PC19 - Submission #156

FORM 5

SUBMISSION ON A PUBLICLY NOTIFIED PLAN CHANGE/ VARIATION

CLAUSE 6 OF FIRST SCHEDULE RESOURCE MANAGEMENT ACT 1991

To: Mackenzie District Council
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(name and designation, if applicable)

This is a submission on proposed Plan Change 18/ Plan Change 19 to the Mackenzie District Plan *(please select Plan Change)*

The specific provisions of the proposal that my submission relates to are:
(give details)
PROPOSED PLAN CHANGES 18-19 LAKE ALICE

My submission is:
(include whether you support or oppose the specific provisions or wish to have them amended and the reasons for your views)

AS ATTACHED.

Continued overleaf

I seek the following decision from the Mackenzie District Council:
(give precise details)

REMOVAL OF THE PROPOSED CHANGE TO PROHIBIT POWERBOATS USING LAKE PUKAKI

☑ **I wish to be heard** in support of my submission

☐ **I do not wish to be heard** in support of my submission

(tick one box)

If others make a similar submission I **would** /~~would not~~ *(delete one)* be prepared to consider presenting a joint case with them at any hearing.

Signature of submitter or person authorised to sign on behalf of submitter
(A signature is not required if you make your submission by electronic means.)

9/3/18
Date

If you have any queries about this form or the proposed plan change or variation, please contact Karina Morrow, Group Manager Planning and regulation, Mackenzie District Council.

Power & Marine Ltd

March 9, 2018

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Re: Submission re proposed plan changes 18-19 Lake Pukaki.

We write to raise concerns around the proposed changes to 18-19 Mackenzie District Council (MDC) district plan, specifically sections 7A.2.3a and 7A.2.3b prohibiting motorized activities on Lake Pukaki.

The powerboat sector makes up a significant part of the New Zealand Marine industry, the NZ economy as a whole and is particularly important to the South Island given the large number of powerboat design and manufacturing businesses operating in the region. This in turn provides significant employment, training and development and career paths for NZ citizens within both the marine and related manufacturing and service industries.

A prohibition on powerboat usage within the region will have a significant negative impact on the industry through decreased demand for powerboat products. Given these negative impacts on an important and significant industry for the South Islands and NZ as a whole, we submit against sections 7A.2.3a and 7A.2.3b plan to prohibit motorized activities on Lake Pukaki

As a NZ based company, we share your concerns around the need to preserve our environment and commend your efforts within the district plan process to protect this valuable resource. With a view to also promoting compromise and alternatives aimed at protecting our environment, we suggest the MDC looks to international trends around the prohibition of specific engine/motor technologies proven to pollute waters in which they are operating.

Specifically we draw your attention to the emission regulations being introduced into Australia on July 1st 2018, prohibiting the importation of 2-stroke engines and from July 1st 2019 onwards prohibiting the sale of the same. These emission standards are in response to concerns around the environmental impact 2-stroke engines have on the waters in which they operate.

We enclose a copy of the report prepared by NIWA in March 2007 detailing the potential impact of emissions from outboard motors - compelling reading given the level of pollution inflicted by 2-stroke technology.

We contend that in order to address the impact of engine emissions on our inland waterways and coastline, the prohibition of 2-stroke engines is a more relevant and manageable method as opposed to the outright prohibition of all engine technologies.

Kind regards,

Cameron Burch
Manager - Marine Division
Power & Marine NZ Ltd.

Potential impacts of emissions from outboard motors on the aquatic environment: a literature review

NIWA Client Report: HAM2007-026
March 2007

NIWA Project: ELF07201

Potential impacts of emissions from outboard motors on the aquatic environment: a literature review

C. Depree

Prepared for

West Coast Regional Council

NIWA Client Report: HAM2007-026
March 2007

NIWA Project: ELF07201

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1. Scope

Recreational boating raises a number of issues for resource managers and the public, including noise complaints, safety concerns and environmental impacts. The potential impacts of recreational boating have been divided into the following areas (Rijkeboer et al. 2004).

- The impact on local air quality.
- The impact on local water quality, subdivided into:
  - As related to ecosystems (including sediments).
  - As related to the product of drinking water.
- The impacts of noise, subdivided into:
  - The impact of noise on ecosystems (i.e., birds and underwater wildlife).
  - The impact of noise on nuisance as perceived by humans.

This report is focussed on the potential impacts of boat derived contaminants on water quality – both environmental toxicity and drinking water criteria. Physical impacts on the aquatic environment from recreational boating activities (i.e., resuspension of sediments, bank erosion etc.), are not covered in this report.

2. Introduction

Over the last 30 years the use of motorised recreational craft on rivers, lakes and water storage reservoirs has increased significantly, which has led to concerns about the potential increasing environmental pressures being placed on these aquatic environments. The growth in recreational boating, is impart, being driven by advances in materials technology that have made water skiing and power boating equipment more affordable. Accordingly, high-speed power boating and personal water craft (jet ski's) activities have become more popular and accessible to a wider section of the community. This trend is reflected in Canada by an annual growth in power boat sales of 3% (Jaakson, 1993). In Australia, Mercer (1977) reported that power boating and water skiing activities were increasing at the rate of 20-24% per year. This general increase in activity, combined with perceptions of safety, ease of accessibility, and calmness of water, has lead to a large and increasing percentage of recreational boating taking place on inland water bodies. This, in turn, has resulted in an increasing demand by the public for the development of more reservoirs and lakes (Department of Community Service and Health, 1990).

With respect to total emissions, recreational water craft do not contribute significantly; for example, recreational boating emissions of non-methane hydrocarbons (NMHC) represent only 0.5% of the total emissions for the European Union (Rijkeboer et al. 2004). The contribution of atmospheric hydrocarbons from recreational boating to the national total in the US has been estimated at 1.59% (Hare and Springier, 1973). However, the high density and nature of boating emissions mean that there is scope for localised impacts on both air and water quality. Although not the subject of this report, briefly, the main concern about air pollution from recreational boating is the potential for localised high concentrations of smog forming components [nitrogen oxide gases (i.e., NO_x) and volatile organic compounds, or VOC], resulting in ground level ozone formation. This phenomenon may often be seen in some sheltered lakes and bays that receive heavy power boat use (Warrington, 1999). Ozone irritates the respiratory tract and eyes with exposure to high levels resulting in chest tightness, coughing and wheezing. People with respiratory and heart problems are at a higher risk, and ozone has been linked to increased hospital admissions and premature death. Furthermore, these emissions from boating activities may occur in otherwise pristine environments that are not impacted by non-point contaminant emissions associated with major urban centres.

With respect to water quality issues, the combination of the inefficient trapping efficiency (defined as the ratio of fuel trapped in the engine to that which is delivered to the engine) of 2-stroke engines and the release of exhaust emissions beneath the water surface, results in relatively large amounts of combustion products and unburned fuel being mixed into surface waters. For example, two stroke engines can

typically release 10-25% of their fuel (petrol/oil mixture) unburned into the waters (Warrington, 1999). The EPA has estimated that a single jet ski (or personal water craft, or PWC) can emit up to 23 litres of fuel in just two hours of operation (Blue Water Network, 1998). Accordingly, many regulatory agencies, particular in the state of California, have placed either bans or restrictions on the use of certain types of 2-stroke powered recreational boats, including PWC's on a number of lakes and reservoirs (Department of Boating and Waterways, 2007).

There are conflicting results from studies regarding the ecological and human risk posed by recreational boating, and this report aims to provide a balanced summary of the available literature relating to the potential risk of recreational boating activities to water quality. At the time of writing the report, there was no information available on boating numbers/density on West Coast lakes or the proportion of 2-stroke carburetted, 2-stroke direct injection and 4-stroke outboard engines. Therefore, the report is limited to merely describing literature studies; no attempt has been made to transfer for the finding of these international studies to a New Zealand or, more specifically, a West Coast context. This is an important point to stress, as the impacts of recreational boating on various environmental compartments including water, are site-, time- and use-specific – that is, general applicable statements will not be valid under all conditions (Warrington 1999).

3. 2-Stroke vs 4-stroke outboard engine emissions

In general, two-stroke engines emit ca. 10-times more pollution than 4-stroke engines because of lower trapping efficiencies inherent in the 2-cycle operation. Unlike 4-stroke engines that have separate exhaust and fuel filling cycles, in 2-stroke engines the exhaust and fuel filling occur in the same stroke, resulting in an un-preventable loss of unburned fuel in the exhaust. Depending on load and configuration, it has been reported that 2-stroke engines release 1-40% of their fuel unburned to the water. Warrington (1999) concluded that 10-25% was a more typical range for normal use of modern 2-stroke engines. Although the data is somewhat out-dated (1973), to give this a global perspective, Jackiviz and Kuzminski (1973) calculated that of the 3.8 billion litres of fuel used per year by outboard engines, 380-600 million litres are discharged (unburned) into the water.

US EPA standards have forced engine manufacturers to significantly reduce the emissions of 2-stroke engines, which has largely been accomplished by direction fuel injection technology (opposed to carburetion). Despite improvements (largely with respect to air quality emissions), these 2-stroke engines still release much higher quantities of contaminants than 4-stroke outboard engine of similar horsepower. Kado et al. (2000) compared particulate matter (PM) emissions from 2 types of 2-stroke engines [carburetted (C) and direct injection (DI)] and a 4-stroke (carburetted) engine. All the engines were 1998 or 1999 models and had a maximum power rating of 90 hp. The total PM emissions for the 67 min test procedure were <0.47 g (similar to background levels), 1.95g and 9.23 g for the 4-stroke, 2-stroke/DI and 2-stroke/C engines, respectively. The total amount of PM-bound PAHs released during the test period was <27 µg, 3600 µg, and 1900 µg for the 4-stroke, 2-stroke/DI and 2-stroke/C engines, respectively. Genotoxic activity (using *Salmonella*) of the 4-stroke PM was only 2-3% of the PM released from the 2-stroke engines. It is worth noting that the 2-stroke/DI engine use in the test meet the U.S. Federal and HC and NO_x emission standards for the year 2006. In another study, Jüttner et al. (1995) reported that for a 10 minute running period, a 10 hp 2-stroke engine introduces 23.8 g of benzene, toluene, ethyl-benzene and xylenes (BTEX chemicals) into the water, compared to only 0.5 g for an equivalent 4-stroke engine. The study also showed that 2-stroke emissions aged for up to 14 days were still more toxic than freshly contaminated water from a 4-stroke engine.

Despite the increased reliability, efficiency and ca. 10-fold lower emission levels of 4-stroke outboard engines, 2-stroke engines still dominate the market (Rijkeboer et al. 2004); however, a comparison of 1996 and 1999 sales figures for Europe show a steady increase in the market share of 4-stroke engines. For European Union countries with outboard sales of more than 10,000 units, the percentage of 4-stroke outboards ranged from ca. 20% (e.g., Norway and Spain) to greater 50-60% (UK and Finland). The increase in 4-stroke outboards sales is largely attributable to the lower power

range (4-16 hp), which are less significant contributors of emissions compared to higher power output engines. In the 150-200 hp range (European data), the percentage of 4-stroke engine sales for the years 1996-2000, 2001 and 2002 were 0, <1, and ca. 10% respectively (Rijkeboer et al. 2004). Although no outboard sales figures beyond 2002 were available, because of the inherently lower emission levels of 4-stroke engines, this is an important parameter for assessing any future impacts of emissions from recreational boating activities.

4. Chemical contaminants from outboard motors that are of concern

Recreational motorboats release a variety of contaminants to the air and water, which are summarised in Table 1. In addition to these, there is concern about metal contaminants originating from fuel additives used to improve the octane rating of fuels. While the lead additives, tetraethyl- (TEL) and tetramethyl-lead (TML) are no-longer used, there are concerns regarding the use of the manganese fuel additive, methylcyclopentadienyl manganese carbonyl (MMT). MTBE is relevant to North American studies, however, its use in NZ is reportedly not very widespread (Ministry for Economic Development, 2001a). While particulate matter could possibly contribute to a reduction in water quality (i.e., in very pristine, oligotrophic lakes, the main contaminants of concern for water quality are BTEX, MTBE and PAHs.

Table 1: Contaminants released into the water by recreational power boats.

Acronym	Full name
BTEX	benzene, toluene, ethyl benzene and xylene
MTBE	methyl-*t*-butyl ether
PAHs	polycyclic aromatic hydrocarbons
CO	carbon monoxide
NO_x	nitrogen oxides
PM	particulate matter
SH	saturated hydrocarbons

4.1 BTEX

BTEX are monocyclic aromatic compounds that make up 20-50% of petrol. Depending on the fuel (regular or super), BTEX comprises ca. 25-35% of New Zealand petrol (Ministry for Economic Development, 2001b). Besides the aromatic content, petrol consists of C_4-C_{12} aliphatic hydrocarbons, which can be broken down into 4-8% *n*-alkanes, 2-5% alkene, 25-40% *iso*-alkanes, 3-7% cycloalkanes and 1-4% cycloalkenes. Unlike PAHs, BTEX chemicals are all very volatile and are rapidly eliminated from the water by evaporative processes. The half-life of BTEX chemicals has been shown to be approximately 1 day – so even though the concentrations of BTEX chemicals can be high immediately after the passage of a boat, these levels rapidly decrease as a large portion is volatized into the air (Correll, 1999; Bouchard, 2000-01). Despite BTEX chemicals being priority water contaminants, their very short residence times in the bulk water phase tend to keep BTEX field concentrations orders-of-magnitude below established toxicity thresholds (Commonwealth of Massachusetts, undated). A potential problem of BTEX chemicals, however, is their

ability to impart an unpleasant taste/odour on drinking water at very low concentrations (Section 9.1).

4.2 PAHs

Unburned petrol contains relatively small amounts of 2 and 3 ring methylated PAHs, including the methylated analogues of naphthalene, fluorene and phenanthrene. Incomplete combustion processes of the petrol generate higher molecular weight 4-7 ring PAHs. In general, PAHs with more than 3 rings have poor biodegradability and can accumulate (TRPA, 1999). The smaller 2-3 ring PAHs are generally more water soluble, more biodegradable and more volatile. Their solubility makes them more bioavailable (i.e., greater risk) to aquatic life, although this is off-set by their low persistence and hence reduced exposure durations. The larger 4-7 ring PAHs are much less water soluble and have a strong tendency to bind to sediment. Unlike the lower molecular weight PAHs, larger PAHs don't biodegrade readily (environmentally persistent) and tend to accumulate in sediments. Because of these properties, small PAHs are generally regarded as more of an immediate (acute) threat to organisms in the water column, while larger PAHs represent a more long-term (chronic) threat to sediment dwelling organisms (VanMouwerik and Hagemann, 1999). While most field studies have shown bulk water phase concentrations to be many times lower than ecological protection guideline values, there is a growing awareness about the impacts PAHs have in relation to the surface microlayer and enhanced photo-toxicity (Section 8).

4.3 MTBE

MTBE is widely used in the U.S., initially to boost the octane value of the fuel, and then in greater amounts (up to 15%) as an oxygenate to reduce tail pipe emissions. MTBE is reportedly not widely added to petrol in NZ, although current regulations allow levels up to 11%. Relative to BTEX and PAHs, which are relatively hydrophobic and have low water solubilities, MTBE is very soluble in water with ca. 46 g dissolving per litre of water (ca. 5% aqueous solubility) and it is resistant to biodegradation (Sakata, 2000-2001). Furthermore, it does not react to UV light (no photo-oxidation) and it rarely adsorbs to suspended particulate matter (Tahoe Research Group, 1997). MTBE from powerboat emissions do not represent any threat to human health because water concentrations of 151 mg/L are required to be acutely toxic, or 51 mg/L for chronic toxicity (US-EPA, 2006). To put this in perspective, MTBE concentrations at Lake Tahoe in the vicinity of boating activity were often in the range of 20-35 µg/L (Reuter et al. 1998), which is ca. 7500-times lower than the acute toxicity value. Adverse effects on rainbow trout are not expected until the concentrations of MTBE in the water column reach 4600 µg/L. MTBE water quality guidelines for the protection of fresh water and marine organism have been set at 3400

µg/L and 440 µg/L, respectively (Environmental Protection Division, 2001). However, like BTEX, MTBE can impart detectable taste and odour on potable water at concentration as low as 20-40 µg/L (Section 9.2). Based on odour/taste threshold levels, the EPA has set a guideline value for MTBE of 20 µg/L, and the State of California has set a primary drinking water standard for MTBE of 13 µg/L, and a secondary drinking water standard of 5 µg/L (California Environmental Protection Agency, 1999). Concentrations of MTBE in surface waters of reservoirs with intensive levels of recreational power boating can routinely exceed 5 µg/L. This is a major concern for many regulatory agencies, especially since current water treatment technology is ineffective at removing the trace levels of MTBE.

Several U.S. studies have indicated a correlation between BTEX, MTBE and PAHs concentration measured in the field and recreational power boat usage. The concentrations often increase throughout the summer boating season (May to September; northern hemisphere), with distinct spikes occurring after peak boating dates on public holidays (Allen et al. 1998; Allen and Reuter, 1999; Miller and Fiore, 1997; Oris et al. 1998; Reuter et al. 1998b). These levels of contaminants tend to diminish within weeks or months of the boating season finishing (returning to almost background levels), and therefore do not appear to significantly degrade the overall water quality (Warrington, 1999; Revelt 1994). However, as BTEX, MTBE and PAHs have been shown to exhibit acute toxicity to a number of aquatic organisms, there is concern about the impact of even short term exposure of organism to outboard emissions during periods of high boating activity.

