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SUBJECT	Outline of Hydrogeological Assessment for Fast track

1. PROJECT DESCRIPTION

The project for which a fast-track application is being applied for is the consenting and construction of the proposed Rogerson Block of the Southern Links Stage 1 (SL1) residential and industrial development.

WGA understands that the SL1 project is to provide a range of differing housing types and land tenure opportunities to provide affordable housing and to boost the industrial capability of the region. 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. The SL1 site is currently zoned rural under the Waipa District Plan and comprises 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 at the site will be managed by naturalised streams, rain gardens and constructed wetlands. WGA understands that groundwater bores will provide water to the development and that wastewater will be treated and disposed on site.

The Rogerson Block is located on the northwestern corner of the SL1 development and comprises approximately 43 hectares, which will be split into 13 hectares of medium density residential development and 28 hectares of industrial development (Figure 1). Most of the Rogerson Block is low-lying flat farmland and the Waitawhiriwhiri Stream flows through the middle of the site.

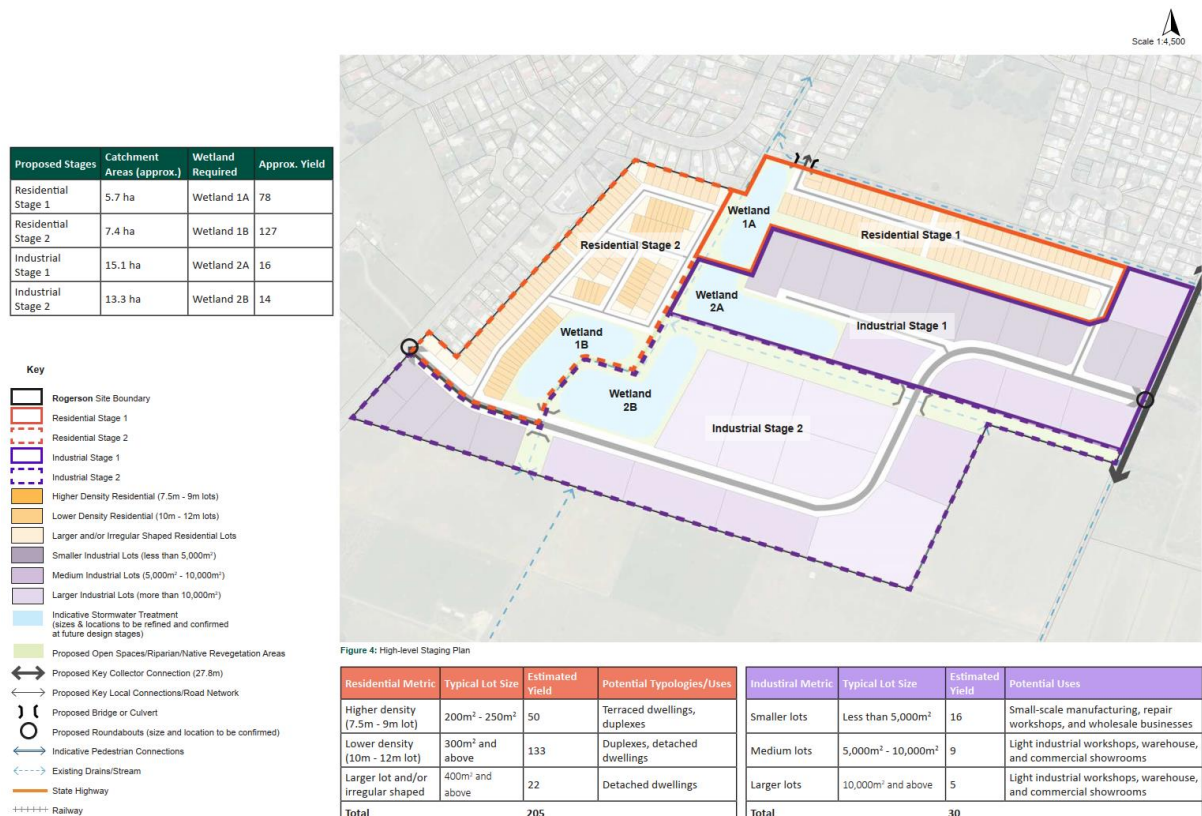


Figure 1: Rogerson Development Conceptual Plan Reproduced from Barker and Associates (2025)

2. HYDROGEOLOGY INTRODUCTION

The hydrogeological assessment is for the following activities at the Rogerson site:

- The construction and on-going effects of the stormwater management infrastructure
- General construction for excavations below the water table
- The operation of Production Bores to provide domestic water supply for the development
- The construction and on-going effects of wastewater treatment and disposal Infrastructure

The site has a shallow groundwater table that is connected to existing surface water bodies (i.e., wetlands and streams). Therefore, a detailed assessment is required to ensure that the effects of the proposed urban development are acceptable. The types of activities required to establish the necessary infrastructure for the development that may result in effects on groundwater and connected wetlands are listed in Table 1.

