawdown curves apply along the no-flow boundary line at an elevation equivalent to the base of the pit.
 The dH_{Zone2} line does not take into account recharge from above.
 Drawdown projections are initial approximations only.

APPENDIX F
STORMWATER WETLAND
GROUNDWATER MOUNDING
ASSESSMENT



MOUNDSOLV Analysis for Stormwater Wetland 2

Model Inputs

The site-specific input values for the Stormwater Wetland 3 groundwater mounding assessment are presented in Table F1. The groundwater flow direction in relation to the orientation of Stormwater Wetland 3 is presented in Figure F1 with the location of the nearest buildings and railway to the site.

Table F1: Inputs for Mounding Assessment – Basin A

MODEL INPUT PARAMETER	SCENARIO 1: 1 DAY EVENT	SCENARIO 2: 30 DAY WET PERIOD AND 335 DAY RECOVERY	INFORMATION SOURCE
Length (m)	137		Maven Design received 08/06/26
Width (m)	95		
Event Duration (days)	1	30	Scenario 1: 1-day storm event duration. Scenario 2: Approximate to 36 days, which is the number of average winter rain days. (NIWA Hamilton, AWS rainfall station 2112).
Maximum Acceptable Groundwater Mounding Height (m)	3.6		Taken as the distance from the winter water table (derived from the piezometric surface) to the top of the permanent water level provided by Maven.
Aquifer Specific Yield (m³/m³)	0.2		Typical for aquifer type (Morris and Johnson 1967).
Aquifer Hydraulic Conductivity (m/day)	2.4		Geometric Mean of Hydraulic test results for Hinuera Formation intercepted at basin base.
Aquifer Hydraulic Gradient (m/m)	-0.0038		Calculated from interpreted winter piezometric surface.
Aquifer Dip Direction (degrees)	19.16		
Aquifer Saturated Thickness (m)	5.65		Estimated from Hinuera Formation in CMW CPT25-13 to modelled base depth of 10 m bgl
Rotation of the Infiltration Basin Length (degrees)	-39.5		From Maven basin design plans

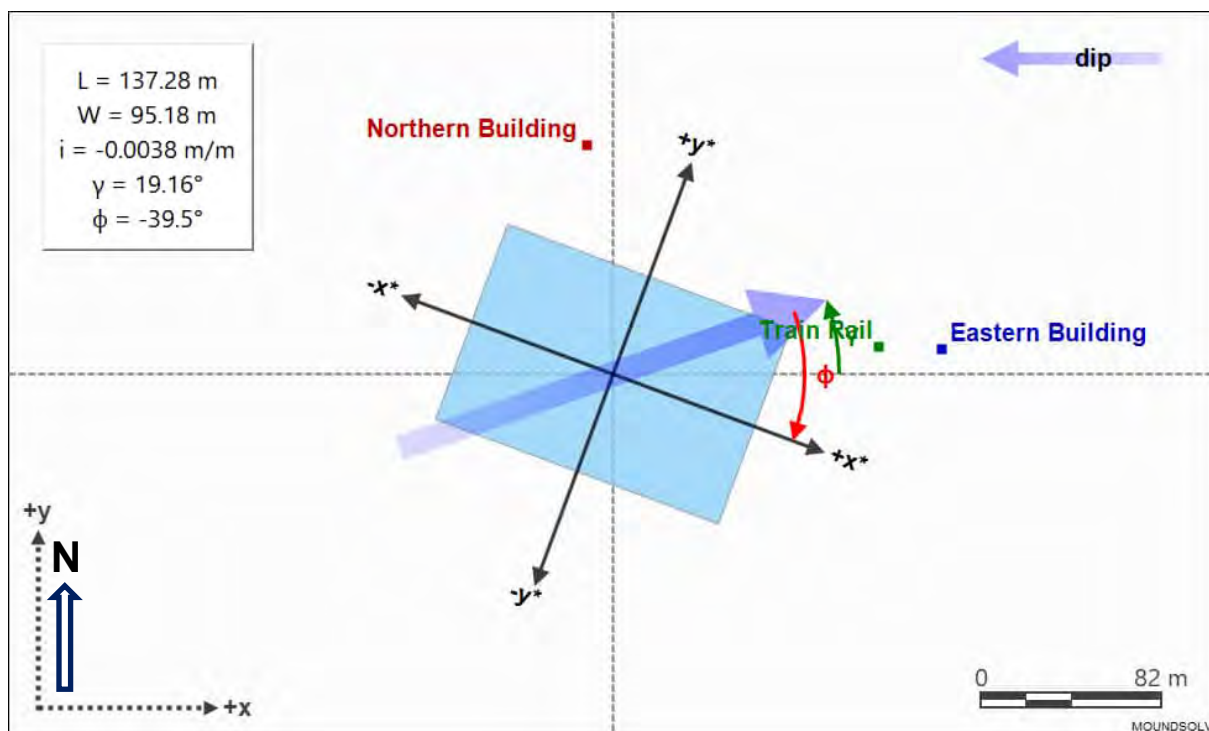


Figure F1: Stormwater Wetland 3 and Closest Structures Relative to Groundwater Flow Direction

Mounding Assessment Results Summary

Modelled infiltration rates (Table F2) are considered to represent an average for the duration of the simulated rainfall event (1 day and 30 days). In effect, recharge through the floor of the basin is defined as being constant until the simulated storm event ceased, at which point the recharge immediately stops. Caveats regarding the use of this conceptualisation are provided later in this appendix.

Table F2: Summary of Mounding Assessment Results for Stormwater Wetland 2

MODEL OUTPUT	SCENARIO 1: 1 DAY EVENT	SCENARIO 2: 30 DAY WET PERIOD	SCENARIO 2: 335 DAY RECOVERY	NOTES
Modelled Infiltration Rate (m/d)	0.72	0.04 (total of 1.2 m over 30 days)		Modelled with water levels in the basin reaching the permanent water level (outflow point).
Modelled Mounding at Stormwater Wetland 3 (m)	3.6	3.6	0.23	
Maximum Modelled Mounding at Neighbouring Structures (m)	<0.01	0.49	0.21	Northern Building
	<0.01	0.39	0.21	Train Rail
	<0.01	0.14	0.19	Eastern Building

Stormwater Wetland 3 Scenario 1 – Model Outputs

The modelling results, including the calculated mounding contours (Figure F2), mounding profiles (Figure F3 and Figure F4) and projected changes in groundwater levels at key points around the basin (Figure F5), indicate detectable groundwater mounding would not extend as far as nearby existing structures by the end of the 1-day rainfall event.

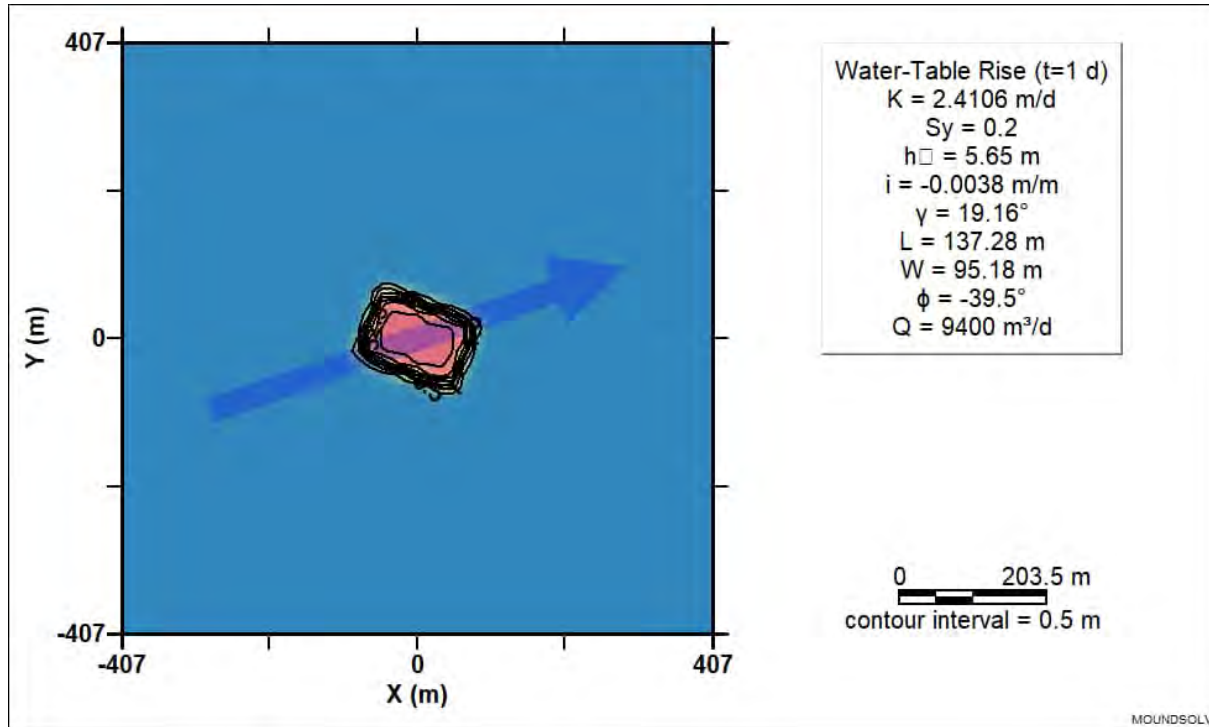


Figure F2: Calculated Mounding Contours at Stormwater Wetland 3 at the End of a 1-day Storm Event

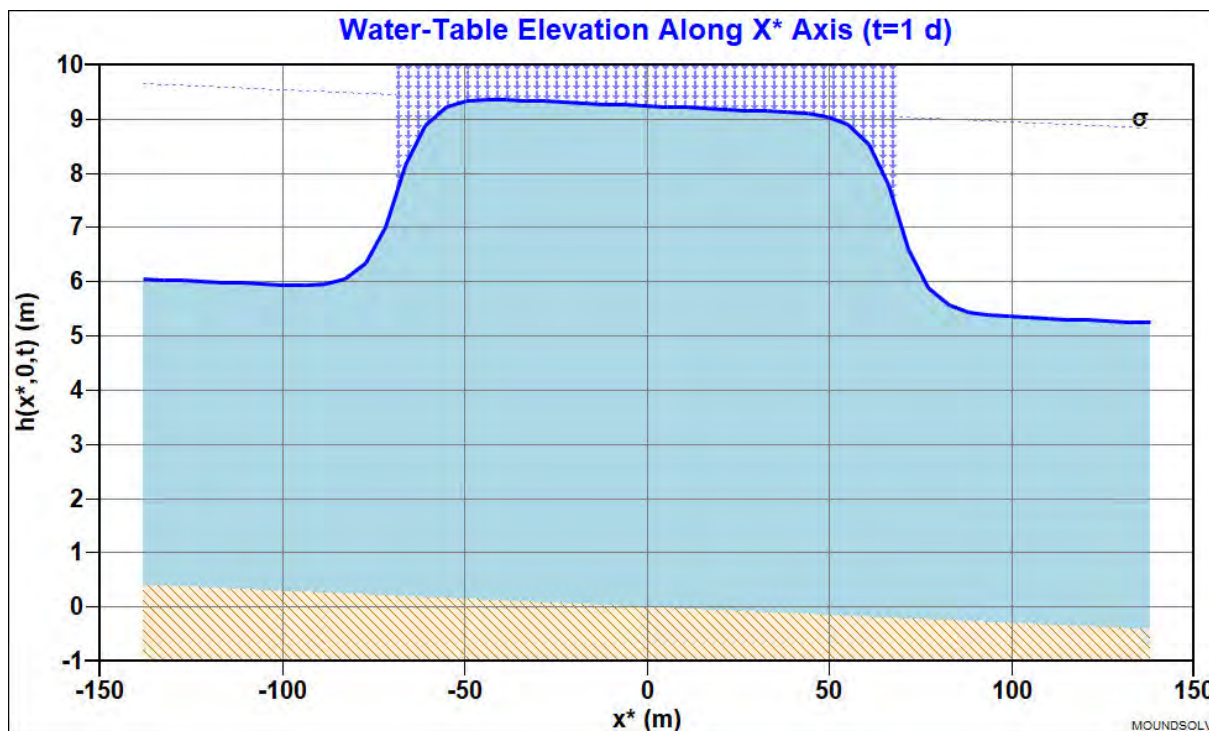


Figure F3: Calculated Mounding, Stormwater Wetland 3, X-Axis Visualisation, Following a 1-day Storm Event

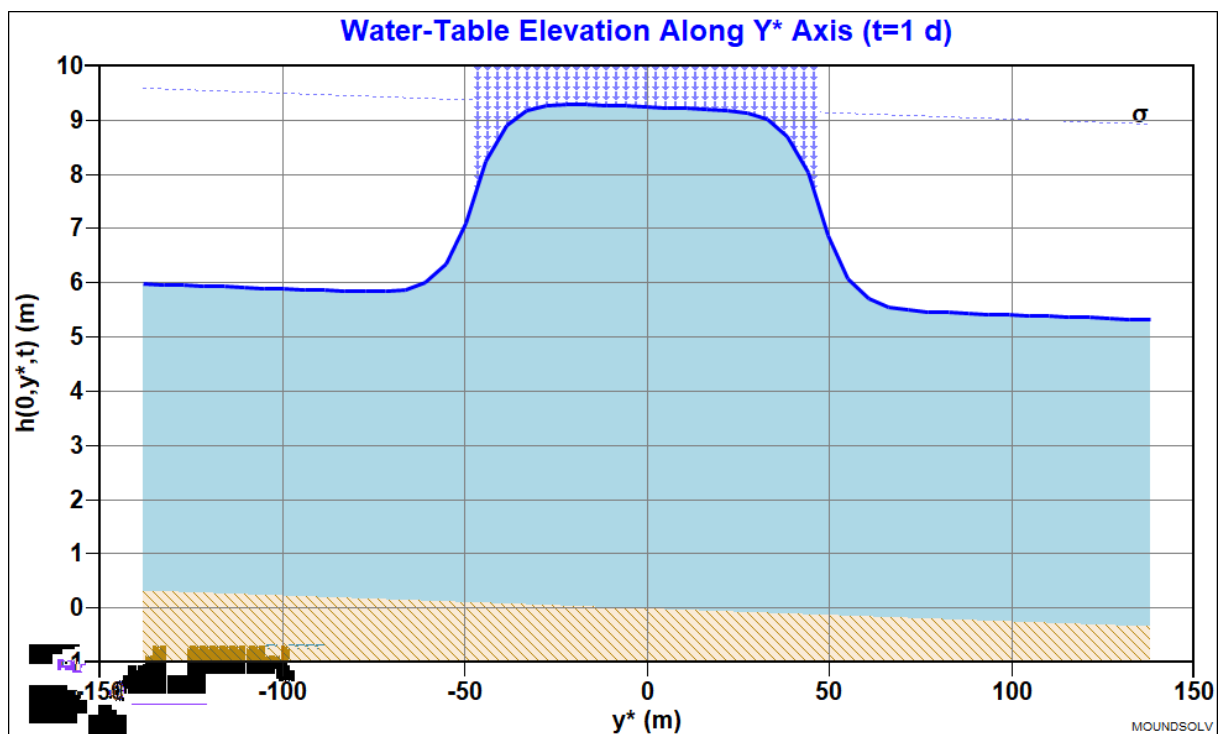


Figure F4: Calculated Mounding, Stormwater Wetland 3, Y-Axis Visualisation, Following a 1-day Storm Event

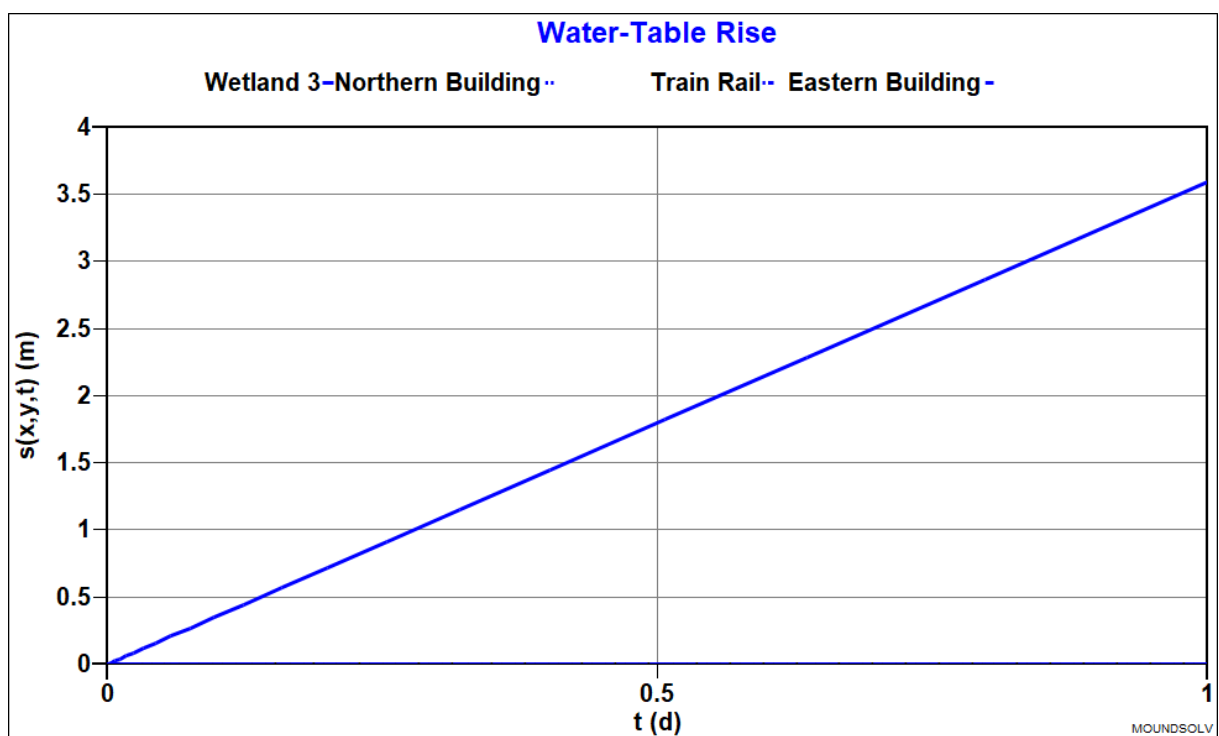


Figure F5: Groundwater Table Hydrographs at Stormwater Wetland 3 in Response to 1 Day Event

Stormwater Wetland 2 Scenario 3 – Model Outputs

The modelling results, including the calculated mounding contours (Figure F6), mounding profiles (Figure F7 and Figure F8) and projected changes in groundwater levels at key points around the basin during the recharge period (Figure F9), indicate groundwater mounding would extend as far as the nearest existing structures by the end of the simulated wet period.

Following the simulated wet period, the simulated groundwater levels beneath the basin decline by approximately 3.37 m over a period of 335 days (Figure F10). This decline in groundwater level beneath the basin is matched by an expansion of the area affected by groundwater mounding (Figure F10). The dissipation of the mounded groundwater under the basin results in continuing rises in simulated groundwater levels outside the basin for weeks to months (Figure F10). During the event recovery period, the peak increases in groundwater levels at the neighbouring structures do not exceed 0.75 m rise (Figure F10). Following a 335 day recovery period, the simulated rises in groundwater levels at neighbouring structures are less than 0.25 m (Figure F10).

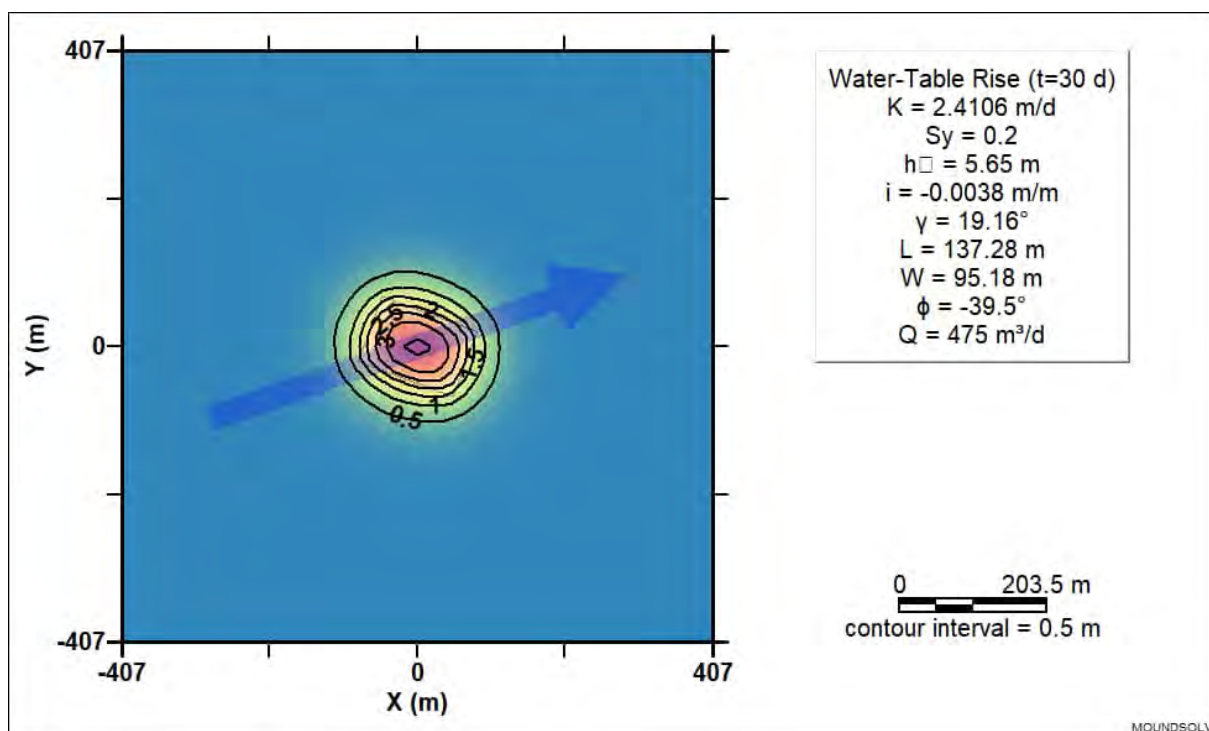


Figure F6: Calculated Mounding Contours at Stormwater Wetland 3 at the end of 30 days

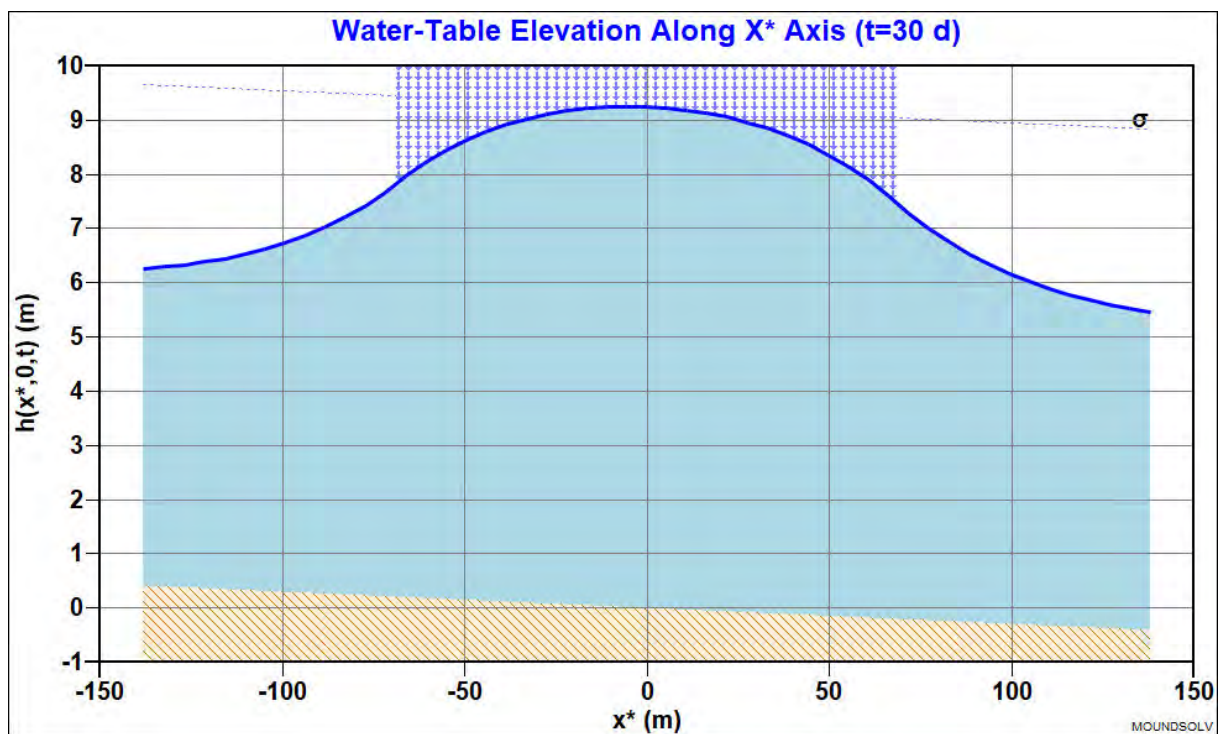


Figure F7: Calculated Mounding, Stormwater Wetland 3, X-Axis Visualisation, Following 30 days

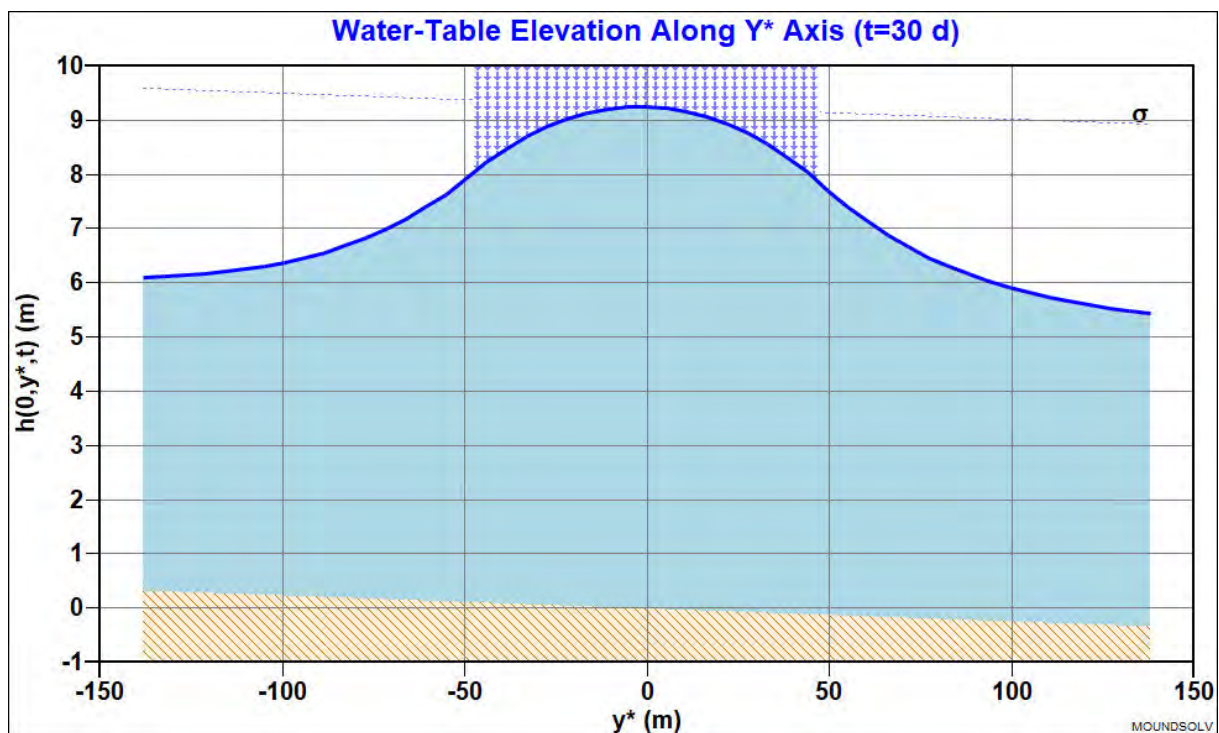


Figure F8: Calculated Mounding, Stormwater Wetland 3, Y-Axis Visualisation, Following 30 days

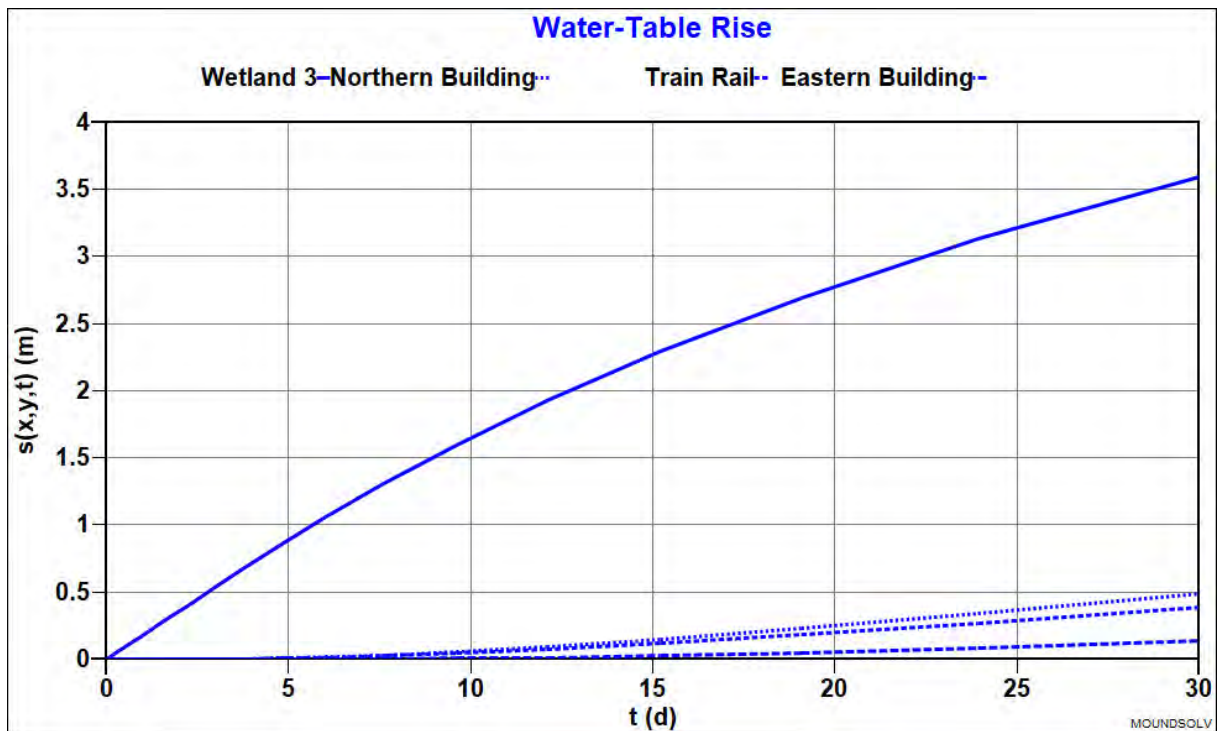


Figure F9: Groundwater Table Hydrographs at Stormwater Wetland 3 in Response to 30 day event

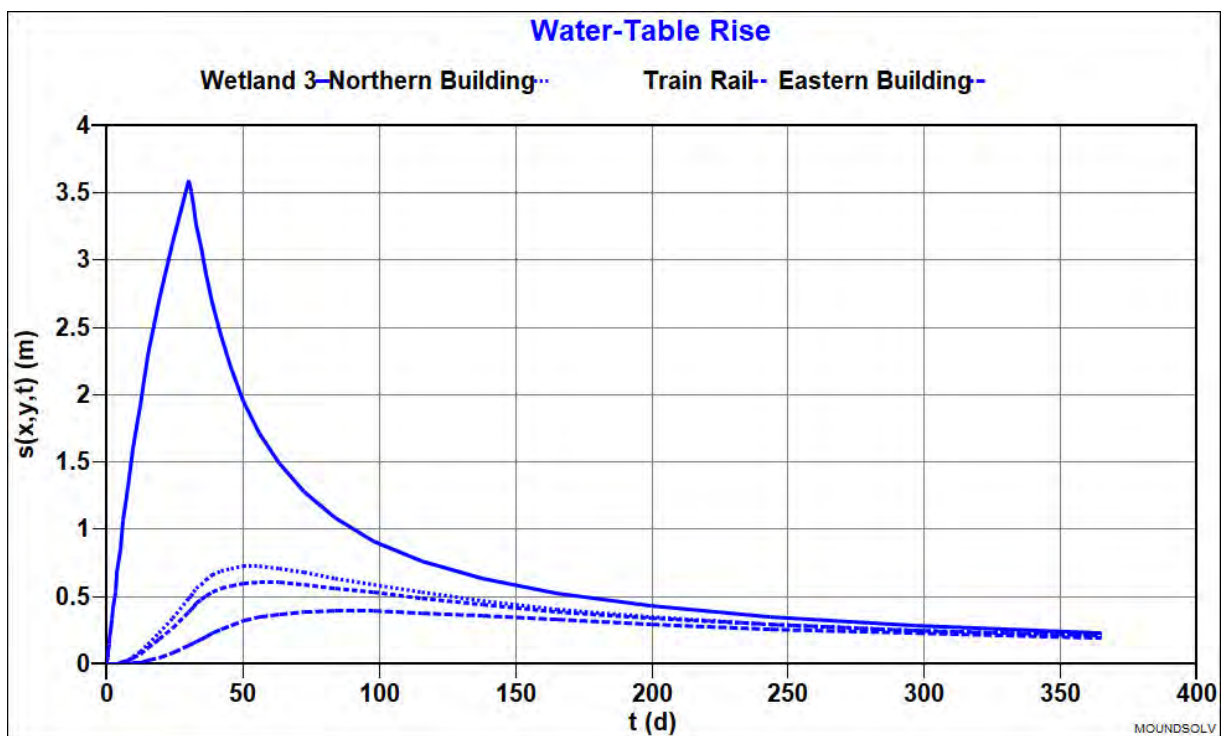


Figure F10: Groundwater Table Hydrographs at Stormwater Wetland 3 in Response to 30 day event and 335 day recovery

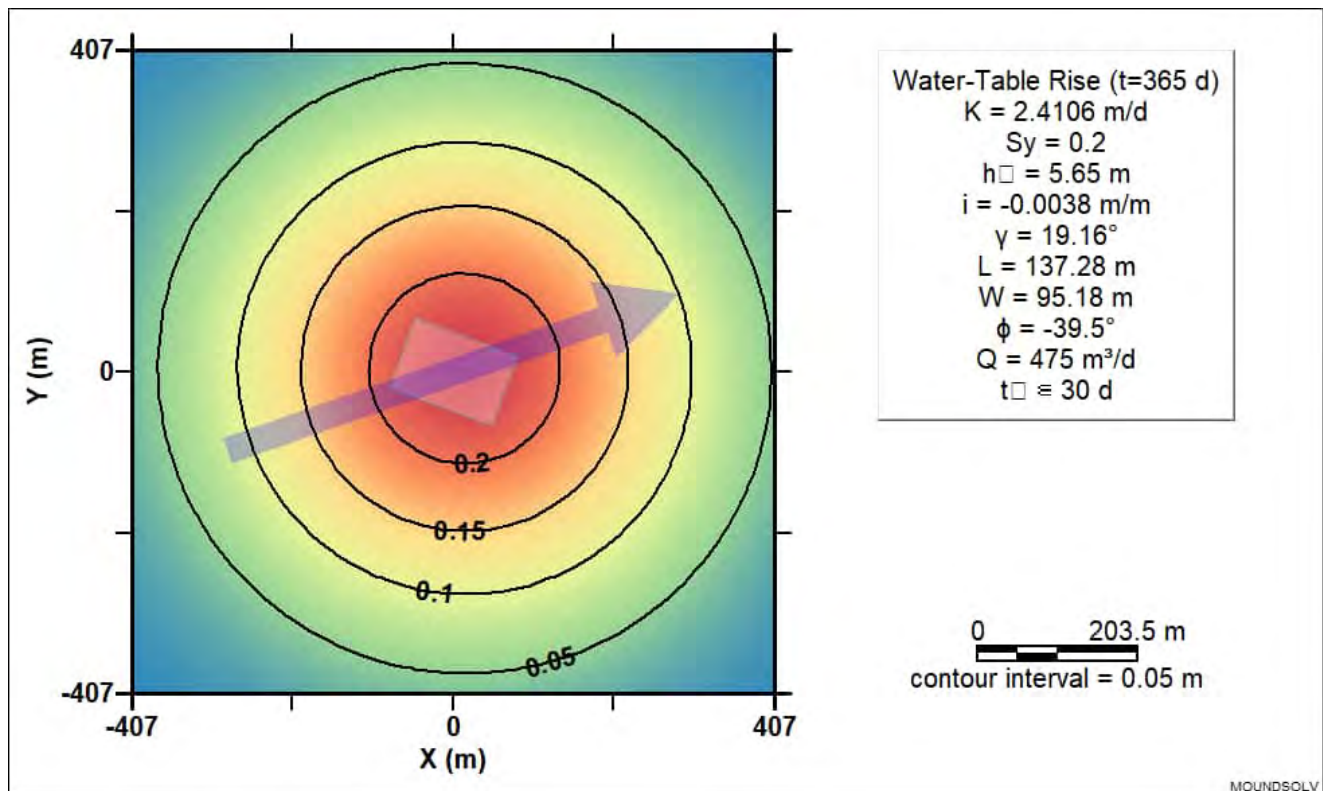


Figure F11: Calculated Mounding Contours at Stormwater Wetland 3 335 days after a the 30 day wet period

Modelling Assumptions and Caveats

It is important to note the following assumptions incorporated in the Moundsolv simulations:

1. The storage capacity of the basin is not taken into account in simulation of the initial mounding. This means that the recharge rate is defined as being constant throughout the designated storm event. In effect, runoff entering the basin is simulated to initially recharge the underlying groundwater system until the induced groundwater mound intersects the floor of the basin. After that point, it is assumed that the rate of rise of water in the basin will match that of the surrounding groundwater, with no change to the infiltration rate through to the end of the designated recharge period and no account taken of storage of water in the basin. This conceptualisation does not reflect in detail the hydraulic processes associated with the basin operation. However, it does provide a reasonable indication of groundwater mounding in response to stormwater runoff entering the basin.
2. The volume of water stored in the stormwater basin is not taken into account in the modelling. This means that each model assumes recharge to groundwater under the basin ceases as soon as the designated storm recharge period ends. Any accumulated water in the basin is not taken into account in the simulation.
3. The MoundSolv model has no designated lateral hydraulic boundary conditions, but it does have a no-flow boundary defined for the base of the model. This means all water introduced to the model needs to be distributed within the defined model throughout the model run period. If there are drains or other potential groundwater discharge points within the modelled area, these are not taken into account in the mounding simulation.