5. Toxicity of outboard exhaust emissions

Outboard emissions have been shown in a number of studies to be toxic to aquatic organisms under either laboratory conditions or mesocosm experiments employing unrealistically high concentrations of outboard exhaust concentrations or individual contaminant concentrations. The vast majority of field investigations have concluded that normal levels of recreational power boating are not having a long-term negative impact on water or sediment quality in lakes. The basis of these findings has come from the observation that field concentrations of contaminants in sediments and the bulk water column are many times lower than reported ecological guidelines. Many of these guideline values are based on toxicity to adult stage organisms, and do not take into account for more sensitive life stages of organisms. Consequently, there is now growing evidence that field concentrations during periods of high boating activity on small lakes (with limited capacity for dilution) could result in PAH concentrations high enough to inhibit early life stage development of some fish (Koehler and Hardy, 1999). Oris et al. (1998) has actually reported that PAHs levels present in Lake Tahoe arising from 'ambient levels of motorised water craft emissions are present at sufficiently high concentrations to cause measurable adverse impacts on fish larval growth and zoo plankton survival/reproduction as a result of enhanced phototoxicity of PAHs (Section 8). Concern regarding the sensitivity of juvenile life stages to contaminants is further increased by the potential for order-of-magnitude higher contaminant concentrations in the surface microlayer – the upper 30-50 μm. This surface microlayer is an area of high biological production and is a nursery for many organisms (egg and larval life stages), and hence the combination of contaminant enrichment in the surface microlayer (Section 7) and phototoxicity (Section 8) has the potential for significant adverse effects.

A summary of the relevant literature describing the potential toxicity of outboard engine exhaust and its individual aromatic components is given below.

Swedish workers assumed a water exhaust concentration of 0.7 mg/L of hydrocarbons based on exhaust emission being confined to a 1 metre path behind the boat. Using this and higher concentrations of fuel placed into water, toxicity experiments were conducted by extracting the exhaust components from the water and injecting into fish. A number of toxicological responses were noted including enzymatic, reproductive and genetic effects. The applicability of these results to real field situations is questionable as realistic exhaust concentrations and uptake of hydrocarbons by the fish would be significantly lower than the body burdens used in the experiments (Tjarnlund et al. 1995). Furthermore, the exposure of the fish to the exhaust plume may only be for a very short time; that is, it is unlikely that fish would swim behind the boat being constantly exposed to the maximum concentration of exhaust contaminants.

The goldfish, *Carrasius auratus*, was subject to a dynamic bioassay using a continuous flow of outboard exhaust condensate and aromatic compounds (Warrington, 1999). The LC_{50}'s (concentration result in 50% mortality over the duration of the experiment) for exhaust components ranged from 172 mg/L (96 hour test) to 226 mg/L (24 hour test) of fuel burned. Assuming 25% of the fuel delivered to the engine was released unburned; this corresponded to 43-57 mg/L of exhaust pollutants in water. The 24 hour LC_{50}'s for the aromatic compounds toluene and xylene were determined as 41.6 and 30.6 mg/L (the respective 96 hour LC_{50}'s were 22.8 and 16.9mg/L).

English et al. (1963) reported relatively high tolerances (LC_{50}, 96 hour test) of the test sunfish, *Lepomis macrochirus*, and *Pomoxis annularis*, to outboard exhaust emissions of 526 mg/L, based on fuel delivered to the engine. Alaskan freshwater fish species exposed to benzene exhibited 96 hour LC_{50} concentrations ranging from 11.7 to 14.7 mg/L (Moles et al. 1979). It should be noted that these values exceed the aromatic levels found in the Boating Industry Association (BIA)/Environmental Control Technology Corporation (ECTC) tests ponds, stressed with very high inputs of outboard exhaust emissions (3-times that possible for recreational boating), by a factor of 100-1000. Since fish kills did not occur in the BIA/ECTC test ponds it is reasonable to assume that for the species and life stages of fish studied, outboard exhaust emissions are not acutely toxic under normal boating conditions.

The sub-lethal biological effects of outboard engine exhaust emissions on fish remain poorly studied. In contrast, many studies have focussed on the effects of crude oil and petroleum, and since these contain many of the main components of outboard engine exhaust, the results may be comparable. The first sign of sub-lethal effects are manifested at behavioural changes, then, with increasing hydrocarbon concentrations, physiological effects become apparent. Sub-lethal concentrations of petroleum hydrocarbons have been observed to effect swimming performance, equilibrium and spontaneous activity patterns. Although such behavioural effects can be observed, it is often difficult to determine their significance with respect to long-term survival of the organism. Physiological effects of exposure to petroleum hydrocarbons include changes in growth, heart rate, respiratory rate, alterations in embryonic activity, premature or delayed hatching and malformed larvae. It is the changes affecting reproductive success that are most damaging and hence of greatest concern. Malins and Hodgins (1981) reviewed several studies which reported decreased larval survival and gross morphological abnormalities after hydrocarbon exposure in the low mg/L to high µg/L range. There is now considerable evidence indicating that relatively low concentrations of petroleum hydrocarbons are toxic to fish eggs and larvae, and that these life stages are at greatest risk from outboard engine exhaust emission to receiving waters.

Carls et al. (1999) reported that total PAH concentrations of 0.7 µg/L (from weathered crude oil) caused malformations, genetic damage, mortality, decreased size and inhibited swimming in Pacific herring eggs. Concentrations of 0.4 µg/L resulted in sub-lethal responses including yolk sac edema and immaturity consistent with premature hatching. Studies with Pink salmon embryos led Heintz et al. (1999) to conclude that water quality standards for total PAHs above 1.0 µg/L may fail to protect fish embryos. The authors recommended a protection standard of 0.01 µg/L (or 0.01 ppb) for total PAHs in water, which includes a safety factor of ca. 100.

Outboard exhaust emissions have been shown to be toxic to benthic macro-invertebrates. The 24 hr LC_{50} concentration of outboard exhaust for amphipods (*Gammarus fasciatus*) and snails (*Amnicola limnosa*) was 1.16 and 1.08 mg /L, respectively. The authors reported that no toxic effects were apparent in the field.

Microalgal (phytoplankton) productivity in BIA/ECTC test ponds (mesocosm) subject to high levels of outboard exhaust emissions was significantly lower than that of microalgae in control ponds. This was further supported by a study by the Rensselaer Institute that found when raw fuel levels in the water exceeded 3 to 5 mg/L, the C^{14} uptake by indigenous Lake George algae was inhibited. The hydrocarbons in the exhaust emissions were found to be more inhibitory to carbon fixation than raw fuel (Hilmer and Bate, 1982).

While phytoplankton productivity can be adversely affected by hydrocarbon levels associated with heavy boating use, it is important to note that the BIA/ECTC test ponds (referred to above) received a stressing level three times the maximum outboard engine usage which could be sustained on a given surface area of water. Furthermore, studies reporting a decrease in photosynthetic rates used an exhaust concentration that was 390-times higher than that typically expected from normal boating usage. Under conditions of normal outboard engine use, exhaust emissions were not found to inhibit the growth of the algal species, *Selenastrum capricornutum* and *Anabaena flos-aquae* (Kuzminski and Fredette, 1976; Chmura and Ross, 1978).

The lack of adverse impacts in the field from bulk water concentration of outboard exhaust contaminants is not surprising when considering the concentrations of aromatic hydrocarbons reportedly toxic to various organisms are typically >1 mg/L; with the exception of some larvae where toxicity is reported at 0.1 mg/L (US EPA, 1985). Jüttner reported LC_{50} concentrations of aromatic compounds for *Daphnia* of 14-237 mg/L and 0.2-6.9 mg/L for the bacteria, *Vibrio fischeri*. The higher sensitivity of bacteria highlights the importance of considering the potential impacts of high contaminant levels in the surface microlayer, which is enriched in micro-organisms. Mesocosm experiments using BIA/ECTC ponds receiving 3-times the exhaust emissions possible under saturation boating conditions maximum yielded a maximum aromatic hydrocarbon concentration of 1.0 mg/L. This level returned to <0.1 mg/L

within 2 days of ceasing engine activity. In contrast, equivalent mesocosm experiments in Michigan test ponds resulted in maximum aromatic hydrocarbon concentrations of just 0.01-0.05 mg/L, with no significant difference between the exhaust-treated and control ponds. The difference between the two sites was attributable to the rapid elimination of aromatic hydrocarbons by a combination evaporation, adsorption or biodegradation (BIA, 1975).

6. Environmental fate of outboard emissions

All modern outboard engines exhaust below the water surface (mostly through the propeller hub), and as a result, all emissions pass through the water. A significant proportion of the emissions remain in the gas phase and is released directly to the atmosphere. The remainder condenses and is mixed into the water column and, depending on their physical properties, becomes suspended in the water column or forms a film on the surface for varying lengths of time. The condensed emissions are eventually eliminated from the water by a combination of physical, chemical and biological processes.

Outboard engines are highly conducive to dispersing engine exhaust in the water, with the propeller turbulence and boat movement through the water resulting in significant dilution. Hare and Springier (1973) showed that the percent removal of hydrocarbons from the water was more rapid in experiments with the propeller on because of increased mixing/aeration. In addition they showed that hydrocarbon removal was also greater with high water to exhaust ratios, which explains why laboratory studies often underestimate the elimination rate of hydrocarbons from the water column. A considerable amount of research by US agencies has been directed at characterising and quantifying outboard engine emissions to the aquatic environment (Hare and Springier, 1973; BIA, 1975). European investigators (Warrington, 1999) have also reported on outboard emissions in Austria, Germany, Norway, and for the Bodensee, a lake bordering Switzerland, Austria and Germany.

Exhaust emissions contain gases (water vapour, oxygen, carbon dioxide, carbon monoxide, nitrogen oxides and hydrocarbons), which rapidly rise through the water column as bubbles, and condensable components which can be transferred to the water column. The condensable components consists of unburned fuel, combustion derived PAHs, fuel additives (e.g., MTBE is present) and partially oxidised hydrocarbons (e.g., phenols and carbonyl compounds).

The organic composition of the gas phase exhaust hydrocarbons is similar to that of the fuel. Warrington (1999) reanalysed data reported by Hare and Springier (1973), and estimated that ca. 60% (range 30-75%) of the exhaust hydrocarbons escape directly to the atmosphere as exhaust gas bubbles. Thus ca. 40% of the emitted hydrocarbons are temporarily retained in the bulk water phase. Compared to the fuel, the aromatic fraction of the condensed hydrocarbons is enriched in two ring aromatics molecules (i.e., naphthalene) and contains higher molecular weight, combustion derived, PAHs.

6.1 Evaporation

Of the ca. 40% of hydrocarbons that are temporarily retained in the bulk water phase, it has been estimated that at least 90% of outboard hydrocarbon emissions move to the surface as a film. Experiments conducted using tracer dyes injected into an outboard engine exhaust showed that emissions were dispersed in two tracks, each about 3 m wide and 4 m from the centreline of the boat's wake (IMEC, 1979). The tendency of condensed hydrocarbon to rapidly migrate to the surface explains why bulk water phase concentrations of exhaust contaminants in the field, and mesocosm ponds, are generally very low.

The rapid migration to the surface means that evaporation at the air-water interface is the major removal mechanism for hydrocarbons. Once at the surface, evaporation of volatile hydrocarbons is very rapid because of the large surface area-to-volume ratio of the hydrocarbon film. Calculations by Warrington (1999) have shown that volatile fuel components evaporate as fast as they reach the surface of the water. For example, a boat with a 200 hp 2-stroke engine travelling at 70 km/h can be expected to emit 13.5 kg of unburned fuel to the water per hour. Assuming the gasoline is deposited of an 8 metre wide strip, the theoretical maximum area of deposition will be 560,000 m^2. Using a water temperature of 10 °C and wind speed of 10 km/h, the calculated time for evaporation is only 0.13 seconds. This is much quicker than observed elimination rates of hydrocarbons from the bulk water phase, implying that the rate limiting step in the loss of fuel hydrocarbons from water appears to be the mixing of exhaust products and their subsequent rise or diffusion to the surface, not the evaporation rate at the surface. Correll (1999) reported that if BTEX compounds are mixed below 1m, the rate of evaporation slows and is a function of the rate of mixing in the water column.

A BIA/ECTC tank study found that the evaporative half-life for volatile aromatic hydrocarbons dispersed to a depth of 1 m under aerated conditions (i.e., prop turbulence) was ca. 1 day. In the field, however, the much lower fuel-to-water ratio, larger surface area for film formation, increased turbulence, wind and lower initial concentrations, results in much shorter half-lives Warrington (1999). Shuster et al. (1974) found that, on average, 65% of the exhaust products were removed in under 1.5 hours at water temperature between 10°C and 30°C.

While most of the volatile gasoline hydrocarbons evaporate quickly, there is a non-volatile hydrocarbon fraction in exhaust emissions which remains to interact with the aquatic environment by other mechanisms. Volatile hydrocarbons are generally considered those that contain less the 11 carbon atoms (Rijkeboer et al. 2004). Because petrol is comprised of largely of C_4-C_{12} aliphatic compounds and C_6-C_8 mono-aromatic compounds (i.e., BTEX), the vast majority of unburned hydrocarbons are removed from the bulk water phase by evaporative processes. However, larger hydrocarbons, including 4-7 ring combustion derived PAHs and fuel additives such as

MTBE are not readily transferred to the air by evaporation (VanMouwerik and Hagemann, 1999). For these components, other elimination processes such as photo-oxidation, biodegradation, flushing and sedimentation may become more important.

6.2 Flushing

Flushing rates for boating situations can vary tremendously – from lakes with little outflow to large rivers. From an assessment of boating areas in British Columbia (Canada), Warrington (1999) concluded that flushing had little effect on contaminant removal compared to other processes such as evaporation and biodegradation.

6.3 Photo-oxidation

Photo-oxidation results in the preferential degradation of aromatic compounds (due to their ability to absorb light) and the process is enhanced by thin films and a high ionic content in the water (U.S.B., 1982). Most researchers have concluded that photo-oxidative degradation is likely to require days or weeks to be completed and that biodegradation would be initiated well before photo-oxidative removal.

6.4 Biodegradation

There are over 200 species of bacteria, yeast and filamentous fungi that are known to metabolize hydrocarbons. The rate of degradation depends on water temperature, the extent of hydrocarbon dispersion and the availability of nitrogen, phosphorus and oxygen. While a considerable amount of research has been carried out on the biodegradation of crude oil, relatively few studies have specifically looked at the biodegradation of outboard engine exhaust emissions. Shuster (1971) reported that microbes showed better growth rates on outboard exhaust products than on raw fuel. The Rensselaer Institute noticed accelerated activity in sediment microbes after a weekend of heavy boating. It was postulated that this stimulation was a result of the introduction of a carbon source (i.e., the exhaust components) to a carbon limited system (Shuster et al. 1974).

6.5 Sedimentation

Hydrophobic contaminants mixed into the water column will readily adsorb to particulate matter and re-suspended sediments, facilitating transport to the lake bottom and incorporation into sediments. High molecular weight combustion-derived PAHs are very persistent in the environment (i.e., slow biodegradation) and have the potential to accumulate in the sediment. The resuspension of sediment by recreational motorboats (and jet skis) operating in shallow water is, therefore, of concern as it provides a mechanism for sediment incorporation of contaminants. The maximum

water depth for sediment disturbance is dependent on engine power, but a 50 hp outboard motor is capable of disturbing sediments at a water depth of 3m (Warrington 1999). Laboratory experiments by the Rensselaer Institute indicated that re-suspended lake sediments were capable of adsorbing outboard engine exhaust products and carrying them to the bottom (Shuster et al. 1974). Some researchers consider the accumulation of combustion derived PAHs in sediments of lakes and reservoirs to be a more serious, but currently less understood, risk to aquatic life than water quality impacts from recreational boating (VanMouwerik and Hagemann, 1999).

In spite of this, the rate at which hydrocarbons reach the sediments appears to be quite slow. Only low levels of petroleum-derived hydrocarbons were detected in the sediments of certain bays of Lake George in New York – a lake that has received heavy outboard use over several decades (Shuster et al. 1974). Edwards (2002) measured sediment PAH levels in the Mary River flood plain billabongs (which receive extensive recreational boating activity in the dry season) but found all of the PAHs were below the detection limit of 10 ng/g. For 3-6 ring PAHs, the ANZECC (2000) low threshold values (a level below which there is a high probability of no toxic effect) for PAH are in the range 63-665 ng/g. The ANZECC high values (levels above which there is a high probability of pronounced effect on sediment dwelling organisms) for the same set of PAHs are in the range 540-2800 ng/g. Based on these guideline values, the authors had to conclude that there was no toxic effect from the current levels of recreational boating activities. A 3 year study on two lakes in Grand Teton National Park (Wyoming) found maximum sediment concentrations of phenanthrene and benzo[a]pyrene of 28 ng/g and 7.6 ng/g, respectively (Rhea et al. 2005). The respective ANZECC low thresholds for phenanthrene and benzo[a]pyrene of 240 ng/g and 430 ng/g suggest that even these 'hot spot' sediment concentrations pose no significant risk to sediment dwelling organisms. The BIA/ECTC test pond study was unable to find any statistically significant build up of hydrocarbons in test pond sediments after three years of heavy outboard engine operation that corresponded to 3-times the maximum possible recreational boating density. The absence of significant hydrocarbons in the sediments is evidence of the efficiency of the other degradation processes. Warrington (1999) postulated that it might also indicate that turbulence and the thermocline may act to keep the hydrocarbon-containing particulate matter in the upper layers where conditions for oxidation and biodegradation are optimal.

6.6 Summary: environmental fate

Condensed hydrocarbons do not accumulate in the bulk water column but are largely eliminated by a variety of naturally occurring mechanisms such as evaporation, biodegradation, dispersion and photo-oxidation. Certain contaminants, such as combustion-derived PAHs, tend to concentrate in the surface microlayer at toxic levels. Aromatic hydrocarbons remain in the water column for less than a day under

normal boating conditions and no enrichment of saturated hydrocarbons is observed even under very heavy boating levels. Accordingly, Cole (1974) concluded that under normal use levels there is no significant water quality degradation caused by outboard motors in large lakes of reasonable depth (e.g., surface area of 250 ha and a mean depth of at least 6 meters).

