Waikato Regional Council Technical Report 2021/20

Condition report for flood protection and land management assets for all zones

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Te Kaunihera ā Rohe o Waikato

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Abstract

This report analyses the data gathered in the field by the council operations staff, mainly by visual observation of assets condition, survey information following annual stopbanks crest level survey by a specialist contractor and any other information that may be available.

The objectives of this report are to:

- Evaluate the physical condition of the assets
- Explain how an asset is performing in relation to design specifications
- Provide an overall assessment in relation to agreed service level performance standard of stopbanks
- Assist relevant Zone Managers and Asset Manager in managing on-going schemes and
- identifying future work requirements
- Provide basis for reporting to scheme's stakeholders including the scheme's Liaison
- Subcommittees.

The assets are assessed according to two sets of guidelines. Floodgates and Pumpstations have been assessed using Asset Failure Modes and the asset operating context to assign a Remaining Useful Life Score. Embankments and all other assets have been assessed using the guidelines outlined in the New Zealand Infrastructures Asset Management Manual 1999 and the Condition Assessment Manual 2011 Guidelines for each asset type, adopted by the council. The methodology followed is described in more detail in sections 2 and 2.1.

Collection of field data and information is performed using the Fulcrum Mobile app. Fulcrum is a mobile platform that allows to customise apps to capture field data on iPhone, iPad, and Android devices. The Asset Management team have developed two apps namely, Defect Inspection app and Condition Inspection app. The Defect Inspection app is used to capture defects on stopbanks, licence areas, and channels while the Condition Inspection app is used for floodgates, pumpstations, and other assets.

In general, most of the council's flood protection assets are in a good condition. 93.9% were rated between condition one and three (very good to average), with the other 6.1% rated condition four or five (poor or very poor).

Executive summary

Every year, a combination of external engineers and Waikato Regional Council staff assess the condition of various river structures and flood protection infrastructure, so a condition grading can be assigned, and then used to prioritise future works. These inspections vary in complexity, from dewatering of sites to allow the structural integrity of pumpstations and floodgates to be checked, to the walking or driving of stopbanks looking for bull holes, excessive gorse growth or damaged fences, as examples.

Both the condition of the assets and any defects found, are noted in the asset management system. For the last six years this information has been compiled and analysed annually.

The condition is rated on a one to five scale: very good, good, average, poor, very poor. The type of action that is taken (monitor, minor repairs, complete overhauls, decommission and/or build new) depends on the asset type, the types of defects, and the condition score.

This year 440 floodgates, 108 pumpstations, and 518km of embankments were assessed.

Currently 6.1% of the asset base is considered to be in a poor or very poor condition, whereas last year only 1.5% was in a poor or very poor condition. The assets with poor condition, that have not improved in the last two years include some Lower Waikato Pumpstations and Floodgates and Thames Valley Floodgates.

Current Condition of Assets
In general, most of the council's flood protection assets are in a good condition. 93.9% were rated between condition one and three (very good to average), with the other 6.1% rated condition four or five (poor or very poor).

Of the 6.1% rated condition four or five (poor or very poor), 5.6% deteriorated from last year, with 0.5% having been in poor condition since at least last year. 0.02% of assets improved from being in very poor condition to being in poor condition. Coromandel, Lake Taupo and Waipa all showed minimal or no deterioration, but all other zones showed significant deterioration. Franklin showed the most significant deterioration this year.

Stopbanks
There are 4.2km in Lower Waikato and 8.5km in Piako that are in a poor or unknown condition.

The main issues to rectify with respect to condition of stopbanks are stock damage and vegetation with deep root systems that can affect the integrity of the structure.

Stock Damage - Bull Hole

WRC is seeking to take a more strategic approach to the future management of scheme land by looking at opportunities for improvement. We want to lead by example across our region by promoting sustainable land management practices including improving biosecurity and biodiversity outcomes on scheme land.

The Scheme Land Use Management Plan is aiming to improve scheme land condition and management while balancing the best income options against the cost of management and administration. Protection of flood protection assets and infrastructure will remain a priority for the review.

Pumpstations

We have 13 pumpstations in the Lower Waikato in poor condition, along with 9 in Piako and 1 in Waihou

Other pumpstations across the region have deteriorating component issues, including deteriorating inlets, outlets, pipes and screens.

Mill Road Structural Audit – Waihou Piako Zone

Floodgates

We have 60 floodgates in the Lower Waikato, 16 in Piako, 7 in Waihou and 3 in Thames Valley that are in a poor condition.

Other Asset types

All Assets falling into the "Other" are in average to good condition. There was some deterioration of Poles, Bridges and Control gates, nothing has hit the threshold for being in poor condition.

Conclusion

As a whole, the council assets appear to be in a reasonable condition, however there has been significant deterioration since last year that must be addressed. A number of assets require further attention to decide the best course of action in terms of minimising council risk. Maintenance on all assets must continue to keep them in good condition, and Maintenance programs should be evaluated for their effectiveness.

1 Introduction

This report analyses the data gathered in the field by the Council Operations staff, mainly by visual observation of assets condition, survey information following annual stopbanks crest level survey by a specialist contractor and any other information that may be available.

The objectives of this report are to:

- Evaluate the physical condition of the assets
- Explain how an asset is performing in relation to design specifications
- Provide an overall assessment in relation to agreed service level performance standard of stopbanks
- Assist relevant Zone Managers and Asset Manager in managing on-going schemes and identifying future work requirements
- Provide basis for reporting to scheme's stakeholders including the scheme's Liaison Subcommittees.

1.1 Commonly Used Acronyms

PS Pumpstation
FG Floodgate
SB Stopbank
C(X) Condition (X), i.e. C5 = Condition 5
RUSL Remaining Useful Service Life
DQR Data Quality Rating
SLUMP Scheme Land Use Management Plan

2 Assets assessment methodology

Traditionally, annual asset condition grading has been resourced by operations staff in their respective areas. Each year 6 to 12 Inspectors provide the condition grades across the WRC Flood protection/drainage asset base. To assist with this in 2011, WRC developed a condition Manual that was written loosely around the New Zealand Infrastructure Asset Management Manual 1999. Despite this, consistent condition grading has long been a problem; recently questions have been asked around it being fit for purpose and the effectiveness of training for Inspectors to promote consistency of condition grading.

To combat these issues, this year the Pumpstations and Floodgates in Lower Waikato, Franklin, Waikato Central, Waihou, Piako and Thames Valley were assessed by just 1 person - the Reliability Engineer from the Asset Management Team. These inspections focused on Asset Failure Modes and the asset operating context which produce a much more realistic score. This has resulted in some shifts in condition that may not have been seen if the inspections had been carried out to the traditional standard. The scores are determined by Remaining Useful Service Life:

C1 >75% RUSL (Remaining Useful Service Life)
C2 34 to 74% RUSL
C3 13 to 33% RUSL
C4 5 to 12% RUSL
C5 <5% RUSL

i.e., if standard life is 80 years, a score of 4 would indicate 4 to 10 years left, while a score of 5 would indicate it is into the last 4 years of useful life.

The intention going forward is to formalise this standard and update the condition manual to ensure it is adhered to in the future. Additional work should also be done to reflect all stakeholders; It is conceivable that an asset may be a condition 1 from an operational point of view but a 4 from an environmental point of view, a distinction that this standard does not allow for.

Each component is assessed, and the condition of the components is considered when determining the condition of a parent asset.

The methodology followed for all other assets (including Floodgates in Coromandel and Lake Taupo) is described below.

2.1 Asset condition general

This part of the report is a summary of information derived from visual inspections undertaken by Council staff during the year. Each asset type is inspected, assessed, and graded based on the typical physical condition. The asset condition grading system is shown in Table 1. The assets that are visually inspected include:

- Stopbanks
- Floodgates
- Pumpstations
- Channels
- Other Assets (groynes, culverts, weirs etc.)

Collection of field data and information is performed using the Fulcrum Mobile app. Fulcrum is a mobile platform that allows to customise apps to capture field data on iPhone, iPad, and Android devices.

The Asset Management team have developed two apps namely, Defect Inspection app and Condition Inspection app. The Defect Inspection app is used to capture defects on stopbanks, licence areas, and channels while the Condition Inspection app is used for floodgates, pumpstations, and other assets.

Grade	Condition	Condition measure
1	**Near new condition**	Asset has recently been built/upgraded, very good condition
2	Normal maintenance required	Good condition, continue with routine maintenance
3	Backlog maintenance required	Average condition, non-routine maintenance required
4	Major renewal required	Poor condition, urgent maintenance required
5	Asset unserviceable	Very poor condition, needs replacement/urgent upgrade

Table 1 Asset condition grading

2.1.1 Floodgates

Floodgates are also visually inspected every year by Council's Operations staff. Field data such as photographs, attribute information and asset location, are collected using the customised Fulcrum Condition Inspection app.

Each component of the floodgate is inspected, assessed and graded using the criteria described in Table 1. Each floodgate is given an overall condition grade taking into account the grade of each component.

2.1.2 Stopbanks

Stopbanks condition assessment is done for the entire stopbank. Using the Defect Inspection app, the inspector walks or drives along the stopbank, captures and re-inspects every defect of the stopbank. Dependant on the number and degree of the captured defects, the inspector scores the stopbank using the scale shown in Table 1. The overall scoring is based on the following factors:

- Vegetation cover
- Embankment erosion
- Damage (stock, vehicles, etc.)
- Geometry (shape)
- Berm erosion

2.1.3 Main and Tributary Channels

The Main and Tributary Channels of Lower Waikato River are visually inspected annually by Council Operations staff. Identical to stopbank inspections, Fulcrum Defect Inspection app is used to record information and capture defects along each channel reach.

Any signs of bank erosion, sediment build-up, fallen trees and other damage or obstructions to flow are noted. Stock damage in unfenced areas along the Main Channel is also noted.

Every captured defect is assessed and graded using the asset condition grading in Table 1**.** The overall condition scoring is based on the number and degree of defects and judgment of the inspector.

2.1.4 Other Assets

Other assets such as control gates, weirs, bridges, etc. are also visually inspected every year by Council Operations staff. The inspection and grading procedures are similar to floodgates and pumpstations.

2.2 Asset performance general

Asset performance is a measure of an asset's ability to perform to design standards and to provide the level of service it was designed for. For this purpose, investigations, surveys and specific technical data are required for performance assessment of each asset type. Performance values are measured on a similar scale to the condition values, however, the criteria differs, as explained further.

The asset performance being assessed include:

- Stopbanks and spillways
- Floodgates
- Pumpstations

In addition, following a flood event the whole flood protection scheme affected is assessed against the design standard.

2.2.1 Stopbanks

The performance of a stopbank is assessed by comparing the current crest level against the Design Crest Level (DCL). The assessment is done at every 100m length or link of stopbank, where the calculated current lowest crest level is compared to DCL.

Each link is assessed and graded applying the criteria set out in Table 2. The lowest grade of any link of the stopbank represents the overall performance grade of the stopbank.

Crest level results	
Grade	Crest level measure
1	Actual crest level > design bank level @100%
2	Actual crest level > target level @100%
3	Actual crest level < target level at any point
4	Actual crest level < half (target level + design flood level) at any point
5	Actual crest level < design flood level at any point

Table 2 Performance grading for earth structures

This table can be graphically presented:

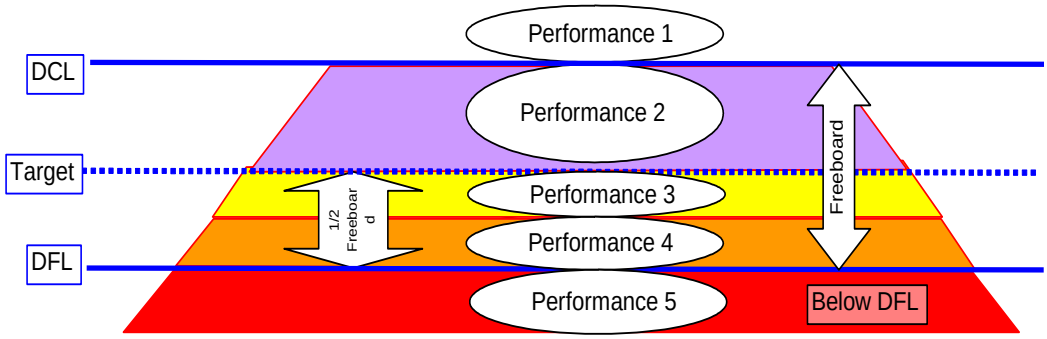
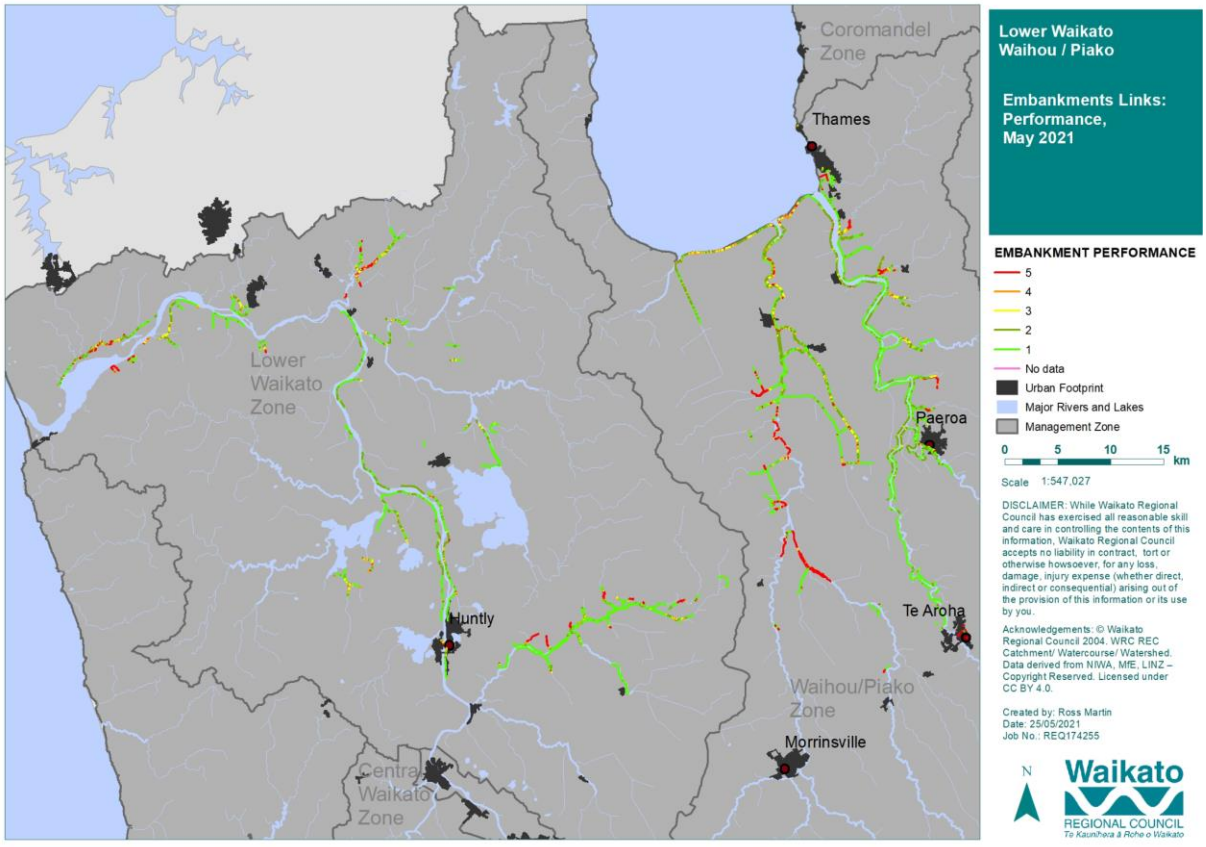


Figure 1 Performance grading for earth structures

Legend:
DFL is the Design Flood Level
DCL is the Design Crest Level, which is DFL plus the freeboard
Target is the target level, which is DFL + ½ of freeboard

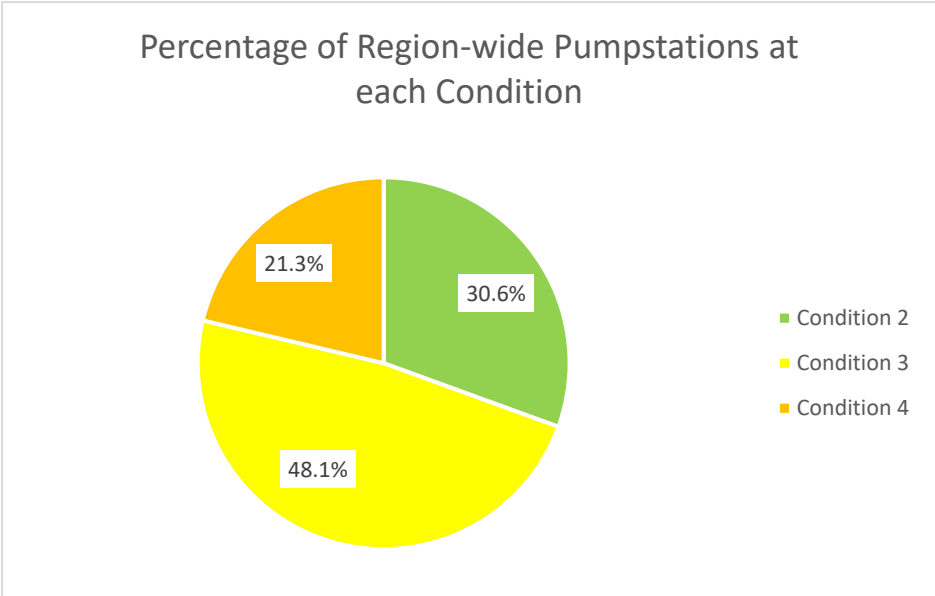
Therefore, a performance grade 1 is given to a stopbank link with the current minimum crest level above DCL; performance grade 2 for link with current crest level between DCL and Target level.

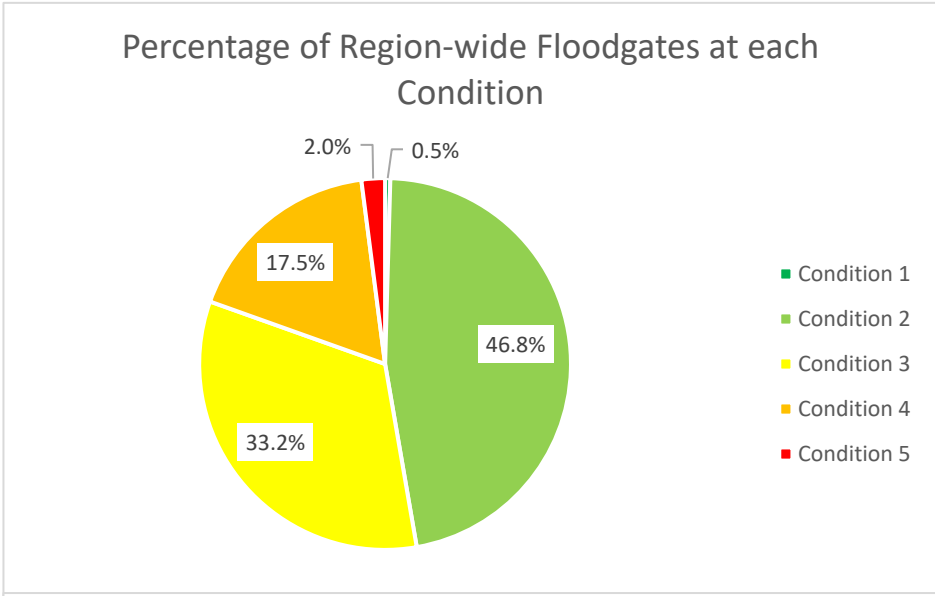
Stopbank section that has lost between half and three-quarters of the freeboard gets a performance grade 3, while those that lost three-quarters or all of the freeboard receives grade 4. Performance grade 5 is for link with current crest level below DFL.

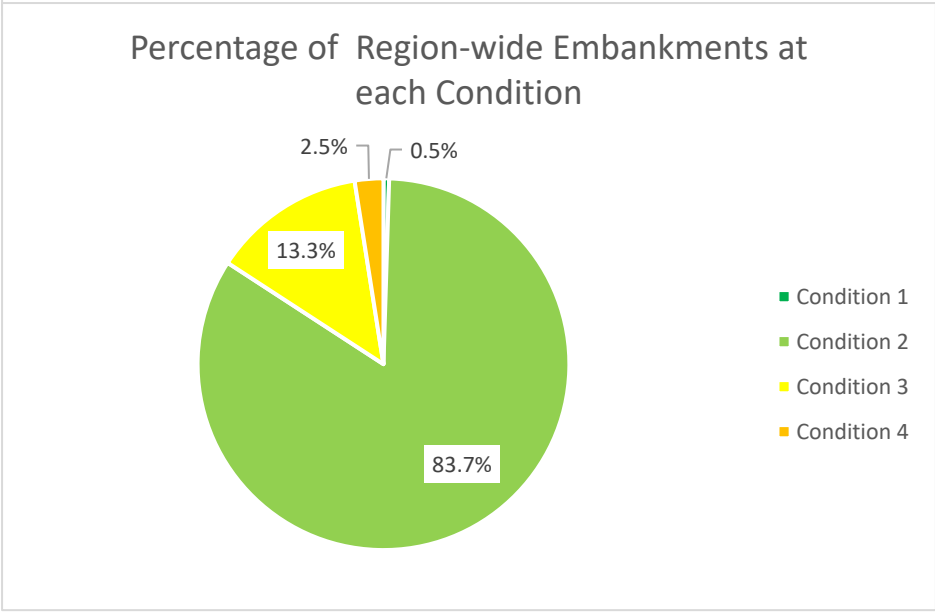


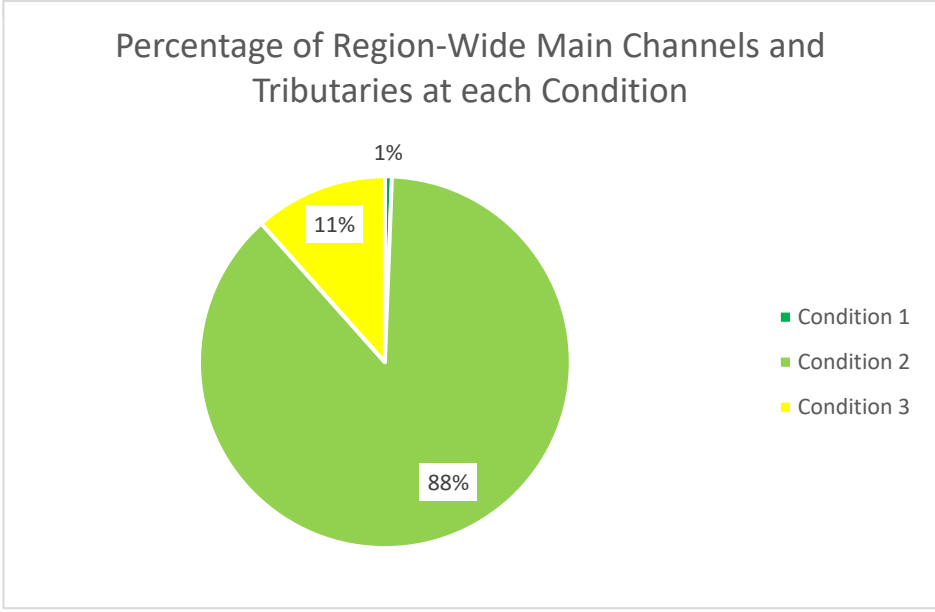
3 Our Region at a glance

	Embankments		Floodgates		Pumpstations		Rivers and Streams		Other Assets	
	Total	C4/C5	Total	C4/C5	Total	C4/C5	Total	C4/C5	Total	C4/C5
Franklin	5km	0km	1	0						
Coromandel	2km	0km	5	0			43km	0km	19	0
Lower Waikato	202km	4km	265	61	59	13	134km	0km	97	0
Waihou	164km	0km	69	7	19	1	462km	0km	74	0
Piako	133km	9km	60	16	28	9	362km	0km	20	0
Waipa							10km	0km	1	0
Waikato Central			6	0	2	0			20	0
Thames Valley	4km	0km	11	3	1	0			29	0
Lake Taupo	8km	0km	23	0			213km	0km	35	0


Percentage of Region-wide Pumpstations at each Condition
21.3%
30.6%
48.1%
Condition 2
Condition 3
Condition 4


Percentage of Region-wide Floodgates at each Condition
2.0%
0.5%
17.5%
46.8%
33.2%
Condition 1
Condition 2
Condition 3
Condition 4
Condition 5


Percentage of Region-wide Embankments at each Condition
2.5%
0.5%
13.3%
83.7%
Condition 1
Condition 2
Condition 3
Condition 4


Percentage of Region-Wide Main Channels and Tributaries at each Condition
1%
11%
88%
Condition 1
Condition 2
Condition 3

3.1 Discussion

It is obvious from looking at the charts above that Pumpstations and Floodgates are where a number of problems lie. Ideally we would prefer to see 95% of assets be in a very good to average condition, with the remaining 5% being already in the pipeline for remedial works. In this situation, C4/5 assets would be in the scope/design/build phase and C3 assets would make up most of the 10-year Long Term Plan.

With approximately 20% of Pumpstations and Floodgates in poor to very poor condition, there is clearly a shortfall in how we manage these asset types. Maintenance programs need to be evaluated to look at what value we get for our investments, as well as carried out more collaboratively with other parts of the organisation. A capital works program driven by this report where the degrading assets were prioritised would also cause a rise in overall condition, provided the works can be done to a rigorous standard with a full scoping and quality control component.

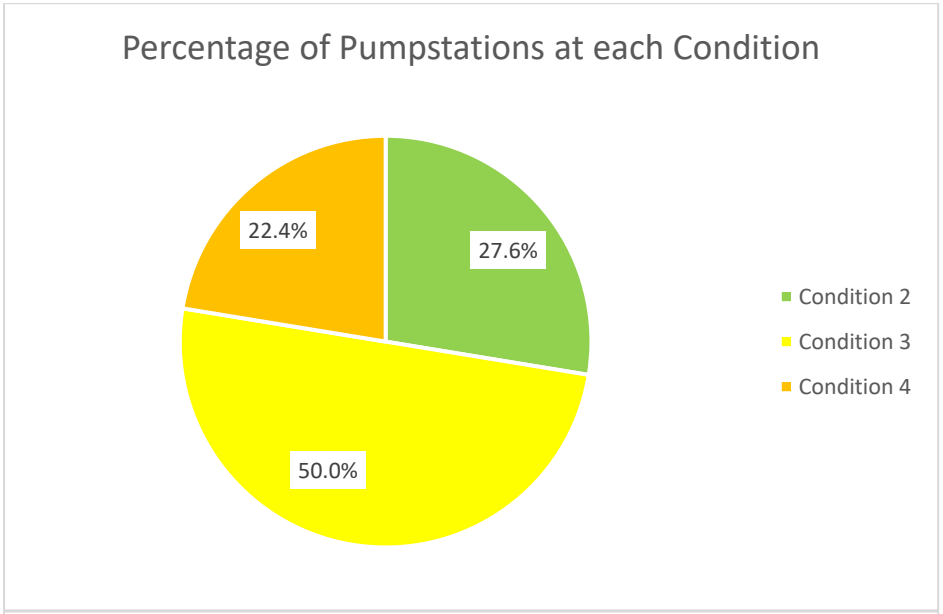
Annual Condition Inspections need to be carried out with rigour and attention to detail; with special attention paid to the Data Quality Rating. Having good data with a well understood level of uncertainty will assist in build the right capital works program to address the most critical assets.

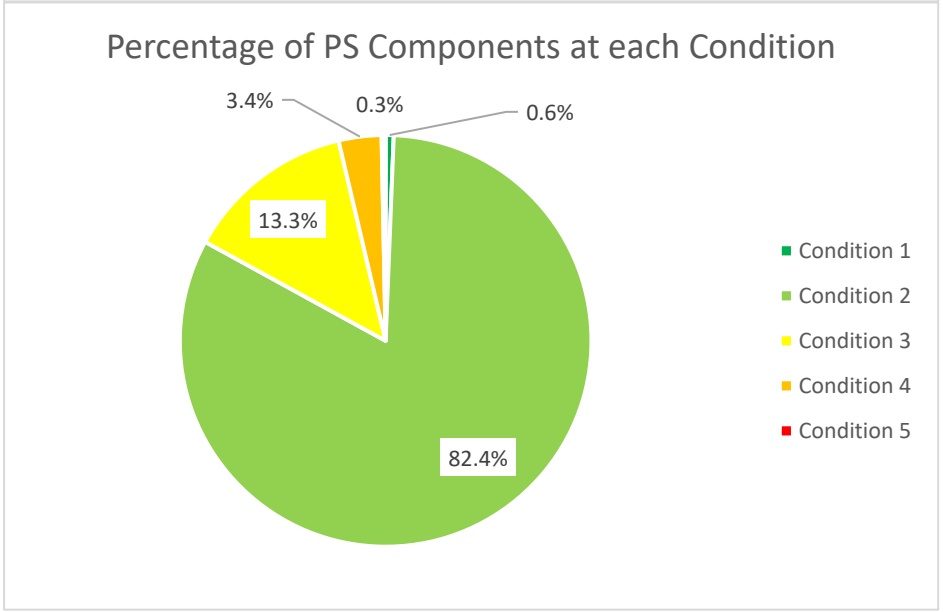
4 Lower Waikato

4.1 Pumpstations

58 Pumpstations were inspected in Lower Waikato as part of the condition monitoring program this year. Of these, 77.6% were found to be in a good to average condition, with 22.4% (or 13 Pumpstations) found to be in poor condition.

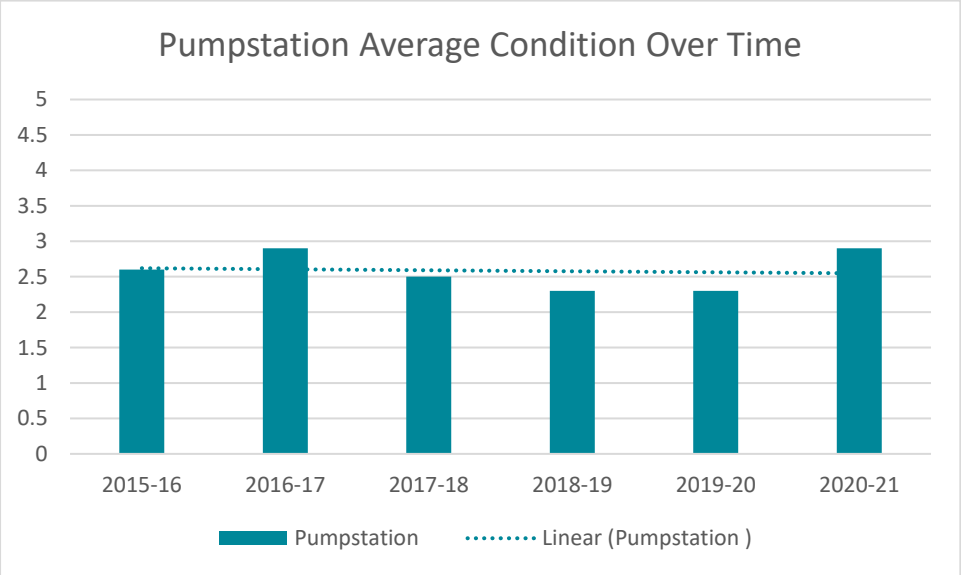
As the condition of a Pumpstation is determined by the poorest condition component, further discussion of the components is required. Pumpstation Inlet Bays are the component most commonly in a poor condition, with 15% of all inlets being graded at condition 4, or 9 individual assets. Outlets are also a common mode of failure. This represents a large risk to the operational effectiveness of the pumpstation network.



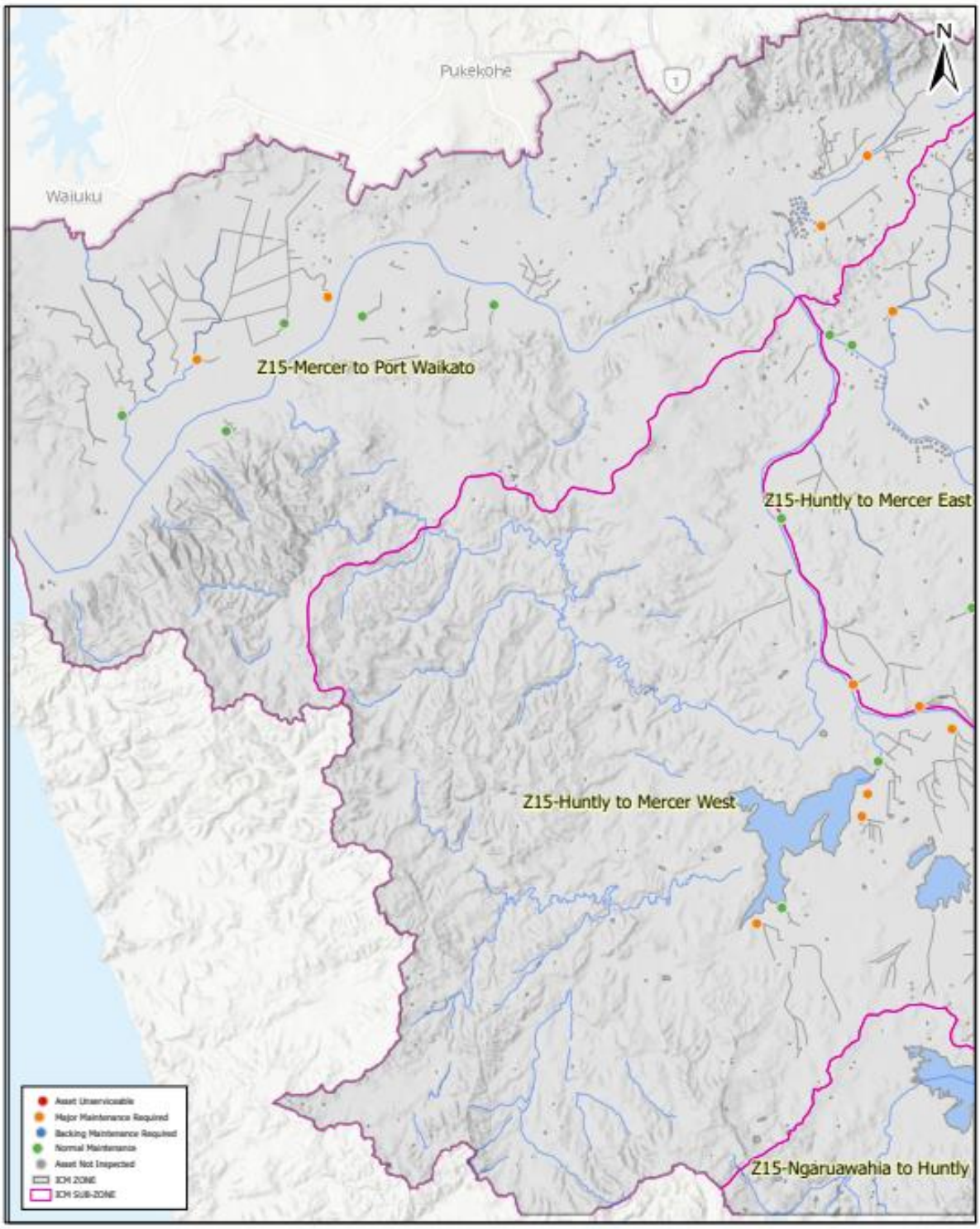


	No Change	Deteriorated	Improved
PS Component	76.0%	17.8%	6.2%
Pumpstation	37.6%	55.9%	6.5%

In terms of condition change, all Gearboxes and Hydraulic Pumps and 75% of Grille Screens were found to have deteriorated since last year, whilst 71% of Concrete and Sheet Pile Sumps and 50% of Screw Pumps have improved on last year's rating.



Pumpstation Average Condition has remained relatively stable over the last six years, although the overall average condition is the among the highest in the zone; almost all other asset types in Lower Waikato are in better condition than the Pumpstations and their components. As discussed in section 4.1, Pumpstations are poorly managed region wide and further investigation is required as to where improvements can be made.



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Pumpstation Condition map.

