Development of Water Management Zones in the Manawatu-Wanganui Region :
Technical Report to Support Policy Development

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Development of Water Management Zones in the Manawatu-Wanganui Region : Technical Report to Support Policy Development

January 2007

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EXECUTIVE SUMMARY

Water management zones are an underpinning component of the integrated water management framework being proposed for the One Plan. This report documents the development and definition of water management zones and sub-zones within the Manawatu-Wanganui Region.

The water management zones support the policy framework for surface water allocation, surface water quality and activities in the beds of rivers and lakes; including structures and flood protection works. Water management zones are the first step toward the development of a framework for managing the synergies and conflicts between values and activities in the Region's river systems.

A key aspect of the boundary definition of the water management zones and sub-zones was commonality between management units for the various ecosystem types, values and activities in our waterways. To this effect, management zones defined in this report represent one way of dividing up the region to achieve common management objectives. For resource management functions it is proposed that some sub-zones within a zone may be amalgamated for one management purpose (ie. water quality) but separated for another (ie. surface water allocation). For ground water management purposes, several surface water zones are amalgamated. Ground water management is not specifically covered in this report; however, at some level of scale the management for various purposes shares boundaries within a catchment.

A range of criteria were applied to derive the water management zones and their subsequent sub-zones. These criteria included but were not limited to National Water Conservation Orders, Local Water Conservation Notices, ecosystem types, geology, hydrology, resource pressures, location of monitoring sites and the length and availability of monitoring data (both flow and water quality). Historic derivation of water management zones for various purposes eg. the water management zones derived for the Rangitikei River and Upper Manawatu water allocation projects have been carried through into this development process for continuity.

Forty-four water management zones and 117 sub-zones have been defined across the Manawatu-Wanganui Region. The zones are catchment or part-catchment based and encompass the waterways within the zones, and the surrounding land area.

Using water management zones (WMZ) is the first step towards policy development for integrated catchment management of natural resources in the Manawatu-Wanganui Region. This integrated approach is being developed in order to meet the values placed on water by the Region's communities and to provide a framework for the setting of standards and objectives to protect those values.

CONTENTS

Figures

Tables

Maps

1. Introduction and Scope

1.1 Planning Context

This technical report outlines the process of establishing a spatial management framework for the application of several key streams of research being undertaken by the Science Team at Horizons Regional Council and follows on from work classifying the river types within the Manawatu-Wanganui Region (Ausseil, 2007).

This document is part of a series of water-resource focused technical reports prepared to support the development of new water management policy (Figure 1). This policy will be incorporated into Horizons' second-generation plan and combined Regional Plan/Regional Policy Statement (the One Plan).

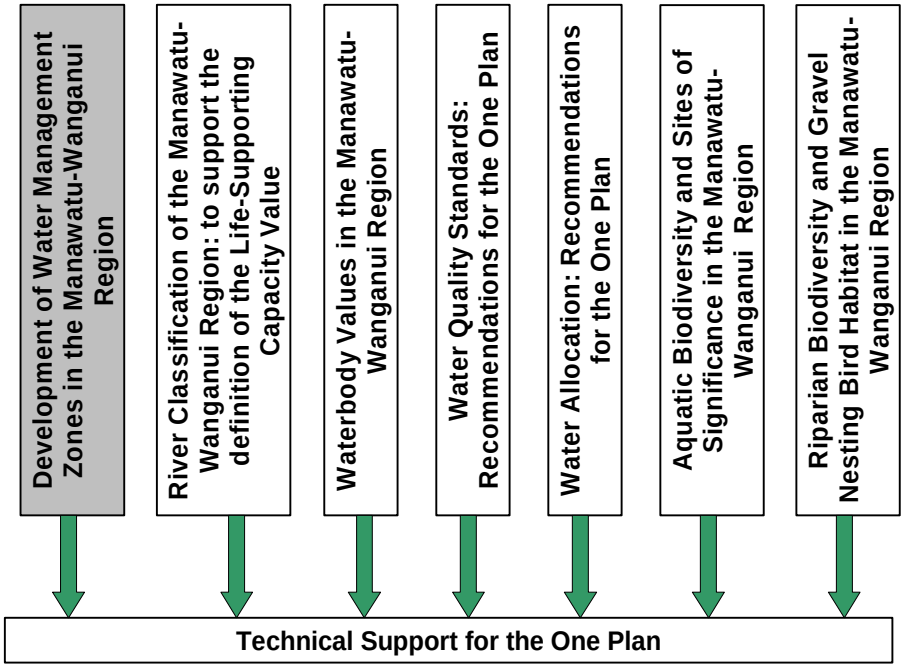


Figure 1: Planning context of the Water Management Zones project in relation to the technical reports supporting the One Plan process.

1.2 Project Scope

Water management zones (WMZ) are the fundamental geographic units in the integrated water quality and quantity management regime being developed by Horizons. Horizons' desire to make use of a spatial framework recognises that different rivers and lakes have different environmental values, resource uses and capacities to yield flow and assimilate contaminants. Many of these factors are controlled by abiotic influences such as geology, climate and relief (Duncan and Woods, 2004).

In defining WMZ for the Region, Horizons' goal was to develop meaningful zones that could be easily managed for surface water quantity, quality and ultimately groundwater. These zones need to be readily identifiable, and have sufficient flexibility to allow addition, deletion or amalgamation of zones in the future as new knowledge becomes available.

As the development of an effective water management regime relies heavily on good quality monitoring data, monitoring around the region will be tailored to fit the WMZ. This revised monitoring program will provide water quality and flow information at the outlet of most zones and will update the current State of the Environment (SOE) monitoring programme.

Two key work streams will be implemented through the realignment of environmental monitoring for surface water management using WMZ. These are:

1. An update of the Regional Monitoring Strategy, and
2. Policy Effectiveness Monitoring Program (these projects will be undertaken following completion of the technical support documents for the One Plan.)

The Regional Monitoring Strategy will realign freshwater monitoring programs with the WMZ in order to measure environmental state against the management targets established for each zone. These results will be used to determine the effectiveness of Policies set out in the One Plan in achieving environmental outcomes within each zone.

The environmental outcomes have been established by assessing the values within each WMZ, defining standards that protect those values, identifying management zones which are not currently achieving these standards and implementing management regimes through One Plan policies and methods (both regulatory and non-regulatory) to work towards these outcomes (Figure 1).

1.3 Goals of the Water Management Zones Project

The ongoing goals of this project are:

- To develop WMZ as the building blocks for a catchment-based approach to water management.
- Allow for the identification and recognition of specific environmental and community values within individual WMZ.
- Provide a framework that fosters a more regionally consistent approach across catchments and users, and yet is relevant to the pressures, characteristics and values of individual catchments.
- Provide recommendations for meaningful and strategic monitoring of water resources to measure the effectiveness of policies applied in the One Plan in meeting environmental outcomes and measure environmental state against the standards applied in the Plan.
- Provide a historical background to water monitoring in the Manawatu-Wanganui Region.

The key questions addressed in this report are:

- What / where are the water management zones for the Manawatu-Wanganui Region?
- How were they derived?
- What monitoring information is available and what needs to be done to make this information available?
- Where are the gaps in our knowledge?
- How can future monitoring programmes be directed to fill those gaps?

1.4 Peer Review

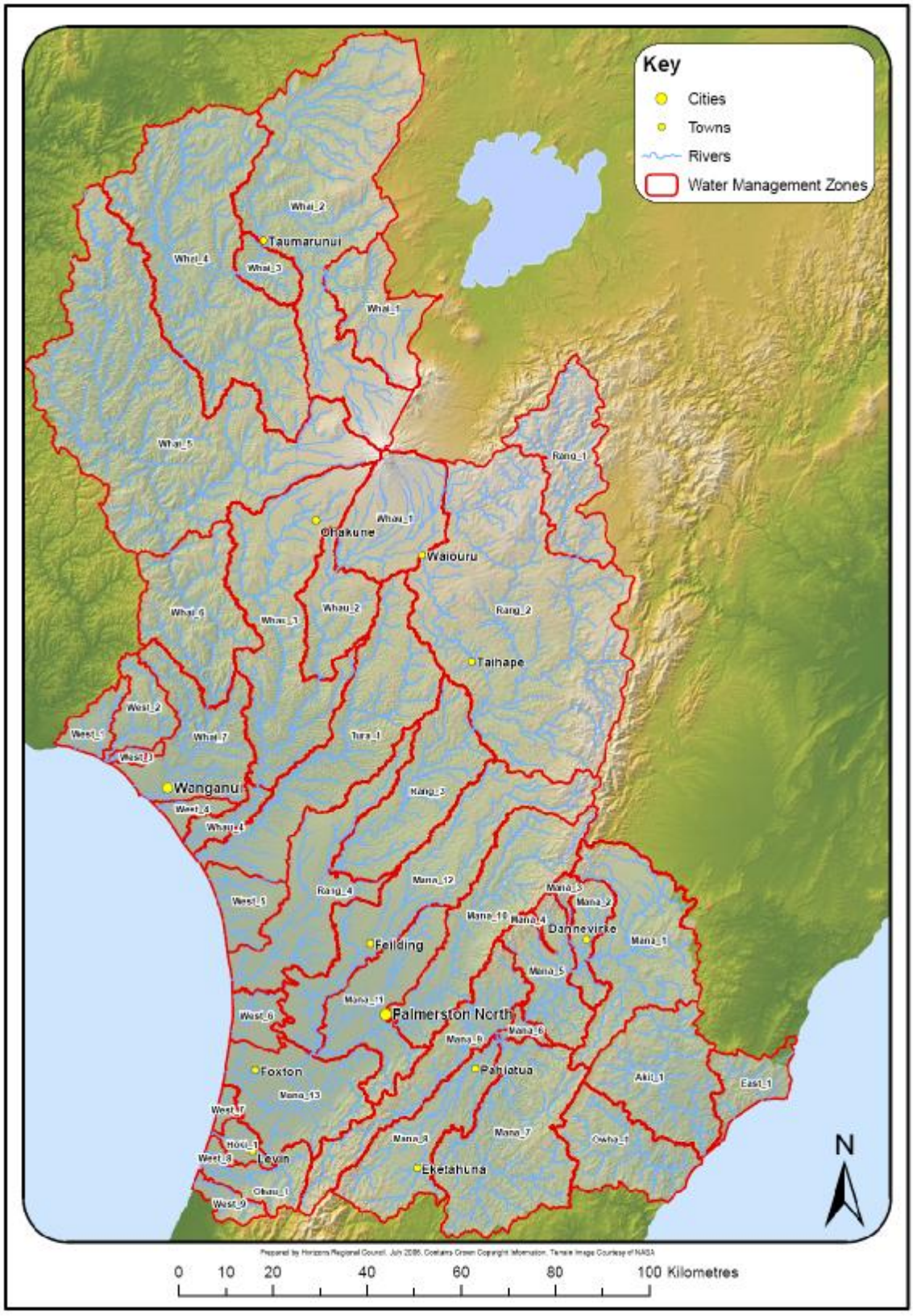
Internal peer review was undertaken by Jeff Watson, Manager of Resource Data for Horizons to ensure any hydrological and/or flow relationships were accurately applied to the zones. External peer review of this report was completed by Graham Sevicke-Jones, Manager, Environmental Science for Hawkes Bay Regional Council. In addition to formal review processes, the definition of the management zones was completed in consultation with a wide range of staff from within Horizons.

2. Definition of Water Management Zones

2.1 Key Selection Criteria

In defining WMZ boundaries (Figure 2), several critical determinants were applied. However, the relative weighting of each criterion was adapted to the characteristics of the individual zones and sub-zones. The selection criteria included:

- Identifying the natural watershed/catchment boundaries;
- The availability of the monitoring data (ie. periodicity and record duration);
- The location and permanence of flow sites (ie. long or short term) and whether the sites were currently in operation;
- Known hydrological peculiarities such as groundwater exchange or recharge;
- The ability to obtain flow data for water quality sites where data is not currently available (ie. by way of modeled flow);
- The underlying geology and landuse homogeneity within the zone;
- Major changes in instream habitat or aquatic ecosystem structure;
- The intensity of pressure on the water resource;
- Catchment landuse type and intensity;
- The presence of major and/or multiple discharges;
- Major water abstractions;
- Existing management requirements such as National and Local Water Conservation Orders and Notices;
- Existing management zone definitions from the water allocation projects in the Rangitikei (Roygard & Carlyon, 2004) and Upper Manawatu (Roygard et al, 2006) Rivers;
- The potential for future increases in resource pressure (ie. conversion of forestry to pasture); and
- Tidal influences.



Map 1: Water Management Zones in the Manawatu-Wanganui Region.

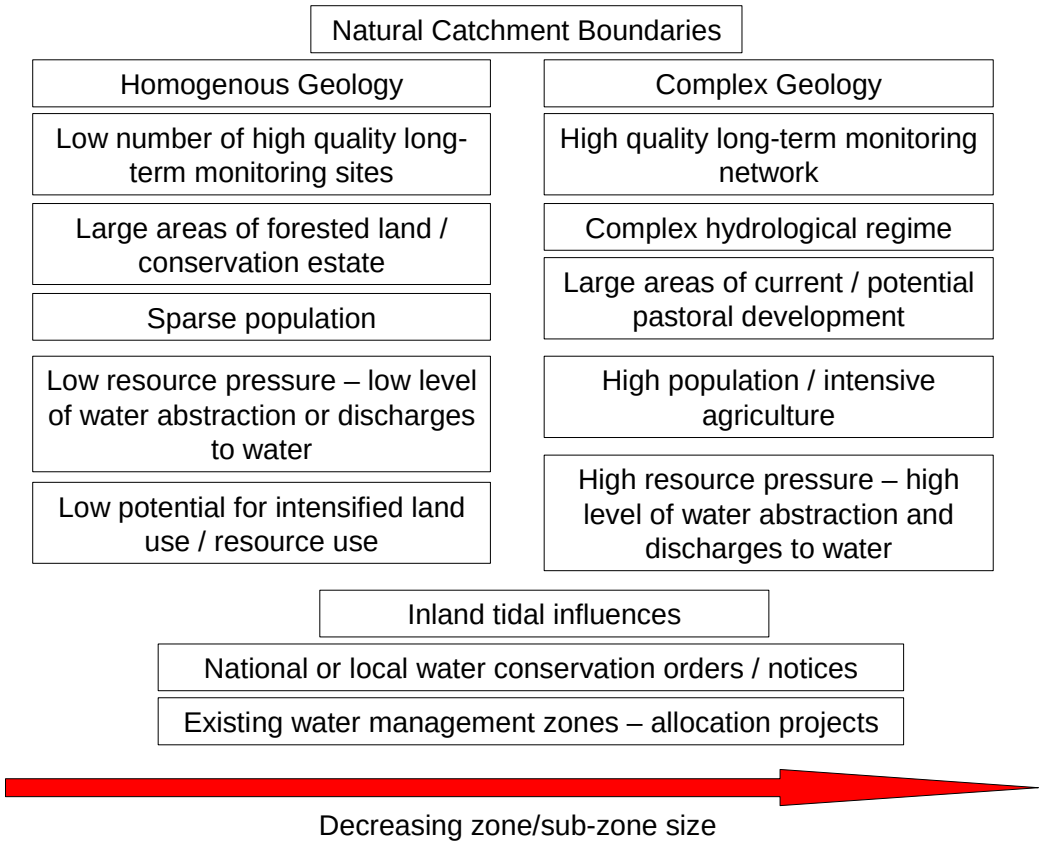


Figure 2: Major factors influencing the determination of water management zones in the Manawatu-Wanganui Region.

2.2 Water Management Zone Monitoring

A strategic goal for monitoring within the water management zones is to have at least one water quality, biomonitoring and/or flow recorder site associated with each zone and sub zone. Where possible flow recorders and water quality monitoring sites have been aligned, as it is preferable to have both datasets monitored from the same location. This enables the calculation of loadings and the application of standards for water quality that are relevant to the flow regime of the zone, as well as the values of that catchment or sub-catchment area.

These sites and the zone boundaries associated with them have, wherever possible, been situated at the furthest downstream point or catchment outflow to capture and monitor the impact of all upstream/within catchment effects.

The following considerations were adopted for the selection of WMZ monitoring sites:

- Access to the site must be safe for personnel;
- Vehicle access through public property is preferable;
- Sites should be located either upstream or downstream of major groundwater exchange areas to avoid the mixing zone;

- Sites at the confluence of two or more rivers should be well downstream (or upstream within smaller catchment sub-zones), to avoid the mixing zone;

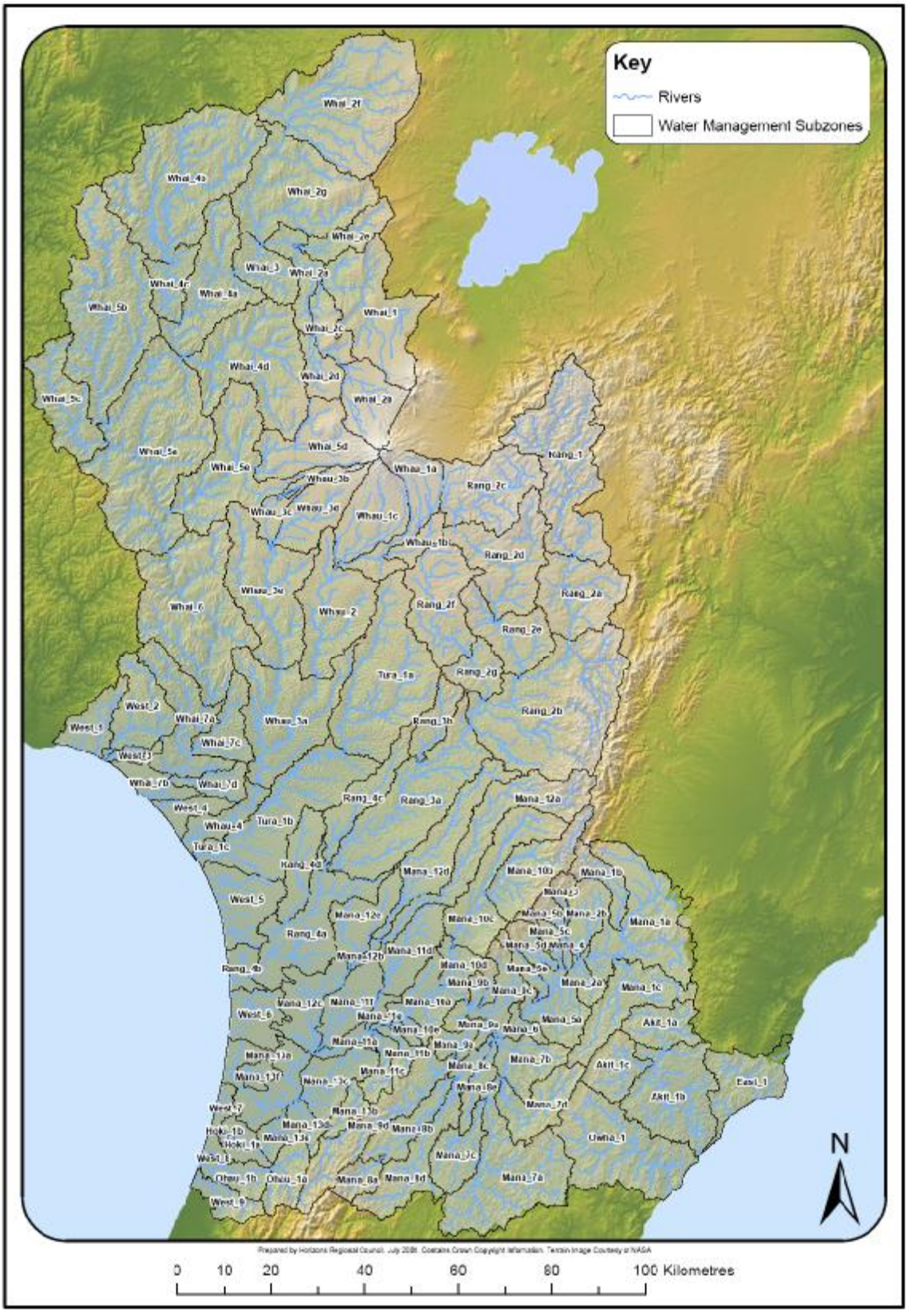
- Sites should be located upstream of known discharges to water. The Regional Policy Statement provides clear guidance on the fact that monitoring the impact of a discharge to surface water which is all but minor is the responsibility of the consent holder (Method 11.13, RPS);

- Maintenance and continuation of data collection at long-term monitoring sites to enable robust analysis;

- Lower river monitoring sites must be located upstream of any tidal influences; and

- Coastal zones will not be monitored within the freshwater program but will have a specialised monitoring and management regime, yet to be applied.

Any future addition or amalgamation of new zones and sub-zones will need to factor these considerations into account.



Map 2: Water Management Sub-zones in the Manawatu-Wanganui Region.

2.3 Water Management Zones and the Coastal Marine Boundary

The coastal zones of our four largest river systems have tidal influences that stretch far inland. The current water quality SOE monitoring program was designed primarily for freshwaters. At the time of establishing the program it included several tidal sites. However it has since been recognised that the monitoring done in these tidal zones is not appropriate due to the influences of salinity, tidal water level change or the unique aquatic organisms (ie. native fish species) that inhabit our tidal and estuarine areas, either permanently or as a critical aspect of their life history (McDowall, 1990).

On the seaward edge of these tidally affected zones lies the Coastal Marine Boundary. This boundary is defined under the Resource Management Act (1991) and doesn't necessarily physically encompass tidal or estuarine ecotypes for water management purposes. To this extent management zone maps show the coastal marine boundaries in relation to tidal WMZ, but within this report discussion of monitoring is limited to freshwater management.

Freshwater management upstream can heavily influence the ecology of these tidal areas (Woods and Howard-Williams, 2004). In order to integrate the management of tidal and freshwater zones; WMZ values, standards and monitoring will need to be approached in a consistent *and* ecologically relevant manner.

It is recognised that our current level of science needs expansion to better monitor tidal and estuarine ecosystems. To meet this need, projects to develop high-quality monitoring of tidal and coastal zones, gather better pressure/state information on coastal habitats and resource usage and establish accurate knowledge about the extent of inland tidal influences in our larger rivers is planned. This information will be applied to better target monitoring and to redefine accurate coastal zone boundaries.

Sub-catchments and small streams within these larger coastal zones have been sub-zoned to allow for freshwater monitoring to occur where it is appropriate to do so. For example, the Koputaroa and Mangaore Streams and the Tokomaru River sub-zones within the Coastal Manawatu WMZ have been established for management due to knowledge of the aquatic biodiversity in these tributaries.

2.4 The Relationship between Ground and Surface Water Management Zones

The integration of ground and surface water resources into a comprehensive environmental management system is a key goal for the sustainability of all water resources (Alley et al. 1999). Due to the interconnectedness of ground and surface water systems, sustainability must be defined within the context of the complete hydrological system, of which ground water is also a part. As an example, Alley et al. (1999) note: "*an established acceptable rate of groundwater withdrawal (with respect to changes in groundwater levels) may reduce the availability of surface water to an unacceptable level*". To this ends, consideration of surface water management zones was taken into account in the development of ground water management zones for the

Region (H. Zarour: Senior Scientist – Groundwater, Horizons Regional Council, *pers. com*.).

The boundaries of the groundwater management zones (GWMZ) coincide with surface WMZ (**Table 50**). Although surface water divides and groundwater divides deviate somewhat at the local scale, the larger ground water zones encompass several surface water zones when identified at the regional scale. These wider groundwater boundaries identically follow the surface water management boundaries. The compatibility between the groundwater management zones (GWMZ) and surface water management zones (WMZ) contributes towards the sought integrated management of water resources on the catchment scale.

3. Water Management Zone Monitoring

In order to collect data on the state of the management zone or sub-zone water resources, monitoring sites are located at the downstream end of each zone (and in most case each sub-zone). In the tables associated with each map this site is identified by map reference and the type of monitoring associated with each site is noted.

3.1 Flow Monitoring

Sites noted as 'Flow' monitored are those with continuous flow recorders established at this location. The flow is recorded at 15-minute intervals and is connected to Horizons' flow databases via telemetry. Zone monitoring sites without established flow recorders will require low flow gauging runs in order to calculate flow-related water quality percentiles. These sites will be recommended for further gauging work within the redrafted Regional Monitoring Strategy.

3.2 Water Quality Monitoring

Sites noted for 'Water Quality' monitoring have water samples taken monthly for a range of physicochemical parameters. In order to maximise the number of sites monitored across the Region in a cost effective manner, water quality sites fall within one of two categories: 1) Permanent sites - monitored monthly on a permanent basis, and 2) Rolling sites - monitored monthly for one year out of every three.

Although it is less than desirable to have sites that are monitored less frequently (ie. rolling sites), in order to cover as many of the management zones as possible some reductions in frequency of monitoring are required. Sites that are currently monitored on a rolling basis can be recommended for upgrade to permanent status if specific issues arise within a zone or sub-zone in the future.

3.3 Biomonitoring

Sites noted as 'Biomonitoring' sites have field samples of aquatic macro-invertebrates and periphyton (as well as some habitat and physicochemical spot measurements) collected once annually during autumnal low flows on either a permanent or a rolling (one year in every three) basis. This information is compiled into an annual 'State of the Riverine Environment Report'.

3.4 NIWA Monitored Sites

A reciprocal arrangement is in place with the National Institute of Water and Atmosphere (NIWA) to allow access to data from NIWA flow and water quality monitoring sites. NIWA sites are noted within tables below.

3.5 Unmonitored Zones

Zones currently without water quality monitoring sites will be recommended for addition into the monitoring program through the redrafting of the Regional Monitoring Strategy. Lakes and coastal zones that require specialised monitoring have been noted within tables and are intended to be added into Science Team work programs.

For the few zones and sub-zones where no monitoring site currently exists, recommendations for future monitoring are noted and will also be carried through into the strategy. Further reporting is required to record historic long-term monitoring periodicity and quality for future reference and research purposes.

3.6 Zone Coding and Labeling

At the regional scale, zones were grouped within their parent catchment or locality code (eg. Manawatu or West Coast) and numbered within these broad catchment areas from upstream to downstream. A letter following the numerical code delineates the sub-zones.

Narrative zone names were based on their river catchment (ie. Turakina) or part catchment (ie. Weber-Tamaki), position within that catchment (ie. Upper Whangaehu) or place name at the terminal end of a zone (ie. Pipiriki). Sub-zones were named after their sub-catchment (ie. Mangaramarama) or position within that sub-catchment (ie. Middle Moawhango).

Mapping and management codes were assigned to each zone and sub-zone to incorporate the parent catchment, zone number and sub-zone letter. For example:

Mana_10c = Manawatu catchment, zone 10 (Middle Manawatu WMZ), sub-zone c (Lower Pohangina sub-zone);

Whau_3d = Whangaehu catchment, zone 3 (Lower Whangaehu WMZ), sub-zone d (Upper Mangawhero).

4. Conclusions and Recommendations

This report documents the water management zones (WMZ) for use in integrated water quality and quantity management regimes being developed by Horizons for use across the Manawatu-Wanganui Region. The spatial framework provided by the WMZ will allow for the implementation of integrated water management policies at the catchment or sub-catchment scale, depending on pressures within each catchment and the level of science and information available at the time.

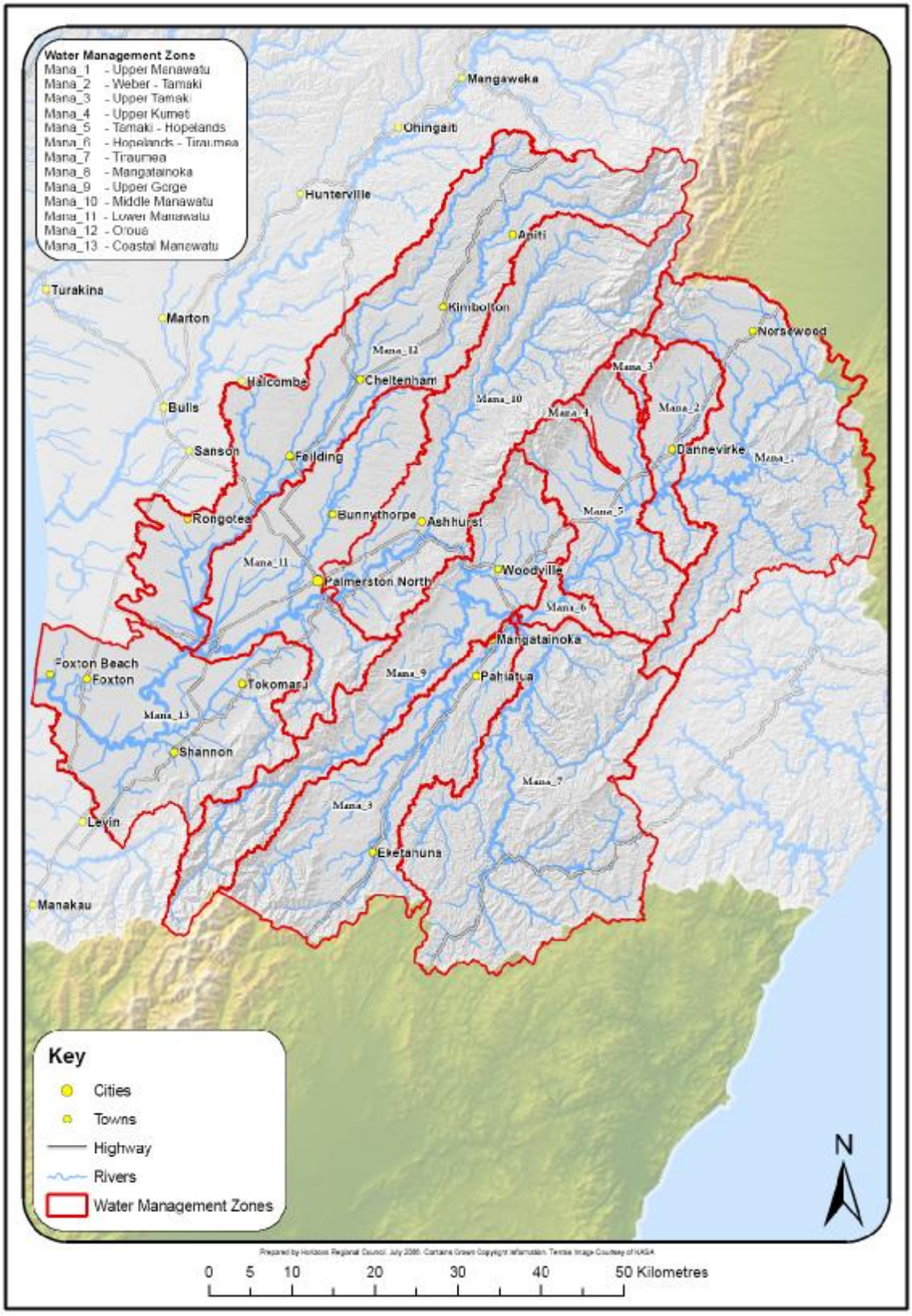
The geographical scope of the WMZ project is as diverse as the Manawatu-Wanganui region. It provides a framework for the management of a broad range of environments, from rivers under National Water Conservation Orders (NWCO), to highly degraded lowland rivers, and to coastal dune lakes and their catchments.

Reflecting the Regional diversity of environment and character, and following the WMZ definition, is the assessment of values within each zone, the setting of standards and management objectives to protect those values and the monitoring of the effectiveness of the One Plan in achieving defined outcomes. These projects will follow in early 2007.

The development of WMZ has integrated the water science programs; updating and improving on the current SOE water quality monitoring and providing linkages to surface water allocation. Eventually the WMZ will also be connected to groundwater allocation programs. Aligning flow information with water quality and aquatic bio-monitoring data within zones and sub-zones will further facilitate integration of these programs.

Future delineation of zones or sub-zones to address specific issues or to better meet management objectives and standards will be possible by way of formal Plan change or review of the One Plan. However the ability to adequately monitor further WMZ will need to be a key consideration in this process.

5. Manawatu River Zones and Sub-zones



Map 3: Manawatu River Catchment and Water Management Zones.

