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

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

21 November 2022

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 and 4 November 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 and 4 November 2022 was to assess the effects of the proposal on groundwater and to provide recommendations to avoid, remedy or mitigate potential adverse effects on groundwater resources at Peach Island.

1.8 The purpose of this evidence is to provide a summary table and updated timeseries plot of groundwater levels, a summary of additional groundwater quality monitoring data and provide clarification in response to an exceedance of the proposed groundwater chemistry trigger levels.

Code of Conduct

1.9 I have read the Code of Conduct for Expert Witnesses in the Environment Court Practice Note 2014 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 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 CJ Industries is seeking resource consent for the discharge of contaminants to land, in circumstances where the contaminants may enter water.

2.2 A summary table and an updated timeseries plot of the measured range of groundwater level fluctuations show that groundwater levels have a slightly larger range of groundwater level fluctuations than previously described in my evidence filed on 15 July

2022. The timeseries plot provides an update to the plot provided in my groundwater report (dated 15 July 2022). The data shows groundwater level fluctuations in the order of 2 to 3.5 m and groundwater levels at the proposed quarry site have been measured between 0.5 m bgl (24545 – Piezo 3) and 5.1 m bgl (24544 – Piezo 2).

2.3 To supplement the existing groundwater chemistry data from September 2022, a groundwater sampling round was undertaken at Peach Island in November 2022. The results of the November 2022 groundwater sampling results that have been received to date generally indicated groundwater chemistry with concentrations below the relevant trigger levels with the exception of iron and manganese which were measured in private drinking-water supply bore 21033 at concentrations of 4.1 g/m³ (iron) and 0.051 g/m³ (manganese) respectively and exceeded the proposed trigger values of 0.3 g/m³ (iron) and 0.04 g/m³ (manganese).

2.4 The proposed response, if an exceedance of a groundwater chemistry trigger level occurred, is provided in the GMP. I have prepared a flow chart (attached to this statement) to provide a visual representation of the response methodology.

2.5 Part of the response methodology if an exceedance of a trigger level occurred, is to investigate the cause/source of the exceedance. The investigation should include all potential sources of contamination in addition to quarrying activities.

3. EVIDENCE

Groundwater level fluctuations

3.1 Table 2 of the Hydrogeology report (dated 15 July 2022) filed with my evidence on 15 July 2022 provided the range of groundwater levels measured in accessible bores at the Peach Island site at that time. This data was updated in response to a request for further information from Council (dated 2 September 2022) and a summary of the overall measured range from this response was included in my evidence filed on 4 November 2022.

3.2 For completeness, an updated summary table of the overall groundwater level fluctuations measured in accessible bores at Peach Island is provided in Table 1 and a plot of groundwater levels with time is shown in Figure 1, attached to this statement. The locations of the bores with available groundwater level data have been displayed in my previous evidence filed on 15 July 2022.

3.3 As noted in my supplementary evidence dated 4 November 2022, the updated groundwater level data set indicates minor differences in the overall range of measured groundwater levels at the proposed quarry site. The data show groundwater level fluctuations in the order of 2 to 3.5 m. The highest groundwater level at the proposed quarry site was 0.5 m bgl, recorded in 24545 (Piezo 3) on 8 November 2020 and the lowest groundwater level at the proposed quarry site was 5.1 m bgl, recorded in 24544 (Piezo 2) on 18 August 2020. The lowest recorded groundwater level at Peach Island was recorded in bore 21033 (3003, 5.3 m bgl) on 3 December 2019 although bore 21033 is located outside of the proposed quarry site.

3.4 The groundwater level monitoring data should continue to be regularly reviewed throughout the life of the proposed quarrying operation to provide the most up to date information on groundwater level patterns and the range of fluctuations.