7. Surface microlayer

Unlike MTBE, which because of its high water solubility is dispersed more uniformly throughout the bulk surface water, the concentration of hydrophobic exhaust contaminants (i.e., hydrocarbons) is generally very low. As mentioned earlier, this is because the hydrocarbon components (BTEX and PAHs) rapidly rise to the surface to form a film near the water surface. While BTEX chemicals and some lower molecular weight PAHs are rapidly volatilised, the concentration of higher molecular weight (i.e., 4-7 ring) PAHs in the surface microlayer (30-50 μm depth) can be present at concentrations ca. 100-1000 times higher than in the underlying water column. For example, Moore and Freyman (2001) reported microlayer and underlying water concentrations of chrysene of 19.3 μg/L and 0.02 μg/L, respectively from samples taken from Burrard Inlet (Vancouver). The authors reported microlayer contaminant enrichment factors of 100-10,000, and that the tidal action can coat intertidal organisms with these high levels of microlayer contaminants. While the subject of this report is inland water bodies, wind and/or boat generated waves and/or hydroelectric variation in lake level could have a similar effect on lake shoreline biota. Although contaminant enrichment in the surface microlayer is different from a visible hydrocarbon film on the water, Hammitt and Cole (1987) have stated that the deposition of thin films of unburned fuel on aquatic organisms (i.e., unicellular plankton and algae) is the 'primary ecological effect' of the operation of outboard motors. The effects of such films include interference with respiration and the inhibition of algal growth; ultimately affecting the food chains of fish and other aquatic organisms Hammitt and Cole (1987).

Contaminant enrichment in the microlayer is potentially significant because this layer is a nursery for many organisms, and is an area of very high production (i.e., plankton, microalgae, bacteria etc.). A number of studies have shown that juvenile life stages of many organisms are more sensitive to contaminants, such as PAHs, than adult life stages. For example, the 1999 interim Canadian water quality guidelines for the protection of aquatic life for benzo[a]pyrene (BaP) is 0.015 μg/L. Moore and Freyman (2001) reported BaP concentrations of up to 3.87 μg/L (260 times higher than guideline value), highlighting the potential for adverse biological effects. However, it should be noted that this study did not involve waters impacted by recreational boating.

Clearly, there is a need for further research to characterise the concentration, residence times and biological effects of the surface microlayer in waters impacted by recreational power boating. This is especially important for PAHs because of their potential for enhanced phototoxicity which can increase toxicity by orders-of-magnitude (Section 9).

8. Phototoxicity of PAHs

Much of the PAH toxicity data from the literature that resource managers compare field data with do not take into account phototoxicity (Landrum et al. 1987; Mekenyan et al. 1994; Arfsten et al. 1996). Giesy (1997) reported that the toxicity of some PAHs found in two-stroke exhaust are as much 50,000 time more toxic in field conditions (exposed to UV light) than in laboratory tests (no UV light exposure). Accordingly, the phototoxic effect is very important to consider when determining acceptable levels of PAHs in the water that will not adversely impact on aquatic life. A study by Oris et al. (1998) found that ambient levels of PAHs in 2-stroke motorboat emissions had significant negative impacts on fish growth and zooplankton survival/reproduction in Lake Tahoe (US). Lake PAH levels ranged from 0.005-0.070 µg/L, but with enhanced phototoxicity, the no-observed-effect-concentrations (NOEC) for these PAHs were calculated as 0.009 µg/L for fish (fathead minnow), 0.007 µg/L for zooplankton (*Ceriodaphnia dubia*) survival, and 0.003 µg/L for zooplankton reproduction. The authors commented that in very clear oligotrophic lakes, the enhanced phototoxic impact of field PAH concentrations could extend to depths of 20 metres.

The study by Oris et al. is a rare example where biological impacts have been reported at field concentrations arising from recreational boating emissions, and highlights the importance of taking into account the phototoxic properties of PAHs. Based on these results, field concentrations of PAHs in the surface microlayer are presumably very toxic to resident plankton, eggs and juvenile life stages of various aquatic organisms. However, the nature of recreational boating usage means that high activity only occurs on fine weathered weekends and public holidays during the summer months. This sporadic activity possibly provides lakes with sufficient time to 'recover' from any temporary and relatively short-lived impacts that may arise from motorised recreational boating activity.

9. Drinking water impacts

9.1 Hydrocarbons

While field concentrations of outboard-derived contaminants are orders-of-magnitude lower than establish guideline values for the protection of aquatic life, components of 2-stroke engine exhaust can taint drinking water supplies at parts-per-billion concentrations. Jüttner et al. (1995) reported that running a 20 hp engine for 1 hour can impart an objectionable odour to 11,000 m^3 of water (the equivalent of one Olympic-size swimming pool), which was largely attributed to the presence of aromatic compounds (i.e., BTEX and low molecular weight PAHs). Odour threshold concentrations of aromatic compounds commonly found in 2-stroke exhaust include, benzene (10 µg/g), toluene (1.0 µg/g), ethylbenzene (0.1 µg/g), *p*-xylene (0.53 µg/g), naphthalene (0.005 µg/g or 5 ng/g) and 1-methylnaphthalene (0.02 µg/g or 20 ng/g) (Van Gemert and Nettenbreijer, 1977). Kuzminski et al. (1974) similarly reported that low concentrations (ca. 0.3 µg/L, or 1 L of fuel per 3,000,000 L of water) of 2-stroke engine exhaust impart an unpleasant taste/odour on a drinking water. These findings were consistent with those of English et al. (1963) who reported that for every litre of fuel delivered to the engine, 0.6-1.3 million litres of dilution water are required for odour control.

The occasional occurrence of high density motorised boating in the proximity of water intakes may allow insufficient time (for evaporation) and/or dilution, resulting in seasonal or occasional complaints of objectionable, petroleum-based odours and tastes from outboard exhausts (Jackivicz and Kuzminski, 1973). Conventional water treatment appears to reduce but not eliminate odour problems. To prevent odour and taste problems in drinking water, it has been recommended that motorised watercraft (in particular those powered by 2-stroke engines) be banned from operating on water bodies used for drinking water supplies (Ludemann, 1968). However, Warrington (1999) recommended that motorised watercraft only need to be excluded from the immediate vicinity (within about 100 m but site specific) of water supply intakes and from small lakes (flushing rates longer than 1 year) that serve as domestic water supplies.

9.2 MTBE

MTBE has an odour threshold concentration of 20-40 µg/L, which prompted the EPA to implement a water quality guideline value for MTBE of 20 µg/L. Unlike hydrocarbons, MTBE is potentially more problematic on account of it relatively high solubility and much slower evaporation rates. Unlike BTEX compounds and other volatile hydrocarbons that have residence times measured in days, the half-life for MTBE has been estimated at 80-120 days (Reuter, 2007). The tendency of MTBE to

disperse throughout the water column has been demonstrated by Boughton and Lico (1997) who detected MTBE at depths of up to 30 m in Lake Tahoe during the boating season. Field sampling at Lake Shasta and Lake Perris in California have revealed MTBE concentrations in excess of the 20 μg/L EPA health advisory limit (Miller and Fiore, 1998; Clementsen, 1997; Dale et al. 1997). The banning of 2-stroke engines on Lake Tahoe and Lower Echo Lake resulted in a ca. 90% reduction in MTBE concentrations (Poppoff, 2000). As with hydrocarbons, because concentrations are highest in areas of high boating activity, power boats should not be allowed within 100 m of any drinking water intake in order to circumvent any potential problems with tainting domestic water supplies.

10. Summary

Normal levels of motorised recreational boating activity do not have a significant impact on water quality with respect to toxicity. The main contaminants of concern are BTEX compounds, PAHs and the fuel additive MTBE. The relevance of MTBE to NZ waters is unclear because although it is not widely used, currently regulations permit up to 11% of MTBE in petrol. The concentration of all these contaminant classes in the bulk water phase are generally orders-of-magnitude lower than establish water quality guidelines for the protection of aquatic life. However, an important caveat is that these guidelines do not always protect the most sensitive life-cycle stages of organisms (i.e., eggs/larvae) and certainly do not take into account for phototoxicity – for PAHs this can increase toxicity 50,000 fold. The majority of BTEX compounds and other volatile hydrocarbons are released directly to the atmosphere as rising bubbles of exhaust gases – the remaining volatile compounds that condense into the water are eliminated via evaporative processes. The rate limiting step in these processes is the migration of the contaminants to the surface-water interface – the evaporative process for most components (including BTEX chemicals) is very fast. High molecular weight PAHs also migrate to the surface of the water, but their reduced volatility can result in up to 1000-fold higher concentrations in the surface microlayer (30-50 μm depth). Accordingly, recreational boating activities may be negatively impacting on plankton production and the environmental compartment where eggs accumulate and larvae feed – this microlayer is thought to be crucial to the reproduction of many species. Even if such impacts do occur, it is important to establish the long-term impacts, as lakes typically have long recovery times between seasons of 'high' recreational boating activities.

In contrast to hydrocarbon contaminants, MTBE has relatively high water solubility and therefore can disperse throughout the water column. The tendency not to accumulate at the surface greatly reduces the evaporative elimination (the major pathway) of MTBE from the water.

Although outboard exhaust contaminants are not present in concentrations that exceed aquatic protection guidelines, there is a significant risk of boating activities tainting drink water (odour/taste). BTEX chemicals, low molecular aromatics and MTBE are capable of tainting water at concentrations as low as ca. 20 ng/L (ppb). Accordingly, it has been recommended that boating activities not be permitted within 100 m of a water intake structures or on small lakes (with slow flushing times) used for domestic water supply.

Despite the potential for negative impacts, it is important to emphasise that 4-stroke outboard emissions are at least 10-fold lower than those from the same powered 2-stroke engine. Trends in overseas outboard sales (latest data was 2002) show that 4-

stroke outboards are starting to dominate the small outboard engine market and from 2000-2002, the proportion of high-powered 4-stroke engine sales went from 0% to 10% of the market (European data). Hence it is important to ascertain how these trends have continued through to 2007, and if these suggest a general replacement of 2-stroke outboards by 4-stroke engines then this will have a large effect in the assessment of potential future (long-term) environmental impacts of motorised recreational boating activities. Moreover, much of the literature relates to lakes and reservoirs that sustain intense levels of motorised boating activity, if the situation on the West Coast of NZ involves large lakes with very low levels of boating activity then this also needs to be factored into any risk assessment. Finally, one major concern in the US is the rapidly growing number of personal water craft (jet skis etc.). These are a rapidly growing market that release disproportionately large amounts of fuel emissions into the water, and because they are jet powered, can access shallow waters that otherwise would not be disturbed by other forms of boating.

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PC19-Submission #157

FORM 5

SUBMISSION ON A PUBLICLY NOTIFIED PLAN CHANGE/ VARIATION

CLAUSE 6 OF FIRST SCHEDULE RESOURCE MANAGEMENT ACT 1991

To: Mackenzie District Council
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Contact person:

(name and designation, if applicable)

This is a submission on proposed ~~Plan Change 19~~/ Plan Change 19 to the Mackenzie District Plan *(please select Plan Change)*

The specific provisions of the proposal that my submission relates to are:
(give details)

Control of Motorized Craft on Lake Pukaki and surrounding waterbodies

My submission is:
(include whether you support or oppose the specific provisions or wish to have them amended and the reasons for your views)

Support the control of commercial operations and Strongly opposed the controls of recreational motorized craft on lake pukaki

PTO for further explantation

Continued overleaf

With the establishment of the hoovercraft on Lake Pukaki it has higlighted the requirements for control of commercial operators and the importance to undergo a resource consent process for this activity.
The noise emmitted by the hoovercraft operation is hugely offensive and we can even hear it from our home 6km (as the crow flies)from Lake Pukaki. We therefore support the control of commercial operations

With regards to recreational motorized craft use on Lake Pukaki -Their is a small minority group of recreational users of lake pukaki (mainly locals) whom typically operate unnoticed on the lake through the summer months. The sound from these activities would be no more than a large cartage truck rummbling round the roadside
Local Recreational users have a minimal impact on the resource compared to the significant levels of tourists and freedom campers of which are degrading the lake banks and shorelines & littering rubbish

We should be focusing on controlling and aiding district plan rules that will add value to the environment no prohibit a minority group of locals utilising a man made resource

I seek the following decision from the Mackenzie District Council:
(give precise details)

TO include commercial craft controls with Plan Change 18

To EXCLUDE control of recreational motorized craft on lake pukaki

☑ **I wish to be heard** in support of my submission

☐ **I do not wish to be heard** in support of my submission

(tick one box)

If others make a similar submission I **would / would not** *(delete one)* be prepared to consider presenting a joint case with them at any hearing.

Signature of submitter or person authorised to sign on behalf of submitter
(A signature is not required if you make your submission by electronic means.)

09/03/18
Date

If you have any queries about this form or the proposed plan change or variation, please contact Karina Morrow, Group Manager Planning and regulation, Mackenzie District Council.

PC 19-Submission#158

FORM 5

SUBMISSION ON A PUBLICLY NOTIFIED PLAN CHANGE/ VARIATION

CLAUSE 6 OF FIRST SCHEDULE RESOURCE MANAGEMENT ACT 1991

To: Mackenzie District Council
PO Box 52
FAIRLIE 7949

Full name of submitter: H2 Explore Limited

Address for service: 1 Swallow Drive, Pukaki, 7999

Telephone: 0220432499

Fax/email: riaan@h2explore.co.nz

Contact person: Riaan Van Der Westhuizen

(name and designation, if applicable)

This is a submission on proposed Plan Change 18/ Plan Change 19 to the Mackenzie District Plan *(please select Plan Change)*

The specific provisions of the proposal that my submission relates to are:
(give details)

Zoning and the use of commercial activities on Lake Pukaki

My submission is:
(include whether you support or oppose the specific provisions or wish to have them amended and the reasons for your views)

That Lake Pukaki is divided up into different zones to enable for different activities to occur within those zones whilst also maintaining the scenic beauty of the Lake. See attached proposal.

Continued overleaf

I seek the following decision from the Mackenzie District Council:
(give precise details)

That the Lake is divided into different zones to allow for activities of both a commercial and non-commercial nature.

☑ **I wish to be heard** in support of my submission

☐ **I do not wish to be heard** in support of my submission

(tick one box)

If others make a similar submission I **would~~/ would not~~** *(delete one)* be prepared to consider presenting a joint case with them at any hearing.

Signature of submitter or person authorised to sign on behalf of submitter
(A signature is not required if you make your submission by electronic means.)

9 March 2018
Date

If you have any queries about this form or the proposed plan change or variation, please contact Karina Morrow, Group Manager Planning and regulation, Mackenzie District Council.

Operations on Lake Pukaki

Proposal for the Zoning of the operating area

February 2018

1 Introduction

1.1 Overview

In the last 5 years tourist numbers in the McKenzie Basin have increased significantly. Tourists no longer go to Wanaka or Queenstown for the "New Zealand Experience". Accommodation within the region has increased and many more houses are being built. These houses not only for the purposes of casual rentals, but also for the many families who bring their water toys from Christchurch or other cities to enjoy their summer holidays in the sun and on the water.

Tourism in the area therefore needs to cater for those independent travelling tourists who want to experience New Zealand and its beautiful scenery, for the adventurers who want to take part in different activities and also the families that have their holiday homes here and want to enjoy the lakes with their own boats and skis.

As Lake Pukaki is changing from a glacier lake to a warmer lake that can support recreational activities, this creates more possibilities for activities on this previously unutilised lake.

Taking into account the changing dynamic of the Lake Pukaki region, booming tourist numbers and the future potential the position of Council can no longer be just a decision between: Should there be water activities on the lakes or not?

All of us, including the tourists, want to keep the scenic beauty of the area in place, but everyone also wants the opportunity to experience the area and the beauty it has to offer.

We believe there is a solution for this problem that will address all these different aspects of our ever-changing area as well as ensure that the Lake Pukaki region will continue to be able to meet the needs of the community and of the ever-increasing tourist population.

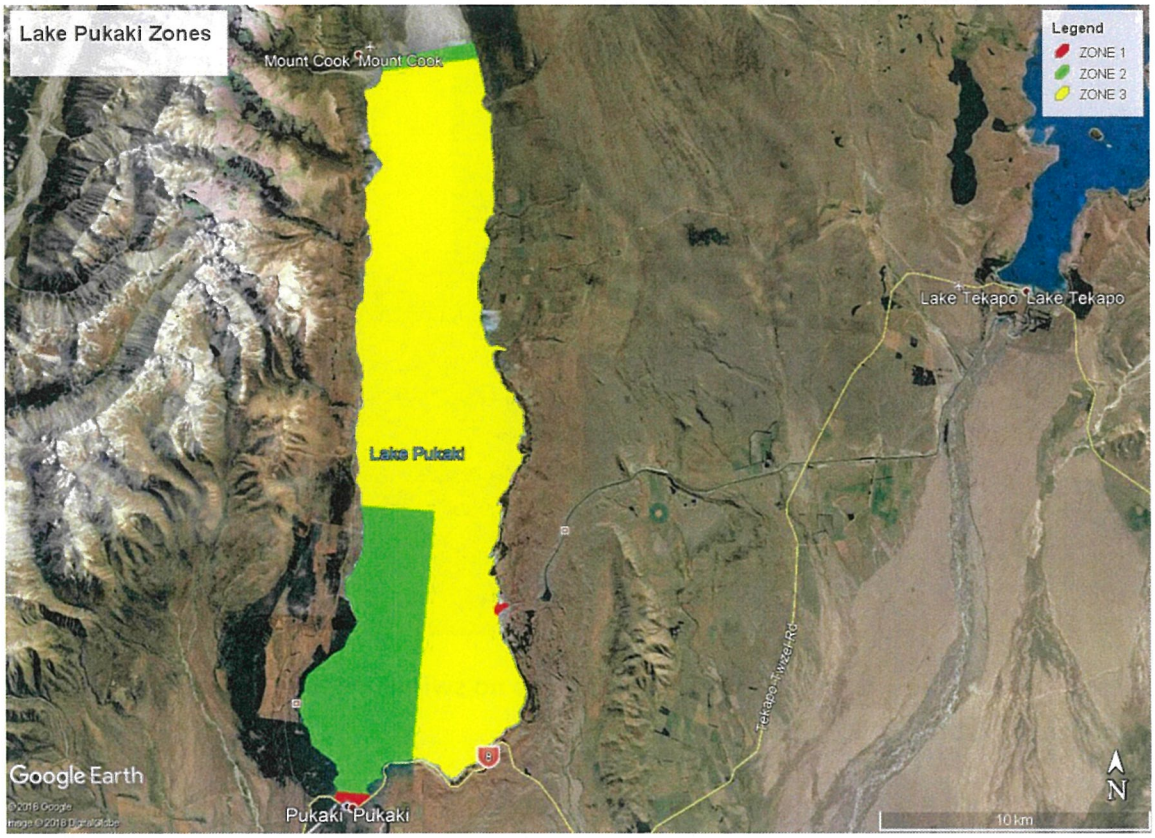
1.2 Desired Outcome

This proposal seeks to investigate the possibility of dividing Lake Pukaki into different areas where the different activities can co-exist, without compromising the scenic beauty we all want to preserve.

