Wairarapa Water Limited

Wakamoekau Community Water Storage Scheme
Pre-feasibility review report

Wairarapa Water

August 2019

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Contents

***Note** – Detailed Report Appendices are being held by WWL for consideration in future workstreams.

Executive Summary

"Based on the review Commercial Information and it's its subject matter experts have undertaken, the WCWSS Project appears to be viable"

Commercial Information has been commissioned by Wairarapa Water Limited (WWL) to provide a view on the viability of the proposed Wakamoekau Community Water Storage Scheme (WCWSS, or the Project or the Scheme). Commercial Information notes that the work undertaken on the Project to date has reached a 'Pre-feasibility standard'. This view is based on Commercial Information and its subject matter experts having addressed the following questions:

- Is there a clear set of Project drivers and do they aggregate to create a clear value proposition?
- Can the value proposition be **validated** through a clear and compelling case for **water demand,** and is the water affordable to justify further investment into the Commercial Information
- Are the technical foundations of the proposed WCWSS robust?
- Can capital be raised to fund each stage of the development, and if so, what capital structure best supports this?

This report should be read in conjunction with all internal and external appendices.

Commercial Information view on the WCWSS value proposition in the face of climate change

A combination of drivers suggest that the status quo of water resources in the Wairarapa Valley, which are currently based on surface and ground water abstraction cannot be sustained, there is a need for systemic shift in water use policy settings. This is because:

- Water sources in the Wairarapa Valley are considered fully or over-allocated, there are no additional sources of water available for alternative uses;
- Forecast increase in demand for water due to climate change and the re-prioritisation of water for environmental and amenity purposes; and
- The greater need for water reliability across all user groups; urban, industrial and agriculture. For these users, the capital at risk creates a strong case to support the development of a community scale water storage facility. In addition, greater water reliability will facilitate a shift to higher value land uses where the climatic conditions and soil type support such a shift'.

Value judgement

- In Commercial Information view, the proposed timeframe for progressing this Project into a full-scale infrastructure development is ideal. Validation of this view will be measured by the success in raising local funds for the next stage of the Project, assuming a decision is made to proceed.

Where to next?

- As part of initial report an indicative route to financial close is outlined i.e., reaching full feasibility, followed by consenting and procurement.

Executive Summary

Water affordability and demand?

Is this view validated in respect of underlying evidence of water affordability and water demand?

Water affordability

WCWSS water will be affordable for the range of uses contemplated; urban, industrial, horticulture and agriculture. Horticultural and arable land uses are expected to have a greater ability to fund a range of water prices, more so than pastoral only land uses. Commercial Information notes that water contracts will need to be 'take or pay', customers will contract for supply of a volume of water and pay for that volume regardless of how much is used. This is the standard contractual arrangement within irrigation infrastructure in New Zealand.

Demand

Commercial Information assessment is that water demand for the WCWSS will be strong, and higher than that assessed in 2016. Furthermore, Commercial Information estimated uptake (the base case) may well be **conservative.** This increase in assessed demand is driven in part by increased community awareness of the drivers of change (identified above) and by a view that water needs to be delivered (as a matter of priority) where demand is highest within the Wairarapa Valley. The forecast water uptake assumed at financial close is ~59% and within 10 years of financial close, it is assumed demand will exceed available supply by ~50%.

Are the technical foundations of the proposed WCWSS solid?

Commercial Information and its advisors (subject matter experts) have addressed this sequentially by focusing on the inflow hydrology, then the reservoir engineering before turning its attention to:

- Determining if the WCWSS is 'consentable'; and
- What is the best approach to construction procurement?

Inflow Hydrology

Commercial Information believes WCWSS's inflow reliability can be improved relative to earlier assessments. This assumption needs validating through reassessing the rainfall in the catchment headwaters, adding GWRC climate station data into the assessment parameters and exploring available water from other sources such as the Mikimiki Creek. Actual hydrological measurements in Wakamoekau Creek suggests there is up to 10% more water available water than assessed in pre-feasibility through 'synthetic flow modelling'.

Reservoir engineering

Work undertaken to date is at a pre-feasibility standard, for both the dam, inflow structures and distribution network. To consent and procure the Project the engineering design needs to be advanced to a point whereby the proposed dam design is produced that deals with the material risks such as dam breach, reservoir induced seismicity and reservoir leakage. These issues are typical for a project of this type and need to be addressed to determine technical viability.

Executive Summary

With respect to reservoir inflow infrastructure and distribution network infrastructure, further design work is required at the time a constructor is engaged and/or tenders for the work. For consenting purposes, WWL will need to have locations and estimated water volumes (for release, and/or takes) together with identified water courses.

Is the WCWSS consentable?

Consenting water storage schemes is a complicated. Notwithstanding this, the regional and District Council planning frameworks anticipate the development of community water storage projects. Furthermore, water storage can help mitigate environmental challenges that are expected to emerge as a result of the implementation of GWRC's Ruamāhanga Whaitua freshwater planning process.

On this basis Commercial Information advisors, Commercial Information, believe the WCWSS is consentable. In addition, Commercial Information believes there is a strong case for commencing lodgment of the consent in early-mid 2020 to ensure the implementation of the Whitua recommendations into GWRC's planning framework accommodates a water storage component. If this timeframe is to be met, those other workstreams that support the consenting process should be advanced with urgency i.e., engineering.

Construction procurement

Commercial Information together with Commercial Information has formed the view that the preferred method of construction and procurement should commence early in the development cycle and is crucial in terms of defining and managing risk through the feasibility, procurement, development phases, together with the capital raising.

A market sounding process with five leading contractors in the NZ market was undertaken to determine the markets appetite for participating in the Project as well as identifying current issues in the constructor market. This knowledge will influence how best to manage procurement function within the Project that will hopefully lead to the optimal value for money.

The key market findings include:

- There is significant interest in the Project from the construction market, whilst Project timing will fill potential gaps in forward work orders;
- A wide range of views exist on what is the preferred procurement method, ranging from alliance style contracts to public private partnerships (PPP's), views driven by individual contractors own perceived competitive advantage for the Project;
- WWL's success will be highly dependent on contractors having confidence that the Project is real, regardless of what procurement method is used;
- All contractors believe that a clearly enunciated procurement approach (from the onset) will lead to a competitive outcome; and lastly
- Recent infrastructure projects procured in the New Zealand market has created certain legacy risk issues for WWL, constructors will not assume nor price 'unknown or unquantifiable' risks.

Executive Summary

Project development path

This will comprise the following steps:

1. Complete the current work streams (largely Pre-feasibility) to reach full feasibility, being the point at which WWL decide the Project is a go, no go, or modify decision (referred below as Phase 1);
2. Commercial Information;
3. Commercial Information
4. Commercial Information

Commercial Information believes that steps 1 and 2 can be completed by Commercial Informatio, provided capital can be raised to finance each step. The approximate quantum required will to complete steps 1 Commercial I is Commer % of the total capex required. During step 1 work will be undertaken to develop the commercial entity(s) required to manage risks and provide confidence to investors.

Proposed capital raising process and capital structure

Commercial Information recommends capital be raised separately in each of the three Phases from the following sources:

1. **Phase 1: Pre-feasibility and feasibility:** A combination of Provincial Growth Fund (PGF) and community funds through a combination of grants and/or donations;
2. Commercial Information
3. Commercial Information

Commercial Information believes each capital raising step, assuming it is successful will (progressively and cumulatively) validate the Projects viability.