Additional Peach Island Groundwater quality data

3.5 To supplement the groundwater chemistry results collected at Peach Island and summarised in my evidence filed on 4 November 2022, another sampling round was undertaken at Peach Island in November 2022. Groundwater sampling at Peach Island was undertaken by PDP in five bores (24543, 24544, 24545, 24546 and 21033) on 10 and 11 November 2022. The locations of these bores have been presented in my previous evidence filed on 4 November 2022.

3.6 The groundwater samples were collected were collected as per the requirements of NEMS (2019) for the sampling and measuring of discrete groundwater quality data. The monitoring bores located at Peach Island that did not have an existing pump were sampled using low flow sampling techniques as outlined in NEMS (2019). Bores with a pump were pumped until at least three well casing volumes had been removed and field parameters had stabilised as outlined in NEMS (2019), to ensure the samples were representative of the surrounding groundwater. All groundwater samples to be analysed for dissolved metals were filtered on site using 0.45 µm filter and collected into acid preserved bottles after filtering, which is in accordance with best practice sampling procedures.

3.7 A summary of the results that were available at the time of preparing this statement and comparison with the proposed groundwater chemistry trigger values is provided in Table 2, attached to my statement. The results of the November 2022 Peach Island

groundwater sampling indicated that the measured concentrations generally complied with the proposed trigger values, with the exception of iron and manganese concentrations in one private drinking-water supply bore 21033 (4.1 g/m³ and 0.051 g/m³ respectively) which exceeded the proposed trigger values of 0.3 g/m³ (iron) and 0.04 g/m³ (manganese).

Flow chart of response to an exceedance of a groundwater chemistry trigger level

3.8 Paragraphs 26 to 39 of the GMP detail the proposed groundwater sampling requirements, trigger levels the results will be compared to and the response the applicant will implement if an exceedance of a trigger level occurred.

3.9 A flow chart to visualise the proposed response as outlined in the GMP has been created and is shown in Figure 2. Provided that the other controls outlined in the GMP are implemented, the proposed response to an exceedance of a trigger level is considered to be a suitable and robust response to reduce adverse effects on the downgradient groundwater system and downgradient groundwater users.

Examples of groundwater contamination sources

3.10 Part of the response plan if an exceedance of a groundwater chemistry trigger level occurred includes investigating sources of the exceedance. In addition to the quarry activities, sources of groundwater contamination include:

(a) Stormwater discharges to ground;

(b) Leaking sewerage pipes/septic tanks;

(c) Agricultural activities/animal effluent;

(d) Buried rubbish/offal pits;

(e) Spills of hazardous substances (hydrocarbons etc.);

(f) Insecure/abandoned bore heads;

(g) Improperly installed/damaged bore casing;

3.11 Figure 3 (sourced from Mance, n.y.), attached to this statement show examples of some of these potential groundwater contamination sources. Figure 4 (sourced from Mance,

n.y.), shows how an insecure bore head of damaged bore casing/improperly installed bore casing can act as a pathway for contaminated surface water/hazardous substances to enter the groundwater system, resulting in contamination.

3.12 While any investigation into the cause of an exceedance should include activities at the proposed Peach Island quarry, the examples of potential sources of groundwater contamination described above in paragraph 3.10 highlight the need to include all possible causes and sources of groundwater contamination.

4. CONCLUSION

4.1 The updated groundwater level data indicates slightly larger range in groundwater level fluctuations, in the order of 2 to 3.5 m. Groundwater levels at the proposed quarry site have been measured between 0.5 m bgl (24545 – Piezo 3) and 5.1 m bgl (24544 – Piezo 2). The GMP procedures adequately manage the potential groundwater effects of the quarry even if ongoing monitoring shows a differing range of groundwater levels as more data is gathered.

4.2 In addition to the September 2022 round, groundwater sampling was undertaken at Peach Island in November 2022. The results of the November 2022 groundwater sampling round that are available at the time of preparing this statement do not show any exceedances of the proposed groundwater chemistry trigger levels with exception of iron and manganese concentrations in a downgradient water supply bore (21033) which exceeded the respective trigger level concentrations for these parameters.

