

**BEFORE AN INDEPENDENT HEARING PANEL  
OF THE WAIKATO REGIONAL COUNCIL**

**IN THE MATTER** of the Resource Management Act 1991

**AND**

**IN THE MATTER** of the Proposed Waikato Regional  
Plan Change 1: Waikato and Waipā  
River Catchments (PPC1)

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**STATEMENT OF EVIDENCE OF GHASSAN WADI BASHEER ON BEHALF OF  
WAIKATO REGIONAL COUNCIL AS SUBMITTER**

**Technical - Block 2**

**DATED 3 May 2019**

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## **INTRODUCTION AND EXPERIENCE**

1. My name is Ghassan Wadi Basheer. I am the Principal Technical Advisor for the Integrated Catchment Management Directorate (ICMD) of the Waikato Regional Council (WRC). I have been in this role since July 2013.
2. I hold a Bachelor Degree in Civil Engineering from the University of Technology, Baghdad, 1976, and a Masters Degree in Urban and Regional Planning from Baghdad University, Baghdad, 1978. I am a member of the Rivers Group of Engineering New Zealand.
3. I have been employed by WRC's Asset Management Group (currently ICMD) since November 1996. Since, I have filled several roles within ICMD including Works Supervisor and manager of the Lower Waikato and Waipa Flood Control Scheme works and assets, Assets Engineer for all flood protection schemes, Technical Services Programme Manager, Special Projects Manager and Principal Technical Advisor.
4. My expertise cover hydrology, hydraulics, hydraulic structures, river engineering, investigations, design, construction and management of flood protection and drainage infrastructure. I am familiar with all flood protection and drainage schemes managed by WRC, especially these established along the Lower Waikato and Waipa Rivers system.

## **CODE OF CONDUCT**

5. I confirm that I am familiar with the Code of Conduct for Expert Witnesses as set out in the Environment Court Practice Note 2014. I have read and agree to comply with the Code. Except where I state that I am relying upon the specified evidence or advice of another person, my evidence is within my area of expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed.

## **SCOPE OF EVIDENCE**

6. The purpose of my evidence/this statement is to:
  - a. Describe WRC's role in managing flood protection and land drainage as regionally significant infrastructure across the region and specifically within the Waikato and Waipa Rivers catchments.

- b. Provide a general background and overview of Lower Waikato and Waipa Flood Control Scheme and Land Drainage Areas managed by ICMD within the Waikato and Waipa Rivers systems.
- c. Describe how the schemes' infrastructure operates and is accordingly managed.
- d. Describe how Plan Change 1 might affect the management and operation of flood protection and drainage infrastructure.
- e. Discuss the ability to manage contaminants sourced from land use activities.
- f. Briefly comment on the rules for stock exclusion as they relate to Council operated flood protection and land drainage schemes

#### **WAIKATO REGIONAL COUNCIL ROLE IN MANAGING FLOOD PROTECTION AND LAND DRAINAGE SCHEMES**

- 7. Waikato Regional Council manages 75 flood protection and land drainage schemes and infrastructure within the Waikato and Waipa Rivers Catchment. These schemes are essential in managing risks to communities associated with natural hazards, enabling and protecting economic productivity and contributing to the community wellbeing. Attached are maps showing the flood protection and drainage infrastructure managed by WRC within the Waikato and Waipa Rivers Catchments.
- 8. The legislation under which flood protection and land drainage schemes were constructed and are currently managed include the Land Drainage Act 1908, Soil Conservation and River Control Act 1941, Public Works Act 1958, Rating Powers Act 1988, Resource Management Act 1991 and Local Government Act 2002. These acts empower, regulate and require WRC to own and manage infrastructure in a sustainable manner for the regional communities' social, economic, cultural and environmental wellbeing.
- 9. The Integrated Catchment Management Directorate (ICMD) is the operational arm of the Waikato Regional Council responsible for delivery of flood protection, river management, land drainage and integrated catchment management services.

10. The infrastructural assets these schemes make up have been developed for over 100 years and primarily consist of stopbanks, spillways, pump stations, floodgates, diversions and collector drains across eight management zones. The total replacement value of WRC's flood protection and drainage infrastructure is approximately \$585 million.
11. The WRC Long Term Plan 2018-2028 describes the flood protection and land drainage infrastructural assets as strategic assets and significant regional infrastructure that WRC needs to retain if it is to maintain its capacity to achieve and promote the community outcomes that are important to current and future generations.
12. WRC has developed a Regional Asset Management Plan and specific Zone Plans for each of the eight management zones to ensure that these schemes and assets are managed consistently and appropriately to deliver the flood protection and drainage benefits to the standards agreed with the local communities.
13. All flood protection and land drainage assets and works are funded by targeted rates applied over the areas which benefit from the schemes and/or contribute to the need for the schemes. Specific funding policies have been developed for each management zone to cover costs of managing and maintaining flood protection and land drainage assets and works.