Executive Summary

Considerations for PGF investment criteria

As proposed, WCWSS is a small-scale community scheme which will, if it proceeds, provide reliable water to multiple users across the Wairarapa Valley:

- It is proposed that water is released during summer low flow periods down the Ruamāhanga River, including those 'stressed reaches' identified in the Ruamāhanga Whaitua process (RWP);
- Urban potable and amenity water be provided to both the Masterton and Carterton District Councils (who are currently assessing their own requirements). Whilst not included due to the perceived cost and subject to further work, potable water may also be provided to the South Wairarapa District Council; and
- Industrial and agricultural users are becoming concerned with water security as the RWP recommendations are progressively implemented. The impact of the RWP recommendations is a re-prioritisation of water for environmental and amenity use at the expense of current water abstractors. WCWSS offers a robust and proven solution for addressing the lose of reliability by existing abstractors as well as a mechanism to facilitate the migration of water to the highest value user.

PGF criteria includes supporting water storage schemes that over time will drive a shift to higher value land uses. This will be achieved through the following mechanisms and proposed design features:

- A water pricing strategy that includes a volumetric charge that provides both an incentive to deploy water conservation technologies and pursue land uses that use comparatively less water, such as horticultural enterprises;
- A transferrable water access contract which enables water to seamlessly migrate over time to the highest value user as opposed to being permanently attached to a property title; and
- A distribution network that allows WWL to transport water to those areas of the Wairarapa Valley suited to high value horticultural use.

In addition, WCWSS represents an opportunity to capture regulatory efficiencies. Assuming all users of WCWSS water, under their respective water access agreements are consented through a 'global consent' Commercial Information
In addition, through its water access agreements, WWL will have a broader range of levers to ensure higher levels of compliance.

Executive Summary

Proposed capital structure

Commercial Information recommends WWL adopt a limited liability company structure for the following reasons:

- Limited liability companies are proven and flexible vehicles through which to raise equity from both water users and non-water users, such as institutional investors. Flexibility will be important as WWL moves through each Phase of the Project;
- The trading banks are more familiar and often most comfortable with limited liability companies from a credit risk perspective;
- Limited liability companies are scalable in the event synergistic infrastructure opportunities present themselves to WWL; and
- Liquidity mechanisms can be readily adopted should foundation investors (such as the District Councils) wish to recycle their invested capital.

Commercial Information notwithstanding WWL is a limited liability company, as is the case with Commercial Information

Overall view

Based on the information available, in the view of Commercial Information and its subject matter experts **the WCWSS Project is viable**. This is based on the key drivers for the scheme, as outlined below:

- Clear evidence of water demand;
- Confidence in the underlying technical fundamentals i.e., hydrology and what needs to be progressed in the engineering design;
- Confidence that the proposed scheme is consentable and constructors are genuinely interested in participating in the Project; and
- A growing awareness and understanding within the local Wairarapa communities of the benefits from a small scale, community-based storage scheme would deliver the community in the face of climate change, in particular re-prioritisation of water to environmental and amenity users at the expense of the current abstractors.

WCWSS Description

The WCWSS is one of three potential schemes developed to a prefeasibility stage by GWRC. The focus of this review is the non-staged WCWSS only Scheme [redacted]. This version of the Scheme would restrict any future ability to extend the scheme to include Black Creek.

The core principle for water storage reflected in the WCWSS proposition is to store water when it is not required i.e., in winter and to distribute it when it is required i.e., in summer.

The pre-feasibility work contemplates building a reservoir capable of storing 18.8 M m^3 of live water storage to supply of 28 M m^3 for consumption in a given supply year.

The pre-feasibility assessment focused on environmental, recreational, cultural, horticultural and agricultural use as the primary drivers, bearing in mind that another tier of uses i.e., urban and industrial would be an integral part of the overall water use profile.

Filling the reservoir assumes approximately one third (33%) of the water comes from WCWSS creek catchment with the balance being pumped from the Waingawa.

The WCWSS includes a theoretical piped water supply network capable of supplying ~8,100 ha in close proximity to the reservoir. This is likely to be adjusted to mix of 'run of river', distribution, piping and pumping. There may or may not be capex savings arising from this adjustment.

As at 2016 the Scheme was estimated to cost approximately $[redacted] (non-staged). This did not include development costs. This assumes a P50 price rating. **The current estimate is that the scheme, excluding development costs, is ~$[redacted].**

Figure 1. highlights the reservoir location.

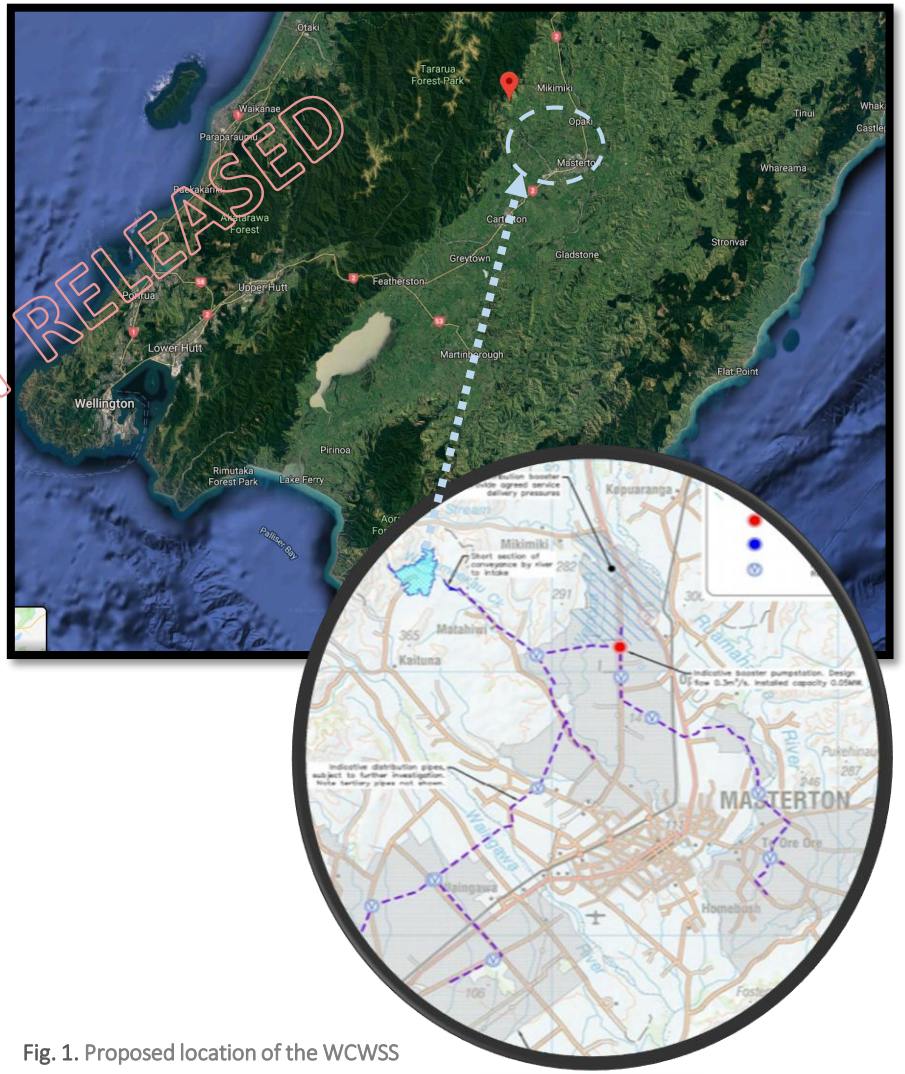

Fig. 1. Proposed location of the WCWSS

Method

Structure of the Report

For ease of reading and assimilation this report has been structured as follows:

