PIK/L3750-1 Rev A/cam

29 May 2026

132 Whangapouri Drury Limited
C/- Bei Group Limited
19 Victoria Street West
Auckland 1010

Attention: **Sean Park**
Development Manager
s 9(2)(a)

Dear Sean

RE: GROUNDWATER SUPPLY FEASIBILITY ASSESSMENT FOR FAST TRACK REFERRAL APPLICATION ACCEPTANCE FOR RESIDENTIAL AND COMMERCIAL DEVELOPMENT AT 132 WHANGAPOURI ROAD, KARAKA

1. Background

Earthtech Consulting Limited (ECL) has been engaged to determine the feasibility of servicing the above project with a groundwater supply. The assessment is to include:

i. Existing water availability of the site aquifers.
ii. Target aquifer for water supply.
iii. Bore yields and likely locations.

This report is based on the bore and consent database information plus the groundwater allocation provided by Auckland Council on 3 May and 5 May 2026 respectively.

The site plus local bore and consent plans are presented on Figures 1 and 2 respectively.

2. Water Demand

From GWE (2026)[1] and the final referral masterplan dated 28 May 2026, the average project water demands based on a per-capita use of 150ℓ/*person*/*day* are summarised as follows:

- 904 residential lots 407m^3/d
- 200 retirement village villas 68m^3/d
- Commercial centre 21m^3/d

496m^3/d

- Annual demand 181,040m^3/yr

[1] GWE (2026). *Water Supply Servicing Report. Referral Application 132 Whangapouri Fast Track.* Report prepared for 132 Whangapouri Drury Limited. Ref J8018, version V1, dated May 2026.

GWE (2026) has also assessed that rainwater harvesting has the potential to provide an average of about 279m^3/d and 101,835m^3/yr for non-potable supply.

For this groundwater assessment, a water demand of 496m^3/d and 181,040m^3/yr has been adopted. Note that rainwater harvesting has the potential to significantly reduce the required annual groundwater abstraction to 79,205m^3/yr (181,040 – 101,835m^3/yr).

The above water demands are for average conditions in order to determine the annual groundwater requirement. Peak water demands are to be provided by short periods of higher bore pumping rates and above ground storage.

3. Local Aquifers and Remaining Allocation

The following local aquifers are present in the vicinity of the site, as defined by Auckland Council GEOMAPS (listed top-down).

i. Bombay-Drury Sand
ii. Pukekohe and Papakura Kaawa
iii. Paerata Waitemata

The distribution of the Bombay-Drury Sand and Kaawa aquifers is shown in Figure A. The deep Waitemata Paerata aquifer is extensive in the area underlying both Kaawa aquifers.

From the Auckland Council water accounting ledgers dated 5 May 2026, these aquifers have the following remaining allocations (including applications in processing):

i.	Bombay-Drury Sand	2,635,044m^3/yr
ii.	Pukekohe Kaawa	69,574m^3/yr
iii.	Papakura Kaawa	258,146m^3/yr
iv.	Paerata Waitemata	Fully allocated

4. Target Aquifers

4.1 Bombay-Drury Sand and Papakura Kaawa

These aquifers have a shared western boundary which extends through the site, resulting in a limited extent in the northeast corner of the property.

A review of local drillers' logs in the vicinity of this area (ID 1320, ID 5028 and ID 5559) shows the following:

i. Bombay-Drury Sand and Papakura Kaawa units occur as a single shallow sand aquifer.
ii. Shallow sand aquifer extending to about 40m depth with limited thickness between 5m and 25m (16m average).
iii. Possibly occurring as lenses with shallow geology.

Although these aquifers have significant remaining allocation, groundwater abstraction is limited to local flows associated with the Whangapouri Road terrace landform.

