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memorandum

TO	Jo Young	FROM	Parviz Namjou
	Stevenson Aggregates Ltd	DATE	12 August 2025
RE	Drury Quarry – Sutton Block Expansion, Auckland Council Further Information Request on Groundwater		

Below is additional information in response to the Auckland Council's further information request on the proposed Drury Quarry – Sutton Block Expansion application.

For ease of reference, the numbered heading corresponds to the row number in the information request table, followed by the requested information, and PDP's response.

76: A - Regional Groundwater Drawdown Predictions

Missing Information

Stage 5 maximum groundwater drawdown contours within the 7.5-kilometre zone of influence, incorporating cumulative drawdown effects from consented Drury and Hunua quarries.

Why is the Information Essential?

The requested information is required to determine the effects on existing groundwater bores and streams, plus verification of proposed monitoring for groundwater and surface water.

PDP Response:

The boundary of the zone of influence for Stage 5, shown in Figure 16: Inferred Drawdown Zones of Influence (Technical Report L - Groundwater and Surface Water Effects Assessment, PDP, 2025), incorporates the zone of influence for all three quarries (Drury, Hunua and Sutton Block Quarries). The reason is explained below:

The dewatering level for the Sutton Block Stage 5 is at RL-60m. This is well below the dewatering levels at Drury Quarry (RL-45m) and the Symonds Hill Quarry (RL-5m). Considering the flat hydraulic gradient identified within each greywacke block (i.e. the Hunua and Drury greywacke blocks), the partial removal of the Hunua Fault may cause hydraulic connection between the east and west of the fault. This means the dewatering level at the Sutton Block controls the drawdowns for all three quarries. Note that, unlike pumping wells, no target inflow/take is required for each quarry (except for minor use for dust suppression) to cause accumulated interference effects (in contrast to fixed takes), and the lowest dewatering level controls the movement of groundwater (within the same aquifer). Therefore, the zone of influence shown in Figure 16 (PDP 2025) for Stage 5 reflects the predicted maximum and cumulative drawdown effects for all three quarries.

In reality, the intervening faults may provide some local barriers/buffers between quarries and also across the Hunua Fault, preventing complete hydraulic connection between the pits. Effects of such subsurface intervening faults on groundwater inflow and movement can only be determined with ongoing groundwater level monitoring currently undertaken (and proposed as part of the Sutton Block consent application).

77: A - Regional Groundwater Drawdown Predictions*:*

Missing Information

A plan showing all stream reaches expected to be subject to baseflow reduction associated with Stage 5 groundwater drawdowns, including cumulative effects from Drury and Hunua quarries. (Please show on plans at a suitable scale. The 1:70,000 scale drawings provided are very difficult to read.)

PDP Response:

The augmentation plan and potential affected reaches of the streams within Stage 5 is shown in Figure S1 attached as Appendix A.

78: B - Groundwater Drawdown and Ground Settlement West of Drury Fault

Missing Information

Assessment of potential groundwater drawdown and ground settlement effects west of the Drury Fault from expected deep greywacke drawdown to RL-55m within the adjacent Hunua and Drury greywacke blocks.

PDP Response:

There are six monitoring bores drilled west of the Drury Fault as part of an existing comprehensive groundwater level monitoring programme. Since dewatering commenced at the Drury Quarry in 2006, the groundwater level in the greywacke east of the Drury Fault has dropped from RL56m to current dewatering level at RL-45m (total drawdown of 103m). However, no drawdown has been observed in any monitoring bores west of the Dury Fault.

The current head difference between the Drury pit (at RL-45m), adjacent to the Drury Fault, and the groundwater levels west of the fault ranges between 67m to 84m. These are significant head differences have resulted in no leakage or drawdown effects in the Tauranga Group west of the fault. The proposed Sutton Block is 1km further away from the Drury Fault than the Drury Quarry. Therefore, it is unlikely that another 15m drawdown at this location would cause any drawdown effects west of the Drury Fault.

It is worth mentioning that no drawdown is also detected in the Hunua Quarry monitoring bore (HUN12/8U), even with dewatering at Huna Quarry. This bore is located west of the Drury Fault, 5km to the north of Drury Quarry. This indicates that the barrier properties of the Drury Fault are not a local feature but are widespread along the fault.

