NIWA
Taihoro Nukurangi

Regional Council Freshwater Management Methodologies Volume 2

accounting systems and limit-setting: appendices

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Appendix A International approaches weblinks

Table A-1: Useful websites for further information for the four countries included in the international approaches review.

Website url	Comments
WFD - http://ec.europa.eu/environment/water/water-framework/	The EU Water Framework Directive (WFD) Also provides links to a number of supplementary directives managing drinking water, bathing water, flood management etc
English Environment Agency - http://www.environment-agency.gov.uk/default.aspx	The EA are responsible for the implementation of the WFD in England & Wales (up til April 2013) Note that now the EA is for England only and Natural Resources Wales takes over WFD implementation for Wales)
UKTAG - http://www.wfduk.org/	Scientific advisory panel for UK (England & Wales, Scotland, Northern Ireland) in regards to implementation of the WFD
Irish Environmental Protection Agency - http://www.epa.ie/#&panel1-1	The EPA are responsible for technical implementation of the WFD in Ireland
Irish WFD - http://www.wfdireland.ie/index.html	Includes RBMPs, characterisation documents, other reporting for WFD
United States Environmental protection Agency - http://www.epa.gov/	The mission of EPA is to protect human health and the environment. The EPA implements law by the development of regulations, and/or set national standards that states and tribes enforce through their own regulations. Useful background on TDMLs
California Department of Water Resources - http://www.water.ca.gov/	Overview of water management for the state, including development of the California water plan
California Environmental Protection Agency - http://www.waterboards.ca.gov/	Responsible for the development of river basin plans, and licensing of abstractions (takes) and discharges
California water boards - http://www.waterboards.ca.gov/water_issues/programs/tmdl/background.shtml	Useful background on TMDLs in California context
Australian Government (commonwealth) Water website - http://www.environment.gov.au/water/index.html	Useful overview of, for example water related legislation and water quality management initiatives (such as the revision of ANZECC guidelines)
Victoria Environment Protection Authority - http://www.epa.vic.gov.au/your-environment/water	Background on State Environmental Protection Policies (SEPP) such as the one which provides a management framework for Victoria's water quality
Department of Environment and Primary Industries - http://www.water.vic.gov.au/home	Outlines water management in Victoria, especially the water allocation framework, monitoring, reporting and accounting, and setting water quantity limits (environmental flows and environmental water reserves)
Queensland Department of Natural Resources and Mines - http://www.nrm.qld.gov.au/water/index.html	Responsible for water resource planning, setting Environmental Flow Objectives
Queensland Department of Environment and Heritage Protection – http://www.ehp.qld.gov.au/water/index.html	Responsible for water quality management, setting Water Quality Objectives

Appendix B Final interview workshop questions

Accounting systems and limit setting – process and methodologies
Survey Questions

Background

In the recent freshwater reform document, the Government outlined their intent to identify examples of good practice among New Zealand councils and overseas on aspects of freshwater management, and provide this as guidance to councils. As a result, the Water Directorate has contracted a NIWA led consortium to document the processes and methodologies regional councils are using to:

- Account for all takes and sources of contaminants
- Derive water quantity and quality limits from objectives.

The approach being taken by the project team is that of structured interviews, to talk to a selected number of councils at a one-day workshop and gather information regarding the methodologies used, evaluating the approaches adopted by councils, documenting the information requirements, identifying the challenges associated with this work, and providing a coarse assessment of the costs.

The information from this project will be used to identify regional council best practice and establish an evidence base for further policy development, anticipated to commence in the second half of this calendar year. It is likely that the information will also be used for the subsequent development of guidance and implementation material.

This document provides a structured outline to the project team, to enable consistency of information gathered from each council visited. Questions are organised under a few main headings: Water quantity, water quality, limit setting, challenges, information requirements, and costs.

Definition of terms

Accounting system	For water quantity: an accounting systems identifies and records all takes (Reforms document page 38) For water quality: an accounting systems identifies and records all sources of the contaminants to be managed (Reforms doc p48) Accounting for existing uses of water and existing sources of contaminant are important for a number of aspects of water management including: • To inform decisions on objectives and limits: an understanding of the existing uses of water and existing sources of contaminants is needed when testing the economic and social impacts of various scenarios for objectives and limits. • To inform decisions on how to manage within limits, once set: for example, to determine the most equitable and cost-effective way to reduce current discharges.

	• Ongoing accounting and reporting will provide feedback to communities on their progress, and act as a trigger for changes in management e.g. when existing initiatives are not having the required effect and targets are not being met. • Consistent regional and national accounting and reporting will provide information for investors on catchments where there is "headroom" for expansion; and information for central government on whether further assistance and/or intervention is required. NB. Accounting can be one-off exercises and not necessarily ongoing. Modelled estimates are included in the definition of accounting.
Environmental flows and/ or levels	Are a type of limit, which describes the amount of water in a body of freshwater (except ponds and naturally ephemeral water bodies) which is required to meet freshwater objectives. Environmental flows for rivers and streams must include an allocation limit and a minimum flow (or other flow/s). Environmental levels for other bodies of freshwater must include an allocation limit and a minimum water level (or other level/s) (NPSFM p5)
Freshwater Objective	A freshwater objective describes the intended environmental outcome (NPSFM p5)
Limit	A limit is the maximum amount of resource available, which allows a freshwater objective to be met (NPSFM p5) The term limit is defined in the NPSFM as "the maximum amount of resource use available, which allows a freshwater objective to be met". The NPSFM Implementation Guide expands on the above definition by stating that a limit is a specific quantifiable amount.[1] The NPSFM Implementation Guide gives an example of a maximum contaminant load for a water quality limit. The Implementation Guide says this would be a "common type of limit", but does not suggest that this is the only type of limit. However, it does not give examples of what other types of limits might be.
Water Management Unit (WMU)	Spatially distinct unit where defined water management policies apply. A WMU may be a catchment, sub-catchment, or group of reaches with similar attributes

