

Northland Water Storage and Use - Prefeasibility

5 Nov 2019



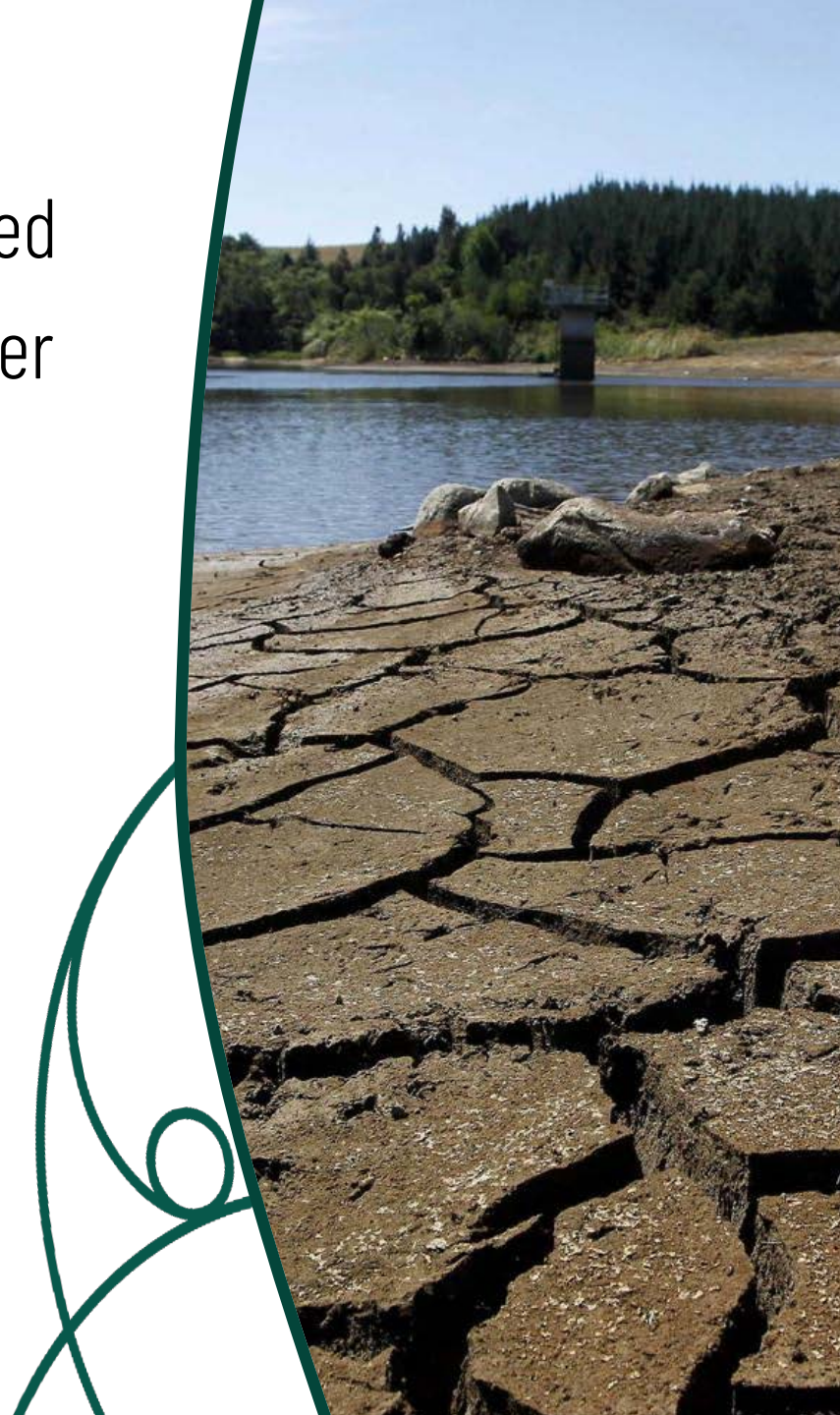
Contents

- Background on the three selected areas
- PGF funding agreement
- Pre-feasibility project
- Update on Progress
- Project Milestones

