# Project Overview and Economic Assessment

## Executive summary

The Far North district is one of the most economically deprived parts of NZ. Kaikohe, in 2018, was ranked as the most deprived area in the Far North.

Despite this the land around and adjacent to Kaikohe has some of the country's best horticultural soils and ample water supply, although a lot of this water falls over short periods and not always during times of the year when needed to support crops.

Starting in 2013 the Northland Regional Council looked at opportunities to provide economic benefits in Northland through land use change based on water. Originally funded through the crown irrigation investment fund, this work identified that the Kaikohe area in the Mid-North as being one that would benefit the most from investment.

In July 2019 the Ministry of Business Innovation and Employment entered into an agreement with the Northland Regional Council to deliver staged reports, leading to construction, that considered the technical feasibility and benefits of building storage reservoirs, harvesting water in times of plenty, and distributing it to stimulate conversion from existing land use to higher value, primarily through horticulture.

The prefeasibility reports, delivered in March 2020, identified that the schemes could provide economic benefits over and above existing land use of an estimated $150 million per annum lift in Gross Domestic Product (GDP) and an additional 877 jobs. The Mid-North scheme alone has the potential to increase the area's GDP by 22% and employment by 12%.

The Otawere project, now being managed by the Te Tai Tokerau Water Trust, forms a part of the mid-north scheme, storing approximately 50% of the water ultimately needed.

The Otawere reservoir, once completed, will create substantial work opportunities associated with land uses changes. In the short term its design and construction of the s 9(2)(b)(ii) reservoir is predicted to employ 31 people over a three year period.

The Far North experienced its worst ever drought in 2020. The impact of this on the council included; diversion of staff to crisis management, costs of $870,000 to provide a temporary supplementary water supply for Kaikohe, and executing contingency operations to continue operation of the Northland Regional Corrections Facility, accommodating 548 inmates and 180 staff. This excludes the impact of residents living under extended water restrictions. The drought, on top of COVID-19, has added to Kaikohe existing economic hardships.

There is a need in the mid-north for a reliable water supply to help improve its economic opportunities, the community's wellbeing, and reduce its vulnerability to droughts.

## Pre-feasibility Phase

The objective of the Pre-feasibility Phase was to assess whether there are viable water storage and distribution scheme options in both the Mid-North and Kaipara command areas that are worth pursuing and which meet the PGF investment principles for water storage (Water Principles). This work commissioned by Northland Regional Council and funded by the Provincial Growth Fund (97%) and council's Investment and Growth Reserve (3%) was undertaken following the conclusion of two previous studies: The Northland Strategic Irrigation Infrastructure Study and the Scoping of Irrigation Scheme Options in Northland.

This phase was governed by a Project Steering Group (consisting of the Chief Executive Officers from the Northland Regional Council, Far North District Council and the Kaipara District Council and two Crown appointed representatives) and a Project Advisory Group (made up of invited representatives from iwi and hapu, Lake Ōmāpere Trust, landowners, primary industry sectors, environmental agencies and community).

The overall conclusion of the Pre-feasibility assessment was that a viable scheme option exists in both areas, and that the preferred options will consist of multiple water storage sites connected through a distribution system rather than based on one or two large reservoirs.

The Otawere reservoir was identified during this work as part of the mid-north distributed scheme.

The following discussion provides and overview of the Northland Water Storage and use Project and includes an analysis of the economic benefit of the scheme to Kaipara and the mid-north, including the Otawere project specifically.

## Demand

Around half of the land in both the Mid-North (54%) and Kaipara (46%) command areas has been identified as being very suitable for horticulture production (Table 1). This finding was based on detailed analysis of soil types, land gradient and solar aspect.

Face to face discussions were had with approximately forty of the larger landowners with suitable horticulture land. Four public drop-in day sessions (two in each area) were held. Interviews were conducted with nineteen horticultural industry representatives across a range of fruit and vegetable crops. In the Mid-North, there are clusters of existing landowners eager to advance water storage and distribution opportunities for around 300 hectares of land. Strong support has also been expressed by landowners in Kaipara.

*Table 1* ***Summary of potential demand factors***[1]

| Variable | Mid North | Kaipara |
|---|---|---|
| Command area (ha) | 6,000 | 10,150 |
| Irrigation area – Farm (ha) | 2,700 | 3,700 |
| Irrigation area – Canopy (ha) | 1,900 | 2,600 |
| Land in command area identified as very suitable for horticulture (ha) | 3,220 | 4,714 |
| Land in command area identified as very suitable for horticulture (%) | 54% | 46% |
| Canopy area as share of very suitable land area (%) | 59% | 55% |

There is strong interest in this project from the wider primary sector, and belief that there is significant potential to grow high value horticulture in the region if more water was available including kiwifruit, avocado, citrus, blueberries and market garden vegetables. This assessment included a financial contribution to the capital construction cost, an ongoing operational and maintenance charge, and on-property development costs associated with converting pastoral land into the specific horticultural crops.

*Figure 1: Project Advisory Group Tour – 12 December 2019*

[1] Williamson Water & Land Advisory Ltd, March 2020

## Supply and storage of water

In order to quantify the volume of water available for harvesting and storage, calibrated catchment models were developed for 14 sub-catchments in the Mid-North and 20 sub-catchments in Kaipara, ranging in size from 10 km2 to 52 km2. These models, using NRC flow data, NIWA's virtual climate station network and consented take data, indicate that there is likely to be sufficient surface water available to typically capture water during high flow events (predominately in winter) and collect it in storage reservoirs. Analysis suggests an overall scheme reliability of 97-99%.

More than 100 possible storage sites were initially identified using a geospatial analysis tool, avoiding areas of significance. These were whittled down to 20 sites in each area using multi-criteria analysis (MCA) to ensure that only sites with the best combination of physical characteristics and low risk are advanced. Each of these 40 sites was subject to field observation, including a site walkover where possible, and a second, more detailed MCA and a fatal flaws analysis.

Based on these 40 sites, the team developed two water storage scenarios in each area (Large Storage and Distributed Storage). The Large Storage scenarios seek to provide a likely lower limit on total scheme cost through capturing economies of scale particularly in dam location and storage volume, i.e. just one or two reservoirs in each command area.

The Distributed Storage scenarios seeks to compartmentalise the overall scheme so that they could be developed in a progressive manner, i.e. four or five reservoirs in each command area. While more expensive, the advantage of this scenario is that it reduced the quantum of funds required for each construction stage and limits the risk associated with uptake by progressing with subsequent stages when the uptake demand had been confirmed.

*Figure 2: Project Advisory Group tour of water supply schemes in the Far North, Dec 2019*

## Community

The scale of the schemes developed fit within the PGF Water Principles criteria for developing small-scale projects. There are also real opportunities to address municipal water supply issues. Both scheme areas include storage opportunities within realistic supply proximity to their respective urban centres.

Both Kaipara and Far North District council are developing their municipal water supply options and looking at how they can be configured to benefit from water available through the storage schemes, and how to fund this work through their forthcoming Long Term Plans

## Environment

The use of water to shift away from intensive pastoral farming in both areas will likely benefit the environment from improved water quality due to less sediment and bacterial run-off.

Table 2 presents the current land use in each of the command areas. Both areas are dominated by high producing grassland. In the Kaipara the water storage sites are predominantly in modified catchments that have been drained as part of flood supply schemes and as such the scheme is likely to provide improvement in habitat.

*Table 2* ***Current land cover of command area***[2]

| Selected land cover type | Mid North % command area | Kaipara % command area |
|---|---|---|
| **High producing exotic grassland** | 83% | 80% |
| **Short rotation crop land** | 2% | 8% |
| **Indigenous forest or scrub** | 8% | 2% |
| **Exotic forest** | 2% | 2% |
| **Orchard, vineyard or other perennial crop** | 1% | 0% |

## Long Term Economic Benefit Assessment[3]

*Strengthen economies by shifting land use to higher value*

The findings of the Pre-feasibility Phase confirm that there are substantial economic opportunities to be realised through the development of water storage and use schemes in Northland. These benefits arise from both a substantial lift in horticultural production and the flow-on effects to other sectors. Analysis suggests a good return on investment: that for every $1 million spent on building the schemes, there will be an on-going annual lift in economic activity (measured by Gross Domestic Product (GDP)) of $1.3 million and a rise in economic well-being (measured by household income) of $0.6 million each year.

Using assumptions about the different types of horticultural crops that will be developed in each scheme area, the value of output and employment per hectare for these crops, and an inter-industry

[2] Northland Regional Council, 2020
[3] Letter to MBIE, 30 March 2020, Appendix 1

input-output table and associated multipliers developed by Insight Economics[4], the following tables show for each scheme area the annual direct and total impacts[5] that are estimated to occur in terms of value of output, GDP, employment (measured on a full time equivalent basis) and gross household income.

The tables show the net gains from moving to high value horticulture, i.e. it accounts for the loss of pastoral farming activity. The analysis does not consider the increased output associated with water supplied for industrial output and assumes that the total area able to be supplied with water undergoes a land use change from pastoral to horticultural production. These estimates are not forecasts or predictions as uptake, prices and volumes may differ from the assumptions. However, they do illustrate the scale of benefits and the economic consequences of developing the schemes.

*Table 3* ***Potential annual economic impacts of proposed schemes – Mid North[6]***

| Variable | Direct | Total |
|---|---|---|
| **Value of output** | $143M | $178M |
| **GDP** | $52M | $67M |
| **Employment (FTE)** | 350 | 440 |
| **Household income** | $22M | $29M |

The analysis indicates an increase in GDP of $67 million per annum in the Far North, equivalent to a 2.4% increase in the district's current GDP (valued at $2451 million in the year ended March 2019). The additional 440 FTE filled jobs represents a 1.5% increase over current employment levels in the district.

The economic impact will be considerably greater on the smaller Mid-North area. Defining this in terms of the four SA2 in and around Kaikohe, the scheme would lift the area's GDP by 22% and employment by 12%[7].



[4] Materials relied upon summarised in Appendix 3

[5] The total impact considers the direct effect as well as the indirect effect (production linkages associated with additional output) and the induced effect (consumption linkages resulting from increased household income).

[6] Economist, Northland Regional Council, March 2020. Refer Appendix A.

[7] The four Statistical Area 2 are: Kaikohe, Ngapuhi, Okaihau and Ohaeawai-Waimate North.

*Table 6* ***Estimate of on the ground jobs during construction***[8]

| Component | Estimate expenditure ($'000) | Calculation of labour input | | | |
|---|---|---|---|---|---|
| | | % Labour | Cost ($ per hr) | Hours | FTE |
| **Reservoirs** | | | | | |
| Feasibility investigation + consenting | s 9(2)(b)(ii) | 100% | s 9(2)(b)(ii) | s 9(2)(b)(ii) | |
| Land procurement | | 0% | | | |
| Design and tender | | 100% | | | |
| Construct + procure | | 30% | | | |
| Total reservoirs | | | | | |
| **Distribution** | | 100% | | | |
| Design and tender | | | | | |
| Easements and land access rights | | 0% | | | |
| Pipe Manufacture | | 50% | | | |
| Construct + procure | | 30% | | | |
| Total distribution | | | | | |
| **Total** | | | | | |

*FTE = Full Time Equivalent (2,080 hrs per annum)*

## Otawere Reservoir

The reservoir site comprises a generally flat plain located between rolling hills on the west and moderate slopes on the east formed by faulting and erosion of greywacke basement rock.

The reservoir is formed between two dams: a main dam at the south-western side, and a smaller saddle dam to the north. The saddle dam is located just beyond a catchment divide separating a tributary of the Okokako Stream with an unnamed tributary of the Waitangi River. Both watercourses confluence the Waitangi River main stem just upstream of Puketona, ultimately discharging to the Waitangi estuary where it joins the Bay of Islands.

The catchment is predominantly in pasture, with isolated areas of wetland and bush predominantly along riparian margins. There are several incised gullies that are cut into the hills surrounding the reservoir basin, which are wider and longer in the western portion of the site. The streams entering the reservoir basin from several locations are fed by springs. Lake Omapere is located 11km to the west of the site and is 170m higher in elevation than the proposed reservoir site.