The proposed activities are relatively standard for land development projects in the Hamilton area. Commonly used monitoring and mitigation measures could be used at the site, such as groundwater monitoring bores, changes to drainage methods, reductions in pumping rates and reductions in hydraulic connections to reduce potential effects in sensitive areas.

Table 1: Activities Which Require Resource Consent and Affect Hydrogeology

ACTIVITY	TECHNICAL ASSESSMENTS REQUIRED	CONSENTS
Drinking Water Infrastructure		
Abstraction of Groundwater for domestic water supply.	Groundwater/hydrogeology including effects on surface waterbodies/wetlands, other groundwater users.	Controlled activity under WRP Rule Section 3.
Stormwater Management Infrastructure		
Temporary and permanent diversion of surface water.	Groundwater/hydrogeology including effects on wetlands and settlement.	Discretionary Activity under WRP Rule 3.6.4.13. Discretionary Activity under Regulation 45 of the NESFW.
Permanent damming and diversion of groundwater (changes to groundwater flows resulting from creation of the stormwater infrastructure).	Groundwater/hydrogeology including effects on surface water bodies/wetlands, other groundwater users, mobilisation of contaminants, and settlement. The stormwater infrastructure may permanently lower the local water table, therefore requiring consent for a groundwater diversion.	Discretionary Activity under WRP Rule 3.6.4.13. Discretionary Activity under Regulation 45 of the NESFW.
Temporary water takes during construction for dewatering/lowering of the groundwater table.	Dewatering during construction to lower the groundwater table or maintain a dry environment within excavations may be undertaken using spears. The take will be classified as a groundwater take and will require an assessment of the effects on aquifer sustainability, other bore users, and surface water bodies (including wetlands), mobilisation of contaminants, ecological and cultural effects.	Controlled activity under WRP Rule 3.8.4.7 (drilling). Discretionary Activity under WRP Rule 3.3.4.24 (groundwater take).
Construction of specified infrastructure including earthworks and clean fill disposal.	Groundwater/hydrogeology including effects on wetlands.	Discretionary Activity under Regulation 45 of the NESFW.

ACTIVITY	TECHNICAL ASSESSMENTS REQUIRED	CONSENTS
Geotechnical and groundwater investigations.	There will be a need to facilitate further groundwater and geotechnical investigation and monitoring to obtain additional information and to monitor the impact of the works on groundwater levels. This will occur prior to works, during works, and post-works.	Controlled Activity under WRP Rule 3.8.4.7 (drilling). Discretionary Activity under WRP Rule 3.3.4.24 (groundwater take). Controlled Activity under WRP Rule 3.6.8.2 (well and aquifer testing discharges).
Wastewater Treatment and Disposal Infrastructure		
Permanent damming and diversion of groundwater (changes to groundwater flows resulting from creation of the wastewater treatment and disposal infrastructure).	Groundwater/hydrogeology including effects on surface water bodies/wetlands, other groundwater users, mobilisation of contaminants, and settlement. The stormwater infrastructure may permanently lower the local water table, therefore requiring consent for a groundwater diversion.	Discretionary Activity under WRP Rule 3.6.4.13. Discretionary Activity under Regulation 45 of the NESFW.
Temporary water takes during construction for dewatering/lowering of the groundwater table.	Dewatering during construction to lower the groundwater table or maintain a dry environment within excavations may be undertaken using spears. The take will be classified as a groundwater take and will require an assessment of the effects on aquifer sustainability, other bore users, and surface water bodies (including wetlands), mobilisation of contaminants, ecological and cultural effects.	Controlled activity under WRP Rule 3.8.4.7 (drilling). Discretionary Activity under WRP Rule 3.3.4.24 (groundwater take).
Construction of specified infrastructure including earthworks and clean fill disposal.	Groundwater/hydrogeology including effects on wetlands.	Discretionary Activity under Regulation 45 of the NESFW.
Treatment and disposal of wastewater.	The potential effects of discharging treated wastewater will need to be assessed. This required assessment will need to assess effects on surface water bodies/wetlands and other groundwater users.	Controlled Activity under WRP Rule 3.5.7.5.