4.3 The proposed response if an exceedance of a groundwater chemistry trigger level occurred is provided in the GMP. For ease of interpretation, a visual flow chart has been created summarising the response and assist with managing an exceedance.

4.4 As part of the response if an exceedance of a trigger level occurred, an investigation into the cause/source of the exceedance is required. The investigation should include all potential sources of contamination in addition to quarrying activities.

Ryan Charles Smith Nicol

21 November 2022

REFERENCES

Mance, E. (n.y): A Landowner's Guide to Water Wall Management. Ottawa: Agriculture and Agri-Food Canada URL [Accessed: 07/11/2022] PDF)

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Table 1: Summary of measured groundwater levels at Peach Island

TDC Bore Number	Bore Name	Groundwater level			Period of available data
		High (m bgl / masl)	Low (m bgl / masl)	Range (m)	
24543	Piezo 1	1.7 / 17.1	3.8 / 15	2.1	August 2020 – July 2022
24544	Piezo 2	1.6 / 18.1	5.1 / 14.5	3.5	August 2020 – July 2022
24545	Piezo 3	0.5 / 18.1	3.4 / 15.2	2.9	August 2020 – July 2022
24546	Piezo 4	2.1 / 18.3	4.2 / 16.1	2.2	August 2020 – July 2022
21948	4582 (Lucas Bore)	-	-	0.45[1]	October 2019 – July 2022[1]
21033	3003 (Peach Island)	1.3 / 17.1	5.3 / 13.1	4.0	October 2019 – July 2022

Notes: [1]Data from continuous groundwater levels measured by Envirolink on behalf of the Applicant after lodgement of resource consent application and response to TDC RFI. This bore only has one measurement in July 2022 with the remaining data being between the period October – November 2019.
Groundwater elevations provided as elevation above sea level using the Nelson 1955 vertical datum.

Table 2: Summary of groundwater quality data at Peach Island from September 2022							
Parameter	**24546 (Piezo 4)**	**24544 (Piezo 2)**	**24545 (Piezo 3)**	**24543 (Piezo 1)**	**21033 (3003)**	**Proposed Trigger**	**Unit**
Location	Upgradient	Upgradient	Downgradient	Downgradient	Downgradient (Drinking-water Supply)	-	-
Date of collection	9/11/2022	10/11/2022	10/11/2022	9/11/2022	9/11/2022	-	-
Laboratory pH	7.5	6.8	6.9	7.5	7.6	<6.5 or >8.5	pH Units
Total Alkalinity	*	69	72	54	65	100	g/m³ as CaCO3
Total Hardness	26	72	74	54	62	200	g/m³ as CaCO3
Electrical Conductivity (EC)	8.1	16.2	16.8	12.8	15	-	mS/m
Dissolved Aluminium	0.01	<0.003	<0.003	0.003	< 0.003	0.1	g/m³
Dissolved Arsenic	< 0.0010	<0.0010	<0.0010	< 0.0010	< 0.0010	0.005	g/m³
Dissolved Boron	0.006	0.009	0.009	0.011	0.011	0.7	g/m³
Dissolved Cadmium	< 0.00005	<0.00005	<0.00005	< 0.00005	< 0.00005	0.002	g/m³
Dissolved Calcium	6.7	20	21	12.3	15.4	-	g/m³
Dissolved Chromium	< 0.0005	<0.0005	<0.0005	< 0.0005	< 0.0005	0.025	g/m³
Dissolved Copper	0.001	<0.0005	0.0005	0.0107	0.0119	1	g/m³
Dissolved Iron	< 0.02	<0.02	<0.02	< 0.02	4.1	0.3	g/m³
Dissolved Lead	< 0.00010	<0.00010	<0.00010	0.00024	0.00024	0.005	g/m³
Dissolved Magnesium	2.2	5.1	5.2	5.7	5.8	-	g/m³
Dissolved Manganese	0.0021	<0.0005	<0.0005	0.0018	0.051	0.04	g/m³
Dissolved Nickel	0.0025	0.0022	0.0011	0.0058	0.0043	0.04	g/m³
Dissolved Sodium	6.4	4.3	4.4	5.2	5	200	g/m³
Chloride	3.5	4.5	4.3	3.4	3.5	125	g/m³
Total Ammoniacal-N	< 0.010	<0.010	<0.010	< 0.010	0.013	1.2	g/m³
Nitrite-N	< 0.002	<0.002	<0.002	< 0.002	0.008	-	g/m³
Nitrate-N	0.058	0.84	0.96	0.56	0.44	5.65	g/m³