[8] Northland Regional Council, Shovel Ready Projects job creation assessment, May 2020

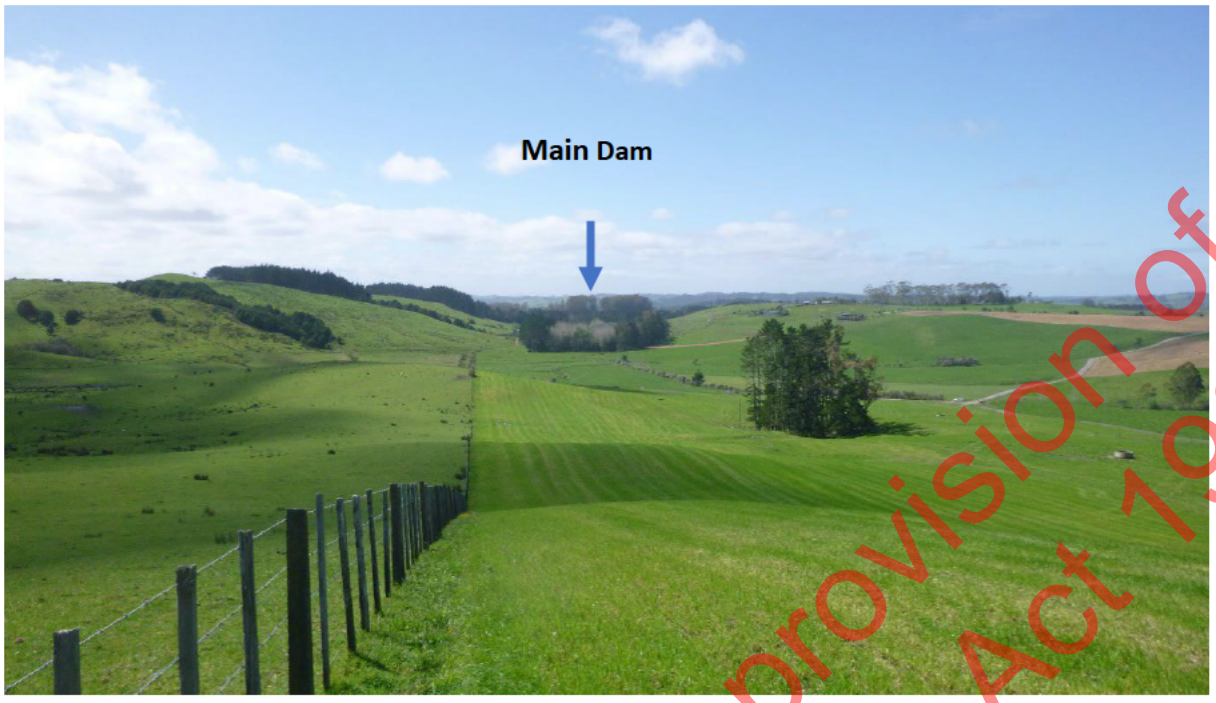



**Fig 2** Main Dam site


**Fig 3** Smaller dam site

Based on the information provided by PWC the Otawere project is estimated to create 31 FTE in the over a three-year period. These estimates are based on an initial 12-month construction period. Please note that these numbers do not reflect the substantial economic benefits, including significant employment opportunities, that will be created with the conversion of pastoral land to horticulture. Horticulture yields substantially more economic benefit per hectare than pastoral farming.


*Figure 3 Technical team site visit June 2020*

## Water storage will help address disparities in Māori access to water for land development

A key focus has been to ensure the project will deliver opportunities for Māori landowners to develop their land through the delivery of a secure water source. The Pre-Feasibility Phase of the project has confirmed that there are Māori landowners within the area of benefit and initial discussions have confirmed that those landowners are interest to develop their land should a reliable water source be available. A key focus of the Feasibility Phase will be to continue to work with these landowners to further explore these development opportunities and address potential barriers that may exist for those Māori landowners.

Multiple hui have been held throughout the Pre-feasibility Phase with various Māori groups, including trusts, marae, and hapū, and input from hapū and Iwi on the Project Advisory Group has helped identify opportunities and challenges for Māori to benefit from investment in a water supply

*Table 8* ***Māori Freehold Land and population within command areas[1]***

| | Mid North | Kaipara |
|---|---|---|
| **Māori Freehold Land (ha)** | 1,000 | 300 |
| **Māori Freehold Land (% command area)** | 17% | 3% |
| **Māori population (total)** | 5,232 | 2,732 |
| **Māori population (% total population)** | 71% | 32% |

Initial discussions with some of these landowners have confirmed that they are interested in developing their land should a reliable water source be available. Multiple hui have been held with various Māori groups, including trusts, marae, and hapū. Input from hapū and Iwi on the Project Advisory Group has helped identify opportunities and challenges for Māori to benefit from a water supply scheme.

A cultural impact assessment is currently being developed by Taiamai ki te Takutai Moana RMU (TKTTM)


**Fig 5** Hone Tia Toa of TKTTM presenting at Tauwhare Marae hui - 30 Nov 2020

## Drought Resilience

One of the most significant dry periods in Northland ended in July 2020. Statistical analysis on its severity has not yet been completed however discussion with Northland Regional Council Hydrology staff has indicated it is likely more severe that the 2009/10 drought in Kaikohe which was estimated at a 1 in 90-year event.

A paper presented to the Far North District Councils 25 June 2020 meeting by its infrastructure planning staff is appended to this document **(Appendix 2).** This paper identifies learnings from the 2020 drought and looks at options to improve the resilience if the Far North districts drinking water supplies.

Points of note include:

- The severity of the event as indicated by rainfall accumulation data collected during 2019 and 2020.
- The impact of the event on council staff. 20 staff were part of the crisis response team.
- The extent of interagency involvement.
- The risk of the water shortage on firefighting ability.
- Implications for the Ngawha Regional Corrections Facility (accommodating 548 inmates and 180 staff), serviced by the Kaikohe town water supply, and the need for them to develop alternative water supply options.
- The cost of bring in temporary water supplies. $878,128 alone was spent on the Lake Omapere temporary supply for Kaikohe.
- Kaikohe was deemed one of two towns at greatest risk in the Far North District of having insufficient water supply.
- Inclusion of an irrigation dam in the mid-north with the capacity to supplement the town water supply as part of the actions to improve resilience.

## Effects of COVID-19[9]

The number of filled wage and salary jobs in Northland (i.e. not including self-employed) fell from almost 69,000 in March to 67,550 in May, a fall of just over 1400 people or 2.1%. Compared to other regions, the 2.1% drop from March to May ranks Northland as the 10th largest, with the change ranging from 0% in Bay of Plenty to a 3.8% drop in Gisborne. Nationally, the number of wage and salary jobs fell by 0.8% between March and May. Changes in employment numbers below the regional level are not available.

The change in filled wage and salary jobs in Northland has not be even across age groups and gender, with the impact falling harder on younger people and females. Of the 1435 fewer wage and salary jobs, 662 (46% of the total) were filled by people aged below 24 years old. A further 276 (19%) were aged 25-34 years old. People under 35 years therefore accounted for two-thirds of the drop in filled wage and salary jobs. Females accounted for 60% of the drop in these jobs, with the drop in female employment being 50% greater than for males. Given the demographic age structure of Kaikohe and the surrounding area, the area is likely to be significantly impacted not only by the

[9] Prepared by Northland Regional Council economist, July 2020

immediate job losses but also the longer-term opportunities for youth to enter into the labour market.

An illuminated road sign outside Kaikohe's drive-through Community-Based Assessment Centre. Photo / Peter de Graaf

*Figure 5 Kaikohe COVID-19 Testing (From Northern Advocate 4 May 2020)*

Between March and June, the total number of Jobseeker Support recipients in Northland increased by 1928 (20%), rising to 11,358. The initial "wave" of unemployment appears to have tapered off, with numbers near to this current level being recorded since the beginning of May and a peak of 11,484 recorded at the beginning of June. Nationally, the number of Jobseeker Support recipients has increased by 26% between March and June. Northland ranks as having the 12th largest increase across the 16 regions, with Tasman recording the highest (39%) and Gisborne the lowest (18%).

However, just over one-in-ten Northlanders aged 18-64 years old are estimated to be receiving Jobseeker Support, the highest among all 16 regions. Otago has the lowest at just 3.6%. Nationally, 6% of 18-64 years olds are estimated to be now receiving the Jobseeker Support benefit, up from 5% at the start of 2020.

The impact of the COVID-19 virus and the lockdown response, coupled with the current drought conditions will have a significant negative impact on economic activity in Northland. It is projected that Northland's GDP may fall by 8% in the year ended March 2021, down from an annual average growth rate of 3.2% experienced over the five-year period 2014-19. This is a significantly larger drop than the 2% fall in activity experienced between 2009-11 as a result of the GFC crisis and various climatic events, and deeper than for New Zealand (6%). The current level of GDP in Northland ($7.9B) is not expected to be reached again until 2024 even if the recovery is as swift as projected

The reduction in economic activity will result in a large fall in the number of jobs in Northland (both people employed and those self-employed): projected to fall from 86,400 in the year ended March 2019 to 77,500 in 2022, a drop of 9000 or 10%. This is more than twice the fall in employment that occurred in the previous recession. The experience of that recession is that the impact will fall greater on Māori than non-Māori. One of the features of the post GFC recovery was the relatively slower and jerky rise in employment compared to economic activity. The projection is that by 2024 the number of people employed in Northland will still be lower than in 2019.

## Deprivation Index - Kaikohe

The 2018 Social Deprivation Index[10], commissioned by the Department of Public Health, identified Kaikohe with an index value of 1302, the highest index value in the Far North district[11]. With reference to Figure 6 this value puts Kaikohe in the top 5% of most deprived areas in NZ.

The Social Deprivation Index is used in the measurement and interpretation of socioeconomic status of communities for a wide variety of contexts such as needs assessment, resource allocation, research and advocacy. The deprivation index applies to areas rather than individuals who live in those areas[11].

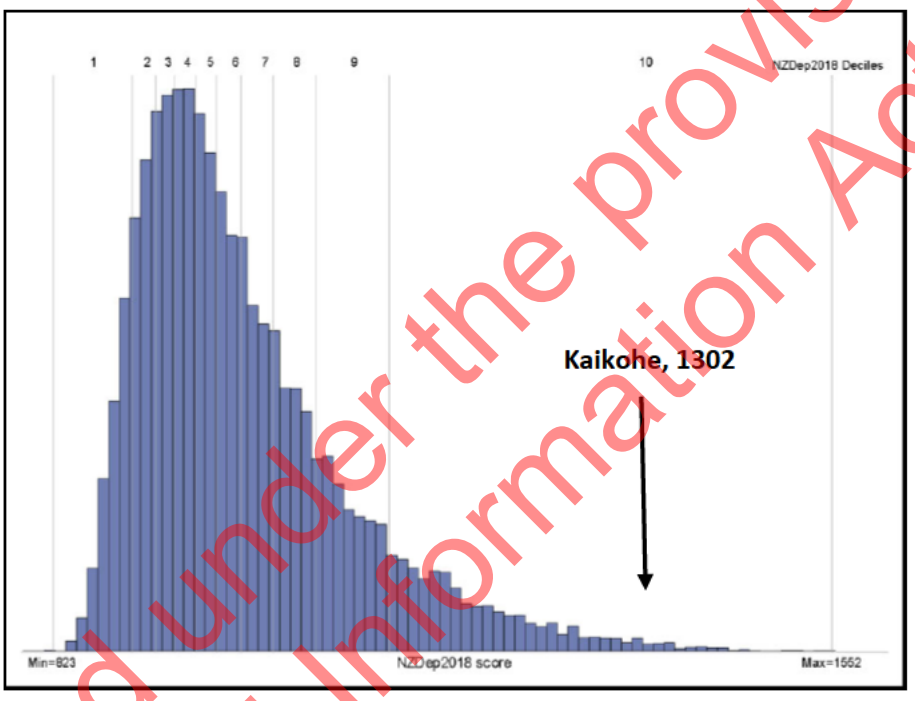



***Figure 6** Distribution of NZDep2018 scores, with the NZDep2018 decile scale superimposed* [10]

## Summary

A prefeasibility study into water storage schemes that enable conversion of land to pastural farming to high value horticulture in the Mid-North and Kaipara determined that viable schemes are possible. The estimated potential economic benefits of the schemes, over and above existing land use, included an increase in annual GDP of $150 million per annum and 877 jobs.

In addition to the direct economic benefits the Otawere reservoir is able support land use in dry conditions increasing the communities resilience to drought. During the drought of 2019 / 2020 Kaikohe was one of the most affected areas in the country, leaving households without access to water, and dairy farms dry.