2020-21

ICM Zone: Lower Waikato (western) Sub Zone Area (labelled)

0 1.5 3 4.5 6 7.5 km

Scale at A4
= 1:200,000

Created by: AJH
Date: 17/05/2021
Version: 1

File: REG173114_

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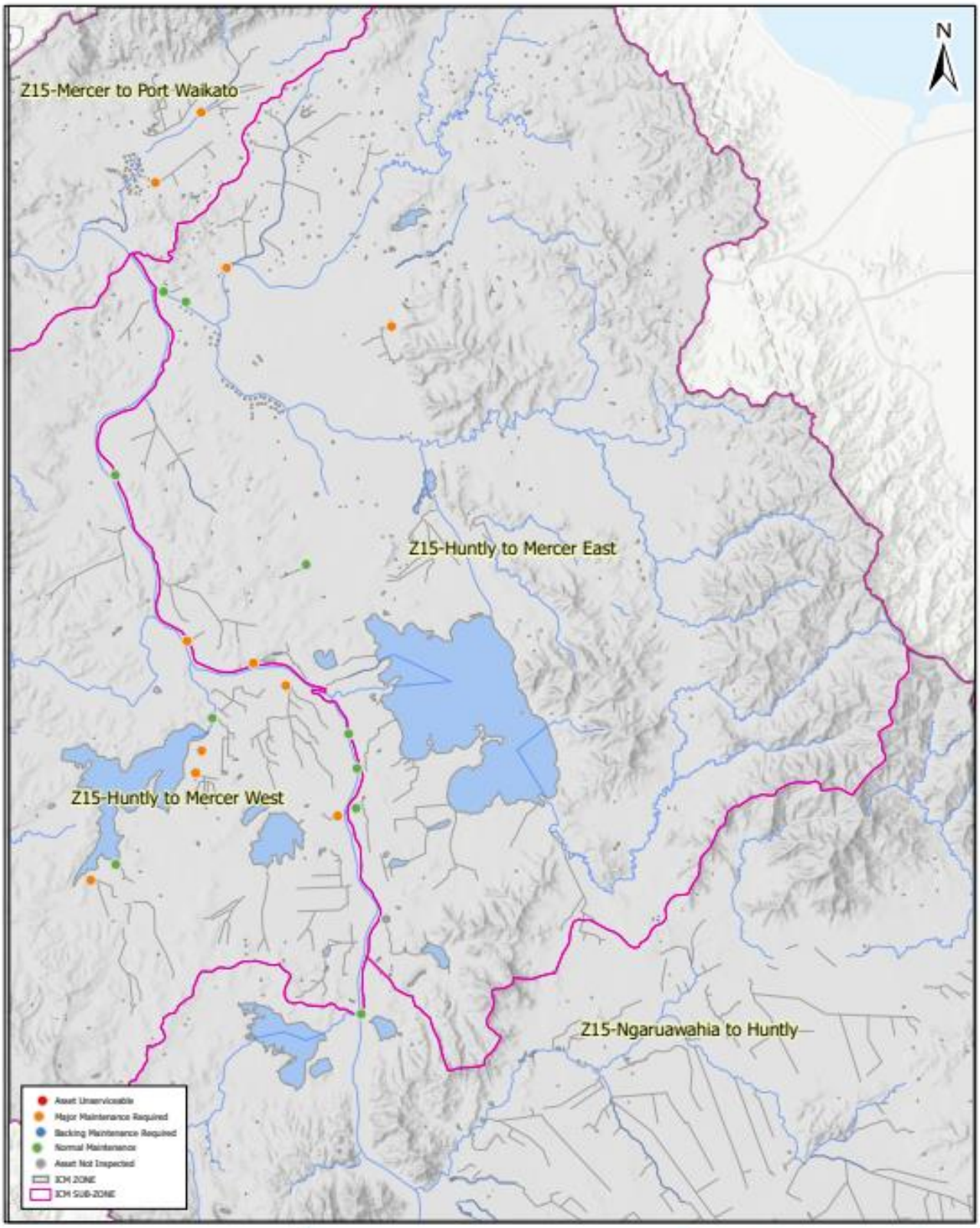

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Pumpstation Condition map.

2020-21

ICM Zone: Lower Waikato (eastern) Sub Zone Area (labelled)

0 1.5 3 4.5 6 7.5 km

Scale at A4
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Date: 17/05/2021
Version: 1

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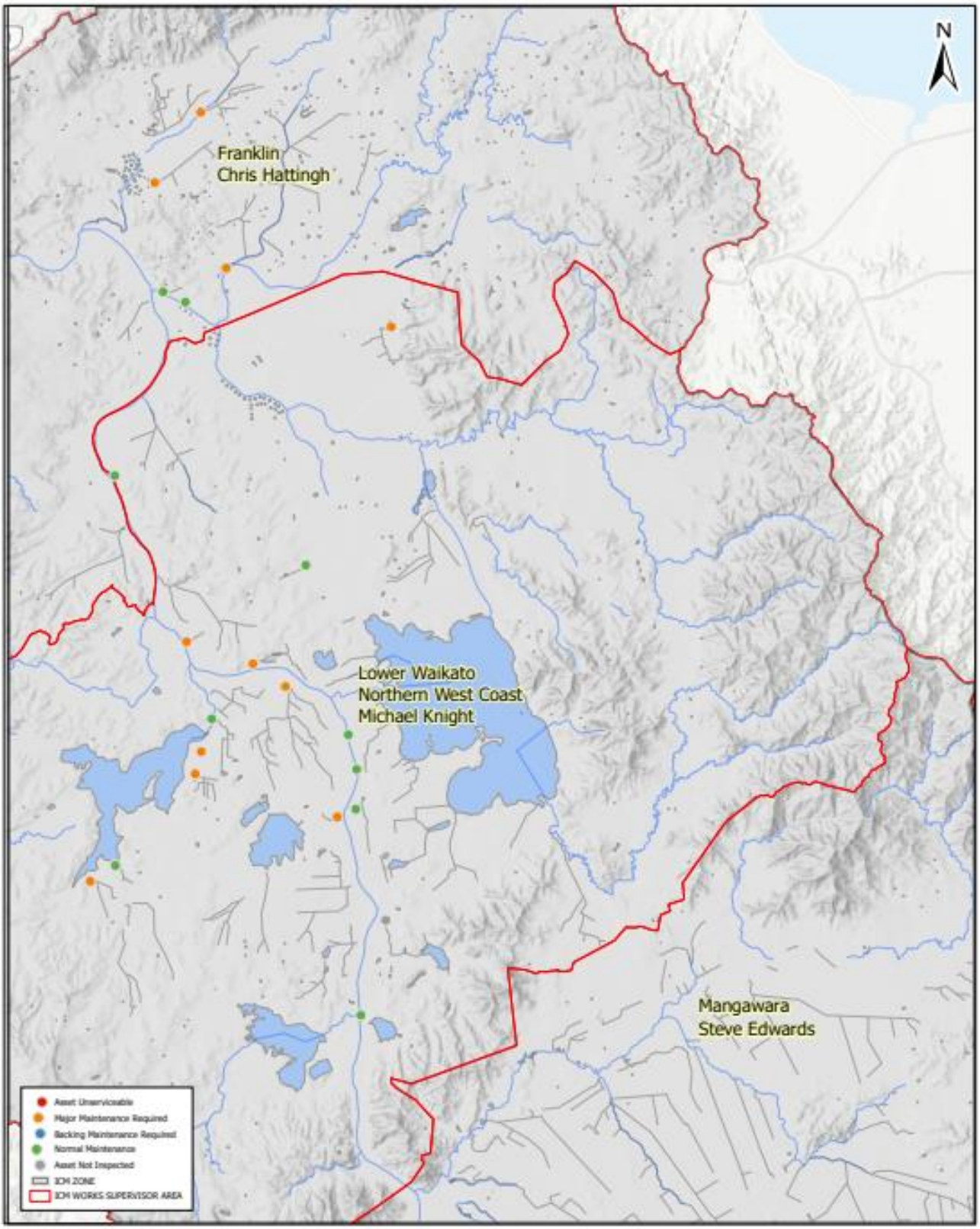

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Pumpstation Condition map.

2020-21

ICM Zone: Lower Waikato (eastern) Work Supervisor Area (labelled)

0 1.5 3 4.5 6 7.5 km

Scale at A4
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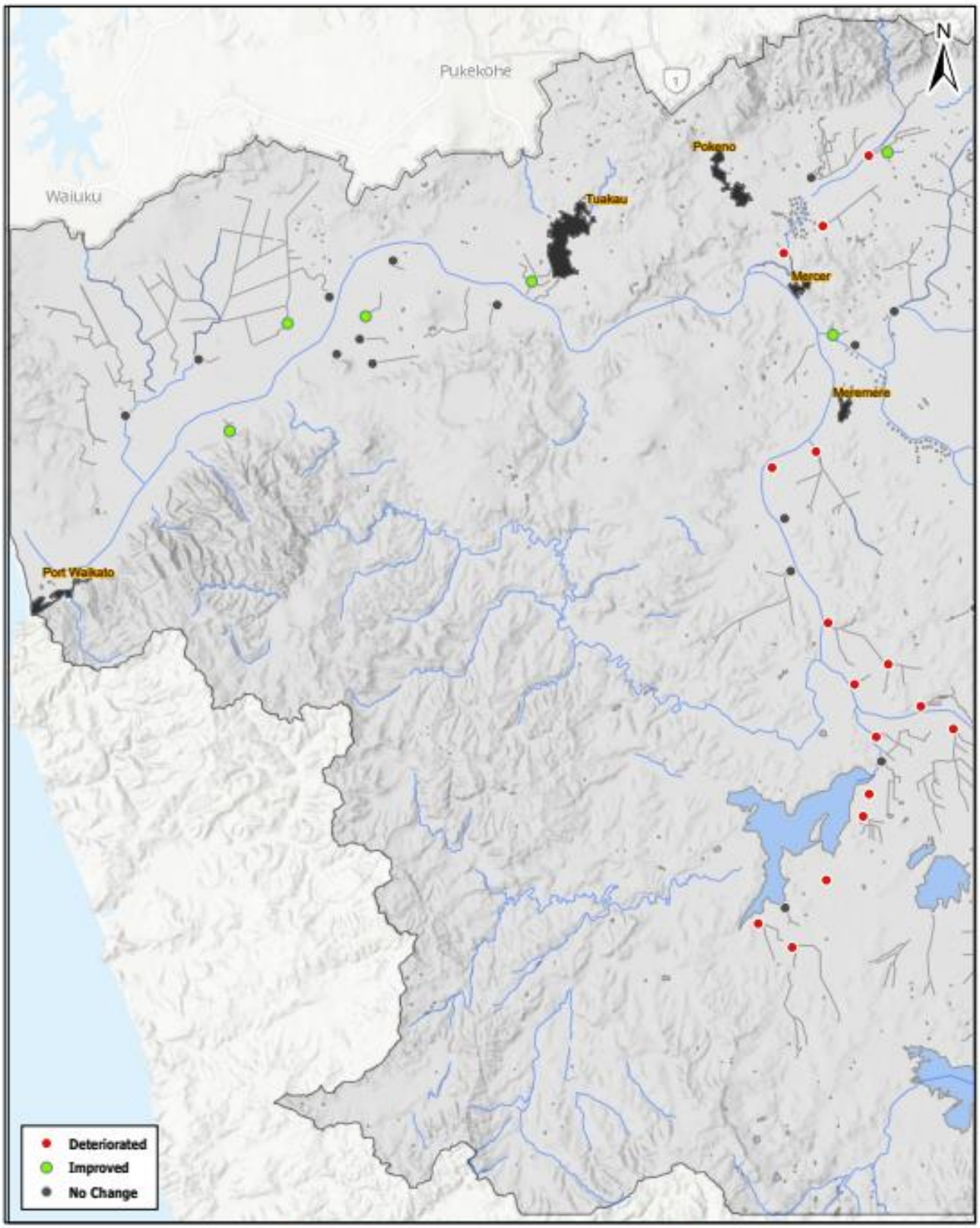

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Pumpstation Condition Change map.

2020-21

ICM Zone: Lower Waikato (western)

0 1.5 3 4.5 6 7.5 km

Scale at A4
= 1:200,000

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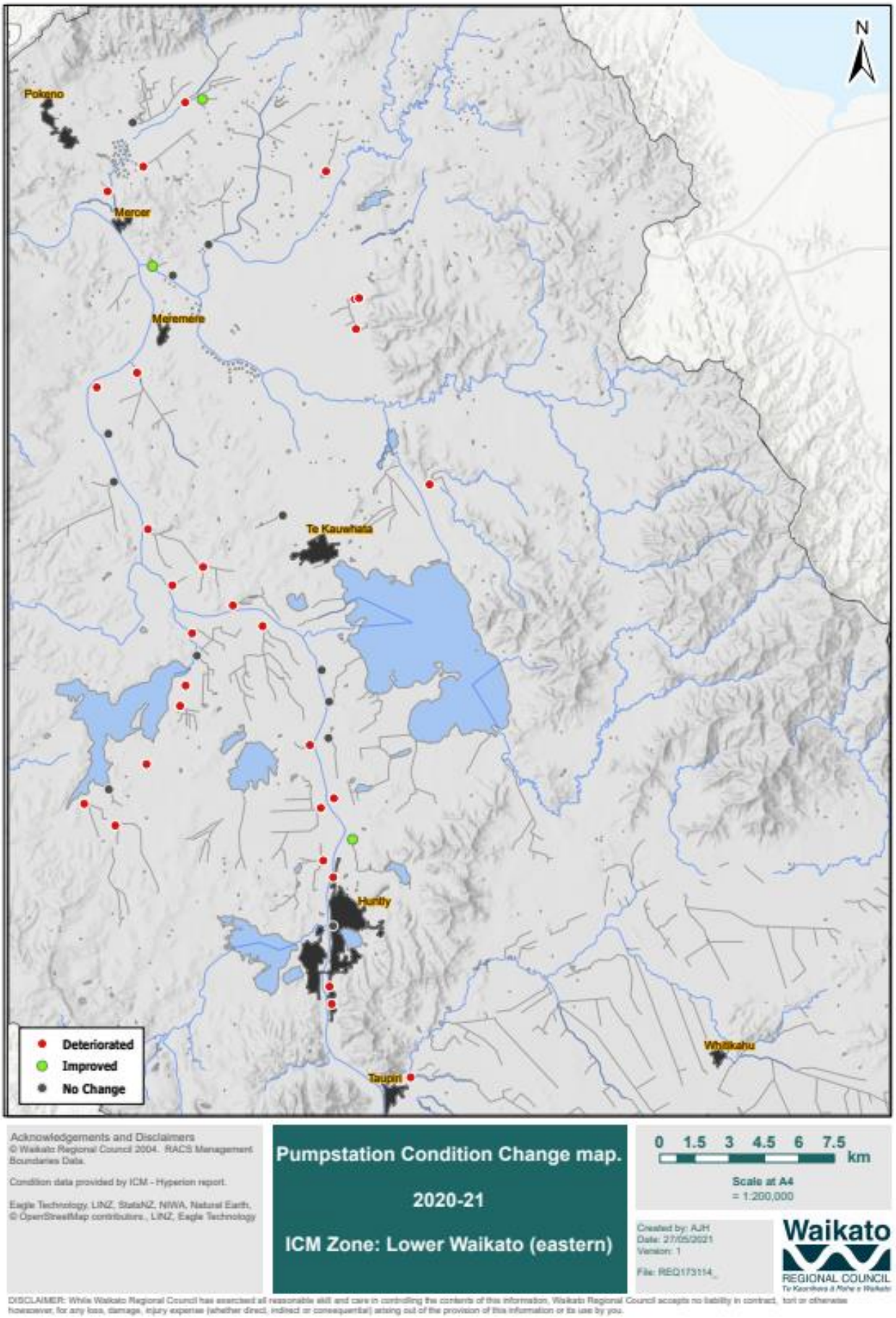


A list of both parent and child assets in a poor condition is shown below. As a rule, the parent asset (a pumpstation in this case) is determined by the worst condition component. However, there are some components that have very little impact on the running of the Pumpstation as a

whole and therefore should not influence the score. For example, the screen on Airey's PS is a C5, but Aireys PS as an Asset was judged by the inspector to be a C3.

The assets below should be prioritised in any upcoming capital woks programme as the present an urgent risk to the safe operating of the assets.

Description	Type description	Previous Year Condition	Current Condition Score	Condition Change	Current Inspection Notes
Hills Pumpstation	Pumpstation: Throughbank	2	4	2	
Guests Pumpstation	Pumpstation: Throughbank	2	4	2	
Saxton Pumpstation (Comins)	Pumpstation: Throughbank	2	4	2	
Pattersons (Horohoro) Pumpstation	Pumpstation: Throughbank	1	4	3	
Harveys Pumpstation	Pumpstation: Throughbank	2	4	2	
Motukaraka Pumpstation Duty Pump (Mac Ewans)	Pumpstation: Siphon Flood	2	4	2	Inlet retaining
Rangiriri North Pumpstation	Pumpstation: Throughbank	2	4	2	Outlet sheetpiling
Churchill East Watts Pumpstation	Pumpstation: Throughbank	2	4	2	Outlet issues
Island Block North Secondary Pumpstation (Pump 1)	Pumpstation: Throughbank	2	4	2	
Sandy Muirs Pumpstation	Pumpstation: Throughbank	4	4	0	Inlet issued
Mangawhero Pumpstation Lower Waikato	Pumpstation: Throughbank	4	4	0	Needs major works
Mangatawhiri Compartment 2 Pumpstation	Pumpstation: Throughbank	3	4	1	Outlet retaining
Mangatawhiri Compartment 3 Pumpstation Duty Pump	Pumpstation: Throughbank	3	4	1	Inlet sump screen issues
Components:					
Huntly North PS - Inlet Channel Rip Rap	Lined Channel: Rip Rap	1	4	3	No steel in it. Very thin and vegetation breaking through it
Huntly South PS/FG 3 - Screen	Screen: Bar	2	4	2	Rusted out
Huntly South PS/FG 3 - Outlet Structure	Outlet Structure	2	4	2	Lots of cracks and gaps to repair
Hills PS - Discharge Pipe 2	Pipework	2	4	2	Pipe leaking underground water flowing through concrete wall
Guests PS - Inlet Structure	Pumpstation Inlet Bay	2	4	2	Retaining issues
Saxton PS - Inlet Structure	Pumpstation Inlet Bay	3	4	1	Sheetpiling failing
Pattersons PS - Inlet Bay	Pumpstation Inlet Bay	2	4	2	Sheetpiling failed
Harveys PS - Inlet Structure	Pumpstation Inlet Bay	2	4	2	Retaining wall failed
Orton PS - Motor 2	Motors	2	4	2	Axial wear

Description	Type description	Previous Year Condition	Current Condition Score	Condition Change	Current Inspection Notes
Motukaraka PS: Duty Pump - Inlet Structure	Pumpstation Inlet Bay	3	4	1	Failing
Rangiriri North PS - Outlet Structure	Outlet Structure	2	4	2	Sheetpiling looks very rusty and close to end of life
Churchill East PS - Pump and Motor 3	Pump: Axial Submersible	2	4	2	Pump end of life
Churchill East PS - Pump and Motor 2	Pump: Axial Submersible	2	4	2	Pump end of life
Churchill East Watts PS - Outlet Structure	Outlet Structure	2	4	2	Major cracks and retaining wall undermined
Churchill East Watts PS - Flapvalve Gravity	Valve: Flap Round	2	4	2	Very rusty
Meremere Main PS - Screen	Screen: Bar	2	4	2	Rusted and broken
Island Block North Secondary PS - Discharge Pipe	Pipework	2	4	2	Circumferential cracks, root intrusion and dipped from 2019 cctv
Island Block North Secondary PS - Inlet Structure	Pumpstation Inlet Bay	2	4	2	Timber retaining has failed
Island Block North Secondary PS - Outlet Structure	Outlet Structure	2	4	2	Trees removed around outlet but concrete headwall is majorly cracked
Sandy Muirs PS - Screen	Screen: Bar	4	4	0	Rusted
Sandy Muirs PS - Inlet Structure	Pumpstation Inlet Bay	4	4	0	Poor construction
Mangawhero PS - Pump Building	Building: Corrugated Iron	4	4	0	Needs rebuilt
Mangawhero PS - Outfall Structure	Outlet Structure	4	4	0	End of life
Mangawhero PS - Screen	Screen: Grille	3	4	1	Very rusty
Mangawhero PS - Inlet Structure	Pumpstation Inlet Bay	4	4	0	End of life
Aireys PS - Screen	Screen: Bar	3	5	2	End of life
Tuakau PS/FG - Screen (Inlet)	Screen: Grille	4	5	1	Broken
Mangatawhiri Compartment 2 PS - Outfall Structure	Outlet Structure	3	4	1	Retaining failed
Mangatawhiri Compartment 2 PS - Screen	Screen: Bar	3	4	1	Rusted
Mangatawhiri Comp 2 PS (submersible) - Outfall Structure	Outlet Structure	3	4	1	Rebuild timber structure
Mangatawhiri Compartment 3 PS Duty Pump - Screen	Screen: Bar	3	5	2	Horrendous
Mangatawhiri Compartment 3 PS Duty Pump - Sump	Sump: Reinforced Concrete Rectangular	3	4	1	Horrendous
Mangatawhiri Compartment 3 PS Duty Pump - Inlet Structure	Pumpstation Inlet Bay	3	4	1	Horrendous
Mangatawhiri Compartment 3 PS Duty Pump - Pump	Service Beam	4	4	0	Same as the screw pump

Description	Type description	Previous Year Condition	Current Condition Score	Condition Change	Current Inspection Notes
Access Platform and Shelter					
Mangatawhiri Compartment 4 Main PS - Switchboards and Controls	Switchboard and Controls	4	4	0	Rusting and very old

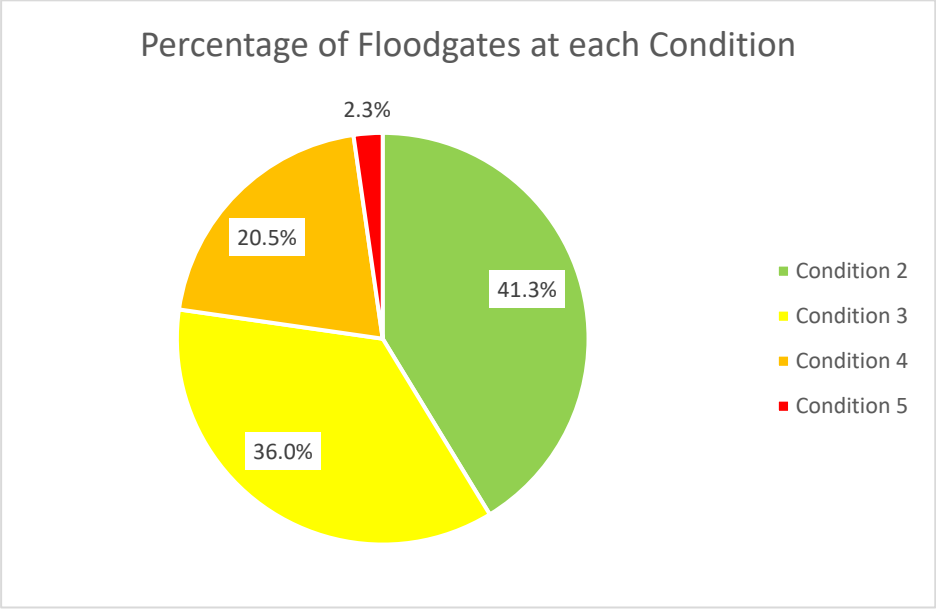
4.2 Floodgates

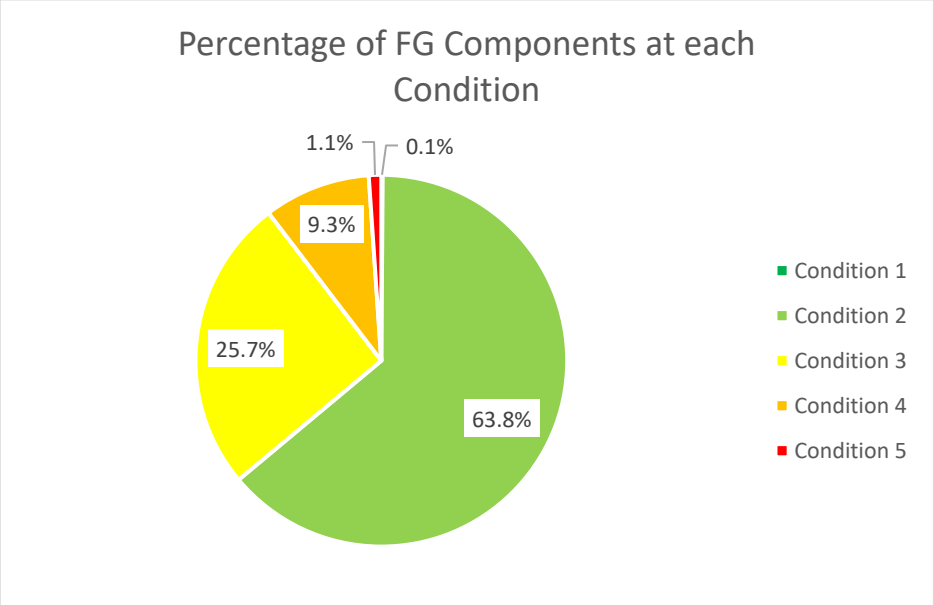
264 Floodgates were inspected in the Lower Waikato this year, of these 77.3% were found to be in average to good condition, with the remaining 22.8% in poor condition.

Looking at the Floodgate components, Pipes and Outlets were the assets most commonly in a poor condition, with 13% and 16% respectively scoring condition 4 or 5. This amounts to 34 pipes and 27 outlets. Pipes and Outlets were also the most likely to have deteriorated from last year with 32% of pipes and 42% of outlets showing worse condition since last year.

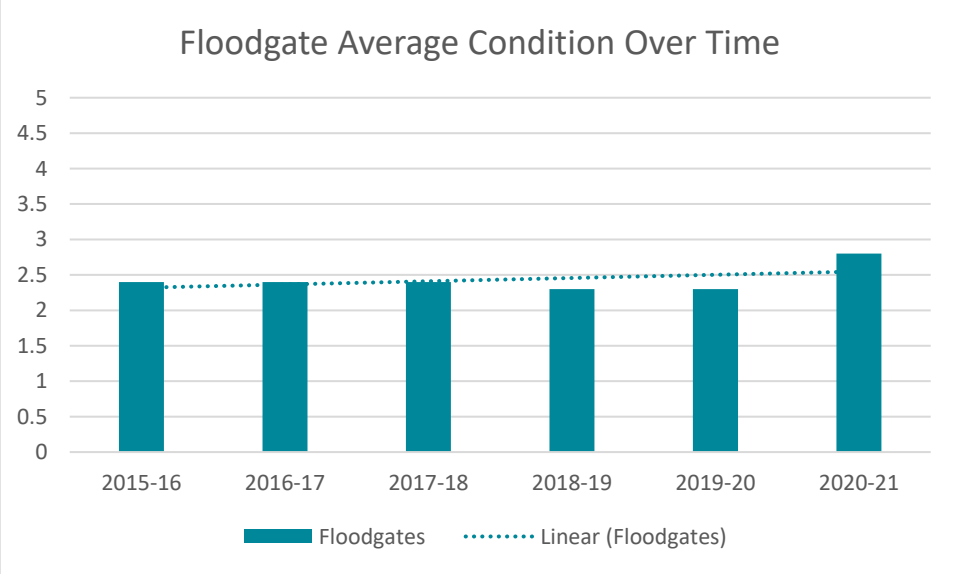
These two statistics combined suggest that pipes and outlets could be the most impacted by the new condition scoring method detailed section 3, but that does not diminish the risk posed by this information. Damaged pipes and outlets present serious operational challenges.

The most improved asset type was Cable and Winch Lifting Gear of which 63% improved over last year.



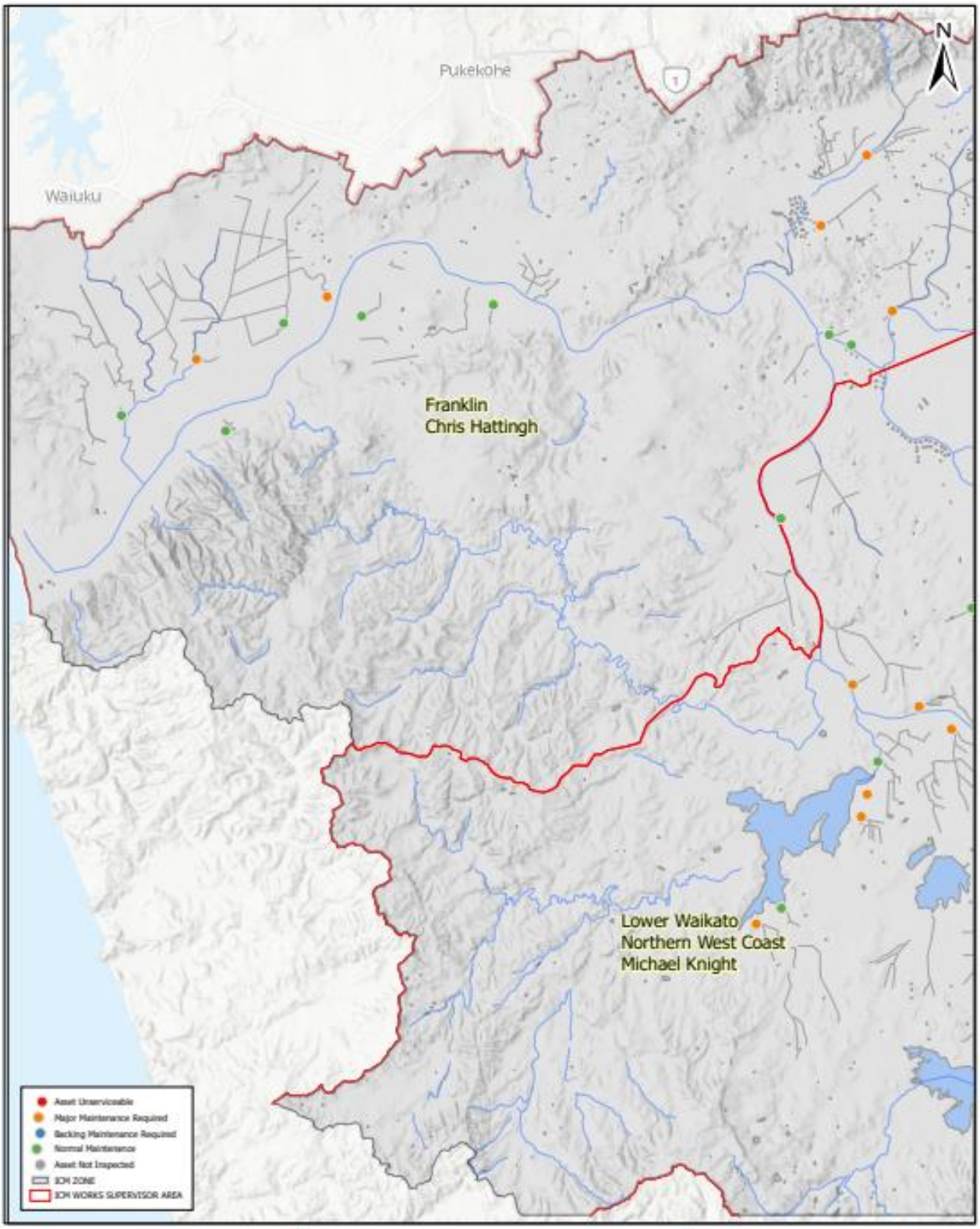


	No Change	Deteriorated	Improved
FG Component	68.2%	25.0%	6.8%
Floodgate	46.3%	46.0%	7.7%



Floodgate Average Condition shows a moderate rise this year as compared to the stability of the last 5 years. Possible factors in this could include:

- The new scoring system
- The impact of multiple Auckland Lockdowns on the northern parts of the region
- A genuine degradation of these assets



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Pumpstation Condition map.

2020-21

ICM Zone: Lower Waikato (western) Work Supervisor Area (labelled)

0 1.5 3 4.5 6 7.5 km

Scale at A4
= 1:200,000

Created by: AJH
Date: 17/05/2021
Version: 1

File: REQ173114_

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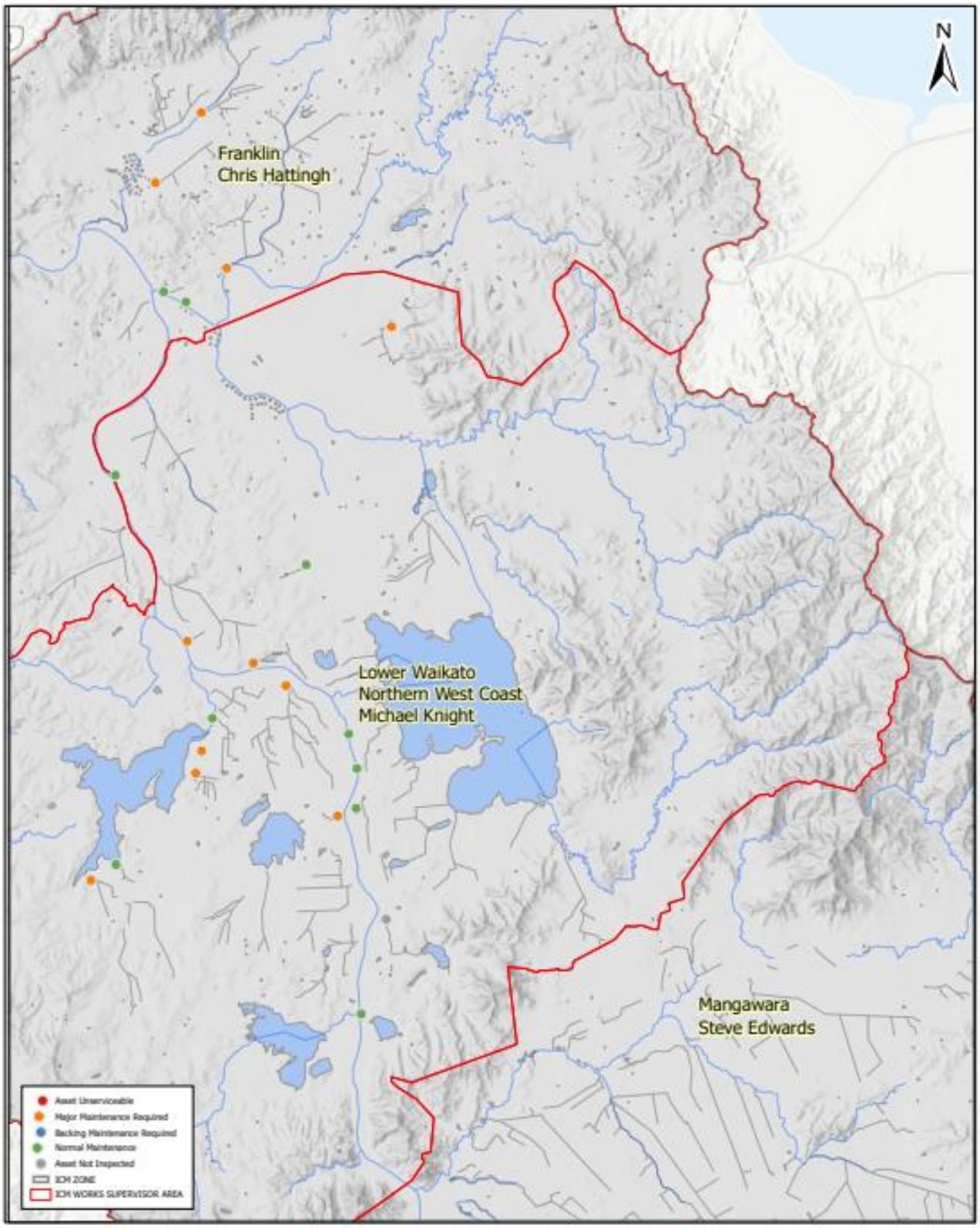

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Pumpstation Condition map.

2020-21

ICM Zone: Lower Waikato (eastern) Work Supervisor Area (labelled)

0 1.5 3 4.5 6 7.5 km

Scale at A4
= 1:200,000

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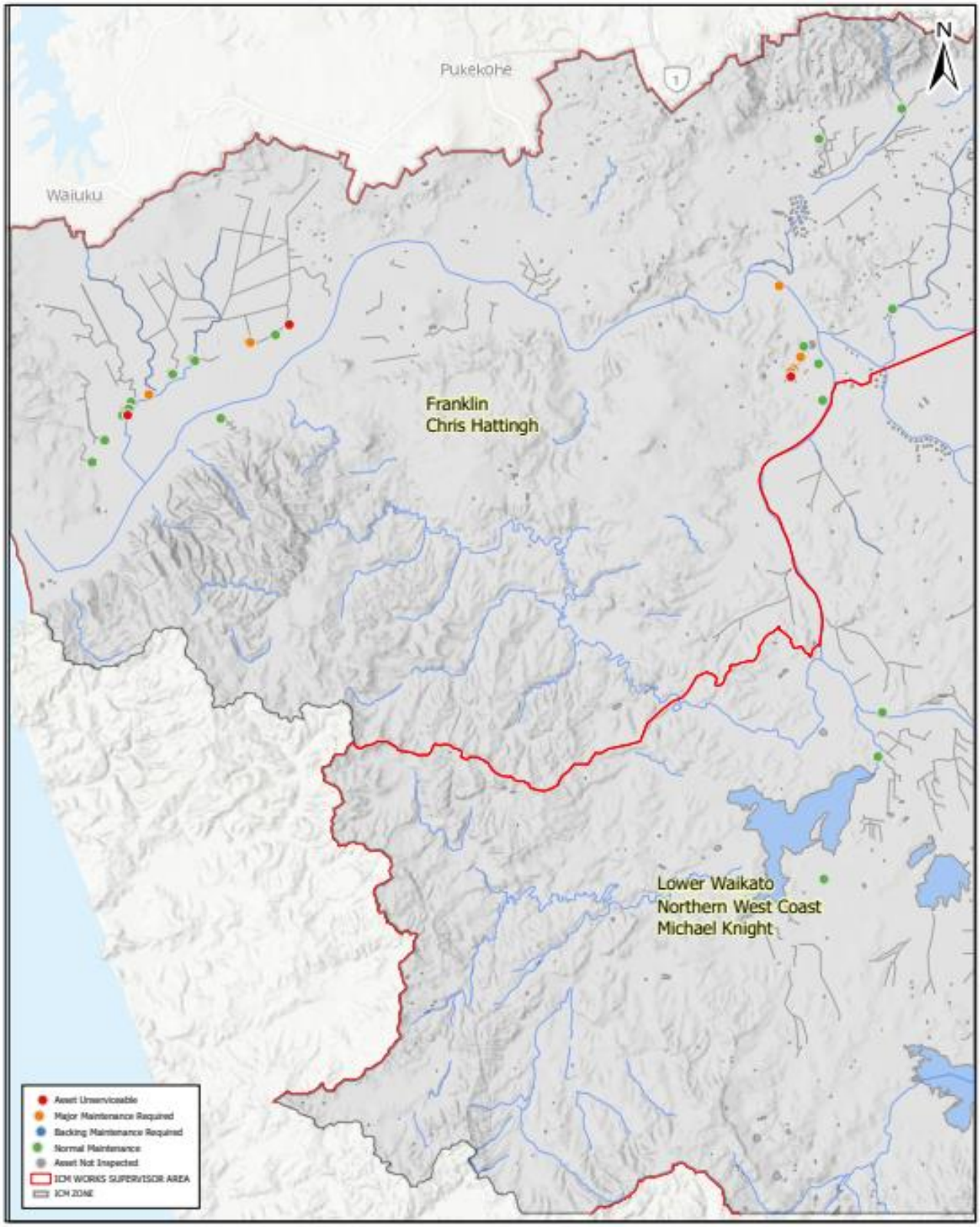

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Floodgate Condition map.