Table 2: Summary of groundwater quality data at Peach Island from September 2022							
Parameter	**24546 (Piezo 4)**	**24544 (Piezo 2)**	**24545 (Piezo 3)**	**24543 (Piezo 1)**	**21033 (3003)**	**Proposed Trigger**	**Unit**
Nitrate-N + Nitrite-N	0.058	0.84	0.96	0.56	0.45	-	g/m³
Sulphate	0.9	4.6	4.7	2.5	3.1	250	g/m³
Escherichia coli	Non-Detect	Non-Detect	Non-Detect	Non-Detect	Non-Detect	1 MPN/100ml	MPN/100 ml
Total Petroleum Hydrocarbons	Non-Detect	Non-Detect	Non-Detect	Non-Detect	Non-Detect	Any detection >0.1 g/m³	g/m³
VOC compounds	Non-Detect	Non-Detect	Non-Detect	Non-Detect	Non-Detect	Any detectable presence	g/m³
Notes: Values highlighted in grey indicate exceedance of proposed trigger value. *Alkalinity concentration for bore 24546 was not available at the time of my statement.							

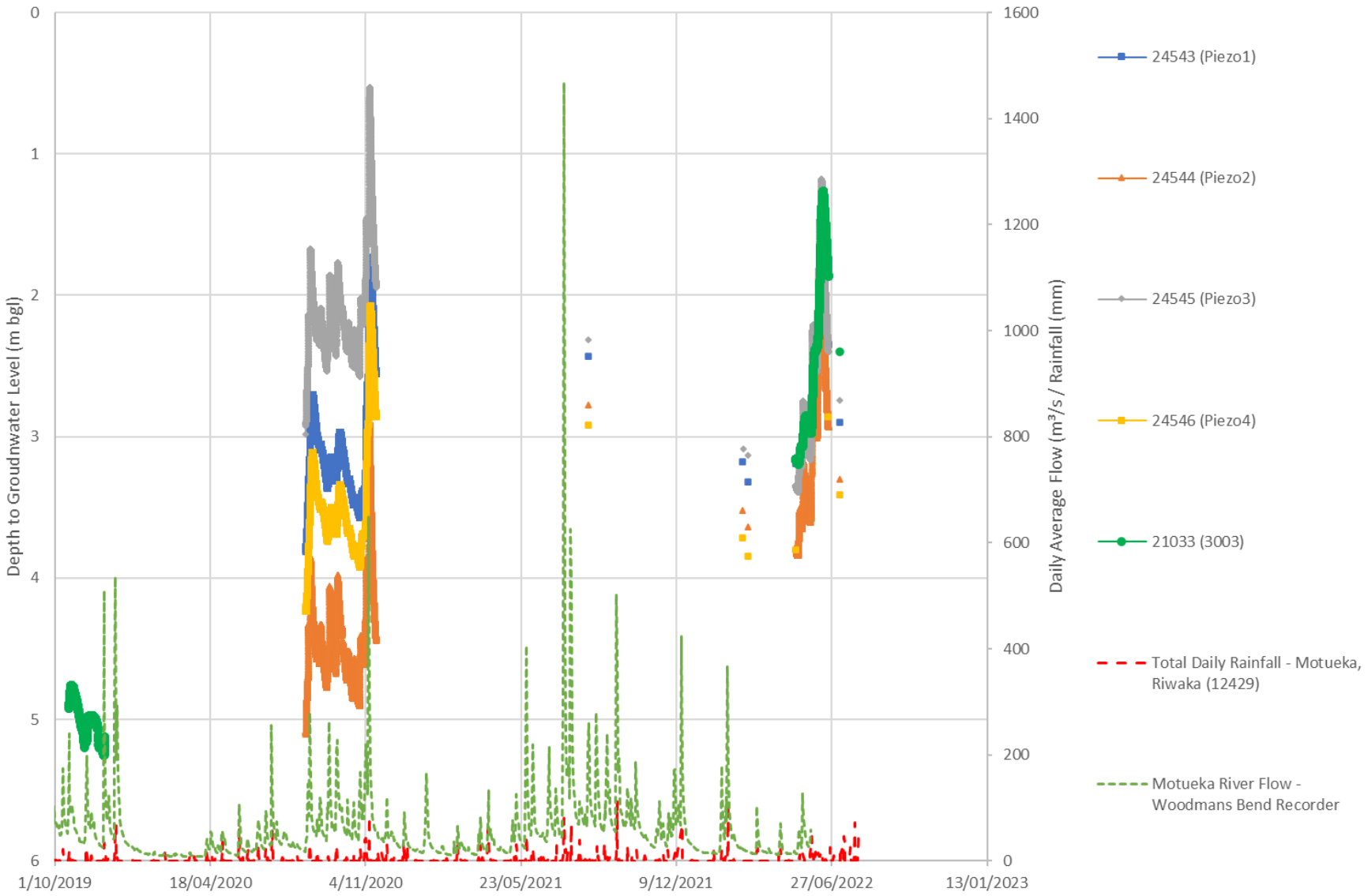

FIGURE 1: TIMESERIES PLOT OF GROUNDWATER LEVEL DATA FOR BORES AT PEACH ISLAND (OCTOBER 2019 – JULY 2022)