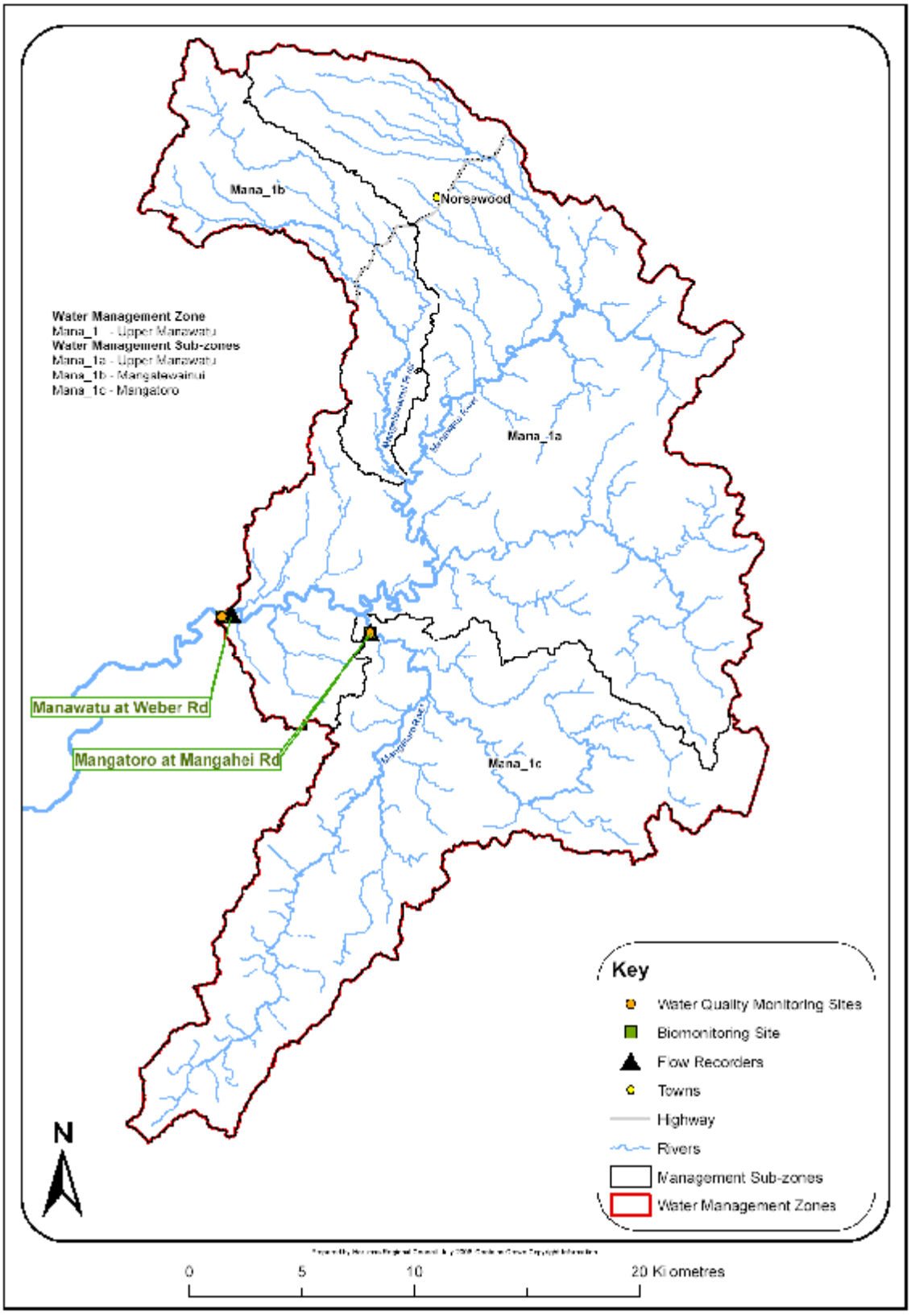
Table 1: Manawatu catchment management zones justification and monitoring

Catchment	Water Management Zone	Zone Code	Description*	Monitoring Site / Zone Justification
Manawatu	**Upper Manawatu**	**Mana_1**	Manawatu River - source to Weber Road flow recorder (U23:751 027)	Manawatu at Weber Road (U23:751 027) – Water Quality, Biomonitoring and Flow
	Weber-Tamaki	**Mana_2**	Manawatu River – Weber Road flow recorder to Tamaki confluence (U23:709 003)	Water Allocation Management Zone (Upper Manawatu) (U23:709 003)
	Upper Tamaki	**Mana_3**	Tamaki River - source to water supply weir (U23:709 111)	Tamaki at Water Supply Weir (U23:709 111) – Water Quality, Biomonitoring and Flow
	Upper Kumeti	**Mana_4**	Kumeti Stream - source to Te Rehunga flow recorder (T23:663 052)	Kumeti at Te Rehunga (T23:663 052) - Flow
	Tamaki-Hopelands	**Mana_5**	Manawatu River – Tamaki confluence to Hopelands flow recorder (T24: 616 899)	Manawatu at Hopelands (T24: 616 899) – Water Quality, Biomonitoring and Flow
	Hopelands-Tiraumea	**Mana_6**	Manawatu River – Hopelands flow recorder to Tiraumea confluence (T24:555 870)	Manawatu at Ngawapurua (T24:553 870) - Downstream limit of Upper Manawatu Water Resources Assessment
	Tiraumea	**Mana_7**	Tiraumea River - source to Manawatu confluence (T24:555 870)	Tiraumea at Haukopua Reserve (T24:559 854)
	Mangatainoka	**Mana_8**	Mangatainoka River – source to Tiraumea confluence (T24:558 855)	Mangatainoka at SH2 (T24:529 833) – Water Quality and Biomonitoring Monitoring required upstream of Tiraumea confluence
	Upper Gorge	**Mana_9**	Manawatu River – Tiraumea confluence to Upper Gorge flow recorder (T24:494 933)	Manawatu at Upper Gorge (T24:494 933) – Water Quality, Biomonitoring and Flow

* Includes all inflowing tributaries and sub-catchments unless otherwise stated.

Catchment	Water Management Zone	Zone Code	Description*	Monitoring Site / Zone Justification
	Middle Manawatu	**Mana_10**	Manawatu River – Upper Gorge to Teacher's College flow recorder (T24:331 892)	Manawatu at Teacher's College (T24:331 892) – Water Quality (NIWA), Biomonitoring and Flow
	Lower Manawatu	**Mana_11**	Manawatu River – Teacher's College to Oroua confluence (S24:167 826)	Manawatu at Opiki Bridge – Water Quality (NIWA) and Biomonitoring
	Oroua	**Mana_12**	Oroua River - source to Manawatu confluence (S24:167 826)	Oroua at Kopane (S24:217 961) – Flow Awahuri Bridge (S23:243 002) – Water Quality and Biomonitoring
	Upper Gorge	**Mana_9**	Manawatu River – Tiraumea confluence to Upper Gorge flow recorder (T24:494 933)	Manawatu at Upper Gorge (T24:494 933) – Water Quality, Biomonitoring and Flow
	Coastal Manawatu	**Mana_13**	Manawatu River - Oroua confluence to mouth (S24:977 788)	Whirikino Boat Ramp (S24:030 744) - Water Quality and Biomonitoring

* Includes all inflowing tributaries and sub-catchments unless otherwise stated.

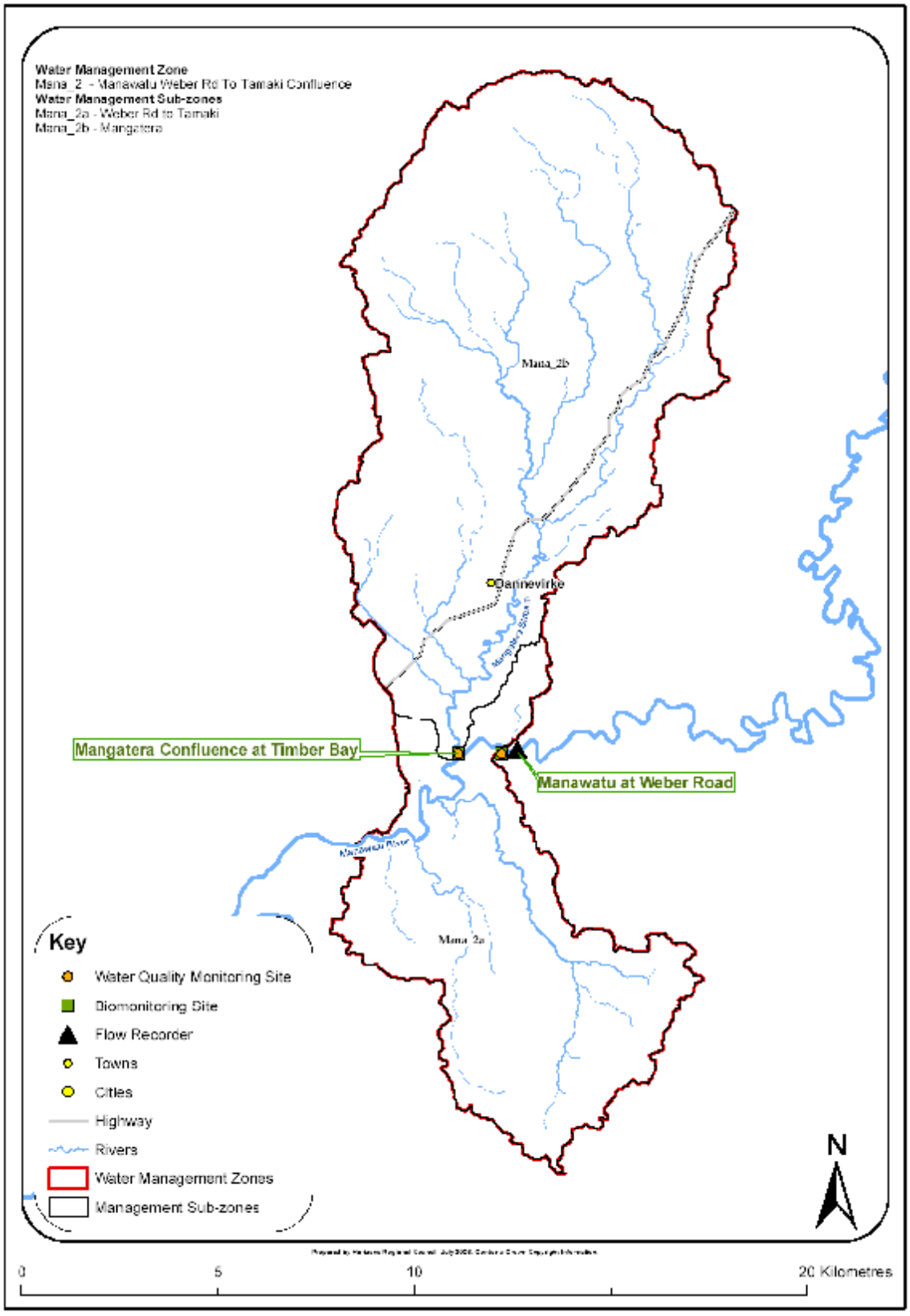


Map 4: Upper Manawatu Zone and Sub-zones.

Table 2: Upper Manawatu management zone sub-zone justification and monitoring

Management Zone	Zone Code	Sub zone	Description*	Monitoring / Sub-zone Justification
Upper Manawatu	**Mana_1a**	Upper Manawatu	Manawatu River - source to Weber Road (U23:751 027)	Manawatu at Weber Road (U23:751 027) – Water Quality, Biomonitoring and Flow
	Mana_1b	Mangatewainui	Mangatewainui River - source to Manawatu confluence (U23:829 086)	Upper Manawatu Water Resource Assessment sub-zone (flow modelled from Manawatu at Weber Road site U23:751 027)
	Mana_1c	Mangatoro	Mangatoro Stream - source to Manawatu confluence (U23:810 027)	Mangatoro at Mangahei Road (U23:813 019) – Water Quality, Biomonitoring and Flow

* Includes all inflowing tributaries and catchment area unless otherwise specified.

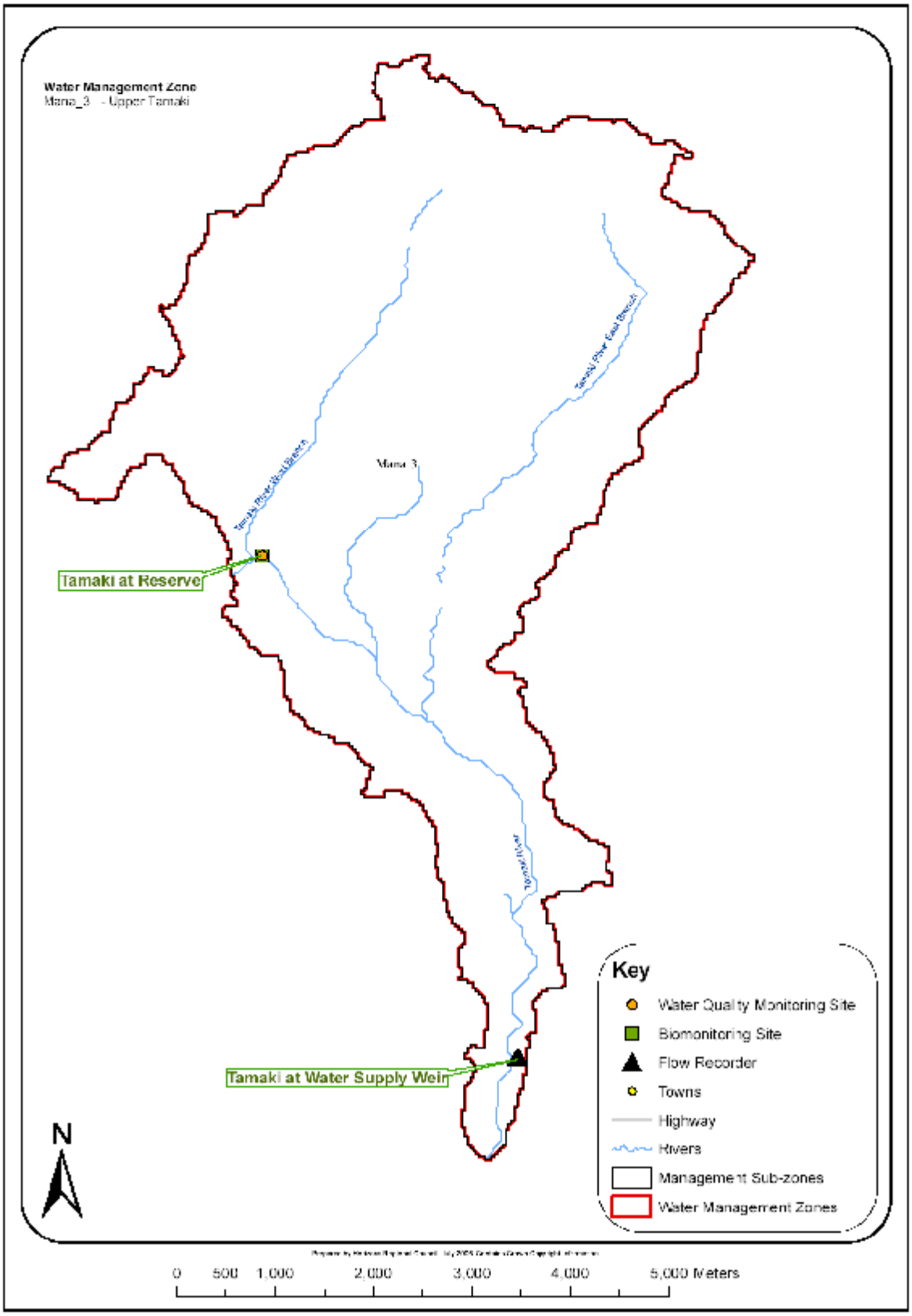


Map 5: Weber-Tamaki Zone and Sub-zones.

Table 3: Weber - Tamaki management zone sub-zone justification and monitoring

Management Zone	Zone Code	Sub zone	Description*	Monitoring / Sub-zone Justification
Weber-Tamaki	**Mana_2a**	Weber-Tamaki	Manawatu River - Weber Road to Tamaki confluence	Manawatu River - Weber Road to Tamaki Water Allocation Management Zone (Upper Manawatu)
	Mana_2b	Mangatera	Mangatera Stream - source to Manawatu confluence (U23:737 025)	Mangatera at Timber Bay (U23:736 026) – Water Quality and Biomonitoring

* Includes all inflowing tributaries and catchment area unless otherwise specified.

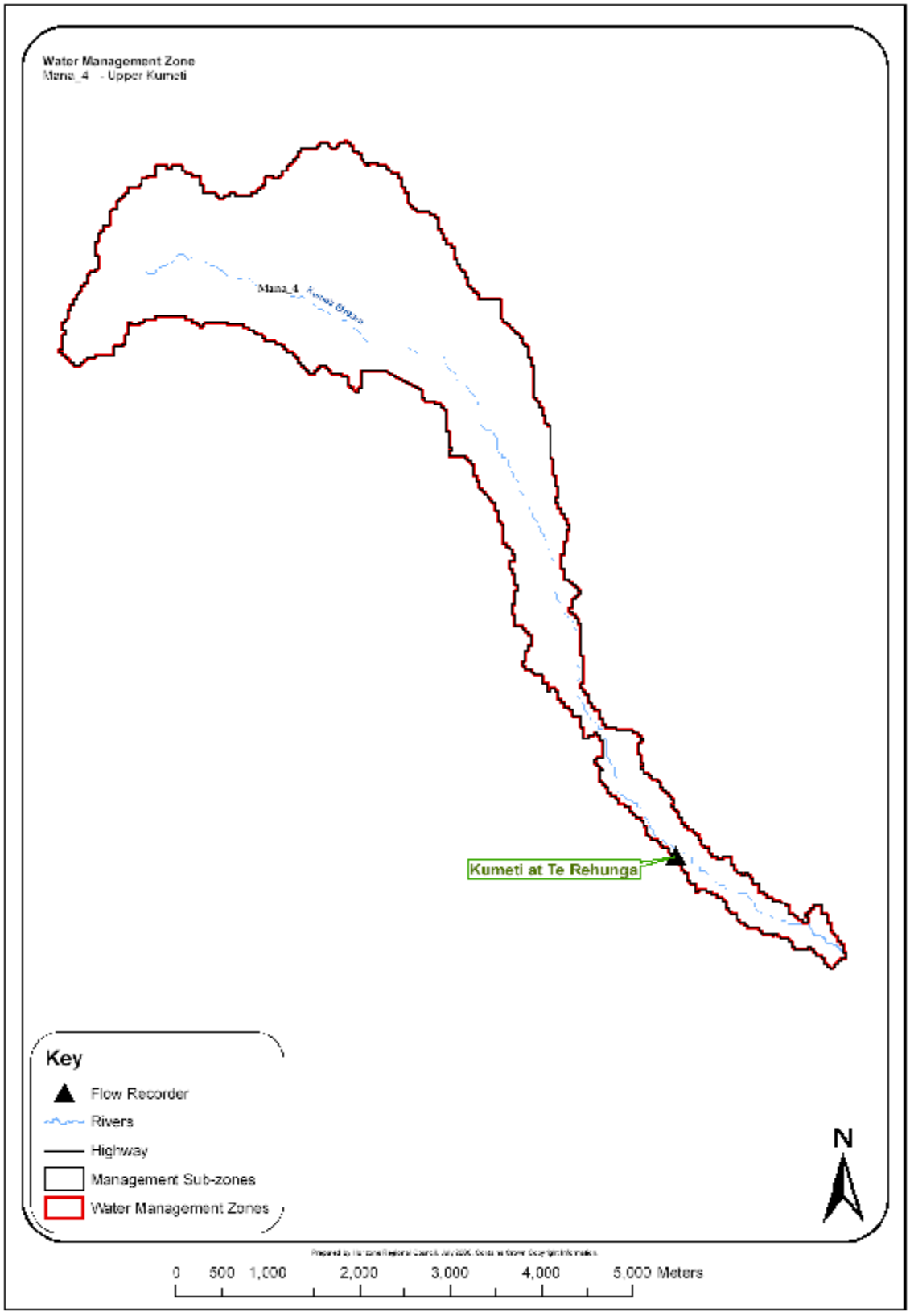


Map 6: Upper Tamaki Zone.

Table 4: Upper Tamaki management zone sub-zone justification and monitoring

Management Zone	Zone Code	Sub zone	Description*	Monitoring / Sub-zone Justification
Upper Tamaki	**Mana_3**	Upper Tamaki	Tamaki River - source to water supply weir (U23:709 111)	Tamaki at Water Supply Weir (U23:709 111) – Water Quality, Biomonitoring and Flow

* Includes all inflowing tributaries and catchment area unless otherwise specified.

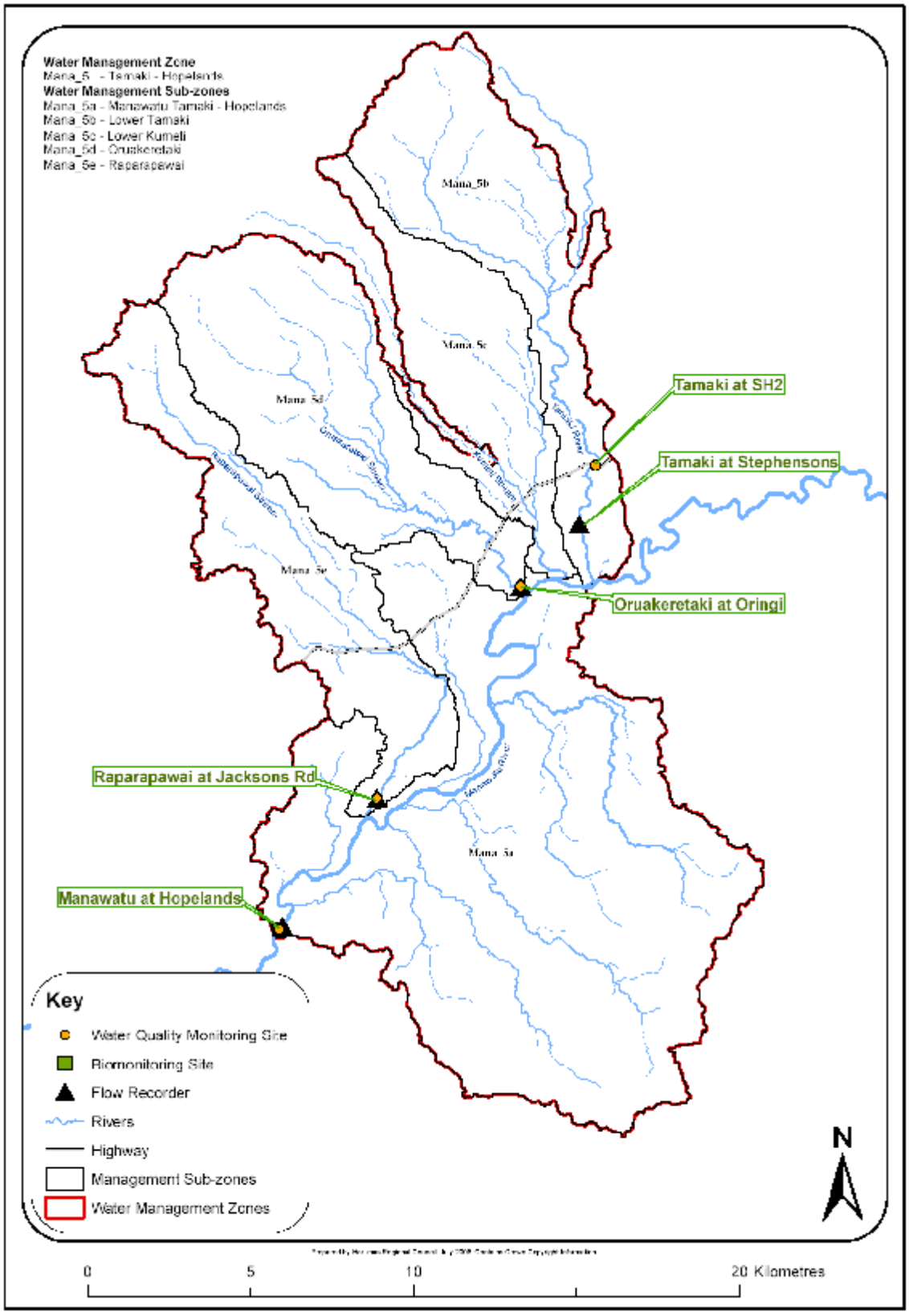


Map 7: Upper Kumeti Zone and Sub-zones.

Table 5: Upper Kumeti management zone sub-zone justification and monitoring

Management Zone	Zone Code	Sub zone	Description*	Monitoring / Sub-zone Justification
Upper Kumeti	**Mana_4**	Upper Kumeti	Kumeti Stream - source to Te Rehunga flow recorder (T23:663 052)	Kumeti at Te Rehunga (T23:663 052) - Flow

* Includes all inflowing tributaries and catchment area unless otherwise specified.

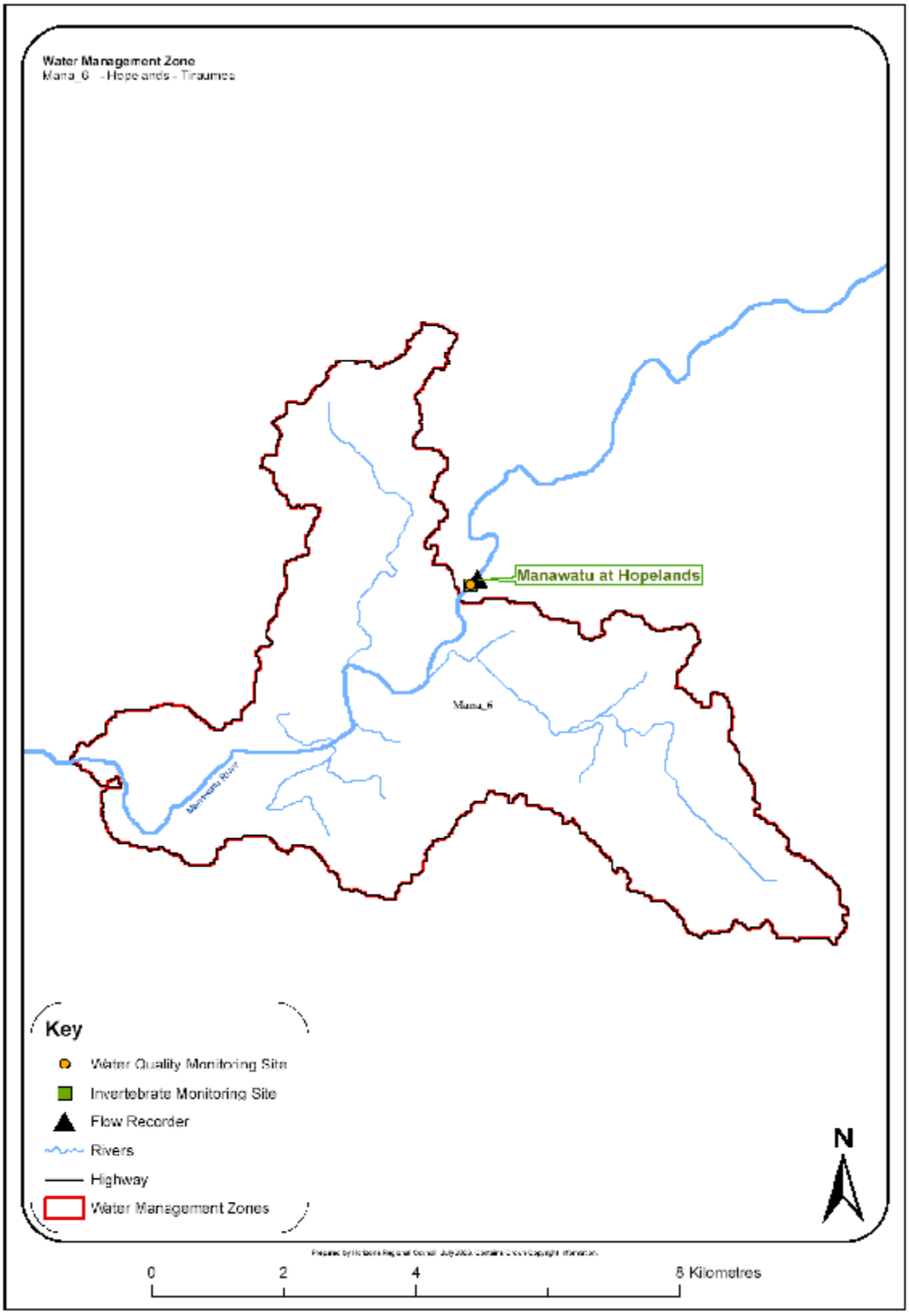


Map 8: Tamaki-Hopelands Zone and Sub-zones.

Table 6: Tamaki-Hopelands management zone sub-zone justification and monitoring

Management Zone	Zone Code	Sub zone	Description*	Monitoring / Sub-zone Justification
Tamaki-Hopelands	**Mana_5a**	Tamaki-Hopelands	Manawatu River - Tamaki confluence to Hopelands (T24: 616 899)	Manawatu at Hopelands (T24: 616 899) – Water Quality, Biomonitoring and Flow
	Mana_5b	Lower Tamaki	Tamaki River - Water supply weir to Manawatu confluence (U23:709 002)	Tamaki at SH2 (U23:711 040) – Water Quality and Biomonitoring Tamaki at Stephensons (U23:707 022) - Flow
	Mana_5c	Lower Kumeti	Kumeti Stream - Te Rehunga to Manawatu confluence (U23:701 006)	Upper Manawatu Water Resource Assessment sub-zone (flow modelled from Kumeti at Te Rehunga site T23:663 052)
	Mana_5d	Oruakeretaki	Oruakeretaki Stream - source to Manawatu confluence (T23:690 000)	Oruakeretaki at Oringi (T23:689 003) – Water Quality and Flow
	Mana_5e	Raparapawai	Raparapawai Stream - source to Manawatu confluence (T24:643 932)	Raparapawai at Jacksons Road (T24:645 938) - Flow

* Includes all inflowing tributaries and catchment area unless otherwise specified.

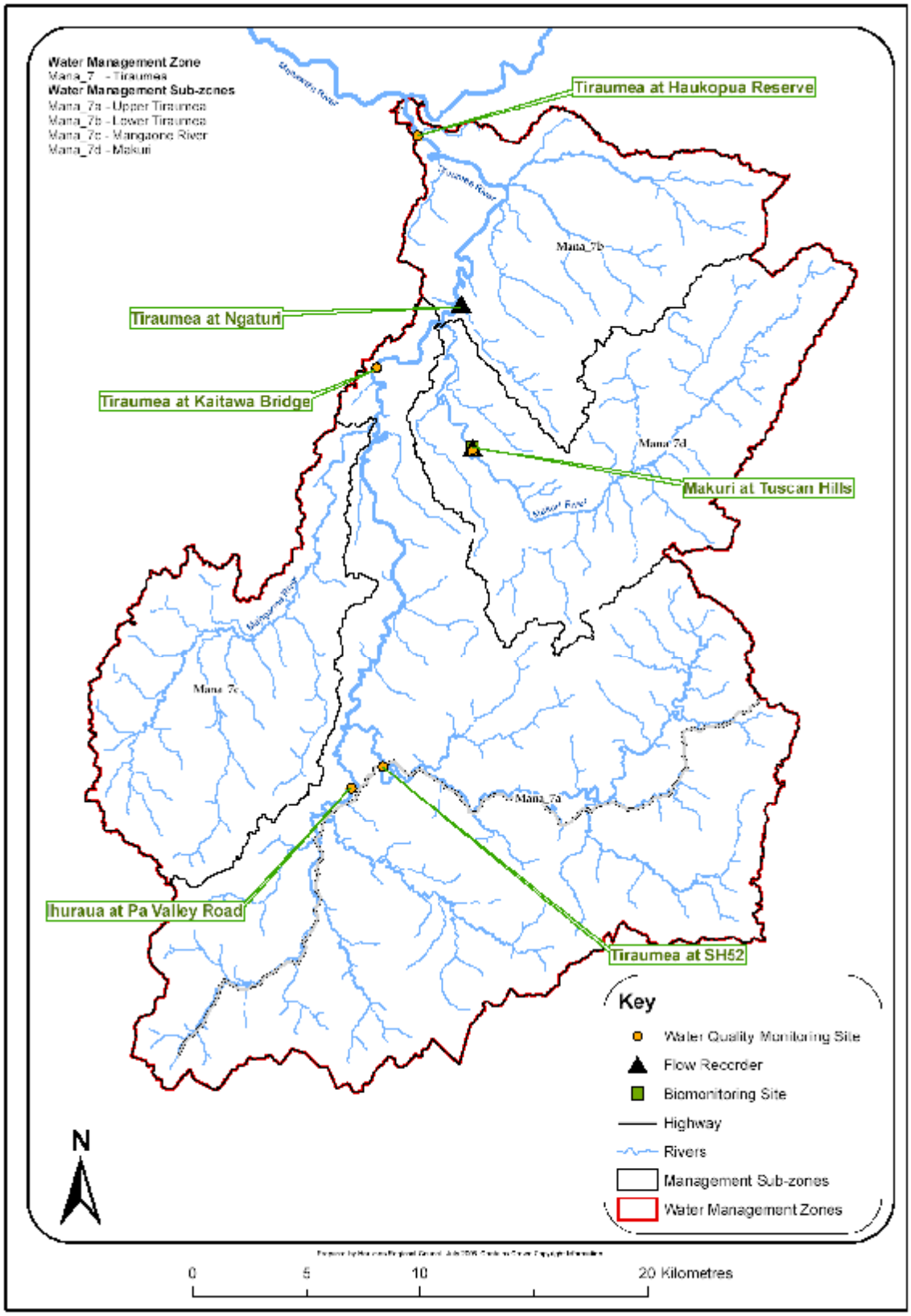


Map 9: Hopelands-Tiraumea Zone.

