



17 March 2021

Environment Canterbury
C/- Helen Caley
Aurecon
Via email: Helen.Caley@aurecongroup.com

Dear Helen

RE: REQUEST FOR INFORMATION CRC194958

**POTENTIAL EFFECTS ON GROUNDWATER FROM THE STORMWATER DISCHARGES TO LAND
WITHIN THE GERALDINE STORMWATER MANAGEMENT AREA**

Further to your email 5 February 2021 and subsequent discussions, we provide the following details in relation to the Groundwater Monitoring Programme and the risks to groundwater drinking supplies in proximity to the stormwater management area (SMA).

1.0 Summary of Land Discharges to Land included in the SWMP

The majority of the area within the Geraldine SMA to the east of the Waihi River in Raukapuka is discharged to ground through individual soak pits from road and private building drainage to permeable river gravels deposited by the Waihi River. Stormwater soakage is also utilised to the south of Geraldine town centre, where a number of light industrial developments exist in addition to residential development.

All TDC discharge points are limited to discharges from individual road sumps and private property discharges.

OPUS(2015) reviewed ECan groundwater levels and confirmed that these indicate the groundwater table is around 3-4 m below ground. This review did not provide any construction records to indicate the depth of these discharges or the seasonal maximum depth to groundwater.

The most significant contaminants of concern associated with stormwater discharges to land are expected to include heavy metals and microbial contaminants. Heavy metal concentrations in stormwater discharges are typically below the applicable Maximum Acceptable values (MAVs) for drinking water and microbial contaminant concentrations vary depending on the stormwater catchment area, with some concentrations typically reasonably low. While such contaminants are common with all stormwater discharges to date, risks associated with such contaminants with discharges to ground has focused on concentrated discharges from infiltration basins (e.g., CRC186263 (Ashburton), CRC190445 (Christchurch)), rather than the cumulative effects of lower volume discharges to ground from individual sumps around Canterbury and New Zealand.



1.1 Groundwater Bores Potentially Affected by Discharges to Land within the Stormwater Water Management Plan (SWMP)

All properties within the SMA and within 500 m downgradient have been provided with approved potable drinking water connections from the Geraldine Municipal water supply, which was reported in 2018/19 as compliant. The municipal water supply for Geraldine is sourced from groundwater bores at least 1,900 m to the east and upgradient of the SMA adjacent to the Opihi River.

We have reviewed the Opus assessment of wells within the SMA and have found that three domestic drinking water bores are currently recorded within the SMA. The most recently drilled bore (BZ19/0205) was drilled in 2018 is located within the SMA and within 150 m of the consented private infiltration basin owned by McKenzie Lifestyle Villas (CRC083599). The individual stormwater discharges within the SWA are considered a lower risk than this infiltration basin, given the size and proximity, and the cumulative effect of the private discharges to ground within the SMA.

A total of 43 bores recorded as used for domestic water supply bores are located within two kilometres downgradient of the SMA. Of these 43 bores, 29 have recorded drilling dates that indicate that they were constructed after Geraldine was developed with soakage drainage to land, with over twenty drilled for domestic water supply since 2000 (i.e., well after when stormwater discharges to ground have been occurring in Geraldine. No drilling date is provided for the remaining 14 bores recorded as used for drinking water.

1.2 Condition of Receiving Environment

No ground water quality information is provided for any of the bores within the SMA or within 2,000 m of the SMA. However, review of water quality information from shallow bores (<10 m deep) in the vicinity to this area, indicates that *E-coli* can be expected to be present in shallow aquifer conditions around the Orari Plains. We expect that similar groundwater quality conditions are anticipated to be present within the SMA from the surrounding land uses and from the adjacent surface water body (i.e., Waihi River), which has historically recorded levels of *E-coli* upstream of Geraldine.

In general, shallow groundwater across Canterbury can be expected to be impacted from *E. coli* from a range of land use activities so it is to be expected that, regardless of this stormwater discharge, *E. coli* detections will occur in shallow groundwater in this area.

1.3 Assessed Effect on the Receiving Environment

Approved drinking water supply is provided to properties considered to be potentially affected by the discharges. The stormwater discharges are considered unlikely to increase the contamination risk to the groundwater in the vicinity of the bores in or adjacent to the SMA occurring from adjacent land uses and effects from the Waihi River.

While the consent application acknowledges the likely discharge of microbial contaminants from stormwater to ground, in the absence of information and the unknown construction details of the discharge points, the monitoring programme proposed to investigate potential effects of stormwater discharges is considered appropriate, given that the potential health risks are current managed effectively with the provision of the public water supply.

1.4 Alternatives to Land Discharges and Treatment Mitigation Measures

As outlined in our previous Section 92 response, best practical stormwater treatment provisions are only likely to remove 1-2 log levels of microbial contaminants, but residual risks remain will remain.