3. HYDROGEOLOGICAL BACKGROUND

The SL1 site is located within the Hamilton Basin, a large tectonic basin centered on Hamilton City with an area of approximately 2,000 km² and traversed by the Waikato River. The basin is infilled with Tauranga Group alluvial sediments dating from the Pliocene to the middle Holocene, overlain by late Holocene unconsolidated alluvial and colluvial sediments.

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. The Hinuera Formation of the Tauranga Group underlies much of the Hamilton basin. 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). Overlying the Hinuera Formation sediments in the Mangakotukutuku area is peat of the Rukuhia Bog. Underlying the low hills are older ignimbrites, tephra fall deposits and alluvium (Lowe, 2010). The Hinuera Formation contains the aquifers used most extensively for water supplies across the Hamilton Basin. 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 a number of zones of higher permeability within the formation rather than a single, continuous aquifer (Scholfield, 1972).

An initial 'high level' geotechnical desktop review of the SL1 site by CMW Geosciences (2024) states that within the low-lying areas of the site within wetlands and alluvial plains are characterised by shallow groundwater levels from surface to 6.7 m below the ground surface. CWM Geosciences (2024) note that perched groundwater tables can be present within the layered Walton Subgroup deposits. The desktop review of the SL1 site by CMW Geosciences (2024) also documents the extent of peatlands throughout the SL1 site. The reported extent of the peatlands is currently uncertain, but it has been encountered throughout the site to depths of 2 m at the proposed Northern Block, Rogerson Block development.

According to the WRC database, there are approximately 16 bores within one kilometre of the Rogerson Block and the details are provided in Table 2. In agreement with CMW Geosciences (2024), groundwater levels within the vicinity of the Rogerson Development site are relatively close to surface.

Table 2: Nearby Bore Details from WRC Database May 2025

BORE NUMBER	DEPTH (m)	STATIC WATER LEVEL (m)	SCREENED DEPTH (m bgl)	SCREENED GEOLOGY
72_10320	17	7	11 - 17	Gravel/Sand
70_1198	12	Unknown	9.7 - 12	Pumice
72_1347	4	2	1 - 4	Peat
72_2039	6	Unknown	2 - 6	Unknown
72_1348	4	1	1 - 4	Sand
72_1349	4	1	1 - 4	Peat
72_7946	38	4.6	20 - 38	Sand
62_82	4.5	2.55	1 - 4.5	Sand
62_83	4.5	2.25	1 - 4.5	Sand
62_84	4.5	1.95	1 – 4.5	Unknown
62_85	4.5	2.3	1 – 4.5	Silt
62_161	4.5	2.55	Unknown	Silt
62_162	4.5	2.22	Unknown	Sand
62_163	4.5	1.98	Unknown	Silt
62_164	4.5	2.3	Unknown	Silt
72_10272	24.45	Unknown	21-24	Silt/Sand

4. KEY HYDROGEOLOGICAL EFFECTS TO BE ASSESSED

The key groundwater effects to be considered in the hydrogeological assessment include:

Earthworks and Stormwater Network

- Groundwater seepage inflows into any temporary work excavations and any associated dewatering activities.
- Groundwater drawdown effects from the works, including potential effects on existing road infrastructure and wetlands (i.e., lowering the water table in the vicinity of a wetland can impact the wetland hydrology).
- Effects from disposal of the pumped groundwater.
- Potential groundwater mounding effects of any soakage system or constructed wetland.

Drinking Water Supply

- Groundwater drawdown effects from operating the water supply bores on nearby groundwater users', streams and wetlands.

Onsite Wastewater Treatment and Disposal

- Groundwater seepage inflows into any temporary work excavations and dewatering activities
- Effects from the disposal of treated wastewater

5. METHODOLOGY FOR THE GROUNDWATER ASSESSMENT

WGA have been involved in modelling groundwater effects for the recent excavations for nearby residential developments, Rotokauri Rise and Rotokauri Greenway. The information gained at these nearby sites will be applied to the assessment. In addition, WGA staff have been highly involved in reviewing groundwater effects of the Waikato Expressway – Hamilton Section.

5.1 Earthworks and Stormwater Network

WGA proposes collaborating closely with geotechnical specialists and design engineers to build upon current groundwater knowledge and provide guidance for additional testing of the local hydraulic properties. Once the underlying local soil hydraulic properties are ascertained WGA will then be able to assess the potential mounding effects of any planned soakage systems within the stormwater management network. Given the high groundwater levels and expected low permeability of the shallow soils, WGA proposes using the MOUNDSOLV software package developed by HydroSOLVE to assess potential groundwater mounding effects of the planned soakage systems.