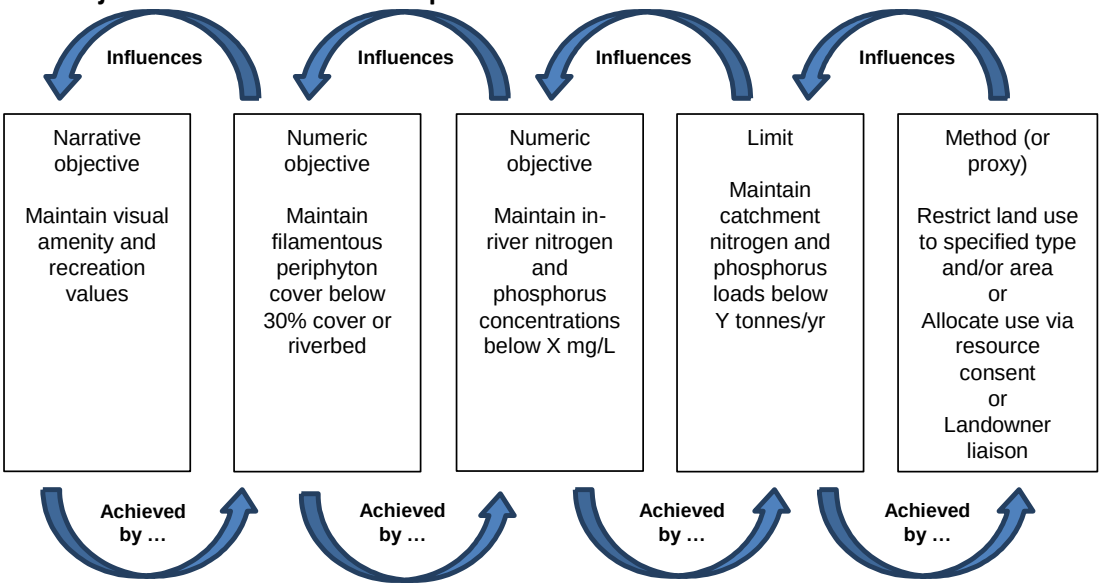
[1] National Policy Statement for Freshwater Management 2011: Implementation Guide, p. 15

1. Water Quantity

Link between objectives, limits and methods

The following diagram (from the NPSFM Implementation Guide) illustrates the link between objectives, limits and methods, using examples to illustrate.

Figure 1: Objective limits cascade example[2]



Limit setting (quantity)

1.1 Does your relevant regional plan contain a freshwater objective(s) for managing water quantity/allocation?

Yes	No
If Yes, insert here	

1.2 What is the form of the proposed limits for surface water quantity?

e.g. Minimum flow and allocation cap (max rate? Seasonal volume?)

1.3 What methodology do you use to determine limits for surface water quantity?

For example, a flow statistic, physical habitat models

1.4 What methodology/models are used to create naturalised surface water flow records (for use in determining limits)?

For example, surface water and groundwater field investigations

[2] Adapted from Environment Canterbury Technical Report for Hurunui Catchment, 2010.

1.5 What mechanism do you use to determine environmental minimum flows? And if relevant, minimum flow levels for lower reliability water (e.g. B Block allocations)?

For example, a flow statistic

1.6 What methodology/models are used to assess what surface water volume or maximum rate should be allocated?

e.g. degree of flat-lining

1.7 What is the form of the proposed limits for ground water quantity?

e.g. Minimum levels? Maximum annual volume?

1.8 What methodology do you use to determine limits for groundwater?

For example, % of estimated resource, models

1.9 What methodology/models are used to determine sustainable yields of groundwater aquifers?

For example, groundwater models, rainfall-recharge assessments, aquifer pump tests

1.10 What science you have used/do you intend to use in determining limits (for both surface water and groundwater)?

For example, hydrological statistics, habitat models, fish distribution info

1.11 Do you assess the impacts of land use change on water availability?

Yes	No
If Yes, what method do you use to do this?	

1.12 Do you take the water takes under permitted and reasonable use into account when determining limits?

Yes	No

1.13 Do you intend to use a standardised/blanket/default methodology for the whole region or different methods based on type of catchment/aquifer?

Standard approach for region	Catchment or WMU specific
E.g.	E.g.

1.14 Have you assessed the benefits and issues of using a standardised method against different methods by catchment/aquifer?

Yes	No

1.15 When you are setting limits, are the quantity and quality attributes integrated e.g. do you manage flows as well as nutrients to manage periphyton?

Yes	No
If Yes, what method do you use to do this?	

1.16 How confident are you that the limits set will achieve your stated freshwater objective? (i.e. what other factors might come into play)?

Very confident	Confident	Somewhat confident	Not at all confident
Comments…			

Challenges – limit setting

1.17 What difficulties and debates/tensions have you faced/do you anticipate in setting limits, and in particular in deriving limits from freshwater objectives?

