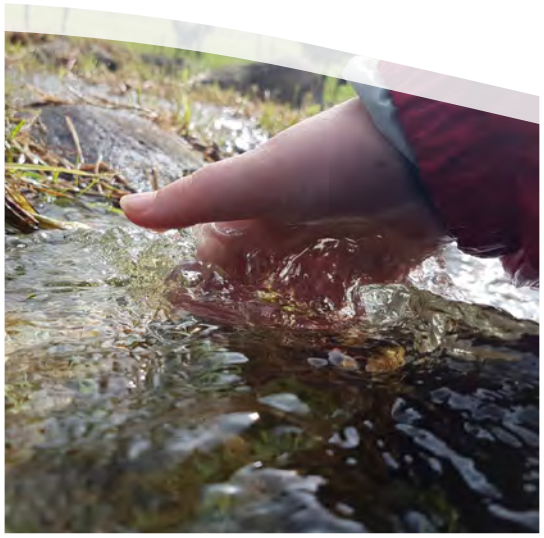
Prepared for Northland Regional Council

Scoping of Irrigation Scheme Options in Northland

Summary Report





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Water will grow our communities

Targeted investment in irrigation infrastructure within Te Tai Tokerau has the ability to drive the development of more prosperous, stronger, resilient communities through enhancing and future-proofing local agri-sector businesses for generations to come.

"Northland has significant untapped economic potential. The region's people and industries are currently not making the most of existing advantages, limiting economic growth."

Tai Tokerau Economic Growth Study, February 2015

As the first step towards delivering on this challenge a Strategic Irrigation Infrastructure Study was undertaken in 2016; its primary focus was to evaluate the opportunities presented by managing a reliable water supply to the farm gates of primary productive capable land. The study provided useful and relevant information to support strategic decision making in regards to water management across the entire Northland region. The analysis highlighted potential irrigable areas of interest within four definable areas; the Far-North, the Mid-North, Whangarei and its surrounds and Kaipara.

"It is easy to see a continuation of the diverse land use that characterises Northland which already allows high value foods to be produced from a patch work of intensive artisan style enterprises. The water these enterprises need to expand and succeed on the international market thereby driving community resilience and stability comes at a commercial cost not typical of other farming areas of New Zealand where more extensive pasture based systems have been adopted. The people of Northland have the opportunity to further evaluate the commercial cost of the water, appreciate the strength that reliable water brings to their futures and scrutinise how this sits within the environmental and cultural expectations placed on them"

Six considerations were identified that would need to be addressed for Northland to enable positive economic growth and authentic social outcomes through the development of irrigation infrastructure:

- Engaging with Māori/Tangata Whenua, communities and stakeholders;
- Undertaking detailed scheme investigations;
- Identifying funding and development entity models;
- Undertaking farm level case studies;
- Developing the regulatory framework for water use; and
- Developing an employment ready workforce.

Kaipara and the Mid-North were prioritised and recommended to take forward to a more detailed level in this current Scoping of Irrigation Scheme Options Study.

Water flowing to where we need it

Kaipara and the Mid-North were prioritised in the recommendations from Stage 1 as being the most likely to benefit from development of community scale irrigation supply infrastructure. A 'Stage 2' scoping study has focused on these areas with further detailed analysis of possible irrigation scheme supply, distribution and water storage options. The primary aim has been to create a prioritised list of options that could be taken forward into a pre-feasibility study.

A successful move towards scheme implementation will require community commitment and significant investment. To achieve this practical information to support robust decisions is needed to obtain the required level of commitment and investment. Any large scale water infrastructure development must work within but also help shape regional and national water planning instruments taking into account the community desire for acceptable water quality and allocation outcomes.

A key feature of this study has been the incredibly valuable interaction with the community stakeholders. These workshops have allowed a deep understanding of the values and challenges within the community objectives for the land, the water and the people. The consideration of existing initiatives, the years of local knowledge and drive for leadership have been taken into account. It was quickly evident that the development of irrigation schemes in Northland would require intergenerational, community focused thinking. This will help ensure the best overall outcomes are achieved and importantly that a social licence for the projects is obtained.

The analysis of land use capability revealed that in the Kaipara and Mid-North areas up to 40,000ha of land could be suited to agricultural and horticultural production. Applying further decision criteria and looking at best available water sources allowed this to be focused down to four priority scheme areas totalling 11,600ha. These were shown to have the greatest opportunity for value add (GDP growth) and employment increases.