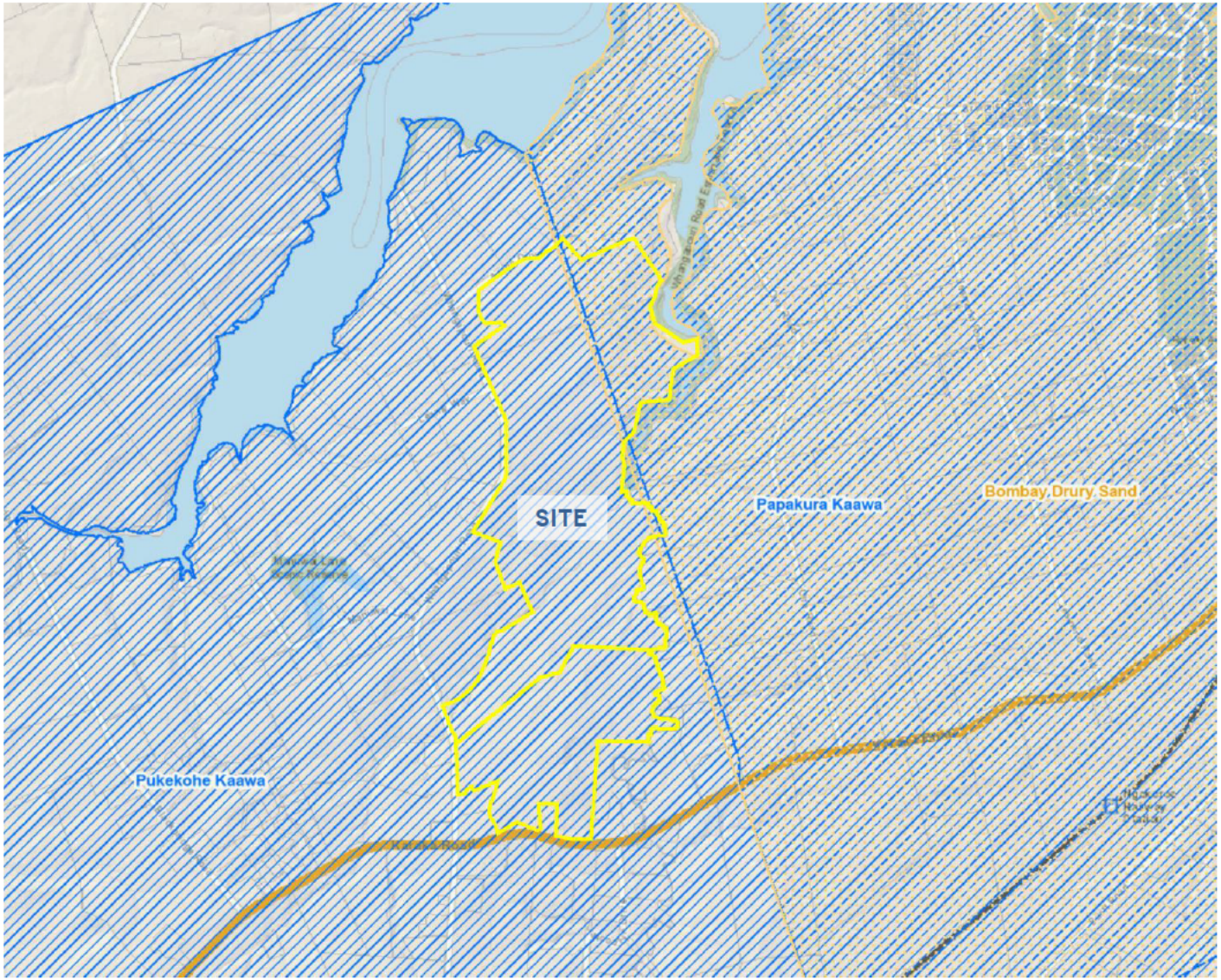


Figure A. Local Aquifers
(from Auckland Council GEOMAPS)

The feasibility assessment of this resource is summarised as follows:

i. Terrace groundwater recharge = 110*mm/yr* (from Earthtech, 2021[2]).
ii. Contributing terrace area = 52*ha*.
iii. Groundwater recharge = 52*ha* x 110*mm/yr* = 57,200m^3/yr.
iv. Local groundwater availability at 35% recharge from AUP.

Shallow sand aquifer resource = 20,020m^3/yr, say 20,000m^3/yr and 55m^3/d.

Depending on the aquifer thickness, one to three bores are required for a 55m^3/d take.

The above shows that the shallow sand aquifer is constrained. Poor water quality is possible from agricultural activity effects. Water quality testing is required to determine the necessary water treatment.

4.2 Pukekohe Kaawa Aquifer

Figure A shows the Pukekohe Kaawa aquifer extending under the majority of the site. This aquifer has a remaining availability of 69,574m^3/yr, equivalent to 191m^3/d.

A review of the local drillers' logs shows that the groundwater system is present in the southern margins of the property, extending up to 100*m* depth with aquifer thicknesses of between 20*m* and 50*m*.

Existing Kaawa aquifer bores are located immediately south of the site near Karaka Road. From local bore logs (ID3768 and ID21658) and preliminary well equation calculations (for a 30*m* thick sand aquifer), Kaawa aquifer yields are estimated to be in the range of 130m^3/d to 220m^3/d for 100*mm* diameter bores.

For the project water demand of 181,040m^3/yr associated with combined average pumping rates of 496m^3/d, three 150*mm* diameter bores would be required. For the remaining allocation of 69,574m^3/yr, with average pumping rates of 190m^3/d, two 150*mm* diameter bores would be required to provide supply redundancy. The location of the three bores are shown on Figure 1.

