



greater WELLINGTON
REGIONAL COUNCIL
Te Pane Matua Taiao

Wairarapa Water Use project

Potential water demand for non-agricultural uses

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1. Purpose

The purpose of this report is to provide a preliminary indication of the potential water demand for a range of possible water uses other than those directly associated with agriculture, as an input into water demand modelling for the pre-feasibility stage of the WWUP investigations.

2. Background

In their peer review document *Wairarapa Irrigation Investigations – The Way Forward* (February 2011) Heiler Consulting state “*In our opinion, restructuring this project into a water resource development that has multiple benefits and beneficiary groups is the key way forward. This will not only open up other funding options, but give a firm basis for local, regional and central government involvement*”. They go on to list a number of water uses and activities they feel may warrant consideration:

- Electricity generation
- Irrigation
- Expanded recreational opportunities associated with a dam
- Augmentation of natural river flows
- Flood mitigation
- Rural water supply
- Urban water supply
- Augmentation of groundwater resources
- Enhancement of wetlands

Project Aim No.8 (see WWUP Mission Statement November 2011) says that the WWUP will “*Maximise multiple uses of water that the project can reasonably provide for which there is an identified demand*”. The report seeks to address the second aspect of this statement by identifying potential demand for the list of possible uses put forward by Heiler (above). In addition to the uses listed, a brief assessment of the potential for industrial use is also presented.

3. Electricity Generation

Meridian Energy commissioned a report by Aqualinc and MWH (August 2009) on the proposed Martinborough South scheme. This report describes the potential for pumped storage generation of electricity inherent in this scheme. However Meridian Energy have not pursued this proposal.

Other power generating companies have also signalled interest in the WWUP.

In particular TrustPower staff travelled to Wellington recently to discuss the scheme with GWRC officers and to offer support and involvement as and when appropriate. TrustPower have experience in the design, implementation and operation of small hydro generating plants, and would be well placed to assist with the investigation of ancillary hydro electricity generation should this appear to be worthwhile.

The adopted WWUP policy of not damming any of the four major rivers means that it is unlikely that any of the bigger generating companies would seek involvement.

Note that the generation of hydro electricity does not necessarily require the involvement of an established generating company. Greater Wellington Water has recently commissioned two small hydro electricity generating plants under the provisions of the distributed generation legislation, and has developed some expertise in this field.

Note also that pumped storage generation relies for revenue on fluctuations in the spot market price, and would need to be expertly managed in order to show a return on investment. The overall efficiency would be in the range of 60% to 70%, so that about 50% more energy is consumed than is generated, which does not align with the GWRC policy of reducing its carbon emissions.

The consultant investigating possible scheme options should be asked to consider the hydro generation opportunities of sites considered suitable for storing water for water supply purposes.

4. Irrigation

It is expected that irrigation will be by far the main use of water. A detailed theoretical analysis of the likely demand for irrigation water is being undertaken by Tonkin and Taylor Ltd and farmer interviews are being conducted by GWRC staff within a sample area to determine the aspirations of the farming community.

Irrigation demand is not discussed in this report.

5. Expanded recreational opportunities associated with a dam

A water storage facility may well provide opportunities for recreation, as many of the south island hydro lakes do. Possible examples are:

- Kayaking
- Fishing
- Sailing
- Waka ama
- Bird watching

- Water skiing
- Walking, running, dog walking.

The practicability and desirability of undertaking activities such as those above would be quite site specific, and would depend on

- The size of the lake
- The micro climate (e.g. wind)
- The availability of ready access to the lake and to the waters edge.
- The proposed end use for the water. For example using the water for public or domestic water supply may mean that the risks of pollution from motorised recreation are considered unacceptable.
- Land ownership
- Cultural acceptability.

However while the creation of recreational opportunities might be attractive to the local community and might assist in mitigating environmental effects, it is very unlikely to generate any revenue.

The consultant investigating possible schemes should be asked to consider the recreational opportunities of sites considered suitable for storing water for water supply purposes.

6. Augmentation of natural river flows

It is expected that the consent conditions for any water storage scheme will require the maintenance of a minimum flow downstream of the dam. The practicability of augmenting natural river flows above this minimum flow would depend very much on the physical arrangement proposed, including the size of the reservoir and the method of conducting water to consumers downstream, as well as the size of the downstream watercourse.

While no analysis of specific sites has yet been done, it can be said that providing worthwhile benefits from flow augmentation will require a significant flow of water. The greatest benefit will be achieved during summer low flow periods, which will most likely correspond with the greatest demand for water for irrigation.

If it is decided to transmit water to customers located downstream using a natural water course, and provided the water quality is good, this additional flow may also have benefits for the river ecosystem.

The potential of flow augmentation to generate ecological benefits is entirely site dependant and should be considered as the investigation of potential storage sites proceeds.