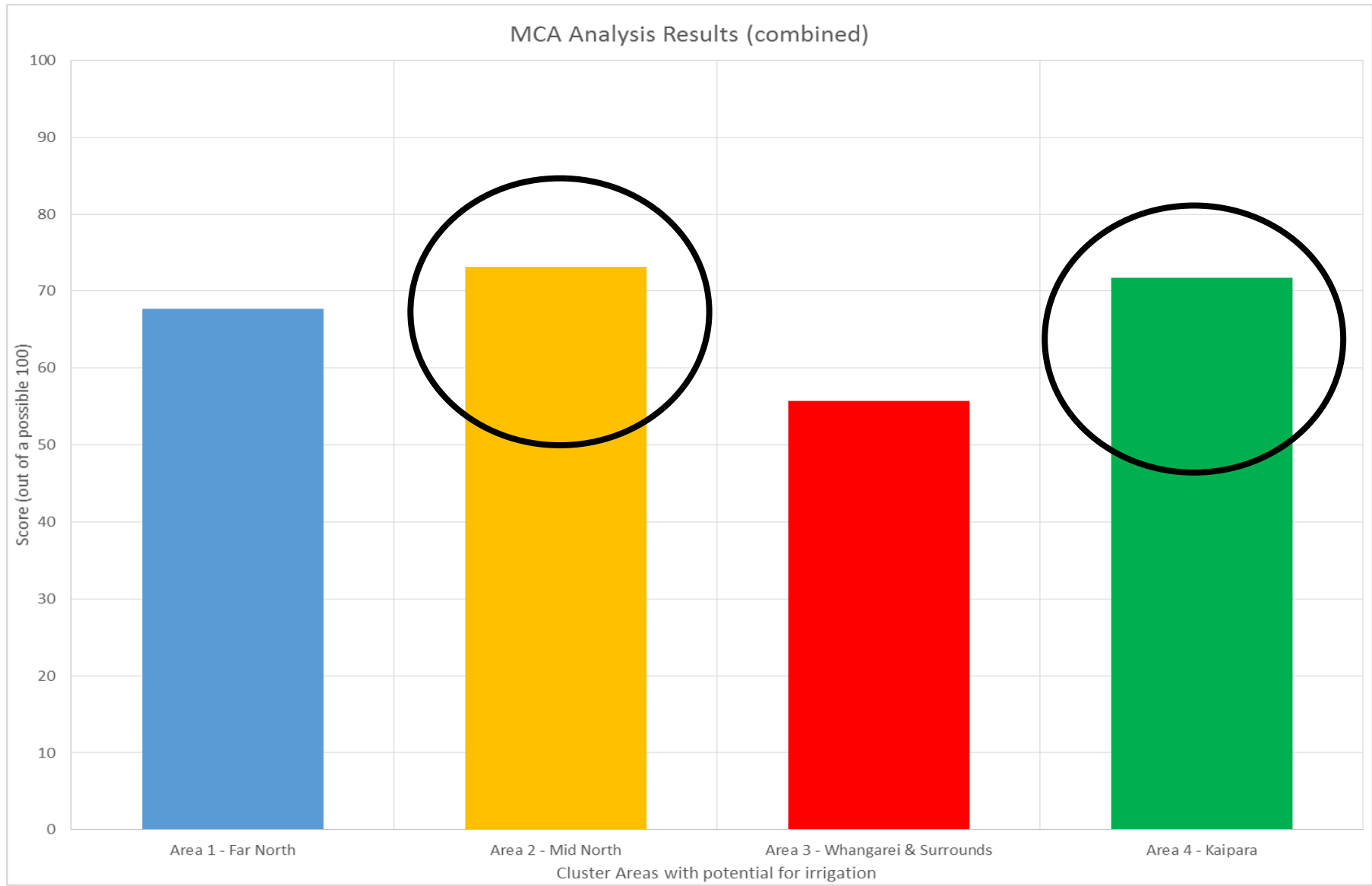


How we got here

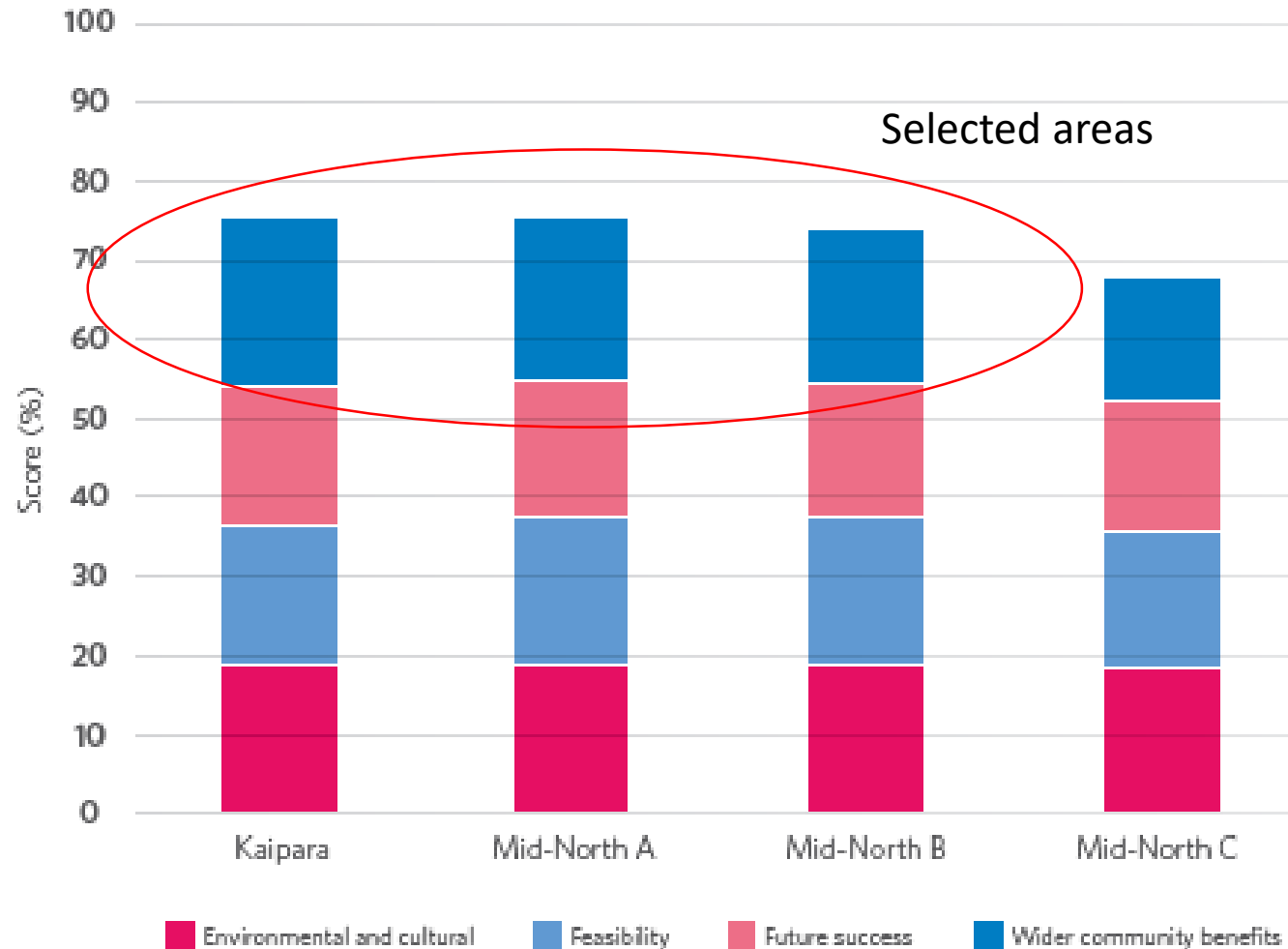
- In 2013/2014 drought conditions led to Northland Inc. fielding a number of enquiries from the farming community about water storage
- In April 2014 Minister Guy challenged the Northland community to apply for funding through MPI's Irrigation Acceleration Fund (IAF)



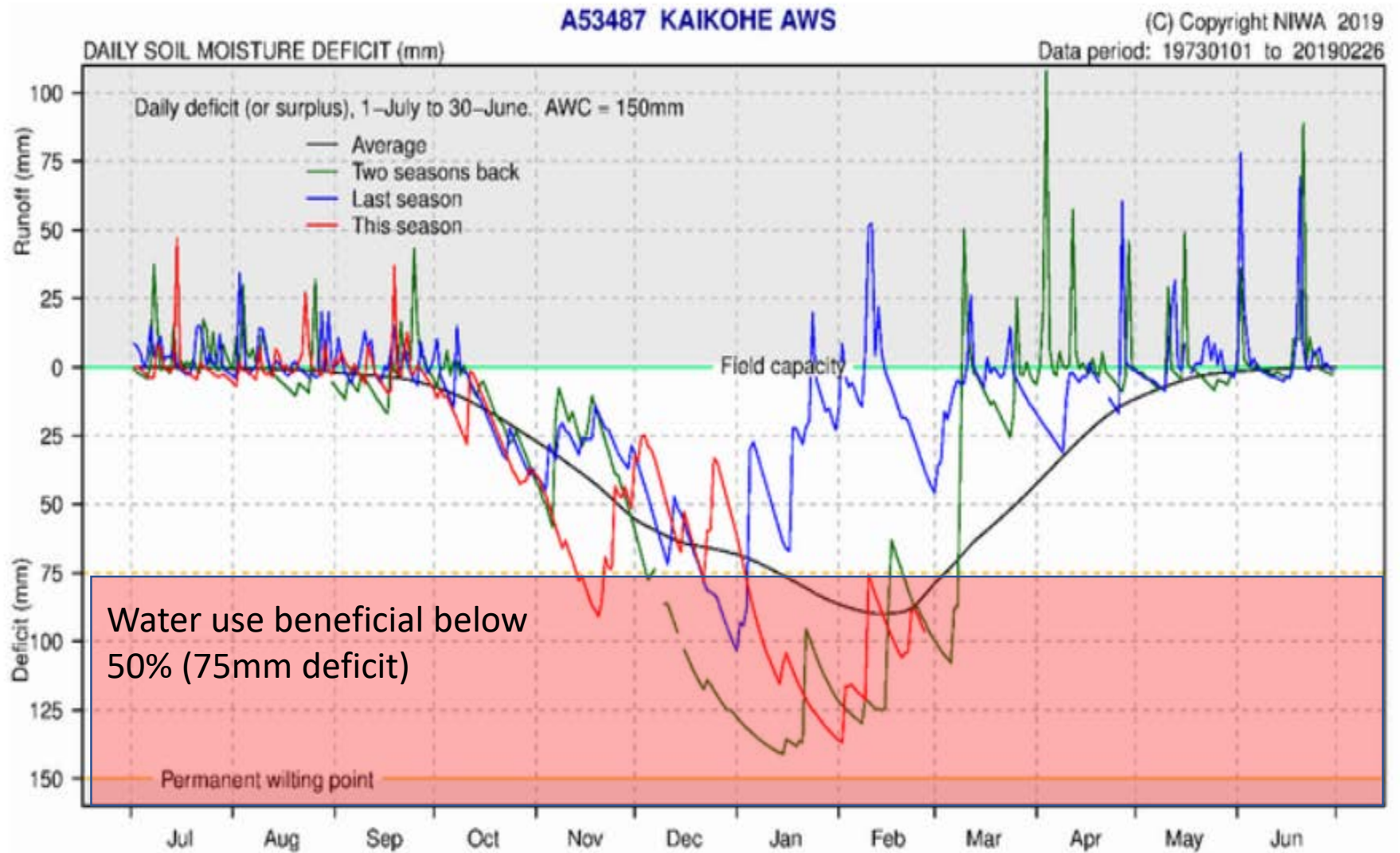
Studies identified two specific clusters that would most likely benefit: **Mid-North** and **Kaipara**



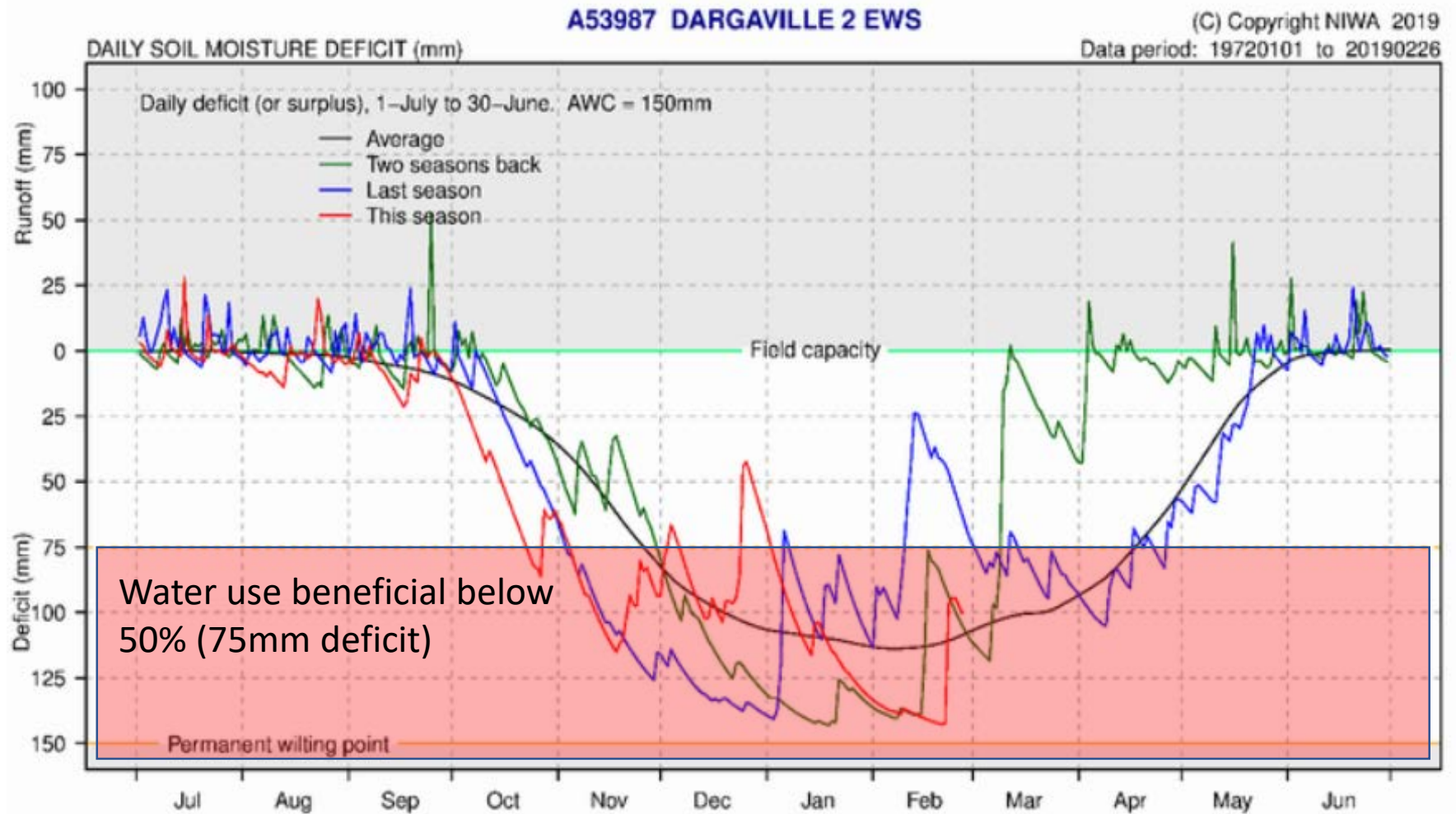
Scoping study narrowed it down to 3 Areas



