



BEFORE

Independent Commissioner appointed
by Tasman District Council

IN THE MATTER

of the Resource Management Act 1991

AND

IN THE MATTER

of an application by CJ Industries Ltd
for to discharge contaminants to land
(backfill material) RM220578

**REPLY EVIDENCE OF RYAN CHARLES SMITH NICOL ON BEHALF OF CJ
INDUSTRIES LIMITED
(GROUNDWATER AND CLEANFILL)**

21 April 2023

1. INTRODUCTION

1.1 My full name is Ryan Charles Smith Nicol. I am a Hydrogeologist with Pattle Delamore Partners (PDP) and have been employed in that role since 2012.

1.2 The applicant has applied for resource consents authorising the extraction of gravel, stockpiling of topsoil, and reinstatement of quarried land, with associated amenity planting, signage and access formation at 134 Peach Island Road, Motueka:

- (a) RM200488 land use consent for gravel extraction and associated site rehabilitation and amenity planting and
- (b) RM200489 land use consent to establish and use vehicle access on an unformed legal road and erect associated signage

1.3 The applicant has also applied for a discharge permit authorising the discharge of contaminants to land, in circumstances where the contaminants may enter water (RM220578).

- 1.4 I have produced evidence addressing clean fill parameters, a groundwater assessment for the purposes of the land use consent application and supplementary evidence addressing issues relevant to the discharge permit rather than the land use activities.
- 1.5 This evidence does not repeat the evidence already filed, and so this statement should be read together with my statements dated 15 July 2022, 4 November 2022, 18 November 2022 and 19 December 2022.

Qualifications and Experience

- 1.6 My qualifications and experience are set out in my statement dated 15 July 2022.

Purpose and Scope of Evidence

- 1.7 The purpose of my evidence dated 15 July 2022, 4 November 2022 and 18 November 2022 was to assess the effects of the proposal on groundwater, provide recommendations to avoid, remedy or mitigate potential adverse effects on groundwater resources at Peach Island and provide updates to groundwater monitoring data.
- 1.8 The purpose of my evidence dated 19 December 2022 was to provide additional responses and clarification to queries that the Commissioner raised during the hearing between 22 and 24 November 2022.
- 1.9 A joint expert witness statement (JWS) prepared by Dr Helen Rutter (Tasman District Council's groundwater expert) and myself was released on 6 March 2023. The purpose of the JWS was to clarify and confirm areas of agreement and disagreement regarding groundwater aspects of the application. Based on the JWS (as well as comments from Tasman District Council Officers and submitters on my 19 December 2022 evidence), the Groundwater and Clean fill Management Plan (GCMP – March 2022) was revised, and amendments made to groundwater-specific consent conditions, and these were filed on 23 March 2023.
- 1.10 The purpose of this evidence is to:
- (a) Address outstanding matters raised by the Commissioner at the hearing in November 2022 not already addressed in my supplementary evidence or the JWS.

- (b) Respond to submitter and council presentations at the hearing in November 2022.
- (c) Respond to comments from submitters and Council Officers on my evidence dated 19 December 2023.
- (d) Respond to comments from submitters and Council Officers on the revised GCMP (March 2023) and groundwater consent conditions (March 2023).

Code of Conduct

- 1.11 I have read the Code of Conduct for Expert Witnesses in the Environment Court Practice Note 2023 and I agree to comply with it. My evidence is within my area of expertise, however where I make statements on issues that are not in my area of expertise, I will state whose evidence or expertise I have relied upon. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed in my evidence.

2. EXECUTIVE SUMMARY

- 2.1 This evidence provides responses to queries and addresses comments by the Commissioner, submitters and Council Officers including:
- (a) Outstanding matters raised by the Commissioner during the November 2022 Hearing.
 - (b) Response to submitter and Council presentations from the November 2022 Hearing.
 - (c) Response to Submitter and Council Officer comments on my 19 December 2022 evidence.
 - (d) Response to submitter comments on the revised GCMP (March 2023) and groundwater consent conditions (March 2023).
 - (e) Response to Council Officer comments on the revised GCMP (March 2023) and groundwater consent conditions (March 2023).

- 2.2 Of the issues discussed in my evidence, the main matters that have been addressed are:
- (a) The methodology for the procurement of clean fill from off-site sources to ensure that only clean fill material is transferred to Peach Island for backfilling excavations that may be inundated by groundwater.
 - (b) The suitability of the proposed groundwater chemistry exceedance criteria and trigger limits to minimise unanticipated groundwater chemistry changes from clean filling activities and whether the proposed trigger limits are consistent with the NPS-FM 2020 and the concept of Te Mana o te Wai.
 - (c) The suitability of the proposed response to an exceedance of the groundwater chemistry exceedance criteria or the trigger limits.
- 2.3 The revised GCMP (March 2023) and the relevant groundwater conditions have been updated to incorporate suggestions by the Commissioner as well as to address issues raised by submitters and Council Officers in a manner that remains achievable for the consent holder should consent be granted.
- 2.4 The proposed clean fill acceptance criteria in the revised GCMP (March 2023) and associated standard operating procedure (SOP) for the procurement and management of clean fill material from offsite sources are more restrictive than those recommended for Class 5 fill (clean fill) in the WasteMINZ (2022) Guidelines. This provides a high level of scrutiny before any material sourced offsite can be accepted as clean fill and transferred to Peach Island.
- 2.5 The proposed exceedance criteria and water chemistry trigger limits allow changes in groundwater chemistry to a degree that does not result in adverse effects on downgradient water users and the environment. Such localised effects on groundwater quality are also allowed to occur through permitted (and potentially also consented) activities that occur in the rural area for wastewater and stormwater discharges. Therefore, I disagree with the view expressed by the Council Officers who consider any change in groundwater chemistry outside of “current state” to be inconsistent with the NPS-FM (2020) and the concept of Te Mana o te Wai. I consider the proposed exceedance criteria and trigger limits set at the dedicated monitoring bores on the

downgradient margin of the quarry area to be conservative, and adequate to identify unanticipated groundwater chemistry changes and avoid adverse effects.

- 2.6 The updated groundwater conditions include requirements to identify any adverse trends in groundwater chemistry data and to investigate and mitigate the cause of any adverse trend before the exceedance criteria or trigger limits are exceeded. The mitigation actions include requirements to cease any activities (including clean filling) that may have caused the adverse trend before it becomes an issue.
- 2.7 The response to an exceedance of the proposed groundwater chemistry trigger limits in a downgradient water supply bore requires an additional sample to be undertaken within 72 hours of receiving the initial results to confirm the exceedance, so as to avoid any artificial result caused by sampling or analysis errors. If the exceedance is confirmed, the consent holder is required to provide an alternative water supply.
- 2.8 Overall, the key control for protecting groundwater downgradient of the proposed Peach Island clean fill site is the quality of the clean fill material used to backfill excavations. For this application, the measures proposed in the revised GCMP (March 2023) and the SOP to ensure good quality backfill material are stringent (i.e. requiring independent assessment of material sourced offsite) and therefore the potential for contaminated material being used as clean fill is reduced. Provided that the measures in the revised GCMP (March 2023) and the SOP are implemented by the consent holder, any effects on groundwater are considered to be less than minor.

3. EVIDENCE

Outstanding Matters raised by the Commissioner during the November 2022 Hearing.

- 3.1 This section of evidence addresses suggestions made by the Commissioner during the November 2022 Hearing.
- 3.2 A number of changes have been made to the revised GCMP (March 2023) and relevant proposed groundwater conditions. While the main body and content of the GCMP (March 2023) has not changed, the updates to the GCMP and groundwater conditions were made to accommodate suggestions from the Commissioner, to address issues raised

by submitters and Council Officers as well as incorporate the outcomes of the JWS while being feasible and achievable for the consent holder to implement.

3.3 The revised GCMP (March 2023) and updated groundwater conditions (March 2023) incorporate the following updates:

- (a) Each section of the GCMP was revised to set out an explanation of the risk along with the associated management requirements to make clear what the specific risks are and how they must be managed.
- (b) A standard operating procedure (“SOP”) was prepared which outlines the steps and procedures for procuring fill material including material from off-site sources. As the SOP is intended to be referred to by the consent holder and an independent suitably qualified and experienced person (SQEP), some information from the previous version of the GCMP (September 2022) was moved into the SOP attached to the revised GCMP (March 2023). This was to ensure that all of the relevant information and procedures for procuring suitable clean fill would be available within a single document that can be referred to by the user and is straightforward to understand and apply. The SOP was prepared with input from my colleague Rowan Freeman who is an Environmental Scientist and certified environmental practitioner for contaminated land. I have relied upon Rowan’s input for the preparation of the SOP, particularly in terms of soil sampling requirements and inspections of fill material required in the SOP that are to be undertaken by a SQEP.
- (c) Table 1 (Summary of Clean Fill Acceptance Criteria) of the SOP (previously Table 1 of previous version of the GCMP (September 2022)) was updated to clarify what materials are acceptable and what materials are unacceptable for use as clean fill at Peach Island.
- (d) The revised GCMP (March 2023) clarifies that it is specific to clean fill material placed at depths of more than 1 m below ground level (bgl). Provisions to manage topsoil and subsoil properties for rehabilitation purposes for material placed at depths less than 1 m below ground level are provided in the Soil Management Plan (SMP) prepared by Dr Hill. I

note that the SMP requirements for soils placed less than 1 m below ground level are consistent with the revised GCMP (March 2023) (for example, the exclusion of material from HAIL sites also applies to soil) with the only difference being the organic content and organic type in the soil used as topsoil.