Community leadership

The stakeholder group participants got excited about the proposed irrigation schemes and the chance to be involved. It is clear that there are a number of non-negotiable attributes that the development of any schemes must have to gain a social licence in the Northland communities. These fall into four key areas of environmental and cultural consideration, scheme feasibility, productivity future success and wider community benefits. The message is that there is currently an opportunity for the communities to drive the development of these schemes.

	Environmental & cultural	Feasibility	Future success	Wider community benefits
High priority	The scheme must not have major detrimental impact to the environment	The community must be supportive of the process	The local community must have a presence within the ownership structure	The scheme must significantly increase employment opportunities for local people
	The scheme must not adversely impact culturally significant sites	The scheme must be affordable to users	The scheme must enable economic development	The scheme must create positive social change within the community
	The scheme must have environmental benefits	The producers must become more profitable	The scheme must have government support through infrastructure and market development	The scheme must not restrict other local opportunities and initiatives
	The scheme must be resilient to climate change	The scheme must be technically feasible	The scheme must have an appropriate management structure	The local people employed by the scheme's properties must have appropriate skills or access to training
Lower priority	The scheme must provide some flood protection	The scheme design must be easy to gain permissions	The scheme must be adaptable to changes in markets	The scheme must provide a water supply for other uses outside of irrigation

Water enables production

Northland offers great opportunity for a strong agricultural and horticultural production led economy. It has good soils, great climate and good opportunity for providing reliable water to growers though schemes. Water availability will allow long term decisions and choices to be made about production systems at a farm level.

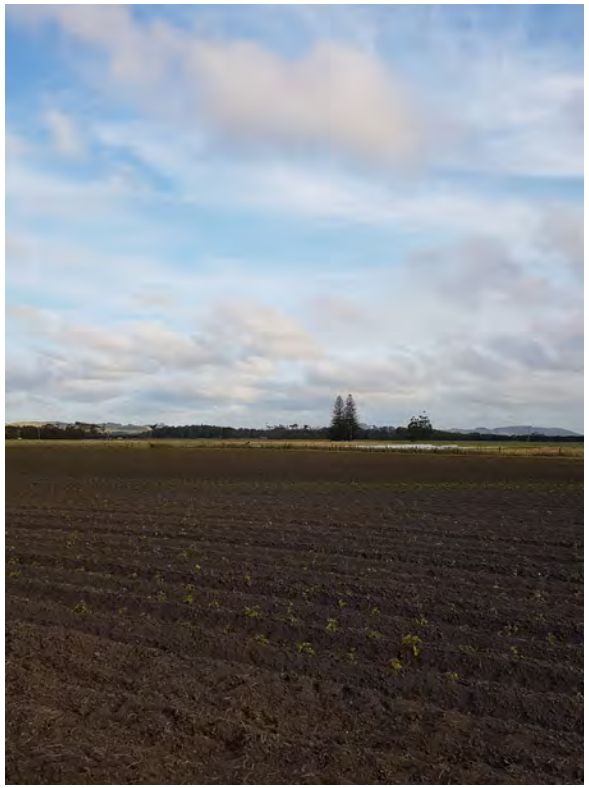
An analysis of the increase in supply predicted from the primary production as a result of irrigation confirmed that demand for Northland's produce from consumer markets, both nationally and internationally, would not limit the development of irrigation schemes in Northland.

Hydrological modelling demonstrated how much water is needed for various land uses typical of Northland and provided insight into the availability from accessible local sources. A focus was given on reliability, the storage volume needed and the impact of climate change on both demand and supply.

When irrigation schemes are contemplated it is common for other water users needs to be met alongside the development especially for underwriting municipal drinking water and industrial demands.

The following observations were made regarding the supply and demand models:

- The total demand for water on a per hectare basis in the Kaipara is significantly more than the Mid-North.
- The seasonal variation for water in the Mid-North is significantly more than the Kaipara. The water in the Mid-North will be utilised over a longer period of each irrigation season.
- The proposed NRC water allocation plan needs to be considered in terms of the drafting of conditions of the water takes consents.
- The water allocation plan impacts the conditions for harvesting of high flows which in turn affects the potential extent of irrigable areas.
- Raising Lake Omapere to provide irrigation water storage and/or utilising existing Kerikeri Irrigation Scheme storage are likely to be more cost effective than construction of new water storage.



