Section 92 Response

CRC222040, CRC222041, CRC222043

Regional Resource Consent to Discharge Agrichemicals over Waterways, into Air and the Coastal Marine Area throughout Canterbury.

Key: request in grey, response in black.

1. Potential Effects on Groundwater

There are some circumstances where the risk to groundwater contamination could be greater than described by the applicant in the Assessment of Environmental Effects (AEE). However, these can be mitigated by the conditions proposed in Section 3 of this letter.

It is unclear how the surface water intakes (referred to in proposed Condition 29) will be identified and there are some situations where agrichemicals could infiltrate rapidly into shallow groundwater (for example around stormwater soak holes). Where agrichemicals move rapidly into groundwater, effects on groundwater fauna (stygofauna) could occur. Therefore:

a. *Please provide further detail regarding how the surface water intake sites will be identified and if these sites will be mapped.*

For work that requires the use of agrichemicals near water, there are multiple opportunities throughout the planning and operational stages where surface water intakes are identified:

Pre- works desktop planning

Environment Canterbury has an extensive record of all Surface Water Abstraction Points (SWAPs) available within our mapping system. When setting up operational works requiring agrichemical use near water, one of the environmental pre-planning assessments is to interrogate for nearby SWAPs and Community Drinking Water supplies and Protection Zones. Any known intakes would be recorded on the 'job sheet' to inform the personnel undertaking the works.

We also undertake thorough pre-spray consultation. Prior to aerial agrichemical operations the public are notified through local print and social network forums. Prior to UAV and ground operations all land owners under the target spray area, and access routes are contacted. We have long term working relationships with these land owners who know we maintain certain waterways on their property. This consultation is an opportunity for those land owners to discuss any issues or concerns. We are currently working on updating the page on our website covering spray information so that the public are invited to lodge any sensitive sites, such as water intakes, for our awareness through the 'Snap, Send, Solve' App.

Pre-works site checks

Often prior to aerial spraying operations there will be a pre-spray flight, during which any infrastructure associated with intakes may be identified. Similarly, during ground-based spraying and drone use our staff and contractors are looking out for signs of intake infrastructure in the field as they walk the site

prior and during spray operations. They will be looking for pipe outlets into the waterway, nearby pump sheds etc.

When in the field, our staff can record site specific information (based on GPS location) into our job-management system 'Rangi'/'Collector' which provides a tool to digitize the knowledge of a site specific sensitive area.

During works

Staff and contractors will continually be looking out for intake structures during agrichemical operations and know to maintain the required setback. Locals and the public are also informed of agrichemical use by signs. These signs have contact information so they can contact us to talk about any concerns with the proximity of agrichemical use and their intakes. Spray operators will have the 'Handbook for spraying' on them when undertaking the works which sets out the consent conditions, including the required setbacks to intakes.

Consolidating data and continual improvement

We are currently consolidating our GIS mapping records. The vision is to have GIS records showing the sites where agrichemical is proposed to be used for the upcoming years and also keeping records of where spraying has been completed (for ground based, this will show the area tracked by the operator, not the exact area that has been sprayed). We are also consolidating our GIS layers for quick and reliable access to any known sensitive areas to support our pre-spray planning (including intakes). This will provide another tool where we can record currently unrecorded intake sites. This will also incorporate any information we receive from the public through our 'Snap, Send, Solve' App.

b. *Please provide further assessment of the potential effects of agrichemicals on stygofauna and/or how these potential effects can be mitigated via conditions on the consent.*

Available research

Globally there has been a limited amount of research done on the effects of various pollutants on stygofauna. In a meta-analysis of 250 papers dealing with groundwater fauna only 20 reported on pollution effects on groundwater ecosystems (Manenti et al 2021). Ecotoxicology assays on individual species can be used to assess the effects of contaminants on faunal mortality or health. Assays tend to focus on either acute (short term) or chronic (long term exposure). Typically, stygofauna studies have been tested under acute conditions and focused on crustacean taxa although a worm and two fungi were included (Castano-Sanchz et al. 2020). Taxa were collected from European, Australian and North American aquifers. Ten different pesticides were tested during a subset of assays using copepods and an amphipod taxa. Tolerances to tested pesticides were broad ranging from 96hr LC50 = 0.003 mg Thiram /L for the copepod P. germanica to 96hr LC50 = 199 mg Imazmox/L. However, neither a glyphosate or trichlopyr product were included in assays.