New discharges to land for new developments will be required to follow these requirements for stormwater treatment. Public education is a primary mechanism included in the SWMP to control contaminant sources within the existing stormwater network. TDC is also happy to develop a risk assessment process to assess the risks of new discharges to ground within the SMA to be included in their Engineering Code of Practice for Development.

The alternative to land discharge is to discharge the stormwater to waterways, where even with implementation of best practical treatment contaminants discharged (namely heavy metals, and microbial contaminants) can have additional adverse impacts, and discharge to land is a preferred option in terms of environmental outcomes. Our network capacity assessment also determined that upgrades to the current discharges to land are beyond the affordability of the community in the short term. Given the controls to the public health risks, with provision of the public water supply network, the discharges to land are considered the best practical option in terms of the requirements included in the NPSFM(2020) and Te Mana O Te Wai.

The monitoring included in the SWMP is intended to provide additional real data to monitor and validate this management approach included in the SWMP.

2.0 Specific Queries

In relation to the specific queries raised in relation to the monitoring provisions, we provide the following responses:

2.1 Trigger and Target values

As previously advised, we have no problems updating the Plan to adopt the suggested trigger and target levels as per the attached revised schedules. We agree with the inclusions of the MAV limits as proposed.

2.2 Appendix E – Timing of Groundwater Monitoring

It had been proposed by TDC to defer groundwater monitoring to year five of the consent. This will provide TDC with a more sustainable means to address the challenges with addressing the requirements of the Plan to maintain and improve water quality in the receiving water bodies through informed decision making and cost-effective investments. While it is acknowledged that there are several unknowns relating to the effects of the stormwater discharges to groundwater, the deferring of the monitoring to improve the understanding of groundwater conditions has been proposed.

Such discharges are common in the Canterbury environment as well as other parts of the country, without any known instances of contamination events associated directly with stormwater.

The stormwater discharges are not likely to affect a public water supply as all domestic residences within at least 500 m of the SWMP have been provided with a potable water connection.

The best available groundwater water quality information outside Geraldine SWA, indicates that the groundwater quality will exceed drinking water limits for reasons other than stormwater discharges as is expected for shallow groundwaters in unconfined aquifers throughout New Zealand. This expectation has been clearly stated in the New Zealand Drinking Water Guideline 2005 since its initial publication.

2.3 Timing of Monitoring

We propose that at least one sampling round per year is included to collect water quality samples within 24 hours of at least 20 mm of rainfall. This is consistent with the approach provided with the surface water monitoring.

2.4 Notification of Exceedances

It has been suggested that consent conditions are included for the consent holder to notify all potentially affected groundwater users of the health risks associated with the water quality condition of the underlying shallow groundwater aquifer.

We agreed that the water quality conditions and the water safety for drinking of the groundwater in the shallow aquifer should be reported to all bore owners by both Environment Canterbury and Timaru District Council as we consider both parties have responsibilities to do this outside of the stormwater management requirements.

However, we do not think appropriate that the consent conditions are included to notifying exceedances to Drinking Water Guidelines or these notification requirements should be included in consent conditions. Such requirements are required under public health guidelines and drinking water safety plans and are governed by separate public health legislation to the RMA.

There are multiple potential sources of contamination to the underlying shallow groundwater aquifer and we consider actions and requirements need to be consistent with current procedures with other exceedances of drinking water standards in the area (e.g. as identified in the AEE), that are not related to stormwater discharges.

Given the potential for containment sources and pathways from the surrounding land use has already been demonstrated, it is also anticipated that any exceedance will not necessarily be due to stormwater discharges and the responsibilities for determining the source of any exceedance will likely need to be determined by ECan and TDC on a case-by-case basis as they occur.

Given the availability of a compliant municipal public water supply connection, the risk to public health is considered minimal unless unapproved cross connection exist from the private water supply bores with the public water supply network. As above, we would recommend that ECan and TDC work together to ensure that shallow bore owners are aware of the risks to water quality that exist (which are not specific to this stormwater discharge), to ensure that they are aware that if they are using the bores for drinking water, appropriate treatment should be in place and risks of backflow contamination should be avoided with houses being supplied by dual sources.

All properties within Geraldine are required to be connected to the municipal water supply network where a potable reticulated water supply exists. Timaru District Council and was not involved in the authorisation of nearby private bores recorded for domestic water supply. The backflow risks associated with these bores and we are advised that the risks associated with potential connections to alternative water supplies are addressed in TDC's Water Supply Safety Plan with TDC's backflow prevention policy. As above this is not considered a stormwater management issue and should be undertaken regardless of the stormwater discharges to ground.

2.5 Water Table Depth

It is not considered appropriate in terms of environmental effects or practical to provide groundwater level triggers relating to the water table at this stage.

The initial intention of the monitoring is to assess baseline groundwater levels and water quality conditions present in Geraldine. It is also noted that the depth of existing soakpits are not known sufficiently to either set any water level trigger levels or to raise concerns. If the water levels are close to the surface TDC will need to consider the level of service provided by the existing drainage system and the implications for design of new systems. This is required to be reported to ECan as part of the reporting process.