[10] Atkinson J, Salmond C, Crampton P (2019). NZDep2018 Index of Deprivation, Interim Research Report, December 2019. Wellington: University of Otago.

[11] https://profile.idnz.co.nz/far-north/deprivation-index - Far North District Council Community Profile

## Appendix 1

Copy of a letter to MBIE dated 30 March 2020 submitted as part of the delivery of the pre-feasibility stage of the work.

Some information in the letter to MBIE has not been disclosed:

- Financial details that may affect future negotiations.
- Details that may be of a personal or confidential nature.
- The information is not material to the Otawere application as it relates primarily to the wider water supply project including work in Kaipara.

30 March 2020

Richard Westbury
Investment Director
Provincial Development Unit
Ministry of Business, Innovation and Employment
15 Stout Street
WELLINGTON 6140

Send by email: s 9(2)(a)

Dear Richard

**R01.00446 Northland Water Storage and Use Project – Completion of Prefeasibility Phase**

The Funding Agreement between the Northland Regional Council (NRC) and the Ministry of Business, Innovation and Employment for Northland Water Storage and Use, executed 8 July 2019, sets out milestones to be met in delivery of the project. The Pre-feasibility Phase is due for completion on 31 March 2020.

The purpose of this letter is to:

1. Provide evidence that the stop/go milestones set-out in Clause 15 of the Agreement have been satisfied, specifically:
    a. Project viability;
    b. Available funding to complete one or both projects;
    c. Alignment with the water principles;
2. Request that the Ministry of Business, Innovation and Employment (Ministry) approve commencement of the Feasibility phase.

**Reference Documents**

The following reports are included as attachments to this letter and are referenced throughout this letter:

- Williamson Water & Land Advisory & Riley Consultants report – **Volume 1**: Command Area Analysis and Refinement Northland Water Storage and Use Project;
- Williamson Water & Land Advisory & Riley Consultants report – **Volume 2**: Water Resources Analysis Northland Water Storage and Use Project;
- Williamson Water & Land Advisory & Riley Consultants report – **Volume 3**: Conceptual Design and Costing Northland Water Storage and Use Project; and
- Williamson Water & Land Advisory & Riley Consultants report – **Volume 4**: Analysis and Recommendations Northland Water Storage and Use Project

**Scheme Area**

The Agreement required assessment of three areas; Mid-North A, Mid-North B and Kaipara.

As the project has evolved, we have considered the Mid-North as a single area rather than as two separate areas A and B. This was due to:

- The spread-out nature of the horticultural soils in the Mid-North, making boundaries between the two areas arbitrary;
- The potential ability for a scheme to be interconnected between areas A and B.
- Future governance models are likely to consider Mid-North as a single area.

The discussion below is therefore based on two schemes; Mid-North and Kaipara.

**Project viability**

There are five factors that are considered fundamental to assessing the viability of the project at the end of the Pre-feasibility Phase.

- **Land Resources:** Do the land resources support a transition to higher value use?
- **Water Resources:** Is sufficient water sustainably available to support high value land use?
- **Geotech:** Is it technically feasible to build the water storage reservoirs?
- **Affordability.** Can the scheme be built and operated at a cost that can be met by the users and community?
- **Demand.** Will the land owners and community utilise the water?

A summary of the work presented in the attached reports is provided in Table 1.

**Table 1** Project Viability

| Factor | Mid-North | Kaipara |
|---|---|---|
| **Land** | 2,700 hectares of suitably contoured farm land currently in pasture or scrub.<br><br>Includes free draining volcanic soil also evident in Kerikeri predominantly growing kiwifruit. | 3,700 hectares of suitably contoured farm land currently in pasture.<br><br>Includes red-hill sands similar to that used on the Aupouri Peninsula and north of Auckland for growing avocados |
| **Water** | There is sufficient surface water available to capture water in winter and higher flows and collect it in storage reservoirs. | There is sufficient surface water available to capture water in winter and higher flows and collect it in storage reservoirs. |

| | | |
|---|---|---|
| | Examples include the Wairoro Stream, Punakitere River, Te Rua o Tehauhau Stream and potentially Lake Ōmāpere. | Examples include the Aratapu Stream, Cole Drain, and Kaihu River. |
| **Geotech** | Suitable storage sites have been identified. Initial studies indicate suitable ground conditions however, geology is variable. | Multiple high efficiency storage sites have been identified.<br><br>Finding engineering solutions to address subsoil conditions will be a critical factor in the next stage. |
| **Affordability** | Total capital cost is in the range of s 9(2)(b)(ii) An assessment of return on investment for a variety of crops indicates operation of the scheme is likely to be financially viable (Table 3).<br><br>Staging the scheme construction reduces the risk of slow uptake but imposes a higher capital cost. | Total capital cost is in the range of s 9(2)(b)(ii) An assessment of return on investment for a variety of crops indicates operation of the scheme is likely to be financially viable (Table 3).<br><br>Staging the scheme construction is viable in Kaipara with a low impact on long term costs. |
| **Demand** | Demonstrated early adopters for around 300ha land. Potential full uptake on commissioning of small reservoir near Kaikohe, including town supply.<br><br>Full uptake of scheme is likely to be slow, recognising a variety of challenges for Maori Freehold land owners to benefit from the water in the short term. | Strong support has been expressed however early adopters unknown.<br><br>Some existing landowners would like an ability to transition to other land use options from existing pastoral farming, others have indicated a willingness to sell if water was available.<br><br>Cost of water and ability to transition land use likely a key to stimulating demand. |

**Overview of cost estimates**

A breakdown of estimated costs is provided below in Table 2.

**Table 2** Cost Estimates

| Components | Kaipara ($000s) | | Mid-North ($000s) | | |
|---|---|---|---|---|---|
| | Large Storage | Distributed Storage | Large Storage | Distributed Storage | Distributed Storage (Lake Ōmāpere) |
| Intakes | | | | | |
| Pump-stations | | | | | |
| Reservoirs | | | | | |
| Piping | | | | | |
| Power Transmission | | | | | |
| Lake Ōmāpere Restoration Works | | | | | |
| Other allowances: design, Supervision, Contingency, P and G | | | | | |
| **Total +/- 15%** | | | | | |
| Plus land allowance | | | | | |
| Total Cost Mid-Point and Range (incl land and +/- 15% uncertainty) | | | | | |
| Cost Midpoint and Range ($/ha) Farm | | | | | |

*Redacted to protect the commercial position of the applicant.*

| | |
|---|---|
| Cost Midpoint and Range ($/ha) Canopy | *Redacted to protect the commercial position of the applicant.* |
| **Total Scheme Operational Costs (000s per annum)** | |

An assessment on investment opportunities is provided in Table 3.

**Table 3:** An estimate of return on investment for various crops

| | Kiwifruit | Avocado | Citrus | Blueberries | Vegetable |
|---|---|---|---|---|---|
| Development Costs ($/ha) | 413,409 | 63,159 | 47,909 | 313,409 | 28,409 |
| Gross Revenue ($/ha/ann) | 119,000 | 63,580 | 42,500 | 165,000 | 41,678 |
| Growing ($/ha/ann) | 40,987 | 15,497 | 31,409 | 95,987 | 28,909 |
| Debt ($/ha/ann) | 33,880 | 5,481 | 4,346 | 25,322 | 3,218 |
| Net Return ($/ha/ann) | 44,133 | 42,602 | 6,745 | 43,691 | 9,551 |
| Payback (years) | 10 | 7 | 14 | 10 | 4 |
| NPV ($/ha) | 296,264 | 311,097 | 1,751 | 280,047 | 110,077 |
| IRR (%) | 10 | 19 | 6 | 11 | 22 |

**Alignment with Water Principles**

**Strengthen economies by shifting land use to higher value**

The findings of the Pre-feasibility Phase confirm that there are substantial economic opportunities to be realised through the development of water storage and use schemes in Northland. These benefits arise from both a substantial lift in horticultural production and the flow-on effects to other sectors. Analysis suggests a good return on investment: that for every $1 million spent on building the schemes, there will be an on-going annual lift in economic activity (measured by Gross Domestic Product (GDP)) of $1.3 million and a rise in economic well-being (measured by household income) of $0.6 million each year.

Using assumptions about the different types of horticultural crops that will be developed in each scheme area, the value of output and employment per hectare for these crops, and an inter-industry input-output table and associated multipliers developed by Insight Economics, the following tables show for each scheme area the annual direct and total impacts[1] that are

[1] The total impact considers the direct effect as well as the indirect effect (production linkages associated with additional output) and the induced effect (consumption linkages resulting from increased household income).

estimated to occur in terms of value of output, GDP, employment (measured on a full time equivalent basis) and gross household income.

The tables show the net gains from moving to high value horticulture, i.e. it accounts for the loss of pastoral farming activity. The analysis does not consider the increased output associated with water supplied for industrial output and assumes that the total area able to be supplied with water undergoes a land use change from pastoral to horticultural production. These estimates are not forecasts or predictions as uptake, prices and volumes may differ from the assumptions. However, they do illustrate the scale of benefits and the economic consequences of developing the schemes.

- Mid -North

| Variable | Direct | Total |
|---|---|---|
| Value of output | $143M | $178M |
| GDP | $52M | $67M |
| Employment (FTE) | 350 | 440 |
| Household income | $22M | $29M |

The analysis indicates an increase in GDP of $67 million per annum in the Far North, equivalent to a 2.4% increase in the district's current GDP (valued at $2451 million in the year ended March 2019). The additional 440 FTE filled jobs represents a 1.5% increase over current employment levels in the district. The economic impact will be considerably greater on the smaller Mid-North area. Defining this in terms of the four SA2 in and around Kaikohe, the scheme would lift the area's GDP by 22% and employment by 12%.[2]

- Kaikohe Storage Site (MN10)

| Variable | Direct | Total |
|---|---|---|
| Value of output | $19M | $24M |
| GDP | $7M | $9M |
| Employment (FTE) | 50 | 60 |
| Household income | $3M | $4M |

- Kaipara

| Variable | Direct | Total |
|---|---|---|
| Value of output | $176M | $220M |
| GDP | $64M | $83M |
| Employment (FTE) | 360 | 437 |
| Household income | $28M | $36M |

The analysis indicates an increase in GDP of $83 million per annum in Kaipara, equivalent to a 9% increase in the district's current GDP (valued at $914 million in the year ended March

[2] The four Statistical Area 2 are: Kaikohe, Ngapuhi, Okaihau and Ohaeawai-Waimate North.

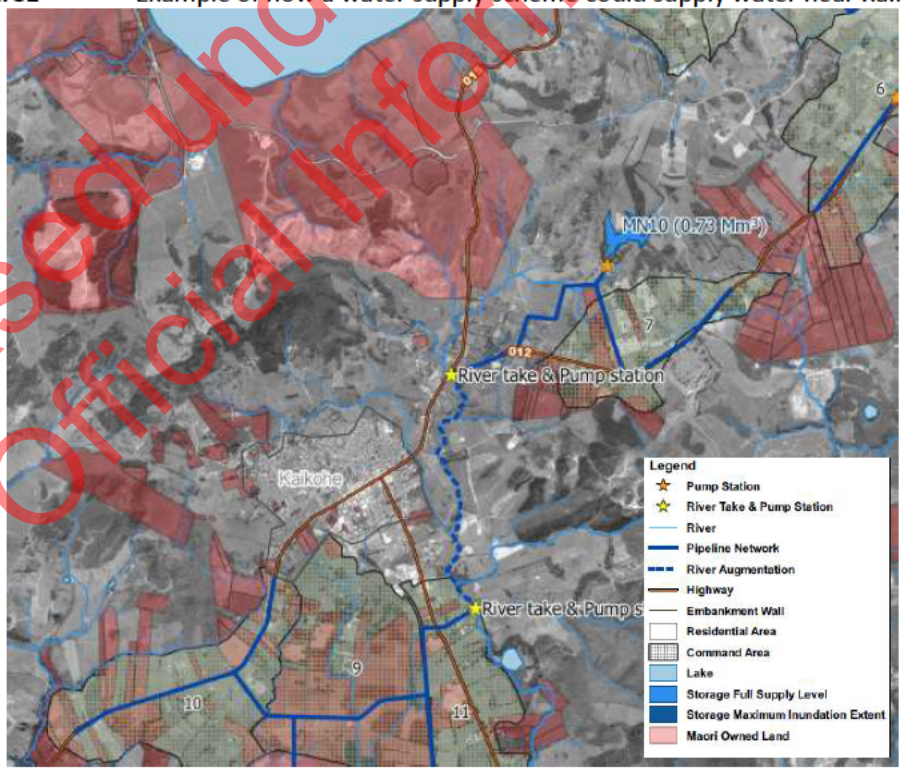
2019). The additional 437 FTE filled jobs represents a 5% increase over current employment levels in the district.