Need for Water - Kaikohe





Need for Water - Dargaville




Scheme option 1: Kaipara

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

 **19,000** ha of land that could benefit from irrigation (command area) shown in green

 **6,300** ha irrigable area within the command area (assumed 30% uptake)

 **4,000** m³/ha peak irrigation demand

 **3,400** m³/ha/year average irrigation demand

 **\$115** million total capital cost

 **\$17,000** /ha capital cost

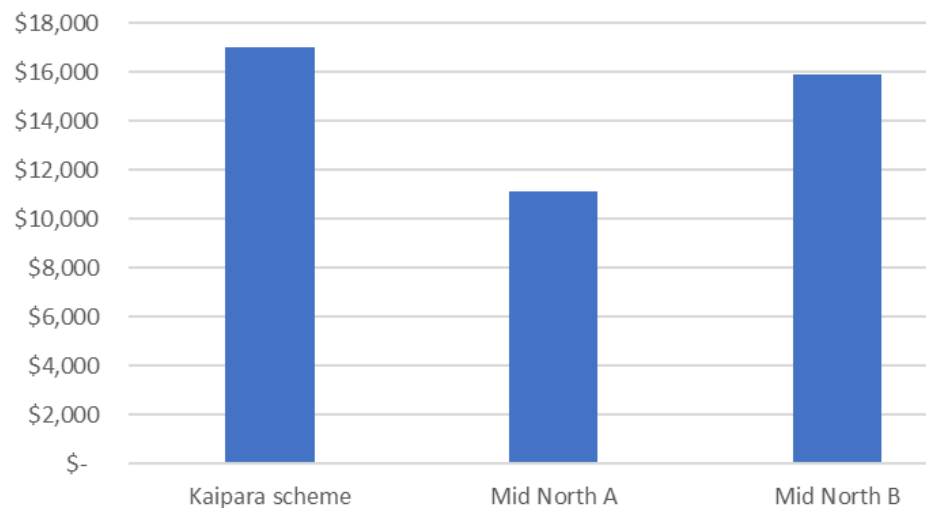
 **\$390** /ha/year operational costs

 **950** additional people predicted to be employed

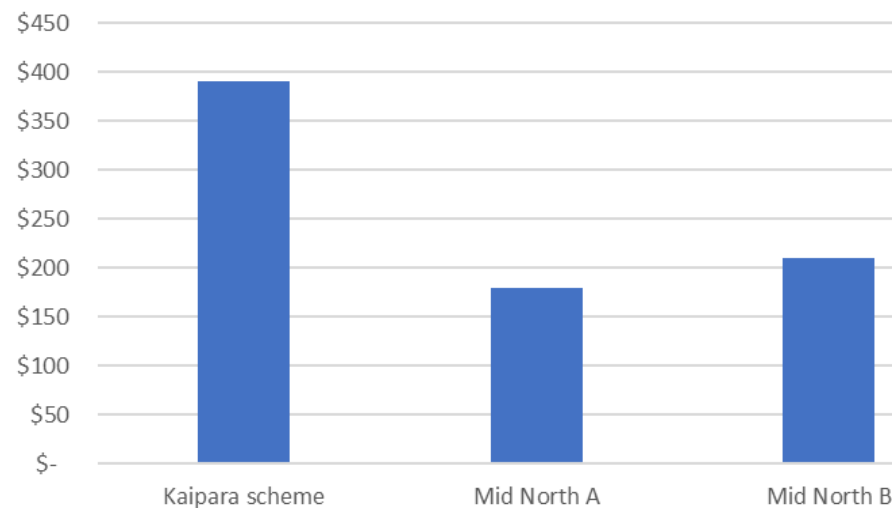
 **\$85** million /year regional GDP increase