Table 7: Hopelands-Tiraumea management zone sub-zone justification and monitoring

Management Zone	Zone Code	Sub zone	Description*	Monitoring / Sub-zone Justification
Hopelands-Tiraumea	**Mana_6**	Hopelands-Tiraumea	Manawatu River - Hopelands to Tiraumea confluence (Ngawapurua) (T24:553 870)	Downstream limit of Upper Manawatu Water Resource Assessment (flow modelled from Manawatu at Hopelands site T24: 616 899)

* Includes all inflowing tributaries and catchment area unless otherwise specified.

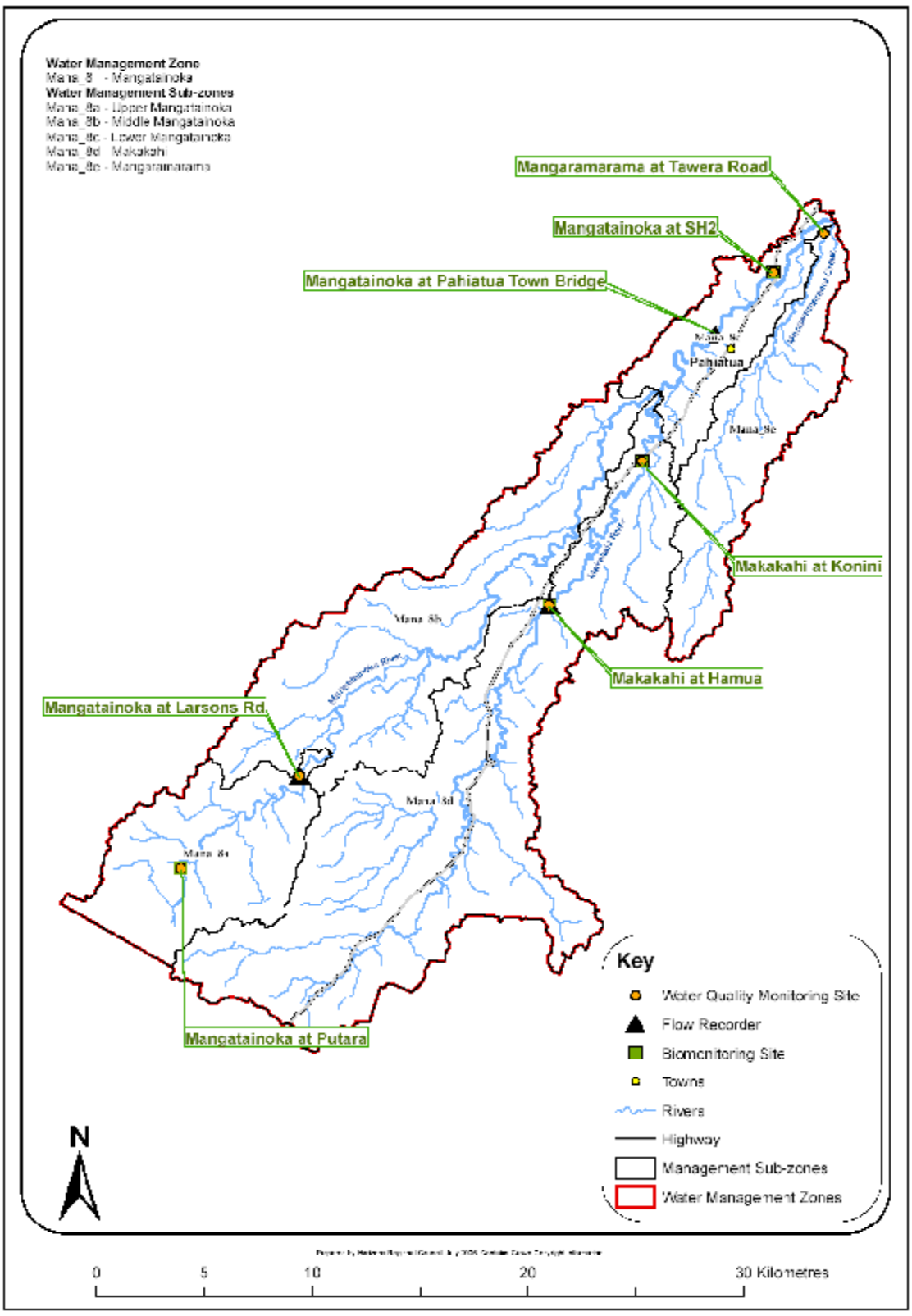


Map 10: Tiraumea Zone and Sub-zones.

Table 8: Tiraumea management zone sub-zone justification and monitoring

Management Zone	Zone Code	Sub zone	Description*	Monitoring / Sub-zone Justification
Tiraumea	**Mana_7a**	Upper Tiraumea	Tiraumea River - source to Ngaturi confluence (T24:578 780)	Tiraumea at Ngaturi (T24:578 780) – Flow Tiraumea at Kaitawa Bridge (T24:539 753) – Water Quality
	Mana_7b	Lower Tiraumea	Tiraumea River - Ngaturi confluence to Manawatu confluence (T24:555 870)	Tiraumea at Haukopua Reserve (T24:559 854) – Water Quality
	Mana_7c	Mangaone River	Mangaone River - source to Tiraumea confluence (T24:541 730)	Mangaone at Valley Road (T24:539 727) – Water Quality
	Mana_7d	Makuri	Makuri River - source to Tiraumea confluence (T24:568 771)	Local Water Conservation Notice Makuri at Tuscan Hills (T24:583 717) – Water Quality, Biomonitoring and Flow

* Includes all inflowing tributaries and catchment area unless otherwise specified.

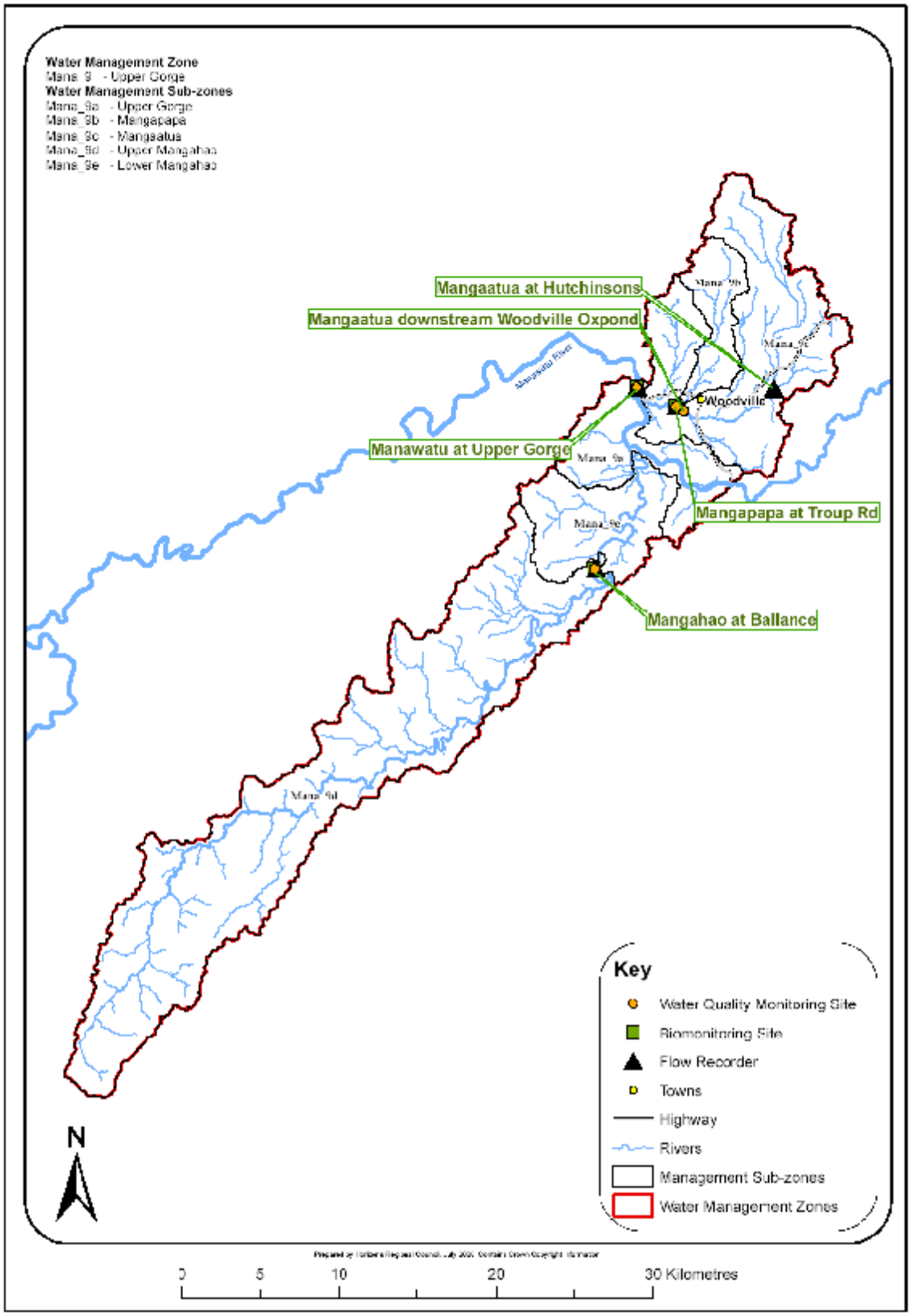


Map 11: Mangatainoka Zone and Sub-zones.

Table 9: Mangatainoka management zone sub-zone justification and monitoring

Management Zone	Zone Code	Sub zone	Description*	Monitoring / Sub-zone Justification
Mangatainoka	**Mana_8a**	Upper Mangatainoka	Source to Larsons Road	Mangatainoka at Larsons Road (T25:308 596) – Water Quality and Flow Mangatainoka at Putara (S25:253 553) - Biomonitoring
	Mana_8b	Middle Mangatainoka	Larsons Road to downstream Makakahi confluence	Water Quality and Flow monitoring site required downstream of Makakahi confluence
	Mana_8c	Lower Mangatainoka	Makakahi confluence to Tiraumea confluence	Mangatainoka at SH2 (T24:529 833) – Water Quality and Biomonitoring Monitoring required above Tiraumea confluence
	Mana_8d	Makakahi	Makakahi River - source to Mangatainoka confluence	Makakahi at Hamua (T25:424 676) – Water Quality, Biomonitoring and Flow
	Mana_8e	Mangaramarama	Mangaramarama Creek - source to Mangatainoka confluence (T24:557 844)	Mangaramarama at Tawera Road (T24:552 849) – Water Quality

* Includes all inflowing tributaries and catchment area unless otherwise specified.

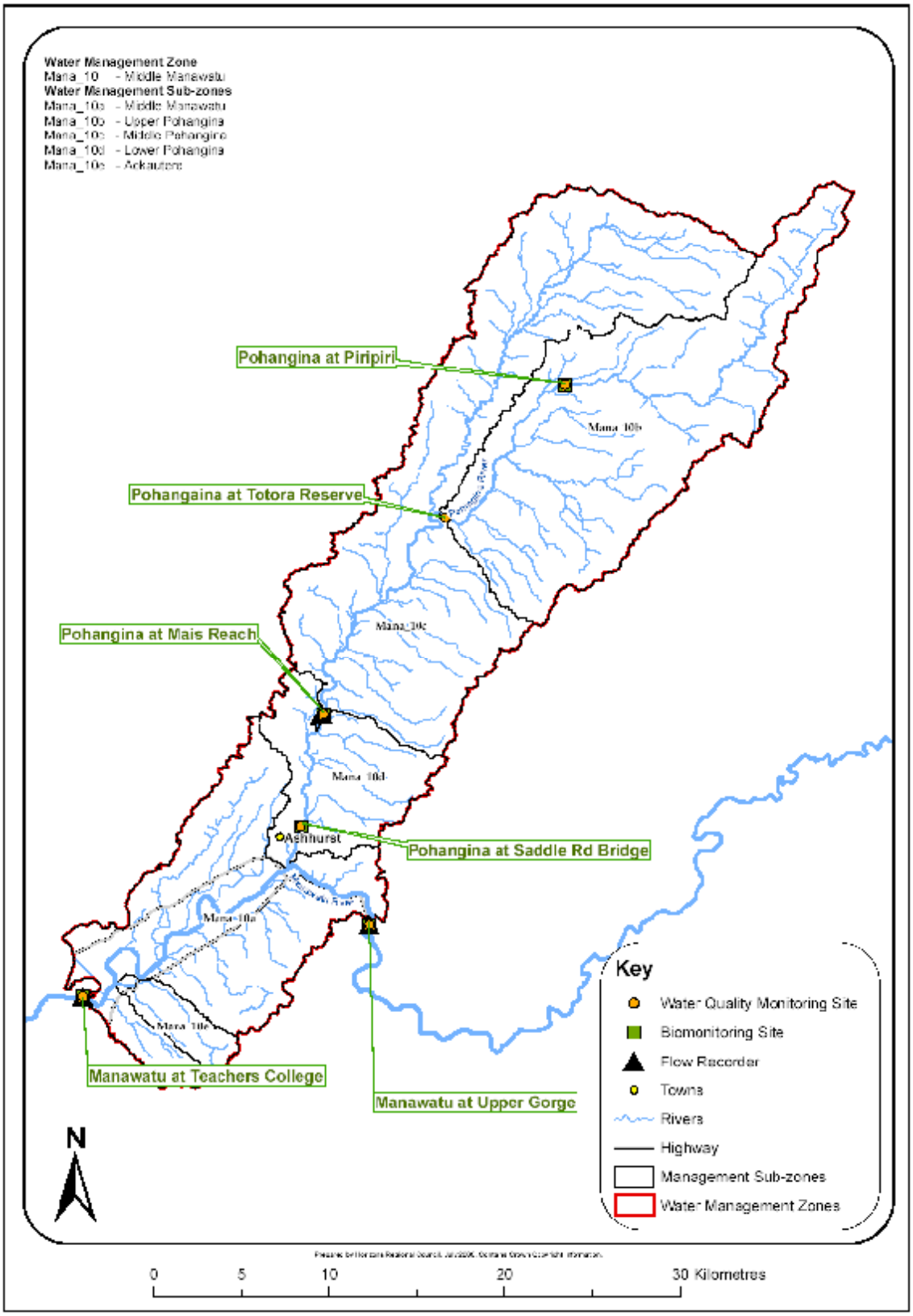


Map 12: Upper Gorge Zone and Sub-zones.

Table 10: Upper Gorge management zone sub-zone justification and monitoring

Management Zone	Zone Code	Sub zone	Description*	Monitoring / Sub-zone Justification
Upper Gorge	**Mana_9a**	Upper Gorge	Manawatu River – Tiraumea confluence to Upper Gorge floe recorder (T24:494 933)	Manawatu at Upper Gorge (T24:494 933) – Water Quality, Biomonitoring and Flow
	Mana_9b	Mangapapa	Mangapapa Stream - source to Mangaatua confluence (T24:515 922)	Mangapapa at Troup Road (T24:520 922) – Water Quality and Biomonitoring
	Mana_9c	Mangaatua	Mangaatua Stream - source to Manawatu confluence (T24:496 925)	Mangaatua at Hutchinsons (T24:581 932) - Flow
	Mana_9d	Upper Mangahao	Mangahao River - source to Ballance (T24:468 818)	Mangahao at Ballance (T24:468 818) – Water Quality, Biomonitoring and Flow
	Mana_9e	Lower Mangahao	Mangahao River - Ballance to Manawatu confluence (T24:496 891)	Water Quality and Biomonitoring site required (T24:496 891)

* Includes all inflowing tributaries and catchment area unless otherwise specified.

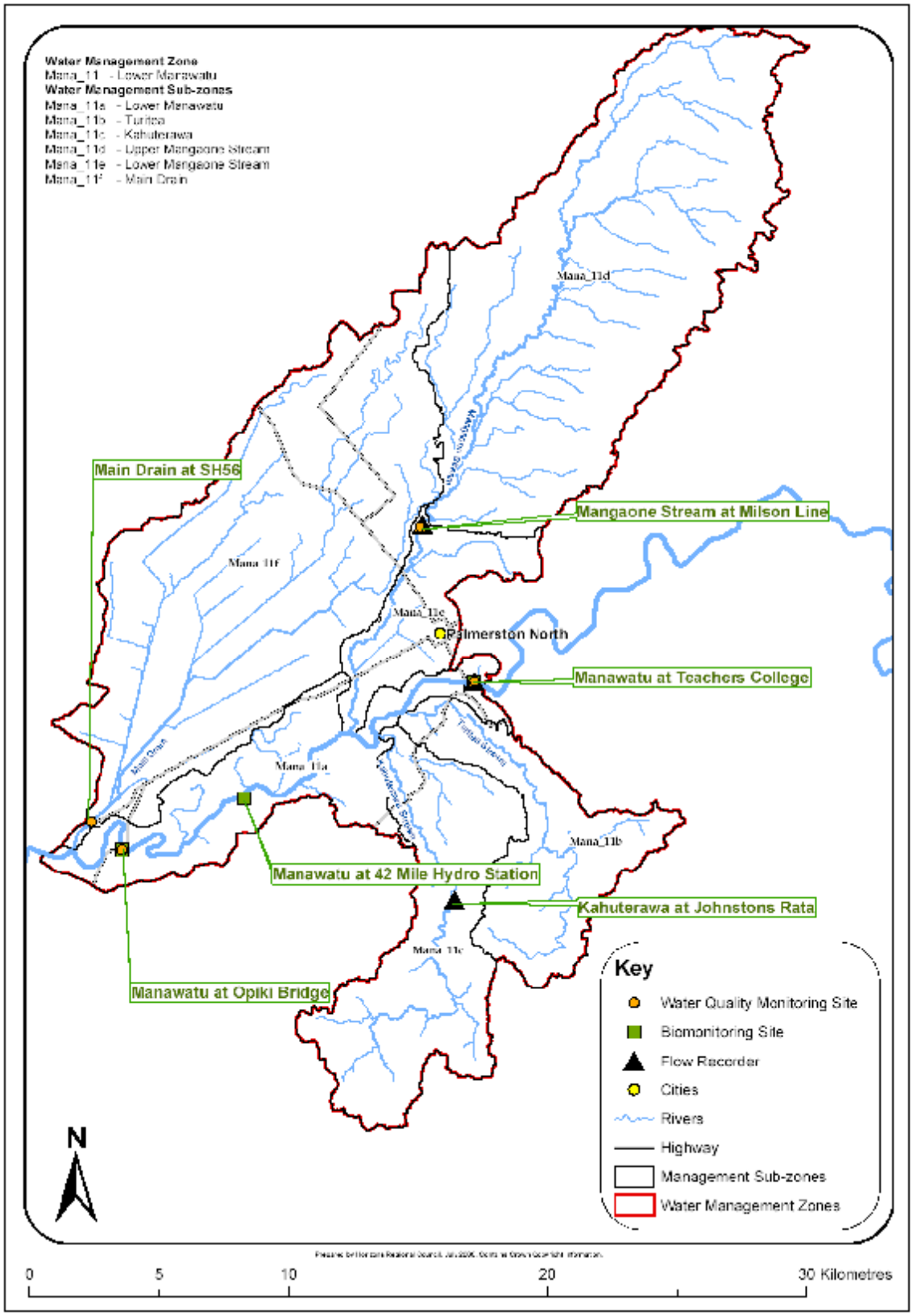


Map 13: Middle Manawatu Zone and Sub-zones.

Table 11: Middle Manawatu management zone sub-zone justification and monitoring

Management Zone	Zone Code	Sub zone	Description*	Monitoring / Sub-zone Justification
Middle Manawatu	**Mana_10a**	Middle Manawatu	Manawatu River - Upper Gorge to Teacher's College (T24:331 892)	Manawatu at Teacher's College (T24:331 892) – Water Quality (NIWA), Biomonitoring and Flow
	Mana_10b	Upper Pohangina	Pohangina River - source to Totara Reserve (T23:534 167)	Pohangina at Totara Reserve (T23:534 167) – Water Quality (Contact Recreation) Biomonitoring and Water Quality site required
	Mana_10c	Middle Pohangina	Pohangina River – Totara Reserve to Mais Reach (T23:467 053)	Pohangina at Mais Reach (T23:467 053) – Water Quality, Biomonitoring and Flow
	Mana_10d	Lower Pohangina	Pohangina River - Mais Reach to Manawatu confluence (T24:450 966)	Pohangina at Saddle Road (T24:449 970) – Water Quality and Biomonitoring
	Mana_10e	Aokautere	Aokautere Stream - source to Manawatu confluence (T24:349 899)	Monitoring site required

* Includes all inflowing tributaries and catchment area unless otherwise specified.

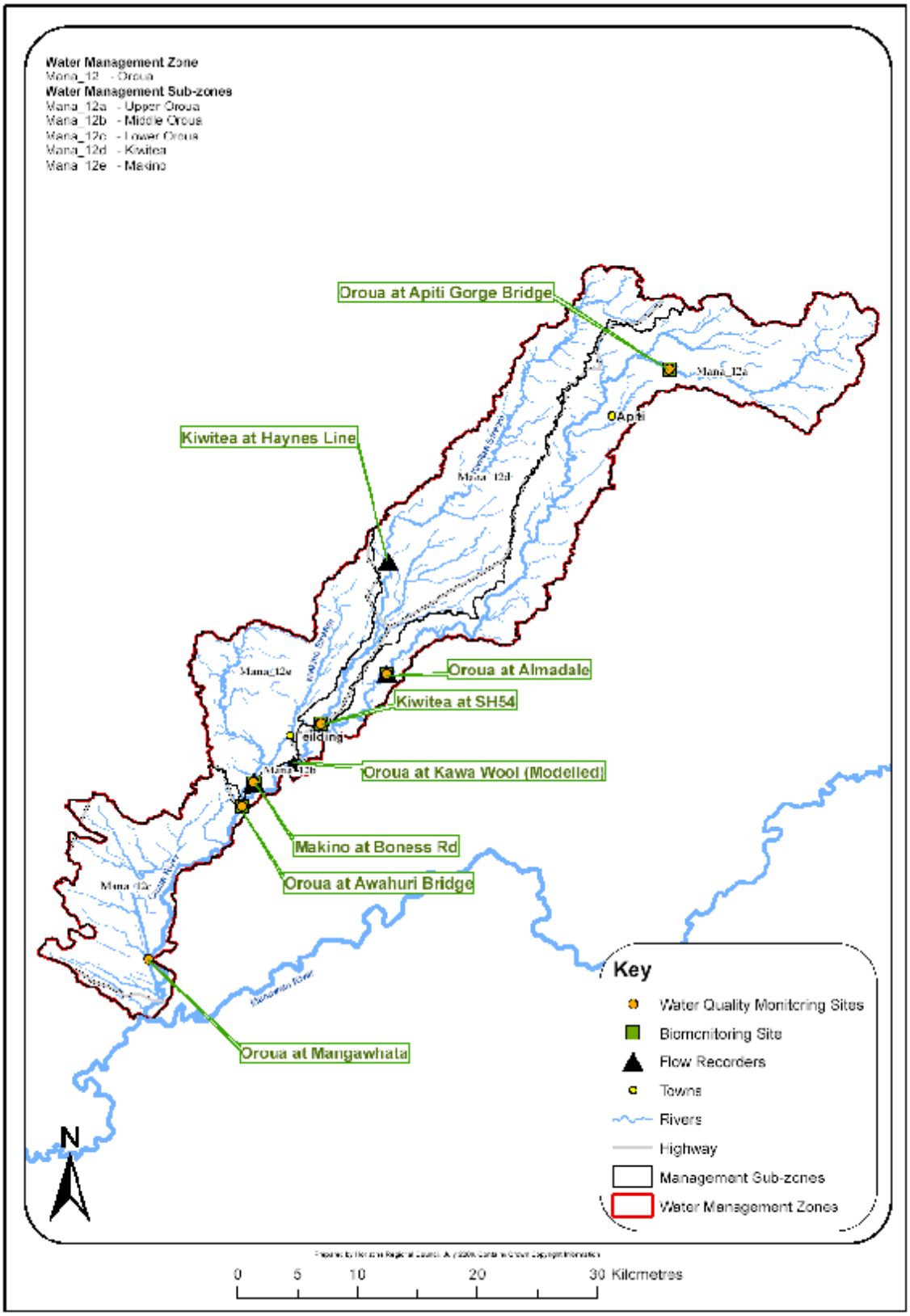


Map 14: Lower Manawatu Zone and Sub-zones.

Table 12: Lower Manawatu management zone sub-zone justification and monitoring

Management Zone	Zone Code	Sub zone	Description*	Monitoring / Sub-zone Justification
Lower Manawatu	**Mana_11a**	Lower Manawatu	Manawatu River – Teacher's College to Oroua confluence (S24:167 826)	Manawatu at Opiki Bridge (S24:195 827) – Water Quality (NIWA) and Biomonitoring
	Mana_11b	Turitea	Turitea Stream - source to Manawatu confluence (T24:304 881)	Monitoring site required upstream of Manawatu confluence – Water Quality and Biomonitoring
	Mana_11c	Kahuterawa	Kahuterawa Stream - source to Manawatu confluence (S24:292 876)	Monitoring site required upstream of Manawatu confluence – Water Quality and Biomonitoring
	Mana_11d	Upper Mangaone Stream	Mangaone Stream - source to Milson Line (T24:311 953)	Mangaone at Milson Line (T24:311 953) – Water Quality, Biomonitoring and Flow
	Mana_11e	Lower Mangaone Stream	Mangaone Stream - Milson Line to Manawatu confluence (S24:283 872)	Monitoring site required at Pioneer Highway
	Mana_11f	Main Drain	Main Drain catchment to Manawatu confluence (including Taonui Stream) (S24:181 836)	Main Drain at SH56 (S24:183 838) - Water Quality

* Includes all inflowing tributaries and catchment area unless otherwise specified.

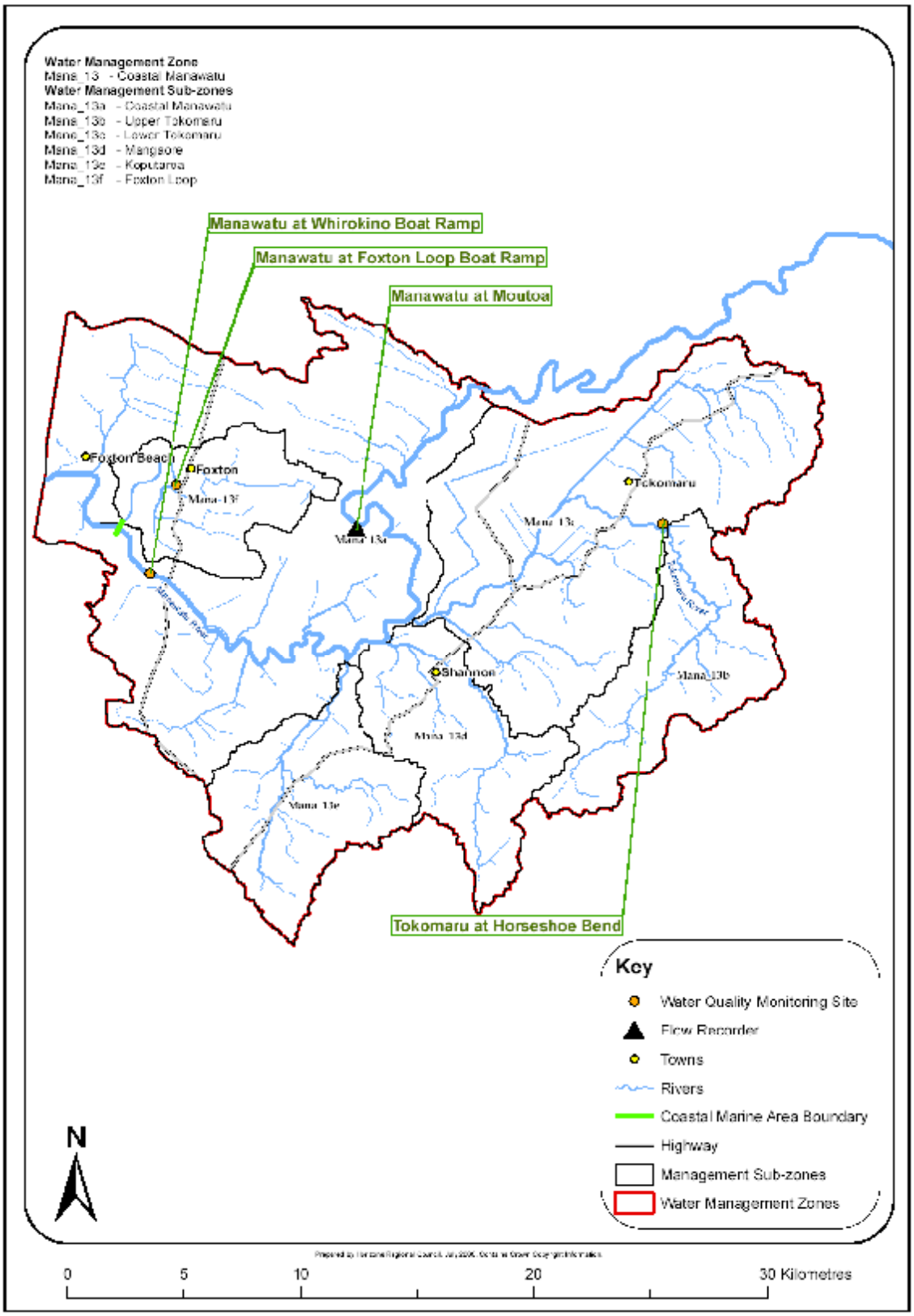


Map 15: Oroua Zone and Sub-zones.

Table 13: Oroua management zone sub-zone justification and monitoring

Management Zone	Zone Code	Sub zone	Description*	Monitoring / Sub-zone Justification
Oroua	**Mana_12a**	Upper Oroua	Oroua River - source to Almadale (T23:365 113)	Oroua at Almadale (T23:365 113) – Water Quality, Biomonitoring and Flow
	Mana_12b	Middle Oroua	Oroua River - Almadale Awahuri Bridge (S23:243 002)	Oroua at Awahuri (S23:243 002) – Water Quality and Biomonitoring (Flow modeled from historic Kawa Wool site (S23:287 038)
	Mana_12c	Lower Oroua	Oroua River - Awahuri Bridge to Manawatu confluence (S24:167 826)	Oroua at Kopane (S24:217 961) - Flow
	Mana_12d	Kiwitea	Kiwitea Stream - source to Oroua confluence (T23:309 066)	Kiwitea at SH54 (T23:310 072) – Water Quality and Biomonitoring
	Mana_12e	Makino	Makino Stream - source to Oroua confluence (S23:243 004)	Makino at Boness Road (S23:254 023) – Water Quality and Flow Makino at South Street (S23:276 053) – Biomonitoring (move to Boness Road)

* Includes all inflowing tributaries and catchment area unless otherwise specified.



