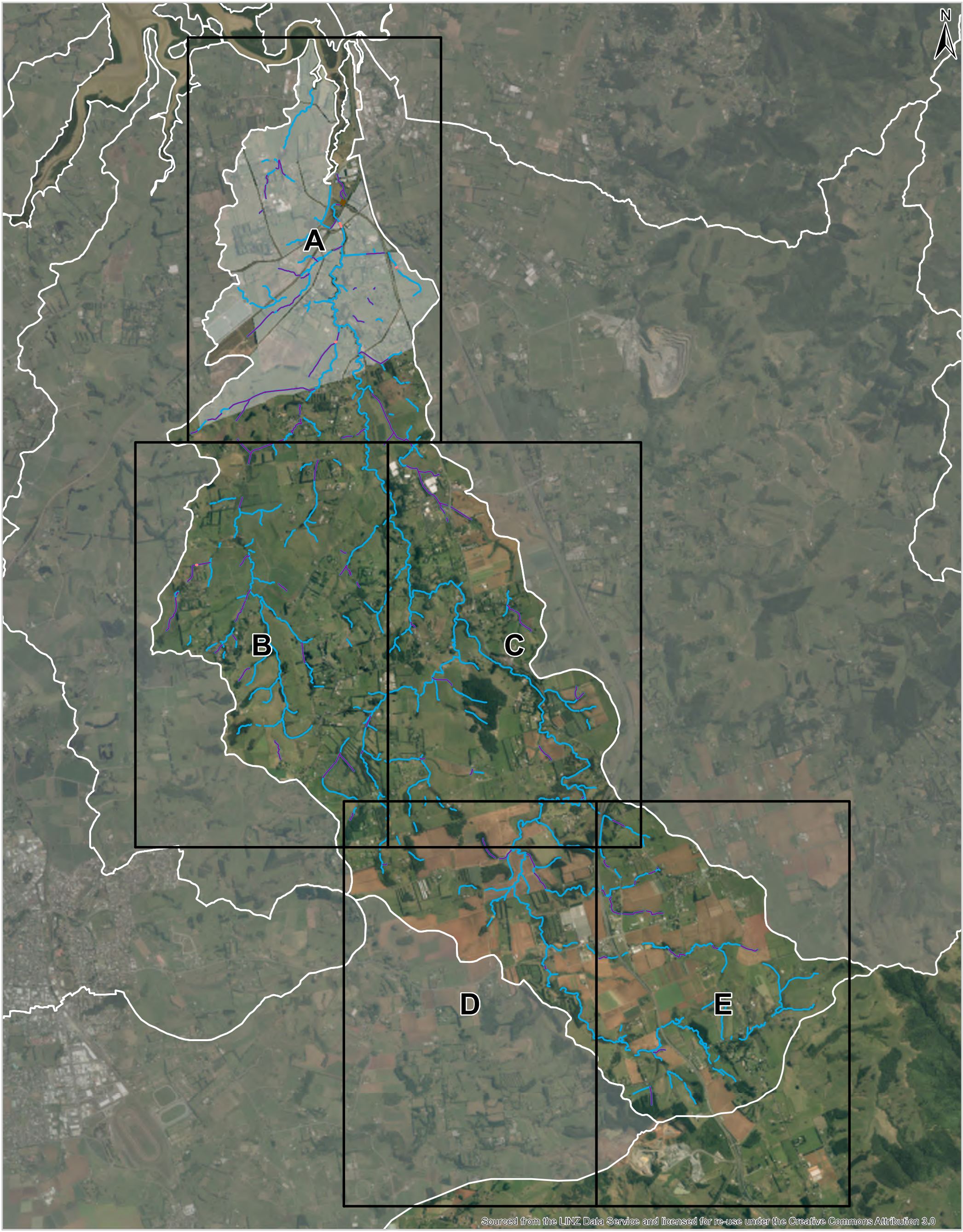
Map3 - Bank and Channel Modification Type & Extent



Bank and Channel Lining

- Cast In Situ Concrete
- Galvanised iron or steel
- Gabion Basket
- Masonry Block
- Other
- Reno mattress channel
- Rock
- Timber
- Ceramic/Earthenware

Stormwater Fitting

- Catchpit
- Inlet or outlet
- Manhole
- Quality/Treatment device
- Stormwater Drain

- Stormwater Catchments
- Ecoline - no modifications
- Ecoline - other channel modifications
- Future Urban Zone

Client AUCKLAND COUNCIL

Project NGAKAROA WAR

0 1,000 2,000 m

Project no. P01644

Date 16 Jun 2018

Drawn CU

Approved RI

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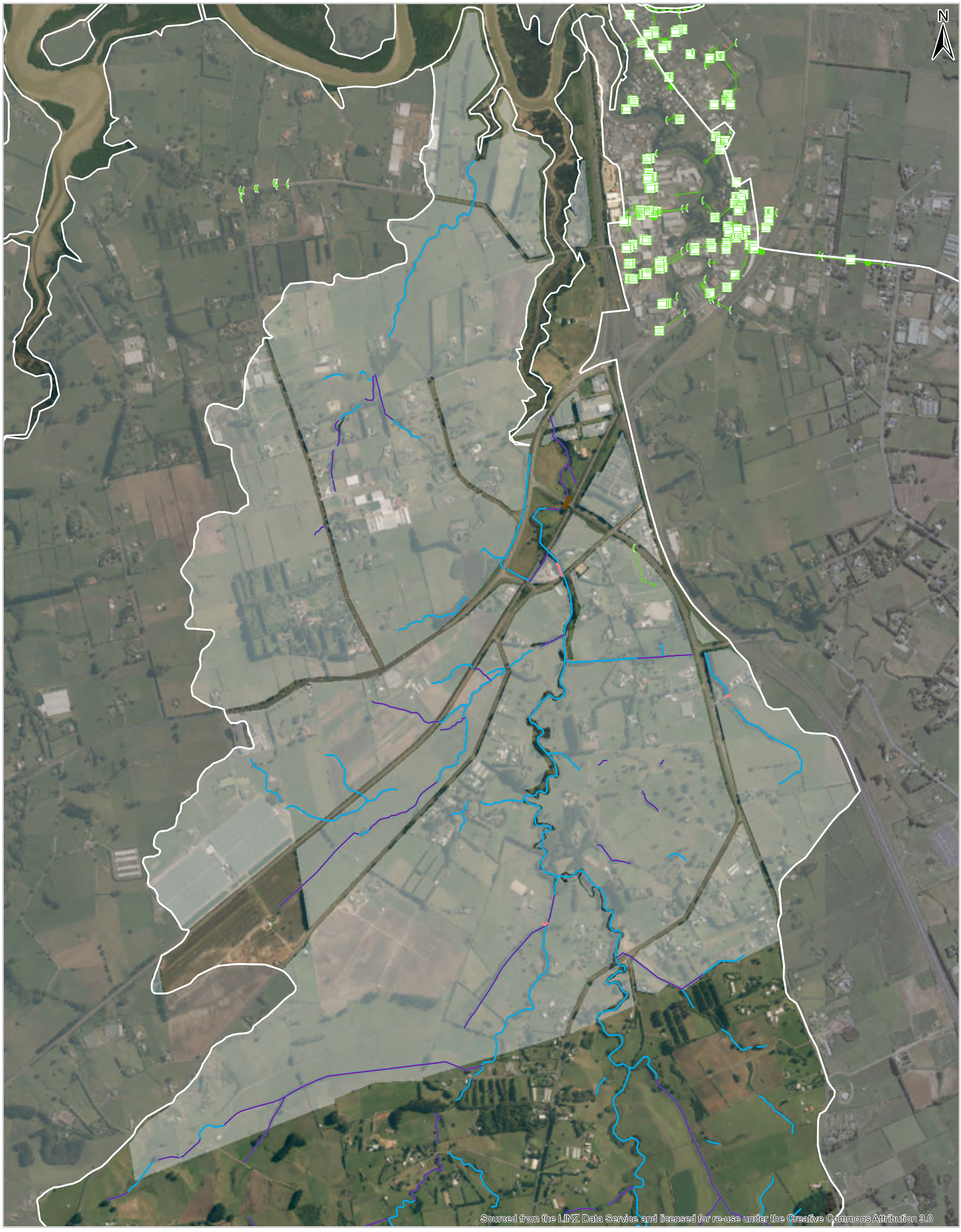
Map3A - Bank and Channel Modification Type & Extent



Bank and Channel Lining

- Cast In Situ Concrete
- Galvanised iron or steel
- Gabion Basket
- Masonry Block
- Other
- Reno mattress channel
- Rock
- Timber
- Ceramic/Earthenware

Stormwater Fitting

- Catchpit
- Inlet or outlet
- Manhole
- Quality/Treatment device
- Stormwater Drain

- Stormwater Catchments
- Ecoline - no modifications
- Ecoline - other channel modifications
- Future Urban Zone

0 330 660 m

Client AUCKLAND COUNCIL
Project NGAKAROA WAR

Project no. P01644
Date 16 Jun 2018
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Map3B - Bank and Channel Modification Type & Extent

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Bank and Channel Lining

- Cast In Situ Concrete
- Galvanised iron or steel
- Gabion Basket
- Masonry Block
- Other
- Reno mattress channel
- Rock
- Timber
- Ceramic/Earthenware

Stormwater Fitting

- Catchpit
- Inlet or outlet
- Manhole
- Quality/Treatment device
- Stormwater Drain

- Stormwater Catchments
- Ecoline - no modifications
- Ecoline - other channel modifications
- Future Urban Zone

0 330 660 m

Client AUCKLAND COUNCIL
Project NGAKAROA WAR

Project no. P01644
Date 16 Jun 2018
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Map3C - Bank and Channel Modification Type & Extent

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Bank and Channel Lining

- Cast In Situ Concrete
- Galvanised iron or steel
- Gabion Basket
- Masonry Block
- Other
- Reno mattress channel
- Rock
- Timber
- Ceramic/Earthenware

Stormwater Fitting

- Catchpit
- Inlet or outlet
- Manhole
- Quality/Treatment device
- Stormwater Drain
- Stormwater Catchments
- Ecoline - no modifications
- Ecoline - other channel modifications
- Future Urban Zone

Client AUCKLAND COUNCIL

Project **NGAKAROA WAR**

0 330 660 m

Project no. P01644

Date 16 Jun 2018

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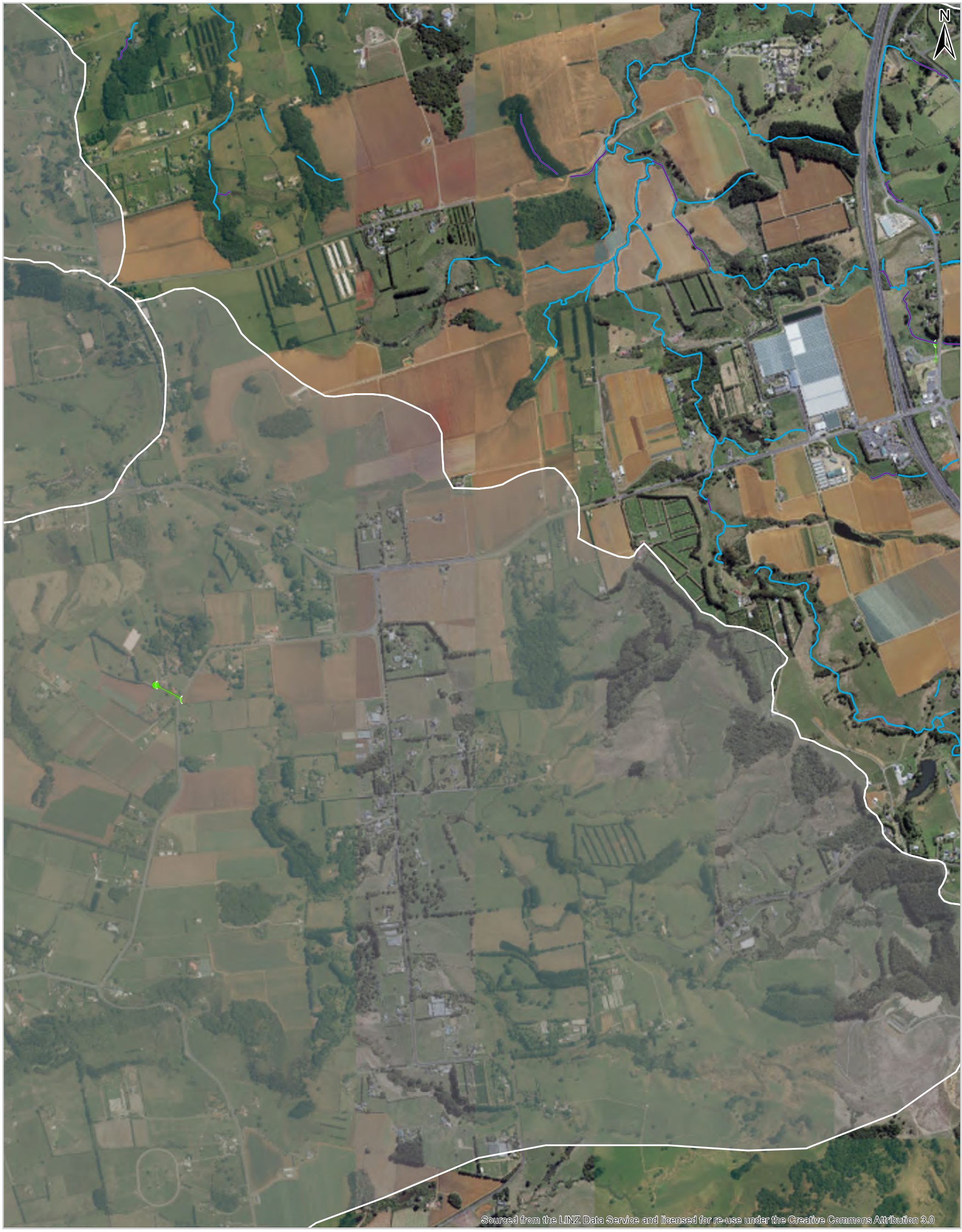
Map3D - Bank and Channel Modification Type & Extent



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Bank and Channel Lining

- Cast In Situ Concrete
- Galvanised iron or steel
- Gabion Basket
- Masonry Block
- Other
- Reno mattress channel
- Rock
- Timber
- Ceramic/Earthenware

Stormwater Fitting

- Catchpit
- Inlet or outlet
- Manhole
- Quality/Treatment device
- Stormwater Drain

- Stormwater Catchments
- Ecoline - no modifications
- Ecoline - other channel modifications
- Future Urban Zone

0 330 660 m

Client AUCKLAND COUNCIL
Project **NGAKAROA WAR**

Project no. P01644
Date 16 Jun 2018
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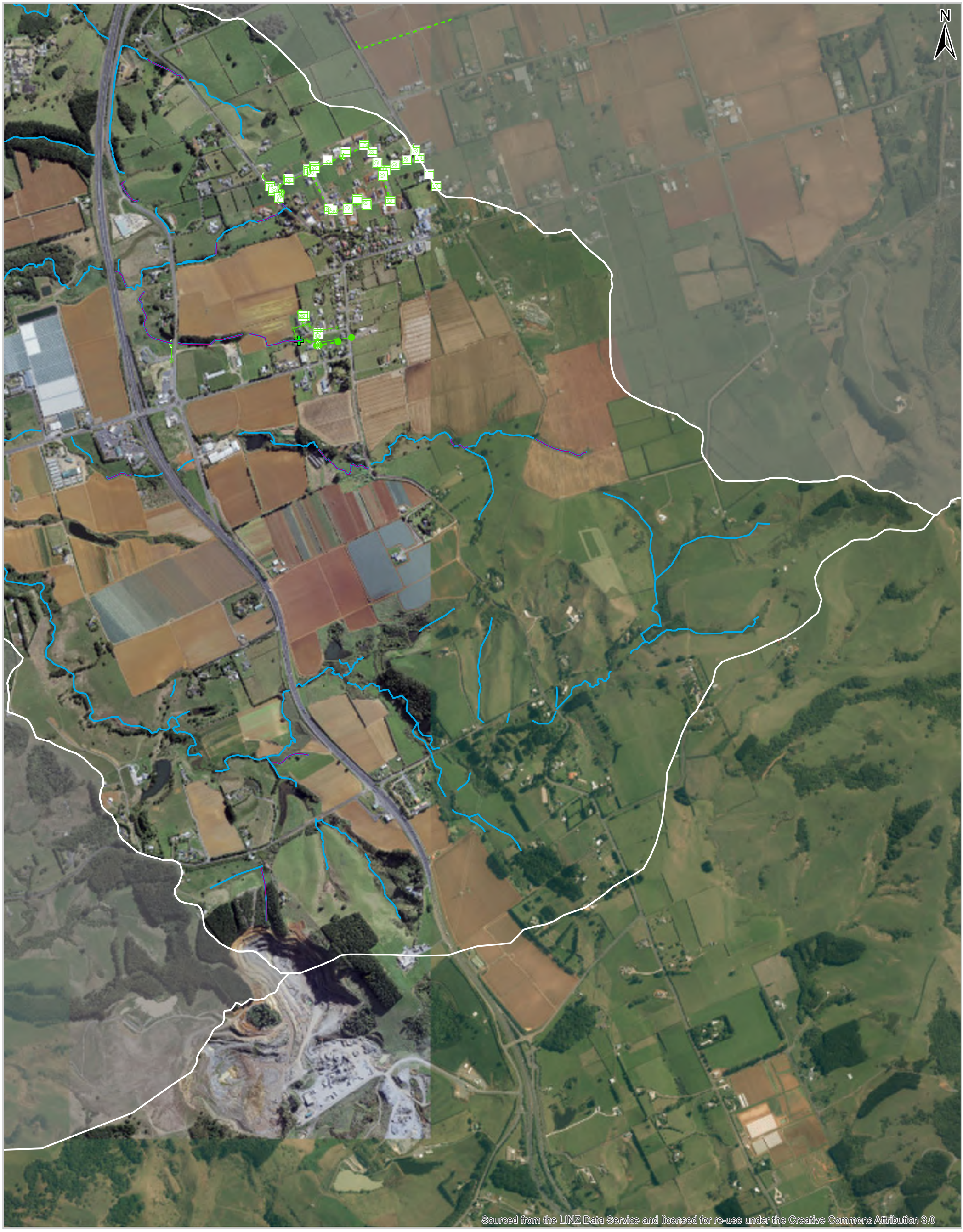
Map3E - Bank and Channel Modification Type & Extent



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Bank and Channel Lining

- Cast In Situ Concrete
- Galvanised iron or steel
- Gabion Basket
- Masonry Block
- Other
- Reno mattress channel
- Rock
- Timber
- Ceramic/Earthenware

Stormwater Fitting

- Catchpit
- Inlet or outlet
- Manhole
- Quality/Treatment device
- Stormwater Drain

- Stormwater Catchments
- Ecoline - no modifications
- Ecoline - other channel modifications
- Future Urban Zone

0 330 660 m

Client AUCKLAND COUNCIL
Project **NGAKAROA WAR**

Project no. P01644
Date 16 Jun 2018

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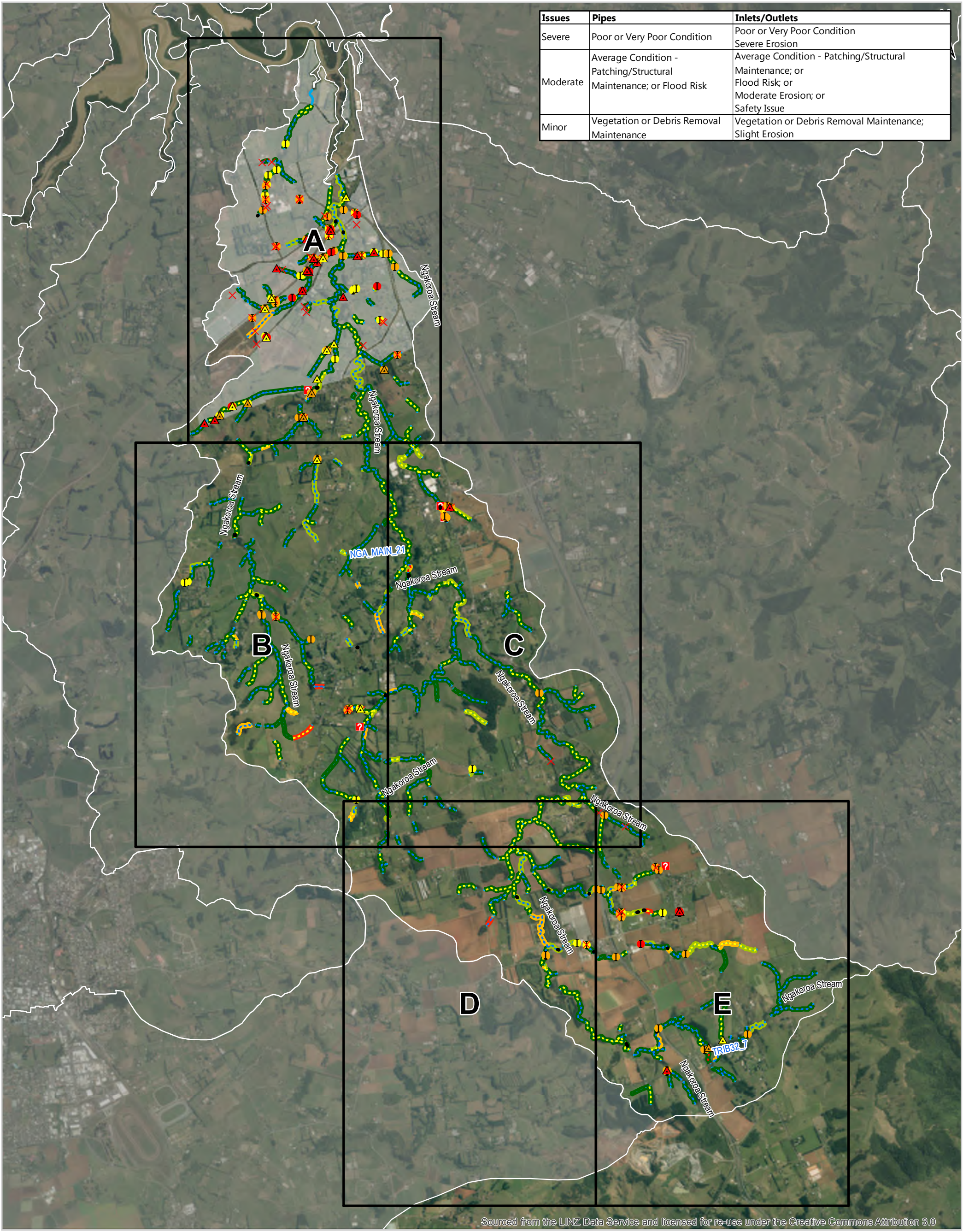
Map 4 - Asset Maintenance Issues

Issues	Pipes	Inlets/Outlets
Severe	Poor or Very Poor Condition	Poor or Very Poor Condition Severe Erosion
Moderate	Average Condition - Patching/Structural Maintenance; or Flood Risk	Average Condition - Patching/Structural Maintenance; or Flood Risk; or Moderate Erosion; or Safety Issue
Minor	Vegetation or Debris Removal Maintenance	Vegetation or Debris Removal Maintenance; Slight Erosion