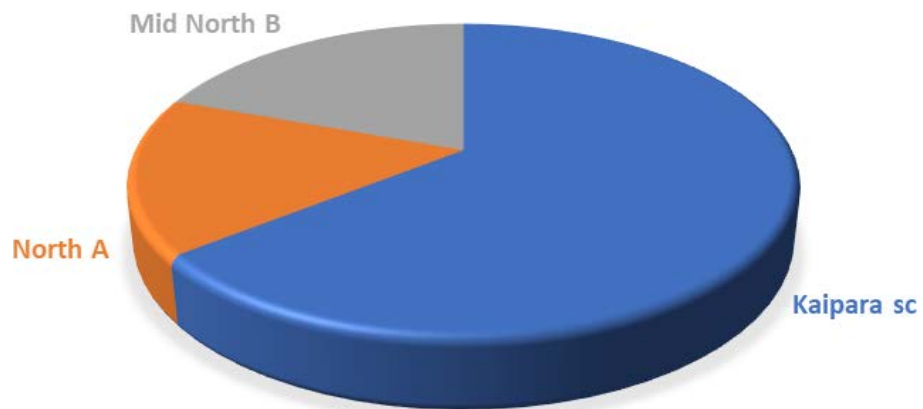
Capital cost, \$/ha



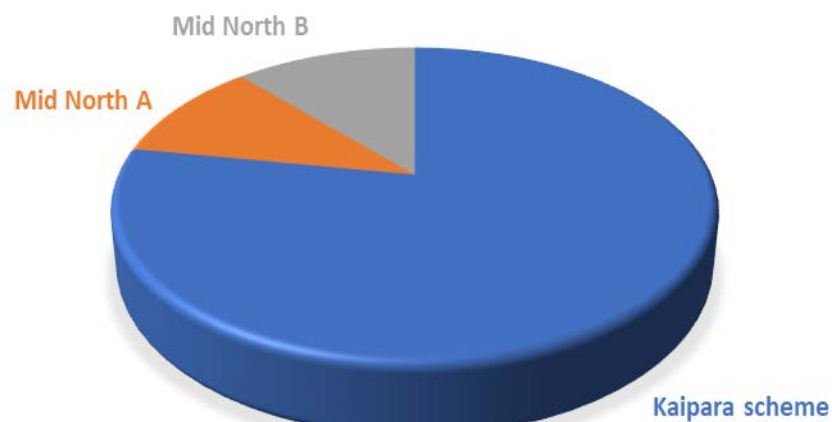
Operational cost, \$/ha/yr



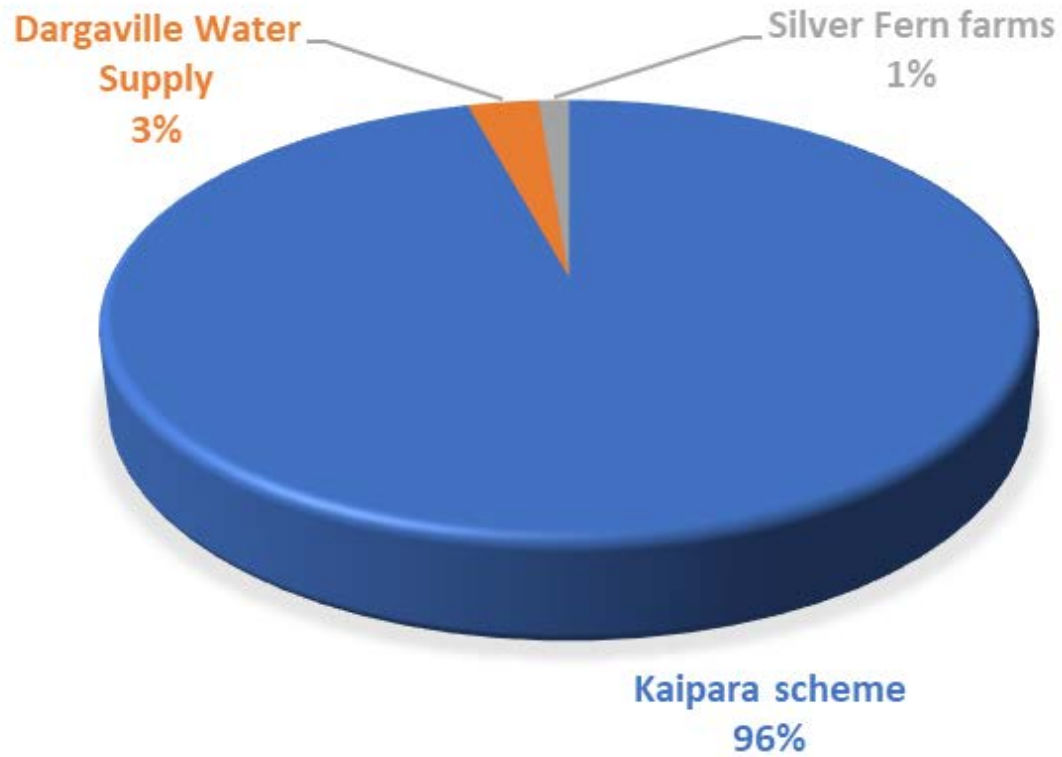
IRRIGATED AREA COMPARISON



WATER DEMAND COMPARISON



COMPARATIVE WATER USAGE



FUNDING AGREEMENT

BETWEEN

**MINISTRY OF BUSINESS,
INNOVATION AND EMPLOYMENT**

AND

**NORTHLAND REGIONAL COUNCIL
TE KAUNIHERA Ā ROHE O TE TAITOKERAU**

FOR

**NORTHLAND WATER STORAGE & USE
(FEASIBILITY GRANT AND
CONSTRUCTION FACILITY TERMS)**

Commenced 8 July 2019, ends 31 March 2023

Conditions Precedent

- Governance framework;
- MOU between the NRC, KDC, FNDC
- Evidence of Co-Funding

Funding

- **Pre-feasibility Phase, up to NZ\$3M**
- Feasibility Phase, up to NZ\$2M
- Commitment Phase, up to NZ\$2M
- Allows carry over through phases
- Remaining balance (\$18.5M less money used above) as loan for construction

PGF Investment Principles

Economic

Strengthen economies by shifting land use to higher value, sustainable uses, while avoiding increases in livestock intensification.

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

Community

Small scale community level projects will be supported rather than mega irrigation schemes.

There must be public benefit from government funding of a project.



PGF Investment Principles

Environment

Water storage proposals should demonstrate that they will support land use that does not increase - and ideally reverses - negative impacts on water quality.

Proposals should maintain the health of waterways.

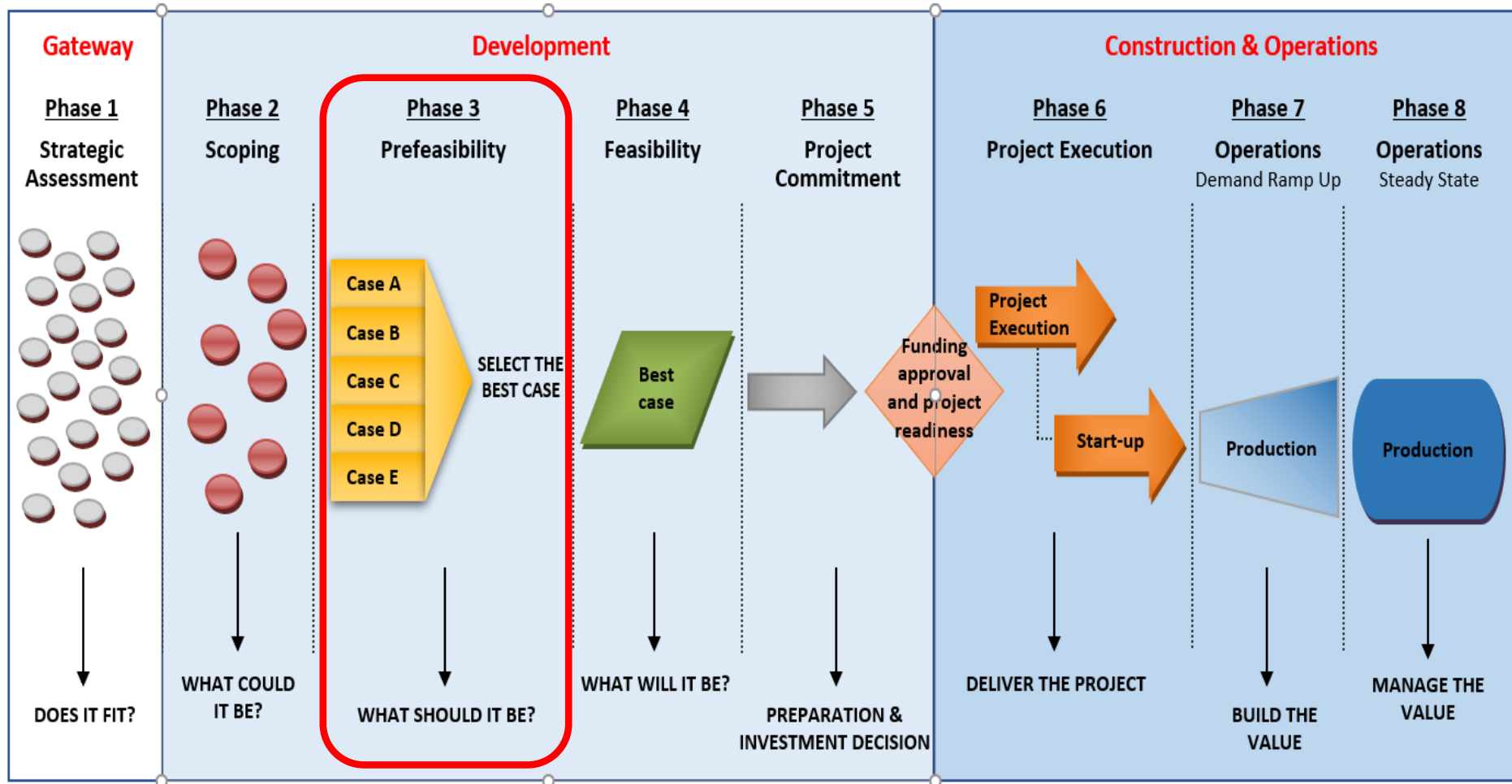
Climate Change

Where practicable, proposals should contribute positively to the target of reducing greenhouse gases, and demonstrate how they will contribute to mitigating or adapting to climate change effects and a just transition to a low emissions economy.

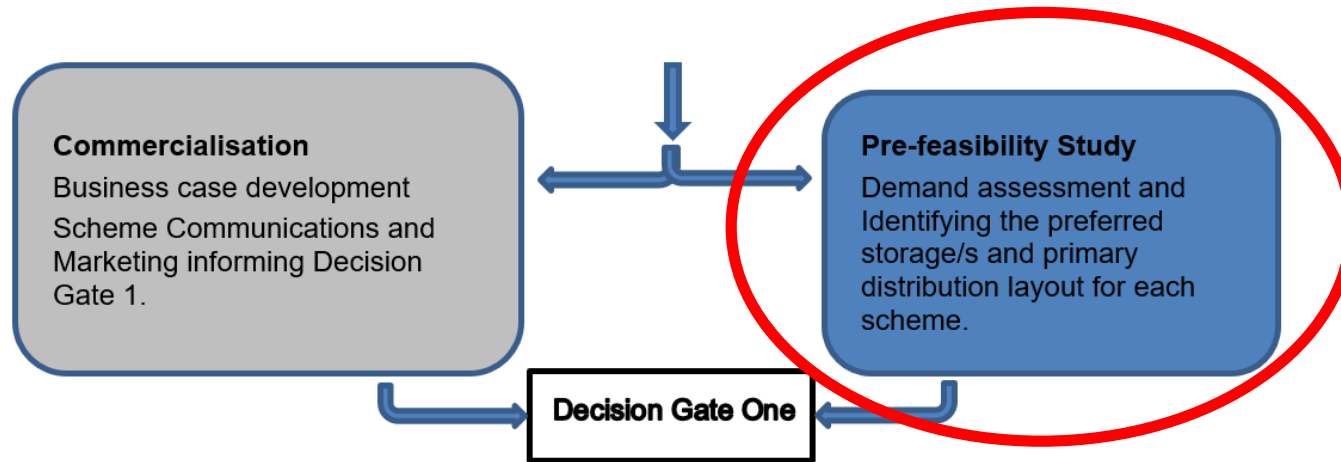
Proposals should consider the potential to contribute to community resilience to climate change.