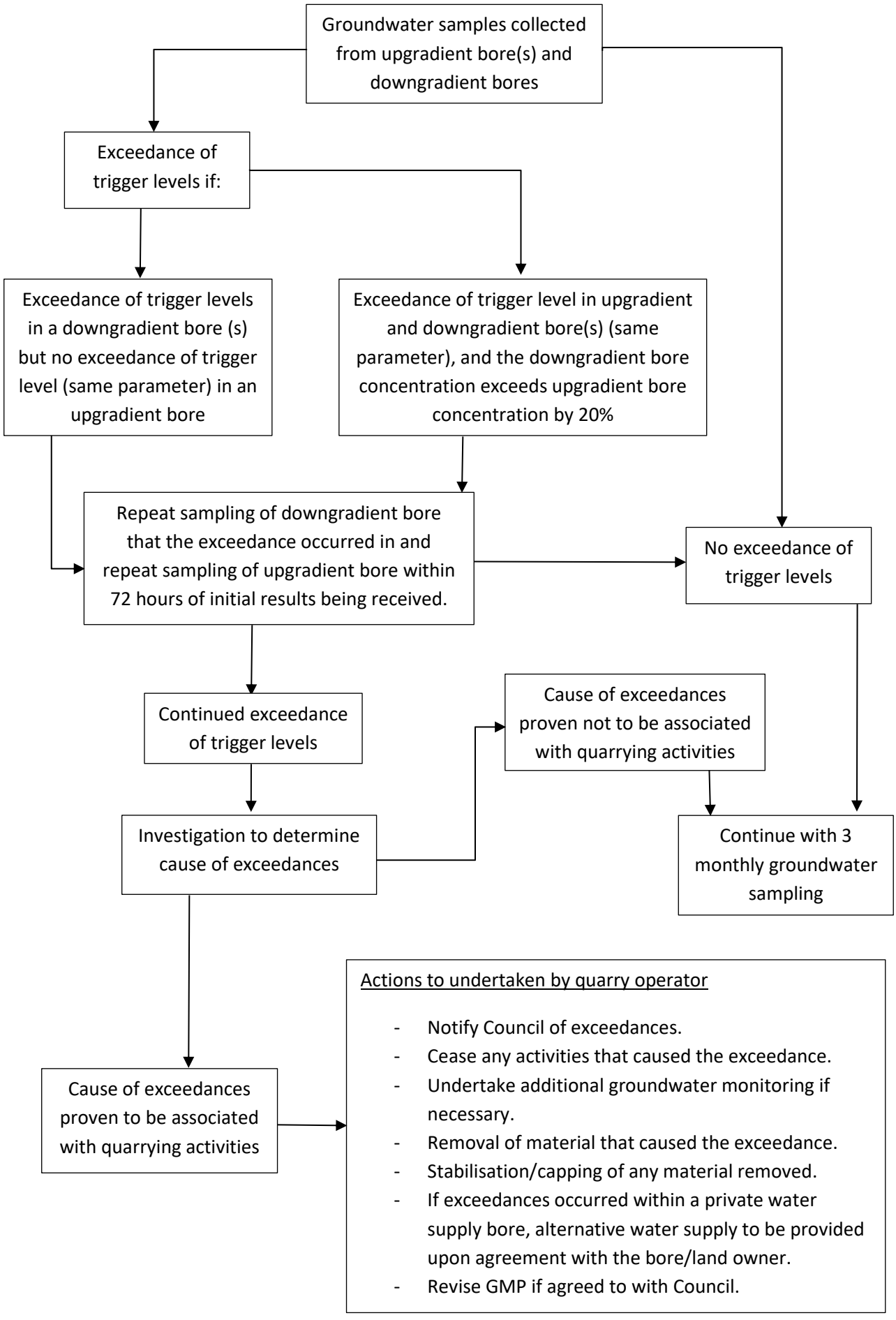

FIGURE 2: FLOW CHART OF RESPONSE TO AN EXCEEDANCE OF A TRIGGER LEVEL