2020-21

ICM Zone: Lower Waikato (western) Work Supervisor Area (labelled)

0 1.5 3 4.5 6 7.5 km

Scale at A4
= 1:200,000

Created by: AJH
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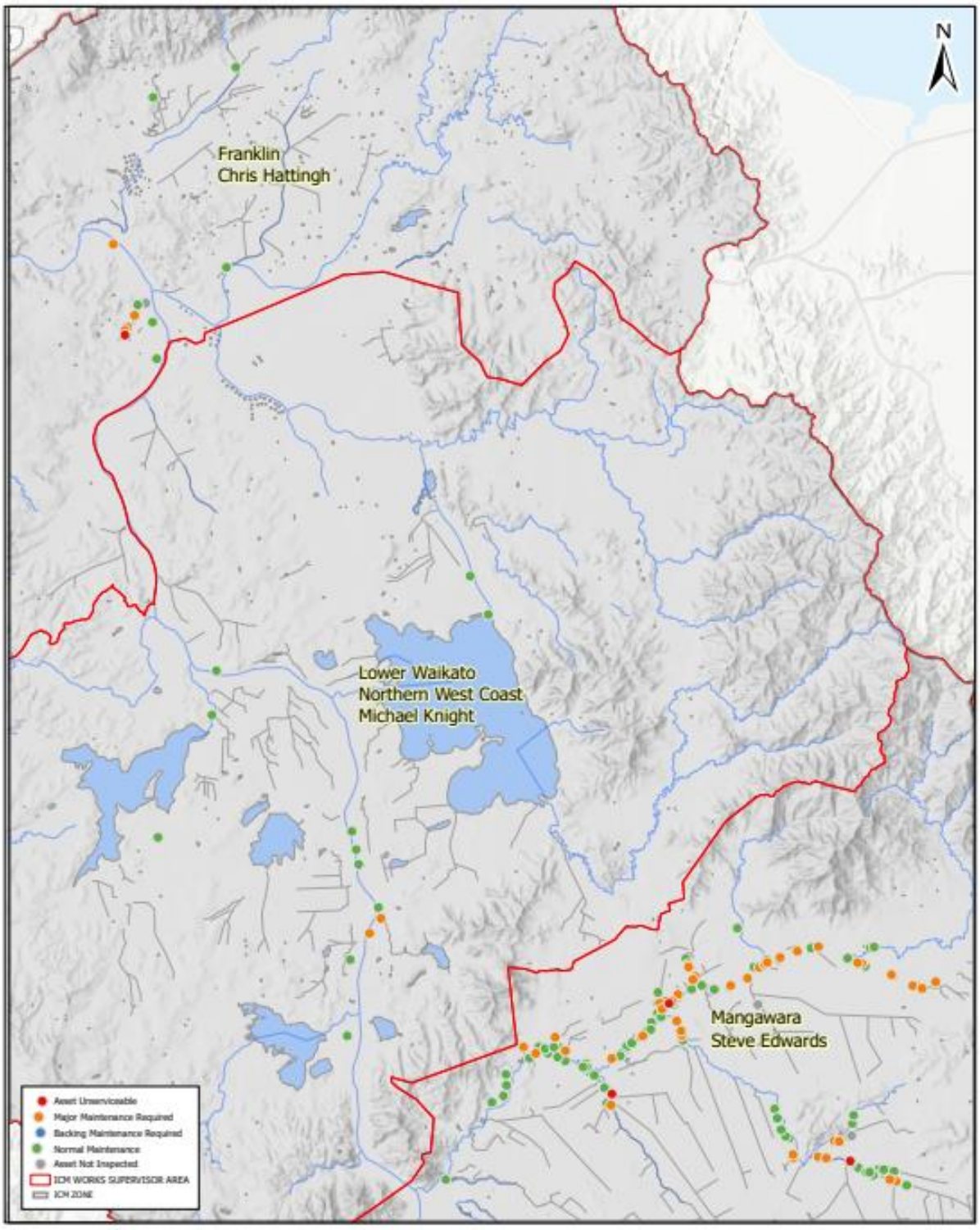

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Floodgate Condition map.

2020-21

ICM Zone: Lower Waikato (eastern) Work Supervisor Area (labelled)

0 1.5 3 4.5 6 7.5 km

Scale at A4
= 1:200,000

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Date: 17/05/2021
Version: 1

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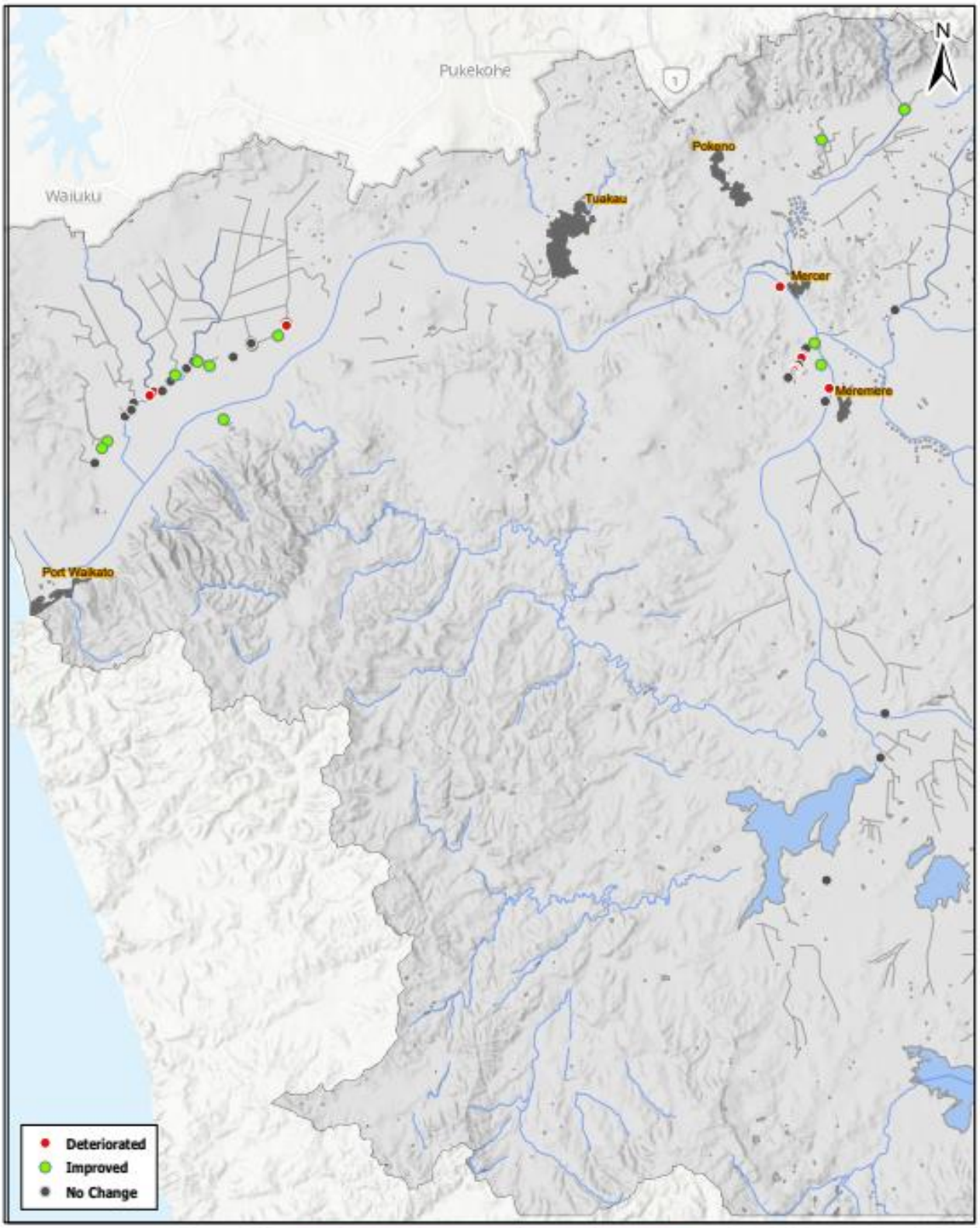

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Floodgate Condition Change map.

2020-21

ICM Zone: Lower Waikato (western)

0 1.5 3 4.5 6 7.5 km

Scale at A4
= 1:200,000

Created by: AJH
Date: 27/05/2021
Version: 1

File: REQ173114_

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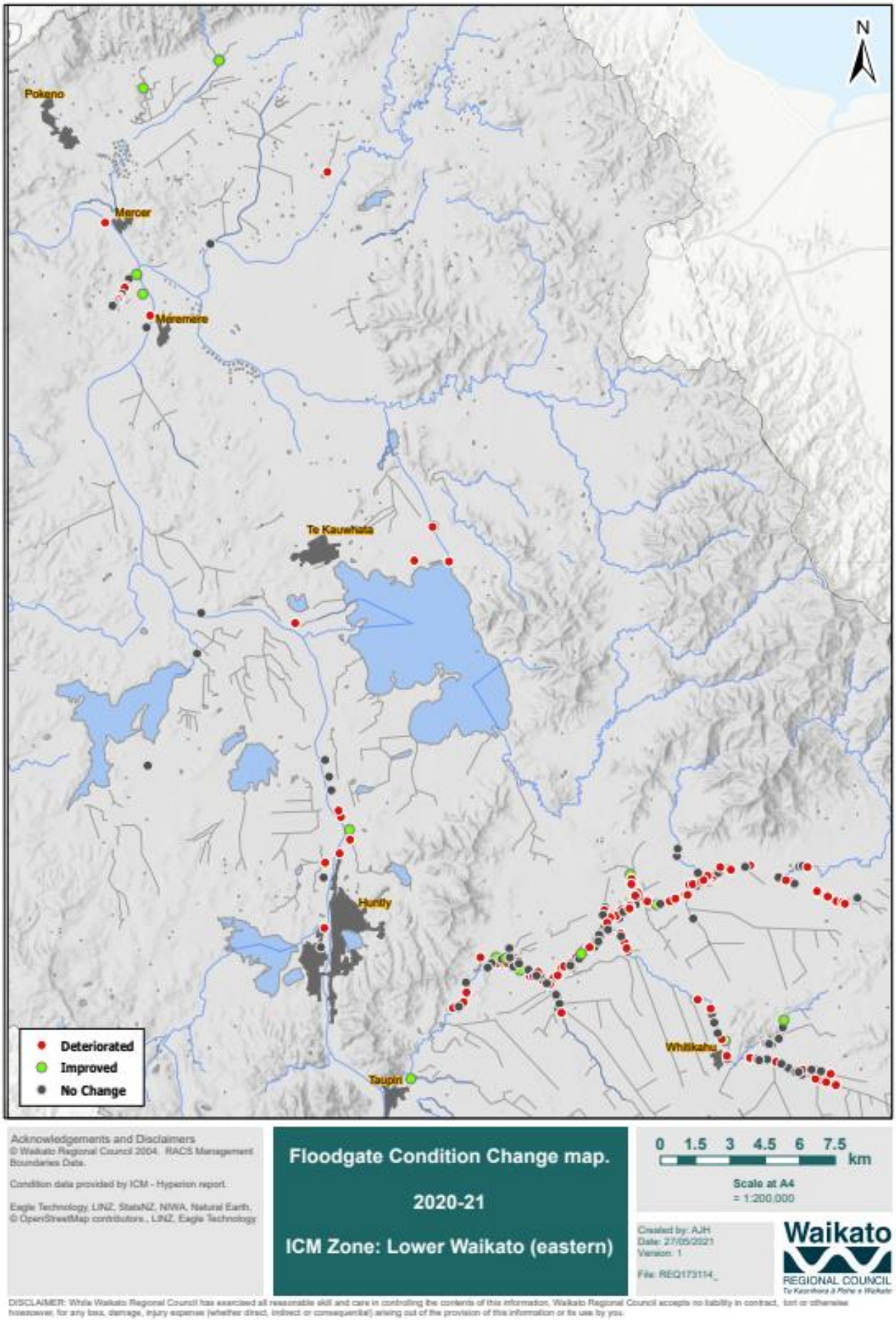


A list of both parent and child assets in a poor condition is shown below. As a rule, the parent asset (a floodgate in this case) is determined by the worst condition component.

The assets below should be prioritised in any upcoming capital woks programme as the present an urgent risk to the safe operating of the assets.

Description	Type description	Previous Year Condition	Current Condition Score	Condition Change Raw	Current Inspection Notes
Floodgate 02/04 (3 x 1200mm)	Floodgate: Conventional	3	4	1	Outlet concrete issues
Floodgate 02/13 (1200mm)	Floodgate: Conventional	2	4	2	Outlet and pipe issues
Comp 2 Rutherford Drain Right Bank Floodgate (450mm)	Floodgate: Conventional	4	4	0	Outlet issues
Floodgate 03/06 (300mm)	Floodgate: Conventional	4	4	0	Pipe issues
Floodgate 03/24 (300mm)	Floodgate: Conventional	2	4	2	Pipe issues
Floodgate 04/12 (300mm)	Floodgate: Conventional	3	5	2	Inlet issues
Floodgate 04/33 (600mm)	Floodgate: Conventional	2	4	2	Outlet failed
Floodgate 05/06 (2 x 1200mm)	Floodgate: Conventional	2	4	2	Pipe issues
Floodgate 05/13 (600mm)	Floodgate: Conventional	2	4	2	Outlet issues
Floodgate 05/14 (300mm)	Floodgate: Conventional	2	4	2	Pipe and outlet issues
Floodgate 05/21 (450mm)	Floodgate: Conventional	2	4	2	Pipe and flap
Floodgate 05/23 (450mm)	Floodgate: Conventional	2	4	2	Pipe and outlet issues
Floodgate 05/24 (450mm)	Floodgate: Conventional	3	4	1	Pipe issues
Floodgate 05/28 (450mm) (Sludge Creek)	Floodgate: Conventional	1	4	3	Pipe issues
Floodgate 05/30 (450mm) (Sludge Creek)	Floodgate: Conventional	3	4	1	Pipe
Floodgate 05/32 (300mm) Sludge Creek	Floodgate: Conventional	2	4	2	Outlet and flap issues
Floodgate 05/38 (Henrys Remedial Outlet Drain LB)	Floodgate: Conventional	2	4	2	Pipe issues
Floodgate 06/06 (450mm) Tauhei Diversion	Floodgate: Conventional	2	4	2	Pipe issues
Floodgate 06/08 (600mm) (Tauhei Diversion)	Floodgate: Conventional	2	4	2	Outlet
Floodgate 06/11 (300mm) (Mangawara River)	Floodgate: Conventional	2	4	2	Pipe concerning
Floodgate 06/12 (300mm) (Mangawara River)	Floodgate: Conventional	2	5	3	Partially decommissioned
Floodgate 07/04 (300mm) (Sludge Creek)	Floodgate: Conventional	2	4	2	Pipe sag
Floodgate 07/05 (900mm) (Sludge Creek)	Floodgate: Conventional	3	4	1	Outlet and possibly pipe issues
Floodgate 07/10 (300mm) (Mangawara River)	Floodgate: Conventional	2	4	2	Pipe sag
Floodgate 07/12 (750mm) (Mangawara River)	Floodgate: Conventional	3	4	1	Outlet knackered
Floodgate 07/15 (300mm) (Mangawara River)	Floodgate: Conventional	2	4	2	Outlet issues
Floodgate 07/16 (600mm) (Mangawara River)	Floodgate: Conventional	2	4	2	Pipe misaligned
Floodgate 07/17 (300mm) (Mangawara River)	Floodgate: Conventional	2	4	2	Outlet issues
Floodgate 08/11 (450mm) (Mangawara River)	Floodgate: Conventional	2	4	2	Pipe
Floodgate 09/15 (300mm) (Mangawara River)	Floodgate: Conventional	2	4	2	Pipe

Description	Type description	Previous Year Condition	Current Condition Score	Condition Change Raw	Current Inspection Notes
Floodgate 09/19 (300mm) (Paranui Drain)	Floodgate: Conventional	2	4	2	Pipe
Floodgate 09/21 (300mm) (Paranui Drain)	Floodgate: Conventional	2	4	2	Outlet and pipe
Floodgate 09/23 (300mm) (Paranui Drain)	Floodgate: Conventional	4	4	0	Outlet and pipe failed
Floodgate 09/26 (300mm) Paranui Drain	Floodgate: Conventional	3	4	1	Pipe
Floodgate 09/29 (Paranui Drain Clarkes)	Floodgate: Conventional	2	4	2	Pipe
Floodgate 10/06 (300mm) Mangawara River	Floodgate: Conventional	3	4	1	Pipe
Floodgate 10/07 (1600mm) (Mangawara River)	Floodgate: Conventional	2	4	2	Outlet and flap issues
Floodgate 12/09 (450mm) (Paranui Drain)	Floodgate: Conventional	2	4	2	All
Floodgate 12/10 (750mm) (Paranui Drain)	Floodgate: Conventional	2	4	2	Outlet
Floodgate 13/16 (300mm)	Floodgate: Conventional	3	4	1	Pipe failed
Floodgate 13/18 (300mm)	Floodgate: Conventional	4	4	0	Pipe failed
Floodgate 20/03 (300mm) Tauhei Left Bank	Floodgate: Conventional	2	4	2	Pipe failed
Floodgate 20/04 (300mm) Tauhei Left Bank	Floodgate: Conventional	2	4	2	Can't see through pipe
Floodgate 21/05 (375mm) Tauhei Scheme Right Bank	Floodgate: Conventional	2	5	3	Flap failed
Floodgate 22/04 (375mm) Tauhei Scheme Right Bank	Floodgate: Conventional	2	4	2	Pipe failed
Floodgate 22/06 (375mm) Tauhei Scheme Right Bank	Floodgate: Conventional	2	4	2	Pipe suspect and flap failed
Floodgate 24/02 (600mm)(Tauhei Mangatea Stream)	Floodgate: Conventional	2	4	2	Flap failed
Floodgate 24/04 (600mm) Tauhei Mangatea Stream	Floodgate: Conventional	4	4	0	Needs new flap
Morrison Road Floodgate 06 RB	Floodgate: Conventional	3	4	1	Outlet failed
Morrison Road Floodgate 07 LB	Floodgate: Conventional	3	4	1	Outlet failed
Morrison Road Floodgate 11 LB	Floodgate: Conventional	4	4	0	Outlet and pipe issues
Morrison Road Floodgate 13 LB	Floodgate: Conventional	3	4	1	Outlet
Morrison Road Floodgate 16 RB	Floodgate: Conventional	5	5	0	Lost outlet
Northern Compartment Downstream Floodgate	Floodgate: Conventional	2	4	2	Pipe failed
Kimihia Upstream Floodgate	Floodgate: Conventional	2	4	2	Inlet issues
Kimihia Main Outlet Floodgate	Floodgate: Conventional	2	4	2	Outlet sheetpiling failing
Hoods Landing Minor Floodgate	Floodgate: Conventional	5	5	0	Knackered
Hair Floodgate	Floodgate: Conventional	2	4	2	Flap and pipe issues
Volz Floodgate	Floodgate: Conventional	4	4	0	Outlet issues
Liefting Floodgate	Floodgate: Conventional	3	5	2	Needs investigation
Components:					

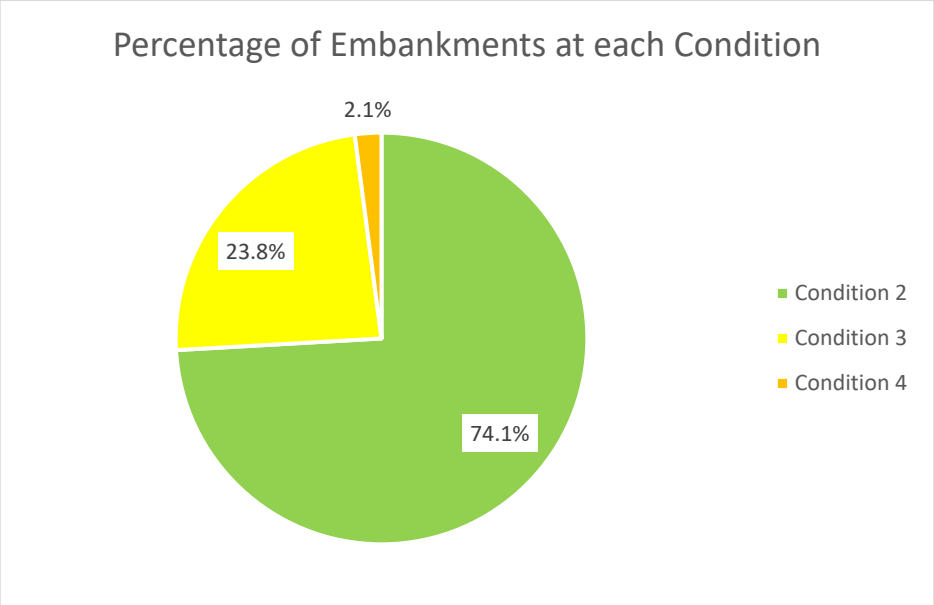
Description	Type description	Previous Year Condition	Current Condition Score	Condition Change Raw	Current Inspection Notes
FG 02/04 - Outlet Structure	Outlet Structure	2	4	2	Possibly major concrete issues
FG 02/13 - Outlet Structure	Outlet Structure	2	4	2	Headwall failed
FG 02/13 - Flapvalve	Valve: Flap Round	2	4	2	New hangers etc
FG 02/14A - Flapvalve	Valve: Flap Round	3	4	1	Repair or replace
FG 02/18 - Flapvalve	Valve: Flap Round	2	4	2	Flap seized
Comp 2 Rutherford Drain RB FG - Outlet Structure	Outlet Structure	4	4	0	Outlet
FG 03/10 - Rock Outlet	Outlet Structure	4	4	0	Rock mostly gone
FG 03/15 - Outlet Structure	Outlet Structure	2	4	2	Rebuild rock outlet
FG 03/24 - Pipe	Barrel: Pipe	2	4	2	Pipe issues
FG 04/12 - Pipe	Barrel: Pipe	2	5	3	Inlet covered over
FG 04/33 - Outlet Structure	Outlet Structure	2	4	2	Cracked
FG 05/06 - Discharge Pipe 1	Barrel: Pipe	2	4	2	Pipes separating
FG 05/13 - Outlet Structure	Outlet Structure	2	4	2	Outlet failed
FG 05/14 - Outlet Structure	Outlet Structure	2	4	2	Cracking
FG 05/14 - Discharge Pipe	Barrel: Pipe	2	4	2	Can see no light thru pipe
FG 05/21 - Discharge Pipe	Barrel: Pipe	2	4	2	Pipe bent hugely and holding water
FG 05/21 - Flapvalve	Valve: Flap Round	2	5	3	Fallen off hangers
FG 05/23 - Discharge Pipe	Barrel: Pipe	2	4	2	Holding water
FG 05/23 - Outlet Structure	Outlet Structure	2	4	2	Crack
FG 05/24 - Pipe	Barrel: Pipe	2	4	2	Separating and holding water
FG 05/28 - Discharge Pipe	Barrel: Pipe	1	4	3	Pipe issues
FG 05/30 - Pipe	Barrel: Pipe	2	4	2	Issues
FG 05/32 - Outlet Structure	Outlet Structure	2	4	2	Collapsed
FG 05/32 - Flapvalve	Valve: Flap Round	2	4	2	End of life
FG 05/38 - Discharge Pipe	Barrel: Pipe	2	4	2	Pipe issues
FG 06/06 - Discharge Pipe	Barrel: Pipe	2	4	2	Pipe separated
FG 06/08 - Outlet Structure	Outlet Structure	2	4	2	Cracks
FG 06/11 - Discharge Pipe	Barrel: Pipe	2	4	2	Can't see through it
FG 06/11 - Flapvalve	Valve: Flap Round	2	5	3	End of life
FG 07/04 - Pipe	Barrel: Pipe	2	4	2	Sag
FG 07/05 - Outlet Structure	Outlet Structure	3	4	1	Many issues
FG 07/09 - Flapvalve	Valve: Flap Round	3	4	1	Rusted
FG 07/10 - Pipe	Barrel: Pipe	2	4	2	Sagged
FG 07/12 - Outlet	Outlet Structure	3	4	1	End of life
FG 07/15 - Outlet Structure	Outlet Structure	2	4	2	Cracking

Description	Type description	Previous Year Condition	Current Condition Score	Condition Change Raw	Current Inspection Notes
FG 07/16 - Discharge Pipe	Barrel: Pipe	2	4	2	Pipe misaligned
FG 07/17 - Outlet	Outlet Structure	2	4	2	Outlet damage
FG 08/11 - Pipe	Barrel: Pipe	2	4	2	Sagging and last section has separated
FG 09/15 - Pipe	Barrel: Pipe	2	4	2	Pipe cannot see through
FG 09/19 - Pipe	Barrel: Pipe	2	4	2	Blocked pipe
FG 09/21 - Outlet	Outlet Structure	2	4	2	Cracked
FG 09/21 - Pipe	Barrel: Pipe	2	4	2	Blocked
FG 09/23 - Pipe	Barrel: Pipe	2	4	2	Very sagged
FG 09/23 - Outlet	Outlet Structure	3	4	1	Snapped
FG 09/25 - Flapvalve	Valve: Flap Round	2	4	2	Cracked
FG 09/26 - Discharge Pipe	Barrel: Pipe	3	4	1	Misaligned sections
FG 09/29 - Discharge Pipe	Barrel: Pipe	2	4	2	Pipe misalignment
FG 10/06 - Discharge Pipe	Barrel: Pipe	2	4	2	Totally blocked cannot see anything but black
FG 10/07 - Outlet Structure	Outlet Structure	2	4	2	Holes in concrete
FG 10/07 - Flapvalve	Valve: Flap Round	2	4	2	Loose on pipe
FG 12/09 - Outlet	Outlet Structure	2	4	2	Concrete issues
FG 12/09 - Pipe	Barrel: Pipe	2	4	2	Can't see through it
FG 12/09 - Valve	Valve: Flap Round	2	4	2	Rusty
FG 12/10 - Outlet Structure	Outlet Structure	2	4	2	Concrete failing
FG 13/16 - Discharge Pipe	Barrel: Pipe	3	4	1	Pipe failed
FG 13/18 - Discharge Pipe	Barrel: Pipe	2	4	2	Pipe failed
FG 20/03 - Discharge Pipe	Barrel: Pipe	2	4	2	Pipe failed
FG 20/04 - Discharge Pipe	Barrel: Pipe	2	4	2	Can't see through pipe
FG 21/05 - Flapvalve	Valve: Flap Round	2	5	3	Section missing
FG 22/04 - Discharge Pipe	Barrel: Pipe	2	4	2	Pipe failed
FG 22/06 - Flapvalve	Valve: Flap Round	2	5	3	Rusted out
FG 23/03 - Flapvalve	Valve: Flap Round	3	4	1	Rusted
FG 24/02 - Flapvalve	Valve: Flap Round	2	4	2	Rusted
FG 24/04 - Flapvalve	Valve: Flap Round	4	5	1	Flap rusting away
Morrison Road FG 04 - Flapvalve 2	Valve: Flap Round	4	4	0	End of life
Morrison Road FG 06 - Outlet Structure	Outlet Structure	3	4	1	Outlet failed
Morrison Road FG 07 - Outlet Structure	Outlet Structure	4	4	0	Rebuild
Morrison Road FG 11 - Discharge Pipe	Barrel: Pipe	4	4	0	Investigate pipe appears to have failed
Morrison Road FG 11 - Outlet Structure	Outlet Structure	4	4	0	Failed
Morrison Road FG 13 - Flapvalve	Valve: Flap Round	4	4	0	Replace

Description	Type description	Previous Year Condition	Current Condition Score	Condition Change Raw	Current Inspection Notes
Morrison Road FG 13 - Outlet Structure	Outlet Structure	3	4	1	Rebuild
Morrison Road FG 14 - Flapvalve	Valve: Flap Round	3	4	1	Replace flap
Morrison Road FG 15 - Flapvalve	Valve: Flap Round	3	4	1	Replace
Morrison Road FG 16 - Discharge Pipe	Barrel: Pipe	2	4	2	Outlet blocked and lost
Northern Compartment Downstream FG - Discharge Pipe	Barrel: Pipe	3	4	1	Failed
Kimihia Upstream FG - Inlet Structure	Inlet Structure	2	4	2	Broken cracked concrete and exposed rebar
Kimihia Main Outlet FG - Outlet Structure	Outlet Structure	2	4	2	Sheetpiling failing
Papa FG - Flapvalve	Valve: Flap Round	3	4	1	End of life
Hoods Landing Minor FG - Discharge Pipe	Barrel: Pipe	2	5	3	Under water at low tide
Hoods Landing Minor FG - Flapvalve	Valve: Flap Round	5	5	0	Jammed closed very rusted
Hair FG - Discharge Pipe	Barrel: Pipe	3	4	1	Can see no light
Hair FG - Flapvalve	Valve: Flap Round	2	4	2	Flap knackered
Volz FG - Outfall Structure	Outlet Structure	5	4	-1	Timber resting and headwall failing
Snook FG - Flapvalve	Valve: Flap Round	3	4	1	End of life soon
Liefting FG - Flapvalve	Valve: Flap Round	4	5	1	End of life
Liefting FG - Outlet Structure	Outlet Structure	2	4	2	Concrete disintegrated

4.3 Embankments

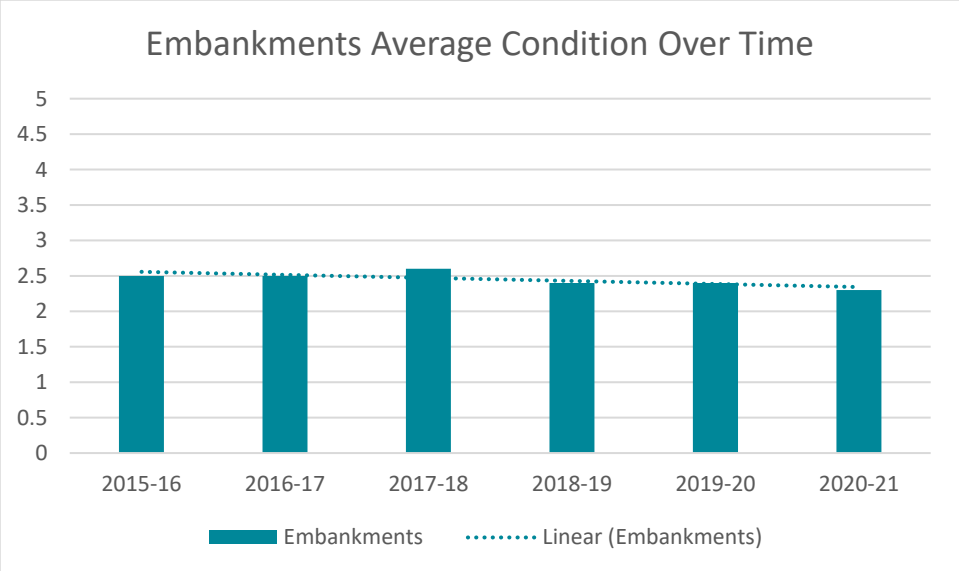
Of the 202km of embankments surveyed this year 97.9% was found to be in average to good condition, with vegetation, stock damage and missing fences being the main issues raised in the inspection notes.

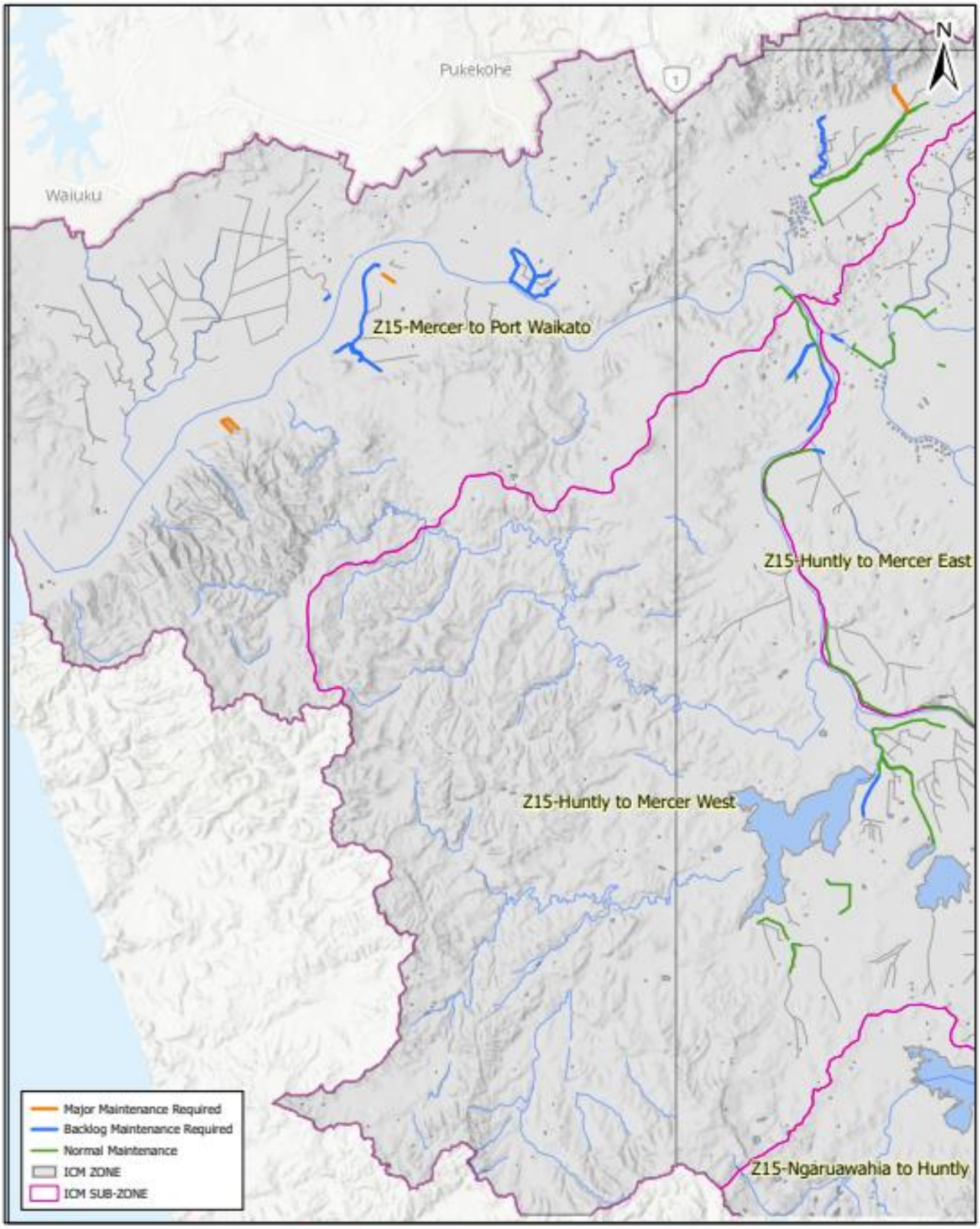


	Deteriorated	Improved	No Change
Embankments	25.2%	3.38%	71.43%

There was some change to the Embankments this year with 25% deteriorating from last year and only 3% improving.

However, as the Average Condition graph below shows, the overall condition improved very slightly over last year, suggesting that the improved sections improved significantly and the deteriorated sections deteriorated slightly. The average condition over the last six years has remained very stable, showing only very minor fluctuations in either direction.





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Embankment Condition map.