Current Phase - Prefeasibility



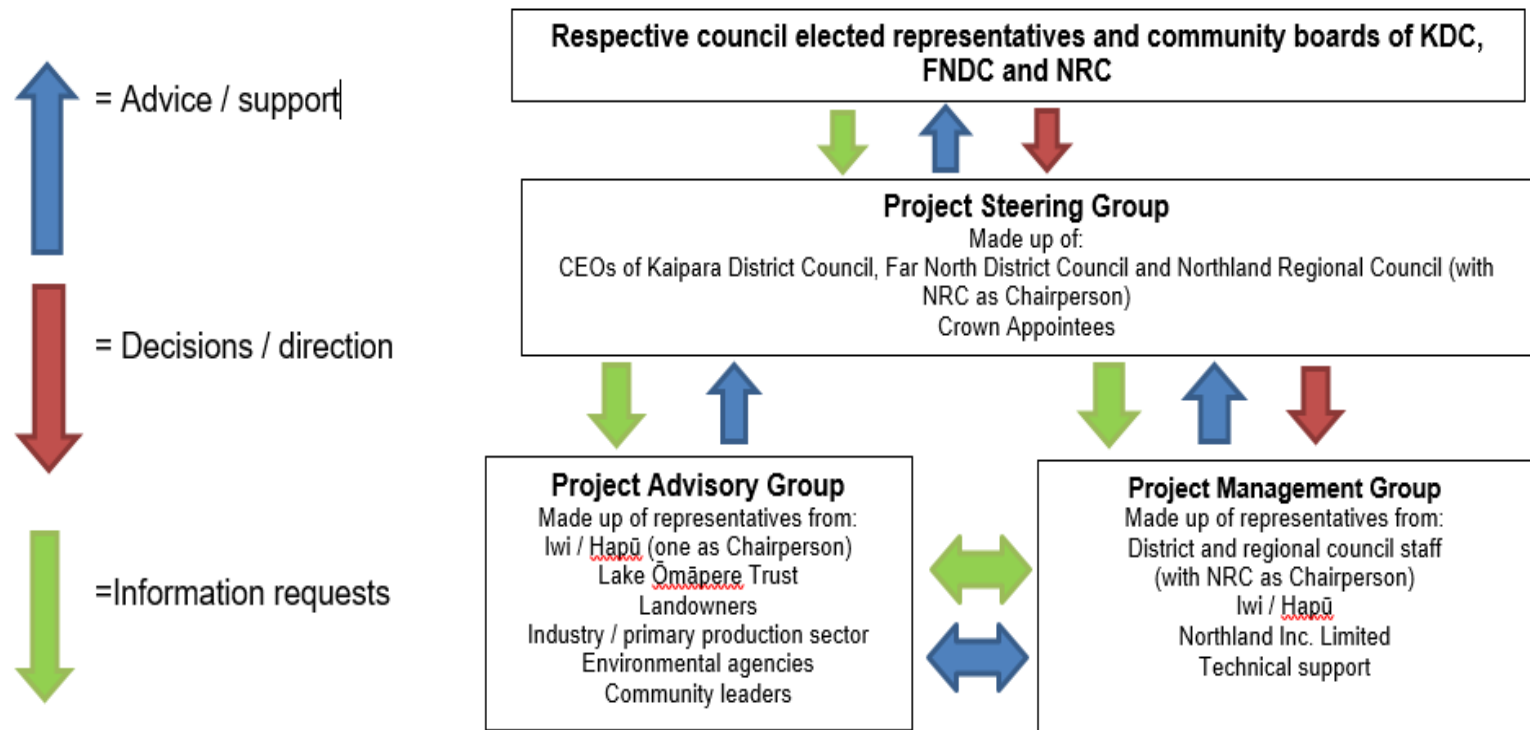
Demand Assessment and Design Study



Objectives

- Assess water user/grower demand
- Lead grower engagement
- Develop water take and storage options
- Undertake concept level design engineering
- Support NRC and its consultants engage and build key stakeholder relationships

Governance Structure



The project governance structure and terms of references for the three bodies within the structure have been designed with the Pre-feasibility Phase in mind and may need to be amended if the project progresses beyond this stage.

Project steering group

	Representative
Northland Regional Council	Malcolm Nicolson (Chair)
Far North District Council	Sean Clarke
Kaipara District Council	Louise Miller
Crown representatives	Dover Samuels Murray McCully
Crown Observer	Jane Francis

Project advisory group

Entity
Kaipara mana whenua
Mid-North iwi / hapū
Lake Ōmāpere Trust
Fish & Game New Zealand
Department of Conservation
Federated Farmers of New Zealand
Horticulture NZ
Irrigation NZ
Landowner – Kaipara
Landowner – Mid-North
Community leader – Kaipara
Community leader – Mid-North
Integrated Kaipara Harbour Management Group

Update on work to date

Water Investigations

Command Area Refinement

– 90% Complete

- Detailed soil, land use and landcover mapping
- Daily irrigation models

Water Resource Analysis

– 90% Complete

- Regional Plan Rules
- Catchments defined
- High level storage area identification & dam break analysis
- Catchment yields
- Storage modelling analysis