The recharge rate derived for each storm event simulation and the extent of groundwater mounding derived by MoundSolv are primarily dependent on:

1. The length of the simulated storm event. The shorter the storm event, the greater the calculated infiltration rate but the more limited the eventual extent of groundwater mounding.
2. The hydraulic conductivity of the receiving aquifer. The higher the aquifer hydraulic conductivity, the greater the infiltration rate and the greater the eventual extent and magnitude of groundwater mounding.

3. The thickness of the receiving aquifer. The smaller the receiving aquifer thickness, the smaller the calculated infiltration rate and the smaller the eventual extent and magnitude of groundwater mounding.

The potential range in potential mounding in response to variations in these parameters could be investigated through a sensitivity analysis. However, in practical terms it would be more effective to undertake further focused site investigations during construction and to use the outcomes to optimise the final designs for the wetlands to ensure groundwater mounding does not impact nearby structures.

APPENDIX G

DRAWDOWN CALCULATIONS FOR WASTEWATER PUMP STATIONS



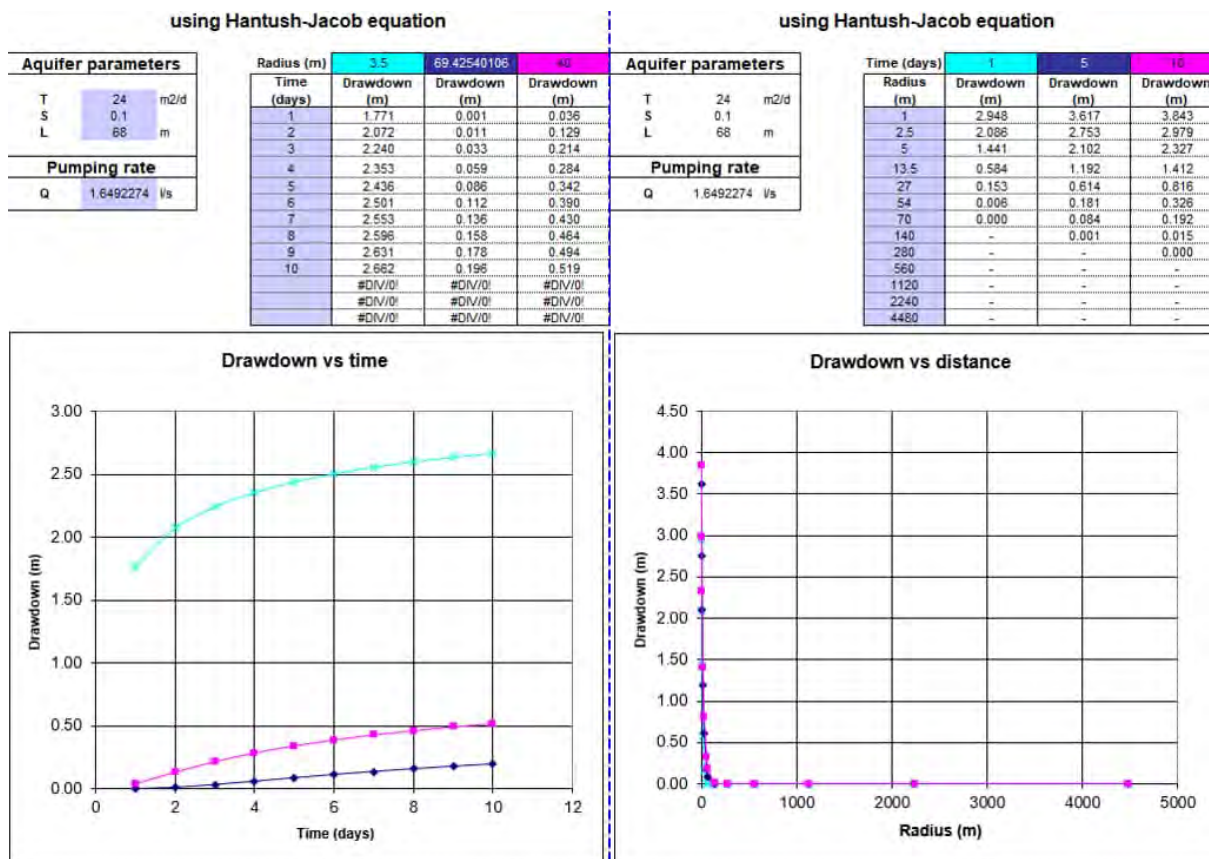


Figure G1: Northern WWPS Calculation Sheets Following Three Days of Pumping to Achieve Dewatering

using Hantush-Jacob equation

Aquifer parameters		
T	24	m ² /d
S	0.1	
L	68	m
Pumping rate		
Q	1.3878765	l/s

Radius (m)	3.5	53.45375724	100
Time (days)	Drawdown (m)	Drawdown (m)	Drawdown (m)
1	1.491	0.005	0.000
2	1.744	0.038	0.000
3	1.885	0.080	0.003
4	1.980	0.120	0.007
5	2.050	0.156	0.014
6	2.105	0.188	0.022
7	2.148	0.215	0.031
8	2.184	0.240	0.040
9	2.214	0.261	0.049
10	2.240	0.279	0.057
#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

Aquifer parameters		
T	24	m ² /d
S	0.1	
L	68	m
Pumping rate		
Q	1.3878765	l/s

using Hantush-Jacob equation

Time (days)	1	5	10
Radius (m)	Drawdown (m)	Drawdown (m)	Drawdown (m)
1	2.481	3.044	3.234
2.5	1.755	2.317	2.507
5	1.213	1.769	1.958
13.5	0.491	1.003	1.188
27	0.129	0.517	0.687
54	0.005	0.152	0.274
56.9479075	0.003	0.133	0.249
113.895815	0.000	0.006	0.034
227.79163	-	0.000	0.000
455.58326	-	-	-
911.166521	-	-	-
1822.33304	-	-	-
3644.66608	-	-	-

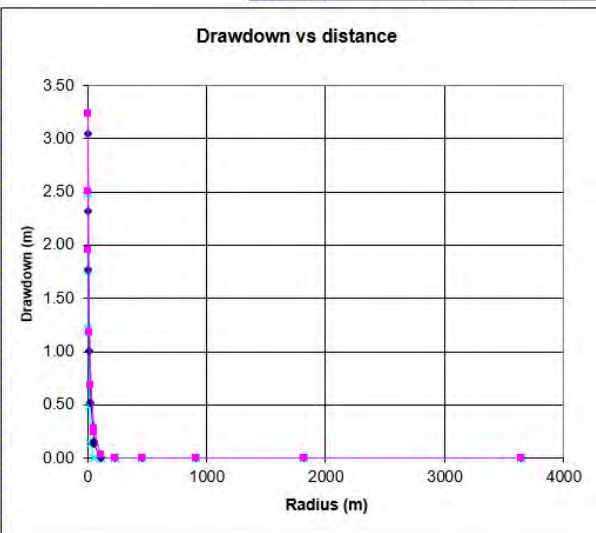
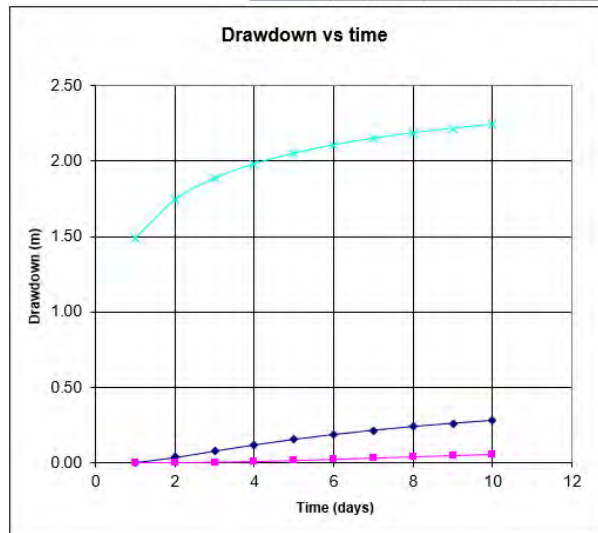


Figure G2: Northern WWPS Calculation Sheets Following 10 Days of Pumping to Achieve Dewatering

using Hantush-Jacob equation

Aquifer parameters		
T	24	m ² /d
S	0.1	
L	94	m
Pumping rate		
Q	2.9742669	l/s

Radius (m)	4.1	20	40
Time (days)	Drawdown (m)	Drawdown (m)	Drawdown (m)
1	2.948	0.567	0.065
2	3.509	0.988	0.241
3	3.830	1.260	0.404
4	4.052	1.458	0.542
5	4.220	1.611	0.657
6	4.353	1.735	0.756
7	4.463	1.838	0.841
8	4.555	1.926	0.916
9	4.635	2.002	0.981
10	4.704	2.068	1.039
#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

Aquifer parameters		
T	24	m ² /d
S	0.1	
L	94	m
Pumping rate		
Q	2.9742669	l/s

using Hantush-Jacob equation

Time (days)	1	5	10
Radius (m)	Drawdown (m)	Drawdown (m)	Drawdown (m)
1	5.337	6.619	7.105
2.5	3.781	5.059	5.545
5	2.618	3.884	4.368
10	1.505	2.723	3.201
20	0.567	1.611	2.068
48	0.024	0.461	0.804
78	0.000	0.110	0.307
156	-	0.001	0.016
312	-	-	0.000
624	-	-	-
1248	-	-	-
2496	-	-	-
4992	-	-	-

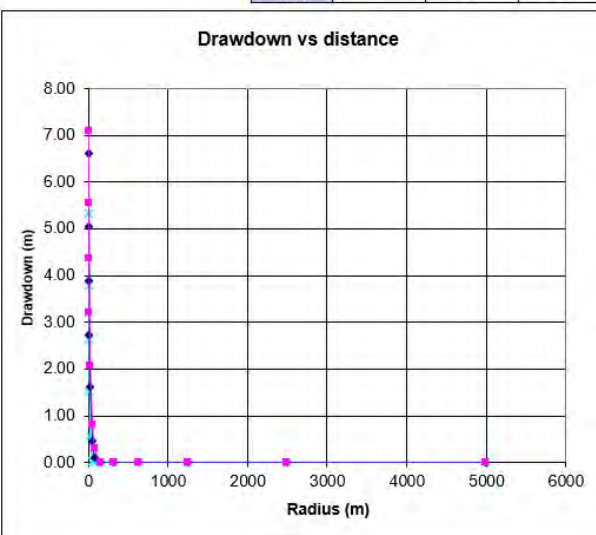
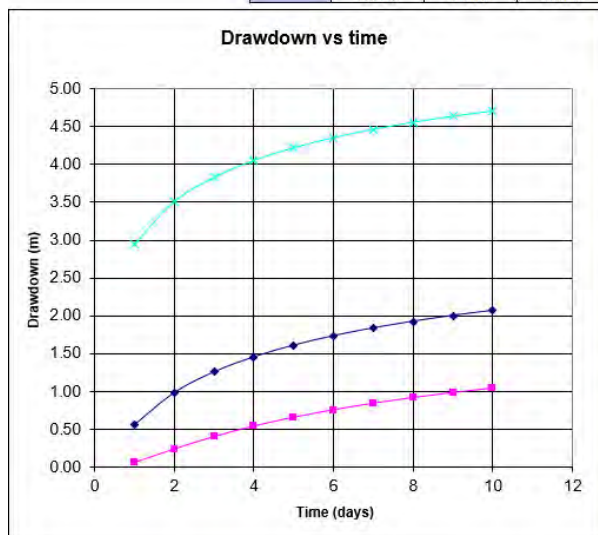


Figure G3: Central WWPS Calculation Sheets Following Three Days of Pumping to Achieve Dewatering

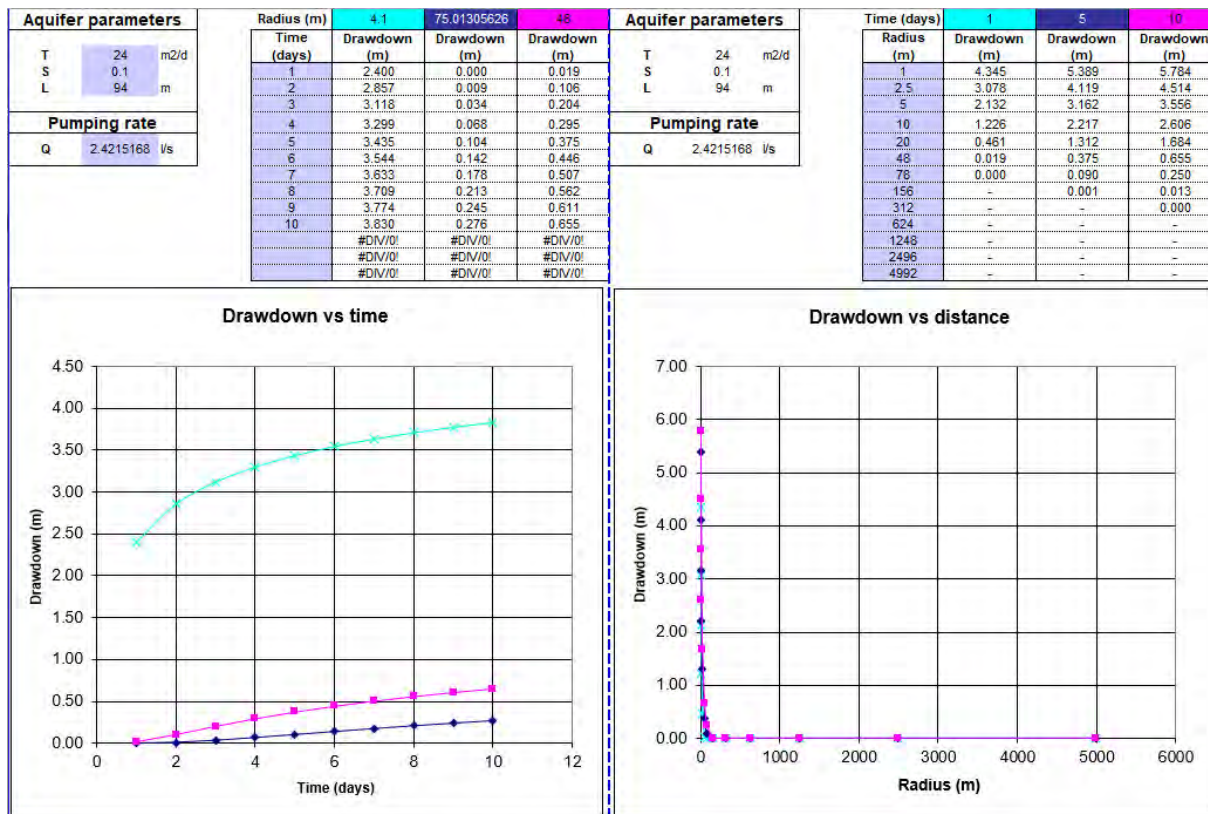
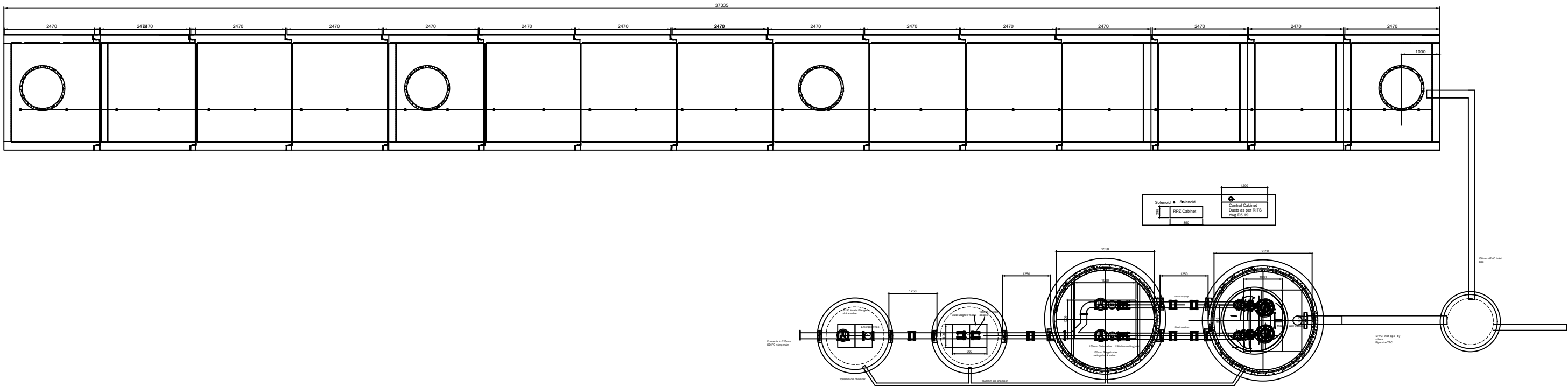


Figure G4: Central WWPS Calculation Sheets Following 10 Days of Pumping to Achieve Dewatering



NOTES:

1.

REVISIONS			
REV #:	REVISION DESCRIPTION:	DATE:	DRAWN:
A	Issued For Approval	22/5/26	PC

PO Box 58142, Botany, Auckland, 2316
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ISO 9001 CERTIFIED MANAGEMENT SYSTEM

PROJECT:
Southern Links Industrial 1
Hamilton

WW Pump Station WWPS - A

DRAWING TITLE:
Plan View with tank

REFERENCE/QUOTE NUMBER:		AQ2286 - 2	
DRAWN: PC	DESIGN: PC	CHECKED: JB	
SIGNATURE:	SIGNATURE:	SIGNATURE:	
SCALE: As Shown	Note: Do not scale drawing if in doubt ASK!!!	DATE:	
PAPER SIZE: A3		22/5/26	
DRAWING NUMBER:	SHEET NUMBER:	REVISION NUMBER:	
AQ2286 - 22	of 4	A	



FOR FURTHER INFORMATION CONTACT:

Joanne Ferry
Senior Hydrogeologist

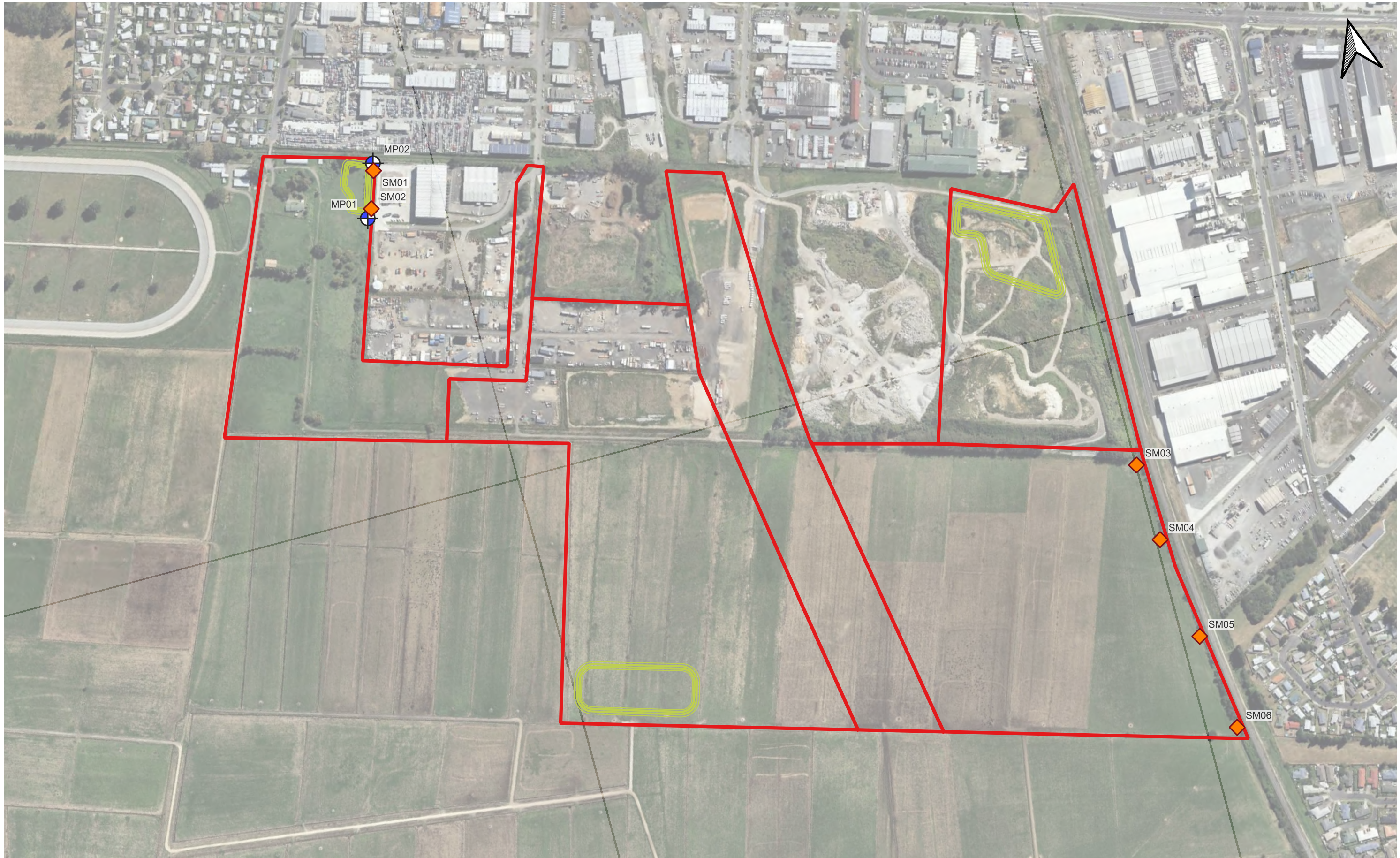
T [REDACTED]
M [REDACTED]
E [REDACTED]

WGA.COM.AU
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APPENDIX B

Drawings



LEGEND:

-  PIEZOMETER
-  SETTLEMENT MARKER
-  STORMWATER WETLAND
-  BOUNDARY

NOTES:
1. BASE AERIAL PLAN SOURCED FROM GOOGLE EARTH (2025 IMAGE)
2. PROPOSED DEVELOPMENT SOURCED FROM MAVEN ASSOCIATES DEVELOPMENT PLANS



CLIENT:	COLLIERS PROJECT LEADERS		DRAWN:	RT	PROJECT:	HAM2024-0120
PROJECT:	STAGE 1 INDUSTRIAL SOUTHERN LINKS		CHECKED:	DM	DRAWING:	DWG26-01
			REVISION:	0	SCALE:	1:5,000
TITLE:	SITE INVESTIGATION PLAN		DATE:	05/08/2026	SHEET:	A3L

APPENDIX C

Geotechnical Investigation Report

28 August 2026

**SOUTHERN LINKS 1 – RESIDENTIAL DEVELOPMENT
HAMILTON**

GEOTECHNICAL INVESTIGATION REPORT

Colliers Project Leaders

HAM2025-0056AD Rev 4



EXECUTIVE SUMMARY

This report presents the results of geotechnical investigations and a geohazards assessment to support the substantive application for the Southern Links 1 project ("SL1" or the "Project") under the Fast-track Approvals Act 2024 ("FTAA"). This report relates to the residential portion of the SL1 Project, referred to as the "Residential Area", "Residential Development" in this report.

The 46Ha Residential Area site, as shown in **Figure 1**, is located on the southern boundary of the current Hamilton City limits in Hamilton, New Zealand. The Residential Development proposal is for a range of residential and associated development, as conceptually summarised in **Figure 2**.

The existing topography of the Residential Area site is generally level between RL38m and RL43m. The regional groundwater table is generally within 3 metres of the surface. The geology typically consists of interbedded sands and silts of the Hinuera Formation.

The assessment of natural hazard risk for the site is assessed as low to medium for all hazards considered. We consider that the Residential Area is suitable for the proposed Residential Development from a geotechnical/geohazards perspective, subject to the adoption of the geohazard and geotechnical recommendations summarised below, which we understand have been incorporated into the project design and resource consent conditions as appropriate. In other words, we consider: the construction of the Residential Development is feasible from a geotechnical perspective; there are satisfactory techniques available to address the geotechnical constraints identified within the Residential Area; and that any potential geotechnical/geohazard effects/risks can be appropriately managed.

Key recommendations from our geotechnical investigations and geohazards assessment include:

(1) Slope Stability:

- Proposed artificial wetland batter slopes of 1V:3H were assessed for stability. Results indicated proposed batters are generally stable;
- During liquefaction, lateral stretch of less than 50mm across foundations is recommended to be accounted for during detailed foundation design.
- Mangakotukutuku stream bank is marginally stable and future buildings should remain outside the 20m wide stream corridor.

(2) Earthworks and Filling

- The site is to be filled with either site won silts or sands to form level building sites with maximum proposed Scut levels of 5m and proposed fill levels of up to 2m.
- Fill-induced ground settlements are predicted to be generally <25mm, with the exception of a few isolated areas with up to 40mm predicted settlement. Settlement is anticipated to be elastic and built out rapidly during construction.

(3) Road Subgrades

- Where pavements are constructed over granular engineered fill, a design subgrade CBR of 10% is considered appropriate. Where over natural sands/silts, a subgrade CBR of 2% to 3% are predicted. Conventional earthworks quality control, together with excavation observations, will be required during construction.

(4) Shallow Foundations

- The potential ULS liquefaction risk is moderate for the Hinuera Formation soils. These effects can be reduced to acceptable levels by utilising TC2 raft foundations.

- Following the preliminary assessment that has been undertaken, it is considered that most of the site is suitable for TC2 raft foundations, with localised areas of higher predicted settlements that will require TC2/TC3 hybrid foundations. This is to be further refined during future investigations and detailed earthworks design. Alternative foundation solutions, such as geogrid-reinforced gravel rafts or piled foundations, may also be suitable.
- A preliminary geotechnical ultimate bearing pressure of 300kPa should be available in the static case for shallow strip and pad foundations constructed within both the natural cut ground and engineered fill areas.

(5) Artificial Wetlands

- The WGA Hydrogeological Effects Assessment¹ identified a low permeability aquitard layer running beneath the site which has a confining effect on the underlying deep aquifer, putting it under some degree of pressure. Excavating the proposed stormwater ponds will remove the existing soil overburden pressure and the uplift pressure from the confined aquifer could rupture the aquitard layer and destabilise the ponds.
- A separate design memorandum has been prepared by CMW in collaboration with WGA and Maven Associates, to address this specific issue, and provide options for mitigation, and presented in **Appendix I**.



Figure 1: SL1 Residential Development Masterplan prepared by Barkers & Associates (Ref: 25546 & 26111, dated February 2026)

¹ Southern Links 1 Residential Stage 1 Southern Block Hydrogeological Effects Assessment, prepared by WGA, Ref: WGA242463-RP-HG-0003_B, dated May 2026

STATEMENT OF QUALIFICATIONS AND EXPERIENCE

Mark McVinnie

I am an Engineering Geologist at CMW Geotechnical NZ Limited, trading as CMW Geosciences. CMW Geosciences is a specialist geotechnical engineering and geological services consultancy with offices in New Zealand and Australia. I have been employed at CMW Geosciences since March 2022.

I hold the qualifications of BSc(Tech) in Earth Sciences from the University of Waikato, which I completed in 2016.

I have 8 years of professional experience in geotechnical engineering in the Waikato and Auckland regions. My experience has been primarily in land development, infrastructure, and landslide mitigation, and for the last several years, I have been focused on projects in the Waikato.

David MacPherson

I am an Associate Geotechnical Engineer at CMW Geotechnical NZ Limited, trading as CMW Geosciences. I have been employed at CMW Geosciences since August 2017.

I hold the qualifications of MEngSc from the University of New South Wales, which I completed in 2022, as well as an MSc from the University of Waikato, which I completed in 2016. I am a Chartered Professional Engineer and a Chartered Member of Engineering New Zealand.

I have over 8 years of experience as a geotechnical engineer, including in project management, design solutions, and team leadership. My background includes extensive work in infrastructure projects. My experience includes managing and participating in site investigations, instrumentation and monitoring, slopes and geotechnical hazard assessments, and slope stability design for major infrastructure projects such as the Peacockes Bridge in Hamilton.

Dave Sullivan

I am a Principal Engineering Geologist at CMW Geotechnical NZ Limited, trading as CMW Geosciences. I have been employed at CMW Geosciences since May 2025.

I hold the qualifications of a BSc in Geological Engineering from Mackay School of Mines at the University of Nevada, which I completed in 1997, and a Master of Business Administration from the University of Phoenix, which I completed in 2023. I am a Chartered Professional Engineer and a Chartered Member of Engineering New Zealand, as well as a Category 1 Geoprofessional (TCC), and a Licensed Civil Engineer in California and Nevada, USA.

I have over 30 years of professional experience in engineering geology and geotechnical engineering. My experience has been primarily in land and building development, disaster relief, and linear infrastructure. The years in New Zealand have been focused on the Christchurch rebuild, the Waikato Expressway, and land development in the Waikato and Bay of Plenty.

HAM2025-0056AD		
Date	Revision	Comments
27 May 2025	A	Internal Review
6 June 2025	0	Report Issue
24 April 2026	1	Revised report Issue
11 June 2026	2	Revised report Issue
17 July 2026	3	Revised report Issue
28 August 2026	4	Revised report Issue

	Name	Signature	Position
Prepared by	Mark McVinnie		Project Engineering Geologist
Reviewed by	David MacPherson		Associate Geotechnical Engineer CMEngNZ, CPEng
Authorised by	David Sullivan		Principal Geotechnical Engineer CMEngNZ, CPEng



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1 INTRODUCTION

CMW Geosciences (CMW) was engaged by Colliers Project Leaders to carry out a geotechnical investigation of a site located at Hamilton, which is being considered for the construction of a 938 Lot residential subdivision (the Residential Development). This site is denoted as the Residential Area as part of the wider Southern Links 1 (SL1) Development situated along the south-western boundary of Hamilton City (the “Project”). CMW have previously undertaken a desktop study of the wider southern links development.²

This report has been prepared to assess the suitability of the Residential Area land for the Residential Development, to support a substantive application for the Project under the FTAA. It incorporates relevant information from the previous desktop study and from subsequent site investigations.

1.1 Project Description

The SL1 Residential South development forms part of the residential component of Southern Links 1, a listed project under FTAA 2024. The Southern Links 1 project is a combined 106ha development, including residential and industrial activities. The residential component comprises circa 46ha and is in single ownership and is currently used for rural farming activities. The landholding includes five land parcels legally described as Lot 2 DP 589463 (22.21 ha); Part Lot 2 DP 25668 and Part Lot 1 DP 25668 (33.64 ha); Lot 3 DP 394366 and Lot 1 DP South Auckland 51518 (7.58 ha); Lot 1 DPSA 69842, Lot 2 DPSA 11357, Lot 1 DPSA 75305 and Section 1 SO 60814 (26.13 ha); and Part Lot 1 DP 25668 (26.50 ha). This site is part of the wider Southern Links Growth Cell, a circa 440ha contiguous land area that stretches the south-western edge of Hamilton that includes the Hamilton Southern Links (RoNS) designation.

The proposal seeks approval for a Substantive Application under the Fast-Track Approvals Act 2024 for a comprehensively master planned and staged residential development. This includes all necessary resource consents under the Resource Management Act 1991, including regional, district approvals where required.

The residential component provides for the establishment of circa 938 residential units, together with a neighbourhood commercial node, open spaces, waterbodies, and infrastructure devices including wetlands and roading.

The proposal includes substantial enabling works to establish developable land, including bulk earthworks across the site. An integrated stormwater management system including wetlands, detention/attenuation devices and treatment ponds supports the development. Ecological restoration is integrated via riparian and corridor planting with appropriate design measures being adopted to enhance and protect key features including the upper tributaries of the Mangakōtukutuku Stream and associated drains.

Access and integration with the surrounding Hamilton area is provided through connected transport framework, including the establishment of intersections, roading, and walking and cycle networks, along with upgrades to existing transport infrastructure. The residential development is proposed to be serviced via a coordinated strategy, including the extension of public networks, upgrades, and installation of appropriate infrastructure.

2 SITE DETAILS

2.1 Site Description

The Residential Area site comprises an area of approximately 44.5ha and is located on Saxby Road, as shown within **Figure 2**. Details of the site are as follows:



Figure 2: Proposed Staging Plan prepared by Maven (Ref: 298001-R1 SL1, Drawing No: R1-C130 Rev A, dated June 2026)

The site is accessed by Saxby Road in the north and is bound by high-density residential houses to the north and east, and pastoral land and rural properties to the west and south. At the time of our 2025 investigation, a residential dwelling and sheds were present in the northern corner of the site. Current land use is primarily grazing pasture.

2.2 Landform

The Residential Area site is situated on flat, low-lying land with open drains between Relative Levels 38 and 43m (ASL). The drains were noted as being up to approximately 2m in depth and were observed running from the west to east, draining into the Mangakotukutuku Stream, which runs from south to north through the centre of the site.

² Ref. HAM2024-0017AB, dated 15 March 2024

2.3 Site History

Based on our review of aerial images available on Retrolens³ and Google Earth, the Residential Area site appears to have been used primarily for pasture and farmland since the early 1940's (earliest available aerial photograph). The large open drains that discharge to the Mangakotukutuku Stream must have been formed prior to 1943. Subsoil drains were installed in 2024.

3 PROPOSED DEVELOPMENT

The proposed Residential Development extent is shown within **Figure 1** and **Figure 2**. Development drawings are presented in **Appendix B**.

Details for the Residential Development are as follows:

- The Residential Area comprises 941 residential lots of varying size with an associated access road extending from Saxbys Road and Croft Lane with an additional five roads to provide access to the proposed lots.
- Residential buildings are proposed to comprise stand-alone and terraced one to two storey buildings.
- The existing landform will need to be modified by raising the ground level with up to 2m fill; and cuts up to 5m will also be required.
- Minor slopes are proposed across the site in the form of swale drains. Preliminary plans indicate these drains will be to a maximum depth of 5m, with slope gradients of approximately 1V:3H.
- Minor fill batters requiring retaining walls up to 2.27m are also proposed.

4 INVESTIGATION SCOPE

Following a dial before you dig search, and onsite service location, the site investigation was carried out on 22 April 2025 during mid-autumn conditions. The scope of fieldwork completed is summarised in **Table 1** below:

Table 1: Investigation Summary		
Test ID	Test Type	Depth (m)
TP25-01 to TP25-15	Test Pits (TP)	3.4m (hole collapsing) to 6.3m
CPT25-01 to CPT25-11	Cone Penetrometer Tests (CPT)	20m
Notes: Refer to Section 6.1 for details		

These tests were supplemented by existing publicly available (New Zealand Geotechnical Database) data, which included ten CPTs and four shallow hand augers within the Residential Area.

The approximate locations of the respective investigation sites referred to above are shown on the Geotechnical Investigation Plan as **Drawing 1** attached in **Appendix A**.

5 GEOLOGY

The local published geological map⁴ details the Residential Area site to be partially underlain by Holocene Swamp deposits and partially by Hinuera Formation interbedded silt and sand soils. Walton Subgroup forms

the base of the hills to the east and is expected to underlie the Hinuera Formation at depth as shown in **Figure 3** below.

However, based on our onsite observations and 3D Leapfrog modelling of subsurface soil conditions, the site is completely underlain by Hinuera Formation soils and the Peat (swamp deposits) soils are located further to the south-west, outside the Residential Area. The modelled geology is presented on **Drawing 2, Appendix A**.

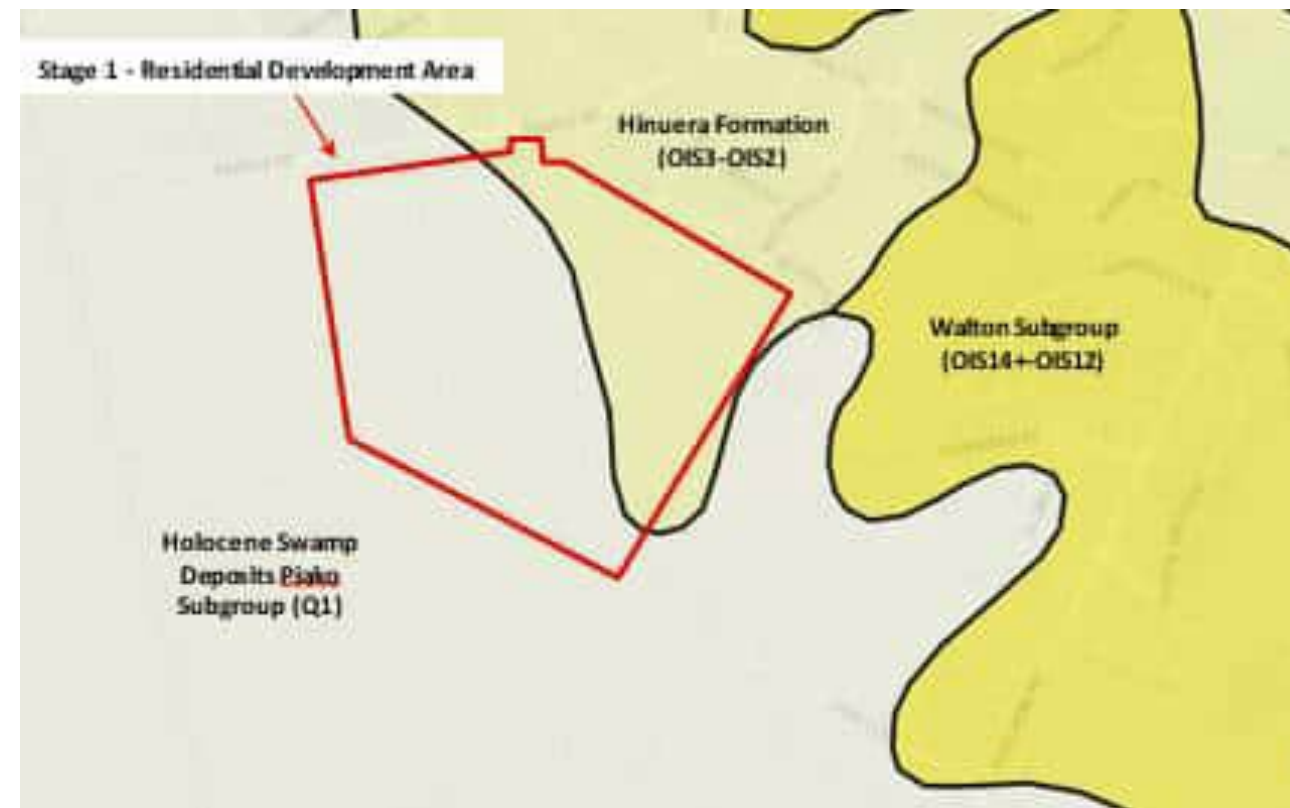


Figure 3: Regional Geology (GNS Science Web Geology Map)

6 GEOTECHNICAL MODEL

6.1 Stratigraphic Units

The distribution of the stratigraphic layers at our specific investigation locations are presented in Table 2 below. Variations can be anticipated between these locations. Our findings are illustrated on the appended Geological Sections (**Drawings 3 and 4**) presented in **Appendix A**.