Note, also an assessment of the Drury Quarry dewatering on the Drury Fault stability was assessed as part of the Drury Quarry consent.[1]

[1] *Note: Gaia Engineers' assessment of the Drury Quarry dewatering and its effects on Drury Fault stability, was undertaken as part of the Drury Quarry Pit Northern Extension consent (Gaia Engineers, Drury Quarry – Northern Extension – Summary Engineering Geological Assessment, November 2015).*

79: B - Groundwater Drawdown and Ground Settlement West of Drury Fault

Missing Information

Groundwater level monitoring west of the Drury Fault.

PDP Response:

Ongoing groundwater level monitoring is proposed for six existing bores west of the Drury Fault. This monitoring, which includes related trigger levels, is proposed to detect and mitigate any unlikely drawdown effects west of the Drury Fault.

Table 1 below shows the existing monitoring bores west of the Drury Faut. We consider these to form a comprehensive monitoring network for detecting any unexpected drawdowns as a result of the Sutton Block dewatering.

Table 1: Proposed Monitoring Bores West of Drury Fault

Bores	GL (m, RL)	Screen (m, RL)	Geology	GWL (m, RL)	Head Difference Dewatering level (-45mRL)
SG4	39.34	20 to 9	TG / volcanics	37.57	82.57
SG9	25	5 to -5	TG / volcanics	22.29	67.29
SG10	26.7	9.7 to -3.3	TG / volcanics	23.8	68.8
SG8	52.75	24.75 to 12.75	TG / volcanics	39.38	84.38
BH03-New	46.77	21.77 to 11.77	TG / volcanics	31.03	76.03
21134	26.7	-2 to -33	TG / volcanics	22.59	67.59

80: C - Groundwater Supply Bores

Missing Information

Specific assessment of in-well drawdown effects (incorporating pump depths and water supply demands) on existing water supply bores within the zone of influence.

PDP Response:

There is no reliable information on the pump from the AC database to estimate the available in-well drawdown for all farm wells within the zone of influence. As mentioned in Section 4.2.5 (page 49) of Technical Report L (PDP 2025), bore details are available only for some of the bores identified in the database. It is likely that many of these wells are either investigation bores, do not exist, or are not in the greywacke. For example, the council database indicates some of the listed bores target the Waitemata Group or shallow sediments. Therefore, to be conservative and to account for this uncertainty, all bores mapped in the greywacke (based on the geological map) have been assumed to have target the greywacke.

It is proposed to mitigate adverse effects on all listed bores if those effects are attributed to Drury Quarry dewatering. Any such adverse effects be investigated on a case-by-case basis before a mitigation plan is proposed. This investigation will include visiting the farm wells to gather local information, such as pump depths and targeted aquifer, etc.

It should be noted that no water take consents were identified within the zone of influence. The listed bores if they exist (and drilled in the greywacke), are Permitted Activities, with takes ranging between 5 to 20m^3/d. Using hydraulic properties defined in Section 4.5.2 (page 49) of Technical Report L (PDP 2025), the in-well/local pumping in these wells would cause less than 0.4m drawdown.

81: C - Groundwater Supply Bores

Missing Information

Identification of potentially affected water supply bore owners, including those with consented takes.

PDP Response:

Investigation bores, identified from various AC bore search data, have been removed from Appendix H. However, this was not always possible due to insufficient Council information on the nature of some bores. Therefore, conservatively, if no information was available on the nature of the bore to confirm they are investigation bores, they are included in the Appendix H.

82: D - Augmentation Flow Water Quality

Missing Information

Water treatment standard for stream augmentation from groundwater. Confirmation of treatment to achieve ANZECC 95% Ecosystem Protection Levels.

PDP Response:

The source of the augmentation is the deep greywacke aquifer, which naturally discharges to the streams. Therefore, the only relevant parameters requiring treatment would be turbidity, temperature and dissolved oxygen. These parameters are already included in the consent as part of monitoring and mitigation conditions.

The nitrate exceedance observed in one of the deep bores (SG11L 230m deep), is considered an anomaly (e.g. potentially from cross-contamination, drilling, etc). It is not considered representative as no nitrate exceedances have been detected in any other deep bores in the area. As shown in Technical Report L, in Table 9 (PDP 2025), nitrate concentration is generally higher in surface water (e.g. NT1-1 and Nt1-4) than in groundwater. Therefore, the proposed augmentation is expected to improve surface water quality.