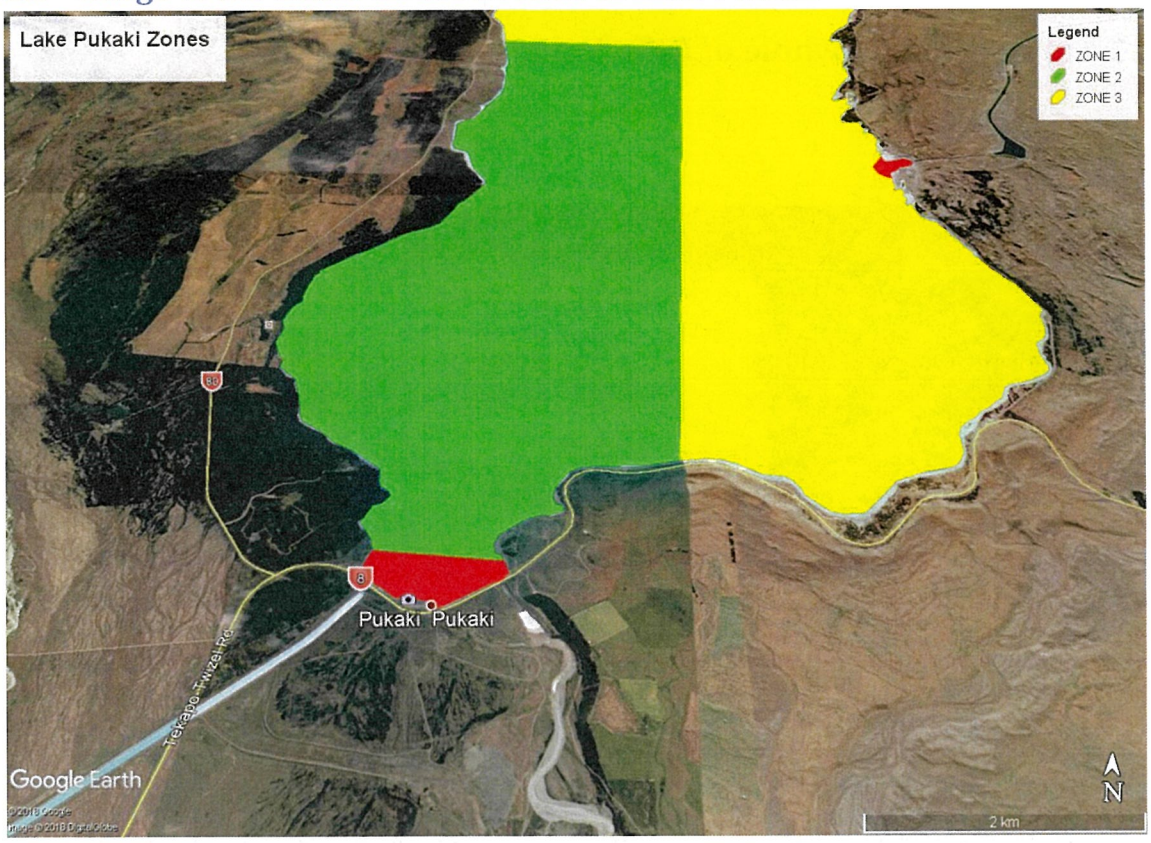
2 Conceptual division

The following conceptual division is only a starting point and an illustration of the proposed operating areas for each activity. We belief dividing up Lake Pukaki into different zones for different activities allows for multiple uses and meets the requirements of multiple parties. Different zoning also enables for the scenic beauty of the lake to be maintained whilst also allowing and encouraging a commercial element which provides benefits to the local economy.

2.1 Image of the whole of Lake Pukaki

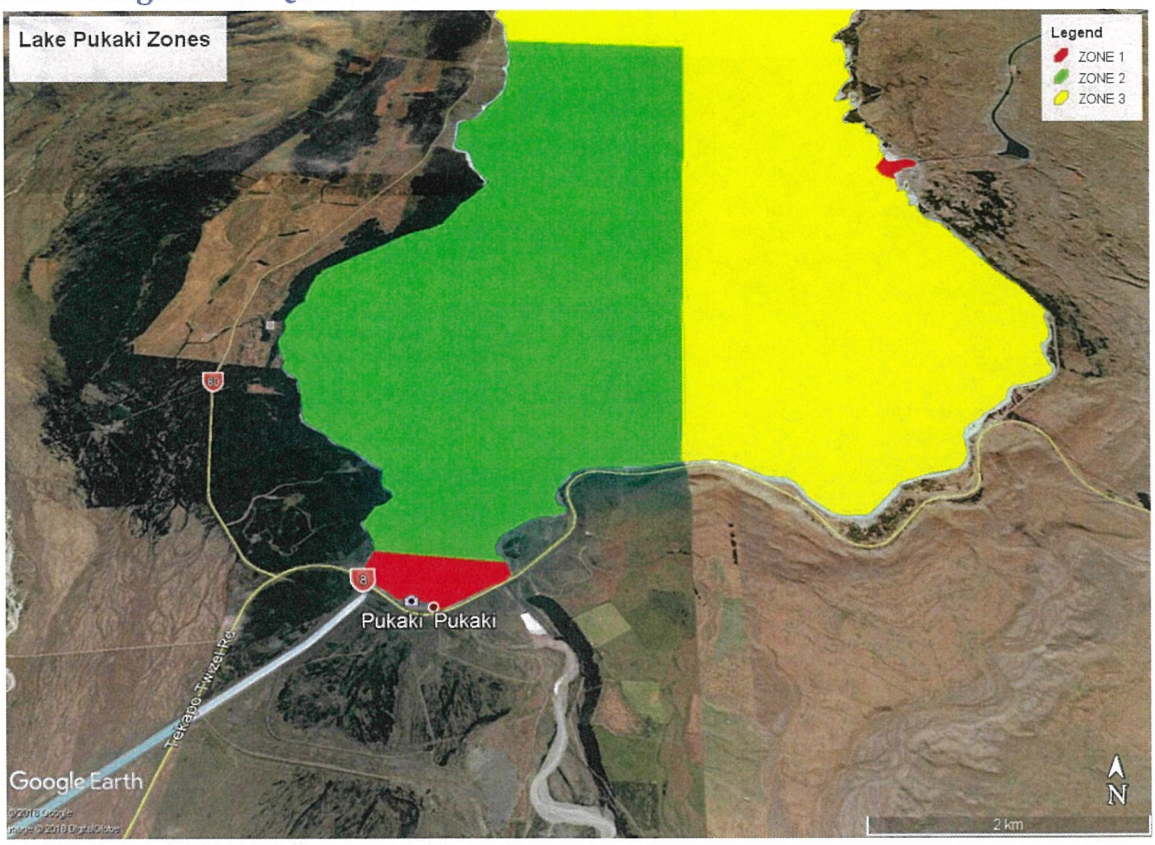


2.2 Image of the Zones on the bottom of Lake Pukaki



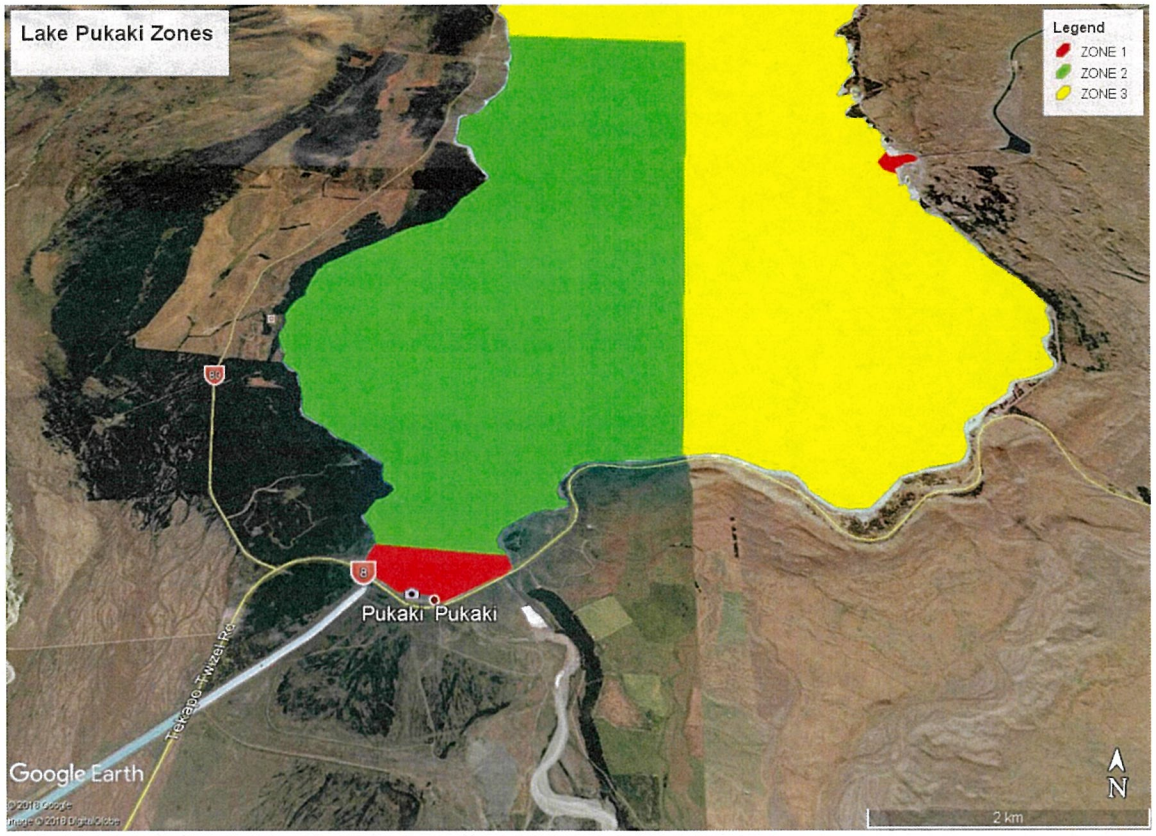
Zone 1 RED ZONE = No access zones. This means no swimming, no motorised or non-motorised crafts.

2.3 Image of the Quiet Zone on the bottom of Lake Pukaki



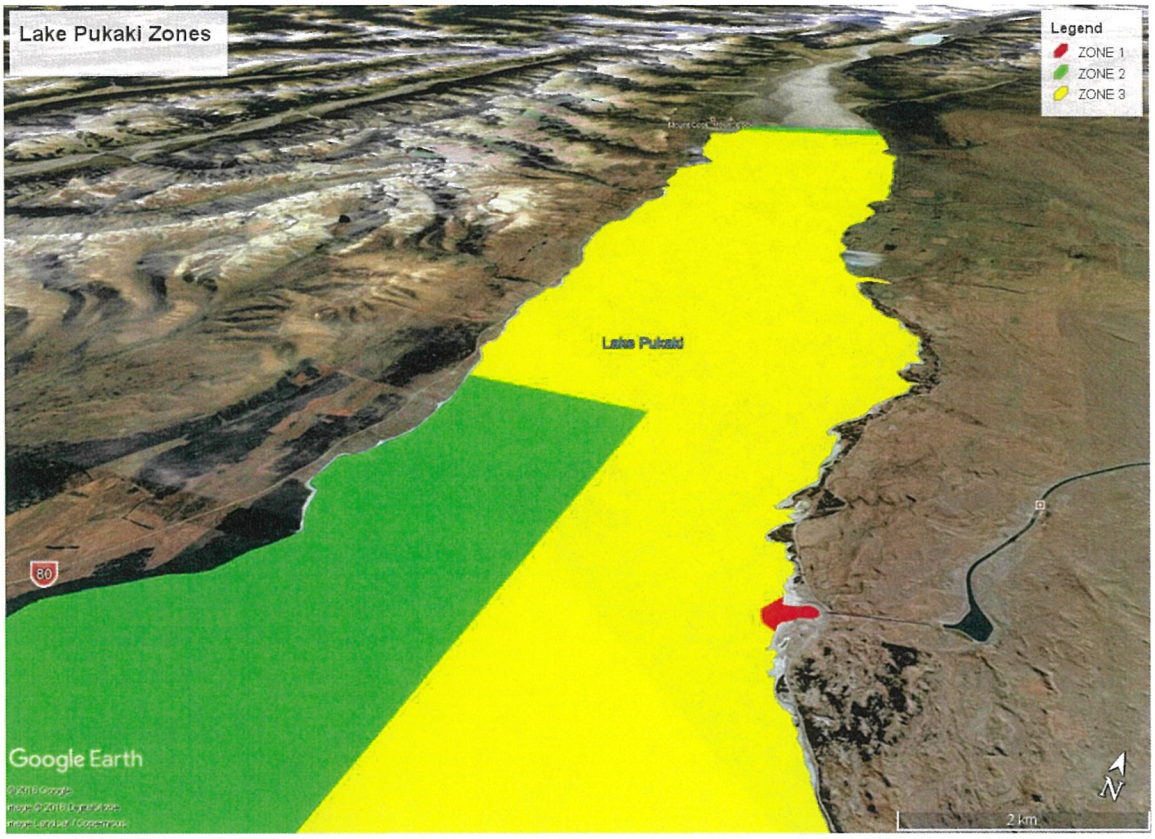
Zone 2 GREEN ZONE = only swimming is permitted in this area. No crafts are permitted here.

2.4 Image of Zone where motorised and non-motorised crafts are permitted



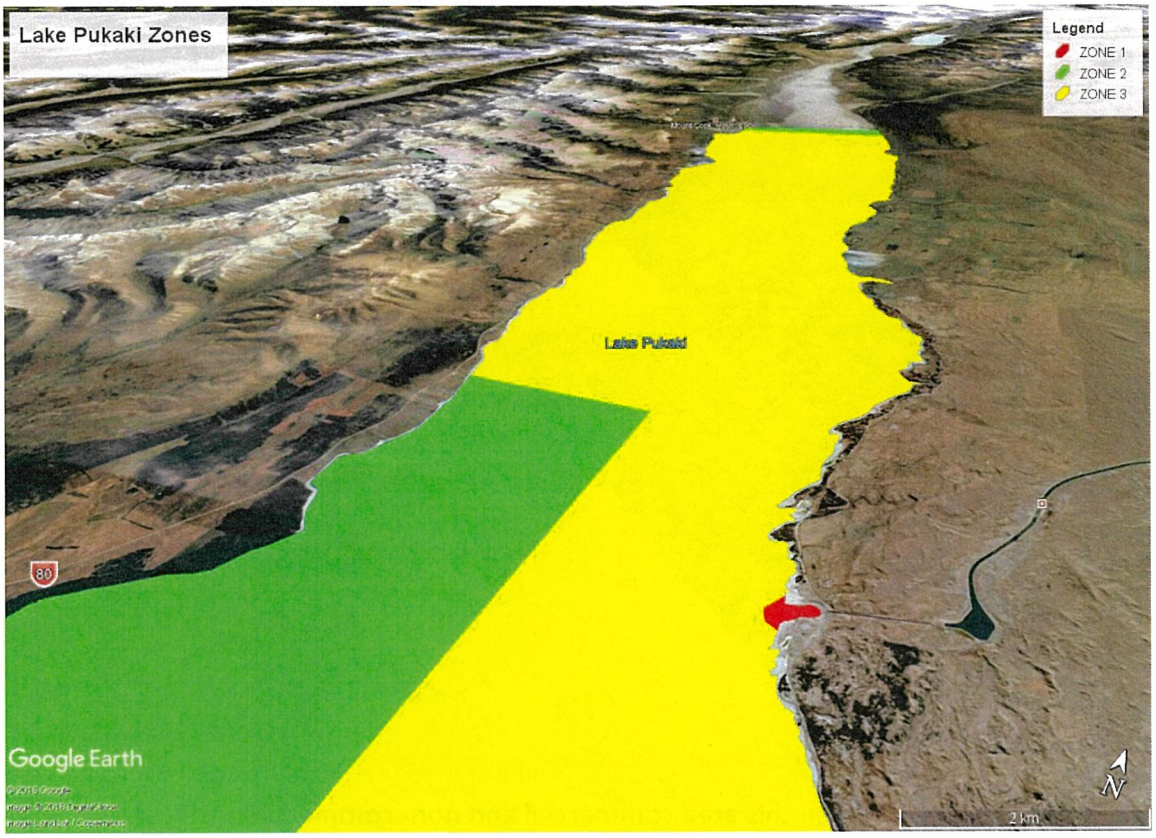
Zone 3 YELLOW ZONE = in this area commercial and non- commercial crafts are permitted to operate without compromising the Quiet Zone and Viewing Corridor.

2.5 Image of Zones on the top part of Lake Pukaki



Zone 3 YELLOW ZONE = in this area commercial and non- commercial crafts are permitted to operate without compromising the Quiet Zone and Viewing Corridor.

2.6 Image of the North end of Lake Pukaki



Zone 2 GREEN ZONE = No activities are allowed here as this is close to the waded river system and the Department of Conservation protected area

Zone 3 YELLOW ZONE= in this area motorised and non-motorised activities are permitted.

