TECHNICAL MEMORANDUM

PROJECT NO.: WGA261049
DOCUMENT NO.: WGA261049-MM-HG-0001_B
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COMPANY NAME	Stillhaven Limited
ATTENTION	Caleb Paterson
SUBJECT	Hydrogeological Effects Fast-Track Referral
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1. INTRODUCTION

Stillhaven Limited proposes **Stillhaven**, a thoughtfully planned mixed-use community on approximately 104 ha of land located east of Te Kowhai in the Waikato District.

The project is intended to be progressed under the Fast-track Approvals Act and will require land use and subdivision consents from Waikato District Council, together with regional resource consents from Waikato Regional Council. The development is proposed to integrate with Council's reticulated infrastructure networks, supporting the efficient delivery of services and long-term growth for the area.

Stillhaven will provide a significant contribution to meeting the Waikato District's housing needs by delivering approximately 700 new homes across a range of housing typologies, alongside a retirement village comprising approximately 200 independent living units and associated support facilities. This diversity of housing will provide opportunities for people at different life stages to remain within the local community.

The development will also include approximately (up to) 1,500 m² of commercial floor space across two neighbourhood centres, providing convenient access to shops, services and employment opportunities for residents while reducing the need to travel for everyday needs.

A key feature of the proposal is the creation of an integrated network of public open spaces, walking and cycling connections, enhanced waterways, stormwater management areas and ecological restoration. At the heart of the development will be a centrally located public reserve incorporating community-focused social infrastructure, creating a welcoming destination for recreation, community events and everyday social interaction for both new and existing residents of the wider Te Kowhai area.

The master planned community has been designed to promote walkability, connectivity and healthy lifestyles through an interconnected transport network, safe active transport routes, attractive public spaces and extensive landscaping. Environmental enhancements, including waterway restoration and ecological planting, will improve local biodiversity and contribute to the long-term health and resilience of the natural environment.

Development will occur in stages/sequence to ensure that housing, community facilities and infrastructure are delivered in a coordinated manner that aligns with servicing capacity and market demand. This staged approach will support the orderly growth of Te Kowhai while creating a vibrant, sustainable and inclusive community that delivers lasting benefits for both future residents and the existing local community.

Investigations are currently underway to determine whether the development water supply will be provided by private groundwater bores or water from the Waikato River via Hamilton City Council's (HCC) intake.