Table 2: Ground Model			
Geological Unit	Depth to top of soil unit (m)		Thickness (m)
	Min	Max	
Topsoil	0		0.1 to 0.5
Interbedded loose to dense Sands and firm to very stiff Silts (Hinuera Formation)	0.1	0.5	1.9 to 18.0
Stiff to very stiff Clayey Silt (Hamilton Ash/Walton Subgroup)	1.9	18.0	*
*NOTE: base of unit not encountered			

³ <https://retrolens.co.nz/Map/>

⁴ Edbrooke, S.W. (compiler) 2005: Geology of the Waikato area. Institute of Geological & Nuclear Sciences 1:250000 geological map 4.

A description of the soils encountered is given below:

- **Topsoil:** Encountered from ground level to between 0.1m and 0.5m below ground level in all test pits.
- **Interbedded loose to dense Sands and firm to very stiff Silts:**
Between 1.9m and 18.0m of interbedded silts and sands underlie the topsoil. The Sands were generally loose to dense with dynamic cone penetrometer (DCP) blow counts of between 3 and 20 blows per 100mm with an average of 4 blows per 100mm. The Silts generally exhibited peak vane shear strengths (VSS) of between 41 and >140kPa with an average of 60kPa. Residual VSS range from 21 to 37kPa, indicating the Silts are moderately sensitive to sensitive.

Some isolated firm to very stiff Organic Silt layers were present within this unit, ranging from 0.1 to 0.5m thick, at depths between 0.5 and 3.5m below the existing ground level.

CPT cone resistance (qc) values were generally medium dense, between 5 to 10 MPa, and up to 15 MPa within this unit.
- **Stiff to very stiff Clayey Silt:** This is the lower-most soil unit which extends below the 20m deep CPT tests. This soil unit is exposed across low rolling hills to the east and dips below Hinuera and was encountered at the surface in Test Pit TP25-10 with peak shear strengths between 83 and 127kPa.

CPT qc readings in this layer were generally stiff to very stiff between 50 and 150kPa. Thick medium dense to dense sand beds are present within this layer, with CPT qc readings typically around 10 to 15 MPa.
- **Uncontrolled fill:** Variable strength Silt, Sand and Topsoil was encountered in TP25-02, 03, 05B, 07. It is thought this material was leftover from subsoil drains installed in 2024.

Soft to firm peat was not encountered in the investigations for the Residential Area, but nearby historic testing indicates this unit as soft to firm and up to 8m thick.

6.2 Groundwater

During the investigation, groundwater was encountered at depths ranging from 1.7 to 5.5m below existing ground levels. Groundwater observations from the CPTs and test pits are listed in Table 3 below.

Table 3: Groundwater Depths		
	Depth to groundwater (m)	Groundwater Relative Level RL(m)
TP25-01	3.5	36.5
TP25-02	2.8	37.8
TP25-03	2.8	36.8
TP25-04	5	36.6
TP25-05	5.5	36.5
TP25-05 B	2.8	38.8
TP25-06	2.5	37.5
TP25-07	1.7	38.3
TP25-08	3.9	36.8
TP25-09	4.5	38
TP25-10	3.1	39.2
TP25-11	2	38.5

⁵ Southern Links 1 Residential Stage 1 Southern Block Hydrogeological Effects Assessment, prepared by WGA, Ref: WGA242463-RP-HG-0003_B, dated May 2026

TP25-12	3.2	36.8
TP25-13	3.7	38.8
TP25-14	2	38.4
TP25-15	3.5	37.2
CPT25-01	3.5	36.5
CPT25-02	2.8	37.2
CPT25-03	2.8	39
CPT25-04	2.5	37.5
CPT25-05	5	35.9
CPT25-06	2.8	39.2
CPT25-07	4.5	37.8
CPT25-08	2	38
CPT25-09	3.2	36.8
CPT25-10	3.7	38.8
CPT25-11	3.5	39
Average depth	3.3	37.7
Minimum depth	1.7	39.2
Maximum depth	5.5	35.9

The historic New Zealand Geotechnical Database (NZGD) test logs indicated water levels between 1 and 4.6m below existing ground level, however those tests were undertaken before the 2024 drainage upgrades to the site so those measurements have been disregarded.

Additionally, groundwater monitoring has been carried out by WGA from mid 2025 (winter conditions) to early 2026 (summer conditions), with findings presented findings in the WGA hydrogeological report⁵. The maximum groundwater level height experienced during monitoring was 38.73 mRL. During the summertime, levels dropped as low as 36.96 mRL.

Additionally, WGA noted a thin organic silt band, 0.1-0.4m thick at approximately 36.36-36.56mRL (typically 5-6m below existing ground level) was acting as a low permeability aquitard that separated the soil profile into an upper unconfined aquifer and a lower confined aquifer. Slug testing and site observations indicated that the lower confined aquifer is under some pressure.

Pressure in the confined aquifer is discussed in Section 7.6.2, and a separate design memorandum⁶ has been prepared by CMW in collaboration with WGA and Maven Associates and is attached in **Appendix I** to address this specific issue and provide options for mitigation.

⁶ Wetland Design Memorandum Ref:HAM2025-0056AK Rev 4, dated August, 2026

6.3 Geotechnical Design Parameters

The various geological strata encountered across the site have been rationalised based on geotechnical engineering properties and grouped into broad units to define a geotechnical model used in subsequent assessments and analyses. The Hinuera formation is split into granular and cohesive units in Table 4 below to account for differing soil behaviours.

Parameters are based on the results of the investigations, known correlations from literature, and our experience with similar soils in the Hamilton area.

The geotechnical design parameters adopted are presented below:

Table 4: Geotechnical Parameters					
Soil Unit	ϕ' (deg)	c' (kPa)	C_u (kPa)	E_v' (MPa)	γ kN/m ³
Stiff to Very Stiff Clayey Silt (Hinuera Formation)	28	2	80	25	17
Generally Medium Dense Sand (Hinuera Formation)	35	0	NA	40	18
Stiff to very stiff Clayey Silt (Hamilton Ash/Walton Subgroup)	30	5	140	40	17
Where: ϕ' = angle of internal friction, c' = drained cohesion, C_u = Undrained Shear Strength, E_v' = drained elastic modulus (vertical), γ = bulk unit weight					

7 GEOHAZARDS ASSESSMENT

7.1 Geohazard Risk Register

Section 106 of the Resource Management Act 1991 (RMA) requires an assessment of the risk from natural hazards to be carried out when considering the granting of a subdivision consent. S106 of the RMA specifically states that the assessment must consider the combined effect of the natural hazard likelihood and relevant material damage to land or structures (consequence).

Table 5 below is a summary of the assessment of the potential geohazards for this site based on information available to date. This risk register of the geohazards at this site is a live document that will be updated as the Project progresses. A summary of the natural hazard risk classification is provided within Appendix D.

Item	Geotechnical Hazard	Description	Area Affected	Assessment Outcome	Existing Risk of Damage to Land / Structures			Mitigation Measure	Residual Risk of Damage to Land / Structures		
					Likelihood	Consequence	Risk Rating		Likelihood	Consequence	Risk Rating
1	Earthquake	Seismicity	Whole Site	Site subsoil class = Class D ULS PGA = 0.25g Importance Level 2 or 3	1	5	5	Not applicable	1	5	5
		Fault Rupture	Whole site	Nearest active fault approximately 3km east of the site (Te Tatua o Wairere Fault). Recurrence interval 100,000 years	1	5	5	Mitigation not required	1	5	5
		Liquefaction Damage	Whole site	Refer to Section 7.4	3	4	12	Liquefaction-induced settlement should be accounted for within the foundation designs. These will be lot-specific and need to be carried out prior to building consent and reviewed by a suitably qualified geotechnical engineer.	2	4	8
		Lateral Spread Damage	Area in vicinity of Artificial Wetlands and Mangakotukutuku Stream	Refer to Section 7.6	3	3	9	Lateral spreading risk is assessed to be minor, and sufficient setbacks are currently in place to mitigate potential risk to structures; the lateral spreading risk should be reviewed during detailed design.	2	3	6
		Cyclic Softening	Entire Site	Not anticipated.	1	4	4	Mitigation not required.	1	4	4
2	Slope Instability / Landslide	Global Instability	Whole Site	Refer to Section 7.3. Due to the general near-level landforms, slope instability is not anticipated across the wider site; it is a risk for the swale drain and fill batters with proposed retaining walls. It is noted that the swale drain and fill batters with proposed retaining walls met the required Factor of Safety requirements.	2	4	8	Slope stability should be reviewed during detailed design within areas adjacent to retaining walls, Artificial Wetlands and the Mangakotukutuku Stream.	2	4	8
3	Problematic Soils	Expansive Soils	Entire Site	Experience in similar soils indicates that the soils on the site are non-expansive.	1	3	3	Mitigation not required.	1	3	3

Table 5: Geohazard Assessment Summary

Item	Geotechnical Hazard	Description	Area Affected	Assessment Outcome	Existing Risk of Damage to Land / Structures			Mitigation Measure	Residual Risk of Damage to Land / Structures		
					Likelihood	Consequence	Risk Rating		Likelihood	Consequence	Risk Rating
		Uncontrolled Fill	Entire Site	Thin isolated pockets of uncontrolled fill were encountered in the northern corner of the site during our site investigation and may be encountered during earthworks elsewhere on the site. It is noted that this also includes the geotechnical exploratory testpit backfill material.	2	3	6	Undercut and replace materials.	1	3	3
5		Debris and Existing Improvements	Entire Site	Existing foundation elements, burn piles, offal pits, abandoned underground utilities, soak holes and septic systems may be encountered during earthworks.	2	3	6	Undercut and replace materials if encountered.	1	3	3
6	Settlement	Compressible Soils	Entire Site	Compressible soils are present across the site.	2	3	6	Construction monitoring by geotechnical engineer to ensure top-up fill is placed where necessary.	1	3	3
		Bearing Capacity Failure	Building Platforms	Loose or unsuitable material may be encountered beneath the building platforms.	2	3	6	Densify or undercut and replace low strength materials beneath building platforms, use appropriate foundation design.	1	3	3
7	Erosion	Soil Erosion	Swale Drains	Some minor erosion is possible to the banks of pond and swale drains during construction	2	3	6	Construction monitoring by geotechnical engineer to ensure good earthworks practices are in place to prevent erosion	1	3	3
8	Groundwater	Groundwater Impacts	Stormwater Controls	Groundwater was encountered at shallow depths below the site. Therefore, any formation of stormwater ponds, swales etc. will require stability analyses.	2	4	8	Stability analysis required at design stage and mitigation measures implemented as required.	2	4	8
9	Geothermal activity	Site not within geothermal area.									
10	Construction Risks	Excavatability	Building Platforms	Given the site is being built up with engineered fill, excavation is expected to be readily achieved with normal earthworks plant.	3	3	9	Construction monitoring by geotechnical engineer to ensure good earthworks practices.	1	3	3
		Sediment Retention Ponds	Building Platforms	Depending on their size sediment retention ponds may require geotechnical input at design stage to ensure batter stability is achievable.	2	3	6	Consideration given to batter stability of proposed ponds at design and construction phase.	1	3	3
		Subgrade Preparation	Building Platforms and Road Alignment	Topsoil and existing vegetation within the building footprints and road alignments will be cleared as part of the proposed development earthworks. In particular buried rootballs from felled trees and	5	2	10	Undercut to remove topsoil and roots and other materials. For saturated subgrade, allow to dry or undercut and replace.	1	2	2

Table 5: Geohazard Assessment Summary

Item	Geotechnical Hazard	Description	Area Affected	Assessment Outcome	Existing Risk of Damage to Land / Structures			Mitigation Measure	Residual Risk of Damage to Land / Structures		
					Likelihood	Consequence	Risk Rating		Likelihood	Consequence	Risk Rating
				hedgerows in the eastern half of the site. Saturated, over optimum moisture condition causing pumping and yielding of the subgrade.							
		Service Trenches (trench collapse / long term settlement)	Building Platforms and Road Alignment	Trench collapse may occur in surficial soils / if proposed service trenches extend below GW level.	3	3	9	Mitigation should be considered in the form of: -trench support -temporary dewatering, in the form of regular spaced pumps	1	3	3
		Short term erosion of swale drains	Swale drains	Erosion of swale drains may occur, due to the battered slope gradient on unvegetated slopes	2	3	6	Mitigation may comprise rapid revegetation, erosion control matting. This is to be confirmed in the design phase.	1	3	3
		Low road/pavement subgrade strengths	Roads and Paths	Low subgrade strengths and/or saturation of pavement subgrade	3	4	12	Further site investigations and specific pavement design is required.	1	4	4

Appendix D contains references for the assessment methods used.

7.2 Seismicity

The seismic subsoil class has been assessed as Class D, deep soil, in accordance with NZS1170.5 Section 3.1.1.⁷

The Peak Ground Acceleration (PGA) for this development was calculated based on a 50-year design life in accordance with the New Zealand Building Code⁸ and importance level (IL) 2 and IL (3) structures. The seismic design and analysis for this site should consider two earthquake events in accordance with NZ1170, which are the serviceability limit state (SLS) and ultimate limit state (ULS) earthquakes. The calculated PGAs for these events are summarised in Table 6 below.

Table 6: Peak Ground Acceleration (PGA) for Two Limit States				
Limit State	AEP	PGA(g) IL2	PGA(g) IL3	Magnitude _{eff}
SLS	1/25	0.06	0.06	5.9
ULS	1/500	0.25	0.32	5.9

Note: SLS = serviceability limit state; ULS = ultimate limit state; AEP = annual exceedance probability

7.3 Fault Rupture

As indicated on the GNS Community Fault Model the nearest known active fault to site is the Te Tatua o Wairere Fault, located approximately 3km to the east. Kututaruhe Fault is also noted to the west approximately 4.6km from the site. We consider the site to be at 'very low' risk with respect to fault rupture. The low return period of the Te Tatua o Wairere Fault has been considered within our analysis.

7.4 Liquefaction

7.4.1 Methodology

In accordance with MBIE/NZGS guidance, the liquefaction susceptibility of the soils at this site was assessed with respect to geological age and compositional (soil fabric and density) criteria, based on the following assumptions:

- Only saturated soils below an assessed seasonal average groundwater level were modelled as being susceptible to liquefaction. A perched water table was considered, due to the bands of stiff silt encountered at a depth of approximately 4m within CPT01, CPT02, and CPT05.
- In accordance with MBIE/NZGS guidance⁴ and in the absence of site-specific shear wave velocity measurements, no aging / strength gain factor has been applied to the Pleistocene aged soils.
- Soils are also classified with respect to their grain size and plasticity to assess liquefaction susceptibility. For this Project, a cut-off threshold soil behaviour type index value (I_c) of 2.6 was used to distinguish between liquefiable (I_c<2.6) and non-liquefiable (I_c>2.6) soils.
- Specific liquefaction analyses were undertaken for IL2 structures, using the software package CLiq and the Boulanger and Idriss (2014) method. The cyclic stress ratio (CSR), being a function of the PGA corrected for the relevant magnitude for the design return period event, was compared to the cyclic resistance ratio (CRR), being a function of the CPT data.
- Free-field liquefaction induced settlements were determined in accordance with Zhang et al. (2002). With respect to liquefaction response, consideration was given to a 10m cut-off depth to estimate index settlements as per MBIE⁹ guidance (foundation technical categories). These were compared to

liquefaction settlement estimates over the full depth range of the CPT's with a depth weighting factor (e_v) applied ranging from 1 at the ground surface to 0 at 20m depth.

7.4.2 Results

Results are presented in **Appendix F** and are summarised in Table 7 below.

Table 7: Liquefaction Analyses Results						
CPT No.	SLS Settlement (mm)	Total ULS Settlement IL2 (mm)	Liquefaction Severity Number (LSN) IL2	Index ULS Settlement	Total ULS Settlement IL3 (mm)	Depth to Liquefied Layer (m)
CPT25-01	<10	65	6	25	80	8
CPT25-02	<10	75	11	60	95	3.1
CPT25-03	<10	110	20	80	120	2.8
CPT25-04	<10	65	7	30	85	6.2
CPT25-05	<10	45	5	25	65	7.8
CPT25-06	<10	85	14	65	110	3
CPT25-07	<10	45	6	35	60	4.5
CPT25-08	<10	110	17	75	135	2.2
CPT25-09	<10	75	8	35	95	6.2
CPT25-10	<10	115	17	80	130	3.7
CPT25-11	<10	100	12	55	120	3.3
CPT_181275	<10	55	11	50	80	2.8
CPT_181276	<10	55	10	40	75	2.8
CPT_87648	<10	95	14	65	115	3
CPT_87654	<10	90	18	80	125	2
CPT_87660	<10	105	20	70	125	2.2
CPT_87655	<10	70	7	35	85	4.6
CPT_87650	<10	80	10	45	105	4
CPT_87646	<10	40	8	35	50	3.2
CPT_87661	<10	130	20	80	150	2.4
CPT_87659	<10	80	10	45	95	3.5
CPT_87652	<10	70	10	40	95	3.7

Note: All settlements and depths based on existing ground profile.

Index settlements are calculated based on the upper 10m of the soil profile using no depth weighting factor.

Total ULS settlements are based on the full depth of the CPT trace with a depth weighting factor applied.

Index settlements are for assessment of the site against the MBIE site Technical Category guidelines and are not comparable to the total ULS settlements.

⁷ NZS 1170.5: 2004 Structural Design Actions Part 5 Earthquake Actions – New Zealand

⁸ Earthquake Geotechnical Engineering Practice, Module 3: Identification, assessment and mitigation of liquefaction hazards", (November 2021)

⁹ Repairing and Rebuilding House affected by the Canterbury Earthquakes", (December 2012)

The calculations indicate that liquefaction may occur in some soil layers during a ULS earthquake event. Affected layers are shown within the liquefaction report attached within **Appendix F**.

Results indicate liquefaction is triggered at a seismic load of PGA 0.14, which is slightly above the 100-year return period PGA of 0.12 for the Hamilton area as per MBIE guidance.

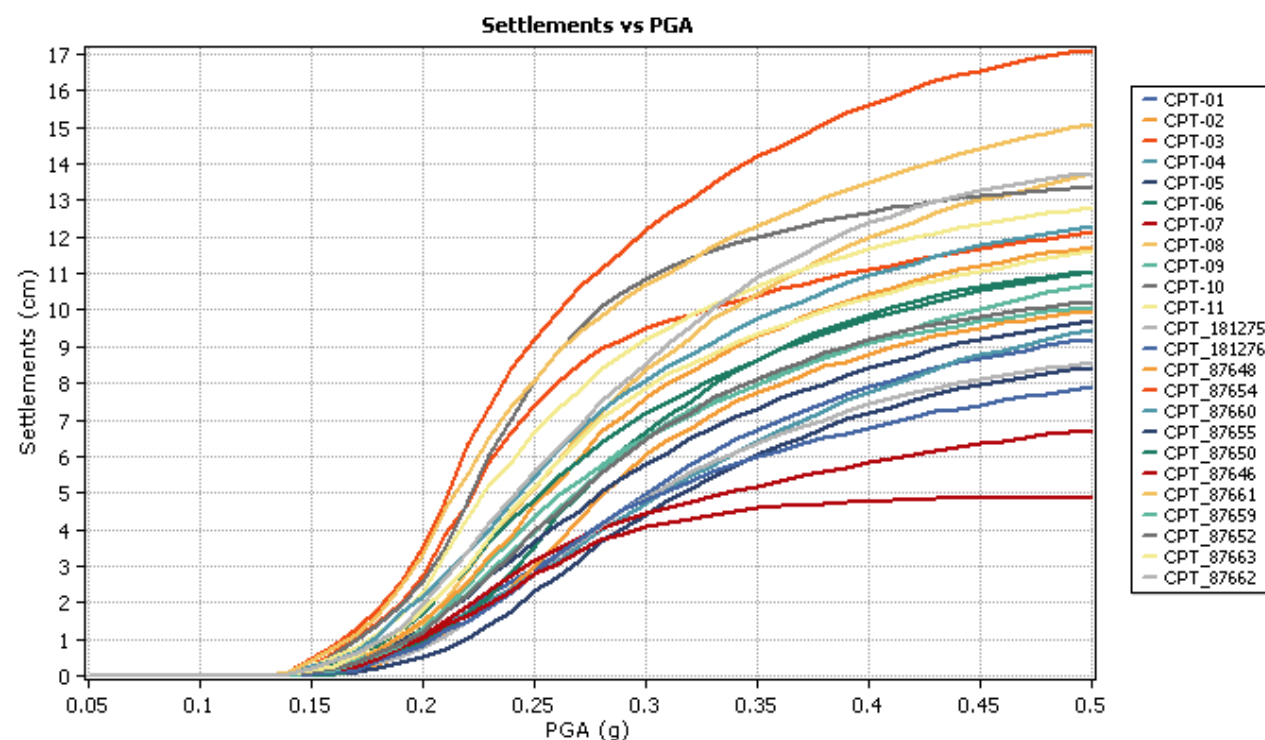


Figure 4: Parametric Summary of predicted vertical settlements from soil liquefaction following a ULS seismic event (IL3: PGA 0.32g)

In the ULS case liquefaction analyses results using the full depth of the CPT testing indicate a moderate to high risk of liquefaction occurring at the site. Recommendations follow in Section 8.6.

7.5 Lateral Spread

Following the onset of liquefaction, the liquefied soils behave as a very weak undrained material, which can give rise to lateral spreading where a free face is present within the vicinity of the site or where proposed cut and fill batters are proposed over or within liquefied soils.

However, preliminary results of the liquefied slope stability analyses estimate 13-35mm lateral spread displacement during the ULS event (within 30m of the top of slope). The estimated lateral spread is within the 50mm limit for TC2 Foundation Technical Category outlined within Table 3.1 of the MBIE Canterbury rebuild guidelines Part A. A summary of this is attached within **Appendix G**.

Although not anticipated to be excessive, the potential lateral spread risk should be reviewed during detailed design.

7.6 Slope Stability

7.6.1 Overview

Minor slopes are proposed across the site in the form of stormwater ponds, with maximum slope gradients of 1V:3H, and may be prone to small scale instability and erosion.

Additionally, Maven have indicated that there will be some minor slope batters requiring retaining up to 2.5m high (refer to Maven preliminary drawings presented in **Appendix B**).

To assess this hazard further, a preliminary slope stability assessment was undertaken.

7.6.2 Design Criteria

The stability of the swale drains under a range of design conditions is expressed in terms of a factor of safety, which is defined as ratio of the resisting forces to destabilising forces acting on a slope. Table 8 below presents the recommended performance standards¹⁰ for slope stability assessment:

Table 8: Slope Stability Factor of Safety Criteria	
Condition	Required Factor of Safety
Static long-term conditions (drained soil conditions, normal groundwater)	1.5
Transient short-term conditions (elevated groundwater and pore water pressures)	1.3
Seismic (ULS) case*	1.0
Note: *Factor of safety < 1.0 acceptable where displacement-based approach is adopted.	

7.6.3 Slope Stability Analysis

Slope stability analyses were undertaken using the Morgenstern-Price method of slices under both circular and translational failure mechanisms using the proprietary software Slide2. Analyses were completed for the various conditions stated in *Error! Reference source not found.* based on the following:

- Static long-term conditions were analysed for the prevailing case with the groundwater table based on the modelled groundwater table.
- When analysing transient conditions, an elevated groundwater table using measured winter flood levels along with an excess pore water pressure of $r_u = 0.3$ above the water table.
- Seismic displacements were estimated based on a Newmark Sliding Block approach using 50th percentile correlations published in Ambraseys & Srbulov (1995)¹¹ and Jibson (2007)¹² for thin, translational rigid sliding block cases, and Bray & Travasarou (2007)¹³ and Bray and Macedo (2019)¹⁴ for flexible sliding mass cases.
- A 10 kPa dead load was used to model typical residential dwelling loads.

The following slopes have been assessed:

- Section A: 4.8m deep stormwater pond (Wetland A – Section A2 on Maven Associates drawings) embankment with a maximum cut slope of 1V:3H. Note, there are several proposed ponds; however, Wetland A is representative of all of them, as the maximum slope angle in all ponds is 1V:3H, and the geologic profile is laterally consistent between ponds.
- Section B: 3.5m deep Mangakotukutuku stream gully with an existing maximum slope of 1V:1.6H.

¹⁰ CoLab, (October 2025). Regional Infrastructure Technical Specification (RITS) V2, Table 16: Proposed factors for safety for different slope stability scenarios

¹¹ Ambraseys, N. and Srbulov, M. (1995) Earthquake induced displacement of slopes, Journal of Soil Dynamics and Earthquake Engineering, Vol 14

¹² Jibson, R.W., (2007) Regression models for estimating coseismic landslide displacement, Journal of Engineering Geology, Vol 91

¹³ Bray, J. D., & Travasarou, T. (2007). Simplified procedure for estimating earthquake-induced deviatoric slope displacements. *Journal of geotechnical and geoenvironmental engineering*, 133(4), 381-392.

¹⁴ Bray, J.D., and Macedo, J. (2019) "Procedure for Estimating Shear-Induced Seismic Slope Displacement for Shallow Crustal Earthquakes," J. of Geotechnical and Geoenvironmental Engineering, ASCE, V. 145(12), doi: 10.1061/(ASCE)GT.1943-5606.0002143.

- Preliminary Retaining Wall Section: 2.27m high fill embankment supported by a timber retaining wall. This wall is the largest (and worst-case) of the proposed retaining walls.

7.6.4 Results

Selected stability printouts are attached in **Appendix E** with the factor of safety for each scenario outlined in **Table 9**.

Table 9: Slope Stability Analyses Results					
Location	Slope Stability Factor of Safety				Lateral Stretch (mm) within 30m of Top of Slope
	Prevailing	Transient	Seismic (ULS)	Yield Acceleration	
Wetland A Section A	1.64	1.3	<1	0.07 - 0.09	15-35
Mangakotukutuku Stream Section B	1.26	0.84	<1	0.15	<15
Retaining Wall	2.65	1.68	1.8	-	NA

The results show that the Section B transient case as well as the seismic and yield acceleration cases do not meet the requisite factor of safety. Recommendations are discussed in Section 8.1.

Mavens' preliminary retaining wall plans achieve the required factor of safety and are provisionally suitable, subject to detailed design.

7.6.5 Potential Pond Uplift

The WGA Hydrogeological Effects Assessment¹⁵ identified a low permeability aquitard layer running beneath the site which has a confining effect on the underlying deep aquifer, putting it under some degree of pressure. Excavating the proposed stormwater ponds will remove the existing soil overburden pressure and the uplift pressure from the confined aquifer could rupture the aquitard layer and destabilise the ponds.

A separate design memorandum has been prepared by CMW in collaboration with WGA and Maven Associates, to address this specific issue, and provide options for mitigation, and presented in **Appendix I**.

7.6.6 Mangakotukutuku Stream

The Mangakotukutuku Stream and gully system extends through the site and beyond the northern boundary. Beyond the northern boundary, the stream and gully are within the 'Waikato Riverbank and Gully Hazard Area' outlined in the Hamilton City Council Operative District Plan. Stability of the stream and gully needs to be considered, such that the proposed development does not exacerbate the Gully Hazard Area.

The development has no proposed works within the 20m wide stream corridor (or within 8-10m of the stream), therefore, there should be no additional stability risk to the stream and gully system from the proposed development.

7.7 Load Induced Settlement

Proposed fill and future building loads will induce settlements within the underlying subsoils. CPT data was used to assess the soil modulus parameters for preliminary load induced settlement analyses.

Load induced elastic settlements for the proposed fill and anticipated building loads were estimated using the software CPeT-IT and CPT data with the following correlation:

$$S_{CPT} = \sum \frac{\Delta\sigma_v}{M_{CPT}} \Delta z$$

Where S_{CPT} = Primary settlement,

$\Delta\sigma_v$ = Change in vertical stress or load applied,

M_{CPT} = Constrained modulus calculated from CPT trace, and

Δz = Change in depth.

Where $M_{CPT} = a_m \times (q_t - s_{vo})$ where a_m is dependent on the I_c .

Secondary creep settlements were calculated using the simplified approach by Mesri (1994) where:

$$S = C_a \times \Delta z \times \log(t)$$

Where $C_a = 0.04 \times \left(\frac{C_c}{1+e_0}\right) \approx 0.1 \times \frac{\sigma'_v}{M_{CPT}}$

t = time

Results are attached within **Appendix H** and summarised in Tables 10 and 11. Two cases have been considered: 10kPa load (lightweight 1-2 storey residential dwellings with widespread loads) with a 50 year design life, and no load with a 100 year design life (roads and council buried infrastructure).

Calculation elements presented in the summary tables are outlined below;

- Proposed Cut/Fill depths were adapted from Maven Plans presented in **Appendix B**.
- Fill Load. A unit weight of 19kN/m³ was assumed for the fill, rounded up to the nearest metre.
- Building Loads. A 10kPa building load has been applied (Table 10 only), suitable for lightweight one to two storey residential buildings with widespread loads.
- Applied working pressure is combined fill load plus the building load (or just the fill load in Table 11).
- Settlement was only calculated where the induced stress increase from the load was more than 20% of the existing overburden stress.
- Calculations account for total fill including minor top up fill required post consolidation.

Table 10: Preliminary Settlement Analyses Results for Building Loads - 50 year design life						
CPT No.	Proposed Cut or Fill Depth (m) (Cut is negative)	Fill Load (kPa)	Building Load(kPa)	Applied Working Pressure (kPa)	Primary Earthworks Settlement (Total) mm	Secondary Post Construction Settlement (Total) mm
CPT25-01	0.5	19	10	29	<5	<5
CPT25-02	1	19	10	29	<5	<5
CPT25-03	-0.3	0	10	10	<5	<5
CPT25-04	1	19	10	29	10	5
CPT25-05	1.1	19	10	29	5	5

¹⁵ Southern Links 1 Residential Stage 1 Southern Block Hydrogeological Effects Assessment, prepared by WGA, Ref: WGA242463-RP-HG-0003_B, dated May 2026

Table 10: Preliminary Settlement Analyses Results for Building Loads - 50 year design life

CPT No.	Proposed Cut or Fill Depth (m) (Cut is negative)	Fill Load (kPa)	Building Load(kPa)	Applied Working Pressure (kPa)	Primary Earthworks Settlement (Total) mm	Secondary Post Construction Settlement (Total) mm
CPT25-06	0	0	10	10	<5	<5
CPT25-07	0.7	19	10	29	5	5
CPT25-08	1.5	38	10	48	40	20
CPT25-09	2	38	10	48	55	35
CPT25-10	0	0	10	10	<5	<5
CPT25-11	-1.2	0	10	10	<5	<5
CPT_87646	1	19	10	29	55	30
CPT_87648	-0.3	0	10	10	<5	<5
CPT_87650	0.9	19	10	29	20	5
CPT_87652	-0.5	0	10	10	<5	<5
CPT_87654	0.5	19	10	29	10	5
CPT_87655	2	38	10	48	60	30
CPT_87659	0.5	19	10	29	50	25
CPT_87660	1	19	10	29	15	5
CPT_87661	1.5	38	10	48	70	15
CPT_181275	0	0	10	10	<5	<5
CPT_181276	-0.4	0	10	10	<5	<5

Table 11: Preliminary Settlement Analyses Results for Infrastructure – 100 year design life

CPT No.	Proposed Cut or Fill Depth (m) (Cut is negative)	Pavement Load (kPa)	Fill Load = Applied Working Pressure (kPa)	Primary Earthworks Settlement (Total) mm	Secondary Post Construction Settlement (Total) mm
CPT25-01	0.5	5	24	25	10
CPT25-02	1	5	24	15	10
CPT25-03	-0.3	5	5	<5	<5
CPT25-04	1	5	24	15	<5
CPT25-05	1.1	5	24	10	<5
CPT25-06	0	5	5	<5	<5
CPT25-07	0.7	5	24	10	<5

Table 11: Preliminary Settlement Analyses Results for Infrastructure – 100 year design life

CPT No.	Proposed Cut or Fill Depth (m) (Cut is negative)	Pavement Load (kPa)	Fill Load = Applied Working Pressure (kPa)	Primary Earthworks Settlement (Total) mm	Secondary Post Construction Settlement (Total) mm
CPT25-08	1.5	5	43	45	25
CPT25-09	2	5	43	65	40
CPT25-10	0	5	5	<5	<5
CPT25-11	-1.2	5	5	<5	<5
CPT_87646	1	5	24	75	40
CPT_87648	-0.3	5	5	<5	<5
CPT_87650	0.9	5	24	30	<5
CPT_87652	-0.5	5	5	<5	<5
CPT_87654	0.5	5	24	15	<5
CPT_87655	2	5	43	65	35
CPT_87659	0.5	5	24	65	30
CPT_87660	1	5	24	20	10
CPT_87661	1.5	5	43	75	20
CPT_181275	0	5	5	15	<5
CPT_181276	-0.4	5	5	10	<5

Results indicate that the majority of the settlement is primary and, due to the granular nature of the Hinuera Formation silts and sands, will be elastic and built out during construction. The balance of the settlement is estimated to be less than 25mm across 6m and within the Building Code limit across most of the site, with the exception of a few CPTs. In these areas, much of the settlement is predicted to occur within the Hinuera Formation silts, which are sensitive and therefore prone to being disturbed during CPT testing, resulting in inflated settlement predictions.

In our experience, the CPeT-iT over estimates settlement within these soils. Therefore, in these areas, settlement monitoring is recommended during construction to confirm that differential settlement across future building platforms is within building code limits (for residential dwellings) or is within serviceability limits for infrastructure.

Further assessment of settlement is required at the detailed design phase once design loads are known.

7.8 Cross Boundary Effects

7.8.1 Proposed Earthworks

Settlements caused by proposed earthworks along the site boundaries are predicted to be minor. As per Section 2 of the RITS Guidance¹⁶ an impact assessment will be carried out during the detailed design stage to

¹⁶ CoLab (October 2025) Regional Infrastructure Technical Specification (RITS)

confirm the acceptability of impacts on the nearby structures, once fill heights and building loads are confirmed.

Retaining walls are needed where cuts/fill exceed 1m along the boundary, such as the 2.3m high fill in the northwestern corner of the site. These areas will require retaining walls, as depicted on Maven's Proposed Retaining Wall plans presented in **Appendix B**.

7.8.2 Groundwater Drawdown

The WGA Hydrogeological Effects Assessment¹⁷ highlights that the potential worst-case drawdown during construction of WWPS A may induce ground subsidence beneath neighbouring properties to the north of WWPS A, but that drawdown below that magnitude is considered to be effectively indistinguishable from natural fluctuations.

Additionally, an assessment has been made of the potential groundwater drawdown induced settlement due to the change in effective stress below these neighbouring properties. We have estimated the change in stress based on the groundwater drawdown modelling presented in the WGA report. Based on this change in stress, the settlement was estimated using the following equation:

$$s = \frac{\sigma'_v \cdot H}{E'}$$

Where s is settlement, $\Delta\sigma'_v$ is change in effective stress, H is the thickness of the layer, and E' is the elastic modulus of the soil.

Furthermore, the groundwater table will have been subject to seasonal fluctuations in the past, therefore at least some of the stresses felt by the soil due to this drawdown will have been experienced previously.

Based on this, we have estimated settlement beneath the neighbouring properties to be less than 5mm. This is considered negligible.

8 RECOMMENDATIONS

8.1 Slope Stability

Results of the slope stability analyses in Section 7.6.4 demonstrate that the design gradients for the proposed wetlands meet the requisite slope stability factors of safety.

Foundation designs will need to account for <50mm of predicted lateral stretch.

The existing Mangakotukutuku stream bank is marginally stable in its existing state and we expect some minor translational failures during future storm events. These are not anticipated to affect adjacent structures as the proposed buildings are to be constructed outside the 20m wide stream corridor. However, if in future buildings are built in the vicinity of the stream they should either be setback at least 3m from the top of slope, or where they are within 3m they will require specific foundation design.

8.2 Earthworks and Filling

Fill-induced ground settlements are predicted to be generally <25mm, with the exception of a few isolated areas with up to 40mm predicted settlement. Settlement is anticipated to be elastic and built out rapidly during construction.

Cross-boundary effects of fill will need to be assessed during detailed design.

All earthwork activities must be carried out in general accordance with the requirements of NZS 4431:2022¹⁸ and the requirements of the Waikato District Council, Waikato R.I.T.S. and under the guidance of a Chartered Geo-professional.

The subgrade of the site will predominantly comprise engineered fill from site won material (Hinuera Formation sands and Silts). Alternatively, imported granular fill such as pit sand or rockfill would be suitable, with appropriate compaction specifications, including geotechnical testing and certification to be confirmed during detailed earthworks design.

The natural subgrade soils can be sensitive to remoulding and moisture ingress. Care will be required to avoid over working and trafficking of these materials, and to protect them from moisture ingress. Pumping and yielding conditions may be encountered near the groundwater level or during particularly rainy periods.

Other areas of unsuitable materials such as variable strength uncontrolled fill present within road or building areas should be undercut and may be used as landscape fill in reserve areas or be removed from site. This may include the geotechnical test pit excavation locations.

8.3 Road Subgrades

Based on the site investigation results, low strength near-surface silts and loose sands with typical Dynamic Cone Penetrometer values of 1 to 2 blows per 100mm penetration are present to a depth of up to approximately 1.0m over the majority of the site. These equate to an estimated CBR of 2% to 3%.