2020-21

ICM Zone: Lower Waikato (western) Sub Zone Area (Labelled)

0 1.5 3 4.5 6 7.5 km

Scale at A4
= 1:200,000

Created by: AJH
Date: 17/05/2021
Version: 1

File: REQ173114_

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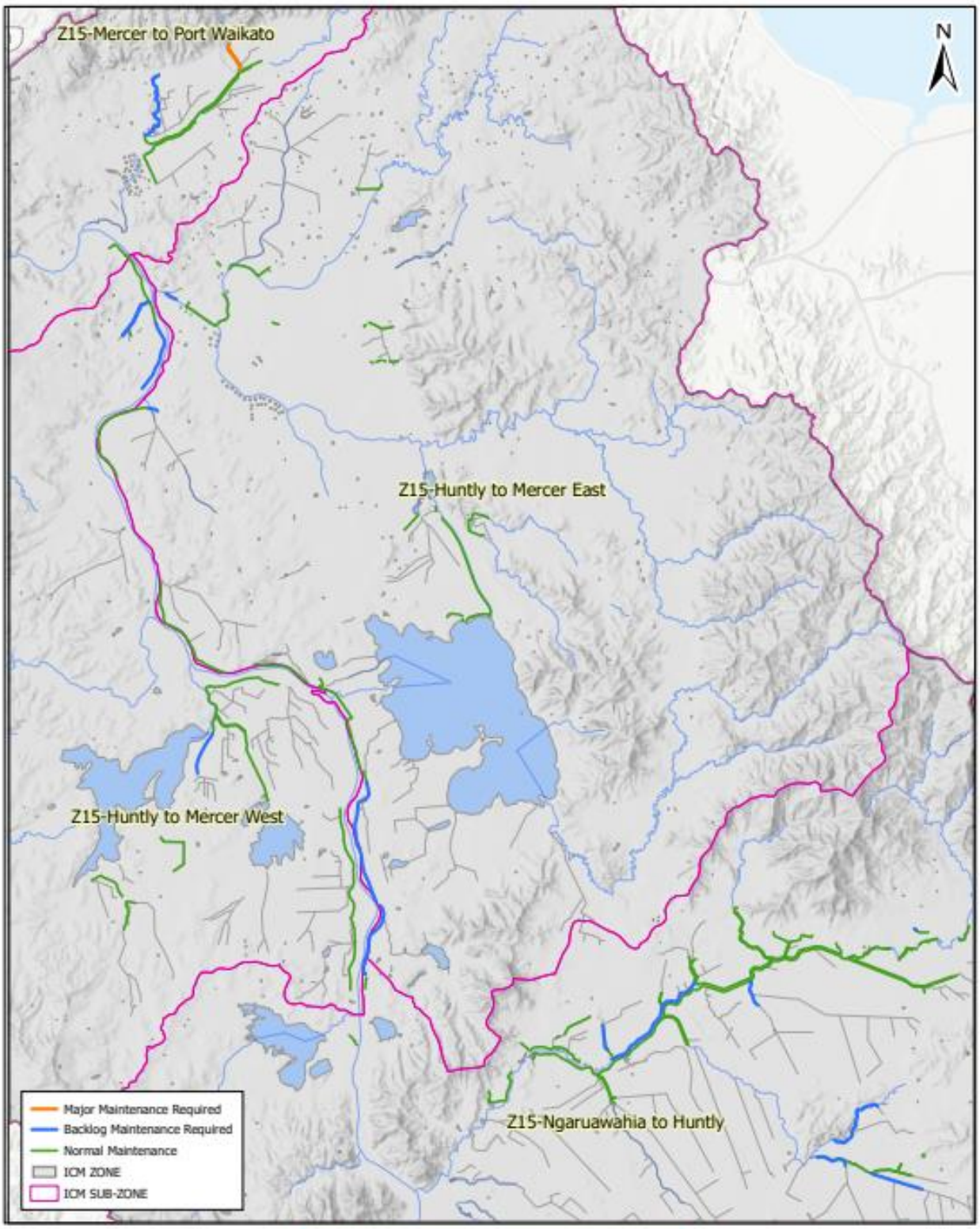

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Embankment Condition map.

2020-21

ICM Zone: Lower Waikato (eastern) Sub Zone Area (Labelled)

0 1.5 3 4.5 6 7.5 km

Scale at A4
= 1:200,000

Created by: AJH
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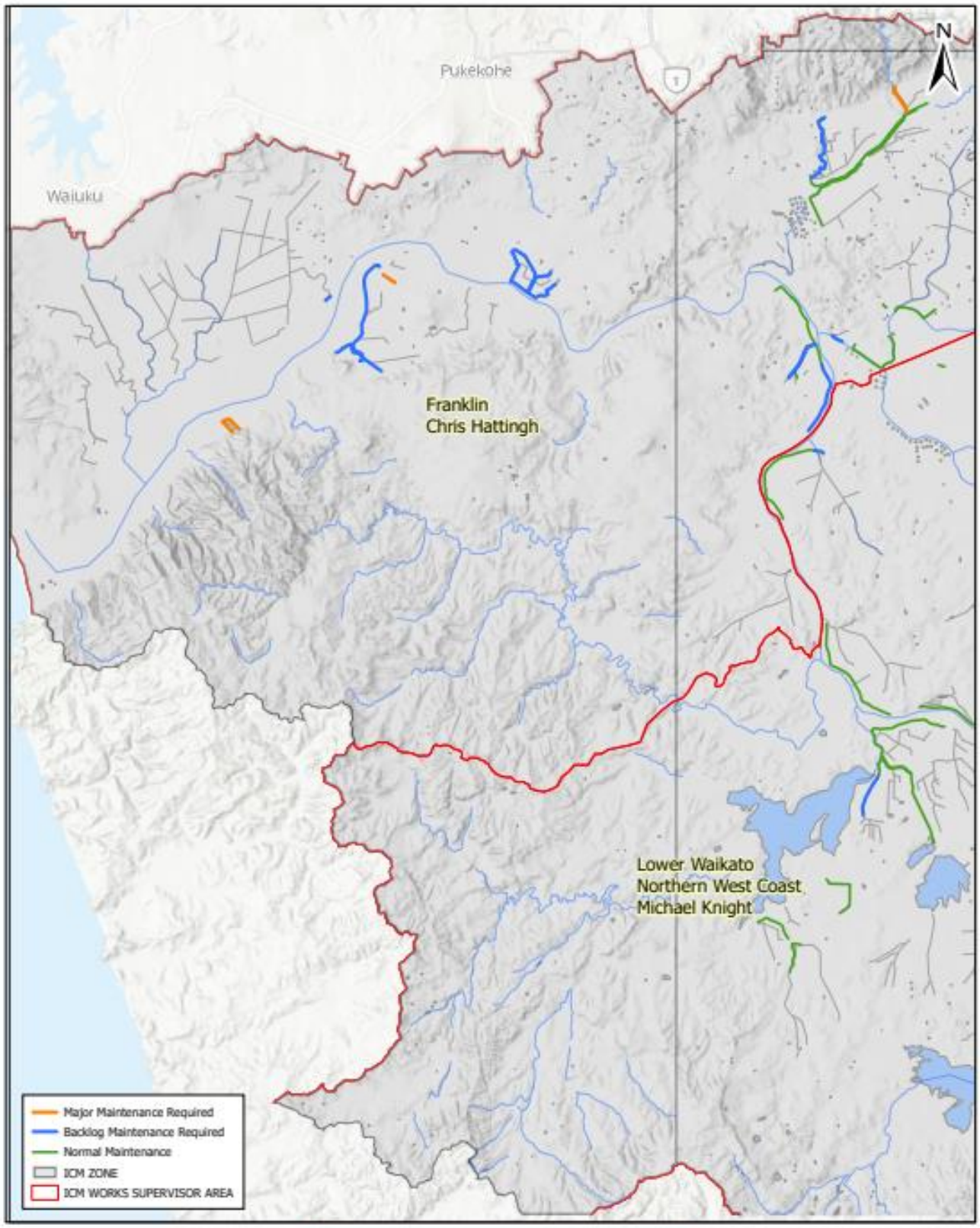

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Embankment Condition map.

2020-21

ICM Zone: Lower Waikato (western) Work Supervisor Area (Labelled)

0 1.5 3 4.5 6 7.5 km

Scale at A4
= 1:200,000

Created by: AJH
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Version: 1

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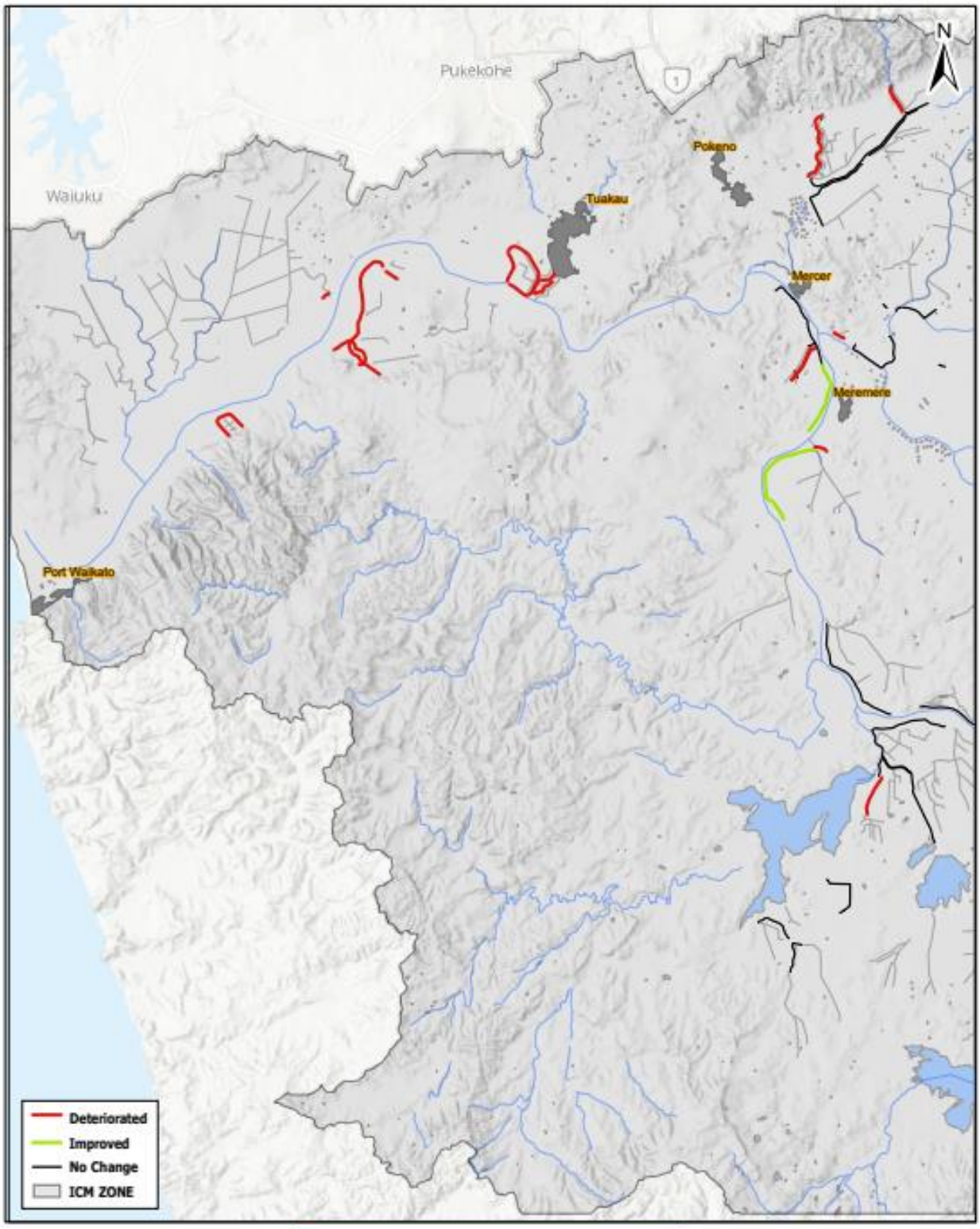
Te Kaunihera ā Rohe o Waikato



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Embankment Condition Change map.

2020-21

ICM Zone: Lower Waikato (western)

0 1.5 3 4.5 6 7.5 km

Scale at A4
= 1:200,000

Created by: AJH
Date: 27/05/2021
Version: 1

File: REQ173114_

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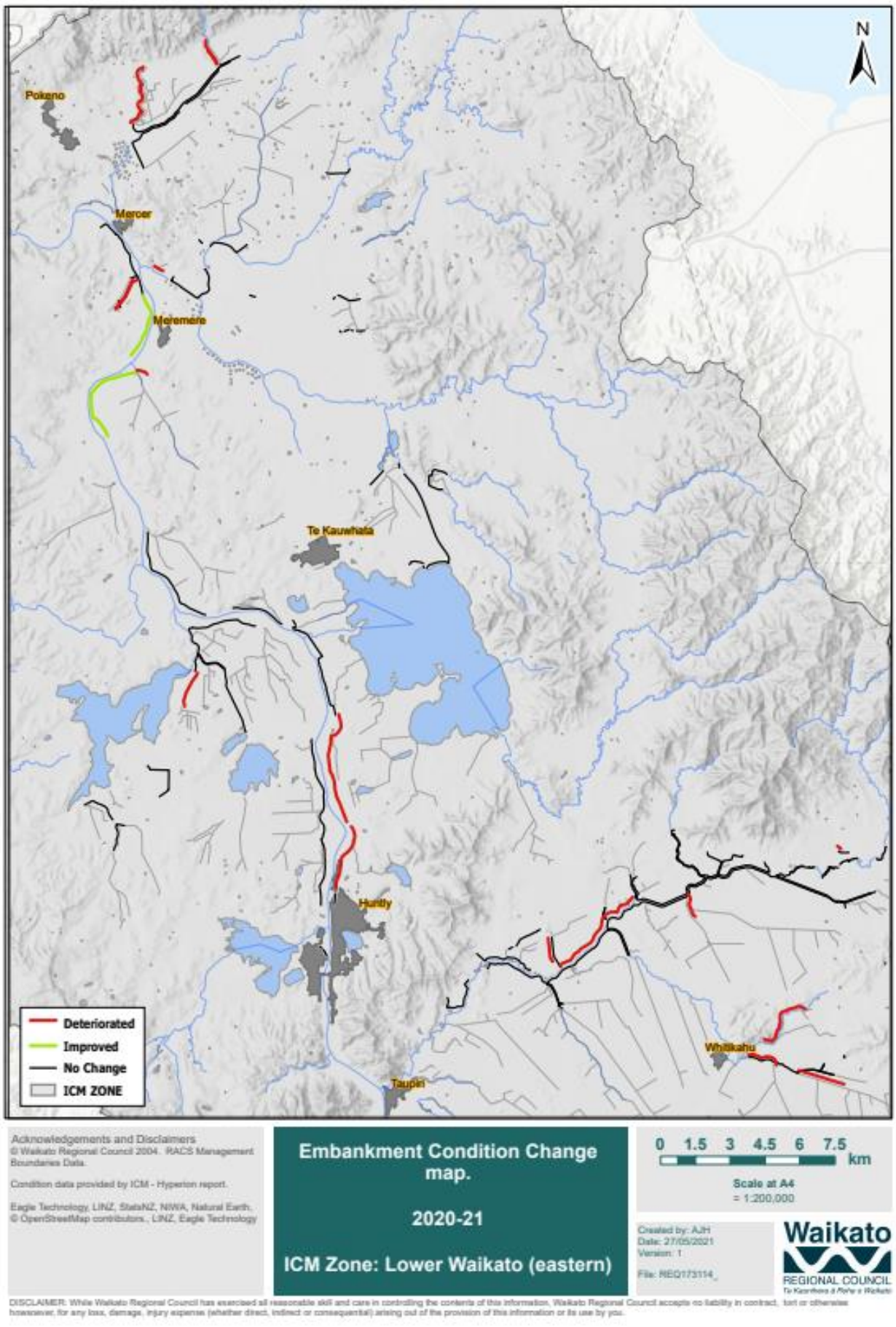
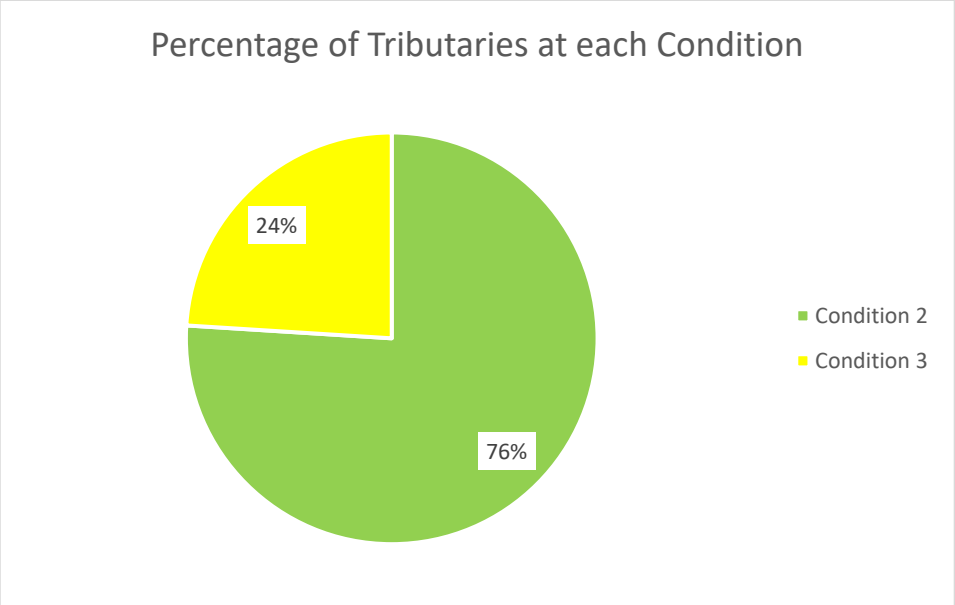


A list of embankments in a poor condition is shown below. These assets should be prioritised in any upcoming capital woks programme, as the integrity of the stopbanks could be compromised.

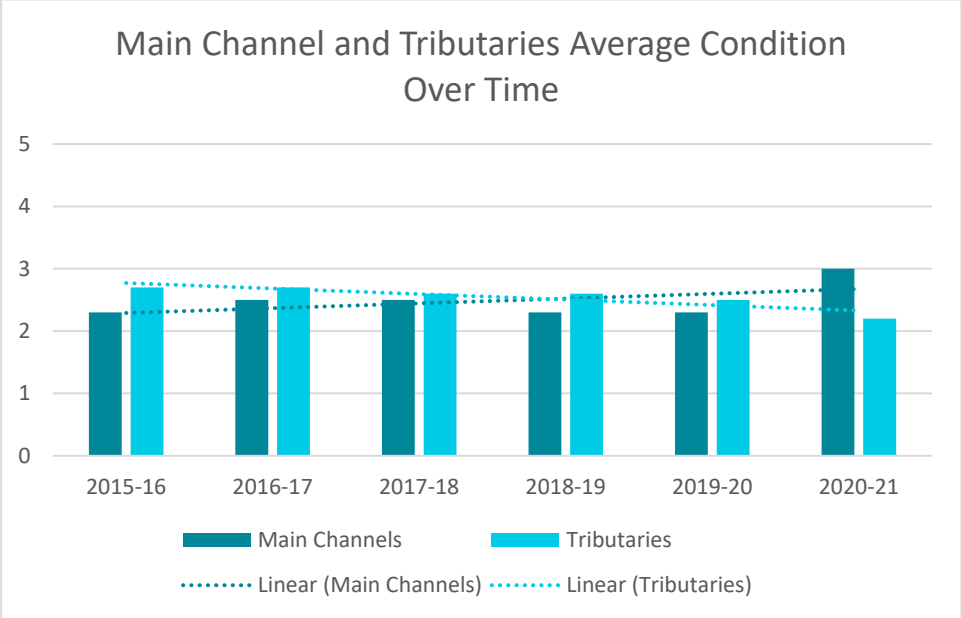
Description	Type description	Previous Year Condition	Current Condition Score	Condition Change	Length (km)	Current Inspection Notes
Tickles SB	Stopbank	2	4	2	1.59	Hasn't really improved by itself
Te Kohanga Major-Eastern Section 3 SB	Stopbank	2	4	2	0.556	Full of bull holes, bank is backup for breach of other bank, whole place needs looking at.
Pouaraurero a Stream Comp 1 LB SB	Stopbank	2	4	2	0.806	Needs renewal
Pouaraurero a Stream Comp 1 RB SB	Stopbank		4	2	0.868	Bank needs major work
Pouaraurero a Stream Comp 1 Spillway LB	Spillway	2	4	2	0.392	Can't see much of bank under long grass

4.4 Main Channels and Tributaries

134km of Main channels and tributaries are being reported on this year, however only one Main Channel was inspected this year and it was rated at condition 3. The tributaries were found to all be in an average to good condition with erosion and vegetation being the most common issues in the inspection notes.



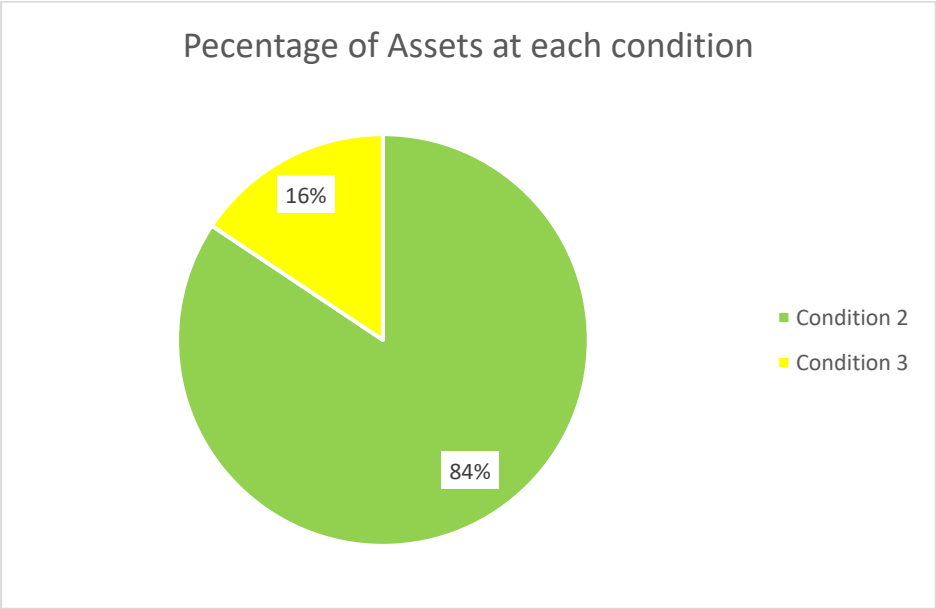
	Deteriorated	Improved	No Change
Main Channel	100%	0%	0%
Tributary	7%	52%	41%



Main channels show a stable line across the previous 5 years, with a swing towards deterioration this year. Tributaries are show a slow improvement over the last 6 years. There should be some investigation as to what is being done differently between the two asset types in order to explain this difference.

4.5 Other Assets

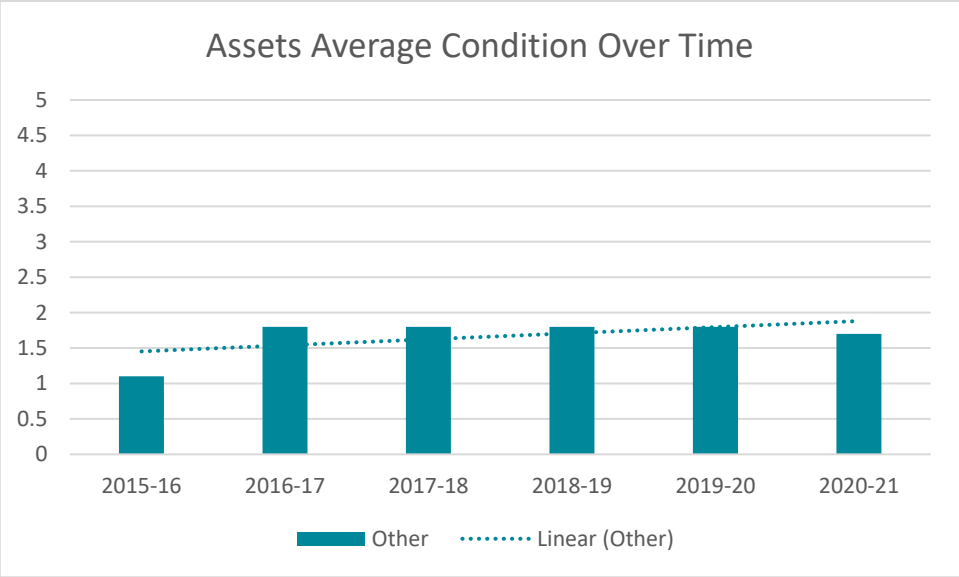
All assets that fall into the "Other" category were found to be in average to good condition this year.



	Deteriorated	Improved	No Change
Other Assets	20%	18%	61%

The almost even deterioration to improvement ratio suggests that current maintenance efforts are keeping pace with the natural decline in condition over time.

	C2	C3
Boat Ramp	1	
Bridge: Concrete	6	
Bunds		1
Canal	1	
Control Gate		3
Culvert: Conventional	8	2
Groynes		1
Pole	50	2
Pumpstation: Archimedes	1	1
Weir: Concrete	1	
Weir: Rock	11	5
Weir: Timber	2	



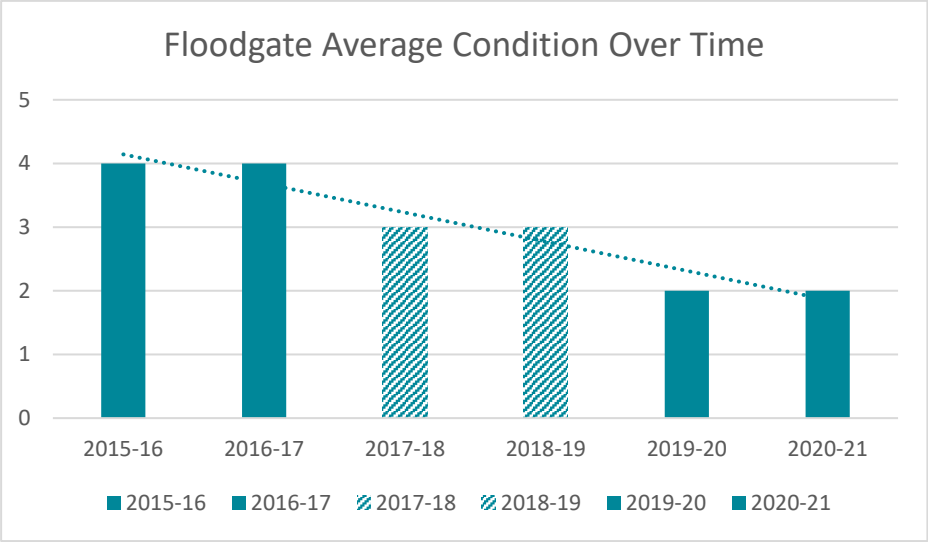
The condition of Other Assets has remained exceptionally stable over the last 6 years.

5 Franklin

5.1 Floodgates

There is one Floodgate in Franklin, Kaawa Twin Box Floodgate; both the floodgate and all its components are graded at condition 2. This is exactly the same score as last year, showing neither improvement nor deterioration.

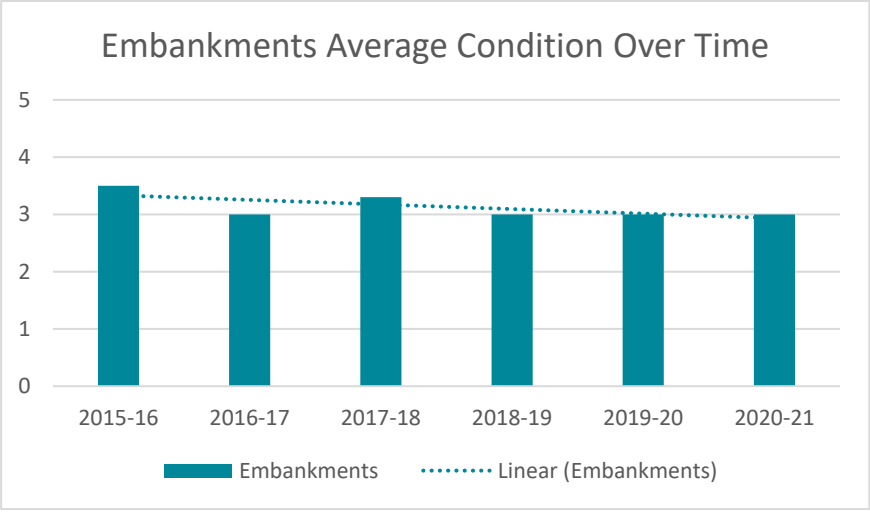
Despite the name "Kaawa Twin Box Floodgate" this asset only has a single pipe and flapvalve. ConQuest action 342126 describes this asset as having been ripped out and replaced by the Farmer occupying the area, hence the name confusion. It is unclear if this issue has ever been resolved.



Please note there are some gaps in the available data so parts of this trend graph have been interpolated. The discovery of the unauthorised refurbishment appears to have been April 2019 which is likely why the condition has improved – it is no longer the same asset it was.

5.2 Embankments

There are two Embankments in Franklin, totalling 4.95km. All of this is graded at condition 3, both having deteriorated from last year. The inspection notes don't give any particular reason for the C3 score.

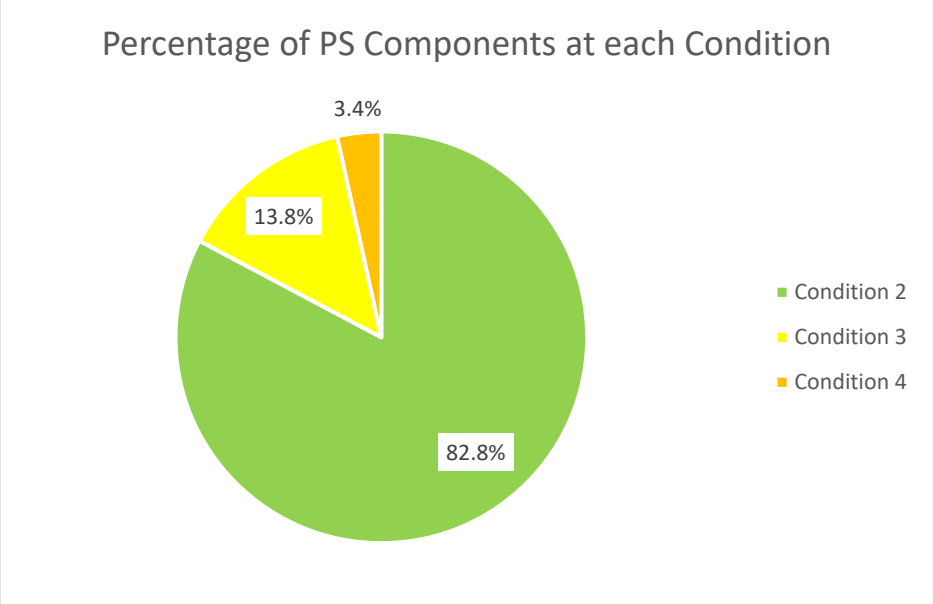


The overall trend of embankments in Franklin is one of improvement, despite this year's decline.

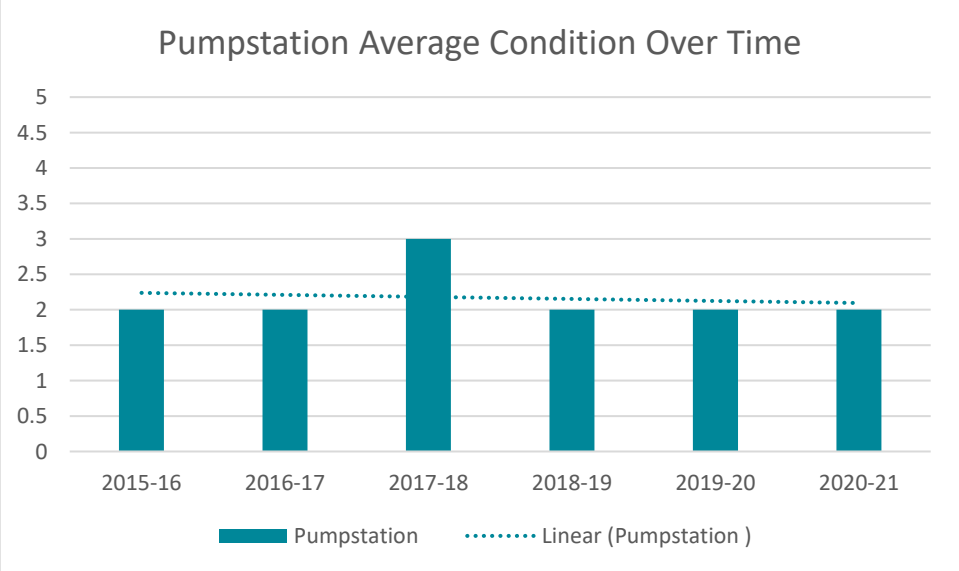
6 Waikato Central

6.1 Pumpstations

There are 2 Pumpstations in Waikato Central and both were graded as Condition 2, in good condition overall.



Row Labels	No Change	Deteriorated
PS Component	79.3%	20.7%
Pumpstation	100.0%	0.0%



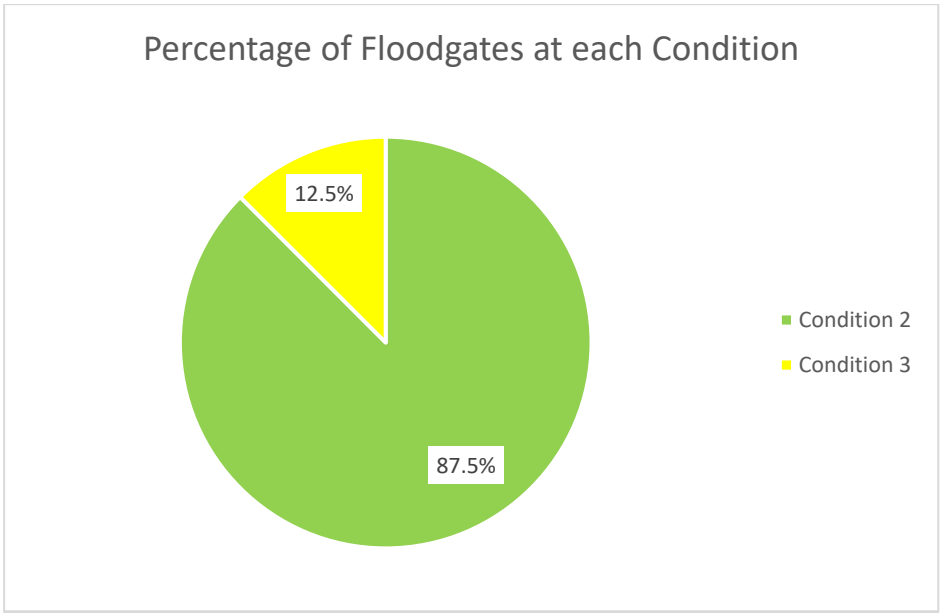
Aside from the 2017/18 fluctuation, the overall condition of these two Pumpstations has been stable.

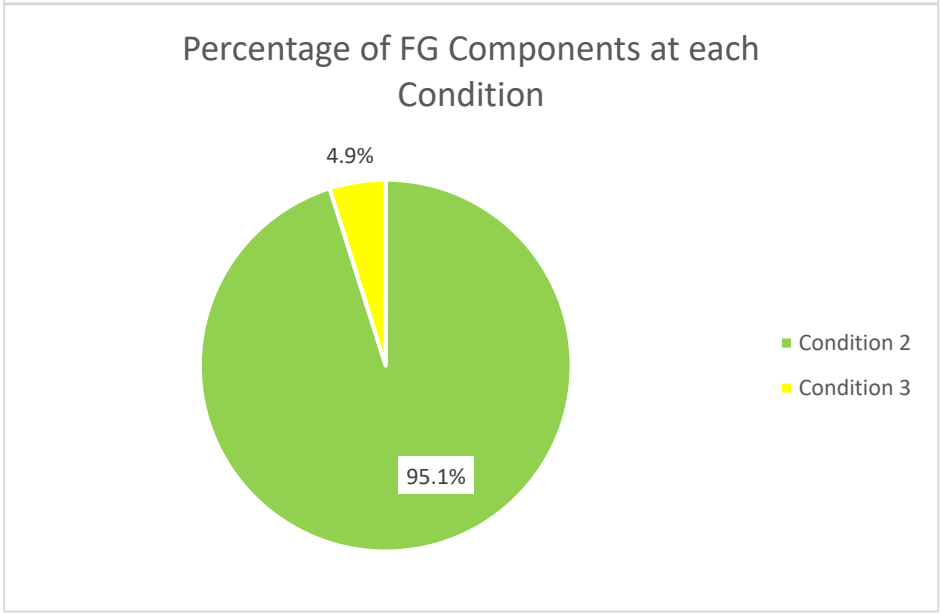
The only component in poor condition is the Manor Park PS Screen, however this was determined by the inspector not to impact the overall condition of the pumpstation. This screen should be replaced as soon as practicable.

Asset ID	Description	Type description	Previous Year Condition	Current Condition Score	Condition Change	Current Inspection Notes
44325	Manor Park PS - Screen	Screen: Bar	2	4	2	Rusted

6.2 Floodgates

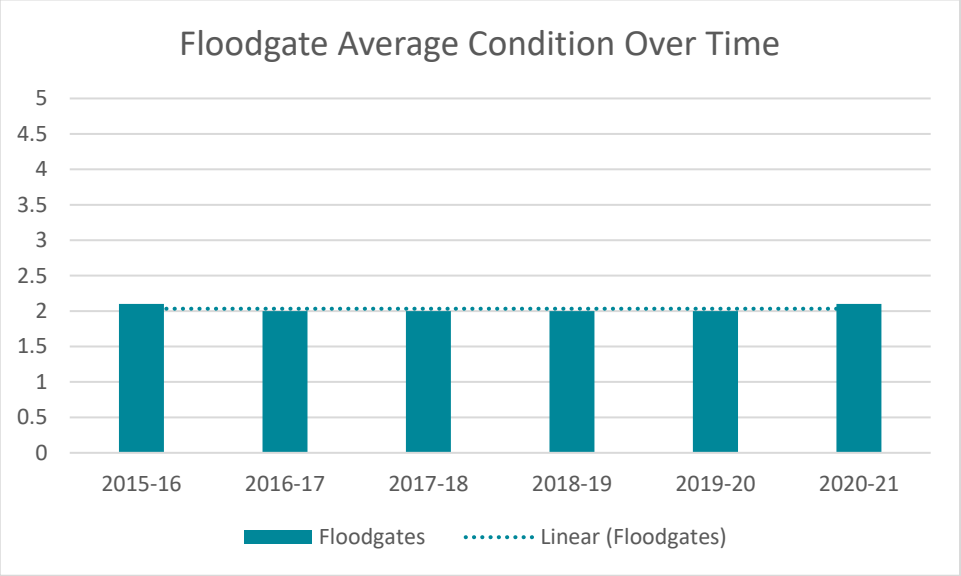
There are 8 floodgates in Waikato Central, all (including their components) were found to be in average to good condition with very little change from last year.