In the absence of stygofauna specific information on the ecotoxicity of Glyphosate or trichlopyr it would seem appropriate to defer to guidance developed for other invertebrates and general fauna and flora. In addition, given the mobility of dissolved triclopyr the use of this chemical over shallow groundwater, particularly on river-beds, should be undertaken with great caution or not at all.

Stygofauna and the Rule framework

We continue to revise our operations based on the continual evolution of available information and best practice; the focus of this Resource Consent process should remain on the current direction in our Regional Plans. Most of our proposed agrichemical use meets the permitted activity requirements of Rule 5.22 of the LWRP. It is only in the limited situations where we are discharging directly into water and within the two setback requirements of community drinking water protection zones and other surface water intakes that we cannot meet condition 4 of the rule and therefore cannot meet the permitted activity.

Whilst acknowledging the overall Activity Status is Discretionary, I consider it unlikely that our proposed use of agrichemicals will have any effect greater than what can occur as a permitted activity on stygofauna. I do not consider that this Consent process should require additional mitigation for effects on stygofauna.

In addition, comments relating to Mr Neil Tomas' memorandum

I acknowledge the higher risk of agrichemicals entering groundwater when used in and around soakholes. Spraying near soakage holes is not common practice for us, as managing weed growth in these areas is not part of our scheme objectives.

The information is kindly received and will inform our operations. However, since it's unlikely we would be spraying into soakholes, and that agrichemical discharge in those areas are likely to meet Permitted Activity requirements, I do not consider it justified to consider specified mitigation (conditions) to manage this risk.

Mr Tomas has also recommended updated to our proposed consent conditions. I note that the advice note that follows proposed condition #28 explains that shallow groundwater intakes are effectively considered surface water supplies for the purposes of that condition. The intention being that the proposed setbacks would also apply to bores that are hydraulically connected to the surface water and supplying drinking water. Deep bores should be adequately protected through sufficient bore heads.

In addition to Mr Tomas' advice, Dr Gray provided advice on the potential effects of our glyphosate use on drinking water. He referred to a study where glyphosate was only found in one of 135 bores, and noted the risks of the chemical getting into groundwater drinking water supplies are slim. Dr Gray also refers to the Garlon XRT MSDS which states there is a risk of groundwater contamination from ester-based triclopyr and notes triclopyr was found in a number of water samples.

Mr Tomas also recommends a condition to restrict spraying to times when rain is not forecast within the manufacturers drying time. It is also in our best interest, not only for the protection of the environment and people, to not wastefully spray agrichemicals at times where it would wash off and not be effective. Our works will be planned around this requirement regardless, so I see little value in adding the condition.

2. Effects on Air Quality

The applicant has discussed the toxicity of those currently Environmental Protection Agency (EPA) approved agrichemicals frequently used for spray application on a number types of sensitive receptors. The applicant has proposed controls and buffer distances to manage and mitigate risk of toxicity due to human and ecological contact.

One of the invasive species the applicant has identified for spraying are the blackberry species. Wild blackberries are commonly foraged along riverbeds by members of the public. Therefore:

a. *Please provide further information on how the applicant intends to manage spraying of blackberries during fruiting seasons and spray drift which may affect public foragers that are picking in the area or ingesting the berries sprayed with agrichemicals?*

Due to many other constraints, agrichemical spraying does occur during the blackberry fruiting season (December through to March). Prior to works we inform the public of our intentions to spray and provide them a contact to raise any concerns to. For aerial operations the public are informed in local papers and social media. We also contact all landowners prior to UAV and ground-based discharge. Letting the landowners/occupiers know ensures those most likely to collect any food will be aware of the use of agrichemicals.

We also place signage at access points stating agrichemical use is in process and contact details (placed prior to spraying and for at 24 hours afterwards). Public notices and signage states that edible plants may be affected. Papatipu rūnanga are provided monthly updates on our upcoming agrichemical use intensions and we avoid known mahinga kai managed sites. In addition, helicopter spraying is often in the hard-to-access inner islands of braided rivers where public access for foraging would be very difficult.