The Pukekohe Kaawa aquifer has a 111,466m^3/yr allocation shortfall for the 181,040m^3/d demand. This shortfall could be provided by increasing the Pukekohe Kaawa aquifer's groundwater availability based on the technical assessment, including the groundwater modelling presented in Earthtech (2020)[3]. These groundwater investigations were used to support the WAT60386923 for a take of 10,800m^3/d and 2,400,000m^3/yr for the Pukekohe Municipal Supply. Earthtech (2020) determined a water availability of 4,991,000m^3/yr for the Pukekohe Kaawa aquifer which is 1,547,731m^3/yr above the 3,443,269m^3/yr currently adopted by Auckland Council.

Drilling, pump testing and water quality sampling of a production bore will be required for confirmation of yield and to provide aquifer parameters for the groundwater effects assessment associated with a 181,040m^3/yr Kaawa take as part of the substantive Fast Track process.

[2] Earthtech (2021). *s127 Variation for Revised Take Locations, Karaka North Village Limited (WAT60351248). Assessment of Environmental Effects*. Ref R3161-4 dated 5 August 2021.
[3] Earthtech (2020). *Groundwater and Spring Investigations for Resource Consent Application. Pukekohe Municipal Water Supply*. Report prepared for Watercare Services Limited. Ref R3436-1, Rev A dated 12 August 2020.

The existing Kaawa bore logs note elevated Fe in groundwater which would need to be treated. In general, Kaawa aquifer water quality is favourable.

4.3 Paerata Waitemata Aquifer

The majority of the groundwater takes in the area are from the deep confined Waitemata aquifer. Recent urban developments at Karaka Village and Kingseat have also sourced potable supply from this deep aquifer. The on-site bore ID 5028 has an intake zone extending between 91*m* and 207*m* within Waitemata geology. The airlift yield for the bore is 27m^3/hr. Actual yield is about 15m^3/hr constrained by the maximum size of a 100*mm* diameter submersible pump.

The Paerata Waitemata aquifer has a water availability of 110,240m^3/yr based on a conservative assessment of groundwater throughflow presented in Earthtech (2018)[4].

For the 132 Whangapouri Road project, further analysis has been completed on aquifer water availability as follows:

i. Earthtech (2018) Paerata Waitemata flownet adopted T (Transmissivity) = 32m^2/d.

ii. T = 32m^2/d conservative on the basis of limited pump testing available at the time.

iii. Reassessment of aquifer T using local Waitemata bores shows relatively uniform k_h (horizontal permeability) = 0.31m/d.

iv. For 250*m* aquifer thickness, revised T = 78m^2/d.

v. Using T = 78m^2/d, aquifer recharge = 9mm/yr (equivalent to 0.8% rainfall) using the methodology presented in Earthtech (2018).

vi. Revised aquifer recharge = 381,600m^3/yr.

vii. Revised groundwater availability at 65% recharge = 248,040m^3/yr.

viii. Increased potential allocation is:

- Revised availability = 248,040m^3/yr
- Consented plus other allocation = 179,270m^3/yr
- Remaining allocation = 68,770m^3/yr say 68,800m^3/yr

The above assessment is preliminary and relies on airlift yield data. Further drilling of a deep Waitemata bore, and pump testing are required to confirm aquifer transmissivity. A review of additional pump tests within the Paerata Waitemata aquifer source (Earthtech, 2018) will also assist.

5. Summary

The project has a minimum water demand of 181,040m^3/d. Potential sources of groundwater to meet the demand are summarised as follows:

[4] Earthtech (2018). *Groundwater Availability Study Franklin Deep Waitemata Aquifer.* Report prepared for Auckland Council. Ref R3172-2 dated 31 October 2018.

Aquifer	Groundwater Supply
Bombay-Drury Sand and Papakura Kaawa	• 20,000m^3/yr
Pukekohe Kaawa	• 69,574m^3/yr from existing allocation • 111,466m^3/yr from additional availability determined for 2020 Earthtech groundwater modelling carried out for Pukekohe WCS Municipal Supply • **181,040m^3/yr Total Water Demand**
Paerata Waitemata	• 68,800m^3/yr from increases in aquifer groundwater availability

The Kaawa aquifer provides the most favoured option for the groundwater supply. The groundwater supply demand can be significantly reduced by rainwater harvesting.

Yours sincerely



P I KELSEY
Principal Hydrogeologist
EARTHTECH CONSULTING LTD

Encls.: Figure 1 – Site Location Plan
Figure 2 – Local Bores and Consents Plan



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132 WHANGAPOURI ROAD

132 Whangapouri Drury Limited

Site Location Plan

REV	DATE	AMENDMENT/ISSUE	DRAWN BY	CHECKED	TRACED BY	APPROVED BY
A	18-05-26	DRAFT FOR COMMENT	P.K	P.K	J.P	
B	29-05-26	ADD PROPOSED BORES	P.K	P.K	S.W	

DRAWING NO.: FIG. 1

REF: 3750

SCALE: 1:7500

CRS: NZTM

DATUM: NZVD2016

Note: All drawings are to be approved (initialled) before final issue.

