

BEFORE THE PROPOSED NATURAL RESOURCES PLAN HEARINGS PANEL

IN THE MATTER of the Resource Management Act 1991

AND

IN THE MATTER of large site stormwater quality provisions
in the proposed Natural Resources
Management Plan for the Wellington
Region

AND

IN THE MATTER of the submissions and further
submissions set out in the S42A
Officer Report

**STATEMENT OF PRIMARY EVIDENCE OF CLAIRE
CONWELL ON BEHALF OF WELLINGTON REGIONAL
COUNCIL**

**TECHNICAL – Large site Stormwater quality in regards to:
1. Rule R52 Stormwater from large sites**

12 January 2018

TABLE OF CONTENTS

1.	EXECUTIVE SUMMARY	3
2.	INTRODUCTION	4
3.	CODE OF CONDUCT	4
4.	SCOPE	5
5.	ASSUMPTIONS REGARDING THE DEFINITION AND DESCRIPTION OF INDIVIDUAL PROPERTIES VERSUS LARGE SITES.....	8
6.	DESCRIPTION OF STORMWATER FROM INDIVIDUAL SITES.....	10
7.	DESCRIPTION OF STATE HIGHWAYS:.....	13
8.	DESCRIPTION OF ACTIVITY OF CENTREPORT	20
9.	DESCRIPTION OF ACTIVITY OF AIRPORTS	23
10.	SUMMARY.....	27
11.	REFERENCES	30

1. EXECUTIVE SUMMARY

1.1 In summary my opinion and conclusions are:

- (a) The intent of Rule 48 is to permit the discharge of stormwater from a property used for residential purposes, but which is not serviced by a TA network. Whilst the term ‘individual site’ is not explicitly defined in the proposed Plan, it can be inferred by what it is not; it is not a contaminated site, nor is it an airport, state highway, or a port.
- (b) The intent of Rule 52 is to recognise that because stormwater discharged from large sites may contain both a wide range of contaminants and relatively high concentrations and/or loads of contaminants compared with individual sites, it should be managed differently to stormwater discharges from individual sites.
- (c) The types of activities that may be present at a site determines the potential range of contaminants that may be discharged via stormwater runoff. The types of activities that occur on large sites for the operation of an airport, state highway or port, differ markedly from those that routinely occur on an individual site for the purpose of residential occupation.
- (d) For airports, state highways and the port, the nature and scale of the activity means that these experience frequent and highly specialised activities associated with the usual operational activities of the site. These may include the high volume passage and movement of vehicles, heavy machinery, aircraft, or the handling of large volumes of goods. As a consequence, contaminant classes associated with these activities are broader than those commonly associated with the residential occupation of an individual site. As such, it is expected and common for contaminant discharges from large sites to be managed in accordance with industry derived Best Management Practices and/or site specific Stormwater Management Plans. It is not an expectation that individual sites require site specific SMP for the purpose of residential occupation.

2. INTRODUCTION

- 2.1 My name is Claire Elaine Conwell. I work for Council as a Senior Environmental Scientist (Coast) in the Environmental Science Department. I have been employed at GWRC for 6 years, which included a period assessing and managing the contaminated land database. Prior to GWRC, I was employed as an environmental consultant for 5 years at the Cawthron Institute (Nelson), undertaking a range of Assessment of Environmental Effects for a variety of activities in near shore coastal environments around New Zealand. This commonly included assessment of contaminants in benthic sediments in urban coastal areas and port environments.
- 2.2 I hold a PhD in marine ecotoxicology from the University of Melbourne (Australia, 2007), and First Class Honours in marine ecotoxicology from the Royal Melbourne Institute of Technology University (Australia, 2000) and a Bachelor of Science from Monash University (Australia, 1999). I am a member of the Society of Environmental Toxicology and Chemistry (SETAC) and the New Zealand Coastal Society (NZCS).
- 2.3 I have authored more than 50 technical reports in environmental management, produced 9 conference presentations in the field of marine ecotoxicology, and published several peer reviewed science papers and co-authored a book chapter in marine hydrocarbon pollution.
- 2.4 I have read the section 42A officers' report prepared by Amber Carter on the stormwater quality provision in the proposed Plan.
- 2.5 My evidence relates to the approach taken by Council on the following specific matters:
- (a) Expected quality of stormwater discharging from individual sites;
 - (b) Expected quality of stormwater discharging from large sites.

3. CODE OF CONDUCT

- 3.1 I confirm that I have read the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note and that I agree

to comply with the code. My evidence in this statement is within my area of expertise. I have not omitted to consider material facts known to me that might alter to detract from the opinions which I express.

4. SCOPE

4.1 Under the proposed Natural Resources Plan (proposed Plan), Rule R52 will require 'large sites' (defined as ports, airports or state highways) to hold a resource consent for the discharge of stormwater. Rule R52 allows the consent as a restricted discretionary activity (see matters for discretion under text for the specific wording of the rule).

4.2 This represents a significant policy shift from the operative plan, whereby no discharge consents have previously been issued for discharges of stormwater from any of these sites.

4.3 'Individual properties' are permitted under Rules R48 and R49 of the proposed Plan to discharge stormwater to surface water bodies, coastal water or groundwater, provided specific conditions are adhered to. This activity does not require a consent.

4.4 I have been asked to provide technical evidence to describe the differences in stormwater associated contaminants discharged from 'individual properties' that are not connected to a stormwater network compared with that which is discharged from 'large sites' (specified as Centreport, the three regional airports, and the state highway network), providing evidence which:

- Describes contaminants associated with activities on 'individual sites', defined as residential properties not serviced by a TA controlled network,
- Describes contaminants associated with activities on 'large sites' defined as ports, airports, state highways,
- Draws on relevant and key comparisons of large sites from areas across New Zealand, where applicable.
- Lists any assumptions/limits/gaps to these descriptions.

4.5 My evidence is limited to technical matters and I do not provided recommendations on individual submissions or policy.

Definition of large sites and individual properties

4.6 The terms 'large sites' and 'individual properties' are not defined in

the proposed Plan. For the purpose of this evidence I have conferred with Amber Carter, policy advisor at GW, on the interpretation of these terms.