Row Labels	No Change	Deteriorated
FG Component	95.1%	4.9%
Floodgate	87.5%	12.5%

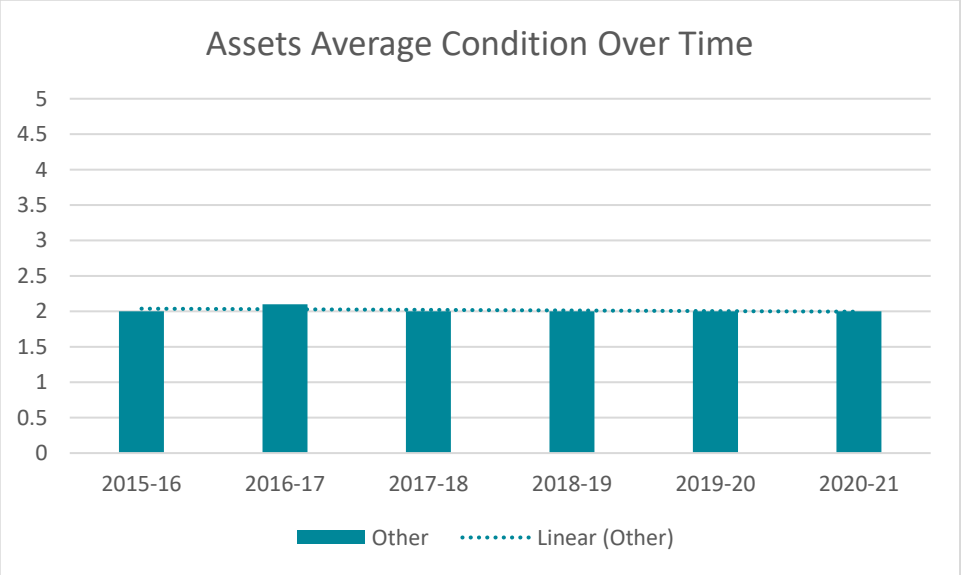
The only components that deteriorated were an inlet and an outlet, however both were still found to be condition 3.



The trend is exceptionally stable over the last 6 years, with almost no fluctuation. This suggests that maintenance is keeping pace with natural deterioration.

6.3 Other Assets

All assets categorised as Other were found to be condition 2, with no changes recorded from last year. Inspection notes list vegetation and lack of access/visibility as the main concerns. The trend is very stable over the last 6 years.



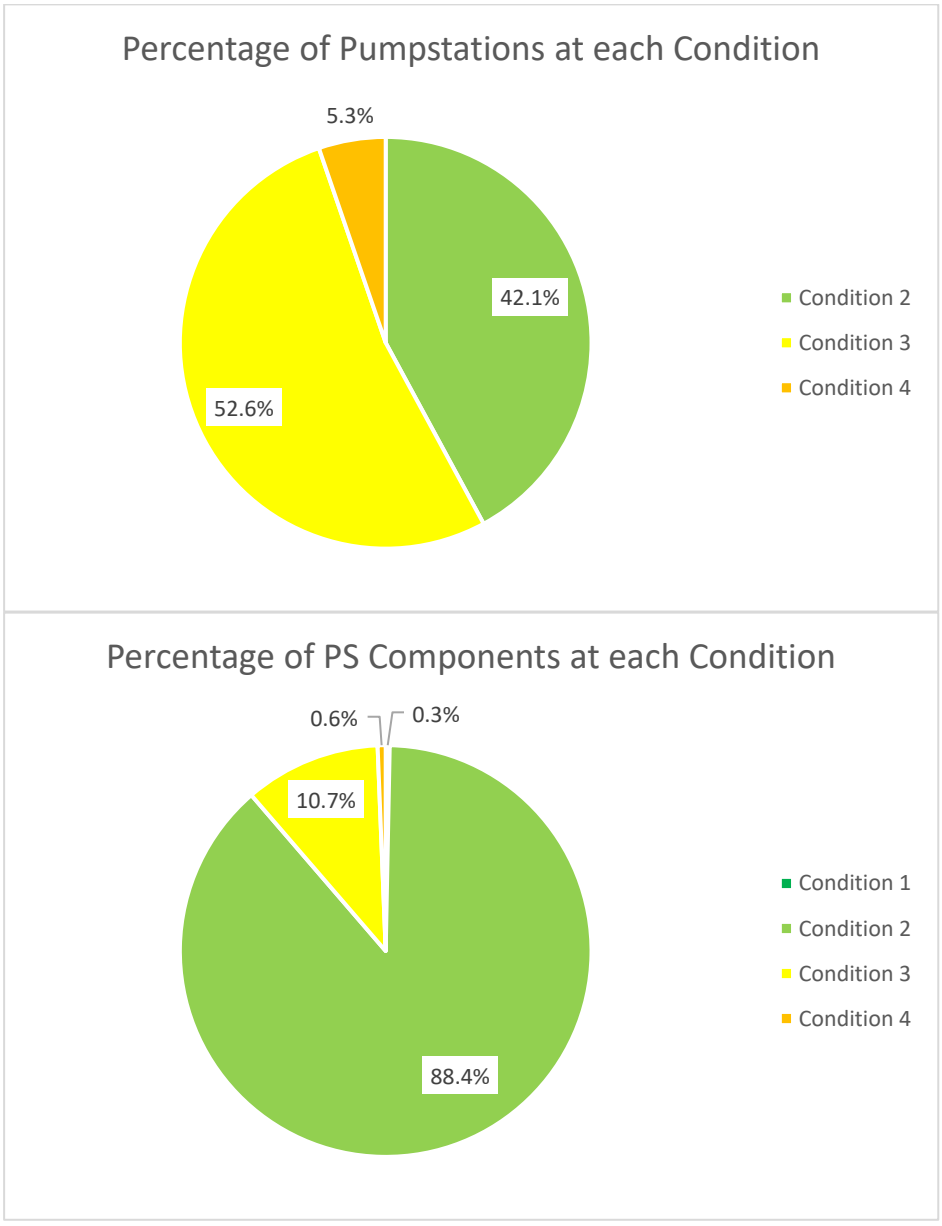
	C2
Barrel: Pipe	5
Culvert: Conventional	4
Drop Structures	7
Manhole	4
Grand Total	20

7 Waihou

Combined maps for Waihou/Piako assets are available in section 9.

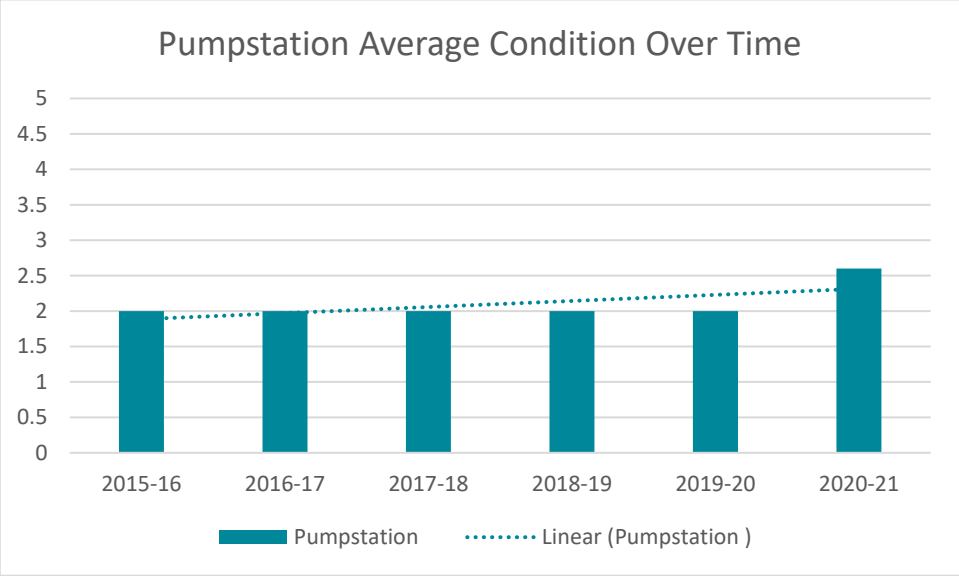
7.1 Pumpstations

Neary 97% of the 19 pumpstations inspected were considered to be in average to good condition, with one Pumpstation (Roger Harris (H Drain) PS) being in a poor condition. This was scored a C4 because of an end-of-life switchboard which is already in the process of being replaced.



Row Labels	No Change	Deteriorated	Improved
PS Component	87.1%	10.1%	2.8%
Pumpstation	42.1%	57.9%	0.0%

Buildings, Inlets and Screens were the components that deteriorated the most, while Diesel storage tanks and Pumps improved the most.



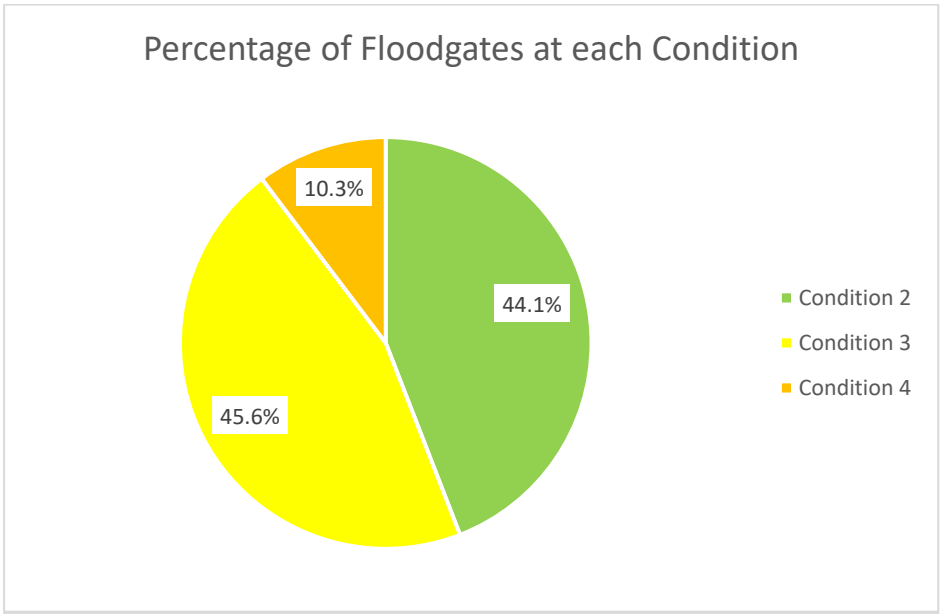
After a very stable run, this year the average condition has deteriorated.

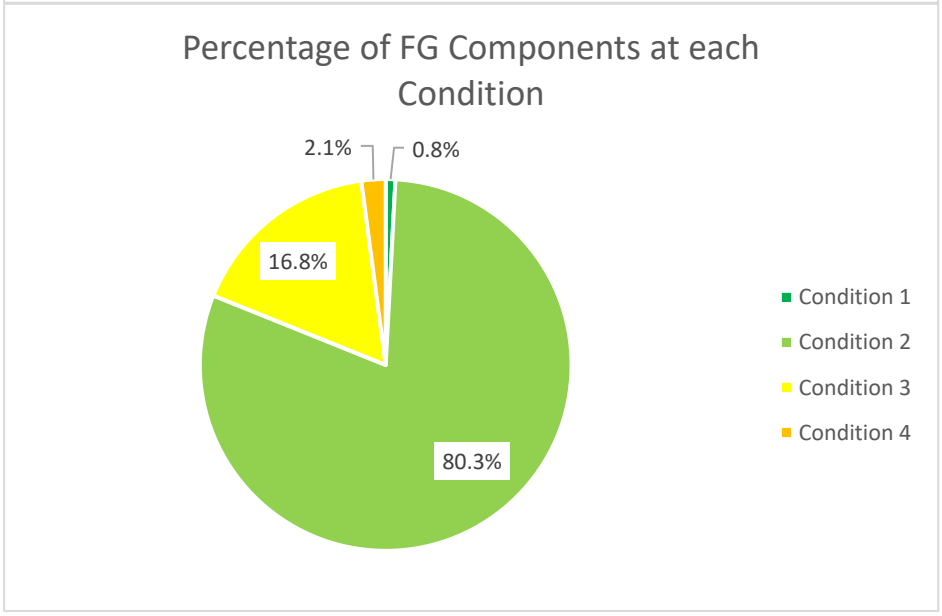
This is important to note – the overall picture presented in this section of the report is generally good, with few assets in poor condition, but the average condition shifted considerably from last year, suggesting that there was a large proportion deteriorating to an average condition. This could either be a result of the different scoring systems or it could indicate a genuine degradation in asset condition, in which case this should be monitored closely so that there is no sudden mass degradation to C4.

Description	Type description	Previous Year Condition	Current Condition Score	Condition Change	Current Inspection Notes
15) Roger Harris (H Drain) Pumpstation	Pumpstation: Siphon Flood	2	4	2	Switchboard end of life
Components:					
Roger Harris (H drain) PS - Switchboard and Controls	Switchboard and Controls	3	4	1	End of life unsafe
Kurere (Komata North) PS - Screen	Screen: Bar	2	4	2	Rusted

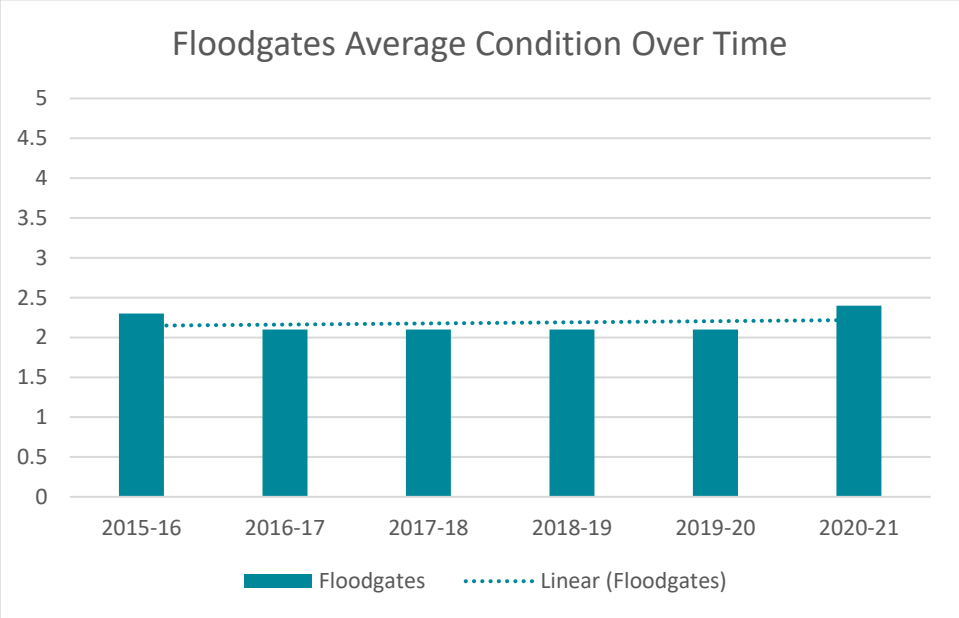
7.2 Floodgates

68 floodgates were inspected this year, with 90% found to be in average to good condition. Where Floodgates are in poor condition, it is most commonly because of issues with Inlets and Outlets. Inlets and Outlets were also the most likely component type as well as the most likely to have deteriorated. Chain and Winch Lifting Gear also showed a high level of deterioration. Service beams were the most improved asset type, possibly reflecting an increased Organisational focus on Health and Safety.





Row Labels	No Change	Deteriorated	Improved
FG Component	76%	18%	5%
Floodgate	51%	49%	0%



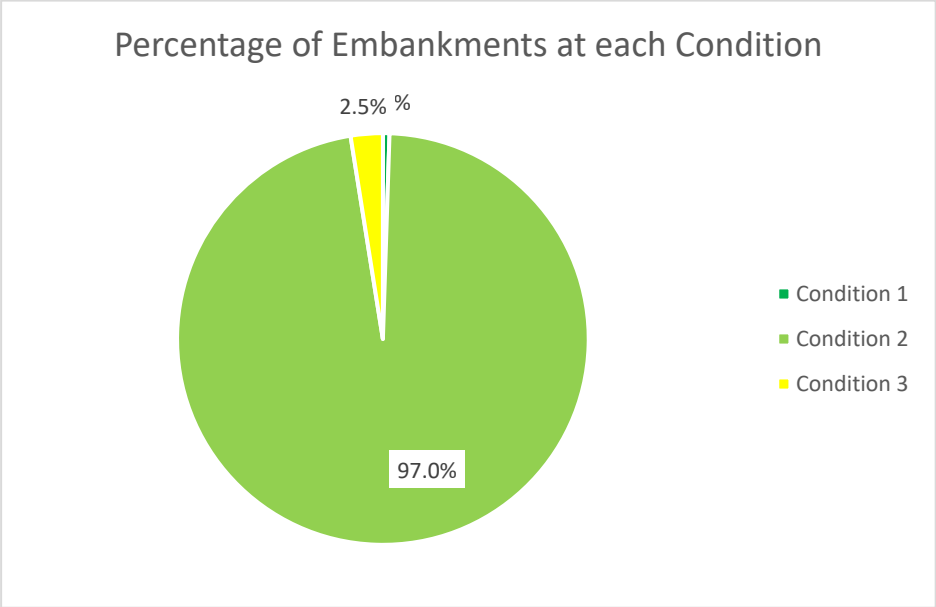
Overall Condition for Floodgates has remained stable over time, with a moderate swing towards deterioration this year.

Description	Type description	Previous Year Condition	Current Condition Score	Condition Change Raw	Current Inspection Notes
09) Torrs Floodgate	Floodgate: Diaphragm	2	4	2	See outlet comments
09) Huirau Road Floodgate	Floodgate: Conventional	2	4	2	Outlet retaining failed
6) Bond Road Floodgate	Floodgate: Conventional	2	4	2	Outlet retaining failed
4) Central Drain Floodgate	Floodgate: Diaphragm	2	4	2	Retaining issues at inlet and outlet
08) Alexanders Floodgate	Floodgate: Conventional	3	4	1	Inlet retaining failing
09) Peartree Floodgate	Floodgate: Conventional	2	4	2	Inlet retaining failed
09) Buchanans Floodgate	Floodgate: Conventional	2	4	2	Inlet issues
Components:					
Lowe Avenue FG - Lifting Gear Inlet	Lifting Gear: Hydraulic	2	4	2	Cylinder rusted out
Torrs FG - Flapvalve	Valve: Flap Rectangular	2	4	2	Rusty hangers and weathered timber
Torrs FG - Outlet Structure	Outlet Structure	3	4	1	Retaining failed
Huirau Road FG - Outlet Structure	Outlet Structure	2	4	2	Retaining walls failed
Captain Cook FG - Outlet Structure	Outlet Structure	2	4	2	Retaining failed
Netherton FG - Outlet Structure	Outlet Structure	2	4	2	Unserviceable
Golf Course FG - Flapvalve	Valve: Flap Rectangular	2	4	2	Very Worn
Bond Road FG - Outlet Structure	Outlet Structure	2	4	2	Retaining failed
Matatoki FG - Outlet Structure	Outlet Structure	2	4	2	Retaining and concrete repairs needed
Central Drain FG - Inlet Structure	Inlet Structure	2	4	2	Retaining failed
Alexanders FG - Inlet Structure	Inlet Structure	2	4	2	Retaining failing

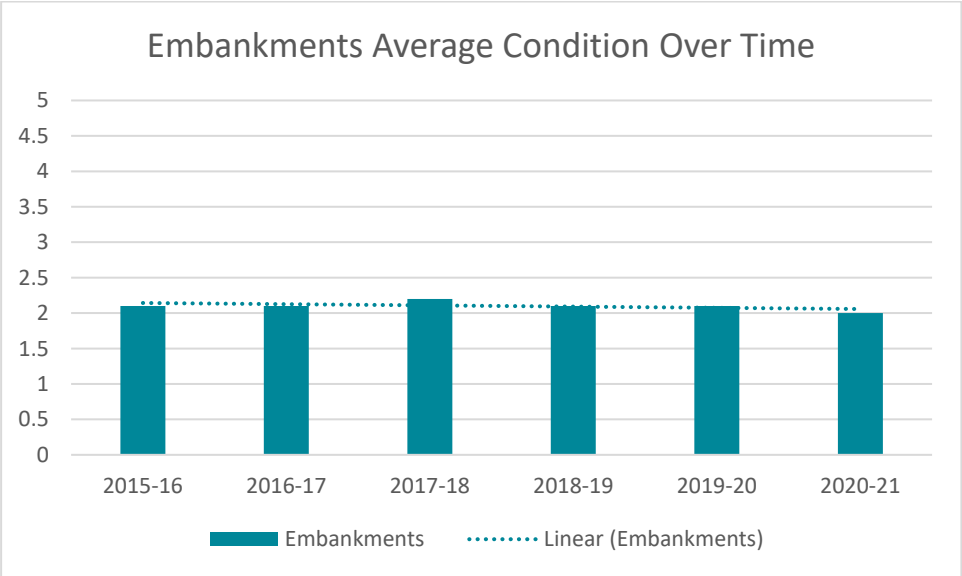
Description	Type description	Previous Year Condition	Current Condition Score	Condition Change Raw	Current Inspection Notes
Peartree FG - Inlet Structure	Inlet Structure	2	4	2	Retaining failed
Rangiora Link FG - Flapvalve 1	Valve: Flap Rectangular	3	4	1	End of life
Paeroa Main Drain FG - Service Beam	Service Beam	3	4	1	Shakes violently when you walk on it
Buchanans FG - Inlet Structure	Inlet Structure	2	4	2	Retaining failed

7.3 Embankments

All the 164km of embankments inspected this year has been found to be in average to very good condition, with 97.5% being in good or very good condition. Less than 3% has deteriorated since last year and the most common defect listed is overgrown grass.



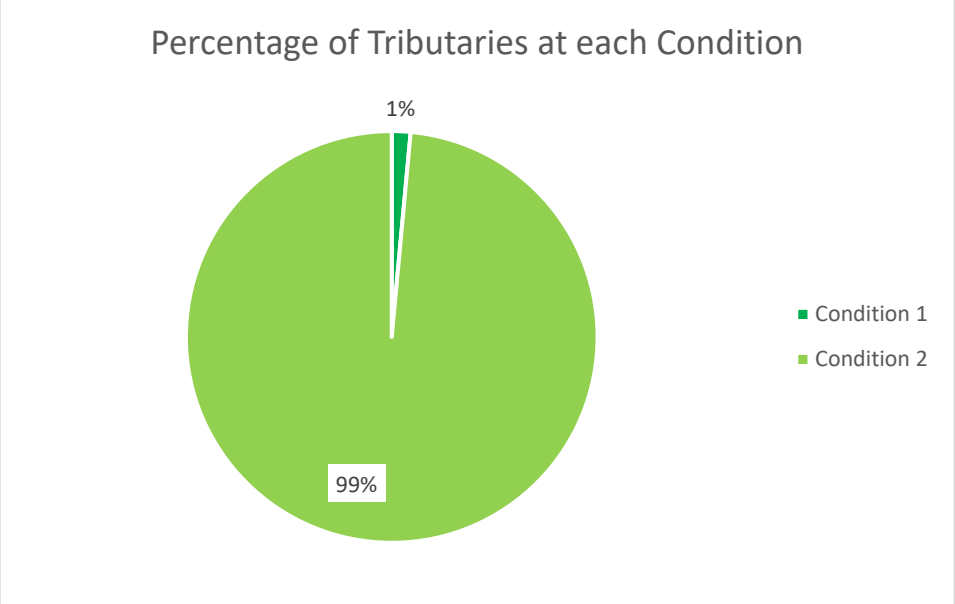
	Deteriorated	Improved	No Change
Sum of Length (km)	2.87%	0.52%	96.62%



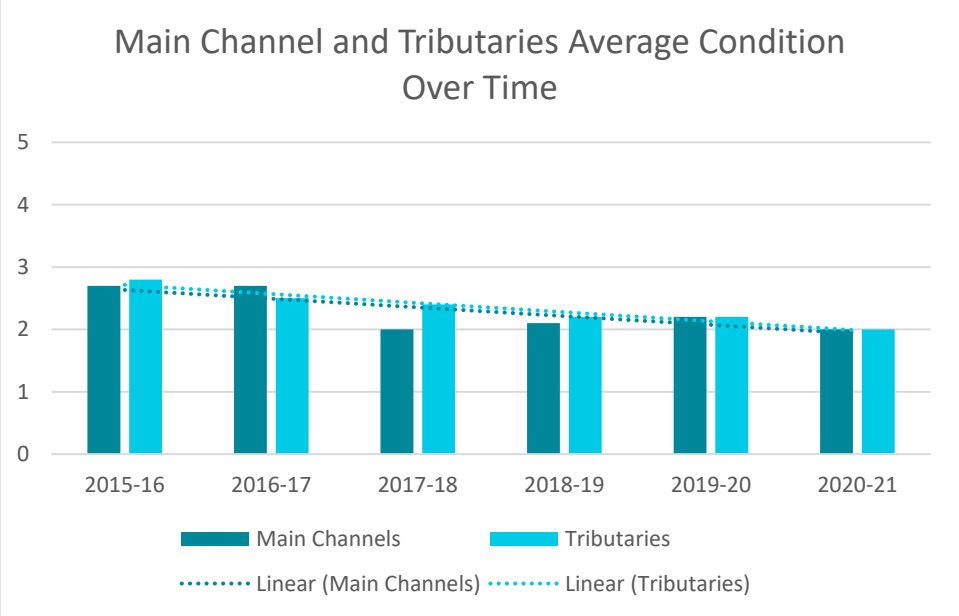
There has been very little change in the Embankment Average Condition over time. This suggests that the maintenance programs in place to look after these embankments are working well.

7.4 Main Channels and Tributaries

462km of Main Channels and Tributaries were inspected this year. All Main Channels were graded at condition 2, and all tributaries were found to be in good or very good condition. Both Main Channels and Tributaries show significant improvement over last year, possibly reflecting the calmer weather conditions this year.



	Improved	No Change
Main Channel	67%	33%
Tributary	61%	39%

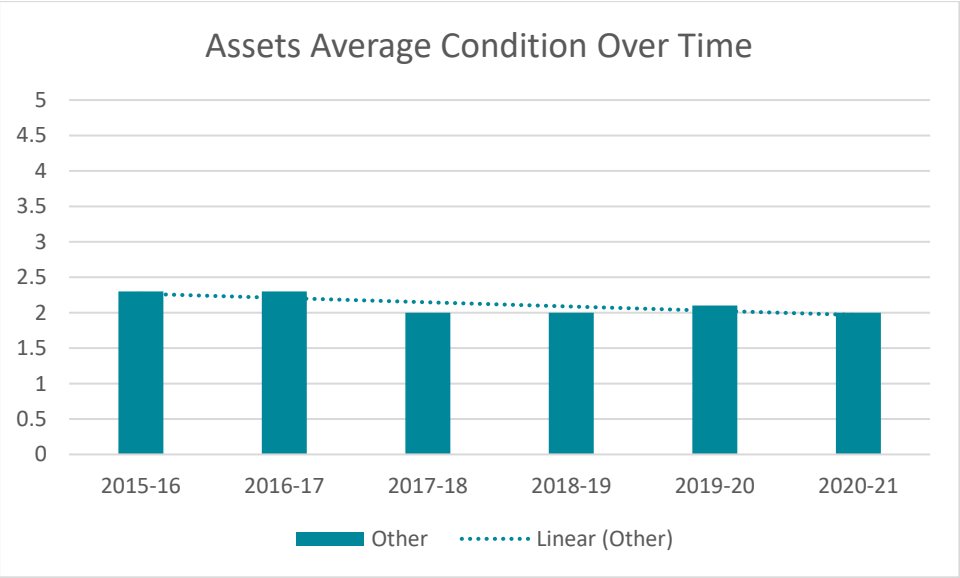


Both Main Channels and Tributaries are showing improvement over time, work should be done to ascertain why, and how we can replicate this elsewhere.

7.5 Other Assets

All assets falling into the “Other” category were graded at condition 2, with very little change from last year. The inspection notes show some vegetation concerns but no other issues.

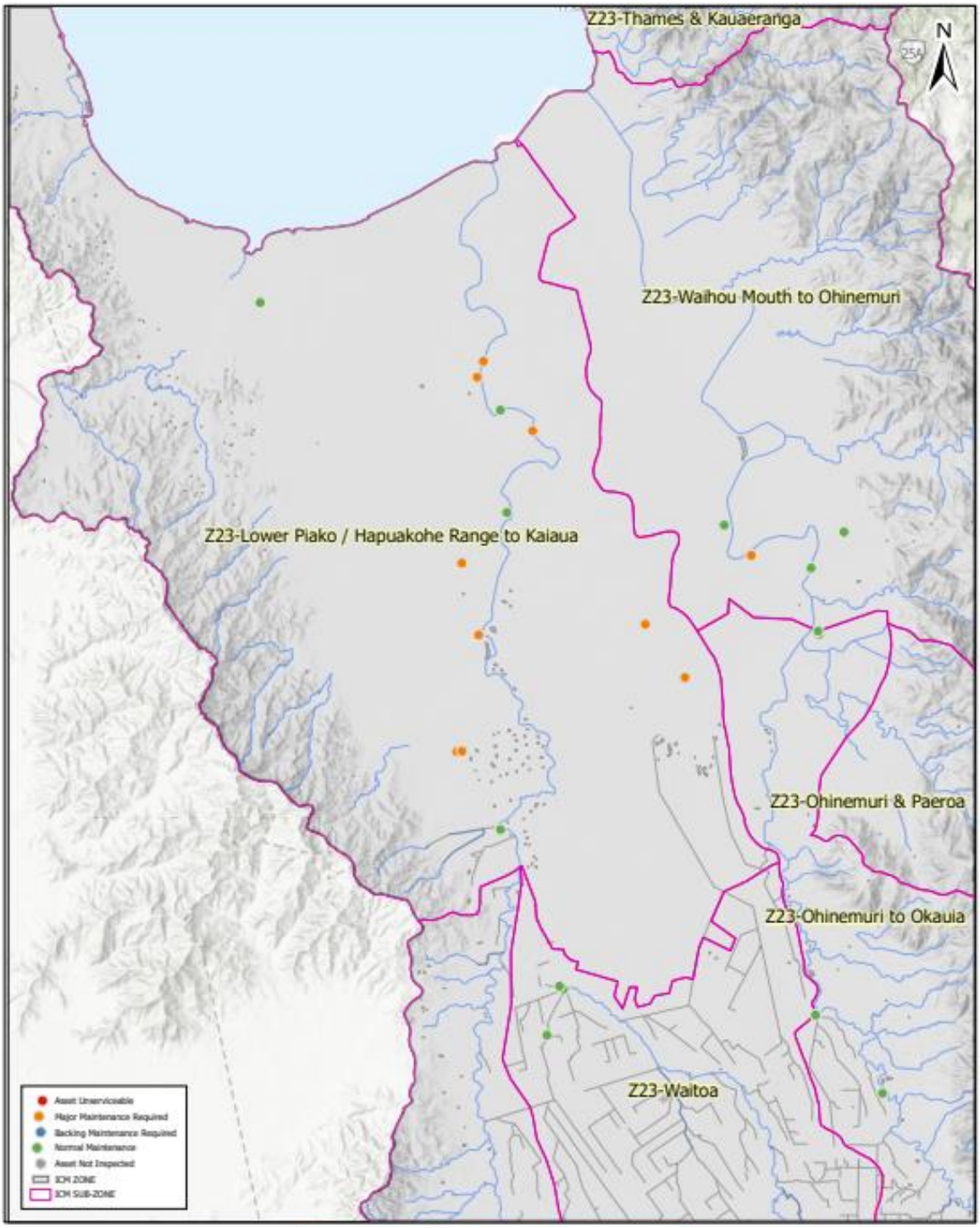
	Deteriorated	Improved	No Change
Other Assets	3%	7%	90%



The average condition is slowly improving over time.

	2
Bank Revetment: Fabriform	1
Bank Revetment: Retaining Structures	16
Barrel: Pipe	2
Culvert: Conventional	11
Debris Traps	5
Fence: Conventional	4
Gradient Control Structure	8
Indigenous Planting	1
Indigenous Scrub	2
Inlet/Outlet Structures	1
Lined Channel: Concrete	2
Lined Channel: Fabriform	1
Lined Channel: Pre-Cast Concrete	2
Lined Channel: Rip Rap	1
Outlet Structure	3
Poplar	1
Rip-Rap	7
Sediment Ponds	1
Stoplog: Temporary	3
Weir: Concrete	1
Weir: Rock	1
Grand Total	74

8 Waihou/Piako Maps



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Pumpstation Condition map.

2020-21

ICM Zone: Waihou-Piako Sub Zone Area (labelled)

0 1.5 3 4.5 6 7.5 km

Scale at A4
= 1:200,000

Created by: AJH
Date: 17/05/2021
Version: 1
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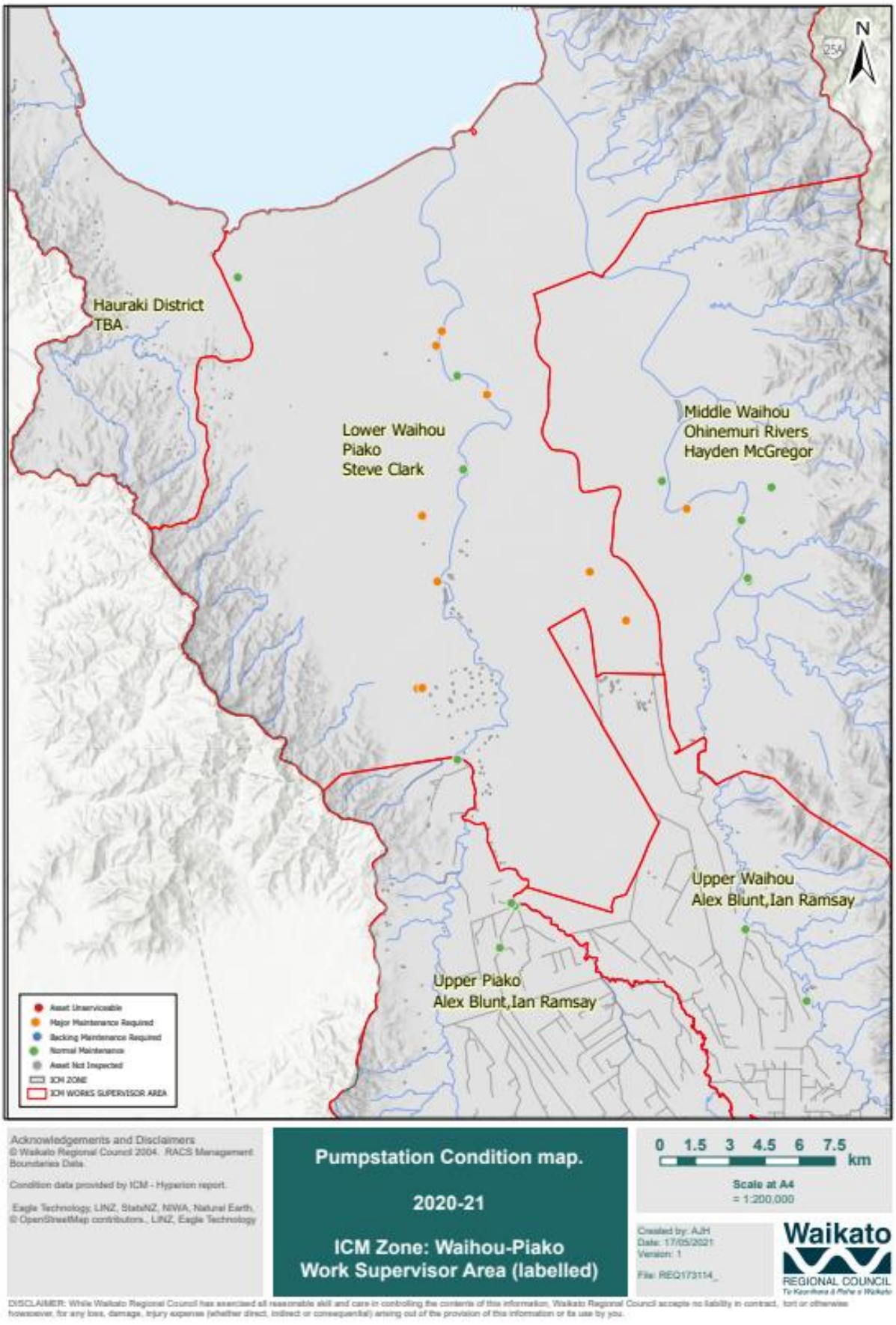

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Pumpstation Condition map.

2020-21

ICM Zone: Waihou-Piako
Work Supervisor Area (labelled)

0 1.5 3 4.5 6 7.5 km

Scale at A4
= 1:200,000

Created by: AJH
Date: 17/05/2021
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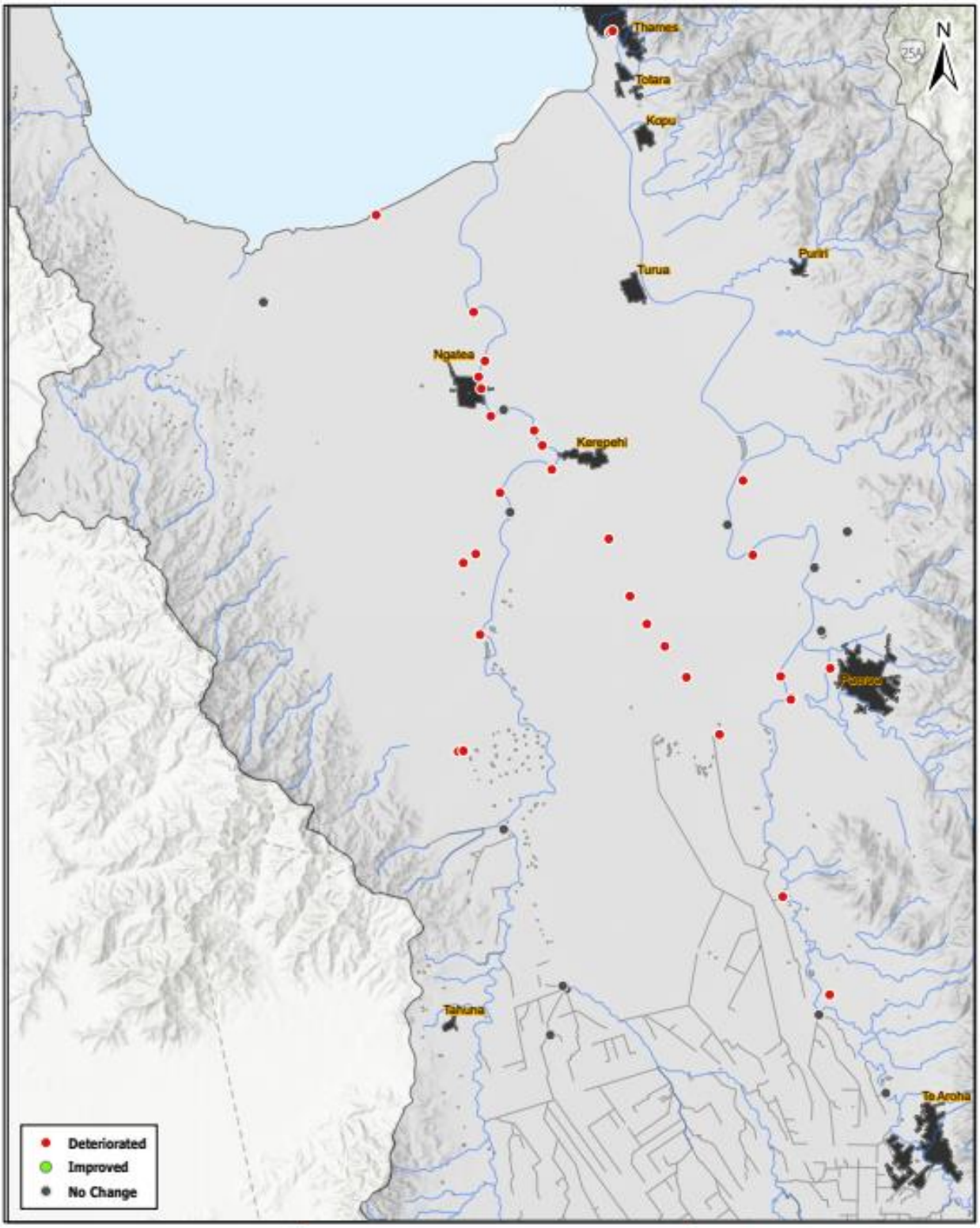

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Pumpstation Condition Change map.

2020-21

ICM Zone: Waihou-Piako

0 1.5 3 4.5 6 7.5 km

Scale at A4
= 1:200,000

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Version: 1

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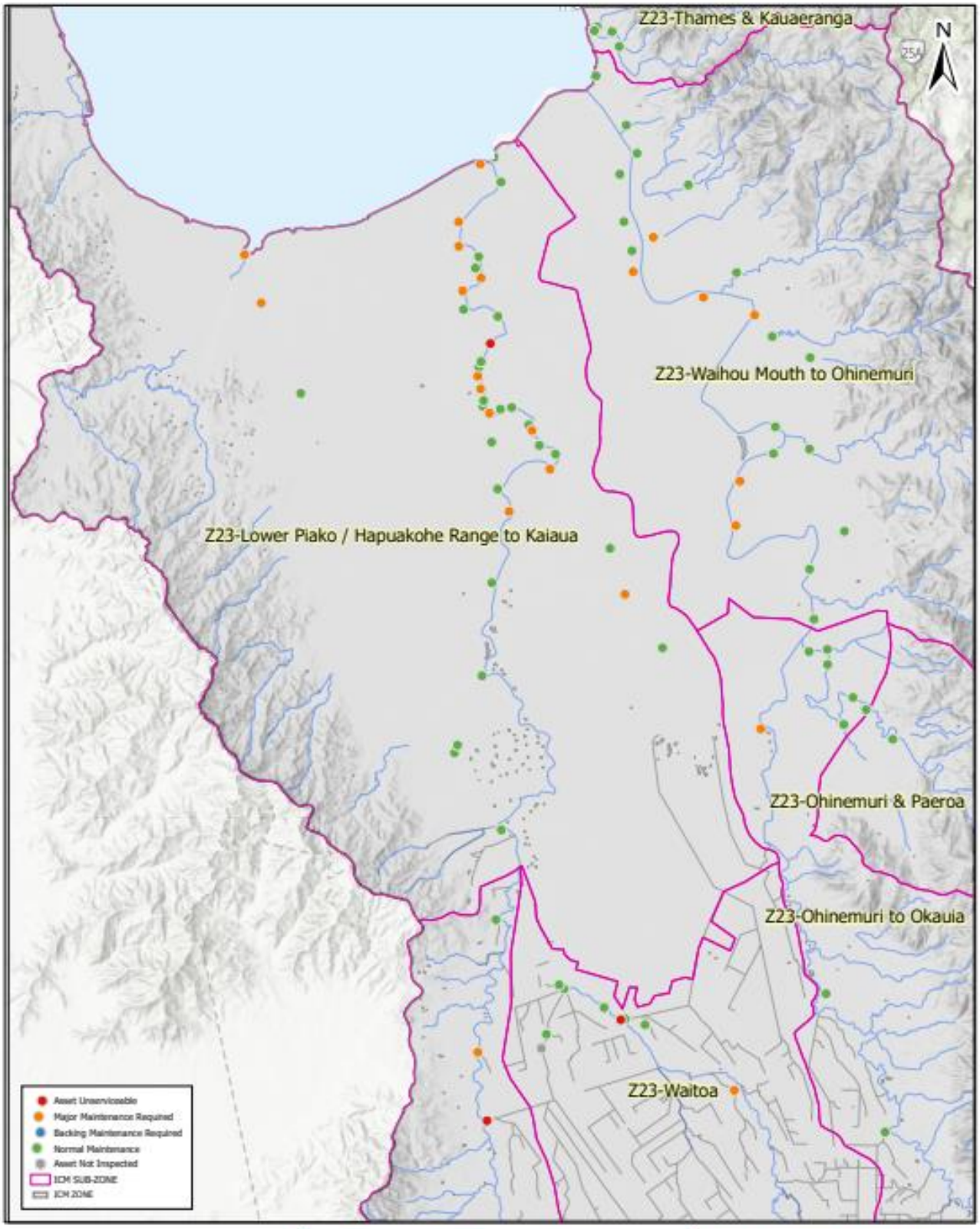

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Floodgate Condition map.

2020-21

ICM Zone: Waihou-Piako Sub Zone Area (labelled)

0 1.5 3 4.5 6 7.5 km

Scale at A4 = 1:200,000

Created by: AJH
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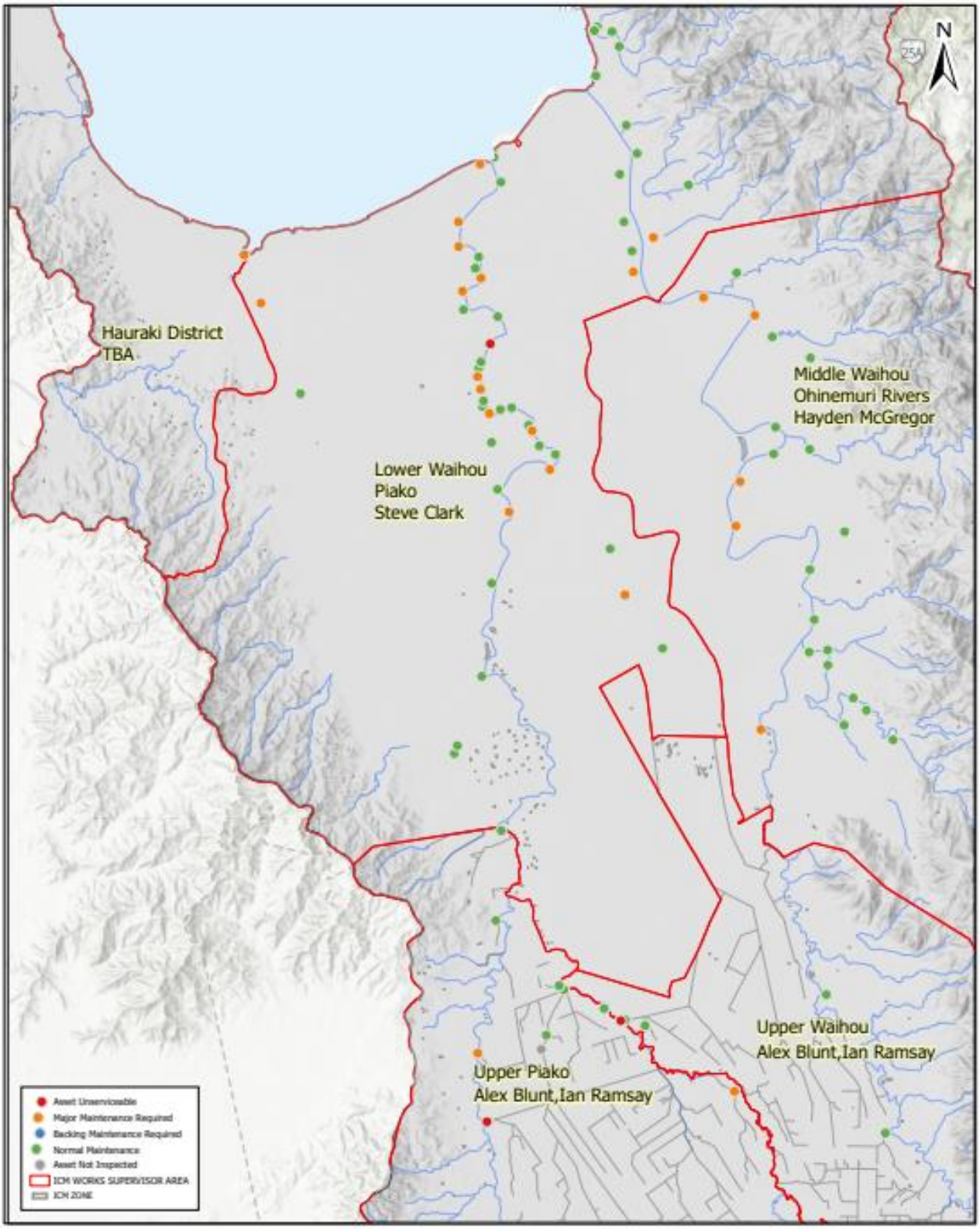

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Floodgate Condition map.

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ICM Zone: Waihou-Piako
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Scale at A4
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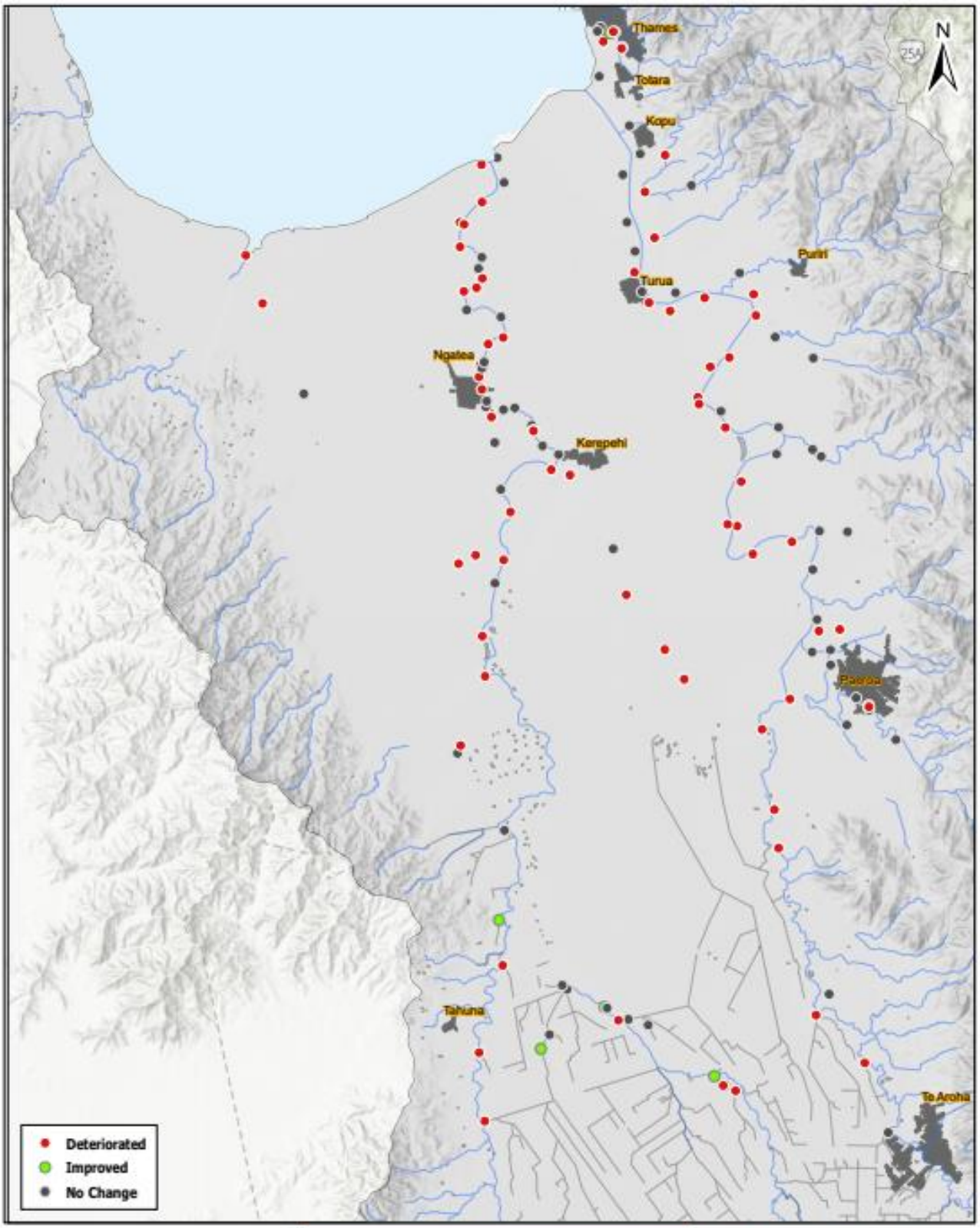

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Floodgate Condition Change map.

2020-21

ICM Zone: Waihou-Piako

0 1.5 3 4.5 6 7.5 km

Scale at A4
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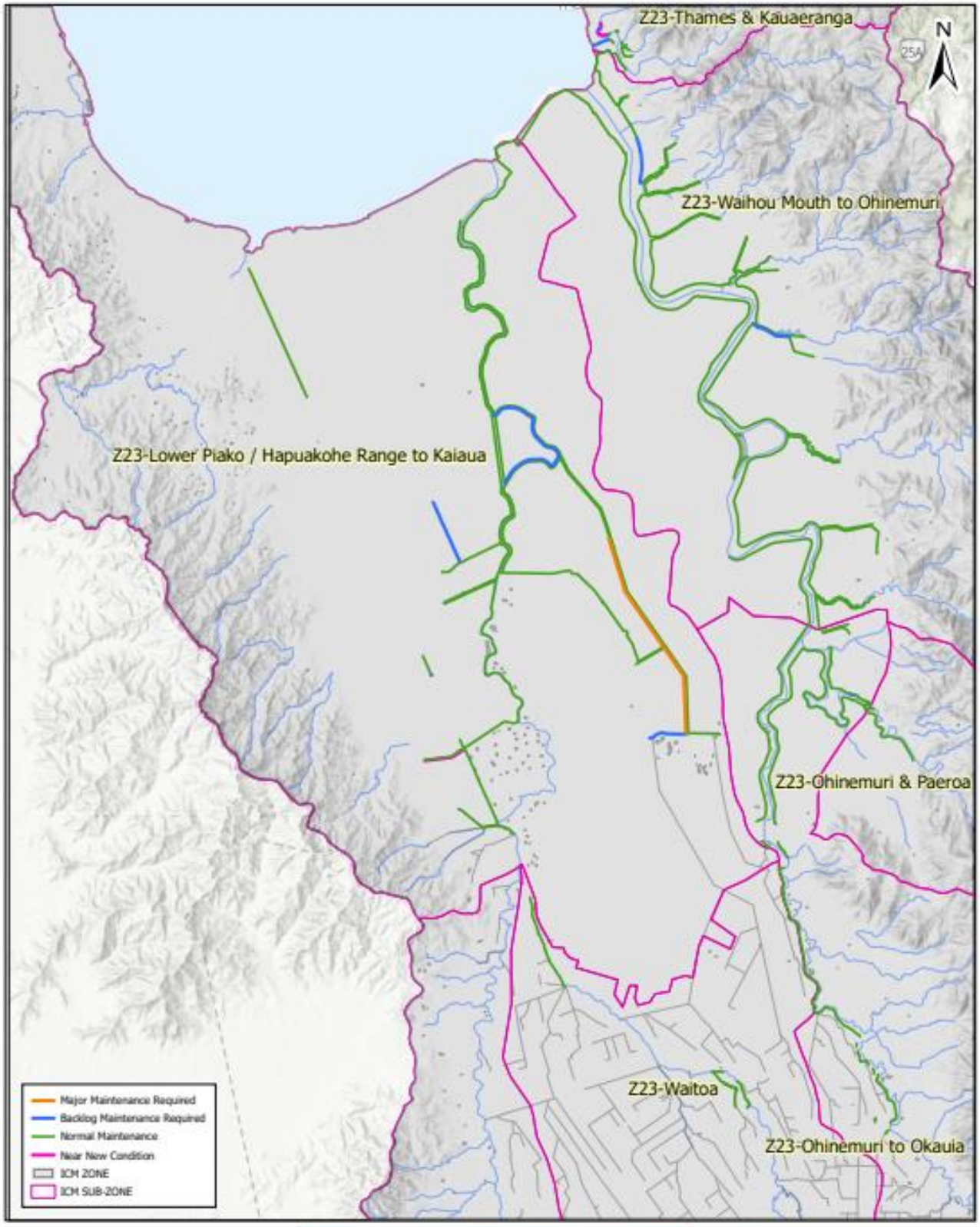

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Embankment Condition map.

2020-21

ICM Zone: Waihou-Piako Sub Zone Area (Labelled)

0 1.5 3 4.5 6 7.5 km

Scale at A4
= 1:200,000

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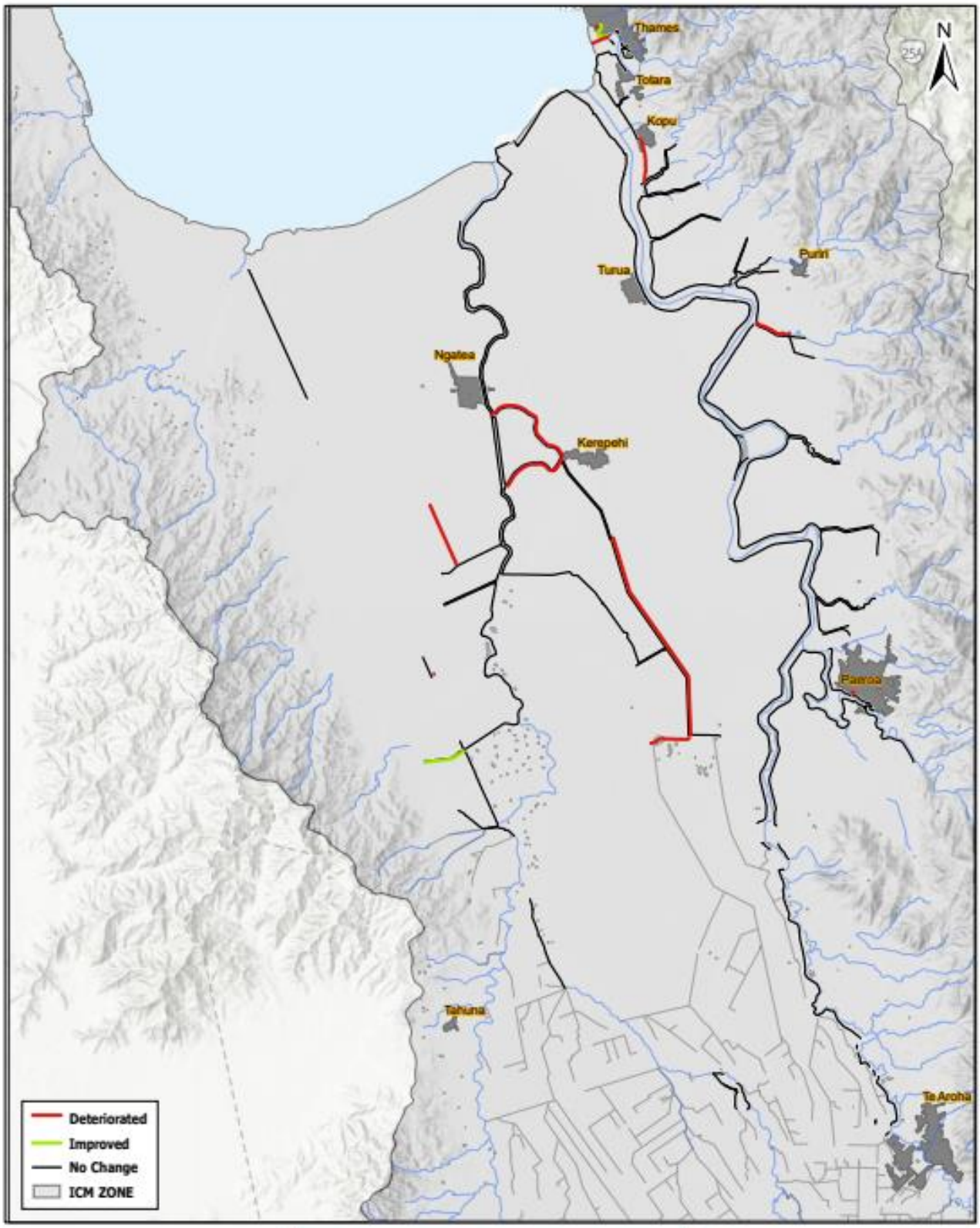

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Embankment Condition Change map.

2020-21

ICM Zone: Waihou-Piako

0 1.5 3 4.5 6 7.5 km

Scale at A4
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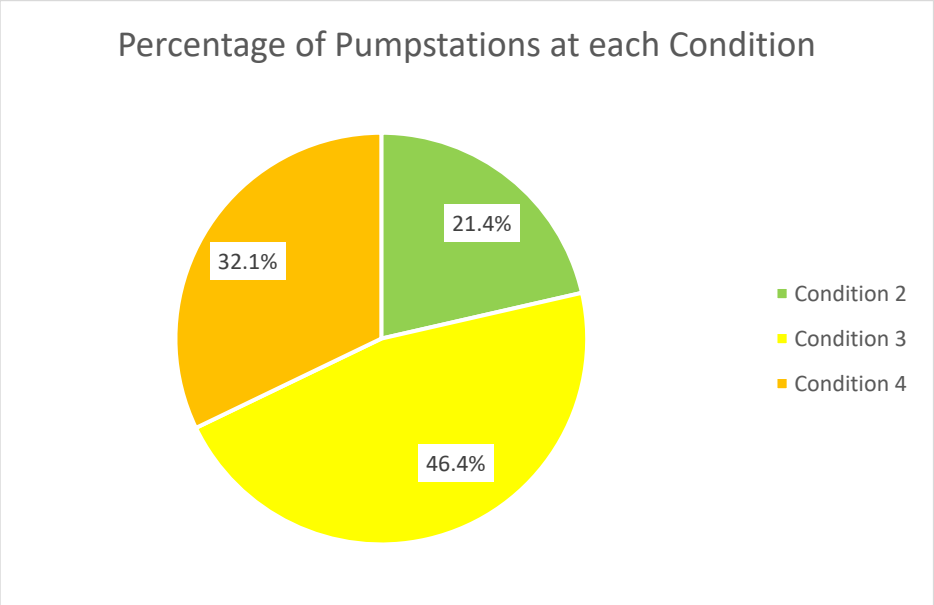
9 Piako

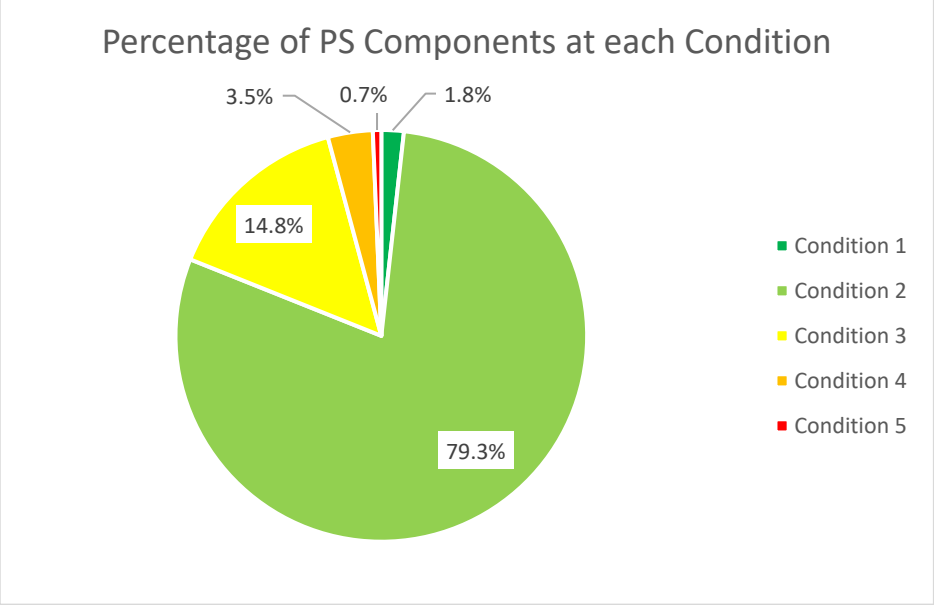
Combined maps for Waihou/Piako assets are available in section 9

9.1 Pumpstations

28 Pumpstations were inspected this year, with 68% of them found to be in an average to good condition, with the remaining 32% (or 9 Pumpstations) in poor condition.

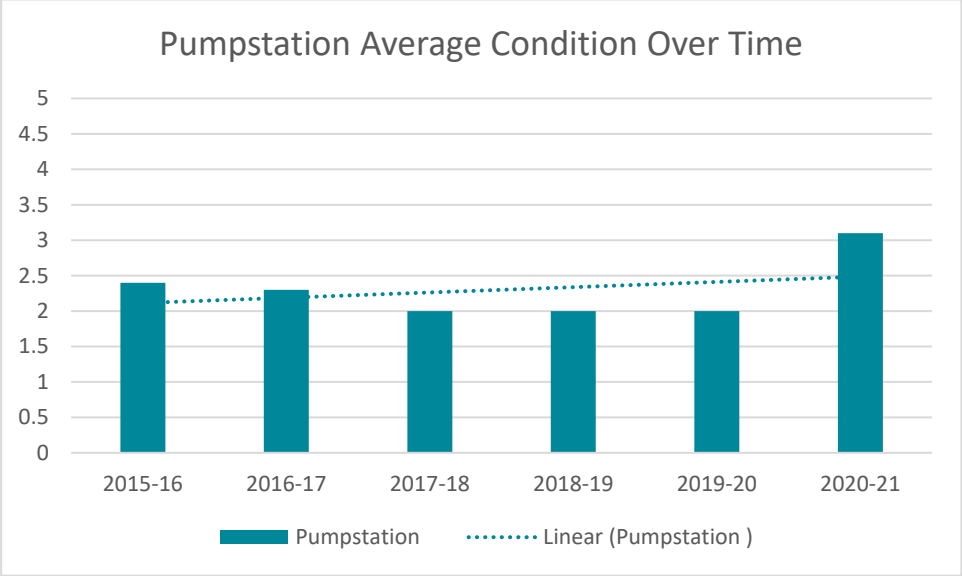
Those Pumpstations in poor condition, are most likely to be in poor condition due to issues with Inlets, Outlets, Pipework, Pumps and Switchboards.





	No Change	Deteriorated	Improved
PS Component	74%	24%	2%
Pumpstation	21%	79%	0%

100% of Surge Chambers and Hydraulic lifting gear, and 63% of inlets deteriorated between last year and this year.



This year shows a significant swing towards deterioration in the average condition. This could be due to the new condition scoring criteria, represent a genuine deterioration in the asset base, or be a combination of the two.

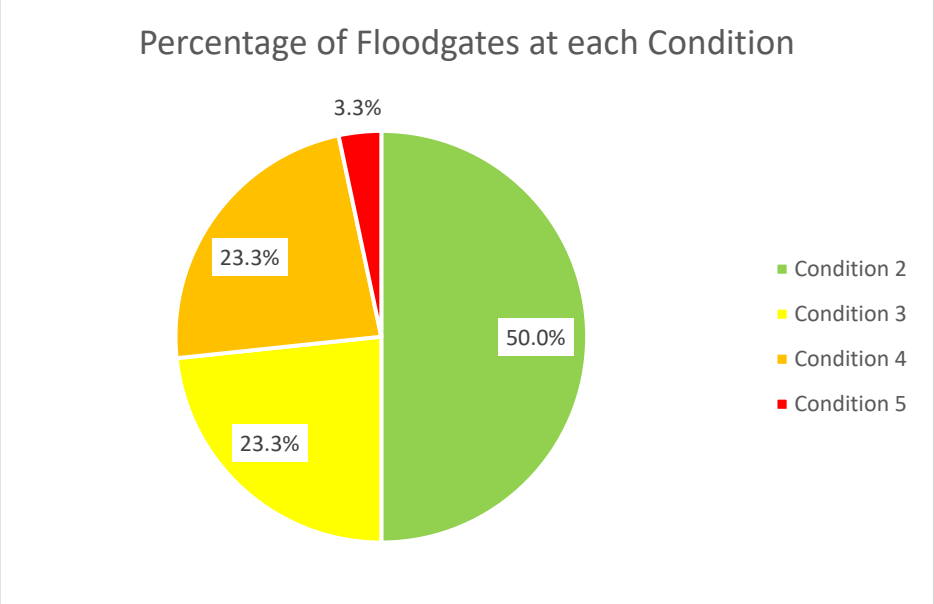
A list of both parent and child assets in a poor condition is shown below. These assets should be prioritised in any upcoming capital woks programme as they present an urgent risk to the safe operating of the assets.

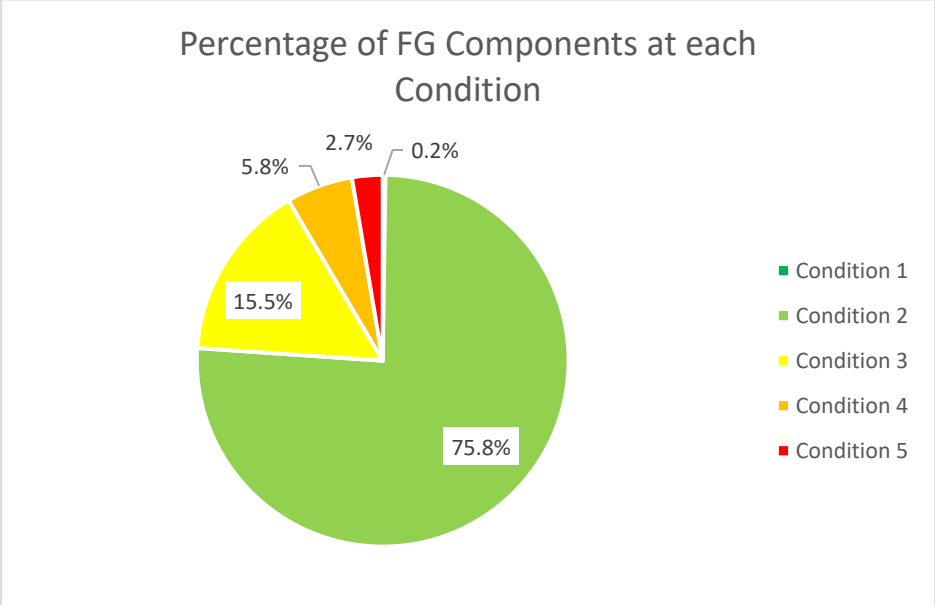
Description	Type description	Previous Year Condition	Current Condition Score	Condition Change	Current Inspection Notes
13) Paul Leonard Pumpstation	Pumpstation: Throughbank	2	4	2	See inlet and outlet comments
10) Johnstones Pumpstation	Pumpstation: Throughbank	2	4	2	See other comments
17) Ngarua Central Pumpstation	Pumpstation: Throughbank	2	4	2	See inlet comments
17) Prices Pumpstation	Pumpstation: Throughbank	2	4	2	See outlet comment
18) Mangawhero Pumpstation Piako	Pumpstation: Throughbank	2	4	2	See inlet comments
19) Waikaka North Pumpstation	Pumpstation: Throughbank	2	4	2	See inlet comments
20) Waikaka South Pumpstation / Floodgate	Pumpstation: Throughbank	2	4	2	See other comments
22) Kerepehi Extension Pumpstation	Pumpstation: Throughbank	2	4	2	See outlet comments
28) Awaiti South Pumpstation	Pumpstation: Throughbank	2	4	2	See inlet comments
Components					
Appletree PS – Pipework	Pipework	2	4	2	Pump 2 pipe is cracked open and water squirts out when pump runs
Rawe Rawe PS - Inlet Structure	Pumpstation Inlet Bay	2	4	2	Timber retaining rotten
Paul Leonard PS - Outfall Structure	Outlet Structure	2	4	2	Timber retaining is at EOL
Paul Leonard PS - Inlet Structure	Pumpstation Inlet Bay	2	4	2	Timber retaining at EOL
Paul Leonard PS - Pipework	Pipework	2	4	2	Pipe at EOL
Johnstones PS - Pump Building	Building: Corrugated Iron	2	4	2	Major leaning
Johnstones PS - Outfall Structure	Outlet Structure	2	4	2	Retaining end of life

Description	Type description	Previous Year Condition	Current Condition Score	Condition Change	Current Inspection Notes
Ngarua Central PS - Inlet Structure	Pumpstation Inlet Bay	2	4	2	Timber retaining has rotted and failed
Prices PS - Outfall Structure	Outlet Structure	2	4	2	No retaining. Timber access plank with no handrails is unsafe
Mangawhero PS - Inlet Structure	Pumpstation Inlet Bay	2	4	2	Timber retainer rotten and failing
Waikaka North PS - Inlet Structure	Pumpstation Inlet Bay	3	4	1	Retaining wall at EOL
Reservoir Canal PS / FG - Switchboards and Controls	Switchboard and Controls	2	5	3	Very old fire risk and resilience risk
Kerepehi Extension PS - Outfall Structure	Outlet Structure	2	4	2	Retaining rotten and erosion
Poulgrains PS - Switchboards and Controls	Switchboard and Controls	2	4	2	Very old, fire risk
Wani Road PS - Pump	Pump: Axial Vertical Shaft	2	5	3	Pump end of life
Wani Road PS - Outfall Structure	Outlet Structure	2	4	2	Needs wing walls and ramp converting to steps
Wani Road PS - Pipework	Pipework	2	5	3	Pipe end of life
Awaiti South PS - Screen	Screen: Bar	2	4	2	Very rusty
Awaiti South PS - Inlet Structure	Pumpstation Inlet Bay	2	4	2	Timber retaining rotting bowing and failing

9.2 Floodgates

73% of the 60 floodgates are in average to good condition, meaning there are 16 floodgates that are condition 4 or 5. Where floodgates are in poor condition, it is frequently due to poor condition Inlets and Outlets; there are 6 inlets and 16 outlets in poor condition.