Erosion Scars
- <20%
- 20-40%
- 40-60%
- >60%

Inlet/Outlet Asset Issues
- Minor
- Moderate
- Severe
- Could not locate

Bank Stability
- Excellent
- Good
- Fair
- Poor

Pipe Asset Issues
- Minor
- Moderate
- Severe
- Erosion Hotspot

- Misc. 2018
- Stormwater Catchments
- Future Urban Zone

Client AUCKLAND COUNCIL
Project NGAKOROA WAR

0 870 1,740 m

Project no. P01644
Date 18 Jun 2018
Drawn CU
Approved RI

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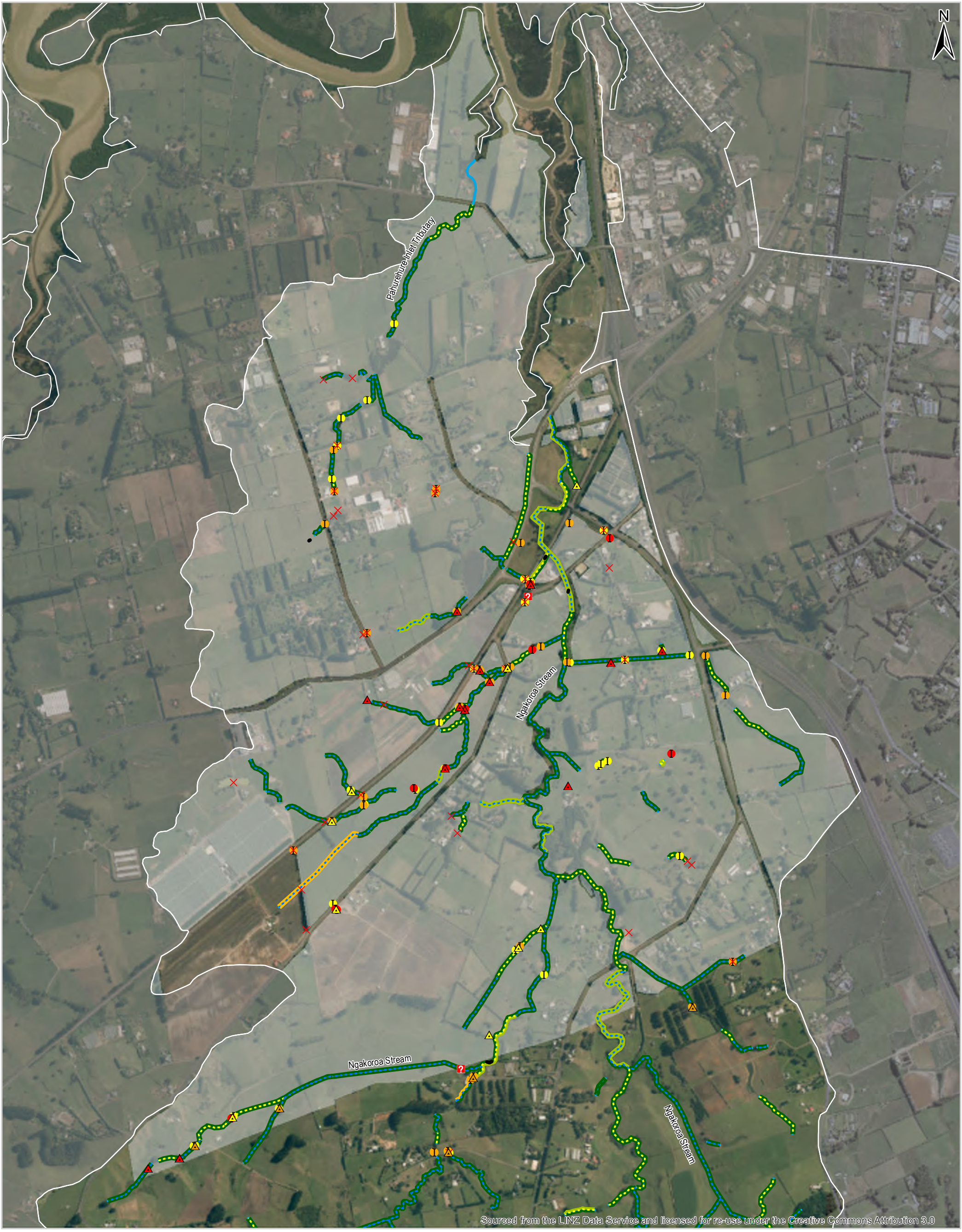
Map 4A - Asset Maintenance Issues



Erosion Scars
- <20%
- 20-40%
- 40-60%
- >60%

Inlet/Outlet Asset Issues
- Minor
- Moderate
- Severe
- Could not locate

Bank Stability
- Excellent
- Good
- Fair
- Poor

Pipe Asset Issues
- Minor
- Moderate
- Severe
- Erosion Hotspot

- Misc. 2018
- Stormwater Catchments
- Future Urban Zone

Client AUCKLAND COUNCIL
Project **NGAKOROA WAR**

0 290 580 m

Project no. P01644
Date 18 Jun 2018
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Map 4B - Asset Maintenance Issues

Erosion Scars
- <20%
- 20-40%
- 40-60%
- >60%

Inlet/Outlet Asset Issues
- Minor
- Moderate
- Severe
- Could not locate

Bank Stability
- Excellent
- Good
- Fair
- Poor

Pipe Asset Issues
- Minor
- Moderate
- Severe
- Erosion Hotspot

- Misc. 2018
- Stormwater Catchments
- Future Urban Zone

0 290 580 m

Client AUCKLAND COUNCIL
Project NGAKOROA WAR

Project no. P01644
Date 18 Jun 2018

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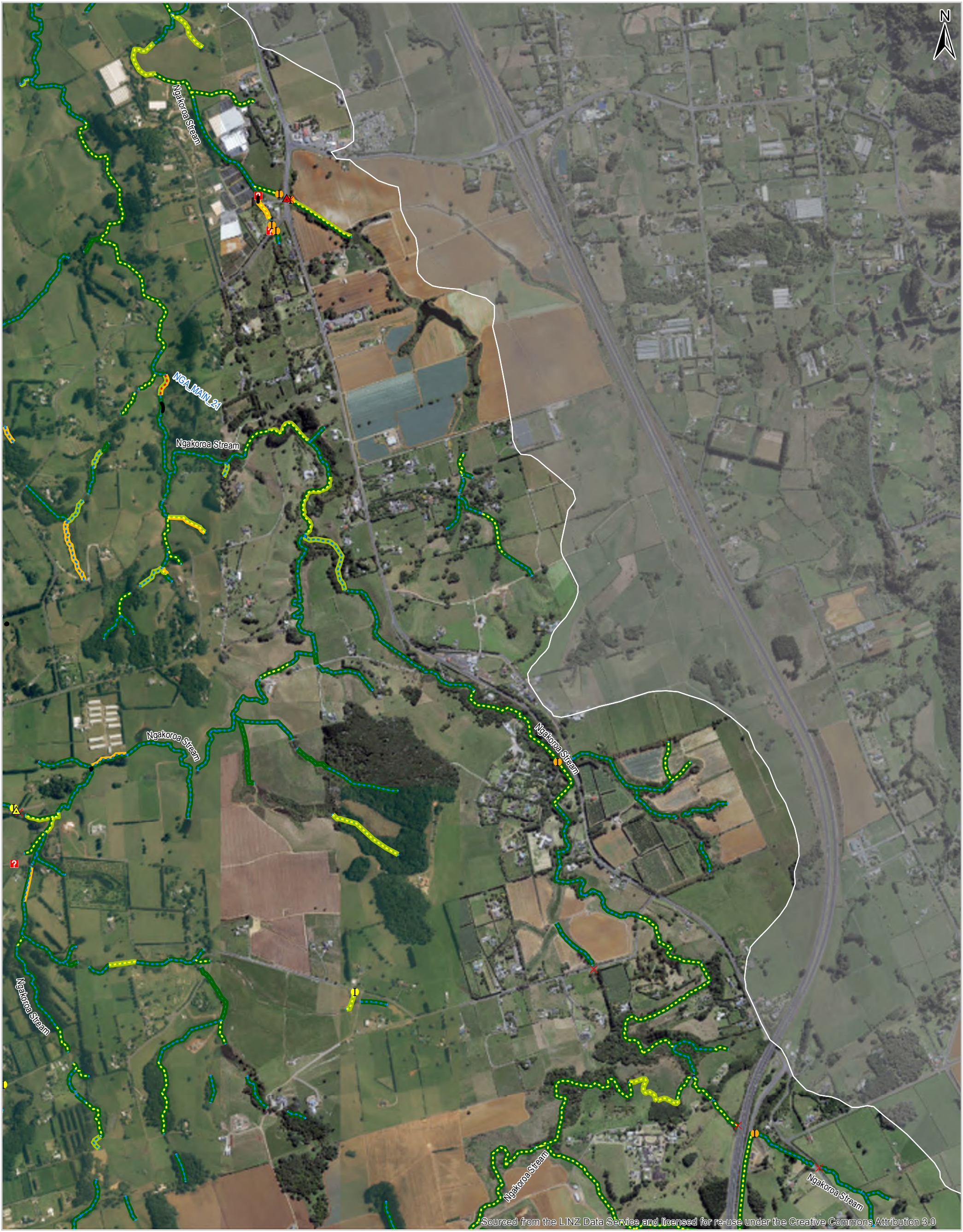
Map 4C - Asset Maintenance Issues



Erosion Scars
- <20%
- 20-40%
- 40-60%
- >60%

Inlet/Outlet Asset Issues
- Minor
- Moderate
- Severe
- Could not locate

Bank Stability
- Excellent
- Good
- Fair
- Poor

Pipe Asset Issues
- Minor
- Moderate
- Severe
- Erosion Hotspot

- Misc. 2018
- Stormwater Catchments
- Future Urban Zone

Client AUCKLAND COUNCIL
Project **NGAKOROA WAR**

0 290 580 m

Project no. P01644
Date 18 Jun 2018

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Map 4D - Asset Maintenance Issues

Erosion Scars
- <20%
- 20-40%
- 40-60%
- >60%

Inlet/Outlet Asset Issues
- Minor
- Moderate
- Severe
- Could not locate

Bank Stability
- Excellent
- Good
- Fair
- Poor

Pipe Asset Issues
- Minor
- Moderate
- Severe
- Erosion Hotspot

- Misc. 2018
- Stormwater Catchments
- Future Urban Zone

Client AUCKLAND COUNCIL
Project **NGAKOROA WAR**

0 290 580 m

Project no. P01644
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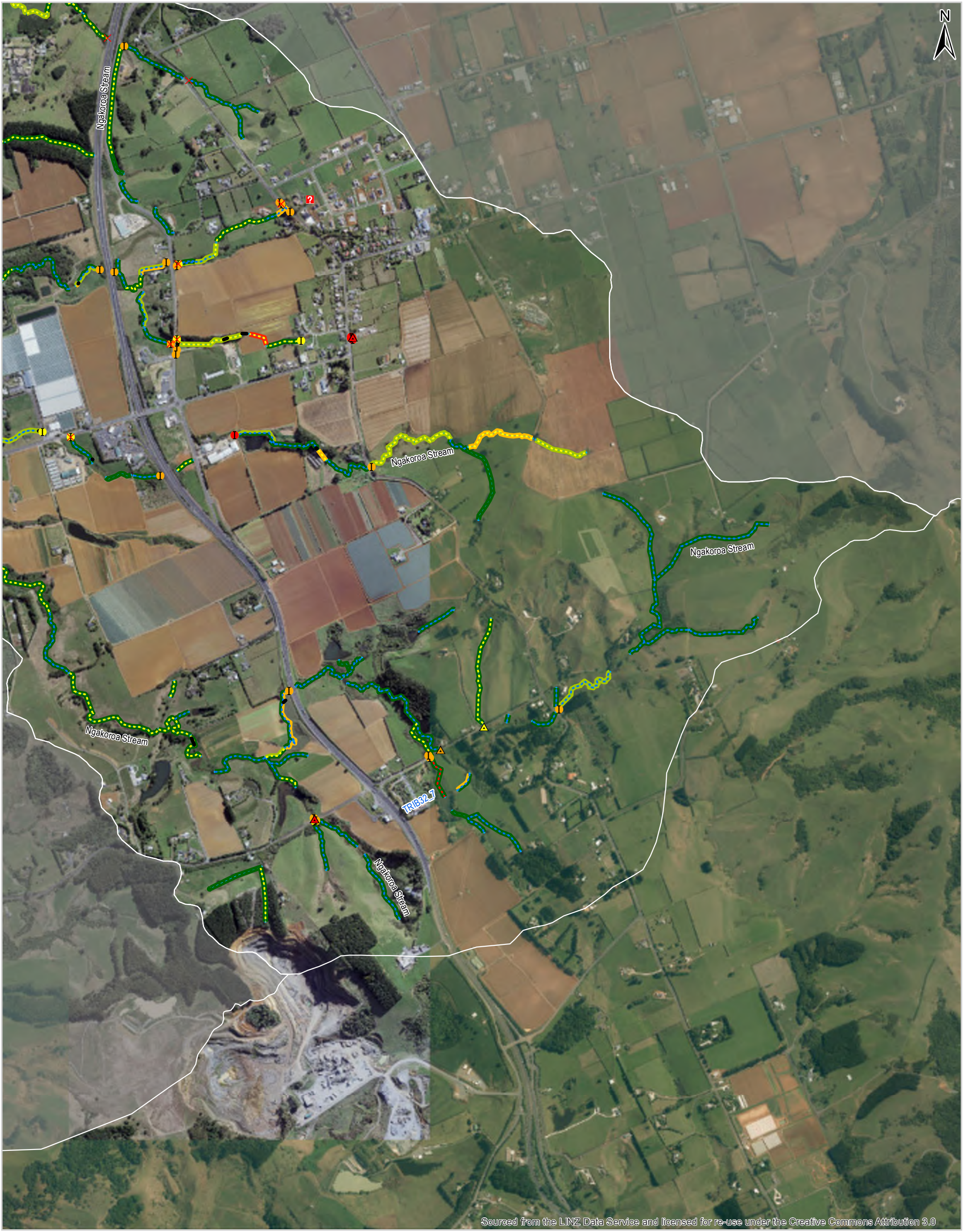
Map 4E - Asset Maintenance Issues



Erosion Scars
- <20%
- 20-40%
- 40-60%
- >60%

Inlet/Outlet Asset Issues
- Minor
- Moderate
- Severe
- Could not locate

Bank Stability
- Excellent
- Good
- Fair
- Poor

Pipe Asset Issues
- Minor
- Moderate
- Severe
- Erosion Hotspot

- Misc. 2018
- Stormwater Catchments
- Future Urban Zone

Client AUCKLAND COUNCIL
Project **NGAKOROA WAR**

0 290 580 m

Project no. P01644
Date 18 Jun 2018
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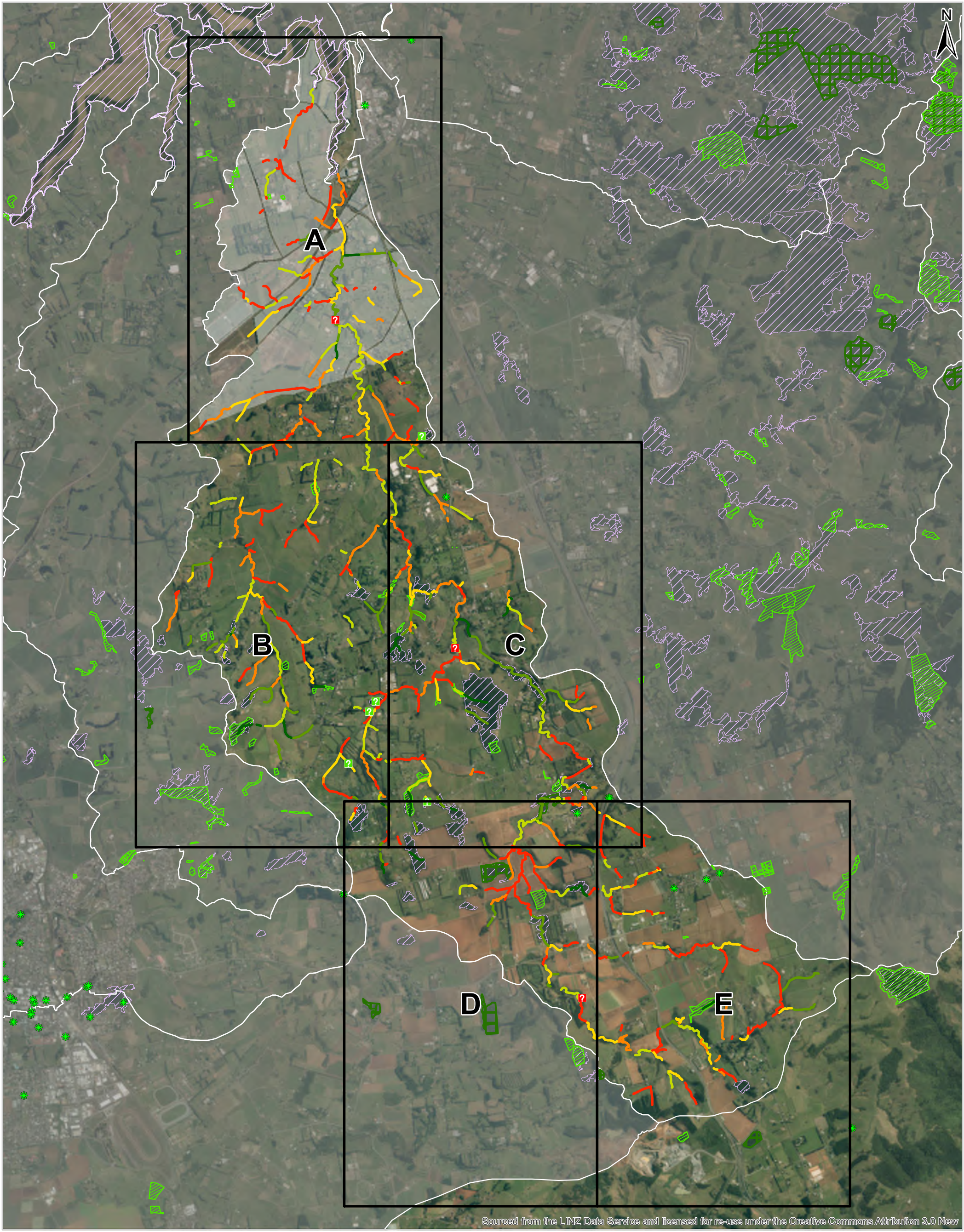
Map 5 - Riparian Vegetation



Overhead Shading

- <10%
- 10-30%
- 30-50%
- 50-70%
- 70-90%
- >90%

- Notable Trees
- Weed Infestation
- Significant Vegetation/Trees
- Covenants
- Stormwater Catchments

Wetland

- Natural
- Artifical
- Prot. Areas QEII Covenants
- Significant Ecological Areas

Client AUCKLAND COUNCIL

Project **NGAKOROA WAR**

0 1,250 2,500 m

Project no. P01618

Date 18 Jun 2018

Drawn CU

Approved RI

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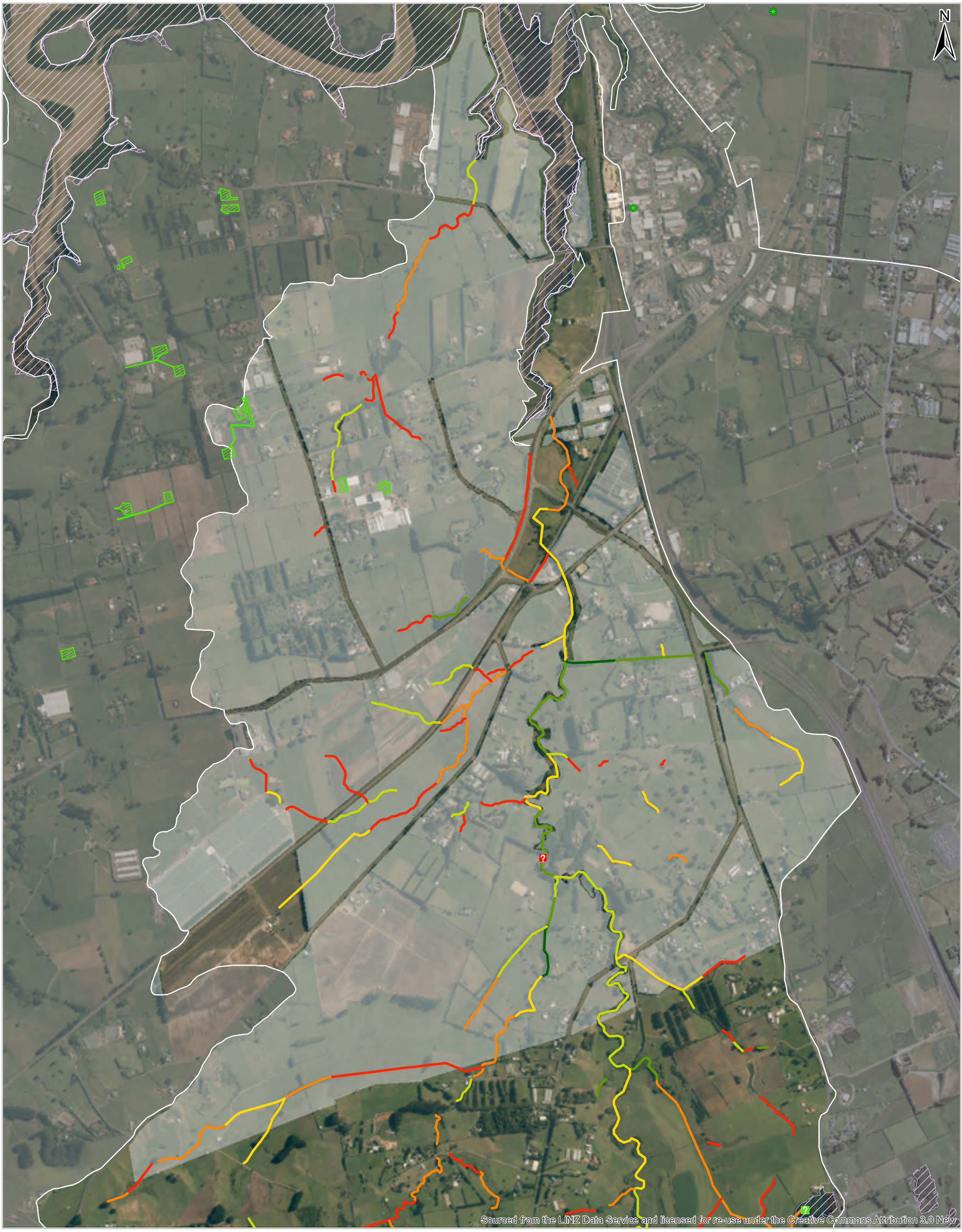
Map 5A - Riparian Vegetation



Overhead Shading
- <10%
- 10-30%
- 30-50%
- 50-70%
- 70-90%
- >90%

- Notable Trees
- Weed Infestation
- Significant Vegetation/Trees
- Covenants
- Stormwater Catchments

Wetland
- Natural
- Artifical
- Prot. Areas QEII Covenants
- Significant Ecological Areas

Client AUCKLAND COUNCIL
Project **NGAKOROA WAR**

0 430 860 m

Project no. P01618
Date 18 Jun 2018
Drawn CU
Approved RI

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Map 5B - Riparian Vegetation