- 4.7 For the avoidance of doubt, this evidence only considers point source discharges of stormwater from these sites. It does not consider discharges that enter a multi –property or council-owned stormwater network.
- 4.8 Individual property – property is defined in the proposed Plan as ‘any contiguous area of land or freehold title in one ownership’. I understand from Ms Carter that submissions have been made on the definition of ‘property’ and the Hearing Panel may alter the wording of the definition. Nonetheless, Ms Carter informs me that the intent of the terms ‘individual property’ and ‘property’ in the proposed Plan is to refer to a site that is the responsibility of one owner or organisation. For this evidence ‘Individual property’ refers to residential and rural properties (i.e., lifestyle blocks, farm and forestry). These individual properties are sites that are not serviced/connected to a territorial authority (TA) stormwater network (by direct connection or indirect discharge via roadside kerbs and sumps). The discharge of stormwater from a local territorial authority (TA) network is a specific activity, managed under a separate consenting process in the proposed Plan.
- 4.9 For the purpose of this review, I am interpreting the term ‘individual sites’ as those that are comprised of residential properties only. In addition to not being serviced by a TA stormwater network, these sites are not located on contaminated land.
- 4.10 Large site – the rule for the discharge of stormwater from a large site is limited to “a port, airport or state highway”. Given the rule is specific to the Wellington Region, the rule is specific to the only port-CentrePort, the three regional airports- Wellington International Airport Ltd (WIAL), Kapiti Airport (KA) and Masterton Hood Aerodrome (MHA), and the four state highways – SH1, SH2, SH58 and SH53.

Definition of stormwater

- 4.11 Stormwater is defined in the proposed Plan as runoff that has been

intercepted, channelled, diverted, intensified or accelerated by human modification of a land surface, or runoff from the external surface of any structure, as a result of precipitation and including any contaminants contained therein.

- 4.12 For the purpose of this evidence diffuse discharges of runoff and overland flow are not considered to be stormwater. Stormwater discharges are point source discharges.
- 4.13 Stormwater does not include discharge of wastewater (covered by other rules).
- 4.14 A wide range of contaminants may be present in stormwater, depending on the land use and specific activities being undertaken within the contributing catchment. Contaminants typically associated with stormwater include metals, hydrocarbons (from incomplete fuel combustion), sediment particulates, and other contaminants that may be specific to an activity in a defined land use area (e.g. nutrients, pathogens, organic and synthetic compounds). Sediment can be a major contaminant in stormwater and can also carry other contaminants bound to particulates; whilst metals (in particular copper and zinc) are also prevalent and regularly exceed receiving water quality guidelines in first flush discharge scenarios (Gadd et al 2014), posing both chronic and acute toxicity risks to resident biota. Other metals and metalloids (total and dissolved arsenic, cadmium, chromium, lead, nickel) can also be present at very high concentrations particularly from industrial areas, which can also exceed receiving environment guidelines (Gadd et al. 2014).
- 4.15 Whilst the focus of the bulk of stormwater discharge effects is focussed on describing potential first flush toxicity thresholds, it is also important to acknowledge that all point source discharges, whether these are from individual or large sites or from reticulated networks, over time can incur cumulative effects on the receiving environment. The description of impacts of cumulative effects is complex and beyond the scope of this evidence.

5. ASSUMPTIONS REGARDING THE DEFINITION AND DESCRIPTION OF INDIVIDUAL PROPERTIES VERSUS LARGE SITES

5.1 Table 1 sets out several key assumptions for this evidence:

Table 1: Key assumptions for discharges of stormwater from individual properties and large sites

Assumption	Individual property	CentrePort, Airports, State Highway
<p>Activities including, but not limited to: Stormwater collection from operational areas of the site (roofed buildings, roading, driveways, paved areas, areas of machinery and vehicle use, areas designated for specific activity such as workshops/maintenance yards etc)</p>	<p>Residential properties that do not discharge to a local council network. Farm and forestry blocks. Does not include land that meets the definition of Contaminated Land and which are reasonably likely to have significant adverse effects on the environment (excluded from conditions of Rules R48(b) and R49(b)).</p>	<p>Operates as a port, airport or state highway. <u>State Highway:</u> High traffic volume per day, including heavy vehicles and machinery. <u>Airport:</u> Transfers high traffic volume on an annual basis, including aeroplanes, heavy vehicles and machinery. Stormwater may discharge directly to surface water (freshwater or to the CMA) or to groundwater. <u>CentrePort:</u> High traffic volume, including heavy vehicles and machinery, workshops and maintenance yards, full time storage of logs and containers. Stormwater discharges directly to the CMA</p>
<p>Size</p>	<p>Residential - ~500m² to lifestyle blocks of several hectare. However, stormwater discharge from a lifestyle block is expected to be from only a portion of the site, such as from sealed driveways, paved surfaces or roofs. Farm or forestry blocks– these can be large. However point-source stormwater discharges would likely only be from farm or forestry tracks. Other discharges are likely to be overland or runoff, which is not considered to be stormwater (for the purposes of the NRP).</p>	<p>CentrePort:- operational area of 28.3 ha (pre-earthquake) Airports: Wellington International Airport Ltd has an operational area of ~96 ha, and a proposed additional operational area following the extension works of ~13 ha. Kapiti Airport ~88 ha. Masterton Hood Aerodome ~95 ha. State Highway Network: SH1, SH2, SH53, SH58 has a total length of ~260 km. For each of the above, the size of large sites means that these have the potential to generate a higher volume of stormwater will be compared with the potential of smaller surface areas of individual residential sites.</p>
<p>Location of discharge</p>	<p>Any point source discharge to a surface or coastal water body or to land where it may enter groundwater.</p>	<p>CentrePort – discharges to Wellington Harbour. Wellington Airport- discharge to Wellington Harbour at Northern end, Lyall Bay at southern end. Kapiti Airport stormwater discharging to the Wharemauku Stream and groundwater which discharges to the Wharemauku Stream and to the CMA Masterton Airport – Waingawa River State highway discharges at</p>