- **Overall assessment of the proposed WCWSS viability which address the following questions:**
  - Is there a clear value proposition for the WCWSS?
  - Is water demand validated?
  - Is the product of the scheme (reliable water) sufficiently secure, and can the scheme be built? and
  - Can capital be raised at each stage of the development?
- **Detailed reports covering:**
  - Water demand and affordability;
  - Reservoir in-flow hydrology;
  - Reservoir engineering and risks;
  - Project consentability;
  - Construction procurement;
  - Project development path;
  - Proposed capital structure and capital raising issues;
  - Feasibility, procurement and development steps; assuming the Board of WWL decides to proceed and capital can successfully be raised for each successive phase i.e., through full feasibility, consenting, procurement, construction to operations.
  - Exclusions, this review does not assess all aspects of what might ultimately be the shape of a WCWSS i.e., in particular the engineering issues associated with reservoir water intake options and water distribution. The reasoning is that engineering solutions in these areas will not materially affect viability and can be most sensibly considered and optimised in subject assessment stages.
- **Other appendices**

WCWSS Review Study Method

Review methodology

- The assessment of the proposed WCWSS has involved three main components:
    1. A commercial review with a focus on water demand and potential capital structures;
    2. A technical review with a core focus on hydrology, engineering and consenting viability; and
    3. Commercial Information
- The review has utilised personnel with substantial technical and commercial experience in both developing and assessing projects of this type. The primary information sources have been:
    - previously published information i.e., information developed through the pre-feasibility phase undertaken by GWRC; and
    - discussions with key personnel from the pre-feasibility phase.
- The team has then applied expert judgement to form a view on the state of the WCWSS from a viability perspective, identified information gaps and what is required to solidify the Scheme's viability.
- Initial views formed by Commercial Information and its team of experts have been 'socialised' through interaction with the WWL Board and local stakeholders including Councils, industrial water users and farming and horticultural representatives. This process has ensured that the findings from each Project stage have been tested and refined interactively prior to writing this report.
- See appendix 2 for the review Project framework, target outcomes and review Project personnel.
- Appendix 3 contains a list of all consulted parties and interactions.

Assessing viability

- Answering the following questions is fundamental to assessing the viability of the WCWSS and can be summarised as follows:
    - Is there a clear set of drivers for the Project and do they aggregate to a clear 'value proposition'?;
    - Can the value proposition be validated i.e., through a clear and compelling case for water demand and water affordable which in turn justifies further investment in feasibility, consenting, procurement and development?;
    - Considering that the product of the WCWSS is a reliable supply of water for a mix of purposes, are the 'technical foundations' of the proposed WCWSS solid?; and
    - Can capital be raised to successfully and efficiently fund each subsequent development phase? If so what form of capital structure best enables this?

WCWSS Value Proposition

Wairarapa Water

WCWSS Project Drivers and Value Proposition

Water Storage Principle

The core principle for water storage reflected in the WCWSS proposition is to store water when it is not required i.e., collect water in winter and distribute it in summer.

Timing

Developing community scale water storage schemes, as opposed to 'on-farm storage', is a complex undertaking. In principle this type of water storage offers far greater socio economic and environmental benefits than smaller scale on-farm storage, but successful completion and delivery relies on a complex mix of environmental, commercial and public factors. There is an element of timing within this, whereby enough material success factors emerge and converge to create a 'window of opportunity'.

Key drivers

Through the 19 years of investigations into water storage in the Wairarapa, the environment for considering and initiating these projects has advanced:

- The main initial driver for considering storage schemes was economic i.e., irrigated agriculture is substantially more profitable than unirrigated or dryland and in principle, there is water available provided it can be accessed, stored and distributed efficiently;
- Trends in national environmental regulations are increasingly restricting access to water from surface and surface connected groundwater sources through regulatory instruments that lift flow cut off points (minimum flows) and connect both surface and ground water abstraction to those flow cut offs;
- Since 2012 there have been limited consents granted for abstraction of both surface water and ground water (during summer low flow periods) in the Wairarapa Valley on the basis that the catchment is considered 'fully or overallocated' i.e., further emphasising the need to shift to stored water;
- An increased focus of regulation designed to maintain and improve water quality. This is creating hurdles for lower value and poorly managed farming activities and emphasising a shift to higher value land uses such as permanent horticulture along with improved management;
- A collaborative freshwater planning process and the Ruamāhanga Whaitua process were completed in 2018 recommending lifting minimum flow levels for some rivers. These are forecast to significantly increase water restrictions within the region. Unreliability at this scale does not fit with high value land use dependent on water and will have a detrimental impact on economic activity;
- A climate change assessment for the Ruamāhanga by Commercial Information suggests that a warming trend is already in place (over the past 20 years) and is set to continue, and as such irrigation water demands driven by increased evapotranspiration are set to rise by 15% by mid-century and 30% by the end of the century.
- From a water consumption perspective the combination of both the Whaitua process and climate change forecasts has highlighted the fragility of Wairarapa Valley's urban and industrial water supplies in addition to those for irrigation.
- In 2018 the four District Councils contracted Commercial to undertake an assessment of the need for an integrated water management strategy in the Wairarapa. This work has helped solidify the need for a storage scheme that serves all water uses.

WCWSS Value Proposition

Value proposition

- The combination of these drivers suggests that the status quo of abstraction and use of Wairarapa's water resources cannot be sustained and there is a need for systemic change. The combination of drivers i.e., no additional access to traditional sources of water, increased demand through climate change, the shift to higher value land uses and a greater need for reliability across all user groups (all of whom have a combination of social, business and financial capital at risk) creates a strong value proposition for a community scale water storage facility.
- Given climate change trends suggest a shift in water demand based on increased evapotranspiration, a staged scheme development which ties in with the work undertaken to date on water storage sites is appropriate.
- WWL has, via the PGF, been funded to assess the 'viability' of the WCWSS Project. There are also indications that a substantial contribution to further feasibility, procurement and development work may be partly funded by the PGF but on the proviso that there is a substantive contribution from the Wairarapa community and alignment with investment principles.

Value Judgement

- The timing for progressing into a full-scale development process for the proposed WCWSS appears favourable, as favourable as it has been in the almost 20 years of investigations and endeavor to-date.
- Validation of this view will be measured by the success in raising local funds for the next Project phases, assuming a decision is made to proceed.