For example, political pressures, lack of relevant info

1.18 What uncertainties may arise in this process and how can these be managed?

e.g. uncertainties	Management approaches

1.19 Do you foresee capacity issues in setting limits?

For example, technical staff, planning staff, …

Info requirements – limit setting

1.20 Do you currently have the right information to set water quantity limits?

Yes	No
If No, what else do you need? (research, models, tools, time for staff, more staff)	

1.21 What else do you want to tell us about your water quantity limit setting processes and methodologies?

Free field

Accounting systems

Accounting for all water takes

Accounting for all water takes involves identifying who is taking water, and collecting information or estimating their use, reporting and verifying. This includes unmetered takes, takes that do not require a consent (e.g. stock water) and unauthorised takes. Simple models can be used to estimate permitted, stock water and domestic takes e.g. multiplying stock numbers by average daily intake, with intake coefficients validated using sample surveys and other data e.g. from metered takes. LAWF envisaged that all water takes would be accounted for (except fire fighting).

1.22 Do you have a system to account for all takes?

Yes	No
If yes, what is the system? e.g. database, spreadsheet – describe all the components that make up the system	

Consented Takes

1.23 Do you have a system to manage records of consented takes?

Yes	No
If yes, what is the system? e.g. database, spreadsheet	

1.24 Do you grant two different consents for 'water take' and 'water use'?

Yes	No

1.25 What are the key fields in your system?

a) Does your system record the following fields for water takes:

Source type (e.g. run-of-river, groundwater, reservoir, lake,……..)	Yes	No
Source (e.g. Waikato River, Kaawa Aquifer,……)	Yes	No
Map grid reference	Yes	No
Detailed description of the purpose of the take?	Yes	No
Primary purpose (e.g. Irrigation, Industrial,….)	Yes	No
Secondary purpose (if any)	Yes	No
Tertiary purpose (if any)	Yes	No
Primary use type (e.g. Pasture irrigation, Cooling,…..)	Yes	No
Secondary use type (if any)	Yes	No
Tertiary use type (if any)	Yes	No
Rate of take (l/s) – maximum Rate of take (l/s) – average	Yes yes	No No
Rate of take (l/hr)	Yes	No
Daily volume (m^3/d)	Yes	No
Weekly volume (m^3/week)	Yes	No
Annual volume (m^3/year) or seasonal volume	Yes Yes	No No
Months that are permitted to take (if not for the whole year)	Yes	No
Consent granted date	Yes	No
Expiry date	Yes	No
Lapse date, if not operative	Yes	No
Actual commencement date	Yes	No
Other (give examples)	Yes	No

b) Does your system record the following fields for water use:

Map grid reference	Yes	No
Map of the land use area (e.g. Irrigated area)	Yes	No
Detailed description of the use?	Yes	No
Primary purpose (e.g. Irrigation, Industrial,….)	Yes	No
Secondary purpose (if any)	Yes	No
Tertiary purpose (if any)	Yes	No
Use type (e.g. Pasture irrigation, Cooling,…..)	Yes	No
Secondary use type (if any)	Yes	No
Tertiary use type (if any)	Yes	No
Rate of use (l/s) – maximum Rate of use (l/s) – average	Yes Yes	No No
Rate of use (l/hr)	Yes	No
Daily volume (m^3/d)	Yes	No
Weekly volume (m^3/week)	Yes	No
Annual or seasonal volume (m^3/year)	Yes	No
Months that are permitted to use water	Yes	No
Irrigated area (ha)	Yes	No
Commencement date	Yes	No
Expiry date	Yes	No
Other (give examples)	Yes	No

1.26 Does your system differentiate between consumptive and non-consumptive takes?

Yes	No

1.27 Does your system deal with diversions/storage/bywash that may be returned further down the catchment?

Yes	No
If yes, how?	

1.28 Do you assess whether the consented rate/volume is reasonable?

Yes	No
If yes, how? e.g. soil-moisture model to determine irrigation demand	

1.29 Does your system account for capacities of storages?

Yes	No
If yes, how?	

1.30 Does your system differentiate between surface water and groundwater takes?

Yes	No
If yes, how?	

1.31 For ground water consents do you record the degree of hydraulic connectivity with surface water?

Yes	No
If yes, how?	

1.32 Does your system allow for cumulative effects on the groundwater system and downstream spring fed streams? Are s14 takes included in this?

Yes	No
If yes, how?	

1.33 Does your system handle expired consents?

Yes	No
If yes, how?	

1.34 Does your system keep historic records of your total consented takes at regular time intervals (e.g. at quarterly, annually, …) to assess the total allocation at any given time?

Yes	No
If yes, how?	

1.35 Does your system handle consent variations (e.g. volume change)? Does your system keep historic records of consents (e.g. granted volumes with time frames for the consents that had consent variations)?

Yes	No
If yes, how?	

1.36 Does your system handle consent renewals?

Yes	No
If yes, how? E.g. use a new ID	

1.37 Does your system handle non-operative consents? (i.e., granted but not commenced)?

Yes	No
If yes, how?	

1.38 Does your system handle consent transfers and water trading?

Yes	No
If yes, how?	

1.39 Is your system capable of maintaining data integrity of consent allocation? e.g. daily volume (m^3/d) should be less than or equal to rate (ℓ/s) x 86.4

Yes	No
If yes, how?	

1.40 Do you have quality control systems for checking the data held in your system?

Yes	No
If Yes, what are they? E.g. Check location/co-ordinates, manage for multiple copies of	

records? Have a dedicated quality controller?