		numerous locations, this may include <u>direct discharges</u> to receiving waters with no treatment (other than sediment catchpits), <u>indirect discharge</u> (via a TA managed network) into receiving water bodies or <u>constructed treatment systems</u> (e.g. swales).
Impervious characteristic	Relatively low proportion of impervious cover of structures associated with residential properties: i.e. dwelling roofs, driveways.	Higher proportion and/or extended areas of impervious cover and/or compacted land cover, a mixture of roofing (e.g. warehouses, terminal buildings) and sealed surfaces (e.g. yards, runways, motorway carriageways).
Main contaminants	Roofing metals, oil, sediment.	SH: fuel, fuel additives, oil, brake & tyre residues containing metals & organic compounds which can be toxic, sediment. Airports: fuel, fuel additives, oil, brake & tyre residues containing metals & organic compounds metals, de-icing & antifreeze agents, biocides, flame retardants, sediment. Port: fuel, fuel additives, oil, brake & tyre residues containing metals & organic compounds, metals, sediment, wood debris from untreated wood, tannins, acidic resins.
Site specific stormwater management plan expected and/or currently in place	No	Yes

5.2 Differences between the characteristics of the activities on an individual site and those on a SH, airport or port are likely to result in differences in stormwater characteristics discharging from the two groups of sites. The characteristics of activities on the two groups of sites are not explicitly defined in the proposed Plan, but are important for the following reasons:

- (a) The purpose of the activity occurring differs between individual sites v large sites: i.e. residential activities are the dominant use on individual sites, while large sites are subject to heavy machinery/vehicle traffic enabling the movement of >20,000 vehicles per day or stockpiling logs.
- (b) The size of the site differs between individual v large sites (e.g. residential sites may vary from ~500m² to lifestyle blocks of several hectares; large sites are in the order of 10s to 100 hectares).

- (c) Impervious characteristics of a site differ between individual sites v large sites: individual sites for residential purposes, especially those that may be considered lifestyle blocks, do not generally have a significant proportion of, or extended sections of impervious cover (limited to roof tops and driveways). Impervious cover on large sites may include extended sections such airstrips, storage yards and hardstands to near 100% impervious surfaces for state highways and the port.
- (d) The types of chemical contaminants and the concentrations at which they are present are expected to be different for individual sites versus large sites, i.e. it is related to the activity on the site.
- (e) The volume of the stormwater and associated loads of contaminants discharging over an event or a typical year is assumed to be significantly smaller for individual sites versus large sites. This assumption is inherent on scale and type of activity on the site.
- (f) Whether a site specific stormwater management plan (SMP) is reasonably expected for the site, e.g. to demonstrate the activity is being conducted in accordance with best management practice (BMP), and to recognise the risk to the receiving environment the activity poses. It is assumed in this review that individual sites do not require site specific SMPs, but that a SMPs is considered BMP for large sites.

6. DESCRIPTION OF STORMWATER FROM INDIVIDUAL SITES

6.1 Contaminants discharging via stormwater from an individual site are those primarily associated with the residential occupation of a site. Sources of these contaminants include, but are not limited to, deposition of solids on impervious surfaces (e.g. paved areas and sealed driveways) and long term weathering of onsite building materials (outside materials that may release variable concentrations of metals or organic contaminants to the immediate environment). These may be associated with galvanised roofs, copper/other metal downpipes, painted buildings, treated timber,

outdoor vehicles and machinery. These various processes are likely to result in low concentrations of suspended solids, metals (copper, zinc) and hydrocarbons being present in stormwater discharged from individual sites. Other stormwater contaminants which may be expected to be present at low concentrations include nutrients (nitrogen and phosphorus compounds) from organic matter/soil and microbial contaminants, for instance from animal faecal matter. This represents the typical range of contaminants found in residential stormwater.

- 6.2 There is no available information regarding the measured contaminant loads from individual sites; this has been inferred from activity status and models only.
- 6.3 Discharges of stormwater from an individual site is a permitted activity under Rule 48 and Rule 49; the activity does not require a resource consent thus the GWRC does not hold records of discharges from any such sites. Because there has been no notification nor monitoring of such discharges, the quality of stormwater discharged from individual properties has not been characterised in any detail.
- 6.4 The purpose of these rules, in my view, is to account for any stormwater that may potentially be discharged from a residential site, but where the property is not connected to a local authority stormwater network. It is intended that the activity that would typically be covered by this rule is for residential properties, rather than sites that are operating as a commercial service or premise, or where the activity may meet the Ministry for the Environment's land use categories defined under the 'Hazardous Activities and Industry List' (HAIL).
- 6.5 Given that the proposed Plan does not explicitly define the activity status of an individual site, it can be inferred from the activities that this rule excludes; i.e. it is not a port, airport, state highway, or site that has been confirmed as contaminated land.

Extent of the numbers of individual properties

- 6.6 I met with Wellington Water Ltd. (WW) staff (Martyn Simpson & Rhyann McCoy) from the data team on Thursday 6/10/16 to discuss

the type of information WW has on describing connections to the stormwater network (i.e. how are private properties serviced by different types of connections), and extent to which WW hold records of where properties that may be defined as 'individual sites' are not connected into the stormwater network. This was to gauge the extent to which residential properties in the Wellington region are directly connected to the TA stormwater network, and thus to gauge what proportion of properties may be identified as individual site, for the purpose of Rule R48.

6.7 A simplified breakdown of drainage from private properties for the Wellington City area was provided by R. McCoy and summarised here:

- Directly connects to stormwater network: **15018**
- Connect to stormwater network via Kerb: **23443**
- Unconnected discharge within **2m** of water course: **509**
- Unconnected discharge within **2m** of a watercourse that wouldn't be included in a TA consent (Rule R48 of the PNRP): **<100**

6.8 R. McCoy noted a few limits to this information:

- WW don't have complete coverage of private drainage for WCC, some areas are poorly described data can often be out of date. For example, in Tawa WW have records of ~11,000 wastewater private connection points versus ~700 stormwater discharge points, but ideally this should be a near 1-1 relationship.
- Quantifying **discharges to land** is looking to be unachievable with the data WW currently hold. As a result these numbers are quite rough and unfortunately WW can't provide a complete picture of overall network activity.