For road subgrades, after topsoil stripping and cutting to design subgrade levels the following should be undertaken:

- Proof rolling should be carried out prior to placement of any filling/hardfill to check for any areas of excessive deflection. Where clean sandy soils are exposed, moisture conditioning may be required to achieve optimum water contents and enable subgrade compaction.
- Where low strength uncontrolled fill or natural soils are exposed at subgrade levels, an allowance for undercut and replacement with clean compacted sand should be allowed for.

It is recommended that a programme of penetration resistance testing is carried out at routine intervals along road alignments as part of the road pavement design prior to road construction to confirm actual CBR values.

8.4 Trench and Open Drain Backfilling

All services trenches and open drains beneath road carriageways and within a 45 degree zone of influence of any building foundation should be backfilled with compacted trench spoil or imported pit-sand to meet engineered fill standards.

8.5 Culverts

Culverts will be required where roads cross swales and existing streams. Constructing these is feasible from a geotechnical perspective but will require careful geotechnical assessment and construction staging. Concept design philosophy is outlined below:

- Slope batter stability to be accounted for in geotechnical design. Geogrids and/or a rock buttress could be required depending on final batter configuration.
- Culverts may need to be constructed on top of a geogrid reinforced gravel raft to mitigate against seismic bearing capacity risks.

¹⁷ Southern Links 1 Residential Stage 1 Southern Block Hydrogeological Effects Assessment, prepared by WGA, Ref: WGA242463-RP-HG-0003_B, dated May 2026

¹⁸ Standards New Zealand (2022) Engineered fill construction for lightweight structures, NZS 4431:2022

- Fill embankment loads will need to be assessed by the geotechnical engineer. If settlements are greater than those allowed in the NZTA Bridge Manual, surcharging or ground improvement may be required.

Culverts are subject to detailed design.

8.6 Shallow Foundations

The Residential Development proposes one and two-story buildings.

As discussed in Section 7.4.2, there is potential for liquefaction induced ground deformation to occur at the site and differential settlement is likely to occur in the subgrade soils following a ULS earthquake.

However, the actual potential for liquefaction hazard will be somewhat reduced due to the 1m to 2m layer of engineered fill which will provide a non-liquefiable crust reducing surface manifestation of liquefaction and differential settlement.

A preliminary geotechnical ultimate bearing pressure of 300kPa should be available in the static case for shallow strip and pad foundations constructed within both the natural cut ground and engineered fill areas.

Specific site investigation and foundation suitability assessments including bearing capacity and static settlement should be carried out prior to Building Consent application for any buildings larger than single-family residential structures.

Following the preliminary assessment it is considered that most of the site is suitable for TC2 raft foundations, with localised areas of higher predicted settlements that will require TC2/TC3 hybrid foundations, in the vicinity of CPT25-09, CPT_87646 and CPT_87655 where there is >25mm predicted secondary settlement. This is to be further assessed during future investigations and detailed earthworks design.

9 SUITABILITY STATEMENT AND CONCLUSIONS

The site investigation carried out is considered suitable for this assessment of geotechnical constraints and associated requirements in support of the substantive application for the Residential Development under the FTAA.

The assessment of natural hazard risk for the site is assessed as low to medium for all hazards considered.

It is our opinion that the Residential Area is geotechnically suitable for the proposed development as depicted on the Maven Scheme Plans (**Appendix B**) and subject to the recommendations contained herein.

10 CLOSURE

Additional important information regarding the use of this CMW report is provided in the '*Using your CMW Report*' document attached to this report.

This report has been prepared for use by the client Colliers Project Leaders in relation to the substantive application for the Project under the FTAA in accordance with the scope, proposed uses and limitations described in the report.

Appendix A: Drawings

Title	Reference No.	Date	Revision
Site Investigation Plan	01	09/06/2026	1
Geology Plan	02	04/06/2025	0
Geological Cross Section A-A	03	04/06/2025	0
Geological Cross Section B-B	04	04/06/2025	0



LEGEND:

- CPT25-01** CONE PENETROMETER TEST (CPT) LOCATION (2025 CMW INVESTIGATION)
- TP25-01** TEST PIT (TP) LOCATION (2025 CMW INVESTIGATION)
- BH01** DEEP MACHINE BOREHOLE (BH) LOCATION (HISTORIC TESTING - NZGD)
- CPT_01** CONE PENETROMETER TEST (CPT) LOCATION (HISTORIC TESTING - NZGD)
- CROSS SECTIONS**
- STAGE 1 RESIDENTIAL AREA EXTENT**
- SITE BOUNDARIES WITHIN WIDER SOUTHERN LINKS DEVELOPMENT**

NOTES:

- BASE CONTOUR PLAN IS ADAPTED FROM MAVEN DRONE IMAGE.
- GEOLOGY ADAPTED FROM GNS 1:250,000 QMAPS DATABASE.
- HISTORIC TEST LOCATIONS SOURCED FROM NZGD DATABASE AND ARE INDICATIVE ONLY.

0 50 100 150 200 250 m

1:5000

CMW Geosciences

CLIENT:	SAXBYS ROAD JV LIMITED	DRAWN:	MM	PROJECT:	HAM2025-0056
PROJECT:	SOUTHERN LINKS DEVELOPMENT STAGE 1 - RESIDENTIAL AREA	CHECKED:	DS	DRAWING:	01
TITLE:	SITE INVESTIGATION PLAN	REVISION:	1	SCALE:	1:5000
		DATE:	09/06/2026	SHEET:	A3 L



LEGEND:

CPT25-01

TP25-01

BH01

CPT_01

CROSS SECTIONS

STAGE 1 RESIDENTIAL AREA EXTENT

SITE BOUNDARIES WITHIN WIDER SOUTHERN LINKS DEVELOPMENT

SOFT TO FIRM PEAT (HOLOCENE SWAMP DEPOSITS)

INTERBEDDED LOOSE TO DENSE SAND AND FIRM TO VERY STIFF SILT (HINUERA FORMATION)

STIFF TO VERY STIFF CLAYEY SILT (HAMILTON ASH / WALTON SUBGROUP)

NOTES:

1. BASE CONTOUR PLAN IS ADAPTED FROM LINZ DATA SERVICE DIGITAL ELEVATION MODEL.

2. CONTOURS AT 1m INTERVALS..

3. GEOLOGY ADAPTED FROM GNS 1:250,000 QMAPS DATABASE.

4. HISTORIC TEST LOCATIONS SOURCED FROM NZGD DATABASE AND ARE INDICATIVE ONLY.

050100150200250

m

1:5000

CLIENT: **SAXBYS ROAD JV LIMITED**

PROJECT: **SOUTHERN LINKS DEVELOPMENT STAGE 1 - RESIDENTIAL AREA**

TITLE: **GEOLOGY PLAN**

DRAWN: MM

CHECKED: DS

REVISION: 0

DATE: 04/06/2025

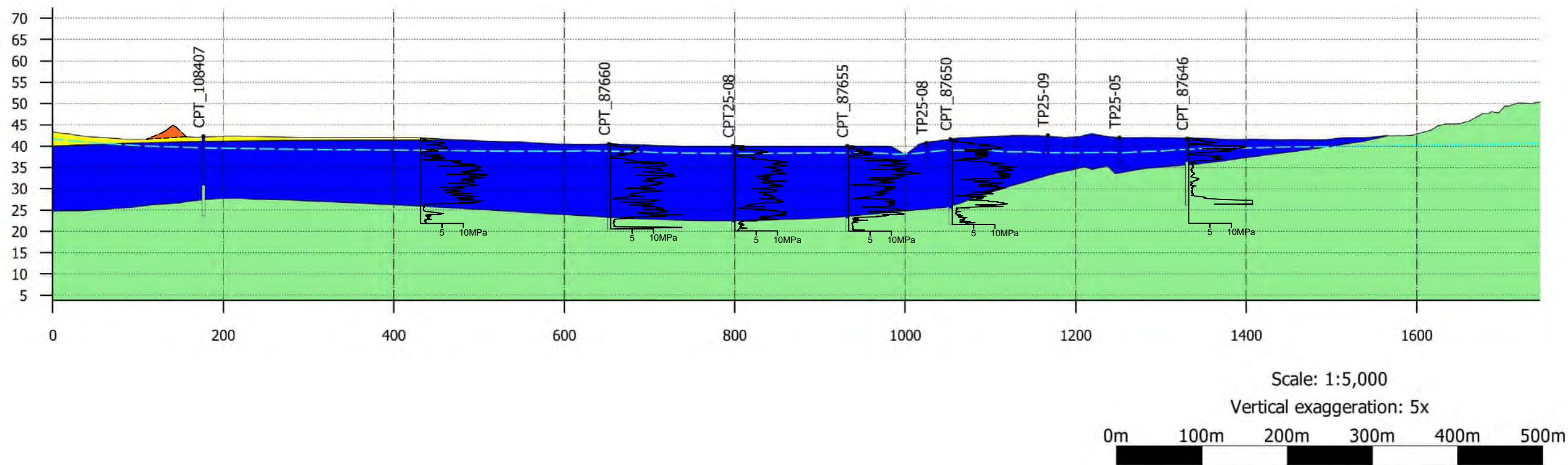
PROJECT: HAM2025-0056

DRAWING: 02

SCALE: 1:5000

SHEET: A3 L

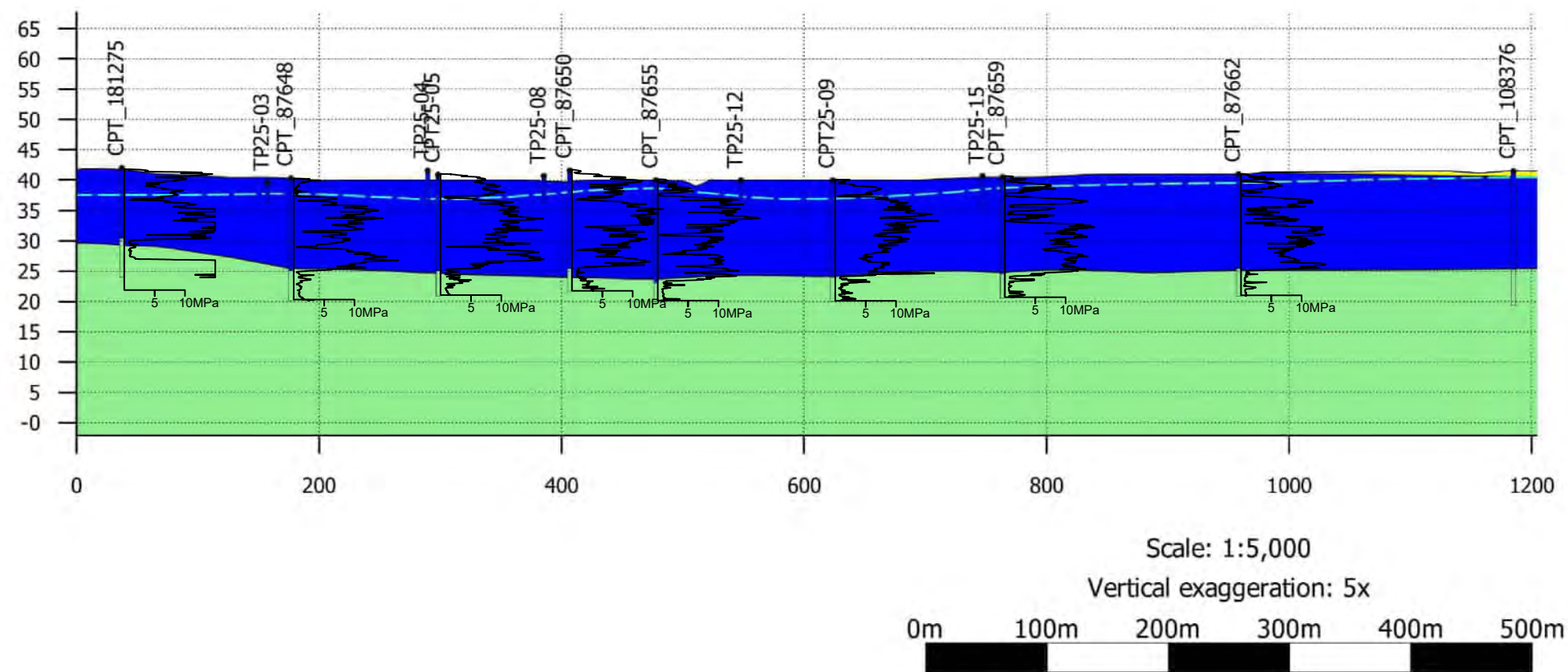
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LEGEND:	
	SOFT TO FIRM PEAT (HOLOCENE SWAMP DEPOSITS)
	INTERBEDDED LOOSE TO DENSE SAND AND FIRM TO VERY STIFF SILT (HINUERA FORMATION)
	STIFF TO VERY STIFF CLAYEY SILT (HAMILTON ASH / WALTON SUBGROUP)
	GRAVEL FILL (RAILWAY BALLAST)
	GROUNDWATER

- NOTES:
- CROSS SECTION DERIVED FROM LEAPFROG 3D MODELLING SOFTWARE UTILISING EXISTING NZGD DATA. THE GEOLOGIC SURFACES ARE INDICATIVE ONLY.
 - ALL TESTS WITHIN 100M OF THE CROSS SECTION HAVE BEEN PRESENTED. AS SUCH, DISCREPANCIES BETWEEN TEST GEOLOGY AND MODEL SURFACES ARE DUE TO SETBACK.
 - GROUND SURFACE DERIVED FROM DRONE SURVEY DATA COURTESY OF MAVEN CONSULTANTS.
 - VERTICAL DATUM NZVD2016.

	CLIENT:	SAXBYS ROAD JV LIMITED		DRAWN:	MM	PROJECT:	HAM2025-0056
	PROJECT:	SOUTHERN LINKS DEVELOPMENT STAGE 1 RESIDENTIAL AREA		CHECKED:	DS	DRAWING:	03
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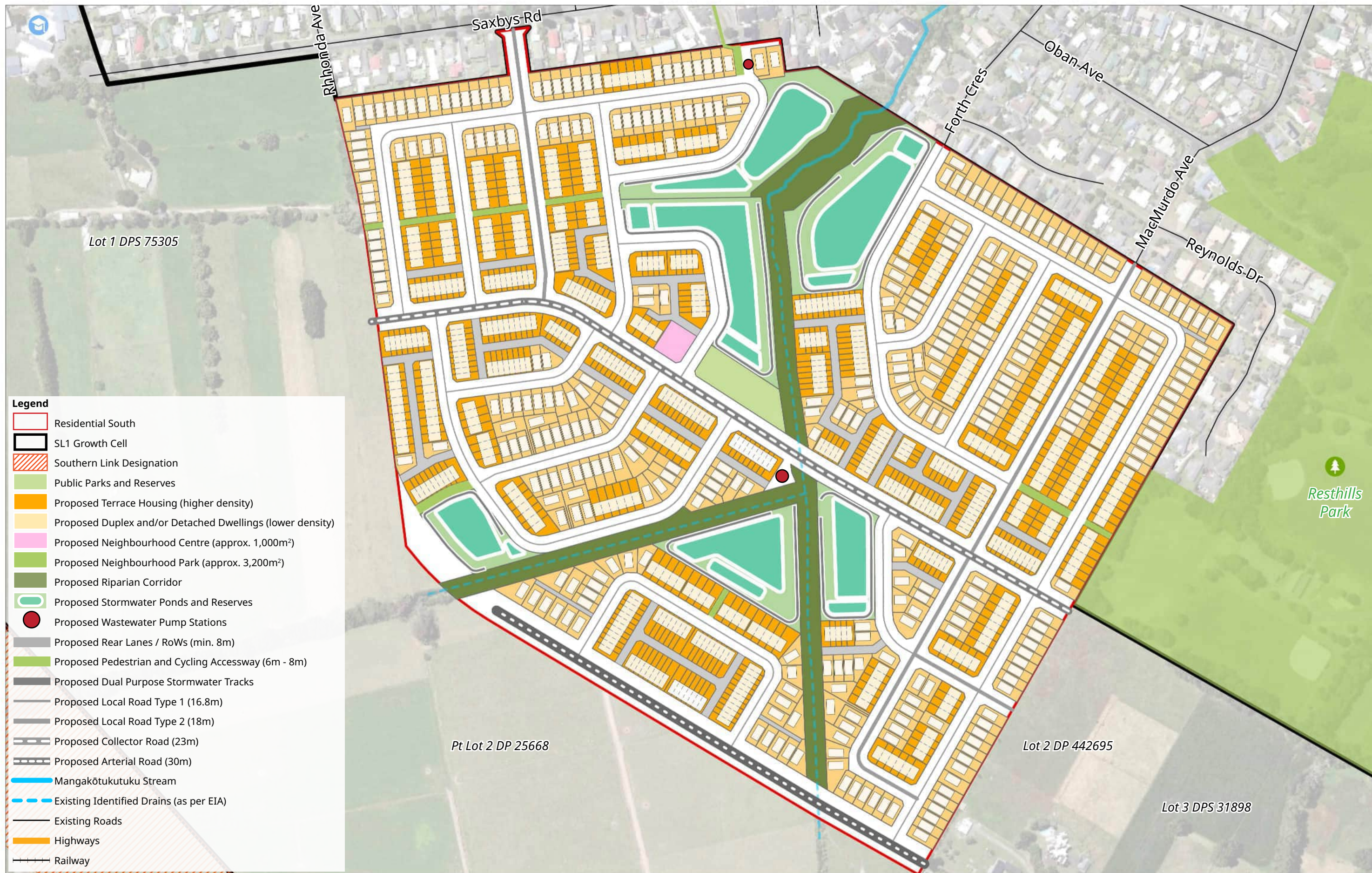
- SOFT TO FIRM PEAT (HOLOCENE SWAMP DEPOSITS)
- INTERBEDDED LOOSE TO DENSE SAND AND FIRM TO VERY STIFF SILT (HINUERA FORMATION)
- STIFF TO VERY STIFF CLAYEY SILT (HAMILTON ASH / WALTON SUBGROUP)
- GROUNDWATER

NOTES:

- CROSS SECTION DERIVED FROM LEAPFROG 3D MODELLING SOFTWARE UTILISING EXISTING NZGD DATA. THE GEOLOGIC SURFACES ARE INDICATIVE ONLY.
- ALL TESTS WITHIN 100M OF THE CROSS SECTION HAVE BEEN PRESENTED. AS SUCH, DISCREPANCIES BETWEEN TEST GEOLOGY AND MODEL SURFACES ARE DUE TO SETBACK.
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- VERTICAL DATUM NZVD2016.

	CLIENT:	SAXBYS ROAD JV LIMITED		DRAWN:	MM	PROJECT:	HAM2025-0056
	PROJECT:	SOUTHERN LINKS DEVELOPMENT STAGE 1 RESIDENTIAL AREA		CHECKED:	DS	DRAWING:	03
	TITLE:	GEOLOGICAL CROSS SECTION B		REVISION:	0	SCALE:	1:5000
				DATE:	04/06/2025	SHEET:	A3 L

Appendix B: Development Plans



Client: Saxby Rd JV Ltd, Industrie Property Tahī
& South Park Agri Development Ltd
Job Number: 25546 & 26111

Drawing: Residential South Proposed Masterplan
Version: Draft
Date: 13/07/2026

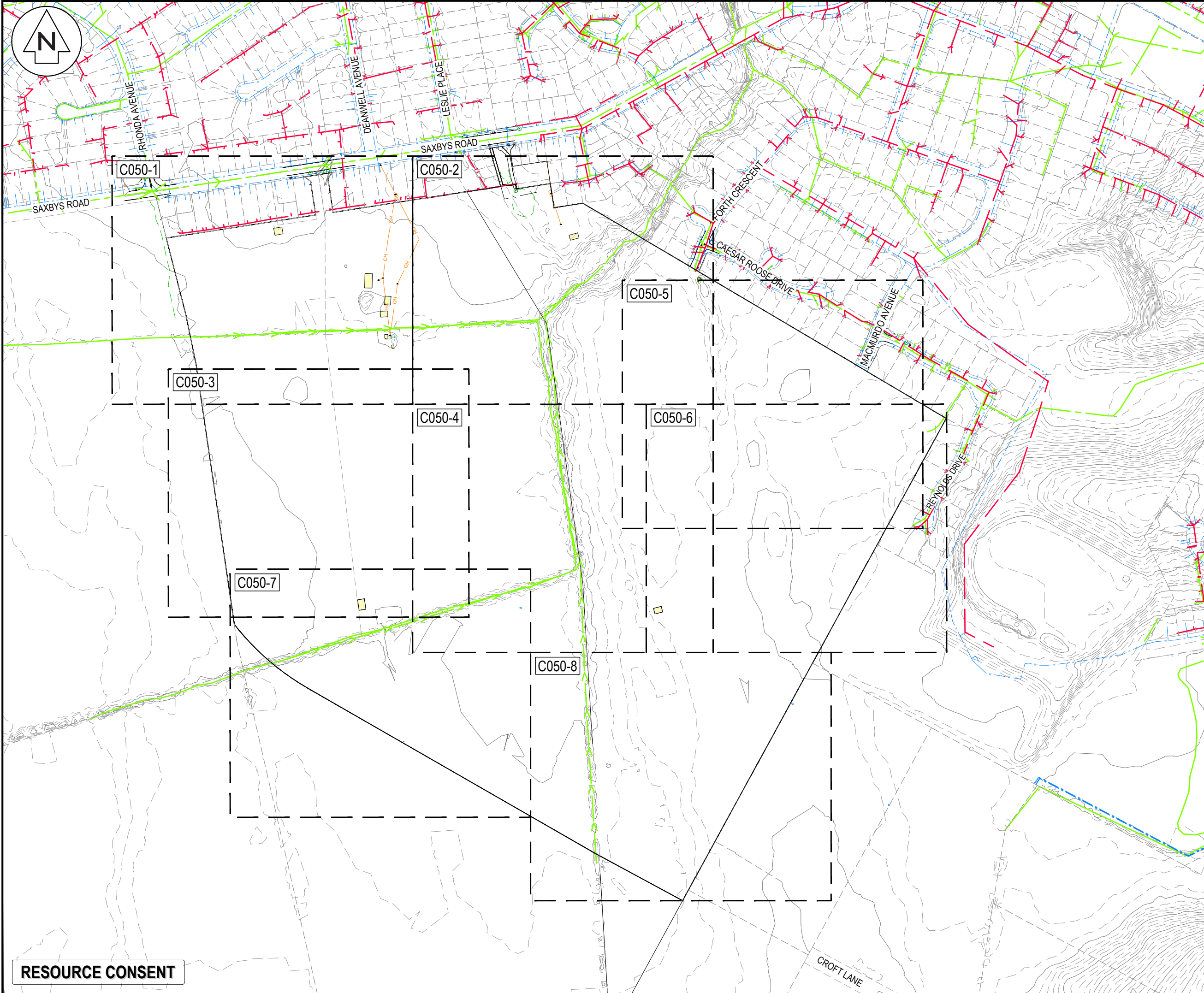
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Sheet: 1 of 1



SL1 Residential South & Industrial North Substantive Application

49A and 49B Saxbys Road, Saxbys Road, 18, 20 & 24 Wickham Street, 160 & 162 Higgins Road, Waikato

B&A
Urban & Environmental



- NOTES
1. ALL WORKS TO BE IN ACCORDANCE WITH HAMILTON CITY COUNCIL STANDARDS.
 2. COORDINATES IN TERMS OF NZ GEODETIC DATUM MT EDEN 2000.
 3. LEVELS IN TERMS OF THE NEW ZEALAND VERTICAL DATUM 2016.
 4. ORIGIN OF LEVELS = PIN 1 SO 537357 PUBLISHED RL=39.788, SOURCED FROM THE LINZ DIGITAL GEODETIC DATABASE.
 5. BOUNDARIES ARE SUBJECT TO FINAL SURVEY.
 6. GROUND CONTOURS WERE CAPTURED USING A LIDAR SURVEY UNDERTAKEN IN MAY 2021.

LEGEND	
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	EX TITLE BDY
	EX MAJOR CONTOUR
	EX MINOR CONTOUR
	EX WASTEWATER
	EX STORMWATER
	EX WATER MAIN
	EX OVERHEAD POWER
	EX ROAD KERB TOP
	EX TOP OF BANK
	EX FENCE
	EX BUILDING
	EX FIRE HYDRANT
	EX WATER METER
	EX VALVE
	EX SW / WW MANHOLE
	EX CESSPIT
	EX TELECOM PLINTH
	EX TELECOM PILLAR BOX
	EX POWER TRANSFORMER
	EX POWER POLE
	EX POWER PILLAR BOX
	EX STREET LIGHT
	EX STREET SIGN
	EX TREE
	EX SLUICE VALVE

A			
FAST TRACK APP		MKS	06/2026
Rev	Description	By	Date
Survey	MAVEN		06/2025
Design	MKS		07/2025
Drawn	MKS		07/2025
Checked	DJM		07/2025



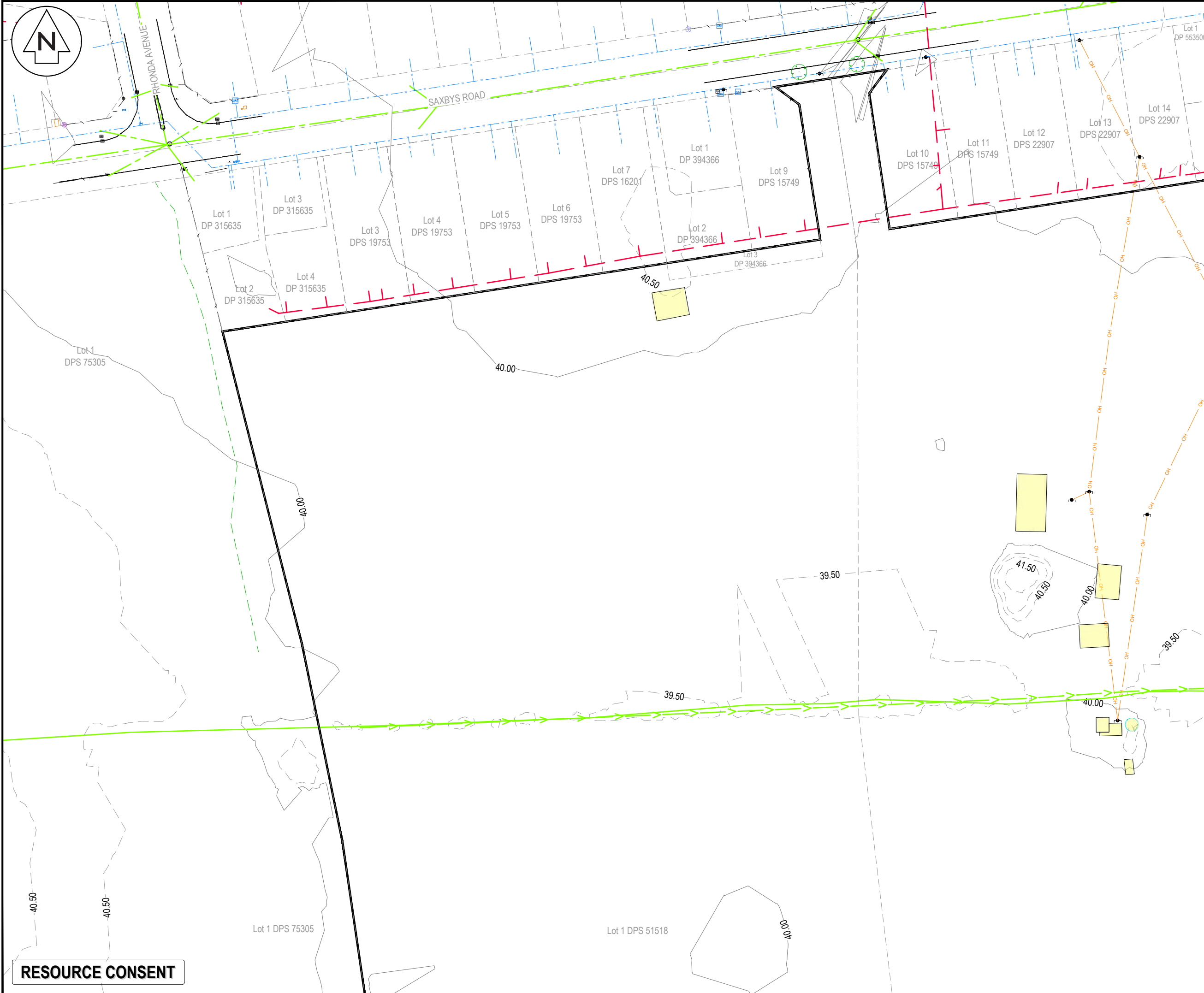
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New Zealand

Project
**SOUTHERN LINKS 1
RESIDENTIAL STAGE 1
HAMILTON, WAIKATO
FOR
SAXBY RD JV LIMITED**

Title
**EXISTING
TOPOGRAPHICAL
OVERVIEW PLAN**

Project no.	298001-R1 SL1		
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Cad file	298001-R1-C050 TOPO.DWG		
Drawing no.	R1- C050	Rev	A

RESOURCE CONSENT



NOTES

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EX BDY	EX EASEMENT
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EX STORMWATER	EX WATER MAIN
EX OVERHEAD POWER	EX ROAD KERB TOP
EX TOP OF BANK	EX FENCE
EX BUILDING	EX FIRE HYDRANT
EX WATER METER	EX VALVE
EX SW / WW MANHOLE	EX CESSPIT
EX TELECOM PLINTH	EX TELECOM PILLAR BOX
EX POWER TRANSFORMER	EX POWER POLE
EX POWER PILLAR BOX	EX STREET LIGHT
EX STREET SIGN	EX TREE
EX SLUICE VALVE	

A	FAST TRACK APP	MKS	06/2026
Rev	Description	By	Date
Survey	MAVEN		06/2025
Design	MKS		07/2025
Drawn	MKS		07/2025
Checked	DJM		07/2025

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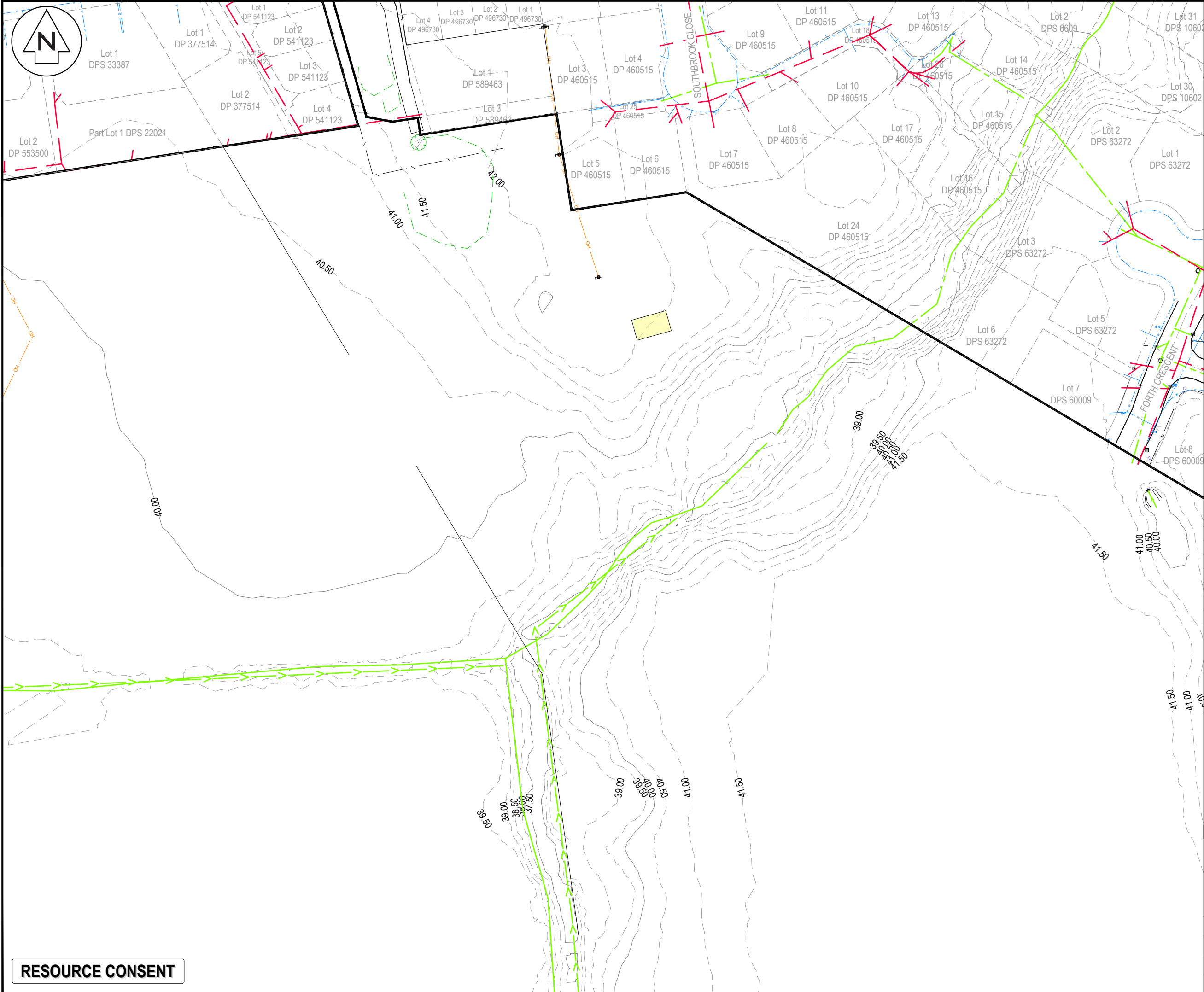
**SOUTHERN LINKS 1
RESIDENTIAL STAGE 1
HAMILTON, WAIKATO
FOR
SAXBY RD JV LIMITED**

Title

**EXISTING
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PLAN**

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Scale	1:1000 @ A3		
Cad file	298001-R1-C050 TOPO.DWG		
Drawing no.	R1- C050-1	Rev	A

RESOURCE CONSENT



NOTES

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A	FAST TRACK APP	MKS	06/2026
Rev	Description	By	Date
		By	Date
Survey	MAVEN		06/2025
Design	MKS		07/2025
Drawn	MKS		07/2025
Checked	DJM		07/2025

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Project

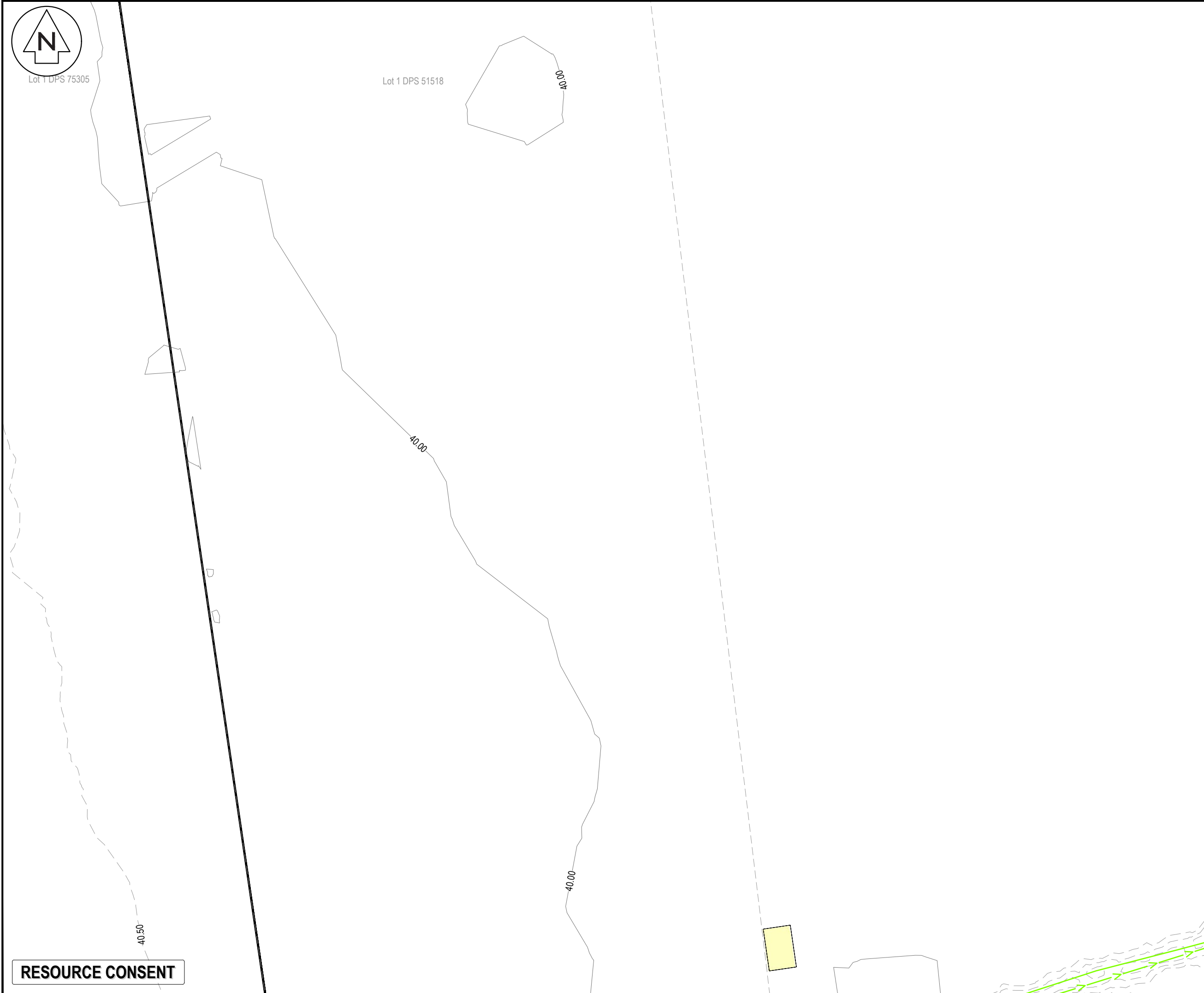
**SOUTHERN LINKS 1
RESIDENTIAL STAGE 1
HAMILTON, WAIKATO
FOR
SAXBY RD JV LIMITED**

Title

**EXISTING
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Drawing no.	R1- C050-2	Rev	A

RESOURCE CONSENT



NOTES

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Rev	Description	By	Date
	By	Date	
Survey	MAVEN	06/2025	
Design	MKS	07/2025	
Drawn	MKS	07/2025	
Checked	DJM	07/2025	

