



STAFF REPORT

TO: Environment & Planning Committee

FROM: Jeremy Butler, Senior Consent Planner – Natural Resources

REFERENCE: W301

SUBJECT: **IRRIGATION MANAGEMENT PLANS (IMPS) OPTIONS AND STRATEGY FOR REQUIRING THEM THROUGH RESOURCE CONSENT CONDITIONS – EP07/02/07** - Report Prepared for 7 February 2007

1. INTRODUCTION

Water is becoming an increasingly scarce resource with ongoing development of rural land needing irrigation and increasing competition for water. Generic irrigation allocations based on water holding capacities of broad scale soil classifications are currently the norm and may be resulting in inefficient allocation and use of water. Irrigation Management Plans (IMPs) prepared as part of resource consent applications for water takes (for irrigation) are considered to be an effective tool to promote and require more efficient use of water. This report outlines both the problems arising from the present generic irrigation strategies and the benefits to be gained from requiring IMPs to be prepared as part of resource consent applications.

2. SOIL BASED APPLICATION RATES

Currently, irrigation requirements for properties are based on low resolution soil information. In resource consent applications, applicants are asked to identify the soil type(s) on their properties and their respective water holding capacities. From this water requirements for irrigation are calculated and the allocation limits are then set in the consent document.

The limitations with this approach are that:

- a) Soil information is not uniform over the district. More detailed information is available for the Waimea, Motueka/Riwaka Plains and parts of Golden Bay, and information is less detailed in other areas. Soil information is often not detailed at a property scale.

Soil water holding capacity information has not routinely been collected by Council and often only exists in generic or broad terms, water holding capacities of soils at a property scale have never been effectively mapped and the information supplied by applicants is often poor.

Soils are not generally uniform over large areas and can vary significantly across a property. If this is not taken into account in an irrigation system it may lead to either under irrigation possibly resulting in sub-optimum production, and / or over irrigation potentially resulting in wastage of water (and energy), soil leaching and the possibility of polluting ground or surface waters.

- b) Climatic conditions are not taken into account. Staffs' experience is that consent holders are doing less monitoring of existing environmental and climatic conditions now than they were five years ago and are often not adjusting their irrigation systems to reflect actual conditions. After a rain event the soil moisture content is likely to be higher than previously – and irrigation should be reduced. Also, consent holders may be unaware of how fast their soil dries out. Therefore, they are potentially unaware of the soil moisture content of their soil and may either over or under irrigate.
- c) The Council's water allocation calculations based on a per hectare amount is generally the maximum needed for the soil and does not take into account crop type, variations in soil type across a property, irrigation application methods and equipment. This approach was consciously adopted by Council to allow landowners flexibility in managing their land (by changing crop types and being responsive to market demand where necessary).

Efficient water use requires these details to be accounted for at a property level in a way that cannot be addressed through the plan. Without a good awareness of these variables it is possible that water use is not optimised.

- d) Consent holders may be unaware of the most effective and efficient rotation strategies and methods. Also improved technologies, materials and irrigation designs have been developed over time that have enabled a more responsive and efficient approach to irrigation.
- e) Council has little defensibility when allocation volumes are challenged. An IMP (as described below) would show that the consent holder knows, and is using, effective and efficient irrigation methods and that Council has actively rationalised their allocation.
- f) Up until now consents have been granted with an allocation limit without controls or requirements for the management of irrigation under changing climatic conditions, such as avoiding irrigating during times of high evaporation (i.e. hot and windy conditions). Provisions in the TRMP now recognise the need for efficient use of allocated water and include policies and rules (matters for discretion) that allow council to address these issues in more detail

3. IRRIGATION MANAGEMENT PLANS (IMPs)

An IMP sets out a strategy whereby the irrigation of a property will be managed to:

- a) Provide for maximum crop production from the land; while
- b) Minimising the wastage of irrigation water.

Generally speaking there are two major tiers of IMPs: basic and comprehensive. The common contents of each are outlined below.

Basic IMP

A basic IMP may contain the following:

- An investigation of soil types and their water holding capacities across the property to be irrigated;
- Documentation of rotation and application rates based on the soil types identified;
- Documentation of the most effective and efficient strategies and methods for irrigation applicable to that land and crop concerned;
- Collection of rainfall and evapotranspiration data for the property;
- Basic soil moisture monitoring procedures;
- Identification of irrigation equipment; and
- Programmes for leak detection, repairs and maintenance.

This type of IMP will allow more accurate irrigation application rates to be determined at different locations across the property so that more water can be applied where the soil water holding capacity is greatest, and less where the soil water holding capacity is less, thereby minimising wastage of water.

This type of IMP may also allow the consent holder to develop an awareness of the most effective and efficient ways of using his/her available water, as well as the most suitable and efficient irrigation system for the land concerned. He or she can also obtain an ongoing understanding of the moisture dynamics of the soil on the property.

If a strategy to collect rainfall and evapotranspiration data is also built into the IMP then the consent holder can adjust their irrigation to make up any shortfall in soil moisture. This will achieve a much more responsive and efficient irrigation system with very little extra effort.

However, a basic IMP does not require ongoing detailed soil moisture monitoring. While the differences in soils across the property are accurately taken into account in the design and operation of the irrigation system, the ongoing changing variables such as rainfall and evaporation are not easily taken into account. Therefore, while some irrigation efficiency improvements can be achieved, water wastage through surface or subsurface runoff may occur if rainfall has occurred or if the soil is wetter than expected for whatever reason.