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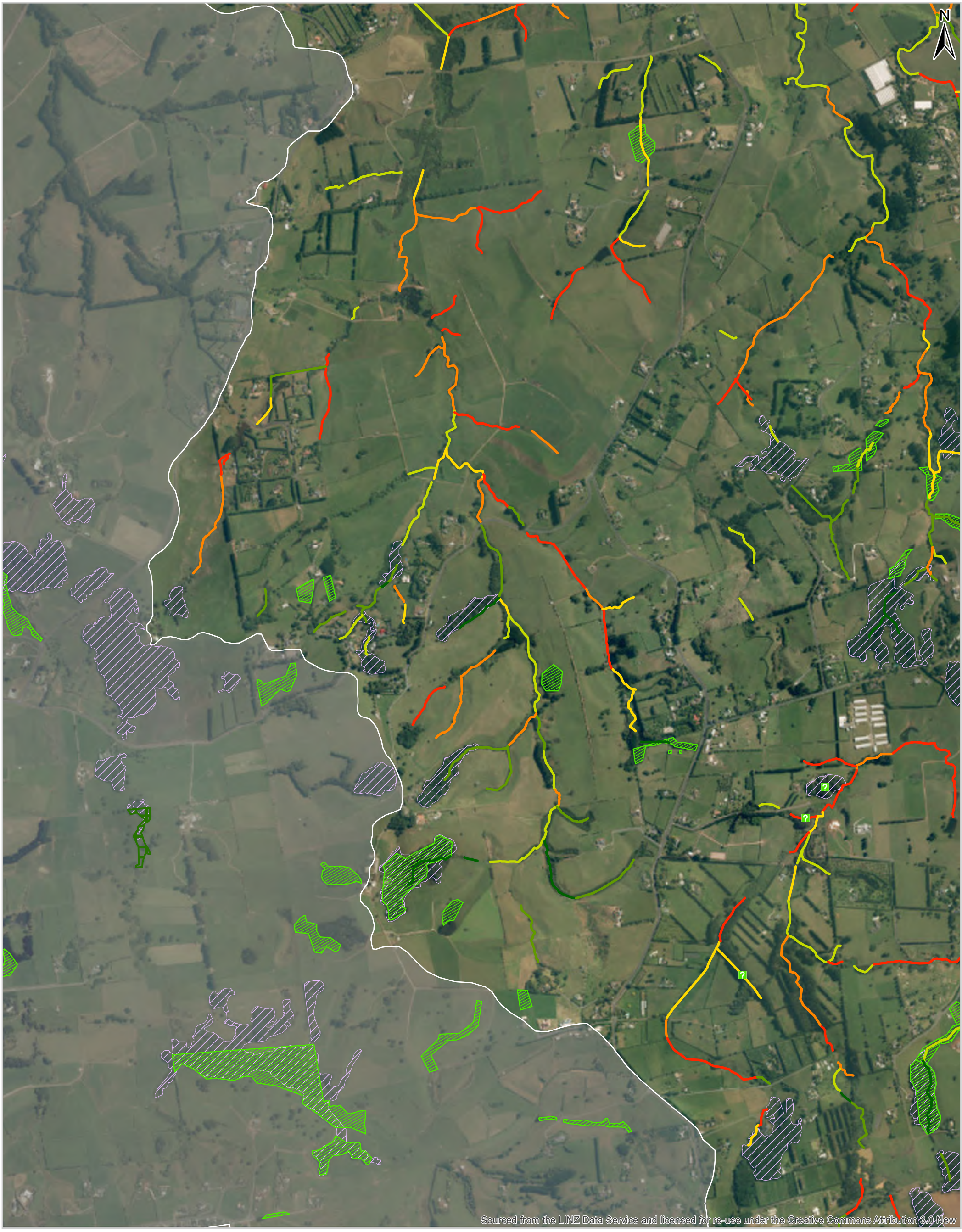

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Overhead Shading

- <10%
- 10-30%
- 30-50%
- 50-70%
- 70-90%
- >90%

- Notable Trees
- Weed Infestation
- Significant Vegetation/Trees
- Covenants
- Stormwater Catchments

Wetland

- Natural
- Artifical
- Prot. Areas QEII Covenants
- Significant Ecological Areas

Client AUCKLAND COUNCIL

Project **NGAKOROA WAR**

0 430 860 m

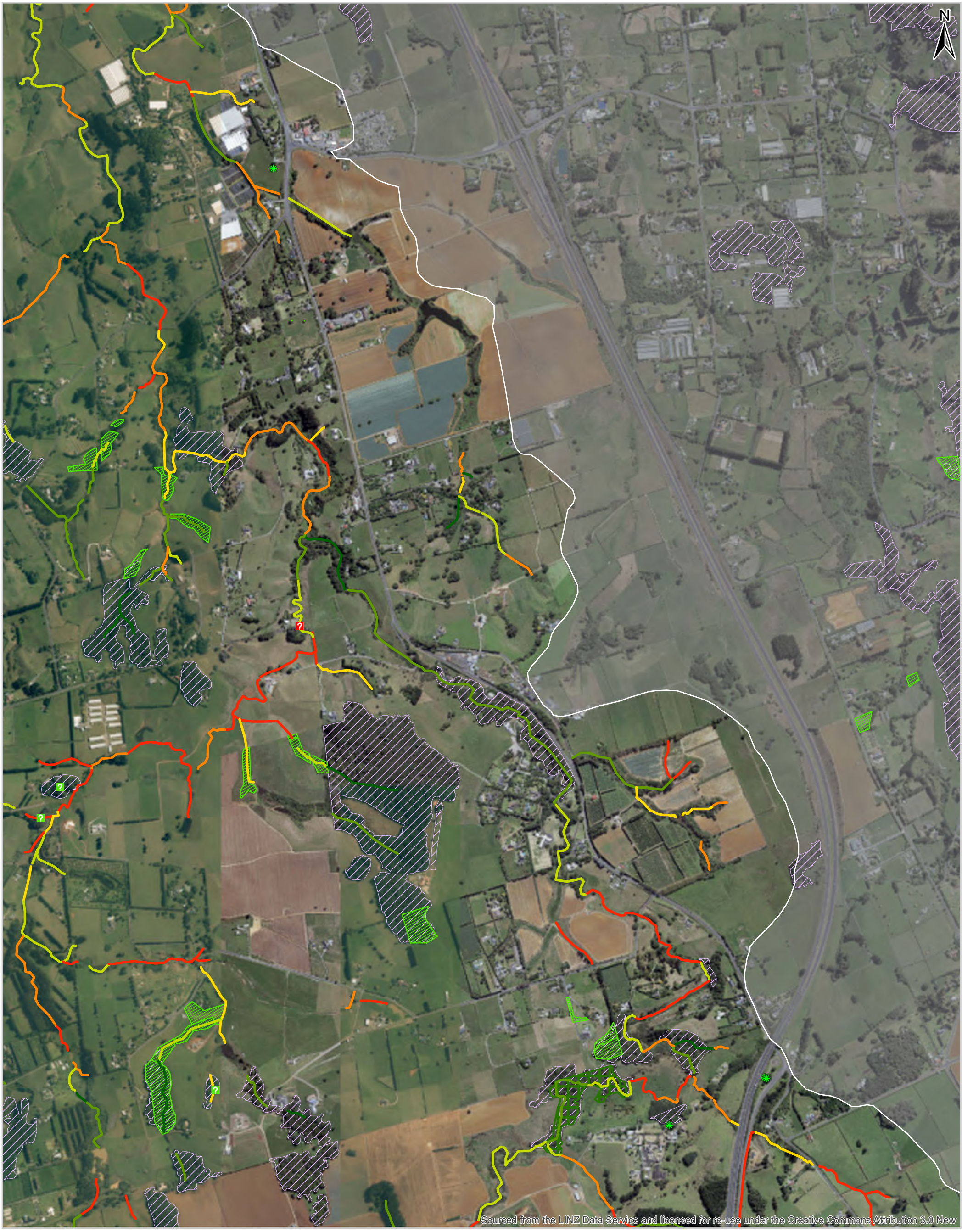
Project no. P01618

Date 18 Jun 2018

Drawn CU

Approved RI

Map 5C - Riparian Vegetation



Overhead Shading

- <10%
- 10-30%
- 30-50%
- 50-70%
- 70-90%
- >90%

- Notable Trees
- Weed Infestation
- Significant Vegetation/Trees
- Covenants
- Stormwater Catchments

Wetland

- Natural
- Artifical
- Prot. Areas QEII Covenants
- Significant Ecological Areas

Client AUCKLAND COUNCIL

Project **NGAKOROA WAR**

0 430 860 m

Project no. P01618

Date 18 Jun 2018

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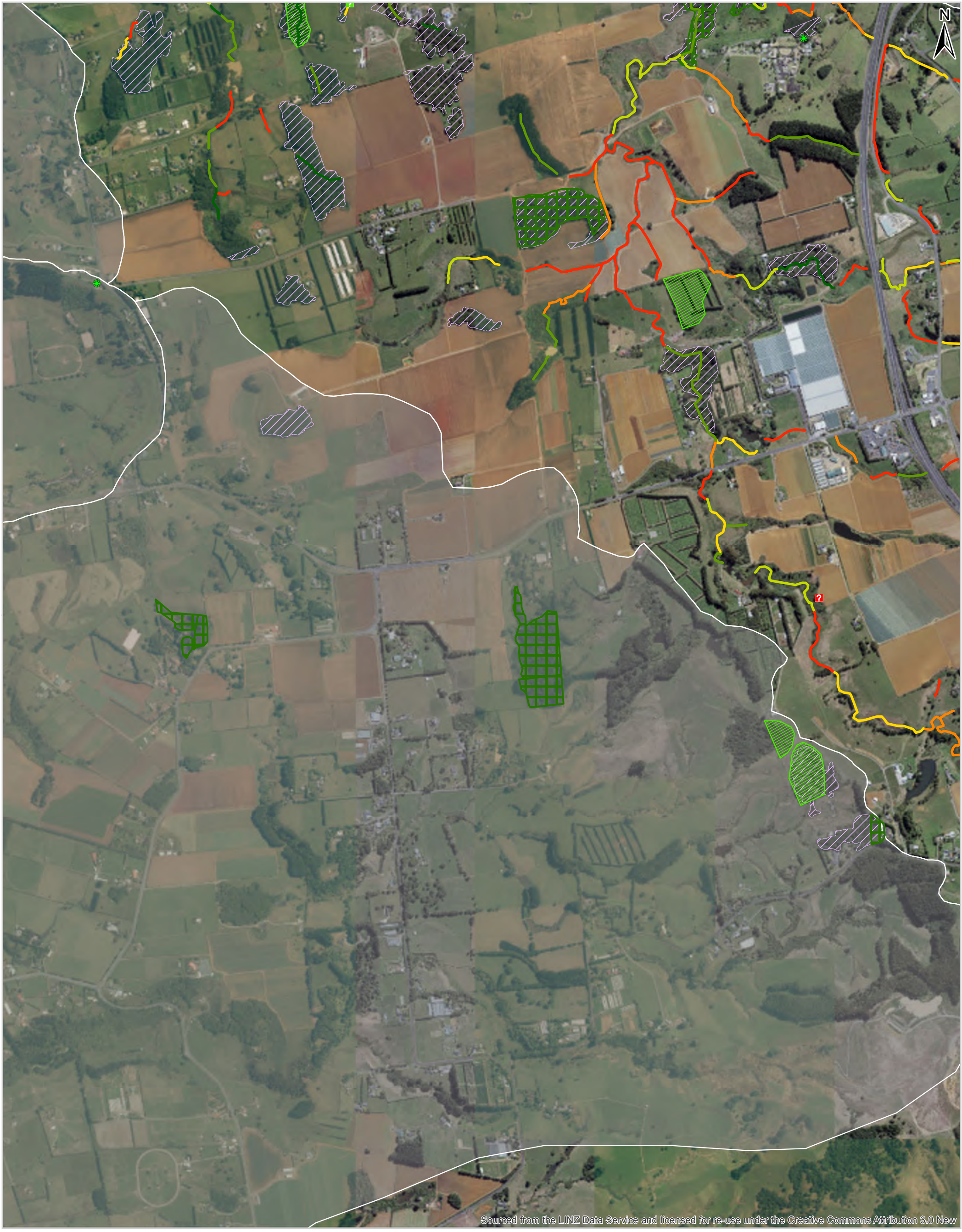
Map 5D - Riparian Vegetation



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Overhead Shading

- <10%
- 10-30%
- 30-50%
- 50-70%
- 70-90%
- >90%

- Notable Trees
- Weed Infestation
- Significant Vegetation/Trees
- Covenants
- Stormwater Catchments

Wetland

- Natural
- Artifical
- Prot. Areas QEII Covenants
- Significant Ecological Areas

Client AUCKLAND COUNCIL

Project **NGAKOROA WAR**

0 430 860 m

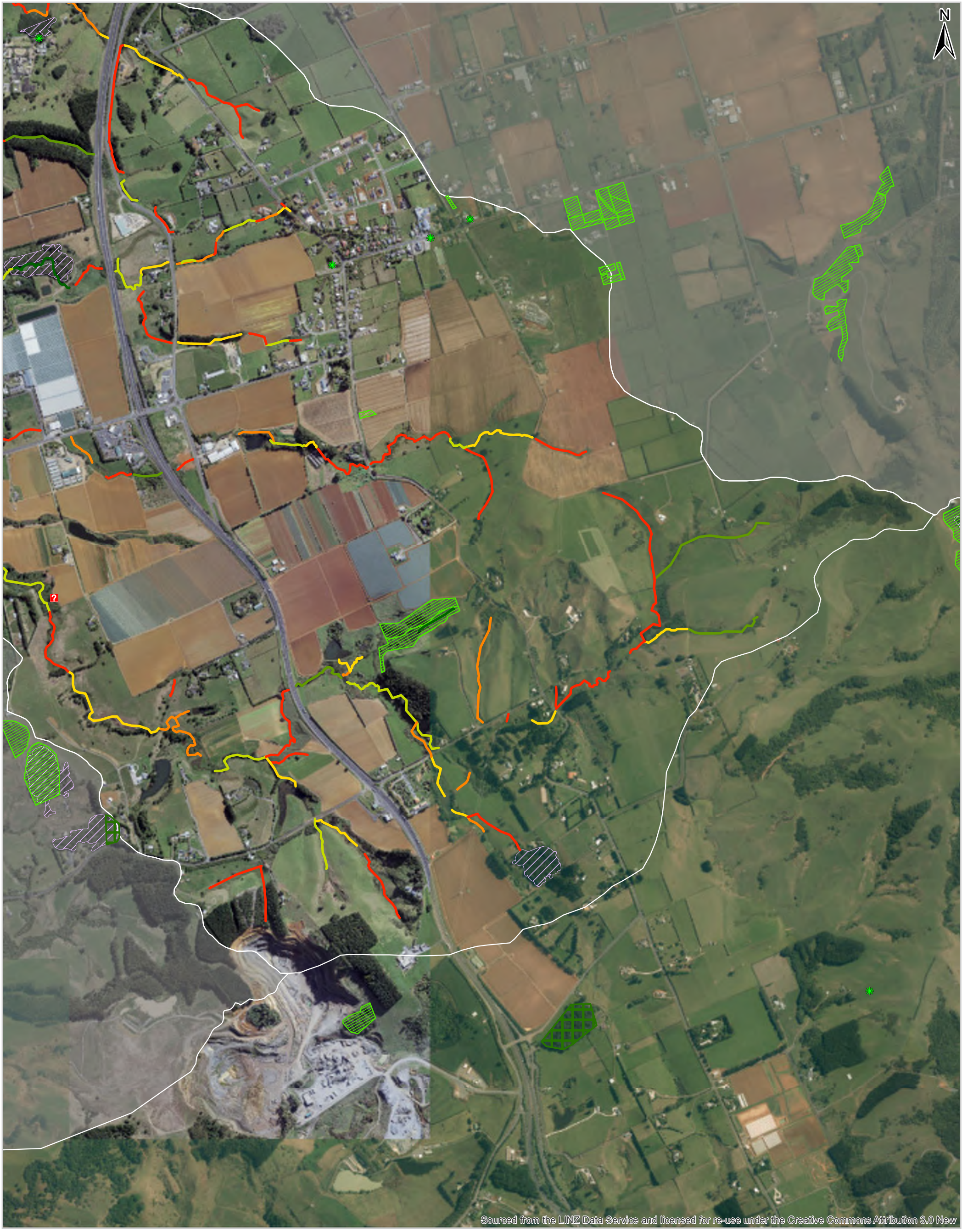
Project no. P01618

Date 18 Jun 2018

Drawn CU

Approved RI

Map 5E - Riparian Vegetation



Overhead Shading

- <10%
- 10-30%
- 30-50%
- 50-70%
- 70-90%
- >90%

- Notable Trees
- Weed Infestation
- Significant Vegetation/Trees
- Covenants
- Stormwater Catchments

Wetland

- Natural
- Artifical
- Prot. Areas QEII Covenants
- Significant Ecological Areas

Client AUCKLAND COUNCIL

Project **NGAKOROA WAR**

0 430 860 m

Project no. P01618

Date 18 Jun 2018

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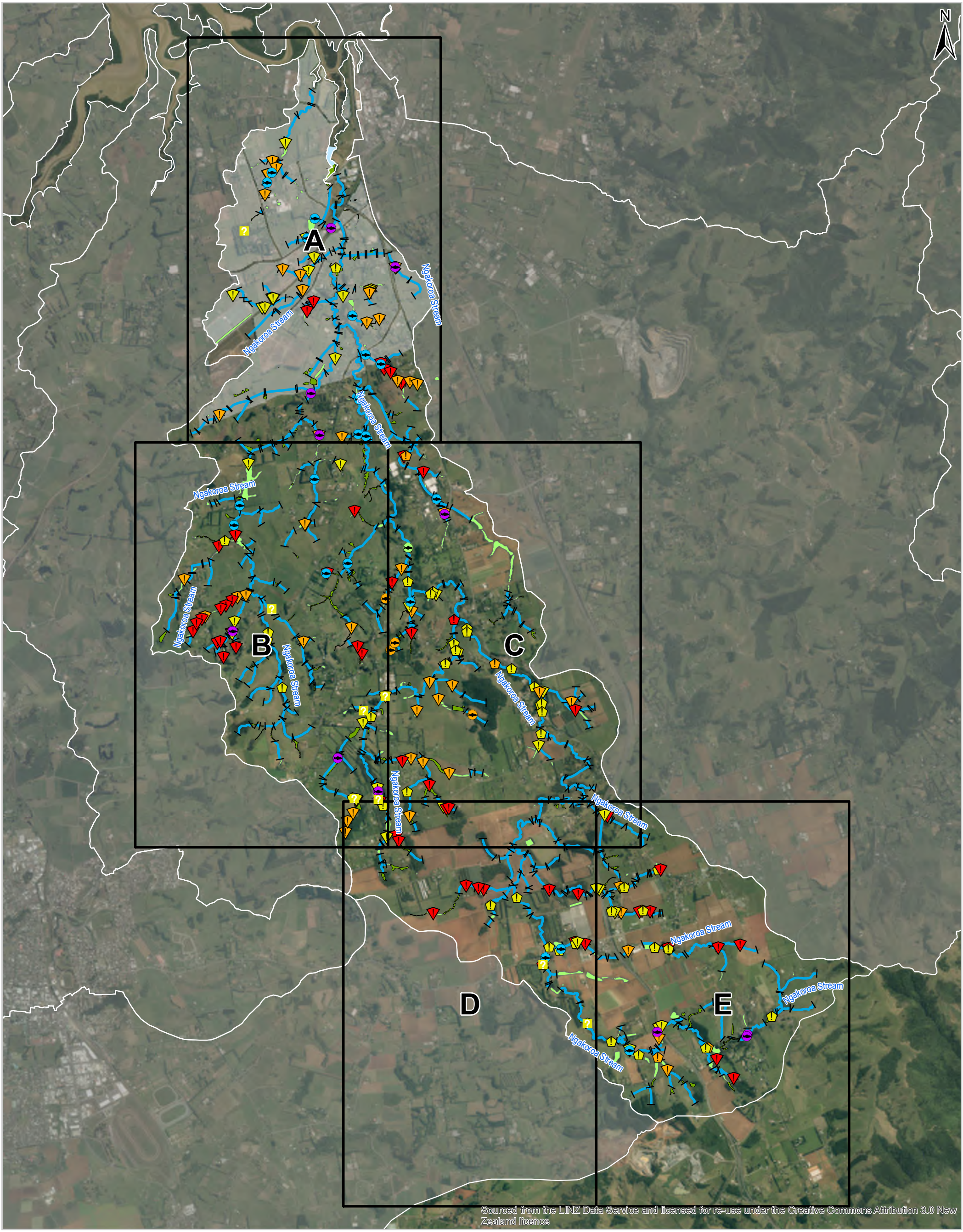
Map 6 - Inanga and Fish incl. Misc Data



Fish Survey
- Anguilliform
- Climber
- Swimmer
- Exotic

NZFFDB
- Anguilliform
- Climber
- Swimmer
- Exotic
- N.A.

Nat. Barrier to:
- Anguilliforms
- Climbers
- Swimmers

Eng. Barrier to:
- Anguilliforms
- Climbers
- Swimmers

- Barrier to Swimmers
- Stream Mouth

Client AUCKLAND COUNCIL
Project **NGAKOROA WAR**

0 1,000 2,000 m

Project no. P01644
Date 18 Jun 2018
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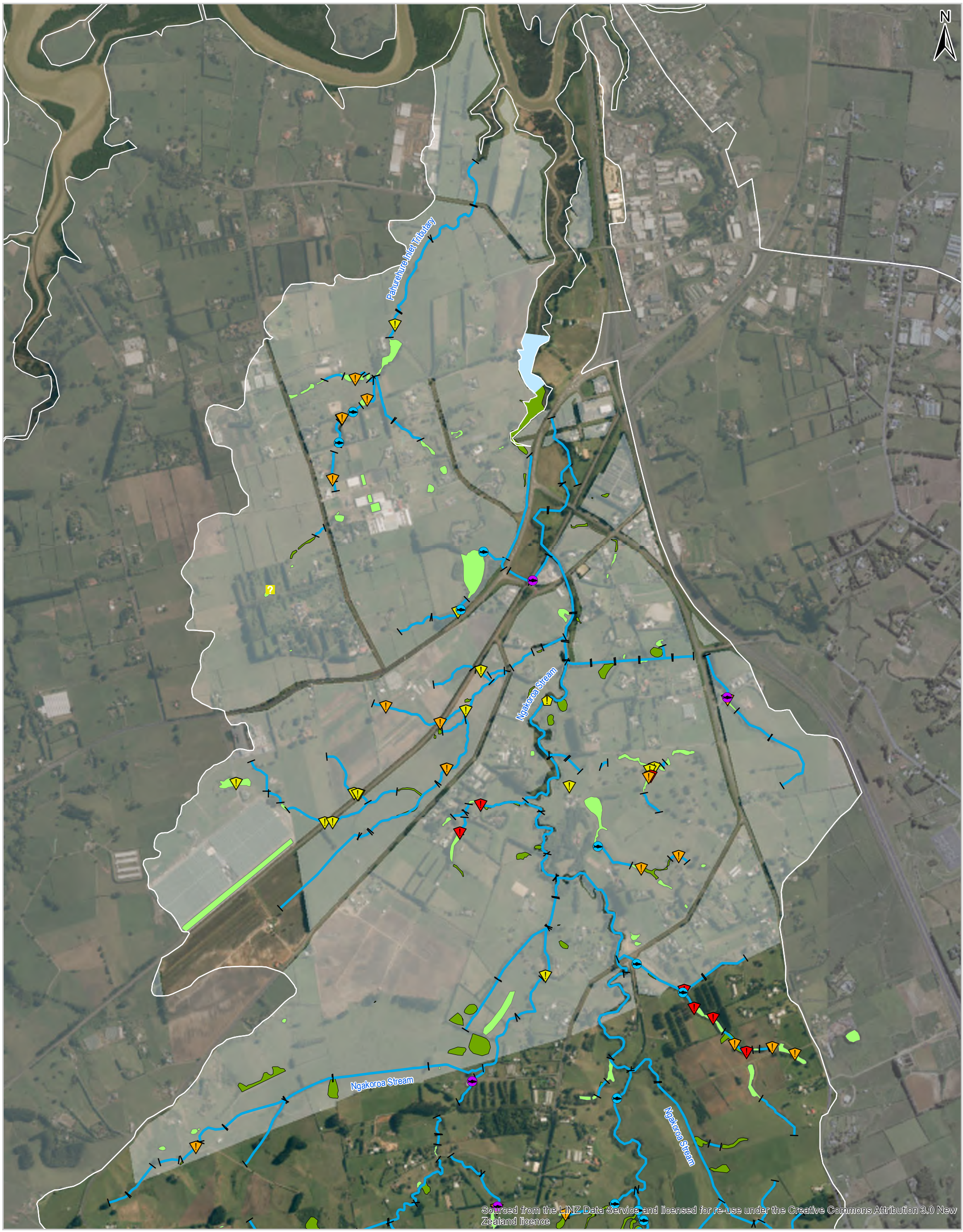
Map 6A - Inanga and Fish incl. Misc Data



Fish Survey
- Anguilliform
- Climber
- Swimmer
- Exotic

NZFFDB
- Anguilliform
- Climber
- Swimmer
- Exotic
- N.A.