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Project

**SOUTHERN LINKS 1
RESIDENTIAL STAGE 1
HAMILTON, WAIKATO
FOR
SAXBY RD JV LIMITED**

Title

**EXISTING
TOPO
PLAN**

Project no.	298001-R1 SL1		
Scale	1:1000 @ A3		
Cad file	298001-R1-C050 TOPO.DWG		
Drawing no.	R1- C050-3	Rev	A



- NOTES
1. ALL WORKS TO BE IN ACCORDANCE WITH HAMILTON CITY COUNCIL STANDARDS.
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Rev	Description	By	Date
		By	Date
Survey	MAVEN		06/2025
Design	MKS		07/2025
Drawn	MKS		07/2025
Checked	DJM		07/2025



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Project

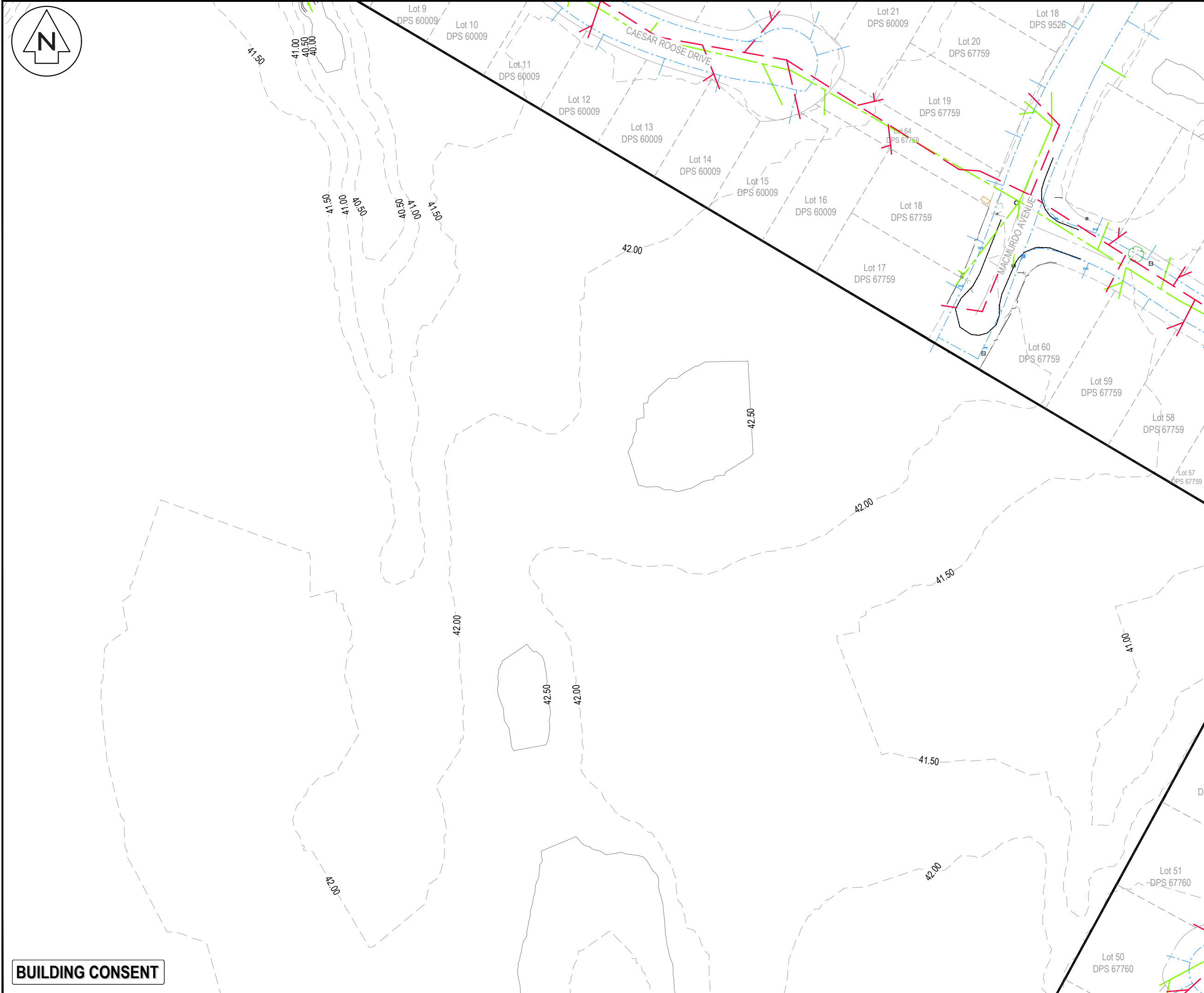
**SOUTHERN LINKS 1
RESIDENTIAL STAGE 1
HAMILTON, WAIKATO
FOR
SAXBY RD JV LIMITED**

Title

**EXISTING
TOPO
PLAN**

Project no.	298001-R1 SL1		
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Cad file	298001-R1-C050 TOPO.DWG		
Drawing no.	R1- C050-4	Rev	A

RESOURCE CONSENT



- NOTES
1. ALL WORKS TO BE IN ACCORDANCE WITH HAMILTON CITY COUNCIL STANDARDS.
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	EX SLUICE VALVE

A	FAST TRACK APP	MKS	06/2026
Rev	Description	By	Date
Survey	MAVEN		06/2025
Design	MKS		07/2025
Drawn	MKS		07/2025
Checked	DJM		07/2025

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Project
**SOUTHERN LINKS 1
RESIDENTIAL STAGE 1
HAMILTON, WAIKATO
FOR
SAXBY RD JV LIMITED**

Title
**EXISTING
TOPO
PLAN**

Project no.	298001-R1 SL1		
Scale	1:1000 @ A3		
Cad file	298001-R1-C050 TOPO.DWG		
Drawing no.	R1- C050-5	Rev	A

BUILDING CONSENT



- NOTES
1. ALL WORKS TO BE IN ACCORDANCE WITH HAMILTON CITY COUNCIL STANDARDS.
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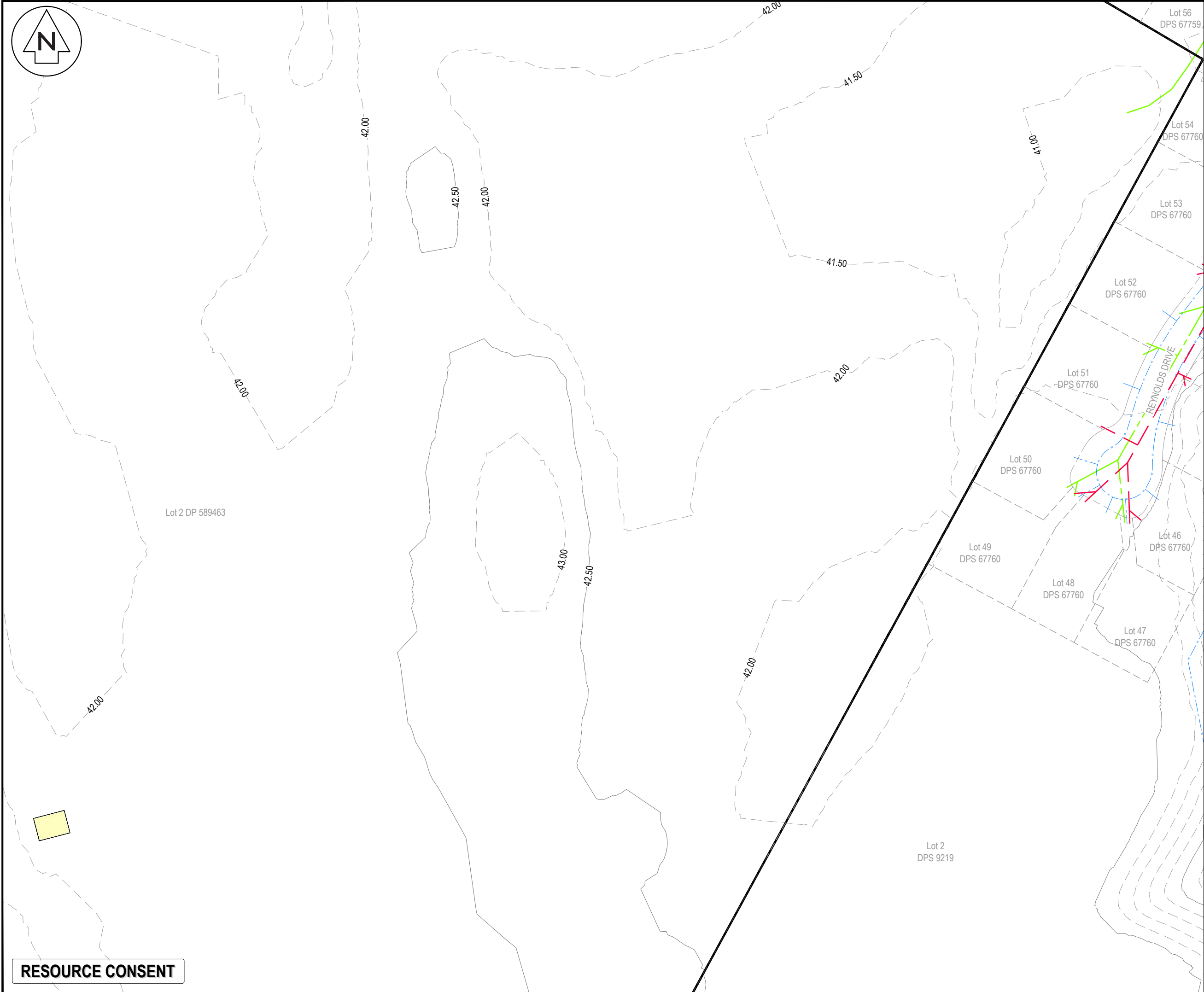
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**SOUTHERN LINKS 1
RESIDENTIAL STAGE 1
HAMILTON, WAIKATO
FOR
SAXBY RD JV LIMITED**

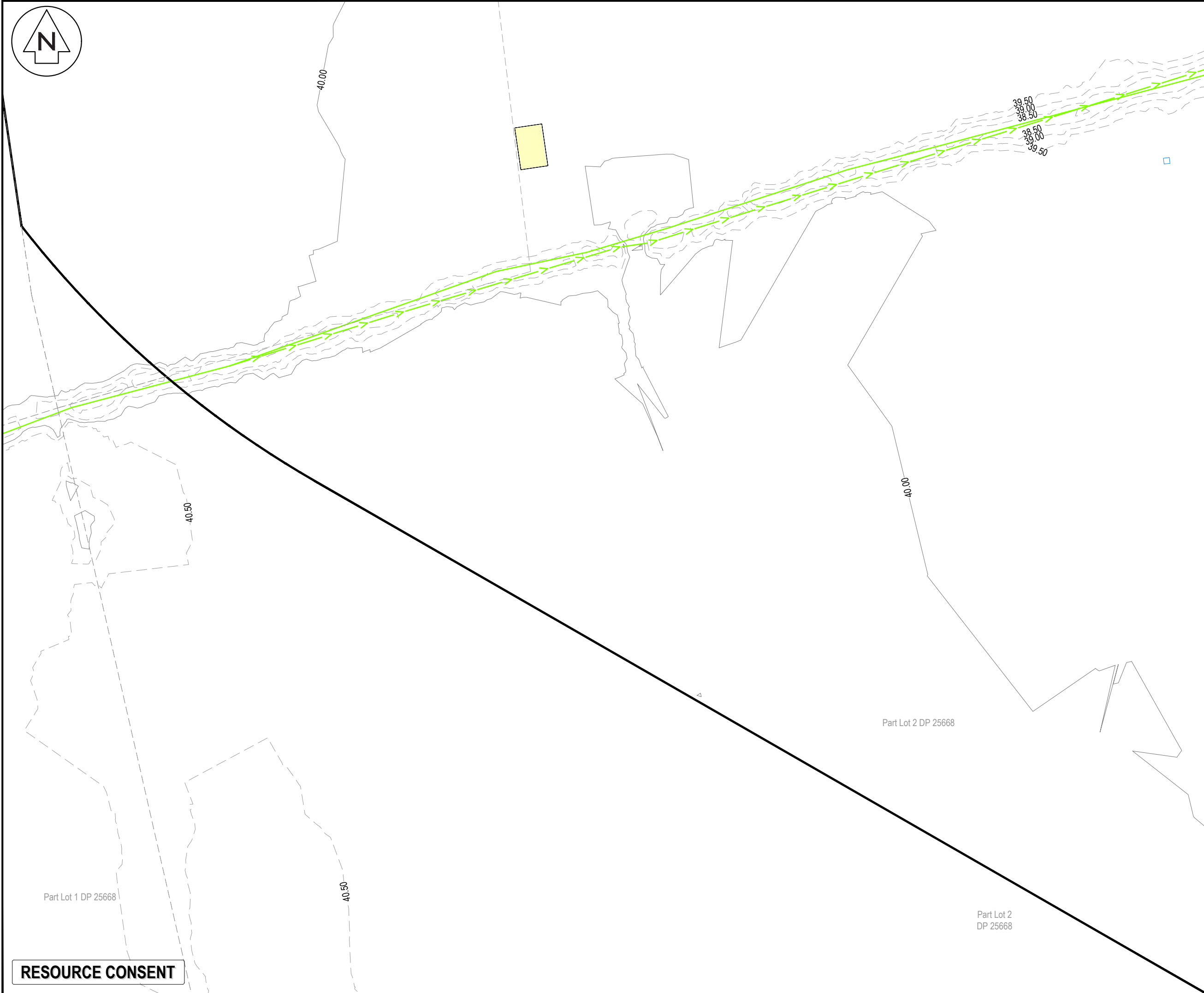
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**EXISTING
TOPO
PLAN**

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Cad file	298001-R1-C050 TOPO.DWG		
Drawing no.	R1- C050-6	Rev	A



RESOURCE CONSENT



NOTES

1. ALL WORKS TO BE IN ACCORDANCE WITH HAMILTON CITY COUNCIL STANDARDS.

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LEGEND

EX BDY

EX EASEMENT

EX TITLE BDY

EX MAJOR CONTOUR

EX MINOR CONTOUR

EX WASTEWATER

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EX WATER MAIN

EX OVERHEAD POWER

EX ROAD KERB TOP

EX TOP OF BANK

EX FENCE

EX BUILDING

EX FIRE HYDRANT

EX WATER METER

EX VALVE

EX SW / WW MANHOLE

EX CESSPIT

EX TELECOM PLINTH

EX TELECOM PILLAR BOX

EX POWER TRANSFORMER

EX POWER POLE

EX POWER PILLAR BOX

EX STREET LIGHT

EX STREET SIGN

EX TREE

EX SLUICE VALVE

A	FAST TRACK APP	MKS	06/2026
Rev	Description	By	Date
	By	Date	
Survey	MAVEN	06/2025	
Design	MKS	07/2025	
Drawn	MKS	07/2025	
Checked	DJM	07/2025	

M

MAVEN

Maven Waikato

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Project

SOUTHERN LINKS 1

RESIDENTIAL STAGE 1

HAMILTON, WAIKATO

FOR

SAXBY RD JV LIMITED

Title

EXISTING

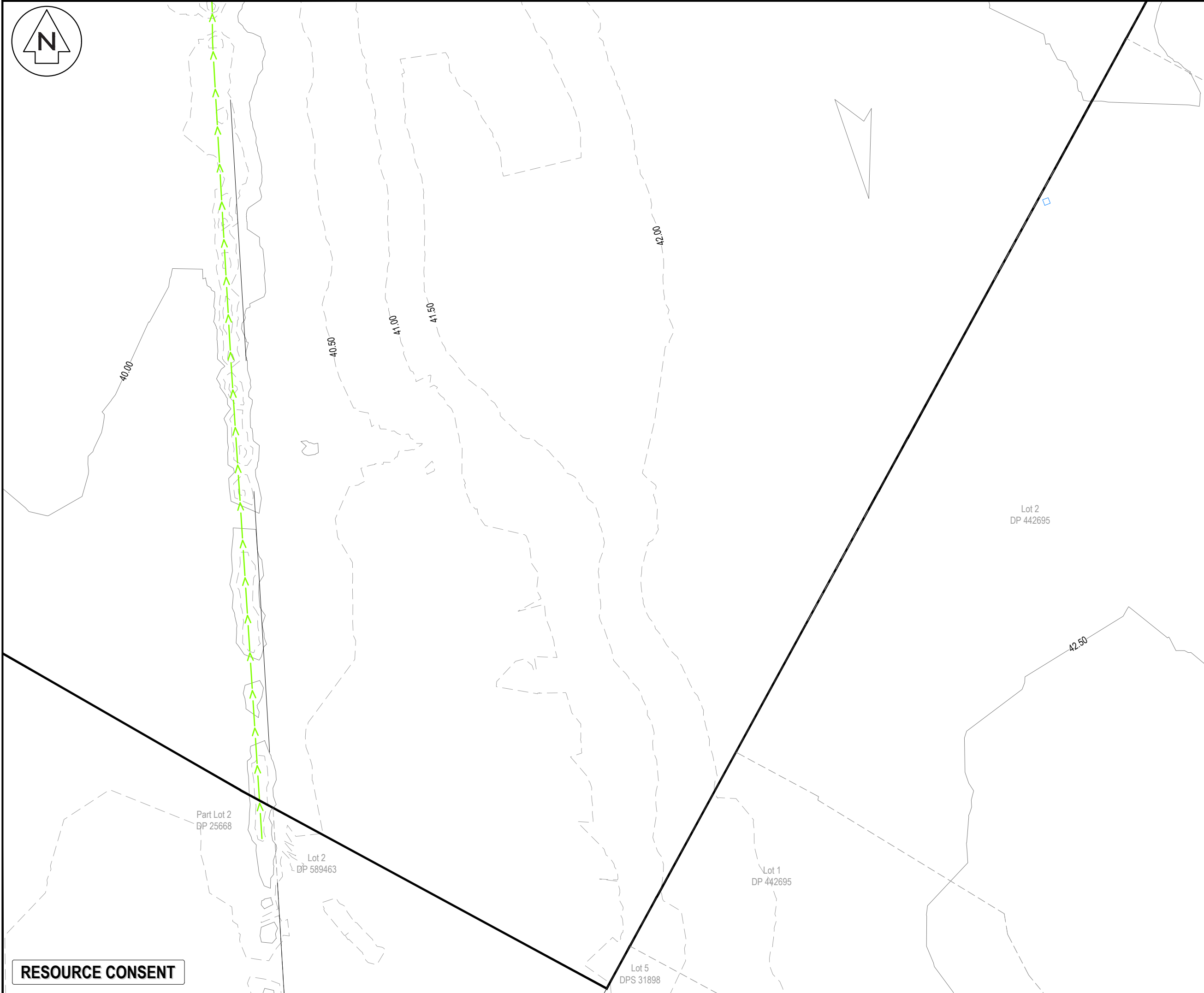
TOPO

PLAN

Project no.	298001-R1 SL1		
Scale	1:1000 @ A3		
Cad file	298001-R1-C050 TOPO.DWG		
Drawing no.	R1- C050-7	Rev	A

DATE: 6/2/25 FILEPATH: F:\MVEN\HAMILTON6 PROJECTS\298001 - SOUTHERN LINKS 1\STG R1\DWG\298001-R1-C050 TOPO.DWG

RESOURCE CONSENT



NOTES

1. ALL WORKS TO BE IN ACCORDANCE WITH HAMILTON CITY COUNCIL STANDARDS.

2. COORDINATES IN TERMS OF NZ GEODETIC DATUM MT EDEN 2000.

3. LEVELS IN TERMS OF THE NEW ZEALAND VERTICAL DATUM 2016.

4. ORIGIN OF LEVELS = PIN 1 SO 537357 PUBLISHED RL=39.788, SOURCED FROM THE LINZ DIGITAL GEODETIC DATABASE.

5. BOUNDARIES ARE SUBJECT TO FINAL SURVEY.

6. GROUND CONTOURS WERE CAPTURED USING A LIDAR SURVEY UNDERTAKEN IN MAY 2021.

LEGEND

EX BDY

EX EASEMENT

EX TITLE BDY

EX MAJOR CONTOUR

EX MINOR CONTOUR

EX WASTEWATER

EX STORMWATER

EX WATER MAIN

EX OVERHEAD POWER

EX ROAD KERB TOP

EX TOP OF BANK

EX FENCE

EX BUILDING

EX FIRE HYDRANT

EX WATER METER

EX VALVE

EX SW / WW MANHOLE

EX CESSPIT

EX TELECOM PLINTH

EX TELECOM PILLAR BOX

EX POWER TRANSFORMER

EX POWER POLE

EX POWER PILLAR BOX

EX STREET LIGHT

EX STREET SIGN

EX TREE

EX SLUICE VALVE

A	FAST TRACK APP	MKS	06/2026
Rev	Description	By	Date
		By	Date
Survey	MAVEN		06/2025
Design	MKS		07/2025
Drawn	MKS		07/2025
Checked	DJM		07/2025

M

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Project

SOUTHERN LINKS 1

RESIDENTIAL STAGE 1

HAMILTON, WAIKATO

FOR

SAXBY RD JV LIMITED

Title

EXISTING

TOPO

PLAN

Project no.	298001-R1 SL1		
Scale	1:1000 @ A3		
Cad file	298001-R1-C050 TOPO.DWG		
Drawing no.	R1- C050-8	Rev	A

DATE: 6/9/25 FILEPATH: F:\MAVEN\HAMILTON6 PROJECTS\298001 - SOUTHERN LINKS 1\STG R1\DWG\298001-R1-C050 TOPO.DWG



RHONDA AVENUE

DEANWELL AVENUE

LESLIE PLACE

SAXBYS ROAD

FORTH CRESCENT

CAESAR ROOSE DRIVE

MACMURDO AVENUE

REYNOLDS DRIVE

CROFT LANE

C130-1

C130-2

C130-5

C130-3

C130-4

C130-6

C130-7

C130-8

STAGE 2B

STAGE 2A

STAGE 1A

STAGE 2D

STAGE 2C

STAGE 1C

STAGE 3A

STAGE 3B

STAGE 1B

STAGE 3C

STAGE 1D

STAGE 1E

STAGE 4A

STAGE 5A

STAGE 5B

- NOTES
1. ALL WORKS TO BE IN ACCORDANCE WITH HAMILTON CITY COUNCIL STANDARDS.
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LEGEND

EX BDY
PR BDY
STAGE BDY

STAGE 1A
STAGE 1B
STAGE 1C
STAGE 1D
STAGE 1E
STAGE 2A
STAGE 2B
STAGE 2C
STAGE 2D
STAGE 3A
STAGE 3B
STAGE 3C
STAGE 4A
STAGE 5A
STAGE 5B

A	FAST TRACK APP	MKS	06/2026
Rev	Description	By	Date
Survey	MAVEN		06/2025
Design	MKS		07/2025
Drawn	MKS		07/2025
Checked	DJM		07/2025

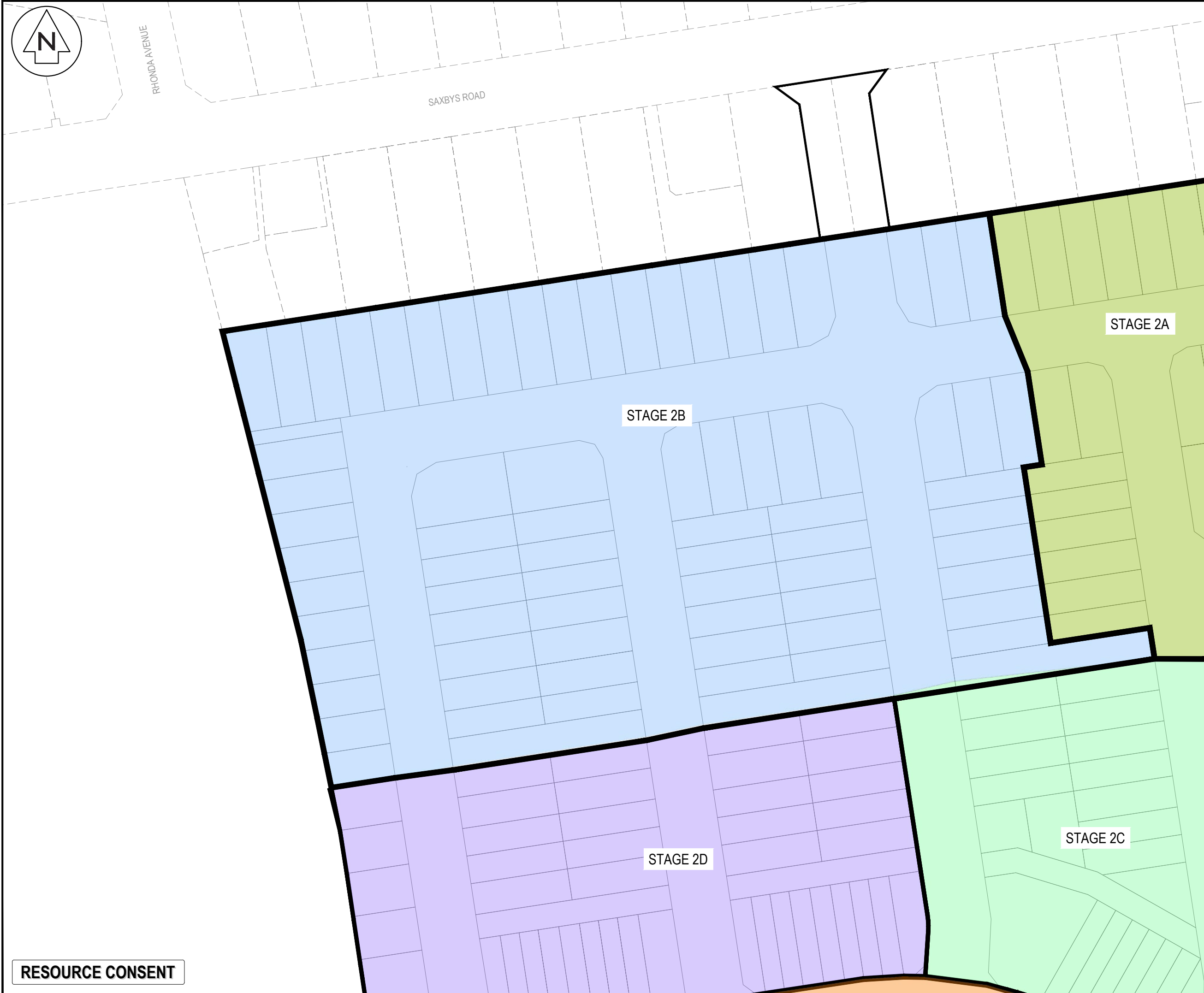
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Project
**SOUTHERN LINKS 1
RESIDENTIAL STAGE 1
HAMILTON, WAIKATO
FOR
SAXBY RD JV LIMITED**

Title
**PROPOSED
STAGING PLAN
OVERVIEW PLAN**

Project no.	298001-R1 SL1		
Scale	1:4000 @ A3		
Cad file	298001-R1-C130 STAGING PLAN.DWG		
Drawing no.	R1- C130	Rev	A

RESOURCE CONSENT



- NOTES
1. ALL WORKS TO BE IN ACCORDANCE WITH HAMILTON CITY COUNCIL STANDARDS.
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LEGEND	
	EX BDY
	PR BDY
	STAGE BDY
	STAGE 1A
	STAGE 1B
	STAGE 1C
	STAGE 1D
	STAGE 1E
	STAGE 2A
	STAGE 2B
	STAGE 2C
	STAGE 2D
	STAGE 3A
	STAGE 3B
	STAGE 3C
	STAGE 4A
	STAGE 5A
	STAGE 5B

A	FAST TRACK APP	MKS	06/2026
Rev	Description	By	Date
Survey	MAVEN	06/2025	
Design	MKS	07/2025	
Drawn	MKS	07/2025	
Checked	DJM	07/2025	



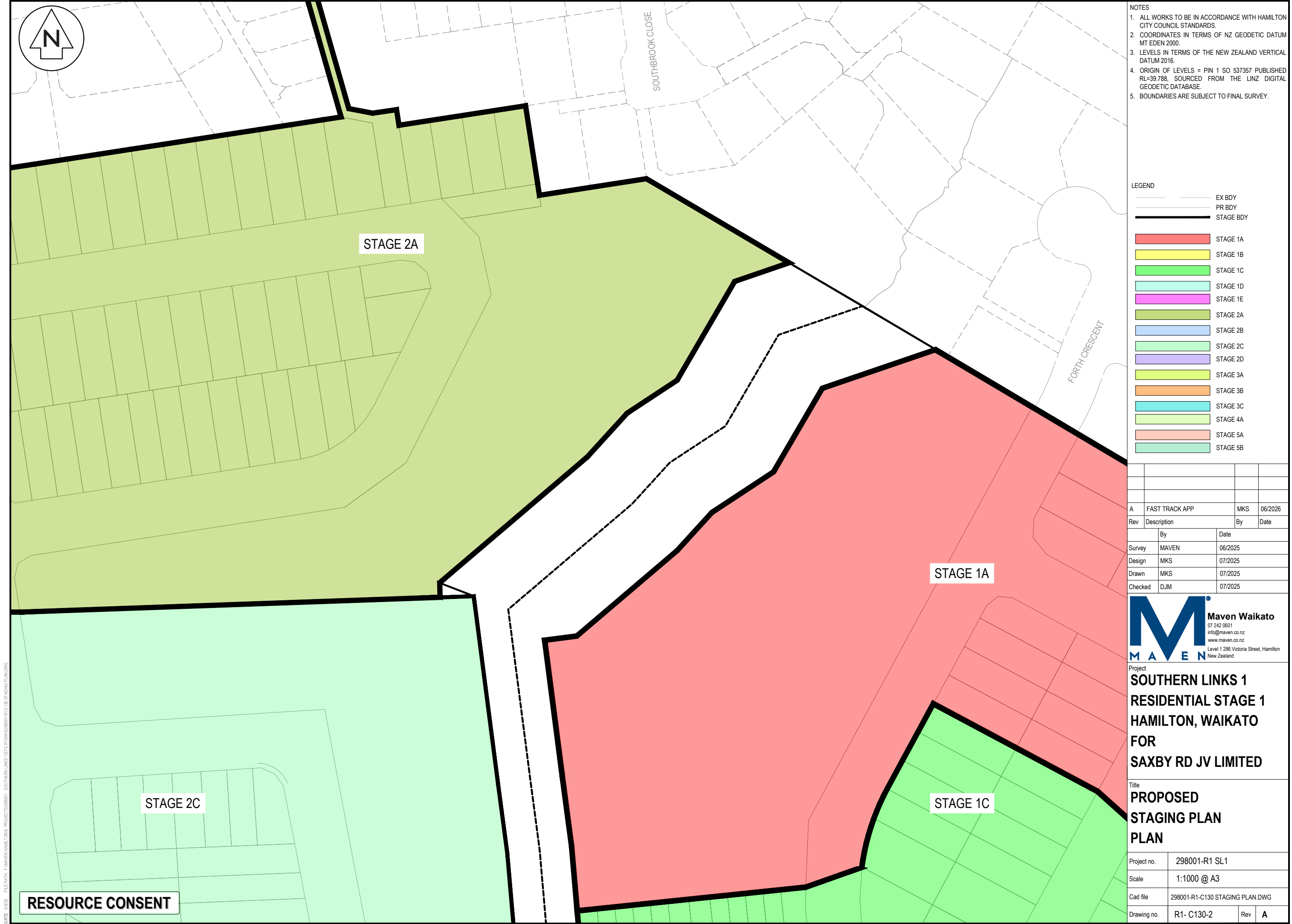
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Project
**SOUTHERN LINKS 1
RESIDENTIAL STAGE 1
HAMILTON, WAIKATO
FOR
SAXBY RD JV LIMITED**

Title
**PROPOSED
STAGING PLAN
PLAN**

Project no.	298001-R1 SL1		
Scale	1:1000 @ A3		
Cad file	298001-R1-C130 STAGING PLAN.DWG		
Drawing no.	R1- C130-1	Rev	A

RESOURCE CONSENT





STAGE 2D

STAGE 2C

STAGE 3A

STAGE 3B

STAGE 3C

- NOTES
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LEGEND

	EX BDY
	PR BDY
	STAGE BDY
	STAGE 1A
	STAGE 1B
	STAGE 1C
	STAGE 1D
	STAGE 1E
	STAGE 2A
	STAGE 2B
	STAGE 2C
	STAGE 2D
	STAGE 3A
	STAGE 3B
	STAGE 3C
	STAGE 4A
	STAGE 5A
	STAGE 5B

A	FAST TRACK APP	MKS	06/2026
Rev	Description	By	Date
Survey	MAVEN		06/2025
Design	MKS		07/2025
Drawn	MKS		07/2025
Checked	DJM		07/2025



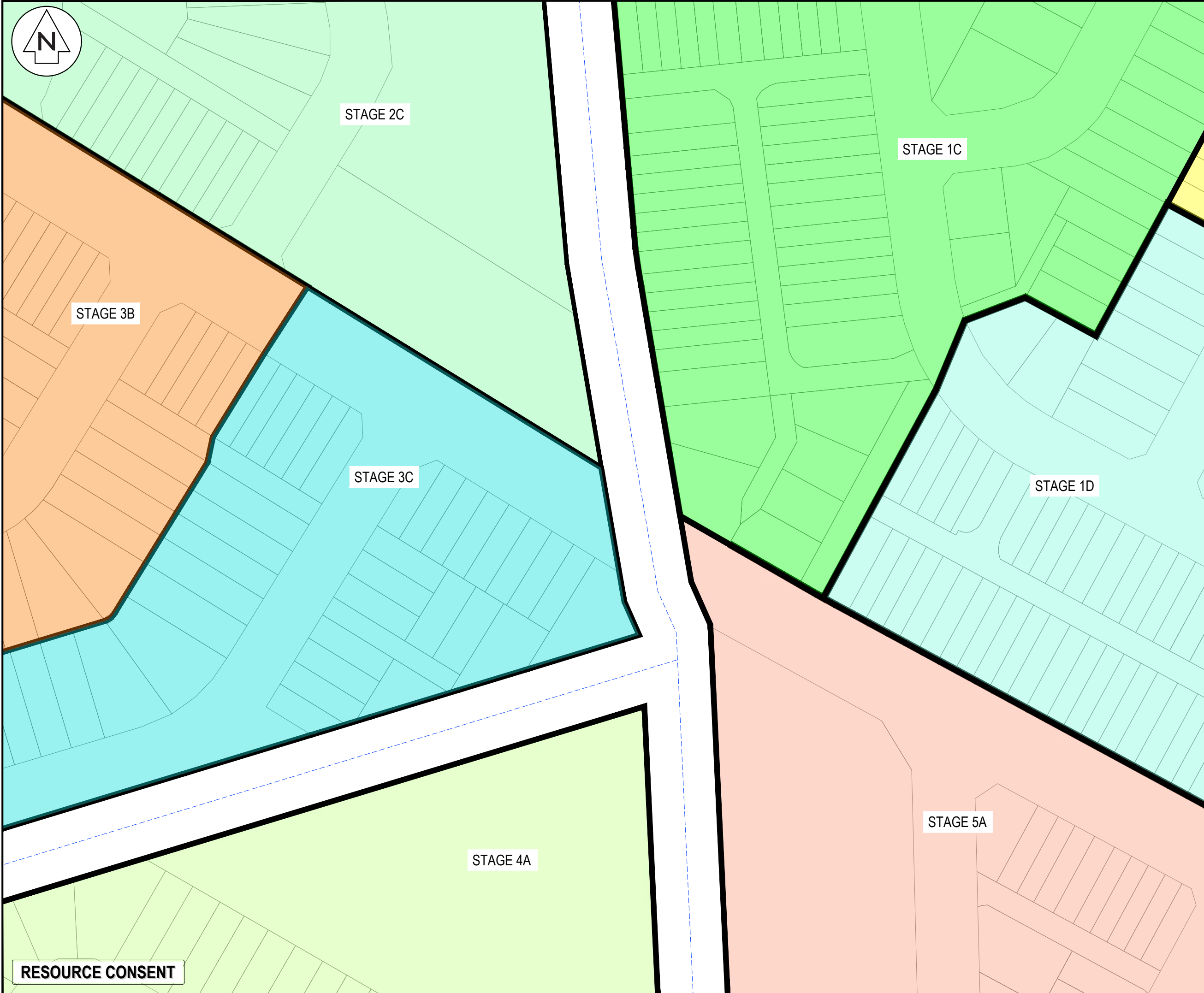
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Project
**SOUTHERN LINKS 1
RESIDENTIAL STAGE 1
HAMILTON, WAIKATO
FOR
SAXBY RD JV LIMITED**

Title
**PROPOSED
STAGING PLAN
PLAN**

Project no.	298001-R1 SL1		
Scale	1:1000 @ A3		
Cad file	298001-R1-C130 STAGING PLAN.DWG		
Drawing no.	R1- C130-3	Rev	A

RESOURCE CONSENT



NOTES

1. ALL WORKS TO BE IN ACCORDANCE WITH HAMILTON CITY COUNCIL STANDARDS.
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4. ORIGIN OF LEVELS = PIN 1 SO 537357 PUBLISHED RL=39.788, SOURCED FROM THE LINZ DIGITAL GEODETIC DATABASE.
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LEGEND

EX BDY

PR BDY

STAGE BDY

STAGE 1A

STAGE 1B

STAGE 1C

STAGE 1D

STAGE 1E

STAGE 2A

STAGE 2B

STAGE 2C

STAGE 2D

STAGE 3A

STAGE 3B

STAGE 3C

STAGE 4A

STAGE 5A

STAGE 5B

A	FAST TRACK APP	MKS	06/2026
Rev	Description	By	Date
		By	Date
Survey	MAVEN		06/2025
Design	MKS		07/2025
Drawn	MKS		07/2025
Checked	DJM		07/2025