6.9 WW also noted that the data and approaches they are taking in regards to measuring the connectivity of private properties is very much a work in progress which they looking to improve in the future.

6.10 From this information, the number of private properties in urban areas that may be defined as individual sites, thus not serviced by the TA stormwater network, can be considered low (estimated to be <2%). It is reasonable to assume that this would be the case for other urban areas across the Wellington Region, including urban zones of Porirua, Hutt, and Wairarapa districts.

- 6.11 On the basis of the available information the number of properties that meets the requirements for Rule R48 and R49 cannot readily be determined directly from the database available at WW.
- 6.12 Therefore the relative contribution to catchment loads of contaminants from individual sites is unknown and beyond the scope of this evidence, either on a site by site basis, or on a cumulative basis. However, based on the assumptions set out in Table 1, the relative contribution of stormwater contaminants from an individual site to a catchment is expected to be low.

Assumptions about individual sites

- 6.13 The main assumptions are listed in Table 1.
- 6.14 SMPs are not typically developed or expected to be developed for residential properties or farms. Forestry properties are required to adhere to best industry practice for controlling erosion and sediment under other rules in the NRP regarding earthworks.
- 6.15 This evidence recognises that the materials and activities on an individual site as listed in Table 1 can be important sources of contaminants, however the scale of the activity and overall (e.g. annual) contribution from an individual site to a catchment load is expected to be markedly smaller than that associated with large sites.
- 6.16 I have assumed that any discharge of a contaminant from an individual site does not trigger any other rules which may require a consent under the proposed Plan or require it to be discharged to trade waste. For example, sites that are listed as Category III 'Contamination Confirmed' on the GWRC Selected Land Use Register database, or represents HAIL sites with the risk of contaminant discharge to receiving water bodies are excluded from the 'individual site' permitted activity rule.

7. DESCRIPTION OF STATE HIGHWAYS:

- 7.1 The primary activity of a State Highway (SH) network is to provide for the direct passage of vehicles transporting people and goods, nationwide. The term SH differentiates between local roads (which are built and maintained by local authorities) and the national SH

network, which is maintained by central government body, New Zealand Transport Agency.

- 7.2 In the Wellington Region the State Highways (SH) are SH1 (106.5km), SH2 (120.3km), SH53 (17.6 km) and SH58 (15.4 km). These represent a total length of around 260 km, with the area of impervious surface estimated at around 44 ha.
- 7.3 There are ~57 km of upgraded or new state highways being developed under the Roads of National Significance programme for the Kapiti Coast & Transmission Gully.
- 7.4 The measure of traffic demand imposed on a section of the SH network can be described in terms of the total volume of traffic passing a particular roadside observation point, and is typically expressed as vehicles per day (vpd). The NZTA publishes data it collects from the nationwide network of telemetry stations, this data is summarised in statistics such as the Annual Average Daily Traffic (AADT), set out in publically available reports such as the ‘State Highway AADT Data Booklet 2011-2015’ (publically available from the NZTA website).
- 7.5 Sections of the SH in Wellington with the highest vehicle use are on the SH1 between WCC and KCDC, as well as the SH2 from the Upper Hutt to Wellington CBD. The SH58 connecting SH1 to SH2 across the Haywards Hill also represents a regionally strategic connection between SH1 and SH2.
- 7.6 A summary of the AADT for telemetered sections of SH in Wellington are listed in Table 2.

Table 2: Summary of the AADT for telemetered sections of SH in Wellington.

SH	Description	AADT (2015)
1	Paekakariki-Telemetry Site 47 (Piezo Axle Classification)	23984
1	Ngauranga SH1 - Telemetry Site 3 - SB	22792
1	Ngauranga SH1 - Telemetry Site 4 - NB	22065
2	Clareville - Telemetry Site 80 - Nth of Whites Line	11146
2	Rimutaka - Telemetry Site 01- Pukuratahi River Brg	6089
2	Kelson - Telemetry Site 99 - SB Lanes	17482

2	Kelson - Telemetry Site 99 - NB Lanes	16832
2	Ngauranga SH2 - Telemetry Site 3 - SB	21269
2	Ngauranga SH2 - Telemetry Site 4 - NB	21244
53	Sth of No.1 Line*	1581
53	West of Princess St (Martinborough)*	2814
58	Pauatahanui East - Telemetry Site 73	14254

*Single loop assessment method. All others are telemetered data. Data from NZTA 2015.

NZTA recognises the impact of stormwater derived contaminants

- 7.7 This is an activity that is well defined, described in detail, is supported by a track record of pro-active and targeted investigations. This evidence review recognises that a range of in-house best management practices and standards have been developed to manage the discharge of stormwater from the SH network across New Zealand. For example, the 'Stormwater Treatment Standard for State Highway infrastructure' published by NZTA (2010) is cited as the guidance document in Board of Inquiry decisions and formulation of construction consent conditions for the 3 major Roads of National Significance projects in the Wellington region (i.e. PP2O, M2PP and TGM). NZTA states it is the purpose of these BMPs to 'provide guidance on the implementation of project specific water quality and quantity management objectives' for discharges of stormwater from the state highway network.
- 7.8 Through its targeted investigations, NZTA has recognised the importance in managing any potential adverse effects in stormwater generated from the operation use of the state highway network. NZTA has commissioned a wide range of investigations and has supported the development of models designed to assess the source, fate, and risks of stormwater contaminants to the receiving environment (Gardiner and Armstrong 2007, Gardiner et al 2016, Moores et al 2010). This research effort is consistent with a recognition that State Highways are an important source of stormwater contaminants, setting them apart from individual sites.
- 7.9 As a result of the various methods already developed for assessment of road derived discharges, the characteristics, likely future quality, and potential risk of adverse effects of stormwater specifically derived from the SH network can be predicted via a

range of modelling tools and simulated over a range of scenarios. For example the 2016 report commissioned by NZTA 'Risk assessment of road stormwater runoff' (March 2016) outlines the key principles in developing a road stormwater screening (RSS) model, with the purpose of addressing the question: "*Under what conditions is stormwater run-off likely to cause adverse environmental effects*". This tool can be applied to any specific section of a SH to estimate annual loads of road-derived copper and zinc and to identify the consequent risk of adverse effects for aquatic receiving environments.