3 Contact info

H2Explore Limited:

1 Swallow Drive, Pukaki Airport, Twizel

Po Box 246, Twizel, 7944

Riaan van der Westhuizen

Cell: 0220432499

Email riaan@h2explore.co.nz

PC 19 - Submission #159

Department of Conservation
Te Papa Atawhai

DOCDM-5412283

9 March 2018

Mackenzie District Council
PO Box 52
Main Street
Fairlie
7949

Attention: Karina Morrow

Dear Karina,

Plan Change 18 and Plan Change 19 – Mackenzie District Plan

Please find enclosed the submission by the Director-General of Conservation in respect of Plan Change 18 and Plan Change 19. The submission identifies the Director-General's concerns.

Please contact Nardia Yozin in the first instance if you wish to discuss any of the matters raised in this submission (03 363 1665, 027 502 3129 or via nyozin@doc.govt.nz).

Yours sincerely

Sally Jones

Operations Manager

Twizel, Eastern South Island

Department of Conservation *Te Papa Atawhai*
Christchurch Shared Services
Private Bag 4715, Christchurch Mail Centre, Christchurch 8140, New Zealand
www.doc.govt.nz

RESOURCE MANAGEMENT ACT 1991

SUBMISSION ON A CHANGE TO THE MACKENZIE DISTRICT PLAN

TO:	Mackenzie District Council
SUBMISSION ON:	Plan Change 18 – Indigenous Vegetation Clearance Plan Change 19 – Surface Water Activities
NAME:	Lou Sanson Director-General of Conservation
ADDRESS:	RMA Shared Services Department of Conservation Private Bag 4715 Christchurch Mail Centre 8140 Attn: Nardia Yozin

STATEMENT OF SUBMISSION BY THE DIRECTOR-GENERAL OF THE DEPARTMENT OF CONSERVATION

Pursuant to clause 6 of the First Schedule of the Resource Management Act 1991 (RMA), I, Sally Jones, Operations Manager, Twizel, acting upon delegation from the Director-General of the Department of Conservation, make the following submission in respect of the Proposed Plan Change 18 and Proposed Plan Change 19 to the Mackenzie District Council.

1. This is a submission on the Plan Change 18 and Plan Change 19 to the Mackenzie District Plan.

2. The specific provisions of the Proposed Plan that my submission relates to are set out in Attachments 1 to this submission. The decisions sought in this submission are required to ensure that the Mackenzie District Plan:
    a. Recognises and provides for the matters of national importance listed in section 6 of the Act and to has particular regard to the other matters in section 7 of the Act.
    b. Promotes the sustainable management of natural and physical resources.
    c. The changes sought are necessary, appropriate and sound resource management practice.

4. I seek the following decision from the Council:

    4.1 That the particular provisions of Proposed Plan Change 18 (vegetation Clearance) and Proposed Plan Change 19 (Surface Water Activities) that I support, as identified in Attachment 1, are retained.

    4.2 That the amendments, additions and deletions to Proposed Plan Change 18 and Proposed Plan Change 19 sought in Attachments 1 are made.

4.3 Further or alternative relief to like effect to that sought in 4.1 – 4.2 above.

5. I wish to be heard in support of my submission and if others make a similar submission, I will consider presenting a joint case with them at the hearing.

Sally Jones
Operations Manager
Twizel, Eastern South Island

Pursuant to delegated authority
On behalf of
Lou Sanson
Director-General of Conservation

Date: 9/3/18

Note: A copy of the Instrument of Delegation may be inspected at the Director-General's office at Conservation House Whare Kaupapa Atawhai, 18/32 Manners Street, Wellington 6011.

ATTACHMENT 1:

PROPOSED PLAN CHANGE 18 and 19– Mackenzie District Plan
SUBMISSION BY THE DIRECTOR-GENERAL OF CONSERVATION

The specific provisions that my submission relates to are set out in Attachment 1. My submissions are set out immediately following these headings, together with the reason and the decision I seek from the Council.

The decision that has been requested may suggest new or revised wording for identified sections of the proposed plan. This wording is intended to be helpful but alternative wording of like effect may be equally acceptable. Text quoted from Proposed Plan Change 18 and Proposed Plan Change 19 and the Mackenzie District Plan shows, text taken from Section 7 – Rural and inserted into the new Section 19 – Biodiversity (original text) as plain text, new text as underlined and original text to be deleted as ~~strikethrough~~. The relief sought by the Department is in double underline for new text or ~~double strikethrough~~ for text seeking to be deleted.

Unless specified in each submission point my reasons for supporting are that the policies are consistent with the purposes and principles of the Resource Management Act 1991 (RMA).

PC REF	PLAN PROVISION	POSITION AND REASON	RELIEF SOUGHT
Plan Change 18 – Indigenous Vegetation Clearance			
PC18: Section 19 – Definitions Biodiversity (or biological diversity)	Biodiversity (or biological diversity): means the variability of living organisms and the ecological complexes of which they are a part, including diversity within species, between species and of ecosystems.	**Support**	*Retain as notified.*
PC18: Section 19 – Definitions (New) Biodiversity Offset	*New Definition*	(new definition) The D-G considers that it is important 'biodiversity offset' is defined to provide clarity on what this means in terms of outcomes. This definition comes from the CRPS with 'indigenous' added in the second sentence for clarity.	*Insert new definition for 'Biodiversity Offset':* ***Biodiversity offset** means a measurable conservation outcome resulting from actions which are designed to compensate for significant residual adverse effects on biodiversity arising from human activities after all appropriate prevention and mitigation measures have been taken. The goal of a biodiversity offset is to achieve no net loss and preferably a net gain of indigenous biodiversity on the ground with respect to species composition, habitat structure and ecosystem function. They typically take the form of binding conditions associated with resource consents and can involve bonds, covenants financial contributions and*

PC REF	PLAN PROVISION	POSITION AND REASON	RELIEF SOUGHT
			biodiversity banking.
PC18: Section 19 – Definitions Farm Biodiversity Management Plan	Farm Biodiversity Management Plan: means a plan that covers the whole of a farming enterprise that is submitted to the Council as part of a resource consent application under Section 19 Indigenous Biodiversity, and is prepared in accordance with Appendix Y.	**Support in Part** – Amend The D-Gs position of FBP is discussed in the submission points in relation to Objective 3, Policy 9, Rule 1.2.1 and Appendix Y.	*Retain, provided the submission points for Objective 3, Policy 9, Rule 1.2.1 and Appendix Y are addressed.*
PC18: Section 19 – Definitions Improved Pasture	Improved Pasture: means an area of pasture where: a) Species composition and growth have been modified and enhanced for livestock grazing within the previous 15 years, by clearance, cultivation or topdressing and oversowing, or direct drilling; and b) Exotic pasture species have been deliberately introduced and dominate in cover and composition. For the purposes of this definition the assessment of dominance shall disregard indigenous vegetation which is growing on land that has previously been modified and enhanced for livestock grazing in accordance with clause a) above and is less than 15 years old.	**Oppose in Part** – delete or amend so that areas of improved pasture have to be identified on the planning maps. The D-G also seeks to delete 'oversowing and topdressing, or direct drilling' as being improved pasture as in many cases indigenous values and significant indigenous values can still be present where these activities have occurred. Ecologically, cultivation and irrigation is where the D-G considers that improved pasture has been achieved. The Map referred to in the amendment is included in Attachment 2 of this submission. The D-G has based this on known cultivated areas (to the Department Staff) but is aware there may be some areas which are lawfully consented, but yet to be cultivated.	Improved Pasture: means an area of pasture identified on the Planning Maps where: a) Species composition and growth have been modified and enhanced for livestock grazing within the previous 15 years, by clearance~~,~~ or cultivation ~~or topdressing and oversowing, or direct drilling~~; and b) It has been determined by a suitably qualified ecologist that indigenous biodiversity values have been lost; and c) Is recorded with the Council as 'improved Pasture'. ~~Exotic pasture species have been deliberately introduced and dominate in cover and composition. For the purposes of this definition the assessment of dominance shall disregard indigenous vegetation which is growing on land that has previously been modified and enhanced for livestock grazing in accordance with clause a) above and is less than 15 years old.~~

PC REF	PLAN PROVISION	POSITION AND REASON	RELIEF SOUGHT
PC18: Section 19 – Definitions Indigenous Vegetation	Indigenous Vegetation: means a plant community of species native to New Zealand, which may include exotic vegetation but does not include plants within a domestic garden or that have been planted for the use of screening/ shelter purposes within a domestic garden or that have been deliberately planted for the purpose of harvest.	**Support in Part** – Amend The D-G supports the definition where it recognises that indigenous vegetation is a plant community, and that as part of the plant community, exotic vegetation may be present. However, indigenous vegetation is indigenous irrespective of who planted it, and for what purposes. If the Council is not concerned about the removal amenity garden plantings, or intentionally planted indigenous vegetation (for the purpose of harvest), then this exemption should be contained in the rule, not the definition of indigenous vegetation. The D-G is not opposed to these types of vegetation being removed, just considers that this removal should be controlled through the rules rather than the definition. Notified Rule 1.1.1 already includes these exclusions in permitted activity rule1.1.1.2 and 1.1.1.4.	Indigenous Vegetation: means a plant community of species native to New Zealand~~,~~ The indigenous vegetation plant community, ~~which~~ may include exotic vegetation ~~but does not include plants within a domestic garden or that have been planted for the use of screening/ shelter purposes within a domestic garden or that have been deliberately planted for the purpose of harvest~~.
PC18: Section 19 – Definitions (New) Significant Indigenous Vegetation or habitat	*New Definition*	(new definition) This definition supports the policy framework and provides clarity around what is considered to be significant.	*Insert new definition for 'significant indigenous vegetation and habitat' as follows:* Significant Indigenous Vegetation or habitat: means indigenous vegetation of habitat of indigenous fauna which meets the criteria listed in the Canterbury Regional Policy Statement.
PC18: Section 19 –	Vegetation Clearance: means the felling,	**Support**	*Retain as notified.*

PC REF	PLAN PROVISION	POSITION AND REASON	RELIEF SOUGHT
Definitions Vegetation Clearance	clearing or modification of trees or any vegetation by cutting, crushing, cultivation, spraying, ~~or~~ burning or irrigation. Clearance of vegetation shall have the same meaning.	The D-G supports this definition and the mention of particular activities which result in vegetation clearance.	Vegetation Clearance: means the felling, clearing or modification of trees or any vegetation by cutting, crushing, cultivation, spraying, ~~or~~ burning or irrigation. Clearance of vegetation shall have the same meaning.
PC18: Section 19 – Definitions (New) No net loss	*New Definition*	(new definition) The D-G considers that it is important 'no-net-loss' is defined to provide clarity on what this means in terms of outcomes. This definition comes from the Business Biodiversity Offsetting Programme (BBOP).	*Insert a new definition for 'no net loss' as follows:* No net loss: means no overall reduction in indigenous biodiversity, as measured by type, amount and condition.
PC18: Section 7 – Rural Zone	Rural Objective 1 and Policies 1A, 1B and 1C	**Support** The D-G agrees with the intent of PC18 to insert a biodiversity specific chapter in the MDP.	*Support the deletion of Rural Policy 1A from Section 7 – Rural Zone* *Support the transfer (with the amendments outlined in this submission) of Rural Objective 1, Rural Policy 1B and Rural Policy 1C into the new Biodiversity Chapter 19 of the MDP.*
PC18: Section 7 – Rural Zone Rules – Rule 12 – Vegetation Clearance – Rule 12.1	12.1 Permitted Activities - ~~Vegetation Clearance~~ ~~Reference in this rule to the Mackenzie Basin means that part of the District known as the Mackenzie Basin and identified as such on the map in Appendix E of the Plan~~	**Support** The D-G agrees with the intent of PC18 to insert a biodiversity specific chapter in the MDP.	*Support the deletion of parts of 12.1 as notified from Section 7 – Rural Zone* *Support the transfer (with the amendments outlined in this submission) of Rural Objective 1, Rural Policy 1B and Rural Policy 1C into the new Biodiversity Chapter 19 of the MDP.*
PC18: Section 7 – Rural Zone Rules – Rule 12 – Vegetation Clearance – Rules 12.1.1b to 12.1.1i	*Delete all provisions from Section 7 – Rural Zone Rules 12.1.1b to 12.1.1i*	**Support** The D-G agrees with the intent of PC18 to insert a biodiversity specific chapter in the MDP.	*Support the deletion of Rules 12.1.1b – 12.1.1i from Section 7 – Rural Zone Rules.*
PC18: Section 7 – Rural Zone Rules – Rule 12 – Vegetation Clearance – Rules 12.2 to 12.2.1	*Delete all provisions from Section 7 – Rural Zone Rules 12.2 and 12.2.1*	**Support** The D-G agrees with the intent of PC18 to insert a biodiversity specific chapter in the MDP.	*Support the deletion of Rules 12.2 and 12.2.1 from Section 7 – Rural Zone Rules.*
PC18: Section 7 – Rural Zone Rules –	*Delete all provisions from Section 7 – Rural Zone Rules 12.3 and 12.3.1*	**Support** The D-G agrees with the intent of	*Support the deletion of Rules 12.3 and 12.3.1 from Section 7 – Rural Zone Rules.*

PC REF	PLAN PROVISION	POSITION AND REASON	RELIEF SOUGHT
Rule 12 – Vegetation Clearance – Rules 12.3 to 12.3.1		PC18 to insert a biodiversity specific chapter in the MDP.	
PC18: Section 19 – Objective 1	To safeguard indigenous biodiversity and ecosystem functioning through the protection and enhancement of significant indigenous vegetation and habitats, riparian margins and the maintenance of natural biological and physical processes.	**Support**	*Retain as notified.*
PC18: Section 19 – Objective 2	Land development activities are managed to ensure the maintenance of indigenous biodiversity, including the protection and/or enhancement of significant indigenous vegetation and habitats, and riparian areas; the maintenance of natural biological and physical processes; and the retention of indigenous vegetation.	**Support**	*Retain as notified.*
PC18: Section 19 – Objective 3	To support/encourage the integration of land development proposals with comprehensive identification, and protection and/or enhancement of values associated with significant indigenous biodiversity, through providing for comprehensive Farm Biodiversity Plans and enabling development that is in accordance with those plans.	**Support in Part** - Amend FBP should identify all indigenous biodiversity values across the whole farm. It is the only way to consider the effects of comprehensive proposals at the farm wide scale. FBP already requires that all indigenous vegetation is identified, so it makes sense that the objective provides for this more clearly.	*Amend Objective 3 as follows:* To support/encourage the integration of land development proposals with comprehensive identification, and protection and/or enhancement of values associated with ~~significant~~ indigenous biodiversity, through providing for comprehensive Farm Biodiversity Plans and enabling development that is in accordance with those plans.
PC18: Section 19 – Policy 1	To identify in the District Plan sites of significant indigenous vegetation or habitat in accordance with the criteria listed in the Canterbury Regional Policy Statement and to prevent development which reduces the	**Support in Part** The D-G is concerned that mapping does not identify the known significant areas as at 2017 and is outdated. The CRPS contains criteria	*Amend Policy 1 as follows:* To identify ~~in the District Plan~~ sites of significant indigenous vegetation or habitat in accordance with the criteria listed in the Canterbury Regional Policy Statement and to prevent development which reduces the values of these sites or features.

PC REF	PLAN PROVISION	POSITION AND REASON	RELIEF SOUGHT
	values of these sites or features.	for identifying significant values, which require protection under s6(c) of the RMA. The D-G is concerned that relying only on (outdated) mapped areas, s6(c) or Policies 9.3.1 and 9.3.2 of the CPRS will not be given effect to.	
PC18: Section 19 – New Policy	New Policy	(Insert new Policy) It is important that there is a clear policy hierarchy in the plan which: 1. Seeks to identify significant values; 2. Seeks to protect significant values 3. Seeks to maintain indigenous values. This new policy is required to undertake (2) above. It sets a clear direction to protect significant values, giving effects to s6(c) of the RMA and Policies 9.3.1 and 9.3.2 of the CRPS.	*Insert new policy as follows:* To avoid adverse effects of subdivision, use and development on significant indigenous vegetation and habitat.
PC18: Section 19 – Policy 2	To avoid, remedy or mitigate adverse effects on the natural character and indigenous land and water ecosystems functions in the District including: a) Landform, physical processes and hydrology b) Remaining areas of significant indigenous vegetation and habitat, and linkages between these areas c) Aquatic habitat and water quality and quantity	**Support in Part** – Amend The D-G in relation to the proposed policy above, the amendment to Policy 2 seeks to maintain indigenous biodiversity values within the Mackenzie District. This is consistent with the Councils function under s31(1)(b)(iii), as well as giving effect policies 9.3.3, 9.3.4 and 9.3.5 of the CRPS.	*Amend Policy 2 as follows:* To avoid, remedy or mitigate adverse effects on the natural character and indigenous land and water ecosystems functions in the District including: a) Landform, physical processes and hydrology b) Remaining areas of ~~significant~~ indigenous vegetation and habitat, and linkages between these areas c) Aquatic habitat and water quality and quantity