Demand

WCWSS Viability - Water Demand

Context

- The WCWSS is capable of supplying 28 M m^3 of water at [redacted]% reliability and expectations on reliability is trending upwards.
- Reliable water is the core product of the WCWSS which provides optionality for users of all types, i.e., urban, industrial, horticultural and agricultural. As a example, higher value land uses such as permanent horticulture, a reliable supply of water is directly linked to crop performance and quality.
- Typically horticulture and agriculture's highest water requirement coincides with the period in the year when there is least water available, and the highest number of competing uses i.e., urban, industrial, stock water, environmental and recreational (January to March).
- Core trends around climate, public expectations and regulatory requirements are diminishing water supply from traditional 'run of river and ground water sources.'
- Reliable water is likely result in a shift of land use [redacted]

Material changes in demand forecasts since 2016

- The WCWSS pre-feasibility work focused on water provision for the primary sectors due to funding constraints. It has since been confirmed that water is forecast to be provided to urban and environmental users.
- Demand forecasts are based on a view of where horticultural and agricultural water demand is highest and apply the simple principle of 'follow the demand'. This demand analysis assumes the command area for WCWSS water has been expanded beyond the previously proposed 'WCWSS Command Zone' to a 'Ruamāhanga command zone.' This potentially includes customers adjacent to the river south of Carterton and around Greytown.
- This adjustment combined with the mix of users has a potentially material affect on day one water uptake.
- When compared with [redacted] 2016 assessment, the assumption was 40% of demand at day one, whereas this assessment suggests a 60% uptake at day one is possible. The uplift is attributable to the inclusion of the Ruamāhanga Command Zone. Much of that uptake being contracted is to retain water security in the face of regulatory adjustments. Further, within ten years the estimate is that demand may well be 150% of what the WCWSS can provide.
- Demand at these levels materially benefit the cost of funds in financing the WCWSS build.
- [redacted] agrees with views expressed by [redacted] and [redacted] which forecast a shift in land use from pastoral production to cropping and permanent horticulture i.e., there will be a progressive shift to higher and more climate-appropriate value land uses, enabled through secure supply of water.

WCWSS Viability - Water Demand

Considerations

- Water volumes by user type will likely change over time especially as climate change takes effect.
- The water price assumption is the same as in 2016 but adjusted by Construction Price Index (CPI). The Primary Producers Index has tracked slightly behind the construction index over the same period.
- The data used to assess horticultural and agricultural demand has been derived from surveys undertaken by GWRC staff ~4 years ago.
- The data used to assume urban water demand has been derived from the Commercial Information and tested with the District Councils. They note that there will be other means of future proofing water supply and that consultation will be required under the Local Government Act (LGA).
- Supplying the 'Ruamāhanga Zone' rests on the assumption that water can be run through reaches where there are not substantive losses to ground water. This assumption will require validation if the Project proceeds.
- Uptake figures include a small component of 'environmental water' and the assumption is that there is a counterparty willing to fund provision of this water.
- Uptake figures assume a 'take or pay' approach to water contracting.
- For agricultural and horticultural water, a 90% reliability threshold was utilised as per previous demand work undertaken by the GWRC. Commercial Information believes this is conservative and expects a higher reliability threshold to prevail.
- Commercial Information and its advisors concur with the climate change forecasts and believe the higher change scenario is more likely and that this will impact on water demand. It makes sense to actively consider additional sources of water and storage in an adaptive management approach. This is an opportunity for the Scheme as it develops.

Value Judgement

- Commercial Information assessment is that water demand for the WCWSS will be strong and materially better than that as assessed in 2016 and that the assumed uptake base case may well be conservative.

Water Affordability

Wairarapa Water

Value Proposition

The benefits of irrigation are largely economic, but emerge in many different forms, including economic prosperity, and a more confident and sophisticated on-farm business demeanour that has positive flow-on benefits within the wider community. Commercial Information view of WCWSS's value proposition is as follows:

- **Increases in production and reduced variability:** Fig. 2 highlights the reduced variability and increased production expected from irrigation. This highlights a 53% increase in average kgDM production whilst reducing variability. This principle also applies to horticultural production. The former is normally used to support the construction of irrigation however, the latter is equally important. More dry-matter converts into saleable protein which is reflected in higher gross margins per ha.
- **Capturing a market premium:** The incremental increase in margins due to capturing a 'market premium' represents the opportunity to secure higher (relative) prices for the commodities grown as a result of providing buyers (exporters and processors) security of supply. Most buyers of NZ's agricultural commodities rely on surety of supply and are prepared to pay a premium to achieve this. Irrigation creates the opportunity to capture this premium.
- **Greater opportunity:** Market opportunities within an existing farming system and the opportunity for land use change.
- **Unlocks on-farm productivity gains:** The class of land within WCWSS's Command Area is well suited to irrigation, and as such is ideally suited to capturing productivity gains on offer to high performance irrigators (farmers and horticulturalists).

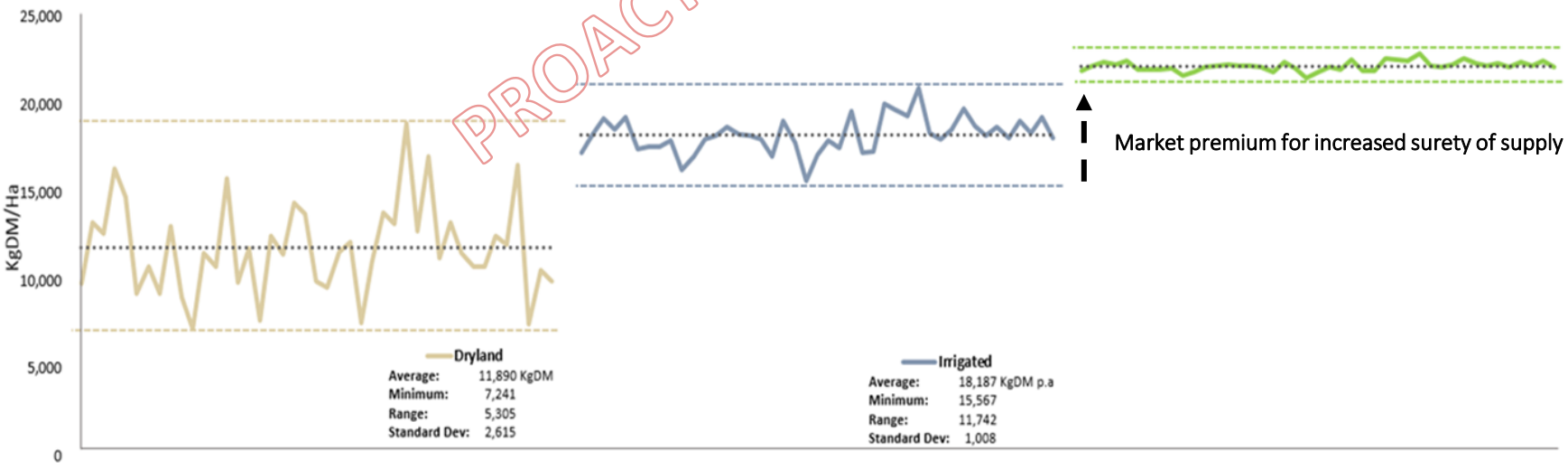

Fig. 2 Dry matter production per hectare under dryland and irrigated scenarios (Daverson .2014)

Affordability

In Commercial Information view, water from the proposed WCWSS is affordable at $Commerci per m^3 and users could afford to pay for real water price escalation of Comme% p.a.

This is based on an assessment of affordability undertaken by Commercial for the relevant land uses that are expected in the command area.

Commercial Information assessment assumes the following:

- A Com% cost of debt;
- Commer% debt funding of conversion capital expenditure
- Existing leverage pre-WCWSS of Comm%.

The figure demonstrates that where water is used efficiently, a price of water above $Commercial per ha (2016 dollars) can be supported by efficient operators. Commercial Information notes, factors such as reliability, water charging regimes and ownership structures.

Affordability is lower when compared with NOIC and Central Plains Water (CPW) (because of the storage element, neither NOIC nor CPW store water) hence justifying that the cost of water requires a higher operating performance. It should be noted also that the Wairarapa has a more favourable climate for higher return uses i.e., horticulture.

