Tonkin & Taylor

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WWAC/TDC
C/- Tasman District Council
Private Bag 4
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Attention Joseph Thomas

Dear Joseph

Feasibility Studies into Water Augmentation
For the Waimea Plains Preliminary Storage Options

We enclose a preliminary map of possible storage (and infill) arrangements which our technical team has listed on a preliminary basis. Most but not all were inspected on Thursday 9 December 2004, access to some being barred by locked gates (Sites 3, 4, 11, 13, 14).

A comprehensive approach to identifying possible storages has been adopted in this first instance. The next step is to cull the list down to a few of the apparently most competitive options and undertake a preliminary fatal flaws review including broad environmental and cultural issues, hydrological characteristics, and indicative costs. Before doing that exercise, however, we seek your views on options which may not be viable from WWAC's perspective.

The Wai-iti River source, or storages in the Wai-iti catchment, are excluded from our present brief from WWAC. However, apart from Upper Wai-iti storage possibilities previously identified, we have identified lower Wai-iti possibilities that the team has included in this initial report to WWAC for completeness. Any storage in the Waiti can be utilised to supplement the Waimea aquifer (maybe needing a transfer to the Wairoa at gorge?) and extend out the area of new irrigation, which is included in the brief.

We noted in our proposal that the best solution may involve more than one storage and we have kept in mind that, at least conceptually, storage for consumptive use could be separated out from storage for riparian flow enhancement, plus adding further flexibility to potential solutions.

Our technical team, at this stage without any input from the environmental or cultural specialists, feels that the off-river type storages deserve strong focus because they may involve considerably fewer environmental issues, have considerably reduced diversion and spillway requirements, are all in open country, have much better storage characteristics than any of the on-river storages, are in the Moutere Gravel Formation (with the exception of site 5A) which is favourable for earth dam construction, and will therefore lead to much reduced

dam costs. Pumped transfer systems for infill is the corresponding negative, but a reasonable amount of local catchment capture is achievable without excessive pumping. If an on-river dam is part of the solution and add-on hydro is cost effective, the whole solution may be self sufficient in energy and avoid future energy price shocks.

Without prejudicing outcomes and recognising that WWAC may have good reasons to exclude some possibilities, the team's initial reaction is that the following would be top contenders:

- Pigeon Valley North (Site 2) with infill ex Pigeon Valley South (Sites 1A or 1B) and Wai-iti (in principle also by gravitating Wairoa water in a pipe from the Pig Valley Saddle).

- Church valley (Site 5) with infill ex Wairoa, and integrating Pig Valley Stream (site 5A) via two stage pumping and intermediate storage (potential to recover around 40 – 50% of pump energy).

- a storage on the Lee River (Site 10A or 10B and/or 11), ideally with cost effective hydro

Those which appear likely to be ranked lowest and without considering ecological impacts, are:

- No. 4 - poor storage
- No. 7 - berry farm and camp area at head of storage may be constraints
- No. 8 - some 8 or so residences affected plus a reasonably well used stretch of road
- No. 9 - to achieve reasonable storage, impinges closely on twin bridges area
- No. 10A - impact on TDC recreational area an issue?
- No. 12 - relatively poor storage and high cost
- Nos. 14/15 - poor storage

It is commented that the site immediately downstream of the Wairoa – Lee confluence is not included on the basis that it has large impact on infrastructure, would be comparatively quite expensive because of diversion and spill requirements and possibly could also be a problem to consent and is assumed to be fatally flawed?

Site 13, the preferred site from the previous study by MWH, will result in an expensive dam to achieve the scale of storage anticipated to meet ultimate objectives or contribute significantly to required storage. It is noted that diversion and flood passage requirements will be substantial and there is no apparent convenient source of earthfill nearby. The likely dam type would be concrete or concrete faced rockfill because of material availability considerations, the tight site and risk exposure during diversion.

It is worth noting when you consider the sites marked, that a wider but lower dam is usually less costly than a narrow but higher dam. This is because the dam structure volume is a function of height squared, diversion costs are almost a function of weight squared due to both length and stress considerations, the spillway is a function mainly of height, but the energy dissipation structure cost is at least a function of height squared. A wide shallow valley can give a better result despite the dam crest length.

With the exception of two or three sites, the potential storages are drawn on the basis of about a 40 m dam height. While somewhat arbitrarily chosen, this height enables a quick visual appreciation of comparative storage potential. Most of the useable storage is near the top of the dam. This aspect also highlights a matter we will need to consider, which is how much extreme drawdown we will be permitted under consents for any large storage, particularly one which is on-river. This factor will impact on dam height and comparative worth.

We look forward to your advice re any of the numbered storages which we should exclude in preparing our proposed shortlist for the preliminary fatal flaw analysis. We propose adopting a fairly basic matrix of key aspects in preparing the shortlist.

Yours faithfully

John Grimston
Project Director

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