1.41 What gaps do you see in your systems that should be filled?

E.g. general database management issues, or specific data gaps

1.42 If you could start building a new system from scratch, what minimum/key elements would you make sure the system had?

For example, being able to

Other Takes

1.43 Do you include surface water and groundwater permitted and reasonable use (domestic and stock water - Section 14(3)(b)and (d)) takes in your accounting system?

Yes	No

1.44 What methodology/models are used to estimate non-consented (permitted and reasonable use) takes?

For example, ???

1.45 Do you have an estimate of unauthorised takes?

Yes	No
If yes, how?	

Actual Use

1.46 Do you differentiate between surface and groundwater when assessing water use?

Yes	No

1.47 What percentage of consented water takes is metered? What % is telemetered? (what % of volume). If not 100%, please provide a breakdown by rate/volume for:

Surface water

0 – 5 l/s	
5 – 10 l/s	
10 – 20 l/s	
20 – 50 l/s	
50 – 100 l/s	
100 – 500 l/s	
500 – 1,000 l/s	
> 1,000 l/s	

Groundwater (please use appropriate unit, if it is different from surface water – e.g. m^3/d)

0 – 100 m^3/d	
……..	

1.48 Do you have quality control systems for checking the accuracy of water meters?

Yes	No
If Yes, what are they? E.g. have stipulated standards for measurement, check calibrations at every fifth year, accuracy should be within +/-5%	

1.49 What percentage of water meters do you assess for compliance? What method do you use to determine which consents to assess for compliance?

Monthly	%
Quarterly	%
Other (specify)	%
Method	

1.50 What else do you want to tell us about your accounting systems?

Free field

1.51 Do you develop annual accounts of allocation and/or water use for your region?

Yes	No
If Yes, what is the timestep (daily, weekly, monthly or annual?) If yes – can we please have an example as we would like to see what is in it and how that is presented	

1.52 Do your accounts include the following fields?

Total (daily...annual)flow	Yes	No
Allocation limit	Yes	No
Total allocated to consented & metered takes	Yes	No
Actual volume taken by consented &metered takes	Yes	No
Total estimated take for consented but unmetered takes	Yes	No
Total estimated take for permitted activity takes	Yes	No
Total estimated take for stock water	Yes	No
Total estimated take for domestic use	Yes	No
Total water taken	Yes	No
Net/difference between allocation limit and total water taken	Yes	No

1.53 How do you use the accounting information?

e.g. to determine when restrictions are put in place in a drought, to determine when new consents can be issued in a catchment, to decide on new policies and rules for the regional plan?

1.54 What scale/spatial units do you use for accounting?

Region	Catchments	WMU How are your WMUs defined?	Other – e.g. tribs

Challenges – accounting systems

1.55 What difficulties and debates/tensions have you faced/do you anticipate in establishing and maintaining accounting systems?

For example, political pressures, lack of relevant info

1.56 What uncertainties may arise in these systems and how can these be managed?

Eg uncertainties	Management approaches

1.57 Are you confident that science/evidence based methodologies have been used to underpin your accounting systems?

Very confident	Confident	Somewhat confident	Not at all confident
Comments…			

1.58 What other powers do you think you might need to collect the required information?

For example, … or none required as consents allow this

1.59 What science needs do you think you will have in order to set-up accounting systems?

For example, groundwater models

1.60 Do you foresee capacity issues in implementing an accounting system?

For example, loading and QA of returns onto archive

Info requirements – accounting systems

1.61 What in your opinion is the critical required information for councils to undertake robust water accounting?

For example, ???

1.62 What is the minimum/core information that all councils should collect?

For example, ???

1.63 What extra (beyond core) information could be collected to improve your management of water quantity?

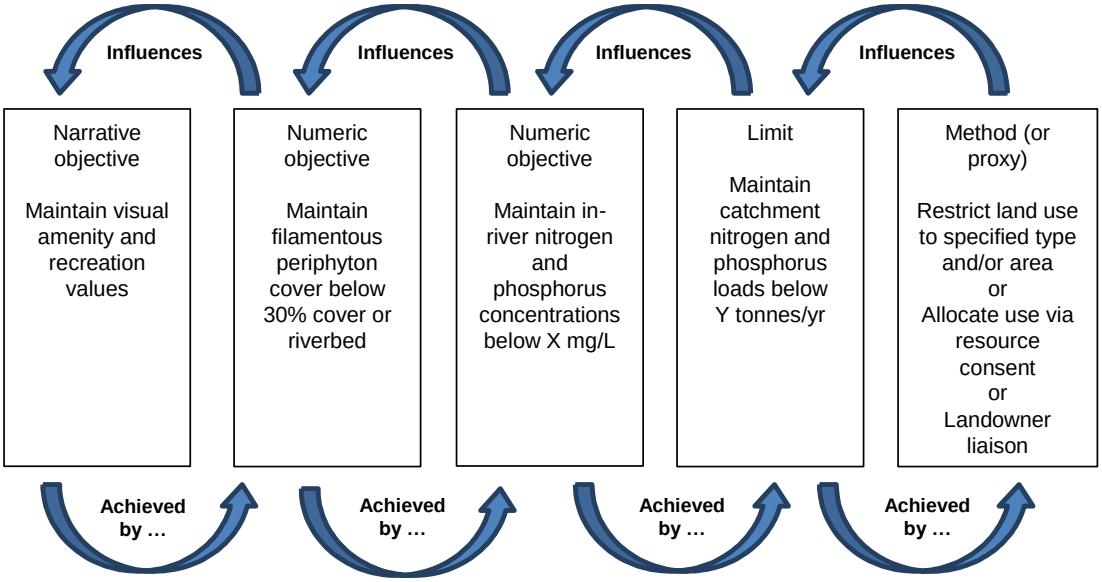
For example, ???