- (e) Removal of so called “out clauses” (which provided that the parameters in the GCMP did not apply where Council consent was given to deviate from it) such as those on Page 4 and page 12 of the previous version of the GCMP (September 2022) as referred to by the Commissioner.
- (f) Moving the proposed groundwater level monitoring and groundwater quality monitoring requirements from the revised GCMP (March 2023) into the proposed consent conditions.

Response to submitter and Council presentations from the November 2022 Hearing

- 3.4 This section of my evidence addresses outstanding issues and queries raised by submitters and Council Officers (specifically Dr Rutter) during the November 2022 Hearing.
- 3.5 Outstanding issues from submitter presentations during the November 2022 Hearing are discussed under the italicised headings (a) – (d) in the following paragraphs.
 - (a) – Whether there is a hydraulic connection between Peach Island and bores located near 273 College Street.*
- 3.6 Bore information available from Council does not indicate any bores located within the land parcel (appellation Lot 1 DP 19831) at 273 College Street. Information from Council indicates that the closest active bore used for domestic supply is located around 400 m north of 273 College Street where there is one bore listed as being actively used for domestic supply (bore 24549, screened between 7.5 and 10 m bgl). There are two other bores with a use of domestic within 20 m of 24549, but they are listed as having an unknown status (24548) or sealed status (21454).
- 3.7 The property at 273 College Street and the closest bores to that property are located on the true right (east) of the Motueka River. The proposed Peach Island Quarry is located

on the true left (west) of the Motueka River. Groundwater contours from Weir and Thomas (2018) indicate groundwater recharge in the vicinity of College Street and bore 24549 is pre-dominantly via flow losses from the Motueka River although rainfall would be expected to also contribute a lesser amount of recharge to groundwater at this location too. The Motueka River is expected to act as a hydraulic barrier between groundwater at Peach Island and groundwater abstracted by the closest bore(s) to the property at 273 College Street. Therefore, there is expected to be no effect from groundwater at the proposed Peach Island quarry on bores located on the true right of the Motueka River.

(b) – Differences between the bore locations recorded on the Tasman District Council database compared to submitter knowledge of bore locations.

- 3.8 Bore information for the Peach Island area has been provided from Council. This information includes depth or screen interval information (where available) of all bores at Peach Island. The locations of these bores along with relevant bore depth and screen interval information were shown in Figure 7 of my 15 July 2022 evidence. This available information indicates that bores in the wider Peach Island area generally range in depth between 3.2 and 15 m bgl. Unregistered bores are not uncommon and it is possible that some bore locations and bore details provided by Council may differ from the actual bore locations on the ground. However, the data provided by Council is expected to be generally representative of the overall number and depths of bores in the Peach Island area. The updated groundwater consent conditions (March 2023) and the revised GCMP (March 2023) are designed to protect all bores, including those that may not be correctly recorded on the Council database. I note that Condition 22 of the proposed discharge consent conditions (RM220578) requires a bore condition survey of privately owned water supply bores within 500 m downgradient of the clean fill to be undertaken if consent is granted which will assist with updating bore locations (if authorisation by bore owners and landowners is forthcoming) prior to commencement of clean filling. The bore condition survey would involve visiting the downgradient properties (where the property/bore owner allow) to identify/confirm locations of bores used for abstraction purposes and assess the bores for potential contamination risks that could affect groundwater monitoring results. The bore condition survey should be undertaken by a suitably qualified and experienced groundwater scientist and I recommend an amendment to the condition to specify this.

(c) – Whether topsoil is considered to be clean fill and whether topsoil must meet cleanfill requirements.

- 3.9 Topsoil will not be used as clean fill that is placed at depths greater than 1 m bgl as the organic content of topsoil would exceed the clean fill acceptance criteria of less than 2% incidental organic material. Dr Hill’s Soil Management Plan (SMP) outlines the parameters for topsoil and subsoil that is used as part of land rehabilitation at depths less than 1 m bgl. These parameters are consistent with the requirements of the revised GCMP (March 2023) with the exception of the organic content and type of organic material within the topsoil and subsoil. Therefore, topsoil or subsoil imported from offsite sources will not be contaminated.

(d) – The relevance of Schedule 8 of the Canterbury Regional Council’s Land and Water Regional Plan to the Peach Island setting.

- 3.10 The use of groundwater chemistry trigger limits from Schedule 8 (Region-wide Water Quality Limits) of Environment Canterbury’s Land and Water Regional Plan (LWRP) was queried by Submitter Mae. In the absence of regionally specific limits in the Tasman Resource Management Plan (TRMP), I consider Environment Canterbury’s groundwater quality limits in Schedule 8 of the LWRP to be a useful example of groundwater chemistry limits for changes in groundwater chemistry from discharges that may enter groundwater. While not specific to the groundwater zone that includes Peach Island, Schedule 36A, Class G (Water Classification for the Motueka/ Riwaka Plains Water Management Area) at Chapter 36 of the TRMP also includes qualitative groundwater quality standards to minimise groundwater chemistry changes. Based on the descriptions in the TRMP, the Schedule 8 groundwater quality limits in the LWRP appear to be consistent with the TRMP qualitative limits in Schedule 36A and therefore are considered to be appropriate.
- 3.11 I have addressed a number of queries that were raised by Dr Rutter during the hearing in detail in my subsequent evidence dated 19 December 2022, in the joint expert witness statement (JWS), the revised GCMP (March 2023) and the updated groundwater consent conditions (March 2023). However, an outstanding matter from Dr Rutter’s presentation was the suggestion that the water chemistry trigger limit for hardness should be changed from a limit of 200 mg/L to a range between 100 mg/L to 200 mg/L. This was suggested by Dr Rutter as hardness concentrations less than 100 mg/L can be corrosive. Hardness concentrations measured in groundwater at Peach Island to date

range between 26 and 74 mg/L indicating that groundwater in the area is likely to be naturally corrosive. Using a range for hardness would mean that the existing, background groundwater hardness concentrations would be outside of Dr Rutter's suggested hardness trigger range. That is a natural characteristic of the groundwater in this area so low hardness concentrations cannot be used as a criterion to indicate effects on groundwater quality caused by quarry activities. Therefore, the proposed trigger limit of 200 mg/L is considered to still be appropriate to accommodate natural variations in hardness at Peach Island.

Response to submitter and Council comments on my 19 December 2022 evidence:

- 3.12 This section of my evidence addresses issues and concerns raised in response to my December 2022 evidence, specifically from Valley RAGE Inc (dated 27 January 2023, specifically Section 5) and Council Officers memorandum (dated 2 February 2023, specifically Section 3 and Dr Rutter's memorandum attached to the Council Officers memorandum).
- 3.13 Valley Rage Inc and Council Officers have queried the location of the additional proposed monitoring bore and the frequency of monitoring at this bore. The additional bore is proposed to be located on the applicant's property at the closest point, in terms of groundwater flow direction, to the nearest downgradient water supply bore (bore 24135 at 131 Peach Island Road). The location of the additional proposed bore, as shown in Figure 1 of my December 2022 evidence, is based on the location of bore 24135 as it is recorded on the Council database. I acknowledge that this location of bore 24135 may differ from the true location of the bore on the ground. However, if consent is granted and if the bore/landowners allow access, the location of bore 24135 would be confirmed during a bore condition survey of downgradient privately owned bores as described in paragraph 3.8. I recommend that the condition incorporated flexibility to adjust the location of the additional proposed monitoring bore if it turns out that the nearest downgradient water supply bore is not in the location shown in information from Council.
- 3.14 Valley RAGE Inc and Dr Rutter also suggest that monthly monitoring prior to commencement of clean filling would be preferable to quarterly monitoring to establish background water chemistry. As one of the main purposes of the year of background

water chemistry monitoring prior to clean filling activities is to establish the initial year to year median concentrations, I remain of the opinion that quarterly monitoring is sufficient to accomplish this, particularly given that monthly monitoring is proposed in the additional monitoring bore upgradient of the closest water supply bore. It also provides a consistent comparison with the proposed ongoing quarterly monitoring regime once clean filling commences. The year to year median concentrations will be continually updated each year and will assist with removing the effect of outlier concentrations associated with seasonal variations in water chemistry. Therefore, this methodology removes the need for undertaking monthly monitoring in the existing dedicated monitoring bores at the site ((Bore 1 (24543), Bore 2 (24544), Bore 3 (24544) and Bore 4 (24546)). Monthly monitoring is still proposed in the proposed additional monitoring bore as this bore will be used to assist with capturing unanticipated changes in water chemistry given its upgradient proximity to the closest water supply bore (24135 at 131 Peach Island Road).