While river flow augmentation may help mitigate environmental effects, and possibly assist in gaining stakeholder support, it will not generate revenue.

The consultant investigating possible schemes should be asked to consider opportunities for augmentation of natural river flows if the option of transporting water using existing water courses is being considered.

7. Flood mitigation

Flood detention dams seek to mitigate flooding by storing the peak of the flood hydrograph and releasing it slowly. Flood detention dams are empty for the majority of the time. This mode of operation is in direct conflict with the way in which a water storage dam would operate, i.e. it would be full most of the time.

While it would be possible to build a dual purpose dam, to be effective it would need to be a large structure, logically built in the western part of the valley to catch runoff from the Tararua Ranges, since this is where most flood flows will originate. Some preliminary studies on the Waiohine River have been conducted and these show that a very large and expensive structure is required to both store irrigation water and reduce flooding. Given the low level of development on the Wairarapa plains it is very unlikely that the saved damage costs achieved by reducing or eliminating flooding would justify a structure of this nature and size.

Flood detention in small tributary catchments would not be economic unless it protected a significant development immediately downstream. Flood detention in sub catchments is generally ineffective in reducing peak flood flows in the main stem, as the tributary flood peak will usually precede the main stem flood.

At this early stage of scheme investigation it is not considered worthwhile investigating flood mitigation opportunities.

8. Rural water supply

It is likely that rural properties supplied with irrigation water will want to use it for domestic and/or stock water supply or dairy shed use to some extent. However the water will not be treated and on farm treatment will be required if it is to be used for drinking, food preparation or sanitation. It may be suitable for stock water without treatment provided toxic cyanobacteria blooms do not occur.

The use of irrigation water for domestic use creates some issues. First the reliability must be much higher than is required for irrigation. Irrigation will be required for three to four months of the year, whereas domestic water supply will be required all year round, 24 hours a day, unless it is used to supplement a rainwater or groundwater supply.

Secondly the question of compliance with the Health (Drinking Water) Amendment Act arises. It is likely the scheme would be required to be a registered drinking water supply and therefore have to comply with the

monitoring and quality standards set out in the Drinking Water Standards of NZ. This would involve a significant testing and administrative regime if there were a large number of separate small treatment facilities on individual properties. It may be possible to treat water on a communal basis and distribute it separately, but this would require a separate pipeline and involve additional cost.

In any case the volume of water used for domestic or stock consumption would be very small by comparison to that required for irrigation, and it is expected that there will be sufficient flexibility within initial water demand assessments to provide for it.

9. Urban water supply

9.1 General considerations

The management of an urban water supply is quite different to that of an irrigation scheme. The supply of water to an urban community is an essential service, required 24 hours a day, 365 days a year. While most community water supply systems have some service storage at a raised elevation, it would be unusual for this to provide supply for more than about 24 hours. Irrigation, on the other hand is usually required to supply water only over the summer period.

The volume of water required for urban domestic supply in general is small compared to the quantity required for irrigation. According to the *Register of Community Drinking Water Supplies* (Ministry of Health) the population of the five Wairarapa townships with community potable water supplies is approximately 30,000. The peak daily water requirement for these townships would be about 15,000 m³, sufficient to irrigate about 300 hectares, a medium size farm (assuming a 5mm deep daily water application).

There is little population growth in the Wairarapa. Statistics NZ “Medium” population projection shows a net population loss of 400 or -1% over the next 20 years. The “High” project shows a net gain of 7,000 or 18% and the “Low” projection a net loss of 7,500 or -19%. GWRC generally adopts the “Medium” Statistics NZ population projections for strategic planning work, for example in planning for future bulk water supply, as they are considered the most likely to eventuate.

9.2 Masterton District Council (MDC)

Water for the Masterton Township is taken from the Waingawa River at Kaituna before treatment and transmission into Masterton. The consented take far exceeds the current normal domestic demands of the Masterton population even after a “step down” limitation is imposed.

At an interview on 12 December 2011 MDC staff told GWRC staff that MDC had adequate water available to meet the foreseeable demands of the community, based on the high likelihood of a stable population in the future. Watering restrictions are sometimes imposed in the summer but it is not clear

whether these restrictions are imposed because of a lack of raw water or because of infrastructure limitations.

MDC will be applying for a renewal of the current consent on the same terms when it expires in 2017.

MDC see no requirement for water from the WWUP within the foreseeable future. A major economic development (such as the WWUP) may alter this, but even so the currently consented take would cater for substantial population growth even if infrastructure capacity had to be increased.

Disposal of treated wastewater effluent to land is planned by MDC and there may be synergies available in this area by possibly diluting the effluent with WWUP water and distributing it through the WWUP network, if this happens to be in the proximity of the wastewater treatment plant.