2. Water quality

Link between objectives, limits and methods

The following diagram (from the NPSFM Implementation Guide) illustrates the link between objectives, limits and methods, using examples to illustrate.

Figure 1: Objective limits cascade example[3]



Limit setting (quality)

2.1 Does your relevant regional plan contain a freshwater objective(s) for managing water quality/sources of contaminants?

Yes	No
If Yes, insert here and clarify which contaminants are managed i.e. which contaminants (parameters/attributes) have to be managed to achieve the objective? How did you decide that? [Eg contaminants Sediment, Nitrate nitrogen, Nitrogen (TN, TDN?), Phosphorus (TP , DRP/FRP), Ammoniacal nitrogen, *E.coli*, Faecal coliforms, Cyanobacteria, Heavy metals, Organic pollutants (e.g. PAHs, pesticides)]	

[3] Adapted from Environment Canterbury Technical Report for Hurunui Catchment, 2010.

2.2 How do you decide which contaminants to manage?

For example, periphyton is a major issue in our region and anglers demand that we reduce it

2.3 What is the form of the proposed limits for water quality for the contaminants you mentioned in 2.1?

For example, x tonnes of N per year

2.4 Have you set (or do you intend to set) a limit for A) E coli B) sediment/clarity C) nutrients D) toxicants – heavy metals?

Yes	No
If Yes, insert here and how were these derived? A B C D	

2.5 What methodology/approach do you use to determine catchment limits for surface water quality?

For example, determine the maximum load of the contaminants the water body can withstand to achieve the freshwater objective, apportion the load amongst diffuse and point sources (i.e. – follow the cascade)

2.6 What methodology/models are used to assess what the maximum load of the contaminants the water body can withstand to achieve the freshwater objective?

For example, Biggs periphyton model

2.7 What science have you used or do you intend to use in determining water quality limits?

For example, models, published relationships between contaminants and effects - over and above current SoE monitoring

2.8 Do you assess the impacts of land use change on water quality?

Yes	No
If Yes, what method do you use to do this?	

2.9 Do you intend to use a standardised/blanket/default methodology for the whole region or different methods based on type of catchment/aquifer or based on contaminant type?

Standard approach for region	Catchment or WMU specific
E.g.	E.g.

2.10 Have you assessed the benefits and issues of using a standardised method against different methods by catchment/aquifer?

Yes	No

2.11 When you are setting limits, are the quantity and quality attributes integrated e.g. do you manage flows as well as nutrients to manage periphyton?

Yes	No
If Yes, what methods do you use to do this?	

2.12 How confident are you that the limits will achieve your stated freshwater objective? (i.e. what other factors might come into play)

Very confident	Confident	Somewhat confident	Not at all confident
Comments…			

Challenges – limit setting

2.13 What difficulties and debates/tensions have you faced/do you anticipate in setting limits, in particular deriving limits from freshwater objectives?

For example, political pressures, lack of relevant info

2.14 What uncertainties may arise in this process and how can these be managed?

Eg uncertainties	Management approaches

2.15 Do you foresee capacity issues in setting limits?

For example, ???

Info requirements – limit setting

2.16 Do you currently have the right information to set water quality limits?

Yes	No
If No, what else do you need? (research, models, tools, time for staff, more staff)	

2.17 What else do you want to tell us about your water quality limit setting processes and methodologies?

Free field

Accounting systems (quality)

Accounting for all sources of contaminant(s)

Contaminant sources may in some cases be able to be individually identified and measured (e.g. large point sources), and in other cases only broad identification will be possible (e.g. estimated loads generated by each land use type). Modelling is needed to identify and estimate diffuse discharges from farmland, urban run-off, native bush, plantation forests, and septic tanks. A range of accounting/estimation methods can be used e.g.

- export coefficients by land use type for sediment, N and P e.g. in the Lake Managers' Handbook (N and P) and the Waikato (sediment),
- N leaching models e.g. the Lilburne model in Canterbury which estimates N discharges from rural land uses based on N leaching models including OVERSEER and SPASMO,
- catchment models e.g. CLUES, Rotan in Rotorua
- risk factor modelling and mapping to identify hot spots e.g. LRI erosion index, recent LCR mapping of N and P leaching
- Faecal typing, isotope footprinting.

LAWF envisaged a catchment contaminant account or database that would be updated over time as land uses and discharge-related practices change.

2.18 Do you have a system to help you account for sources of contaminants?

Yes	No
If yes, what is the system? e.g. Database, spreadsheet – describe all the components that make up the system	

2.19 Does your system differentiate between point source discharges versus diffuse (non-point sources)?

Yes	No
If yes, how?	