- 3.15 Valley RAGE Inc and the Council Officers have suggested that monthly monitoring would be preferable to quarterly monitoring in all bores once clean filling activities commence. Monthly monitoring is proposed to be undertaken in the additional proposed bore, as it closest to the nearest water supply bore downgradient of the clean fill site (refer to Figure 1 of my December 2022 evidence). The proposed quarterly monitoring frequency of the existing, dedicated monitoring bores at the clean fill site is considered to be appropriate to gather sufficient data for assessing seasonal changes in water chemistry and calculating year to year median concentrations as part of the exceedance criteria.
- 3.16 The Council Officers have acknowledged that some domestic bores are not included on Council databases and may have been missing from Figure 1 of my December 2022 evidence. As discussed in paragraph 3.8 of my evidence bores that are incorrectly located or missing from the Council database within 500 m downgradient of the clean fill site would be identified during a bore condition survey and included as part of proposed monitoring provided the bore/land owner allows access to the bores as required by Condition 21 of the discharge consent (RM220578).
- 3.17 The Council Officers do not think the proposed exceedance criteria and trigger limits are consistent with the NPS-FM 2020. The Council Officers suggest that the proposed groundwater chemistry trigger limits should be based on current state. The NPS-FM

(2020) provides bottom-line concentrations for some chemical parameters which are specific to surface water (i.e. rivers and lakes) but not groundwater. Unlike surface water, there are no environmental bottom lines or attribute states for groundwater in the NPS-FM (2020). In lieu of groundwater chemistry bottom-lines in the NPSFM, I have proposed the use of exceedance criteria based on nationally determined maximum acceptable values (“MAV”) and trigger limits set at half MAV. These trigger limits were chosen to protect human health as the main receptors in the groundwater environment downgradient of the clean fill are drinking-water users. It is worth reiterating that clean fill acceptance criteria are the primary control to minimise any changes in groundwater chemistry. The proposed water chemistry triggers are a mechanism to identify *unanticipated* changes and implement mitigation measures *if* groundwater chemistry changes occur.

3.18 As discharge of a contaminant (as defined in the RMA) that enters groundwater will by definition change the receiving groundwater chemistry to a certain degree, the Council Officers’ interpretation of the NPS-FM (2020) and the concept of Te Mana o te Wai means that any discharge of a contaminant to land in circumstances where it may enter groundwater would be inconsistent with the NPS-FM and Te Mana o te Wai. While it is acknowledged that the purpose of the NPS-FM and Te Mana o te Wai are to protect freshwater in Aotearoa New Zealand, avoiding all discharges that may alter groundwater chemistry from its existing water chemistry state does not appear to be the intent of the NPS-FM. Policy 5 NPSFM requires that freshwater is managed to ensure that the health and well-being of waterbodies is maintained, not that the concentration of individual groundwater chemicals must not change. The revised GCMP (March 2023) and the updated groundwater consent conditions (which include the trigger limits), will maintain the health and well-being of Peach Island groundwater. Therefore, I disagree with Dr Rutter’s interpretation and I consider that what is proposed in the updated discharge conditions is adequate to minimise groundwater chemistry changes and avoid adverse effects.

3.19 Further to this (and as noted in paragraph 3.10 of my evidence), Schedule 36A, Class G of the TRMP provides qualitative standards for discharges that enter groundwater in the Motueka/Riwaka Plains area (which is further downstream of Peach Island). The Schedule 36A, Class G standards allow for changes in groundwater chemistry provided that a number of conditions are met which include that the groundwater is not

contaminated or made unsuitable for human consumption in anyway following treatment. While I acknowledge they are not directly applicable, I consider the proposed water chemistry trigger limits to be consistent with the Schedule 36A, Class G standards in the TRMP which allow for changes groundwater in chemistry outside of current state. Commonly occurring discharges such as on-site wastewater treatment systems and stormwater discharges to ground via soakage pits, that are a requirement for dwellings in rural areas, all cause a change in groundwater chemistry. Farming discharges (such as fertiliser, animal effluent and sediment from cultivation) can also change groundwater chemistry. There is no indication in the NPS-FM (2020) that such activities must henceforth be prohibited. The Council Officers' view that a discharge that enters groundwater must not change water chemistry away from current state appears to be inconsistent with Schedule 36A, Class G standards in the TRMP and the existence of discharges that occur commonly throughout the wider district.

- 3.20 Valley RAGE Inc and the Council Officers have queried the proposed response to a breach of the exceedance criteria suggesting that the response should be faster. To further strengthen the groundwater conditions, an assessment of trends in the water chemistry data collected as part of the proposed monitoring has been volunteered based on suggestions from Dr Rutter in Section 8 of her memorandum (dated 31 January 2023) attached with Council's response to my December 2022 evidence. The purpose of the trends assessment is to seek to identify any unanticipated adverse changes in water chemistry *before* any exceedance of the water chemistry trigger limits and exceedance criteria occur.. If an adverse trend is detected, then the consent holder will undertake a number of actions including undertaking an investigation into the cause of the trend, ceasing any activities that caused the adverse trend (such as clean filling), and undertaking additional groundwater chemistry sampling. If an exceedance of the exceedance criteria occurs in a dedicated monitoring bore at the clean fill boundary, then repeat sampling of the bore the exceedance occurred in will be undertaken followed by sampling of the closest downgradient water supply bore. If an exceedance of the trigger limits occurs in a downgradient water supply bore, a repeat sample will be undertaken in that bore, and if the exceedance is confirmed by the additional sample, the consent holder will provide an alternative water supply. Additional groundwater sampling in other downgradient bores may have to be undertaken as well. The reason for repeat sampling is to check that the sampling and laboratory testing procedures have not inadvertently caused incorrect information to be reported.

- 3.21 The timeframe between when the laboratory results are received and follow up sampling is required is 72 hours which allows sufficient time to mobilise groundwater sampling staff and seek permission from bore owners, whilst not causing unnecessary delay in the repeat sampling and testing being undertaken. Additional sampling, including repeat sampling in other water supply bores may need to be undertaken, as noted in Condition 32(d) of the discharge consent conditions (RM220578). However, the proposed timeframe of 72 hours between receiving results and undertaking additional sampling in Conditions 32(d) and 33 of the discharge consent could be amended to “...as soon as practicable and within 72 hours...”.
- 3.22 Council Officers have provided comments on high permeability zones, estimated hydraulic conductivities and groundwater movement in gravel aquifer systems. Dr Rutter summarises her discussion on this topic by stating “*The important point is that high fill quality is ensured and mistakes are not allowed in terms of accepting any fill that is not Class 5*”. Regardless of the variability in the groundwater hydraulic conductivities and movement through the gravel aquifer at Peach Island, I agree with the Dr Rutter that the key control on minimising any changes in groundwater chemistry is the quality of clean fill material being used to back fill excavations.

Response to submitter comments on the revised GCMP (March 2023) and updated groundwater-related consent conditions:

- 3.23 This section of evidence addresses issues raised in submitters comments that were lodged on 7 April 2023 regarding the revised GCMP (March 2023) and the updated groundwater-related consent conditions. A large number of comments were made by submitters with some of the issues also raised by Council Officers. These points have been condensed into the main areas of concern and are discussed under the italicised headings (a) – (g) in the following paragraphs:

(a) – Submitter concerns regarding the SOP, namely the process for procuring fill material from offsite sources to ensure quality of the fill and potential for groundwater chemistry changes from placement of that fill in excavations that may be inundated by groundwater

- 3.24 There is particular concern from submitters regarding the procurement of fill material from offsite sources and the potential for this material to be contaminated. The purpose of the SOP is described in paragraph 3.3(b) of this evidence and outlines the procedures

and requirements to determine if fill material from offsite sources is acceptable before transferral to Peach Island. The proposed requirements for sourcing material for clean fill purposes are strict and go beyond the requirements recommended in WasteMINZ (2022) for Class 5 fill (clean fill). The requirements proposed in the SOP that are in addition to the WasteMINZ (2022) guidelines include:

- (a) Groundwater chemistry monitoring will be undertaken at Peach Island – groundwater is not considered an exposure pathway of concern for Class 5 fill (clean fill) and groundwater quality monitoring is not a requirement for Class 5 fill (clean fill) in WasteMINZ (2022).
- (b) No acceptance of man-made materials in Clean fill used at Peach Island – Class 5 fill (clean fill) under WasteMINZ (2022) allows no more than 5% by volume per load of incidental manmade materials.
- (c) Requirements to store material considered for clean fill purposes at an external site for inspection and soil testing of material by a Suitably Qualified and Experienced Person (SQEP). The material will only be deemed to be clean fill if the soil testing requirements are met and the SQEP is satisfied – these requirements are not included in WasteMINZ (2022) and the soil testing described here is in addition to the random soil sampling of 1 in 500 m³ of material transferred to Peach Island and the annual random sampling of placed clean fill which are also requirements of the SOP.
- (d) The SQEP may recommend additional investigation and testing (i.e. hydrocarbons, asbestos etc) in addition to meeting the Tasman regional soil background concentrations in Table 5 of Cavanagh (2015) if visual or olfactory contamination is discovered during an inspection of the fill.
- (e) If the acceptance criteria in Table 1 of the SOP is met, then the material will be transferred to Peach Island where the clean fill site manager will also visually inspect the material and if any visual or olfactory evidence of contamination is present (which it should not be given the previous testing and inspection requirements), the material will be rejected and removed from the site for disposal at an appropriate facility.

- (f) The WasteMINZ 2022 definition of VENM is not specific to material sourced from one particular site but material from any site consisting of clay, soil and rock with concentrations that meets the regional background soil concentrations for the site it is discharged to.
- (g) The SOP outlines three scenarios (A, B and C) for material to be procured from an offsite source. As an additional check on material sourced under Scenario C, a minor amendment Scenario C in the SOP has been proposed which requires the SQEP to check if material is from a HAIL site and visual inspections to check if the material is suitable. A copy of the amended SOP is provided in the attached GCMP with my evidence.

(b) – Submitter concerns regarding the suitability of the proposed groundwater chemistry monitoring and the proposed response to and timeframe for an exceedance of the water chemistry trigger limits or the exceedance criteria to avoid adversely affecting downgradient private water supply bores.

- 3.25 There are concerns from submitters regarding the adequacy of the proposed groundwater chemistry monitoring and the proposed response and timeframe to an exceedance of the water chemistry trigger limits or the exceedance criteria to avoid adversely affecting downgradient private water supply bores. These matters have been addressed in my response in paragraph 3.20.