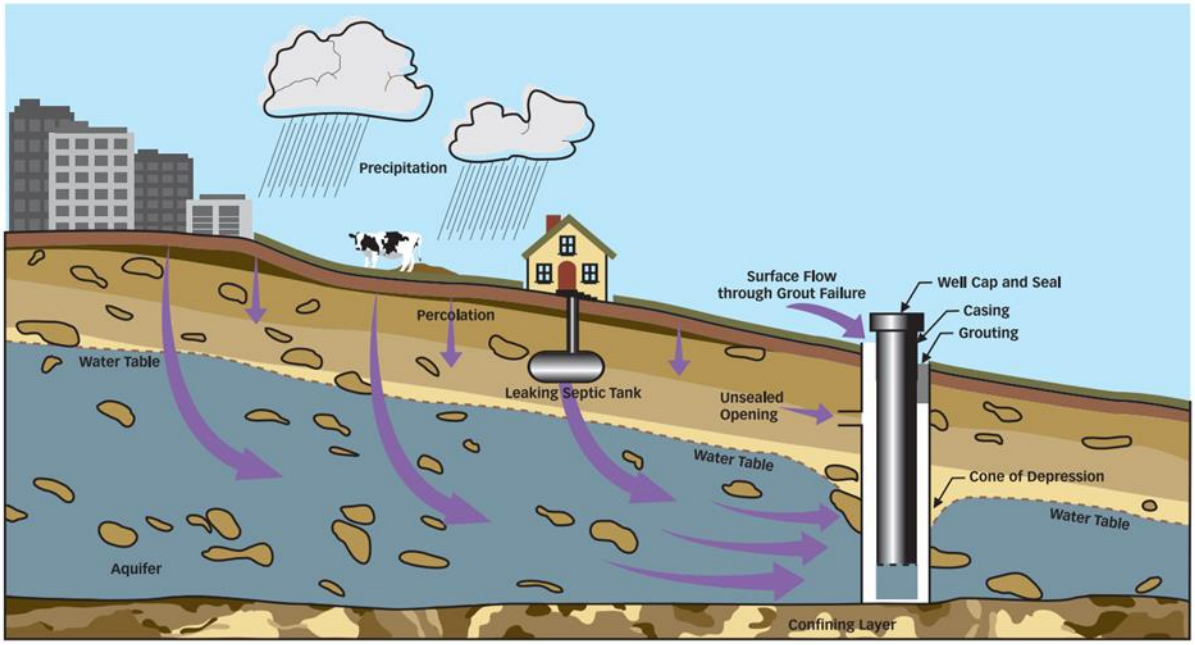

FIGURE 3: SOURCES OF POTENTIAL GROUNDWATER CONTAMINATION (SOURCED FROM MANCE)