We are providing multiple avenues for the public to be aware of the use of agrichemicals. Members of the public should also be exercising a degree of caution when foraging and be mindful of our activity, and others, that may be occurring in the area. Our use of agrichemicals is relatively infrequent, unlikely to be more than twice a years, and in some areas we only return after multiple years of no agrichemical use. The public are able to provide us the location of any common/valuable/likely food foraging sites through the 'Snap, Send, Solve' App so we know of their interests and can work with them.

Rationally, this is a risk that is difficult to completely avoid and something that we will continue to be cognitive of. As mentioned above, our discharge of agrichemical to land meets the permitted activity of Rule 5.22, and therefore any risk to terrestrial foraged foods is no greater than the permitted baseline.

The AEE, and advice from Dr Gray attached to the AEE, considered the potential effects from humans consuming plants that have been sprayed by agrichemical. The scientific advice is that, although there is residual risk of human consumption, both Glyphosate and Triclopyr are metabolized or excreted rapidly by humans. The US-EPA and NZ-EPA identified little to no concerns around human health subject to these agrichemicals being used at correct doses. Mr Julian Sykes, Senior Environmental Advisor within our Rivers team, has also provided further assessment of scientific research below. He also notes the low risk to human health, although recommends Glyphosate is used in preference over Triclopyr which is our standard practice.

On balance, I consider the risks on people due to the consumption of wild blackberries to be adequately mitigated. We continue to have a willingness to work through this concern with the public and the appropriate agencies to ensure that our communication with regard to spray locations is best practice.

Mr Julian Sykes literature assessment:

> *"It appears from the research (see references) that glysophate presents a low risk to human health with relatively low absorption rates of 25% and a low persistence of 1% in a mammalian body. The*

European Food Safety Authority (EFSA) review in 2016 set out the following toxicological parameters for Humans based on experimentation with rabbits.

- *Acceptable Daily Intake (ADI) of 0.5 mg/kg of body weight per day.*
- *Acceptable Operator Exposure Level (AOEL) of 0.1 mg/kg body weight per day.*

Information regarding the risk of triclopyr exposure to human health is somewhat difficult to ascertain, however it seems from reading available literature that it is also presents a relatively low risk to humans. It is clear though that it persisted in the organs of farm animals (Brancato A, Brocca D, et al 2017), and was also a dominant residue on crops and orchard fruit. A visual analysis of all the accepted maximum residue levels (MRL's) for most of the vegetable and fruit varieties ranged from 0.01mg/kg to 0.8 mg/kg most of these values were subject to ongoing revisions.

In summary I would recommend that glyphosate is used in preference to triclopyr, if triclopyr deemed to be necessary then its use should be minimised and applied with caution."

The applicant has proposed spraying will occur during appropriate wind conditions (less than 15 km per hour) and staff spraying will actively monitor wind speeds and directions, cease spraying when wind conditions are likely to cause spray to drift outside of the target area. Grow Safe New Zealand advises that winds of 10 - 15 km/h have increased risk of spray drift, and fine spray should be avoided. The result of spray drift in the proposed locations may result in agrichemicals coming into contact with a large variety of sensitive receptors, with significant adverse effects. Grow Safe recommends ideal to good spray conditions are between 3 - 10 km/h.

Knowledge and qualifications of operators

Prior to answering the specific questions you have below, I think it is valuable to reflect on the level of skills and knowledge of those discharging agrichemical on our behalf, particularly for those undertaking aerial spraying. Our operators are competent at ensuring legislative and environmental protections are met.

In addition, all operators I have spoken to requested that any conditions on consents are not unnecessarily restrictive and are outcome focused. We appreciate the need for certainty to avoid, mitigate or remedy potential effects, but these should focus on the desired outcome; for example, 'Spray drift is managed to ensure there is no vegetation kill-off beyond the target spray area'. An outcomes focused option is favoured over controls on specific parameters, such as wind speeds, discharge heights, pump pressure, nozzle types, or adjuvants. Itemising restrictions for each of these parameters may become unnecessarily restrictive with future technical developments that allow us to work outside of any one of those parameters whilst also ensuring that spray drift does not cause plant-kill beyond the target area. It would also be difficult to demonstrate compliance with those parameters. This risk-based approach will allow our appropriately trained operators to undertake a site-specific risk assessment and plan accordingly with the tools available to them.