#### **LOWER WAIKATO AND WAIPA FLOOD CONTROL SCHEME (LWWFCS)**

14. The LWWFCS is a comprehensive river control scheme designed to provide flood protection and drainage improvements within the flood plains of the Lower Waikato and Waipa Rivers and to address the other issues including the effects of hydro-electricity generation on the Waikato River. Drivers for the flood control schemes include:
  - a. The severe floods in the 1950s, which caused severe damage to the land, local economy and livelihood of people around Lake Taupo, Te Kuiti, Otorohanga, and the Lower Waikato region.
  - b. The annual disruption to the national land transport network (State Highways 1, 2 and 3, and National Railway) during floods for long periods of time, affecting the national economy.

- c. In 1964, while the scheme was in its initial implementation stages, the Tongariro Power Development (TPD) proposal was also being investigated, and discussions were held with the Waikato Valley Authority in relation to the effects of diverting additional water into the Waikato catchment. Assessment of effects included that the TPD would cause an overall increase in water levels throughout the Lower Waikato River. The TPD was estimated to introduce an additional flow equivalent to 10% and 15% of total flow in the Lower Waikato. In 1973, the Tongariro Offset Works including additional funding were introduced to form part of the LWWFCS.
  - d. Siltation of the Lower Waikato River due to the failure of Arapuni Dam in 1927. The results of the Waikato River siltation survey in 1932 estimated approximately 7 million cubic yards of sediment was deposited in the lower river between Huntly and Tuakau, raising the riverbed and causing more frequent flooding.
  - e. The effects of the Waikato hydro-dams system on the Lower Waikato flows, especially during flood conditions.
  - f. The technical feasibility and economic viability of each element of the LWWFCS, with the overall objective of establishing appropriate level of flood protection and achieving maximum economic benefit.
15. These issues have added complexity to the design and cost of the LWWFCS, to the extent that the scheme was considered a matter of national interest and was heavily subsidized by Central Government along with significant commitments under the Scheme Deeds of Agreement with the Local Authorities and Drainage Boards of the day.
16. The area of low lying land in the Lower Waikato, comprising the floodplains of the Waikato River and its tributaries, and substantial areas of wetland, is approximately 36,400 ha. Approximately 17,700 ha of this is directly protected by Scheme works including stopbanks floodgates and pumping stations. An additional 16,000 ha receives drainage improvements resulting from stream and river works including the Waikato and Waipa River channels.
17. Within the Mangawara River valley (the second largest tributary of the Lower Waikato River draining the whole eastern catchment between Ngaruawahia north of Hamilton and

Taupiri and discharging into the River at Taupiri), the Scheme provides protection to approximately 8,300 ha of rural land. The Mangawara River has its headwaters located in the Hapuakohe Ranges and winds its way generally southwest towards the township of Taupiri, collecting water from a number of tributaries including the Tauhei Stream, Paranui Canal and the Komakarau Stream. The Scheme consists primarily of stopbanks, pump stations, floodgates, and main river channel improvement works. In addition, are included some major structures for the control of flood storage in designated ponding areas. All of these works are designed to collectively provide protection to a range of standards for the different areas on the basis of the economic and technical feasibility of the works. Scheme construction was commenced in 1961 and completed in 1982.

18. The Scheme was divided into six sections, three of which provide protection for specific areas (sections A, B and D), while the other sections (section C, Main Channel and Community Works) are generally designed to increase flood conveyance capacities of both the Waikato and Waipa Rivers and hence benefit the communities along both rivers. These sections are:
  - a. **Section A:** Flood protection for urban communities within Te Kuiti, Otorohanga and Huntly.
  - b. **Section B:** Flood protection for rural communities within the Waikato Districts.
  - c. **Section C:** Waipa River channel improvement works within Otorohanga, Waipa and Waikato Districts.
  - d. **Section D:** Flood protection for the rural community within the Managawara River area.
  - e. **Main Channel Works:** The Lower Waikato channel improvement works.
  - f. **Community Works:** The control of flood storage areas at Lake Waikare and the Whangamarino Wetland.
  