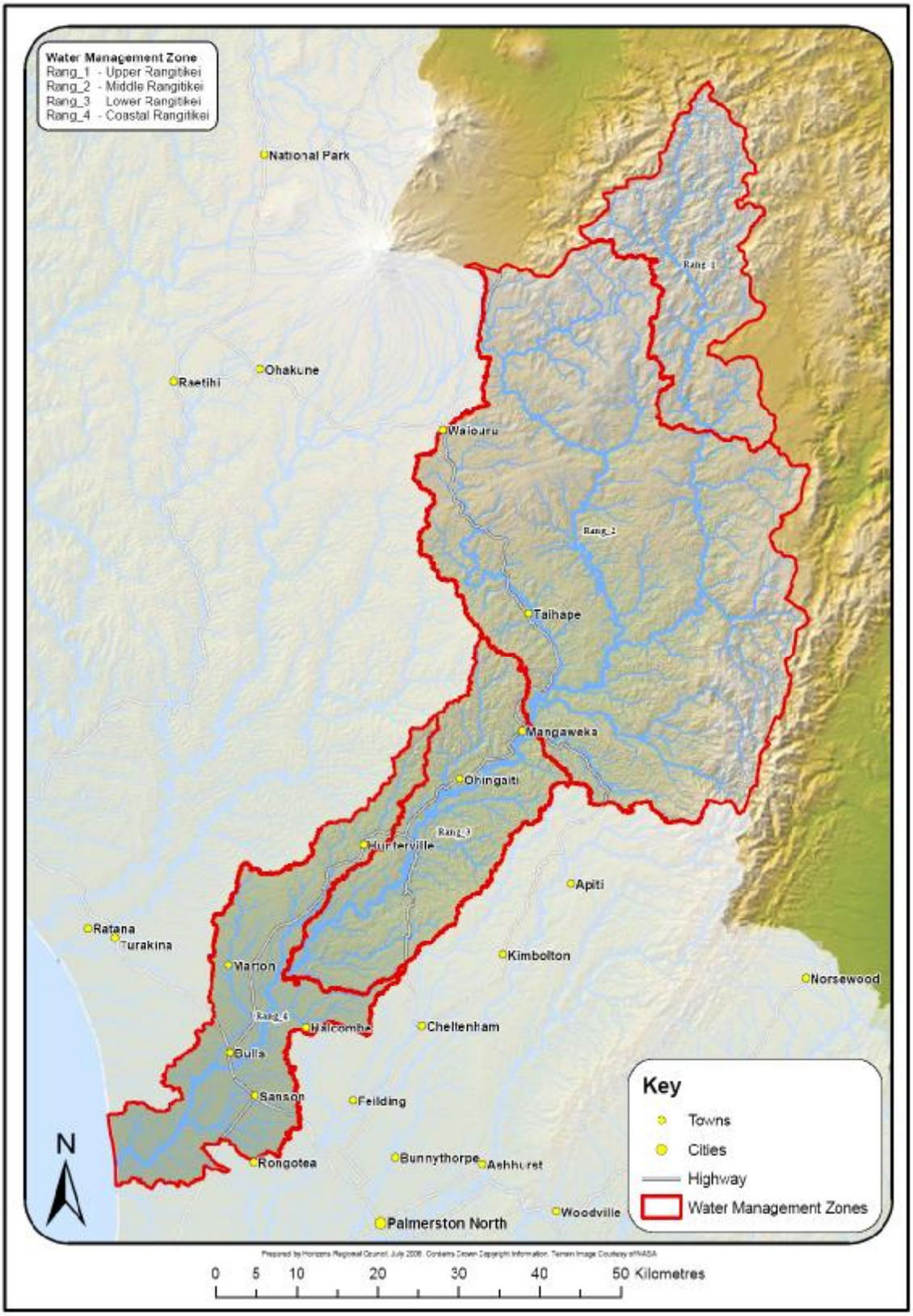
Map 16: Coastal Manawatu Zone and Sub-zones.

Table 14: Coastal Manawatu management zone sub-zone justification and monitoring

Management Zone	Zone Code	Sub zone	Description*	Monitoring / Sub-zone Justification
Coastal Manawatu	**Mana_13a**	Coastal Manawatu	Manawatu River - Oroua confluence to mouth (S24:977 788)	Manawatu at Whirikino (S24:030 744) – Water Quality and Biomonitoring RAMSAR site at Estuary
	Mana_13b	Upper Tokomaru	Tokomaru River - source to Horseshoe Bend (S24:241 768)	Tokomaru at Horseshoe Bend (S24:241 768) – Water Quality
	Mana_13c	Lower Tokomaru	Tokomaru River - Horseshoe Bend to Manawatu confluence (S24:134 727)	Monitoring site required upstream of Manawatu confluence
	Mana_13d	Mangaore	Mangaore River - source to Manawatu confluence (S24:123 717)	Monitoring site required upstream of Manawatu confluence
	Mana_13e	Koputaroa	Koputaroa Stream - source to Manawatu confluence (S24:106 708)	Biomonitoring and Fish monitoring site required upstream of Manawatu confluence
	Mana_13f	Foxton Loop	Manawatu at SH1 to downstream limit of Whirikino Cut (S24:010 769)	Manawatu at Whirikino (S24:030 744) – Water Quality and Biomonitoring Community Management Plan to be developed

* Includes all inflowing tributaries and catchment area unless otherwise specified.

6. Rangitikei Catchment Zones and Sub-zones

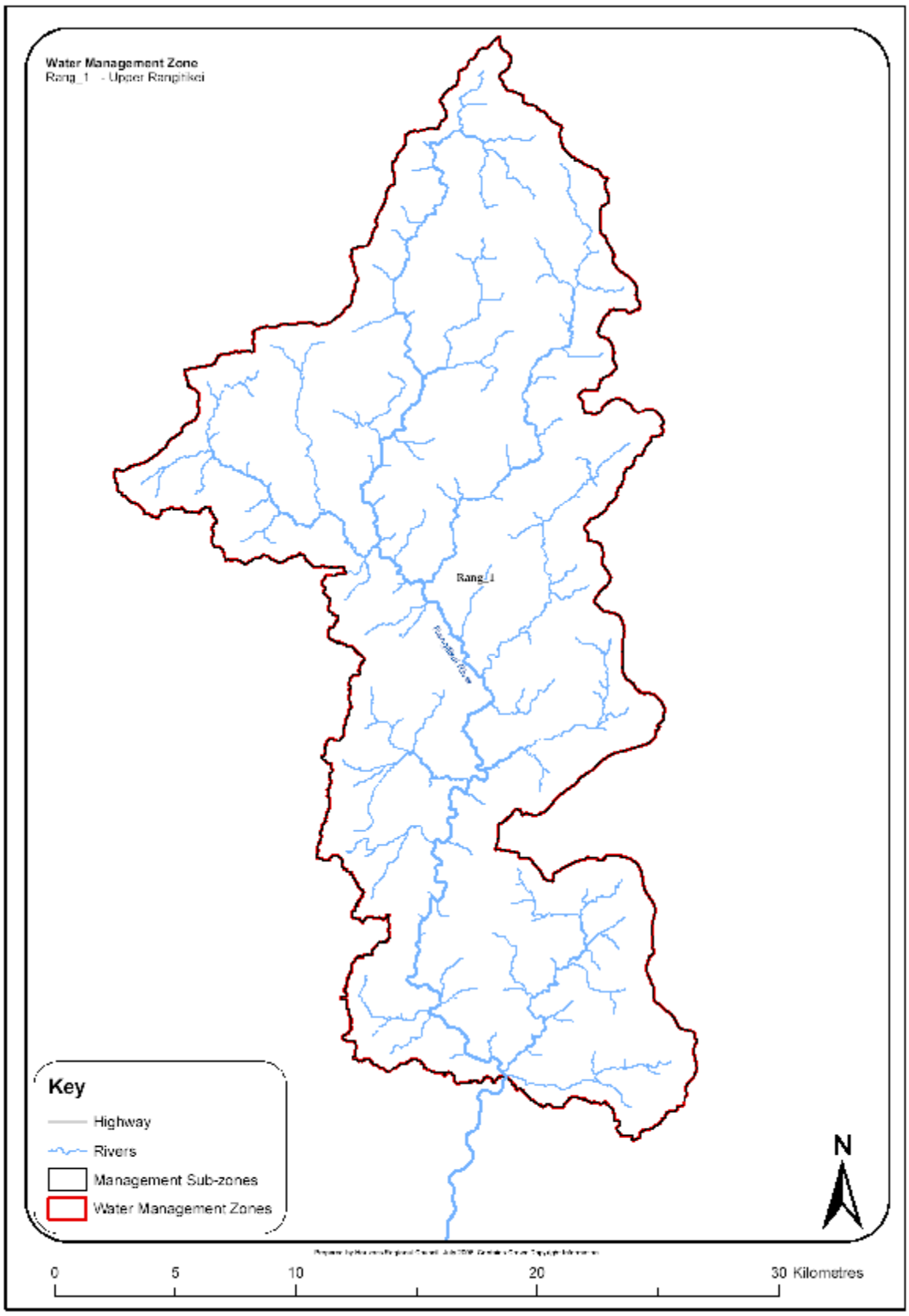


Map 17: Rangitikei River Catchment and WMZ.

Table 15: Rangitikei Catchment management zone justification and monitoring

Catchment	Water Management Zone	Zone Code	Description*	Monitoring Site / Zone Justification
Rangitikei	Upper Rangitikei	Rang_1	Rangitikei River – source to Makahikatoa confluence (U21:726 888)	Rangitikei at Makahikatoa Stream confluence (U21:726 888) - National Water Conservation Order (Upper Rangitikei)
	Middle Rangitikei	Rang_2	Rangitikei River – Makahikatoa confluence to Mangaweka flow recorder (T22:504 513)	Rangitikei at Mangaweka (T22:504 513) – Downstream limit of National Water Conservation Order (Middle Rangitikei) Flow, Water Quality and Biomonitoring
	Lower Rangitikei	Rang_3	Rangitikei River – Mangaweka to Onepuhi flow recorder (S23:201 222)	Rangitikei at Onepuhi (S23: 201 222) – Water Quality and Flow Rangitikei at Vinegar Hill (T22:358 379) - Biomonitoring
	Coastal Rangitikei	Rang_4	Rangitikei River – Onepuhi to mouth (S24:991 984)	Rangitikei at McKelvies (S24:033 985) – Water Quality and Flow Rangitikei at Kakariki (S23: 184 175) - Biomonitoring

* Includes all inflowing tributaries and sub-catchments unless otherwise stated.

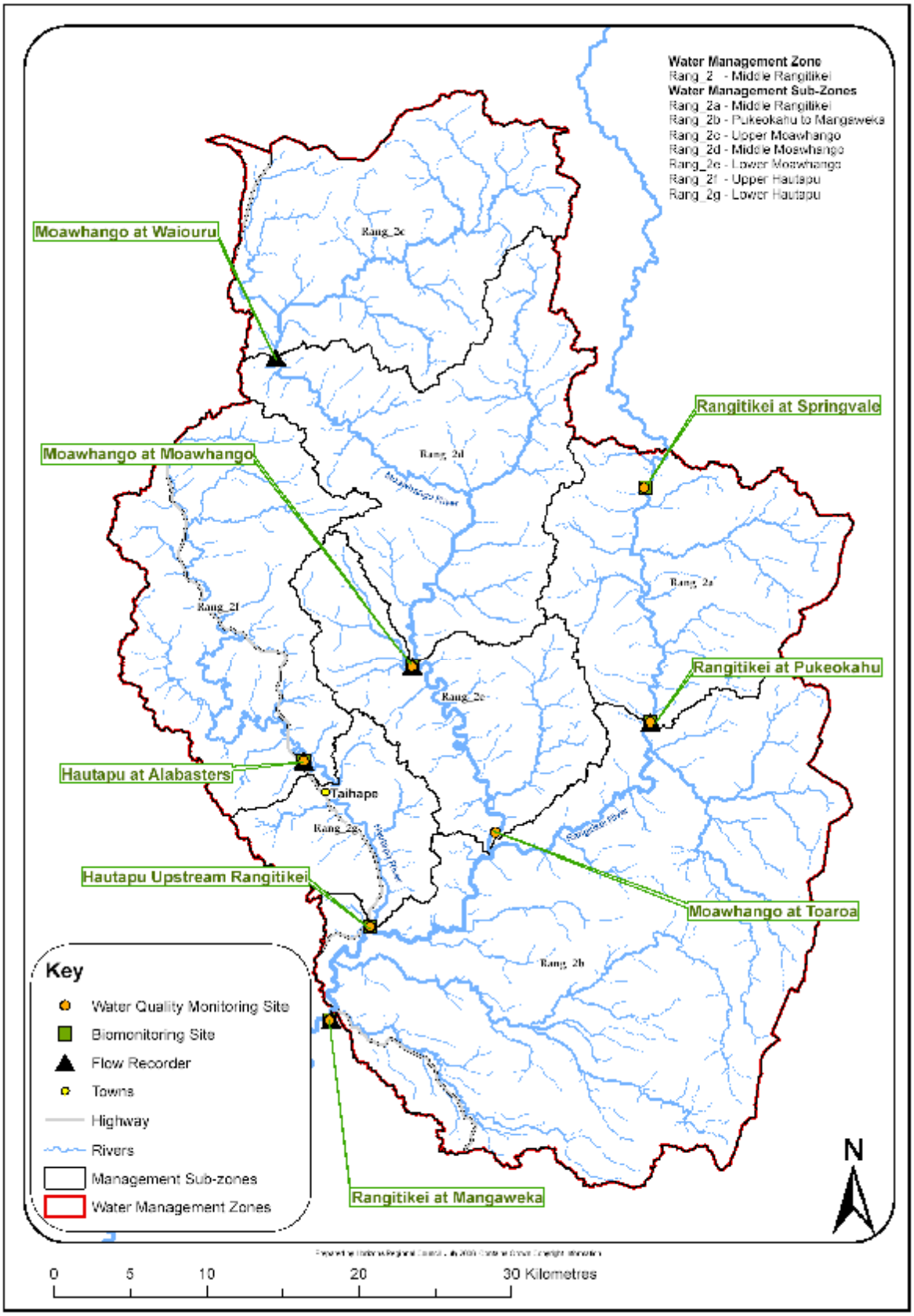


Map 18: Upper Rangitikei Zone.

Table 16: Upper Rangitikei management zone sub-zone justification and monitoring

Management Zone	Zone Code	Sub zone	Description*	Monitoring / Sub-zone Justification
Upper Rangitikei	**Rang_1**	Upper Rangitikei	Rangitikei River - source to Makahikatoa Stream (U21:726 888)	Rangitikei River at Makahikatoa Stream confluence (U21:726 888) – National Water Conservation Order (Upper Rangitikei)

* Includes all inflowing tributaries and catchment area unless otherwise specified.

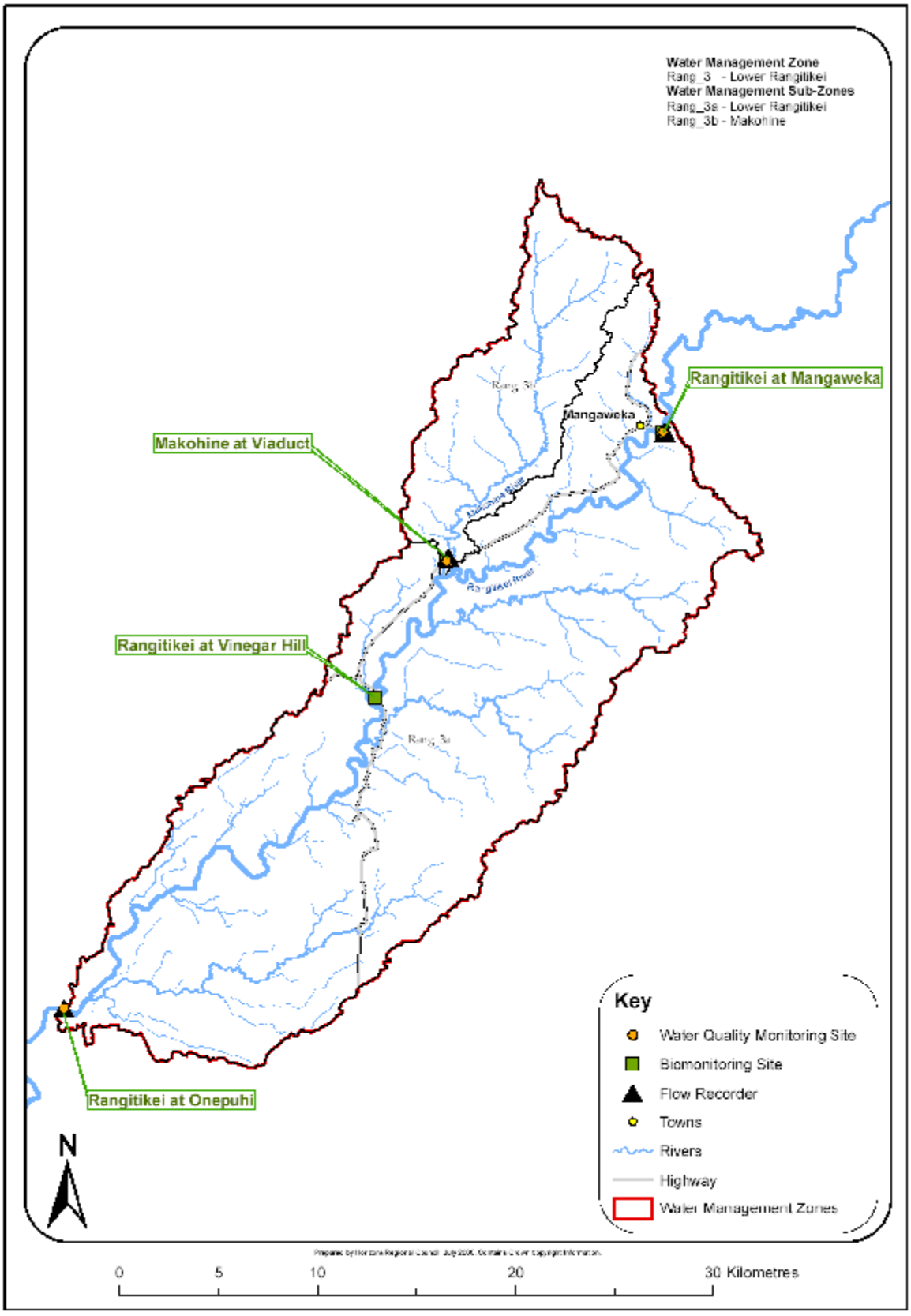


Map 19: Middle Rangitikei Zone and Sub-zones.

Table 17: Middle Rangitikei management zone sub-zone justification and monitoring

Management Zone	Zone Code	Sub zone	Description*	Monitoring / Sub-zone Justification
Middle Rangitikei	**Rang_2a**	Middle Rangitikei	Rangitikei River - Makahikatoa Stream to Pukeokahu (U21:713 708)	Rangitikei at Pukeokahu (U21:713 708) – Water Quality, Biomonitoring and Flow NWCO (Middle Rangitikei)
	Rang_2b	Pukeokahu - Mangaweka	Rangitikei main stem – Pukeokahu to Mangaweka (T22:504 513)	Rangitikei at Mangaweka (T22:504 513) – Water Quality, Biomonitoring and Flow NWCO (Middle Rangitikei) – downstream limit
	Rang_2c	Upper Moawhango	Moawhango River - source to Moawhango Dam (T20:469 960)	Moawhango at Waiouru (T20:468 948) - Flow
	Rang_2d	Middle Moawhango	Moawhango Dam to Moawhango Township (T21:557 745)	Moawhango at Moawhango (T21:557 745) – Water Quality (NIWA), Biomonitoring and Flow
	Rang_2e	Lower Moawhango	Moawhango Township to Rangitikei confluence (T21:609 623)	Moawhango at Toaroa (T21:612 636) – Water Quality
	Rang_2f	Upper Hautapu	Hautapu River - source to Taihape (T21:506 670)	Hautapu at Alabasters (T21:486 683) – Flow and Biomonitoring Local Water Conservation Notice (Hautapu)
	Rang_2g	Lower Hautapu	Hautapu River - Taihape to Rangitikei confluence (T22:529 574)	Hautapu at Rangitikei confluence (T22:530 574) – Water Quality and Biomonitoring LWCN (Hautapu) – downstream limit

* Includes all inflowing tributaries and catchment area unless otherwise specified.

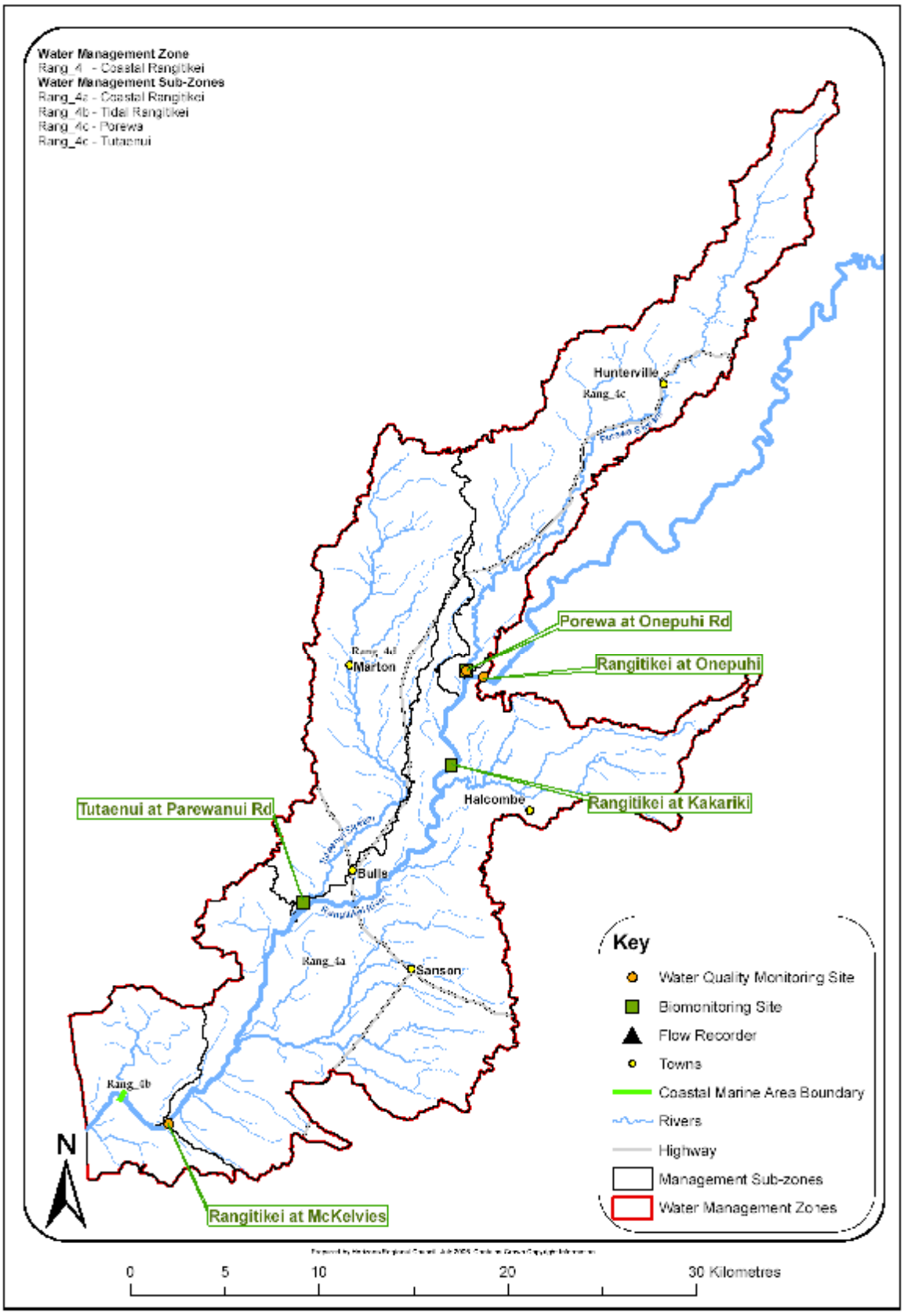


Map 20: Lower Rangitikei Zone and Sub-zones.

Table 18: Lower Rangitikei management zone sub-zone justification and monitoring

Management Zone	Zone Code	Sub zone	Description*	Monitoring / Sub-zone Justification
Lower Rangitikei	**Rang_3a**	Lower Rangitikei	Rangitikei River - Mangaweka to Onepuhi (S23: 201 222)	Rangitikei at Onepuhi (S23: 201 222) – Water Quality and Flow Rangitikei at Vinegar Hill (T22:358 379) - Biomonitoring
	Rang_3b	Makohine	Makohine Stream - source to Rangitikei confluence (T22:400 443)	Makohine at Viaduct (T22: 395 450) – Water Quality, Biomonitoring and Flow

* Includes all inflowing tributaries and catchment area unless otherwise specified.



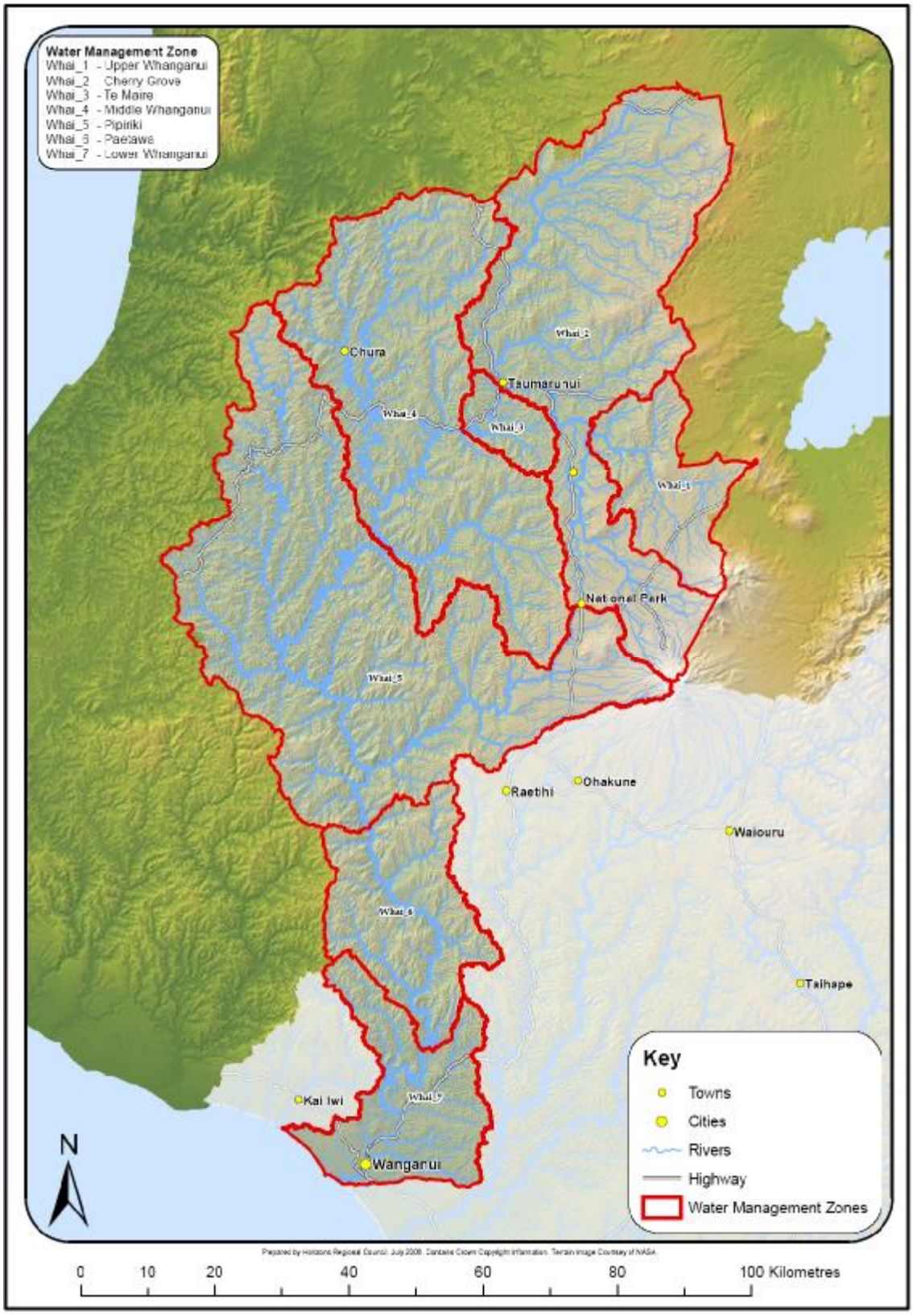
Map 21: Coastal Rangitikei Zone and Sub-zones.

Table 19: Coastal Rangitikei management zone sub-zone justification and monitoring

Management Zone	Zone Code	Sub zone	Description*	Monitoring / Sub-zone Justification
Coastal Rangitikei	**Rang_4a**	Coastal Rangitikei	Rangitikei - Onepuhi to McKelvies (S24:033 985)	Rangitikei at McKelvies (S24:033 985) – Water Quality and Flow Rangitikei at Kakariki (S23: 184 175) - Biomonitoring
	Rang_4b	Tidal Rangitikei	Rangitikei - McKelvies to mouth (S24:991 984)	Coastal monitoring required
	Rang_4c	Porewa	Porewa Stream - source to Rangitikei confluence (S23:190 212)	Porewa at Onepuhi Road (S23: 192 225) – Water Quality and Biomonitoring
	Rang_4d	Tutaenui	Tutaenui Stream - source to Rangitikei confluence (S23:101 095)	Tutaenui at Parewanui Road (S23: 106 103) – Water Quality and Biomonitoring

* Includes all inflowing tributaries and catchment area unless otherwise specified.

7. Whanganui Catchment Zones and Sub-zones

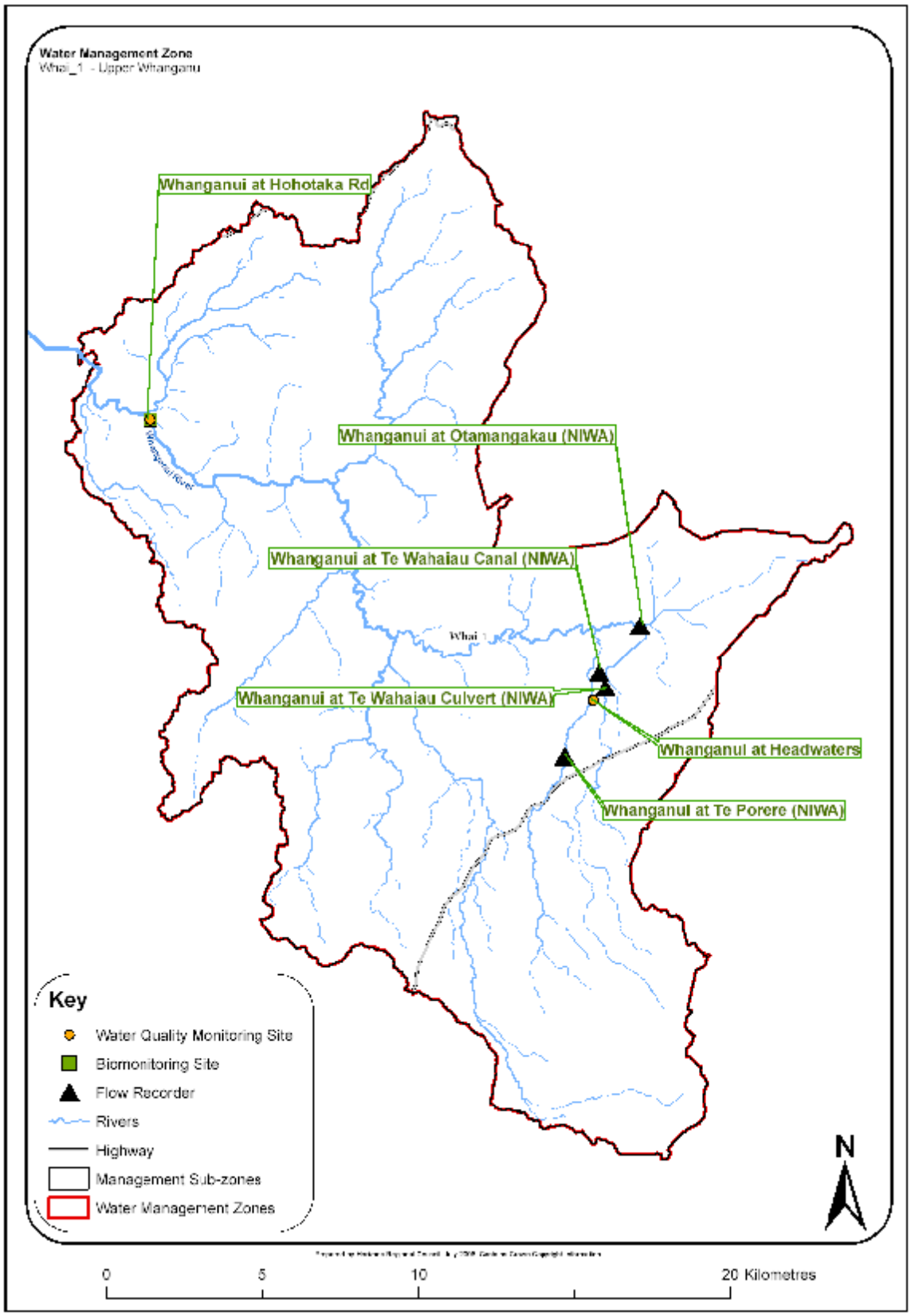


Map 22: Whanganui River Catchment and Water Management Zones.