PC REF	PLAN PROVISION	POSITION AND REASON	RELIEF SOUGHT
PC18: Section 19 – Policy 3	Rural development, including indigenous vegetation clearance and pastoral intensification, is to occur in a way or at a rate that provides for no net loss of indigenous biodiversity values in areas identified as significant.	**Support in Part** – Amend The D-G is concerned that the no net loss approach will only be taken for significant indingoeus biodiversity, which requires protection under the RMA. The no net loss approach should be taken for all indigenous biodiversity.	*Amend Policy 3 as follows:* Rural development, including indigenous vegetation clearance and pastoral intensification, is to occur in a way or at a rate that provides for no net loss of indigenous biodiversity ~~values in areas identified as significant~~.
PC18: Section 19 – Policy 4	To ensure that land use activities including indigenous vegetation clearance and pastoral intensification do not adversely affect any ecologically significant wetland.	**Support** – Retain as notified. The Department agrees with the intent of this policy to protect ecologically significant wetlands in the district from the adverse effects of development.	*Retain as notified.*
PC18: Section 19 – Policy 5	To consider a range of mechanisms for achieving protection of significant indigenous vegetation and significant habits of indigenous fauna, including avoidance, remediation, mitigation or offsetting of adverse effects, and to secure protection through appropriate instruments including resource consent conditions (if approved).	**Oppose** – Delete and replace with new Policy Biodiversity offsetting should not be used as preference for avoiding, remedied or mitigating adverse effect. The Department supports the Business and Biodiversity Programme (BBOP) approach to biodiversity offsetting and have developed the 'Guidance on Good Practice Biodiversity Offsetting in New Zealand' (the Guidance) along with other government agencies. The Guidance promotes a mitigation hierarchy, which strives for avoiding, remedying or mitigating adverse effects in the first instance, and using offsetting for any residual effects	*Delete proposed policy 5 and replace with the following policy:* ~~To consider a range of mechanisms for achieving protection of significant indigenous vegetation and significant habits of indigenous fauna, including avoidance, remediation, mitigation or offsetting of adverse effects, and to secure protection through appropriate instruments including resource consent conditions (if approved).~~ Manage the effects of activities on indigenous vegetation habitat by: a) Avoiding as far as practicable, and where total avoidance is not practicable, minimising adverse effects b) Requiring remediation where adverse effects cannot be avoided c) Requiring mitigation where adverse effects on the areas identified above cannot be avoided or remedied Where (a), (b), or (c) cannot be met, residual adverse effects that are more that minor are to be offset through protection, restoration and enhancement actions in accordance with Policy (8)

PC REF	PLAN PROVISION	POSITION AND REASON	RELIEF SOUGHT
		which can't be avoided, remedied or mitigated. The Guidance which should be referred to when developing any potential offsetting measures can be found at http://www.doc.govt.nz/Documents/our-work/biodiversity-offsets/the-guidance.pdf. The D-Gs proposed amendment also give effect to Policy 9.3.6 of the CRPS.	below.
PC18: Section 19 – Policy 6	Where offsetting is proposed, to apply the following criteria: a) the offset will only compensate for residual adverse effects that cannot otherwise be avoided, remedied or mitigated; b) the residual adverse effects on biodiversity are capable of being offset and will be fully compensated by the offset to ensure no net loss of biodiversity; c) where the area to be offset is identified as a national priority for protection in accordance with Policy 9.3.2 of the Canterbury Regional Policy Statement 2013 or its successor, the offset must deliver a net gain for biodiversity; d) there is a strong likelihood that the offsets will be achieved in perpetuity; and	**Support in part** – amend The Department supports a policy to manage how offsets are used. The proposed amendments complement the mitigation hierarchy supported by BBOP and The Guidance and well as policy 9.3.6 contained in the CRPS. The term 'compensation' has been deleted as under both BBOP and the Guidance, compensation is separate to a biodiversity offset. A biodiversity offset must be a like-for-like offset. Compensation occurs if (following the mitigation hierarchy proposed in the amended policy 6 above), the biodiversity offset isn't like-for-like biodiversity. Compensation is protecting or enhance a different type of biodiversity or financial in nature. Using the term	*Amend Policy 5 as follows:* ~~Where~~ For any biodiversity offset~~ting is proposed, to apply~~ the following criteria applies: a) the offset is ~~will only compensate~~ for residual adverse effects that cannot otherwise be avoided, remedied or mitigated; b) the residual adverse effects on biodiversity are capable of being offset and will be fully ~~compensated by the~~ offset through protection, restoration and enhancement actions that achieve to ensure no net loss of biodiversity and preferably a net gain in indigenous biodiversity values; c) where the area to be offset is identified as a national priority for protection in accordance with Policy 9.3.2 of the Canterbury Regional Policy Statement 2013 or its successor, the offset must deliver a net gain for biodiversity; d) there is a strong likelihood that the offsets will be achieved in perpetuity; and e) where the offset involves the ongoing protection of a separate site, it will deliver no net loss, and preferably a net gain for indigenous biodiversity conservation.

PC REF	PLAN PROVISION	POSITION AND REASON	RELIEF SOUGHT
	e) where the offset involves the ongoing protection of a separate site, it will deliver no net loss, and preferably a net gain for indigenous biodiversity conservation. Offsets should re-establish or protect the same type of ecosystem or habitat that is adversely affected, unless an alternative ecosystem or habitat will provide a net gain for indigenous biodiversity.	'compensation' in the policy is confusing.	Offsets should re-establish or protect the same type of ecosystem or habitat that is adversely affected. Where the offset is for the loss of significant indigenous vegetation or habitat, there must provide for a net gain for indigenous biodiversity. ~~unless an alternative ecosystem or habitat will provide a net gain for indigenous biodiversity.~~
PC18: Section 19 – Policy 8	To enable rural land use and development at an on-farm level, where that development is integrated with comprehensive identification, sustainable management and long-term protection of values associated with significant indigenous vegetation and significant habitats of indigenous fauna, through a Farm Biodiversity Plan process.	**Oppose in Part** – Amend Rural development needs to recognise all indigenous biodiversity values over the whole farm. This is because the Mackenzie Basin has experienced extensive biodiversity losses due to previous land use activities, meaning that what remains is highly likely to be 'significant even if it hasn't been mapped in the District Planning Maps. It is important that farm development considers this and appropriate assessments are undertaken of all remaining vegetation to identify significant values and then appropriate manage them in accordance with the proposed Plan framework, the objectives and policies of the CRPS and the RMA. FBP already require that all indigenous vegetation is identified,	*Amend Policy 8 as follows:* To enable rural land use and development at an on-farm level, where that development is integrated with comprehensive identification, sustainable management and long-term protection of values associated with ~~significant~~ indigenous vegetation and ~~significant~~ habitats of indigenous fauna, through a Farm Biodiversity Plan process.

PC REF	PLAN PROVISION	POSITION AND REASON	RELIEF SOUGHT
		so it makes sense that the objective provides for this more clearly.	
PC18: Section 19 – Policy 9	Where a Farm Biodiversity Plan is proposed, to require comprehensive and expert identification of significant indigenous biodiversity values as part of that Plan, and to ensure that any development proposed under that Plan is integrated with protection for those significant values.	**Oppose in Part** – Amend FBP already require that all indigenous vegetation is identified, so it makes sense that the objective provides for this more clearly. The Mackenzie Basin has experienced extensive biodiversity losses due to previous land use activities, meaning that what remains is highly likely to be 'significant even if it hasn't been mapped in the District Planning Maps. It is important that appropriate assessments are undertaken as part of a FBP process so that of all remaining vegetation assessed against the CRPS significance criteria to ensure that any significant values are managed in accordance with the proposed Plan framework, the objectives and policies of the CRPS and the RMA.	*Amend Policy 9 as follows:* Where a Farm Biodiversity Plan is proposed, to require comprehensive and expert identification of ~~significant~~ indigenous biodiversity values as part of that Plan, and to ensure that any development proposed under that Plan is integrated with protection for those ~~significant~~ values.
PC18: Section 19 – Rule 1	Rules Indigenous Vegetation Clearance 1. Indigenous Vegetation Clearance excluding indigenous vegetation clearance associated with the Waitaki Power Scheme.	**Support in Part** - Amend The Department supports the approach of having specific vegetation clearance rules, however is concerned that some permitted activities in the Plan in other sections provide for extensive vegetation clearance to occur unchecked. To give effect to the proposed	*Amend Rule 1 as follows:* Rules Indigenous Vegetation Clearance The rules contain in this part of Section 19 take precedence over any other rules that may provide for associated indigenous vegetation clearance as part of another activity, including those rules contained in Section 16. 1. Indigenous Vegetation Clearance excluding indigenous vegetation clearance associated with the Waitaki Power

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		objectives and policies in section 19, all vegetation activities need to be subject to the proposed rules.	Scheme.
PC18: Section 19 – Rule 1.1.1 clause 1 to clause 5	1.1. Permitted Activities – Indigenous Vegetation Clearance 1.1.1. Clearance of indigenous vegetation is a permitted activity provided the following conditions are met: 1. ... 5. ...	**Support** The D-G supports some permitted activities which cover indigenous vegetation clearance for safety and maintenance, provided these structures for which the clearance relates to are lawfully established. However, the D-G notes that the large parts of the District, the vegetation types are highly unlikely to compromises safety and integrity structures or access due to their small stature and it needs to be ensured that clearance under 1.1.1.1 is not abused.	*Retain 1.1.1 clause 1-5 noting the D-Gs concerns.*
PC18: Section 19 – Rule 1.1.1 clause 6	1.1. Permitted Activities – Indigenous Vegetation Clearance 1.1.1. Clearance of indigenous vegetation is a permitted activity provided the following conditions are met: 6. The clearance is of indigenous vegetation within an area of improved pasture (refer Definitions);	**Oppose in Part** – Amend 1.1.1(6) How Improved pasture is identified appears to be problematic in the context of the Mackenzie Basin and the significant indigenous biodiversity loss which has occurred to date as a result of the (pre PC17) loophole rule. The D-G considers that in order to sustainably manage the significant indigenous biodiversity community, which was confirmed by PC13 to be throughout the whole basin, there needs to be more accurate method for identifying what is considered to	*Amend 1.1.1 Clause 6 as below:* 1. Indigenous Vegetation Clearance excluding indigenous vegetation clearance associated with the Waitaki Power Scheme 1.1. Permitted Activities – Indigenous Vegetation Clearance 1.1.1. Clearance of indigenous vegetation is a permitted activity provided the following conditions are met: 1. ... 6. The clearance is of indigenous vegetation within an identified area of improved pasture (refer Definitions);

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		be improved pasture. While the D-G is not averse to landowners maintaining existing sprayed or irrigated land where the values are already lost, land which has been oversowed, topdressed or direct drilled can often still contain indigenous plant communities, and more than likely significant indigenous biodiversity due to the nature of biodiversity loss and rarity within the Mackenzie Basin. The D-G considers that there needs to be a clearer identification of what is improved pasture, and when something is considered to be 'within' improved pasture. The notified provision has the potential to lead to further significant losses, similar to what occurred prior to PC17. The Department considers that identifying 'improved pasture' through this plan change process is the best way to ensure that there is clarity and agreement (or at least a baseline) on what areas are improved pasture. The Department would be comfortable with a permitted activity rule, if identification and assessment occurs.	
PC18: Section 19 – Rule 1.1.1 clauses 7	1.1. Permitted Activities – Indigenous Vegetation Clearance	**Support** – Retain 1.1.1 clause 7 and 8 as notified.	*Retain 1.1.1 clause 7 and 8 as notified.*

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and 8	1.1.1. Clearance of indigenous vegetation is a permitted activity provided the following conditions are met: 7. The clearance is not within a Site of Natural Significance or on land above 900m in altitude; 8. The clearance is not within: a) 100m of a lake b) 20m of the bank of a river c) 100m of an ecologically significant wetland d) 50m of all other wetlands	The D-G supports the rule hierarchy for the clearance of indigenous vegetation within sensitive areas (SONS, above 900m and waterbody margins)	
PC18: Section 19 – Rule 1.2.1	1.2. Restricted Discretionary Activity – Indigenous Vegetation Clearance 1.2.1. Unless permitted under Rule 19.1 the clearance of indigenous vegetation clearance is a restricted discretionary activity provided the following conditions are met: 1. ...	**Support in Part** – Amend Rule 1.2.1 The D-G only supports the use of Farm Biodiversity Management Plans (FBMP) if a consent is required to establish the plan in the first instance. The D-Gs understanding of the FBMP as proposed in PC18 is that is forms part of a comprehensive, farm wide resource consent that signals what development will occur over the whole farm site and requires a significance assessment to be undertaken. The department supports this approach provided: ▪ The FBMP is able to be amended by Council through the (resource consent) approval process; ▪ The areas identified under (A)(4)(a)-(i) and (B) are	*Ensure that amendments or changes to FBMP are approved, there is transparency around the content of FBMP and that the FBMP is enforceable.* *Please see comment on Appendix Y.*

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		confirmed on the ground by Council, and in particular (A)(4)(c)-(i) and (B) and the methodologies in (D) are confirmed and agreed by an independent ecologist; ▪ The implementation of the FBMP is monitored; ▪ Any changes to the FBMP have to be approved through the same process as its establishment. This includes (E)(2); ▪ There is transparency around the content of the FBMP and any changes to it; and ▪ The FBMP is enforceable and where any non-compliances with the FBMP as approved occur, enforcement action can be undertaken by council. It is important to make clear in the district plan, that while the FBMP is not called a resource consent, it is a resource consent and any changes to it need to go through the district plan process.	
PC18: Section 19 – Rule 1.2.1 (matters of discretion)	1.2.1. Unless permitted under Rule 19.1 the clearance of indigenous vegetation clearance is a restricted discretionary activity provided the following conditions are met: 1. ...	**Oppose in Part** – Amend The D-G is concerned that the effects of indigenous biodiversity clearance on visual or landscape values are not considered in the determining of consent for vegetation clearance	3.2.1. Unless permitted under Rule 19.1 the clearance of indigenous vegetation clearance is a restricted discretionary activity provided the following conditions are met: 1. ... The Council will restrict its discretion to the following matters:

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	The Council will restrict its discretion to the following matters: 1. ...	through a FBP. The D-G recognises that FBP focus on indigenous biodiversity and ecological values but consider that where this vegetation clearance would cause adverse effects on outstanding or significant landscape or visual values, that an assessment of these effects is warranted. This also recognises that often ecological values contribute to the visual or landscape values. Expanding the matters of discretion to include landscape and visual effects would achieve this.	1. ... 3. Where the proposed clearance is within an geopreservation site, Area of High Visual Vulnerability, or Scenic Grassland Area, and how the indigenous vegetation proposed to be cleared contributes to the values of these areas and how any proposed clearance will impact on the values of these areas. 4. Where the clearance is within an Outstanding Natural Feature or Landscape, whether the vegetation proposed to be cleared contributes to the Outstanding Natural Feature or Landscape values and the degree to which the proposed clearance would avoid adverse effects on these values.
PC18: Section 19 – Rule 1.2.2	1.2.2. Unless provided for in Rule 19.2.1 any indigenous vegetation clearance up to 5000m2, within any site in any 5-year continuous period provided the following conditions are met: 1. The clearance is not within a Site of Natural Significance or on land above 900m in altitude. 2. The clearance is not within: a) 100m of a lake b) 20m of the bank of a river c) 100m of an ecologically significant wetland d) 50m of all other wetlands The Council will restrict its discretion to the following matters: 1. The actual or potential impacts on	**Support in Part** – Amend Matters of Discretion The D-G seeks that the matters of discretion are amended to: i. Provide a mechanism to undertake significance assessments in accordance with the CRPS significance Criteria; ii. Assess the effects on significant indigenous values, including any how the proposal seeks to avoid adverse effects; iii. Assess the effects on Indigenous biodiversity values, including how the proposal seeks to avoid,	1.2.2. Unless provided for in Rule 19.2.1 any indigenous vegetation clearance up to 5000m2, within any site in any 5-year continuous period provided the following conditions are met: 1. The clearance is not within a Site of Natural Significance or on land above 900m in altitude. 2. The clearance is not within: e) 100m of a lake f) 20m of the bank of a river g) 100m of an ecologically significant wetland h) 50m of all other wetlands The Council will restrict its discretion to the following matters: 5. The actual or potential impacts on biodiversity or ecological values expected to occur as a result of the proposal, particularly the impact on significant indigenous vegetation and habitat values including the values significant to Ngāi Tahu.

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	biodiversity or ecological values expected to occur as a result of the proposal, particularly the impact on significant values including the values significant to Ngāi Tahu. 2. The extent to which species diversity or habitat availability could be adversely impacted by the proposal. 3. Any potential for mitigation or offsetting of effects on ecosystems and biodiversity values. 4. Any technical and operational constraints and route, site and method selection process. 5. The benefits that the activity provides to the local community and beyond.	remedy or mitigate adverse effects; iv. Effects on adjacent vegetation and habitat; v. Effects on the ecosystem processes in the Mackenzie Basin; vi. Effects on the wider ecosystem from the proposed clearance and how this may impact function, diversity and integrity; and vii. Any linkages between the vegetation proposed to be cleared and the visual or landscape values which are underpinned by the ecology present. The D-G considers that these are important consideration for the Council to take into account when assessing in proposals for indigenous vegetation clearance and will assist the council in implementing the policies, particularly: - Identifying further significant values throughout the life of the Plan; - Achieving biodiversity maintenance; - Ensuring the protection of	6. Where vegetation meets the criteria for significant indigenous vegetation and habitat, how the proposed clearance has considered the avoidance of adverse effects on the significant values, including if alternative options have been considered. 7. The extent to which species diversity or habitat availability could be adversely impacted, modified or damaged by the proposal. 8. Methods proposed to avoid, remedy or mitigate adverse effects including: a) Soil and water conservation measures b) Animal and plant pest control c) Stock control measures 9. The treatment of the area surrounding any clearance created so that vegetation within the adjoining area of significant indigenous vegetation or habitat is not adversely affected. 10. The effect on the overall ecological integrity and biological diversity throughout the district. 11. Whether the indigenous vegetation contributes to an important ecological function (such as an ecological corridor or connectivity), or result in ecological fragmentation and the degree to which this function will be compromised or fragmentation increased by the proposed clearance. 12. The proximity of the area affected by the proposal to riparian margins and wetland. 13. Where the proposed clearance is within an geopreservation site, Area of High Visual Vulnerability, or Scenic Grassland Area, and how the indigenous vegetation proposed to be cleared contributes to the values of these areas and how any proposed clearance will impact on the values of these areas.