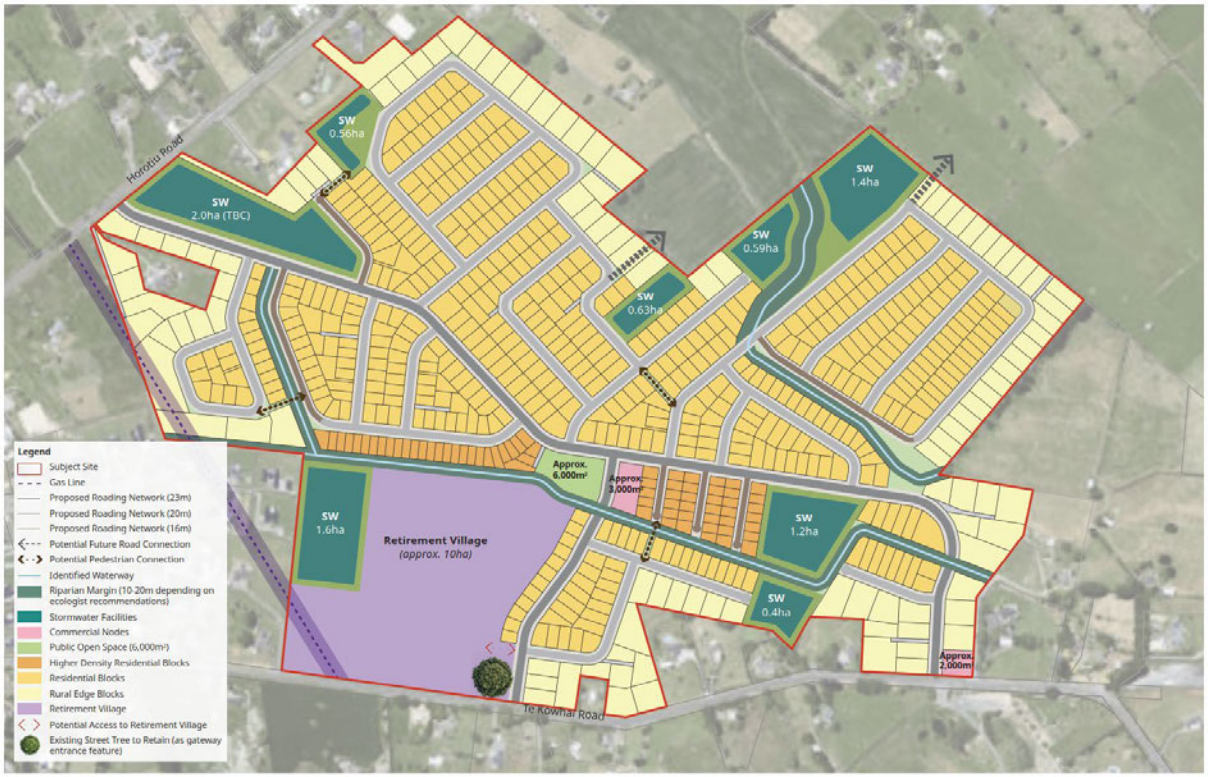


Figure 1: Stillhaven Conceptual Plan (Barker and Associates, 2026)

2. HYDROGEOLOGY INTRODUCTION

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

- The construction and ongoing effects of the stormwater management infrastructure.
- General construction activities, including wastewater pipelines and pumping stations, that involve excavations below the water table.
- A potential water supply from the Waikato River to provide domestic water supply for the development or operation of onsite groundwater bores, if needed.

The site has a shallow groundwater table that is connected to existing surface water bodies. 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
Dust Suppression		
Abstraction of groundwater or surface water for dust suppression water supply.	Groundwater assessment, including effects on surface water bodies/wetlands and other users.	Discretionary Activity under WRP Rule 3.6.4.13. Discretionary Activity under Regulation 45 of the NESFW.
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 the creation of 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 effects on the aquifer, bore users, surface water bodies (including wetlands), mobilisation of contaminants, and 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.
Geotechnical and groundwater investigations.	Further groundwater and geotechnical investigation and monitoring will be required to obtain additional information and monitor the impact of the works on groundwater levels. This will occur before, during and after the 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 Infrastructure		
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 effects on aquifer sustainability, other bore users, surface water bodies (including wetlands), mobilisation of contaminants, and 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.

3. HYDROGEOLOGICAL BACKGROUND

3.1 Regional Hydrogeology

The site is located within the Hamilton Basin, a large tectonic basin centered on Hamilton City with an area of approximately 2,000 km^2 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). 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 several zones of higher permeability within the formation rather than a single, continuous aquifer (Scholfield, 1972).

3.2 Local Hydrogeology

An initial high-level geotechnical desktop review of the Stillhaven site by ENGEO (2025) states that most of the site is shown to be underlain by the Piako Subgroup, which is composed of soft, organic peat material, silts and pumice sands. It is also stated that it is likely that groundwater levels are shallow within the site area given the open drains and streams present onsite.

According to the Waikato Regional Council (WRC) database, there are approximately 79 bores within one kilometre of the site, with details provided in Appendix A. Most bores are shallow and indicate that groundwater levels within the vicinity of the site can be relatively close to the surface.

Lithological logs of nearby bores surrounding the Stillhaven site show that the shallow subsurface geology comprises interbedded clay, silt, peat, sand gravel and pumiceous deposits. The lithology is consistent with Tauranga Group/Piako Subgroup alluvial deposits, with discontinuous permeable sand, gravel and pumiceous horizons separated by lower-permeability silt, clay and peat layers.

3.3 Nearby Groundwater Takes

From the WRC database there are approximately 19 groundwater abstraction consents surrounding the Stillhaven site. Six of these are 'zero net take' consents associated with dewatering and the remaining 13 are net abstraction takes (Table 2). Groundwater in the Stillhaven area is primarily used for agricultural purposes, with some use for horticulture and domestic supply. WGA considers that based on these current groundwater consents, groundwater could be used to supply the Stillhaven development with a potable water supply.

Table 2: Nearby Groundwater Takes

CONSENT NUMBER	DESCRIPTION OF WATER USE	MAXIMUM VOLUME (m^3/day)	MAXIMUM ANNUAL VOLUME (m^3)
AUTH119292.01.01	Domestic and Municipal Water Supply	50	16,800
AUTH126924.01.01	Agriculture	76.5	27,923
AUTH131340.01.01	Agriculture	15.4	5,621
AUTH127639.01.01	Agriculture	22.8	8,322
AUTH133494.01.01	Agriculture	20.3	7,410
AUTH130922.01.01	Agriculture	44	16,171
AUTH133167.01.01	Agriculture	29.4	10,731

CONSENT NUMBER	DESCRIPTION OF WATER USE	MAXIMUM VOLUME (m^3/day)	MAXIMUM ANNUAL VOLUME (m^3)
AUTH134322.01.01	Agriculture	21	7,665
AUTH137525.01.01	Horticulture/market gardening	1,200	280,000
AUTH139031.01.02	Horticulture/market gardening	220	14,000
AUTH145242.01.01	Agriculture	20.3	7,410

Note: Data obtained from WRC database June 2026.