Table 20: Whanganui Catchment management zone justification and monitoring

Catchment	Water Management Zone	Zone Code	Description*	Monitoring Site / Zone Justification
Whanganui	**Upper Whanganui**	**Whai_1**	Whanganui River - source to Whakapapa confluence (S19:189 498)	Whanganui at Hohotaka Road (S19:211 476) – Water Quality
	Cherry Grove	**Whai_2**	Whanganui River – Whakapapa confluence to Cherry Grove (S18:057 545)	Whanganui at Cherry Grove (S18:057 545) – Water Quality and Biomonitoring
	Te Maire	**Whai_3**	Whanganui River – Cherry Grove to Te Maire flow recorder (S19:998 490)	Whanganui at Te Maire (S19:998 490) – Water Quality, Biomonitoring and Flow
	Middle Whanganui	**Whai_4**	Whanganui River – Te Maire to Retaruke confluence (Wades Landing/Whakahoro) (R19:886 306)	Whanganui at Wades Landing (Whakahoro) (R19:886 306) – Water Quality and Biomonitoring
	Pipiriki	**Whai_5**	Whanganui River – Retaruke confluence to Pipiriki flow recorder (R21:859 897)	Whanganui at Pipiriki (R21:859 897) – Water Quality, Biomonitoring and Flow
	Paetawa	**Whai_6**	Whanganui River – Pipiriki to Paetawa (S22:937 566)	Paetawa (S22:937 566)– Water Quality (NIWA)
	Lower Whanganui	**Whai_7**	Whanganui River – Paetawa to mouth (R22:797 328)	Wanganui at Town Bridge (R22:849 382) – Flow (NIWA)

* Includes all inflowing tributaries and sub-catchments unless otherwise stated.

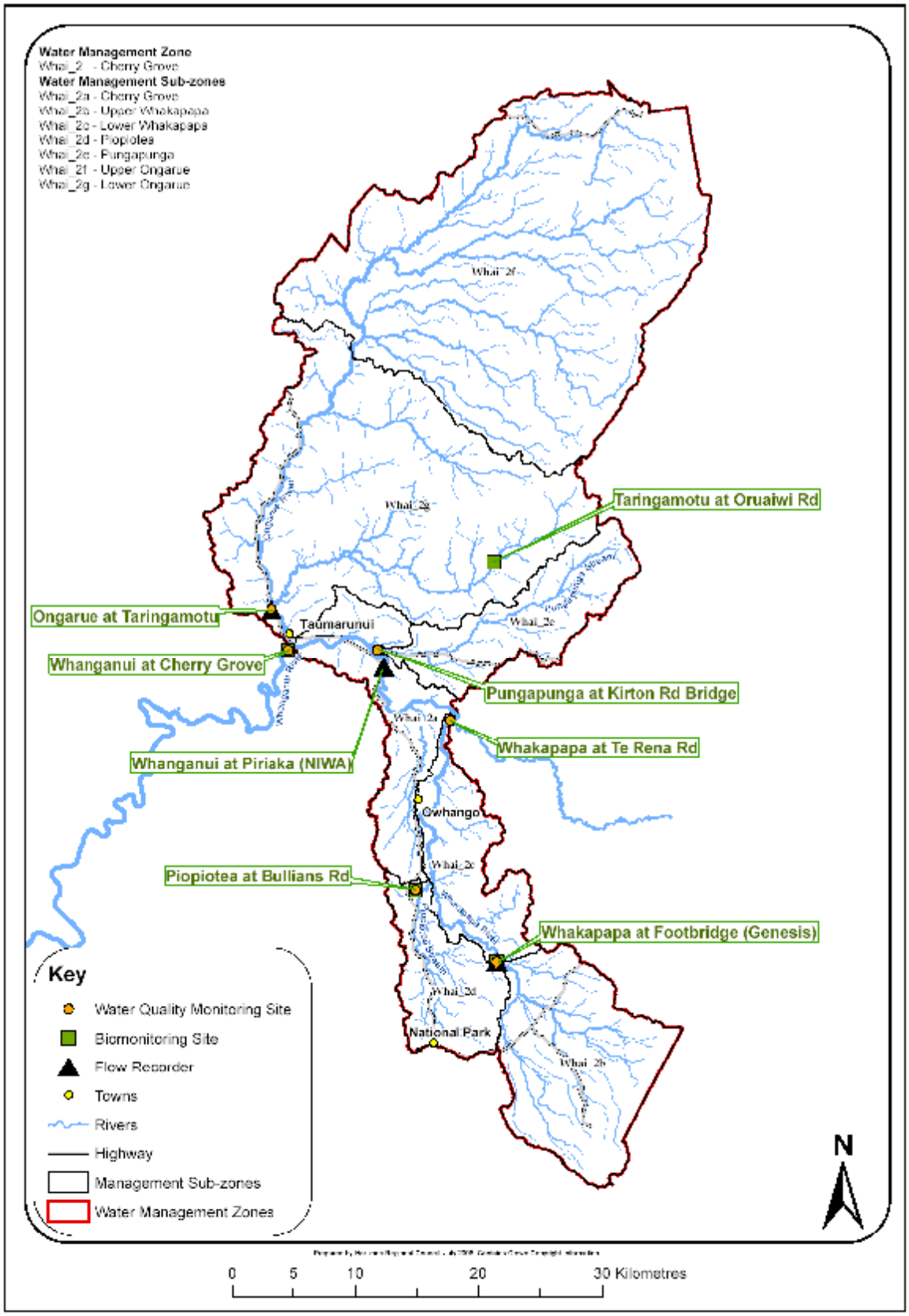


Map 23: Upper Whanganui Zone.

Table 21: Upper Whanganui management zone sub-zone justification and monitoring

Management Zone	Zone Code	Sub zone	Description*	Monitoring / Sub-zone Justification
Upper Whanganui	**Whai_1**	Upper Whanganui	Whanganui River - source to Whakapapa confluence (S19: 189 499)	Whanganui at Hohotaka Road (S19: 211 476) – Water Quality

* Includes all inflowing tributaries and catchment area unless otherwise specified.

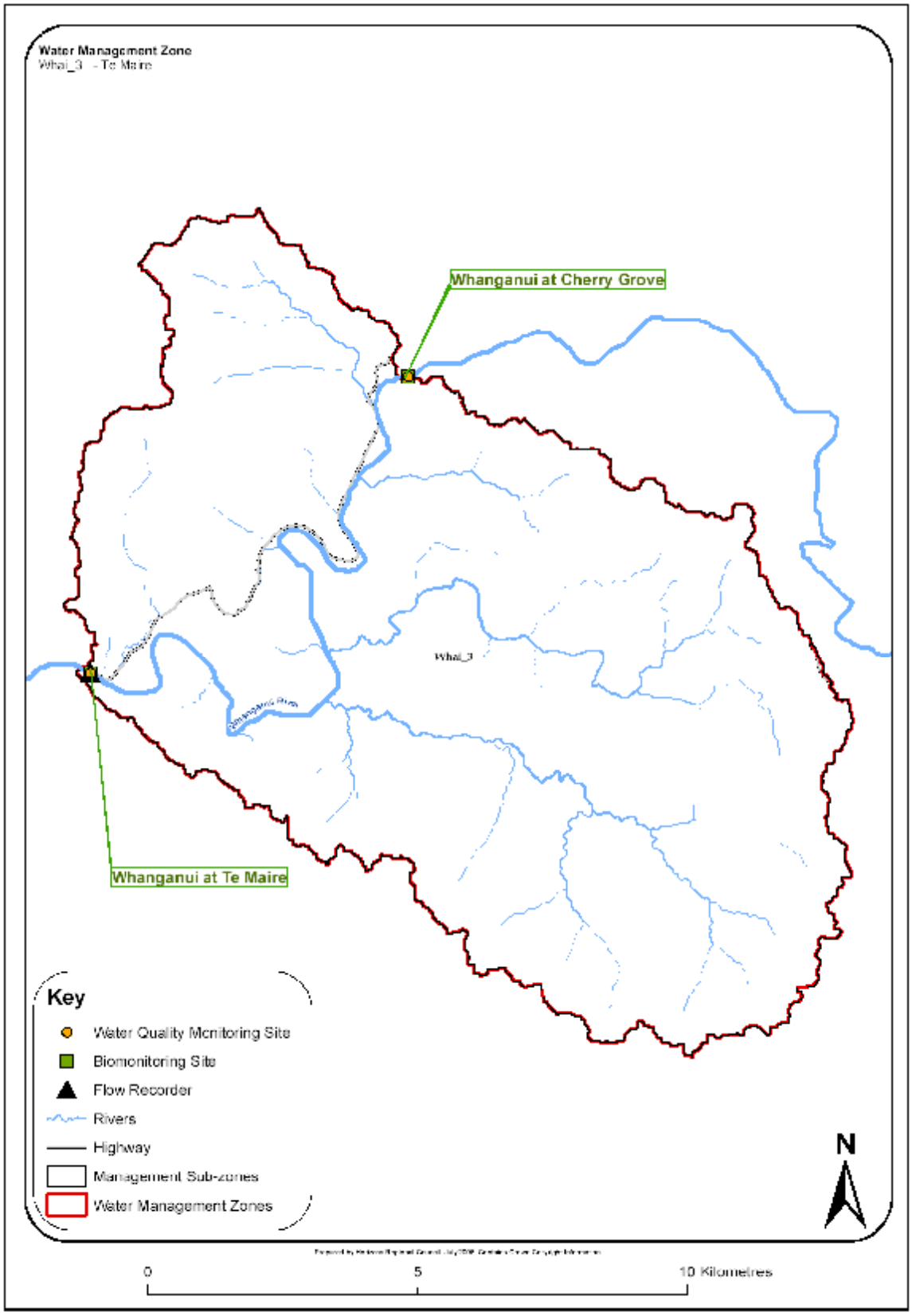


Map 24: Cherry Grove Zone and Sub-zones.

Table 22: Cherry Grove management zone sub-zone justification and monitoring

Management Zone	Zone Code	Sub zone	Description*	Monitoring / Sub-zone Justification
Cherry Grove	**Whai_2a**	Cherry Grove	Whanganui River - Whakapapa confluence to Cherry Grove (S18:057 545)	Whanganui at Cherry Grove (S18:057 545) – Water Quality and Biomonitoring
	Whai_2b	Upper Whakapapa	Whakapapa River - source to Footbridge (S19: 226 293)	Whakapapa at Footbridge (S19: 226 293) – Water Quality and Biomonitoring
	Whai_2c	Lower Whakapapa	Whakapapa River - Footbridge to Whanganui confluence (S19: 189 499)	Whakapapa at Te Rena Road (S19: 188 488) – Water Quality
	Whai_2d	Piopiotea	Piopiotea Stream - source to Whakapapa confluence (S19:174 356)	Piopiotea at Bullians Road (S19: 160 351) – Water Quality
	Whai_2e	Pungapunga	Pungapunga River - source to Whanganui confluence (S18:124 546)	Pungapunga at Kirton Road (S18: 129 545) – Water Quality
	Whai_2f	Upper Ongarue	Ongarue River - source to Waihuka Stream confluence (S18:108 785)	Downstream change in geology from Volcanic Acidic (VA) to Soft Sedimentary (SS) Monitoring site required (S18:108 785)
	Whai_2g	Lower Ongarue	Ongarue River – Waihuka Stream to Whanganui confluence (S18:056 547)	Ongarue at Taringamotu (S18:043 578) – Water Quality and Flow

* Includes all inflowing tributaries and catchment area unless otherwise specified.

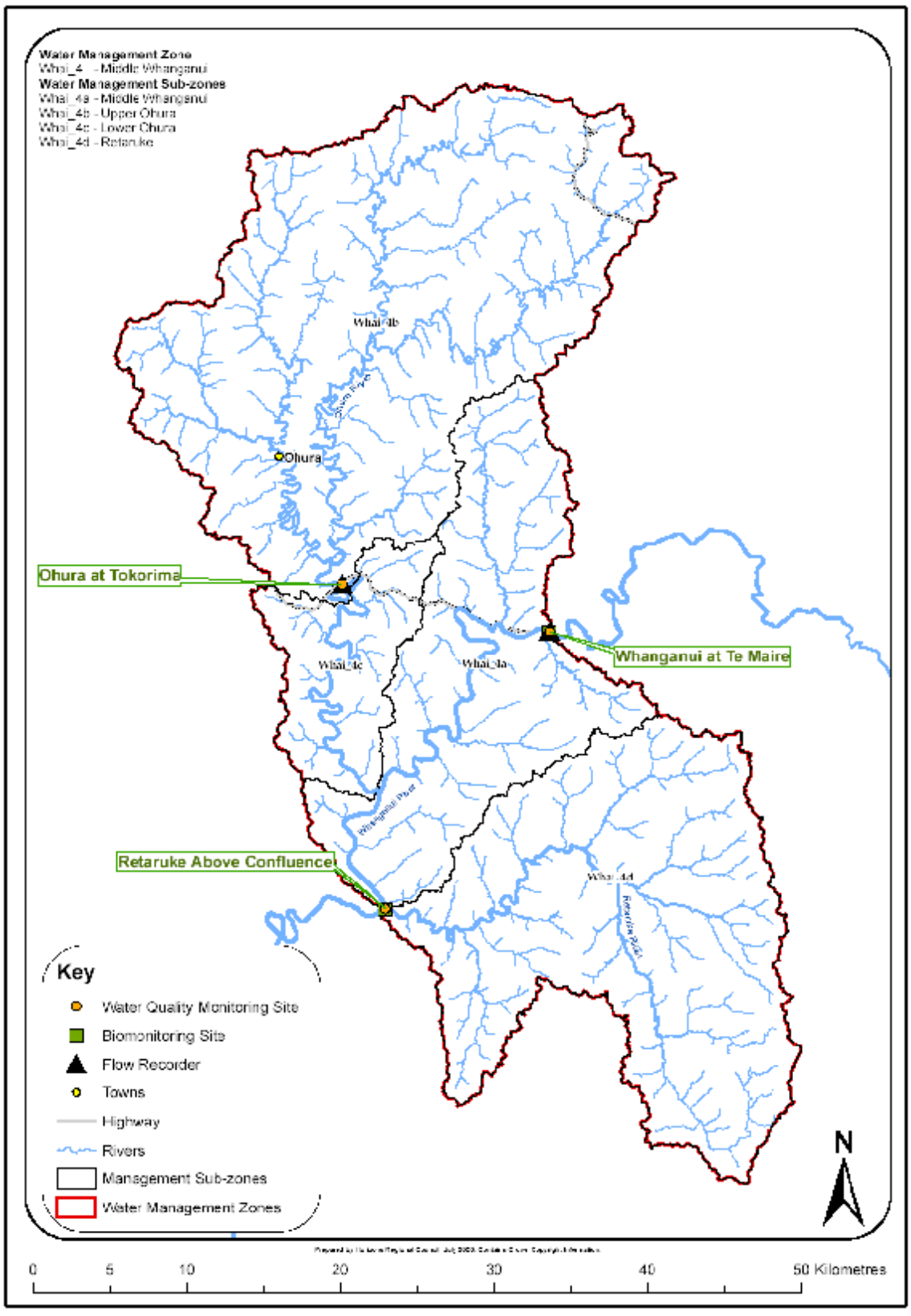


Map 25: Te Maire Zone.

Table 23: Te Maire management zone sub-zone justification and monitoring

Management Zone	Zone Code	Sub zone	Description*	Monitoring / Sub-zone Justification
Te Maire	**Whai_3**	Te Maire	Whanganui River - Cherry Grove to Te Maire (S19: 998 490)	Whanganui at Te Maire (S19: 998 490) – Water Quality, Biomonitoring and Flow

* Includes all inflowing tributaries and catchment area unless otherwise specified.

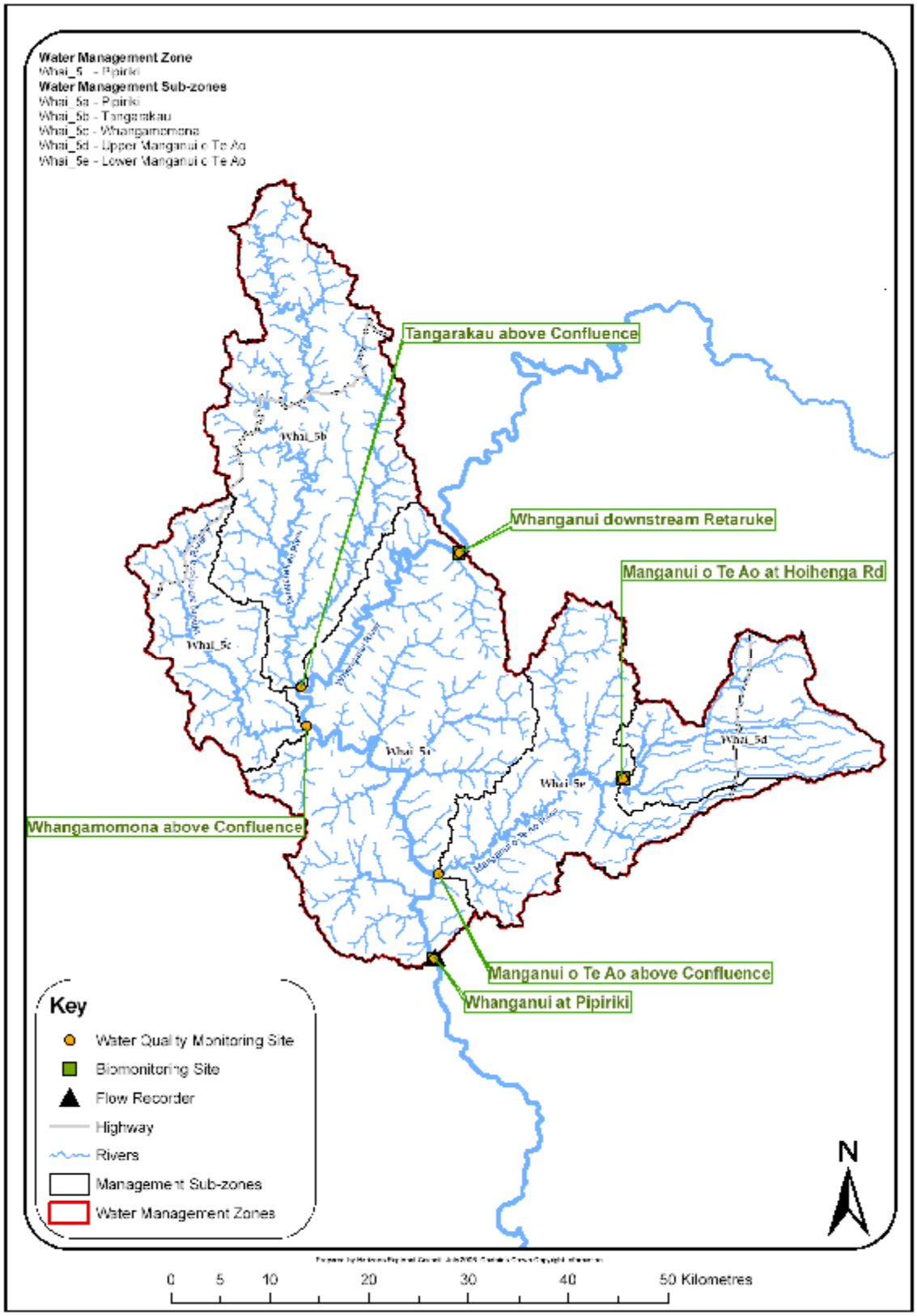


Map 26: Middle Whanganui Zone and Sub-zones.

Table 24: Middle Whanganui management zone sub-zone justification and monitoring

Management Zone	Zone Code	Sub zone	Description*	Monitoring / Sub-zone Justification
Middle Whanganui	**Whai_4a**	Middle Whanganui	Whanganui River - Te Maire to Retaruke confluence (Wades Landing/Whakahoro) (R19: 886 306)	Whanganui at Wades Landing (Whakahoro) (R19: 886 306) – Water Quality and Biomonitoring
	Whai_4b	Upper Ohura	Ohura River - source to Tokorima (R18: 863 521)	Ohura at Tokorima (R18: 863 521) – Water Quality
	Whai_4c	Lower Ohura	Ohura River - Tokorima to Whanganui confluence (R19:887 386)	Monitoring site required (R19:887 386)
	Whai_4d	Retaruke	Retaruke River - source to Whanganui confluence (R19:890 309)	Retaruke upstream Whanganui (R19: 891 309) – Water Quality and Biomonitoring

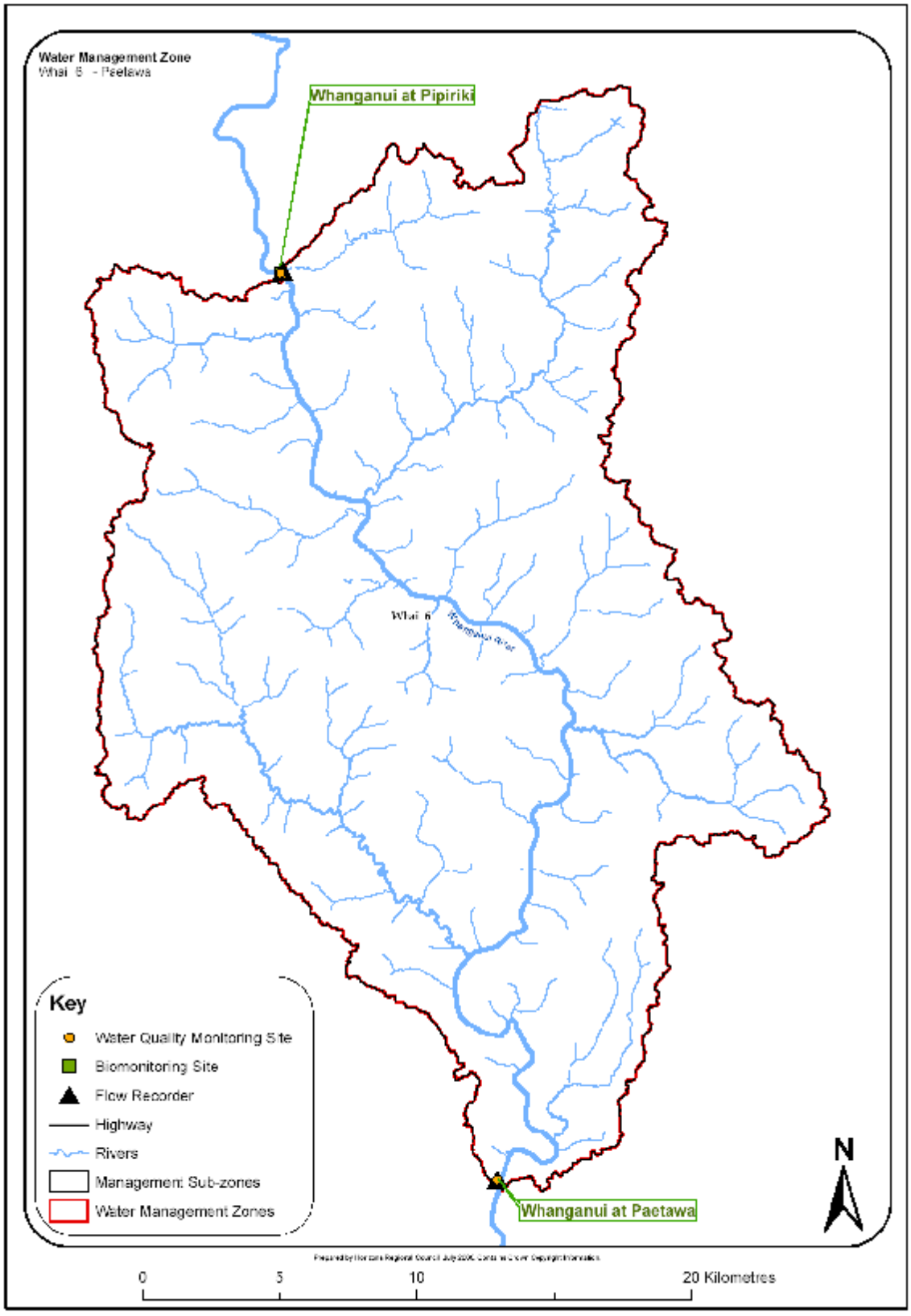
* Includes all inflowing tributaries and catchment area unless otherwise specified.



Map 27: Pipiriki Zone and Sub-zones.

Management Zone	Zone Code	Sub zone	Description*	Monitoring / Sub-zone Justification
Pipiriki	**Whai_5a**	Pipiriki	Whanganui River - Retaruke confluence to Pipiriki (R21: 859 897)	Whanganui at Pipiriki (R21: 859 897) – Water Quality Biomonitoring and Flow
	Whai_5b	Tangarakau	Tangarakau River - source to Whanganui confluence (R20:714 175)	Tangarakau upstream Whanganui (R20: 724 169) – Water Quality
	Whai_5c	Whangamomona	Whangamomona River - source to Whanganui confluence (R20:731 130)	Whangamomona upstream Whanganui (S22: 908 462) – Water Quality
	Whai_5d	Upper Manganui o te Ao	Manganui o te Ao River - source to Hoihenga Road (S20:047 077)	Manganui o te Ao at Hoihenga Road (S20:047 077) – Water Quality and Biomonitoring NWCO (Manganui o te Ao)
	Whai_5e	Lower Manganui o te Ao	Manganui o te Ao - Hoihenga Road to Whanganui confluence (R20:861 979)	Monitoring site required (R20: 862 981 – Historic Water Quality site) NWCO (Manganui o te Ao)

* Includes all inflowing tributaries and catchment area unless otherwise specified.

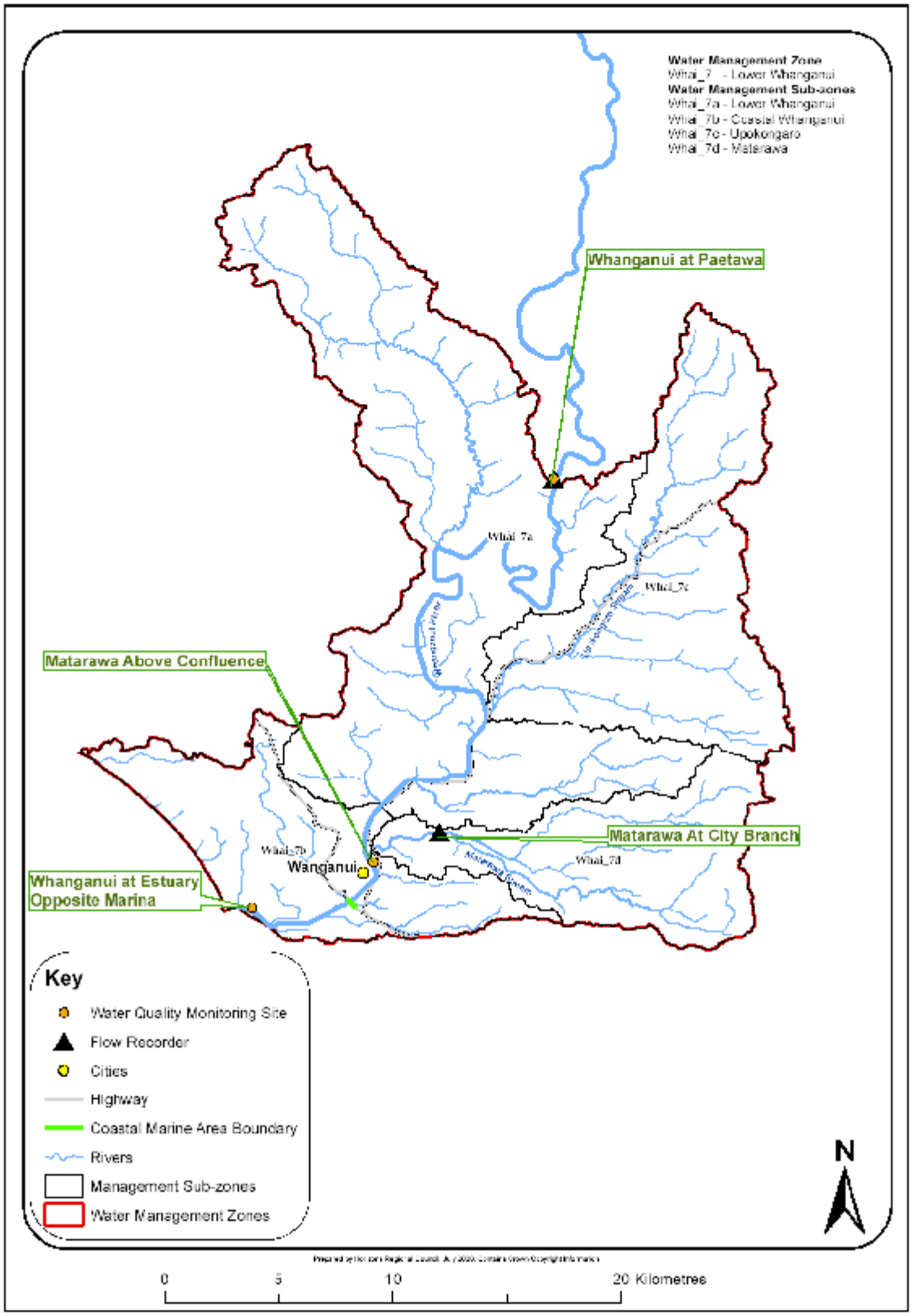


Map 28: Paetawa Zone.

Table 25: Paetawa management zone sub-zone justification and monitoring

Management Zone	Zone Code	Sub zone	Description*	Monitoring / Sub-zone Justification
Paetawa	**Whai_6**	Paetawa	Whanganui River - Pipiriki to Paetawa (S22: 937 566)	Whanganui at Paetawa (S22: 937 566) – Water Quality (NIWA)

* Includes all inflowing tributaries and catchment area unless otherwise specified.



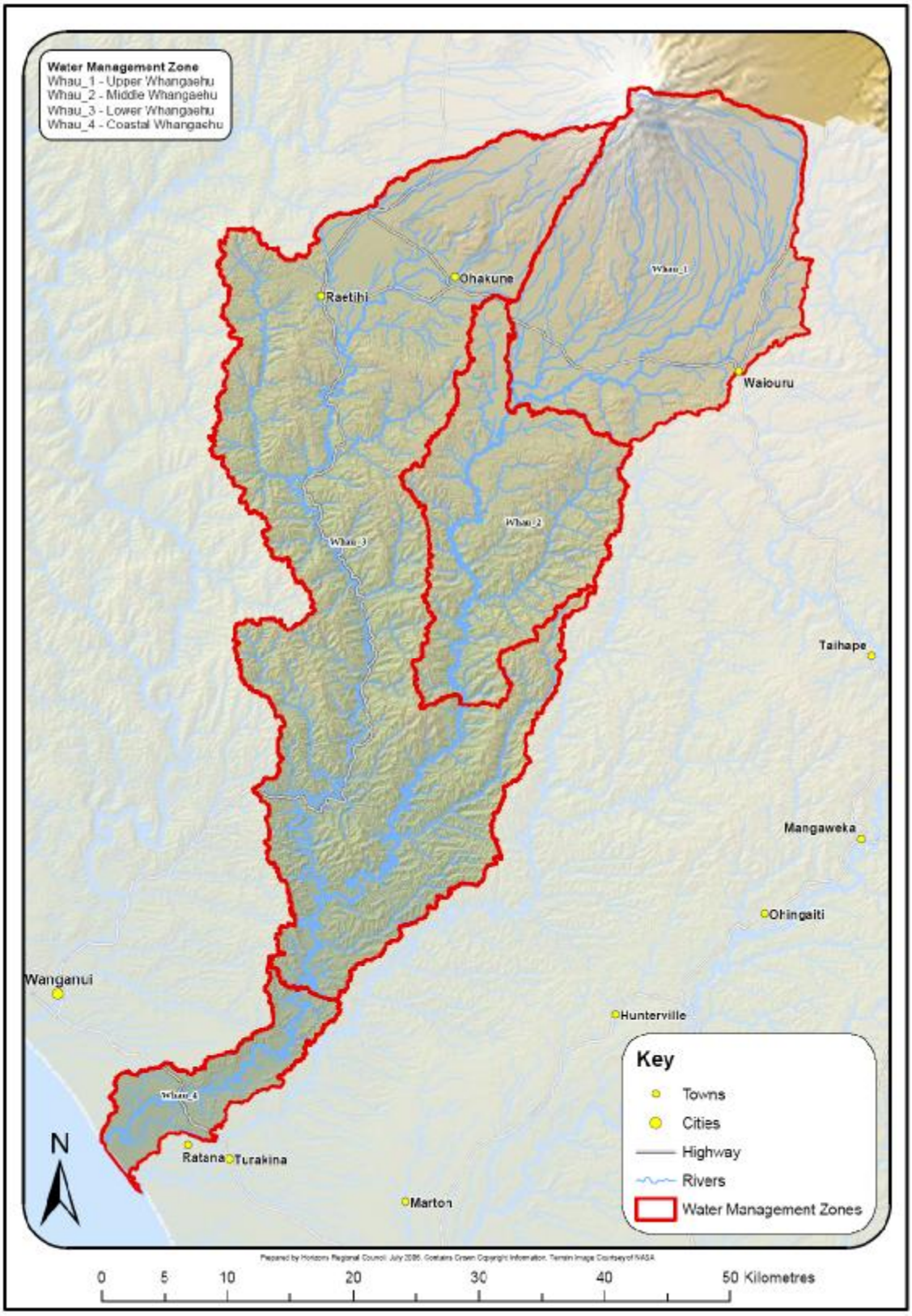
Map 29: Lower Whanganui Zone and Sub-zones.