Nat. Barrier to:
- Anguilliforms
- Climbers
- Swimmers

Eng. Barrier to:
- Anguilliforms
- Climbers
- Swimmers

- Barrier to Swimmers
- Stream Mouth

Client AUCKLAND COUNCIL
Project **NGAKOROA WAR**

0 350 700 m

Project no. P01644
Date 18 Jun 2018

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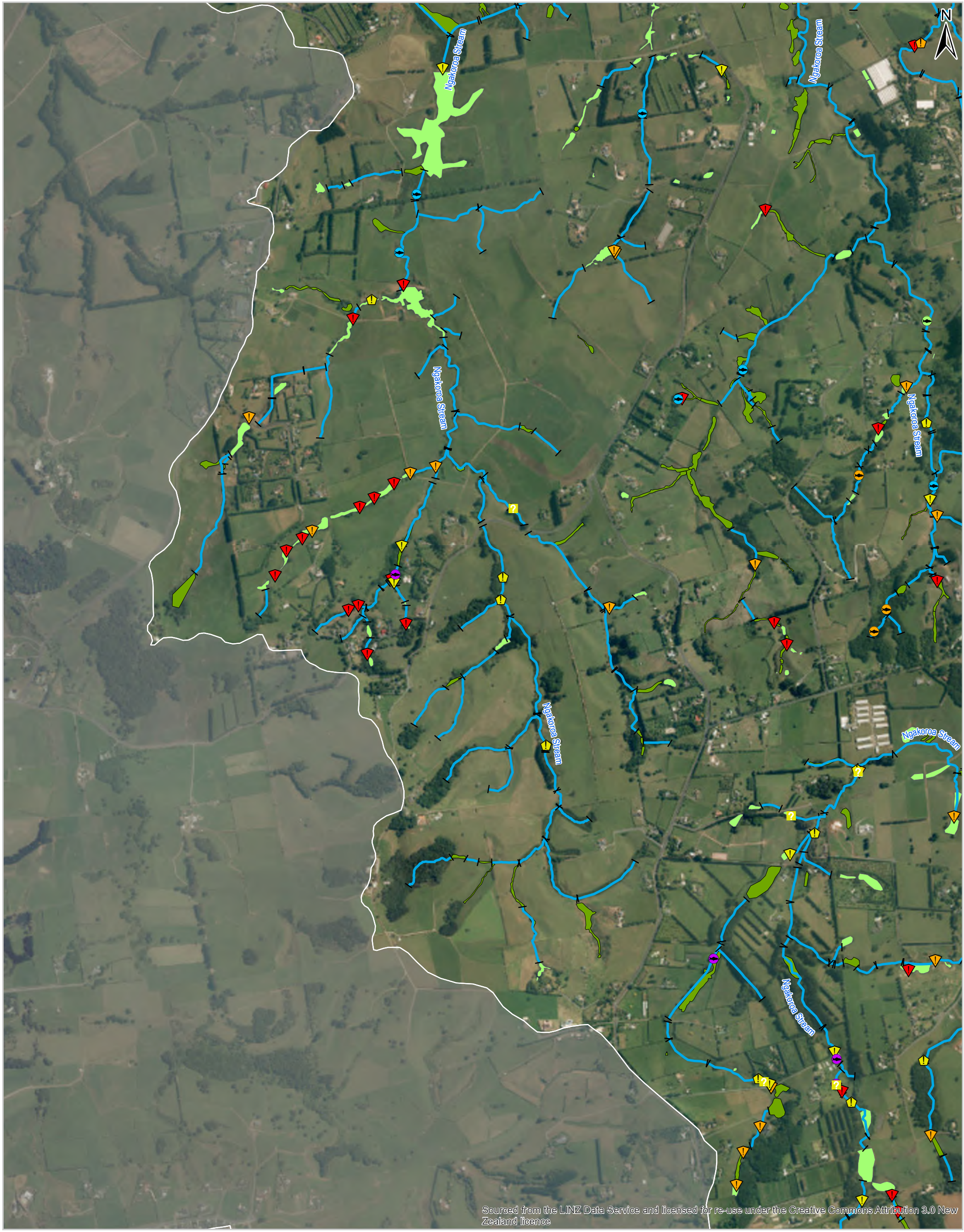
Map 6B - Inanga and Fish incl. Misc Data



Fish Survey
- Anguilliform
- Climber
- Swimmer
- Exotic

NZFFDB
- Anguilliform
- Climber
- Swimmer
- Exotic
- N.A.

Nat. Barrier to:
- Anguilliforms
- Climbers
- Swimmers

Eng. Barrier to:
- Anguilliforms
- Climbers
- Swimmers

- Barrier to Swimmers
- Stream Mouth

Client AUCKLAND COUNCIL
Project **NGAKOROA WAR**

0 350 700 m

Project no. P01644
Date 18 Jun 2018

Drawn CU
Approved RI

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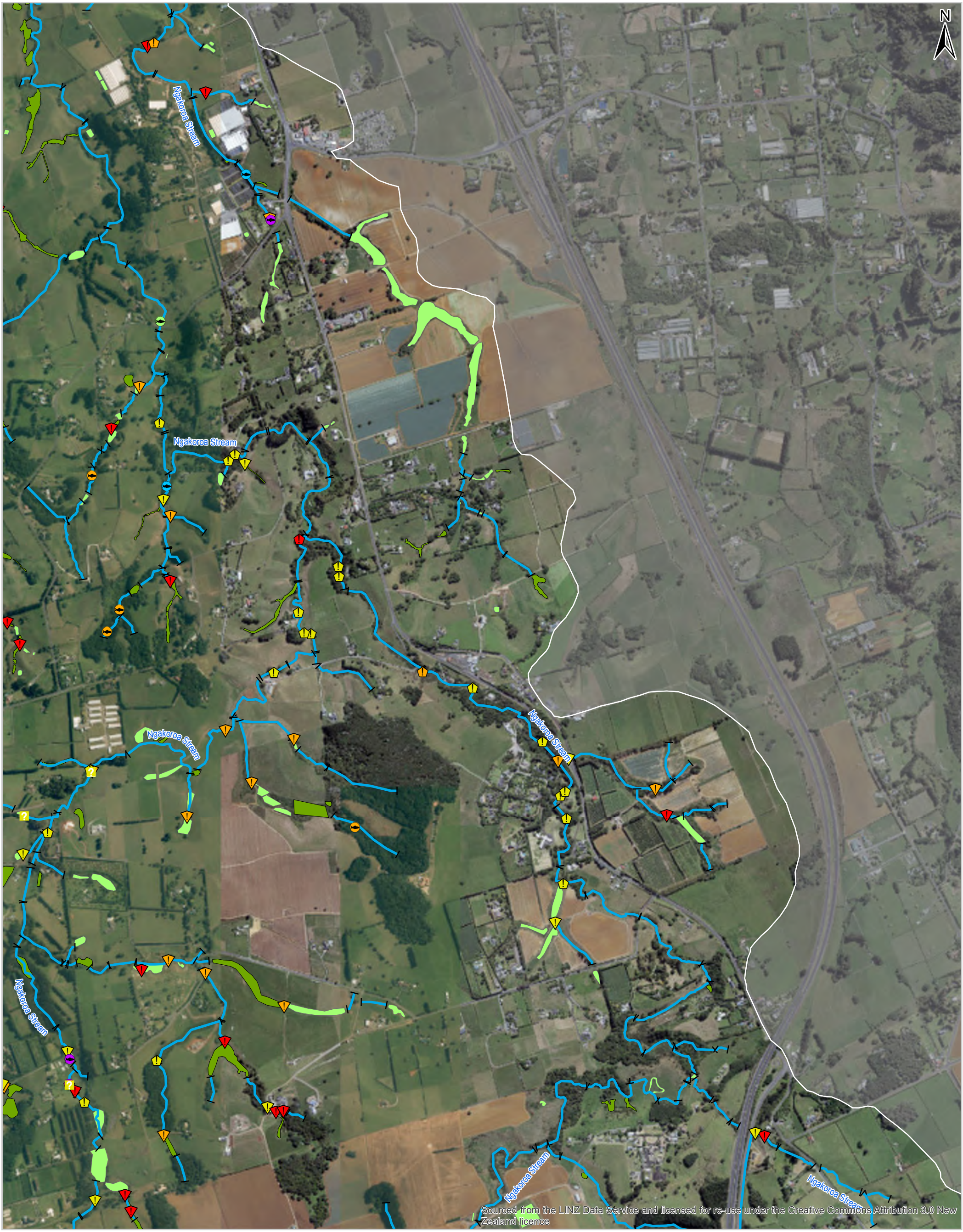
Map 6C - Inanga and Fish incl. Misc Data



Fish Survey
- Anguilliform
- Climber
- Swimmer
- Exotic

NZFFDB
- Anguilliform
- Climber
- Swimmer
- Exotic
- N.A.

Nat. Barrier to:
- Anguilliforms
- Climbers
- Swimmers

Eng. Barrier to:
- Anguilliforms
- Climbers
- Swimmers

- Barrier to Swimmers
- Stream Mouth

Client AUCKLAND COUNCIL

Project **NGAKOROA WAR**

0 350 700 m

Project no. P01644

Date 18 Jun 2018

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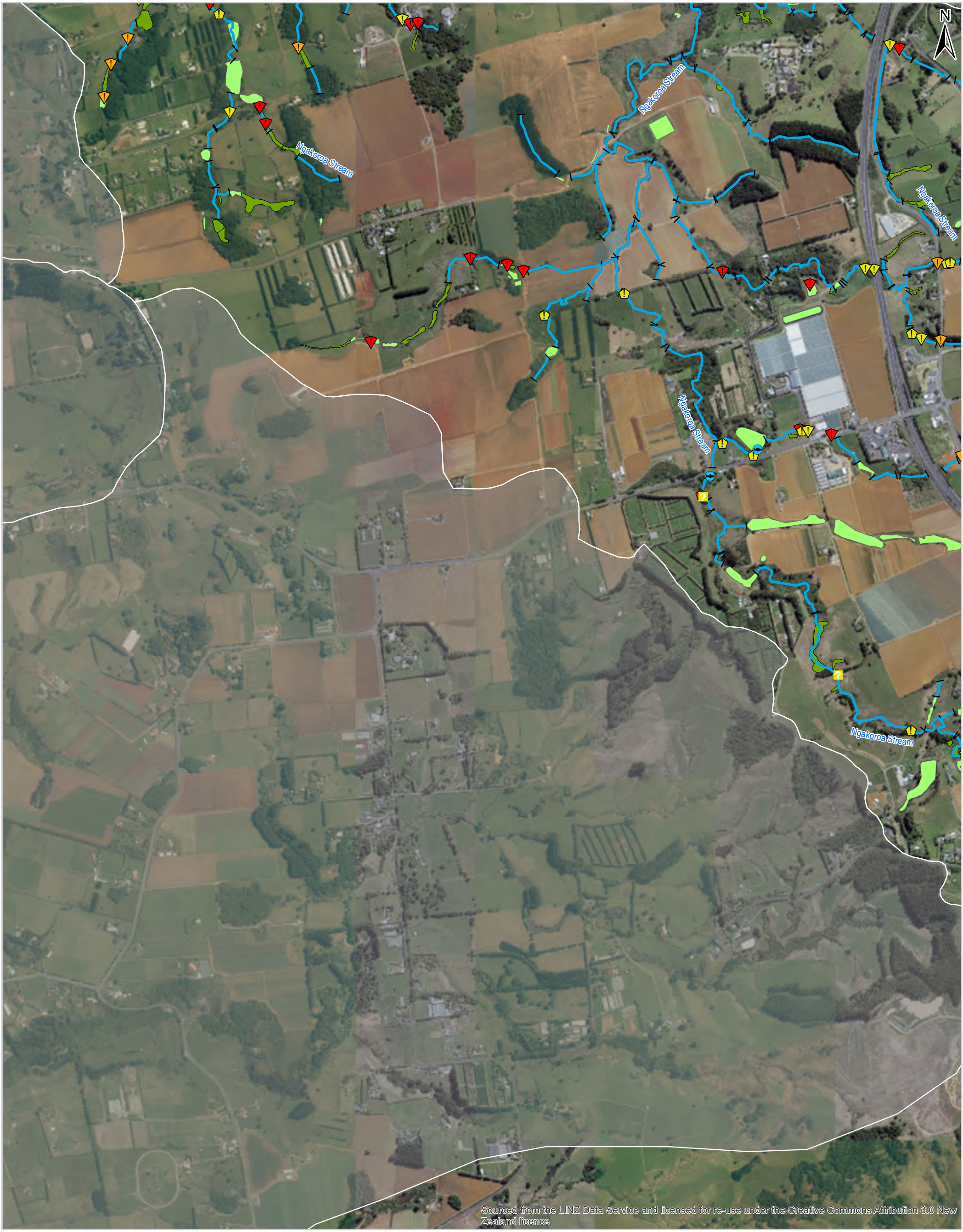
Map 6D - Inanga and Fish incl. Misc Data



Fish Survey
- Anguilliform
- Climber
- Swimmer
- Exotic

NZFFDB
- Anguilliform
- Climber
- Swimmer
- Exotic
- N.A.

Nat. Barrier to:
- Anguilliforms
- Climbers
- Swimmers

Eng. Barrier to:
- Anguilliforms
- Climbers
- Swimmers

- Barrier to Swimmers
- Stream Mouth

Client AUCKLAND COUNCIL
Project **NGAKOROA WAR**

0 350 700 m

Project no. P01644
Date 18 Jun 2018
Drawn CU
Approved RI

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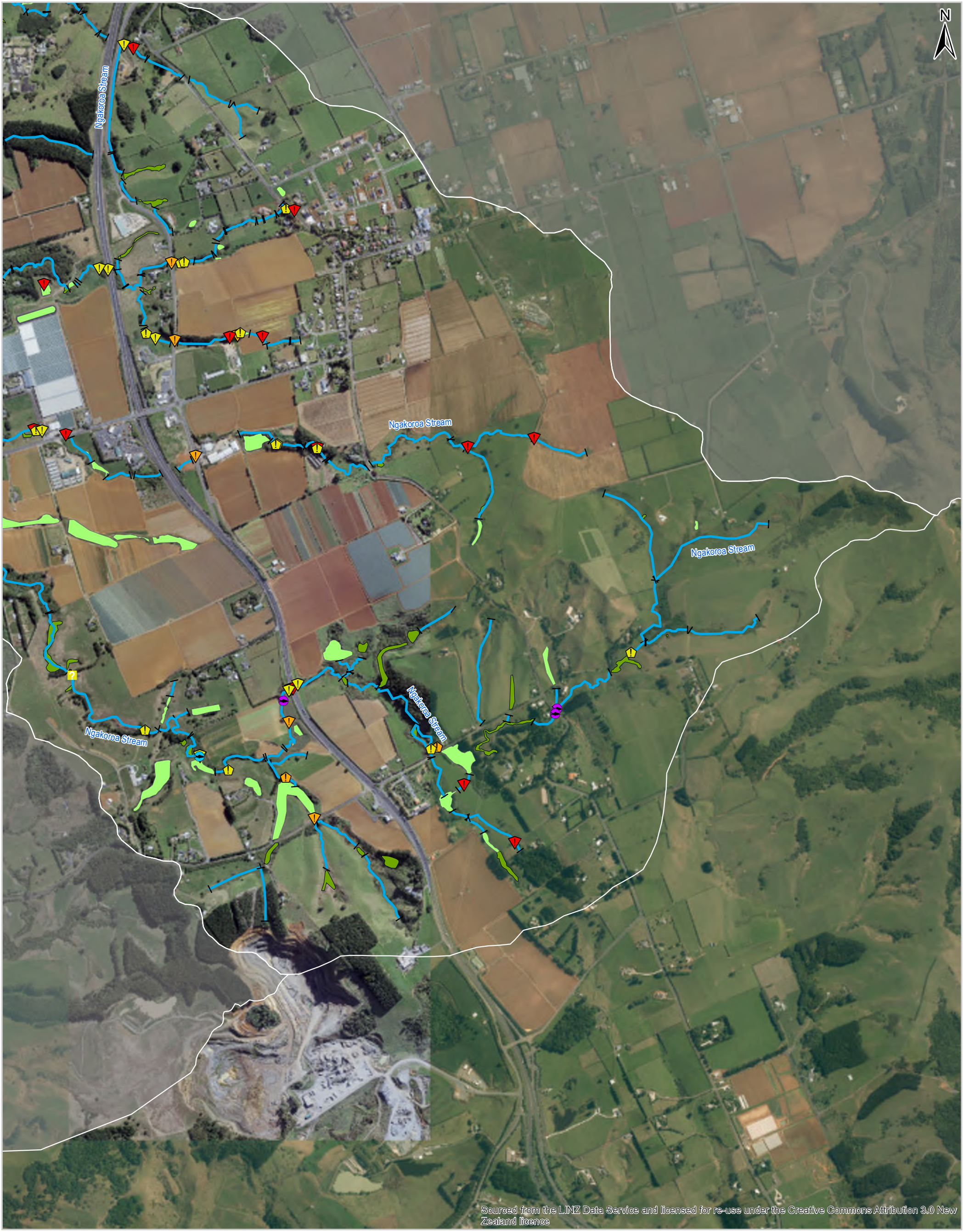
Map 6E - Inanga and Fish incl. Misc Data



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Fish Survey
- Anguilliform
- Climber
- Swimmer
- Exotic

NZFFDB
- Anguilliform
- Climber
- Swimmer
- Exotic
- N.A.

Nat. Barrier to:
- Anguilliforms
- Climbers
- Swimmers

Eng. Barrier to:
- Anguilliforms
- Climbers
- Swimmers

- Barrier to Swimmers
- Stream Mouth

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Project **NGAKOROA WAR**

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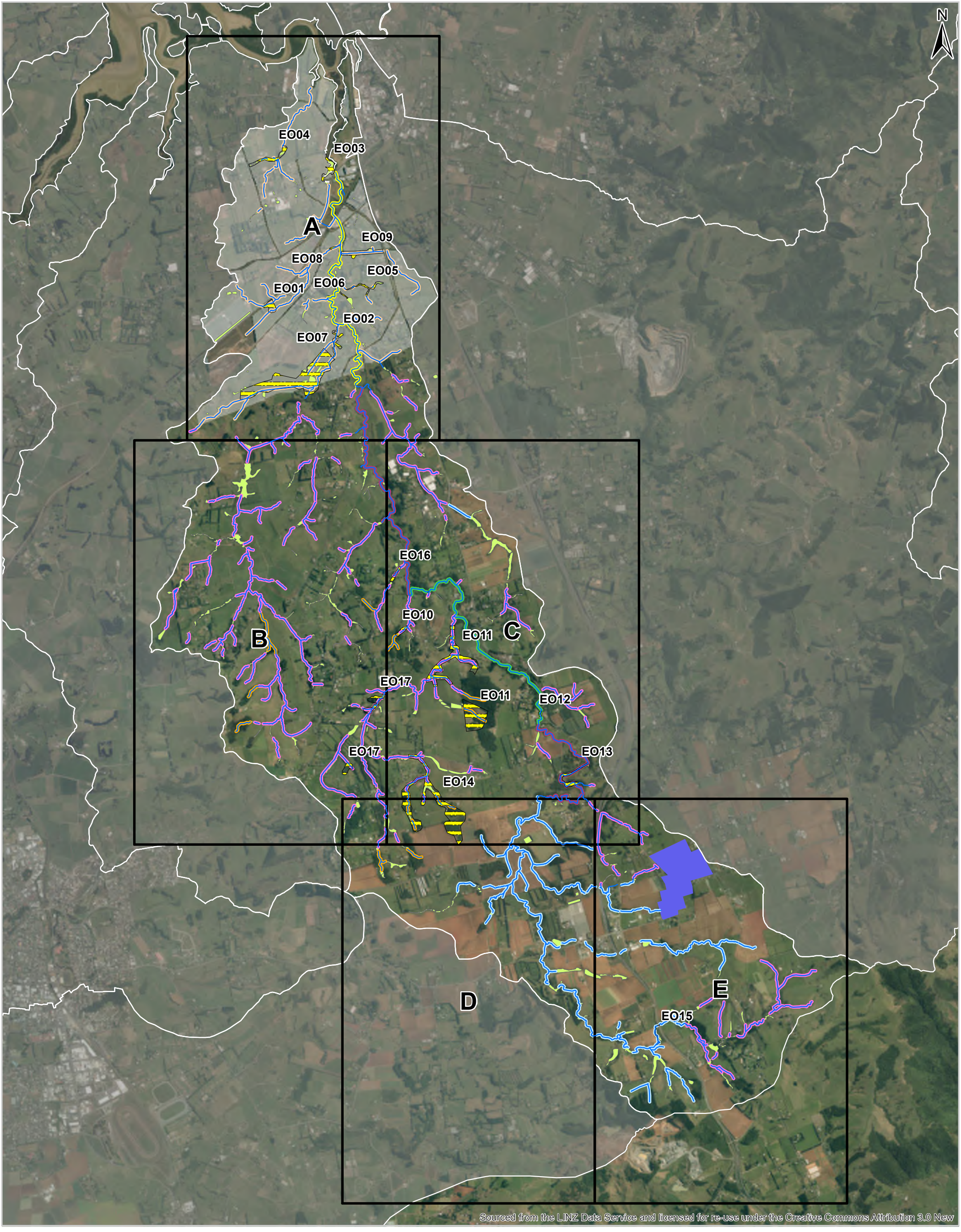
Map7 - Management Zones and Enhancement Opportunities



Management Zones

- MZ1
- MZ2
- MZ3
- MZ4
- MZ5
- MZ6
- MZ7
- MZ8

- Ecoline
- Enhancement Opportunities
- Future Urban Zone
- Stormwater Catchments
- Wetland