Scheme option 1: Kaipara

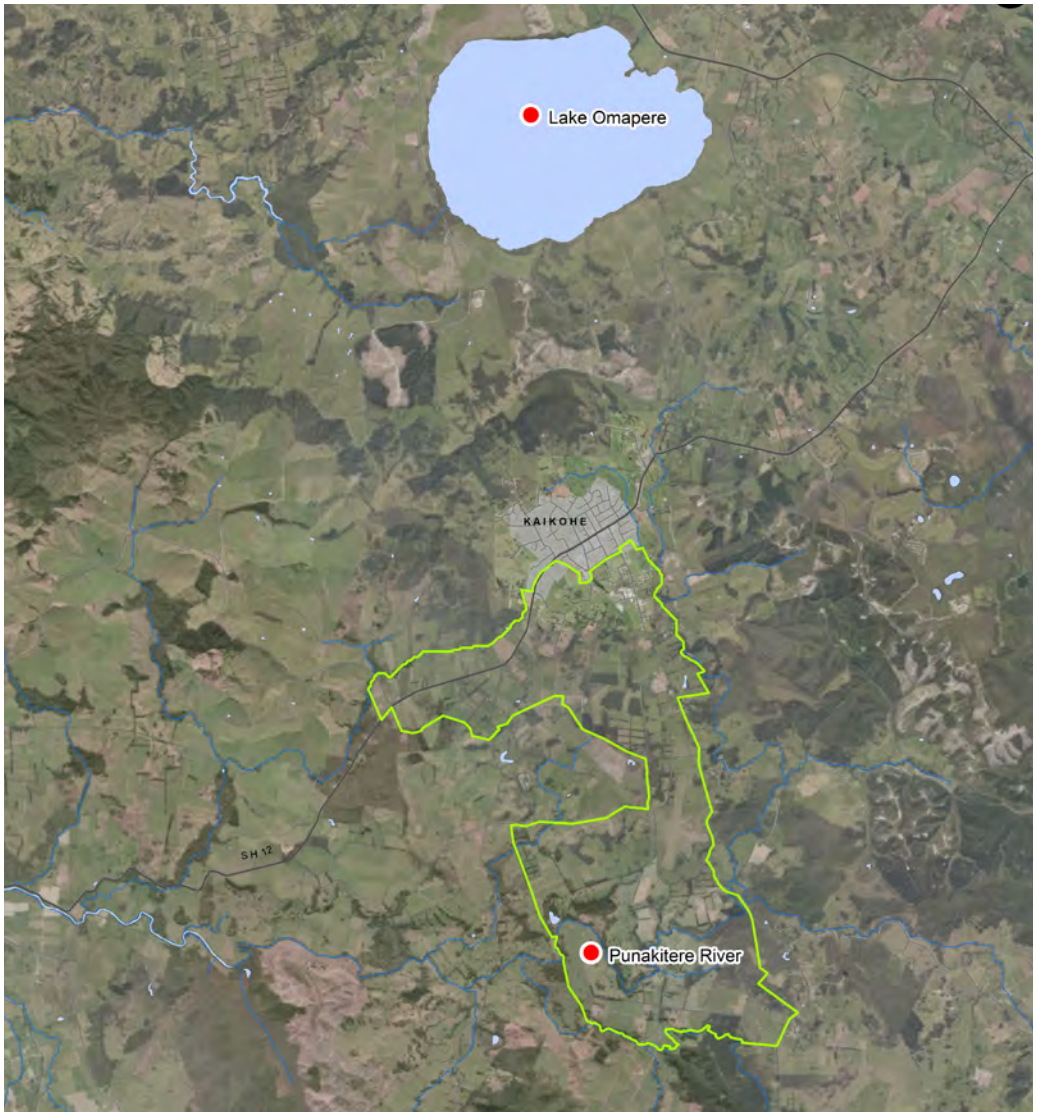
Water storage will encourage diversification of existing land-use as well as provide a reliable water supply within Dargaville and the wider community.

- **19,000** ha of land that could benefit from irrigation (command area) shown in green
- **6,300** ha irrigable area within the command area (assumed 30% uptake)
- **4,000** m3/ha peak irrigation demand
- **3,400** m3/ha/year average irrigation demand
- **$115** million total capital cost
- **$17,000** /ha capital cost
- **$390** /ha/year operational costs
- **950** additional people predicted to be employed
- **$85** million /year regional GDP increase

Scheme option 2: Mid-North A

Supply of a reliable water supply will enable higher value uses of land in turn providing significant opportunities within Kaihohe and the wider community.