Table 26: Lower Whanganui management zone sub-zone justification and monitoring

Management Zone	Zone Code	Sub zone	Description*	Monitoring / Sub-zone Justification
Lower Whanganui	**Whai_7a**	Lower Whanganui	Whanganui River - Paetawa to Aramoho Bridge (R22:858 420)	Wanganui at Estuary (R22: 805 378) – Water Quality and Flow (NIWA) Coastal monitoring site required
	Whai_7b	Coastal Whanganui	Whanganui River - Aramoho Bridge to mouth (R22:797 328)	Coastal monitoring site required
	Whai_7c	Upokongaro	Upokongaro River - source to Whanganui confluence (S22:908 463)	Upokongaro upstream Whanganui (S22: 908 462) – Water Quality
	Whai_7d	Matarawa	Matarawa River - source to Whanganui confluence (R22:857 403)	Matarawa upstream Whanganui (R22: 858 398) – Water Quality

* Includes all inflowing tributaries and catchment area unless otherwise specified.

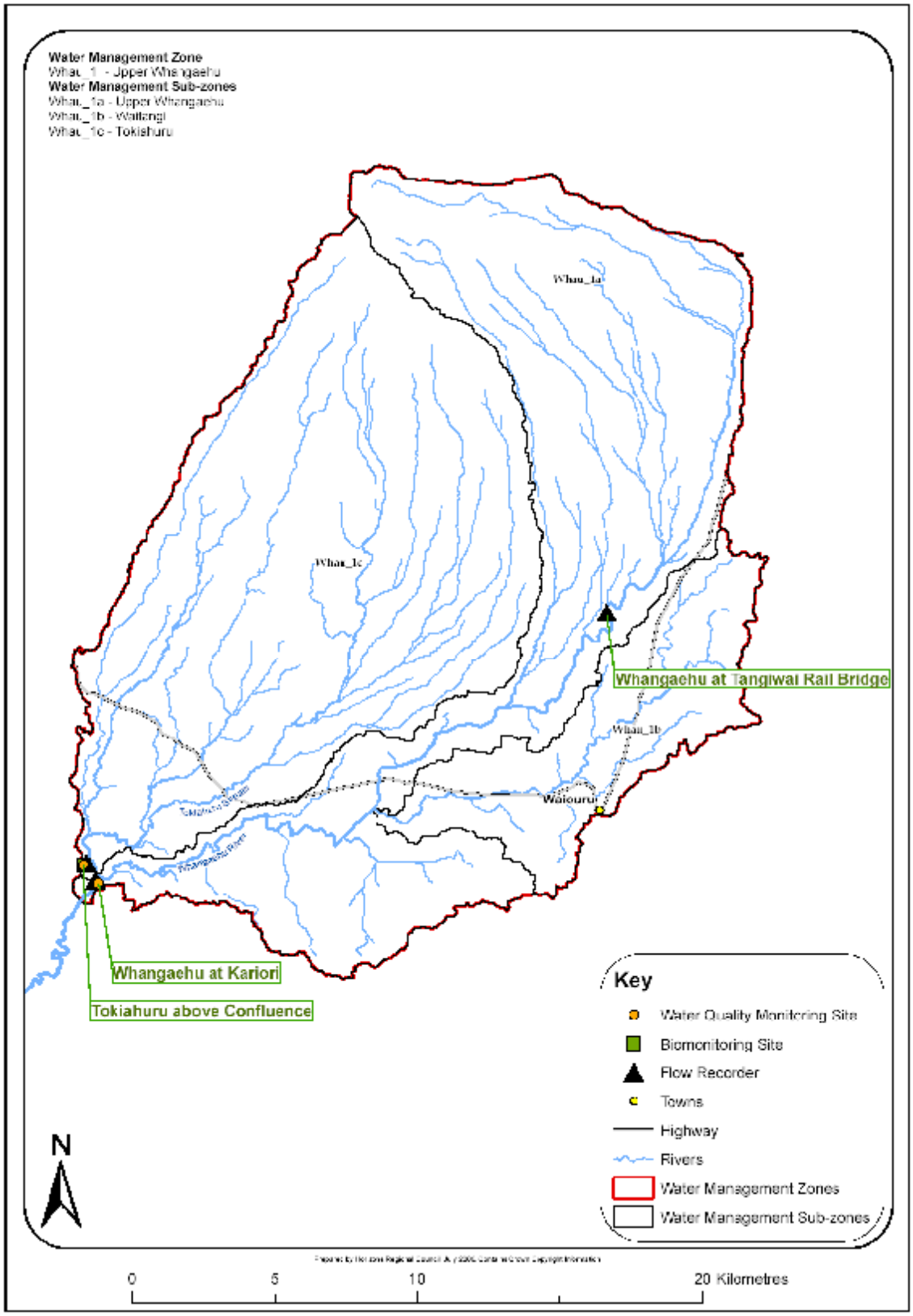
8. Whangaehu River Catchment Management Zones and Sub-zones



Map 30: Whangaehu River Catchment and WMZ.

Catchment	Water Management Zone	Zone Code	Description*	Monitoring Site / Zone Justification
Whangaehu	Upper Whangaehu	Whau_1	Whangaehu River - source to Karioi flow recorder (S21:218 864)	Whangaehu at Karioi (S21:218 864) – Water Quality and Flow
	Middle Whangaehu	Whau_2	Whangaehu River – Karioi flow recorder to Aranui flood recorder (S21:175 627)	Whangaehu at Aranui (S21:175 627) – Water Quality and Flood Recorder
	Lower Whangaehu	Whau_3	Whangaehu River – Aranui to Kauangaroa flow recorder (S22:045 397)	Whangaehu at Kauangaroa (S22:045 397) – Water Quality and Flow
	Coastal Whangaehu	Whau_4	Whangaehu River – Kauangaroa to mouth (R23:890 275)	Coastal monitoring required

* Includes all inflowing tributaries and sub-catchments unless otherwise stated.

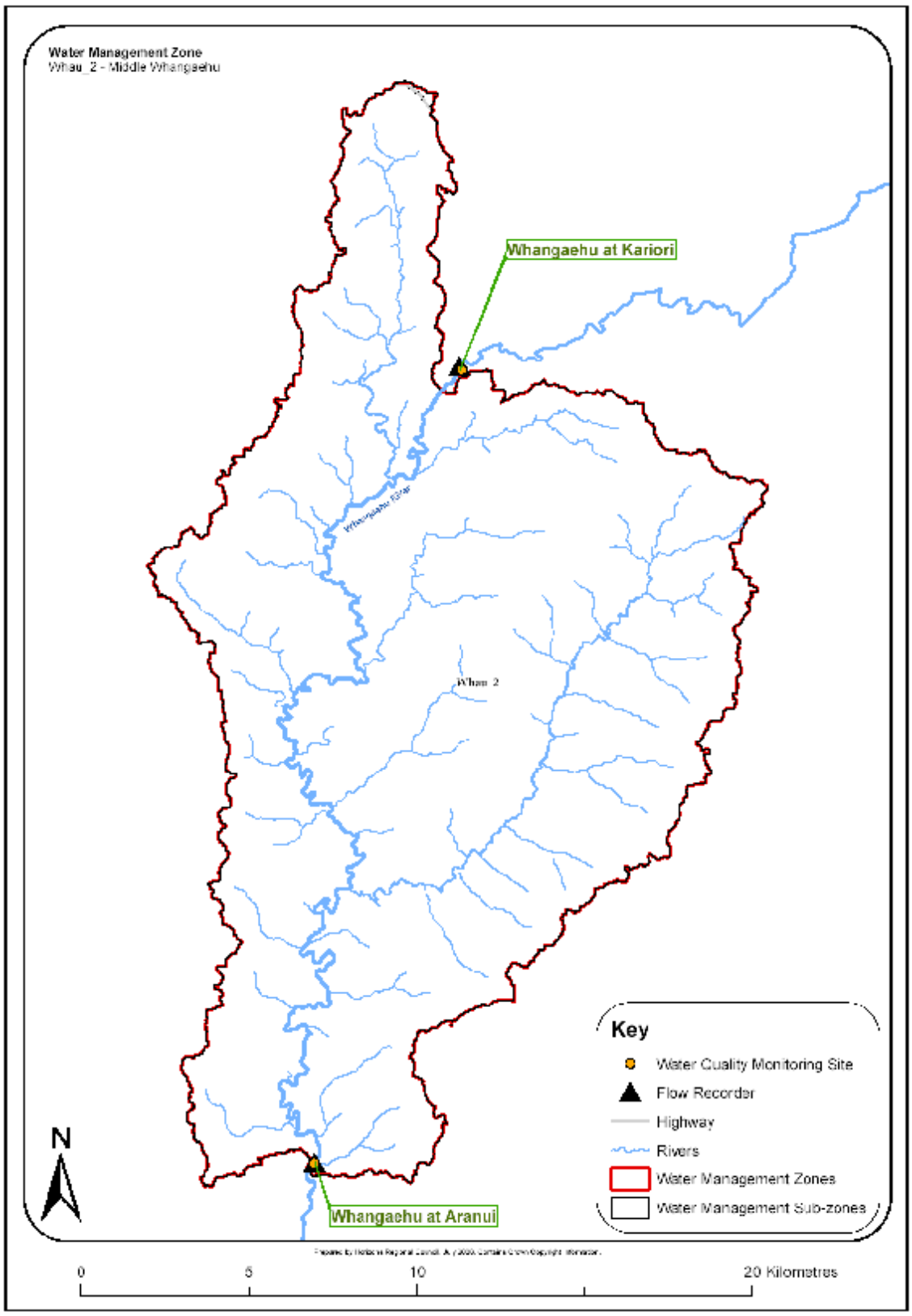


Map 31: Upper Whangaehu Zone and Sub-zones.

Table 27: Upper Whangaehu management zone sub-zone justification and monitoring

Management Zone	Zone Code	Sub zone	Description*	Monitoring / Sub-zone Justification
Upper Whangaehu	**Whau_1a**	Upper Whangaehu	Whangaehu - source to Karioi (S21: 218 864)	Whangaehu at Karioi (S21: 218 864) – Water Quality and Flow
	Whau_1b	Waitangi	Waitangi Stream – source to Whangaehu confluence (T21:316 888)	Monitoring site required
	Whau_1c	Tokiahuru	Tokiahuru Stream - source to Whangaehu confluence (S21:219 865)	Tokiahuru upstream Whangaehu (S21: 214 870) – Water Quality

* Includes all inflowing tributaries and catchment area unless otherwise specified.

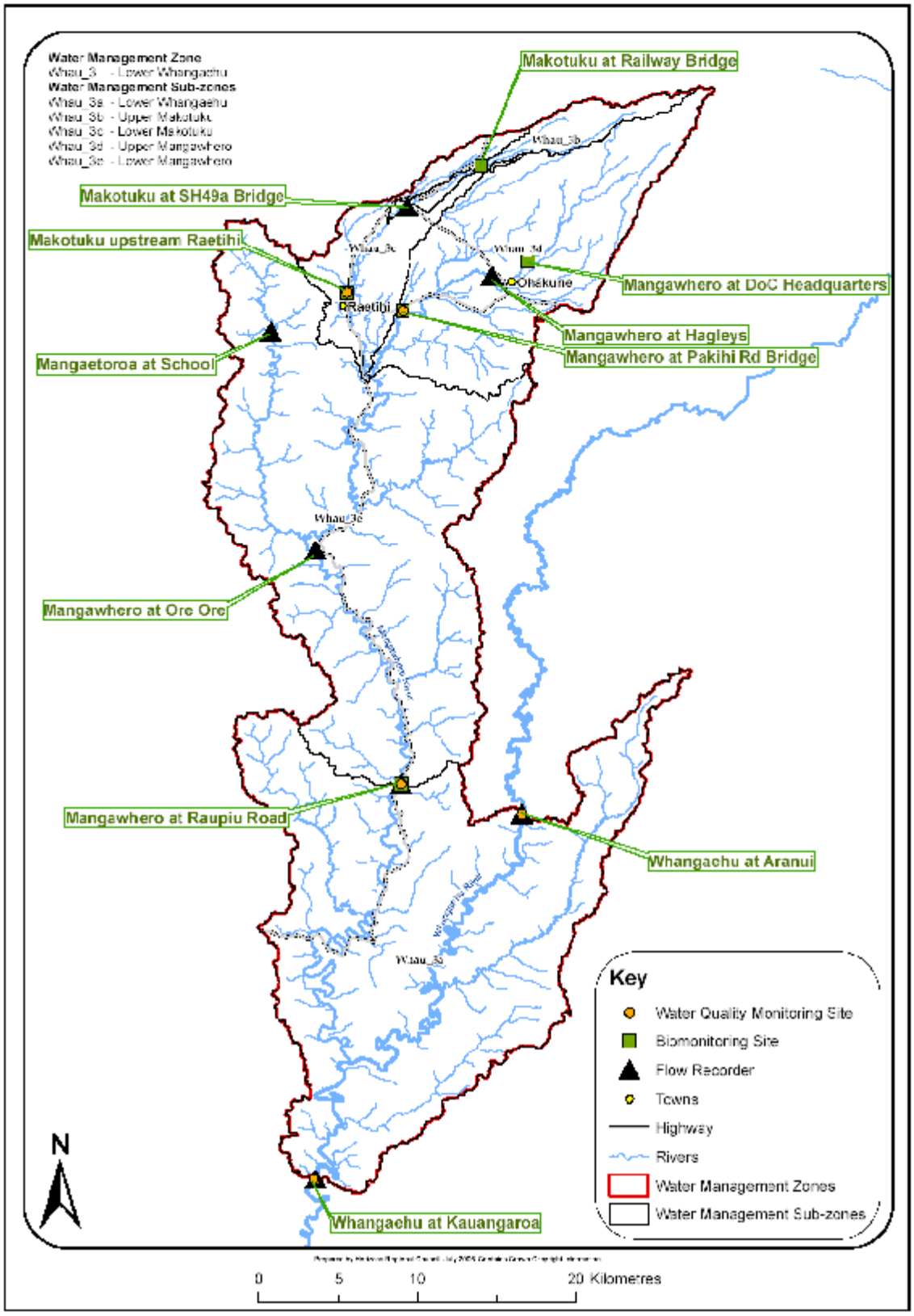


Map 32: Middle Whangaehu Zone.

Table 28: Middle Whangaehu management zone sub-zone justification and monitoring

Management Zone	Zone Code	Sub zone	Description*	Monitoring / Sub-zone Justification
Middle Whangaehu	**Whau_2**	Middle Whangaehu	Whangaehu River - Karioi to Aranui (S21: 175 627)	Whangaehu at Aranui (S21: 175 627) – Water Quality and Flood Recorder

* Includes all inflowing tributaries and catchment area unless otherwise specified.

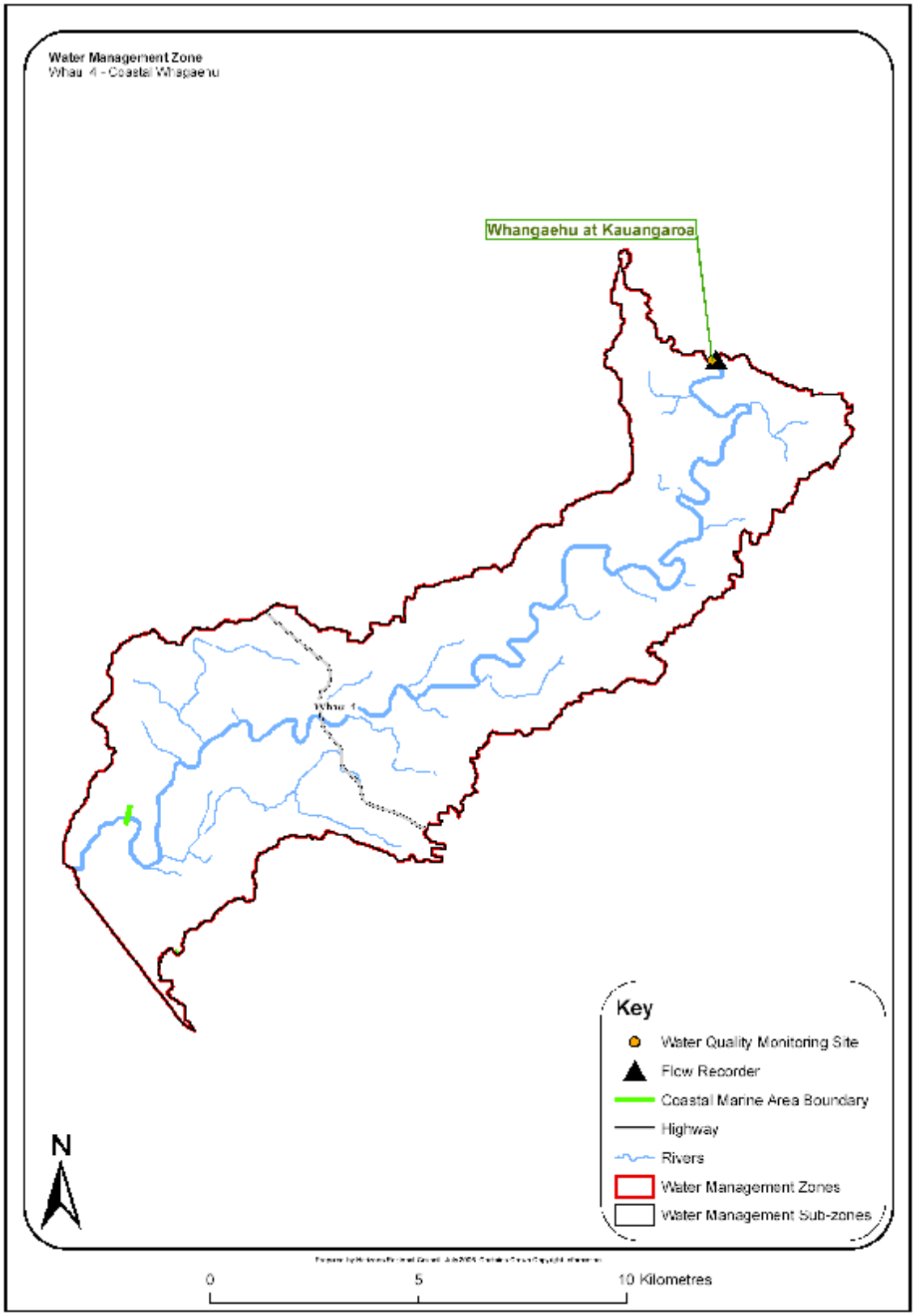


Map 33: Lower Whangaehu Management Zone and Sub-zones.

Table 29: Lower Whangaehu management zone sub-zone justification and monitoring

Management Zone	Zone Code	Sub zone	Description*	Monitoring / Sub-zone Justification
Lower Whangaehu	**Whau_3a**	Lower Whangaehu	Whangaehu River - Aranui to Kauangaroa (S22:045 397) (includes Mangawhero from Raupiu Road to Whangaehu confluence)	Whangaehu at Kauangaroa (S22:045 397) – Water Quality and Flow
	Whau_3b	Upper Makotuku	Makotuku River - source to Water supply weir (S20: 103 011)	Makotuku at Water Supply Weir (S20: 103 011)– Water Quality and Flow (NIWA)
	Whau_3c	Lower Makotuku	Makotuku River - Water supply weir to Mangawhero confluence (S20:080 903)	Makotuku upstream Raetihi (S20:065 956) – Water Quality, Biomonitoring and Flow
	Whau_3d	Upper Mangawhero	Mangawhero River - source to Makotuku confluence(S20:080 903)	Mangawhero at Pakahi Road (S20: 100 945) – Water Quality, Biomonitoring and Flow
	Whau_3e	Lower Mangawhero	Mangawhero River - Makotuku confluence to Raupiu Road (S21:099 646)	Mangawhero at Raupiu Road (S21:099 646) – Water Quality, Biomonitoring and Flow

* Includes all inflowing tributaries and catchment area unless otherwise specified.



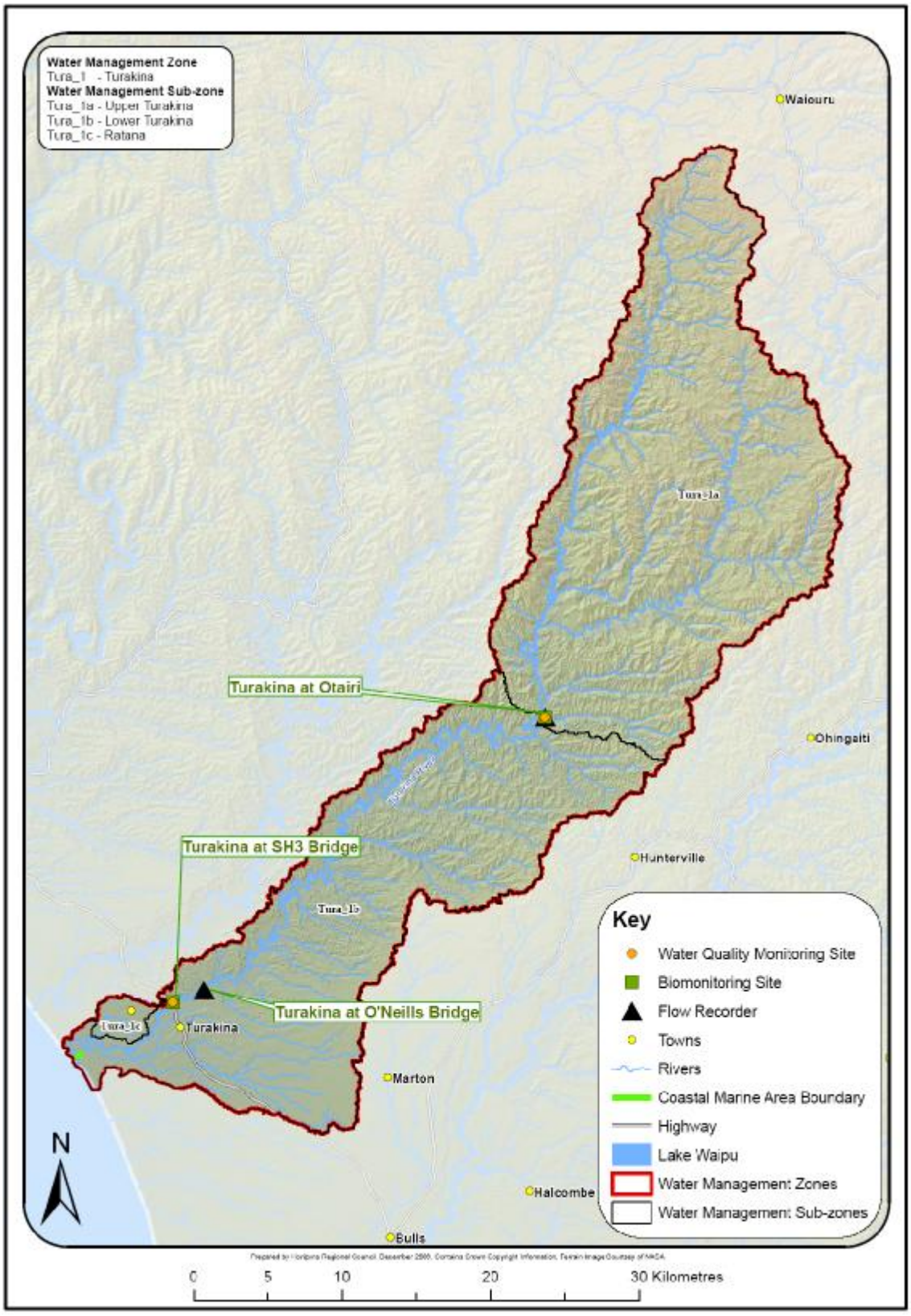
Map 34: Coastal Whangaehu Zone.

Table 30: Coastal Whangaehu management zone sub-zone justification and monitoring

Management Zone	Zone Code	Sub zone	Description*	Monitoring / Sub-zone Justification
Coastal Whangaehu	**Whau_4**	Coastal Whangaehu	Whangaehu River - Kauangaroa to mouth (R23:890 275)	Coastal monitoring site required

* Includes all inflowing tributaries and catchment area unless otherwise specified.

9. Turakina Catchment Management Zone and Sub-zones



Map 35: Turakina Zone and Sub-zones.

Table 31: Turakina Catchment management zone justification and monitoring

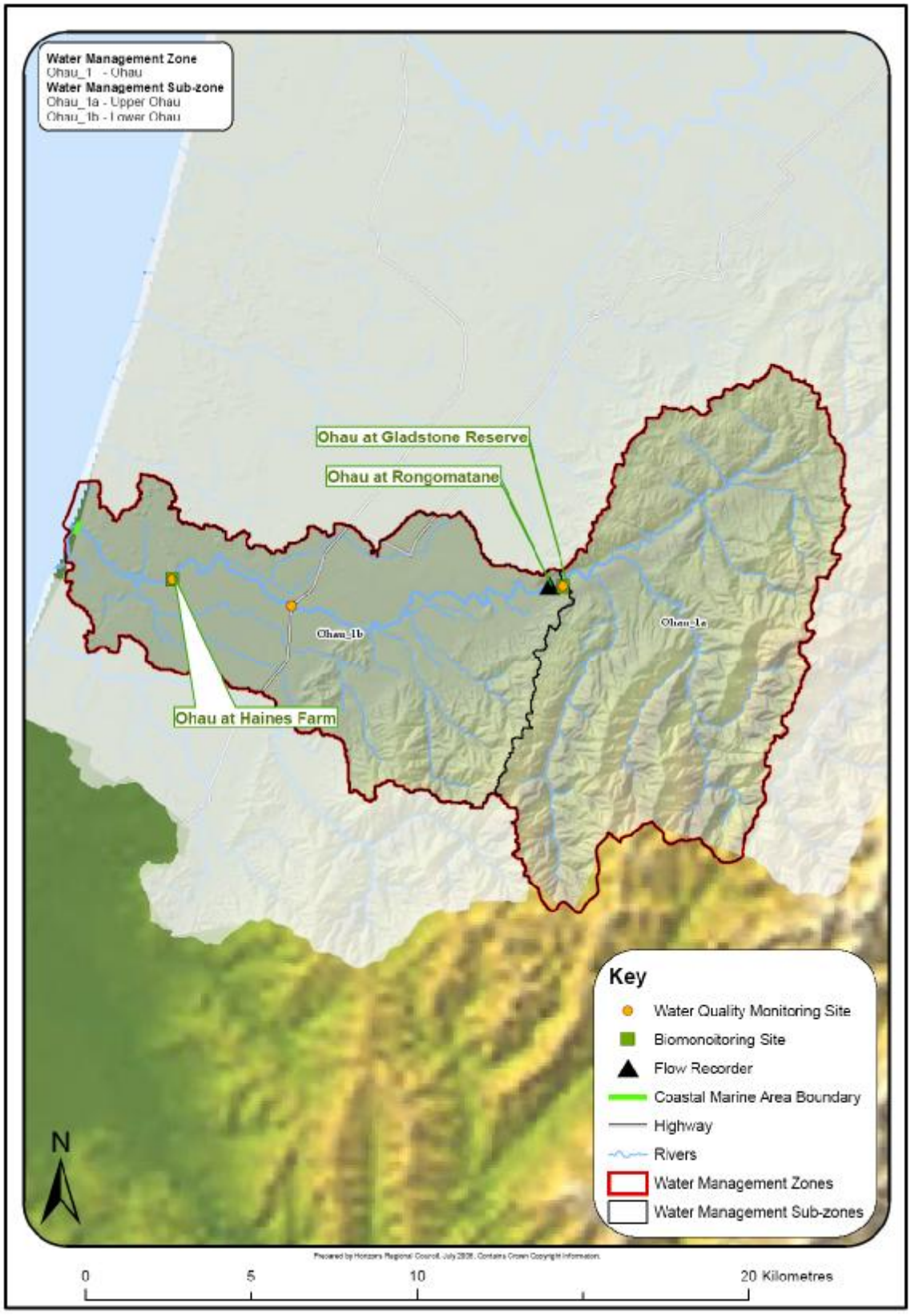
Catchment	Water Management Zone	Zone Code	Description*	Monitoring Site / Zone Justification
Turakina	**Turakina**	**Tura_1**	Turakina River - source to mouth (S23:924 231)	Turakina at SH3 (S23:985 280) – Water Quality and Biomonitoring Turakina at O'Neils Bridge (S23:006 287) – Flow

Table 32: Turakina management zone sub-zone justification and monitoring

Management Zone	Zone Code	Sub zone	Description*	Monitoring / Sub-zone Justification
Turakina	**Tura_1a**	Upper Turakina	Turakina River - source to Otairi (S22: 236 471)	Turakina at Otairi (S22: 236 471) – Water Quality, Biomonitoring and Flow (NIWA)
	Tura_1b	Lower Turakina	Turakina River - Otaire to mouth (S23:924 231)	Turakina at SH3 (S23: 985 279) – Water Quality and Biomonitoring. Turakina at O Neil's Bridge (S23:006 287) - Flow
	Tura_1c	Ratana	Lakes Waipu and Oraekomiko and all surrounding catchment area	Lake and outflow monitoring sites required

* Includes all inflowing tributaries and sub-catchments unless otherwise stated.

10. Ohau Catchment Management Zone and Sub-zones



Map 36: Ohau Zone and Sub-zones.

Table 33: Ohau Catchment management zone justification and monitoring

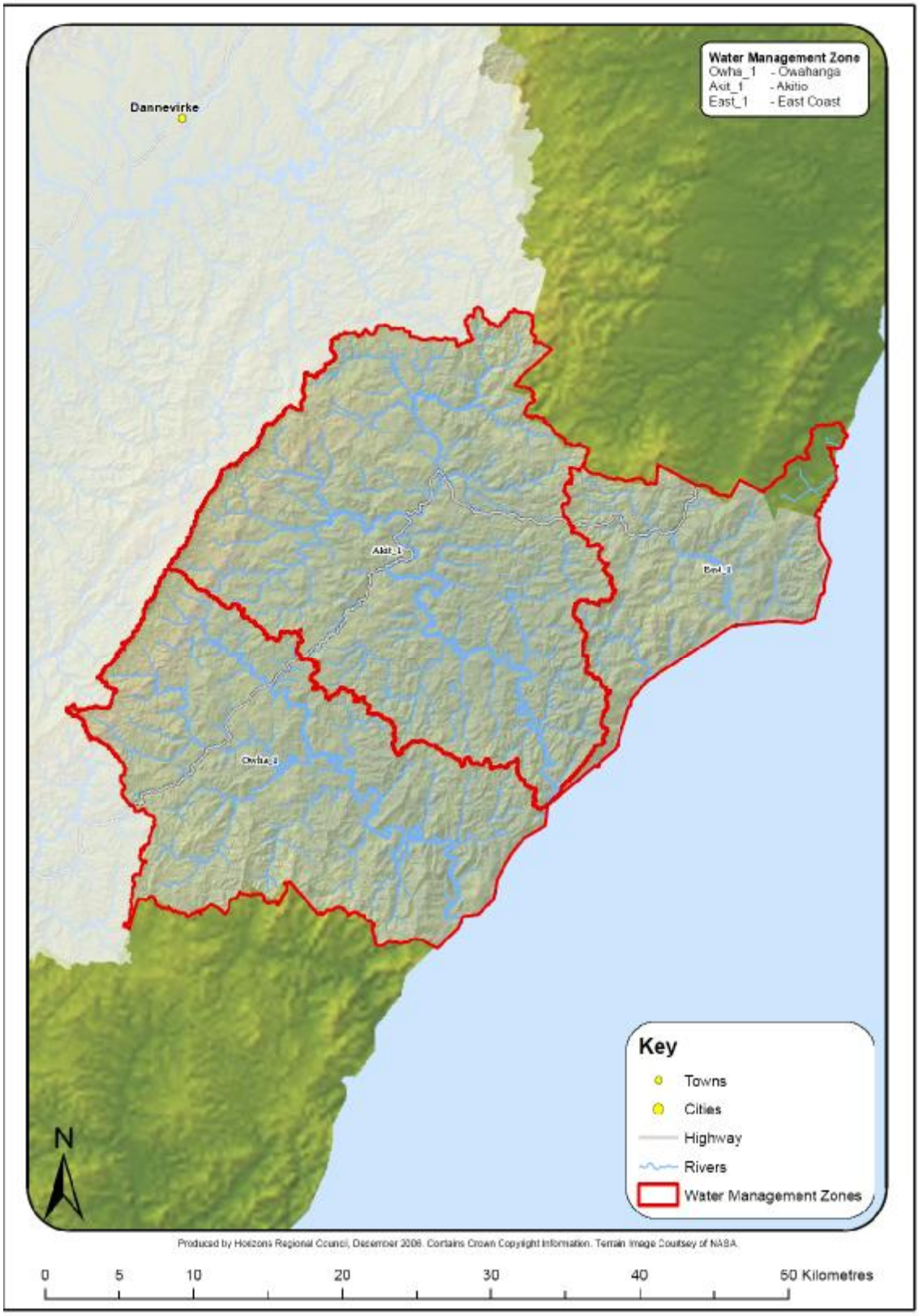
Catchment	Water Management Zone	Zone Code	Description*	Monitoring Site / Zone Justification
Ohau	**Ohau**	**Ohau_1**	Ohau River - source to mouth (S25:918 578)	Ohau at Haines Farm (S25:958 579) – Water Quality and Biomonitoring

Table 34: Ohau management zone sub-zone justification and monitoring

Management Zone	Zone Code	Sub zone	Description*	Monitoring / Sub-zone Justification
Ohau	**Ohau_1a**	Upper Ohau	Ohau River - source to Rongomatane (S25:072 577)	Ohau at Rongomatane (S25:072 577) – Water Quality, Biomonitoring and Flow
	Ohau_1b	Lower Ohau	Ohau River - Rongomatane to mouth (S25:918 578)	Ohau at Haines Farm (S25: 958 579) – Water Quality and Biomonitoring

* Includes all inflowing tributaries and catchment area unless otherwise specified.