LEGEND

Aquifers

- Deep Waitemata Bore
- Kaawa Bore
- Sand Bore or Puketoka Bore
- Other Bore or Unknown

- Current Take Consent
- Permitted Activity
- Motion* (Verikiwi) (4944) d=112m — Original owner, Current owner, Bore ID, Bore depth
- Proposed Bore
- Kaawa Aquifer Management Area Boundaries
- Sands Aquifer Management Area Boundaries

Notes:
1. Background layer Esri Topo.
2. Bore and take consent information from Auckland Council database search 7 May 2026.
3. Parcels from Linz (2025).
4. Aquifers assigned on basis of bore depths.

N

(20106)
(1257) d=208m
(455) d=201
Bremner Road
(4871) d=124.8m
(1396) d=200m
(5488) d=205.4m
Justified Ltd
Consent 41842/WAT60277085
Q = 40m³/d and 4,980m³/yr
(3820) d=65.5m
Consent 41842
WAT60277085
(1320) d=184m
(3764) d=184m
(430) d=185m
Esmond Road
(1177) d=207.8m
(681) d=175m
Whangapouri Road
(29868) d=180m
Arana Drive
(5559) d=202.9m
(438) d=201m
(3786) d=201m
Oira Road
(29109)
(20249)
(333) d=182m
(20382)
(20249)
(3813) d=182m
WAT60152161
WAT60152177
WAT60152177
Q = 60m³/d
WAT60276592
PA51951
P & S Doncaster
Consent 41889
Q = 30m³/d and 4,250m³/yr
(21002) d=70m
(22674) d=238.4m
(28949)
(22482) d=193m
PA53390
(28952) d=210m
Consent 41889
(21001) d=204.1m
(21653)
Consent 42099
WAT60152135
Claire Conaghan
Consent 42099/WAT60152135
Q = 40m³/d and 10,500m³/yr
(946) d=187.3m
(1091) d=196.4m
(3801) d=60m
(29070) d=136.5m
(31508)
3758) d=131m
(4901) d=203.7m
(22812) d=221m
Leamy Way
(20167)
(23081)
(23081) d=252m
(23081)
(5028) d=207.2m
PUKEKOHE KAAWA
SITE
PAPAKURA KAAWA
(1332) d=228.5m
(3753) d=138m
(29209) d=220.44m
Whangapouri Road
(206) d=270m
Manuwai Lane
(3745) d=85m
(20166)
(3732) d=270m
(20302) d=202m
(3723) d=248m
(31733)
(30995) d=210m
(23580) d=220m
(213) d=115.8m
Karaka Road 22
(3776) d=60m
PB1
(21144) d=210m
(31608)
(20165) d=35m
PB2
PB3
Karaka Road 22
(28855) d=186m
(3783) d=88m
(4801) d=203m
Karaka School Lane
Old Farm Lane
(29902)
WAT60277798
(potable water)
Karaka Road 22
(22364)
Wood (3762) d=43m
(23487) d=54m
(23481)
Burns (23479)
Blackie (22363) d=49m
Elray Holdings (22365) d=55m
(3794) d=91.75m
Underglass (Karaka) Ltd
WAT60276187
Q = 100m³/d and 6,000m³/yr
Underglass (Karaka) Ltd (21626) d=76.15
Bark 328 Ltd (21658) d=77.87m
(20424) d=352m
WAT60276187
WAT80316613-A
WAT60277151
Bark 328 Ltd
WAT60277151
Q = 1,100m³/d and 110,000m³/yr
(972) d=214.8m
(1145) d=219m
(29871) d=201m
Leng (22361) d=42m
(22362)
Te Henga Family Trust (3768) d=6442m
Consent 40805
WAT60275891
Te Henga Family Trust
Consent 40805/WAT60275891
Q = 150m³/d and 5,200m³/yr
(22455) d=253m
BOMBAY DRURY SANDS
(31039)

0m 100 300 500m
Scale 1:10,000

Notes: All drawings are to be approved (initialled) before final issue.

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Local Bores and Consents

REV	DATE	AMENDMENT/ISSUE	DRAWN BY	CHECKED	TRACED BY	APPROVED BY
A	18-05-26	DRAFT FOR COMMENT	P.K	P.K	J.P	
B	26-05-26	UPDATE TO BORES	P.K	P.K	S.SW	

DRAWING NO.: FIG. 2
REF: 3750
SCALE: 1:10000
CRS: NZTM
DATUM: