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Committee Strategy and Policy Committee
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WWUP update

1. Purpose

To update the committee on the Wairarapa Water Use Project (WWUP) prefeasibility work programme – Review Point #1 investigations.

Additionally, a verbal presentation will be provided to give an overview of:

- The Board of Inquiry decision on the Ruataniwha Water Storage Scheme consent and Tukituki Plan Change 6 outcomes and its implications for WWUP
- Catchment modelling framework to test land and water policy options.

2. Modelling framework

This work is being undertaken by the Greater Wellington Regional Council (GWRC) Environment Science team primarily for the Whaitua process.

Importantly, the modelling provides a values-based assessment framework for a range of criteria such as aquatic ecology and land use intensification. This assists understanding of the impact of WWUP on a range of community values.

The modelling work is a way of “front loading” investigations. Current data and other information are used to undertake values-based assessments. During the values-based process, if an area is identified that does not have enough data, then the science programme can be developed so as to answer the relevant questions.

A verbal presentation will be provided as a way of introducing this work.

3. WWUP prefeasibility review point #1

WWUP has recently completed prefeasibility investigations in Review Point #1 which encompasses the following:

- Use of rivers for conveying
- On-plains storage investigations
- Command area review
- Review point #1

4. Use of rivers for conveyancing

WWUP has recently completed an initial investigation and assessment of both the Tauweru and the Huangarua rivers' ability to convey water from the proposed Tividale and White Rock Road reservoirs respectively. The first of these schemes relies on the river as the sole means of conveyance mainly due to the distances involved, such that it would likely be a fatal flaw if it could not do so. On the other hand, the White Rock Road scheme can pipe water from the reservoir.

The investigation measured the concurrent stream flow gaugings in the two rivers to identify potential major flow losses (or gains) from the river bed that could affect the viability of flow delivery options. This included an assessment of potential 'leakage' along the reaches of interest by comparing gauged flows and incremental catchment area, accounting for tributary inflows (either gauged or estimated) and any significant abstractions.

To determine their suitability for conveyancing, concurrent low flow gauging programmes were conducted by GWRC field staff on the Tauweru River between 19 and 24 February 2014 during reasonably low to medium flow conditions. This entailed monitoring the flows of the main stem as well as its major tributaries to establish the nature of flow/losses to groundwater.

Likewise, concurrent low flow gauging was conducted on the Huangarua River on 13 March 2014 to assess losses to groundwater, time delays in delivery, and flow ramping losses. At that time, the river was under low to medium flow conditions.

The field work approximated the level of losses and gains from flushing flows down channels. The costs and other considerations are assessed later in the project to optimise river intake structures locations. These factors will then be built into the relative viability considerations of the schemes.

The second part of this investigation was to review the potential for losses to groundwater, time delays in delivery and behaviour of the water as water is introduced to a catchment system.

With respect to the Tauweru River, it was concluded that there will be lag times of 1.5 to 3 days, mainly depending on the flows in the river. Some of the water released into that river will not be available for irrigation or other uses as

it will be used in reaching equilibrium between the body of water in the river channel and the surrounding lands, i.e. naturally occurring groundwater.

In terms of the Huangarua River, it was concluded that the travel time from the storage reservoir to the intake would be in the order of 6 to 8 hours, and therefore issues such as time delays, and the water used in reaching equilibrium as the flows ramp up and down that will be encountered in the Tauweru River, will not be so evident in the Huangarua River.

4.1 Conclusions

4.1.1 Tauweru River

To quote from the peer review with respect to the Tauweru River characteristics, *“the conclusion that there is no significant flow loss (or gain) upstream of Te Kopi Road End is consistent with a hydrogeological understanding of the catchment.”*

Further, the peer review stated that *“It would be advisable therefore to perform additional gaugings on the entire river reach considered for conveyance to increase confidence in the suitability assessment.”*

4.1.2 Huangarua River

Similarly the peer review with respect to the Huangarua River stated, *“Since the valley is relatively restricted and underlain by older alluvial material (lower permeability) above Hikawera Bridge, it is not considered that the river could lose significant quantities of flow to the aquifer.”*

It then goes on to add, *“... this assumption should be confirmed through additional investigation. A significant problem in this area is the lack of groundwater level monitoring data – if this conveyance option is considered feasible, monitoring sites need to be established.”*

In summary therefore, based on the level of investigation conducted, both the Tauweru and Huangarua rivers definitely have potential to convey storage waters at least to a point downstream where it is suspected that significant losses may be incurred in each case. Equally, these initial conclusions are subject to further field investigations being conducted.