Consent status of stormwater discharges from the SH network

- 7.10 NZTA currently hold a series of resource consents for the discharge of stormwater from the operational area of the Roads of National Significance upgrades of the SH in the Wellington Region (i.e. for Mackays to Peka Peka, Peka Peka to Otaki, Transmission Gully Motorway).
- 7.11 NZTA hold a global resource consent for the purpose of discharge of stormwater from the SH network in the Canterbury region (Consent number CRC111005)
- 7.12 NZTA hold a series of discharge consents in the Auckland region for the purpose of stormwater discharges (R. Dismeyer, AC via email 2016). At the time of preparing this evidence it is unclear whether these include global stormwater consents or consents for individual sections of the SH network.

Contaminants from SH and description of stormwater quality.

- 7.13 Contaminants in road stormwater runoff are numerous, and typically include fuels, additives, oil, brake and tyre residues containing a variety of heavy metals and organic compounds which can be toxic/ecotoxic (Gardiner et al. 2016).
- 7.14 The metals copper (Cu) and zinc (Zn) represent contaminants in stormwater that are ubiquitous in road runoff, present at concentrations that are of potential environmental concern, are reliably measured in the laboratory, and are routinely measured in targeted investigations. As a result there are sufficient data to provide a reliable characterisation of copper and zinc concentrations

in road runoff.

- 7.15 The Urban Runoff Quality Information System (URQIS) database, managed by NIWA, is one example of a data repository that summarises stormwater quality data collected across New Zealand, including data from roading networks.
- 7.16 Summarised NZ-wide data on copper and zinc concentrations in runoff from motorways and state highways, as well several other land use types, are listed below:

Table 3: Median metal concentrations (mg/L) for untreated stormwater types, output from the URQIS database as of 5/10/2016. ANZECC (2000 and 2016 draft revision) freshwater receiving water guideline values are listed for comparison.

Landuse type	Dissolved Cu	Total Cu	Dissolved Zn	Total Zn
Low-density residential*	0.0073	0.014	0.046	0.082
Road >20000vpd	0.0072	0.018	0.017	0.083
Road 5000-20000vpd	0.0034	0.013	0.017	0.07
Rural	0.0016	0.0028	0.052	0.057
ANZECC (2000) 80% TV	0.0025	-	0.031	-
ANZECC (2016 revised) 80% TV	0.004	-	0.012	-

Note: data mostly from Auckland region.

*Connected to the TA network, not individual sites.

- 7.17 This evidence assumes that data summarised by URQIS for residential land use is collected from areas serviced by a TA stormwater network, not properties that would be defined as individual sites.
- 7.18 In the absence of site-specific data, median metal concentrations for stormwater discharging from an individual property is assumed to be in the range of concentrations for rural and low-density residential properties. This assumption is based on the land use comparison that is inferred from the intent of Rule 48, i.e. where by a land use for an individual site used for residential occupation is a small scale activity and can be considered as not dissimilar to a rural property or low density residential properties.
- 7.19 The URQIS data summary shows that for total copper, the median concentration for highways/roads >20,000 vpd is higher than that for low-density residential and rural land use. Compared against

receiving water quality guidelines, it is also higher ANZECC (2000, 2016) freshwater guideline value at the 80% level of protection (representative of degraded ecosystems). Thus this concentration range represents a discharge that over time, may potentially contribute to degraded receiving environmental quality in susceptible areas, even after reasonable mixing that would be expected to occur.

- 7.20 For total zinc the median concentration from highways/roads >20,000 vpd is relatively similar to that from low-density residential land use. This reflects the understanding that stormwater from residential land uses generally contains relatively elevated concentrations of zinc from the weathering of galvanised roofs. Compared against receiving environment water quality guidelines, the concentration of zinc typically discharging from this road class is higher than the revised ANZECC (2016) guideline value for dissolved zinc, at the 80% level of protection (representative of degraded ecosystems). Thus this concentration range represents a discharge that over time, may potentially contribute to degraded receiving environmental quality in sensitive areas, even after reasonable mixing that would be expected.

Limits and assumptions about URQIS data

- 7.21 Data are for concentrations only, not loads.
- 7.22 The number of studies and sites for a particular land use represented by the number of sample points in the URQIS output data (not shown in Table 3) is unknown.
- 7.23 Available data is primarily from the Auckland Region, and contains very few data from the Wellington Region.
- 7.24 Data in URQIS is assigned by vpd, Vehicle telemetry data ranges for SH in the Wellington Region is variable, and can range from <10,000 to >20,000 vpd, depending on location.
- 7.25 The discharge point and/or fate of the stormwater discharge is unknown (i.e. whether it is discharge to surface water, land, service network, other).

- 7.26 Data from residential land use most likely represents stormwater discharges via a local authority network (not individual properties not connected/serviced by a local authority network).