M

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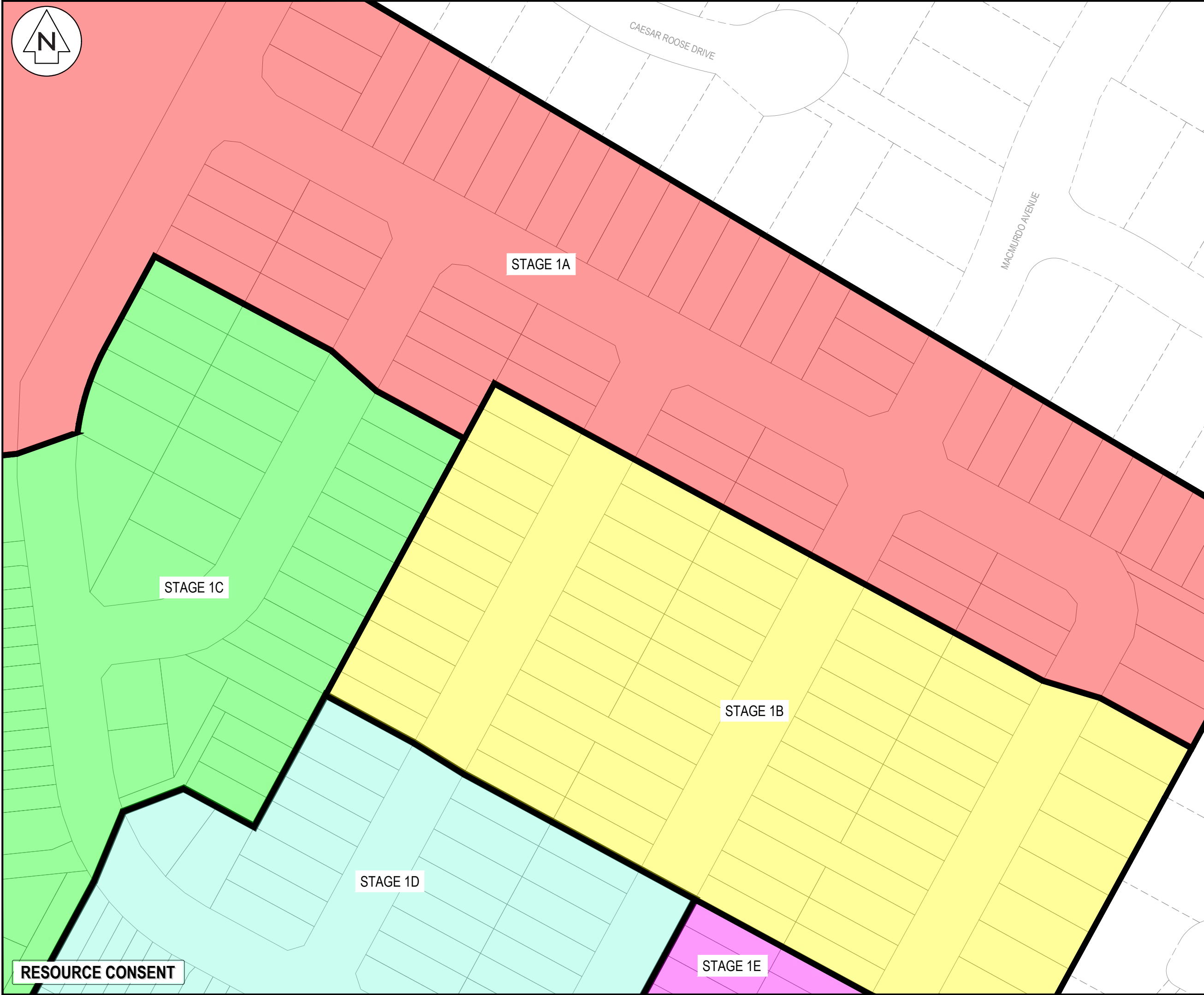
Project

SOUTHERN LINKS 1
RESIDENTIAL STAGE 1
HAMILTON, WAIKATO
FOR
SAXBY RD JV LIMITED

Title

PROPOSED
STAGING PLAN
PLAN

Project no.	298001-R1 SL1		
Scale	1:1000 @ A3		
Cad file	298001-R1-C130 STAGING PLAN.DWG		
Drawing no.	R1- C130-4	Rev	A



- NOTES
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LEGEND

	EX BDY
	PR BDY
	STAGE BDY

	STAGE 1A
	STAGE 1B
	STAGE 1C
	STAGE 1D
	STAGE 1E
	STAGE 2A
	STAGE 2B
	STAGE 2C
	STAGE 2D
	STAGE 3A
	STAGE 3B
	STAGE 3C
	STAGE 4A
	STAGE 5A
	STAGE 5B

A	FAST TRACK APP	MKS	06/2026
Rev	Description	By	Date
		By	Date
Survey	MAVEN		06/2025
Design	MKS		07/2025
Drawn	MKS		07/2025
Checked	DJM		07/2025



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Project

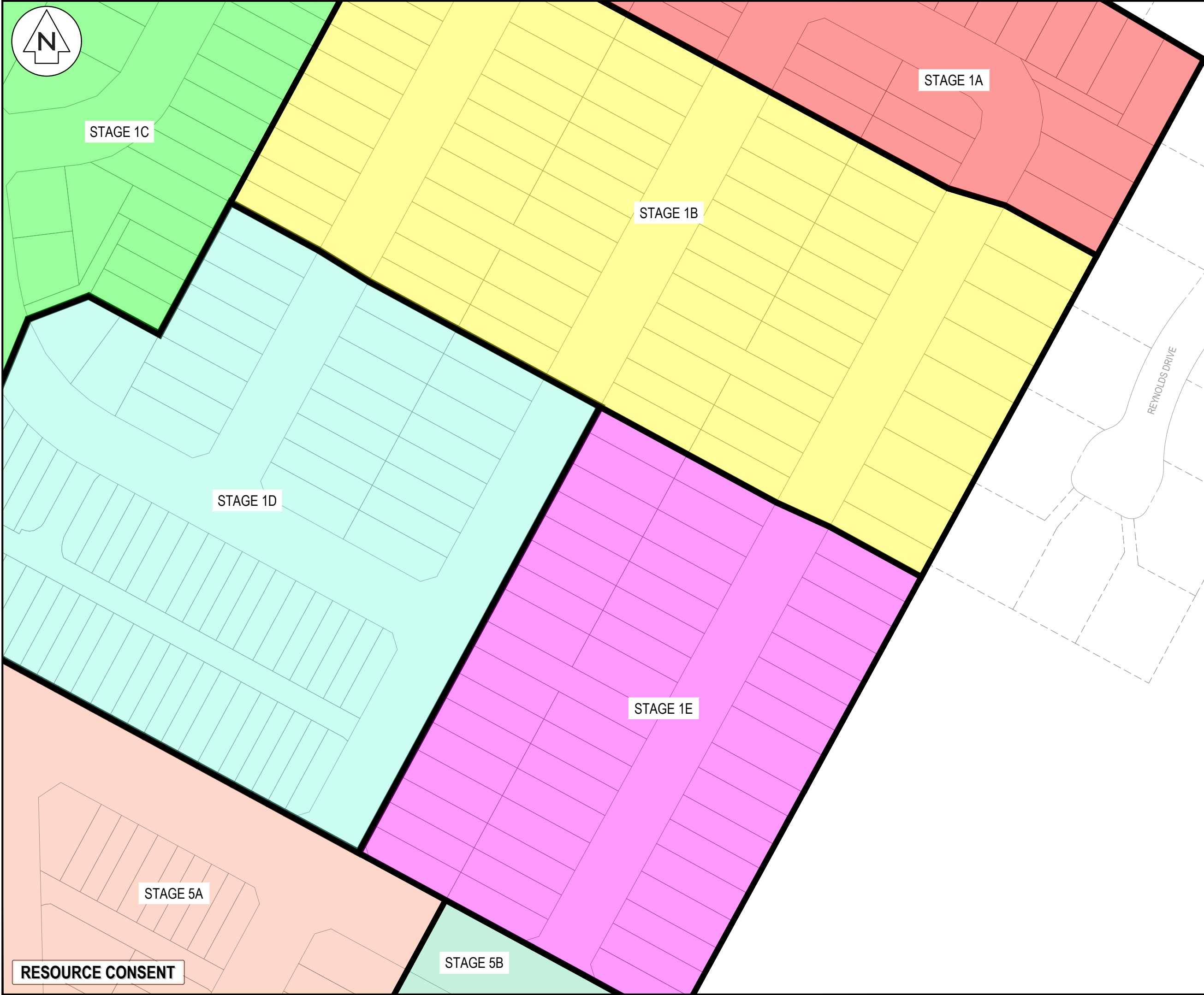
**SOUTHERN LINKS 1
RESIDENTIAL STAGE 1
HAMILTON, WAIKATO
FOR
SAXBY RD JV LIMITED**

Title

**PROPOSED
STAGING PLAN
PLAN**

Project no.	298001-R1 SL1		
Scale	1:1000 @ A3		
Cad file	298001-R1-C130 STAGING PLAN.DWG		
Drawing no.	R1- C130-5	Rev	A

DATE: 6/2/25 FILEPATH: F:\MAVEN\HAMILTON6 PROJECTS\298001 - SOUTHERN LINKS 1\STG\298001-R1-C130 STAGING PLAN.DWG



- NOTES
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LEGEND

EX BDY

PR BDY

STAGE BDY

STAGE 1A

STAGE 1B

STAGE 1C

STAGE 1D

STAGE 1E

STAGE 2A

STAGE 2B

STAGE 2C

STAGE 2D

STAGE 3A

STAGE 3B

STAGE 3C

STAGE 4A

STAGE 5A

STAGE 5B

A	FAST TRACK APP	MKS	06/2026
Rev	Description	By	Date
		By	Date
Survey	MAVEN		06/2025
Design	MKS		07/2025
Drawn	MKS		07/2025
Checked	DJM		07/2025

M

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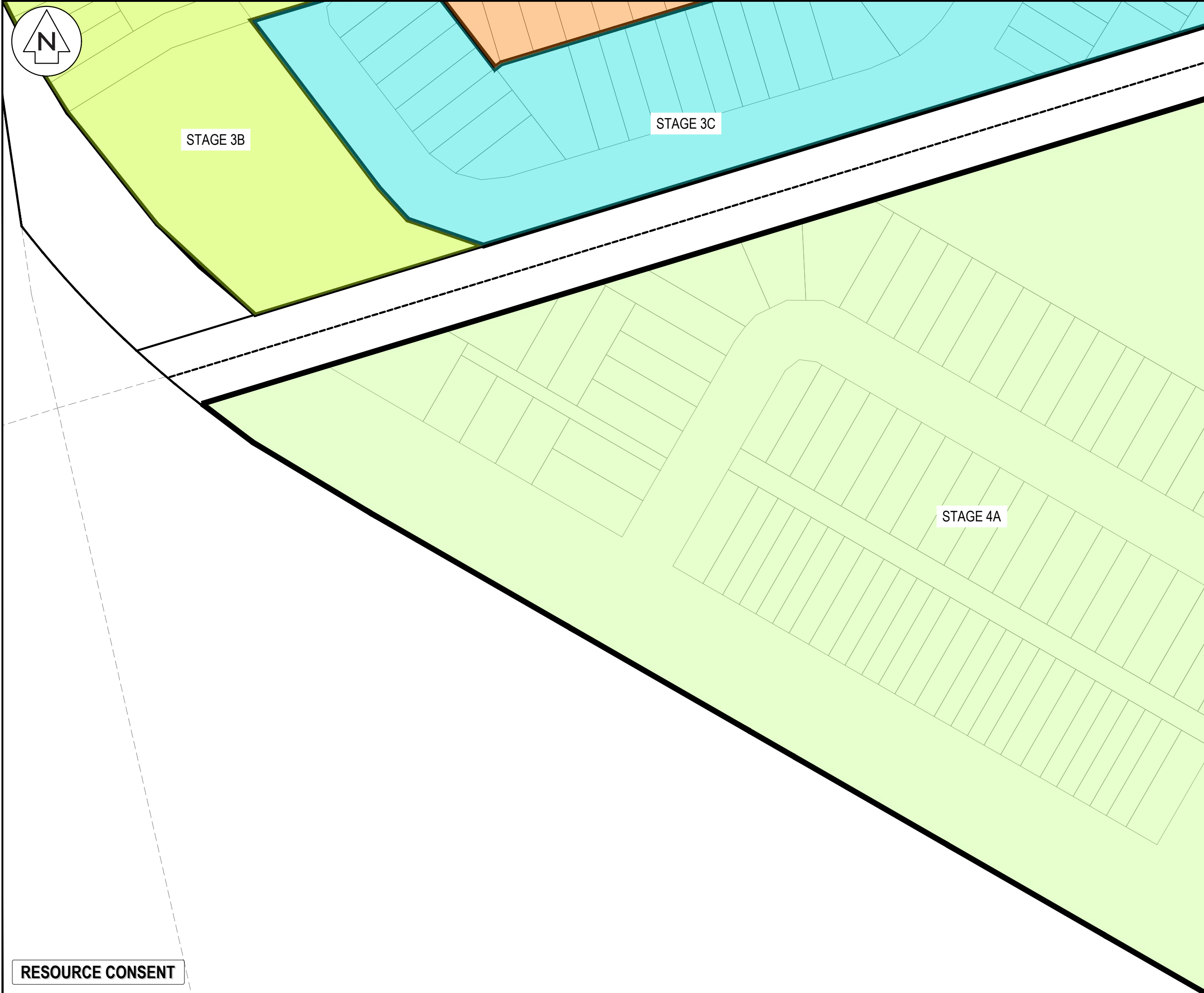
Project

**SOUTHERN LINKS 1
RESIDENTIAL STAGE 1
HAMILTON, WAIKATO
FOR
SAXBY RD JV LIMITED**

Title

**PROPOSED
STAGING PLAN
PLAN**

Project no.	298001-R1 SL1		
Scale	1:1000 @ A3		
Cad file	298001-R1-C130 STAGING PLAN.DWG		
Drawing no.	R1- C130-6	Rev	A



NOTES

1. ALL WORKS TO BE IN ACCORDANCE WITH HAMILTON CITY COUNCIL STANDARDS.
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LEGEND

EX BDY

PR BDY

STAGE BDY

STAGE 1A

STAGE 1B

STAGE 1C

STAGE 1D

STAGE 1E

STAGE 2A

STAGE 2B

STAGE 2C

STAGE 2D

STAGE 3A

STAGE 3B

STAGE 3C

STAGE 4A

STAGE 5A

STAGE 5B

A	FAST TRACK APP	MKS	06/2026
Rev	Description	By	Date
	By	Date	
Survey	MAVEN	06/2025	
Design	MKS	07/2025	
Drawn	MKS	07/2025	
Checked	DJM	07/2025	

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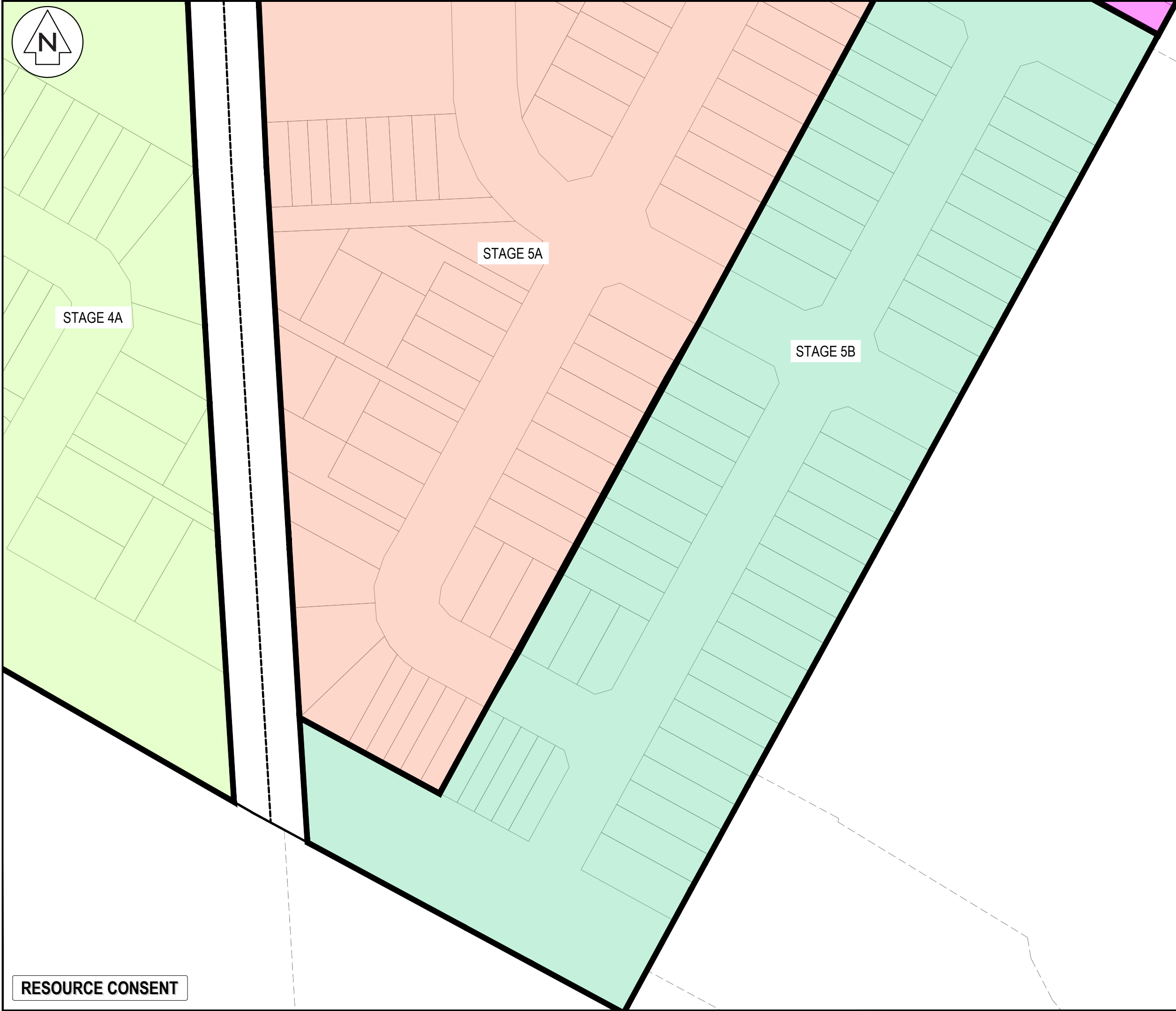
Project

**SOUTHERN LINKS 1
RESIDENTIAL STAGE 1
HAMILTON, WAIKATO
FOR
SAXBY RD JV LIMITED**

Title

**PROPOSED
STAGING PLAN
PLAN**

Project no.	298001-R1 SL1		
Scale	1:1000 @ A3		
Cad file	298001-R1-C130 STAGING PLAN.DWG		
Drawing no.	R1- C130-7	Rev	A



- NOTES
1. ALL WORKS TO BE IN ACCORDANCE WITH HAMILTON CITY COUNCIL STANDARDS.
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LEGEND	
	EX BDY
	PR BDY
	STAGE BDY
	STAGE 1A
	STAGE 1B
	STAGE 1C
	STAGE 1D
	STAGE 1E
	STAGE 2A
	STAGE 2B
	STAGE 2C
	STAGE 2D
	STAGE 3A
	STAGE 3B
	STAGE 3C
	STAGE 4A
	STAGE 5A
	STAGE 5B

A	FAST TRACK APP	MKS	06/2026
Rev	Description	By	Date
		By	Date
Survey	MAVEN		06/2025
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Drawn	MKS		07/2025
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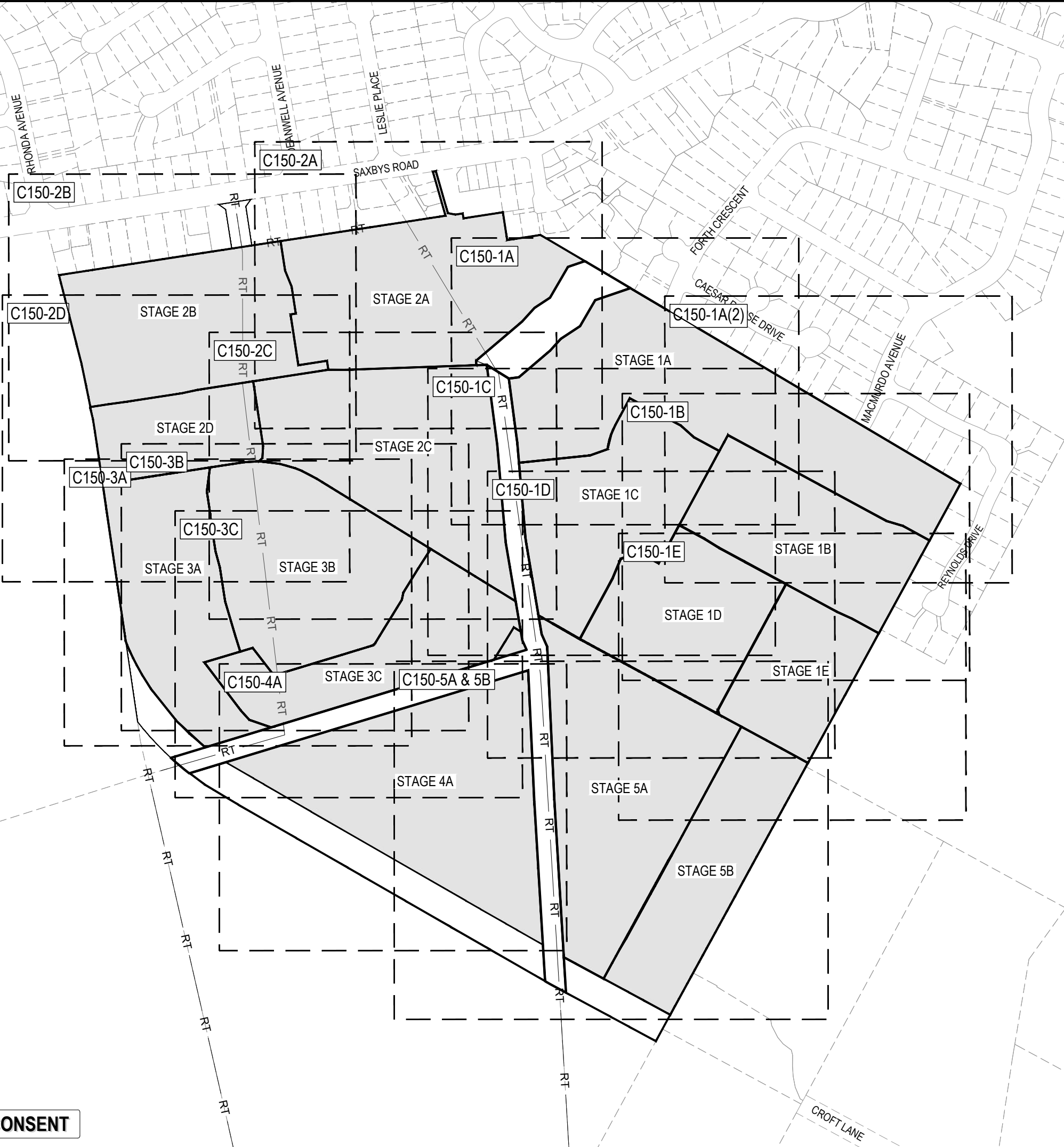
Project

**SOUTHERN LINKS 1
RESIDENTIAL STAGE 1
HAMILTON, WAIKATO
FOR
SAXBY RD JV LIMITED**

Title

**PROPOSED
STAGING PLAN
PLAN**

Project no.	298001-R1 SL1		
Scale	1:1000 @ A3		
Cad file	298001-R1-C130 STAGING PLAN.DWG		
Drawing no.	R1- C130-8	Rev	A



- NOTES
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Rev	Description	By	Date
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Drawn	MKS		07/2025
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Project
**SOUTHERN LINKS 1
RESIDENTIAL STAGE 1
HAMILTON, WAIKATO
FOR
SAXBY RD JV LIMITED**

Title
**PROPOSED
SCHEME
OVERVIEW PLAN**

Project no.	298001-R1 SL1		
Scale	1:4000 @ A3		
Cad file	298001-R1-C150 SCHEME.DWG		
Drawing no.	R1- C150	Rev	A

RESOURCE CONSENT



NOTES

1. ALL WORKS TO BE IN ACCORDANCE WITH HAMILTON CITY COUNCIL STANDARDS.
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LEGEND

--- EX BDY
--- PR BDY
--- SITE BDY

Rev	Description	By	Date
A	FAST TRACK APP	MKS	06/2026
Rev	Description	By	Date
Survey	MAVEN		06/2025
Design	MKS		07/2025
Drawn	MKS		07/2025
Checked	DJM		07/2025



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Project

**SOUTHERN LINKS 1
RESIDENTIAL STAGE 1
HAMILTON, WAIKATO
FOR
SAXBY RD JV LIMITED**

Title

**PROPOSED
SCHEME PLAN
STAGE 1A**

Project no.	298001-R1 SL1		
Scale	1:1000 @ A3		
Cad file	298001-R1-C150 SCHEME.DWG		
Drawing no.	R1- C150-1A-1	Rev	A



NOTES

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LEGEND

EX BDY

PR BDY

SITE BDY

A	FAST TRACK APP	MKS	06/2026
Rev	Description	By	Date
		By	Date
Survey	MAVEN		06/2025
Design	MKS		07/2025
Drawn	MKS		07/2025
Checked	DJM		07/2025

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Project

SOUTHERN LINKS 1

RESIDENTIAL STAGE 1

HAMILTON, WAIKATO

FOR

SAXBY RD JV LIMITED

Title

PROPOSED

SCHEME PLAN

STAGE 1A(2)

Project no.	298001-R1 SL1		
Scale	1:1000 @ A3		
Cad file	298001-R1-C150 SCHEME.DWG		
Drawing no.	R1- C150-1A-2	Rev	A

DATE: 6/9/25 FILEPATH: F:\MVEN\HAMILTON6 PROJECTS\298001 - SOUTHERN LINKS 1\STG1\RD\298001-R1-C150 SCHEME.DWG



- LOCAL PURPOSE
RESERVE TO BE
VESTED TO HCC
(ACCESS)

STAGE 1C

ROAD 2

ROAD 5

ROAD A

REYNOLDS DRIVE

LEGEND

— — — — — EX BDY

————— PR BDY

————— SITE BDY

A	FAST TRACK APP	MKS	06/2026
Rev	Description	By	Date
	By	Date	
Survey	MAVEN	06/2025	
Design	MKS	07/2025	
Drawn	MKS	07/2025	
Checked	DJM	07/2025	

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Project
**SOUTHERN LINKS 1
RESIDENTIAL STAGE 1
HAMILTON, WAIKATO
FOR
SAXBY RD JV LIMITED**

Title
**PROPOSED
SCHEME PLAN
STAGE 1B**

Project no.	298001-R1 SL1		
Scale	1:1000 @ A3		
Cad file	298001-R1-C150 SCHEME.DWG		
Drawing no.	R1- C150-1B	Rev	A



STAGE 1A

STAGE 2C

STAGE 1B

STAGE 1C

STAGE 1D

STAGE 5A

STAGE 3C

RESOURCE CONSENT

- NOTES
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LEGEND

--- EX BDY
--- PR BDY
--- SITE BDY

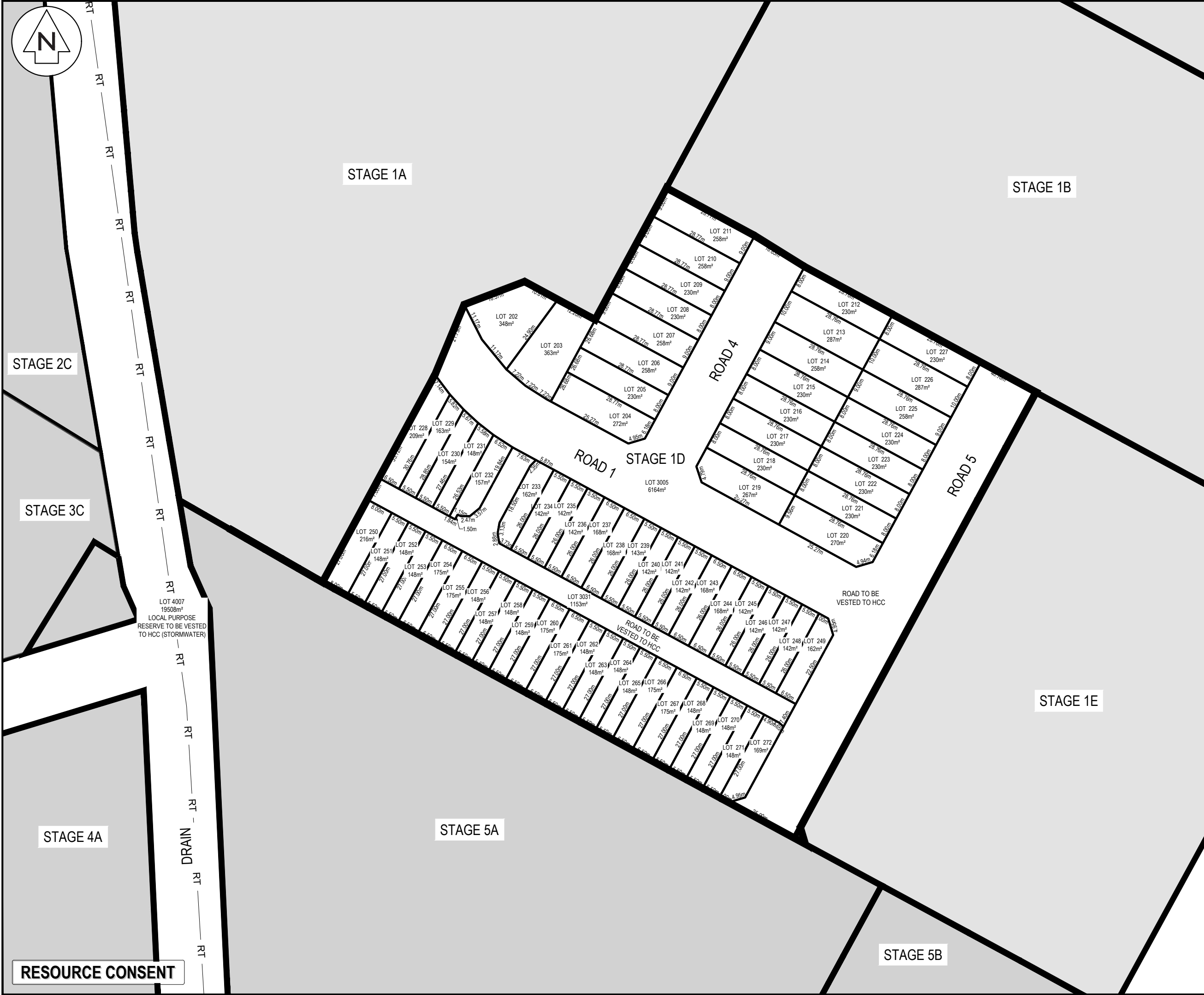
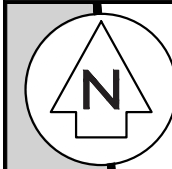
A	FAST TRACK APP	MKS	06/2026
Rev	Description	By	Date
		By	Date
Survey	MAVEN		06/2025
Design	MKS		07/2025
Drawn	MKS		07/2025
Checked	DJM		07/2025

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Project
**SOUTHERN LINKS 1
RESIDENTIAL STAGE 1
HAMILTON, WAIKATO
FOR
SAXBY RD JV LIMITED**

Title
**PROPOSED
SCHEME PLAN
STAGE 1C**

Project no.	298001-R1 SL1
Scale	1:1000 @ A3
Cad file	298001-R1-C150 SCHEME.DWG
Drawing no.	R1- C150-1C
Rev	A



- NOTES
1. ALL WORKS TO BE IN ACCORDANCE WITH HAMILTON CITY COUNCIL STANDARDS.
 2. COORDINATES IN TERMS OF NZ GEODETIC DATUM MT EDEN 2000.
 3. LEVELS IN TERMS OF THE NEW ZEALAND VERTICAL DATUM 2016.
 4. ORIGIN OF LEVELS = PIN 1 SO 537357 PUBLISHED RL=39.788, SOURCED FROM THE LINZ DIGITAL GEODETIC DATABASE.
 5. BOUNDARIES ARE SUBJECT TO FINAL SURVEY.

LEGEND

---	EX BDY
==	PR BDY
---	SITE BDY

A	FAST TRACK APP	MKS	06/2026
Rev	Description	By	Date
		By	Date
Survey	MAVEN		06/2025
Design	MKS		07/2025
Drawn	MKS		07/2025
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Project
**SOUTHERN LINKS 1
RESIDENTIAL STAGE 1
HAMILTON, WAIKATO
FOR
SAXBY RD JV LIMITED**

Title
**PROPOSED
SCHEME PLAN
STAGE 1D**

Project no.	298001-R1 SL1		
Scale	1:1000 @ A3		
Cad file	298001-R1-C150 SCHEME.DWG		
Drawing no.	R1- C150-1D	Rev	A

RESOURCE CONSENT



STAGE 1D

STAGE 1B

STAGE 5A

STAGE 5B

RESOURCE CONSENT

- NOTES
1. ALL WORKS TO BE IN ACCORDANCE WITH HAMILTON CITY COUNCIL STANDARDS.
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LEGEND

--- EX BDY
--- PR BDY
--- SITE BDY

A	FAST TRACK APP	MKS	06/2026
Rev	Description	By	Date
		By	Date
Survey	MAVEN		06/2025
Design	MKS		07/2025
Drawn	MKS		07/2025
Checked	DJM		07/2025



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Project

**SOUTHERN LINKS 1
RESIDENTIAL STAGE 1
HAMILTON, WAIKATO
FOR
SAXBY RD JV LIMITED**

Title

**PROPOSED
SCHEME PLAN
STAGE 1E**

Project no.	298001-R1 SL1		
Scale	1:1000 @ A3		
Cad file	298001-R1-C150 SCHEME.DWG		
Drawing no.	R1- C150-1E	Rev	A

DATE: 6/9/25 FILEPATH: F:\MAVEN\HAMILTON6 PROJECTS\298001 - SOUTHERN LINKS 1\STG R1\DWG\298001-R1-C150 SCHEME.DWG



- NOTES
1. ALL WORKS TO BE IN ACCORDANCE WITH HAMILTON CITY COUNCIL STANDARDS.
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LEGEND

--- EX BDY
--- PR BDY
--- SITE BDY

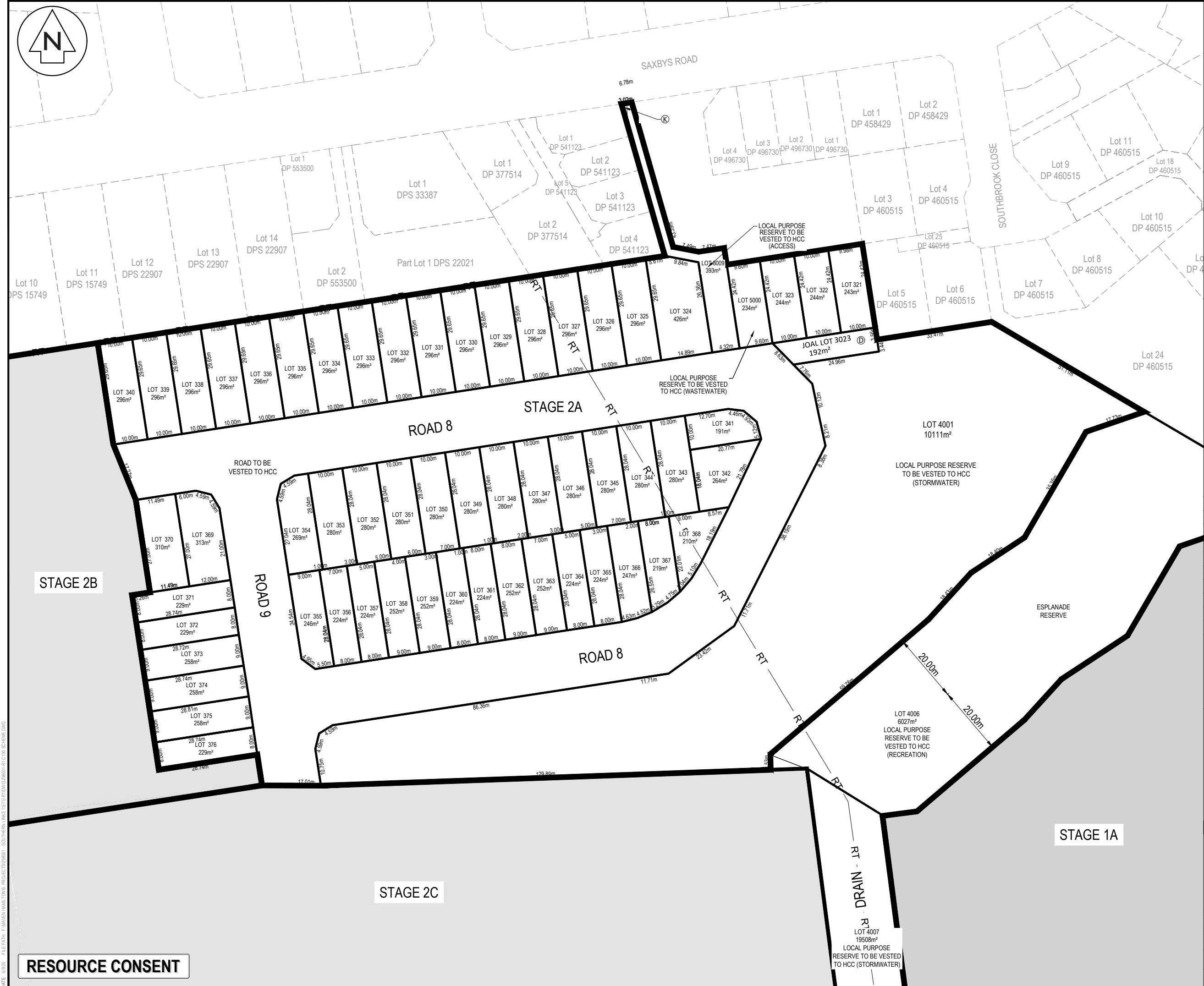
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Rev	Description	By	Date
		By	Date
Survey	MAVEN		06/2025
Design	MKS		07/2025
Drawn	MKS		07/2025
Checked	DJM		07/2025



Project
**SOUTHERN LINKS 1
RESIDENTIAL STAGE 1
HAMILTON, WAIKATO
FOR
SAXBY RD JV LIMITED**

Title
**PROPOSED
SCHEME PLAN
STAGE 2A**

Project no.	298001-R1 SL1
Scale	1:1000 @ A3
Cad file	298001-R1-C150 SCHEME.DWG
Drawing no.	R1- C150-2A
Rev	A