(c) – Submitter concerns regarding the availability of groundwater chemistry results to bore owners and the public availability of groundwater chemistry data and trends.

- 3.26 Submitters have raised concerns that water chemistry results from samples collected from their bores won't be made available to them. However, all data collected to meet the requirements of the proposed consent conditions (i.e. groundwater level and chemistry data) will be provided in an annual groundwater monitoring report to Council that will be publicly available. While not stated explicitly in the proposed consent conditions, it would not be unreasonable for individual results to be provided to that bore owner(s)/user(s) within 2 weeks of them being received, if that would be of interest to the bore owners.
- 3.27 Submitters have raised concerns regarding the wording of groundwater chemistry monitoring in the discharge consent which do not include the words “collected and

tested". Condition 23 of the discharge consent describes that all groundwater samples are collected by a suitably qualified and experienced practitioner and all samples analysed by an IANZ laboratory.

(d) – Submitter concerns regarding the process for managing groundwater levels to avoid accidental exposure of groundwater within excavations at the clean fill site.

3.28 Concerns regarding the process for managing groundwater levels in excavations have been noted by submitters, particularly regarding the potential for accidental exposure of groundwater. Sections 4 and 5 of the revised GCMP (March 2023) and the updated groundwater consent conditions (March 2023) describe the management methodology which include:

- (a) Using groundwater level contour maps generated daily to inform excavation depths. The excavation depth is then confirmed via a temporary test pit to a depth of 1 m below the working level of the excavation. A temporary test pit will be undertaken on each day when excavation is being undertaken to check the occurrence of groundwater beneath that particular excavation in a temporary and controlled manner.
- (b) At least 1 m of material must be maintained between groundwater level and the base of the excavation at the time of gravel extraction except for deeper excavations (described below).
- (c) Deeper excavations to depths between 0.3 and 1 m above groundwater level can only occur during stable weather conditions (as defined in the revised GCMP (March 2023) and in Condition 88 of the landuse consent (RM200488)) to avoid uncontrolled exposure of groundwater. These deeper excavations must be backfilled to at least 1 m above groundwater level on the same day as extraction.
- (d) If groundwater is encountered during the temporary test pitting noted above in (a), the excavation will be backfilled to a level of at least 0.3 m above groundwater within 30 minutes of water being observed and only the material removed to create the temporary excavation shall be used to backfill it (i.e. no aggregate excavated from depths below 0.3 m above groundwater will be taken away by the applicant).

- (e) Mr Corrie-Johnston has confirmed that there will be access to sufficient clean fill material at Peach Island and there will be access to available machinery to backfill excavations in advance of increasing groundwater levels. Excavation must only occur if there is sufficient clean fill on site for backfilling.

(e) – Submitter concerns that the proposed exceedance criteria will allow changes in groundwater chemistry that is not consistent with NPS-FM (2020) and Te Mana o te Wai.

- 3.29 Submitters have indicated that the proposed groundwater chemistry trigger limits are inconsistent with the NPS-FM (2020) and Te Mana o te Wai as the proposed limits will allow changes in groundwater chemistry beyond current state. I have addressed this issue in paragraphs 3.17 to 3.19 of this evidence.

(f) – Reference to the Environment Court decision Selwyn Quarries Limited v Canterbury Regional Council.

- 3.30 Submitters Valley RAGE INC have referred to the Environment Court decision *Selwyn Quarries Limited v Canterbury Regional Council*. This decision is on a request, lodged jointly by Selwyn Quarries Ltd and the Canterbury Regional Council, for the Court to issue a consent order allowing Selwyn Quarries Limited appeal against a decision made by the Canterbury Regional Council Hearings Commissioners. The Hearings Commissioners had declined a joint resource consent application from multiple quarry operators (referred to as the Canterbury Aggregates Producers Group or CAPG). The CAPG application involved the extraction of gravel aggregate and backfilling excavations within the zone of groundwater fluctuation at existing quarry sites near Christchurch.

- 3.31 The reason for the request was that Selwyn Quarries Limited had changed their management for the quarry to only backfill with Virgin Excavated Natural Material (VENM), which is the same approach that is proposed by the applicant at Peach Island. The Canterbury Regional Council found the changed methodology to be acceptable and so supported the request for an order. However, the Environment Court decided not to grant the order because it was not sought by consent (there was a lay submitter who did not agree to the order). The decision declining the order was not a rejection of the proposal to excavate into the zone of groundwater level fluctuations and to backfill with natural materials.

3.32 The original CAPG consent application that was declined by a Canterbury Regional Council hearing panel was very different to the much more conservative management regime being proposed for Peach Island. The key differences are:

- (a) CAPG proposed to use Class 2, 3, and 4 landfill materials, as they were defined in the WasteMINZ Guidelines at that time, with this material potentially being inundated at times of high groundwater levels, as well as the potential for groundwater to be exposed within excavations. In contrast, only Class 5 fill (Clean fill), but also excluding man-made materials, will be used as backfill at Peach Island and procedures are proposed to ensure uncontrolled exposure of groundwater is avoided.
- (b) The area of excavations which CAPG proposed to backfill was much larger (in excess of 400 ha) than the much smaller area to be backfilled with clean fill at Peach Island (7.35 ha).
- (c) The areas where CAPG were proposing to excavate and backfill had been historically quarried and backfilled with poor quality fill material before controls on filling were established (in some cases going back to the 1950's). This carried a very high risk of contaminated backfill material being placed within the zone of groundwater level fluctuations and in some cases, directly into exposed groundwater. The Peach Island site has no prior history of gravel extraction or backfilling that I am aware of and the proposed acceptance criteria will be restrictive in terms of the material that can be accepted and used as clean fill.
- (d) CAPG proposed to have fill material deposited in excavations by multiple different operators. Only the consent holder (or its contractors) will transfer clean fill material to Peach Island and only after it has met the strict acceptance criteria, so there will be higher level on control at Peach Island than what was proposed in the CAPG application.

3.33 For those reasons, I do not consider that any parallels can be drawn between this application and the *Selwyn Quarries Limited* scenario.

(g) – *Submitter concerns that placement of fill material within zone of groundwater level fluctuations to be “unusual”.*

3.34 Submitter have expressed concern and echoed Dr Rutter's view that the placement of fill material within the zone of groundwater level fluctuations to be "unusual" as it could potentially lead to an increased risk of migration of contaminants if present in the fill material. The placement of fill material within the zone of groundwater level fluctuations has been previously granted under resource consents RM150896 (granted in 2016) and RM210649 (granted in 2021 for the applicant at their Douglas Road site which also allow the exposure of groundwater in excavations). Therefore, I do not consider the proposed methodology to be unusual for the region. The key control for minimising the migration of contaminants in groundwater is the quality of the fill material. The requirements of the revised GCMP (March 2023) and the updated groundwater consent conditions (March 2023) are strict. Provided the requirements are met there is a low probability for accidental placement of a large enough volume of contaminated fill material to cause adverse effects as agreed by Dr Rutter in Section 4(c) of the JWS.

Response to Council comments on updated GCMP and groundwater consent conditions:

- 3.35 In this section I discuss and address comments made by Council Officers in their memorandum dated 14 April 2023, specifically Section 2.8, Appendix 2 and Appendix 3 which provides comments on the revised GCMP (dated March 2023) and updated groundwater consent conditions.
- 3.36 Dr Rutter has raised concerns regarding the management of excavation and backfilling activities at the Peach Island site to avoid accidental exposure of groundwater within an excavation. I have addressed this in paragraph 3.28 of this evidence.
- 3.37 Dr Rutter notes that the Ministry for the Environment (MfE) Hazardous Activities and Industries List guidance: Identifying HAIL land was published on 30 March 2023. I note this was after the revised GCMP (March 2023) and updated groundwater conditions were filed with Council on 23 March 2023. I agree that the reference to updated MfE guidelines should be incorporated into the consent conditions, although noting there are no changes to the guidelines that alter the requirements of the SOP.
- 3.38 The Council Officers have recommended the inclusion of Table 5 from Cavanagh (2015) outlining background soil quality limits specific to the Tasman region in the SOP.

Council note that relevant background soil limits are being reviewed. I agree that including a copy of Table 5 Cavanagh (2015) in the SOP and the consent conditions is useful for the consent holder to refer to although for clarity, I would recommend that the Table 5 from Cavanagh (2015) is simplified to just include the trace elements and their relevant 99th percentile concentrations to avoid confusion with the other values shown on that table (which are not relevant). The Council Officers note that the information from Cavanagh (2015) may be updated in future. Therefore, I would recommend provision is made for any future updates to the regional soil background concentrations to be incorporated into the proposed consent conditions through a condition review process.