4. KEY HYDROGEOLOGICAL EFFECTS AND HYDROLOGICAL CONSIDERATIONS

The key groundwater effects and hydrological considerations in the assessment include:

Earthworks and Stormwater Network

- Groundwater seepage inflows into temporary work excavations and associated dewatering activities, including wastewater pipelines and pumping stations.
- 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 the disposal of pumped groundwater.
- Potential groundwater mounding effects from any soakage system or constructed wetland.

Drinking Water Supply

If it is determined that water needs to be sourced from onsite groundwater bores (backup option), the assessment will consider:

- Groundwater drawdown effects from operating the water supply bores, including potential effects on nearby groundwater users, rivers and streams and wetlands.
- Alternatively, if it is determined that water will be sourced from the Waikato River, the assessment will consider:
  - Hydrological effects associated with using the existing Hamilton City Council's Waikato River intake, including potential effects on available allocation, other water users, rivers, streams and wetlands.

5. METHODOLOGY FOR THE GROUNDWATER ASSESSMENT

WGA has been involved in modelling groundwater effects for recent excavations at nearby residential developments, including 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 for the Waikato Expressway – Hamilton Section.

5.1 Earthworks and Stormwater Network

WGA proposes to collaborate closely with geotechnical specialists and design engineers to build on current groundwater knowledge and provide guidance for additional testing of local hydraulic properties. Once the underlying local soil hydraulic properties are ascertained, WGA will 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 from any planned soakage systems.

Additionally, once local soil hydraulic properties are ascertained, the potential dewatering effects of construction activities that require excavation 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 resulting from construction activities that require excavation below the water table.

Once the risks of groundwater mounding and drawdown have been analysed, WGA proposes that a monitoring plan 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 on this monitoring plan, mitigation measures will be developed and documented so that they can be implemented to reduce any calculated groundwater drawdown at the site, both during the construction period and following completion of the earthworks. These measures may include:

- Design, installation and monitoring of groundwater level measurement systems.
- Options to modify dewatering systems to reduce the magnitude and extent of groundwater drawdown.
- Optimising pumping rates and incorporating transient adjustments to 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 Drinking Water Supply

5.2.1 Onsite Groundwater Option

If it is determined that the development will use onsite groundwater bores to supply water to 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.

5.2.2 Waikato River Water Supply Option

If it is determined that water will be supplied to the development using existing HCC infrastructure from the Waikato River, WGA proposes to assess whether the additional demand can be accommodated within the available Waikato River allocation.

The assessment will involve comparing the estimated water demand for the development against the allocation currently available.

5.3 Dust Suppression

WGA proposes to assess the effects of operating the onsite bores using a similar methodology as Section 5.2.1. WGA will undertake a desktop assessment of the onsite bores and the aquifers they intersect. WGA will identify any factors that may affect, or be affected by, the proposed groundwater takes. WGA will use this to determine whether literature-derived aquifer parameters can be used to assess the effects of operating the abstraction bores on nearby bores or if a constant rate test is required to be analysed.

6. CONCLUSION

Based on WGA's experience and the information received and known to date, WGA can see no reason why the proposed 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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APPENDIX A NEARBY BORES

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Table A1: Nearby Bore Details from WRC Database June 2026