11. East Coast Catchments Management Zones and Sub-zones

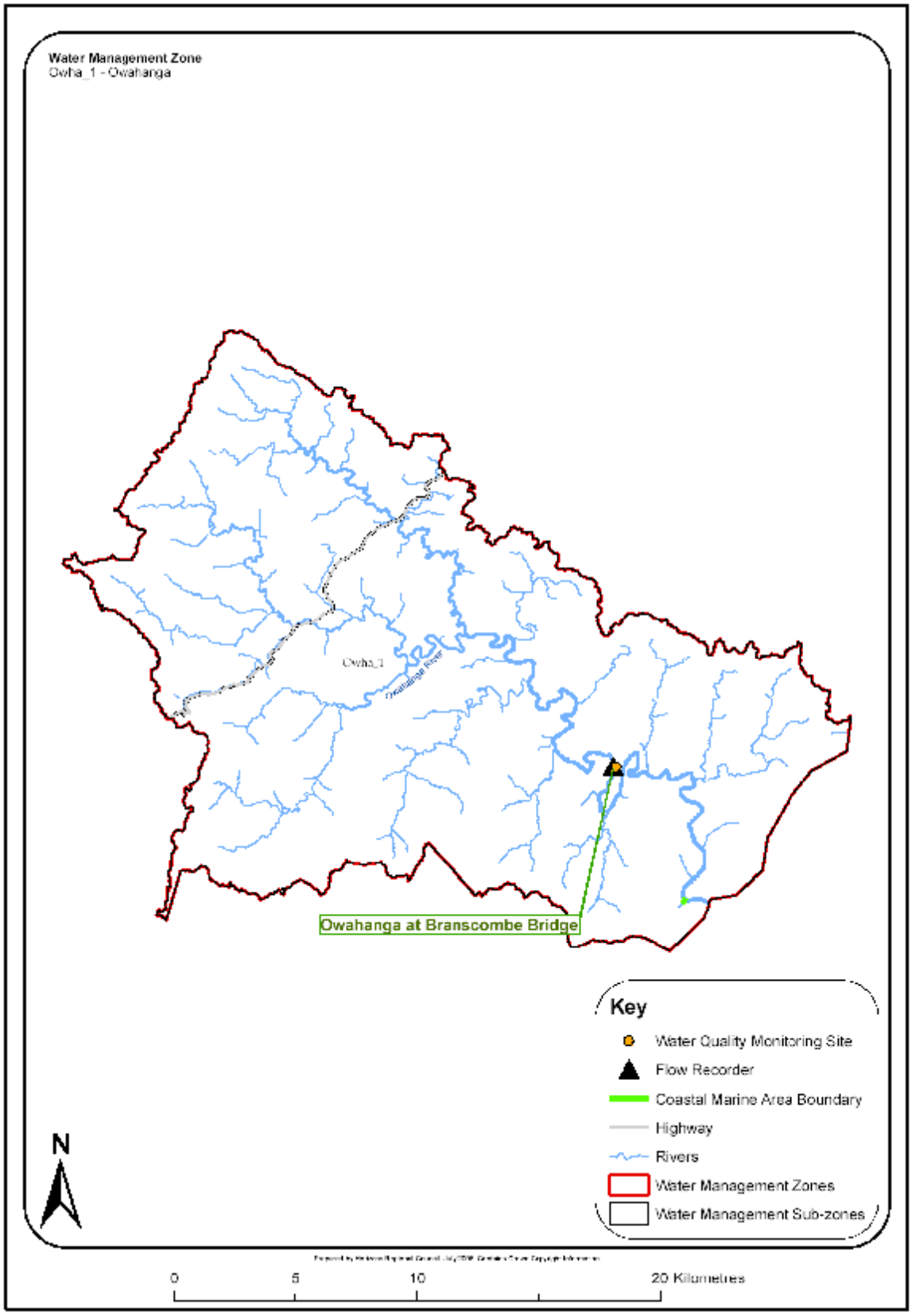


Map 37: East Coast Catchments and Water Management Zones.

Table 35: East coast catchments management zone justification and monitoring

Catchment	Water Management Zone	Zone Code	Description*	Monitoring Site / Zone Justification
East Coast	Owahanga	Owha_1	Owahanga River - source to mouth (U25:932 532)	Owahanga at Branscombe Bridge (U25:893 587) – Water Quality and Flow
	East Coast	East_1	Wainui, Tautane and Waimata – whole catchments from source to mouth	Wainui at Herbertville Road (U24: 113 765) – Water Quality Tautane at Tautane Road (V24:142 747) – Water Quality
	Akitio	Akit_1	Akitio River - source to mouth (U25:992 610)	Akitio above Estuary (U25:985 665) – Water Quality and Biomonitoring

* Includes all inflowing tributaries and sub-catchments unless otherwise stated.

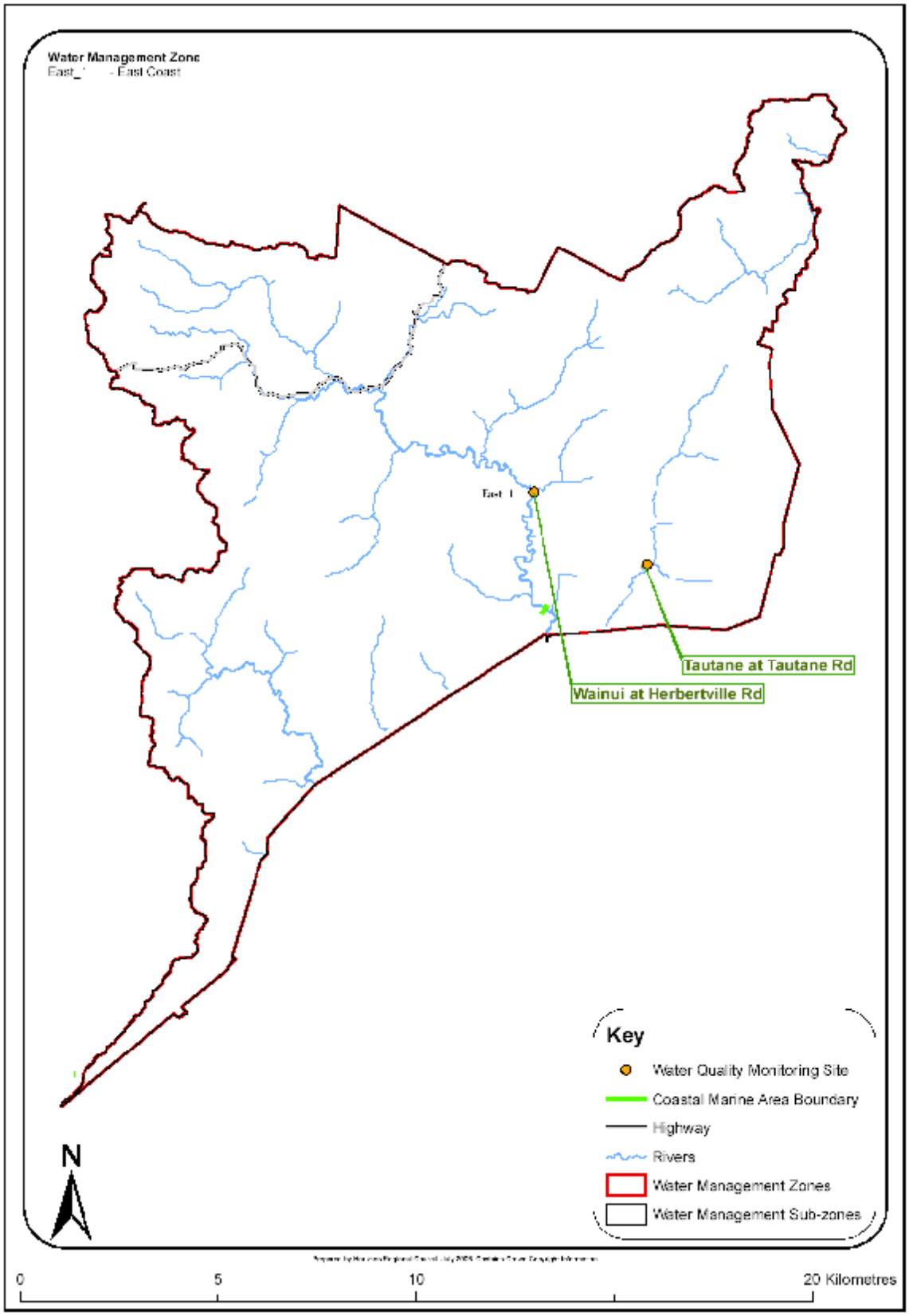


Map 38: Owahanga Zone.

Table 36: Owahanga management zone sub-zone justification and monitoring

Management Zone	Zone Code	Sub zone	Description*	Monitoring / Sub-zone Justification
Owahanga	**Owha_1**	Owahanga	Owahanga River - source to mouth (U25:932 532)	Owahanga at Branscombe Bridge (U25: 893 587) – Water Quality and Flow

* Includes all inflowing tributaries and catchment area unless otherwise specified.

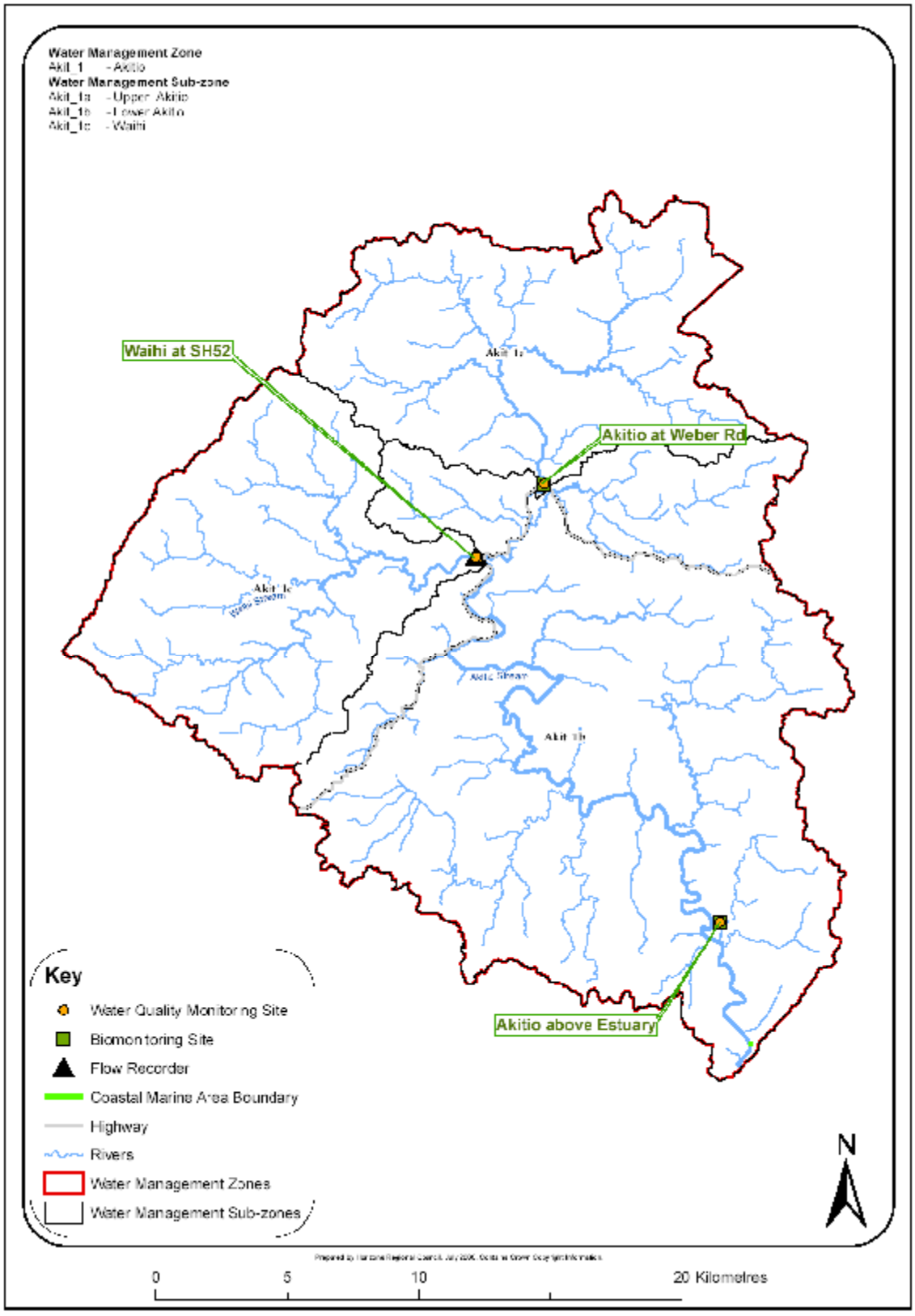


Map 39: East Coast Zone.

Table 37: East Coast management zone sub-zone justification and monitoring

Management Zone	Zone Code	Sub zone	Description*	Monitoring / Sub-zone Justification
East Coast	**East_1**	East Coast	Wainui, Tautane and Waimata – whole catchments from source to mouth	Wainui at Herbertville Road (U24: 113 765) – Water Quality Tautane at Tautane Road (V24:142 747) – Water Quality

* Includes all inflowing tributaries and catchment area unless otherwise specified.



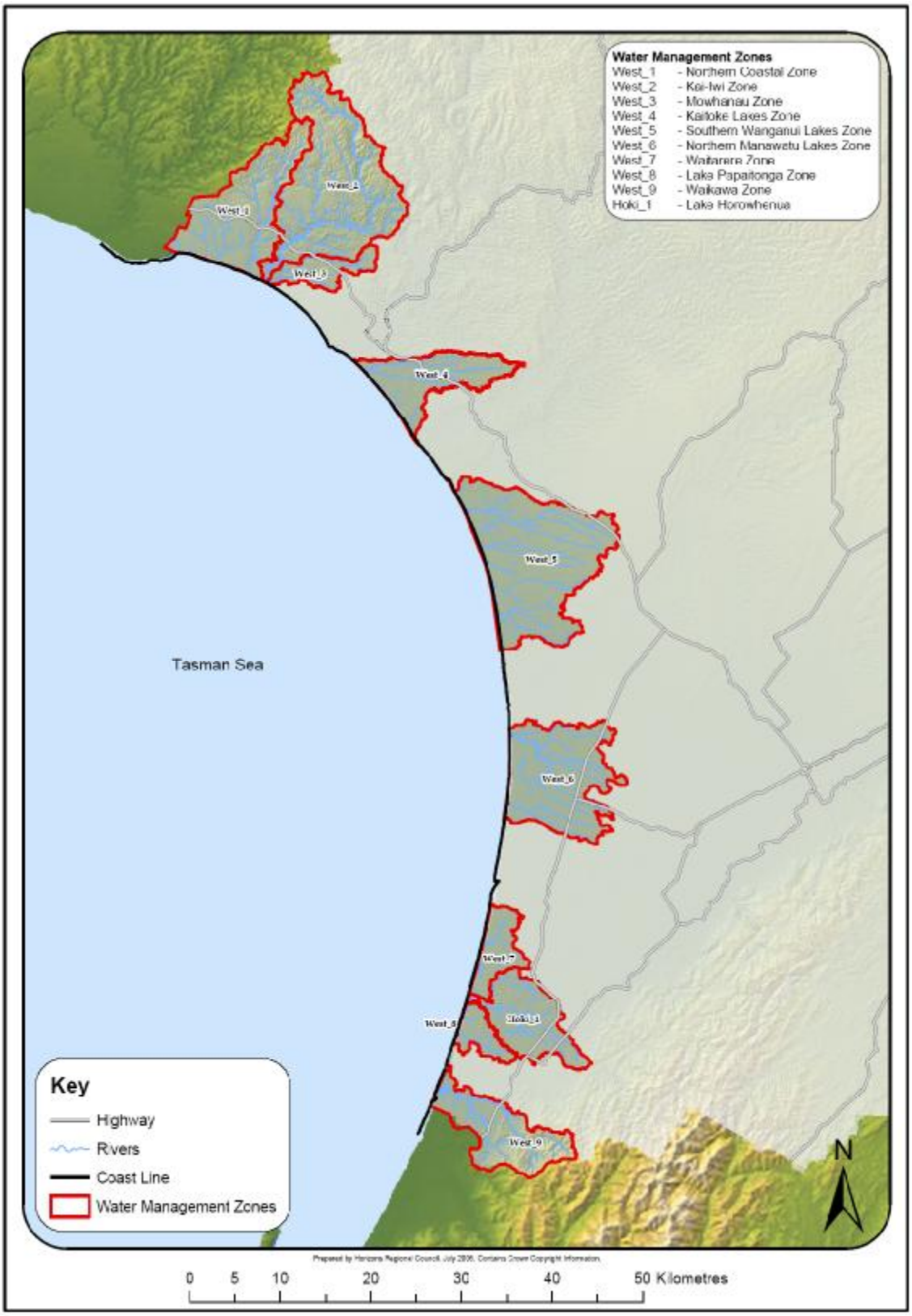
Map 40: Akitio Zone and Sub-zones.

Table 38: Akitio management zone sub-zone justification and monitoring

Management Zone	Zone Code	Sub zone	Description*	Monitoring / Sub-zone Justification
Akitio	**Akit_1a**	Upper Akitio	Akitio River - source to Weber Road (U24: 919 832)	Akitio at Weber Road (U24: 919 832) – Water Quality, Biomonitoring and Flow (NIWA)
	Akit_1b	Lower Akitio	Akitio River - Weber Road to mouth (U25:992 610)	Akitio above Estuary (U25: 985 665) – Water Quality and Biomonitoring
	Akit_1c	Waihi	Waihi Stream - source to Akitio confluence (U24:895 801)	Waihi at SH52 (U24: 892 804) – Biomonitoring and Flow

* Includes all inflowing tributaries and catchment area unless otherwise specified.

12. West Coast Catchments Management Zones and Sub-zones

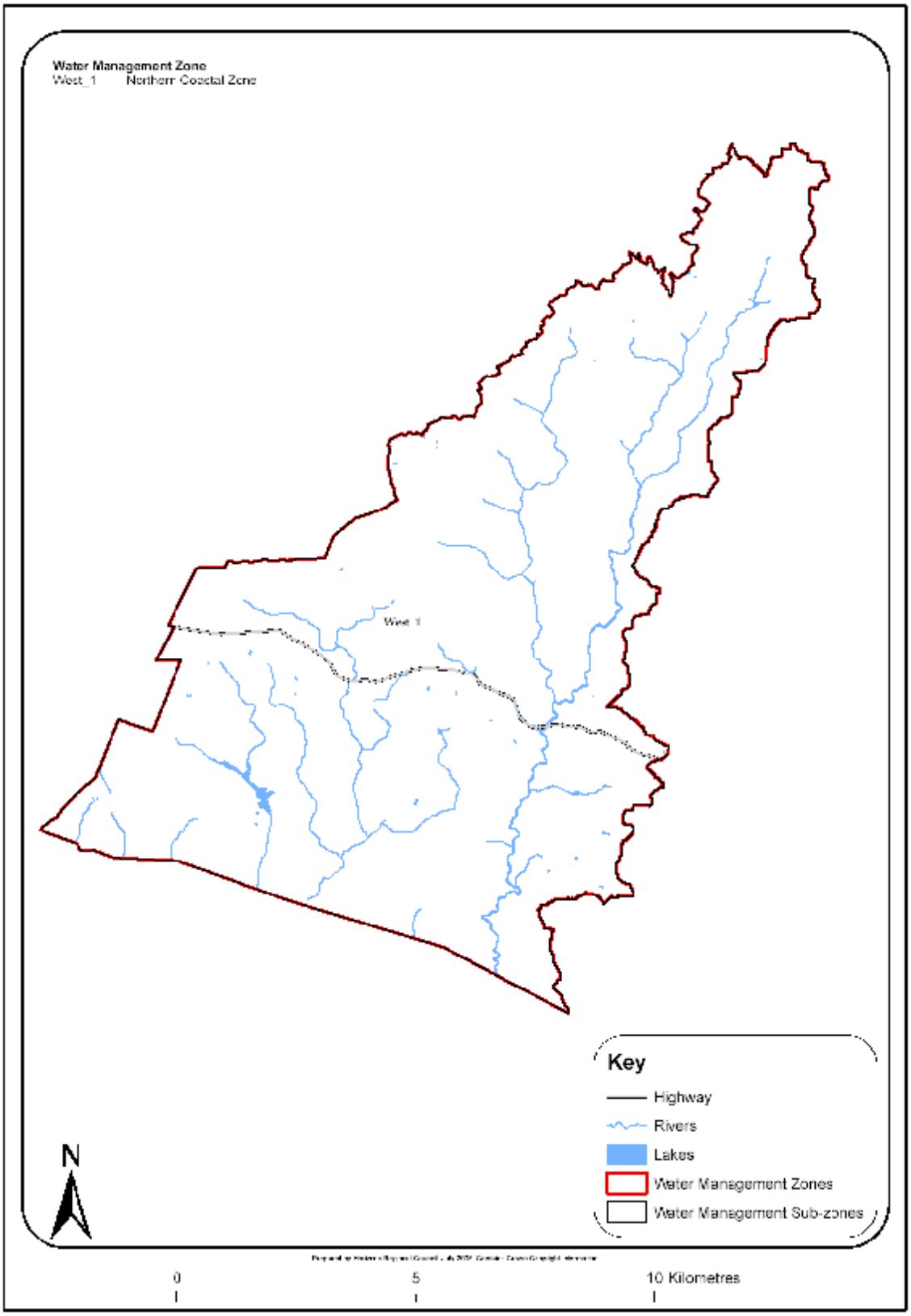


Map 41: West Coast Small Catchments and WMZ.

Table 39: West Coast Catchments management zone justification and monitoring

Catchment	Water Management Zone	Zone Code	Description*	Monitoring Site / Zone Justification
West Coast	**Northern Coastal**	**West_1**	All coastal catchments and dune lakes between Kai Iwi and Waitotara catchments	Coastal and lake monitoring required
	Kai Iwi	**West_2**	Kai Iwi Stream - source to mouth (R23:723 449)	Kai Iwi at Handley Road (R22:726 455) – Water Quality
	Mowhanau	**West_3**	Mowhanau Stream - source to mouth (R22:725 447)	Monitoring required
	Kaitoke Lakes	**West_4**	Lakes Kaitoke, Pauri, Wiritoa, Kohata and all surrounding catchment area	Lake Pauri (R22:894 342) – Water Quality (x2) Lake Wiritoa (R22:882 344) – Water Quality Lake Kaitoke (R22:871 360)– Water Quality (x2)
	Southern Wanganui Lakes	**West_5**	Lakes Vipan, Heaton, Bernard, William, Herbert, Hickson, Alice, Koitiata, Dudding and all surrounding catchment area	Lake Dudding (S23:045 203) – Water Quality Coastal and lake monitoring required
	Northern Manawatu Lakes	**West_6**	All lakes and lagoons between Coastal Rangitikei and Coastal Manawatu and all surrounding catchment area	Coastal and lake monitoring required
	Waitarere	**West_7**	All lakes and lagoons between Coastal Manawatu and Lake Horowhenua catchment and all surrounding catchment area	Coastal and lake monitoring required
	Lake Papaitonga	**West_8**	Lake Papaitonga catchment	Coastal and lake monitoring required
	Waikawa	**West_9**	Waikawa Stream - source to mouth (S25:908 548)	Waikawa below Manakau confluence (S25:930 555) – Water Quality
	Lake Horowhenua	**Hoki_1**	Lake Horowhenua and Hokio Stream catchment	Hokio Stream Weir (S25:992 644) – Water Quality Lake Horowhenua (S25:005 635) – Water Quality

* Includes all inflowing tributaries and sub-catchments unless otherwise stated.

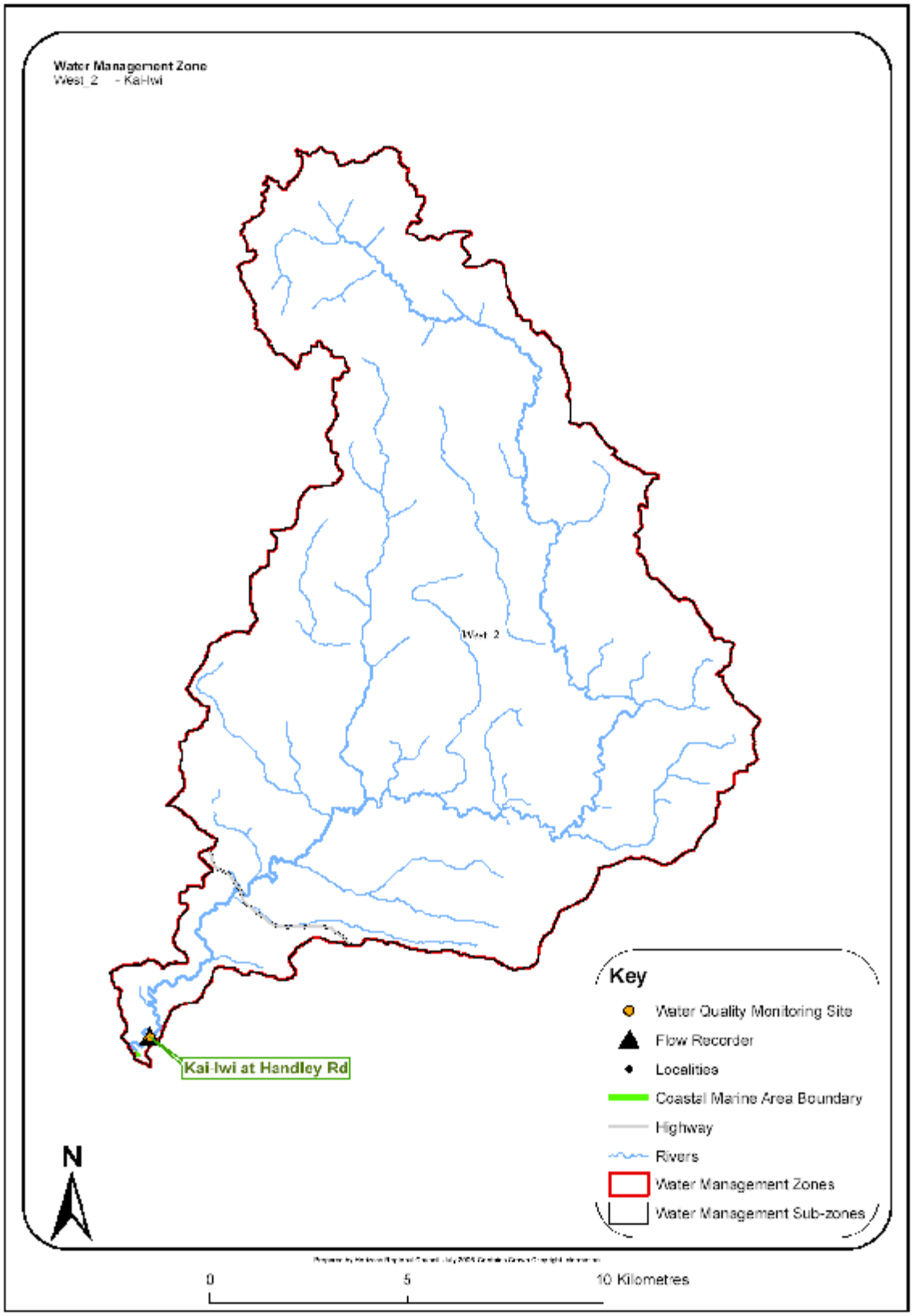


Map 42: Northern Coastal Zone.

Table 40: Northern Coastal management zone sub-zone justification and monitoring

Management Zone	Zone Code	Sub zone	Description*	Monitoring / Sub-zone Justification
Northern Coastal	**West_1**	Northern Coastal	All coastal catchments and dune lakes between Kai Iwi and Waitotara catchments	Coastal and lake monitoring required

* Includes all inflowing tributaries and catchment area unless otherwise specified.

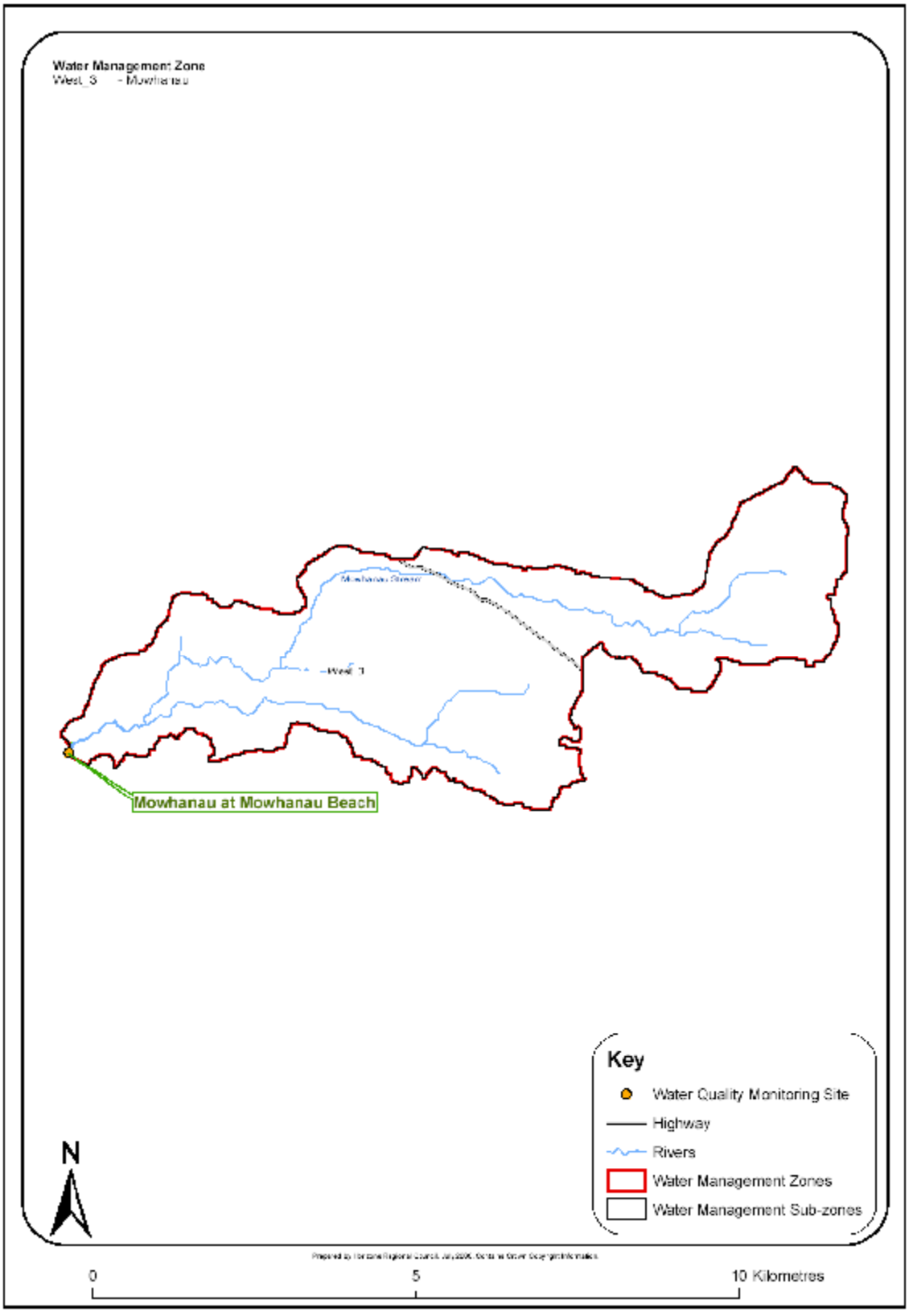


Map 43: Kai-Iwi Zone.