- **2,300** ha of land that could benefit from irrigation (command area) shown in green
- **1,600** ha irrigable area within the command area (assumed 70% uptake)
- **3,500** m3/ha peak irrigation demand
- **1,800** m3/ha/year average irrigation demand
- **$22** million total capital cost
- **$11,100** /ha capital cost
- **$180** /ha/year operational costs
- **500** additional people predicted to be employed
- **$70** million /year regional GDP increase



Scheme option 3: Mid-North B

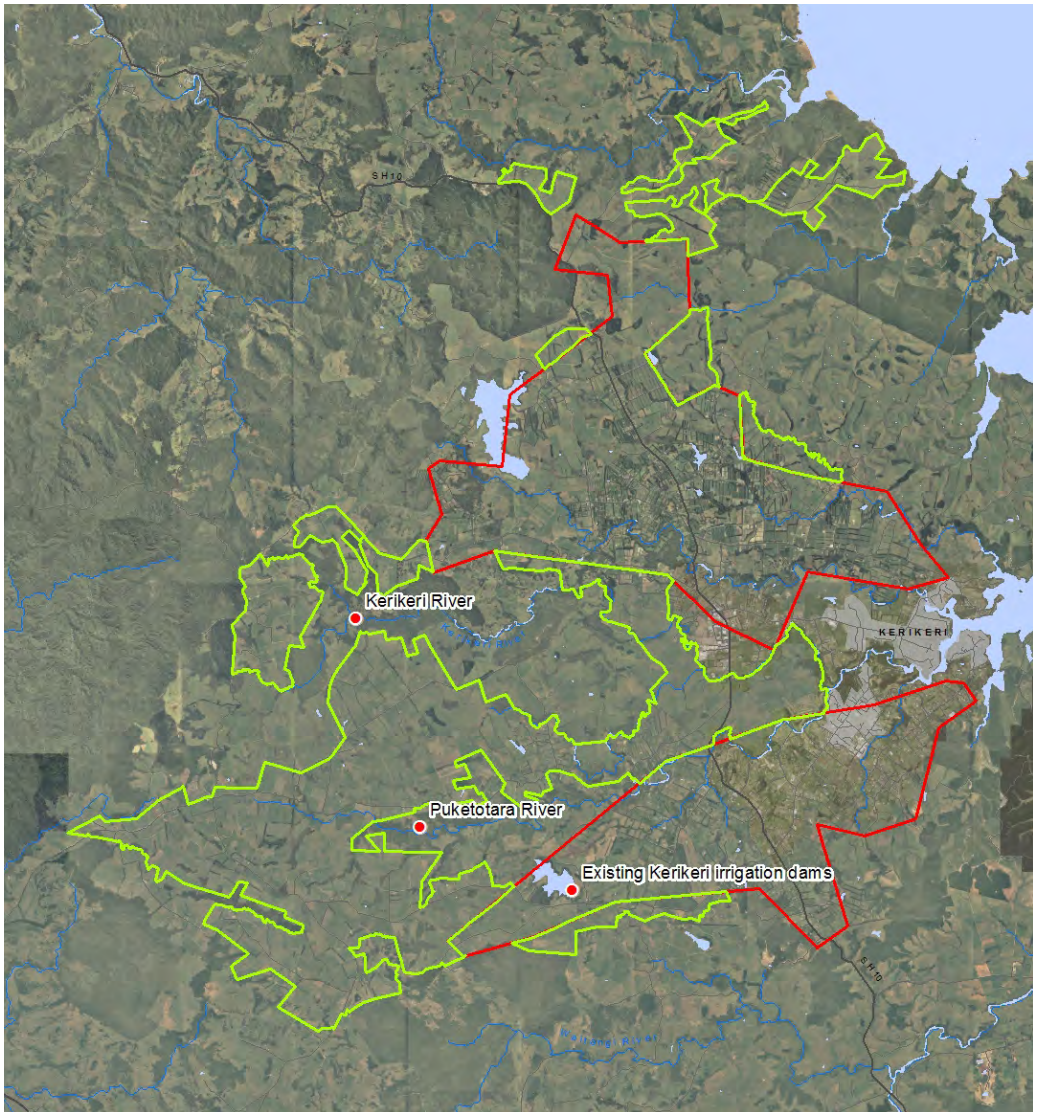
A reliable water supply will enable higher value uses of land, including supply to the possible industrial park, providing significant opportunities within the community.

- **2,800** ha of land that could benefit from irrigation (command area) shown in green
- **1,700** ha irrigable area within the command area (assumed 60% uptake)
- **3,900** m3/ha peak irrigation demand
- **1,900** m3/ha/year average irrigation demand
- **$32** million total capital cost
- **$15,900** /ha capital cost
- **$210** /ha/year operational costs
- **650** additional people predicted to be employed
- **$75** million /year regional GDP increase

Scheme option 4: Mid-North C

Existing irrigation infrastructure and land use around Kerikeri could provide the basis for expansion of opportunities for the wider community.