- 3.39 The Council Officers suggest using a lower soil background limit of 0.65 mg/kg for cadmium rather than the limit of 0.9 mg/kg as recommended by Cavanagh (2015). The lower limit soil background limit for cadmium recommended by the Council Officers is a default value provided in WasteMINZ (2022) for areas in New Zealand where there is no regional specific soil background limits. WasteMINZ 2022 state “*As a default, national background soil levels numbers are provided where region specific values are not available. These national background soil levels should only be adopted when region specific values are not available.*” As Cavanagh (2015) provides limits specific to the Tasman region, it is appropriate to use the region specific limits (or any future updates to the Tasman region specific limits).
- 3.40 The proposed exceedance criteria include the use of 50% of the maximum acceptable values (MAV) in the Water Services (Drinking Water Standards for New Zealand) Regulations 2022 in downgradient water supply bores. Dr Rutter has indicated that in her opinion this will result in a degradation of water quality. As the purpose of the proposed exceedance criteria are to protect downgradient groundwater drinking users, changes in water chemistry that do not exceed the proposed trigger limits or exceedance criteria will not adversely affect groundwater users. It is worth noting that identification of water chemistry changes and mitigation actions are not solely reliant on water chemistry triggers. The proposed water chemistry trend analysis is intended to assist with capturing any adverse changes in water chemistry (such as copper) and mitigating the cause of the trend before exceedances occur.
- 3.41 The Council Officers have commented on the threshold for notifying Council of spills in Condition 83 of the proposed landuse consent conditions (RM200488). The Council Officers have suggested that the proposed threshold for notifying Council for spills

greater than 20 L should be reduced if spills occur closer to the water table. The evidence of Mr Corrie-Johnston confirms that no machinery will be physically within an excavation (apart from the digging implement) so spills within an excavation are not anticipated. However, it is reasonable that this condition could be updated to include a requirement to notify Council of *any spills within an excavation* as well as retaining the requirement to notify Council of spills greater than 20 L outside of an excavation. Spills less than 20 L outside an excavation do not need to be notified to Council because the risk of such spills contaminating groundwater is lower.

- 3.42 The Council Officers have commented on Condition 13 of the proposed discharge consent conditions (RM220578) and have recommended that the groundwater sampling to be undertaken prior to clean filling in the existing monitoring bores should be monthly rather than the proposed three-monthly sampling frequency. This has been addressed in paragraphs **Error! Reference source not found.** and 3.14 of this evidence. As agreed in Section 10 of the JWS, undertaking quarterly groundwater sampling to establish the initial year to year median concentrations in the existing dedicated monitoring bores prior to clean filling is an appropriate balance between gathering enough data without being prohibitive to consent holder.
- 3.43 The Council Officers have commented on Condition 19 of the proposed discharge consent conditions RM220578. This condition requires that the five dedicated monitoring bores at the clean fill site should allow groundwater samples to be collected across the full range of groundwater level fluctuations to reduce the risk of the bores going dry. The Council Officers have queried how this condition will be complied with. Groundwater level data will be collected at the same time as groundwater samples are collected (in addition to the continuous groundwater level monitoring) and will be reported in the annual monitoring report. This will allow the suitability of the monitoring bores for capturing the full range of groundwater levels to be assessed and documented. For clarity, I would recommend that the Council Officers amendment to Condition 19 be updated to the following in italics below:

If for any reason a groundwater sample cannot be collected, a suitably qualified and experienced groundwater scientist shall recommend and the consent holder shall undertake an appropriate alternative for sampling groundwater.

- 3.44 The Council Officers have commented on Condition 21 of the proposed discharge consent conditions (RM220578) which requires annual sampling of downgradient water supply bores within 500 m of the clean fill. The Council Officers note that the consent holder would need to identify all bores used for drinking-water supply. This issue has been addressed in paragraph 3.8 of my evidence.
- 3.45 The Council Officers have recommended the inclusion of Condition 25 of the proposed discharge consent conditions (RM220578). The likelihood/magnitude of unanticipated changes in groundwater chemistry would be expected to be greatest at the downgradient boundary of the clean fill and reduce with distance. I consider that a 500 m buffer is appropriate to assess for unanticipated changes in water supply bores. Contrary to the Council Officers' comments, a 500m buffer is what was proposed in the previous versions of the GCMP documents (July 2022 and September 2022). In my opinion, the inclusion of a condition similar to what is proposed by the Council Officers is appropriate provided it is amended to distinguish between groundwater chemistry management limits and absolute limits on unanticipated changes in groundwater chemistry. As such, the amended condition I support is proposed in italics below:

Quarrying activities, including the discharge of clean fill to land and any accidental spills on the site shall be managed in a manner that seeks to avoid any exceedance of 50% of the maximum acceptable values or guideline values of the Water Services (Drinking Water Services for New Zealand) Regulations 2022. Under no circumstances shall quarrying activities cause the maximum acceptable values of the Water Services (Drinking Water Services for New Zealand) Regulations 2022 to be exceeded in any existing water supply bore within a 500 m buffer zone downgradient of the quarry.

- 3.46 The Council Officers have recommended that Condition 26b (exceedance Criterion B) be amended to use a difference of 10% rather than the proposed difference of 20%. As agreed to in Section 8(f) of the JWS, a 20% change in groundwater chemistry can be a very small change compared to natural groundwater chemistry variations and in my opinion 20% is the appropriate figure. As exceedance Criterion B and the percentage difference between upgradient and downgradient bore year to year median concentrations only applies to situations where there is an upgradient contaminant source (not related to clean filling activities), a lower threshold may cause the consent holder to undertake investigations into the source of contamination caused by another land user. This could result in the consent holder implementing actions which include undertaking additional groundwater chemistry monitoring in addition the extensive

monitoring already volunteered and providing an alternative drinking-water supply. However, as I consider even a 10% exceedance is very unlikely to occur, I would be comfortable with the condition being amended to refer to a 10% exceedance.

3.47 The Council Officers have queried the proposed response to exceedances of the water chemistry exceedance criteria in the dedicated monitoring bores, as outlined in proposed Condition 32 of the discharge consent conditions (RM220578). This has been addressed in paragraph 3.20 of my evidence but for clarity I have provided a summary of water chemistry monitoring response below:

- (a) Trend analysis of water chemistry data – if adverse trends identified, then additional actions to occur including notifying Council, further monitoring, ceasing activities that caused the adverse trend as documented in Condition 28 of the discharge consent.
- (b) If exceedance criteria in the dedicated monitoring bores at downgradient clean fill site boundary are exceeded and the exceedance is confirmed by repeat sampling, then sampling of downgradient water supply bores (in addition to the annual sampling) is required provided access the water supply bores are accessible.
- (c) If an exceedance of the trigger limits occurs in a downgradient water supply bore occurs and is confirmed by repeat sampling then consent holder will provide an alternative water source to the water supply bore user.
- (d) An additional response that Council have proposed (Condition 34 of the discharge consent (RM220578)) is that if a MAV is exceeded in a water supply bore, then consent holder is to provide an alternative water source to the water supply bore user and cease clean filling activities.

3.48 While this scenario is not anticipated, the Council Officers' proposed Condition 34 of the discharge consent conditions of immediately ceasing clean filling and providing an alternative water supply if the Maximum Acceptable Values (MAV) in the downgradient water supply bore(s) are exceeded is appropriate provided the following underlined words are included "*...and the consent holder shall supply drinking water to affected residences to a similar standard as existed prior to commencement of this consent*". Council's proposed condition

would then provide that works shall only recommence once the Consent Holder has established to Council's satisfaction that the activity is not causing the changes/decrease in water quality. To make this condition more objective, I recommend it should specify that the consent holder must cease work *until a report by a suitably qualified and experienced groundwater scientist is produced which demonstrates that the activity is not causing the changes/ decrease in water quality.*

- 3.49 The Council Officers comment that no reporting requirements or complaints register requirements are included in the proposed discharge consent conditions (RM220578). These requirements are captured in the landuse consent conditions and the revised GCMP (March 2023) although for consistency, I agree that it would be useful to include reference to these requirements (as outlined in the revised GCMP (March 2023)) in the discharge consent conditions.
- 3.50 The Council Officers have included Condition 111 in the landuse consent (RM200488) to cease excavations in Stage 1 if seepage inflows from Shaggery Stream / Peach Island Overflow channel are observed. While the proposed groundwater conditions have been developed to avoid uncontrolled exposure of groundwater in excavations (including seepage from Shaggery Stream), I consider inclusion of this condition to be appropriate.
- 3.51 I consider the Council Officers inclusion of Condition 87 in the landuse consent (RM200488) to limit excavations below a level of 0.3 m above groundwater level is appropriate.
- 3.52 The Council Officers review of the revised GCMP (March 2023) and groundwater consent conditions conclude that the proposed groundwater chemistry monitoring conditions are inconsistent with the NPS-FM and Te Mana o te Wai (2020) in terms of groundwater chemistry changes. This has been addressed in paragraphs 3.17 to 3.18 of my evidence.

4. CONCLUSION

- 4.1 The revised GCMP (March 2023) and the relevant groundwater conditions have been updated to incorporate suggestions by the Commissioner as well as to alleviate concerns from submitters and Council Officers while being achievable for the consent holder.