2.20 Are the contaminants to be managed routinely referenced in consent conditions?

Yes	No

2.21 Do you have databases to understand the following influences on contaminant loads entering water bodies?

Comprehensive land use databases	Yes	No
Soil databases	Yes	No
Climate	Yes	No
Topography	Yes	No
Additional information on databases		

2.22 Do you perceive any limitations with the existing databases?

Yes	No
If yes, give examples	

2.23 Does your accounting system record the following fields for all consented point source discharges?

Commencement date	Yes	No
Expiry date	Yes	No
New consent	Yes	No
History of consent conditions (if not new)	Yes	No
Map grid reference of discharge point	Yes	No
Details of discharge outlet (i.e. culvert/diffuser)	Yes	No
Special conditions	Yes	No

if YES - what are they?		
Maximum discharge rate (normal)	Yes	No
Maximum discharge rate (contingency)	Yes	No
Measured discharge rates	Yes	No
Max contaminant discharge loads (normal)	Yes	No
Max contaminant discharge loads (contingency)	Yes	No
Measured discharge contaminant loads	Yes	No
Compliance with consent conditions (measured vs consented)	Yes	No
if YES - frequency of compliance monitoring		
Relevant data regarding the receiving water body (i.e. river flows / temperature)	Yes	No
Frequency/duration of exceedance events	Yes	No
Frequency/duration and details of contingency discharge events	Yes	No

2.24 For point sources does your system differentiate between loads of contaminants consented to enter rivers and streams and the actual loads?

Yes	No
If yes, how? E.g. Compliance monitoring, SOE monitoring, modelling	

2.25 For diffuse sources of contaminants considered important to manage in your region, how do you estimate the loads of those contaminants entering water bodies?

For example, OVERSEER modelling, GIS databases, monitoring of small catchments

2.26 Does your system allow you to understand changes in the loads of contaminants entering water bodies as a consequence of significant changes in landuse (e.g. a change from forestry to pastoral agriculture, a change from non-irrigated extensive farming, to irrigated intensive farming)?

Yes	No
If yes, how?	

2.27 Do you have any requirement or plan any requirement for dischargers of diffuse contaminants considered important to manage in your region to estimate the loads of these contaminants from their operations?

Yes	No
If yes, what are they and at what frequency do they have to report and what methodology do they use?	

2.28 If yes to 2.27, how do you validate estimates of contaminant loads arising from diffuse sources provided to Council by consent holders?

For example, monitoring and/or modelling

2.29 Do you have any requirement for dischargers of diffuse contaminants considered important to manage in your region to report significant changes in their operations that might affect the load of those contaminants entering waterways?

Yes	No
If yes, at what frequency do they have to report?	

2.30 Do you manage contaminant loads in your region by catchment or water management unit?

Catchment	WMU
If WMU – how do you provide estimates per catchment?	

2.31 Do you present information on contaminant loads through State of Environment reporting?

Yes	No
If yes, how do you analyse and report on changes in contaminant loads between SOE reports?	

2.32 What linkages/verification is there between estimates of contaminant loads (both point and diffuse source) arising from input estimates (i.e. consented loads or estimated in runoff from land) and output estimates (i.e. from measured flows and concentrations in rivers and streams)?

For example – OVERSEER modelling coupled with monitoring/modelling of river systems

2.33 Does your system differentiate between consented location and actual location of discharges?

Yes	No
If yes, how?	

2.34 Does your system handle expired consents?

Yes	No
If yes, how?	

2.35 Does your system handle consent variations?

Yes	No
If yes, how?	

2.36 Does your system handle consent renewals?

Yes	No
If yes, how? E.g. use a new ID	

2.37 Does your system handle non-operative consents? (i.e., granted but not commenced)?

Yes	No
If yes, how?	

2.38 Does your system handle consent transfers?

Yes	No
If yes, how?	

2.39 Do you have quality control systems for checking the data held in your system?

Yes	No
If Yes, What are they? set standards for returns info, validation, checking for consent duplicates	

2.40 Have you ever carried out an exercise to account for the sources of contaminant in a catchment in the region? Ask about a) E coli b) sediment/clarity c) nutrients and d) toxicants – heavy metals.

Yes	No
If Yes, what methods/models did you use? What were the strengths/weaknesses in the methods/models and how did you decide which to use? Have you subsequently improved/validated that initial piece of work? How was the information used? Do the methods/models you use identify hot spots?	

2.41 Do you develop accounts indicating the sources and loads of contaminants for your region at regular intervals?

Yes	No
If Yes, what is the timestep? (daily, weekly, monthly or annual?) If yes – can we please have an example as we would like to see what is in it and how that is presented	

2.42 Do your accounts include the following fields?

Load limit	Yes	No
Load from point sources	Yes	No
Load from diffuse sources (total)	Yes	No
Load from diffuse sources (by land use type?)	Yes	No
Other (what?)	Yes	No

2.43 How do you use the accounting information?

e.g. is it used to determine whether new consents can be issued for the catchment, to decide on any new policies and rules for the Regional Plan when it is being reviewed, as a way to focus advice and information to various discharging sectors or land parcels e.g. land manager visits?

2.44 What scale/spatial units do you use for contaminants accounting?

Region	Catchments	WMU	Other – what?

2.45 What gaps do you see in your systems that should be filled?

E.g. general database management issues, or specific data gaps

2.46 If you could start building a new system from scratch, what minimum/key elements would you make sure the system had? How long would it take to collect the necessary scientific and land use information to develop an accounting system (if known)?

For example, ???

2.47 What else do you want to tell us about your accounting systems?

Free field

Challenges – accounting systems

2.48 What difficulties and debates/tensions have you faced/do you anticipate in establishing and maintaining accounting systems?