MDC has control of the Te Ore Ore and Opaki water races. MDC staff pointed out that there are a number of difficulties in managing these assets, both physical and political, which would need to be taken into account in any proposal to use water races to convey WWUP water.

Appendix 1 contains a detailed record of the discussion with the MDC staff.

9.3 Carterton District Council (CDC)

The Carterton water supply is obtained from two small surface takes in council owned catchments west of the township, supplemented by two bores. CDC has recently introduced metering, which has significantly reduced consumption.

At an interview on 9 December 2011 CDC staff stated that they saw no need for water from the WWUP in the foreseeable future given the historically stable population. However a major economic development (such as the WWUP) may alter this.

CDC has similar issues to Masterton with regard to both water races and wastewater disposal, and the staff see these as areas where future integration in some form may be beneficial.

Appendix 1 contains a detailed record of the discussion with the CDC staff.

9.4 South Wairarapa District Council (SWDC)

At an interview on 28 November 2011 SWDC staff stated that the three townships within the SWDC had adequate water supplies for the foreseeable future. Greytown and Martinborough are supplied from bores and Featherston has a run of river supply from (it is understood) the Tauherenikau River or the Longwood water race. SWDC staff see no need for water from the WWUP in the foreseeable future. This assessment is based on the historically stable population in the area and may change if a major economic development (such as the WWUP) occurred.

SWDC are currently developing a three waters strategy which will deal with effluent disposal as well as the supply of potable water and the management of water races. Staff see a possibility for integration of wastewater disposal with the WWUP similar to MDC and CDC.

Appendix 1 contains a detailed record of the discussion with the SWDC staff.

10. Augmentation of groundwater resources

The possibility of augmenting groundwater resources has not been studied at this stage. Given the complexity of the Wairarapa groundwater systems and the already high degree of interconnectivity between groundwater and surface water described in report GW/EMI-T-11/53 "*Wairarapa Valley groundwater resource investigation*" May 2011 it seems unlikely that opportunities exist to provide significant augmentation of groundwater.

However if existing water courses are used to transmit scheme water it is likely that water will enter adjoining associated groundwater zones.

If transmission of scheme water by existing water channels is being considered then the consultant who undertook the modelling of groundwater in the Wairarapa, Earth in Mind Ltd, should be asked to comment on the likelihood of this water moving into adjoining groundwater zones.

11. Enhancement of wetlands

The possibility of enhancing wetlands has not been studied at this stage. Any action to enhance or create wetlands would be very site specific.

It is possible that the margins of storage lakes may offer opportunities for wetland enhancement. However it must be borne in mind that a successful wetland requires a stable water level, and the water level in an irrigation storage reservoir will fluctuate markedly.

The consultant investigating possible schemes should be asked to consider the opportunities for wetland development of sites considered suitable for storing water for water supply purposes.

12. Industrial use

A desk top assessment of 15 non agricultural enterprises known to be water users was undertaken by GWRC and Grow Wellington Wairarapa based staff. The enterprises considered are listed in Appendix 1.

The assessment concluded that while some enterprises experienced reliability issues, it was unlikely that any would take significant water volumes from a community scheme in the foreseeable future.

13. Summary

The demand for water from a community scheme from territorial authorities and industry for consumptive use in the foreseeable future is expected to be negligible.

Scheme water could be utilised for rural domestic and stock water supplies, but the volume would be very small. Such use could raise issues around scheme management and reliability and with regard to water quality and statutory requirements regarding drinking water.

Other uses such as electricity generation may provide additional revenue but their implementation will depend on the location and nature of the storage sites chosen. These uses should be considered on a site by site basis.

Environmental, non consumptive uses such as augmenting river flows, groundwater or wetlands or providing recreational opportunities will not provide revenue, but may assist in mitigating environmental impacts and encouraging public acceptance. This would improve consentability and community perceptions of the scheme.

Opportunities for development of this nature should be considered on a site by site basis.

14. Recommendations

- 1) No allowance should be made within preliminary water demand modelling for water use by territorial authorities or industry.
- 2) No allowance should be made within preliminary water demand modelling for rural domestic or stock water use, although the possibility of this happening should be taken account of in scheme management considerations.
- 3) Studies of individual storage sites and schemes should consider the possibility of electricity generation, recreational activities, and augmentation of natural river flows, groundwater or wetlands.
- 4) Any possible opportunities for enhancing groundwater should be discussed with the GWRC groundwater consultant Earth in Mind Ltd.



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Appendix 1

Wairarapa Water Use Project - off-farm demand assessment

By Geoff Copps, Sector Manager, Grow Wellington

Wairarapa Water Use Project

Date 31 January 2012

Author **Geoff Copps, Sector Manager**
Grow Wellington

Wairarapa Water Use Project - off-farm demand assessment

15. Purpose

To determine potential off-farm water demand from a range of possible water users including TLA's, to input to the water demand modelling for the pre-feasibility stage of the WWUP.