BORE NUMBER	EASTING (NZTM)	NORTHING (NZTM)	DEPTH (m)	SCREENED DEPTH (m bgl)	STATIC WATER LEVEL (m)
69_354	1791446	5820158	3.5	Unknown	Unknown
69_707	1790643	5822057	3.72	Unknown	Unknown
69_106	1792146	5820259	3.73	Unknown	Unknown
69_102	1790645	5820857	4.21	Unknown	Unknown
69_1983	1791645	5820858	4.5	2.5	Unknown
69_708	1790543	5822257	4.95	Unknown	Unknown
69_1685	1789944	5821656	5	3	Unknown
69_1562	1791145	5820958	5	Unknown	Unknown
69_176	1791443	5822358	5.05	Unknown	Unknown
69_166	1791843	5822259	5.18	Unknown	Unknown
69_61	1789646	5820355	5.27	Unknown	Unknown
69_212	1789543	5822255	5.34	Unknown	Unknown
69_309	1791745	5821059	5.4	Unknown	Unknown
69_855	1791242	5822658	5.8	3.8	5.8
69_227	1790845	5820957	5.81	Unknown	Unknown
69_1230	1791645	5820858	6	Unknown	Unknown
69_151	1789443	5822255	6.38	Unknown	Unknown
69_1390	1789944	5821656	6.5	3.2	Unknown
69_31	1789842	5822656	6.69	Unknown	Unknown
69_638	1791242	5822658	6.7	5.5	Unknown
69_1277	1790245	5821056	6.7	4.8	3
69_2183	1791746	5820358	6.8	4.8	1
72_637	1789244	5821455	7	4.5	1.4
69_2233	1791245	5821258	7	5.5	3.5
72_10495	1791806	5821050	7.3	5.5	3.6
69_580	1789745	5820855	7.8	5.6	4
69_1992	1791242	5822658	7.9	5.7	Unknown
69_2104	1791242	5822658	7.9	6.7	5.7
69_1257	1789845	5821056	8	5	Unknown
69_1747	1791543	5822459	8	4.5	3
72_9898	1791733	5822320	8	4	Unknown
69_940	1791845	5821159	8.2	6	Unknown
69_1006	1789643	5822156	8.5	6.4	2.7
69_939	1791843	5822159	8.5	5.5	3.5
69_1753	1789643	5821855	10	6	3
72_678	1791342	5822658	10	6	4
72_3729	1792067	5820192	10	6	3
72_5871	1790444	5821857	10	8	Unknown
72_12643	1791470	5822350	10.7	5.7	3.3

BORE NUMBER	EASTING (NZTM)	NORTHING (NZTM)	DEPTH (m)	SCREENED DEPTH (m bgl)	STATIC WATER LEVEL (m)
72_10786	1790870	5822586	11	6	3.8
72_12856	1789661	5821886	11.7	5.7	6
72_9140	1791866	5820194	11.77	5.77	3.4
69_501	1789222	5821814	12	8	9
72_745	1789845	5821056	12	4	1
69_2119	1790747	5819957	13.4	11.2	3.9
69_1574	1791543	5822159	13.4	11.5	Unknown
69_291	1789144	5821655	13.4	Unknown	Unknown
72_3904	1789554	5821571	13.5	6	7
72_5824	1789745	5820855	13.6	11.6	Unknown
72_9925	1789804	5820914	14.5	7.5	Unknown
72_1975	1789788	5821025	14.6	12.5	Unknown
72_1861	1789841	5820947	14.6	Unknown	11.15
72_1864	1789739	5820993	15	Unknown	Unknown
72_1897	1789845	5820956	15	Unknown	10.22
72_10093	1791734	5822320	16	13	4.6
69_496	1789144	5821655	16.7	13.1	9.4
69_2077	1789746	5820964	17.7	16.1	Unknown
72_1863	1789755	5821000	18.3	Unknown	Unknown
69_1346	1789345	5820955	25	19	6
72_3611	1789344	5821155	26	19	15
72_241	1791946	5820759	30.43	Unknown	4.92
72_11794	1789660	5821510	35	28.5	10.2
72_12251	1789333	5822131	37	Unknown	Unknown
72_10484	1790161	5820577	37.5	32	6.9
72_12100	1791257	5820827	38	21	Unknown
72_9674	1790347	5821167	39.8	33.3	Unknown
69_1120	1790643	5822257	50	31	Unknown
69_1834	1789345	5820855	67.05	51.2	19.29
72_9373	1791422	5820218	88.8	80.5	6.7
69_2180	1789545	5820755	Unknown	Unknown	Unknown
72_4268	1789645	5820955	Unknown	Unknown	Unknown
69_1815	1789445	5820755	Unknown	Unknown	Unknown
69_1916	1790743	5822057	Unknown	Unknown	Unknown
69_72	1790643	5822057	Unknown	Unknown	Unknown
69_73	1790543	5822257	Unknown	Unknown	Unknown
69_1763	1792046	5820459	Unknown	Unknown	Unknown
72_1862	1789806	5820968	Unknown	Unknown	Unknown
72_11368	1791492	5820165	Unknown	Unknown	Unknown
72_11444	1791424	5822245	Unknown	Unknown	Unknown