Client AUCKLAND COUNCIL
Project NGAKOROA WAR

0 1,000 2,000 m

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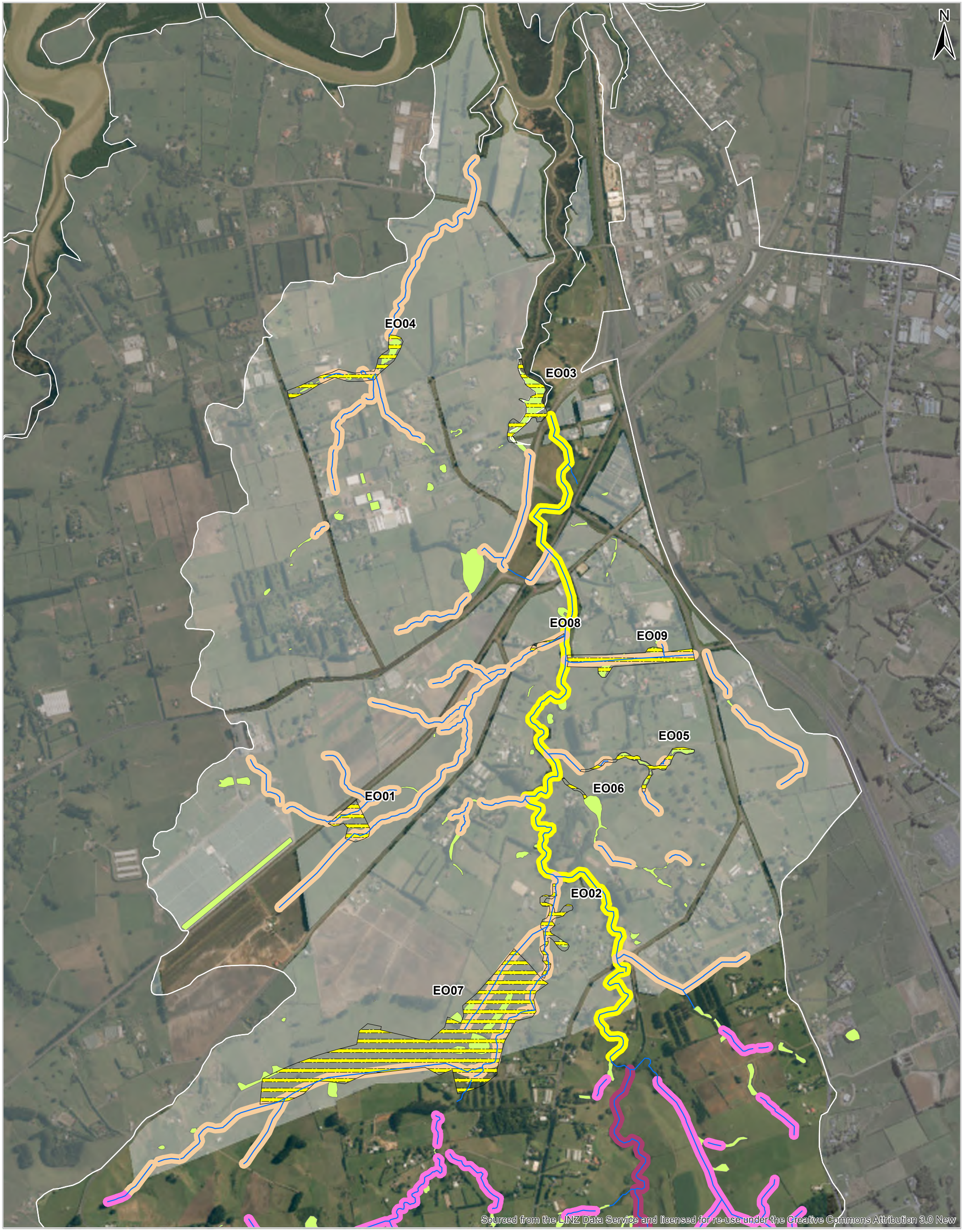
Map7A - Management Zones and Enhancement Opportunities



Management Zones

- MZ1
- MZ2
- MZ3
- MZ4
- MZ5
- MZ6
- MZ7
- MZ8
- Ecoline
- Enhancement Opportunities
- Future Urban Zone
- Stormwater Catchments
- Wetland

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Project **NGAKOROA WAR**

0 340 680 m

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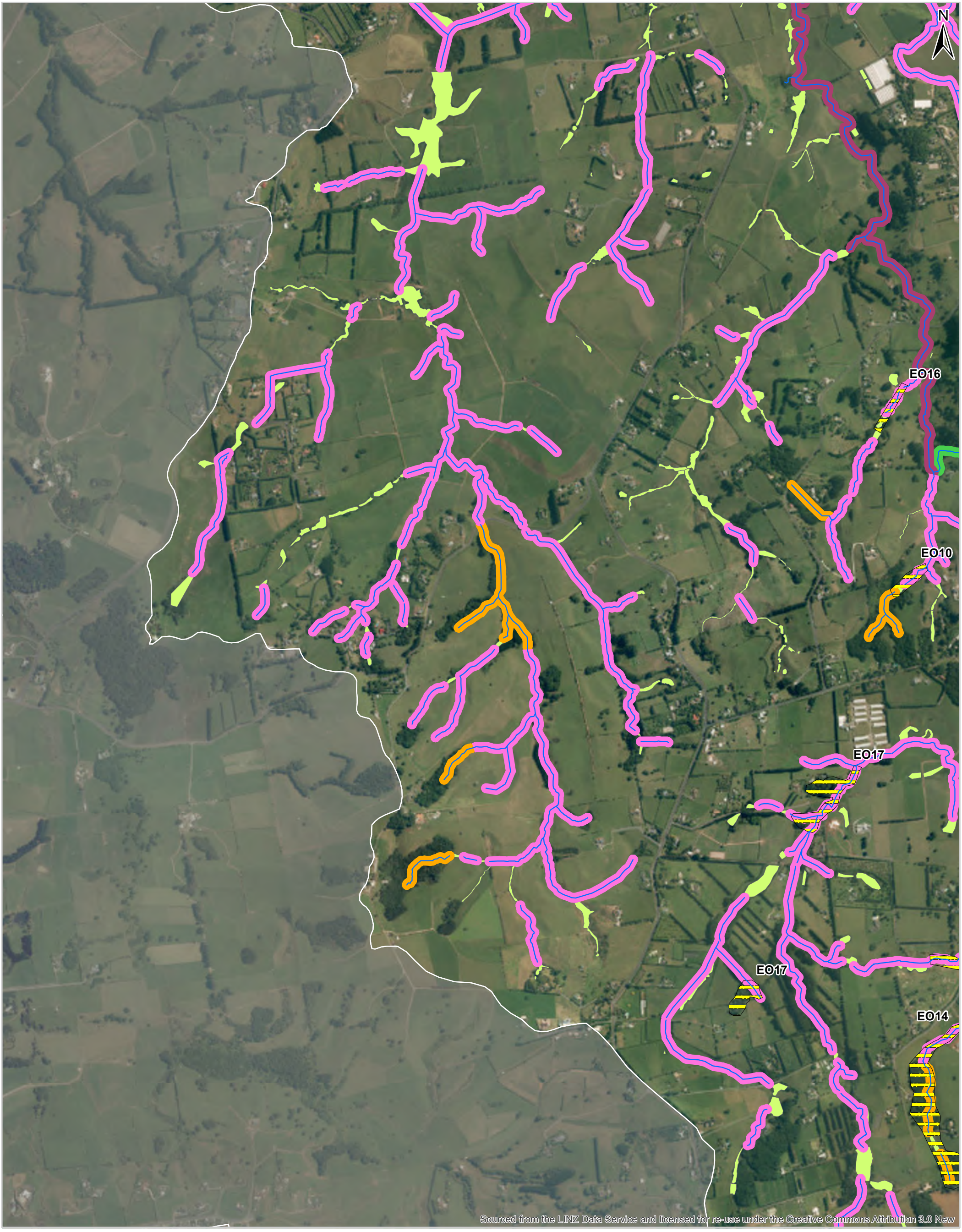
Map7B - Management Zones and Enhancement Opportunities



Management Zones

- MZ1
- MZ2
- MZ3
- MZ4
- MZ5
- MZ6
- MZ7
- MZ8
- Ecoline
- Enhancement Opportunities
- Future Urban Zone
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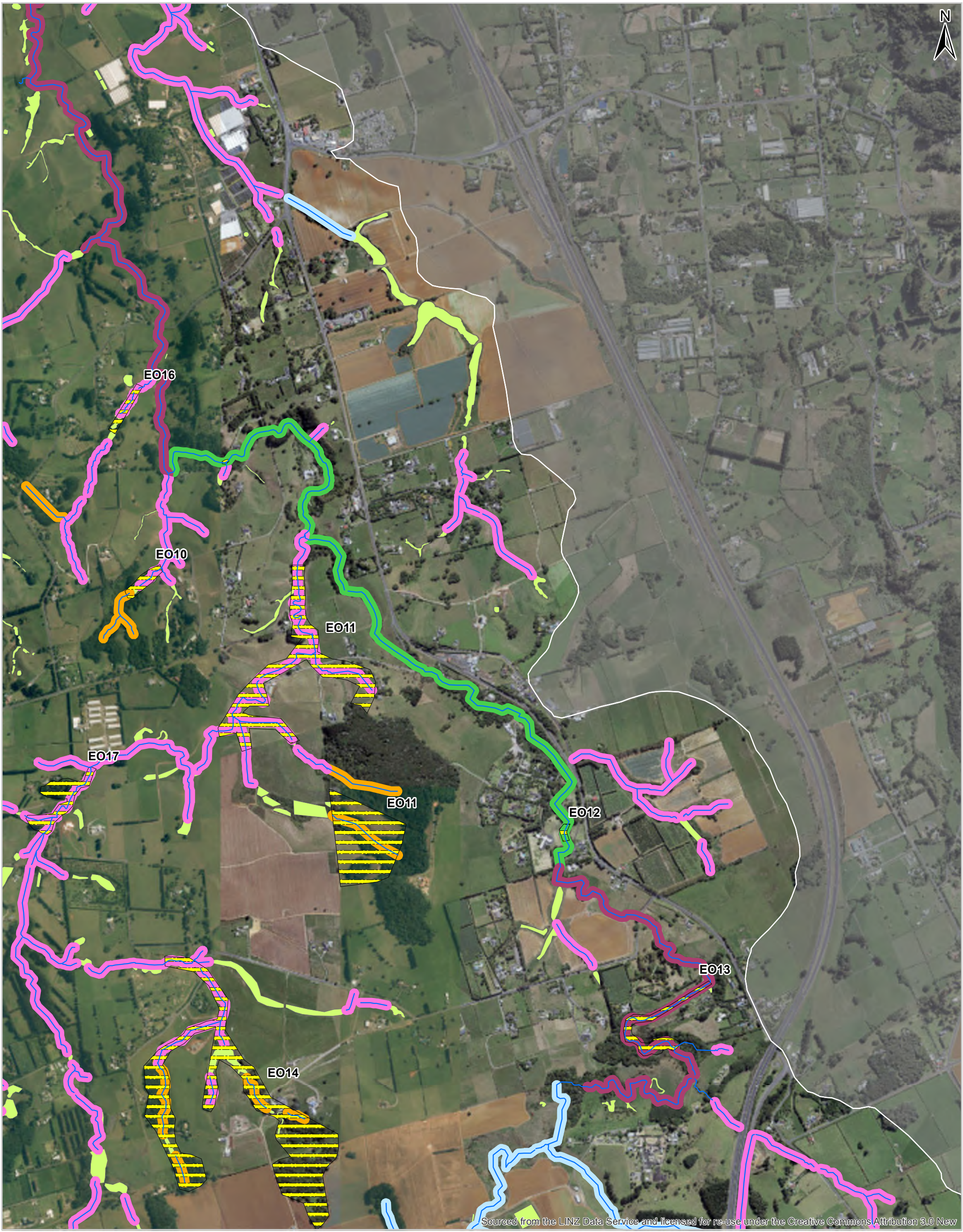
Map7C - Management Zones and Enhancement Opportunities



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Management Zones

- MZ1
- MZ2
- MZ3
- MZ4
- MZ5
- MZ6
- MZ7
- MZ8
- Ecoline
- Enhancement Opportunities
- Future Urban Zone
- Stormwater Catchments
- Wetland

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Project NGAKOROA WAR

0 340 680 m

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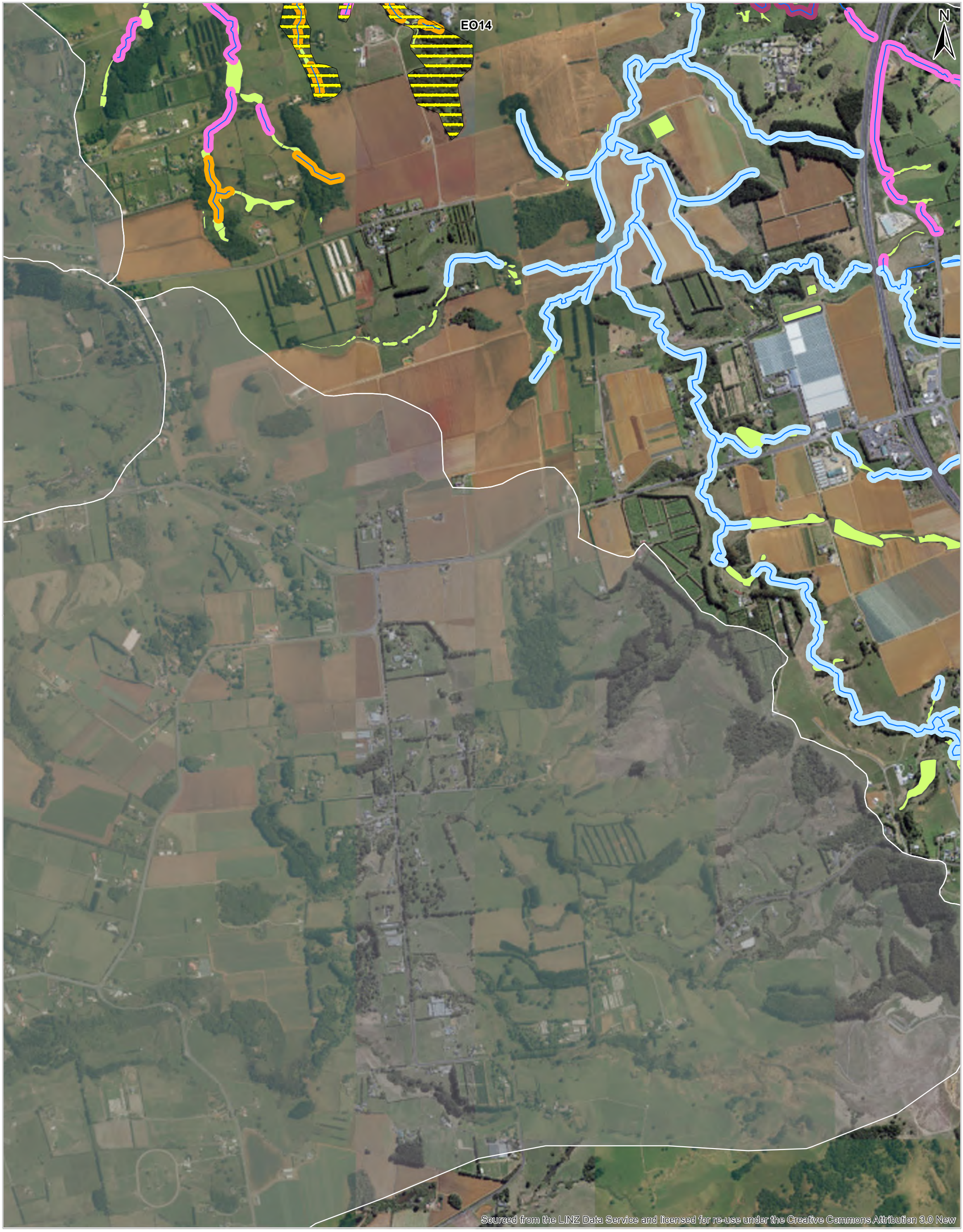
Map7D - Management Zones and Enhancement Opportunities



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Management Zones

- MZ1
- MZ2
- MZ3
- MZ4
- MZ5
- MZ6
- MZ7
- MZ8
- Ecoline
- Enhancement Opportunities
- Future Urban Zone
- Stormwater Catchments
- Wetland

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Project **NGAKOROA WAR**

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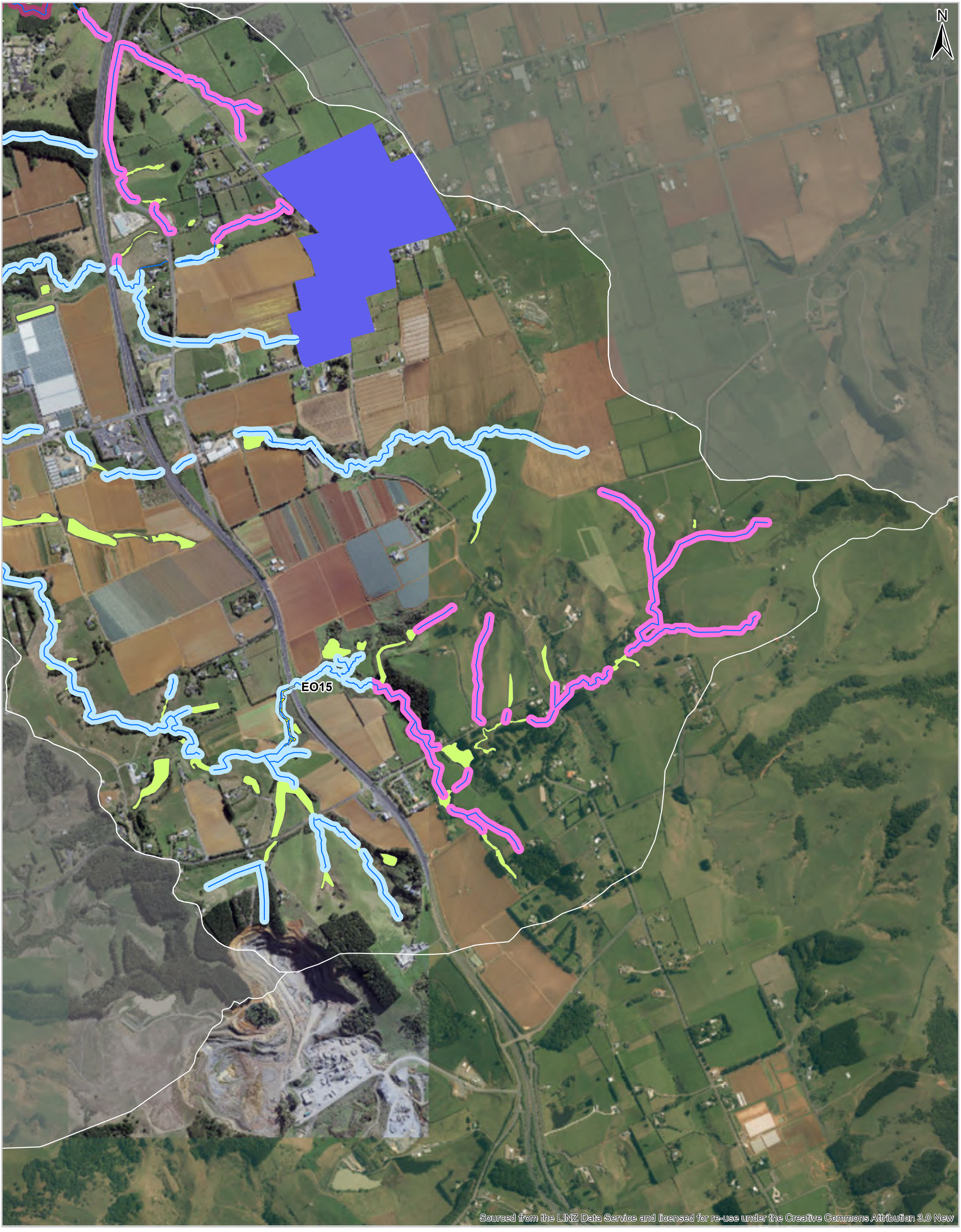
Map7E - Management Zones and Enhancement Opportunities



Management Zones

- MZ1
- MZ2
- MZ3
- MZ4
- MZ5
- MZ6
- MZ7
- MZ8
- Ecoline
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Appendix 2 Maintenance Schedule

Engineering Assets (Inlets/Outlets)– Council Owned

Stream Name	Tributary Code	Asset ID	Asset Type	GIS Record	Condition Rating	Maintenance Type	Erosion	Flood Risk	Fish Barrier	Notes
Ngakoroa Stream	TRIB24_17	3000039153	Standard Outlet (Headwall and Wingwalls)	Incorrect in GIS	Average	Erosion Protection	Slight	Yes	Does Not Apply	Slight erosion on TLB, dissipating rocks are scattered. Slump on TRB 8m downstream of outlet. Location of outlet in GIS downstream of where actually built.
Ngakoroa Stream	TRIB24_18	2000322225	Standard Outlet (Headwall and Wingwalls)	Correct in GIS	Good	Erosion Protection	Slight	No	Does Not Apply	Not standard outlet. Recorded as manhole in GIS. Scruffy domed steel grill dented likely associated with deposition of rock rip rap. Concrete material. Large rocks placed at structure and downstream act as dissipating structure. Small rectangular opening exists opposite pipe outlet in catch pit wall.

Engineering Assets (Inlets/Outlets)– Other Public Ownership

Stream Name	Tributary Code	Asset ID	Asset Type	GIS Record	Condition Rating	Maintenance Type	Erosion	Flood Risk	Fish Barrier	Notes
Ngakoroa Stream	NGA_TRIB2_3	NGAR_023	Standard Outlet	Not in GIS	Very Poor	Replacement	None	Yes	Does Not Apply	Concrete headwall structure completely detached from outlet and lying in pool approximately 1 m downstream. Edge of public reserve and road corridor
Ngakoroa Stream	NGA_TRIB2_2	NGAR_074	Outlet point	Not Located	Poor	Erosion Protection	Severe	Yes	Does Not Apply	Culvert outlet point not located, suspected buried under road, erosion severe as services exposed
Ngakoroa Stream	NGA_MAIN_2	NGAR_103	Standard Inlet	Not in GIS	Poor	Debris Removal	None	Yes	Does Not Apply	Culvert appears buried with corrugated iron head wall visible out of stream bed sediment. Could not see culvert diameter, Appears as though flows seep through slowly.
Ngakoroa Stream	TRIB24_18	NGAR_106	Standard Outlet	Not in GIS	Poor	Erosion Protection	Moderate	Yes	Does Not Apply	No formal structure, concrete bags as head wall. Rock and poured in Situ concrete erosion protection however concrete broken and scoured underneath
Ngakoroa Stream	TRIB24_18	NGAR_105	Standard Inlet	Not in GIS	Poor	Replacement	None	Yes	Does Not Apply	Head wall masonry block with large catchpit with broken grill which is 1.7m above 'stream bed'.
Ngakoroa Stream	TRIB24_18	NGAR_107	Standard Outlet	Not in GIS	Poor	Replacement	Slight	Yes	Does Not Apply	Informal rock in soil structure. Internal erosion worse than external erosion of structure.
Ngakoroa Stream	TRIB24_18	NGAR_073	Outlet point	Not in GIS	Poor	Erosion Protection	Moderate	No	Does Not Apply	Large concrete blocks and pours in situ concrete broken up with large scour pool. Confluence of road drainage and drain from paddock
Ngakoroa Stream	NGA_MAIN_32	NGAR_092	Standard Outlet	Not in GIS	Average	Erosion Protection	Slight	No	Climbers	Apron eroded underneath with 0.2 m perched drop.
Ngakoroa Stream	NGA_TRIB3_2	NGAR_091	Standard Inlet	Not in GIS	Average	Vegetation Clearance	None	No	Does Not Apply	Completely covered in grass and weeds preventing full assessment
Ngakoroa Stream	TRIB11_18	NGAR_093	Standard Outlet	Not in GIS	Average	Erosion Protection	Moderate	No	Does Not Apply	Outlet into pond from under road. Stacked rock headwall and wingwall in reasonably good condition apart from erosion on true left side, although this seems to have been caused by adjacent OLFP. Large amounts of sediment deposition at outlet
Ngakoroa Stream	TRIB11_23	NGAR_098	Standard Outlet	Not in GIS	Average	Structural	Moderate	No	Does Not Apply	Informal outlet structure with stacked old concrete pieces forming headwall, no wingwall. Erosion undercut TLB with sediment deposition from TRB due to adjoining drainage ditch. Should be given structural overhaul or replacement with formal structure
Ngakoroa Stream	TRIB24_5	NGAR_097	Standard Outlet	Not in GIS	Average	Patching	Moderate	No	None	Concrete material. Wing wall on TLB broken off at extremities. Sediment blockage 10m downstream of apron causing erosion. Head wall and some of wing wall overgrown with vegetation.
Ngakoroa Stream	TRIB32_9	NGAR_086	Standard Outlet	Not in GIS	Average	Erosion Protection	Moderate	No	None	Outlet of concrete box culvert under road with no structure. Sandbag reinforcing on either side has been exposed. Moderate erosion on true right edge beginning to undermine sandbags.