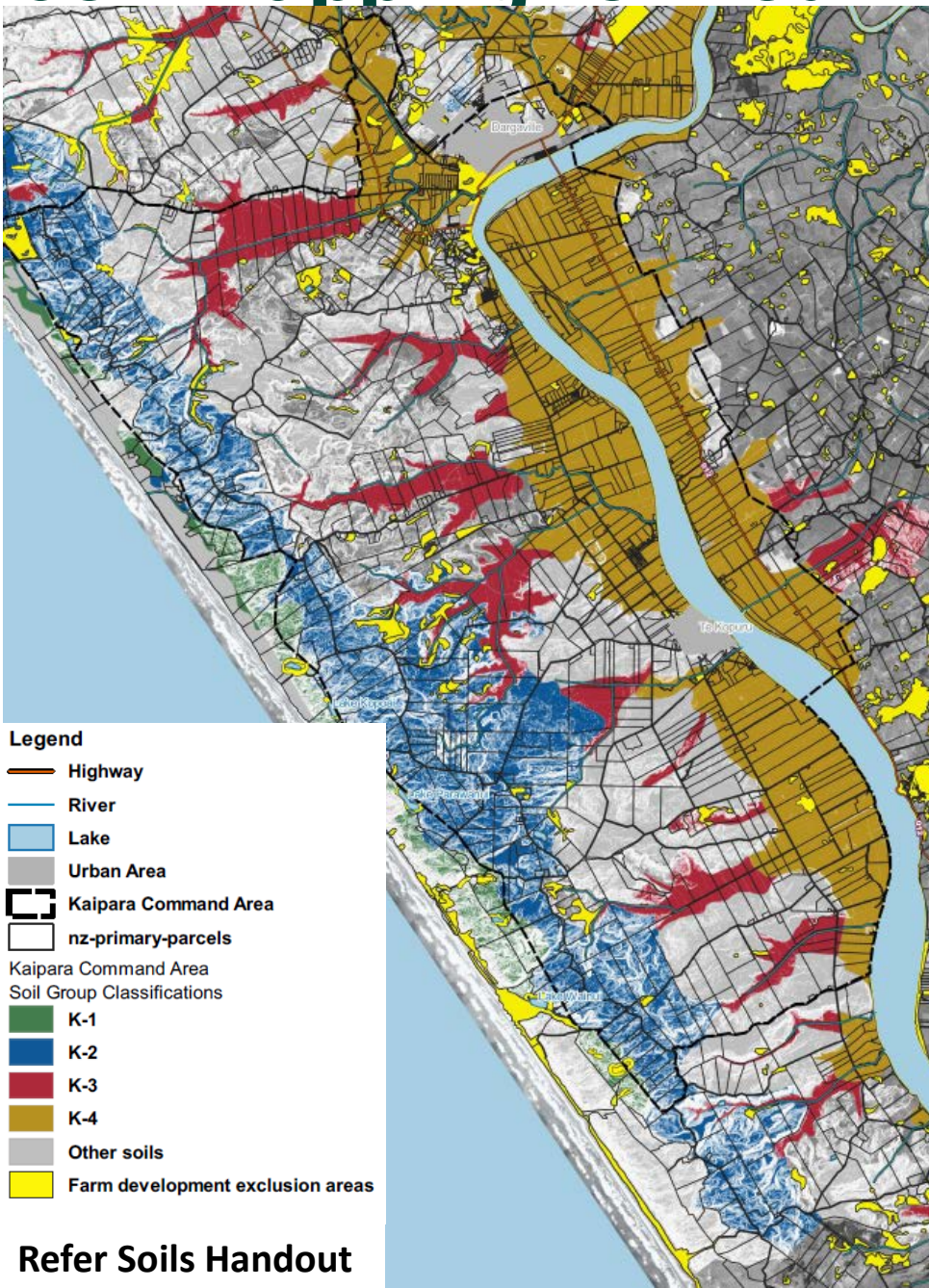
Development and Refinement of Long List

– 95% Complete

- Potential storage sites identified
- Site walkovers
- Multi-Criteria Analysis



Soil mapping refined

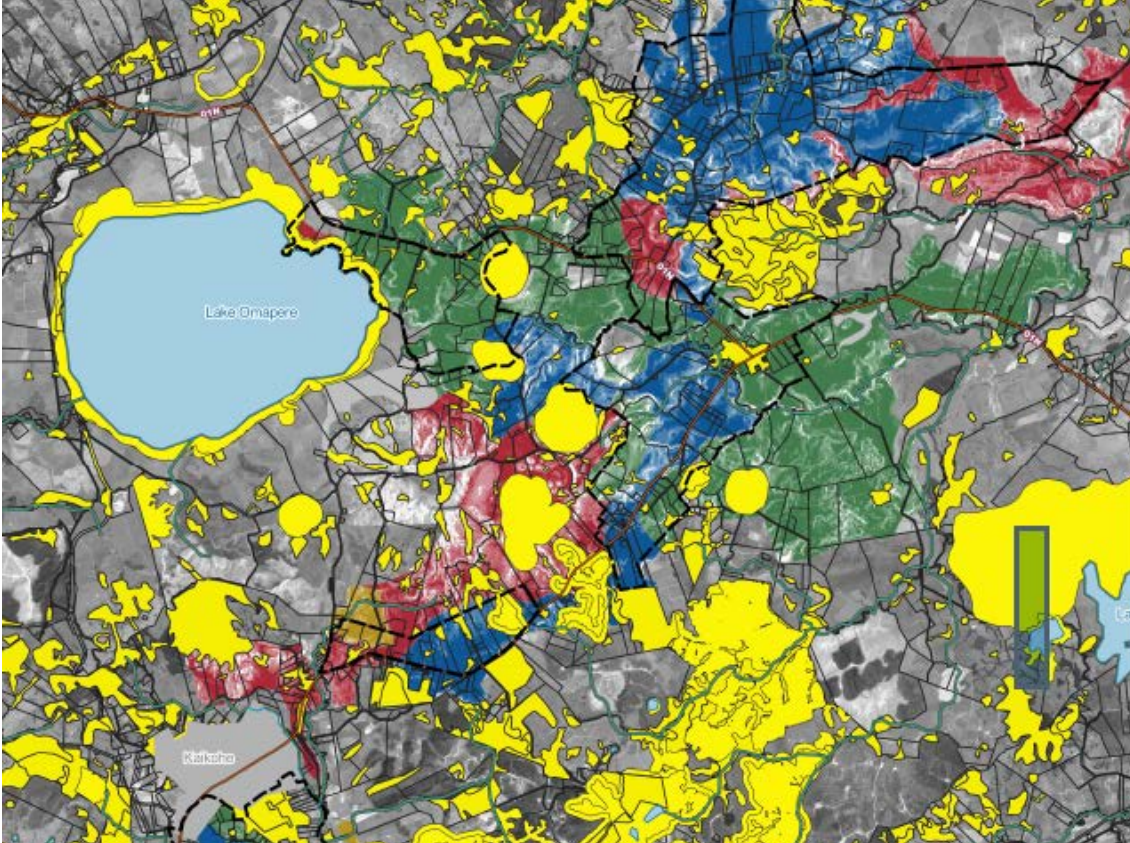


Red Hill Sands (K-2)



Refer Soils Handout

Kiripaka Silt Loam (MN-1)



Legend

-  Highway
-  River
-  Lake
-  Urban Area
-  Mid-North Command Area
-  nz-primary-parcels
- Mid-North Command Area
Soil Group Classifications**
-  MN-1
-  MN-2
-  MN-3
-  MN-4
-  Other soils
-  Farm development exclusion areas



Refinement of Water Demand – soil properties and proxy crops

- Free draining soils- Higher water demand
- Water demand varies by Crop

Table 1 Proxy crops and their peak irrigation requirements.

Crop Type	Soil Group Peak Irrigation Requirements (mm/day)							
	Kaipara				Mid-North			
	K-1	K-2	K-3	K-4	MN-1	MN-2	MN-3	MN-4
Pasture	4.7	4.3	4.1	3.9	4.2	4.1	3.7	3.7
Citrus	-	4.1	3.7	3.8	4.1	3.4	3	3
Avocado	4.4	4.2	-	-	4.2	-	-	-
Kiwifruit	-	4.4	4.1	4.2	4.4	3.8	3.6	3.6

Refinement of Water Demand – Example of effect of different security levels

- How reliable the water supply is affects storage volumes – more reliable/larger volume
- This will be a decision going forward when costs and storage availability is further considered

Table 2 Comparison of irrigation volume based on security of supply

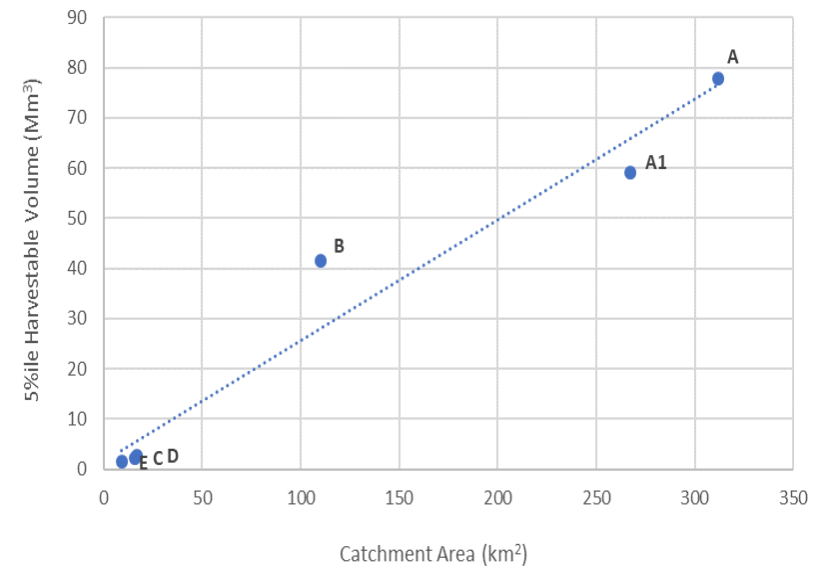
Crop type	Level of security (%)	Irrigation Requirement (mm)							
		Jan	Feb	Mar	Apr	Oct	Nov	Dec	Total
Eg	25	14.7	31.5	0.0	0.0	0.0	0.0	14.7	172
	Median	54.6	58.8	33.6	8.4	0.0	29.4	42.0	239
	75	98.7	73.5	63.0	31.5	6.3	56.7	77.7	355
	90	115.1	100.8	92.4	43.7	25.2	73.1	119.3	417
	95	120.5	109.2	106.7	61.7	32.3	86.9	121.8	433
	99	124.1	117.6	124.1	78.9	49.1	109.5	128.3	524

Water Supply (Kaipara)