- 4.2 The proposed clean fill acceptance criteria are more restrictive than those recommended for Class 5 fill (clean fill) in the WasteMINZ (2022) Guidelines, offering a high level of scrutiny before any material sourced offsite can be accepted as clean fill and transferred to Peach Island.
- 4.3 The groundwater consent conditions have been updated to allow for the identification of adverse changes in groundwater chemistry before the proposed exceedance criteria and trigger levels are exceeded. This involves identifying any adverse trends in groundwater chemistry data and if identified, the consent holder will initiate an investigation into the cause of the trend and undertake actions to mitigate the cause of the trend before the exceedance criteria or trigger limits are exceeded. The mitigation actions include requirements for the consent holder to cease any activities such as clean filling that may have caused the adverse trend before it becomes an issue.
- 4.4 The response to an exceedance of the proposed groundwater chemistry trigger limits in a downgradient private water supply bore requires an additional sample to be undertaken within 72 hours of receiving the initial results to confirm the exceedance. This is to avoid any artificial exceedances caused by sampling or analysis errors. If the exceedance is confirmed, then the consent holder will provide an alternative water supply. In accordance with the amendment by Council Officers to Condition 34 of the discharge consent, an alternative water supply would also be required if the MAV were exceeded in a downgradient water supply bore.
- 4.5 The proposed exceedance criteria and water chemistry trigger limits allow changes in groundwater chemistry up to the proposed water chemistry trigger limits. While the Council Officers consider any change in groundwater chemistry outside of “current state” to be a degradation and inconsistent with the NPS-FM (2020) and the concept of Te Mana o te Wai, I consider that management of clean fill activities to ensure any groundwater chemistry changes are within the proposed exceedance criteria and trigger limits to be adequate to minimise unanticipated groundwater chemistry changes and to be consistent with the localised changes in groundwater quality that are allowed to occur by the TRMP.
- 4.6 The key control on ensuring groundwater downgradient of the proposed Peach Island clean fill site is the quality of the fill material used to backfill excavations. Provided that the controls and procedures proposed in the revised GCMP (March 2023) and

groundwater consent conditions are met, effects on groundwater are considered to be less than minor.

Ryan Charles Smith Nicol

21 April 2023

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Peach Island Proposed Quarry: Groundwater and Clean Fill Management Plan

• Prepared for

CJ Industries

• April 2023

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CJ INDUSTRIES - PEACH ISLAND PROPOSED QUARRY: GROUNDWATER AND CLEAN FILL
MANAGEMENT PLAN

Quality Control Sheet

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1.0 Introduction

This report sets out the measures and procedures for groundwater protection that must be applied to manage the excavation of gravel aggregate by CJ Industries (the “site operator”) at their proposed Peach Island quarry site (the “clean fill site”) and backfilling of the excavations with clean fill material, as authorised by consents RM200488 and RM220578.

Clean fill refers to material placed at a depth of more than 1 metre (below the subsoil and topsoil). Subsoil and topsoil are addressed in the Soil Management Plan.

2.0 Purpose: Consent Compliance and Key Performance Indicators

The purpose of this Groundwater and Clean Fill Management Plan is to ensure that the clean fill site will be managed to comply with consent conditions related to the clean filling activities and discharge of contaminants to land, specifically in respect of achieving groundwater quality outcomes.

The key performance indicators to ensure that the site activities are managed are:

- ∴ Ensuring that excavations do not expose groundwater in excavations.
- ∴ Ensuring that all backfill material is strictly managed to ensure it meets the definition of ‘clean fill’ under WasteMINZ guidelines (2022) but also excludes any manmade hard fill material (i.e., concrete, bricks, tiles etc).
- ∴ Minimising any change to the physical and chemical properties of groundwater as result of the land use and discharge activities associated with clean fill activities (as defined by the groundwater chemistry monitoring requirements).
- ∴ Ensuring that under no circumstances will the land use and discharge activities associated with clean fill activities result in groundwater quality exceeding the acceptable values in the Water Services (Drinking Water Standards for New Zealand) Regulations 2022 in downgradient water supply bores.

The following sections of this report detail the procedures to achieve these outcomes.

Each section sets out an **Explanation of Risk** followed by the associated **Management Requirements**.

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3.0 Clean Fill Materials

Explanation of Risk

The use of inappropriate fill materials carries risks for groundwater quality.

Given that the excavation depths will vary depending on groundwater level conditions at the clean fill site, it is expected that material used to back fill areas of the clean fill excavated during periods of low groundwater levels will become inundated by groundwater during periods of high groundwater levels. Therefore, it is important that suitable controls are placed on the material being used to back fill the excavation pits to avoid contamination of shallow groundwater.

The WasteMINZ document Technical Guidelines for Disposal to Land (2022) (WasteMINZ 2022) defines differing Classes of landfill and the technical constraints (i.e., hydrogeology, hydrology, ecology, etc.) on the Class of landfill considered acceptable for a particular location. The key hydrogeological technical constraint for the siting of different Classes of landfill is whether the underlying aquifer system beneath the proposed landfill is used for drinking-water purposes. Only Class 5 Clean fills are allowed to be sited over aquifers used for drinking-water purposes. Therefore, since the shallow groundwater aquifer system in the Peach Island area is used for private drinking-water supply purposes, the proposed Peach Island clean fill site is therefore defined as a Class 5 Clean fill.

WasteMINZ 2022 provides guidance on material that is acceptable for backfilling a Class 5 landfill. The primary protection against adverse changes in groundwater chemistry that could impact downgradient groundwater drinking-water supplies is to ensure that the material used as back fill at the Peach Island clean fill site is uncontaminated. A summary of acceptable and unacceptable material for clean fill purposes at Peach Island is provided in Table 1 of Appendix A: Clean Fill Procurement SOP.

Management requirement

1. Clean fill deposited at Peach Island must comply with Table 1 of Appendix A: Clean Full Procurement SOP

4.0 Proposed Clean Fill Management System

Explanation of risk

Management of clean fill before it reaches Peach Island (how it is sourced, stored, inspected, tested and transported) is important to ensure the clean fill meets the specified requirements.

It is also essential to have sufficient clean fill on site to backfill excavations, including in the case of rising groundwater. This is to ensure that groundwater is not accidentally exposed within an excavation at the Peach Island clean fill site.

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Management requirement

1. Clean fill must be managed (sourced, stored, inspected, tested and transported) in accordance with Appendix A: Clean Fill Procurement SOP.
2. Any excavation into the range of groundwater fluctuation must only occur when there is sufficient clean fill material available to rapidly backfill the excavation.
3. At least 1 m of material must be maintained between the base of the working gravel extraction pit and the groundwater level beneath that excavation at the time of the gravel extraction, except as described in 4 or 5.
4. Deeper excavations to between 0.3 and 1 m above groundwater level may occur, but:
 - a. Only during stable weather conditions, which means:
 - i. Decreasing or stable groundwater level trends, based on the groundwater level monitoring requirements described in the consent conditions of RM200488; and
 - ii. Decreasing or stable flow within the Motueka River as measured at the TDC Woodmans Bend flow recorder site.
 - b. Must immediately cease, and backfilling must occur if any of the following occur:
 - i. Tasman District Council issue any flood warnings for the Motueka River catchment.
 - ii. Any weather warnings are issued for the Nelson/Tasman region that might be expected to cause groundwater levels at the clean fill site to rise.
 - iii. When groundwater level monitoring described in the consent conditions of RM200488 display an increasing trend.
 - c. Such excavations must be backfilled to at least 1 m above groundwater level on the same day as extraction.
5. Temporary test pits that expose groundwater can be undertaken to confirm the groundwater level elevation beneath an excavation provided the temporary test pit is back filled to 0.3 m above groundwater level within 30 minutes of exposing groundwater. These temporary test pits may only occur during stable weather conditions.
6. Management Requirements 3,4 and 5 are also shown in Table 1 below. The placement of clean fill material and excavation methodology at the clean fill site must comply with Table 1 below.

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Table 1: Summary of fill placement / excavation methodology				
Activity¹	Authorised Depth range	Authorised Type of fill	Time constraint	Other constraints
Temporary test pit or excavation below base of working depth that does not encounter groundwater within 1 m of working depth.	Ground surface to 1 m above groundwater level ²	Clean fill material ³	No constraint as long as groundwater level is at least 1 m below working depth ⁴	Area of excavation controlled by volume of available fill material. There must be sufficient material to back fill to at least 1 m above groundwater level
Excavation that encounters groundwater within 1 m of working depth.	1 m to 0.3 m above groundwater level	Clean fill material ³	Backfilled on same day as extraction of material	Area of excavation controlled by volume of fill material. There must be sufficient material available to back fill to at least 1 m above groundwater level. Excavations can only occur during stable weather conditions and must cease if there are any flood or weather warnings or increasing groundwater levels.
Temporary test pit that encounters groundwater	0.3 m above groundwater level to groundwater level	Material removed from this test pit excavation	Backfilled within 30 minutes	
<p>Notes:</p> <ol style="list-style-type: none"> ¹Physical groundwater checks within an excavation to be undertaken in addition to assessment from groundwater level data/groundwater contours from onsite piezometers. ²Taking into account site restoration requirements. ³Natural clean fill material defined in Table 1 of Appendix A: Clean Fill Procurement SOP ⁴Working depth defined as the elevation of the base of an excavation on that particular day. 				



5.0 Groundwater Level Monitoring and Excavation Controls

Explanation of risk

A key risk to groundwater arises from exposure of groundwater within the excavation pit prior to the pit being backfilled with clean fill material. Groundwater level monitoring and excavation controls are provided in conditions of RM200488.

Management Requirements

1. Excavation of gravel aggregate must not result in uncontrolled exposure of groundwater at the surface (i.e., groundwater exposed in the bottom of the gravel extraction pit) except for small, temporary test pits to check on the occurrence of groundwater.
2. To assess groundwater levels at the clean fill site, continuous groundwater level monitoring (i.e. automated measurements collected every hour) must be undertaken in dedicated monitoring bores at the perimeter of the clean fill site. The consent holder must check groundwater level using this information daily when excavation is occurring. Groundwater levels beneath an excavation must be confirmed via temporary test pitting.

6.0 Response and Mitigation to a Spill

Explanation of risk

Groundwater can become contaminated from spills of liquids such as diesel or machinery oil. This risk can be avoided by appropriate handling of hazardous liquids.