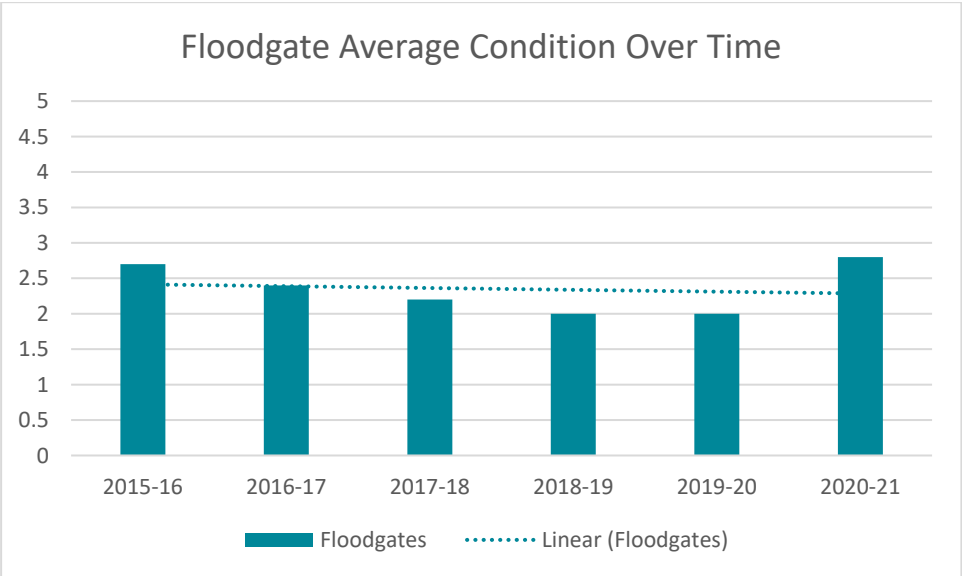


	No Change	Deteriorated	Improved
FG Component	71%	27%	2%
Floodgate	47%	53%	0%

100% of Round Flap Valves and Bank Revetment (Piles) had deteriorated, along with 49% of outlets and 38% of Rack and Pinion lifting gear.

Box Barrels and Rack and Pinion lifting gear showed the greatest improvements at 29% and 25% respectively.

The fact that Rack and Pinion lifting gear showed such high deterioration and improvement suggests a large discrepancy between the old and new condition assessment standards.



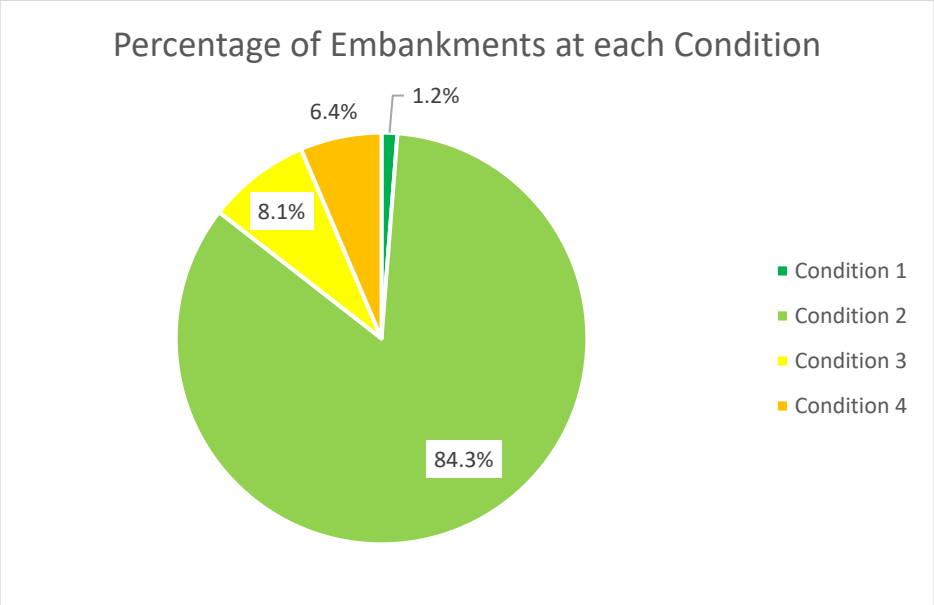
Similar to the Piako Pumpstations, this year shows a significant swing towards deterioration in the average condition. This could be due to the new condition scoring criteria, represent a genuine deterioration in the asset base, or be a combination of the two.

Description	Type description	Previous Year Condition	Current Condition Score	Condition Change	Current Inspection Notes
3) Reserve Floodgate	Floodgate: Conventional	2	4	2	See outlet notes
04) Marshalls Floodgate	Floodgate: Conventional	3	4	1	See other comments on assets
03) Pipiroa West Floodgate	Floodgate: Conventional	2	4	2	See outlet comments
04) Settlers Floodgate	Floodgate: Conventional	2	4	2	See notes for other individual assets
06) Duck Creek Floodgate	Floodgate: Conventional	2	4	2	See other comments on individual assets
08) Pauls Wharf Floodgate	Floodgate: Conventional	3	5	2	Asset being decommissioned
10) Paul Leonard Floodgate	Floodgate: Conventional	2	4	2	See outlet comments
11) Ngatea Township Floodgate	Floodgate: Diaphragm	2	4	2	See note on inlet concrete damage
04) Limeworks Floodgate	Floodgate: Conventional	2	4	2	See issues on individual assets
06) Phillips Road Twin Floodgate	Floodgate: Box	2	4	2	See inlet and outlet comments
10) Stitchburys Floodgate	Floodgate: Conventional	2	4	2	See inlet comments
10) Prices Single Floodgate	Floodgate: Conventional	2	4	2	See outlet comments
12) No.10 Floodgate	Floodgate: Box	2	4	2	See outlet and inlet comments
19) DOC Floodgate	Floodgate: Box	2	5	3	Outlet failed
15) Haughs Road Floodgate	Floodgate: Conventional	2	4	2	See comments on inlet and outlet
03) Pouarua Floodgate	Floodgate: Box	2	4	2	See outlet comments
Components					
Reserve FG - Outlet Structure	Outlet Structure	2	4	2	Silted up, retaining failed, access issues
Reserve FG - Lifting Gear Outlet	Lifting Gear: Chain and Winch	2	4	2	Chain end of life
Marshalls FG - Outlet Structure	Outlet Structure	3	4	1	Wing wall crack. Retaining knackered and erosion close to stop bank
Pipiroa West FG - Outlet Structure	Outlet Structure	2	4	2	Retaining knackered erosion getting close to stop bank
Settlers FG - Outlet Structure	Outlet Structure	2	4	2	Retaining knackered
Duck Creek FG - Outlet Timber Retaining Wall	Bank Revetment: Retaining Structures	2	4	2	Retaining structure knackered
Pauls Wharf FG - Outlet Structure	Outlet Structure	3	4	1	Retaining knackered
Pauls Wharf FG - Flapvalve	Valve: Flap Rectangular	2	5	3	.
Pauls Wharf FG - Lifting Gear Outlet	Lifting Gear: Chain and Winch	2	5	3	Missing
Paul Leonard FG - Outlet Structure	Outlet Structure	2	4	2	Earth collapse very close to stop bank
Ngatea Township FG - Inlet Structure	Inlet Structure	2	4	2	Concrete damage at flap sealing face big job to fix

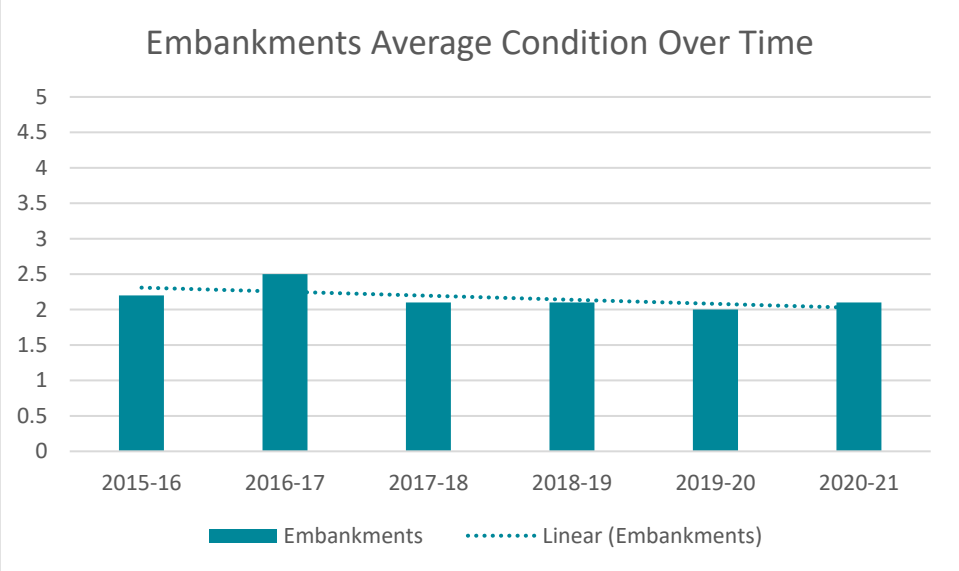
Description	Type description	Previous Year Condition	Current Condition Score	Condition Change	Current Inspection Notes
					but needs doing before gets worse
Pipiroa East FG - Outlet Structure	Outlet Structure	2	4	2	Outlet retaining wall collapsing
Limeworks FG - Inlet Structure	Inlet Structure	1	4	3	Inlet retainer is holding up stop bank and very weak bending a lot
Limeworks FG - Outlet Structure	Outlet Structure	2	4	2	Outlet retainer has a snapped whaler
James FG - Outlet Structure	Outlet Structure	2	4	2	Retaining walls knackered
Blakes FG - Outlet Structure	Outlet Structure	2	4	2	Outlet retaining failing
Phillips Road Twin FG - Inlet Structure	Inlet Structure	2	4	2	Retaining knackered
Phillips Road Twin FG - Outlet Structure	Outlet Structure	2	4	2	Retaining knackered erosion very close to stop bank
Stitchburys FG - Inlet Structure	Inlet Structure	2	4	2	Some cracks in concrete structure and timber retaining wall knackered
Prices Single FG - Outlet Structure	Outlet Structure	2	4	2	Erosion very close to stop bank. No retaining present at all
No.10 FG - Inlet Structure	Inlet Structure	2	4	2	Retaining wall knackered
No.10 FG - Outlet Structure	Outlet Structure	2	4	2	Retaining failing and concrete cracks
No.10 FG - Sluice Gate 1	Valve: Sluice Gate	2	5	3	Concrete sluice
No.10 FG - Sluice Gate 2	Valve: Sluice Gate	2	5	3	Concrete sluice
No.10 FG - Sluice Gate 3	Valve: Sluice Gate	2	5	3	Concrete sluice
TO BE DISPOSED - No.10 FG - Lifting Gear Inlet 1	Lifting Gear: Rack and Pinion	2	5	3	End of life
TO BE DISPOSED - No.10 FG - Lifting Gear Inlet 2	Lifting Gear: Rack and Pinion	2	5	3	End of life
TO BE DISPOSED - No.10 FG - Lifting Gear Inlet 3	Lifting Gear: Rack and Pinion	2	5	3	End of life
DOC FG - Outlet Structure	Outlet Structure	2	5	3	Completely failed
DOC FG - Pipe	Barrel: Box	2	4	2	Pipe could be wooden stave. Exposed and 1/2 blocked
Haughs Road FG - Inlet Structure	Inlet Structure	2	4	2	Retaining wall end of life
Haughs Road FG - Outlet Structure	Outlet Structure	2	4	2	Channel blocked up with vegetation needs a good clean out and understand how exposed the ends of the stop bank are
Carters Block FG - Sluice Gate 2	Valve: Sluice Gate	2	5	3	To be replaced this year
Carters Block FG - Sluice Gate 1	Valve: Sluice Gate	2	5	3	To be replaced this year
Pouarua FG - Outlet Structure	Outlet Structure	2	4	2	Retaining failed

9.3 Embankments

94.6% of the 133km of embankments surveyed in Piako are in average to very good condition, with 85.5% in good or very good condition. Vegetation was the concern most mentioned in the inspection notes.



	Deteriorated	Improved	No Change
Sum of Length (km)	14.48%	1.24%	84.28%



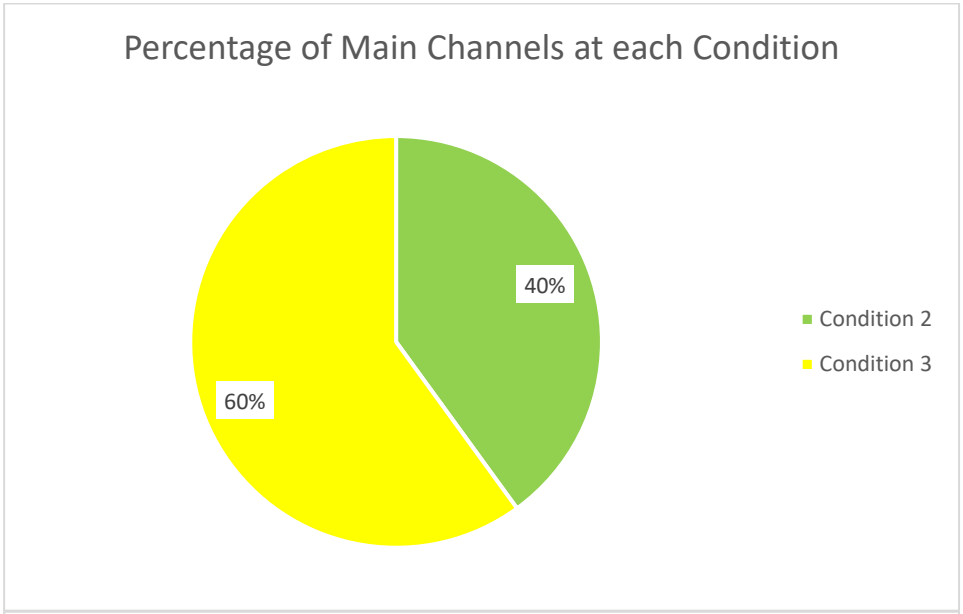
The trend is for a slow improvement in average condition; there is a very small rise this year but it is statistically negligible. Maintenance programs for stopbanks appear to be generally successful.

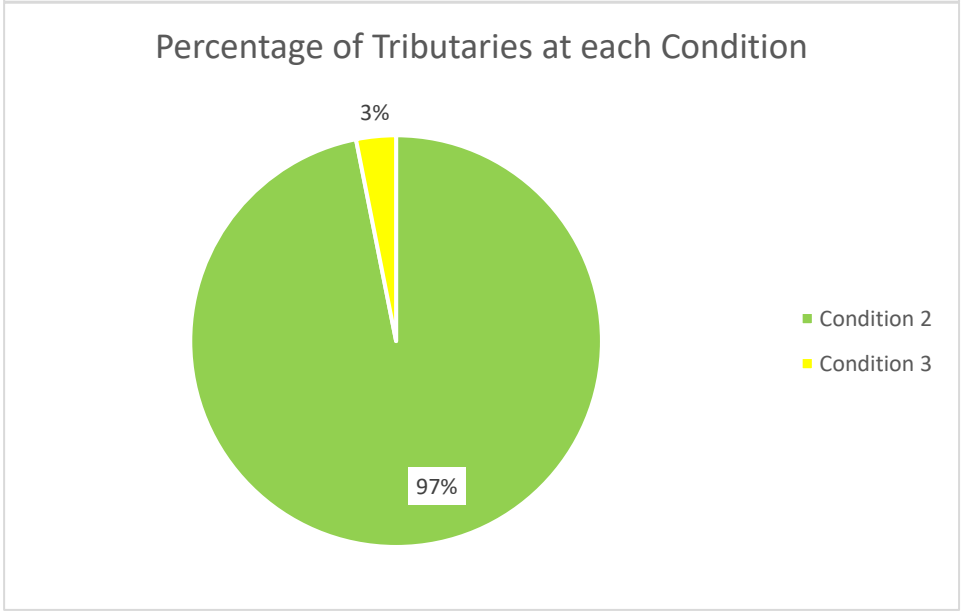
As seen below, Awaiti: Reservoir Canal Road to Tee Head SB is the only stopbank in poor condition currently. This has a ConQuest action for an upgrade scheduled for Summer 21/22, so the issue is being actively managed.

Description	Type description	Previous Year Condition	Current Condition Score	Condition Change	Length (km)	Current Inspection Notes
Awaiti: Reservoir Canal Road to Tee Head SB	Stopbank	2	4	2	8.5	No fence along entirety of channel, river side of bank quite damaged,

9.4 Main Channels and Tributaries

362km of Main channels and Tributaries were inspected this year, with all of it being in an average to good condition. Inspection notes mention the need for dredging of main channels and erosion as the main concerns.



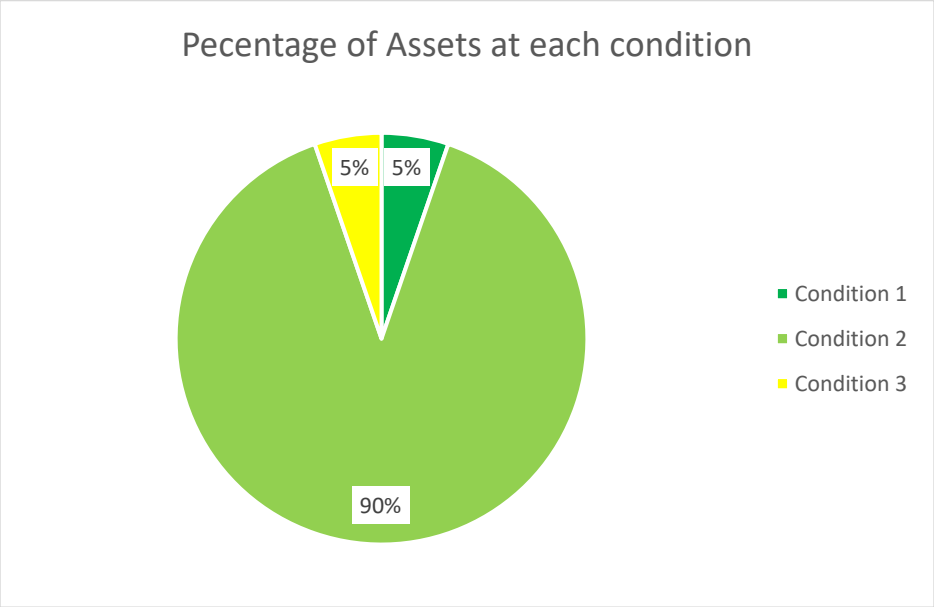


Row Labels	Deteriorated	Improved	No Change
Main Channel	26%	0%	74%
Tributary	2%	21%	77%

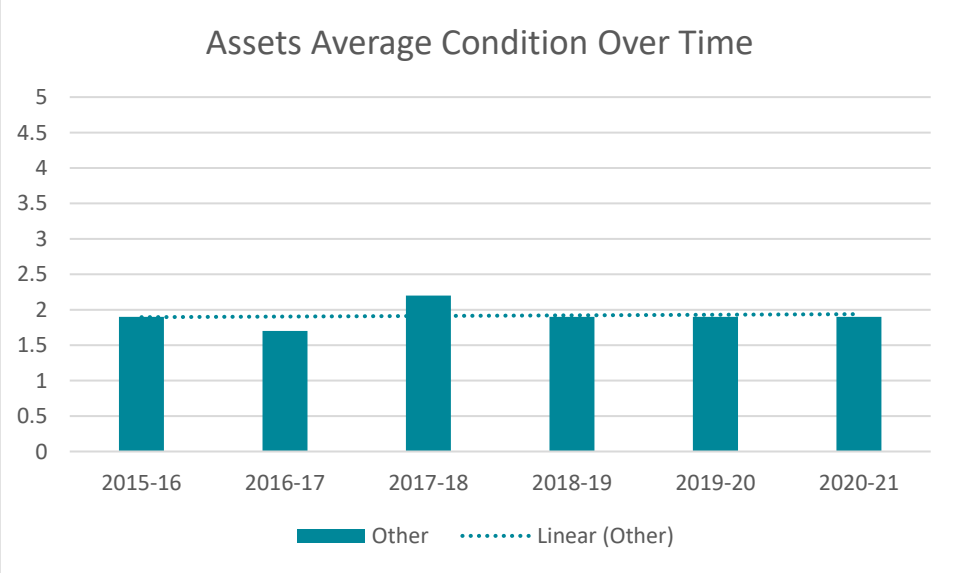
There is not sufficient data going back through the years to produce any useful trend information.

9.5 Other

Of the 19 assets that fell into the "Other" category, all were found to be in average to very good condition with very minimal deterioration.



	Deteriorated	Improved	No Change
Other Assets	11%	5%	84%



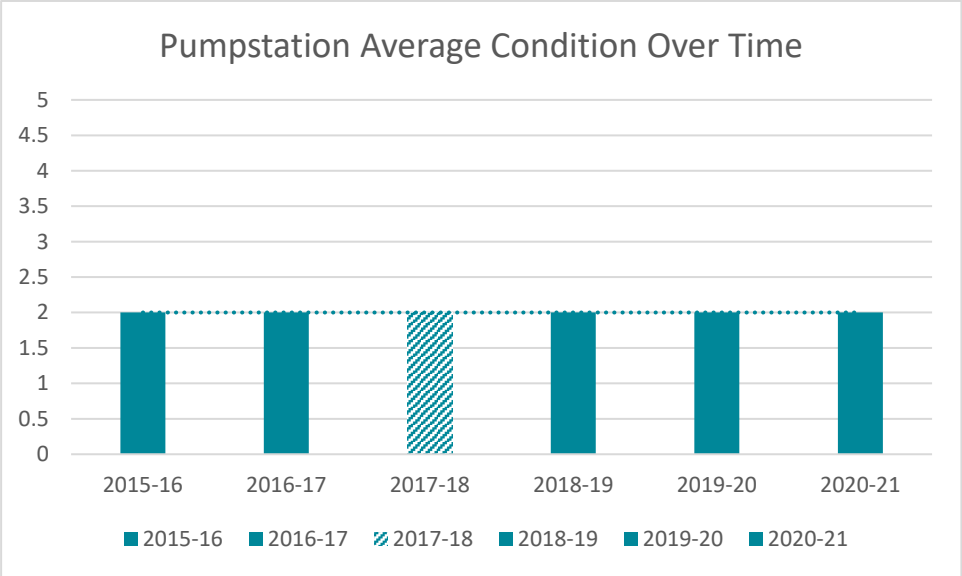
Row Labels	0	1	2	3
Bank Revetment: Piles			2	
Bridge: Timber/Steel	1		2	
Canal			3	1
Culvert: Conventional			5	
Groynes		1	1	
Rip-Rap			4	
Grand Total	1	1	17	1

10 Thames Valley

10.1 Pumpstations

There is one Pumpstation in Thames Valley and it was graded as a condition 2 with no change on last year. All components were also graded at condition 2, with some components showing improvement.

	No Change	Improved
PS Component	93%	7%
Pumpstation	100%	0%

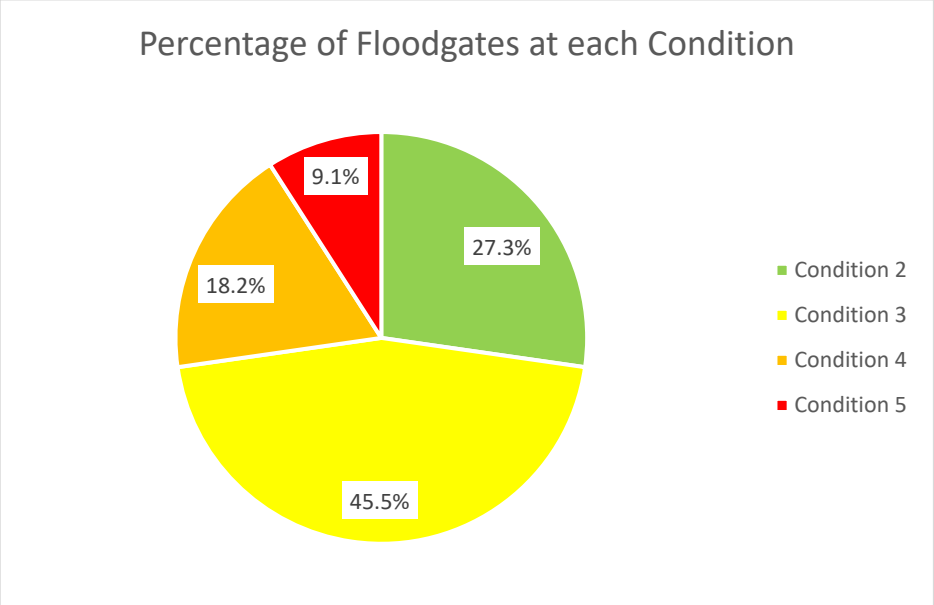


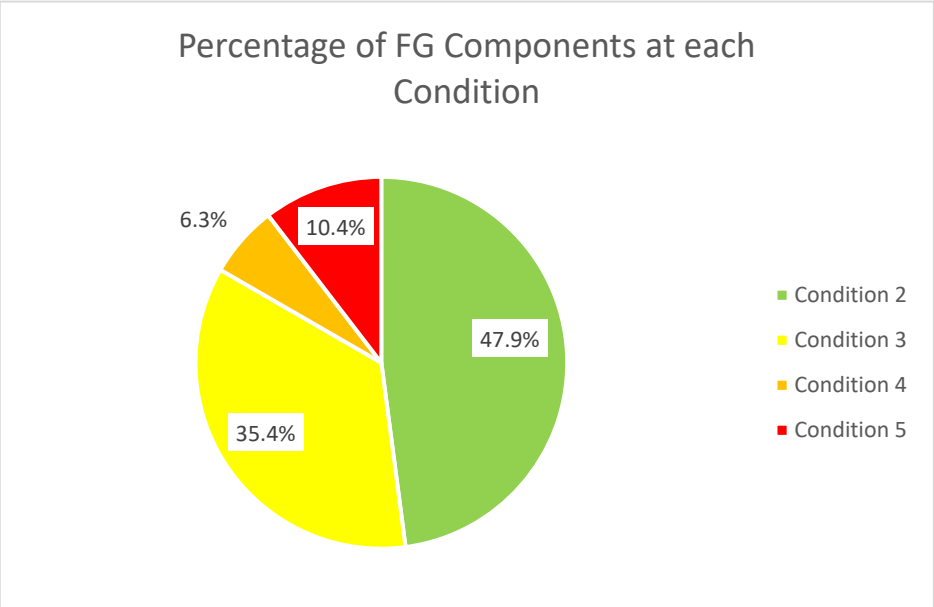
Pumpstation average condition has remained absolutely stable over time, indicating that the maintenance on this pumpstation being done regularly and to a high standard. Due to the fact it is only one station though it is unlikely to be something that can be applied more broadly.

10.2 Floodgates

There are 11 floodgates in Thames Valley; 73% are in an average to good condition, with 3 in a poor or very poor condition.

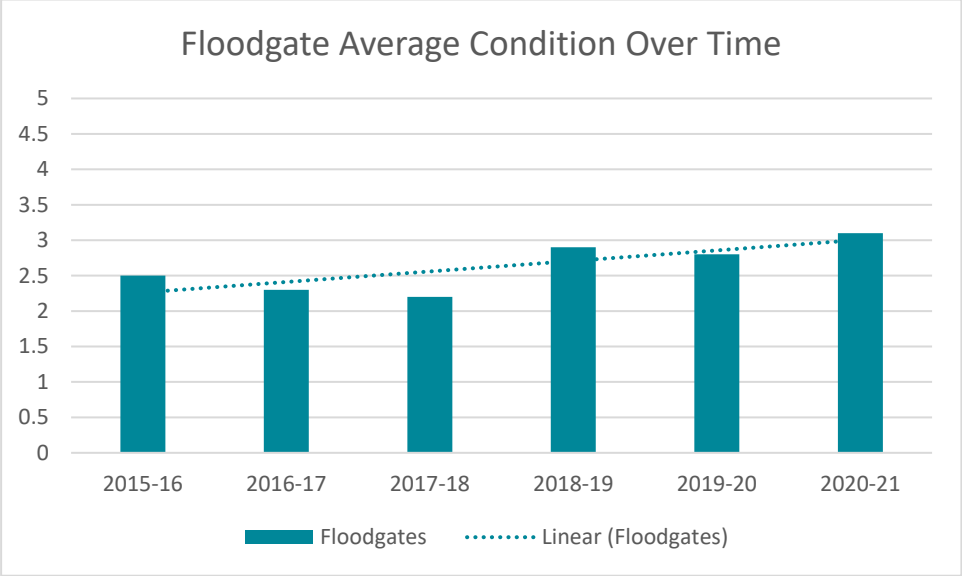
The floodgates in a poor condition mostly had issues with Inlets and Outlets, these component asset types also showed the greatest deterioration. These asset types, along with Rack and Pinion lifting gear also showed the greatest deterioration since last year.





	No Change	Deteriorated	Improved
FG Component	52%	40%	8%
Floodgate	18%	55%	27%

The most improved asset type was Chain and Winch lifting gear.

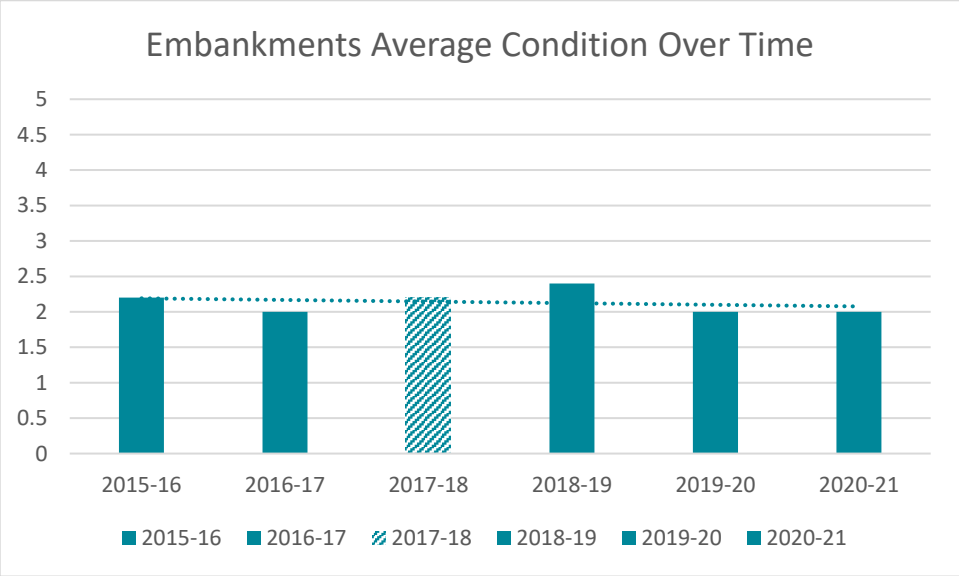


Floodgate Average condition has been deteriorating steadily over the last six years. This, combined with the 55% deterioration this year suggests that there may be a large number of assets needing major attention in Thames Valley in the next 10 years. To avert this, the current maintenance schedule should be reviewed for effectiveness.

Asset ID	Description	Type description	Previous Year Condition	Current Condition Score	Condition Change	Current Inspection Notes
23718	Whakahoro Road West R1 Floodgate	Floodgate: Conventional	4	5	1	Major issues
25226	Zig Zag Right Bank Floodgate 3	Floodgate: Conventional	2	4	2	Inlet retaining has failed
27475	Moore-Hopper Floodgate	Floodgate: Conventional	3	4	1	Outlet issues
Components:						
14820	Whakahoro Road FG - Outlet Structure	Outlet Structure	2	5	3	Stop bank collapsing above asset
76728	Whakahoro Road FG - Inlet Structure	Inlet Structure	3	4	1	Retaining failed and inlet platform failed
76729	Whakahoro Road FG - Sluice Gate 1	Valve: Sluice Gate	4	5	1	Dangerous
76730	Whakahoro Road FG - Sluice Gate 2	Valve: Sluice Gate	4	5	1	Dangerous
76731	Whakahoro Road FG - Inlet Lifting Gear 1 & 2	Lifting Gear: Rack and Pinion	4	5	1	Dangerous
79075	Whakahoro Road FG - Service Beam	Service Beam	2	5	3	Needs a service beam installed
14825	Zig Zag Right Bank FG 3 - Inlet Structure	Inlet Structure	2	4	2	Retaining failed
14829	Moore-Hopper FG - Outlet Structure	Outlet Structure	3	4	1	Major issue with retaining

10.3 Embankments

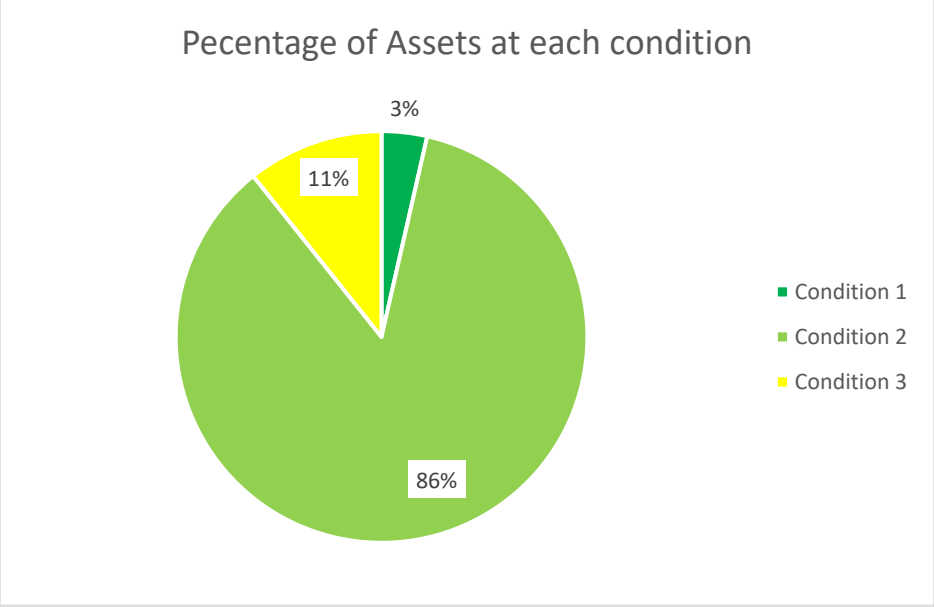
There are 4km of Embankments in Thames Valley and all are Condition 2 with no change from last year.



Average condition has been mostly stable with some fluctuations, suggesting the stopbank maintenance is keeping pace with any degradation that is occurring. The patterned bar denotes an interpolated value.

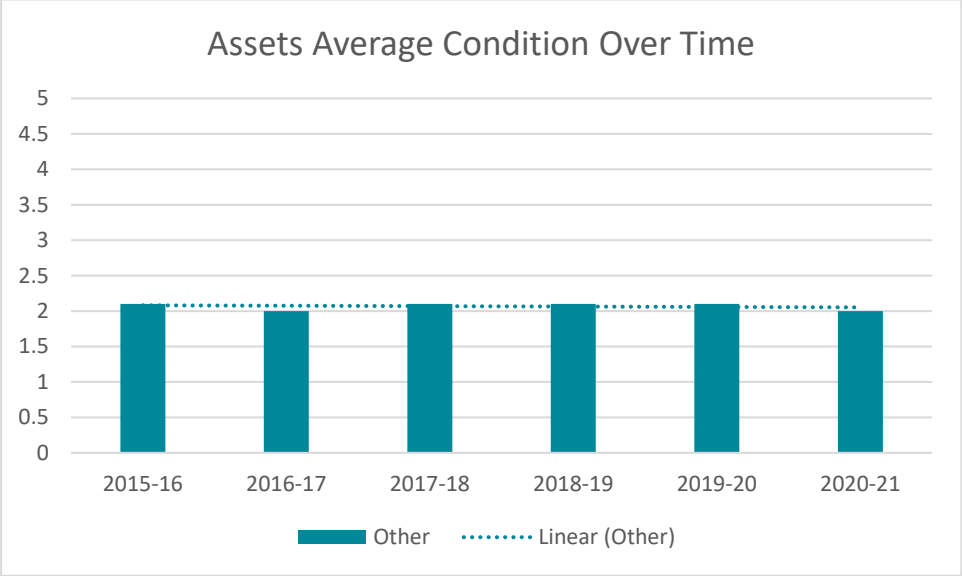
10.4 Other

There are 28 assets that fall into the "Other" category, of these all are in an average to very good condition, with 89% in good or very good condition.



	Deteriorated	Improved	No Change
Other Assets	11%	11%	76%

The even deterioration to improvement ratio suggests that current maintenance efforts are keeping pace with the natural decline in condition over time.



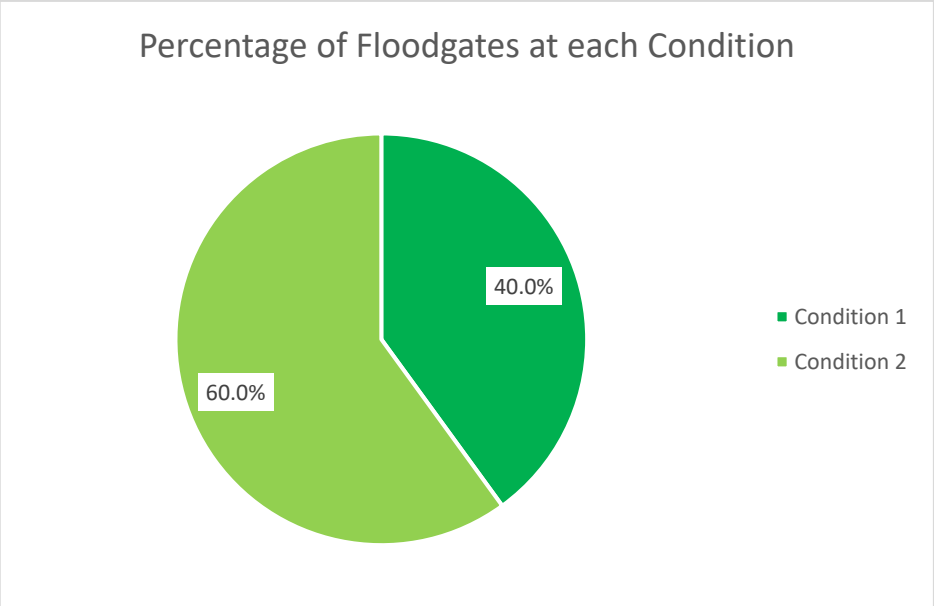
Average condition has been stable over time with almost no fluctuation.