Preliminary results – prior to final model validation

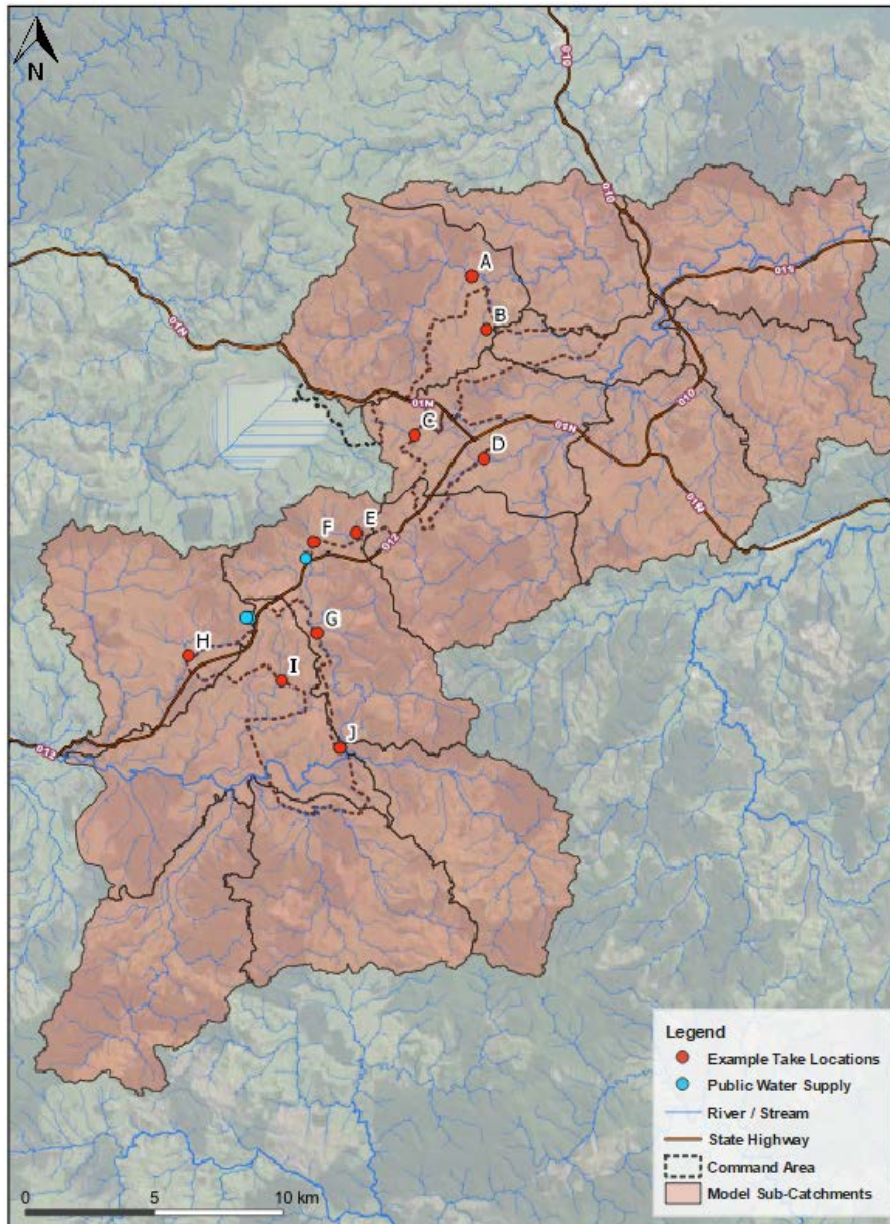


Potential Take Site	Annual Harvestable Volume (Mm ³)	Irrigable Area Supported (1000's ha)
A	80	20
A1	60	15
B	40	10
C	2	0.5
D	3	0.75
E	1	0.25

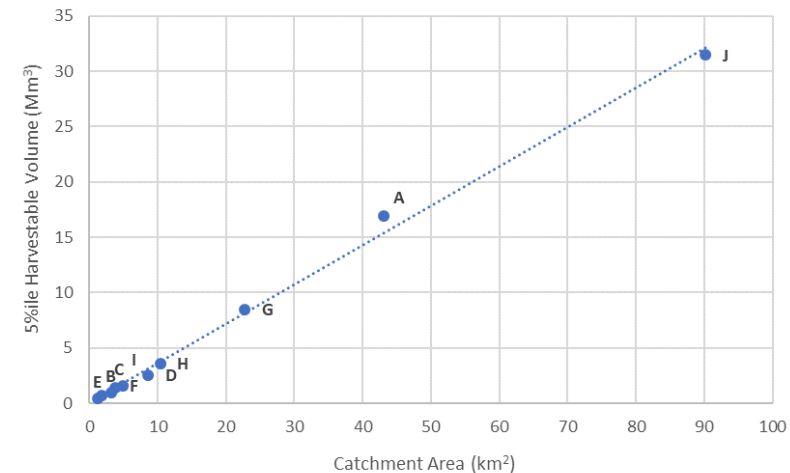


Water Supply (Mid North)

Preliminary results – prior to final model validation



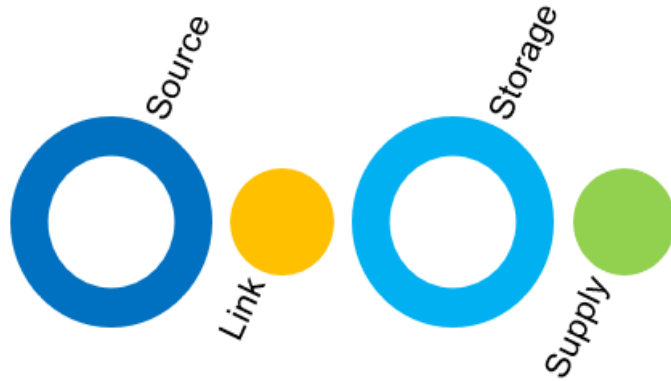
Potential Take Site	Annual Harvestable Volume (Mm ³)	Irrigable Area Supported (1000's ha)
A	15	3.75
B	0.5	0.13
C	1	0.25
D	2	0.5
E	0.5	0.13
F	1	0.25
G	8	2
H	3	0.7
I	1	0.25
J	30	7.5



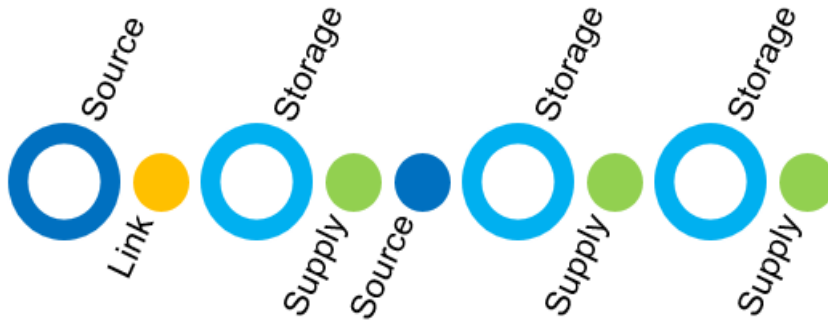
Conceptual Design

“Bookends” design scenarios. Provides a **“pick and mix”** for ongoing community engagement, design and implementation phases