**Water storage will help address disparities in Māori access to water for land development**

A key focus has been to ensure the project will deliver opportunities for Māori landowners to develop their land through the delivery of a secure water source. The Pre-Feasibility Phase of the project has confirmed that there are Māori landowners within the area of benefit and initial discussions have confirmed that those landowners are interest to develop their land should a reliable water source be available. A key focus of the Feasibility Phase will be to continue to work with these landowners to further explore these development opportunities and address potential barriers that may exist for those Māori landowners. Multiple hui have been held throughout the Pre-feasibility Phase with various Māori groups, including trusts, marae, and hapū, and input from hapū and Iwi on the Project Advisory Group has helped identify opportunities and challenges for Māori to benefit from investment in a water supply scheme.

Opportunities arise for example from the extent of Māori Freehold Land (MFL) around Kaikohe and adjacent to potential water supply schemes, as shown in Figure 1. [redacted] *Redacted to protect personal information that may be confidential.* that would also make use of existing infrastructure from previous horticultural operations.

**Figure1** Example of how a water supply scheme could supply water near Kaikohe



There is less extent of MFL in Kaipara as shown in Figure 2 below. Work is currently underway with Oturei, Ripia and Waikartu Marae to develop a more in depth understanding of the impact of the scheme on cultural values and where the opportunities arise to benefit Maori directly.

We are also working with Te Puni Kokiri to ensure we have the best information on land ownership, ownership structures and readiness in terms of governance.

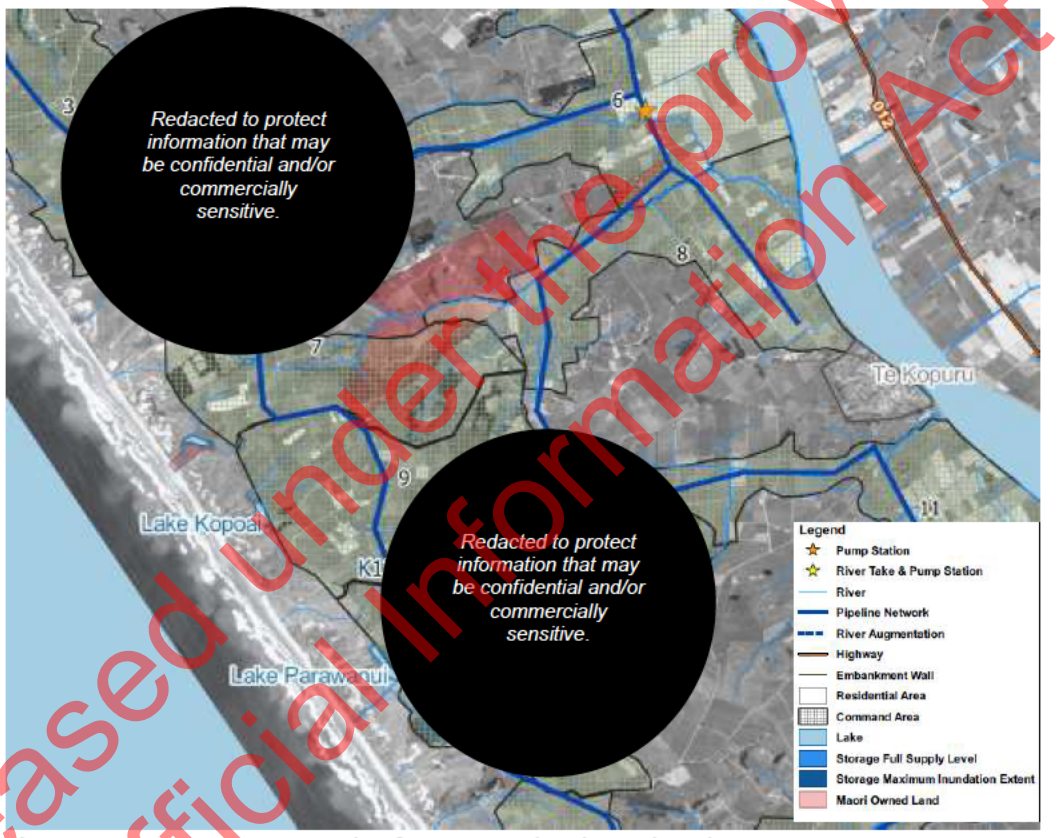



**Figure 2** Example of water supply scheme in Kaipara

Te Uri o Hau Settlement Trust have indicated opportunities would arise with development of the scheme and provide Iwi opportunities for investment.

The challenges in taking up the opportunities include getting access to capital to fund on-farm conversions and development of governance entities to enable decisions on future land use.

As indicated in the economic analysis the expected increase job opportunities and increase in local investment will provide multiple opportunities for Maori.

**Community**

The scale of schemes developed in the prefeasibility stage fits within the criteria for small scale projects. All options have components of off-site storage and water harvesting, rather than damming of major water ways.

The pre-feasibility options incorporate the opportunity for town supply to Kaikohe and Dargaville. The Far North District Council are currently seeking funding to secure storage in a reservoir near Kaikohe to improve resilience in their town water supply.
Kaipara District Council are also considering their current Long Term Plan budgets for water supply and potential to utilise some of the is funding to purchase water supply through this project.

**Environment**

The Pre-Feasibility Phase has confirmed that there are environmental benefits to developing a water storage scheme in both the Mid-North and Kaipara. As part of the feasibility study there will be an increased focus on environmental enhancement opportunities such as riparian planting and enhancement of wetlands.

Additionally, with alternative water sources available for the Dargaville and Kaipara townships there will be less pressure on other sources during times of drought, such as has occurred on the Wairoro this summer.

In the Mid-north the proposal for smaller scale reservoirs reduces the overall environmental effects of constructing a scheme. Because of the conducive conditions for plant growth and long history of occupation all of the storage sites identified have a variety of intrinsic values that may be impacted on by construction of a schemes. Avoiding, minimising and mitigating effects will be required as the scheme develops.

In the Kaipara the water storage sites are predominantly in modified catchments that have been drained as part of flood supply schemes and as such the scheme is likely to provide improvement in habitat.

Use of water to shift away from intensive farming in both areas will have the effects to benefit the environment from improved water quality due to less sediment and bacterial run-off.

By providing alternative water sources there is potential to reduce the current demand on water ways in summer and provide an alternative for takes that currently occur from Kaipara dune lakes. As discussed further below, there is an ongoing work programmes with the Lake Ōmāpere Trust about improving Lake water quality.

**Climate Change**

The water storage project provides significant opportunities to mitigate the impacts of climate change. The frequency and severity of droughts are expected to increase with climate change and having a reliable water supply, that takes water during the wet months, will become increasingly important to provide resilience and support small rural economies

such as Kaikohe and Dargaville. Opportunities for power generation through a water supply scheme have been considered, however the small scale of the schemes is unlikely to provide a benefit to emissions.

There is low lying land in the Kaipara that is at risk from future sea level rise. An increase in land value through a shift to higher economic use and increased GDP has the potential to increase available funding for future mitigation. For example, investment in flood defences will be more cost effective if the defences protect higher value land.

**Lake Ōmāpere**

As required under clause 14 (d) of the Agreement there has been open and constructive engagement with Lake Ōmāpere trustees. This has included development of a draft Memorandum of Understanding, undertaking water quality assessments on the lake and Utukura River, and incorporation of Lake Ōmāpere into a potential water supply scheme option.

Further work is being scoped around how the priority of the Trust to improve water quality in the Lake may be also incorporate an opportunity to develop economic benefits through provision of water.

The cost analysis, including the potential in reduced capital costs by incorporating Lake Ōmāpere into the scheme, supports continuing work with the Trustees to improve water quality and develop the Lake as a water supply option. Funding of $500,000 towards this work is included in the forward funding assumptions.

**Preferred Concept**

During the pre-feasibility phase a single storage area option and a multiple storage option (distributed model) was developed. The preferred approach is set out below for each area.

**Mid-North**

1. Seek to progress MN-10 towards construction as fast as practical to enable water to be supplied to the area of generally Maori freehold land immediately south of Kaikohe, to address Kaikohe Municipal supply, and to seed development of horticulture needs on Ngawha Innovation and Enterprise Park. This progress however should be undertaken with a clear understanding of how this component would integrate into the overall scheme.

2. Progress feasibility works on the following storage sites to optimise a preferred network and better assess risks associated with construction, such as geotech, cultural impact, land procurement and environmental impacts:

    - MN02
    - MN06

- MN16
- MN18 upper reservoir
- MN20 (an existing farm reservoir)

3. Continue to work with the Lake Ōmāpere Trust and stakeholders to determine how and when (or if) Lake Ōmāpere forms part of a future water supply scheme.

The reasons for this approach include:

- The difficulty to access capital funding to construct a large storage reservoir and associated pipework, given the limited confirmed demand at this stage.
- That MN10 forms part of a distributed supply, a scheme that includes Lake Ōmāpere, or a single storage site option.
- A distributed scheme allows time for work to be carried out with the Lake Ōmāpere Trust and stakeholders to better assess the viability of the Lake becoming available as part of the scheme.

**Kaipara**

1. Progress feasibility works on the following storage sites to optimise a preferred network and better assess risks associated with construction, such as geotech, cultural impact, land procurement and environmental impacts:

    - K06
    - K10
    - K13
    - K17

The reasons for this approach include:

- A distributed approach allows the scheme to be constructed in pace with demand;
- The difficulty to access capital funding to construct a large storage reservoir and associated pipework, given the limited confirmed demand at this stage.
- There are multiple storage site options in the Kaipara. The above sites warrant further investigation however other opportunities exist.

**Funding**

An additional s 9(2)(b)(ii) was made available to the project in January 2020 to allow development of projects in both Kaipara and the Mid-North.

The current forecast for Pre-feasible phase spending is s 9(2)(b)(ii) leaving an underspend of s 9(2)(b)(ii) to be carried forward. In addition to the prefeasibility works feasibility works have already progressed or committed, including:

- Mid-North Feasibility investigations s 9(2)(b)(ii)
- Lake Ōmāpere Investigation s 9(2)(b)(ii)
- Kaipara Geotech investigations s 9(2)(b)(ii)

Up to s 9(2)(b)(ii) in total of co-funding is available from the Far North District Council, Northland Regional Council and Kaipara District Council.

Work will continue throughout the Feasibility stage to secure other funding sources, such as landowners.

**Conclusion and Recommendation to continue to the feasibility phase**

Based on the above assessment it is the opinion of the Steering Group that the stop/go milestones set-out in Clause 15 of the Agreement have been satisfied, specifically:

1. The project is viable in both the mid-North and Kaipara
2. There is funding available to complete the feasibility works for both areas as set out in Table 4;
3. The prefeasibility works demonstrate alignment with the Water Principles

Additionally, the forecast impact of the coronavirus outbreak is that in the short-term government expenditure on critical infrastructure will be needed to stimulate the local economy, and in the longer term the Northland region will need to look for economic opportunities outside of tourism to support its communities. This project provides for this through:

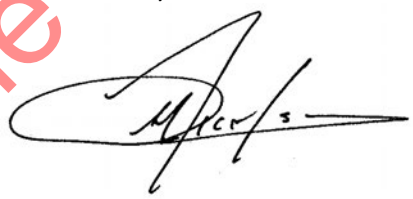
- An opportunity for construction of projects starting in 2020;
- Being scalable, there is an opportunity to bring forward construction stages should additional stimulus be needed and funding available;
- An ability to provide long term economic stimulus through land use transformation based on horticulture.
- An opportunity to expedite water security and industrial capacity ahead of a UN forecast food shortage post COVID-19.

It is therefore recommended that:

1. MBIE approve continuation of the project into the feasibility phase in both the Mid-North and Kaipara areas;

A letter will be sent separately on our recommendations to deliver the next stage of the project.