For example, political pressures, lack of relevant info

2.49 What uncertainties may arise in these systems and how can these be managed?

E.g. uncertainties	Management approaches

2.50 Are you confident that science/evidence based methodologies have been used to underpin your accounting systems?

Very confident	Confident	Somewhat confident	Not at all confident
Comments…			

2.51 What other powers do you think you might need to collect the required information?

For example, … or none required as consents allow this

2.52 What science needs do you think you will have in order to set-up accounting systems?

For example, sort out defensible periphyton guidelines, field studies relating MCI to NNN concentrations

2.53 Do you foresee capacity issues in implementing an accounting system?

For example, loading and QA of returns onto archive

Info requirements – accounting systems

2.54 What in your opinion is the critical required information for councils to undertake robust contaminant accounting?

For example, ???

2.55 What is the minimum/core information that all councils should collect?

For example, ???

2.56 What extra (beyond core) information could be collected to improve your management of water quality?

For example, ???

3. Costs – accounting systems

These questions will be followed up with you by email of phone, by Annabelle from Enveco. Please confirm the contact person/people for Annabelle to approach for this information.

3.1 Please provide the annual costs for each process, methodology and tool you use in your accounting systems for water quantity and quality. Please indicate what you are spending now, and how these costs may increase as a result of the need to change processes etc. as a result of the NPSFM.

Please note *that the Water Directorate are trying to gain an understanding of the costs that have been (and will be) occasioned by the advent of the National Policy Statement for Freshwater Management 2011, or that may arise from implementation of the Freshwater Reforms 2013.*
In terms of historic costs, please provide a time horizon of last 3-5 (or when the policy initiative started).

Within Regional Councils, policy costs are typically split between science/research, policy development and policy implementation areas. Examples of types of costs are given below. Please provide costs according to your financial accounting system and organisational structure in place. Please provide annual costs.

- Annual RCs staff time costs
- Sub-contracting, consultancy fees
- Legal fees incurred by Hearing Processes, Environment Court etc.
- Public consultation costs, Iwi and other parties relationships costs
- Benchmarking, monitoring costs etc.
- Transaction costs such as Resource Consents updates, water trading costs etc.
- Any other costs (e.g. communications, travel, training etc.).

We are seeking indicative (order of magnitude) costs, but please be as specific as you can e.g. 2010/11: $15,000 staff time, $25,000 contract fee, etc.
2011/12: $5,000 staff time, $30,000 water quality monitoring costs, etc.
If you are not able to provide us with details of the costs on the day, could you please give us the relevant contact staff in your council (email and direct phone) for our economist to contact directly:
- For policy development costs, …
- For policy implementation costs, ...

3.2 Will costs be minimised if standardised processes or accounting systems are used?

For example, would you have staff time and sub-contracting savings etc. if there was a standardised system in place (set up nationally)? Could transaction costs or hearing costs have been reduced for any of the processes, methodologies or tools you have outlined, if there had been a standardised system in place?

3.3 What capability and capacity issues might there be in implementing accounting systems? Provide a list of bullets.

For example, related to water use data checking prior to archiving, or the cost benefit of telemetered water use information

3.4 What other benefits could there be from a standardised accounting system for all councils? Provide a list of bullets.

For example, would the implementation of the NPSFM be more cost-effective?

Costs – limit-setting

3.6 Please provide the annual costs for each process, methodology and tool you use in setting limits for water quantity and quality. Please indicate what you are spending now, and how these costs may increase as a result of the need to change processes etc. as a result of the NPSFM.

Please note *that MfE are trying to gain an understanding of the costs that have been (and will be) occasioned by the advent of the National Policy Statement for Freshwater Management 2011, or that may arise from implementation of the Freshwater Reforms 2013.*

In terms of historic costs, please provide a time horizon of last 3-5 (or when the policy initiative started).

Within Regional Councils, policy costs are typically split between science/research, policy development and policy implementation areas. Examples of types of costs are given below. Please provide costs according to your financial accounting system and organisational structure in place. Please provide annual costs.

- Annual RCs staff time costs
- Sub-contracting, consultancy fees
- Legal fees incurred by Hearing Processes, Environment Court etc.
- Public consultation costs, Iwi and other parties relationships costs
- Benchmarking, monitoring costs etc.
- Transaction costs such as Resource Consents updates, water trading costs etc.
- Any other costs (e.g. communications, travel, training etc.).

We are seeking indicative (order of magnitude) costs, but please be as specific as you can e.g. 2010/11: $15,000 staff time, $25,000 contract fee, etc.

2011/12: $5,000 staff time, $30,000 water quality monitoring costs, etc.

If you are not able to provide us with details of the costs on the day, could you please give us the relevant contact staff in your council (email and direct phone) for our economist to contact directly:

- For policy development costs, …
- For policy implementation costs, ...

3.7 Will costs be minimised if standardised processes or methods are used?

For example, would you have staff time and sub-contracting savings etc. if there was a standardised system (set up nationally) in place? For example, could transaction costs or hearing costs have been reduced for any of the processes, methodologies or tools you have outlined, if there had been a standardised system in place?

3.9 What capability and capacity issues might there be in setting limits? Provide a list of bullets.

For example, having staff to make the links between resource information and policy approaches

3.10 What other benefits could there be from a standardised process or method to help set limits for all councils? Provide a list of bullets.

For example, would the implementation of the NPSFM be more cost-effective

The End

Appendix C IRIS background and description

IRIS Background

In 2007–2008 a group of Regional Councils undertook a competitive open tender process to find application software to support Regional Council administrative computing. No suitable package software could be found, so a collaborative development project was undertaken by six Regional Councils: Northland, Horizons, Taranaki, Waikato, West Coast and Environment Southland. This group is collectively known as the Regional Council Collaborative Development Group (RCCDG). The resultant application suite is called the Integrated Regional Information System (IRIS)[4]. As at 27/5/2013 IRIS is live at NRC, is undergoing implementation at WRC and TRC, and is scheduled to be live in all six councils before the end of the 2013 calendar year.