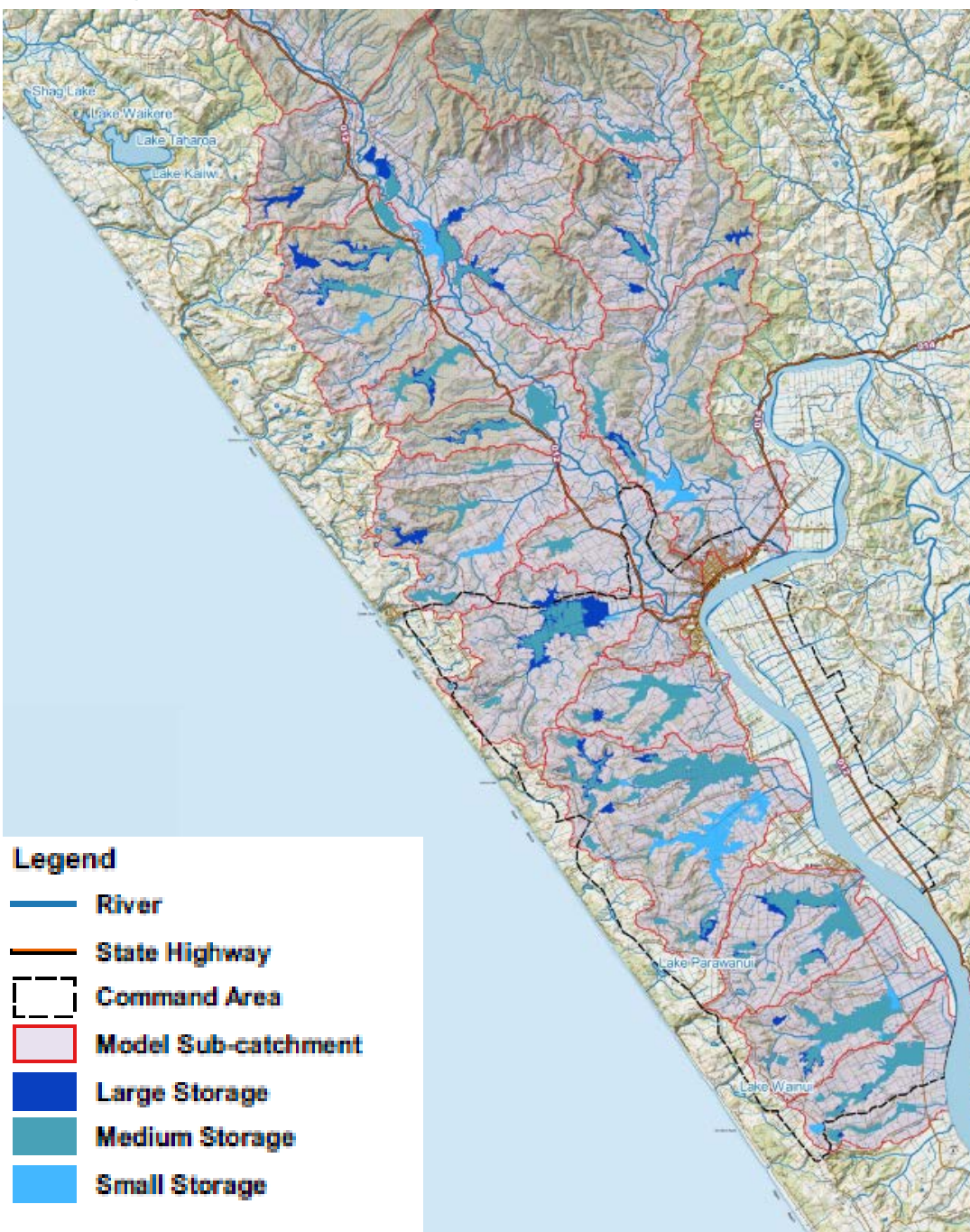
Concentrated



Distributed



Storage assessments - First cut



Refining storage areas – Multi Criteria Assessment

Criterion				Wt'd													
Group	Sub-Category	Unit	Notes	1 - 5	1	2	3	4	5	6	7	8	9	10	11	12	
Summary																	
Averaged						2.2	2.3	2.4	2.2	2.1	2.1	1.9	1.9	2.0	1.8	2.0	2.1
Minimum						1.9	1.9	1.9	1.6	1.9	1.6	1.3	1.2	1.7	1.0	1.6	1.6
Storage					<div><div></div><div></div><div></div></div> 3	1.9	2.3	2.8	2.3	2.3	2.5	2.2	2.1	2.1	1.8	2.5	2.2
Dam					<div><div></div><div></div><div></div></div> 3	1.9	1.9	1.9	1.6	1.9	1.6	1.3	1.2	1.8	1.0	1.6	1.6
Location (enter data via separate page)					<div><div></div><div></div><div></div></div> 3	2.3	2.0	2.0	2.0	2.0	1.7	2.0	2.0	1.7	1.7	1.7	2.0
Land					<div><div></div><div></div><div></div></div> 3	2.5	3.0	2.8	2.8	2.3	2.8	2.0	2.3	2.3	2.5	2.3	2.5
Consentability					<div><div></div><div></div><div></div></div> 3	2.4	2.4	2.4	2.4	2.1	2.1	1.8	2.0	2.4	2.1	2.1	2.1
Full Assessment																	
Storage						1.9	2.3	2.8	2.3	2.3	2.5	2.2	2.1	2.1	1.8	2.5	2.2
	Efficiency	Vs/Ve	1= <10, 3= >20	<div><div></div><div></div><div></div><div></div></div> 4	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 3	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 3	<div><div></div><div></div><div></div><div></div></div> 3	<div><div></div><div></div><div></div><div></div></div> 3	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 1	<div><div></div><div></div><div></div><div></div></div> 1	<div><div></div><div></div><div></div><div></div></div> 1	<div><div></div><div></div><div></div><div></div></div> 3	
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	Regional Hazards		1=significant, 3=minimal	<div><div></div><div></div><div></div><div></div></div> 4	<div><div></div><div></div><div></div><div></div></div> 3	<div><div></div><div></div><div></div><div></div></div> 3	<div><div></div><div></div><div></div><div></div></div> 3	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 3	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 1	<div><div></div><div></div><div></div><div></div></div> 1	<div><div></div><div></div><div></div><div></div></div> 1	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 1	<div><div></div><div></div><div></div><div></div></div> 2	
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	Material suitability		1=poor, 3=good	<div><div></div><div></div><div></div><div></div></div> 3	<div><div></div><div></div><div></div><div></div></div> 1	<div><div></div><div></div><div></div><div></div></div> 1	<div><div></div><div></div><div></div><div></div></div> 1	<div><div></div><div></div><div></div><div></div></div> 1	<div><div></div><div></div><div></div><div></div></div> 1	<div><div></div><div></div><div></div><div></div></div> 1	<div><div></div><div></div><div></div><div></div></div> 1	<div><div></div><div></div><div></div><div></div></div> 1	<div><div></div><div></div><div></div><div></div></div> 1	<div><div></div><div></div><div></div><div></div></div> 1	<div><div></div><div></div><div></div><div></div></div> 1	<div><div></div><div></div><div></div><div></div></div> 1	
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	Distance to Supply	km	1= >5km, 3= <2km	<div><div></div><div></div><div></div><div></div></div> 3	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 2	
	Elevation vs Source	m	1= >50m, 3= <0m	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 2	
	Elevation vs Supply	m	1= < -25m, 3= >25m	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 2	
Land						2.5	3.0	2.8	2.8	2.3	2.8	2.0	2.3	2.3	2.5	2.3	2.5
	Number of properties		1= several, 3= 1or2	<div><div></div><div></div><div></div><div></div></div> 3	<div><div></div><div></div><div></div><div></div></div> 3	<div><div></div><div></div><div></div><div></div></div> 3	<div><div></div><div></div><div></div><div></div></div> 3	<div><div></div><div></div><div></div><div></div></div> 3	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 3	<div><div></div><div></div><div></div><div></div></div> 3	<div><div></div><div></div><div></div><div></div></div> 2	
	Land "value"		1= High, 3= Low	<div><div></div><div></div><div></div><div></div></div> 3	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 3	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 3	<div><div></div><div></div><div></div><div></div></div> 3	<div><div></div><div></div><div></div><div></div></div> 3	<div><div></div><div></div><div></div><div></div></div> 3	<div><div></div><div></div><div></div><div></div></div> 3	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 3	
	Cultural/Heritage		1= High, 3= Low	<div><div></div><div></div><div></div><div></div></div> 3	<div><div></div><div></div><div></div><div></div></div> 3	<div><div></div><div></div><div></div><div></div></div> 3	<div><div></div><div></div><div></div><div></div></div> 3	<div><div></div><div></div><div></div><div></div></div> 3	<div><div></div><div></div><div></div><div></div></div> 3	<div><div></div><div></div><div></div><div></div></div> 3	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 3	<div><div></div><div></div><div></div><div></div></div> 3	<div><div></div><div></div><div></div><div></div></div> 3	
	Irrigator		1= Unlikely, 3 = Likely	<div><div></div><div></div><div></div><div></div></div> 3	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 3	<div><div></div><div></div><div></div><div></div></div> 3	<div><div></div><div></div><div></div><div></div></div> 3	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 3	<div><div></div><div></div><div></div><div></div></div> 1	<div><div></div><div></div><div></div><div></div></div> 1	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 1	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 1	
Consentability						2.4	2.4	2.4	2.4	2.1	2.1	1.8	2.0	2.4	2.1	2.1	2.1
	Ecological		1= several, 3= 1or2	<div><div></div><div></div><div></div><div></div></div> 3	<div><div></div><div></div><div></div><div></div></div> 3	<div><div></div><div></div><div></div><div></div></div> 3	<div><div></div><div></div><div></div><div></div></div> 3	<div><div></div><div></div><div></div><div></div></div> 3	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 3	<div><div></div><div></div><div></div><div></div></div> 3	<div><div></div><div></div><div></div><div></div></div> 2	
	Sensitivity		1= High, 3= Low	<div><div></div><div></div><div></div><div></div></div> 3	<div><div></div><div></div><div></div><div></div></div> 3	<div><div></div><div></div><div></div><div></div></div> 3	<div><div></div><div></div><div></div><div></div></div> 3	<div><div></div><div></div><div></div><div></div></div> 3	<div><div></div><div></div><div></div><div></div></div> 3	<div><div></div><div></div><div></div><div></div></div> 3	<div><div></div><div></div><div></div><div></div></div> 3	<div><div></div><div></div><div></div><div></div></div> 3	<div><div></div><div></div><div></div><div></div></div> 3	<div><div></div><div></div><div></div><div></div></div> 3	<div><div></div><div></div><div></div><div></div></div> 3	<div><div></div><div></div><div></div><div></div></div> 3	
	Hydological Change		1= High, 3= Low	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 1	<div><div></div><div></div><div></div><div></div></div> 1	<div><div></div><div></div><div></div><div></div></div> 1	<div><div></div><div></div><div></div><div></div></div> 1	<div><div></div><div></div><div></div><div></div></div> 1	<div><div></div><div></div><div></div><div></div></div> 1	<div><div></div><div></div><div></div><div></div></div> 1	<div><div></div><div></div><div></div><div></div></div> 1	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 1	<div><div></div><div></div><div></div><div></div></div> 1	<div><div></div><div></div><div></div><div></div></div> 1	
	Technical challenges		1= Large, 3= Small	<div><div></div><div></div><div></div><div></div></div> 3	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 1	<div><div></div><div></div><div></div><div></div></div> 1	<div><div></div><div></div><div></div><div></div></div> 2	<div><div></div><div></div><div></div><div></div></div> 1	<div><div></div><div></div><div></div><div></div></div> 2	

2nd PGF Application

- 2nd PGF application has been prepared;
- Aim is to secure enough funding to progress schemes in both Kaikohe and Kaipara
- Lodged late September – expect decision later this year.



Project milestones

- High level project information sheets – 16 Sept
- Soil / command area assessed – 20 Sept
- Face to face engagement begins - 23 Sept
- Draft decision model developed – 23 Sept
- Water availability assessment completed – Nov
- Business case development starts – Nov
- Drop in days Mid-North, Kaipara – late November
- Storage options developed – 6 Dec
- Impact assessment and costing completed – 16 Jan
- Pre-feasability and business case completed – 28 Feb
- Recommendation to Ministry – 27 March



Next steps

Area	Meeting Date and Time	Venue
Kaikohe- Punakitere (Māori landowners)	12 November, 1- 5pm	Citizens advice - Kaikohe
Kaikohe- Waimate Taiaimai (Māori landowners)	14 November, 1- 5pm	Ohaewai Rugby Club Rooms
Dargaville	21 Nov, 11am to 3pm 23 Jan, 11am to 3pm	Dargaville – Sportsville Dargaville – Sportsville
Kaikohe	20 Nov, 11am to 3pm 22 Jan, 11am to 3pm	Ohaewai Rugby Club Rooms Ohaewai Rugby Club Rooms

- Develop recommendation report for review.
- Pre-feasibility study due for completion in March 2020.