The transition from operating under a low cost, no debt 'survive at all costs' philosophy to being a sufficiently competent operator delivering top 20% operating performance will justify the delivery of (comparatively) high cost WWL water on a take-or-pay basis. It requires education and confidence.

The above assessment is based on high level analysis and requires a detailed review to be undertaken during the next phase.

Land Use	IRR (pre-tax unlevered)	IRR (pre-tax unlevered) (Comme% real growth water)	IRR (pre-tax unlevered) (Com% real growth water)
Pastoral	Comme%	Comme%	Comme%
Arable	Commerci%	Commerci%	Commerci%
Pip fruit	Commerci%	Commerci%	Comme5%
Average*	**Comme%**	**Comme%**	**Comme%**

Table. 1 Returns post water investment

Commercial Information

Figure. 3 Cost of irrigation scheme water delivery in New Zealand (Source: Irrigation NZ, 2016)

Technical Viability

Wairarapa Water

Technical Viability

Context and problem definition

Developing water storage schemes typically involves resolving a complicated mix of technical issues which individually and collectively affect viability. Whilst the work undertaken to-date by GWRC has explored both storage and distribution infrastructure together with water volumes associated with varied irrigation land use options, the technical component of this review has explicitly focused on what are material risks impacting viability of the WCWSS Project and include:

- Are the water infill volumes for the WCWSS reliable enough to create a secure water product which can be sold to customers over the lifetime of the scheme?
- Can the reservoir infrastructure be built to an engineering standard and within a cost envelope which deals with material risks, noting that the proposed WCWSS site sits within 5 kilometers of the Wairarapa fault and there are several adjacent 'splinter faults'? Having said this the engineering challenge is however not un-typical for the East Coast of the North Island;
- Commercial Information
- Commercial Information

Inflow Hydrology

Inflow Hydrology

Problem Definition

The WCWSS is based on a pre-feasibility assessment of irrigable area (command area) assessed as being 90% reliable, but with that reliability dropping significantly post 2030 due to climate change effects. A material drop in reliability will create issues within the customer base and financing model i.e., fewer customers, less revenue, more financial risk and a more expensive financing proposition. Further, the hydrology assessments in part rely on synthetic flow data whereas actual measured flow data is clearly a more reliable source. This will also be balanced by water being a higher valued commodity when climate change effects are felt.

Summary and Recommendations

A review was undertaken to assess the reliability and robustness of the estimated inflows and predicted storage reliability for the Wakamoekau Dam. This involved scrutiny of the methodology and assumptions for estimated stream flow and modelled diversion flows in Commercial Information, the Commercial Information Commercial) and the Water Management Report (AquaLinc 2018). In addition, teleconference calls were held with the reports' authors to clarify aspects of the reports and staff at GWRC regarding flow monitoring. Key points are as follows:

- Current estimates suggest that after about 2030 the storage reliability for WCWSS (and Black Creek) will begin to decline due to declining rainfall on the plains and higher irrigation demand despite possible increases in rainfall via storm events in the headwaters. The combination of these effects needs validating.
- The current WCWSS has been optimised by Commerc for construction and operating cost. If assumptions such as water allocation rules or irrigation demand change in the future this could significantly affect the reliability of the hydrology. In parallel, the restrictions resulting from the Whaitua recommendations could lead to increased demand for stored water.
- The stream flow data input now requires significant refinement to bring the analysis up to feasibility stage that can be confidently used to proceed to Commercial Inform Commercial Information and Commercial Information
- The following remarks about the limitations of current data apply equally to the WCWSS and Black Creek Schemes because the inflow methodologies and assumptions for both schemes are similar in the pre-feasibility reports.
- The estimated flow record for Wakamoekau Creek, as per the pre-feasibility study is based on a correlation with the Kopuaranga River. GWRC has now collected several years of data in Wakamoekau Creek which indicate approximately Comm% more water than was estimated previously.
- A high priority should be placed on gauging during high flow periods to ensure WWL has confidence in the high flow range.

Inflow Hydrology (continued)

Summary and Recommendations (continued)

- The annual rainfall, distribution of rainfall and water balance checks over the Wakamoekau and Waingawa catchments has been based on the mapped 1941-70 normal rainfall and the NIWA Virtual Climate Station Network (VCSN) dataset. Both datasets are known to underestimate rainfall at higher elevations in the Tararua Ranges. Most of the stream flow is generated by rainfall in these higher elevation areas. The latter was derived without incorporating information from the GWRC rain gauge.

- The distribution of past rainfall has been used as the baseline to derive the distribution of rainfall under predicted climate change conditions. A high priority should be given to adjusting annual rainfall data for water balance, VCSN datasets and for RCP past and RCP8.5 rainfall distributions so that rainfall predictions are more accurately reflected at higher elevations. The same checks should be undertaken on the potential evaporation dataset using available GWRC climate station information. Consideration should also be given to any additional climate or flow monitoring requirements needed for the Project.

- Refining and improving the consistency of the 30-year estimated Wakamoekau Creek flow record and the rainfall dataset is the basis for predicting long-term climate change effects is a fundamental pre-requisite to reliably estimating dam infill flows and storage reliability.

- Consideration should be given to investigating an additional diversion from the Mikimiki stream into a tributary of the Wakamoekau catchment. A very preliminary assessment suggests that on average an additional volume equivalent to 18% of the live storage in Wakamoekau could be diverted. Flow measurements in this upper Mikimiki stream are recommended to start immediately and the above estimate is subject to refinement of estimated stream flows.

- The flood estimates based on historical data seem satisfactory, however the flood estimates predicted for 2090 climate conditions are not based on the current IPCC climate forecasts and should be updated.

- Modelling of flows downstream for the Scheme has assumed that the current interactions between surface water and groundwater systems will continue. This assumption may not hold in the future as consents from groundwater systems are utilised more fully and the natural recharge of aquifers changes as stream flow reduces under climate change. Models used in previous Wairarapa groundwater resource investigations may be able to be adapted to this task or a new model developed.

- Depending on the ultimate water distribution method utilised (based on following the highest water demand) there may be more work to be undertaken, and or at least peer reviewed in relation to gaining and losing reaches within key water courses e.g. Waipoua stream and the Ruamāhanga on the basis that these water courses are utilised as a primary conveyance system from the Wakamoekau reservoir.

- Commercial Information

Inflow Hydrology (continued)

Interdependencies with other workstreams

- In the current Draft Plan, a special category for a limited number of designated water supply catchments and tailored water allocation rules could be considered. This would streamline the consenting process for this and future water supply schemes. For example, compared with the existing supplementary allocation rules in the GWRC Regional Resource Management Plan (RRMP), adopting a simple [redacted]% flow share above median flow would result in the average annual diverted volume increasing by [redacted]%. This suggestion will be crossed referenced with further commentary in the Consents section as both Masterton and Carterton Districts Councils have urban water take consents which operate at more favorable (from a Scheme perspective) flow take points. These in turn might be utilised for the reservoir infilling.

- Once a constructor engagement process is underway in which there is sufficient engineering design work completed to a consent application standard, reservoir infill engineering options should be assessed, including adding water from the Mikimiki stream.

Value Judgement

- Subject to verification there is a strong prospect of inflow hydrology for the Scheme improving over what was assessed in the pre-feasibility work. This includes accounting for climate change risk. Through a combination of consenting additional water, and considering consent opportunities with other parties, WWL should have confidence that this element of the scheme viability is sound.