Additionally, once local soil hydraulic properties are ascertained the potential dewatering effects of any construction activities that require the excavations below the water table can be assessed. WGA proposes to use a combination of analytical tools such as trench models and pit models to assess temporary and long-term groundwater drawdown as a result of any construction activities that require excavations below the water table. Additionally, WGA can build upon these models to undertake 2D finite element groundwater modelling if deemed required for excavations conducted in sensitive areas.

Once mounding and groundwater drawdown risk has been analyzed, WGA propose that a monitoring plan will be developed to ensure any potential groundwater drawdown or mounding linked to potentially significant impacts can be detected and mitigated before these impacts arise.

Building upon this monitoring plan, mitigation measures will be developed and documented so that they may be put in place to reduce any calculated groundwater drawdown at the site both during the construction period and following completion of the earthworks, including for example:

- Design, installation and monitoring of groundwater level measurement systems.
- Options to modify dewatering systems to reduce the magnitude and extent of groundwater drawdown.
- Optimize pumping rates and incorporate transient adjustments in pumping rates.
- Returning pumped water to ground in areas where drawdown may lead to excessive ground settlement or other impacts.
- Reduction in hydraulic connections between groundwater and surface water bodies to reduce the effects of drawdown in sensitive areas.

5.2 Groundwater Recharge

WGA understands that the engineering solutions include soakage and recharge of stormwater into peat to maintain hydrology to prevent dewatering of downstream wetland and streams and to mitigate ground shrinkage. The potential recharge pits will be designed at regular intervals throughout the development to encourage even distribution of groundwater recharge. WGA will support the planned soakage through modelling of mounding and soakage rates into the planned areas of infiltration. WGA will undertake groundwater balance calculations for the site and analyse changes in the water balance arising from the proposed development.

5.3 Drinking Water Supply

In 2021 WGA undertook a high-level desktop assessment on possibilities for bore water supply to a potential suburban development area (Mangakotukutuku) together with comments on potential issues, constraints, and opportunities (WGA, 2021).

The desktop assessment concluded that new water supply bores can provide drinking water during the initial development of the land parcels. This will allow the development to start while waiting for the Hamilton town network to be developed to a standard to support the new subdivision areas. These bores could then provide a supplementary supply for the development and for the wider Hamilton area if required into the future.

In order to construct the required groundwater supply bores for the development WGA proposes to use the following workflow for each of the bores:

Gather Background Site Information

- Carry out a desktop survey of the site to establish local lithological information and identify any factors that may affect, or be affected by, the proposed groundwater takes.

Drill Pilot Bore

- Drill a 75 mm pilot bore to inform the precise depth that the test bore and production bore will target.
- Collect and record underlying lithology.
- Determine from the underlying stratigraphy if the site is suitable or if another location is needed.

Construct Test Bore

- Drill a 100 mm test bore and carry out a production test.
- Collect a water sample during the production test and have it analysed.
- Decide if the target aquifer can provide the desired water volumes and quality or if the bore needs to be drilled into a deeper aquifer.

Construct Production Bore

- Drill and construct a production bore close to the test bore. The diameter of the production bore will be determined based on pump and water requirements.
- Undertake a stepped rate and constant rate pumping test on the production bore.
- Analyse the pumping test data and carry out forward projections to assess the effects of operating the production bore.

5.4 Onsite Wastewater Treatment and Disposal Infrastructure

WGA proposes to assess the effects of the planned wastewater treatment and discharge facilities by undertaking attenuation modelling using microbial removal rates documented in Pang (2009). WGA proposes to use E. coli and rotavirus in the attenuation modelling as these are less likely to be removed by natural attenuation compared to other pathogens.

Once the groundwater quality risk from the wastewater treatment and discharge facilities have been assessed, WGA propose that a monitoring plan will be developed to ensure groundwater is not affected by any wastewater discharge.

If excavations below the water table are required for the construction and operation of the wastewater treatment and disposal infrastructure, WGA will assess these using the same methods proposed for the dewatering associated with the stormwater infrastructure and detailed in Section 5.1. WGA propose that a similar groundwater monitoring plan will be developed to ensure any potential groundwater drawdown or mounding linked to potentially significant impacts can be detected and mitigated before these impacts arise.

6. CONCLUSION

Based on WGA's experience and the information which has been received and known to date, WGA can see no reason why the following development could not proceed under a fast-track application, as the effects on the environment can be managed with suitable conditions.

7. REFERENCES

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Yours Sincerely



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