19. The infrastructure associated with the LWWFCS is shown on the attached (Figures xx) includes:

- a. 255 Kilometres of Stopbanks;
  - b. 3 Control Gates (associated with Community Works);
  - c. 279 Floodgates;
  - d. 67 Pump Stations (includes 3 in Otorohanga Township);and
  - e. River works, weirs, diversion canals, and bank revetments.
20. The total replacement value of these assets is approximately \$170 million.

### **LAND DRAINAGE SCHEMES**

21. Land Drainage Schemes are another layer of service provided by WRC to specific geographical areas called Drainage Areas. Within the Waikato and Waipa Rivers Catchment, Drainage Areas are located within the Lower Waikato, Waipa, and Central Waikato zones. These normally cover relatively flat land where a community managed drainage network is essential to allow landowners to sustain pastoral farming.
22. The land drainage service is provided through a partnership with landowners where the Council has a stewardship responsibility to maintain a primary network of drains on private land for, and on behalf of, the various communities of landowners located within each of the drainage areas so the landowners can drain their own land for farming purposes.
23. The service is entirely funded by targeted land drainage rates and is in addition to the other zone and specific targeted rates for catchment, flood protection, biosecurity and natural heritage works. The Council manages 84 separate drainage areas regionally, or subdivisions of drainage areas, and has 92 separate funding systems that allow the necessary work programmes to be completed.
24. Within the Waikato and Waipa Rivers Catchments, WRC manages 74 Drainage Areas covering an area of approximately 149,000 hectares of land. The drainage network managed include 959 main drains having a total length of 1,084 kilometres, 12 kilometres of stopbanks, 3 pump stations, and 22 floodgates, with a total replacement value of approximately \$30 million.



## PURPOSE AND OPERATION OF FLOOD PROTECTION AND DRAINAGE SCHEMES

25. The key purpose of flood protection infrastructure is to prevent and/or reduce risks of inundation of land and property during flood events.
26. The key purpose of land drainage infrastructure is to manage ground water levels for pasture growth and land productivity.
27. Flood protection and land drainage schemes incorporate infrastructure that conveys water from the contributing catchments and discharges that water into Waikato and Waipa Rivers directly or indirectly via their tributary streams.
28. The conveyance infrastructure, which is the subject of this evidence is of several types including the following:
  - a. Main drains: These are artificial or modified waterways collecting catchment runoff from adjacent land, conveying the runoff by gravity and discharging it into Waikato/Waipā River system.
  - b. Flood Gates: These are simple conveyance structures located at the downstream end discharge points of main drains. In other words, these are culverts with a flap on the downstream end to prevent back water flow. The structure normally consists of inlet box, pipe culvert and outlet box. A flap is installed at the outlet side of the pipe to prevent flood water from flowing back into the drain. Under normal flow conditions, floodgates are opened allowing runoff to discharge in the river system. Flaps are different shapes, sizes and operating mechanisms, however they all operate under hydraulic head (eg. difference between drain water level and river water level).
  - c. Pump Station: These are structures incorporating mechanical conveyance systems located at the downstream end points of main drains. The structure normally consists of an inlet structure and sump and a discharge structure with electrically powered pump/s to lift and move flood/drainage water across a physical barrier (stopbank, high ground, etc). Under normal conditions pumps are not operated, as drainage water passes through nearby floodgates. However, there are some instances where the general drainage level of the land is lower than that of the receiving end water levels, where drainage can only be provided

mechanically by pumping. In these circumstances the pumps operate to maintain set water levels within the scheme, including to pump flood flows across the stopbank/dam.

- d. Flood Control Gates: There are three flood control gates within the LWWFCS which are designed to manage water levels and maintain adequate flood storage within Lake Waikare and Whangamarino Wetland. These are Te Onetea Gate, Lake Waikare Gate and Whangamarino Gate, which form the key elements of the Community Works section of the Scheme. These Control Gates are operated under specific rules and conditions authorised by Resource Consents.
29. The drains, floodgates and pump stations are direct conveyance (culvert like) structures, which receive runoff and move it at the same time, or within a short time frame, depending on its capacity and changes in water levels. Their operation is one of flow-through which does not constitute the addition of contaminants into the receiving waterways.
  30. The Lower Waikato Flood Control Gates are operated to regulate water levels within two significant water bodies for the purposes of flood storage. Their operation incorporates damming and diverting water under specified conditions as authorised by a suite of Consents and Environment Court Consent Orders. Again, the operation of the Gates do not constitute addition of contaminants into the receiving waters.
  31. Several weir structures were constructed as part of the LWWFCS for riverbed control and minimum water level control purposes. These are overflow, mostly submerged structures and do not affect water quality as water passes over the structures. However, as low level shallow dams, these have caused some limited sediment build up upstream depending on their height and location in the system.