Reservoir Engineering

Wairarapa Water

Reservoir Engineering

Problem Definition

The proposed WCWSS is one Commercial Information developed to a pre-feasibility standard. Much of the work undertaken by GWRC involved assessing multiple sites on a 'like for like' criteria. Of the remaining sites Wakamoekau is considered the preferred option. In regard to the engineering assessment, further engineering and geotechnical work is required on the reservoir to bring the Project up to a standard whereby the following actions can be initiated, specifically:

- Early contractor engagement; and
- Community engagement and education undertaken with respect to geotechnical risk and design standards.

In Commercial Information opinion, a detailed assessment of the potential distribution network can be left until later in the Project, once water demand is clearly defined. Similarly, an assessment of infill options for the reservoir should wait until more is known about the Mikimiki stream infill potential and the consent rules which may govern water takes from the Waingawa.

Reservoir Engineering (continued)

Summary and Recommendations

The proposed dam wall sits on greywacke and some parts of the reservoir footprint on mudstone. Also there are alluvial deposits within the reservoir. Key issues to understand include:

- The suitability of the greywacke material as a source of material for the dam;
- Potential issues within the dam footprint/foundations;
- Reservoir induced seismicity risk; and
- Risk of seepage from the reservoir.

What does this mean?

- The dam hazard rating Potential Impact Classification (PIC) is required to be defined in more detail, with the hazard to the downstream population confirmed (i.e., complete a dam breach failure analysis).
- The engineering quality and longevity or lifetime of the new assets is to be defined with definition of the quality of materials and the reference of the appropriate NZS/AS standards for the design and construction.
- The engineering work to date needs to be made current to the New Zealand Society on Large Dams (NZSoLD) 2015 'Dam Safety Guidelines' and the legislative environment.
- The seismic and geological setting needs further study, including the potential for reservoir induced seismic events and the potential for weaker mudstone bedrock in the foundations.
- A hydrogeological study is required including the potential for reservoir losses and reliability of infilling from the dam catchment and secondary sources.
- Landslide hazards including reservoir slope stability need to be further appraised.
- A "specimen" dam design should be produced which encapsulates the above issues and risks. In doing so this will enable the Project to be consented and early constructor engagement initiated.

Reservoir Engineering (continued)

Interdependencies with other work-streams

- Work in the water demand workstream is likely to have significant implications for any distribution network and there is little merit in further engineering analysis until there is more clarity on where the customers are based, and the optimal conveyance system is determined. This will have a material impact on the financial returns of the scheme and overall viability as distribution comprises [redacted]% of the capital costs.
- The same principle applies for reservoir infill options; however, both the above issues need to be resolved quickly if the Project proceeds further as any consent application will need to take water off-take and distribution to land issues into account.
- As the engineering issues are refined, work will be required on forming a community briefing and education process, i.e., associated with dam breach risk and design, and a landowners' reference group should be formed immediately post the review if the Project proceeds on the basis that landowners are initially the most directly affected parties due to access issues.

Value Judgement

- There is a need for WWL to fully understand the **engineering necessary for the reservoir component of the Project** in its current form. Establishing a specimen dam design to a basis standard that accounts for material risks, and is sufficient for resource consents, community consultation and contractor engagement processes, needs to be a priority in the next phase.
- Having said this, the types of risks requiring assessment are not untypical for a project of this type in most of New Zealand.

Consenting

Wairarapa Water

Consenting

Problem Definition

Several consents are required for a project of this type from both the Regional and Territorial Local Authorities. Firstly, WWL needs an understanding of Project fit within the overarching planning framework and then what, if any, are the likely hurdles to be negotiated. Gaining resource consents for the Project is clearly one of the material milestones required to turn the Project from a concept into a live Project that can be financed and built. Given the significance of this, an early view is critical.

Summary and Recommendations

Resource consents will be required as follows:

Masterton District Council (MDC) is responsible for the land use consents associated with the construction of the water storage schemes. This includes:

- Earthworks and vegetation clearance;
- Construction of structures and effects e.g. noise dust & vibration;
- Electricity generation, transmissions and telecommunication facilities;
- Water distribution infrastructure; and
- Storage of hazardous substances.

GWRC is responsible for all regional consents Including:

- The take and use of groundwater and surface water;
- Activities on or in rivers and wetlands;
- Damming and diverting water within or from rivers;
- Diversion of groundwater and surface water;
- Earthworks; and
- Discharge (of water) e.g. for construction activities and spillways.

Consenting (continued)

Specific Recommendations

Ensuring a smooth consenting process between both the District and Regional Councils is essential. Commercial Information

Specific consideration should be given to the following:

- The operative and proposed planning framework is well set up for accommodating a scheme of this type with relevant objectives laid out in the Regional Policy Statement (RPS) and Proposed Natural Resources Plan (PNRP).
- Ensuring early discussion with iwi will be a key factor in the consenting process.
- Most consents required will be considered as restricted discretionary or discretionary activities.
- The Project may require a non-complying activity resource consent for modification of a wetlands. This was highlighted by the Regional Council as a potential issue. It is important to gain an expert wetland ecologist assessment to identify any areas where land within the reservoir may be classed as a wetland.
- The PNRP includes some specific policies which promote the offset of biodiversity effects and provide strong confidence that the potential loss of areas of ecological or biodiversity values can be mitigated as part of any consent process.
- Decisions on the PNRP were released on the 31st July 2019 with appeals due to be lodged by 18th September 2019. A review of the decisions and implications for WWL are currently being assessed.

Regarding water take consents, WWL and the relevant local authorities, Masterton and Carterton District Councils should explore integrating consents to take water from the Waingawa (currently for domestic/urban/stock water supply) into the water take consents for the scheme.

Recommendations from the Ruamāhanga Whaitua process have yet to be integrated into the regulatory framework. WWL should, where it makes sense and is practically viable, offer up voluntary conditions which assist in giving effect to outcomes sought through the Whaitua process.

Essentially there are three routes for consenting:

- Standard two step process i.e., joint Council hearing then appeals to the Environment Court;
- Direct referral to the Environment Court; and
- Board of Inquiry process via the Environmental Protection Agency (assuming the Project qualifies as a having nationally significant status).

Our advice will be to consider options 1 and 2 with the direct referral potentially being the preferred option once there is further clarity on the wetland's issues.

Consenting (continued)

Interdependencies with other workstreams

- Water take consents should build in a framework around resilience, given climate change forecasts, which in turn implies consenting takes from water sources including the Mikimiki stream should be contemplated. See comments in Hydrology.
- Decisions will need to be made on primary anticipated demand and the implications for distribution i.e. use of water courses, water offtakes and 'ring fencing' of scheme water within the minimum and proposed minimum flow arrangements.
- The specimen dam design with attendant risk issues need to be completed ahead of consenting and likely multiple water infill options consented.

Value Judgement

- Consenting a water storage scheme is a complicated process. Having said this the planning framework specifically accommodates water storage and the WCWSS is considered highly consentable. There is a strong case for proceeding to lodgement by early to mid 2020. Other key workstreams that will have material input into consenting should be progressed with urgency if this timeframe is to be met.

Constructor Engagement

Wairarapa Water

Construction Procurement Assessment

Method

- Develop a simple Project description.
- Undertake a set of interviews with Commercial Information constructors Commercial Information .
- Document initial findings.
- Set in place a process for direct constructor feedback including their preferences for engagement, contractual form and risk allocation.