Table 41: Kai-Iwi management zone sub-zone justification and monitoring

Management Zone	Zone Code	Sub zone	Description*	Monitoring / Sub-zone Justification
Kai Iwi	**West_2**	Kai Iwi	Kai Iwi Stream - source to mouth (R23:723 449)	Kai Iwi at Handley Road (R22:726 455) – Water Quality

* Includes all inflowing tributaries and catchment area unless otherwise specified.

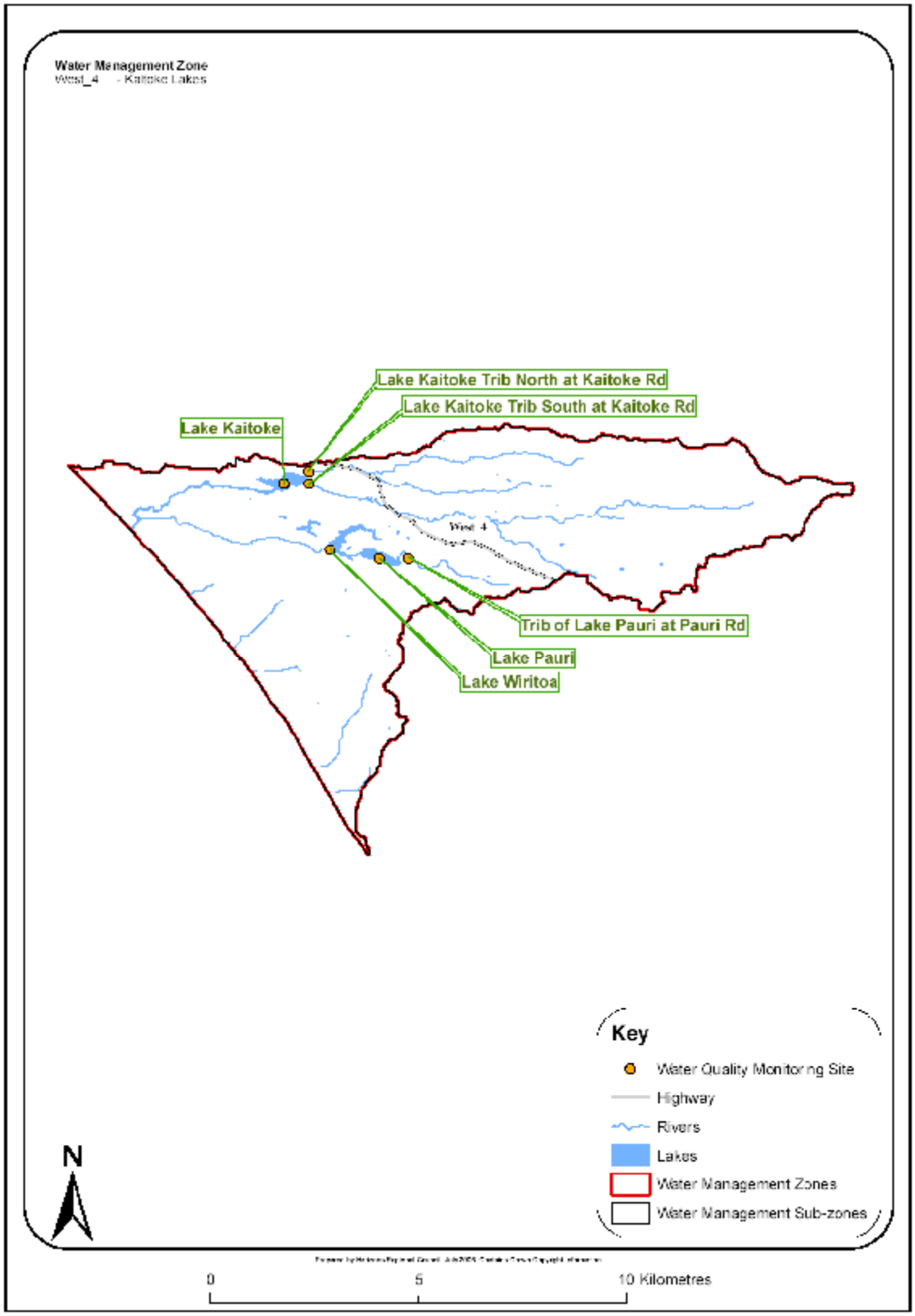


Map 44: Mowhanau Zone.

Table 42: Mowhanau management zone sub-zone justification and monitoring

Management Zone	Zone Code	Sub zone	Description*	Monitoring / Sub-zone Justification
Mowhanau	**West_3**	Mowhanau	Mowhanau Stream - source to mouth (R22:725 447)	Monitoring required

* Includes all inflowing tributaries and catchment area unless otherwise specified.

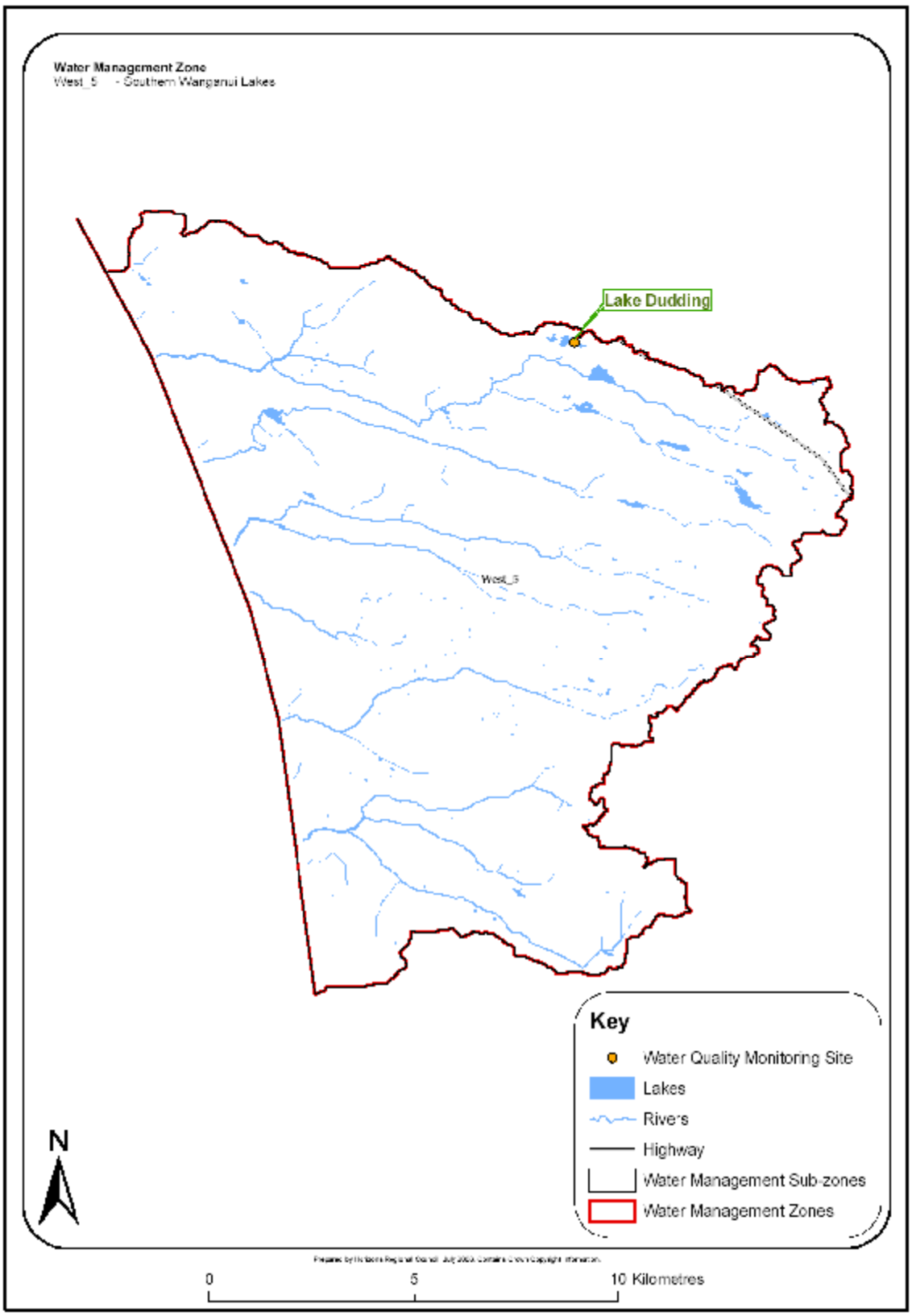


Map 45: Kaitoke Lakes Zone.

Table 43: Kaitoke Lakes management zone sub-zone justification and monitoring

Management Zone	Zone Code	Sub zone	Description*	Monitoring / Sub-zone Justification
Kaitoke Lakes	**West_4**	Kaitoke Lakes	Lakes Kaitoke, Pauri, Wiritoa, Kohata and all surrounding catchment area	Lake Pauri (R22:894 342) – Water Quality (x2) Lake Wiritoa (R22:882 344) – Water Quality Lake Kaitoke (R22:871 360)– Water Quality (x2)

* Includes all inflowing tributaries and catchment area unless otherwise specified.

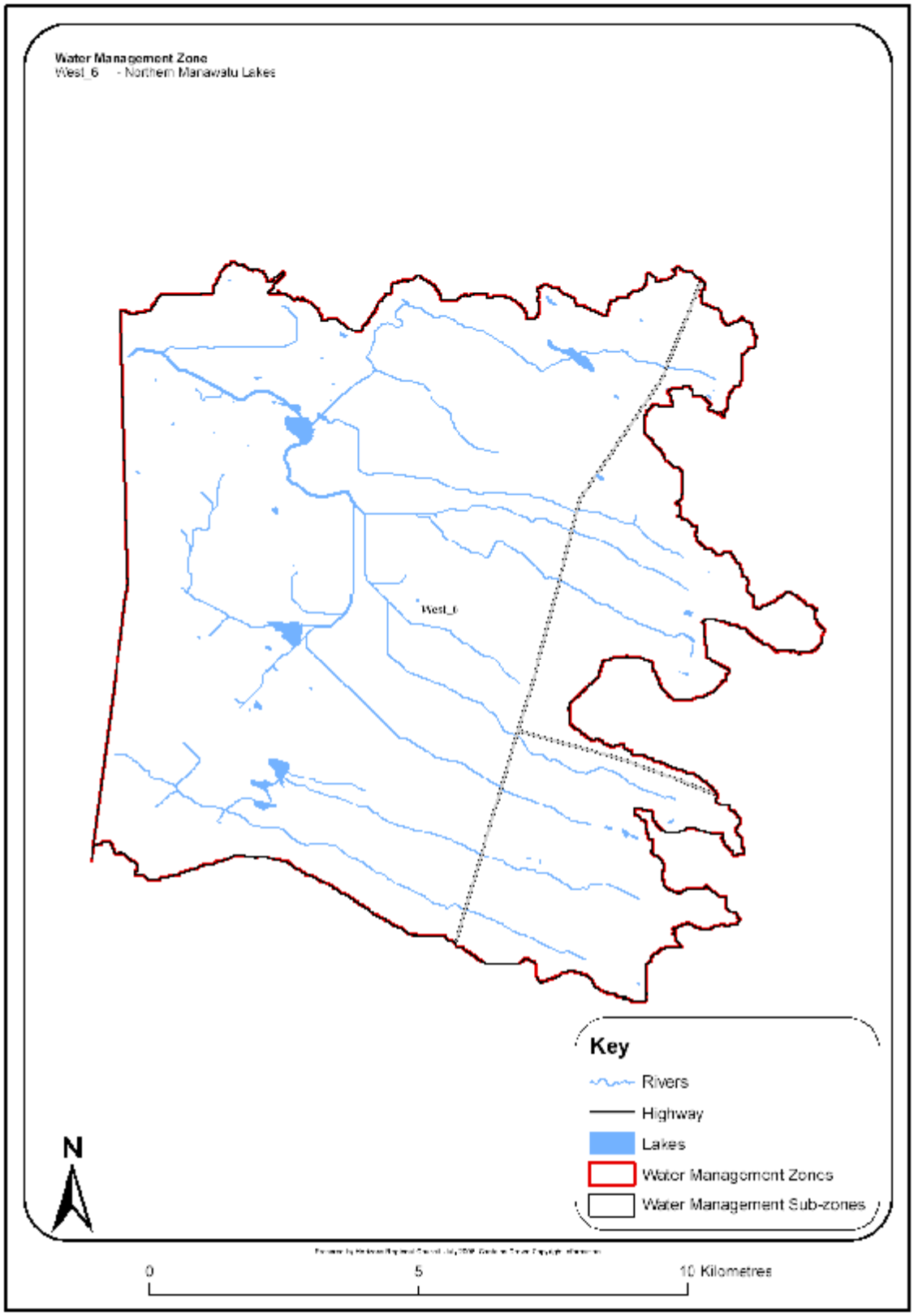


Map 46: Southern Wanganui Lakes.

Table 44: Southern Wanganui Lakes management zone sub-zone justification and monitoring

Management Zone	Zone Code	Sub zone	Description*	Monitoring / Sub-zone Justification
Southern Wanganui Lakes	**West_5**	Southern Wanganui Lakes	Lakes Vipan, Heaton, Bernard, William, Herbert, Hickson, Alice, Koitiata, Dudding and all surrounding catchment area	Lake Dudding (S23:045 203) – Water Quality Coastal and lake monitoring required

* Includes all inflowing tributaries and catchment area unless otherwise specified.

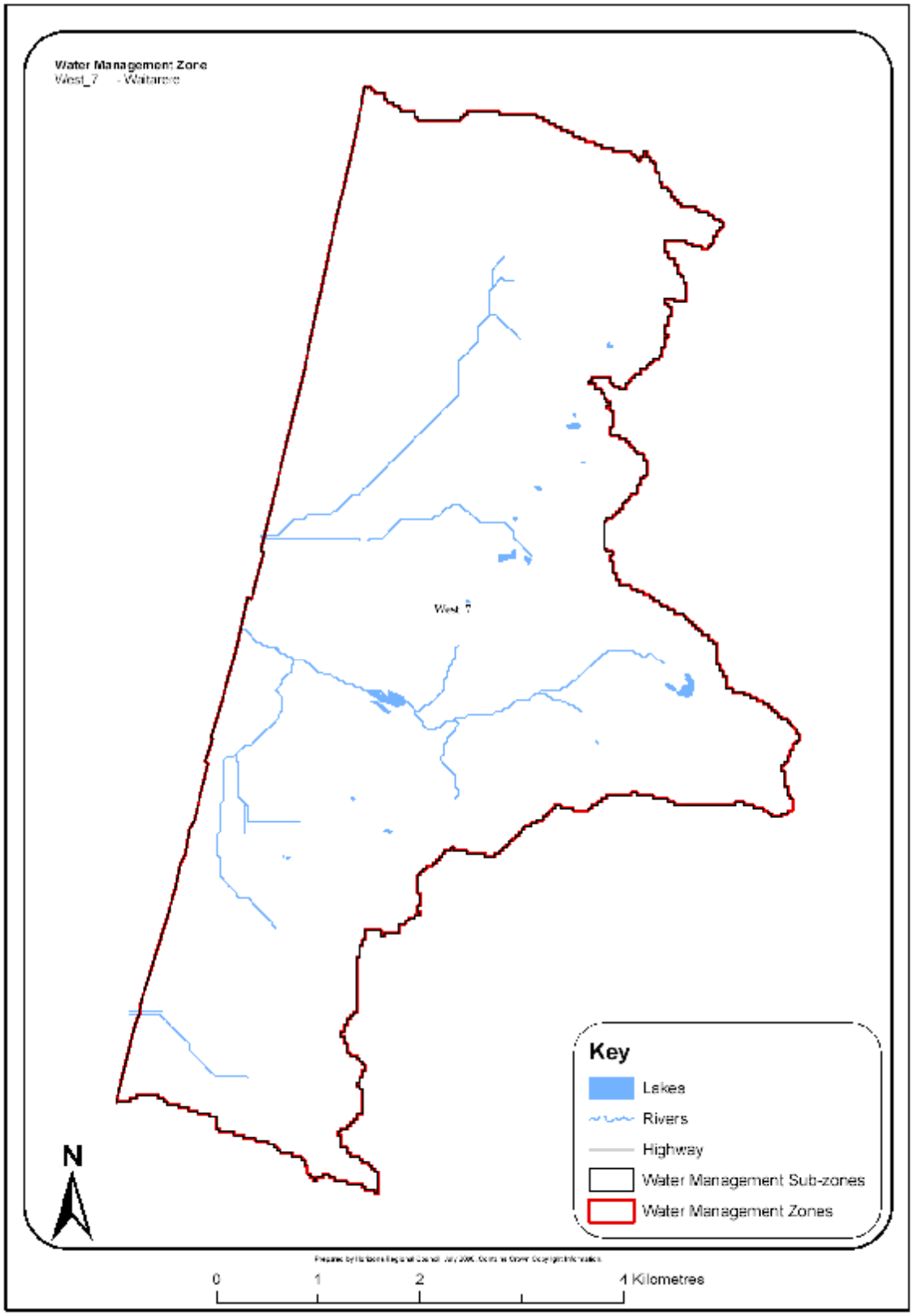


Map 47: Northern Manawatu Lakes Zone.

Table 45: Northern Manawatu Lakes management zone sub-zone justification and monitoring

Management Zone	Zone Code	Sub zone	Description*	Monitoring / Sub-zone Justification
Northern Manawatu Lakes	**West_6**	Northern Manawatu Lakes	All lakes and lagoons between Coastal Rangitikei and Coastal Manawatu and all surrounding catchment area	Coastal and lake monitoring required

* Includes all inflowing tributaries and catchment area unless otherwise specified.

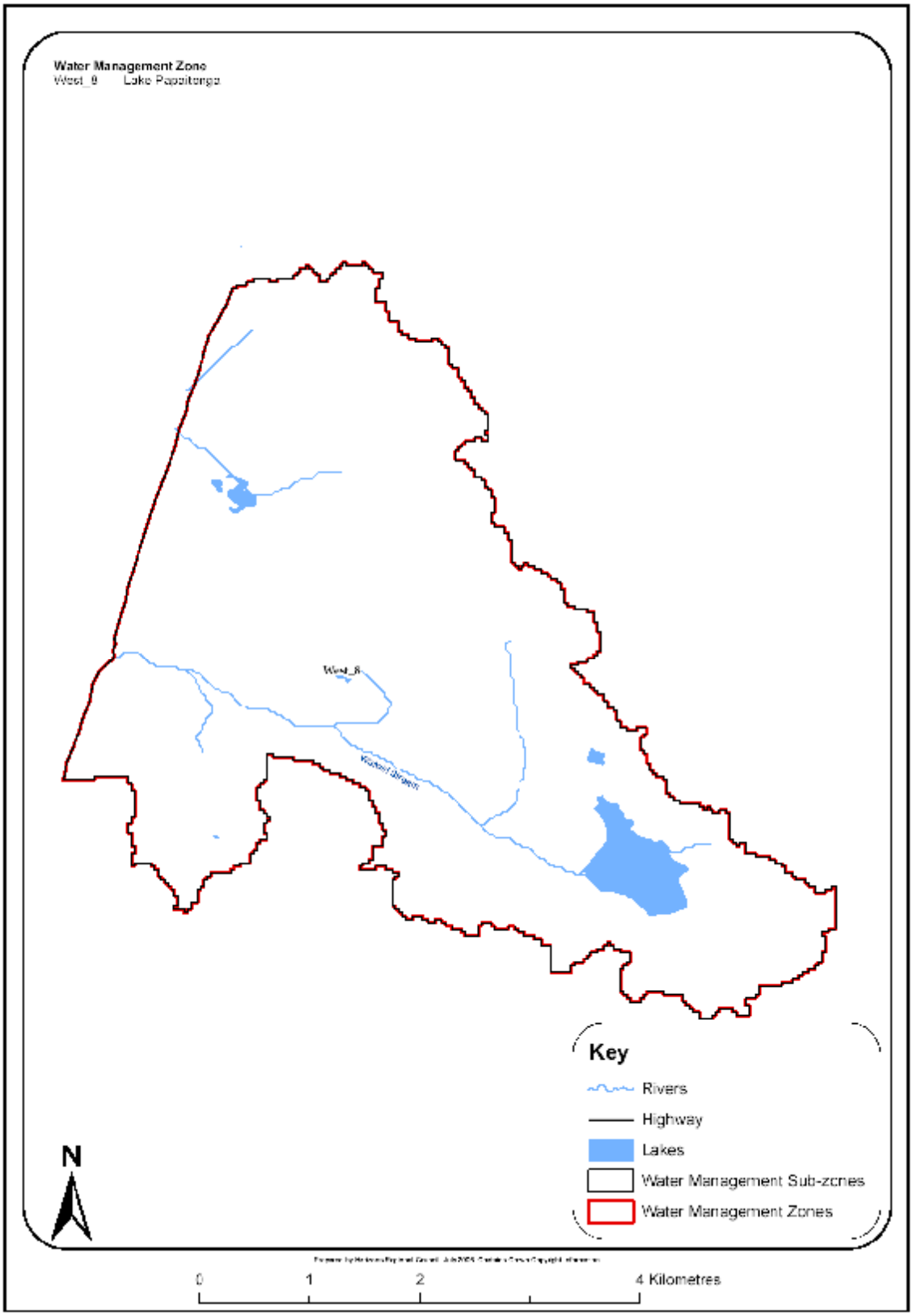


Map 48: Waitarere Zone.

Table 46: Waitarere management zone sub-zone justification and monitoring

Management Zone	Zone Code	Sub zone	Description*	Monitoring / Sub-zone Justification
Waitarere	**West_7**	Waitarere	All lakes and lagoons between Coastal Manawatu and Lake Horowhenua catchment and all surrounding catchment area	Coastal and lake monitoring required

* Includes all inflowing tributaries and catchment area unless otherwise specified.

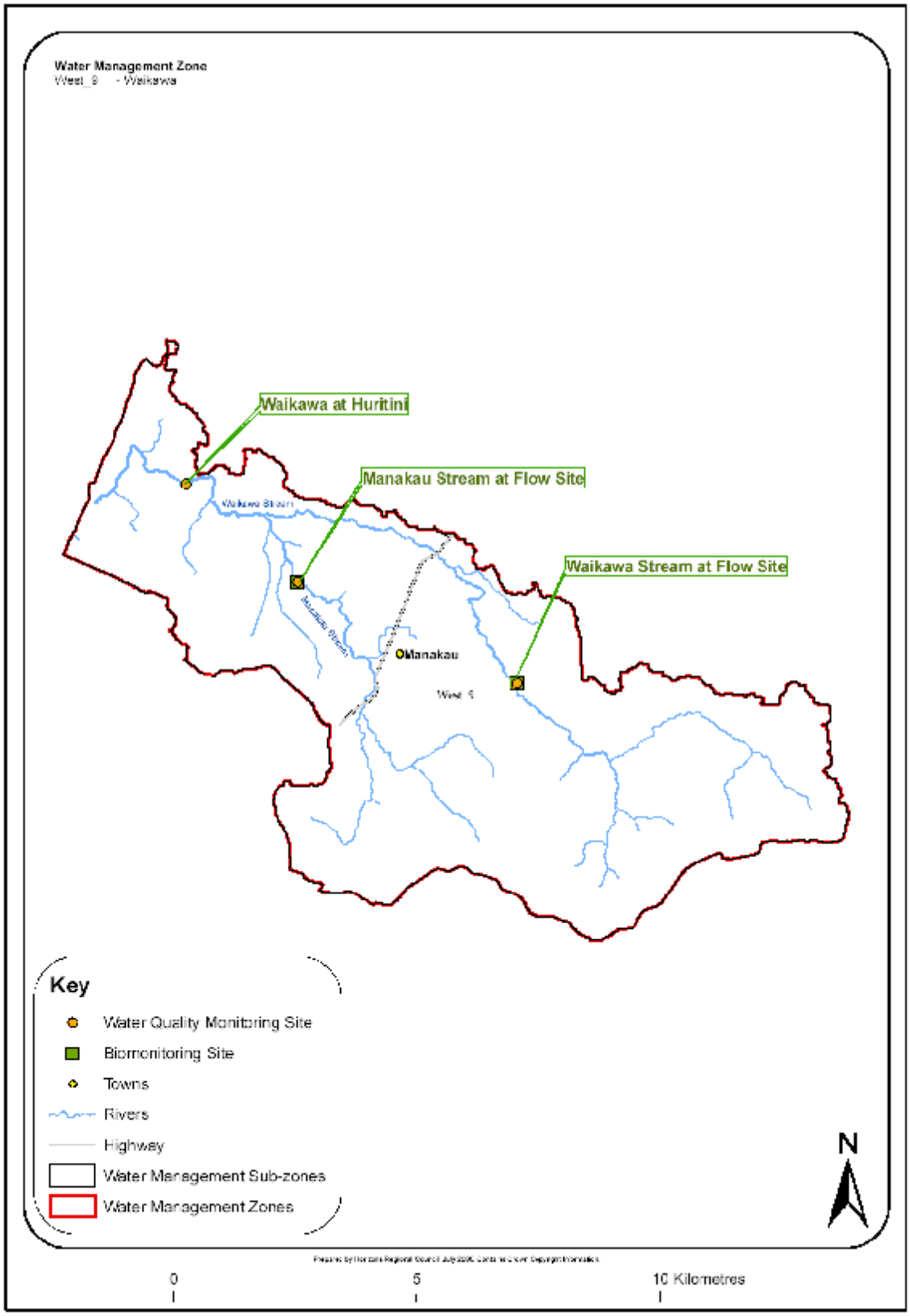


Map 49: Lake Papaitonga Zone.

Table 47: Lake Papaitonga management zone sub-zone justification and monitoring

Management Zone	Zone Code	Sub zone	Description*	Monitoring / Sub-zone Justification
Lake Papaitonga	**West_8**	Lake Papaitonga	Lake Papaitonga catchment	Coastal and lake monitoring required

* Includes all inflowing tributaries and catchment area unless otherwise specified.

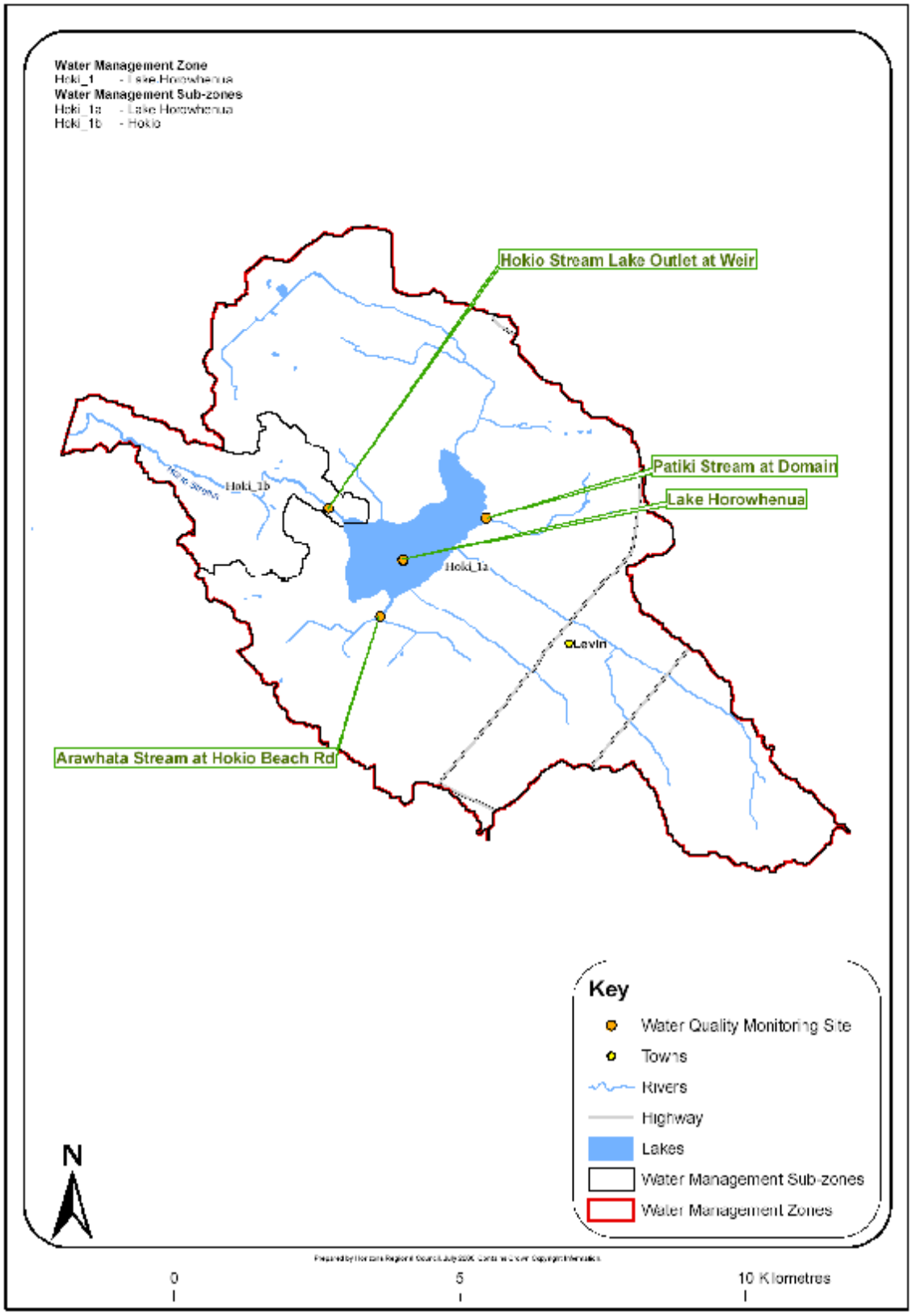


Map 50: Waikawa Zone.

Table 48: Waikawa management zone sub-zone justification and monitoring

Management Zone	Zone Code	Sub zone	Description*	Monitoring / Sub-zone Justification
Waikawa	**West_9**	Waikawa	Waikawa Stream - source to mouth (S25:908 548)	Waikawa at Huritini (S25:930 555) – Water Quality

* Includes all inflowing tributaries and catchment area unless otherwise specified.



Map 51: Lake Horowhenua Zone and Sub-zones.

Table 49: Lake Horowhenua management zone sub-zone justification and monitoring

Management Zone	Zone Code	Sub zone	Description*	Monitoring / Sub-zone Justification
Lake Horowhenua	**Hoki_1a**	Lake Horowhenua	Whole lake catchment above Hokio Stream outlet	Lake Horowhenua (S25:005 635) – Water Quality (x3)
	Hoki_1b	Hokio	Hokio Stream downstream of Lake Horowhenua outlet	Lake outlet at Weir (S25: 992 644) – Water Quality

* Includes all inflowing tributaries and catchment area unless otherwise specified.

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14. Appendix 1.

Table 50: The Relationship between Ground and Surface Water Management Zones in the Manawatu-Wanganui Region.

Ground Water management zones (GWMZ)	Surface (WMZ) Zone Code	Surface Water management zones (WMZ)
Whanganui	Whai_7	Lower Whanganui
	West_1	Northern Coastal
	West_2	Kai Iwi
	West_3	Mowhanau
	West_4	Kaitoke Lakes
Whangaehu	Whau_1	Upper Whangaehu
	Whau_2	Middle Whangaehu
	Whau_3	Lower Whangaehu
	Whau_4	Coastal Whangaehu
Turakina	Tura_1	Upper Turakina
Rangitikei	Rang_3	Lower Rangitikei
	Rang_4	Coastal Rangitikei
	West_5	Southern Wanganui Lakes
	West_6	Northern Manawatu Lakes
Manawatu	Mana_10	Middle Manawatu
	Mana_11	Lower Manawatu
	Mana_12	Oroua
	Mana_13	Coastal Manawatu
Horowhenua	Hoki_1	Lake Horowhenua
	Ohau_1	Ohau
	West_7	Waitarere
	West_8	Lake Papaitonga
	West_9	Waikawa
Eastern	Mana_1	Upper Manawatu
	Mana_2	Weber - Tamaki
	Mana_3	Upper Tamaki
	Mana_4	Upper Kumeti
	Mana_5	Tamaki - Hopelands
	Mana_6	Hopelands - Tiraumea
	Mana_7	Tiraumea
	Mana_8	Mangatainoka
	Mana_9	Upper Gorge

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