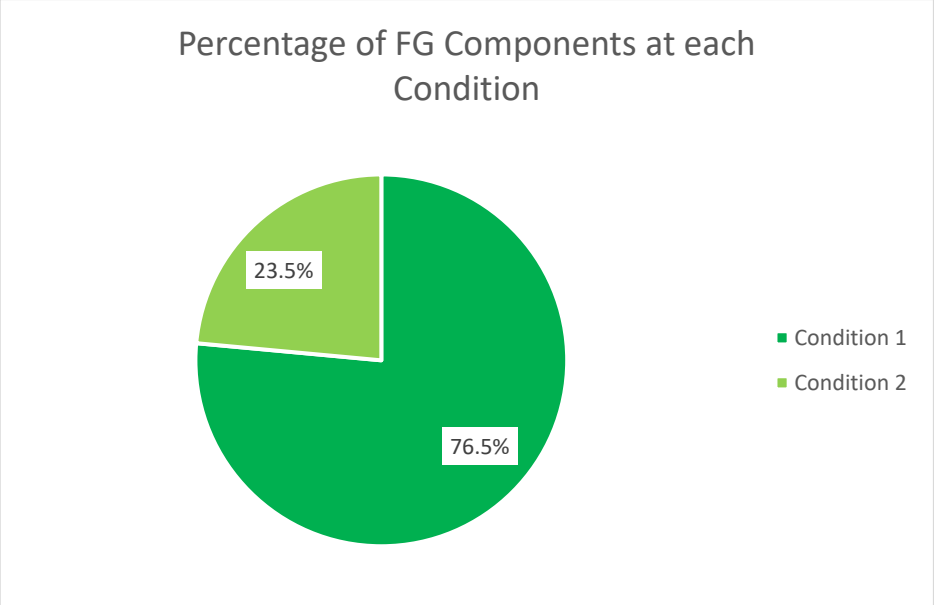
	1	2	3
Bank Revetment: Retaining Structures	1	15	3
Culvert: Conventional		1	
Drop Structures		8	
Grand Total	1	24	3

11 Coromandel

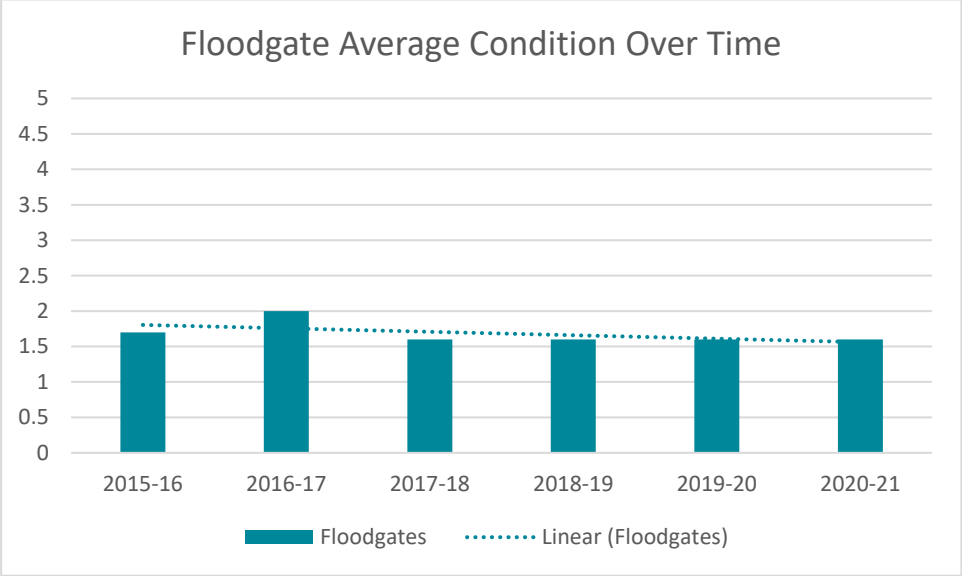
11.1 Floodgates

All floodgates in Coromandel are in good or very good condition with very little change from last year.





Row Labels	No Change	Improved
FG Component	82%	18%
Floodgate	100%	0%

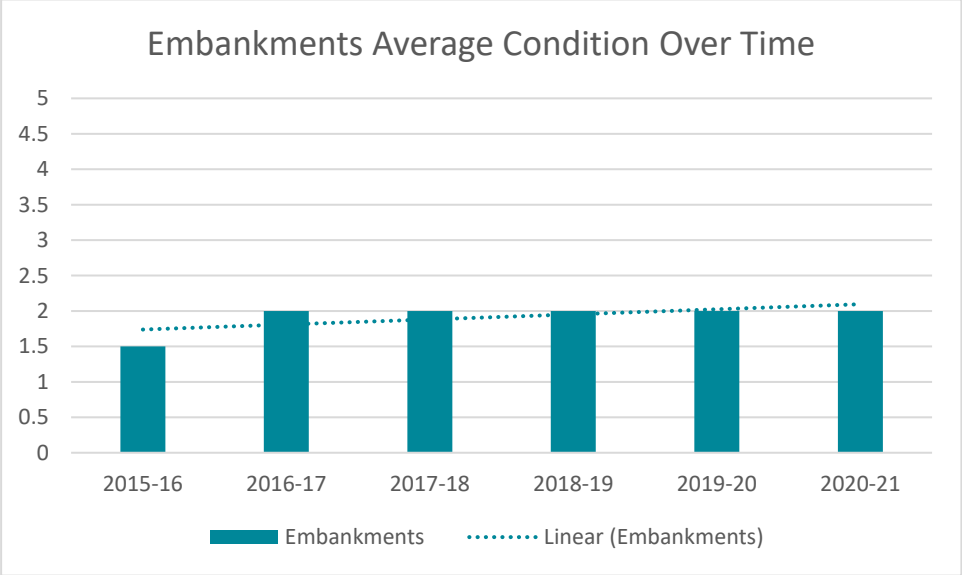


The overall trend for Coromandel Floodgates is one of stability. Year on year there is little change in the condition of these assets and inspection notes typically describe few issues other than vegetation.

The maintenance in this area appears to be keeping pace with natural decline.

11.2 Embankments

There are 16 Embankments in Coromandel totalling 1.95km. These are all scored a 2 with no changes from last year.

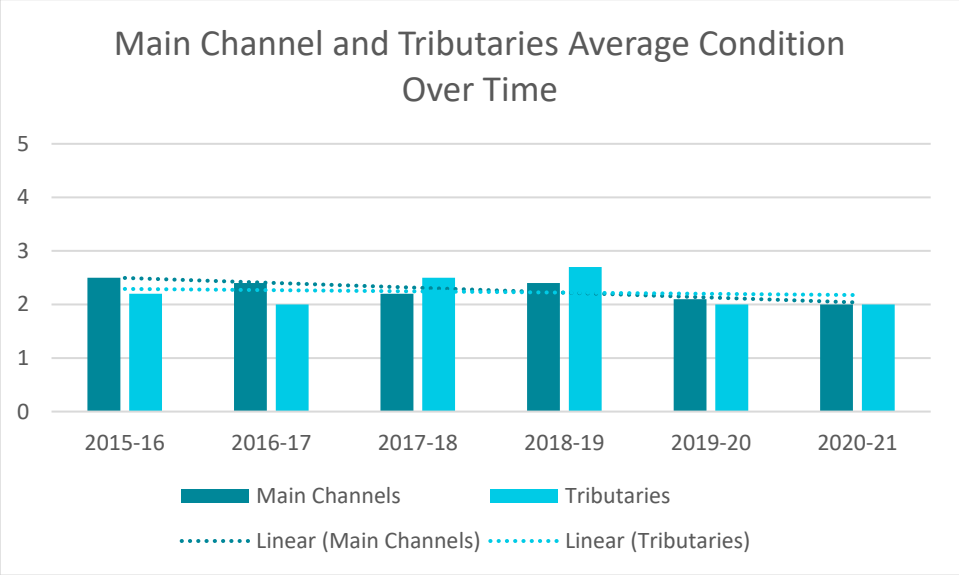


Similar to Floodgates, Embankments in Coromandel show a trend of stability with very little change. The inspection notes for these assets show a variety of minor defects to be addressed.

11.3 Main Channels and Tributaries

All Main Channels and Tributaries in Coromandel were graded at condition 2. Inspection notes for Coromandel listed erosion control and vegetation as the most common issues to be addressed.

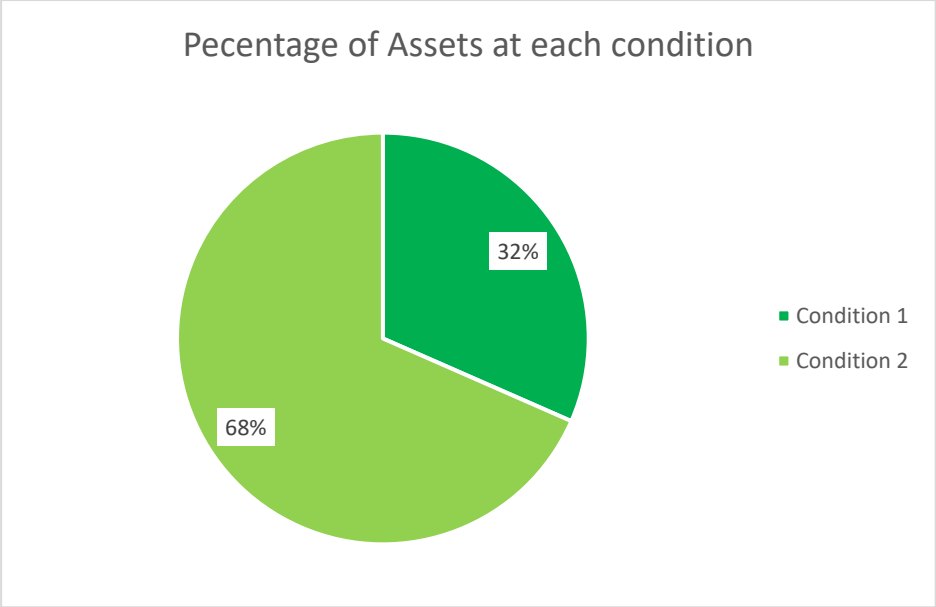
	Improved	No Change
Main Channel	40%	60%
Tributary	73%	27%



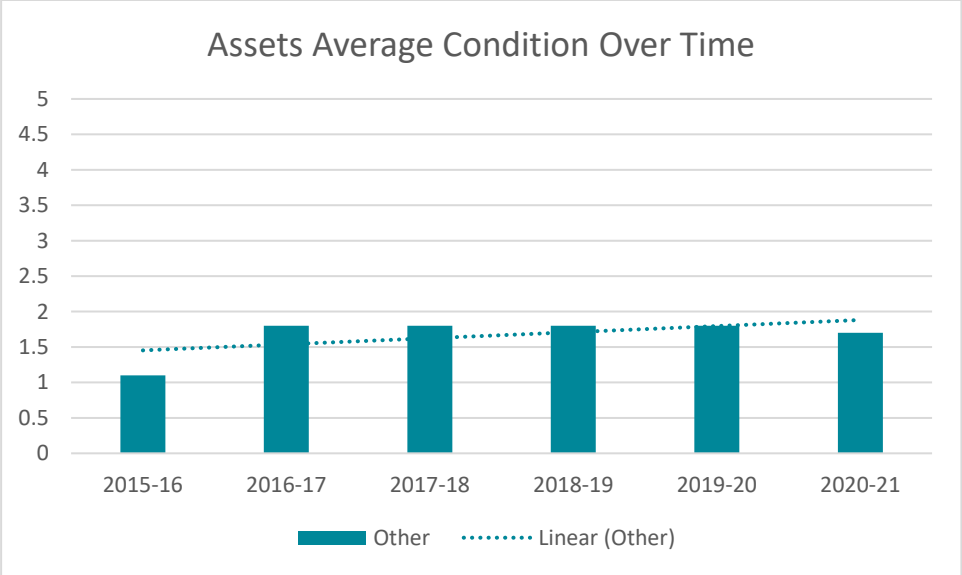
There is a general trend of improvement in Coromandel's main channels and tributaries. Work should be done to ascertain why, and how we can replicate this elsewhere.

11.4 Other Assets

All assets falling into the "Other" category are in good or very good condition, with the inspection notes listing vegetation control as the main concern.



	Improved	No Change
Other Assets	11%	89%



The overall trend is very stable with no major fluctuations, improvements, or declines.

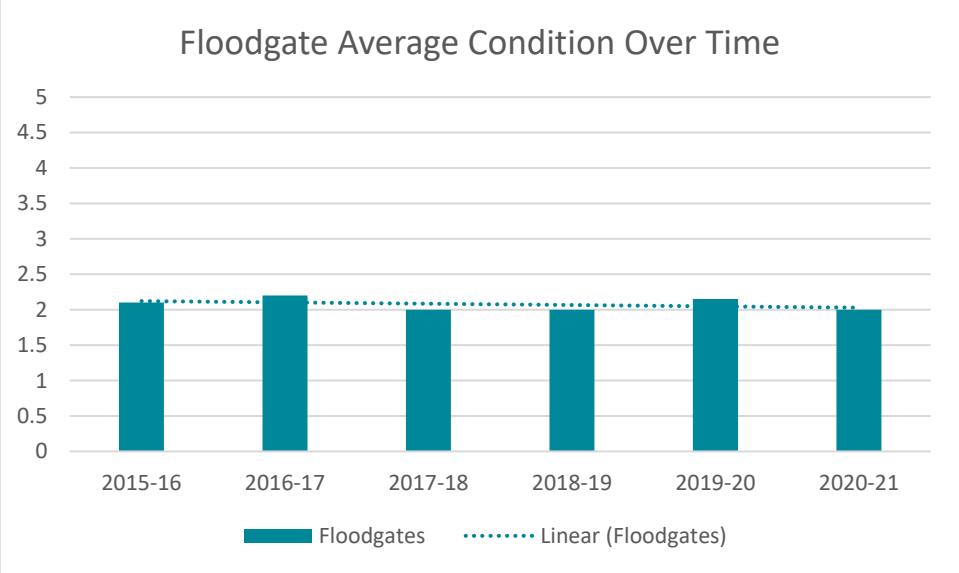
	1	2
Bank Revetment: Retaining Structures		2
Canal	2	1
Rip-Rap	4	10
Grand Total	6	13

12 Lake Taupo

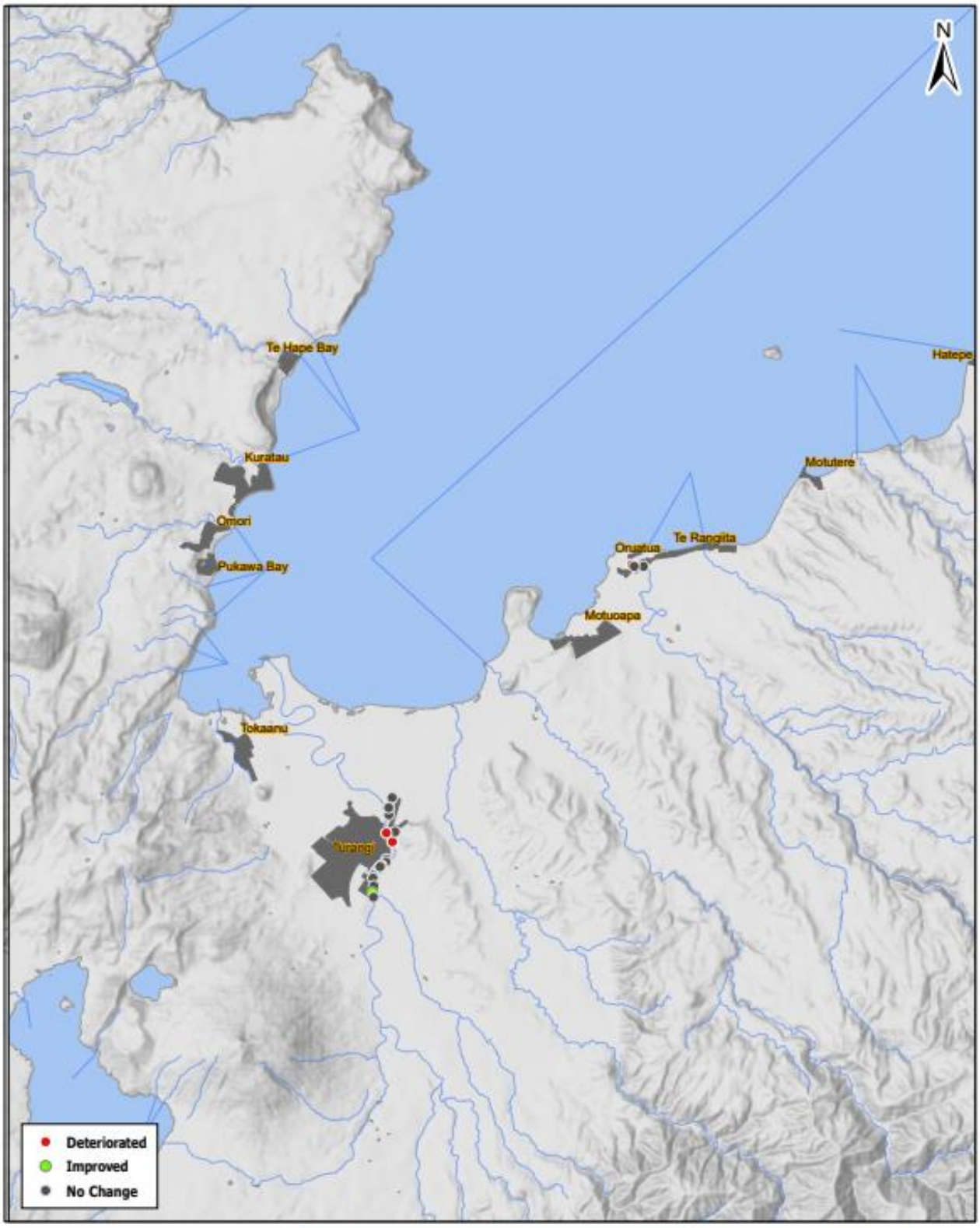
12.1 Floodgate

There were 2 floodgates that could not be inspected due to overgrown vegetation. All of the remaining floodgates and their components were graded as Condition 2.

	No Change	Improved
FG Component	96%	4%
Floodgate	96%	4%



The trend for Floodgates is very stable with no major fluctuations.



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Condition data provided by ICM - Hyperion report.

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Floodgate Condition Change map.

2020-21

ICM Zone: Lake Taupo

0 1 2 3 4 5 km

Scale at A4
= 1:150,000

Created by: AJH
Date: 27/05/2021
Version: 1

File: REQ173114_

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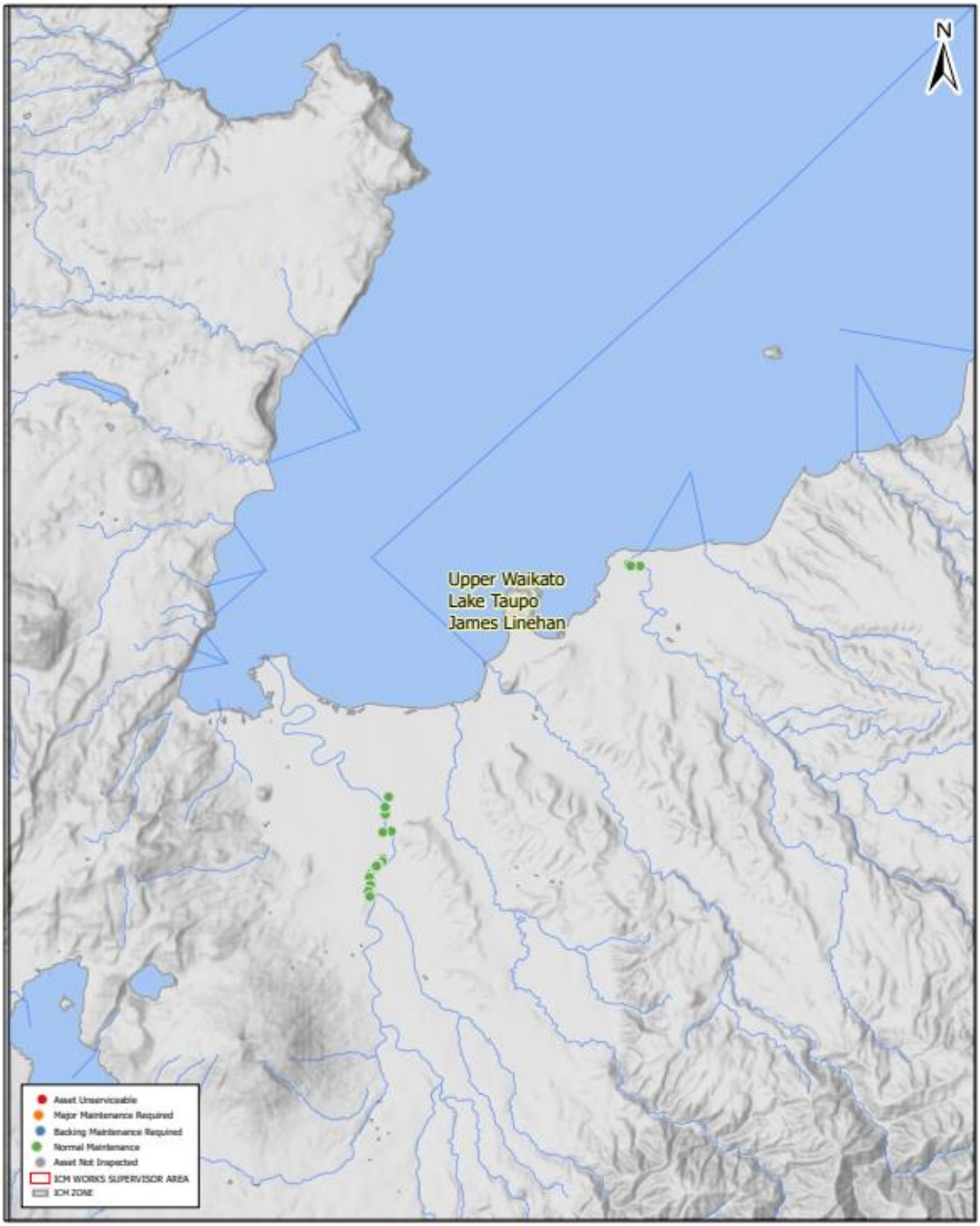

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Condition data provided by ICM - Hyperion report.

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Floodgate Condition map.

2020-21

ICM Zone: Lake Taupo
Work Supervisor Area (labelled)

0 1 2 3 4 5 km

Scale at A4
= 1:150,000

Created by: AJH
Date: 17/05/2021
Version: 1

File: REQ173114_

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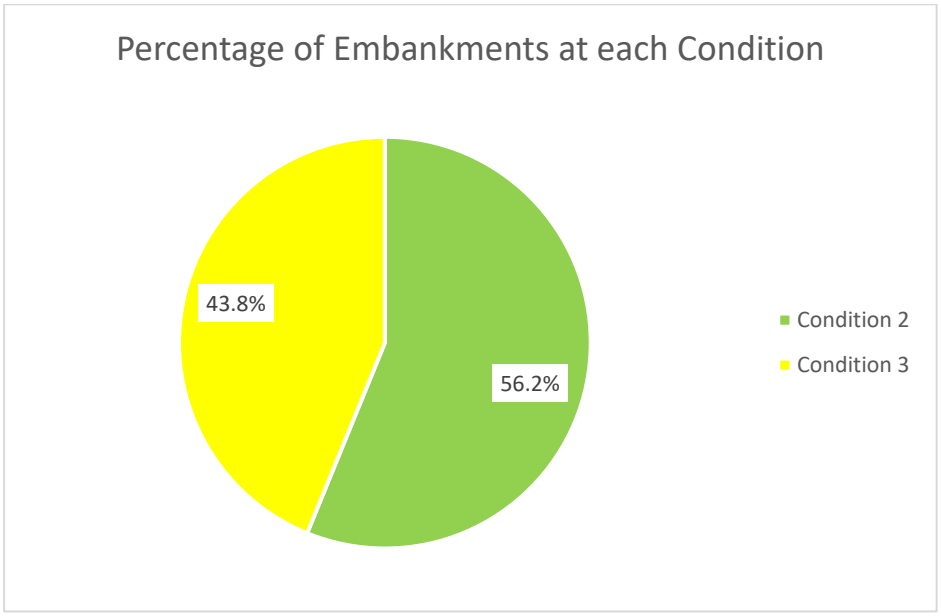
12.2 Embankments

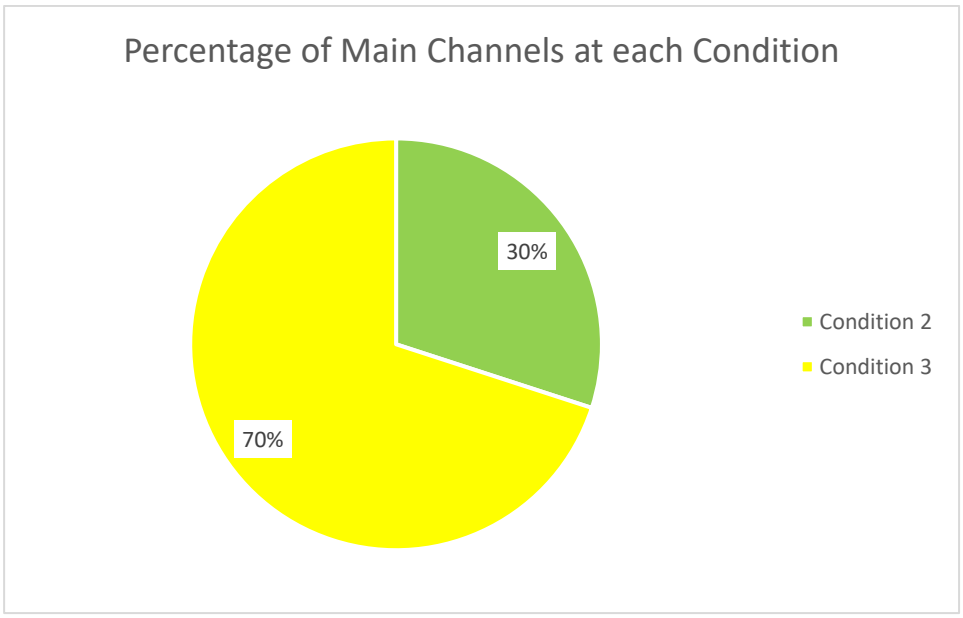
All Embankments are in average to good condition. Inspection notes were not available at the time of writing, so it is difficult to determine the most critical issues affecting these assets.



Change data and Maps are not available for these assets.

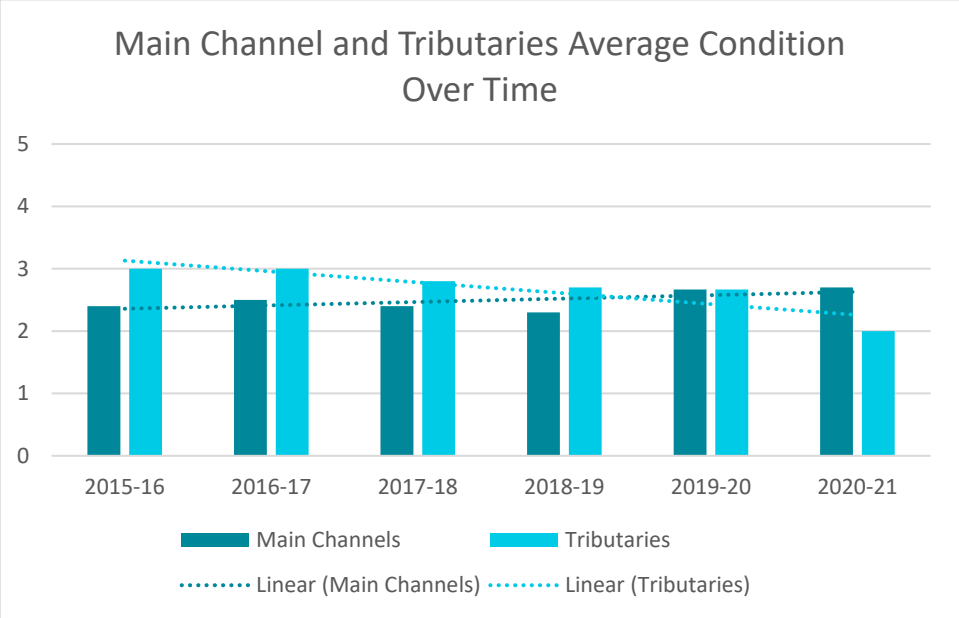
12.3 Main Channels and Tributaries

All main channels and tributaries are in an average to good condition. The inspection notes list erosion, blockages, and invasive willows as being of concern to these waterways.



All Tributaries were graded at Condition 2.

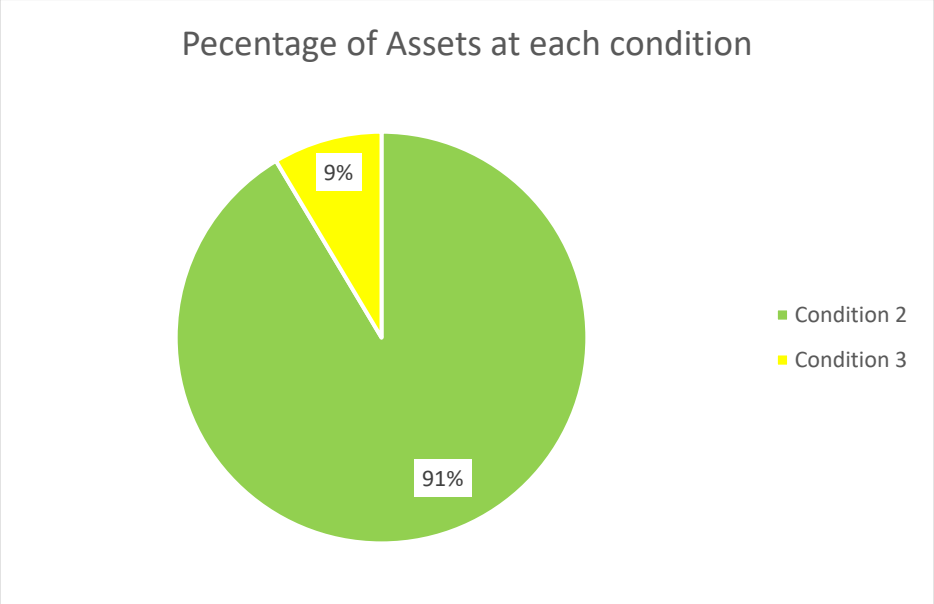
	Deteriorated	Improved	No Change
Main Channel	14%	0%	86%
Tributary	0%	97%	3%



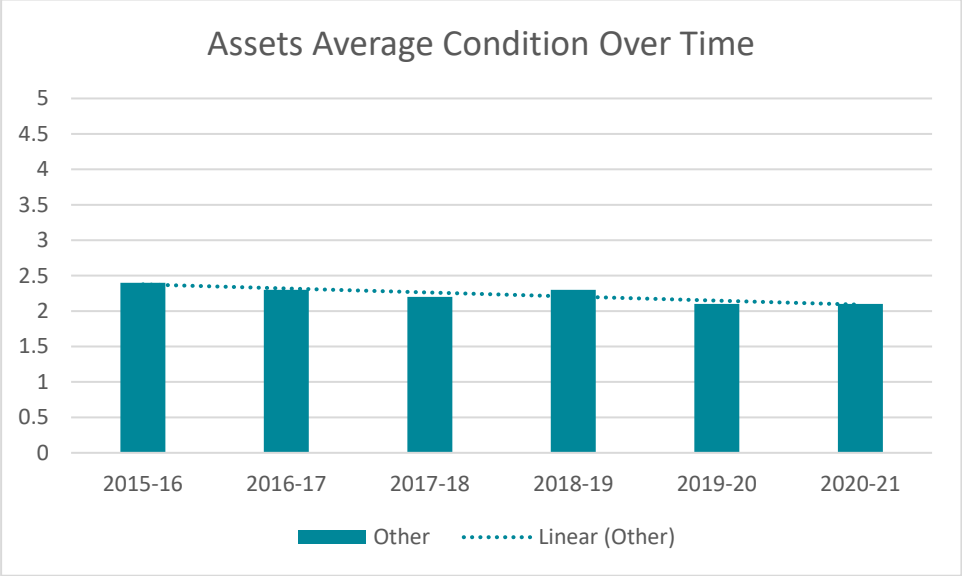
The trend for Main channels is for stability, whilst the tributaries are improving slightly.

12.4 Other Assets

All Other assets were found to be in average to good condition with vegetation control and sediment/silt build up being the main issues mentioned in the inspection notes.



	Deteriorated	Improved	No Change
Other Assets	3%	15%	82%



The average condition of the Other Assets is stable over the last six years.

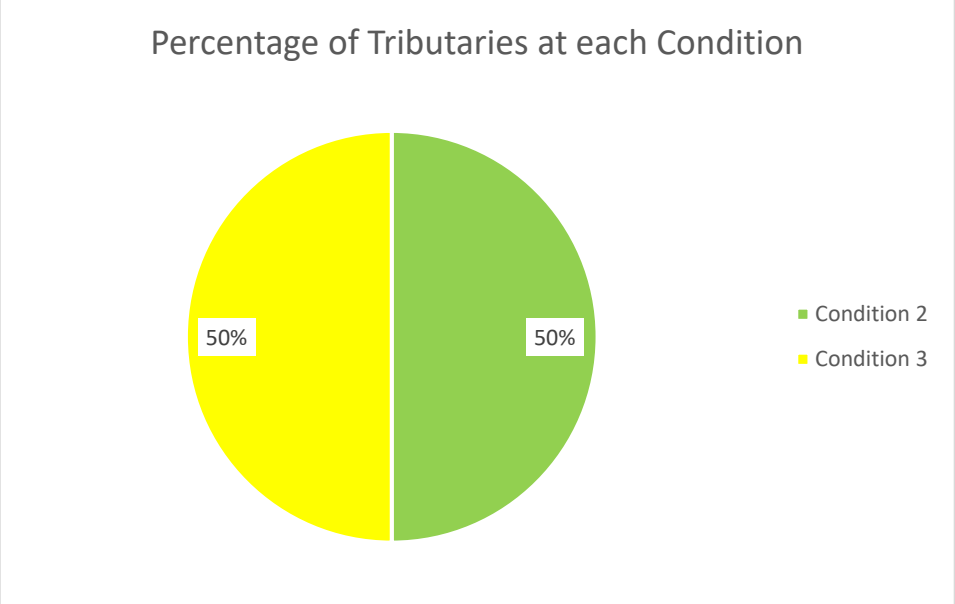
	2	3
Canal	1	1
Culvert: Conventional	2	
Fence: Conventional	1	
Ford Crossing	1	
Groynes	1	
Inlet Structure	1	
Outlet Structure	2	
Rip-Rap	22	1
Sediment Ponds		1
Weir: Rock	1	
Grand Total	32	3

13 Waipa

13.1 Main Channels and Tributaries

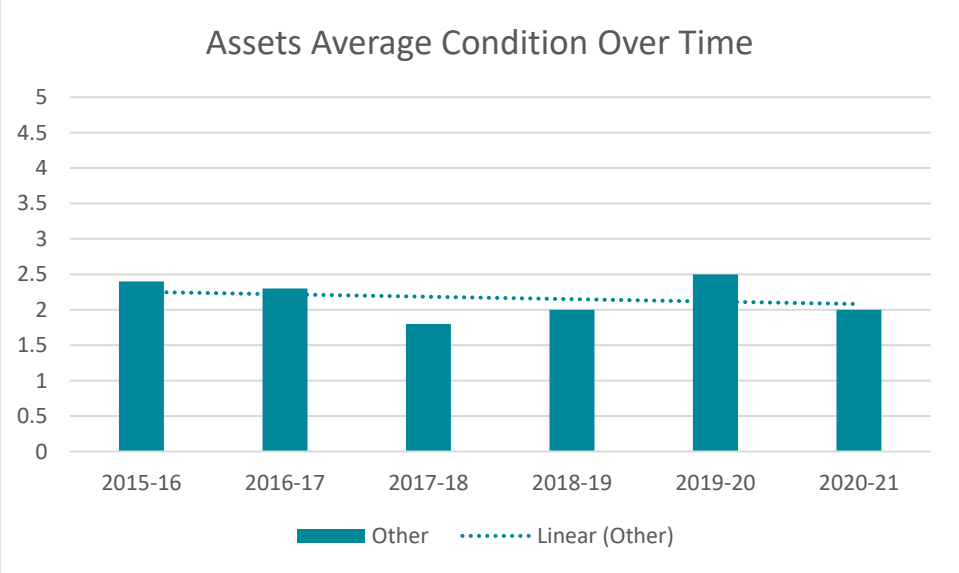
There were no main channels inspected in Waipa this year, only tributaries. These were found to be in average to good condition with no changes from the previous year. The inspection notes mention some gorse removal being required.

There is insufficient data to generate a trend for Waipa Main Channels and Tributaries.



13.2 Other Assets

The only asset inspected this year was the Lake Rotokauri Weir, which was graded as Condition 2 with no change from last year. The inspection notes list a slight warp in the wooden structure as being of concern.



This trend is stable, changing little in the last 5 years.