16. Background

The Wairarapa Water Use Project is an infrastructure development project designed to improve the way water is managed in the Wairarapa valley to improve community wellbeing.

This report assesses the potential demand by off-farm users, based on information gathered in November/December 2011, to input to determining a water demand volume to be used in the water demand modelling.

17. Methodology

Territorial local authorities

Interviews were held with senior management of each of the District Councils in the Wairarapa in late 2011 to discuss all aspects of current and future water demand. These meetings were attended by Bruce Geden and Alastair McCarthy of GWRC and Geoff Copps of Grow Wellington.

Other off-farm users

A listing of non-farm water consent holders (such as industry) was developed and a high level, unverified assessment made of their likely interest in additional volume and/or greater reliability of water supply. The list is attached as Appendix 1. No discussions have been held with these consent holders to verify these assessments.

18. Outcomes

South Wairarapa District Council

Jack Dowds (CEO) and Mark Allingham (Group Manager, Infrastructure and Services) – 28 November 2011

SWDC is compiling an overall Water Strategy as to date they have dealt with each of the 3 waters (potable/waste/stormwater) separately. The move is being driven from waste water considerations.

Part of this strategy is a review of stock water races. Mark Allingham will provide a copy of that review when it is completed.

The SWDC representatives advised that in terms of urban water supply, the three towns all have sufficient volume and reliability to meet their needs. Greytown and Martinborough are supplied from bores which they consider to be secure and Featherston is on a run-of-river take with some storage backup.

All towns are requiring a waste water upgrade and the Council is keen to explore land-based disposal. There may be synergies with this irrigated waste and the WWUP in their opinion.

Carterton District Council

Colin Wright (CEO), Garry Baker (Operations Manager), Stu Clark (NZET) – 9 December 2011

Water Races – the CDC would like to devolve the races to another entity that could better manage them. There is a great divergence of opinion as to their value among ratepayers/users. It is acknowledged that they are both a means of conveyance and a drain and combine man-made and natural water courses.

Urban water – demand is 3000m³/day mostly supplied from two surface takes on Council owned catchments. Have two bores to supplement surface takes. Have done a lot of work to reduce leaks in system and now have water metering.

Waste water – up for consent renewal with consent lodged with GWRC now for existing system with small enhancement. Ultimate goal is land disposal with some storage. Have identified sites for storage (T&T have undertaken preliminary assessment) including some Council owned and have spoken to owners of other sites on flat land (ox-bows) downstream from treatment. One of the sites is suitable for capture of additional freshwater to supplement and dilute wastewater, allowing greater volume for irrigation.

Masterton District Council

Wes ten Hove (CEO) and David Hopman (Assets and Operations Manager) – 12 December 2011

Waste water – seeking a Combined Plan change to control the proximity of land disposal to houses. Especially if treated to Fonterra standard.

Urban water – have run of river surface take from Waingawa River. Consent up for renewal in 6 years. Will go for same volume as no predicted growth in

demand over next 10-20 years due to stable population. Do have summer restrictions to stay within consent limits.

Water races – have races at Opaki and Te Ore Ore. Up for consent renewal soon. Believe customers want to keep them but would be happy to have some else manage them. Want to make Henley Lake a regional significant water body and not as it is currently a water race which would remove the water take restrictions it experiences.

Other off-farm users

The assessment of the other off-farm users water demand was based on personal contact by Greg Ordish over the past 5 years. It is considered that the off-farm water consent holders were facing some issues around reliability but that they were not likely to generate meaningful demand in the medium term.

19. SUMMARY

Potential water demand from urban water users via TLA's = negligible over the next 20 years.

Waste water synergies with WWUP = possible (subject to separate assessment)

Rural water race synergies with WWUP = likely

Off-farm water take demand = negligible

Report prepared by:

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Off – Farm Water Users

Henergy Eggs – Te Ore Ore (faces quality and quantity issues)

Wairarapa Aggregates – Waiohine River (15 l/sec), Tauherenikau River (16.5 l/sec) and Waingawa River (6.3 l/sec) – all have reliability issues

Juken NZ – Waingawa

Treeline Timber – Waingawa

McCarthy's Truck Wash – Waingawa

Oldfields Metal and Bark Plant – Waingawa (3 consents totalling 28.1 l/sec) – reliability issues

Malneek Sand Plant – South Wairarapa

Parkvale Mushrooms – Parkvale (water quality issues)

Kintyre Meats – Gladstone

Parkvale Meats – Parkvale

Premier Beehive – Carterton (2.3 l/sec)

Geoff Chandel – Carterton

Hansells Food Group – Opaki

David Sawmill – Featherston

Golf Courses – Martinborough, Featherston, Carterton and Masterton (2)