STAGE 2B

STAGE 1A

STAGE 2C

RESOURCE CONSENT



STAGE 2B

STAGE 2A

STAGE 2C

STAGE 1A

STAGE 2D

ROAD 6

ROAD 9

ROAD 10

DRAIN

STAGE 3

RESOURCE CONSENT

- NOTES
1. ALL WORKS TO BE IN ACCORDANCE WITH HAMILTON CITY COUNCIL STANDARDS.
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LEGEND

--- EX BDY
--- PR BDY
--- SITE BDY

A	FAST TRACK APP	MKS	06/2026
Rev	Description	By	Date
		By	Date
Survey	MAVEN		06/2025
Design	MKS		07/2025
Drawn	MKS		07/2025
Checked	DJM		07/2025



Project
**SOUTHERN LINKS 1
RESIDENTIAL STAGE 1
HAMILTON, WAIKATO
FOR
SAXBY RD JV LIMITED**

Title
**PROPOSED
SCHEME PLAN
STAGE 2C**

Project no.	298001-R1 SL1
Scale	1:1000 @ A3
Cad file	298001-R1-C150 SCHEME.DWG
Drawing no.	R1- C150-2C
Rev	A



RESOURCE CONSENT

Lot 1
DPS 75305

STAGE 2B

STAGE 2A

STAGE 2C

STAGE 2D

STAGE 3

- NOTES
1. ALL WORKS TO BE IN ACCORDANCE WITH HAMILTON CITY COUNCIL STANDARDS.
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--- PR BDY
--- SITE BDY

A	FAST TRACK APP	MKS	06/2026
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		By	Date
Survey	MAVEN		06/2025
Design	MKS		07/2025
Drawn	MKS		07/2025
Checked	DJM		07/2025



Project
**SOUTHERN LINKS 1
RESIDENTIAL STAGE 1
HAMILTON, WAIKATO
FOR
SAXBY RD JV LIMITED**

Title
**PROPOSED
SCHEME PLAN
STAGE 2D**

Project no.	298001-R1 SL1		
Scale	1:1000 @ A3		
Cad file	298001-R1-C150 SCHEME.DWG		
Drawing no.	R1- C150-2D	Rev	A



STAGE 2D

ROAD 11

ROAD 12

STAGE 3A

STAGE 3B

STAGE 2C

STAGE 3C

STAGE 4

RESOURCE CONSENT

- NOTES
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--- EX BDY
--- PR BDY
--- SITE BDY

A	FAST TRACK APP	MKS	06/2026
Rev	Description	By	Date
		By	Date
Survey	MAVEN		06/2025
Design	MKS		07/2025
Drawn	MKS		07/2025
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Project
**SOUTHERN LINKS 1
RESIDENTIAL STAGE 1
HAMILTON, WAIKATO
FOR
SAXBY RD JV LIMITED**

Title
**PROPOSED
SCHEME PLAN
STAGE 3A**

Project no.	298001-R1 SL1
Scale	1:1000 @ A3
Cad file	298001-R1-C150 SCHEME.DWG
Drawing no.	R1- C150-3A
Rev	A



STAGE 2D

STAGE 2C

STAGE 3B

STAGE 3A

STAGE 3C

STAGE 4

RESOURCE CONSENT

- NOTES
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LEGEND

--- EX BDY
--- PR BDY
--- SITE BDY

A	FAST TRACK APP	MKS	06/2026
Rev	Description	By	Date
		By	Date
Survey	MAVEN		06/2025
Design	MKS		07/2025
Drawn	MKS		07/2025
Checked	DJM		07/2025



Project
**SOUTHERN LINKS 1
RESIDENTIAL STAGE 1
HAMILTON, WAIKATO
FOR
SAXBY RD JV LIMITED**

Title
**PROPOSED
SCHEME PLAN
STAGE 3B**

Project no.	298001-R1 SL1
Scale	1:1000 @ A3
Cad file	298001-R1-C150 SCHEME.DWG
Drawing no.	R1- C150-3B
Rev	A

DATE: 6/2/25 FILEPATH: F:\MVEN\HAMILTON\6. PROJECTS\298001 - SOUTHERN LINKS 1\STG1\RD\298001-R1-C150 SCHEME.DWG



- NOTES
1. ALL WORKS TO BE IN ACCORDANCE WITH HAMILTON CITY COUNCIL STANDARDS.
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LEGEND

--- EX BDY
--- PR BDY
--- SITE BDY

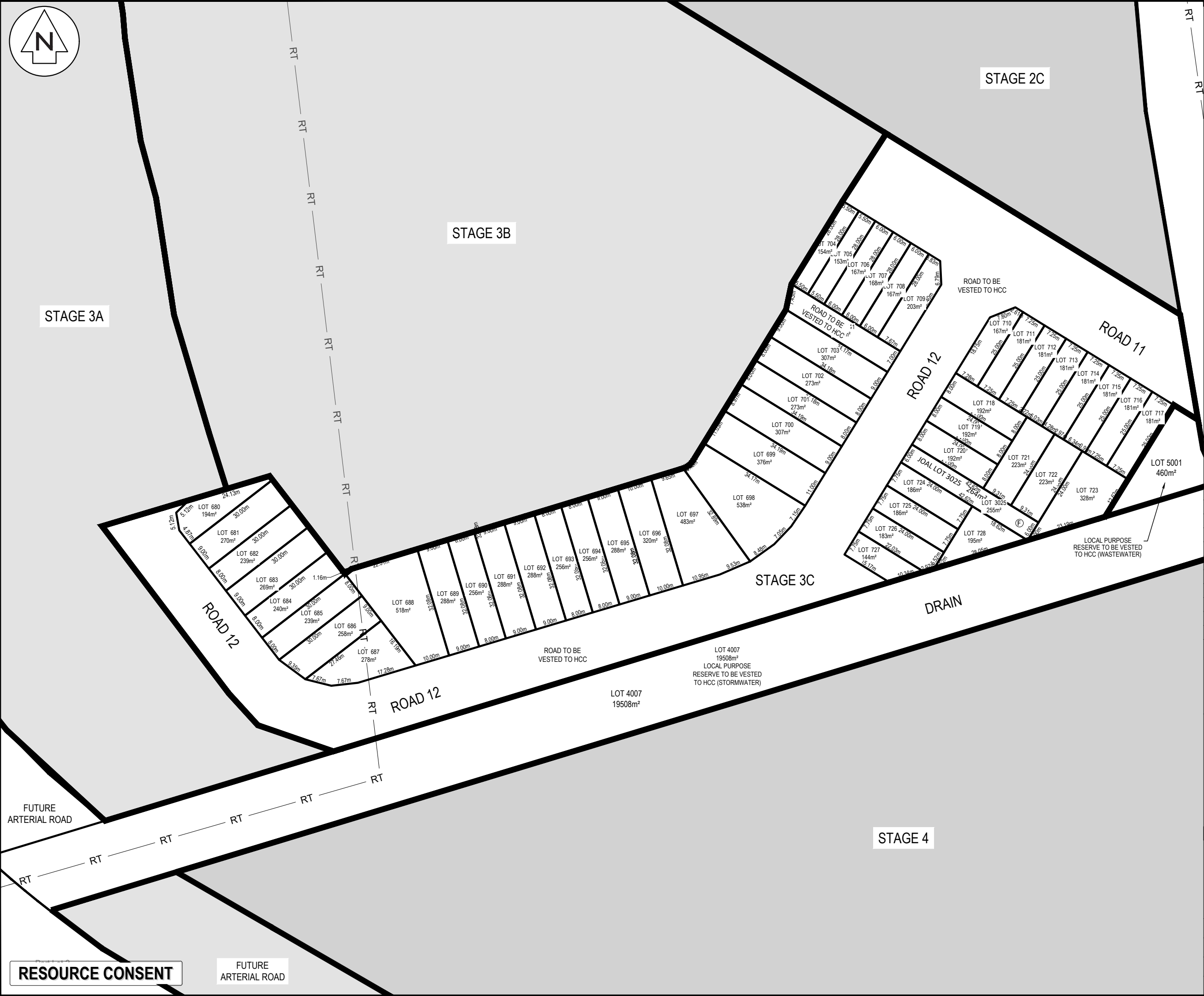
A	FAST TRACK APP	MKS	06/2026
Rev	Description	By	Date
		By	Date
Survey	MAVEN		06/2025
Design	MKS		07/2025
Drawn	MKS		07/2025
Checked	DJM		07/2025



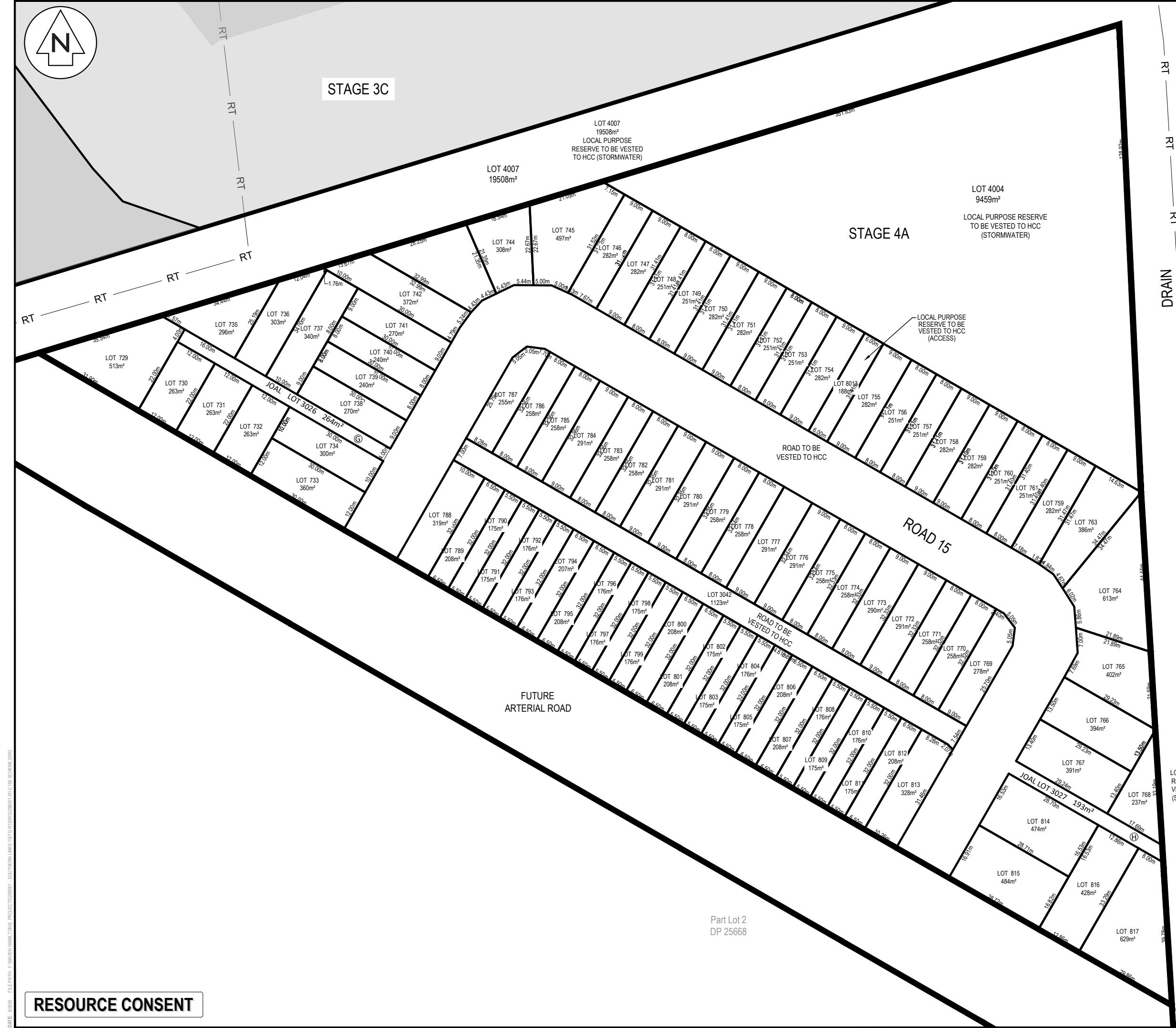
Project
**SOUTHERN LINKS 1
RESIDENTIAL STAGE 1
HAMILTON, WAIKATO
FOR
SAXBY RD JV LIMITED**

Title
**PROPOSED
SCHEME PLAN
STAGE 3C**

Project no.	298001-R1 SL1
Scale	1:1000 @ A3
Cad file	298001-R1-C150 SCHEME.DWG
Drawing no.	R1- C150-3C
Rev	A



DATE: 6/9/25 FILEPATH: F:\MVEN\HAMILTON\6. PROJECTS\298001 - SOUTHERN LINKS 1\STG1\DWG\298001-R1-C150 SCHEME.DWG



RESOURCE CONSENT

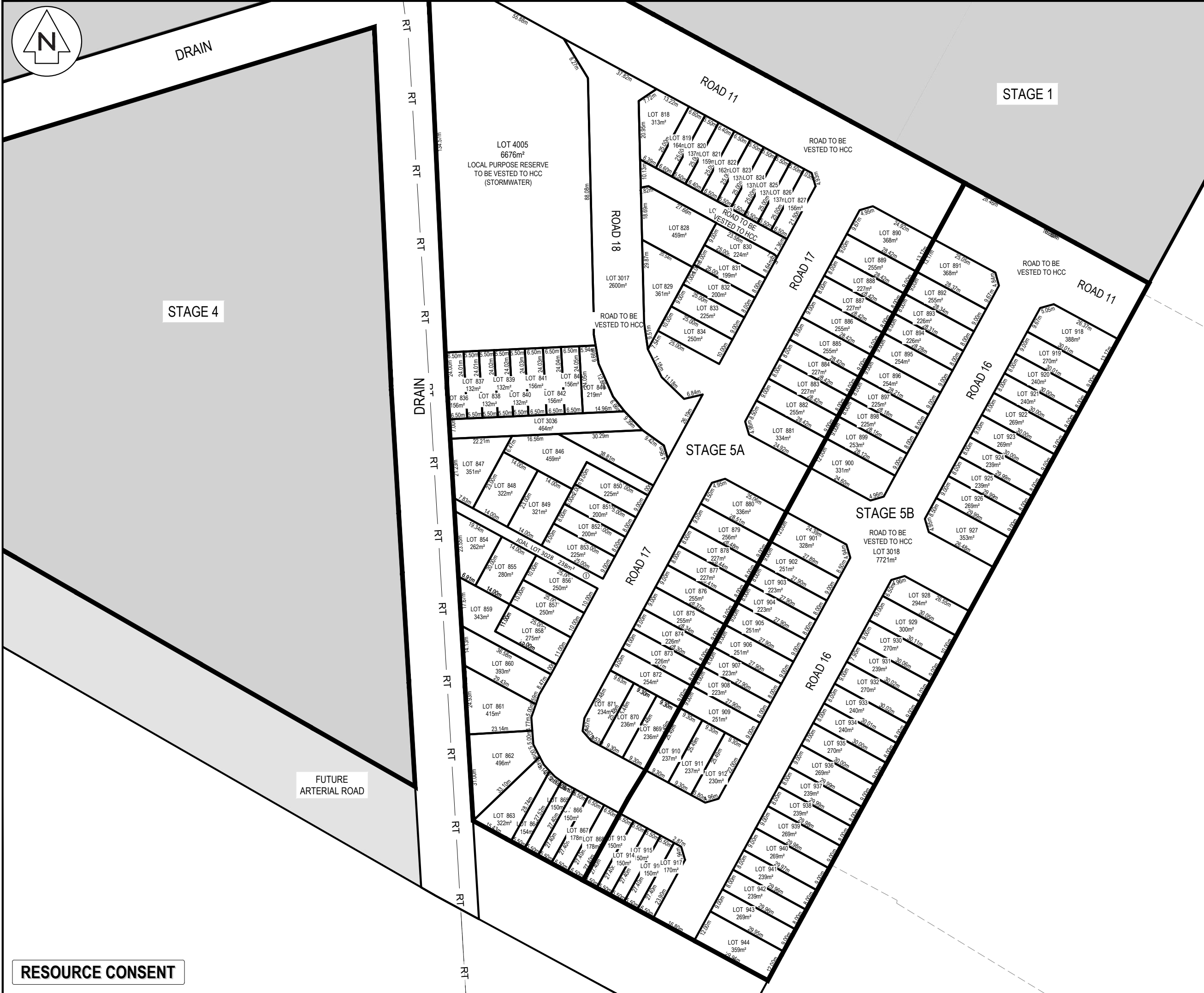
- LEGEND
- — — — — EX BDY
- PR BDY
- SITE BDY

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Title

**PROPOSED
SCHEME PLAN
STAGE 4A**

Project no.	298001-R1 SL1		
Scale	1:1000 @ A3		
Cad file	298001-R1-C150 SCHEME.DWG		
Drawing no.	R1- C150-4A	Rev	A



- NOTES
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LEGEND

---	EX BDY
---	PR BDY
---	SITE BDY

A	FAST TRACK APP	MKS	06/2026
Rev	Description	By	Date
		By	Date
Survey	MAVEN		06/2025
Design	MKS		07/2025
Drawn	MKS		07/2025
Checked	DJM		07/2025



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Project

SOUTHERN LINKS 1 RESIDENTIAL STAGE 1 HAMILTON, WAIKATO FOR SAXBY RD JV LIMITED

Title

PROPOSED SCHEME PLAN STAGE 5A & 5B

Project no.	298001-R1 SL1
Scale	1:1250 @ A3
Cad file	298001-R1-C150 SCHEME.DWG
Drawing no.	R1- C150-5A&5B
Rev	A



SAXBYS ROAD

RHONDA AVENUE

DEANWELL AVENUE

LESLIE PLACE

SAXBYS ROAD

FORTH CRESCENT

CAESAR ROOSE DRIVE

MACMURDO AVENUE

REYNOLDS DRIVE

CROFT LANE

LOT 1 DPS 73305

LOT 2 DPS 9219

LOT 2 DP 442695

LOT 1 DP 442695

LOT 5 DPS 31996

PART LOT 2 DP 25668

LOT 2 DP 589463

RT

RT

RT

RT

RT

RT

RT

RT

RT

RT

RT

RT

STAGE 2

STAGE 1

STAGE 3

STAGE 4

STAGE 5

- NOTES
1. ALL WORKS TO BE IN ACCORDANCE WITH WAIKATO REGIONAL COUNCIL EROSION AND SEDIMENT CONTROL: GUIDELINES FOR SOIL DISTURBING ACTIVITIES TR 2009/02.
 2. COORDINATES IN TERMS OF NZ GEODETIC DATUM MT EDEN 2000
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 7. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY APPROVAL FROM UTILITY OPERATORS BEFORE COMMENCING WORK UNDER OR NEAR THEIR SERVICES.
 8. CONTRACTOR SHALL PROVIDE AS-BUILT OF WORKING SEDIMENT CONTROL DEVICES AND CONFIRMATION OF POND/DECENT VOLUMES TO ENGINEER.

LEGEND

	EX BDY
	PROP BDY
	EX MAJOR CONTOUR
	EX MINOR CONTOUR
	PR MAJOR CONTOUR
	PR MINOR CONTOUR
	PROP EXTENT WORK
	PROP CLEANWATER
	PROP DIRTYWATER
	PROP SILT FENCE
	PROP STOCKPILE
	PROP DECANT
	PROP DECANT BAR

A	FAST TRACK APP	MKS	06/2026
Rev	Description	By	Date
		By	Date
Survey	MAVEN		06/2025
Design	RJM		11/2025
Drawn	RJM		11/2025
Checked	DJM		11/2025

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Project
**SOUTHERN LINKS 1
RESIDENTIAL STAGE 1
HAMILTON, WAIKATO
FOR
SAXBY RD JV LIMITED**

Title
**PROPOSED
CONTOUR
OVERVIEW PLAN**

Project no.	298001-R1 SL1		
Scale	1:4000 @ A3		
Cad file	298001-R1-C200 EARTHWORKS.DWG		
Drawing no.	R1-C200	Rev	A

DRAFT FOR REVIEW

DATE: 6/2025 FILEPATH: F:\MAVEN\HAMILTON6 PROJECTS\298001 - SOUTHERN LINKS 1\STG R1\DWG\298001-R1-C200 EARTHWORKS.DWG



- NOTES
1. ALL WORKS TO BE IN ACCORDANCE WITH WAIKATO REGIONAL COUNCIL EROSION AND SEDIMENT CONTROL: GUIDELINES FOR SOIL DISTURBING ACTIVITIES TR 2009/02.
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LEGEND	
	EX BDY
	PROP BDY
	EX MAJOR CONTOUR
	EX MINOR CONTOUR
	PR MAJOR CONTOUR
	PR MINOR CONTOUR
	PROP EXTENT WORK
	PROP CLEANWATER
	PROP DIRTYWATER
	PROP SILT FENCE
	PROP STOCKPILE
	PROP DECANT
	PROP DECANT BAR

A	FAST TRACK APP	MKS	06/2026
Rev	Description	By	Date
		By	Date
Survey	MAVEN		06/2025
Design	RJM		11/2025
Drawn	RJM		11/2025
Checked	DJM		11/2025



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Project
**SOUTHERN LINKS 1
RESIDENTIAL STAGE 1
HAMILTON, WAIKATO
FOR
SAXBY RD JV LIMITED**

Title
**PROPOSED
STAGE 1
CONTOUR PLAN**

Project no.	298001-R1 SL1		
Scale	1:4000 @ A3		
Cad file	298001-R1-C200 EARTHWORKS.DWG		
Drawing no.	R1-C200-1	Rev	A



- NOTES
1. ALL WORKS TO BE IN ACCORDANCE WITH WAIKATO REGIONAL COUNCIL EROSION AND SEDIMENT CONTROL: GUIDELINES FOR SOIL DISTURBING ACTIVITIES TR 2009/02.
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- LEGEND
- EX BDY
 - PROP BDY
 - EX MAJOR CONTOUR
 - EX MINOR CONTOUR
 - PR MAJOR CONTOUR
 - PR MINOR CONTOUR
 - PROP EXTENT WORK
 - PROP CLEANWATER
 - PROP DIRTYWATER
 - PROP SILT FENCE
 - PROP STOCKPILE
 - PROP DECANT
 - PROP DECANT BAR

A	FAST TRACK APP	MKS	06/2026
Rev	Description	By	Date
		By	Date
Survey	MAVEN		06/2025
Design	RJM		11/2025
Drawn	RJM		11/2025
Checked	DJM		11/2025

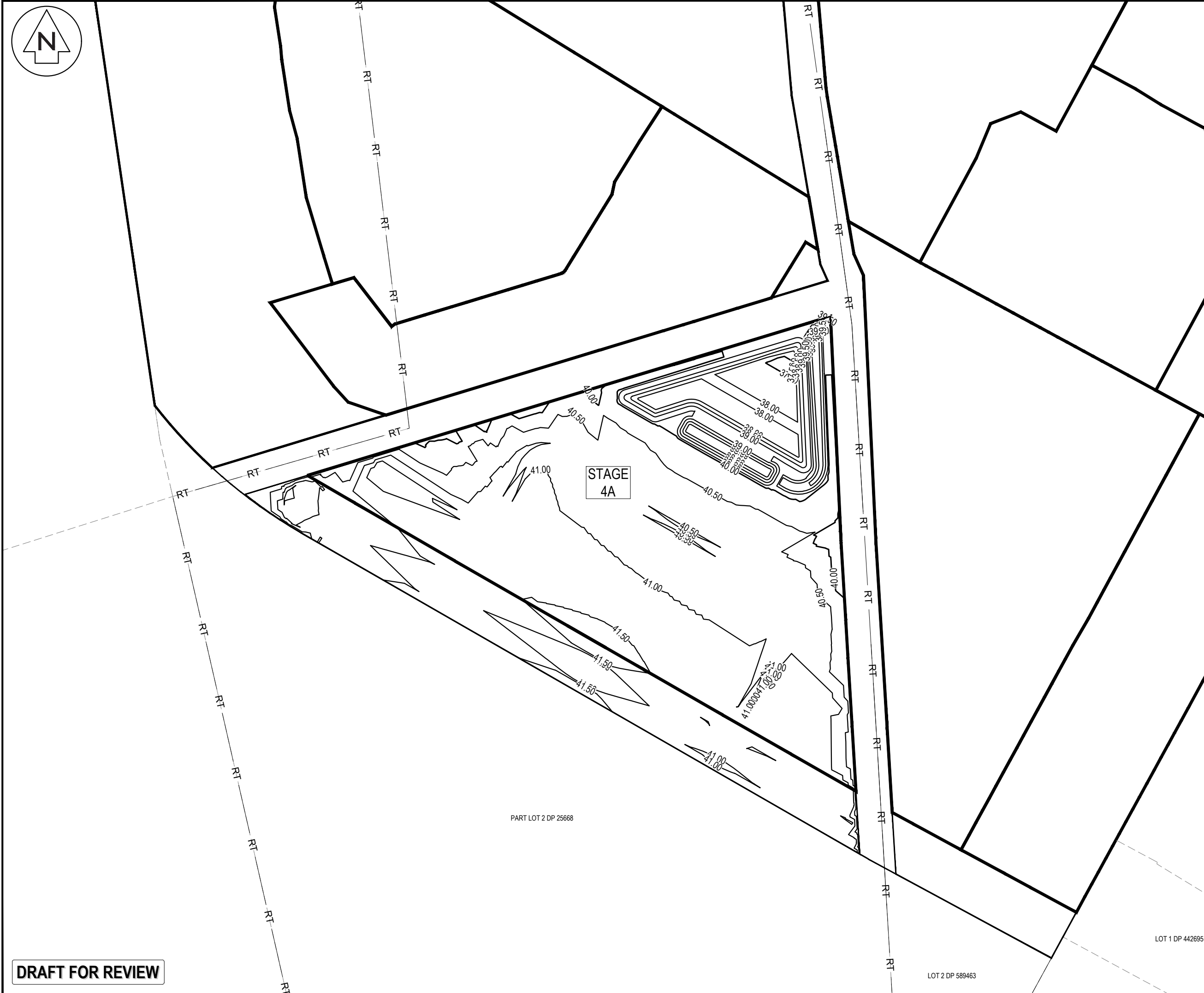


Project
**SOUTHERN LINKS 1
RESIDENTIAL STAGE 1
HAMILTON, WAIKATO
FOR
SAXBY RD JV LIMITED**

Title
**PROPOSED
STAGE 1
CONTOUR PLAN**

Project no.	298001-R1 SL1
Scale	1:4000 @ A3
Cad file	298001-R1-C200 EARTHWORKS.DWG
Drawing no.	R1-C200-3
Rev	A

DRAFT FOR REVIEW



- NOTES
1. ALL WORKS TO BE IN ACCORDANCE WITH WAIKATO REGIONAL COUNCIL EROSION AND SEDIMENT CONTROL: GUIDELINES FOR SOIL DISTURBING ACTIVITIES TR 2009/02.
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LEGEND	
	EX BDY
	PROP BDY
	EX MAJOR CONTOUR
	EX MINOR CONTOUR
	PR MAJOR CONTOUR
	PR MINOR CONTOUR
	PROP EXTENT WORK
	PROP CLEANWATER
	PROP DIRTYWATER
	PROP SILT FENCE
	PROP STOCKPILE
	PROP DECANT
	PROP DECANT BAR

A	FAST TRACK APP	MKS	06/2026
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Survey	MAVEN		06/2025
Design	RJM		11/2025
Drawn	RJM		11/2025
Checked	DJM		11/2025



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Project
**SOUTHERN LINKS 1
RESIDENTIAL STAGE 1
HAMILTON, WAIKATO
FOR
SAXBY RD JV LIMITED**

Title
**PROPOSED
STAGE 1
CONTOUR PLAN**

Project no.	298001-R1 SL1		
Scale	1:4000 @ A3		
Cad file	298001-R1-C200 EARTHWORKS.DWG		
Drawing no.	R1-C200-4	Rev	A

DRAFT FOR REVIEW



- NOTES
1. ALL WORKS TO BE IN ACCORDANCE WITH WAIKATO REGIONAL COUNCIL EROSION AND SEDIMENT CONTROL: GUIDELINES FOR SOIL DISTURBING ACTIVITIES TR 2009/02.
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 4. ORIGIN OF LEVELS = SM XXXX SO XXXX(XXXX) PUBLISHED RL=XX.XX, SOURCED FROM THE LINZ DIGITAL GEODETIC DATABASE.
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 6. THE CONTRACTOR SHALL COMPLY WITH ALL RELEVANT HEALTH AND SAFETY REQUIREMENTS.
 7. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY APPROVAL FROM UTILITY OPERATORS BEFORE COMMENCING WORK UNDER OR NEAR THEIR SERVICES.
 8. CONTRACTOR SHALL PROVIDE AS-BUILT OF WORKING SEDIMENT CONTROL DEVICES AND CONFIRMATION OF POND/DECENT VOLUMES TO ENGINEER.

LEGEND

	EX BDY
	PROP BDY
	EX MAJOR CONTOUR
	EX MINOR CONTOUR
	PR MAJOR CONTOUR
	PR MINOR CONTOUR
	PROP EXTENT WORK
	PROP CLEANWATER
	PROP DIRTYWATER
	PROP SILT FENCE
	PROP STOCKPILE
	PROP DECANT
	PROP DECANT BAR

A	FAST TRACK APP	MKS	06/2026
Rev	Description	By	Date
		By	Date
Survey	MAVEN		06/2025
Design	RJM		11/2025
Drawn	RJM		11/2025
Checked	DJM		11/2025



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Project

**SOUTHERN LINKS 1
RESIDENTIAL STAGE 1
HAMILTON, WAIKATO
FOR
SAXBY RD JV LIMITED**

Title

**PROPOSED
STAGE 1
CONTOUR PLAN**

Project no.	298001-R1 SL1		
Scale	1:4000 @ A3		
Cad file	298001-R1-C200 EARTHWORKS.DWG		
Drawing no.	R1-C200-5	Rev	A

DATE: 6/2025 FILEPATH: F:\MAVEN\HAMILTON6 PROJECTS\298001 - SOUTHERN LINKS 1\STG R1\DWG\298001-R1-C200 EARTHWORKS.DWG

DRAFT FOR REVIEW



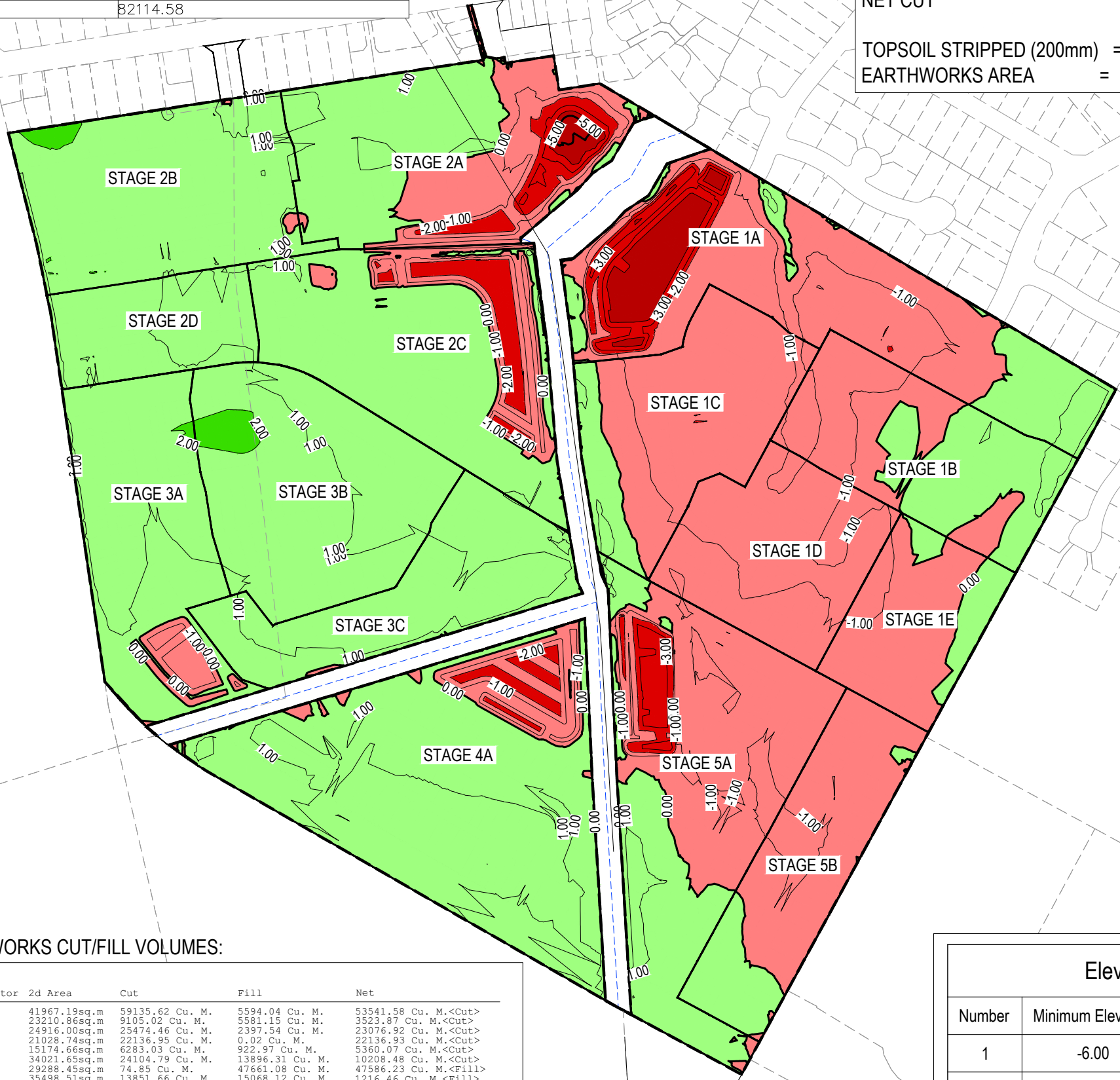
Extrapolated/Estimated Spoils Excavated (cu.m.)	
SW Pipe Embedment Spoils	6110.71
SW Manhole Spoils	260.25
WW Pipe Embedment Spoils	1449.78
WW Manhole Spoils	426.02
WS Pipe Spoils	301.88
Road Paving Excavated	47103.37
Footpath Paving Excavated	10585.03
JOAL Paving Excavated	15877.54
Total	82114.58

WHOLE SITE EARTH WORKS (SURFACE PSGL COMPARISON WITH SURFACE ESGL)

CUT VOLUME	207,910 m ³
CUT VOLUME (FROM SPOILS)	82,100 m ³
FILL VOLUME	272,850 m ³
NET CUT	17,160 m ³

TOPSOIL STRIPPED (200mm)	= 86,690 m ³
EARTHWORKS AREA	= 433,460 m ² / 43.34 Ha

- NOTES
1. ALL WORKS TO BE IN ACCORDANCE WITH WAIKATO REGIONAL COUNCIL EROSION AND SEDIMENT CONTROL: GUIDELINES FOR SOIL DISTURBING ACTIVITIES TR 2009/02.
 2. COORDINATES IN TERMS OF NZ GEODETIC DATUM MT EDEN 2000
 3. LEVELS IN TERMS OF THE NEW ZEALAND VERTICAL DATUM 2016.
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WHOLE SITE STAGING BULK EARTHWORKS CUT/FILL VOLUMES:

Cut/Fill Summary						
Name	Cut Factor	Fill Factor	2d Area	Cut	Fill	Net
PSGL vs ESGL - STAGE 1A	1.000	1.200	41967.19sq.m	59135.62 Cu. M.	5594.04 Cu. M.	53541.58 Cu. M.<Cut>
PSGL vs ESGL - STAGE 1B	1.000	1.200	23210.86sq.m	9105.02 Cu. M.	5581.15 Cu. M.	3523.87 Cu. M.<Cut>
PSGL vs ESGL - STAGE 1C	1.000	1.200	24916.00sq.m	25474.46 Cu. M.	2397.54 Cu. M.	23076.92 Cu. M.<Cut>
PSGL vs ESGL - STAGE 1D	1.000	1.200	21028.74sq.m	22136.95 Cu. M.	0.02 Cu. M.	22136.93 Cu. M.<Cut>
PSGL vs ESGL - STAGE 1E	1.000	1.200	15174.66sq.m	6283.03 Cu. M.	922.97 Cu. M.	5360.07 Cu. M.<Cut>
PSGL vs ESGL - STAGE 2A	1.000	1.200	34021.65sq.m	24104.79 Cu. M.	13896.31 Cu. M.	10208.48 Cu. M.<Cut>
PSGL vs ESGL - STAGE 2B	1.000	1.200	29288.45sq.m	74.85 Cu. M.	47661.08 Cu. M.	47586.23 Cu. M.<Fill>
PSGL vs ESGL - STAGE 2C	1.000	1.200	35498.51sq.m	13851.66 Cu. M.	15068.12 Cu. M.	1216.46 Cu. M.<Fill>
PSGL vs ESGL - STAGE 2D	1.000	1.200	12606.45sq.m	0.00 Cu. M.	16847.56 Cu. M.	16847.56 Cu. M.<Fill>
PSGL vs ESGL - STAGE 3A	1.000	1.200	27326.55sq.m	2719.46 Cu. M.	32129.16 Cu. M.	29409.70 Cu. M.<Fill>
PSGL vs ESGL - STAGE 3B	1.000	1.200	31286.41sq.m	0.00 Cu. M.	46036.93 Cu. M.	46036.93 Cu. M.<Fill>
PSGL vs ESGL - STAGE 3C	1.000	1.200	21113.31sq.m	7.92 Cu. M.	25662.40 Cu. M.	25654.48 Cu. M.<Fill>
PSGL vs ESGL - STAGE 4A	1.000	1.200	53087.67sq.m	8623.46 Cu. M.	49833.35 Cu. M.	41209.90 Cu. M.<Fill>
PSGL vs ESGL - STAGE 5A	1.000	1.200	41521.63sq.m	27600.06 Cu. M.	9305.01 Cu. M.	18295.05 Cu. M.<Cut>
PSGL vs ESGL - STAGE 5B	1.000	1.200	21410.89sq.m	8792.78 Cu. M.	1913.89 Cu. M.	6878.90 Cu. M.<Cut>
Totals			433458.96sq.m	207910.08 Cu. M.	272849.54 Cu. M.	64939.46 Cu. M.<Fill>