The following are lists of qualifications (not exhaustive) required for the operation of our three spray methods:

Helicopter:

To inform our response on helicopter spraying, we obtained technical information from Tony Michelle, Executive Officer of New Zealand Agricultural Aviation Association.

Pilots must hold a 'Pilot Chemical Rating'. In accordance with Civil Aviation Authority (CAA) Rule Part 61 a Pilot must successfully complete a training course (with assessment) in agricultural chemical application conducted under the authority of an agricultural aircraft operator certificate (issued under Part 137) or an aviation training organisation certificate (issued under Part 141). A current Pilot Chemical Rating authorizes the holder to dispense an agricultural chemical from an aircraft on an agricultural aircraft operation, in accordance with Part 137.

Those responsible overseeing the storage, preparation, and handling of agrichemicals must hold a Standard Growsafe certificate as a minimum.

The CAA also regulate agricultural and rural aviation. To work in agricultural aviation an operator must hold an Agricultural Aircraft Operator Certificate (Part 137) and hold Part 101 SMS (Safety Management Systems) certification. Current recognized best practice systems are CAA Part 100 SMS and NZS:8409.

UAV:

To inform our response on UAV spraying, we obtained technical information from Vaughan Ward, Managing Director and Chief Pilot at AgSmart UAV Ltd.

It is mandatory for those operating unmanned aircraft over 25kg to hold a CAA 'Part 102 Unmanned Aircraft Operator Certification' with the privilege allowing the aerial application of agrichemicals. To apply for the 'Part 102 Certificate' the operator is required to have a 'Pilots Agrichemical Rating', a 'UAV Agrichemical Rating (UAV Aerial VTA rating), and 'Pilot Competency Assessment'. This requires the demonstrated ability to prepare spray plans that meet all regulatory requirements and field competency. The UAV Pilot Agricultural Chemical Rating is obtained by either Adroit Solutions or Educhem (CAA part 141 certified).

Ground based (vehicle or knapsack):

Ground based staff and contractors will hold the suitable/required Growsafe qualifications

Therefore, please provide further information on the following:

b. how the proposed wind speed limit of 15 km/h was determined and why this is considered appropriate for adoption as a limit.

The proposed condition was primarily included following pre-lodgment feedback from Central South Island Fish and Game. Their request on wind speed was:

> *"Wind speed is discussed in the AEE (does not include parameters) but there is nothing about wind speed in the proposed conditions. The paper titled 'The Investigation and Surveillance of Agrichemical Spraydrift Incidents' by the Ministry of Health (2007) states that any windspeed over 15km/hr is unsuitable for any spraying. Growsafe indicates that extreme caution should be used with any spray in windspeeds of 15-20km/h and anything over 20km/hr is unsuitable for spraying. We would like to see a maximum wind speed specified."*

As you have also identified, grow safe provides information on varying wind speeds, their visual signs and impact on spraying. Spraying in winds 3-10 km/hr is identified as best for spraying. Winds of 10-15km/hr are described as a moderate breeze where small branches move, and dust or loose paper may raise and that there is an increased risk of spray drift. Beyond 15 km/hr the growsafe website notes 'extreme caution with any sprays'. Growsafes information, and South Canterbury Fish and Game's

request were the bases of us proposing an upper wind limit, that spraying will not occur above 15 km/hr.

Under 15 km/hr, we consider our operators are appropriately skilled to make a site specific field-based decision on whether the spray is drifting beyond the targeted vegetation. Our field staff have reassured me that it is obvious to them when wind is causing spray drift and the operation is no longer safe, efficient, or effective. Operators will continually observe if there is an increase risk of drift and operations will pause or stop at that site until conditions improve. Our local staff and contractors have good knowledge of their districts and they will often know of other, more sheltered sites for the particular wind conditions. They will either move to a sheltered site, or agrichemical work will be postponed for another day.

c. what technology or instruments will the staff spraying be using to actively monitor wind speeds and directions?