The council group formed a not-for-profit council control organisation (CCO) called Regional Software Holdings Ltd, which owns the Intellectual Property rights, manages the contracts for supplies and services and is responsible for the on-going evolution of the product. The main reason for developing IRIS was that all member councils had systems in place that needed replacing. They felt that a coordinated approach was more likely to succeed and be affordable rather than each council investing in a new system independently.

The key drivers identified for implementing IRIS across the six regional councils were:

1. Continuity of supply.
2. Influence / control of the destiny of RC sector specific software.
3. Risk reduction.
4. Economies of scale.
5. Some standardisation of practice, or adoption of best practice.

IRIS General Business Design Concept

Regional Councils have multiple business interactions with locations (sites) & contacts (organisations & people). IRIS tries to reflect most of those relationships and data, and is not

limited to one discipline's view. This allows council staff a fuller perspective of all councils' activities at a particular location, or for a particular person or organisation.

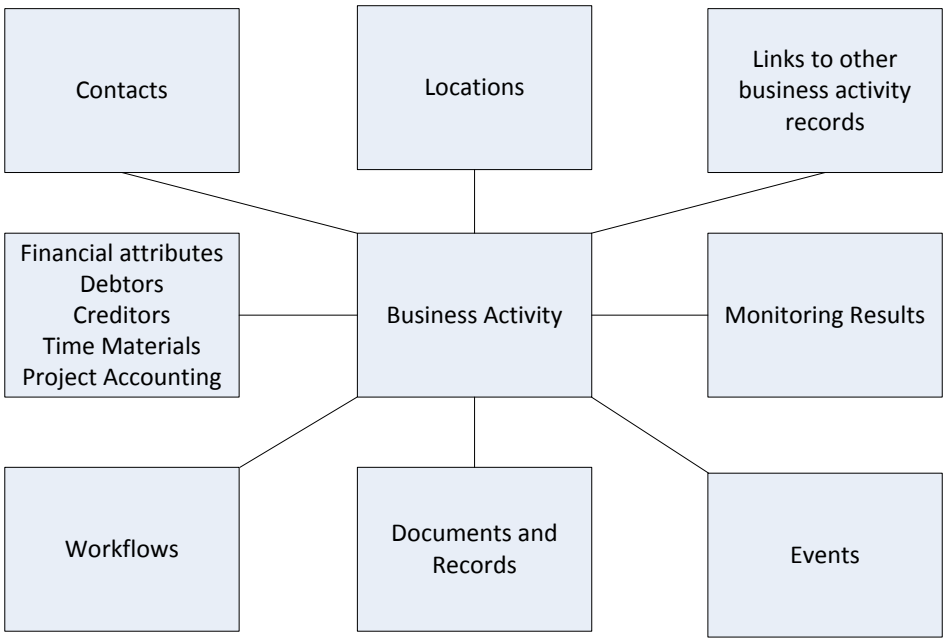


Figure C-1: IRIS business design concept.

IRIS scope

IRIS has a much wider scope than just water quantity and quality, for example it covers biodiversity, biosecurity, land management, Selected Land Use sites, etc. The items listed below are of relevance for water quality and quantity management.

- Consents & Permitted Activities
- Contacts
- Customer Service – Requests for Service, Enquiries, Complaints, Incidents
- Enforcement
- Environmental Data / Test Results
- GIS (Integration not just interface)
- Locations
- Monitoring

- Customer Web Enablement
- Disconnected devices (field)
- Reporting
- Search
- Task List
- Time Recording
- Workflow

IRIS today is more of a water quantity management tool with water quality playing a minor role, e.g. it is stronger in support of the process of getting and managing consents and compliance etc., and although it manages quality test monitoring regimes, it assumes that specialised databases manage sample results. However, the use of those functions are not limited to water, but apply to all facets of the council's consent, compliance and monitoring activities.

Based on discussions at the workshop on 22 May, IRIS may require some enhancement to cover all the aspects discussed. For water quantity, if real time monitoring of water usage is required, a front end process that handles telemetry data acquisition would be required. For water quality the assumption is that specialised result sample databases would be deployed that would not only inform IRIS for compliance purposes, but also support the further analysis across aquifers or Water Management Units, and provide for modelling and projection. The extent of enhancement depends of the complexity and scope of the requirements, and from a computer systems perspective these are not yet definite enough to estimate, or even provide an accurate indication of scale. For example, if water quantity was measured by monthly or weekly self-reporting from a site and little further analysis was required, then that could be done within the current capabilities of IRIS. At the other end of the scale, if real-time measuring of water quantity was required, there would additional costs in the order of $150,000-$250,000 at the councils end, and more costs at the site end to install measuring devices per site etc.

Issues identified

IRIS as it currently stands is not the full information management and storage answer to the issues outlined at the WRC workshop. It is likely to be an integral part of the answer for the IRIS member councils, but it is also likely that additional specialist software will be required for data acquisition (for water quantity) and for test result storage analysis and modelling (for water quality).

If a separate consent and compliance system was introduced that is specific to water issues, it is likely to introduce significant operational overheads and inconsistencies for council staff that are involved in processing and monitoring consents and other permitted activities for other purposes.