In addition, based on the information gleaned, it is anticipated that no further field investigations are required with respect to conveyancing for the prefeasibility phase.

5. On-plains storage

The project has undertaken a concept (very high) level investigation of on-plains storage. This work has been conducted by Opus International Consultants.

On-plains storage is the storage of water in man-made ponds on the Wairarapa plains instead of or in partnership with storage in the surrounding hills.

For the purposes of this investigation, some of the key assumptions were:

- The target command area would be irrigated (57,100 ha gross or approx. 40,000 ha net)
- Each pond would hold 2 million cubic metres (MCM) (a 'single fill' for the season)
- 110 lined ponds, each being 450m square, 10m deep
- The combined live storage would be 219 MCM (based on Variant 1)
- Each pond would nominally irrigate 526 ha
- Filled by gravity from the nearest available water source
- Gravity and pumped distribution to provide pressurised water at the farm gate
- Land purchase costs averaging \$25,000 per ha (estimated by a Wairarapa real estate agent).

5.1 Conclusions

This investigation studied just one of many options available. Generally speaking, the larger the pond size, the less cost of water per cubic metre. For example, at the scale of ponds studied, if the pond volume was double the volume assumed, the cost per cubic metre drops by approximately 20%.

Based on the preliminary information there are associated benefits and disadvantages; in general, the scale of these ponds makes them more flexible, able to easily staged, avoids damming rivers or streams, lower physical profile (averagely 50% below and above ground level), manageable and responsive. Conversely, hydroelectricity opportunities would be few, evaporation losses would be higher, and because they involve multiple sites, multiple functions such as construction sites and operational matters would need to be repeated.

In summary, based on the work conducted, it is concluded that on-plains storage is a potentially viable water storage option in the Wairarapa valley situation. Further high level work could be usefully conducted on this in parallel with the existing valley storage schemes so they could either supplement or replace storages.

6. Command area review

Dr John Bright (Aqualinc) has led a brief review to determine whether the target command area (the area within which water could be reticulated) was still appropriate for the project's Prefeasibility phase.

Dr Bright's work concluded that:

"..... the methods used to generate the maps of priority areas are logical and that, if anything, the T&T map is likely to be under-reporting the size of the high priority area in the East Carterton zone.

I base this last point on my expectation that few people understand the implications to water supply reliability of the changes in groundwater take management. Water supply reliability will deteriorate for the groundwater takes that go onto surface water take restrictions. Thus the benefits of reliable scheme supplied water will be greater than I suspect is realised at present.

The modified boundary of the High priority scheme in the Carterton area that I recommend further investigations be based on is shown outlined in red in the following figure."

In terms of the broader project investigations, the total demand command area remains unchanged with respect to continuing investigation of the five preferred schemes.

7. Reports

The following reports document the investigations for workstream #1 and are available on request or can be found on the WWUP website at www.wairarapawater.org.nz.

Conveyancing:

- *"WWUP – Potential Use of Rivers for Conveyance; Analysis of Flow Gaugings of Huangarua and Tauweru Rivers"* – 31 March 2014, Tonkin & Taylor memo
- Independent peer review of Tonkin & Taylor memo for WWUP – Mark Gyopari
- *"WWUP - Potential Use of Rivers for Conveyance; Comments on Potential Time lags and Flow Ramping Losses"* – 15 March 2014, Tonkin & Taylor memo

On-plains storage:

- *"Preliminary Assessment of the Option of 'on-plain' storage"* – March 2014, Opus International Consultants

Command area review:

- *"Command Area Review"* – 22 April 2014, Dr John Bright (Aqualinc)

8. Review Point #1

As discussed above, the three investigations, namely:

- Use of Rivers for Conveyancing

- On-plains storage investigations
- Command area review

did not discover anything that would suggest a fatal flaw for any of the five preferred schemes or a change to the programmed investigations at this stage of the prefeasibility phase. The information gathered in all cases will be most useful background to the remainder of the decision making processes.

9. Investigation findings

- That based on the investigations conducted, both the Tauweru and Huangarua rivers have the potential to convey storage waters as a means of distribution, and will not require any further field work until the feasibility phase investigations.
- That the concept level report on on-plains storage concluded this it is a potentially viable water storage option and that a further iteration of work could be conducted during the prefeasibility phase investigations in order that costs and the practicality of on-plains storage can be compared with the five preferred valley storage.
- That the target command area remains unchanged, and in particular the extent of high priority demand is likely to be more extensive than initially indicated in previous stages of the project.

10. The decision-making process and significance

No decision is being sought in this report.

11. Recommendations

That the Committee:

1. *Receives the report.*
2. *Notes the content of the report.*

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