Staff will be aware of the weather forecast in the days leading up to spraying and plan accordingly. It is our operators experience, qualifications and personal judgement that is the most valuable tool to identify whether the wind conditions are suitable for spraying. The technology/instruments available to operators to measure and record wind speed based on method of spraying:

Helicopter:

Some operators may use handheld anemometers, but these may not return an accurate wind speed record for the actual application area. Pilots are trained to monitor and assess wind speed and direction by observation (eg. The displacement of vegetation) and cross-referencing airspeed and ground speed (which are measured by the helicopter GPS and airspeed indicator).

UAV:

The operator uses a handheld anemometer.

Ground based:

A handheld anemometer is available in each 'spray vehicle' (for truck and knapsack based spraying). The job sheet, amongst other matters, requires the wind speed to be recorded prior to spraying. Wind speed will be measured again if the operator has noticed an increase in wind.

d. details on how frequently the wind speeds will be checked during spraying?

Staff will continually be aware of and assessing wind speed and direction throughout spray operations. Wind speeds will be recorded immediately before spraying starts at each location, and again if the operator notices an increase or change in spray drift behavior.

e. confirm whether the windspeed data will be recorded and archived?

We will require the daily records to be submitted to us each spray season so we can review, undertake audits, and archive within the Councils electronic filing system. Below is a summary of what has occurred before now:

Helicopter:

Pilots record weather observations on their Daily Flight Records (DFR's). There is no prescribed interval for recording but they should record whenever they detect any changes in wind speed or direction. The CAA rules require that onsite weather conditions (including temperature, wind speed and direction) are recorded in the pilot 'Daily Flight Records' and these records to be retained by the operator for at least 2 years.

UAV:

Pilots record windspeed and direction (using a handheld anemometer) before, and at the end of any operation. There is no prescribed interval for recording, but they should record whenever they detect any changes in wind speed or direction in the comments of the UAV flight record. These records are currently archived with the supplier, and available to us on request.

Ground based:

Currently ground based operators record windspeed data on their job sheet. These are archived within the CRC electronic filing system (Content Manager).

One of the matters of discretion includes an assessment of the spray volume and droplet size, the direction of spraying and the height of release above the ground. The applicant has touched on varying droplet size but further assessment is required to provide understanding of the risk of spray drift as a result of direction of spraying and the height of release above the ground. Therefore, regardless of wind speed aerial sprays, please provide further information relating to the following:

There are a number of questions that follow where, due to the complex nature of spray drift mitigation, I am unable to provide answers to individual questions. I have therefore provided some further overarching discussion here and added any relevant brief comments under the specific questions.

Instead of focusing on each parameter that may contribute to spray drift risk, I continue to hear that managing spray drift is complex, that operators require flexibility to use all the tools available to them, and an outcome focus approach is the only viable way to manage spray drift. As mentioned above, other legislation requires the operators to hold a number of qualifications, based on the risk profile of the discharge method they use. There is ongoing research into best droplet size and the balance between spray drift risk and efficacy. Spray technology, booms, nozzles and adjuvents are also continuing to progress.

It is also worth raising that everyone has an interest in minimising spray drift. If spray drift was occurring, it would be picked up in our water quality sampling program and/or we would be facing criticism and costs associated with damaging non-targeted vegetation. By minimising spray drift we ensure:

- no kill-off of non-targeted vegetation (rivers are mostly bordered by our own flood protection vegetation, an asset worth $263M region wide);
- operators and the public are safe;
- no wasted agrichemicals (and flight time);
- positive relationships are maintained; and

- vegetation kill-off on the banks of 'drains'/small watercourses is avoided. Bare banks may result in erosion and sediment inputs which then go on to require addition intervention and costs.

You have asked specific questions about wind and droplet size. All the parameters that impact spray interact and is complex. Spray drift and efficacy will be impacted by droplet size, nozzle configuration/orientation, boom width vs rotor width, aircraft speed, pressure, discharge height, wind direction and speed, physical barriers such as shelter belts and vegetation height, buffer zones, humidity and temperature, atmospheric stability and drift reduction products (adjuvents).