Therefore, the proposed baseline monitoring of potential effects is considered appropriate for the risks involved. This provides a clear and plausible path to provide for identification of any actual effects on groundwater contamination.

2.6 Nutrients

Nutrients are not considered a common contaminant of concern with stormwater discharges in New Zealand, unless there are high-risk activities associated with such contaminants.

The site inspections to date have not identified any specific concerns and the SWMP includes provision for ongoing site inspections of high-risk sites.

Therefore, as with the surface water monitoring plan, nutrients are not proposed as a contaminant of concern requiring monitoring for the effects from stormwater discharges. As noted with the initial sampling associated with Serpentine Creek, increased levels of nitrates and *E-coli* were observed downstream of the SWMP from groundwater springs from the Waihi/Slaughterhouse Creek gravel fan. This condition is considered to be most likely associated with the surrounding land use.

2.7 Continuous Groundwater Monitoring

The installation of the continuous groundwater monitoring equipment will need to be undertaken by a suitably qualified person. Downloading and reviewing of the data is expected to occur on a quarterly basis. We note that in our experience, more detailed requirements have not been defined in other consents we have been involved nor are they included with other Environment Canterbury Consent Decisions (for example such as CRC186263 (Ashburton Stormwater Discharges)).

2.8 Testing for Heavy Metals in Groundwater

In general, given the low expected stormwater concentrations and mixing that will occur, there are not expected to be significant concentrations of heavy metals in groundwater from stormwater discharges with respect to either applicable groundwater or surface water limits.

However, the SWMP recognises that very limited information exists about the presence of heavy metals in groundwater either naturally occurring or from stormwater discharges in groundwater in New Zealand.

Initially this is proposed to be investigated with GW01 and GW03, but not included initially with GW06 & GW07. If changes in water chemistry are observed and the investigations for GW03 demonstrate that these potential contaminants of concern are present in groundwater, monitoring can be included. However, if this is the case then it may be more appropriate to revise the approach in the SWMP with respect to discharges to ground, rather than invest money in more monitoring.

2.9 Location of Monitoring Bore G006

The location and purpose of this monitoring bore is firstly to establish a baseline understanding of conditions. We consider it important that this objective is not compromised in the pursuit of site-specific concerns that have yet to be clearly identified.

Proposed monitoring bore G006 is located down gradient of three public soak-pits as shown in the application, and also within the lower Serpentine Creek catchment.

The likely contaminants of concern that may be present within the discharge are in line with the discharges from a number of other authorised consents in Canterbury with much greater volumes of stormwater discharged to ground.

We would also consider that there are likely to be other private discharges to ground in the vicinity (as well as effects from surrounding rural land and the Waihi River). It is expected that it will be likely to be

very difficult to separate out specific effects in the first instance. The plan proposes to establish the baseline conditions and then provides for the process to identify the various potential sources.

TDC is agreeable to varying the locations of the bores on issue of the consent. (TDC have suggested locating the bore to the south in the vicinity of a recently approved subdivision rain garden).

2.10 Frequency of Water Quality Monitoring

The monitoring is programmed to collect at least 12 samples over a period of three years. This is in line with the surface water quality regime agreed with Environment Canterbury to identify seasonal and annual fluctuations in baseline conditions. The installation of continuous water meter loggers will provide continuous monitoring of changes in water quality and groundwater level responses to rainfall and stormwater discharges.

2.11 Risks to Domestic Groundwater Bores and Supplies

The proposed monitoring programme is designed to capture baseline information to identify potential risks from contaminants of concern to domestic groundwater bores. It is considered that these will likely be primarily microbial contaminants, which will also be present due to surrounding land use activities. Continuous monitoring is included to identify changes in chemical composition of the water relative to rainfall and stormwater discharges.

Risks from HAIL activities are addressed with site inspections on an ongoing basis to monitor potential risks from higher risk activities. The monitoring in GW06 and GW07 will also potentially identify the baseline water quality responses upgradient of stormwater discharges through the continuous monitoring.

Based on existing groundwater quality details for the surrounding area, we expect that risks are present to the drinking water quality from the surrounding land use. TDC's approved water safety plan considers the backflow risks from connections to alternative private drinking water supplies also connected to their drinking water supply network. As above, we also recommend a proactive approach is taken to ensure all bore owners are aware of the general risks to water quality that exist and the requirements for treatment.

We consider that the issues that have been raised in relation to stormwater discharges to ground, are still emerging and requirements will continue to develop in this area. The nature of these risks will be informed by the proposed monitoring.

We trust this addresses the queries raised, but please contact the undersigned if you have any further queries

Yours faithfully

PATTLE DELAMORE PARTNERS LIMITED

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OPUS(2015) Groundwater and Contaminated Sites Assessment for Geraldine Stormwater Management