Yours sincerely



**Malcolm Nicolson – NRC Chief Executive Officer**

0800 002 004 www.nrc.govt.nz info@nrc.govt.nz

Private Bag 9021, Whangārei 0148

KAIPARA DISTRICT
Kaipara te Oranganui • Two Oceans Two Harbours

Far North District Council
Te Kaunihera o Tai Tokerau ki te Raki

Northland REGIONAL COUNCIL
Te Kaunihera ā rohe o Te Taitokerau

**Jim Sephton**
**For Louise Miller**
**KDC Chief Executive Officer**

**Shaun Clarke**
**FNDC Chief Executive Officer**

**Dover Samuels**
**Crown Appointed Member**

**Murray McCully**
**Crown Appointed Member**

## Appendix 2

Learning From The 2020 Drought And Improving The Resilience Of Our Drinking Water Supplies.

Far North District Council, 25 June 2020.

## 7.3 LEARNING FROM THE 2020 DROUGHT AND IMPROVING THE RESILIENCE OF OUR DRINKING WATER SUPPLIES

**File Number:** **A2894873**

**Author:** **Melissa Parlane, Team Leader - Infrastructure Planning**

**Authoriser:** **Andy Finch, General Manager - Infrastructure and Asset Management**

### PURPOSE OF THE REPORT

The purpose of this report is to summarise the efforts and outcomes of the 2020 drought as it related to FNDC drinking water supplies. To also present for comment, a programme of urgent unbudgeted work identified as learnings from the 2020 drought.

### EXECUTIVE SUMMARY

- The Northland region experienced a significant drought in the first half of 2020 and this event impacted on the Far North District Council's ability to maintain reticulated water supply in some of its communities.
- Council responded with a variety of demand management efforts including:
  - Water restrictions
  - Extensive and varied communications to the public
  - Private leak campaign in Kaikohe
- FNDC worked closely with Regional Civil Defence Emergency Management team to roll out emergency drinking water stations in areas where the reticulation was a risk of failing.
- FNDC worked closely with local iwi to design and construct emergency alternative sources of water for the treatment plants at Kaikohe and Kaitaia.
- The experience highlighted a programme of work required to improve the resilience of water supply in the Far North. This programme will be further refined, including costings, before it is presented again for funding.

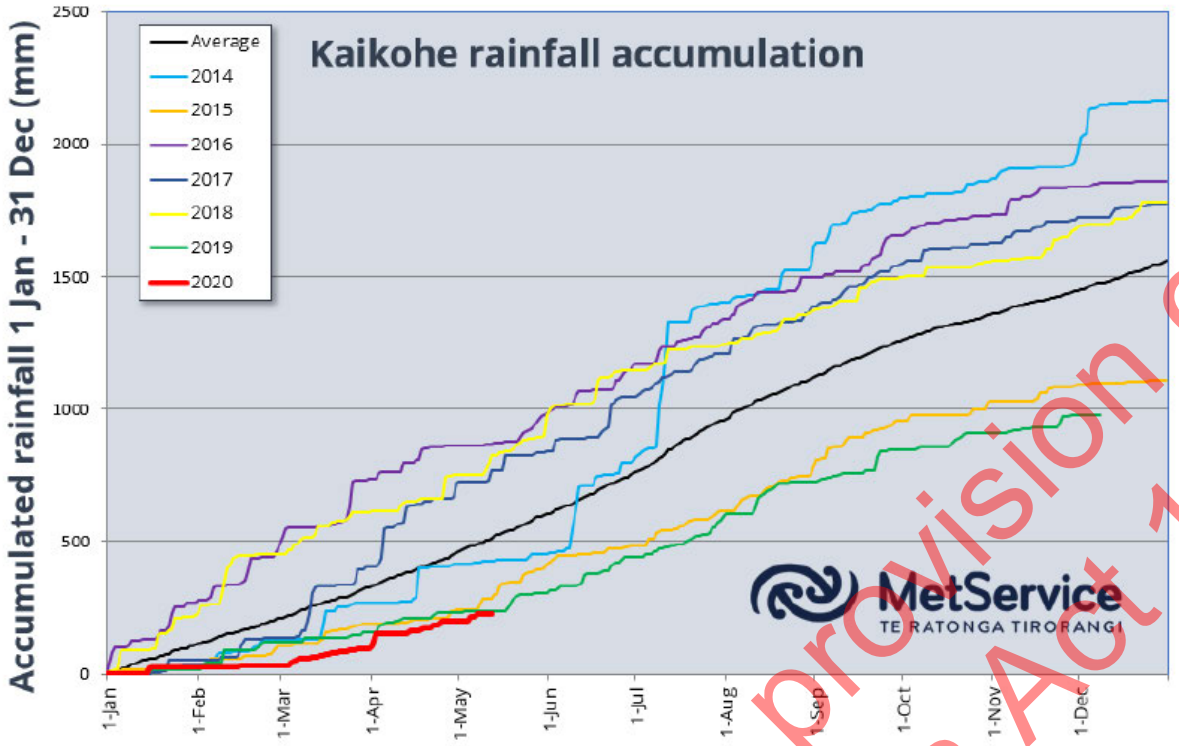
### RECOMMENDATION

**That Council note the report entitled Learning from the 2020 Drought and Improving the Resilience of our Drinking Water Supplies.**

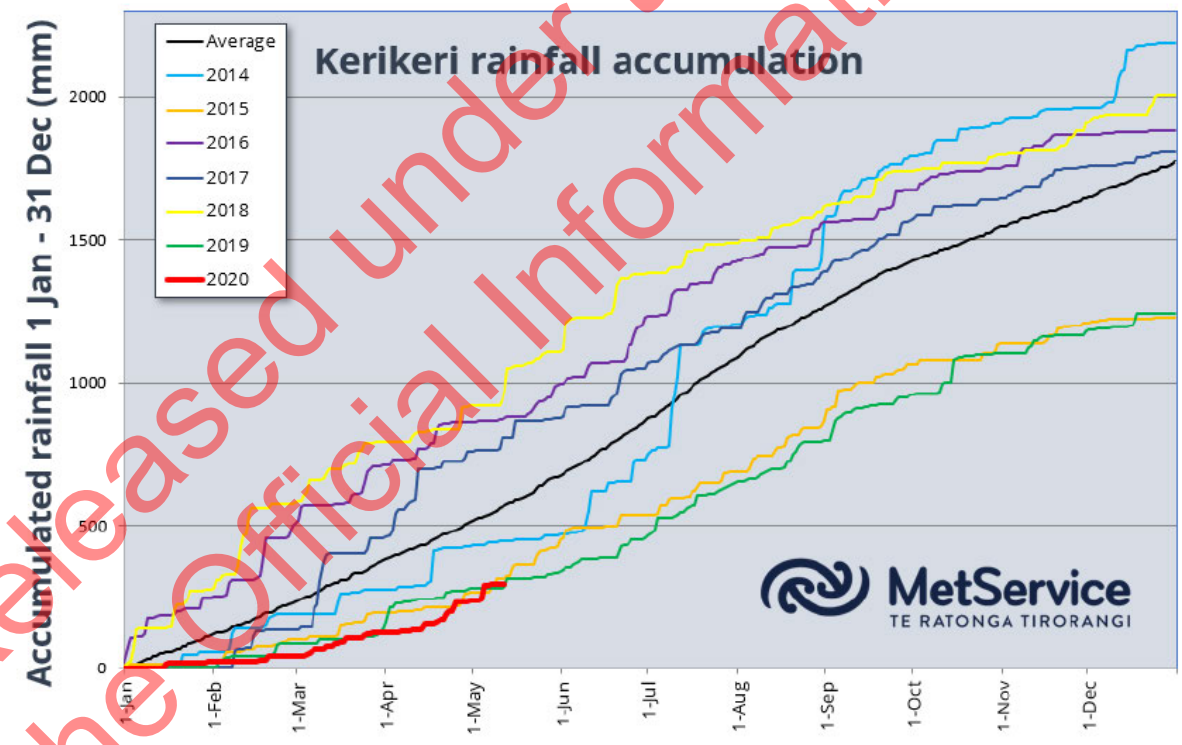
### 1) BACKGROUND

The Far North District Council own and operate eight drinking water schemes supplied by 14 primary and supplementary sources and treated with nine water treatment plants.

The meteorological drought experienced in early 2020 has been compounded by very low total rainfall in 2019. Both aquifers and surface water sources have been hit hard and the impact on our water schemes right across the District have been, and continue to be, significant.




- *Figure 1 - Kaikohe rainfall accumulation provided in MetService Four Week Forecast issued 12 May 2020. In mid-May Kaikohe rainfall is 44% of year to date average rainfall.*




- *Figure 2- Kerikeri rainfall accumulation provided in MetService Four Week Forecast issued 12 May 2020. In mid-May Kerikeri rainfall is 52% of year to date average rainfall.*

FNDC have a Water Shortage Management Plan which outlines processes and provides guidance on how water restrictions can be implemented to manage demand. The plan sets out the make-up of the Water Shortage Management Committee. The current version (Nov. 2019) of the plan sets out the following roles comprise the committee (with names of staff currently filling that role/position in the committee):

- FNW Alliance Risk and Portfolio Manager (Martin Baker)
- FNW Alliance Treatment Manager - Water (Peter Cowdell)
- FNW Alliance Operations Manager (Corey Hutchinson)
- FNDC Infrastructure Compliance Planner (Vacant – Melissa Parlane filling in)
- FNDC Infrastructure Consents Planner (Jessica Crawford)
- FNDC Support Officer (Ngawiki Cooper)
- FNDC Communications and Stakeholder Engagement Advisor (Ken Lewis)
- FNDC Manager – Infrastructure Operations (Glenn Rainham)

Water restrictions are enabled by the Water Supply Bylaw. The General Manager of Infrastructure and Asset Management (GMIAM) has the appropriate delegations to issue restrictions and the committee makes recommendations for the GMIAM to consider.

The Water Shortage Management Plan lays out each scheme, key conditions of consent and learnings from previous water shortages. In an organisation which experiences high staff turnover this document has provided the structure required for a team to work effectively every year for only 3 or 4 months at a time. The Water Shortage Management Plan will be updated again this year and there are many opportunities to learn from our experiences in 2020.

This season the Water Shortage Management Committee first met in November 2019 and has met weekly or twice weekly since then. In mid-January the then chair of the committee highlighted the escalating drought as a risk to GMIAM. By the first week of February a dedicated team of four staff were managing and coordinating the district's response to the on-going and increasing water shortage on behalf of FNDC. The workstreams identified at that time were:

- Twice weekly Water Shortage Management Committee meetings
- Weekly briefing meetings to stakeholders
- Recommending and implementing water restrictions
- Media releases and responses
- Signs, letter drops, social media campaigns
- Private leak campaign in Kaikohe
- Water restriction monitoring and enforcement
- Water Shortage Direction applications
- Contingency planning
- Water Shortage Direction compliance
- High user monitoring and reporting
- Water management plans for high users
- Reporting on leak management
- Reporting on restriction monitoring and enforcement

The need for coordination and collaboration with other agencies was quickly apparent. As a result, a Drought Response Team (later the Crisis Response Team) was formed in early March with a larger dedicated team of 20 experts from within the organisation. This structure enabled better communication with external stakeholders and a more focussed and agile response to the drought.

FNDC initiated a series of meetings with the Northland Regional Council (NRC) regulatory team and Civil Defence Emergency Management (CDEM)), the Northland District Health Board (NDHB), Drinking Water Assessors (DWA), Fire and Emergency NZ (FENZ, rural and urban sectors). At these meetings agencies were able to convey the criticality of the situation much more effectively

and quickly understand how this would change the way they do business for a few months. Key changes included:

- Water storage specifically for firefighting because opening and shutting fire hydrants put the fragile reticulation at risk in the dry conditions.
- Emergency drinking water facilities set up by CDEM in case the reticulated water supply could not be maintained.
- Updated information on the whereabouts and waters needs of dialysis patients in the Far North.

Council also built on existing relationships with key stakeholders in the community and high-water users. The Waikotihe Trust is Kaitiaki of the Monument Hill aquifer and keeping them informed throughout the early stages of the drought played a key role in maintaining our reputation in Kaikohe. Early engagement with the Northland Region Corrections Facility saw it substantially change how it uses water in the facility and carry the burden of importing water from outside of the district.