- **5,000** ha of land that could benefit from irrigation (command area) shown in green
- **2,000** ha irrigable area within the command area (assumed 40% uptake)
- **3,600** m3/ha peak irrigation demand
- **1,500** m3/ha/year average irrigation demand
- **$27** million total capital cost
- **$35,600** /ha capital cost
- **$320** /ha/year operational costs
- **600** additional people predicted to be employed
- **$96** million /year regional GDP increase



Commercial realities vs economic growth

If the focus is placed solely on the ability of farm gate returns to pay for the schemes they are unlikely to proceed. The growers alone can't afford to build schemes that have high community and environmental benefits. Leadership from within the community may be able to drive development at this current stage where positive social outcomes are the more significant story to tell.

There is an opportunity to build on community leadership with additional governance skills and specifically related to large infrastructure projects. The Government and Regional Councils role should probably be seen as an enabler and financial supporter with leadership coming from the community.

- The capital required is substantial for Northland alone but with a special funding vehicle the pathway could be enabled for public, private and Iwi investors to all participate and benefit.
- The staging of the developments and hence the funding may help the overall development process.
- The investment is not likely to be overly attractive assuming a simple cost recovery commercial analysis.
- The benefits will be long term and therefore scheme may require a patient or initial "angel" such has been the case with many of the schemes in NZ.
- The real whole of economy benefits need to be considered and they can sometimes be hard to quantify and measure.
- The returns may not accrue directly back to those who make the initial risk on the capital investment.
- The long term affordability for land uses may be marginal however if you only pick the irrigated land uses with top returns then there is unlikely to a critical mass achieved to enable development of a scheme.
- The four community irrigation schemes if developed together will likely deliver regional scale benefits and "turn the dial" for Northland.

Ranking the options

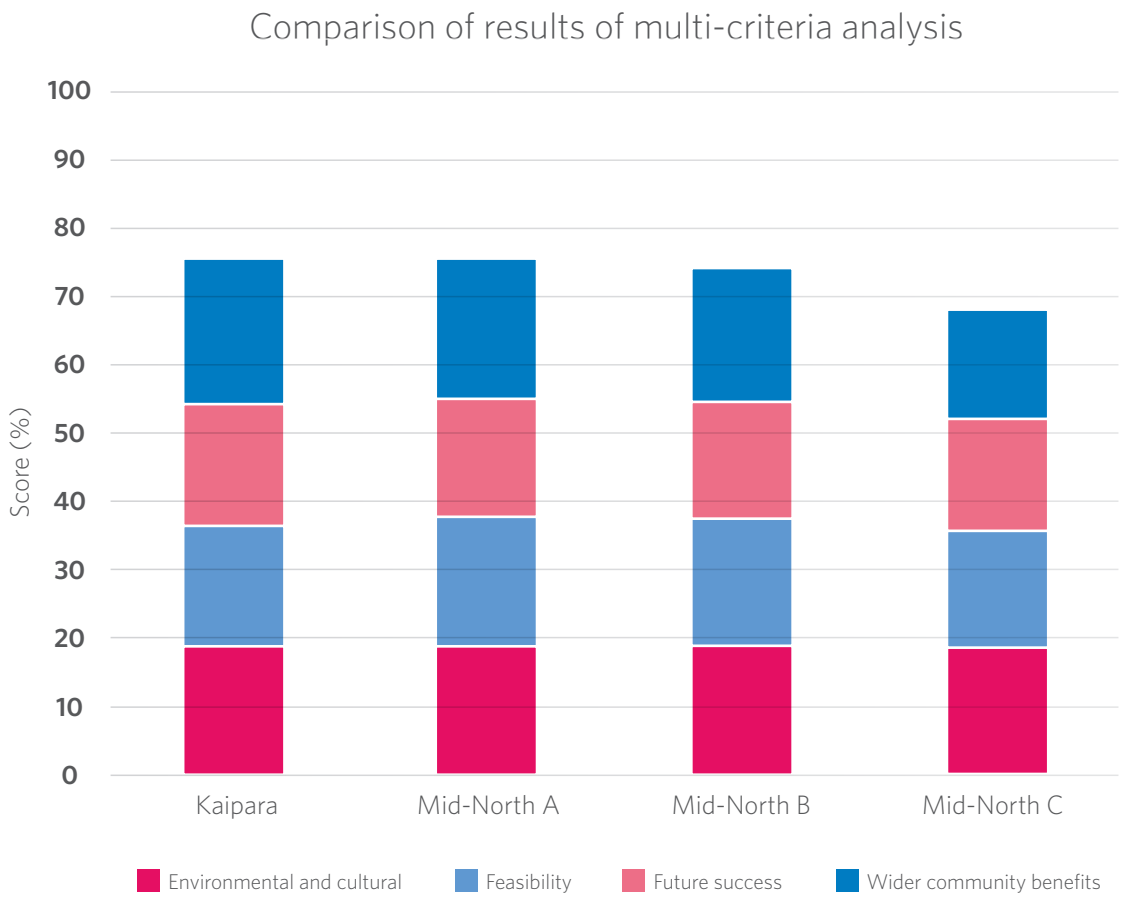
The development of a community irrigation scheme requires decisions to be made that have inter-generational benefits. The comparison of the four options has been undertaken using a balanced approach by looking at the scheme attributes identified by the project team as well as those issues highlighted as important by the communities. Rather than entirely focusing on grower affordability and profitability this approach will help ensure the best community and regional outcomes are achievable.