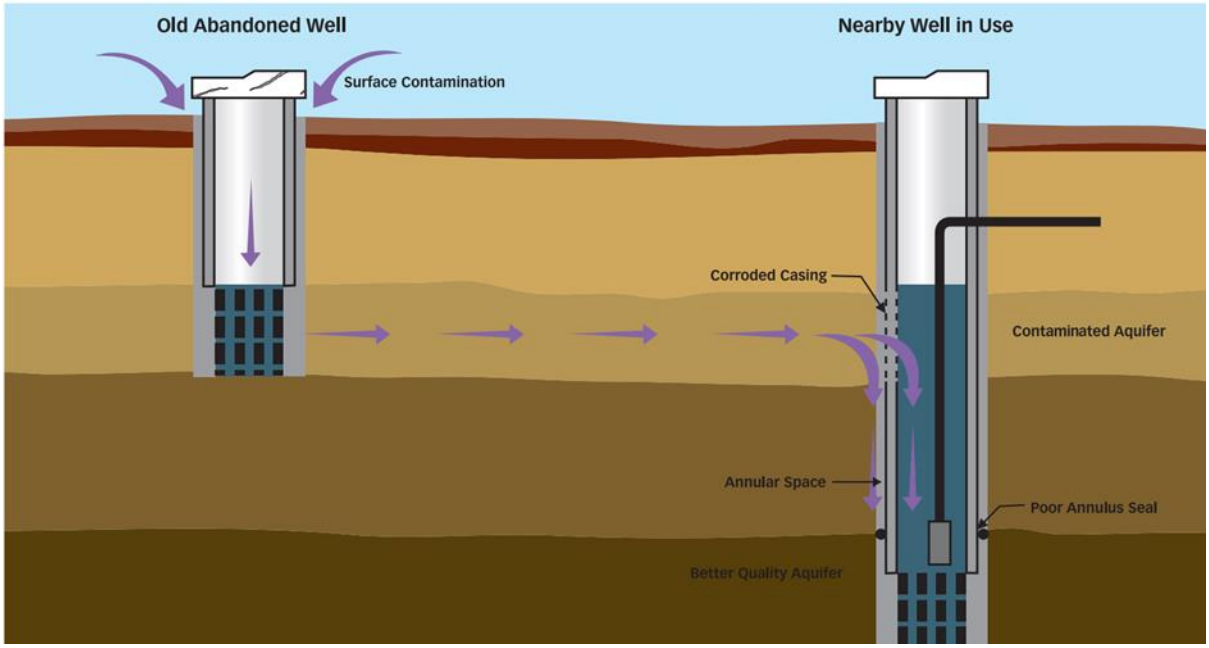

FIGURE 4: POTENTIAL GROUNDWATER CONTAMINATION PATHWAYS VIA EXISTING BORES (SOURCED FROM MANCE)