Comprehensive IMP

A comprehensive IMP may contain the following:

- Soil mapping that accurately identifies soil water holding capacities across the property;
- Installation of a network of soil moisture monitoring sites across the property;
- Ongoing modelling and water balance calculations to allow irrigation in accordance with the exact moisture status and requirements of the soil;
- Documentation of rotation and application rates based on the soil types identified;
- Documentation of the most effective and efficient strategies and methods for irrigation;
- Identification of irrigation equipment; and
- Programmes for leak detection, repairs and maintenance.

A comprehensive IMP takes into account both soil variability and the ongoing variables that may affect soil moisture status such as climate (rainfall and evaporation) and crop transpiration rates.

Depending on Council requirements, this type of IMP may be as high tech or as low tech as required. Computer systems may be installed which automatically perform all necessary calculations from the soil moisture monitoring sites. The system may then control the irrigation accordingly. Alternatively, the same information may be gained manually and calculations may be performed by hand to achieve the same outcome.

Unlike several years ago, it is now relatively easy and cheap to buy basic climatic instruments and soil moisture meters and automatically feed the data into a proprietary computer programme that controls irrigation. Comprehensive IMPs are becoming a very viable and beneficial option to maximise yield and minimise wastage.

Council may require water usage records, irrigation rates across the property and water balance calculations or soil moisture results allowing full audits of irrigation efficiency to be carried out.

4. THE ADVANTAGES AND DISADVANTAGES OF IMPs

The disadvantages of implementing IMPs are:

- Increased resource consent application costs and setup costs. Compiling and implementing an IMP will often require a consultant to be engaged to survey soils and soil water holding capacities, and also to design irrigation rotation strategies and application rates. The costs of this are discussed below.

- Implementing an IMP may mean a more complex irrigation regime due to uneven application rates across the property.

As previously mentioned, there are a number of advantages in requiring that even basic IMPs be required with water take applications:

- Less water is likely to be wasted through subsurface runoff below the root zone. This will mean that either more water will be available for nearby soils with higher water holding capacities elsewhere on the property, or more water will be available for other irrigators elsewhere in the catchment, or streams and rivers will have greater flow without unnecessary abstraction from their catchment;
- Production will be maximised with a concentration of water where it is needed;
- The most efficient method of irrigation is used (for example, certain types of sprinklers are known to be inefficient and wasteful);
- Pollution of surface and groundwater resources will be minimised as fertilisers will not be washed through the soil profile to the groundwater;
- Energy will not be wasted through unnecessary pumping of water to places where it is not needed; and
- As the Council is implementing policies that seek efficient use of allocated water (30.2.9 and 30.2.17), the Council will have a more defensible position when challenged by the public because it will have a plan on file which shows that the water usage is the most efficient and practicable.

5. RESOURCE CONSENT IMP REQUIREMENTS

After discussing the matter with a range of Council staff within the policy, and resource science departments, consent planning staff intend to phase in a requirement for at least basic IMPs to be provided with water take applications. They are considered to be an essential tool for improving the efficiency of water use and for avoiding or mitigating the adverse effects on the environment resulting from over abstraction of water and over application of water to land. They are also considered essential for raising the awareness of irrigators to the most practicable and efficient methods. They also provide Council with a more defensible position when justifying allocations.

The TRMP already reserves, as a matter for control or discretion, the ability to require *“Measures to achieve efficient water use or water conservation, including ... preparation of property water management plans ...”* (TRMP Rule 31.1.4 matter number 10, and Rule 31.1.6 matter number 10). The TRMP also requires that, when applying to take water, information be provided to the Council on *“measures taken to ensure efficient use of water”* and *“measures taken to conserve water use”*. Therefore no changes are required to the TRMP in order to implement this change.

Where Council receives applications for very large volumes of irrigation water Council staff may require that comprehensive IMPs are provided.

6. COST AND COMPLIANCE IMPLICATIONS

The cost to applicants of having a basic IMP prepared that includes a soil survey, irrigation rotation plans etc would likely range from \$500 for a 10 to 20 hectare block up to \$2,000-\$3,000 for a large 100 hectare block. If IMP guidelines were to be developed by Council staff outlining the content and level of information that an IMP should contain, this cost could come down markedly. As consultants become more familiar with IMP requirements their costs would likely decrease.

The cost of developing a comprehensive IMP with associated ongoing climate and soil moisture monitoring would be somewhat greater.

Offsetting these costs is the more efficient use of water where less is wasted below the root-zone or to evaporation, and better returns are gained from under-irrigation of some areas which may potentially have greater water holding capacities.

I have discussed with Daryl Page (Compliance Officer for Water) the level of monitoring that is currently undertaken. Unless a complaint is received there is currently no checking of irrigation practices apart from the processing and maintenance of the water use returns filed by consent holders. Therefore, the requirement for IMPs would not change the nature of the monitoring that is currently done. It would however, give the consent holder a strategy and a plan to follow when irrigating, as well as raising awareness of irrigation efficiency.

7. USE OF IMPs IN OTHER REGIONAL COUNCILS

A survey of other councils was made through the Local Government Planners email list and the Consent Managers Group list.

Several other Councils use software packages that take into account soil type, crop type, localised rainfall and evapotranspiration rates to allow them to calculate appropriate water allocations. TDC staff prefer to use an IMP system because the approach simply "dishing out" allocations based on a Council computer programme is considered to be less co-operative than encouraging the production of IMPs which gives consent holders ownership and understanding of water efficiency and good irrigation practices. As is experienced at the moment in Tasman, if irrigators are given an allocation with no further guidance they may inadvertently use the water inefficiently. However, if an IMP is complied they will have greater understanding and greater buy in to using the water efficiently.

8. RECOMMENDATION

It is recommended that this report be received

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