The multi-criteria analysis (MCA) used is not a screening process to determine feasibility; and it does not provide the final answer on what should be a commitment to build. It does however inform robust decision-making on the relative future viability of the schemes. It has allowed the relative strengths and weaknesses of the schemes to be further understood. Importantly it has also highlighted factors that have not yet been well enough explored and therefore should be considered in future stages.

The initial results of the MCA did not show a significant front-runner in the prioritisation process. The following points have been observed in considering the sensitivity of the MCA outcomes to the thought processes of the participants who scored the scheme options:

- Kaipara, Mid-North A and Mid-North B (both near Omapere) only show minor differences in the raw data but are relatively consistent in their desirability.
- In most criteria, it was difficult to separate Mid-North A and Mid-North B. This may be due to their close proximity to each other and the potential to use the same water source.
- Although the Mid-North C scheme (Kerikeri area) scores highly on individual aspects such as existing skills, management and local ownership due to the existing Kerikeri Irrigation Scheme operation, it consistently scores significantly lower than the other three potential scheme options overall.
- The confidence for making decisions on the relative merits was low when considering the environmental impact, implying that more detailed assessments should be undertaken to enable these questions to be revisited. Nevertheless potential for environmental benefits was considered greatest by the schemes in Kaipara and Mid-North B.

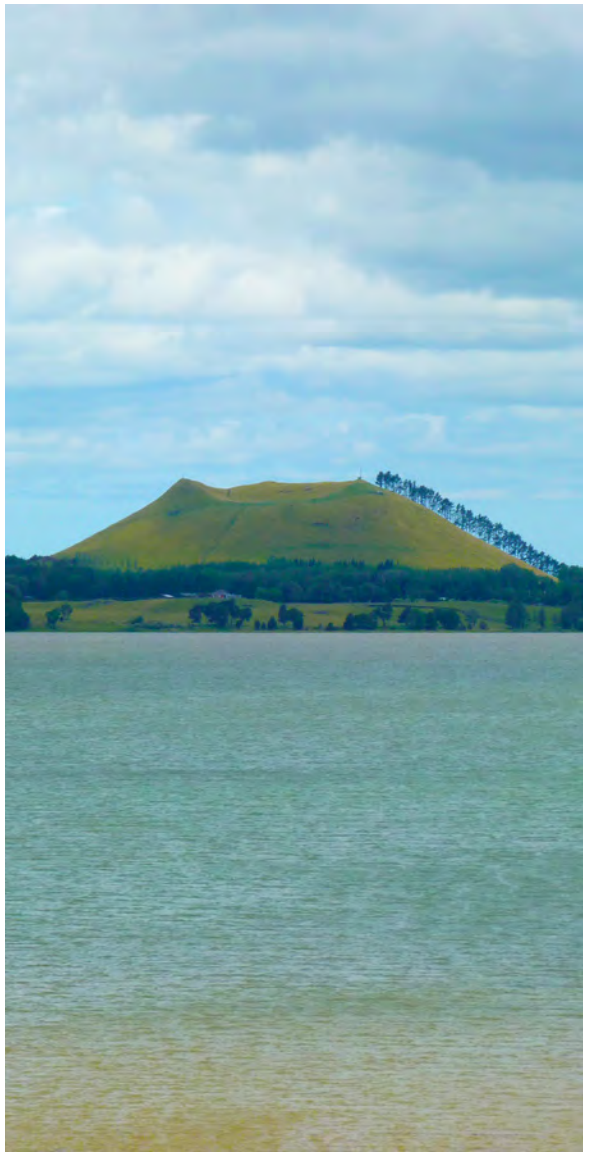
- The confidence was high around the impact that the schemes would have on the wider community. Kaipara and Mid-North A scored higher than Mid-North B for these criteria, likely due to the proximity to, and impact they could have on Dargaville and Kaikohe respectively; and Mid-North C trailed behind, likely due to constrained ability to influence a "step-change" within the Kerikeri community.
- Reviewing only financial and economic success of any scheme, Mid-North A and Mid-North B were significantly higher than Kaipara. This is likely to be because of the capital costs of the scheme in the Kaipara; the influence of a larger portion of high value crops to be grown in the Mid-North on the profitability of growers; and the potential use of Lake Omapere.
- It is likely that if the Ngawha area had been included in Mid-North A rather than Mid-North B that several questions, specifically on the potential industrial park, may have been scored differently. Although this would potentially result in Mid North A scoring slightly higher, and Mid North B lower this wouldn't have affected the outcome relative to the other options.