Stream Name	Tributary Code	Asset ID	Asset Type	GIS Record	Condition Rating	Maintenance Type	Erosion	Flood Risk	Fish Barrier	Notes
Ngakoroa Stream	NGAWEST_33	NGAR_099	Standard Outlet	Not in GIS	Average	Structural	Slight	No	None	Informal headwall and wingwall structure made of concrete blocks stacked up - no grouting. Minor erosion of bank between blocks. Appears stable for now but will need replacement or structural overhaul for development. Fenced.
Ngakoroa Stream	NGAWEST_83	NGAR_100	Standard Outlet	Not in GIS	Average	Structural	None	No	None	Informal headwall structure with stacked concrete blocks, not grouted but embedded in bank. Could not access for thorough inspection. Appears stable but Should be replaced or given structural overhaul for development. No fence to stop fall from road.
Ngakoroa Stream	NGAWEST_88	NGAR_027	Standard Inlet	Not in GIS	Average	Structural	Slight	No	Does Not Apply	No formal structure, timber retaining from road. On a slight angle.
Ngakoroa Stream	NGAWEST_59	NGAR_090	Standard Inlet	Not in GIS	Average	Patching	Slight	No	None	Concrete wing walls and head wall. Slight erosion of structure, soil surrounding inlet shows more erosion. In stream channel.
Ngakoroa Stream	NGA_TRIB2_5	NGAR_112	Inlet point	Not Located	Does Not Apply	Does Not Apply	None	Yes		Buried
Ngakoroa Stream	NGA_TRIB3_7	NGAR_017	Inlet point	Not Located	Does Not Apply	Does Not Apply	None	Yes		Not assessed. Submerged. Suspect outlet from glasshouse ponds
Ngakoroa Stream	TRIB17_47	NGAR_084	Standard Inlet	Not Located	Does Not Apply	Does Not Apply	None	Yes		Apparent timber headwall/ retaining structure but can not locate pipe inlet.
Ngakoroa Stream	TRIB24_17	NGAR_104	Standard Inlet	Not in GIS	Good	None	None	Yes		Rocks and cement as an informal wing wall and head wall structure.
Ngakoroa Stream	TRIB24_9	NGAR_001	Standard Inlet	Not in GIS	Does Not Apply	Does Not Apply	None	Yes		Inlet for large culvert under motorway. Unable to access due to thick gorse and high, steep banks.
Ngakoroa Stream	TRIB30_2	NGAR_047	Inlet point	Not in GIS	Does Not Apply	Does Not Apply	Slight	Yes	Does Not Apply	No structure. Pipe inlet extrudes from soil.
Ngakoroa Stream	TRIB30_2	NGAR_067	Outlet point	Not in GIS	Does Not Apply	Does Not Apply	Slight	Yes	Does Not Apply	No structure. Pipe outlet extrudes from soil.
Ngakoroa Stream	NGA_TRIB2_2	NGAR_034	Inlet point	Not Located	Does Not Apply	Debris Removal	None	Yes	Does Not Apply	Culvert inlet point not located, suspected buried under road. Potentially blocked culvert contributing to flooding upstream
Ngakoroa Stream	TRIB11_18	NGAR_036	Inlet point	Not in GIS	Does Not Apply	Debris Removal	None	Yes	Does Not Apply	Inlet to culvert under road blocked with log but pipe appeared to be flowing. Close to house with risk of flooding.
Ngakoroa Stream	NGA_MAIN_2	NGAR_018	Inlet point	Not in GIS	Does Not Apply	Erosion Protection	Moderate	No	Does Not Apply	Concrete culvert inlet with no structure. Undercutting due to erosion with evidence of heading up and scouring bank
Ngakoroa Stream	TRIB24_5	NGAR_043	Inlet point	Not in GIS	Does Not Apply	Erosion Protection	Moderate	Does Not Apply	Does Not Apply	Erosion evident immediately upstream from this inlet point.
Ngakoroa Stream	TRIB35_3	NGAR_045	Inlet point	Not in GIS	Does Not Apply	Erosion Protection	Moderate	No	Does Not Apply	Inlet point has vegetation surrounding it. Small stream running next to inlet point, considerable erosion there.
Ngakoroa Stream	TRIB24_21	NGAR_080	Outlet point	Not in GIS	Does Not Apply	Erosion Protection	Moderate	Does Not Apply	Does Not Apply	High velocity, deeply incised l channel 1 m steps. 0.4 m depth pool in between
Ngakoroa Stream	TRIB24_4	NGAR_028	Outlet point	Not in GIS	Does Not Apply	Erosion Protection	Moderate	No	Does Not Apply	No formal structure visible. Overhanging vegetation present. Perched 0.5 m. Large scour pool and erosion downstream.
Ngakoroa Stream	TRIB24_5	NGAR_066	Outlet point	Not in GIS	Does Not Apply	Erosion Protection	Moderate	Does Not Apply	Does Not Apply	Erosion evident from this point to 15m downstream. Undermining foundation of roadside signage
Ngakoroa Stream	NGA_TRIB2_2	NGA_043	Outlet point	Not in GIS	Does Not Apply	Vegetation Clearance	None	Does Not Apply	Does Not Apply	Overgrown. Not assessed.
Ngakoroa Stream	NGA_TRIB3d_1	NGAR_021	Outlet point	Not in GIS	Does Not Apply	Vegetation Clearance	None	Does Not Apply	Climbers	Perched culvert dropping .5m into stream channel. Heavily overgrown and inaccessible

Stream Name	Tributary Code	Asset ID	Asset Type	GIS Record	Condition Rating	Maintenance Type	Erosion	Flood Risk	Fish Barrier	Notes
Ngakoroa Stream	NGA_MAIN_2	NGAR_077	Outlet point	Not Located	Does Not Apply	Vegetation Clearance	None	Does Not Apply	Does Not Apply	Outlet overgrown by dense bindweed and gorse, could not be observed.
Ngakoroa Stream	NGA_TRIB2_2	NGAR_019	Inlet point	Not Located	Does Not Apply	Vegetation Clearance	None	Does Not Apply	Does Not Apply	Overgrown. Not assessed.
Ngakoroa Stream	NGA_TRIB2_2	NGAR_057	Inlet point	Not Located	Does Not Apply	Vegetation Clearance	None	Does Not Apply	Does Not Apply	Overgrown. Not assessed.
Ngakoroa Stream	NGA_TRIB3_7	NGAR_079	Outlet point	Not in GIS	Does Not Apply	Vegetation Clearance	None	Does Not Apply	Does Not Apply	
Ngakoroa Stream	NGA_TRIB3a_1	NGAR_060	Outlet point	Not Located	Does Not Apply	Vegetation Clearance	None	Does Not Apply	Does Not Apply	Timber, wood, branches, and other vegetation obscuring outlet. Could not be visually assessed.
Ngakoroa Stream	NGA_TRIB3b_1	NGAR_020	Outlet point	Not Located	Does Not Apply	Vegetation Clearance	None	Does Not Apply	Does Not Apply	Completely enclosed in gorse- could not be seen or assessed
Ngakoroa Stream	NGA_TRIB4_5	NGAR_078	Outlet point	Not in GIS	Does Not Apply	Vegetation Clearance	None	Does Not Apply	Does Not Apply	Overgrown
Ngakoroa Stream	NGA_MAIN_68	NGAR_006	Standard Outlet	Not in GIS	Good	Vegetation Clearance	None	No	Swimmers	Wing walls not visible. Head wall Gabon baskets. Crash barrier of motorway acts as safety fence for structure. Blackberry growth over structure.
Ngakoroa Stream	NGA_TRIB2_2	NGAR_101	Standard Outlet	Not in GIS	Good	Vegetation Clearance	None	No	None	Upstream flooding in road corridor. Scum at outlet
Ngakoroa Stream	TRIB17_47	NGAR_032	Outlet point	Not Located	Does Not Apply	Vegetation Clearance	None	Does Not Apply	Does Not Apply	Could not be located to assess - Dense vegetation preventing access.
Ngakoroa Stream	TRIB24_5	NGAR_035	Inlet point	Not located	Does Not Apply	Vegetation Clearance	None	Does Not Apply	Does Not Apply	Could not be assessed due to inaccessibility. Steep drop and blackberry bush.
Ngakoroa Stream	NGAWEST_33	NGAR_056	Inlet point	Not Located	Does Not Apply	Vegetation Clearance	None	No	Does Not Apply	Could not be located amongst the vegetation to be assessed. Appeared flowing well. No fence to stop fall from road.
Ngakoroa Stream	NGAWEST_71	NGAR_029	Standard Outlet	Not Located	Does Not Apply	Vegetation Clearance	None	No	Does Not Apply	Not formal structure, timber retaining for road. Appears to be at an angle.
Ngakoroa Stream	NGA_MAIN_69	NGAR_002	Standard Inlet	Not in GIS	Good	None	None	No	Swimmers	Large concrete inlet to 2x culverts under motorway
Ngakoroa Stream	NGA_TRIB3e_1	NGAR_022	Standard Inlet	Not in GIS	Good	None	None	No	Swimmers	Not a standard structure, head wall formed by grouted rock (same as box culvert). Fall to stream not over 1.5 m
Ngakoroa Stream	TRIB17_48	NGAR_076	Outlet point	Not in GIS	Does Not Apply	Does Not Apply	Slight	No	Swimmers	Erosion on TRB around rocks
Ngakoroa Stream	TRIB21_11	NGAR_005	Standard Inlet	Not in GIS	Good	None	None	No	Swimmers	Large pit formed by wingwalls from inlet and vertical concrete wall below constructed waterfall upstream.
Ngakoroa Stream	TRIB24_10	NGAR_004	Standard Outlet	Not in GIS	Good	None	None	No	Swimmers	Very large sunken apron dissipation structure downstream from culvert under motorway. Sloped concrete below culvert outer is approx 70 degrees. Culvert invert 1.9m above water level. Culvert diameter 2.5m.
Ngakoroa Stream	TRIB24_30	NGAR_089	Standard Inlet	Not in GIS	Good	None	None	No	Anguilliforms	Scruffy Dome Inlet. Dry at time of inspection. Verical chamber walls acting as fish barrier.
Ngakoroa Stream	TRIB27_12	NGAR_094	Standard Outlet	Not in GIS	Good	None	Slight	No	Swimmers	Boulders of various sizes used as wingwall and head wall. Dissipating structure are the same boulders aligned on a slant. Erosion evident immediately downstream from outlet.
Ngakoroa Stream	TRIB34_2	NGAR_051	Inlet point	Not in GIS	Does Not Apply	Does Not Apply	None	Does Not Apply	Climbers	Inlet to 1400mm concrete culvert under road, no structure. Flows trickling through at time of inspection suggesting there may be low flow impedance when dryer.

Engineering Assets (Inlets/Outlets)– Private Ownership

Stream Name	Tributary Code	Asset ID	Asset Type	GIS Record	Condition Rating	Maintenance Type	Erosion	Flood Risk	Fish Barrier	Notes
Ngakoroa Stream	NGA_TRIB8b_6	NGA_053	Standard Outlet (Headwall and Wingwalls)	Not in GIS	Very Poor	Replacement	None	No	Does Not Apply	Head wall has broken in half and remaining half separated from pipe and slumped forward. Partially obstructing pipe
Ngakoroa Stream	NGA_TRIB8b_7	NGA_057	Standard Inlet (Headwall and Wingwalls)	Not in GIS	Very Poor	Replacement	None	No	Does Not Apply	Head wall has come away from the bank. Debris blocking 50% of pipe
Ngakoroa Stream	NGA_TRIB3_2	NGA_055	Standard Inlet (Headwall and Wingwalls)	Not in GIS	Poor	Replacement	Moderate	No	Does Not Apply	concrete has come away. headway serves no purpose
Ngakoroa Stream	NGA_TRIB3_4	NGA_139	Standard Outlet (Headwall and Wingwalls)	Not in GIS	Poor	Structural	Severe	No	Climbers	Pipe broken in middle downstream half slumped slightly. 0.8 m diameter. Concrete retaining beams broken with slip above. Concrete rubble dissipating structure. Pipe perched above apron/
Ngakoroa Stream	NGA_TRIB3_5	NGA_146	Standard Inlet (Headwall and Wingwalls)	Not in GIS	Poor	Replacement	None	No	Does Not Apply	Non-standard concrete headwall formed by vehicle crossing structure. Pipe inlet could not be located. Should be replaced or removed.
Ngakoroa Stream	NGA_TRIB3_7	NGA_153	Standard Inlet (Headwall and Wingwalls)	Not in GIS	Poor	Replacement	Moderate	Yes	Does Not Apply	Non-standard inlet, concrete posts associated with crossing retaining. Crossing eroding. Culvert inlet buried.
Ngakoroa Stream	NGA_TRIB3_7	NGA_154	Standard Outlet (Headwall and Wingwalls)	Not in GIS	Poor	Replacement	Moderate	Yes	Does Not Apply	Not a standard inlet, concrete posts associated with crossing retaining. Culvert submerged.
Ngakoroa Stream	NGA_TRIB5_FORK2_2	NGA_145	Standard Inlet (Headwall and Wingwalls)	Not in GIS	Poor	Replacement	None	No	Climbers	Non-standard timber structure holding pipe inlet in poor condition requiring replacement.
Ngakoroa Stream	NGA_TRIB8b_4	NGA_047	Standard Inlet (Headwall and Wingwalls)	Not in GIS	Poor	Structural	Moderate	No	Does Not Apply	Concrete retaining beams functioning as head wall, several collapsed over inlet. Erosion at inlet face.
Ngakoroa Stream	TRIB27_7	NGAR_111	Standard Inlet (Headwall and Wingwalls)	Not in GIS	Poor	Replacement	Slight	Yes	Does Not Apply	Informal structure. Head wall and wing walls consist of broken concrete blocks in soil. Some erosion of soil evident on right wing wall.
Ngakoroa Stream	NGA_TRIB3e_2	NGA_066	Standard Inlet (Headwall and Wingwalls)	Not in GIS	Average	Erosion Protection	Moderate	No	Does Not Apply	Non-standard Inlet to culvert under farm crossing - timber headwall with no wingwalls. Erosion occurring behind timber 'headwall'. Should be removed for development.
Ngakoroa Stream	TRIB32_9	NGA_140	Standard Inlet (Headwall and Wingwalls)	Not in GIS	Average	Erosion Protection	Moderate	No	None	Inlet point to concrete box culvert under road with no structure. Sandbag retaining on either side. Some erosion on true left side exposing sandbags. Requires erosion protection or wingwall structure.
Ngakoroa Stream	PAH_MAIN_8	NGA_141	Standard Inlet (Headwall and Wingwalls)	Not in GIS	Average	Erosion Protection	Moderate	No	None	Informal Inlet to culvert under farm driveway. Concrete headwall present but partly collapsed (not level) and undercut from erosion. No wing walls.
Ngakoroa Stream	NGA_TRIB3e_2	NGA_148	Standard Outlet (Headwall and Wingwalls)	Not in GIS	Average	Erosion Protection	Slight	No	Does Not Apply	Non-standard outlet - timber headwall with no wingwalls. Erosion behind headwall.
Ngakoroa Stream	NGAWEST_88	NGAR_010	Standard Inlet (Headwall and Wingwalls)	Not in GIS	Average	Patching	None	No	Does Not Apply	Masonry block in TRB, loosely placed rocks on TLB.
Ngakoroa Stream	NGA_TRIB8_6	NGA_056	Standard Inlet (Headwall and Wingwalls)	Not in GIS	Average	Replacement	Slight	Yes	Does Not Apply	Undercut structure. No apron. High flood risk. Non habitable floors in the immediate flood plain. Culvert breached 3 times in the past year. Broken staff gauge, lower 1m gone.
Ngakoroa Stream	NGA_TRIB8b_4	NGA_054	Standard Outlet (Headwall and Wingwalls)	Not in GIS	Average	Structural	Slight	No	Does Not Apply	Not standard structure. Timber retaining wall as head wall. No access due to dense hawthorn

Stream Name	Tributary Code	Asset ID	Asset Type	GIS Record	Condition Rating	Maintenance Type	Erosion	Flood Risk	Fish Barrier	Notes
Ngakoroa Stream	NGA_TRIB8_6	NGA_058	Standard Outlet (Headwall and Wingwalls)	Not in GIS	Average	Structural	Slight	Yes	Does Not Apply	Fenced off. Submerged macrophytes. Dead matter.
Ngakoroa Stream	NGA_TRIB8_3	NGA_147	Standard Inlet (Headwall and Wingwalls)	Not in GIS	Average	Structural	None	No	Does Not Apply	Timber retaining wall approx 10 m wide. Pole displaced and wall bulging on trb. Slight debris jam at inlet resulting in 0.25 m drop at invert
Ngakoroa Stream	NGA_TRIB7_3	NGA_150	Standard Outlet (Headwall and Wingwalls)	Not in GIS	Average	Structural	None	No	Does Not Apply	Not a standard outlet. However, driveway retaining acts as headwall. Some slumping of retaining
Ngakoroa Stream	NGA_TRIB7a_1	NGA_151	Standard Outlet (Headwall and Wingwalls)	Not in GIS	Average	Structural	None	No	Does Not Apply	Not a standard outlet. However, driveway retaining acts as headwall. Some slumping of retaining.
Ngakoroa Stream	NGA_TRIB8_3	NGA_152	Standard Outlet (Headwall and Wingwalls)	Not in GIS	Average	Vegetation Clearance	None	No	Swimmers	Timber retaining wall approx 10 m wide. Willow root mat functioning as apron
Ngakoroa Stream	NGA_TRIB9a_1	NGA_144	Standard Inlet (Headwall and Wingwalls)	Not in GIS	Average	Structural	None	No	Does Not Apply	No fish barrier. Concrete Headwall not connected to pvc pipe
Ngakoroa Stream	NGA_TRIB3_3	NGA_059	Inlet point (no structure)	Not in GIS	Does Not Apply	Erosion Protection	Severe	No	Does Not Apply	Only head wall exists as part of collapsed road. No wing walls. Extremely heavy erosion present. Debris also present at inlet.
Ngakoroa Stream	NGA_TRIB3_3	NGA_064	Outlet point (no structure)	Not in GIS	Does Not Apply	Erosion Protection	Severe	No	Does Not Apply	No structure present. Heavy erosion around outlet.
Ngakoroa Stream	NGA_TRIB3b_1	NGA_026	Inlet point (no structure)	Not in GIS	Does Not Apply	Erosion Protection	Moderate	No	Does Not Apply	No apron. No wing walls. Erosion evident, part of road may have once been head wall but is unclear due to erosion.
Ngakoroa Stream	NGA_TRIB3b_1	NGA_062	Outlet point (no structure)	Not in GIS	Does Not Apply	Erosion Protection	Moderate	No	Does Not Apply	No structure. Erosion evident around this point.
Ngakoroa Stream	NGA_TRIB3b_1	NGA_063	Outlet point (no structure)	Not in GIS	Does Not Apply	Erosion Protection	Moderate	No	Does Not Apply	Concrete from road now acting as a head wall but that is due to collapse of the side of road.
Ngakoroa Stream	NGA_TRIB3b_1	NGA_060	Inlet point (no structure)	Not in GIS	Does Not Apply	Erosion Protection	Moderate	No	Does Not Apply	Inlet point buried with sediment from road.
Ngakoroa Stream	NGA_TRIB3e_1	NGA_077	Inlet point (no structure)	Not in GIS	Does Not Apply	Erosion Protection	Moderate	Does Not Apply	Does Not Apply	Inlet point to farm culvert with no structure. Erosion of banks undermines concrete beams for vehicle crossing.
Ngakoroa Stream	NGA_TRIB3e_1	NGA_108	Outlet point (no structure)	Not in GIS	Does Not Apply	Erosion Protection	Moderate	Does Not Apply	Does Not Apply	Outlet with no structure. Erosion of bank has undermined concrete beam for vehicle corssing.
Ngakoroa Stream	NGA_TRIB9_2	NGA_158	Outlet point (no structure)	Not in GIS	Does Not Apply	Erosion Protection	Moderate	Does Not Apply	Does Not Apply	Erosion out outlet. Culvert perched. Rock placed in channel.
Ngakoroa Stream	NGAWEST_38	NGA_125	Outlet point (no structure)	Not in GIS	Does Not Apply	Erosion Protection	Moderate	No	Does Not Apply	Pipe outlet into stream appearing to drain pond. Erosion around pipe has left it exposed and it appears some flow gravels down the outside of the pipe in high flow contributing to erosion. No structure.
Ngakoroa Stream	NGA_TRIB2_4	NGA_014	Inlet point (no structure)	Not in GIS	Does Not Apply	Debris Removal	None	Yes	Does Not Apply	Blocked and submerged
Ngakoroa Stream	NGA_TRIB3_4	NGA_094	Inlet point (no structure)	Not in GIS	Does Not Apply	Debris Removal	Slight	Does Not Apply	Does Not Apply	0.6 m diameter. Partially obstructed with branches and concrete rubble. Erosion at outlet.
Ngakoroa Stream	NGA_TRIB3_5	NGA_128	Outlet point (no structure)	Not in GIS	Does Not Apply	Vegetation Clearance	None	Does Not Apply	Does Not Apply	Oulet could not be located to be assessed due dense vegetation.