Primary Considerations

- All Co mer parties are interested in a project on the scale of WCWSS i.e., ~$Commercial Inf
- Regardless of the procurement and engagement approach, WWL will need to budget for further design and engineering expense in the development phase, whether it be within the Project or via an early constructor engagement process.
- The quicker the Project can sensibly progress to a contractor engagement the quicker it will take on the shape of a real development project versus a conceptual development.
- Engagement appetite will be driven to a significant degree by confidence in:
    - the underlying drivers for the project;
    - the ability to successfully consent it; and
    - the ability to fund it.

Construction Procurement Assessment (continued)

Key Findings from market sounding

- Each contractor has a strong capability to deliver the Project, with some current water projects providing relevant key learnings for WWL.
- The construction market does not perceive any material impacts on the deliverability of the Project due to supply constraints despite current market conditions. The Project is dependent on timing but should fit well with other projects in the lower North Island finishing (i.e., Transmission Gully and the alternative route between Hawkes Bay and Manawatu).
- The parties interviewed had varying views on the rate and scale of early engagement. Contractors currently engaged in the delivery of water infrastructure projects are keen to use their developed intellectual property from these current deals as a comparative advantage to bidding for WWL, and as such favour an early contractor involvement (ECI) procurement approach.
- Contractors that have larger balance sheets, with capability to be both a contractor and an investor and are current in the New Zealand PPP market favour a PPP style procurement.
- Recent large-scale infrastructure projects procured by government and quasi government agencies in both NZ and Australia had risk allocations that all contractors were of the view as not sustainable, in particular, 'unknown or unquantifiable' risks would not be accepted in the current market environment.
- All contractors would expect some form of cost reimbursement for bidding for the Project. External costs incurred by contractors in order to develop a bid, full reimbursement is the market expectation.

Value Judgement

- Commercial Information and Commercial Information' view is that early contractor engagement is the preferable route whereby the constructor is given space and time to create design innovation which will lead to cost optimisation.
- Constructor appetite for a project of this scale and of this type will attract competitive bids, given its potential timing Commercial Information However, the key issues to resolve for WWL will be accurate risk assessment and risk reduction which in turn will correlate with progress on engineering and consenting issues.
- The overall findings from this review, including confidence vis-a-vis the value proposition, water demand and the ability to consent will provide a sound basis for constructor interest and appetite. Further interest from constructors will be garnered if capital is raised by WWL for a subsequent pre-feasibility to feasibility phase.

Project Development Path

Project Development Path

Current State

- Work undertaken to date on the WWSS is at a pre-feasibility level.
- A key next step is the WWL Board determining if there is a case for progressing further.
- Essentially, in the life of the scheme, there are four discrete phases each requiring discrete funding streams and some requiring differing forms of governance and managerial capabilities.

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Critical Development Issues

Project Business Model

- Commercial Information recommends WWL carefully consider its business model to ensure there is a balance between insourcing and outsourcing strategic, commercial and technical project management capacity.

Procurement Policy

- WWL should develop a procurement policy for large scale projects taking into account the balance between competitive tendering versus retaining specialist expertise and institutional knowledge.
- The procurement model needs to ensure critical intellectual property specific to the project is retained by WWL.

Analytical and Optimisation Tools

- Consistent with above, WWL needs to either build or procure three analytical tools to retain the ability to drive scheme optimisation and critical decision making including:
  - Financial Model, a more detailed version of the existing Commercial Information model;
  - Water Supply model; and
  - Water demand data base and forecasting model.

Commercial Information

- Commercial Information This decision will enhance project delivery timeframes but there will be a related funding challenge.

Capital Structure and Financing

Co-operative *vs*. Limited Liability Company?

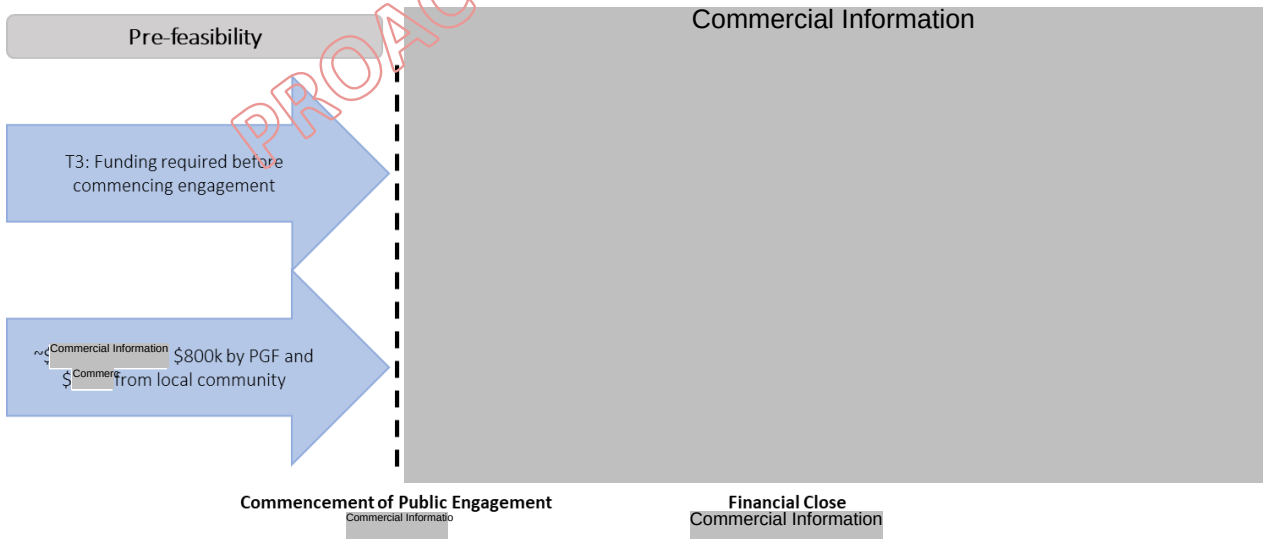
Recommendation

- Commercial Information is recommending WWL be a limited liability company. Cooperatives are the default ownership structure in the South Island, almost exclusively for irrigation schemes (with or without storage) dedicated to irrigating pastural properties. Cooperatives offer irrigator (farming) shareholders significant control over the asset but requires a higher upfront capital contributions. WCWSS is a multi-purpose community-based scheme, whose shareholders are expected to be equally diverse.
- This recommendation is based on ensuring WWL has a flexibility and does not exclude the WWL Board from adopting cooperative water pricing principles, as is the case with NOIC. The primary benefit of a limited liability company is WWL's ability to implement a commercial water pricing structure to attract external capital in the event the GWRC, the District Councils or commercial users wish to re-cycle their capital contributions following the successful commissioning of the Project. Commercial Information believes this will future-proof WWL's capital structure.
- This is a decision Commercial Information recommends the Board of WWL considers early. Commercial Information believes the Board of WWL may wish to seek further feedback on this before such a decision is made.

Raising Capital

Overview

- The proposed WCWSS dam and associated distribution infrastructure is a small, highly integrated community-based water storage facility designed to deliver benefits to a wide cross section of the Wairarapa community.
- Capital needs to be raised in 3 phases:
  - **Phase 1, pre-feasibility:** a combination of PGF and community funds. Initially grant and or donation based.
  - Commercial Information .
  - Commercial Information .
- Commercial Information recommends that equity is sourced from the Wairarapa community and beneficiaries blended with suspensory loans (PGF) and subsequently, as the Project becomes more defined, senior debt.
- To date the WCWSS has followed a relatively typical funding path with a significant public sector involvement through phases where the outcomes are uncertain and risk is high. Commercial Information . The capital structure needs to enable this.