Agrichemical labels will state the pressures and nozzle types for the varying methods of discharge. Typically, larger droplet size is likely needed for aerial discharge, where finer droplet sizes may be recommended for ground-based options. In regards droplet size, the larger the droplet, the lower risk of drift. Larger droplet size can reduce plant coverage, or efficacy of agrichemical uptake by plants (Hipkins and Grisso, 2014). The American Society of Agricultural and Biological Engineers (ASABE) have developed the below droplet size classification system.

Color Codes for Droplet Size

Category	Symbol	Color Code	Approx. VMD Range (microns)
Extremely Fine	XF	Purple	<60
Very Fine	VF	Red	60-145
Fine	F	Orange	145-225
Medium	M	Yellow	226-325
Coarse	C	Blue	326-400
Very Coarse	VC	Green	401-500
Extremely Coarse	EC	White	501-650
Ultra Coarse	UC	Black	>650

Table 1: Droplet size categories. https://www.mssoy.org/uploads/files/virginia-coop-ext.pdf

Currently the helicopter companies are using reduction nozzles. Mr Michelle prefers that operators have the flexibility to manage site specific risks. Mr Ward also explained that he chooses the best nozzle type on his UAV based on the drain depth and width. His nozzle choice is made to assure only the bottom of the drain is targeted and not the embankments.

f. Please provide further detail on the efficacy of increasing the droplet size to manage spray drift in aerial and UAV applications during higher winds.

From a management perspective, using the pressure and nozzle type/size recommended on agrichemical labels is most sensible. In addition, site specific plans will assess the risk of spray and most appropriate mitigation. Too larger droplet size may reduce spray coverage on the target plants and reduce efficacy of agrichemical.

g. Please confirm what droplet size ranges are achievable with the apparatus on aerial and UAV methods?

Nozzles can be bought that supply the full range of droplet size shown in the table above.

h. Please confirm what droplet sizes need to be achieved to minimise spray drift in winds up to 15 km/h?

Droplet size is only one of many factors influencing spray drift. A successful spray operation cannot be guaranteed by simply stating a specific droplet size.

i. Please confirm what maximum distances away from the application zone is spray drift likely to travel given the controls in place?

Due to the many factors that influence spray drift, this is not simple to answer. To provide some certainty on risk of spray drift, we can propose a condition that 'Spray drift is managed to ensure there is no vegetation kill-off beyond the target spray area'. In addition to that, we have proposed setbacks from known sensitive areas.

j. Please confirm what the maximum height off the ground will aerial and UAV sprayers be while spraying? (below)

k. Please provide further information on how varying height is likely to affect potential for spray drift? (below)

l. Please suggest limits that will be put on spray height and wind speed to minimise spray drift.

Mr Michelle responded that standard release height is ~3-5 metres above the ground, however this may increase to safely operate around hazards such as wires and trees. There should be no limits on spray height otherwise flight safety may be compromised.

Mr Ward said his UAV are operated as low as possible, usually around fence height.

Again, due to the interacting nature of all parameters that impact spray drift, there is not a simple answer to how varying discharge heights impact spray drift. Obviously, the higher agrichemical is released, the higher risk of drift.

To manage this, pre-works planning, including the site specific plan, can consider what height our experience operators consider optimal for reducing spray drift.

m. Please detail the methodology that ECan will use for the direction of aerial and UAV spraying, in particular when spraying in winds above 10 km/h?

As discussed earlier, we rely on the expertise of our operators to ensure that spray drift does not cause vegetation kill-off beyond the target area. I am happy to accept a condition to this effect.

n. Please describe what adjuvants are available and could be used to reduce spray drift as mentioned as a measure to avoid and mitigate effects.

This is another area where our operators have asked us to ensure there is flexibility in the products available and to focus on the desired outcomes. We will continue to review the agrichemicals and adjuvents used to ensure we are legally using the best available option on the market. We are currently not discharging adjuvents to water, although may be discharging them aerially. Adjuvents may be used to reduce drift and also agrichemical efficacy, reducing the amount of agrichemical needed. We want to continue to have the option to include adjuvents if they can be used safely in accordance with EPA requirements, and they are appropriate and improve the effectiveness of agrichemical use or mitigate potential effects.