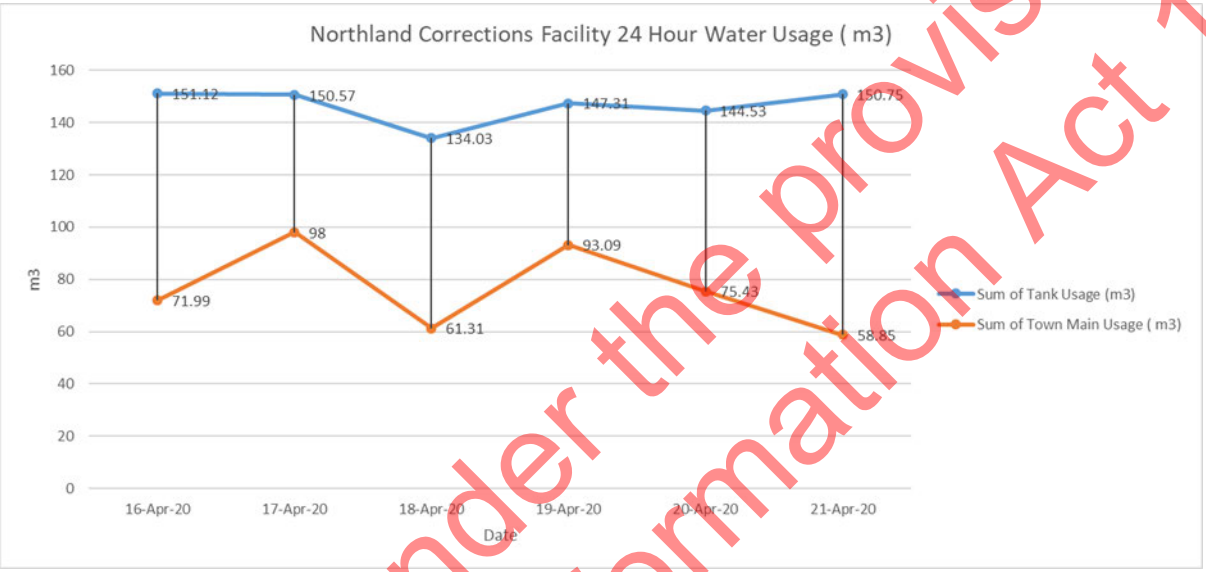



*Figure 3- Sample of water use data from NRCF. Annual average water use for the Facility is about 225m3/day. Changes to infrastructure and procedures brought water use down to 150m3/day and NRCF were importing nearly half of that from outside of the region. At the time of writing this report NRCF were no longer importing water and the 75% restricted supply was meeting their needs.*

In Kaikohe, senior staff and elected members attended a series of public meetings and worked closely throughout the drought with the Kaikohe Business Association. In Kaitaia, FNDC maintained contact with the Juken Nishu Mills to ensure they were using water in-line with the restrictions.

Communications throughout the drought were targeted and well considered. Traditional media was well used with media releases, editorials, and a joint radio campaign with the region's four councils. Social media was a key player and Council's social media presence regularly featured drought related communications and posts including videos of local kaitiaki and water treatment plant operators driving home the criticality of the drought. Staff and elected members featured in person at Kaikohe and Kaitaia A&P shows, there were T-shirts, posters, display banners, signs and pamphlets to name a few.

A particularly successful program was the Kaikohe Private Leak Campaign. The drivers for the campaign were two-fold; to save water by fixing private leaks that residents had not got around to (or couldn't afford to) fix and to promote the seriousness of the drought by getting people talking about water use and leaks. The community appreciated the assistance and saw that Council was doing their part; not just enforcing rules. The volume of water saved directly through this initiative is very difficult to quantify because domestic meters are only read every six months. However, the fact that Kaikohe regularly had the greatest water savings (compared with a pre-drought benchmark) of schemes in Level 4 is telling.

The Northland Regional Council (NRC) were supportive through-out the drought period, particularly the water compliance team and the Civil Defence Emergency Management team. In particular, the pragmatism in issuing Water Shortage Directions for five of our primary sources when we were unable to meet the conditions of consent and maintain the water supply was appreciated. Professional and productive relationships between FNDC and NRC are an essential part of our business.

**Accelerated and emergency supply solutions**

The Water Shortage Directions allowing FNDC to temporarily operate outside of its residual flow limits were imperative in our successful response to the drought but ultimately the severity of the drought posed too great a risk to rely on them alone. The Emergency Works section of the Resource Management Act enabled FNDC undertake works that would normally be subject to consenting timeframes that just weren't feasible in this situation. FNDC will be applying for retrospective consents for the following activities relating to the drought in 2020:

- Installation of a rock weir immediately downstream of the Awanui River. The weir was installed to increase the water level around the intake structure to eliminate the risk of air being drawn into the network and causing an unplanned shut down or infrastructure failure.
- Temporary and emergency water take from Lake Omapere to supply Kaikohe.
- Temporary and emergency change of use for the consented water take from Te Rarawa's bore at Sweetwater.

In the hills behind ***Opononi*** and ***Omapere***, works on the new groundwater source was accelerated in January to bring the bore online earlier.

In ***Kaikohe***, our primary source is the Wairoro Stream which supplies the Taraire Hills Water Treatment Plant (WTP). Our secondary source is a bore in the volcanic cone of the Monument Hill aquifer which supplies another water treatment plant. The lack of rainfall in 2019, and previous operational challenges led to low levels in the Monument Hill aquifer from December. FNDC was reliant on the Wairoro Stream entering the peak of summer. The Wairoro Stream is a very small stream for a town of Kaikohe to be reliant on (without the resilience usually provided by the Monument Hill aquifer). The town typically demands approximately 2,200$m^3$/day; an average of 25 litres per second. The design minimum flow (DMF) for the Wairoro Steam is assumed to be the consent limit of 13 litres for second. DMF is the stream flow that has a 20 percent chance of occurring in any one year (or a likelihood of occurrence of once in every five years, also termed a '5year return period'). There was a very real risk that Kaikohe would not have sufficient source water to maintain the reticulated supply in town.

As the significance of the event became apparent FNDC took a three-pronged approach to mitigating the risks of a failing water supply:

1. encourage conservation to extend the time that Wairoro Stream can be used.
2. prepare an emergency water distribution system in case a reticulated supply is not feasible.
3. Exhaust all options for an alternative water supply for the Taraire Hills WTP.

Following on from public meetings and targeted online communications, Kaikohe residents and businesses have managed phenomenal water savings throughout this period. The greatest savings were 40% of typical demand during the lockdown but even while schools and businesses were open, Kaikohe regularly achieved 25-30% savings. Regional Civil Defence (Northland CDEM) supported FNDC to establish storage tanks, a manifold supply system and a stock of containers for individuals to refill in case the reticulated supply failed. And finally, FNDC exhausted many options to find an alternative supply of water for Kaikohe. All of the local streams were experiencing the same drought related low flows. We found the most promising option (downstream of our take on the Wairoro) was suffering from a significant algae bloom and contained cyanotoxins. After an exhaustive search, Lake Omapere (with all its challenges) presented the most reliable option for an emergency supply of source water for the town of Kaikohe. The Council is grateful to the Lake Omapere Trust and the Omapere Taraire E Rangihamama X3A Ahuwhenua Trust for making the lake available to the community as a temporary emergency water supply.

The technical nature of the solution in Kaikohe is:

> A buoyancy device is attached to a pump placed in the lake. Raw water is pumped via 2 x 100meters of 125mm MDPE pipe and 800meters of 180mm layflat pipe to 3 x 30m³ tank farm. The raw water is then gravity fed with a 450meters of 125mm MDPE pipe to the Taraire Hills water treatment plant.
>
> The Taraire treatment plant is modified by installing a new 30,000 litre PAC mixing/contact tank, a new 30,000 litre ACH mixing/contact tank, new waste tank and pertaining reticulation system to accommodate treatment of the water from the lake.

In ***Kaitaia*** the drivers for an emergency supply were different. Where in Kaikohe we risked the stream having insufficient flows to supply the town, in Kaitaia the stream continued to flow with more water than the town needed. The Awanui River is the primary source for Kaitaia's water treatment plant (WTP). The Awanui River and its tributaries drain the northern side of the Mangamuka Range and flow northwards through Kaitaia and across the Awanui flats to enter the Rangaunu Harbour. The river is the lifeforce for a vast area as it winds 30km to the sea. The NRC were quick to place a Water Shortage Direction on the entire catchment which severely limited the utilisation of the water to essential human and livestock uses. Maintaining a strong flow in the river is very important from an ecological perspective but also to provide enough dilution for Kaitaia's wastewater treatment plant discharge downstream.

An alternative to the Awanui River had to be a groundwater source to realise any benefits. Again, Council are grateful to the Te Rarawa and Ngai Takoto Sweetwater Farm at Bonnetts Road in agreeing to provide a temporary supply solution given so much of the infrastructure accessing the Aupouri aquifer north of town was in place, and the relatively close proximity to the Te Rarawa pumping station in Bonnetts Road to the Kaitaia WTP. With this source in operation as a temporary supplementary supply for a 100-day period, the river would be spared our substantial take and allowed to flow more naturally through the intense drought.

The technical solution at Bonnetts Road, Kaitaia can be described as:

> Raw water is sourced from Te Rarawa's existing farm infrastructure on the corner of Gill Road and Bonnett Road. The raw water is pumped 3.9km to the Kaitaia treatment plant where the pipe reticulation connects alongside the existing Awanui river supply inlet line.
>
> The total raw water reticulation system is as follows: 2 x 100 mm tapping bands was used to connect into the existing 410 mm existing farm irrigation supply. 2 x 125 MDPE pipes conveys the raw water into 3 x 30m³ storage tanks. The raw water is then pumped with 2 x 125mm MDPE pipes 3km east to another 3 x 30m³ storage tanks. The raw water is then pumped via another section of 2 x 125mm pipes to the Kaitaia treatment plant inlet line.
>
> Electricity is reticulated from the existing farm pumping shed into a 10-foot container to be used as a control unit for pump 1 and valves. A Heavy-duty diesel generator is being used to drive Pump 2.

Further drought resilience was also considered. The most unpredictable demand on the Kaitaia WTP is the demand of private water haulers supplying bulk water to homes outside of the reticulated area. The Kaitaia WTP services the entire Aupouri Peninsular, Ahipara and North Hokianga as well as out to Whatuwhiwhi on the east coast. After weeks with no substantial rain the demand from these tankers will spike dramatically as homes on rainwater tanks run dry. A dedicated supply to support bulk tankers enables the town supply to focus on providing a sustainable town supply and relieve some pressure on the infrastructure and resources managing Kaitaia's water supply. FNDC's bore north of Kaitaia would have been ideal for Kaitaia but the infrastructure required to get it to town was too significant to install in an emergency, whereas bulk tankers are inherently mobile and can easily take advantage of this plentiful clean water source. Installing a small water treatment plant, on loan from Watercare Services Ltd, at the bore provided bulk tankers with a plentiful potable water source without imposing any pressure on the already strained Kaitaia town supply.

The technical nature of the solution at Sweetwater Bulk Tanker fill point is:

100m deep production well and raw water bore pump, poly aluminium chloride dosing, 2 x silt busters, clarified to waste tank, ultraviolet dosing, sodium hypochlorite dosing, 2 x 30m³ contact tanks, 2 x 30m³ storage tanks, booster pumps, 700m 150mm pipeline and metered tanker filling point.

**Costs associated with the 2020 emergency supply solutions**

As at 5/6/2020

| | Committed | Actual | Total |
|---|---|---|---|
| Te Rarawa/Bonnetts Rd, KTA | $ 287,329.21 | $ 784,614.39 | $1,071,943.60 |
| Lake Omapere, KHO | $ 382,162.50 | $ 495,965.73 | $ 878,128.23 |
| Sweetwater Tanker Supply, KTA | $ 988,561.43 | $ 544,808.23 | $1,533,369.66 |

In addition:

1. The agreement with Te Rarawa provides for the compensation of substantiated farm losses up to the value of $700,000
2. FNDC has entered into a funding agreement with MBIE for a PGF grant of up to $2,000,000
3. FNDC has applied for additional drought related funding from NEMA. Outcome pending.
4. Operational savings have also been identified from within the 2019/20 budgets
5. The sums relating to points 1, 2 and 4 have been excluded from the above table

## 2) DISCUSSION AND OPTIONS

The primary source for Kaikohe, Kaitaia, Opononi, Rawene, Kawakawa and Paihia are surface water takes from local rivers and streams. Kerikeri also relies heavily on surface water as its secondary source. For each of these surface water takes FNDC hold a consent issued by the Northland Regional Council (NRC). The consents have conditions relating to many things but most importantly:

- the volume of water FNDC is authorised to take, and
- the instantaneous residual flow we are required to leave in the environment.

The instantaneous residual flow rate is typically the 7 day Designed Minimum Flow (DMF). DMF is the stream flow that has a 20 percent chance of occurring in any one year (or a likelihood of occurrence of once in every five years, also termed a '5-year return period'). The DMF is calculated from the lowest seven consecutive days of flow in each year.