Financial Viability

Based on evidence to date:

- In Commercial Information view there is a compelling case to advance the development of the WCWSS. This is based on an increased clarity in the value proposition, the validation of this proposition as expressed through water demand, and further tested by views on affordability.
- Further review work is required to be undertaken on material technical risk issues such as hydrology and consenting which suggests more confidence can be derived from these assessments.
- Dam engineering is likely to be the area of highest risk and uncertainty at this point and therefore should be one of the areas given highest priority for further attention should WWL decide to proceed.

Appendices

1. References

Reference	Title	Reference	Title
Commercial Information	Water Wairarapa Future Land Use Scenarios (Reframing Investigations).	WWL (2018)	Summary Report, Water Wairarapa reframing investigations – climate change and water resources limits effects. Wairarapa, New Zealand: Water Wairarapa Limited.
Commercial Information	Wairarapa Whaitua – EIA of integrated water management (Report No. 5977). Wellington, New Zealand: BERL.	T&T (2013a)	Wairarapa Water Use Project: Options Refinement Phase, Summary Report.
Commercial Information	Urban Infrastructure and Environmental Considerations for an Integrated Water Management Scheme in the Wairarapa.	T&T (2015)	Wairarapa Water Use Project: Prefeasibility Phase, Engineering Report.
Dark, A. (2018)	Effects of climate change and water resource limits on valley floor water resources. Water Wairarapa RD18001-1).	BakerAg (2016)	BakerAg Land Use report to Water Wairarapa.
GNS Science (2017)	Results of Ruamāhanga groundwater flow and transport modelling for the Ruamāhanga Whaitua Committee: (Report No 2017/101).	T&T (2016)	Updated Cost estimates based on Stage 1 Feasibility geotechnical investigations.
NIWA (2017a)	Climate Change / Variability, Report 2017066AK. Auckland, New Zealand: National Institute of Water & Atmospheric Research	T&T (2017)	Wairarapa Township Water Supply Demand forecasting.
NIWA (2017b)	Impact of climate change on inflows to the Ruamāhanga groundwater management zone, (Report No. 2017018CH).	Water Wairarapa GWRC	Water Wairarapa Reframing Investigations, Climate change and water resource limits effects.
NPS-FM (2017)	National Policy Statement for Freshwater Management 2014. New Zealand Government, Wellington, New Zealand.	SMEC (2014)	Wairarapa Water Use Project (WWUP), Review of Pumped and gravity Options. For GWRC
Ruamāhanga Whaitua Committee (2018)	Whaitua Implementation Programme. Wairarapa, New Zealand.	WRSO (2018)	Water Wairarapa's Reframing investigations, Economic and Community Outcomes. Based on modelling by BERL & BakerAg land use scenarios
SWDC (2018a)	Water Asset Management Plan. Martinborough, New Zealand: South Wairarapa District Council.	AqualinLinc (2016)	Review of reliability for WCWSS – Final Draft.
SWDC. (2018b)	South Wairarapa District Council, Long Term Plan 2018-2028. Martinborough, New Zealand: South Wairarapa District Council.	The AgriBusiness Group	Effects on future rural land use mix.

2. Consulted parties

Organisation / Person	Personal	Contacted by
Wairarapa Water Limited	Privacy of natural persons	Commercial Information
Greater Wellington Regional Council	Privacy of natural persons	Commercial Information
Masterton District Council	Privacy of natural persons	Commercial Information
Carterton District Council	Privacy of natural persons	Commercial Information
South Wairarapa District Council	Privacy of natural persons	Commercial Information
Farmer Reference Group	Privacy of natural p	Commercial Information
Industrial Reference Group	Privacy of natural p	Commercial Information
AgFirst Engineering	Privacy of natural persons	Commercial Information
Commercial Information	Privacy of natural persons	Commercial Information
Commercial Informa	Privacy of natural persons	Commercial Information
Downer NZ	Privacy of natural persons	Commercial Information
MacConnell Dow	Privacy of natural person	Commercial Information
Fulton & Hogan	Privacy of natural persons	Commercial Information
HEB(Vinci)	Privacy of natural persons	Commercial Information

3. Project brief

Workstream	Workstreams	Responsible
Project Management	• Overall Project management • Workshop facilitation	Commercial Information
Consenting	• Assessment of WCWSS and distribution consentability, including estimated timeframe and budget • Review of relevant consenting documentation • Liaison with Commercial Inf r.e. Commercial Information	Commercial Information
Hydrology Review	• Assess hydrological data and modelling to form a view on the reliability thresholds for the proposed scheme • Provide opinion on the likely impacts of climate change based on the NIWA climate change forecasts • Meet with technical personnel, including Commercial Information, Commercial Inf, TLA water managers, and NIWA • Review the hydrological models and data sources • Consideration of changes in water demand and the relevance to consenting	Commercial Information
Engineering Assessment	• 'High level' review of current documents for the WCWSS and consider suitability level of concept detail, thus enabling early engagement with the contractor's market for developing to preliminary design • Assessment of work done and required for potential early contractor engagement	Commercial Information
Construction Procurement	• Assess the Pros and Cons of various procurement options for WCWSS	Commercial Information
Demand Forecasting	• Review Command Area data including area of surplus irrigable land • Affordability scenarios by land-use type and water price (uplift MRB Ruataniwha affordability analysis 2016) • Undertake a farmer focus group exercise to assess water demand appetite relative to revised water price • Consider what if any external investment appetite there is for irrigated land acquisition in the command area	Commercial Information
Capital Structure	• Update and further develop the original financial model to reflect the current WCWSS, capital and operating cost assumptions, along with the demand outputs • Capital structure optimisation and scenario analysis	Commercial Information
Budget estimates and forecasts	• Consolidating, costing and summarising key workstream to financial close	Commercial Information

4. Glossary of Terms

Term	Terminology
CDC	Carterton District Council
Command Area	The gross area that could be supplied with water from a scheme
CPI	Construction Price Index
Current Irrigators	Farms with a current consent to take water whether they irrigate or not
Dryland Farms	Farms that do not have a consent to take water (for irrigation)
Effective Area	The actual area of land farmed. (Excludes all non-productive areas)
Farm	Single or multiple properties owned and/or managed and operated by a farmer as a farm unit; for clarity a farm can include leased land and operated as part of that farm
Farmer	A person or entity responsible for operating a farm and for the purpose of WWL will make decisions on behalf of the farm
Irrigable Area	The farm area that could potentially be irrigated, excluding all non-productive areas (as defined by the farmer)
Irrigated Area	The current irrigated area on a farm (as informed by farmer)
MDC	Masterton District Council
Net Supplied Area	The portion of the Command Area expected to actually be irrigated/supplied, after accounting for buildings, tracks, hedges etc.
NOIC	North Otago Irrigation Company Limited
Property	An area of land with a legal title; a farm may comprise several properties
SWDC	South Wairarapa District Council
Stakeholder	Any party interested or affected by the Project; includes communities, individuals, and groups who are either indirectly or direct affected
Total area of farms involved in the Scheme	The gross area of whole farms that could be influenced by the Scheme. This includes the parts of farms directly within the Command Area, plus the parts of farms currently assumed to be outside the Command Area (for example hills) but that are still affected because the farms are operated as whole units
WCWSS	Wakamoekau Community Water Storage Scheme