Discharge of stormwater from the SH

- 7.27 Estimates of indicator contaminants discharged per unit area over the course of a year is listed in Table 4. This is derived using the Contaminant Load Model (CLM; Auckland Regional Council 2010). This compares discharges from what can be considered as individual sites for the purpose of this evidence, against the Wellington region’s state highway network.
- 7.28 The SH estimates are based on calculation of contaminant loads from the specified areas of road surface while the individual property estimates are the sum of contaminant loads calculated for the specified areas of roofs, paved surfaces and grassed areas. The CLM’s estimates of contaminant loads for roads and roofs are based on sampling data derived from measurement of road and roof runoff water quality, respectively (Auckland Council, 2010). The CLM’s estimates of contaminant loads for paved and vegetated areas are based on parameters values derived from model calibration against sub-catchment scale water quality measurements (Auckland Council, 2010).
- 7.29 Table 4 below sets out a comparison of the typical contaminant yield estimates comparing a hypothetical individual property with SH. Over the course of a year, assuming no stormwater management controls, the discharge of stormwater contaminants (Cu, Zn, TSS) estimated using the CLM is significantly greater per unit area of state highways, compared to a hypothetical residential occupation of an individual site.
- 7.30 Whilst this evidence does not directly assess cumulative effects, several observations are highlighted here: it can be inferred from these high-level approximations set out in Table 3 and Table 4 that contaminants discharging from SH can be at concentrations that exceed receiving environmental water quality guidelines (i.e. at the ANZECC 80% trigger values for ecosystem protection). Furthermore, the annual yield for these land uses can reasonably be

expected to cumulatively contribute to receiving environment degradation over years of stormwater discharging under these scenarios.

Table 4: Example of yield (kg/ha/year) calculated from the Contaminant Load Model. These calculations have not factored in stormwater management options or controls.

Landuse type	Size	Yields (Kg/ha/yr)		
		Copper	Zinc	Sediment TSS
Individual property*	Small	0.10	4.9	344.0
	Medium	0.02	1.0	410.8
SH1 ¹	106.5 km	3.70	11.1	5257.5
SH2 ¹	120.3 km	3.70	11.1	5256.3
SH58 ¹	15.4 km	3.73	11.2	5284.7
SH53 ²	17.64 km	0.89	2.7	2780.3

*Based on a hypothetical residential activity only

1 Based on 5000-20000 vpd across the entire length though specific areas recording >20000 AADT are noted in NZTA telemetry data for SH1 and SH2.

2 Based on 1000-5000 vpd across the entire length.

8. DESCRIPTION OF ACTIVITY OF CENTREPORT

8.1 The Ministry for the Environment defines the activity of operational port areas as HAIL category F Vehicle refuelling, service and repair (5) Port activities.

8.2 In the Wellington Region, CentrePort Ltd. operates one of the largest seaports in NZ. One of the main activities of the port is handling logs.

8.3 The operational area of CentrePort is 28.3 ha, of which close to 100% is an impervious surface. One of the main activities at the port is the log handling area; this area of the log yard operates 24 h a day, seven days a week. In 2015 the log yard handled 875,000 tonnes of logs, with the predicted increase in capacity to 1.5 million tonnes/year over the next 5 to 10 years driven by growth demands (CentrePort/Beca meeting 21/9/2016). Other activities at the Port include heavy machinery/vehicle use, car park areas, workshop areas, fuelling areas, container storage.

8.4 In 2016 CentrePort prepared an Assessment of Effects in support of a Resource Consent application under Rule 52. Following the November 2016 Kaikoura earthquake that significantly disrupted operations at the port, the status of this consent application is

currently on hold.

- 8.5 In 2016 CentrePort was also looking to expand the storage handling area of logs and other items to the proposed development on the Kaiwharawhara Point, just north of the Aotea Quay. Following the November 2016 Kaikoura earthquake the status of this consent application is also on hold.

Description of contaminants from ports

- 8.6 Contaminants commonly associated with stormwater discharges from ports with log handling activities include: wood debris and high total suspended solids, dissolved metals (copper, zinc), , dissolved humic material, nutrients, acidic resins and tannins, PAHs, organic enrichment (as biological/chemical oxygen demand), and microbial contaminants washed off logs. Whilst larger wood debris is contained and removed on site, all other contaminants are predominantly discharged untreated directly to the coastal marine area (CMA) (Culliford 2015).
- 8.7 Various assessments undertaken for logging yards at ports have in general described the main effect of stormwater discharge as an aesthetic one, whereby the colour of the plume (as tannins and TSS) remains highly conspicuous, and at times beyond the specified zone of reasonable mixing. A Nelson City Council decision in 2002 declined an application by Port Nelson to discharge stormwater into a section of the historic marina used largely for recreational vessels on the basis that these visual effects were more than minor (NCC 2002).
- 8.8 Other effects are associated with the contaminants in the stormwater themselves; as dissolved chemical contaminants, microbiological contaminants, or sediment/particulate associated ones. These can be directly toxic to susceptible biota when discharged directly to the CMA, and toxicity of these mixtures is routinely assessed as Whole Effluent Toxicity test (Culliford 2015). The potential for toxic exposure is, however, determined by the relative mixing and subsequent dilution and dispersion into the CMA. Thus it is common for consenting and assessment purposes for a 'zone of reasonable mixing' to be defined on a location specific

basis for discharges form port areas.

8.9 Information on other ports in New Zealand with major log handling activities includes the following:

- Port of Napier (HBRC) (AEE Cawthron Report. 772 (Barter 2002, memorandum notes from Anna Madarasz-Smith HBRC)
- Port Shakespeare (MDC) (Cawthron consent variation letter (Sneddon 2011b), Cawthron report Nos. 1813 (Sneddon 2010), 2001 (Sneddon 2011a) 2578 (Sneddon 2014),
- Port of Tauranga (BoPRC) (Documents from BoPRC consent officer David Ede & phone conversation 26/9/2016)
- Eastland Port (Gisborne) (Gisborne District Council Decision document (GDC 2013), Cawthron report No. 2743, Morrisey and Sneddon 2015)
- Port of Nelson (NCC decision document (NCC 2002) & email exchange with NCC stormwater team leader Neil Henderson)
- Port of Taranaki (website summary information only)

8.10 There is a range of monitoring requirements for these ports, ranging from consent specified limits (HBRC, MDC) to no consent in place (BoPRC), or consent status is unconfirmed (NCC).

8.11 Concentration ranges typical for New Zealand port log yards are listed in Table 5:

Table 5: Range of monitoring data for indicator stormwater metals (copper, zinc) from representative ports with log handling facilities in New Zealand, compared with URQIS data (accessed 5/10/2016) for low-density residential and rural land use

Landuse type	Dissolved Cu	Total Cu	Dissolved Zn	Total Zn
Ports	0.0027 - 0.035	0.0056 - 0.035	0.050 - 0.553	0.036 - 3.6
Low-density residential	0.0073	0.014	0.046	0.082
Rural	0.0016	0.0028	0.052	0.057

Port data ranges based on ranges from CentrePort, Port of Napier, Port Shakespeare, Eastland Port.