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		significant biodiversity and landscape values; and - Managing adverse effects appropriately.	14. Where the clearance is within an Outstanding Natural Feature or Landscape, whether the vegetation proposed to be cleared contributes to the Outstanding Natural Feature or Landscape values and the degree to which the proposed clearance would avoid adverse effects on these values. 15. The quantity of indigenous vegetation to be cleared and reason for the removal. 16. Any potential for mitigation or offsetting of effects on ecosystems and biodiversity values. 17. Any technical and operational constraints and route, site and method selection process. 18. The benefits that the activity provides to the local community and beyond.
PC18: Section 19 – Rule 1.3	1.3. Non-Complying Activity – Indigenous Vegetation Clearance The following activities are Non-complying activities unless specified as a Permitted Activity, Restricted Discretionary Activity or Discretionary Activity: 1.3.2. Any indigenous vegetation clearance of more than 5000m2 within any site in any 5-year continuous period. 1.3.3. Any indigenous vegetation clearance in the following location: 1. Within a Site of Natural Significance. 2. Above 900m in altitude. 3. Within 100m of a lake, 20m of the bank of a river, 100m of an ecologically significant wetland or 50m of all other wetlands	**Support** – retain as notified The Department supports the proposed non-complying Rule.	*Retain Rule 1.3 as notified.*

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Appendix Y – Farm Biodiversity Plan Framework	**Introduction** The purpose of a Farm Biodiversity Plan is to facilitate integration of development activity with the identification and protection of significant ecological areas to ensure no net loss of biodiversity, on a comprehensive whole of property basis. **Development of a Farm Biodiversity Plan** A Farm Biodiversity Plan can be developed through a collaborative process between the Council and the landowner / land manager. (refer footnote) ***Note:*** *The Council will work with landowners / land managers in developing a Farm Biodiversity Plan and may provide a suitably qualified ecological expert to identify and assess the indigenous biodiversity of the farming enterprise, and to provide ecological advice on management of those values. Advice may also be provided from an appropriately qualified person who has expertise in land/farm management, where appropriate. Council will not fund experts other than those provided by the Council.* **Framework** The following sets out the framework for development of a Farm Biodiversity Plan. 1. A Farm Biodiversity Plan can be provided in one of the following formats: a. as a separate stand-alone Farm	**Oppose in Part** – Amend The main amendments are to clarify that the FBP functions much the same as conditions on a resource consent would, and that the Council retains the ability to influence these management methods, as they would resource consent conditions. The D-G supports that management proposed (in (C) and (D)) are developed by a suitably qualified and experienced ecologist. However, the D-G needs to be sure that this information is peer reviewed by Council's ecologist and any areas of difference in opinion between ecologists are addressed prior to the FBP being approved. The Council needs to retain the ability to suggest amendments to any of the content in the FBP to address their concerns and require that these concerns are addressed through the FBP. Where a review under (E) occurs, any changes need to be approved through the FBP process as would a variation of resource consent. "improved pasture" must be assessed and approved by Council's independent ecologist, as per the D-G's proposed amendments to the 'improved pasture' definition and how is related to rule 1.1.1.6.	*Amend Appendix Y as follows:* **Introduction** The purpose of a Farm Biodiversity Plan is to facilitate integration of development activity with the identification and protection of significant ecological areas to ensure no net loss of biodiversity, on a comprehensive whole of property basis. A Farm Biodiversity Plan is effectively a comprehensive, farm-wide resource consent which outlines the existing environment, future development and biodiversity values present within a farm enterprise. **Development of a Farm Biodiversity Plan** A Farm Biodiversity Plan can be developed through a collaborative process between the Council and the landowner / land manager. However, a Farm Biodiversity Plan must be approved by Council in order to be implemented as a Farm Biodiversity Plan under Rule 1.1.1.6 (refer footnote) ***Note:*** *The Council will work with landowners / land managers in developing a Farm Biodiversity Plan and may provide a suitably qualified ecological expert to identify and assess the indigenous biodiversity of the farming enterprise, and to provide ecological advice on management of those values. Advice may also be provided from an appropriately qualified person who has expertise in land/farm management, where appropriate. Council will not fund experts other than those provided by the Council.* **Framework** The following sets out the framework for development of a Farm Biodiversity Plan. 1. A Farm Biodiversity Plan can be provided in one of the following formats: a. as a separate stand-alone Farm Biodiversity Plan; or b. as an additional section to a farm environment plan prepared according to an industry template such as the Beef and Lamb New Zealand Canterbury Farm

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	Biodiversity Plan; or b. as an additional section to a farm environment plan prepared according to an industry template such as the Beef and Lamb New Zealand Canterbury Farm Biodiversity Plan or a plan prepared to meet Schedule 7 of the Canterbury Land and Water Regional Plan. *Note: Where an industry farm biodiversity plan template is used, the Council is only concerned with the sections of that plan which address the matters outlined in this Appendix Y.* 2. A Farm Biodiversity Plan shall apply to a farming enterprise (see Definitions). 3. A Farm Biodiversity Plan must contain as a minimum: **A Description of the property and its features:** 1. Physical address; 2. Description of the ownership and name of a contact person; 3. Legal description of the property; and 4. A map(s) or aerial photograph at a scale that clearly shows, where relevant: a. The boundaries of the farming enterprise; b. The boundaries of the main land management units on the property or within the property; c. The location of all water bodies,	The D-G recognises that the FBP manages effects on Biodiversity values but is concerned about how effects on Landscape from these biodiversity values will be addressed. To address these concerns, it is suggested that the matters of discretion in Rule 1.2.2 are extending to include effects on landscape and visual values. The D-G notes that assessments of visual or landscape effects are not part of the FBP framework.	Biodiversity Plan or a plan prepared to meet Schedule 7 of the Canterbury Land and Water Regional Plan. *Note: Where an industry farm biodiversity plan template is used, the Council is only concerned with the sections of that plan which address the matters outlined in this Appendix Y.* 2. A Farm Biodiversity Plan shall apply to a farming enterprise (see Definitions). 3. A Farm Biodiversity Plan must contain as a minimum: **A Description of the property and its features:** 1. Physical address; 2. Description of the ownership and name of a contact person; 3. Legal description of the property; and 4. A map(s) or aerial photograph at a scale that clearly shows, where relevant: a. The boundaries of the farming enterprise; b. The boundaries of the main land management units on the property or within the property; c. The location of all water bodies, including riparian vegetation; d. Constructed features including buildings, tracks and any fencing to protect biodiversity values (including around riparian areas); e. The location of any areas within or adjoining the property that have been identified as a Sites of Natural Significance or are legally protected by way of covenant; f. The location of any other areas within the property that may have ecologically significant values; g. Areas of improved pasture[1]; h. Areas of retired land; and i. Location of any proposed developments, including intensification of production, new tracks or buildings and areas to be cleared. **B Description of existing ecological values:**

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	including riparian vegetation; d. Constructed features including buildings, tracks and any fencing to protect biodiversity values (including around riparian areas); e. The location of any areas within or adjoining the property that have been identified as a Sites of Natural Significance or are legally protected by way of covenant; f. The location of any other areas within the property that may have ecologically significant values; g. Areas of improved pasture; h. Areas of retired land; and i. Location of any proposed developments, including intensification of production, new tracks or buildings and areas to be cleared. **B Description of existing ecological values:** The purpose of this section of the Farm Biodiversity Plan is to describe the indigenous biodiversity of the farming enterprise to understand what the ecological values are and any threats or risks to these values. This will inform how these values are to be managed to achieve the overall goal(s) of maintenance, and over time, enhancement, of indigenous biodiversity on the property/catchment. 1. This assessment shall be undertaken by a suitably qualified and experienced		The purpose of this section of the Farm Biodiversity Plan is to describe the indigenous biodiversity of the farming enterprise to understand what the ecological values are and any threats or risks to these values. This will inform how these values are to be managed to achieve the overall goal(s) of maintenance, and over time, enhancement, of indigenous biodiversity on the property/catchment. 1. This assessment shall be undertaken by a suitably qualified and experienced ecologist. 2. This assessment shall describe existing ecological values within the farming enterprise and identify any significant sites in accordance with Policy 9.3.1 (1) and 9.3.1 (2) and the criteria in Appendix 3 of the Canterbury Regional Policy Statement 2013. 3. This assessment shall contain: a. Recommended and measurable outcomes to demonstrate achievement of no net loss of identified values of significance; b. Recommended actions to achieve these outcomes; c. Recommendations for monitoring and review of progress in achieving the outcomes. **C Development Areas and Activities:** The purpose of this section is to understand how the land, including any Sites of Natural Significance, has been managed, what the future management will be, and how this will affect the indigenous biodiversity. 1. Describe historic and current land use management, including stocking policy, water supply, grazing regimes, improved pasture, biodiversity management, where relevant; 2. Describe any proposed land use management or activities to be undertaken that would require the clearance or disturbance of indigenous biodiversity and the time frames over which these activities are proposed to occur. Such activities may

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	ecologist. 2. This assessment shall describe existing ecological values within the farming enterprise and identify any significant sites in accordance with Policy 9.3.1 (1) and 9.3.1 (2) and the criteria in Appendix 3 of the Canterbury Regional Policy Statement 2013. 3. This assessment shall contain: a. Recommended and measurable outcomes to demonstrate achievement of no net loss of identified values of significance; b. Recommended actions to achieve these outcomes; c. Recommendations for monitoring and review of progress in achieving the outcomes. **C Development Areas and Activities:** The purpose of this section is to understand how the land, including any Sites of Natural Significance, has been managed, what the future management will be, and how this will affect the indigenous biodiversity. 1. Describe historic and current land use management, including stocking policy, water supply, grazing regimes, improved pasture, biodiversity management, where relevant; 2. Describe any proposed land use management or activities to be undertaken that would require the clearance or disturbance of indigenous		include construction of new farm tracks or buildings, intensification of land use, vegetation clearance of previously undisturbed areas, earthworks or cultivation; and 3. Describe any potential adverse effects of the proposed activities described above on areas of indigenous biodiversity, including any Site of Natural Significance. **D Management Methods to Achieve Protection of Values** Having regard to the information in B above, the purpose of this section is to set out information on management methods to ensure the values identified in the assessment at B are protected to ensure no net loss of indigenous biodiversity values in areas identified as significant: 1. A description of how the objective of 'no net loss' will be met by the proposal/s, including a description of tools and methods to achieve this. These may include: a. Formal legal protection; b. Pest or weed control; c. Grazing regimes/management to protect values; d. Fencing; e. Restoration planting or other restoration measures; f. Confirmation that area/s will not be subject to future land use change or development activity that will impact on the identified values present; g. Confirmation that the tools and methods will endure beyond any fragmentation of the farming enterprise e.g. as a result of changes in ownership 2. The plan shall include for each proposed management method above: a. Detail commensurate with the scale of the environmental effects and risks; b. Defined measurable targets that clearly set a pathway and timeframe for achievement; c. Any proposed monitoring and information or records to

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	biodiversity and the time frames over which these activities are proposed to occur. Such activities may include construction of new farm tracks or buildings, intensification of land use, vegetation clearance of previously undisturbed areas, earthworks or cultivation; and 3. Describe any potential adverse effects of the proposed activities described above on areas of indigenous biodiversity, including any Site of Natural Significance. **D Management Methods to Achieve Protection of Values** Having regard to the information in B above, the purpose of this section is to set out information on management methods to ensure the values identified in the assessment at B are protected to ensure no net loss of indigenous biodiversity values in areas identified as significant: 1. A description of how the objective of 'no net loss' will be met by the proposal/s, including a description of tools and methods to achieve this. These may include: a. Formal legal protection; b. Pest or weed control; c. Grazing regimes/management to protect values; d. Fencing; e. Restoration planting or other		be kept for measuring performance and achievement of the target. 3. Confirmation from an appropriately qualified and experienced ecologist that the proposed methods will achieve the objective. **E Monitoring and Reporting on actions:** The Farm Biodiversity Plan shall include the following: 1. Having regard to B (3.) above, describe how the outcomes will be monitored, and how the results will be reported. 2. Describe when a review of management methods will be necessary; how such reviews/s will be undertaken, who by and within what timeframes; and how the results of any review will be implemented. [1] Improved Pasture where it is confirmed by an independent ecologist and there are no indigenous biodiversity values present.

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	restoration measures; f. Confirmation that area/s will not be subject to future land use change or development activity that will impact on the identified values present; g. Confirmation that the tools and methods will endure beyond any fragmentation of the farming enterprise e.g. as a result of changes in ownership 2. The plan shall include for each proposed management method above: a. Detail commensurate with the scale of the environmental effects and risks; b. Defined measurable targets that clearly set a pathway and timeframe for achievement; c. Any proposed monitoring and information or records to be kept for measuring performance and achievement of the target. 3. Confirmation from an appropriately qualified and experienced ecologist that the proposed methods will achieve the objective. **E Monitoring and Reporting on actions:** The Farm Biodiversity Plan shall include the following: 1. Having regard to B (3.) above, describe how the outcomes will be monitored, and how the results will be reported.		

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	2. Describe when a review of management methods will be necessary; how such reviews/s will be undertaken, who by and within what timeframes; and how the results of any review will be implemented.		
PC19: Section 7 – Rural Objective 8	**Rural Objective 8 – ~~Surface of Waterways~~ Activities on or within Waterbodies** Recreational activities being undertaken on or within the District waterways and riverbeds in a manner which avoids, remedies or mitigates potential adverse effects on conservation values, wildlife and wildlife habitats, public health and safety, recreational values, takata whenua values and general amenity values.	**Support** The D-G supports this outcome.	*Retain as notified*
PC19: Section 7 – Rural Objective 8A	**Rural Policy 8A – Values of Waterbodies** To acknowledge the range of values associated with waterbodies within the District and to maintain or enhance those values through management of activities on or within waterbodies. ...	**Support** The D-G supports this outcome.	*Retain as notified*
PC19: Section 7 – Rural Objective 8B	**Rural Policy 8B – Lake Pukaki** To protect the unique natural quiet, beauty and tranquillity values and experience of Lake Pukaki by avoiding motorised activities on the Lake other than for essential activities. ...	**Support** The D-G supports this outcome for Lake Pukaki.	*Retain as notified*
PC19: Section 7 – Rural Objective 8E~~A~~	**Rural Policy 8E ~~A~~ – Effects on Wildlife and Wildlife Habitats ~~Recreational Use Of Riverbeds And Waterbodies~~**	**Support in Part** – include provisions to address access to waterbodies	*Amend provisions in the plan or signal effective non-regulatory measures which address the access to waterbodies and their margins as these are areas where activities can result in significant*

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	To avoid, remedy or mitigate the adverse effects of the recreational use of riverbeds and waterbodies (in particular the use of off-road vehicles and power boats) on wildlife and wildlife habitats. **Explanation and Reasons** As for Objective 8 • The braided riverbeds of the Tasman, Dobson, Hopkins, Ohau, Tekapo, Pukaki, Cass, Godley and Macauley rivers are important breeding habitats for many important and threatened species. It is important that care is undertaken during the breeding season as disturbance of parent birds leaves eggs and chicks unattended and therefore extremely vulnerable to predation and cold temperatures. • Off-road vehicles can inadvertently run over eggs and chicks. • Lake Alexandrina and Lake McGregor form part of a wildlife refuge that was initially established in 1899, and re-gazetted in 1957 under the Wildlife Act 1953. At this time restrictions were also gazetted limiting boats to those 'wholly propelled by oars or paddles' to prevent disturbance of wildlife habitats and bird breeding areas. • The predominately single thread braided river channels of the Opihi and Opuha rivers are widely utilised by trout and salmon for spawning. During the	The D-G supports this policy, however is concerned that there are limited provisions in the plan which address the effects of access or off-road vehicles on beds and margins of waterbodies, which the explanation of this policy considers. The D-G notes that the authority over the disturbance of beds lays with the Regional Council, but would like to see clarity on how this policy seeks to be achieved, possibly through amending provisions in the plan or signalling effective non-regulatory measures which address the access to waterbodies and their margins as these are areas where activities can result in significant adverse effects on biodiversity.	*adverse effects on biodiversity.*

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	spawning season (April to September) eggs and fry buried in the riverbed gravels are particularly susceptible to disturbance from motorised boats.		
PC19: Section 7 – Rural Objective 8F~~B~~	**Rural Policy 8F~~B~~ - Structures** To ensure that the location, design and use of structures and facilities, within or near waterways are such that any adverse effects on visual qualities, safety and conflicts with recreational and other activities on the waterways are avoided or mitigated.	**Support in Part** – Amend The D-G seeks that the effects of structures on or near waterbodies can result in adverse effects on habitat and ecological processes. Where any structure are considered, the effects on biodiversity values resulting from their construction and occupation should be considered by the Council. The effects of any improved access to waterbodies (e.g. increased usage of that waterbody) should also be considered. As increased access and activity can have adverse effects on habitat.	*Amend Rural Policy 8F as follows:* **Rural Policy 8F~~B~~ - Structures** To ensure that the location, design and use of structures and facilities, within or near waterways are such that any adverse effects on visual qualities, safety, indigenous habitat and conflicts with recreational and other activities on the waterways are avoided or mitigated.
PC19: Section 7 – Rural Objective 8H~~D~~	**Rural Policy 8H ~~D~~ - Cross Boundary Co-Ordination** To co-ordinate with adjoining territorial authorities where activities on the surface of rivers and lakes cross territorial boundaries, including the co-ordination of resource consent processes.	**Support** The D-G supports the co-ordination between agencies where an activity is across boundaries.	*Retain as notified*
PC19: Section 7 – Rural Zone Rules Clause 7	OUTDOOR RECREATIONAL ACTIVITIES - EXCLUDING ACTIVITIES ON OR WITHIN WATERBODIES 7.1. Permitted Activities – Outdoor Recreational Activities 7.1.1. Non-commercial...	**Support** The D-G supports the deletion of surface water activities from these rules and the new rule structure within the plan proposed by PC19.	*Retain the deletions and amendments to Clause 7 of the Rural Zone Rules.*
Rural Zone Rules	7A ACTIVITIES ON OR WITHIN	**Support in Part** – Amend	*Amend 7A.1 as follows:*

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Clause 7A.1	**WATERBODIES** **7A.1 Activities on or within Lakes Tekapo, Benmore and Ruataniwha and all rivers other than the Opihi and Opuha Rivers**	The D-G supports the management of activities provided from through the 7A.1 proposed Rule on or within Lakes Tekapo, Benmore and Ruataniwha and all rivers (other than Opihi and Opuha). However. The D-G is concerned that Rivers Godley, Tasman, Cass and Dobson require additional protection beyond what Rule 7A.1 will provide. This is because these rivers are home to significant indigenous biodiversity and the use of these rivers by any motorised craft could lead to adverse effects on these species.	**7A ACTIVITIES ON OR WITHIN WATERBODIES** **7A.1 Activities on or within Lakes Tekapo, Benmore and Ruataniwha and all rivers other than the Godley, Tasman, Cass, Dobson, Opihi and Opuha Rivers**
PC19: Section 7 – Rural Zone Rules Clause 7A.1.1	**7A.1.1 Permitted Activities on or within Lakes Tekapo, Benmore and Ruataniwha and all rivers other than the Opihi and Opuha Rivers** 7A.1.1.a. Use of motorised and non-motorised craft for search and rescue, civil emergency, scientific research and monitoring and pest control purposes. 7A.1.1.b Non-commercial motorised and non-motorised activities 7A.1.1.c Craft on the surface of waterways used for accommodation where all effluent is contained on board the craft.	**Support in Part** – Amend The D-G supports the management of activities provided from through the 7A.1 proposed Rule on or within Lakes Tekapo, Benmore and Ruataniwha and all rivers (other than Opihi and Opuha). However. The D-G is concerned that Rivers Godley, Tasman, Cass and Dobson require additional protection beyond what Rule 7A.1 will provide. This is because these rivers are home to significant indigenous biodiversity and the use of these rivers by any motorised craft could lead to adverse effects on these species. The D-G support permitted activity 7A.1.1.a as these activities are	*Amend 7A.1.1 and 7A.1.1.b and retain 7A.1.1.a as follows:* **7A.1.1 Permitted Activities on or within Lakes Tekapo, Benmore and Ruataniwha and all rivers other than the Godley, Tasman, Cass, Dobson, Opihi and Opuha Rivers** 7A.1.1.a. Use of motorised and non-motorised craft for search and rescue, civil emergency, scientific research and monitoring and pest control purposes. 7A.1.1.b Non-commercial motorised and non-motorised activities. Where it is a motorised activity, access to the waterbody must be via a form accessway or boat ramp. 7A.1.1.c ....