Empowering the decision-makers

It is concluded that a special purpose development entity will be needed to advance any of the investigations. It is the make-up, governance and priorities of that entity that needs to be determined. This report presented some scenarios for how that could be achieved to accommodate the wide community interest in participation in the way forward. All development entities have their strengths and weaknesses. It is therefore recommended that the range of development entity options are continued to be explored as further investigation is undertaken and the evaluation of best fit is revisited.

1. There is no "one size fits all" scheme design and hence no single answer to which entity structure is best. The decision is more related to the number of schemes that could be taken forward and the sequence in which they are addressed.
2. Early and on-going sector engagement and communication is a relatively low-cost but highly beneficial activity to undertake.
3. There is no guarantee that the market would develop as many schemes as wider society would like without some degree of local or central government intervention.
4. In the absence of sufficient in-house capability, it is important that experienced, adequately skilled, independent advisers whose incentives are aligned with the success of the scheme are used.



Examples of development options

	Name	Short descriptions	Advantages	Disadvantages/Issues
1.	Single autonomous dam ownership by a commercial / infrastructure investor.	One dam, and a self-contained entity that supplies water to users. So a third party builds it for the community, and some public money may be used. The users may have a limited investment, but by and large they are customers of the scheme and through water user agreement they effectively pay for the scheme overtime.	• Commercial focus • Capability • Access to funding sources	• Affordability • Buy in from water users and community • Potentially less focused on the environmental outcomes • Not all benefits of the scheme remain in the community • Potentially limits ability to involve certain pools of public funds
2.	Single autonomous dam ownership by the growers and or users of the water.	They are building it for themselves. Growers have 100% ownership of the scheme and are responsible for the funding and cost of running. Some public money may be used.	• Greater buy in • Growers receive benefits • Focused on delivering cost effective, reliable water	• Capability • Ability to raise funds • Ability to get all the growers who need to be involved, committed • Council wanting to be involved
3.	Integrated value chain	Growers and other participants in the value chain have 100% ownership of the scheme and are responsible for the funding and cost of running.	• Greatest buy in • Wider sources of capital • Value chain receive benefits • Provides wider benefits than just increased agricultural production	• Getting the value chain together • Complexity • Who funds external benefits
4.	A portfolio approach	Whereby a number of water schemes collaborate and share capability, back offices systems and process and collectively raise funds from government and third parties. A holding company maybe formed to take on these collective activities and operating "subsidiaries" (wholly owned or not) would be formed underneath on a case by case basis –would focus on the water scheme itself with the beneficiaries of that scheme.	• Efficient use of resources • Greater participation from community • Lower risk /greater diversification across a number of schemes • Learnings could be shared	• Ability of shared entity to meet all the demands – would have to prioritize • Complexity

Recommendation 1: Update the community of stakeholders

There is an opportunity to leverage off the momentum that has already been established and build community support for these initiatives.

Transparency in the process will ensure that opportunity is not lost for positive contribution and collaboration to bring in a wide perspective; this will encourage community participation and support.

There is a clear desire within Northland communities for an improved social outcome within well considered criteria that will benefit many. At this stage there is strong support for all of the proposed schemes to proceed in some form. The communities who have been consulted should now be informed of the progress that has been made and the decisions contemplated during this process.

It is recommended that the findings of this, and subsequent studies, be made available to the all interested Northland community and other stakeholders.

Recommendation 2: Initiate a development entity for evaluation and implementation

An appropriate development entity should be designed and implemented now. It may be as simple as initiating a community steering group with public, private and Iwi participation. It will need to have the flexibility to adapt to more formal structure to meet the changing life cycle of the implementation process.