Management requirements

1. Staff operating in the excavation pit area(s) must be trained in the appropriate way to respond to a spill.
2. A spill kit must be available close to the excavation pit area(s).
3. In the event of a spill of machinery oil (including hydraulic oil) or fuel from excavation machinery, all works shall cease and measures must be taken to limit the extent of the spill. Any contaminated strata or spill response material must be excavated and removed from the site and disposed of at an appropriate disposal facility (subject to approval of the disposal facility).
4. If any spill greater than 20 litres occurs, the site operator must immediately notify the Tasman District Council Pollution Incident contact number. Based on the magnitude and type of the spill, and in consultation with TDC, the consent holder shall undertake groundwater quality monitoring of downgradient monitoring bores and drinking water supply bores in accordance with the consent conditions for RM220578.

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7.0 Groundwater Quality Monitoring

Explanation of risk

Removal of the naturally deposited strata and backfilling with clean fill material at the Peach Island clean fill site is expected to result in some level of change in groundwater chemistry. The level of change is not precisely known, but is not expected to be greater than the proposed water quality trigger concentrations provided in the consent conditions RM220578. The main control on groundwater chemistry changes is the quality of the clean fill material used to backfill excavations, as outlined in Section 3.0. However, the purpose of the groundwater quality monitoring is to detect any unanticipated changes in groundwater chemistry before they reach a level that will adversely affect downgradient groundwater users.

Management requirements

1. Groundwater quality must be monitored in accordance with conditions of RM220578.

8.0 Water Quality Complaints

Management requirements

1. The Consent Holder must maintain a complaints register.

The Consent Holder must record and investigate any complaint of bad taste, odour or illness reported in downgradient bores used for water supply purposes within 500 m of the clean fill. Investigation and records must include:

- a. The location where the issue that resulted in the complaint was experienced.
- b. The date and time when the issue that resulted in the complaint was experienced.
- c. A description of the excavating and clean filling activities that were being undertaken prior to the complaint being experienced.
- d. A description of trends in water quality data undertaken in accordance with the consent conditions in RM220578.
- e. The most likely cause of the issue that resulted in the complaint.
- f. Any corrective actions undertaken by the consent holder to avoid, remedy, or mitigate any contribution the clean filling activities are likely to have made to the situation that caused the complaint.

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2. This record shall be provided to the Manager, RMA Compliance and Enforcement, Tasman District Council following any investigation into a complaint.

9.0 Reporting Requirements

1. An annual monitoring report will be prepared for the period of 1 July to 30 June and provided to the Tasman District Council: Attention – Monitoring and Compliance, by 30 September each year.
2. The annual monitoring report shall include but not be limited to:
 - a. Results of groundwater quality monitoring as required by the consent conditions in RM220578 and include:
 - i. A discussion of any groundwater quality trends.
 - ii. Any mitigation actions undertaken in response to any groundwater quality trends.
 - iii. A description of how effective any mitigation actions were in addressing any water quality trends.
 - iv. Any exceedance of the contaminant trigger concentrations.
 - v. Any mitigation actions taken in response to the exceedances.
 - vi. A description of the drinking water quality results from bores used for domestic supply/irrigation purposes located downgradient of the clean fill site, if this data is available.
 - b. Groundwater level data including:
 - i. A copy of the telemetered groundwater level data measured at the site.
 - ii. A copy of the excavation elevation data

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10.0 References

Waste Management Institute New Zealand (WasteMINZ). 2022. Technical Guidelines for Disposal to Land. Revision 3. October 2022.



CJ INDUSTRIES - PEACH ISLAND PROPOSED QUARRY: GROUNDWATER AND CLEAN FILL
MANAGEMENT PLAN

Appendix A: Clean Fill Procurement SOP

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CJ Industries. Draft RFM 21/04/23 – Clean Fill Procurement

Standard Operating Procedures for the selection, inspection/testing, and transport of clean fill for use at Peach Island.

The purpose of this SOP is to set out operating procedures that will be applied by CJ Industries (CJI) to ensure that all clean fill destined for Peach Island is “clean fill” that meets the requirements of the Groundwater and Clean Fill Management Plan for Peach Island (“GCMP”).

1.0 Clean Fill Acceptance Criteria

Table 1 below provides a summary of acceptable and unacceptable material for clean fill purposes at Peach Island.

Table 1: Summary of Clean fill Acceptance Criteria ¹		
Source	Acceptable Material	Unacceptable Material
Materials sourced onsite.	<ul style="list-style-type: none"> ∴ Uncontaminated natural material such as soil, clay, rock and gravel. ∴ Maximum biodegradable materials (i.e., vegetative matter) to be no more than 2% by volume per load of incidental and is limited to incidental organic materials. 	<ul style="list-style-type: none"> ∴ Contaminated soil, clay, rock and gravel. ∴ Materials containing more than 2% by volume per load of biodegradable organic matter, including peat, loams and topsoils with high organic content. ∴ Manufactured materials including concrete, bricks, tiles, etc.
Materials sourced offsite	<ul style="list-style-type: none"> ∴ Uncontaminated natural material such as soil, clay, rock and gravel. Compliance with this definition will be achieved by testing a representative composite sample of imported fill material to demonstrate that total soil contaminant concentrations do not exceed regional soil background concentration limits. ∴ Maximum biodegradable materials (i.e., vegetative matter) to be no more than 2% by volume per load of incidental and is limited to incidental organic materials. 	<ul style="list-style-type: none"> ∴ Contaminated soil, clay, rock and gravel. ∴ Any material sourced from any site listed on the Tasman District Council Hazardous Activities and Industries List (HAIL) register (as defined by the Ministry for the Environment) or any site where the Clean fill Operator has a reasonable expectation of HAIL activities occurring, even if it is not listed on TDC’s HAIL register and for both these categories of sites, the HAIL activity is known to have been occurring before the date the clean fill material is received. ∴ Materials containing more than 2% by volume per load of biodegradable



Table 1: Summary of Clean fill Acceptance Criteria¹

Source	Acceptable Material	Unacceptable Material
		<p>organic matter, including peat, loams and topsoils with high organic content.</p> <p>∴ Manufactured materials including concrete, bricks, tiles, etc.</p>
<p>Note: ¹The clean fill acceptance criteria provided in this table shall be applied to all material placed at depths greater than 1 m below ground level. The Soil Management Plan applies to topsoil and sub soil.</p>		

Furthermore, any material, that is understood to comply with the Table 1 definition, but displays visual or olfactory evidence of contamination, will be rejected.

2.0 Clean Fill Management Procedures

On site sourced material

The Suitably Qualified and Experienced Practitioner (i.e., SQEP¹) will inspect and undertake representative sampling of the overburden for laboratory testing at the source, in accordance with Section 4.0: Sampling Methodology if the material displays any visual or olfactory evidence of contamination (i.e. accidental discovery of manmade hardfill, visible staining, odours, etc). If the inspection and testing find that the material does not meet the clean fill acceptance criteria in Table 1, the material will be transferred to an approved disposal site, at the advice from the SQEP.

Offsite sourced material

There are three procedures depending on offsite clean fill source category as follows:

- A: overburden from quarries controlled by CJI.
- B: from selected and approved construction sites, slips or other clean fill material not controlled by CJI.
- C: as for B, but where the material is taken to a CJI site for testing.

A. Procedure where clean fill is overburden from CJ Industries (CJI) Quarries

Note: Overburden is virgin natural material of a consistent composition, and no other materials are brought onto these controlled sites, so contamination of this material is very unlikely with the main potential for contaminants being organic matter such as sticks and branches. Site operating procedures also exist to prevent material contamination.

1. The SQEP will inspect and undertake representative sampling of the overburden for laboratory testing at each quarry source, in accordance with Section 4.0: Sampling Methodology. If the inspection and laboratory testing demonstrate that the overburden meets the clean fill acceptance criteria in Table 1, the overburden is acceptable for transfer to Peach Island, subject to the additional procedures below.

¹ Guidance for what is expected of a SQEP is provided in the *Users' Guide: NES for Assessing and Managing Contaminants in Soil to Protect Human Health* (MfE, 2012)



2. The Quarry Manager at the source site must check for and remove visible organic matter. Where this is not practical, material containing organic matter will be rejected.
3. Clean Fill from approved quarries, that comply with this category A, will be carted directly to Peach Island only by CJI truck and trailers.
4. The Quarry Manager at the source site must check that truck and trailer trays are clean before loading.
5. The following information will be recorded in the truck docket book:
 - a. Date and time.
 - b. Source of clean fill.
 - c. Description of clean fill.
 - d. Approximate quantity of clean fill.
 - e. Reference for Laboratory Sampling results and details of the SQEP who oversaw the sampling and inspection.
 - f. Truck ID.
 - g. Name of Quarry Manager.
6. At Peach Island, a copy of the truck docket book entry and laboratory results will be provided to the clean fill Site Manager.
7. The clean fill will be visually inspected by the clean fill Site Manager to assess the following:
 - a. Clean fill that is visibly wet, has the appearance of mud, or does not readily break apart due to the presence of moisture will be laid aside and not inspected until dry.
 - b. Clean fill displaying any visual or olfactory evidence of contamination (i.e. manmade hardfill, visible staining, odours, etc) will be rejected.
8. Random chemical testing must be carried out on imported clean fill from 1 in every 500 m³ of fill material.
9. The clean fill must be deposited as directed by the clean fill Site Manager.