In addition, the sump water quality has been monitored annually as part of the Drury Quarry consent in dry conditions, and no nitrate exceedance has been detected in the Drury Sump (receiving environment for groundwater).

Despite the above, the water quality of the new sump (at the Sutton Block) also will be monitored (as per current Drury Quarry Consent) annually to establish sump water chemistry characteristics.

83: E - Stream Augmentation – Cumulative Effects

Missing Information

Clear methodology in determining the cause of baseflow reduction in terms of Hunua or Sutton Block quarries for Hays and Symonds Streams.

PDP Response:

As stated in Section 4.9.1 (page 56) of Technical Report L (PPD, 2025), dewatering of the Symonds Hill Pit to RL-5m is expected to result in stream depletion effects, requiring augmentation from Hunua Quarry. As a result, the additional drawdowns predicted for the new proposed Sutton Block for Stages 3 to 5 (which also results in dewatering below RL-5m) is not likely to cause any additional stream flow loss.

Therefore, the predicted loss of baseflow in these streams is unlikely to exceed the currently consented augmentation rates for Hunua Quarry. The methodology for augmenting these streams forms part of the Hunua Quarry consent and involves monitoring stream flow and supplementing the streams to offset any loss of baseflow and no changes to this methodology are proposed or required as a result of the Sutton Block project.

84: F - Post Quarrying Augmentation of NT1 Stream

Missing Information

Proposed post-quarrying mitigation of loss of baseflows to NT1 Stream as a result of greywacke aquifer removal from quarry excavation within catchment.

PDP Response:

As mentioned in Technical Report (PDP 2025) Section 5, the main objective of any quarry rehabilitation programme after completion of the proposed aggregate extraction, and cessation of pumping from the sump (after about 50 years), is to maintain the pre-quarry groundwater levels to the east of Hunua Fault to prevent any long-term adverse effects on the streams (beyond 50 years). This can be achieved by restoration of the Fault barrier effect by judicial placement of low permeability materials over fracture zones on the quarry floor and the whole western face of the quarry. Any detailed mitigation options will be dependent on the actual head difference between the groundwater across the fault as part of the Sutton Block development, based on the proposed groundwater level monitoring program. Based on the proposed monitoring data, the mitigation options will be covered in detail in the Quarry Management Plan which will include details on the closure methodology and rehabilitation of the Quarry.

This memorandum has been prepared by Pattle Delamore Partners Limited (PDP) on the basis of information provided by Stevenson Aggregates Ltd and others (not directly contracted by PDP for the work). PDP has not independently verified the provided information and has relied upon it being accurate and sufficient for use by PDP in preparing the memorandum. PDP accepts no responsibility for errors or omissions in, or the currency or sufficiency of, the provided information.

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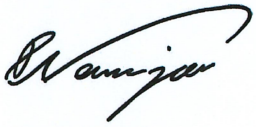
Prepared and approved by



Parviz Namjou

Technical Director – Water Resources

Appendix A: Stream Augmentation Programme and Potential Affected Stream Reaches

0 500 1000
METRES

SCALE : 1:50,000 (A3)

NO.	REVISION	DATE	BY
A	FINAL	AUG 25	MS
A	ISSUED FOR REVIEW	JUL 25	MS

SOURCE:
1. CADASTRAL/TOPOGRAPHICAL INFORMATION AND INSET DERIVED FROM LINZ DATA.
2. PROPOSED SUTTON BLOCK EXPANSION (DRAWING SSQ_24_405, ISSUED SEPT 2024).
3. SHALLOW GROUNDWATER CATCHMENTS DERIVED BY PDP.
4. FAULT LINES PROVIDED BY GNS SCIENCE (2020, (NZL GNS1:250K GEOLOGY (3rd EDITION)) AND, MURRAY, S., GRAEME, F., (2005), PDP (2021).

CLIENT

STEVENSON

FIGURE

FIGURE S1: STREAM AUGMENTATION PROGRAMME FOR STREAM REACHES WHICH MAY SHOW BASEFLOW REDUCTION

PROJECT

PROPOSED SUTTON BLOCK EXPANSION – GROUNDWATER & SURFACE WATER EFFECTS ASSESSMENT

A02447709.aprx - A02447709GIS401_Stream_Reaches_Fig51