Note: CLM estimates cannot be derived for ports because the CLM land use class does not include ports as a land use class

8.12 Compared against the low-density residential and rural landuse data, the highest ranges of total copper and zinc for ports are well above the median values for these other land use types.

Stormwater Management Plan requirements

8.13 A Stormwater Management Plan (SMP) is a feature of the overall Environmental Management Plans (EMP) of port operational areas around New Zealand, in particular those managing a high amount of surface debris (such as log yards and coal yard). The key management tool of frequent and effective/targeted site

maintenance (i.e. good housekeeping) is the key practice for reducing wood debris and suspended material discharging via stormwater runoff to the CMA. This includes sump cleaning/clearing, site sweeping, incident response, keeping manholes and sumps clear from log stockpiles.

- 8.14 SMP are generally flagged as 'living documents' in overall EMPs whereby practices should be updated accordingly. For example if new/improved systems for site maintenances are available, or if on-site practices and activities change to the extent that the expected contaminant runoff in stormwater needs to be accounted for (e.g. change in operator, changes to activity capacity, changes to treatment systems etc), then this can be updated in the SMP.

9. DESCRIPTION OF ACTIVITY OF AIRPORTS

- 9.1 The Ministry for the Environment defines the activity of airports as HAIL category 'F: Vehicle refuelling, service and repair (1) Airports including fuel storage, workshops, washdown areas, or fire practice areas' (MfE, October 2011)
- 9.2 There are three airports in the Wellington region; two domestic airports (Masterton Hood Aerodome, Kapiti Airport) and one international airport (Wellington International Airport Ltd - WIAL). Each of these sites are identified on GWRC's Selected Land Use Register database, as HAIL category F(1).
- 9.3 The WIAL Monthly Traffic Report for April (Airways New Zealand website accessed June 2017) reported a rolling 12 month total of 84,087 total aircraft movements. Aircraft movement statistics reported by *Airways New Zealand* reported a total of 99,444 aircraft movements for WIAL, down from a total of 119,059 reported for 2008. There were 27,191 aircraft movements for Kapiti Airport in 2016, up from a total of 2,619 reported for 2008. Statistics for Masterton Hood Aerodrome were not available.
- 9.4 All three Wellington region airports indicate an intention to expand or promote the expansion of airport capacity and activity in the future (WIAL Resource Consent Application 2016, Kapiti Airport Holdings Ltd, Masterton District Council LTP).

9.5 Specific activities on airport sites include:

- Vehicle/aircraft movement on runways and taxiways resulting in brake pad and tyre wear and tear
- Fuel storage and refuelling activities
- De-icing and anti-icing of aircraft and airfields
- Firefighting practices
- Cleaning and maintenance of aircraft, ground service equipment and motor vehicles
- Airport terminal/facility/workshop operations and maintenance
- Vehicle parking
- Removal of weeds and other vegetation from the airport apron (Sulej et al. 2011, 2012, PDP 2014).

9.6 In addition to these on-site specific activities, the physical layout of the airport is in general comprised of buildings (terminal, workshops and maintenance facilities), washdown areas and hardstands, extended areas of impervious surface of the runway bounded by areas of flat grassed areas. The total impervious area are approximated to be ~58 ha (WIAL), ~18 ha (KA) and ~6 ha (MHA). There are also grassed airstrips adjacent to sealed airstrips. The three airports in the Wellington region are also each adjacent to a receiving water body (WIAL is piped to the coastal marine area, MHA stormwater and overland flow discharges to the Waingawa River and to groundwater, KA stormwater discharges to the Wharemauku Stream).

Contaminants from airports

9.7 Contaminants generated by airport activities can include: hydrocarbons (oil and fuel), fuel additives, metals, biocides (herbicides/pesticides), anti-freeze agents, flame retardants, sediment (PDP 2014, Sulej et al. 2011). As with other catchment-derived first-flush discharges, contaminants present in first-flush stormwater discharges derived from airports can potentially exceed both acute and chronic toxicity receiving environment thresholds.

Consents and/or SMPs for Wellington's airports

9.8 As part of the Resource Consent application to extend the runway of WIAL an assessment of the effects of stormwater discharge from the airport was included. In response to a request for further information (13 July 2016, Mitchell Partnerships Ltd) on the status of stormwater discharging from the WIAL, the applicant concluded *'Monitoring data from the existing stormwater system undertaken*

between 2013-2015 located at the Airport shows that the contaminants (sic) levels from the outfalls are negligible.” In my memo to Environmental Regulation (7 October 2016) as requested for the s87F report, upon examination of the data appended in Annexure A of the letter, I concluded the following: *“On the basis of the results listed in Annexure A it would be impossible to make a justified statement regarding whether water quality discharging off site has improved or deteriorated over time”*. In my opinion, on the basis of the information presented in the AEE the quality of the stormwater discharging from the WIAL site remains unknown.

- 9.9 Kapiti Airport Holding Limited (KAHL, owner-operator of Kapiti Airport) commissioned an Environmental Management Plan (Harrison Grierson 2010a), part of which includes a Stormwater Management Plan (Harrison Grierson 2010b). The main objective of the SMP is for the management of potential flooding as a result of high rainfall events leading to increased surface runoff.
- 9.10 The KAHL SMP does not explicitly refer to the management, controls, or assessment of effects of contaminants associated with stormwater runoff, other than to indicate the installation and use of stormwater treatment devices to capture and contain potential sediment runoff. The SMP also acknowledges that this is a living and flexible document to account for expansion of operations and future potential treatment devices that may be required to meet the management of stormwater on site.
- 9.11 In the Wairarapa Combined District Plan, the Masterton Hood Aerodrome is identified as a designated airport protection area. The Masterton District Council manages and operates the Masterton Hood Aerodrome, for the benefit of travelling, commercial and recreational aircraft users from within and outside the Wairarapa District. The MDC LTP 2015-2025 identifies airport as consisting of 3 grassed runways, 1 sealed runway, hardstand and terminal area.
- 9.12 The Masterton Hood Aerodrome Management Plan (Beca 2006) briefly describes the management of onsite stormwater as follows: *“Runoff from the runways and taxiways drains directly into open V-drains that run parallel to the runway strip. Approximately one third*

of the runoff drains into the Waingawa River and the balance discharges into the water table drains on Manaia Road. It is noted that there is only minimal treatment of any oil or fuel spillage within the existing stormwater system, and no facilities to treat runoff from aircraft washing. An environmental study could be conducted to determine the level of pollutants in the existing stormwater and what form of treatment, if any, is required to meet current standards of quality for discharge.” (p 10).