Stream Name	Tributary Code	Asset ID	Asset Type	GIS Record	Condition Rating	Maintenance Type	Erosion	Flood Risk	Fish Barrier	Notes
Ngakoroa Stream	NGA_TRIB3e_i	NGA_015	Inlet point (no structure)	Not in GIS	Does Not Apply	Debris Removal	None	Does Not Apply	Does Not Apply	50% of inlet blocked.
Ngakoroa Stream	NGA_TRIB4_1	NGA_069	Inlet point (no structure)	Not in GIS	Does Not Apply	Debris Removal	None	No	Does Not Apply	Not accessible, covered in blackberry
Ngakoroa Stream	NGA_TRIB4_3	NGA_068	Inlet point (no structure)	Not located	Does Not Apply	Vegetation Clearance	None	Does Not Apply	Does Not Apply	Not accessible, covered in blackberry
Ngakoroa Stream	NGA_TRIB4a_1	NGA_067	Inlet point (no structure)	Not in GIS	Does Not Apply	Debris Removal	None	No	Does Not Apply	60% blocked with debris
Ngakoroa Stream	NGA_TRIB6_2	NGA_070	Inlet point (no structure)	Not in GIS	Does Not Apply	Debris Removal	None	No	Does Not Apply	Inlet 95% blocked
Ngakoroa Stream	NGA_TRIB8b_6	NGA_027	Inlet point (no structure)	Not in GIS	Does Not Apply	Vegetation Clearance	None	No	Does Not Apply	densely overgrown with kikuyu. No structure visible underneath. Retaining wall above
Ngakoroa Stream	NGA_TRIB8b_6	NGA_042	Outlet point (no structure)	Not in GIS	Does Not Apply	Vegetation Clearance	Slight	No	None	Outlet densely overgrown with kikuyu. No structure visible underneath. Retaining wall above
Ngakoroa Stream	NGA_TRIB8bi_1	NGA_016	Inlet point (no structure)	Not in GIS	Does Not Apply	Debris Removal	None	No	Does Not Apply	
Ngakoroa Stream	PAH_MAIN_5	NGA_041	Outlet point (no structure)	Not in GIS	Does Not Apply	Vegetation Clearance	Slight	Does Not Apply	Does Not Apply	Slight erosion associated with scour pool. Outlet covered by blackberry.
Ngakoroa Stream	PAH_MAIN_7	NGA_127	Outlet point (no structure)	Not located	Does Not Apply	Vegetation Clearance	None	No	None	No formal structure observed but heavily overgrown preventing full assessment.
Ngakoroa Stream	PAH_MAIN_9	NGA_100	Outlet point (no structure)	Not in GIS	Does Not Apply	Debris Removal	None	No	Climbers	Outlet with no structure. Perched approx 400 mm with collapsed concrete/ timber debris from bridge structure fallen across outlet. Bridge needs repair
Ngakoroa Stream	PAH_MAIN_9	NGA_161	Outlet point (no structure)	Not Located	Does Not Apply	Vegetation Clearance	None	Yes	Does Not Apply	Pipe outlet with no apparent structure. Heavily overgrown with vegetation preventing full assessment. Appears safe with fence separating from driveway. Close to house with possible flood risk.
Ngakoroa Stream	PAH_TRIB1_2	NGA_098	Outlet point (no structure)	Not in GIS	Does Not Apply	Debris Removal	None	Yes	Does Not Apply	Outlet 50% blocked.
Ngakoroa Stream	NGA_TRIB9a_2	NGA_012	Outlet point (no structure)	Not Located	Does Not Apply	Does Not Apply	None	Yes	Does Not Apply	Water discharging from ground. Maybe buried outlet or seepage from driveway swale
Ngakoroa Stream	PAH_TRIB1_2	NGA_084	Inlet point (no structure)	Not Located	Does Not Apply	Does Not Apply	None	Yes	Does Not Apply	Inlet submerged and not located.
Ngakoroa Stream	PAH_TRIB1_2	NGA_085	Inlet point (no structure)	Not Located	Does Not Apply	Does Not Apply	None	Yes	Does Not Apply	Inlet submerged and not located.

Engineering Assets (Pipes/Culverts)– Council Owned

None

Engineering Assets (Pipes/Culverts)– Other Public Ownership

Stream Name	Tributary Code	Asset ID	Asset Type	GIS Record	Diameter (m)	Condition Rating	Maintenance Type	Land Ownership	Flood Risk	Fish Barrier	Notes
Ngakoroa Stream	TRIB24_18	NGAPR_052	Pipe	Not in GIS	0.75	Very Poor	Replacement	Public	Yes	Does Not Apply	Pipe is discontinuous, snapped with a gap of 0.2m between sections. Internal erosion evident. Pipe outlet lip eroded revealing steel reinforcement. Length unsure.
Ngakoroa Stream	NGA_TRIB2_2	NGAPR_053	Culvert	Not Located	999	Poor	Replacement	Public	Yes	Does Not Apply	Submerged and blocked with high sediment deposition. Pipe also cracked and slumped.. Evidence of upstream flooding of road corridor.
Ngakoroa Stream	TRIB11_23	NGAPR_044	Culvert	Not in GIS	1.5	Poor	Replacement	Public	No	Climbers	Culvert under road. 1500 dia for first 8m from downstream end with displaced joints and cracking/ holes exposing rebar. Then changes diameter for upstream section- appears approx 1m from there. No access from upstream end.
Ngakoroa Stream	TRIB30_2	NGAPR_051	Culvert	Not in GIS	0.6	Poor	Replacement	Public	Yes	Climbers	Concrete culvert. Mostly embedded in sediment. Section from outlet point to 1m upstream is a different pipe to the remaining culvert.

Stream Name	Tributary Code	Asset ID	Asset Type	GIS Record	Diameter (m)	Condition Rating	Maintenance Type	Land Ownership	Flood Risk	Fish Barrier	Notes
Ngakoroa Stream	TRIB17_47	NGAPR_021	Culvert	Not in GIS	999	Average	Debris Removal	Public	No	Does Not Apply	Partially blocked with silt. Could not locate downstream outlet. Suspected submerged outlet
Ngakoroa Stream	TRIB24_18	NGAPR_018	Pipe	Not in GIS	0.3	Average	Structural	Mixed	No	Does Not Apply	End of pipe partially broken and half buried in stream
Ngakoroa Stream	TRIB24_21	NGAPR_019	Culvert	Not in GIS	1	Average	Replacement	Public	No	Climbers	Concrete culvert under main road. Concrete shattered at mouth of outlet. Steep, difficult access.
Ngakoroa Stream	TRIB34_2	NGAPR_022	Culvert	Not in GIS	1.4	Average	Debris Removal	Public	No	Does Not Apply	Culvert under road. Circular at inlet and box culvert at outlet. Almost completely full of water in low flow with sediment depth of approx 0.7m. Could not assess internal of pipe to determine condition although appears to be conveying flows.
Ngakoroa Stream	NGA_TRIB1_1	NGAPR_010	Pipe	Not in GIS	0.8	Good	Vegetation Clearance	Public	No	None	Railway line. Watercress at outlet
Ngakoroa Stream	NGA_TRIB3a_1	NGAPR_061	Culvert	Not Located	999	Does Not Apply	Vegetation Clearance	Public	Does Not Apply	None	Could not be seen to be assessed. Heavy vegetation and debris at both inlet and outlet.
Ngakoroa Stream	TRIB24_18	NGAPR_043	Pipe	Not in GIS	0.35	Good	Erosion Protection	Mixed	No	None	Significant erosion downstream
Ngakoroa Stream	TRIB24_21	NGAPR_064	Pipe	Not in GIS	0.3	Good	Erosion Protection	Public	No	None	
Ngakoroa Stream	NGAWEST_88	NGAPR_054	Culvert	Not Located	999	Does Not Apply	Does Not Apply	Public	Yes	Does Not Apply	Culvert running under road. Could not be directly observed due to complete submergence.
Ngakoroa Stream	NGA_MAIN_32	NGAPR_038	Culvert	Not in GIS	1	Good	None	Public	No	Swimmers	Drop from apron at outlet is fish barrier
Ngakoroa Stream	NGA_MAIN_68	NGAPR_004	Culvert	Not in GIS	1.8	Good	None	Public	No	Swimmers	Concrete culvert running under motorway. Considerably less flow than identical culvert running parallel. Gravel adhered to bottom surface of culvert.
Ngakoroa Stream	NGA_MAIN_69	NGAPR_006	Culvert	Not in GIS	1.8	Good	None	Public	No	Anguilliforms	Concrete culvert running under motorway. Considerably greater flow than identical culvert running parallel.
Ngakoroa Stream	NGA_TRIB3e_1	NGAPR_014	Culvert	Not in GIS	999	Good	None	Public	No	Swimmers	Grouted rock box culvert under railway
Ngakoroa Stream	NGA_TRIB3e_2	NGAPR_013	Culvert	Not in GIS	0.5	Good	None	Public	No	Swimmers	inlet not assessed. Almost no flow in pipe. Pond upstream only habitat.
Ngakoroa Stream	TRIB17_48	NGAPR_040	Culvert	Not in GIS	0.4	Good	None	Mixed	No	Climbers	Perched and undercut
Ngakoroa Stream	TRIB24_5	NGAPR_039	Culvert	Not in GIS	0.9	Good	None	Public	No	Climbers	Concrete culvert under road. Overhanging vegetation present.
Ngakoroa Stream	TRIB24_9	NGAPR_007	Culvert	Not in GIS	2.5	Good	None	Public	No	Swimmers	Culvert discharges onto steep concrete ramp above large apron structure.
Ngakoroa Stream	TRIB27_8	NGAPR_050	Pipe	Not in GIS	1	Good	None	Mixed	No	Climbers	Long concrete pipe running under business and road. Good condition. Not sure where inlet is.
Ngakoroa Stream	TRIB27_9	NGAPR_041	Culvert	Not in GIS	1.5	Good	None	Public	No	Anguilliforms	Concrete pipe, not straight. Looks clear of debris. Decent flow. Large drop from perched culvert outlet to outlet structure prevents fish passage.

Engineering Assets (Pipes/Culverts)– Private Ownership (Issues only)

Stream Name	Tributary Code	Asset ID	Asset Type	GIS Record	Diameter (m)	Condition Rating	Maintenance Type	Flood Risk	Fish Barrier	Notes
Ngakoroa Stream	NGA_TRIB2_4	NGAP_063	Culvert	Not in GIS	999	Very Poor	Replacement	No	Swimmers	Inlet blocked - partial barrier. Culvert collapsed.
Ngakoroa Stream	NGA_TRIB3_3	NGAP_058	Culvert	Not in GIS	0.7	Poor	Replacement	No	Swimmers	Severely degraded culvert and farm crossing with sections of pipe separated and pushed downstream.
Ngakoroa Stream	NGA_TRIB3b_1	NGAP_059	Culvert	Not in GIS	0.4	Poor	Replacement	No	Swimmers	Half buried culvert under farm road. Could not fully assess. Minimal flow. Limited upstream habitat
Ngakoroa Stream	NGA_TRIB3b_1	NGAP_057	Culvert	Not in GIS	0.6	Poor	Replacement	No	None	Culvert under private farm road. Both farm road and culvert deteriorating due to erosion. Segments of pipe displaced
Ngakoroa Stream	NGA_TRIB3c_1	NGAP_010	Culvert	Not in GIS	0.3	Poor	Replacement	No	None	Culvert under farm road. Appeared flowing freely

Stream Name	Tributary Code	Asset ID	Asset Type	GIS Record	Diameter (m)	Condition Rating	Maintenance Type	Flood Risk	Fish Barrier	Notes
Ngakoroa Stream	NGA_TRIB3c_2	NGAP_056	Culvert	Not in GIS	0.35	Poor	Replacement	No	Does Not Apply	Culvert sections disconnected
Ngakoroa Stream	NGA_TRIB4_2	NGAP_065	Culvert	Not Located	0.25	Poor	Replacement	No	Does Not Apply	Inlet behind electric fence. Small culvert draining wetland. Outlet 70% blocked and crushed
Ngakoroa Stream	NGA_TRIB4a_1	NGAP_060	Culvert	Not in GIS	0.25	Poor	Replacement	No	Climbers	Culvert crushes and cracked. Beneath stream invert. Temporal low flow barrier.
Ngakoroa Stream	NGA_TRIB5_2	NGAP_062	Culvert	Not in GIS	0.25	Poor	Replacement	No	Swimmers	Outlet submerged. Pipe damaged in middle (according to owner)
Ngakoroa Stream	NGA_TRIB8b_7	NGAP_064	Pipe	Not in GIS	0.85	Poor	Replacement	Yes	None	Broken concrete headwall covering 40% of the inlet pipe at both inlet and outlet
Ngakoroa Stream	NGA_TRIB8b_9	NGAP_061	Culvert	Not in GIS	0.6	Poor	Replacement	No	Does Not Apply	Poor condition concrete pipe. Head wall come away from bank.
Ngakoroa Stream	NGA_TRIB4_2	NGAP_065	Culvert	Not in GIS	0.8	Poor	Replacement	No	Climbers	Slightly perched. Broken in middle of culvert
Ngakoroa Stream	NGA_TRIB3_7	NGAP_007	Culvert	Not in GIS	0.25	Average	Debris Removal	No	Does Not Apply	Inlet buried, outlet submerged
Ngakoroa Stream	NGA_TRIB3e_2	NGAP_003	Culvert	Not in GIS	0.3	Average	Vegetation Clearance	No	Swimmers	Culvert under farm crossing. Should be removed or replaced for development.
Ngakoroa Stream	NGA_TRIB8_2	NGAP_075	Culvert	Not Located	0.8	Average	Debris Removal	No	Does Not Apply	Difficult access due to dense vegetation and fencing. Unable to see pipe for fish passage assessment. Rock head wall at inlet and outlet. Slight to no erosion.Large tree debris at inlet.
Ngakoroa Stream	NGA_TRIB8_3	NGAP_004	Culvert	Not in GIS	1.5	Average	Structural	No	Swimmers	Debris jam at inlet. Gradient change half way through culvert, possibly cracked
Ngakoroa Stream	NGA_TRIB8_5	NGAP_001	Culvert	Not in GIS	0.5	Average	Vegetation Clearance	No	Does Not Apply	Water depth 0.3. Obscured under branches and blackberry. Approx measurements
Ngakoroa Stream	NGA_TRIB8a_1	NGAP_008	Culvert	Not in GIS	0.8	Average	Debris Removal	No	None	Partially filled with sediment to 0.3 m depth
Ngakoroa Stream	NGA_TRIB8b_4	NGAP_009	Culvert	Not in GIS	1	Average	Debris Removal	No	None	Debris blocking pipe. Edge visible very rusty
Ngakoroa Stream	NGA_TRIB8b_6	NGAP_006	Culvert	Not in GIS	1.2	Average	Erosion Protection	No	Climbers	Outlet obstructed by dense kikuyu, difficult to see
Ngakoroa Stream	NGA_TRIB8bi_1	NGAP_005	Culvert	Not in GIS	0.65	Average	Patching	No	None	Outlet end of pipe cracked
Ngakoroa Stream	NGA_TRIB3_1	NGAP_066	Culvert	Not in GIS	0.8	Average	Structural	No	None	Cast iron dented at outlet
Ngakoroa Stream	NGAP_067	PAH_MAIN_10	Pipe	Not in GIS	0.3	Good	Erosion Protection	No	Does Not Apply	Angle of pipe deflecting flow into TRB, reinforced with private construction of timber structure and extended lining
Ngakoroa Stream	NGA_TRIB3e_i	NGAP_055	Culvert	Not in GIS	0.25	Good	Debris Removal	No	None	
Ngakoroa Stream	NGA_TRIB5_3	NGAP_054	Pipe	Not in GIS	0.35	Good	Erosion Protection	No	None	Erosion protection from moderate pugging. Could remove pipe and naturalise watercourse. Limited upstream habitat - pond
Ngakoroa Stream	NGA_TRIB9_2	NGAP_011	Culvert	Not in GIS	0.45	Good	**Patching**	No	Anguilliforms	
Ngakoroa Stream	NGAWEST_73	NGAPR_042	Culvert	Not in GIS	0.9	Good	Vegetation Removal	No	Does Not Apply	No formal structure, erosion scour on TLB of pipe. Difficult to clear vegetation due to water depth and black berry.
Ngakoroa Stream	NGA_TRIB7_2	NGAP_053	Culvert	Not in GIS	0.4	Good	None	No	Anguilliforms	Twin culvert 0.1m higher.
Ngakoroa Stream	NGA_TRIB7a_1	NGAP_051	Culvert	Not in GIS	0.25	Good	None	No	Anguilliforms	
Ngakoroa Stream	NGA_TRIB3c_2	NGAP_076	Culvert	Not Located	0.3	Good	None	No	Climbers	0.5 m perched culvert. Inlet not located - vegetation
Ngakoroa Stream	NGA_TRIB6_1	NGAP_049	Culvert	Not in GIS	0.4	Good	None	No	Climbers	

Stream Name	Tributary Code	Asset ID	Asset Type	GIS Record	Diameter (m)	Condition Rating	Maintenance Type	Flood Risk	Fish Barrier	Notes
Ngakoroa Stream	NGA_TRIB6_2	NGAP_046	Culvert	Not in GIS	0.25	Good	None	No	Climbers	Inlet 95% blocked
Pahurehure Inlet Tributary	PAH_MAIN_5	NGAP_048	Culvert	Not in GIS	0.3	Good	None	No	Climbers	Perched (0.3 m culvert) with vegetation out outlet
Pahurehure Inlet Tributary	PAH_TRIB2_2	NGAP_050	Culvert	Not in GIS	0.3	Good	None	No	Climbers	
Pahurehure Inlet Tributary	PAH_TRIB2_3	NGAP_045	Culvert	Not in GIS	0.3	Good	None	No	Climbers	Barrier during period of low water levels
Ngakoroa Stream	NGA_TRIB3e_4	NGAP_047	Culvert	Not in GIS	0.3	Good	None	No	Swimmers	Temporal barrier during low flow.
Ngakoroa Stream	NGA_TRIB5_FORK2_1	NGAP_044	Culvert	Not in GIS	999	Good	None	No	Swimmers	PVC culvert linking ponds. Top end perched to only drain pond when full
Ngakoroa Stream	NGA_TRIB5_FORK2_1	NGAP_043	Culvert	Not in GIS	0.3	Good	None	No	Swimmers	Concrete culvert linking ponds
Pahurehure Inlet Tributary	PAH_MAIN_4	NGAP_052	Culvert	Not in GIS	0.35	Good	None	No	Swimmers	Vegetation allows climbers partial passage. Parallel pvc pipe allows swimmers passage.
Pahurehure Inlet Tributary	PAH_MAIN_6	NGAP_042	Culvert	Not in GIS	0.375	Good	None	No	Swimmers	Twin Culvert under farm access crossing. Limited upstream habitat
Pahurehure Inlet Tributary	PAH_MAIN_6	NGAP_041	Culvert	Not in GIS	0.375	Good	None	No	Swimmers	Twin Culvert under farm access crossing. Limited upstream habitat
RURAL ZONE - condition assessment out of scope, some below with noted issues. Fish passage only in scope										
Ngakoroa Stream	NGAWEST_49	NGAF_231	Culvert	Not in GIS	0.25				Anguilliforms	Outlet diameter 0.25m. Perched 0.65m above channel. Inlet unable to be located.
Ngakoroa Stream	NGA_MAIN_65	NGAF_195	Culvert	Not in GIS	0.35				Anguilliforms	Culvert perched 0.65m above channel
Ngakoroa Stream	NGA_TRIB9_2	NGAF_244	Culvert	Not in GIS	1				Anguilliforms	
Ngakoroa Stream	NGAWEST_35	NGAF_218	Culvert	Not in GIS	0.3				Anguilliforms	Culvert between dam upstream and large wetland area below. Contains a small black plastic pipe that appears to be discharging from the pond above. No flow throughout go the concrete culvert itself.
Ngakoroa Stream	NGAWEST_35	NGAF_154	Culvert	Not in GIS	0.6				Anguilliforms	Culvert beneath new farm road that was under construction at time of inspection - could not get close enough for full inspection due to active plant/ contractors. Culvert quite dry at time of inspection - low flow impedance of fish passage
Ngakoroa Stream	NGAWEST_45	NGAF_237	Culvert	Not in GIS	0.23				Anguilliforms	Pipe under driveway. Perched 0.18m above steel trough leading to stream.
Ngakoroa Stream	NGAWEST_45	NGAF_216	Culvert	Not in GIS	0.3				Anguilliforms	Culvert perched by 0.7 m at outlet
Ngakoroa Stream	NGAWEST_5	NGAF_189	Culvert	Not in GIS	0.35				Anguilliforms	0.5m perched drop. Piped from wetland to main stream
Ngakoroa Stream	NGAWEST_53	NGAF_246	Culvert	Not in GIS	0.9				Anguilliforms	
Ngakoroa Stream	NGAWEST_56	NGAF_160	Culvert	Not in GIS	0.5				Anguilliforms	Perched undercut. Concrete rubble placed at outlet but scour underneath. Iron floc
Ngakoroa Stream	NGAWEST_7	NGAF_213	Culvert	Not in GIS	0.3				Anguilliforms	Culvert connecting two aesthetic ponds. Not on main watercourse.
Ngakoroa Stream	NGAWEST_7	NGAF_202	Culvert	Not in GIS	0.33				Anguilliforms	Perched outlet has 0.3m drop to channel. Outlet diameter is 0.48m. Inlet diameter is 0.33m.

Stream Name	Tributary Code	Asset ID	Asset Type	GIS Record	Diameter (m)	Condition Rating	Maintenance Type	Flood Risk	Fish Barrier	Notes
Ngakoroa Stream	NGAWEST_7	NGAF_142	Culvert	Not in GIS	0.6				Anguilliforms	Perched culvert at outlet of large dam. One of two pipes acting as outlets. Perched approx. 1.5m above stream.
Ngakoroa Stream	NGAWEST_7	NGAF_137	Culvert	Not in GIS	0.65				Anguilliforms	Culvert perched approx. 0.8m above streambed. Outlet point for large dam upstream. Sulphur smell in stream below.
Ngakoroa Stream	TRIB11_17	NGAF_217	Culvert	Not in GIS	0.3				Anguilliforms	Small culvert acting as outflow from dam upstream. Perched approx 0.5m above stream level below.
Ngakoroa Stream	TRIB11_19	NGAF_194	Culvert	Not in GIS	0.35				Anguilliforms	Outlet is perched 0.48m above water level. Pipe is 0.35m diameter at outlet. Inlet diameter is 0.65m.
Ngakoroa Stream	TRIB11_19	NGAF_121	Culvert	Not in GIS	0.9				Anguilliforms	Timber weir at inlet holding back sediment. Heavy sediment deposition at upstream end. Complete fish barrier due to weir
Ngakoroa Stream	TRIB11_7	NGAF_039	Culvert	Not in GIS	1.5				Anguilliforms	Culvert under farm road. Perched at outlet forming fish barrier
Ngakoroa Stream	TRIB14_2	NGAF_233	Culvert	Not in GIS	0.25				Anguilliforms	Small concrete culvert. Perched by 0.12 m.
Ngakoroa Stream	TRIB14_9	NGAF_222	Pipe	Not in GIS	0.3				Anguilliforms	Rural pipe on TRB of stream. Low flow. Length unknown.
Ngakoroa Stream	TRIB14_9	NGAF_159	Culvert	Not in GIS	0.5				Anguilliforms	Culvert perched by approx 0.35m at outlet. Length is approx 7 m. Inlet unable to be seen due to thick vegetation. Unable to get a good photo of outlet due to deep water and thick vegetation surrounding it.
Ngakoroa Stream	TRIB15_15	NGAF_192	Culvert	Not in GIS	0.35				Anguilliforms	Culvert from pond to stream below. Approx 6.5 m long. Perched above channel by 2.1m
Ngakoroa Stream	TRIB15_15	NGAF_117	Culvert	Not in GIS	0.95				Anguilliforms	0.8 perch above channel, banded kokopu found upstream despite appearance as a complete barrier to fish passage. Approx 7 metres in length.
Ngakoroa Stream	TRIB16_1	NGAF_219	Culvert	Not in GIS	0.3				Anguilliforms	Twin 0.3m drainage pipes from pond above. One on TRB is perched 0.15m above channel.
Ngakoroa Stream	TRIB17_14	NGAF_167	Culvert	Not in GIS	0.46				Anguilliforms	Outlet perched by 0.75m. Located under farm track. Culvert approx 3m long.
Ngakoroa Stream	TRIB17_30	NGAF_168	Culvert	Not in GIS	0.45				Anguilliforms	Pipe has collapsed at the downstream section due to downstream scour . No flow through pipe
Ngakoroa Stream	TRIB17_30	NGAF_024	Culvert	Not in GIS	0.5				Anguilliforms	Difficult to see pipe , 1.5m drop from outlet point
Ngakoroa Stream	TRIB17_39	NGAF_215	Culvert	Not in GIS	0.3				Anguilliforms	10m long culvert. Inlet in pond riser and outlet discharges to another riser.
Ngakoroa Stream	TRIB17_46	NGAF_169	Culvert	Not in GIS	0.45				Anguilliforms	Culvert perched by 0.2 m. Culvert length approx 15m
Ngakoroa Stream	TRIB17_54	NGAF_188	Culvert	Not in GIS	0.38				Anguilliforms	Outlet 0.38m, perched 0.2m above channel inlet diameter 0.48m. Pipe between ponds.
Ngakoroa Stream	TRIB17_55	NGAF_242	Culvert	Not in GIS	0.4				Anguilliforms	Culvert is perched 0.6m above stream. Stream has undercut culvert, so no flow is going through the pipe. Length of culvert is approx 5m
Ngakoroa Stream	TRIB17_55	NGAF_239	Culvert	Not in GIS	0.225				Anguilliforms	Culvert from pond above discharging into wetland area. Perched by 0.25m, culvert approx 5m long.
Ngakoroa Stream	TRIB17_63	NGAF_143	Culvert	Not in GIS	0.6				Anguilliforms	Culvert perched by 0.4 m
Ngakoroa Stream	TRIB17_7	NGAF_236	Culvert	Not in GIS	0.23				Anguilliforms	0.23 diameter, perched 0.55 above channel, inlet not found
Ngakoroa Stream	TRIB18_6	NGAF_193	Culvert	Not in GIS	0.35				Anguilliforms	Small perched culvert approx 5 m in length through dam wall. Culvert is perched approx 0.3m above water level.
Ngakoroa Stream	TRIB18_6	NGAF_120	Culvert	Not in GIS	0.9				Anguilliforms	900 mm outlet perched 1 m height. Inlet submerged. Crossing in average condition.
Ngakoroa Stream	TRIB21_11	NGAF_158	Culvert	Not in GIS	0.53				Anguilliforms	Flow is running under culvert, rather than through it.
Ngakoroa Stream	TRIB24_13	NGAF_038	Culvert	Not in GIS	1.6				Anguilliforms	Culvert perched 0.7m above channel. Culvert joint is misaligned. Appears to be below defunct farm track. Culvert approx 4m long.
Ngakoroa Stream	TRIB24_19	NGAF_131	Culvert	Not in GIS	0.75				Anguilliforms	Concrete rural farm culvert. Very informal rocks as structure.