PC REF	PLAN PROVISION	POSITION AND REASON	RELIEF SOUGHT
		important for Department staff to carryout their conservation work within waterbodies and their margins. The D-G supports the ability for all non-motorised craft to use and enjoy the waterbodies covered by Rule 7A.1.. However, there is concerns around motorised-craft. This is because regardless of is the operator is undertaking a commercial or recreational activity, the effects would be the same.	
PC19: Section 7 – Rural Zone Rules Clause 7A.1.2	**7A .1.2 Discretionary Activities on or within Lakes Tekapo, Benmore and Ruataniwha and all rivers other than the Opihi and Opuha Rivers** 7A.1.2.a Commercial motorised and non-motorised activities 7A.1.2.b Jetties and boat ramps	**Support in Part** – Amend The D-G supports the management of activities provided from through the 7A.1.2 proposed Rule on or within Lakes Tekapo, Benmore and Ruataniwha and all rivers (other than Opihi and Opuha). However. The D-G is concerned that Rivers Godley, Tasman, Cass and Dobson require additional protection beyond what Rule 7A.1.2 will provide. This is because these rivers are home to significant indigenous biodiversity and the use of these rivers by any motorised craft could lead to adverse effects on these species. The D-G supports a discretionary activity status for the activities covered by 7A.1.2.	*Amend 7A.1.2 as follows:* **7A.1.2 Discretionary Activities on or within Lakes Tekapo, Benmore and Ruataniwha and all rivers other than the Godley, Tasman, Cass, Dobson, Opihi and Opuha Rivers** 7A.1.2.a ...

PC REF	PLAN PROVISION	POSITION AND REASON	RELIEF SOUGHT
PC19: Section 7 – Rural Zone Rules Clause 7A.1.3	**7A.1.3 Non-complying Activities on or within Lakes Tekapo, Benmore and Ruataniwha and all rivers other than the Opihi and Opuha Rivers** 7A.1.3.a Craft on the surface of waterways used for accommodation where effluent is not contained on board the craft.	**Support in Part** – Amend The D-G supports the management of activities provided from through the 7A.1.3 proposed Rule on or within Lakes Tekapo, Benmore and Ruataniwha and all rivers (other than Opihi and Opuha). However. The D-G is concerned that Rivers Godley, Tasman, Cass and Dobson require additional protection beyond what Rule 7A.1.3 will provide. This is because these rivers are home to significant indigenous biodiversity and the use of these rivers by any motorised craft could lead to adverse effects on these species. The D-G supports a non-complying activity status for the activities covered by 7A.1.2.	*Amend 7A.1.3 as follows:* **7A.1.3 Non-complying Activities on or within Lakes Tekapo, Benmore and Ruataniwha and all rivers other than the Godley, Tasman, Cass, Dobson, Opihi and Opuha Rivers** 7A.1.3.a Craft on the surface of waterways used for accommodation where effluent is not contained on board the craft.
PC19: Section 7 – Rural Zone Rules Clause 7A.2.1	**7A.2.1 Permitted Activities on or within Lake Pukaki** 7A.2.1.a Use of motorised and non-motorised craft for search and rescue, civil emergency, scientific research and monitoring and pest control purposes. 7A.2.1.b Non-commercial non-motorised activities	**Support** – Retain as notified The D-G supports proposed Rule 7A2.1 which allows for monitoring, research and safety activities and the ability for non-motorised craft to be permitted activities on Lake Pukakai.	*Retain 7A.2.1 as notified.*
PC19: Section 7 – Rural Zone Rules Clause 7A.2.2	**7A.2.2 Non-complying Activities on or within Lake Pukaki** 7A.2.2.a Commercial non-motorised activities 7A.2.2.b Jetties and boat ramps	**Support** – Retain as notified The D-G supports proposed Rule 7A2.2 which restricts motorised commercial activities and the construction of jetties and boat	*Retain as notified*

PC REF	PLAN PROVISION	POSITION AND REASON	RELIEF SOUGHT
		ramps on or within Lake Pukakai.	
PC19: Section 7 – Rural Zone Rules Clause 7A.2.3	**7A.2.3 Prohibited Activities** 7A.2.3.a Commercial motorised activities 7A.2.3.b Non-commercial motorised activities 7A.2.3.c Craft on the surface of waterways used for accommodation.	**Support** – Retain as notified The D-G supports proposed Rule 7A2.3 which prohibits all motorised activities and craft used for accommodation on or within Lake Pukakai.	*Retain as notified*
PC19: Section 7 – Rural Zone Rules Clause 7A.3.1	**7A.3.1 Permitted Activities on or within Lakes Alexandrina and McGregor** 7A.3.1.a Use of motorised and non-motorised craft for search and rescue, civil emergency, scientific research and monitoring and pest control purposes. 7A.3.1.b Non-commercial non-motorised activities	**Support in Part** – Amend The D-G supports the specific rules for Lakes Alexandrina and McGregor as it recognises their significant wildlife value and status as a wildlife refuge. The D-G supports proposed Rule 7A.2.3.1a which allows for monitoring, research and safety activities and the ability for non-motorised craft to be permitted activities on both lakes. However, the D-G is concerned the yachts or sail-boats could operate on these lakes, and while they may not be motorised, their wakes can cause significant effects on indigenous biodiversity and therefore does not consider that their use on these lakes is appropriate. The D-G seeks that yachts and sails boats are specifically excludes from the permitted activity rules and are instead prohibited activities.	*Amend Rule 7A.3.1.b as follows:* **7A.3.1 Permitted Activities on or within Lakes Alexandrina and McGregor** 7A.3.1.a Use of motorised and non-motorised craft for search and rescue, civil emergency, scientific research and monitoring and pest control purposes. 7A.3.1.b Non-commercial non-motorised activities (excluding yachts and sail-boats).
PC19: Section 7 – Rural Zone Rules	**7A.3.2 Discretionary Activities on or within Lakes Alexandrina and McGregor**	**Support in Part** – Amend The D-G supports the specific rules	*Amend Rule 7A.3.2.a as follows:* **7A.3.2 Discretionary Activities on or within Lakes Alexandrina**

PC REF	PLAN PROVISION	POSITION AND REASON	RELIEF SOUGHT
Clause 7A.3.2	7A.3.2.a Commercial non-motorised activities	for Lakes Alexandrina and McGregor as it recognises their significant wildlife value and status as a wildlife refuge. The D-G is concerned the yachts or sail-boats could operate on these lakes, and while they may not be motorised, their wakes can cause significant effects on indigenous biodiversity and therefore does not consider that their use on these lakes is appropriate. The D-G seeks that yachts and sails boats are specifically excludes from the permitted activity rules and are instead prohibited activities.	**and McGregor** 7A.3.2.a Commercial non-motorised activities (excluding yachts and sail-boats).
PC19: Section 7 – Rural Zone Rules Clause 7A.3.3	**7A.3.3 Non-complying Activities on or within Lakes Alexandrina and McGregor** 7A.3.3.a Jetties and boat ramps 7A.3.3.b Craft on the surface of waterways used for accommodation	**Support** – Retain as notified The D-G supports the specific rules for Lakes Alexandrina and McGregor as it recognises their significant wildlife value and status as a wildlife refuge.	*Retain as notified*
PC19: Section 7 – Rural Zone Rules Clause 7A.3.4	**7A.3.4 Prohibited Activities on or within Lakes Alexandrina and McGregor** 7A.3.4.a Commercial motorised activities 7A.3.4.b Non-commercial motorised activities	**Support in Part** – Amend The D-G supports that those activities which may have adverse effects on the biodiversity values present on or within Lakes Alexandrina and McGregor. As noted in the D-Gs submission on 7A.3.1 and 7A.3.2, the use of yachts and sail-boats on the lakes could result in adverse environmental	Amend Rule 7A.3.4 as follows: **7A.3.4 Prohibited Activities on or within Lakes Alexandrina and McGregor** 7A.3.4.a Commercial motorised activities 7A.3.4.b Non-commercial motorised activities 7A.3.1.c Commercial sail-boats or yachts 7A.3.1.d Non-commercial sail-boats or yachts

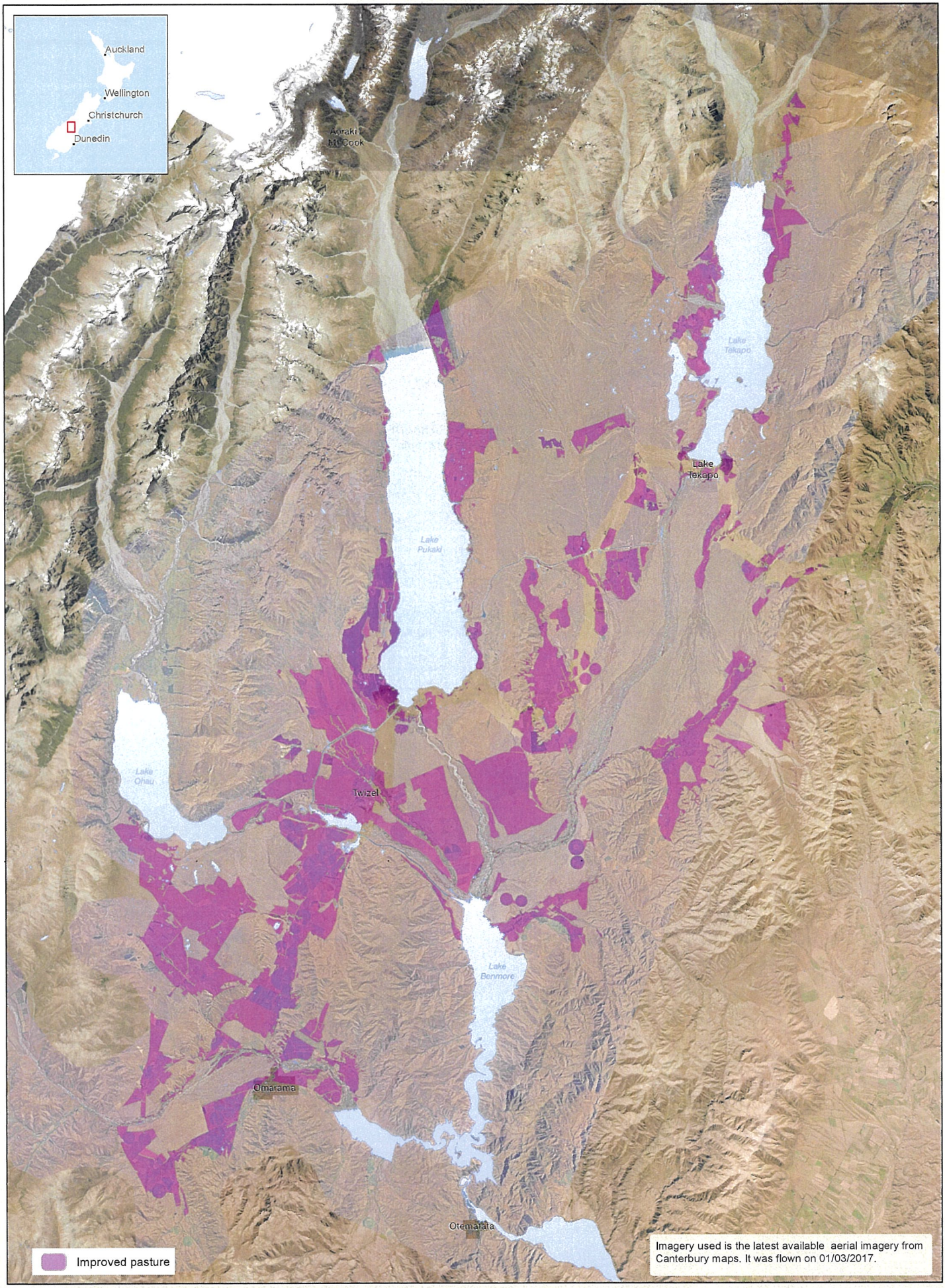
PC REF	PLAN PROVISION	POSITION AND REASON	RELIEF SOUGHT
		effects on indigenous biodiversity values, and as such should be treated the same as motorised activities. The D-G seeks for these activities to be included as prohibited activities.	
PC19: Section 7 – Rural Zone Rules Clause 7A.4	**7A.4 Activities on or within the Opihi and Opuha Rivers**	**Support in Part** – Amend The D-G supports the additional protection proposed for the Opihi and Opuha Rivers. However, the D-G considers that this level of protection should extend to the Godley, Tasman, Cass and Dobson rivers as they require additional protection of their values. This is because these rivers are home to significant indigenous biodiversity and the use of these rivers could lead to adverse effects on these species.	*Amend 7A.4 as follows:* **7A.4 Activities on or within the Godley, Tasman, Cass and Dobson Opihi and Opuha Rivers**
PC19: Section 7 – Rural Zone Rules Clause 7A.4.1	**7A.4.1 Permitted Activities on or within the Opihi and Opuha Rivers**	**Support in Part** – Amend The D-G supports the additional protection proposed for the Opihi and Opuha Rivers. However, the D-G considers that this level of protection should extend to the Godley, Tasman, Cass and Dobson rivers as they require additional protection of their values. This is because these rivers are home to significant indigenous biodiversity and the use of these rivers through certain activities could lead to adverse effects on these species.	*Amend 7A.4.1 as follows:* **7A.4.1 Permitted Activities on or within the Godley, Tasman, Cass and Dobson Opihi and Opuha Rivers**

PC REF	PLAN PROVISION	POSITION AND REASON	RELIEF SOUGHT
		The D-G supports proposed Rule 7A.4.1.a which allows for monitoring, research and safety activities and the ability for non-motorised craft to be permitted activities on the rivers covered by this rule (noting the D-Gs proposed amendments).	
PC19: Section 7 – Rural Zone Rules Clause 7A.4.2	**7A.4.2 Discretionary Activities on or within the Opihi and Opuha Rivers** 7A.4.2.a Jetties and boat ramps 7A.4.2.b Commercial non-motorised activities	**Support in Part** – Amend The D-G supports the additional protection proposed for the Opihi and Opuha Rivers. However, the D-G considers that this level of protection should extend to the Godley, Tasman, Cass and Dobson rivers as they require additional protection of their values. This is because these rivers are home to significant indigenous biodiversity and the use of these rivers by any craft or the erection of structures on could lead to adverse effects on these species.	*Amend 7A.4.2 as follows:* **7A.4.1 Discretionary Activities on or within the Godley, Tasman, Cass and Dobson Opihi and Opuha Rivers**
PC19: Section 7 – Rural Zone Rules Clause 7A.4.3	**7A.4.3 Non –complying Activities on or within the Opihi and Opuha Rivers** 7A.4.3.a Commercial motorised activities 7A.4.3.b Non-commercial motorised activities 7A.4.3.c Craft on the surface of waterways used for accommodation	**Support in Part** – Amend The D-G supports the additional protection proposed for the Opihi and Opuha Rivers. However, the D-G considers that this level of protection should extend to the Godley, Tasman, Cass and Dobson rivers as they require additional protection of their values. This is because these rivers are home to significant indigenous biodiversity and the use	

PC REF	PLAN PROVISION	POSITION AND REASON	RELIEF SOUGHT
		of these rivers by any motorised craft could lead to adverse effects on these species.	
PC19: Section 7 – Rural Zone Rules Clause 7A – all rules	(all proposed rules in 7A)	**Opposed in Part** – Amend The D-G is concerned, in particular regarding waterbody margins and braided river beds, of the adverse effects of vehicles and craft.	

ATTACHMENT 2:

PROPOSED PLAN CHANGE 18 and 19– Mackenzie District Plan
SUBMISSION BY THE DIRECTOR-GENERAL OF CONSERVATION
Improved Pasture Mapping



5 km

NZGD 2000 New Zealand Transverse Mercator
Not for publication nor navigation

1:300,000
Produced: 6/03/2018
DOC, Geospatial Services
Canterbury Maps

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Improved Pasture in Mackenzie Basin

Department of Conservation
Te Papa Atawhai

New Zealand Government

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