As an example, spraying in North Canterbury this last season and UAV operations used Li-1000. Our operators know Li-1000 has a HSNO Class of 9.1C (harmful to the Aquatic environment) and a label requirement that there is no discharge to water. We ensured additional setbacks to water, and spray drift was managed, to ensure that there was **no** risk of the adjuvant entering water.

The applicant has proposed a number of sites where aerial spraying, or any other method with a higher risk of spray drift, will be avoided. These include:

I. Within 250 m of any schools, dwellings, marae or campgrounds
II. Where spray drift may affect organic farms
III. Where spray may drift over flood protection vegetation, over water or into nontarget vegetation

Therefore, please provide further information on the following:

o. Please describe how a setback of 250 m from schools, dwellings, marae or campgrounds was determined (below)

p. and the extent to which this distance will mitigate effects to these sensitive receptors due to spray drift.

This was a carry-over from our expiring consents which we have been operating under for a number of years. It is very likely we could operate closer to these sensitive areas and manage all spray risks. I do acknowledge some public interest/concern with agrichemical use, so we have suggested a continuation of this setback.

We have added additional sensitive sites to the list following our pre-lodgement consultation.

There will be site specific assessments prior to aerial discharges, which is the best tool to mitigate spray drift risks on these sensitive areas. I also support advice I received from Mr Michelle, to request an amendment to our proposed condition so that, if it is safe and appropriate, we can spray closer than these setbacks if we have the written agreement of the managers/owners of those sensitive sites. For instance, some campgrounds want the weeds sprayed right up to their boundary.

q. Please detail what guidelines there are for staff applying sprays near organic farms and flood protection vegetation to know whether they are a sufficient distance from these sensitive receptors to avoid affects from spray drift for all wind speeds? (below)

r. Please confirm if there is a setback distance which should be applied for staff working near these areas for all wind speeds?

I have reviewed the list available on Organic Farm NZ (www.organicfarm.org.nz) of certified organic farmers within Canterbury. There were four within our jurisdiction. One was ~4km away from the Pareora River and one ~750m away from Waihi River which I consider outside of a risk-zone we need to consider. The other two are within the Halswell Catchment. One site our operators were aware of, have discussed our spray operation and only use hand and mechanical clearing adjacent to their property and/or they opt to undertake the maintenance of the weeds in that drain on our behalf. The other is at a site we do not current use agrichemicals near water adjacent to the property.

Our CRC Flood Protection and Drainage Bylaw does provide the option, through section 7.7, for land owners and land occupiers who want to avoid agrichemical use in the drains adjacent to their properties

to apply for agreement to maintain those drains themselves. We are also currently in the process of updating our website so private landowners who do not want agrichemical use near their property can lodge that request through our 'Snap, Send, Solve' App. Land owners are also able to contact us through the main call center and through the contact details include on spray notifications.

Otherwise, if/when we become aware of other organic farms, we will work with those farms to try and address their concerns. We do need to be mindful of reverse sensitivity, reasonable expectations, and our ability to continue to protect the community from flood and erosion risk as well as noxious weed control. We have been undertaking drain maintenance in these catchments for many decades.

Organic farmers will have their own setback requirements from non-organic activities and will need to manage the risks from all their neighbors activities.

The applicant describes there will be no detectable odour outside of the treatment area (noting that most chemicals are odourless). Therefore, please provide further information on the following:

s. Please provide a description of any agrichemicals that CRC proposes to use, which are currently authorised by the EPA, that are known to cause odours.

Glyphosate and Triclopyr are both recorded as odourless or having a faint smell.

t. Please provide an assessment of the effects of the odour.

Due to the current agrichemicals used having no, or little, odour, the current effects due to odour are less than minor.

u. Please assess the odour risk of any types of vegetation commonly sprayed which can result in odour when decomposing.

Glyphosate is a dessicant that dries the dying and dead vegetation. This killed plant is therefore dry with no, or little, odor. It will not be left rotting. We are not aware of any previous concerns being raised with us over odour of decomposing vegetation (after spraying) nor is this something our staff have noticed. We are spraying outside, primarily in rural area, infrequently and vegetation kill-off happens gradually.

Based on past experience, we do not consider this a likely effect that requires further assessment.

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