Its first function should be to source funding and manage budgets for further investigation to provide the overarching decision support and setting objectives

It is clear that there are opportunities to progress all of the proposed schemes, however the development of an individual community scheme should be considered as a part of a larger regional strategy.

It is likely that to 'turn the dial' for the economy and community in Northland, all the priority schemes should be considered in further detail for development. It is likely that the most effective way to achieve the desired outcomes will be to advance the schemes under a single 'umbrella' development entity that adopts consistent a framework taking into account previous lessons on technical, environmental and financial implementation.

Recommendation 3: Confirmation of all stakeholder priorities and roles

By drawing on widely-focused, multiple stakeholders, all objectives can be more deeply explored and priorities established so that the pathway can be determined.

It is important that the Regional Council determine its own role in the process and that it further explores the opportunity to participate financially in the community development process and the role of management of the natural resources. Both are important considerations.

This project has been driven by the Northland Regional Council with the support of central government as they are critical participants in the management of the natural resources and the community outcomes.

The community has shown through this study to have a major contribution to make to future decision making criteria that will take into account prosperity, resilience and stability as well as achieving positive environmental and cultural outcomes

Recommendation 4: Undertake pre-feasibility studies to improve the knowledge base for decisions

The study has found merit in all four of the irrigation scheme options proposed and further investigations will be required to determine viability for implementation.

The prioritisation exercise ranked Kaipara, Mid-North A and Mid-North B higher than Mid-North C using criteria established by the communities.

The following key steps are recommended to be undertaken in parallel as part of pre-feasibility studies:

- Undertake farm level case studies to show the impact of land use change on production and profitability for individuals.
- Undertake an assessment to determine technical viability of the proposed schemes including the likes of water allocation policy, storage volumes, construction innovations and staging of development.
- Undertake more detailed engineering and hydraulic analysis to optimise potential storage and water distribution network configurations.
- Undertake preliminary environmental and cultural impact assessments to identify risks and opportunities.
- Undertake more detailed cost analysis to provide increased confidence in the capital and whole of life costs.
- Identify the potential beneficiaries and scheme investors taking into account the whole of life costs and overall economic returns.

Recommendation 5: Develop an investment case and benefits model for the priority schemes

Findings from the pre-feasibility studies will need to be presented in a format suitable for potential investors to consider so that decisions can be made on viability and levels of interest.

At an early stage the leadership team needs to identify plausible capital sources from both private and public sources that are willing to support the long term outcomes available to the community. This needs to take into account and balance the scale and optimisation of a scheme design that meets both simple commercial drivers and how to fund the wider community benefits.

It is recommended that a draft investment case provides information built on pre-feasibility findings about how infrastructure development and operations could be funded and resourced. This will enable the community, and central and local government to gauge the level of commitment and where their best participation occurs in the projects.

This phase of work will need to consider in some detail the:

- Governance and management for decision making;
- Financing and funding options;
- Uptake and revenue streams;
- Technical and engineering limitations;
- Regulatory and environmental frameworks;
- Social and cultural objectives; and
- Commercial operations forward planning
- Long term economic, environmental and social indicators; and
- Monitoring of performance against expectations over time.

Looking ahead

There is a well-tested and logical pathway to implement any of the proposed schemes which follows a series of information gathering, decision making and review point stages. To ensure all interested parties work to the pace required, at the end of each incremental investigation stage, recommendations would be proposed tagged to the improving confidence limits around the final outcomes.

The opportunity is open for Iwi and wider community ownership of the outcomes working within a development entity. This will need strong and effective leadership as "champions" within the scheme areas for the developments to be successful. Council and Government will play key roles as enablers within this process.

Stages			Indicative timing	$ Indicative cost
No#	**Description**	**Purpose**		
1	Strategic assessment	Determine if fits	Completed	**$130k**
2	Scoping study	Define what the project could be	Current	**$320k**
	Recommendations 1 Update the community of stakeholders **Recommendations 2** Initiate a development entity for evaluation and implementation **Recommendations 3** Confirmation of all stakeholder priorities and roles			
3	**Recommendations 4** Undertake pre-feasibility studies to improve the knowledge base for decisions **Recommendations 5** Develop an investment case and benefits model for the priority schemes	Define what the project should be	6-12 months	**$1-2 million**
4	Feasibility study	Determine what the project will be	12-24 months	**$5-10 million**
5	Project commitment	Execute procurement strategy	12-24 months	**$2-5 million**
6	Construction		18-36 months	**$100-$300 million**
7	Operation		**Intergenerational**	**Benefit**

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