Therefore, irrespective of the volume of water we are consented to take, there is a 20 percent chance each year that we will not be authorised to take water from the surface water sources for a week or more.

The drought we have experienced this year is as a result of dry weather in both 2019 and 2020. The 2020 drought has not yet been defined or given a label in terms of return periods, but some rivers set new record low flows and most rivers in Northland have been flowing below DMF for more than 2 months. In theory this means there has been no consented surface water available for this period.

Fortunately, both the legislation and regulations recognise the supply of drinking water to humans to be critical. As we approach our consented limits in catchments reliant on surface water we engage with NRC and agree temporary conditions of operation using a Water Shortage Direction (s329 of the Resource Management Act). With the issuing of a Water Shortage Direction there is an expectation that our customers will use this water wisely as we are breaching the consent conditions which were developed to protect the fine balance between the ecology of the stream and the needs of the human environment.

Droughts typically cover a large geographically area; not just a single catchment or community. Having several surface water sources for a community drinking water supply does not increase its drought resilience. All the local streams are going to approach their own unique DMF at roughly the same time. Practical solutions for drought resilience are large reservoirs of water in form of

- lakes,

- man-made storage, or
- aquifers.

Our experience in 2020 was that the Kaikohe and Rawene water supplies were at the greatest risk of having insufficient source water available (even with water shortage directions in effect) to meet the demands of the town. **Table** 1 considers the ratio of water available in drought to water demanded by the supply. Kaikohe and Rawene both have a ratio of less than 1 meaning their respective towns have a demand greater than the residual flow of the source in a one in five-year drought (if the consent limit is DMF).

*Table 1- Water scheme surface water consent limits and demands*

| Scheme | Residual Flow Consent Limits for Surface Water Sources | Approximate Daily Demand in Summer in $m^3$/day | Equivalent Daily Demand in l/sec | Ratio of consent limit to demand |
|---|---|---|---|---|
| Kaikohe | Wairoro: 13 l/sec | 2,200 $m^3$/day | 25 l/sec | 0.52 |
| Rawene | Petaka: 1.9 l/sec | 300 $m^3$/day | 3.5 l/sec | 0.54 |
| Kaitaia | Awanui: 460 l/sec | 2,600 $m^3$/day | 30 l/sec | 15 |
| Kawakawa | Tirohanga: 170l/sec | 1,200 $m^3$/day | 14 l/sec | 12 |
| Kerikeri | Puketotara: 113 l/sec | 2,200 $m^3$/day | 25 l/sec | 4.5 |
| Paihia | Waitangi River: n/a | 2,300 $m^3$/day | 26 l/sec | n/a |
| Opononi | Waiotemarama: 14 l/sec | 410 $m^3$/day | 4.75 l/sec | 2.9 |
| Okaihau | no surface water sources | 160 $m^3$/day | 1.85 l/sec | n/a |

Water Shortage Directions are a cost-effective treatment to the risk of drought but only if there is enough water remaining in the stream at the time of drought. This is not the case for Kaikohe and Rawene and drought resilient sources should be a priority for these schemes.

As a water supplier FNDC saw new challenges with the drought of 2020:

- the wide-spread nature of the drought saw resources spread thin
- the severity of the drought saw the possibility of reticulated water supply being impractical
- the harshness of the drought saw the network threatened by large cracks and moving ground
- the longevity of the drought saw massive peaks in bulk water demand and demand overwhelming the local supply of tankers
- the permanency of the drought saw resources stretched and fatigued; this was only intensified as the drought overlapped with an international pandemic and nationwide lockdown
- as infrastructure and people were pushed to their limits risks that have previously been deemed acceptable were viewed as the straw that could break the camel's back.

The need to invest to improve the resilience of the water supply in some areas is urgent, in other areas there is important work already planned in future years. The programme of work for water infrastructure being developed in the early stages of the 2021/2031 Long Term Plan is significant and includes many renewals projects to the treatment plants and the networks.

**Appendix 1** includes a list of resilience projects compiled from learnings from the 2020 drought. The projects are identified as being in one of three categories:

- Urgent projects required to prepare for the next dry season which are not currently funded
- Important projects which will be considered in the 2021/2031 Long Term Plan prioritisation
- Important projects which are already timed and funded in the Long Term Plan.

A summary of the urgent projects is in **Table 2**. The costs are currently being refined and will be presented in a decision report for council to consider unbudgeted funding to support this work.

*Table 2 - summary of urgent projects identified as part of the 2020 drought learnings*

| Scheme | Issue / Problem Statement | Actions to improve resilience | Capital | Operational |
|---|---|---|---|---|
| Kaikohe | The residual flows in the primary surface water source are a fraction of the town's demand and there is high risk of the town running out of water in drought. | Develop a bore in the deeper aquifer under Monument Hill. | ✓ | |
| Kaikohe | Raw water storage is limited due to concerns about the structural integrity of the raw water reservoir (dam) at Taraire Hills WTP. | Structural dam inspection and design for repairs. | | ✓ |
| Kaikohe | The water treatment plant at Taraire Hills has relatively high losses due to backwash processes. | Investigate the whole of life costs and cost/benefit analysis of process modifications to reduce the water wasted in treatment. | | ✓ |
| Kerikeri | The condition of the clarifier is very poor. | Investigate options for the renewal of the clarifier alongside options for replacement of the water treatment plant. | | ✓ |
| Kerikeri | The condition of the clarifier is very poor. | Initial assessments determined that the clarifier will need to be replaced, not repaired and funding beyond what is available in the 2020/21 year will be required. | ✓ | |
| Opononi | The Smoothy Road bore has high pH and may not be able to meet drinking water standards without blending or treatment | Installation of pH correction at the WTP would allow greater use of the bore (less blending with drought-stricken sources) and improve resilience. | ✓ | |
| Kawakawa | Water treatment plant operators have not seen evidence of the connection between the Tirohanga Stream and the bore source. | Commission hydrogeologist to investigate the connection between groundwater and surface water in the area to support a change to the resource consent residual flow limits. | | ✓ |

| | | | | |
|---|---|---|---|---|
| Paihia | Dry and warm weather increases the algae present in the Waitangi River and each drought we experience difficulty extracting water from the river as the screen blocks. | An automated screen would regularly clear the screen of any build up. This would significantly reduce the risks associated with water supply at the Paihia water treatment plant. | ✓ | |
| Kaitaia | The shallow, soft-bottom nature of the Awanui River makes it difficult to abstract water from the river in low flows. | A permanent weir with a suitable screen and fish ladders to promote the ecological health of the stream in drought | ✓ | |
| All Schemes | Keeping up with demand of our customers is always our goal. Some of our customers use more water than necessary. | Demand management is a soft approach to infrastructure management where we try and minimise necessary upgrades and make the best use of the existing infrastructure and sources. BRANZ is undertaking a nationwide study into how water is used domestically and how we can best focus our attention on making more efficient use of water in the home. Funding required to develop a methodology to assess each township and mentoring to complete work on one plan. | | ✓ |
| All Schemes | All schemes would benefit in drought with improved leakage rates. Kaitaia and Paihia have our highest leakage rates in the Far North. | Purchase leak detection equipment to locate and repair leaks quickly. Leak detection equipment uses listening devices and vibrations to locate water leaks which can't be seen from the surface. | ✓ | |
| All Schemes | Communications challenging with 8 different schemes and varying levels of water restrictions | More permanent, but variable, signage would improve consumer knowledge about restriction levels. Communications team is working on a plan for permanent signage in all 8 towns. | ✓ | |

## 3) FINANCIAL IMPLICATIONS AND BUDGETARY PROVISION

Information report only

## ATTACHMENTS

**1. Resilience Programme Appendix - A2895547** ⇩

**Compliance schedule:**

Full consideration has been given to the provisions of the Local Government Act 2002 S77 in relation to decision making, in particular:

1. A Local authority must, in the course of the decision-making process,
   a) Seek to identify all reasonably practicable options for the achievement of the objective of a decision; and
   b) Assess the options in terms of their advantages and disadvantages; and
   c) If any of the options identified under paragraph (a) involves a significant decision in relation to land or a body of water, take into account the relationship of Māori and their culture and traditions with their ancestral land, water sites, waahi tapu, valued flora and fauna and other taonga.
2. This section is subject to Section 79 - Compliance with procedures in relation to decisions.

| **Compliance requirement** | **Staff assessment** |
|---|---|
| State the level of significance (high or low) of the issue or proposal as determined by the Council's Significance and Engagement Policy | The recommended work does not meet the threshold of any criteria in the Significance and Engagement Policy. Although the aim will be to improve the level of service provided through drought, we do not consider the proposal to be "major and long-term". These are relatively small tweaks which will lead to improved levels of service, particularly in drought conditions. |
| State the relevant Council policies (external or internal), legislation, and/or community outcomes (as stated in the LTP) that relate to this decision. | The recommendation will contribute to the community outcome "Connected and engaged communities prepared for the unexpected" by improving drought resilience in our drinking water supplies.<br>The recommendation will contribute to the community outcome "Communities that are healthy, safe, connected and sustainable" by ensuring that safe drinking water is available at all times. |
| State whether this issue or proposal has a District wide relevance and, if not, the ways in which the appropriate Community Board's views have been sought. | The recommendation is for a programme of work which will impact on communities differently. The Community Board's views have not been sought. |
| State the possible implications for Māori and how Māori have been provided with an opportunity to contribute to decision making if this decision is significant and relates to land and/or any body of water. | Water is the lifeforce of Māori and the recommendation includes seeking a new source of water for Kaikohe. Waikotihe Trust are kaitiaki of the aquifer and springs around Monument Hill in Kaikohe. Their views have been sought on the proposal. It has been agreed that when further information on the potential impact this water take will have on local springs, we will consult further with the Waikotihe Trust. The requirement to consult is also included in the Resource Consent Application process. |
| Identify persons likely to be affected by or have an interest in the matter, and how you have given consideration to their views or preferences (for example | The right to clean drinking water is universal. In time of significant drought some persons are affected more greatly. It is more difficult to maintain a small business when Council restricts the use of water. The inconvenience or extra effort required to save water are |

| | |
|---|---|
| – youth, the aged and those with disabilities. | felt more by elderly and disabled persons. The importance of abundant clean water is critical to those on dialysis at home. A more resilient water supply will reduce the barriers faced by persons identified above. |
| State the financial implications and where budgetary provisions have been made to support this decision. | Financial implications are discussed in section 3 of the report and budgetary provisions are requested in the recommendation. |
| Chief Financial Officer review. | The Chief Financial Officer has reviewed this report. |