Stream Name	Tributary Code	Asset ID	Asset Type	GIS Record	Diameter (m)	Condition Rating	Maintenance Type	Flood Risk	Fish Barrier	Notes
Ngakoroa Stream	TRIB24_6	NGAF_100	Culvert	Not in GIS	1				Anguilliforms	Severe erosion. Outlet in very poor condition
Ngakoroa Stream	TRIB26_5	NGAF_220	Culvert	Not in GIS	0.3				Anguilliforms	Twin 0.3m drainage pipes from pond above. One on TLB is perched 0.2m above channel.
Ngakoroa Stream	TRIB26_5	NGAF_211	Culvert	Not in GIS	0.3				Anguilliforms	Small concrete culvert, perched by 0.15 m.
Ngakoroa Stream	TRIB26_5	NGAF_156	Culvert	Not in GIS	0.55				Anguilliforms	Perched by 0.4m on outlet
Ngakoroa Stream	TRIB26_5	NGAF_140	Culvert	Not in GIS	0.6				Anguilliforms	Culvert outlet is perched by 0.45 m
Ngakoroa Stream	TRIB26_5	NGAF_094	Culvert	Not in GIS	1.1				Anguilliforms	.1 m perched on outlet
Ngakoroa Stream	TRIB27_15	NGAF_227	Culvert	Not in GIS	0.28				Anguilliforms	Small culvert perched by 0.47m.
Ngakoroa Stream	TRIB27_15	NGAF_163	Culvert	Not in GIS	0.5				Anguilliforms	Small culvert of in stream. Runs under market garden vehicle access track. Approx 5m long. Outlet is perched by approx 0.1m.
Ngakoroa Stream	TRIB27_4	NGAF_232	Culvert	Not in GIS	0.25				Anguilliforms	Outlet diameter is 0.25m. Perched 0.85m above channel. Inlet unable to be identified.
Ngakoroa Stream	TRIB27_6	NGAF_035	Culvert	Not in GIS	2.25				Anguilliforms	Culvert outlet is perched with a drop height of 0.19m. Culvert is approx 4m long.
Ngakoroa Stream	TRIB32_6	NGAF_161	Culvert	Not in GIS	0.5				Anguilliforms	Newly laid 0.5m plastic culvert. Outlet perched 0.25m above channel. Owner of neighbouring property is not happy that it has been installed.
Ngakoroa Stream	NGA_MAIN_55	NGAF_191	Culvert	Not in GIS	0.35				Climbers	One of two assets from pond, No formal structure, drop from concrete pipe is 0.2m to corograted iron apron. Apron flume is 3m long and 0.5m wide, 0.3m high. Timber debris screens on apron flume.
Ngakoroa Stream	NGA_MAIN_65	NGAF_185	Culvert	Not in GIS	0.4				Climbers	Concrete culvert running under driveway. No structure on either end except for dissipating rocks.
Ngakoroa Stream	NGA_MAIN_65	NGAF_126	Culvert	Not in GIS	0.8				Climbers	Drop 0.2. Rock rip rap dissipation. Two pipes
Ngakoroa Stream	NGAWEST_38	NGAF_180	Culvert	Not in GIS	0.4				Climbers	Perched 0.7 m high. Slight erosion at outlet
Ngakoroa Stream	NGAWEST_38	NGAF_088	Culvert	Not Located	999				Climbers	Culvert under farm crossing. Pipe/ Culvert could not be located as densely vegetated and potentially buried. Potential partial barrier to swimmers and climbers in low flow.
Ngakoroa Stream	NGAWEST_43	NGAF_252	Culvert	Not in GIS	0.25				Climbers	Temporal barrier at low flow. Culvert not in bed of stream.
Ngakoroa Stream	NGAWEST_54	NGAF_230	Culvert	Not in GIS	0.25				Climbers	Dual 250mm concrete culverts. Lower pipe perched 0.1 m
Ngakoroa Stream	NGAWEST_54	NGAF_165	Culvert	Not in GIS	0.5				Climbers	Culvert between ponds. Perched 0.1m above d/s channel. Approx 4.5m in length
Ngakoroa Stream	NGAWEST_56	NGAF_224	Pipe	Not in GIS	0.3				Climbers	
Ngakoroa Stream	NGAWEST_72	NGAF_179	Culvert	Not in GIS	0.4				Climbers	0.6 m drop
Ngakoroa Stream	NGAWEST_72	NGAF_044	Pipe	Not in GIS	1.2				Climbers	No formal structure, rock rip rap dissipating structure, 4m2, timber retaining TLB is failing and falling into stream. Erosion scour on TLB of pipe. Pipe broken middle.
Ngakoroa Stream	NGAWEST_91	NGAF_253	Culvert	Not in GIS	0.4				Climbers	Culvert under driveway. Appeared flowing well. Potential for low flow impedance when dry
Ngakoroa Stream	TRIB11_17	NGAF_153	Culvert	Not in GIS	0.6				Climbers	Culvert between pond and stream (outlet of pond). Appears in good condition. Slight cascade over rock dissipation at outlet potential fish barrier.
Ngakoroa Stream	TRIB11_7	NGAF_176	Culvert	Not in GIS	0.45				Climbers	Metal farm culvert below wetland area. Perched by 0.1 m.
Ngakoroa Stream	TRIB14_1	NGAF_238	Culvert	Not in GIS	0.225				Climbers	225mm plastic culvert between pond and downstream wetland.
Ngakoroa Stream	TRIB15_17	NGAF_196	Pipe	Not in GIS	0.35				Climbers	No formal structure, drop from concrete pipe is 0.2m to corograted iron apron. Apron flume is 3m long and 0.5m wide, 0.3m high. Timber debris screens on apron flume.

Stream Name	Tributary Code	Asset ID	Asset Type	GIS Record	Diameter (m)	Condition Rating	Maintenance Type	Flood Risk	Fish Barrier	Notes
Ngakoroa Stream	TRIB15_17	NGAF_130	Culvert	Not in GIS	0.78				Climbers	Concrete culvert, 0.7m drop, perched above channel at outlet,
Ngakoroa Stream	TRIB16_1	NGAF_155	Culvert	Not in GIS	0.6				Climbers	Connects two ecolines
Ngakoroa Stream	TRIB17_10	NGAF_043	Culvert	Not in GIS	1.2				Climbers	Culvert under farm crossing. Perched at outlet resulting in approx 0.4m drop height.
Ngakoroa Stream	TRIB17_14	NGAF_008	Culvert	Not in GIS	999				Climbers	Masonry blocks, weir at inlet, good condition, slight erosion at inlet and outlet on true left bank, bridge over top, scour at end of base lining
Ngakoroa Stream	TRIB17_24	NGAF_170	Culvert	Not in GIS	0.45				Climbers	Culvert under farm crossing with pond upstream. Perched and undercut at the outlet preventing fish passage.
Ngakoroa Stream	TRIB17_24	NGAF_033	Culvert	Not in GIS	999				Climbers	0.8 m drop
Ngakoroa Stream	TRIB17_28	NGAF_235	Culvert	Not in GIS	0.25				Climbers	Temporal barrier at low flow. Culvert not in bed of stream.
Ngakoroa Stream	TRIB17_31	NGAF_212	Culvert	Not in GIS	0.3				Climbers	0.4 m perched drop.
Ngakoroa Stream	TRIB17_31	NGAF_141	Culvert	Not in GIS	0.6				Climbers	
Ngakoroa Stream	TRIB17_36	NGAF_240	Culvert	Not in GIS	0.225				Climbers	225mm plastic pipe passing flows under farm crossing from pond to downstream stream. High velocity and turbulence through culvert may prevent fish passage.
Ngakoroa Stream	TRIB17_54	NGAF_102	Culvert	Not in GIS	1				Climbers	0.3 drop
Ngakoroa Stream	TRIB17_61	NGAF_210	Pipe	Not in GIS	0.3				Climbers	Humes formal structure, concrete pipe. High bedload. 12m2 Apron with a 0.6m drop to stream. Apron Overgrown with veg.
Ngakoroa Stream	TRIB17_61	NGAF_139	Culvert	Not in GIS	0.6				Climbers	Road culvert
Ngakoroa Stream	TRIB21_11	NGAF_221	Culvert	Not in GIS	0.3				Climbers	Perched and undercut
Ngakoroa Stream	TRIB24_13	NGAF_174	Culvert	Not in GIS	0.45				Climbers	Culvert perched 0.45m above channel. Approx 6m long. Upstream fish habitat very limited, as all wetland.
Ngakoroa Stream	TRIB24_19	NGAF_201	Culvert	Not in GIS	0.35				Climbers	0.05 m drop
Ngakoroa Stream	TRIB24_5	NGAF_190	Culvert	Not in GIS	0.35				Climbers	0.4m perched drop
Ngakoroa Stream	TRIB26_5	NGAF_181	Culvert	Not in GIS	0.4				Climbers	Perched 1 m high. Slight erosion at outlet
Ngakoroa Stream	TRIB32_6	NGAF_225	Culvert	Not in GIS	0.3				Climbers	Crossing part collapsed, culvert inlet submerged, outlet 90% blocked. Velocity barrier due to culvert restrictions.
Ngakoroa Stream	NGA_MAIN_55	NGAF_116	Culvert	Not in GIS	1				Swimmers	Culvert is on TRB, with all flow currently directed through paired culvert on TLB.
Ngakoroa Stream	NGA_MAIN_65	NGAF_101	Culvert	Not in GIS	1				Swimmers	Rock rip rap dissipation. Two pipes
Ngakoroa Stream	NGA_TRIB9_2	NGAF_166	Culvert	Not in GIS	0.5				Swimmers	Culvert perched by 0.1m at downstream end.
Ngakoroa Stream	NGAWEST_45	NGAF_152	Culvert	Not in GIS	0.6				Swimmers	Culvert under farm track. Wetland area upstream.
Ngakoroa Stream	NGAWEST_5	NGAF_114	Culvert	Not in GIS	1				Swimmers	Pipe sections displaced on different angles. Hole on tr side of inlet segment with high flow through.outlet end of pipe larger diameter 1.5 m. Concrete blocks at outlet at head and dissipating but deflecting flow backwards into wings. Slight erosion.
Ngakoroa Stream	TRIB16_1	NGAF_182	Pipe	Not in GIS	0.4				Swimmers	Broken concrete pipe, outlet from pond. No formal structure. 0.1m drop to tree root apron. 1.4m above stream channel. Erosion TLB scour.
Ngakoroa Stream	TRIB16_1	NGAF_098	Culvert	Not in GIS	1.05				Swimmers	Culvert with wingwall and apron. Approx 20m long. Has rocks cemented into base of culvert.
Ngakoroa Stream	TRIB17_10	NGAF_178	Culvert	Not in GIS	0.4				Swimmers	

Stream Name	Tributary Code	Asset ID	Asset Type	GIS Record	Diameter (m)	Condition Rating	Maintenance Type	Flood Risk	Fish Barrier	Notes
Ngakoroa Stream	TRIB17_39	NGAF_151	Culvert	Not in GIS	0.6				Swimmers	Culvert under crossing
Ngakoroa Stream	TRIB17_46	NGAF_029	Culvert	Not in GIS	0.4				Swimmers	Willow roots twisted pipe around
Ngakoroa Stream	TRIB17_63	NGAF_214	Culvert	Not in GIS	0.3				Swimmers	0.05 m drop.
Ngakoroa Stream	TRIB24_5	NGAF_115	Culvert	Not in GIS	1				Swimmers	
Ngakoroa Stream	TRIB24_6	NGAF_184	Culvert	Not in GIS	0.4				Swimmers	Plastic culvert under driveway. Slightly perched by 0.1m
Ngakoroa Stream	TRIB27_6	NGAF_173	Culvert	Not in GIS	0.45				Swimmers	Outlet pipe from pond above. Inlet not found

Appendix 3 Sedimentation Issues

Table 30: Market garden sediment issues in Northern Ngakoroa Catchment

ID	Issue Description	Site Example One	Site Example Two	Site Example Three
MKG_12	Market gardens present on the true left bank of the reaches. After rain events the gardens are contributing to high sediment loads in nearby streams. A channel running through the market gardens (site example 2) appears to be repeatedly dug out and loose sediment inputs are entering the nearby watercourses.			
MKG_05	Two neighbouring residents reported erosion issues and sedimentation of the waterways on the western perimeter of their properties, which are downstream of market gardens. The stream has deep, fine sediment, with sediment benches present throughout the reach. Large amounts of filamentous algae are present on the substrate. Further downstream, the stream surface is covered in red-brown algae and gas bubbles are evident on disturbance. Springs were common and appear to be contributing to bank erosion in places. There is evidence of slumping along both banks. Ponding is occurring at one point of the reach due to a build-up of rock washed from the neighbouring glasshouses.			

MKG_06	The stream reach is between two market garden lots, with evidence of loose fine sediment to 0.5 m depth in the stream. On the True Left Bank there is exposed soil which has been recently dug over approximately 2 m from stream edge, with minimal to no vegetated buffer. Severe erosion also noted at outlet from dam, indicating damaging flashy stream flows during rain events.				
MKG_07	Overland scour noted to be flowing into the farm ponds on the market garden land. Downstream reaches were noted to have high sediment percentages (70%). Ponds in this locality were noted to have high presence of algae.				

Table 31: Market garden sediment issues in Mid-Ngakoroa Catchment

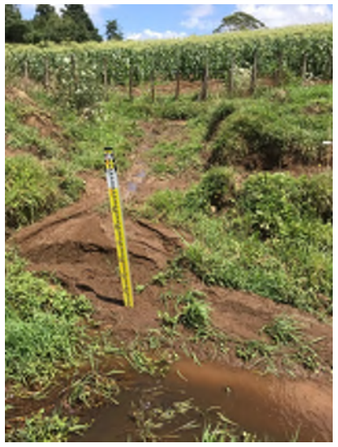
ID	Issue Description	Site Example One	Site Example Two	Site Example Three
MKG_08	Significant soil run off going into the stream reaches from the market garden. Evidence of the effects of this can be seen in the discolouration of the water downstream of the market garden site.			
MKG_01	Large, shallow farm pond with evidence of heavy sediment deposition and Potentially associated with sub-division works upstream and potentially unconsented dam. **Not associated with market gardens.**			
MKG_09	Extensive market gardens within this property, however access was not possible for the field teams. From the aerial photography the riparian vegetation is set back 5 m for many reaches, streams appear to have high turbidity. No on-site photos available.			

Table 32: Market garden sediment issues in Southern Ngakoroa Catchment

ID	Issue Description	Site Example One	Site Example Two	Site Example Three
MKG_13	Exposed earth no riparian buffers present. Online sediment pond with large benches of deposited sediment. Redundant culvert crossing downstream with outlet structure collapsed and severe erosion.			
MKG_10	The market gardens are located on both banks of the channel. The water was cloudy The channel has large benches of poorly consolidated sediment. Further upstream, reaches are predominantly hard bottom but with a layer of fine sediment.			
MKG_11	The stream reach is between two market garden lots, with evidence of fine sediment deposition.			

MKG_03	Immediately adjacent to market garden on TLB. Wide stream dominated by water celery, which provide the only shade to the water's surface. Gap in bund at downslope end of large market garden. Evidence of channels forming from the market garden, with soil runoff going straight into stream. Large sediment bench across channel at this location. On a return visit to this reach, a thin hydrocarbon sheen on water surface and a strong fuel odour was noted.			
MKG_02	Farm pond within boundaries of market garden. Pond has high algal growth, indicating excess nutrients in the waterway. Discharge to direct to main stream on southern perimeter via 400mm culvert. The main st4ream is dominated by willows and has high sediment deposition and dense mats of a variety of periphyton in-stream			
MKG_04	Sediment deposition in a number ponds and waterways on the western border of the market gardens. Unconsolidated sediment depth of 0.7m noted in some ponds. Resident commented on recent construction of bund at the top of the hill to control sedimentation, but that high sediment discharge still occurs during rain events. Extensive riparian planting undertaken downstream.			

Appendix 4 SEV Results

Table 33: SEV calculations

Function category	Function	Variable (code)	NGA1	NGA2	NGA3	NGA4	NGA5
		Vchann	0.10	0.37	0.37	1.00	0.40
		Vlining	0.80	0.80	0.80	1.00	0.80
		Vpipe	1.00	1.00	1.00	1.00	1.00
Hydraulic	**NFR**	=	**0.33**	**0.51**	**0.51**	**1.00**	**0.53**
		Vbank	1.00	1.00	1.00	1.00	0.60
		Vrough	0.46	0.92	0.80	0.61	0.25
Hydraulic	**FLE**	=	**0.46**	**0.92**	**0.80**	**0.61**	**0.15**
		Vbarr	1.00	1.00	1.00	0.30	1.00
Hydraulic	**CSM**	=	**1.00**	**1.00**	**1.00**	**0.30**	**1.00**
		Vchanshape	0.20	0.90	0.90	1.00	0.90
		Vlining	0.80	0.80	0.80	1.00	0.80
Hydraulic	**CGW**	=	**0.60**	**0.83**	**0.83**	**1.00**	**0.83**
		Hydraulic function mean score	**0.60**	**0.82**	**0.79**	**0.73**	**0.63**
		Vshade	0.52	0.58	0.28	0.72	0.70
Biogeochemical	**WTC**	=	**0.52**	**0.58**	**0.28**	**0.72**	**0.70**
		Vdod	0.40	0.40	0.45	1.00	0.34
Biogeochemical	**DOM**	=	**0.40**	**0.40**	**0.45**	**1.00**	**0.34**
		Vripar	0.30	0.40	0.20	0.90	0.00
		Vdecid	0.23	0.00	0.02	1.00	0.01
Biogeochemical	**OMI**	=	**0.18**	**0.20**	**0.10**	**0.90**	**0.00**
		Vmacro	0.96	0.19	0.42	1.00	0.25
		Vretain	0.20	0.20	0.20	1.00	0.20
Biogeochemical	**IPR**	=	**0.20**	**0.19**	**0.20**	**1.00**	**0.20**
		Vsurf	0.70	0.62	0.71	1.00	0.60
		Vripfilt	0.40	0.40	0.40	0.94	0.10
Biogeochemical	**DOP**	=	**0.55**	**0.51**	**0.55**	**0.97**	**0.35**
		Biogeochemical function mean score	**0.37**	**0.38**	**0.32**	**0.92**	**0.32**
		Vgalspwn	0.00	0.00	0.70	0.00	0.40
		Vgalqual	0.00	0.00	0.00	0.00	0.00
		Vgobspwn	0.10	0.10	0.80	1.00	0.80
Habitat Provision	**FSH**	=	**0.05**	**0.05**	**0.40**	**0.50**	**0.40**
		Vphyshab	0.39	0.51	0.51	0.96	0.33
		Vwatqual	0.20	0.16	0.09	0.61	0.15
		Vimperv	0.70	0.70	0.70	0.70	0.70
Habitat Provision	**HAF**	=	**0.42**	**0.47**	**0.45**	**0.81**	**0.38**
		Habitat provision function mean score	**0.24**	**0.26**	**0.42**	**0.65**	**0.39**

Function category	Function	Variable (code)	NGA1	NGA2	NGA3	NGA4	NGA5
		Vfish	0.30	0.00*	0.00*	0.43	0.00
Biodiversity	**FFI**	**=**	**0.30**	**0.00***	**0.00***	**0.43**	**0.00**
		Vmci	0.35	0.42	0.32	0.44	0.07
		Vept	0.00	0.00	0.00	0.17	0.00
		Vinvert	0.00	0.00	0.12	0.38	0.12
Biodiversity	**IFI**	**=**	**0.12**	**0.14**	**0.14**	**0.33**	**0.06**
		Vripcond	0.36	0.48	0.60	0.70	0.10
		Vripconn	1.00	1.00	0.90	0.70	1.00
Biodiversity	**RVI**	**=**	**0.36**	**0.48**	**0.54**	**0.49**	**0.10**
		Biodiversity function mean score	**0.26**	**0.31**	**0.34**	**0.42**	**0.05**
		Overall mean SEV score (maximum value 1)	**0.393**	**0.483**	**0.482**	**0.719**	**0.360**

** Vfish score excluded from SEV calculation for site due to lack of fish data*

Table 34: Fish species recorded for SEV calculations

Site	Species	Number	Size Range
NGA1	Inanga (*Galaxias maculatus*)	14	50 – 70 mm
	Mosquitofish (*Gambusia affinis*)	100+	10 – 40 mm
	Shortfin eel (*Anguilla australis*)	7	300 – 500 mm
NGA4	Mosquitofish (*Gambusia affinis*)	16	10 – 40 mm
	Shortfin eel (*Anguilla australis*)	2	300 – 500 mm
	Longfin eel (*Anguilla dieffenbachii*)	1	450 mm
NGA5	Mosquitofish (*Gambusia affinis*)	1000+	10 – 40 mm

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