RESOURCE CONSENT

Elevations Table			
Number	Minimum Elevation	Maximum Elevation	Color
1	-6.00	-4.00	Red
2	-4.00	-2.00	Red
3	-2.00	0.00	Light Red
4	0.00	2.00	Light Green
5	2.00	4.00	Green

Project
**SOUTHERN LINKS 1
RESIDENTIAL STAGE 1
HAMILTON, WAIKATO
FOR
SAXBY RD JV LIMITED**

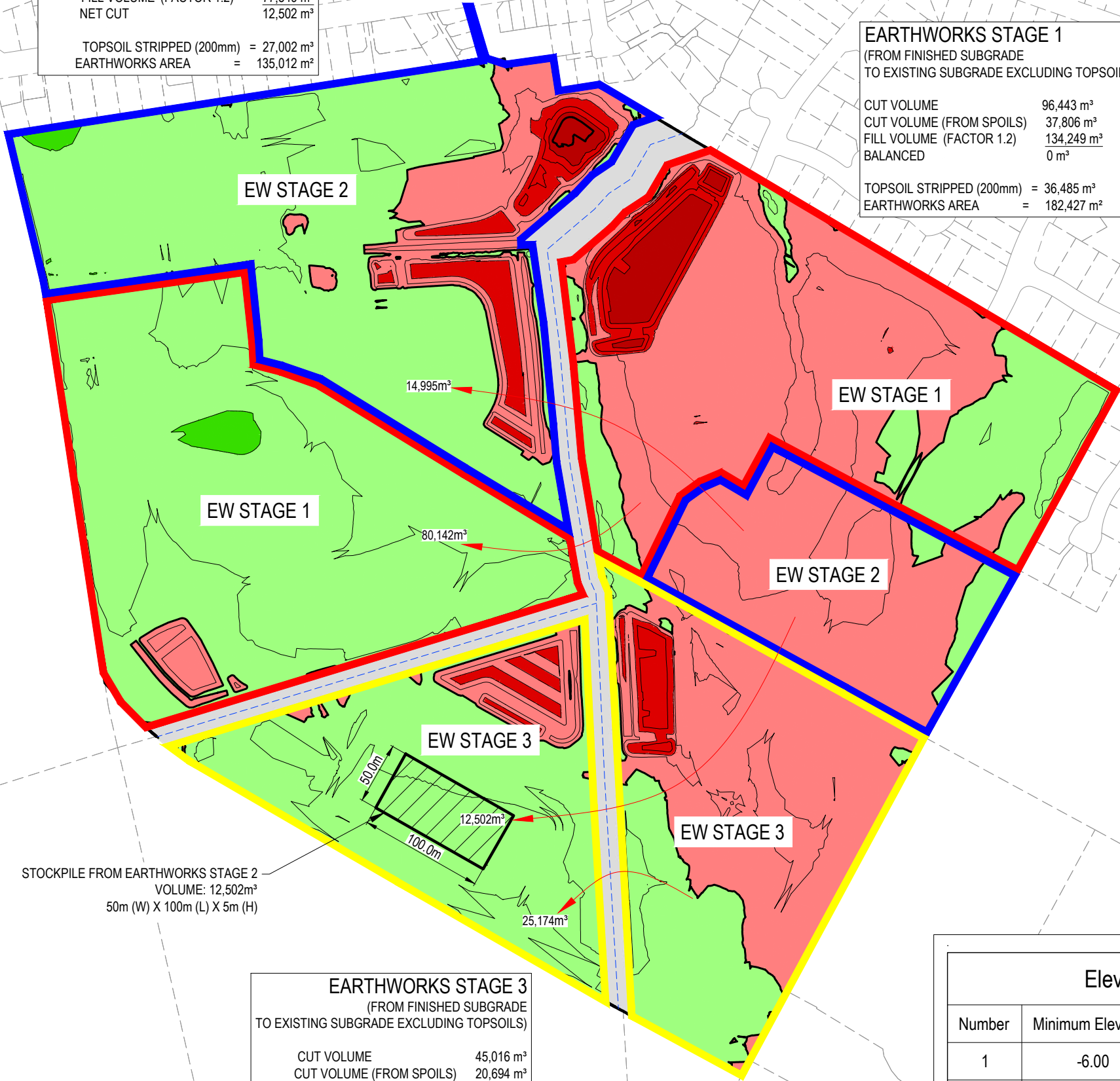
Title
**PROPOSED
CUT/FILL
OVERVIEW PLAN**

Project no.	298001-R1 SL1
Scale	1:4000 @ A3
Cad file	298001-R1-C220 EW CUT&FILL.DWG
Drawing no.	R1-C220
Rev	A



EARTHWORKS STAGE 2	
(FROM FINISHED SUBGRADE TO EXISTING SUBGRADE EXCLUDING TOPSOILS)	
CUT VOLUME	66,451 m³
CUT VOLUME (FROM SPOILS)	23,600 m³
FILL VOLUME (FACTOR 1.2)	77,549 m³
NET CUT	12,502 m³
TOPSOIL STRIPPED (200mm)	= 27,002 m³
EARTHWORKS AREA	= 135,012 m²

EARTHWORKS STAGE 1	
(FROM FINISHED SUBGRADE TO EXISTING SUBGRADE EXCLUDING TOPSOILS)	
CUT VOLUME	96,443 m³
CUT VOLUME (FROM SPOILS)	37,806 m³
FILL VOLUME (FACTOR 1.2)	134,249 m³
BALANCED	0 m³
TOPSOIL STRIPPED (200mm)	= 36,485 m³
EARTHWORKS AREA	= 182,427 m²



STOCKPILE FROM EARTHWORKS STAGE 2
VOLUME: 12,502m³
50m (W) X 100m (L) X 5m (H)

EARTHWORKS STAGE 3	
(FROM FINISHED SUBGRADE TO EXISTING SUBGRADE EXCLUDING TOPSOILS)	
CUT VOLUME	45,016 m³
CUT VOLUME (FROM SPOILS)	20,694 m³
FILL VOLUME (FACTOR 1.2)	61,052 m³
NET CUT	4,658 m³
TOPSOIL STRIPPED (200mm)	= 23,204 m³
EARTHWORKS AREA	= 116,020 m²

Elevations Table			
Number	Minimum Elevation	Maximum Elevation	Color
1	-6.00	-4.00	Dark Red
2	-4.00	-2.00	Red
3	-2.00	0.00	Light Red
4	0.00	2.00	Light Green
5	2.00	4.00	Green

- NOTES
1. ALL WORKS TO BE IN ACCORDANCE WITH WAIKATO REGIONAL COUNCIL EROSION AND SEDIMENT CONTROL: GUIDELINES FOR SOIL DISTURBING ACTIVITIES TR 2009/02.
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A	FAST TRACK APP	MKS	06/2026
Rev	Description	By	Date
		By	Date
Survey	MAVEN		06/2025
Design	MKS		11/2025
Drawn	MKS		11/2025
Checked	DJM		11/2025



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Project
**SOUTHERN LINKS 1
RESIDENTIAL STAGE 1
HAMILTON, WAIKATO
FOR
SL1 CONSORTIUM GROUP**

Title
**PROPOSED
CUT/FILL
STAGING PLAN**

Project no.	298001-R1 SL1		
Scale	1:4000 @ A3		
Cad file	298001-R1-C220-1 EW CUT&FILL.DWG		
Drawing no.	C220-1	Rev	A

RESOURCE CONSENT



C250-1

C250-2

C250-3

ROAD 3

ROAD 4

ROAD 5

ROAD 6

ROAD 3

ROAD 7

ROAD 8

ROAD 16

ROAD 9

COLLECTOR ROAD 1

COLLECTOR ROAD 2

ROAD 17

ROAD 13

ROAD 15

ROAD 14

ROAD 10

ROAD 12

ROAD 10

ROAD 12

ROAD 10

ROAD 11

RESOURCE CONSENT

- The maximum retained height shall be as specified on the drawing and shall not be exceeded unless approved by Maven in writing.
- The concrete encasement shall be adequately vibrated with a pencil vibrator to avoid "honey combing".
- Excavations for foundations shall be taken out by augering to the dimensions detailed with all surplus soil being disposed of away from the site.
- Allowance shall be made in positioning augered holes for the slope of the wall and for concrete surround to poles.
- Driving of poles is not acceptable as an alternative to auguring.
- The Contractor shall verify the position of all underground services and confirm that there are no clashes prior to construction.
- The Contractor shall refer to Maven as soon as possible for further instruction should any unforeseen circumstance or abnormal site condition be encountered during construction.
- Inspections are required by Geotechnical Engineer during construction to confirm assumed ground conditions.
- Maven shall inspect and approve the founding depth and condition of all pile holes prior to installation of the poles and pouring of concrete.
- Any groundwater and associated sediment/sludge within the pile holes shall be removed prior to installing the timber poles and the pouring of concrete.
- If there is potential for hole collapse e.g. due to weak ground condition or groundwater ingress, it is recommended that alternate holes be drilled initially and backfilled with concrete prior to the drilling of the remaining holes.
- Concrete encasement to extend to toe of permanent retaining wall i.e. post future backfilling in front of wall.
- Building Consent to be done by others.

Notes

- All works to be in accordance with Matamata-Piako District Council standards.
- All existing and proposed services shall be marked and protected during construction works.
- The extent of excavation required shall be marked out on the ground having regard to the positions of poles, working space for construction, backfill and drainage provisions.
- The retaining wall should be backfilled to its full height with 'no fines' concrete, fully wrapped by a separation geotextile Bidim A14 or approved similar.
- Timber pole wall
 - All timber poles shall be H5 treated radiata pine in accordance with NZS 3603 unless otherwise specified.
 - All timber poles shall have concrete encasement below the ground level with a minimum of 75mm side cover. The characteristic compressive strength of the concrete encasement shall be $f_c = 20$ MPa unless otherwise noted.
 - Poles are expressed as a minimum small end diameter $\emptyset$ (SED) and shall be installed small end upwards. Cut ends shall not be put into the ground.
 - The timber railing shall be H4 treated Radiata Pine and shall be fixed to the rear of the poles with CCA resistant coated screws or nails. Rails shall have minimum 10mm gap between them.
 - Cutting of timbers shall be avoided wherever possible. If cutting is necessary, the exposed surfaces shall be flooded with a copper naphthenate type wood preservative.

Legend

- EX BDY
- PROP BDY
- RETAINING WALL 0.0-1.0m
- RETAINING WALL 1.0-1.5m
- RETAINING WALL 1.5-2.0m
- RETAINING WALL 2.0-2.5m

A	FAST TRACK APP	MJRA	06/2026
Rev	Description	By	Date
Survey	MAVEN		06/2025
Design	MJRA		04/2026
Drawn	MJRA		04/2026
Checked	MKJ/DJM		04/2026



Project
**SOUTHERN LINKS 1
RESIDENTIAL STAGE 1
HAMILTON, WAIKATO
FOR
SAXBY RD JV LIMITED**

Title
**PROPOSED
RETAINING WALL
OVERVIEW PLAN**

Project no.	298001-R1 SL1
Scale	1:4000 @ A3
Cad file	298001-R1-C250 RETAINING WALL.DWG
Drawing no.	R1-C250
Rev	A



Notes
1. See plan C250 for all notes.

Legend	
	EX BDY
	PROP BDY
	RETAINING WALL 0.0-1.0m
	RETAINING WALL 1.0-1.5m
	RETAINING WALL 1.5-2.0m
	RETAINING WALL 2.0-2.5m

A	FAST TRACK APP	MJRA	06/2026
Rev	Description	By	Date
		By	Date
Survey	MAVEN		06/2025
Design	MJRA		04/2026
Drawn	MJRA		04/2026
Checked	MKJ/DJM		04/2026



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Project
**SOUTHERN LINKS 1
RESIDENTIAL STAGE 1
HAMILTON, WAIKATO
FOR
SAXBY RD JV LIMITED**

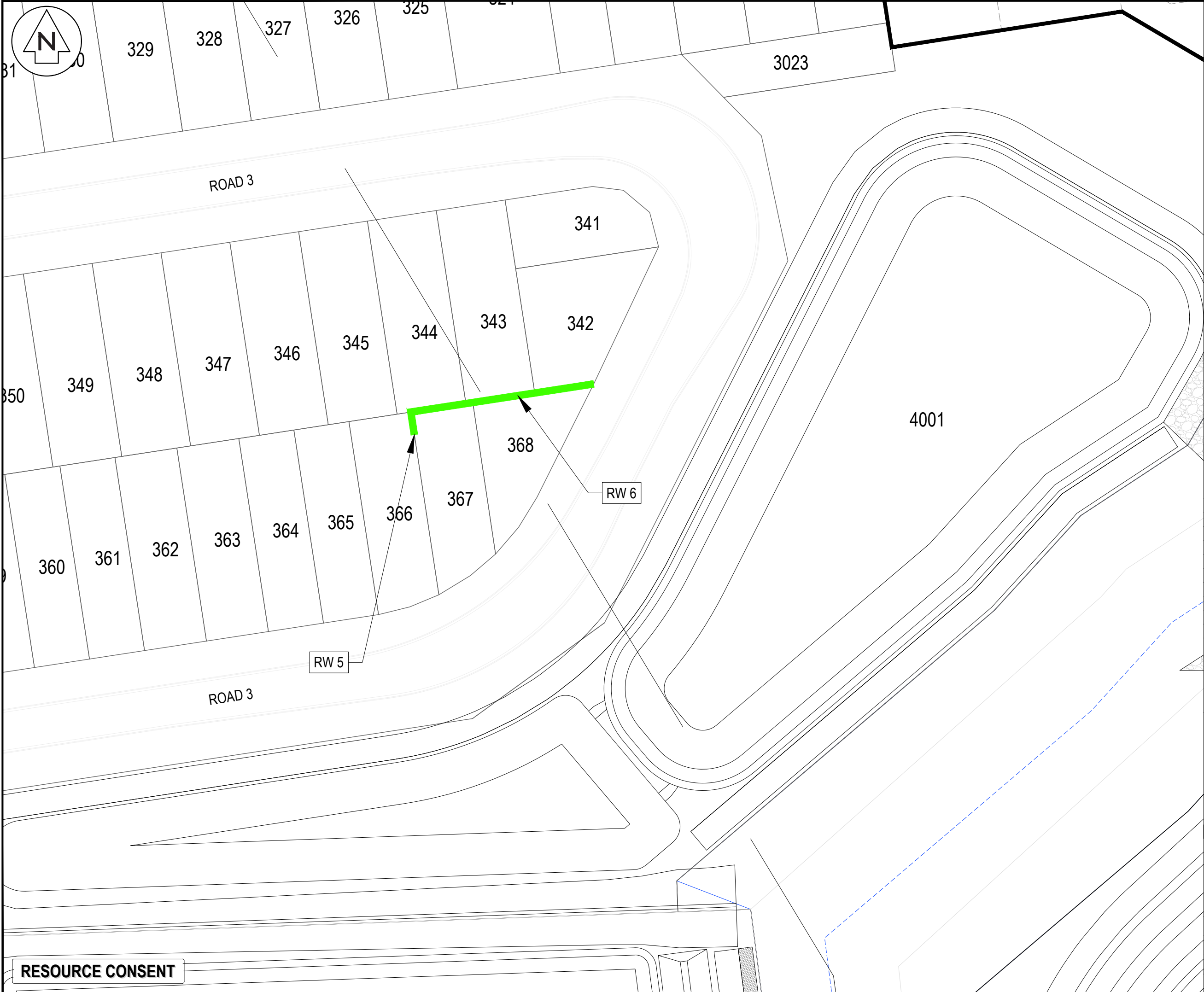
Title
**PROPOSED
RETAINING WALL
PLAN**

Project no.	298001-R1 SL1
Scale	1:1000 @ A3
Cad file	298001-R1-C250 RETAINING WALL.DWG
Drawing no.	R1-C250-1
Rev	A

RW 1
NOTE: BUILD BACK OF
RETAINING WALL ON THE
EDGE OF JOAL & LOT
BOUNDARY. NO NEED TO
APPLY THE 0.5m SETBACK
SPECIFIED ON THE RETAINING
WALL TYPICAL SECTION

RESOURCE CONSENT

DATE: 6/9/25 FILEPATH: F:\MVEN\HAMILTON\6. PROJECTS\298001 - SOUTHERN LINKS 1\STG1\DWG\298001-R1-C250 RETAINING WALL.DWG



Notes
1. See plan C250 for all notes.

Legend

EX BDY

PROP BDY

RETAINING WALL 0.0-1.0m

RETAINING WALL 1.0-1.5m

RETAINING WALL 1.5-2.0m

RETAINING WALL 2.0-2.5m

A	FAST TRACK APP	MJRA	06/2026
Rev	Description	By	Date
		By	Date
Survey	MAVEN		06/2025
Design	MJRA		04/2026
Drawn	MJRA		04/2026
Checked	MKJ/DJM		04/2026

M

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Project

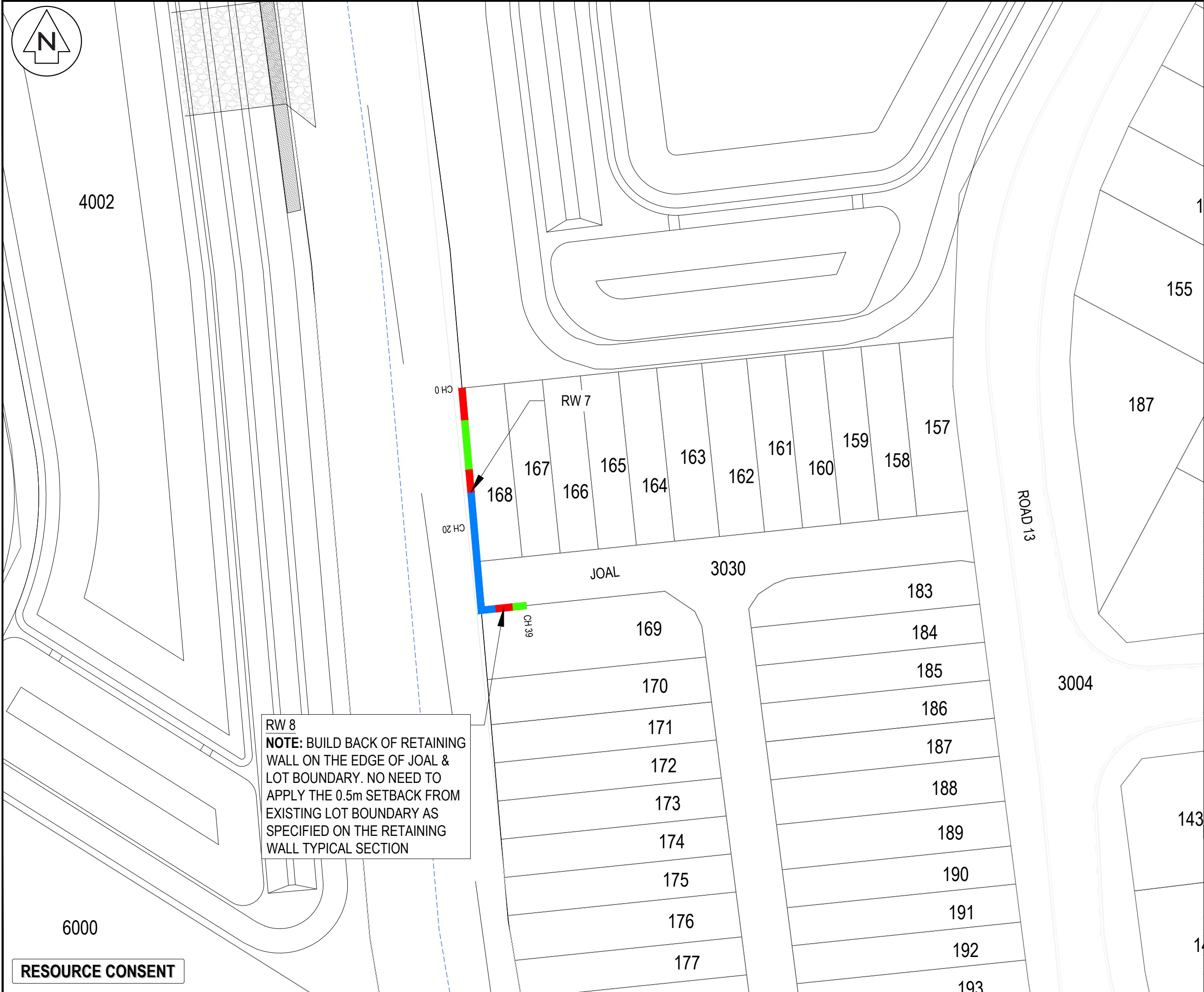
SOUTHERN LINKS 1
RESIDENTIAL STAGE 1
HAMILTON, WAIKATO
FOR
SAXBY RD JV LIMITED

Title

PROPOSED
RETAINING WALL
PLAN

Project no.	298001-R1 SL1		
Scale	1:500 @ A3		
Cad file	298001-R1-C250 RETAINING WALL.DWG		
Drawing no.	R1-C250-2	Rev	A

DATE: 6/9/25 FILEPATH: F:\MVEN\HAMILTON6 PROJECTS\298001 - SOUTHERN LINKS 1\STG1\DWG\298001-R1-C250 RETAINING WALL.DWG



Notes

1. See plan C250 for all notes.

Legend

- EX BDY
- PROP BDY
- RETAINING WALL 0.0-1.0m
- RETAINING WALL 1.0-1.5m
- RETAINING WALL 1.5-2.0m
- RETAINING WALL 2.0-2.5m

A	FAST TRACK APP	MJRA	06/2026
Rev	Description	By	Date
		By	Date
Survey	MAVEN		06/2025
Design	MJRA		04/2026
Drawn	MJRA		04/2026
Checked	MKJ/DJM		04/2026

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Project

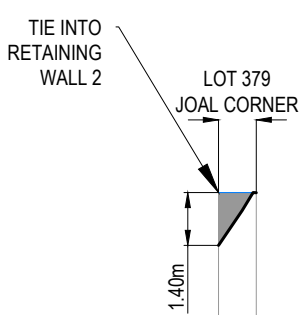
**SOUTHERN LINKS 1
RESIDENTIAL STAGE 1
HAMILTON, WAIKATO
FOR
SAXBY RD JV LIMITED**

143

Title

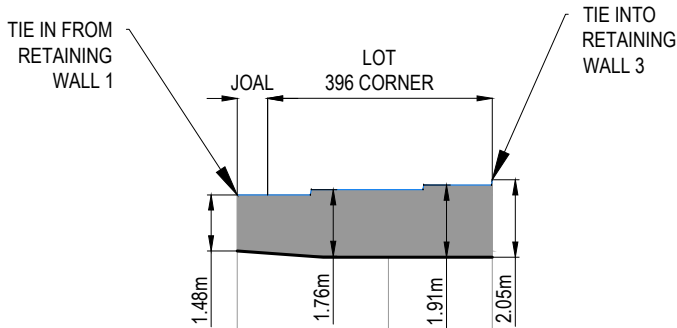
**PROPOSED
RETAINING WALL
PLAN**

Project no.	298001-R1 SL1		
Scale	1:500 @ A3		
Cad file	298001-R1-C250 RETAINING WALL.DWG		
Drawing no.	R1-C250-3	Rev	A



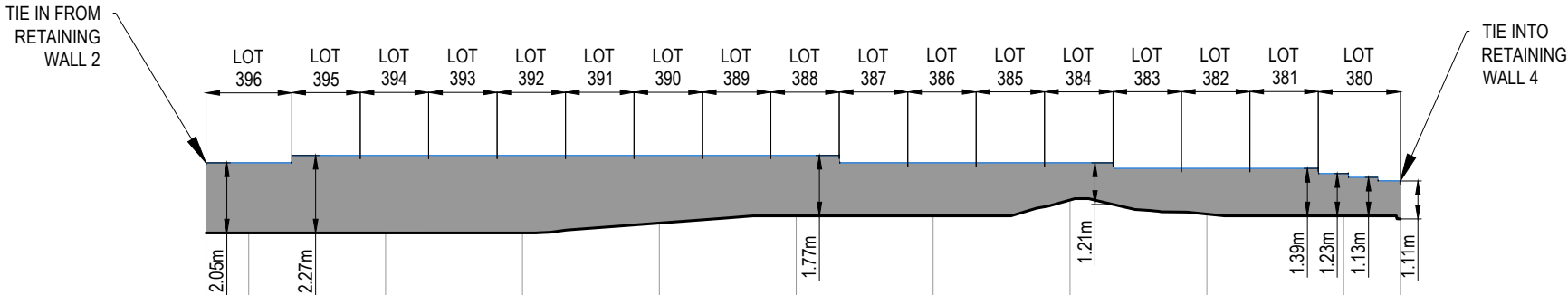
DATUM 36.00m	
TOP OF WALL	41.45
TOE OF WALL	40.05
WALL HEIGHT	1.40
CHAINAGE	0.00
	5.00

Retaining Wall 1
SCALE: HORI 1:1000 VERT 1:200



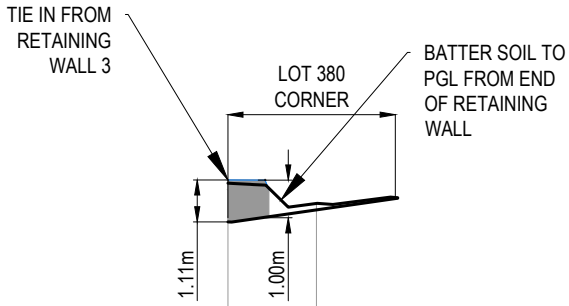
DATUM 36.00m	
TOP OF WALL	41.38
TOE OF WALL	39.90
WALL HEIGHT	1.48
CHAINAGE	0.00
	20.00
	33.74

Retaining Wall 2
SCALE: HORI 1:1000 VERT 1:200



DATUM 36.00m	
TOP OF WALL	41.78
TOE OF WALL	39.74
WALL HEIGHT	2.05
CHAINAGE	33.74
	40.00
	60.00
	80.00
	100.00
	120.00
	140.00
	160.00
	180.00
	200.00
	208.29

Retaining Wall 3
SCALE: HORI 1:1000 VERT 1:200



DATUM 36.00m	
TOP OF WALL	41.25
TOE OF WALL	40.14
WALL HEIGHT	1.11
CHAINAGE	208.29
	220.00
	237.97

Retaining Wall 4
SCALE: HORI 1:1000 VERT 1:200

RESOURCE CONSENT

Notes
1. See plan C250 for all notes.

A	FAST TRACK APP	MJRA	06/2026
Rev	Description	By	Date
	By	Date	
Survey	MAVEN	06/2025	
Design	MJRA	04/2026	
Drawn	MJRA	04/2026	
Checked	MKJ/DJM	04/2026	

M

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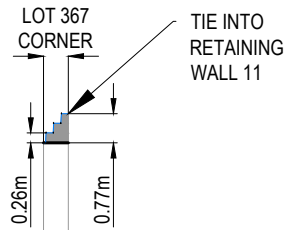
New Zealand

Project
**SOUTHERN LINKS 1
RESIDENTIAL STAGE 1
HAMILTON, WAIKATO
FOR
SAXBY RD JV LIMITED**

Title
**PROPOSED
RETAINING WALL
LONGSECTION**

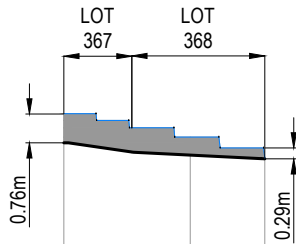
Project no.	298001-R1 SL1
Scale	AS SHOWN
Cad file	298001-R1-C250 RETAINING WALL.DWG
Drawing no.	R1-C250-4
Rev	A

DATE: 6/9/25 FILEPATH: F:\MAVEN\HAMILTON6 - PROJECTS\298001 - SOUTHERN LINKS 1\STG R1\DWG\298001-R1-C250 RETAINING WALL.DWG



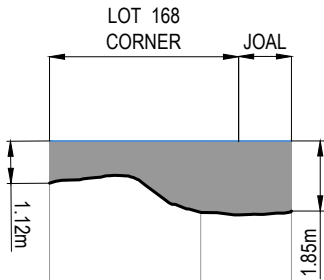
DATUM 36.00m	
TOP OF WALL	39.80 40.57
TOE OF WALL	39.80 39.80
WALL HEIGHT	0.00 0.77
CHAINAGE	0.00 3.29

Retaining Wall 5
SCALE: HORI 1:1000 VERT 1:200



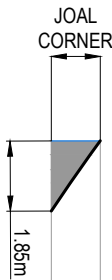
DATUM 36.00m	
TOP OF WALL	40.57 39.95 39.38
TOE OF WALL	39.80 39.47 39.37
WALL HEIGHT	0.77 0.47 0.01
CHAINAGE	3.29 20.00 29.86

Retaining Wall 6
SCALE: HORI 1:1000 VERT 1:200



DATUM 36.00m	
TOP OF WALL	40.91 40.91 40.91
TOE OF WALL	39.76 39.02 39.06
WALL HEIGHT	1.12 1.89 1.85
CHAINAGE	0.00 20.00 32.02

Retaining Wall 7
SCALE: HORI 1:1000 VERT 1:200



DATUM 36.00m	
TOP OF WALL	40.91 40.91
TOE OF WALL	39.06 40.91
WALL HEIGHT	1.85 0.00
CHAINAGE	32.02 38.51

Retaining Wall 8
SCALE: HORI 1:1000 VERT 1:200

RESOURCE CONSENT

Notes
1. See plan C250 for all notes.

A	FAST TRACK APP	MJRA	06/2026
Rev	Description	By	Date
	By	Date	
Survey	MAVEN	06/2025	
Design	MJRA	04/2026	
Drawn	MJRA	04/2026	
Checked	MKJ/DJM	04/2026	

M

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Level 1 286 Victoria Street, Hamilton

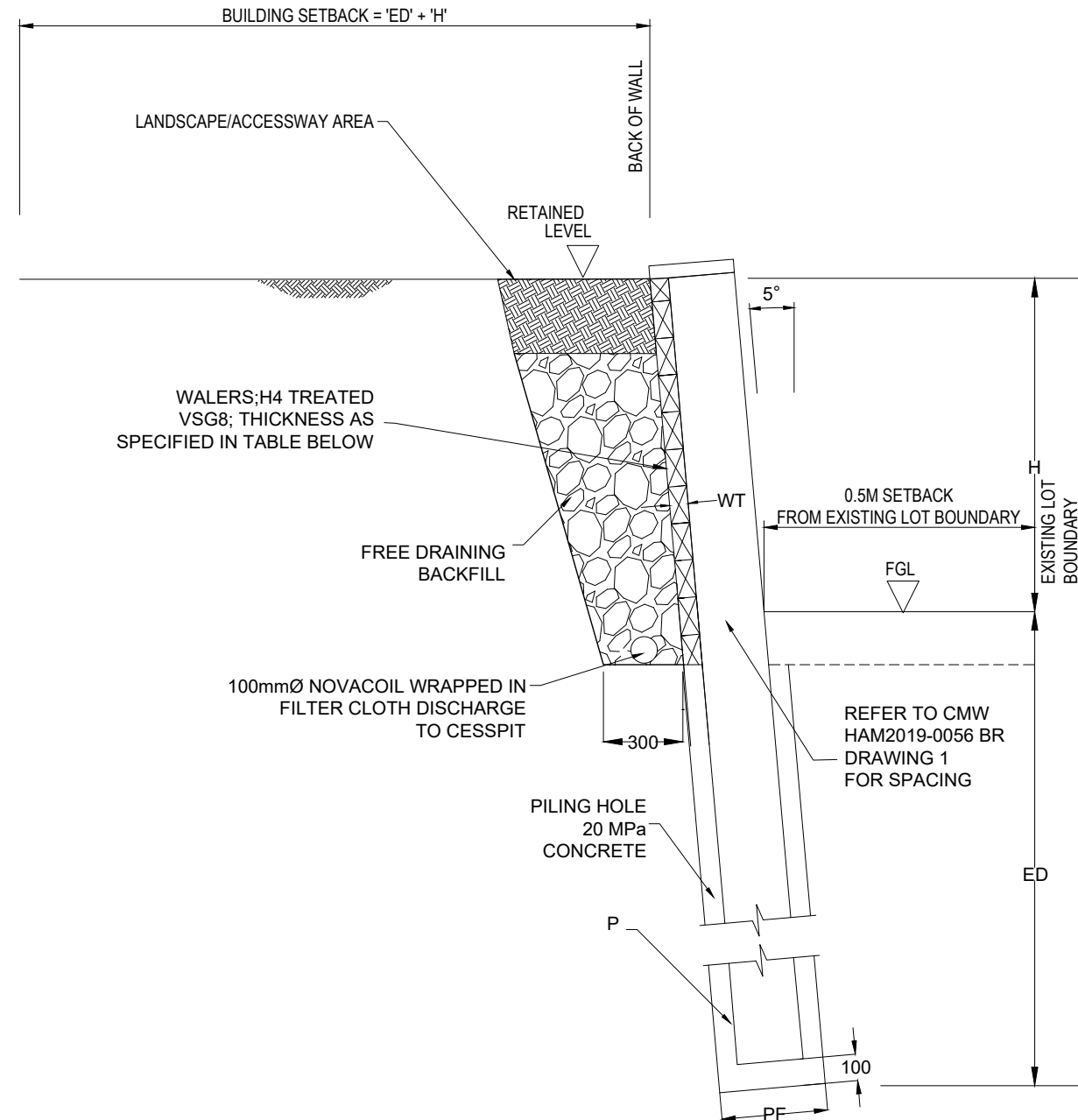
New Zealand

Project
**SOUTHERN LINKS 1
RESIDENTIAL STAGE 1
HAMILTON, WAIKATO
FOR
SAXBY RD JV LIMITED**

Title
**PROPOSED
RETAINING WALL
LONGSECTION**

Project no.	298001-R1 SL1		
Scale	AS SHOWN		
Cad file	298001-R1-C250 RETAINING WALL.DWG		
Drawing no.	R1-C250-5	Rev	A

DATE: 6/9/26 FILEPATH: F:\MAVEN\HAMILTON\6. PROJECTS\298001 - SOUTHERN LINKS 1\STG R1\DWG\298001-R1-C250 RETAINING WALL.DWG



RETAINING HEIGHT 'H' 'm' MAX.	MINIMUM SMALL END DIA (H5 TREATED) IN 'mm'	PILE FOOTING Ø 'PF' IN 'mm'	MIN. EMBEDMENT DEPTH 'ED' IN 'm'	SPACING 'm'	WALER THICKNESS WT 'mm'
1.00	200	350	1.6	1.0	(<1.5m) 45
1.50	275	425	2.1	1.0	(<1.5m) 45
2.00	325	475	2.7	1.0	(>1.5m) 90
2.30	350	500	3.0	1.0	(>1.5m) 90

NOTES:

- RETAINING WALL DESIGNED FOR BACK SLOPE = 0° MAX; SURCHARGE = 12 kPa
- DESIGN PARAMETERS FROM CMW GEOTECHNICAL INVESTIGATION REPORT. SOIL DENSITY = 17.0 kN/m³, ANGLE OF SOIL FRICTION = 28°, Su = 60 kPa.
- WALER SHALL BE CONTINUOUS OVER MINIMUM 2 SPANS.

- The maximum retained height shall be as specified on the drawing and shall not be exceeded unless approved by Maven in writing.
- The concrete encasement shall be adequately vibrated with a pencil vibrator to avoid "honey combing".
- Excavations for foundations shall be taken out by augering to the dimensions detailed with all surplus soil being disposed of away from the site.
- Allowance shall be made in positioning augered holes for the slope of the wall and for concrete surround to poles.
- Driving of poles is not acceptable as an alternative to auguring.
- The Contractor shall verify the position of all underground services and confirm that there are no clashes prior to construction.
- The Contractor shall refer to Maven as soon as possible for further instruction should any unforeseen circumstance or abnormal site condition be encountered during construction.
- Inspections are required by Geotechnical Engineer during construction to confirm assumed ground conditions.
- Maven shall inspect and approve the founding depth and condition of all pile holes prior to installation of the poles and pouring of concrete.
- Any groundwater and associated sediment/sludge within the pile holes shall be removed prior to installing the timber poles and the pouring of concrete.
- If there is potential for hole collapse e.g. due to weak ground condition or groundwater ingress, it is recommended that alternate holes be drilled initially and backfilled with concrete prior to the drilling of the remaining holes.
- Concrete encasement to extend to toe of permanent retaining wall i.e. post future backfilling in front of wall.
- Building Consent to be done by others.

Notes

- All works to be in accordance with Matamata-Piako District Council standards.
- All existing and proposed services shall be marked and protected during construction works.
- The extent of excavation required shall be marked out on the ground having regard to the positions of poles, working space for construction, backfill and drainage provisions.
- The retaining wall should be backfilled to its full height with 'no fines' concrete, fully wrapped by a separation geotextile Bidim A14 or approved similar.
- Timber pole wall
 - All timber poles shall be H5 treated radiata pine in accordance with NZS 3603 unless otherwise specified.
 - All timber poles shall have concrete encasement below the ground level with a minimum of 75mm side cover. The characteristic compressive strength of the concrete encasement shall be f_c = 20 MPa unless otherwise noted.
 - Poles are expressed as a minimum small end diameter Ø (SED) and shall be installed small end upwards. Cut ends shall not be put into the ground.
 - The timber railing shall be H4 treated Radiata Pine and shall be fixed to the rear of the poles with CCA resistant coated screws or nails. Rails shall have minimum 10mm gap between them.
 - Cutting of timbers shall be avoided wherever possible. If cutting is necessary, the exposed surfaces shall be flooded with a copper naphthenate type wood preservative.

A	FAST TRACK APP	MJRA	06/2026
Rev	Description	By	Date
		By	Date
Survey	MAVEN		06/2025
Design	MJRA		04/2026
Drawn	MJRA		04/2026
Checked	MKJ/DJM		04/2026

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New Zealand

Project
**SOUTHERN LINKS 1
RESIDENTIAL STAGE 1
HAMILTON, WAIKATO
FOR
SAXBY RD JV LIMITED**

Title PROPOSED RETAINING WALL TYPICAL SECTION			
Project no.	298001-R1 SL1		
Scale	1:25 @ A3		
Cad file	298001-R1-C250 RETAINING WALL.DWG		
Drawing no.	R1-C250-6	Rev	A