| Urgent projects required to prepare for the next dry season which are not currently funded. | | Important projects which will be considered in the 2021/2031 Long Term Plan prioritisation. | Important projects which are already timed and funded in the Long Term Plan. | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Scheme** | **Issue / Problem Statement** | **Actions to improve resilience** | **"Shovel Ready"** | **Detailed Design required** | **Options/Feasibility Required** | | **Capital** | **Operational** | | |
| Kaikohe | The residual flows in the primary surface water source are a fraction of the town's demand and there is high risk of the town running out of water in drought. | Develop a bore in the deeper aquifer under Monument Hill. | | □ | | | □ | | | |
| Kaikohe | The residual flows in the primary surface water source are a fraction of the town's demand and there is high risk of the town running out of water in drought. | Investigate the feasibility of an irrigation dam in the Mid-north with capacity to supplement Kaikohe. | | | □ | | □ | ✓ | | |
| Kaikohe | Raw water storage is limited due to concerns about the structural integrity of the raw water reservoir (dam) at Taraire Hills WTP. | Structural dam inspection and design for repairs. | | □ | | | | ✓ | | |
| Kaikohe | The water treatment plant at Taraire Hills has relatively high losses due to backwash processes. | Investigate the whole of life costs and cost/benefit analysis of process modifications to reduce the water wasted in treatment. | | | □ | | | ✓ | | |
| Rawene | The residual flows in the primary surface water source are a fraction of the town's demand and there is high risk of the town running out of water in drought. | Investigate the feasibility of a bore or manmade storage facility. | | | □ | | | ✓ | | |
| Kerikeri | FNDC are reliant on a third party for the supply of raw water as its primary source. The supply has proven to be unreliable in the drought of 2020 due to breaks caused by moving ground and aged infrastructure. | Investigate the feasibility of a bore or new FNDC dam infrastructure to eliminate the risk of third-party provisions. | | | □ | | | ✓ | | |
| Kerikeri | The secondary source for Kerikeri is increasingly required as the sole supply for Kerikeri. The infrastructure from this secondary source is fragile and under-spec'ed. | Install new: screen, electrical cabinet and rising main. | □ | | | | □ | | | |
| Kerikeri | During peak summer demand the water treatment plant is running at capacity and any setbacks put the water supply at risk. The growth in the Kerikeri area will see the community quickly outgrow it's WTP. | Investigate options for a new water treatment plant for Kerikeri. | | | □ | | | □ | | |
| Kerikeri | The condition of the clarifier is very poor. | Investigate options for the renewal of the clarifier alongside options for replacement of the water treatment plant. | | | □ | | | □ | | |
| Kerikeri | The condition of the clarifier is very poor. | Initial assessments determined that the clarifier will need to be replaced, not repaired, and funding beyond what is available in 2020/21 year will be required. | | □ | | | | | | |
| Opononi | The Smoothy Road bore has high pH and may not be able to meet drinking water standards without blending or treatment | Installation of pH correction at the WTP would allow greater use of the bore (less blending with drought-stricken sources) and improve resilience. | □ | | | | □ | | | |
| Kawakawa | Water treatment plant operators have not seen evidence of the connection between the Tirohanga Stream and the bore source. | Commission hydrogeologist to investigate the connection between groundwater and surface water in the area to support a change to the resource consent residual flow limits. | □ | | | | □ | | | |
| Paihia | Dry and warm weather increases the algae present in the Waitangi River and each drought we experience difficulty extracting water from the river as the screen blocks. | An automated screen would regularly clear the screen of any build up. This would significantly reduce the risks associated with water supply at the Paihia water treatment plant. | □ | | | | □ | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Paihia | During summer demand the water treatment plant is running at capacity and any setbacks put the water supply at risk. Compared to other communities the peak demand lasts much longer and is therefore a greater risk. | A new water treatment plant is required for Paihia. Options assessment has been completed; a preferred location and treatment technology has been identified using TIF funding. | | □ | | | □ | | |
| Kaitaia | The shallow, soft-bottom nature of the Awanui River makes it difficult to abstract water from the river in low flows. | A permanent weir with a suitable screen and fish ladders to promote the ecological health of the stream in drought | | □ | | | □ | | |
| Kaitaia | Water resilience | Long term solution for Kaitaia Water | □ | | | | □ | | |
| Okaihau | The existing operational bores suffer from high sulphur content and take up solids on start-up. | A new well has been drilled and a consent has been obtained. Infrastructure is required to bring this new bore online | □ | | | | □ | | |
| All Schemes | Keeping up with demand of our customers is always our goal. Some of our customers use more water than necessary. | Demand management is a soft approach to infrastructure management where we try and minimise necessary upgrades and make the best use of the existing infrastructure and sources. BRANZ is undertaking a nationwide study into how water is used domestically and how we can best focus our attention on making more efficient use of water in the home. | | | □ | | | □ | |
| All Schemes | All schemes would benefit in drought with improved leakage rates. Kaitaia and Paihia have our highest leakage rates in the Far North. | Purchase leak detection equipment to locate and repair leaks quickly. Leak detection equipment uses listening devices and vibrations to locate water leaks which can't be seen from the surface. | □ | | | | □ | | |
| All Schemes | Repairing known leaks isn't the complete solution. Leaks that have developed overtime in old infrastructure are an indication of the need to replace the assets. They are a natural pressure relief system and fixing the leak will usually create another one somewhere else. When leaks occur on asbestos concrete pipe we can take a sample of the pipe and determine its condition using Phenolphthalein Indicator tests which provides a good indication of the deterioration of the pipe. | Programme of pipe renewals based on asset condition, age and failure rate. | | | | | | | |

## Appendix 3

PWC Letter.

**Draft for discussion**

**Strictly confidential**

Andrew Carvell
Project Manager
Te Tai Tokerau Water Trust
PO Box 716
Whangarei

9 December 2020

## Economic benefit of the 'MN02' water storage reservoir – initial analysis

Dear Andrew,

The purpose of this letter is to briefly summarise the economic benefits from the proposed 'MN02' reservoir, which is part of a wider water storage project in Northland, and to set out the initial analysis we have undertaken to date.

This letter has been prepared in accordance with the terms of our engagement letter dated 21 August 2020 and extension of scope letter dated 2 September 2020, and is subject to the restrictions in the appendix.

# Background

The Te Tai Tokerau Water Trust (the Trust) is proposing to construct a number of water storage reservoirs, and associated distribution network assets, in the Kaipara and Mid-North areas of Northland (broadly around Dargaville and Kaikohe). These schemes will harvest surface water during peak flows, and store it for use during dry periods.

These schemes have two main types of economic benefit:

- They create employment during the construction phase
- Once completed, they will enable increased productivity and/or new land uses in the surrounding areas, as a result of increased water availability, and these new land uses will enable higher GDP and employment than might otherwise be the case.

We understand that the Trust has undertaken a significant amount of analysis and planning for this project, including strategic, scoping and pre-feasibility phases. The Trust has secured funding from the Provincial Growth Fund (PGF), and is in the process of applying for additional funding through the Government's 'shovel ready' infrastructure projects channel.

One of the proposed reservoirs is named 'MN02'. This is located to the north-east of Kaikohe. The surrounding area was in the 5th (out of ten) grouping for socio-economic deprivation in New Zealand in 2018.

# The whole project

We understand that the cost of developing all ten schemes, in the Kaipara and Mid-North areas collectively, is around s 9(2)(b)(ii) .

The Trust has advised us that the capital cost of the MN02 reservoir (excluding the associated distribution network) is around s 9(2)(b)(ii).

## *Shovel ready funding*

We understand that five reservoirs (and distribution assets) costing around s 9(2)(b)(ii) can be developed over a 'fast-track' two-year timeframe. These schemes were the subject of the application for 'shovel ready' funding.

The shovel ready funding application[1] sets out estimates of the economic benefit of the five schemes together. We understand that these estimates were developed by Northland Regional Council (NRC).

It states that:

- The construction of the schemes will create 215 full-time equivalent jobs (FTEs) over the two-year construction period.
- Over the long-term, the project will increase GDP by $150m p.a. and create jobs for 877 FTEs.

The MN02 scheme is not part of the five schemes included in the shovel ready funding application. However, our analysis of the benefits of the MN02 scheme utilises some of the analytical methods and assumptions used to estimate the benefits of the five shovel ready schemes.

# Benefits of the MN02 scheme

In this section, we set out estimates of the economic benefits of the MN02 reservoir.

## *Construction phase*

Table 1 sets out estimates of the employment which will be generated by the construction of the reservoir. It shows that around 31 FTE positions will be created (over the one-year construction period).

Note that benefits from construction of the associated distribution network have been excluded from this analysis, because we understand that it is outside of the scope of the funding being requested for this scheme.

[1] Te Tai Tokerau Water Trust (2020), 'Shovel ready' Infrastructure Projects: Project Information Form, Northland Water Storage and Use Project – Acceleration of Construction.

These estimates were derived using the following method:[2]

- The current estimate of total capital expenditure for the scheme was provided to us by the Trust.
- The total capital expenditure value was allocated across the design and construction elements using the aggregate proportions which apply to the five 'shovel ready' schemes (as provided to us by the Trust).
- We adopted assumptions for the % labour component of each expenditure element, and the hourly cost of that labour. The values adopted are those used by the Trust and NRC in its economic analysis of the Matawii (MN10) scheme, which formed part of its PGF application.[3]
- Expected total hours were derived for each expenditure element, and these were converted into FTE values using an assumed 2,080 hours per year.

This method is the same as that used to develop the estimates for the five shovel ready schemes. This is a relatively simplistic but not unreasonable approach to estimating employment impacts, and we understand that the cost and labour intensity assumptions used are based on the Trust's experience of other projects.

Note that these values only reflect direct employment, not the additional employment that will result from flow-on impacts on other sectors of the economy.

**Table 1 Estimated employment during construction phase, MN02**

| FTEs (total over 3-year period) | Reservoirs |
|---|---|
| **Pre-construction** | 2 |
| **Construction** | 30 |
| **TOTAL** | **31** |

Source: PwC analysis, Inputs and assumptions provided by the Trust.
Notes: (1) The FTE values shown above reflect the number of people able to be employed full-time for one year. The reservoir has around a one-year construction period, and hence the annual FTE employment will be the same as the values stated above.
(2) Totals may not add due to rounding.

## *Long-term benefits*

The MN02 reservoir will be able to hold 4,000,000 $m^3$ of water. We understand that the main outcome of the increased water availability is expected to be the conversion of land from pastoral farming to horticulture.

[2] We have separately provided the Trust with more detailed information regarding the input values and calculations used to derive the estimates shown in Table 1.
[3] Te Tai Tokerau Water Trust (2020), LP16 Matawii Water Storage Reservoir – Appendix J – Economics.

Horticulture typically yields more economic output, and involves more employment, than pastoral farming for a given land parcel. However, the size of the benefit depends on the specific type(s) of horticulture which will be able to be accommodated.

We understand that the estimates of the long-term benefits of the five shovel ready schemes were derived assuming that:

- All land which can be supplied with the new water is converted from pastoral farming to horticulture.
- The land will support a range of horticulture crop types.

We have not undertaken analysis of the size of the long-term benefits of the MN02 scheme.

## COVID-19 impacts

This project is not designed as a response to COVID-19. The drivers of this project – in particular, a lack of water availability in certain areas at certain times – were evident before the pandemic.

However, we note that the employment created from this project, and in particular during the immediate construction phase, will assist with Northland's recovery from COVID-19.

We also note that the application for shovel ready funding states that:

> *"… COVID-19 will not have a significant delaying impact on the project. However, a longer-term impact is that it could reduce private sector demand for water as financial resources may have been used up during the COVID-19 crisis, coupled with the impact of the drought in Northland, and potential investors might have a reduced risk appetite. This increases the importance of government support for the project." (page 10)*

Yours sincerely

Mark Robinson
Director
s 9(2)(a)
s 9(2)(a)

Craig Rice
Partner
s 9(2)(a)
s 9(2)(a)

# Appendix: Restrictions

This report has been prepared for the Te Tai Tokerau Water Trust (the Trust) to set out analysis undertaken to date of the economic benefits of the Trust's proposed MN02 water storage scheme, to assist the Trust in developing an application for external funding. This report has been prepared solely for this purpose and should not be relied upon for any other purpose. We accept no liability to any party should it be used for any purpose other than that for which it was prepared.

You have advised us that you may make the report available to selected parties as part of funding applications. We note that we do not accept any responsibility or liability (whether in contract, tort (including negligence) or otherwise) to any person other than the Trust for the consequences of any reliance on this report.

To the fullest extent permitted by law, PwC accepts no duty of care to any third party in connection with the provision of this report and/or any related information or explanation (together, the "Information"). Accordingly, regardless of the form of action, whether in contract, tort (including without limitation, negligence) or otherwise, and to the extent permitted by applicable law, PwC accepts no liability of any kind to any third party and disclaims all responsibility for the consequences of any third party acting or refraining to act in reliance on the Information.

We have not independently verified the accuracy of information provided to us, and have not conducted any form of audit in respect of the Trust. Accordingly, we express no opinion on the reliability, accuracy, or completeness of the information provided to us and upon which we have relied.

The statements and opinions expressed herein have been made in good faith, and on the basis that all information relied upon is true and accurate in all material respects, and not misleading by reason of omission or otherwise.

The statements and opinions expressed in this report are based on information available as at the date of the report.

We reserve the right, but will be under no obligation, to review or amend our report, if any additional information, which was in existence on the date of this report, was not brought to our attention, or subsequently comes to light.

It is not possible to assess with any certainty the implications of COVID-19 on this project or the economy as a whole, both generally in terms of how long the current crisis may last and more specifically in terms of its impact on a specific business or the wider economy. We note our advice is subject to significant caveats and caution at this time due to uncertainty that exists.

We have relied on forecasts and assumptions prepared by the Trust about future events which, by their nature, are not able to be independently verified. Inevitably, some assumptions may not materialise and unanticipated events and circumstances are likely to occur. Therefore, actual results in the future will vary from the forecasts upon which we have relied. These variations may be material.

This report is issued pursuant to the terms and conditions set out in our engagement letter dated 21 August 2020 and extension of scope letter dated 2 September 2020.