- 9.13 The Hood Aerodrome management plan is under review but there are no additional plans for further stormwater or other environmental plans to be included (David Hayes, Aerodrome Manager, by email July 2007)

Other Airports with international terminals in New Zealand, and status of stormwater consent monitoring requirements.

- 9.14 Auckland International Airport Ltd. (AIAL) holds a range of discharge consents covering nearly all Airport designated land: Consents Numbers 50193, 28575 and 35175 act as global discharge permits for the southern and northern parts of the airports, including the taxiway cross connections (Auckland Airport 2017). The focus of stormwater management is the implementation of design standards (i.e. Auckland Council’s Technical Publication 10, 1999 and 2003) and the requirement for a SMP. In addition, the consent conditions have set limits on total suspended sediment in stormwater discharges (specified as % of TSS removal to be achieved), but do not set limits on other contaminant classes. A 2015 AEE prepared in support of an application for additional works within an existing zone of AIAL assessed the impacts of stormwater discharges from the development, but states only that given stormwater treatment methods will be in accordance with other site methods, effects will be adequately managed. Actual summaries or data from onsite stormwater quality monitoring was not presented in this AEE, and requirements detailing site specific stormwater are not explicitly set out in these consents.
- 9.15 AIAL have published a high level Environmental Management Plan which sets out the management framework for other effects, including the provision of a detailed SMP. The focus of the SMP is

for the provision of flood control and mitigation (AIAL 2017, PDP 2014).

- 9.16 Similarly, Christchurch International Airport Ltd. (CIAL) holds both airside (Consent No. CRC981129.1) and landside (Consent No. CRC000013.3) stormwater discharge consents, for the discharge to groundwater. Conditions in the airside consent requires annual sampling of stormwater as it exits the oil interceptor/containment tank prior to the discharge entering the ground from the airside discharge points. These consents require that the total concentration of TPH shall be less than 20 g/m³ in stormwater discharging to groundwater. An additional consent CRC130198 requires groundwater samples to be analysed from a series of wells and compared against potable water and applicable groundwater guidelines. Sediment from existing soak pits are also analysed at 5 yearly intervals for hydrocarbons, metals and other hazardous substances known to have been spilled within the catchment area within the past 6 months. A condition of the landside consent also requires CIAL to have in place an Operations Manual for stormwater treatment and disposal from landside areas
- 9.17 A 2016 report 'Review of hydrocarbon analyses from groundwater monitoring for July 2015-June 2016 sampling round (CRC130198)' reported all TPH and BTEX results were below applicable guidelines (PDP 2016). Results of other analyses were not available.

Other issues for Airports

- 9.18 For airports in the Wellington Region there is a paucity of data for on site assessment of stormwater quality discharging from the airport catchments. Whilst this may be inferred from models and assumptions regarding activities on site, actual monitoring data would be required to fulfil this knowledge gap.

10. SUMMARY

- 10.1 The intent of Rule 48 is to permit the discharge of stormwater from a property used for residential purposes, but which is not serviced by a TA network. Whilst the term 'individual site' is not explicitly defined in the proposed Plan, it can be inferred by what it is not; it is not a contaminated site, nor is it an airport, state highway, or a port.

- 10.2 The intent of Rule 52 is to recognise that because stormwater discharged from large sites may contain both a wide range of contaminants and relatively high concentrations and/or loads of contaminants compared with individual sites, it should be managed differently to stormwater discharges from individual sites.
- 10.3 Differences between the characteristics of the activities on an individual site and those on a SH, airport or port that are likely to result in differences in stormwater characteristics discharging from the two groups of site include:
- 10.4 The purpose of the activity occurring differs between individual sites v large sites: i.e. residential activities are the dominant use on individual sites, while large sites are subject to heavy machinery/vehicle traffic enabling the movement of >20,000 vehicles per day or stockpiling logs.
- 10.5 The size of the site differs between individual v large sites (e.g. residential sites may vary from ~500m² to lifestyle blocks of several hectares; large sites are in the order of 10s to 100 hectares).
- 10.6 Impervious characteristics of a site differ between individual sites v large sites: individual sites for residential purposes, especially those that may be considered lifestyle blocks, do not generally have a significant proportion of, or extended sections of impervious cover (limited to roof tops and driveways). Impervious cover on large sites may include extended sections such airstrips, storage yards and hardstands to near 100% impervious surfaces for state highways and the port.
- 10.7 The types of chemical contaminants and the concentrations at which they are present are expected to be different for individual sites versus large sites, i.e. it is related to the activity on the site.
- 10.8 The volume of the stormwater and associated loads of contaminants discharging over an event or a typical year is assumed to be significantly smaller for individual sites versus large sites. This assumption is inherent on scale and type of activity on the site.
- 10.9 Whether a site specific stormwater management plan (SMP) is

reasonably expected for the site, e.g. to demonstrate the activity is being conducted in accordance with best management practice (BMP), and to recognise the risk to the receiving environment the activity poses. It is assumed in this review that individual sites do not require site specific SMPs, but that a SMPs is considered BMP for large sites.

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Attachment A

Qualifications and experience

Qualifications

List out formal qualifications

Experience:

Set out work experience

Attachment B
Evidence from other experts

Attachment C Submission Points