B. Procedure where clean fill is from other selected and approved sources

1. Where CJI is notified of the availability of clean fill, CJI will make an initial decision as to whether they will continue due diligence on the clean fill based on:
 - a. Supplier (of clean fill) suitability.
 - b. Supplier prepared to sign CJI terms and conditions of acceptance.
 - c. Whether the clean fill is required (whether there is capacity to take it).
2. As per Section 4.0: Sampling Methodology, the SQEP will check whether the material comes from a known or possible HAIL site. If so, material will not be used for clean fill (will be directed to an approved disposal site).
3. CJI will carry out a visual inspection, including pothole tests if appropriate, to check the source is likely to be suitable.
4. The material will be excavated and stockpiled either on site, or in the vicinity of the site. In either case, the site or the stockpile must be surrounded by a temporary security fence (see **Figure 1** below) or other suitable method providing CJI with physical control of the stockpile, and stockpiles will be separated from each other (see **Figure 2** below).
5. No additional material will be added to a stockpile after inspection and testing.
6. The SQEP will inspect and undertake representative sampling of the stockpile material for laboratory testing in accordance with Section 4.0: Sampling Methodology. If the inspection and the laboratory testing demonstrate that the material meets the clean fill acceptance criteria in Table 1, the material is acceptable for transfer to Peach Island, subject to the



additional procedures below. If the material does not meet the requirements, the material will be rejected.

7. Acceptable clean fill will be transported to Peach Island by CJI vehicles only.
10. The following information will be recorded in the truck docket book:
 - a. Date and time.
 - b. Source of clean fill.
 - c. Description of clean fill.
 - d. Approximate quantity of clean fill.
 - e. Reference for laboratory results and details of the SQEP who oversaw the sampling and inspection.
 - f. Truck ID.
8. At Peach Island, a copy of the truck docket book entry and laboratory results for the load will be provided to the clean fill Site Manager.
11. The clean fill will be visually inspected by the clean fill Site Manager to assess the following:
 - c. Clean fill that is visibly wet, has the appearance of mud, or does not readily break apart due to the presence of moisture will be laid aside and not inspected until dry.
 - d. Clean fill displaying any visual or olfactory evidence of contamination (i.e. manmade hardfill, visible staining, odours, etc) will be rejected.
12. Random chemical testing must be carried out on imported clean fill from 1 in every 500 m³ of fill material.
13. The clean fill must be deposited as directed by the clean fill Site Manager.

C. as for B, but where the material is taken to a CJI site for testing

Note: In some circumstances (e.g. where quantities are small, or source material is on a site that is unable to be secured, or stockpiles are unable to be stored onsite while testing occurs), material will be transported to a CJI controlled site prior to testing occurring. In such cases this procedure applies.

1. [As per Section 4.0: Sampling Methodology, the SQEP will check whether the material comes from a known or possible HAIL site. If so, material will not be used for clean fill \(will be directed to an approved disposal site\).](#)
- ~~1.2.~~ [CJI will carry out a visual inspection, including pothole tests if appropriate, to check the source is likely to be suitable.](#)
- ~~1.3.~~ The material will be transported from the source site to a pre-test storage site, which will be in a fenced CJI controlled yard (e.g. Hau Road or Lower Queen Street) or another of CJI's sites ("CJI Yard").
- ~~1.4.~~ The following information will be recorded in the truck docket book:
 - a. Date and time of transfer to CJI Yard.
 - b. Source of clean fill.
 - c. Description of clean fill.
 - d. Approximate quantity of clean fill.
 - e. Truck ID.
- ~~1.5.~~ At the CJI Yard the material will be stored and tested as set out below:
 - a. Each stockpile will be from a single source.
 - b. There may be several stockpiles. The stockpile size should be set to meet transport requirements— e.g. the intended number of truck and trailer units for one day's transfers. Stockpiles will be separated as shown in **Figure 2** below.



- c. The stockpile will be inspected by an approved person, and will be approved, rejected or held, pending sampling and testing. No additional material will be added to the stockpile after inspection and testing.
 - d. The SQEP will inspect and undertake representative sampling of the stockpile material for laboratory testing in accordance with Section 4.0: Sampling Methodology. If the inspection and laboratory testing demonstrate that the material meets the clean fill acceptance criteria in Table 1, the material is acceptable for transfer to Peach Island, subject to the additional procedures below. If the material does not meet the requirements, the material will be rejected.
- 1.6. Approved clean fill will be transported to Peach Island by CJI vehicles only. The following information will be recorded in the truck docket book:
- a. Date and time of transfer from CJI Yard to Peach Island.
 - b. Source of clean fill.
 - c. Description of clean fill.
 - d. Approximate quantity of clean fill.
 - e. Reference for laboratory results and details of the SQEP who oversaw the sampling and inspection.
 - f. Truck ID.
- 1.7. At Peach Island, a copy of the truck docket book entry and laboratory results for the load will be provided to the clean fill Site Manager.
- 1.8. The clean fill will be visually inspected by the clean fill Site Manager to assess the following:
- a. Clean fill that is visibly wet, has the appearance of mud, or does not readily break apart due to the presence of moisture will be laid aside and not inspected until dry.
 - b. Clean fill displaying any visual or olfactory evidence of contamination (i.e. manmade hardfill, visible staining, odours, etc) will be rejected.
- 1.9. The clean fill will be deposited as directed by the clean fill Site Manager.

In all cases, rejected material will be returned to source or directed to an approved disposal facility.



Figure 1: Temporary site fencing.

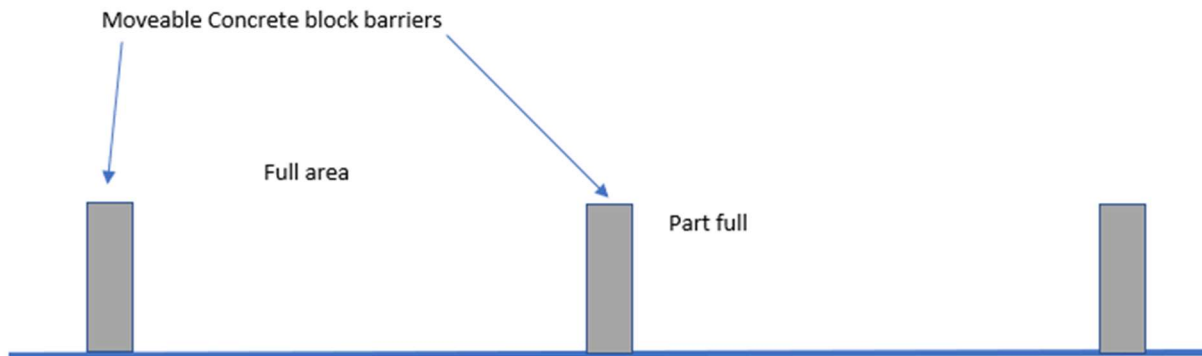


Figure 2: Clean Fill storage prior to testing and rejection or transfer to gravel pit site.

3.0 Additional Clean Fill Assessment

In addition to the requirements in 2.0: Clean Fill Management Procedures, random chemical testing of clean fill material placed within an excavation at the Peach Island clean fill site shall be undertaken at least once every 12 months. Sampling and testing shall be undertaken in accordance with Section 4.0: Sampling Methodology.

4.0 Sampling Methodology

All validation sampling for clean fill from all sources shall be carried out as follows:

- Clean fill sampling will be undertaken by a SQEP for site contamination.
- Quality assurance, quality control and field sampling procedures (including sampling parameters and frequency) shall be implemented by the SQEP as guided by the Ministry for the Environment (MfE) *Contaminated Land management Guideline No.5: Site investigation and analysis of soils* (CLMG No.5) 2004 (revised 2021) and any relevant references to which CLMG No.5 refers for implementation of field sampling programmes.
- Material sourced on site may require further investigation (i.e., due to accidental discovery of visual and olfactory evidence of contamination such as buried anthropogenic waste). In the event of an accidental discovery, the SQEP will be notified and will advise upon inspection, laboratory testing and management of any such material encountered. CJ I will follow the recommendations of the SQEP.
- Analytical parameters analysed for offsite clean fill sources sites A, B, and C shall be informed by due diligence undertaken by the SQEP on a case-by-case basis for each of the three offsite source sites. At a minimum:
 - Material from source sites in category A will be tested for a suite of seven priority heavy metals (i.e., arsenic, cadmium, chromium, copper, lead, nickel and zinc). The SQEP may advise analysis of additional analytical parameters (e.g., based on potential contamination sources identified on adjacent site, if relevant).
 - Material from source sites in category B and C will be tested in the first instance for heavy metals (as for source site A above). The SQEP will evaluate the nature of the historical and current land uses (abbreviated preliminary site investigation) for



evidence of HAIL² activities associated with clean fill source sites under source sites B and C to inform additional analyses required. **Note** – the NES Users Guide (MfE, 2012) includes information about relevant contaminants of concern generally known to be associated with specific HAIL activities.

- All analysis of samples collected shall be undertaken (under chain of custody) by an IANZ accredited analytical laboratory that is certified to undertake the required analyses.
- All results returned from the analytical laboratory shall be interpreted and reported by the SQEP, including evaluation of clean fill material compliance against relevant background concentrations³ as defined in Cavanagh (2015⁴).

² MfE (2012) - The Hazardous Activities and Industries List (HAIL) is a compilation of activities and industries that are considered likely to cause land contamination resulting from hazardous substance use, storage or disposal. The HAIL is intended to identify most situations in New Zealand where hazardous substances could cause, and in many cases have caused, land contamination.

³ Relevant regional soil background concentration limits are the 99th percentile values provided in Table 5 of Cavanagh (2015).

⁴ Cavanagh, J. 2015. Background concentrations of trace elements and options for managing soil quality in the Tasman and Nelson Districts. Landcare Research. June 2015.