## **STATUS OF FLOOD PROTECTION AND DRAINAGE SCHEMES UNDER THE WAIKATO REGIONAL PLAN**

32. The infrastructure associated with flood protection and land drainage schemes and their operation are generally exercised as permitted activities under the current Waikato Regional Plan (WRP).

33. The key applicable rule in the WRP for the continued operation of drains, flood gates, pump stations, stopbanks and other related structures is “Permitted Activity Rule 3.5.10.1 – Take, Diversion and Discharge of Water Pumped from Drainage and Flood Control Schemes”. This rule enables the take, diversion and discharges associated with rural drainage schemes lawfully established or authorised before the date of the Regional Plan subject to various conditions. If these conditions cannot be met then there is a Controlled Activity Rule 3.5.10.2 which requires a Resource Consent be sought for these activities for existing schemes.
34. The maintenance, renewal and replacement activities of flood protection and land drainage infrastructure are governed by other WRP rules. These might be permitted, controlled or discretionary depending on the nature of the work and the scale of their effect. ICMD holds comprehensive maintenance consents to enable the ongoing maintenance activities and applies for consents for specific works and activities on an as required basis.
35. ICMD holds consents for the operation and maintenance of the Control Gates and associated Pungarehu Canal, the Motukaraka Pump Stations and Motukaraka Water Take/Discharge Structure.
36. Several conditions of the discharge consent for the operation of Waikare Gate (referred to as Northern Outlet Control Structure) were the subject of review under s128 over the last 5 years. The subject of the review related to discharge of sediment laden water from Lake Waikare into the Whangamarino Wetland. ICMD are undertaking significant steps to reduce the water discharge volumes in addition to erosion protection measures downstream of the Control Gate with the aim of reducing the total sediment load entering the Whangamarino Wetland.
37. It is recognised that changes in the operation of the Control Gates could only result in limited reduction of sediment entering Lake Waikare and Whangamarino Wetland. Ability to Manage Contaminants Sourced from Land Use Activities
38. Under the WRP, many of the flood protection and drainage structures described above are considered point source discharges and I understand that under PPC1 there are requirements for point sources discharge to adopt the BPO for managing contaminants. Where there are residual effects then an off set is 'encouraged' (Policy 11). Accordingly,

I will now address the practical ability of flood protection and drainage schemes to reduce contaminants from the land use activities that they receive runoff from.

39. As described above, the structures are designed for direct conveyance of sub-catchment groundwater and runoff serviced by these structures. The structures are small in size, occupying small footprint areas and do not incorporate storage facilities and/or areas, where contaminants could be held or treated prior to discharge. Further, the volume of runoff conveyed during flood events is very large and there is no practically efficient and feasible system that can be added to these structures to treat such large volumes of water within a short period of time – recognising that holding sub-catchment runoff back behind these structures, will defeat the purpose of these structures and cause flooding of the land and loss of the service, which ICMD is obliged to deliver.
40. Holding the drainage water back without actual treatment and/or removal of contaminants for long periods of time (eg. weeks) may reduce dissolved oxygen, which when released may have a larger negative effect on the quality of the receiving water than that passing the water directly across the flood control and drainage structure. However, the service level of ICMD's managed structures provide is generally defined evacuation of runoff build up within 3 days.
41. In most, if not all instances, discharges through floodgates and pump stations involves aeration and increase in dissolved oxygen concentration due to increased flow velocity through these structures and associated turbulence.
42. That is not to say that the discharges are not managed to help protect downstream receiving environments. As I have discussed above, significant effort has been undertaken to develop operational procedures for key structures to minimise downstream hydrological and other effects. In addition, ICMD applies "Environmental Best Practice Guidelines" (doc#8814325) when undertaking maintenance and renewal of its infrastructural assets and networks. These guidelines provide practical methodologies for undertaking maintenance works with the aim of reducing sediment and associated contaminants released in the waterways.
43. However, beyond these operational measures, there are no reasonably practical options for flood protection and land drainage to remove nitrogen, phosphorus, sediment and microbial pathogens once they have been generated and discharged to the drains and

stream systems. ICMD supports PPC1 in that the key method for reducing contaminants is by reducing these at their source on land, before entering the main conveyance systems.

44. In my opinion, PPC1 should recognise that there is limited practical ability for flood protection and land drainage schemes to further reduce contaminants that are entrained in water beyond the measures that the scheme land owners will already be required to implement through the requirements of PPC1. Further, any costs of attempting to do so will be imposed back onto these same landowners within the schemes and other downstream beneficiaries.

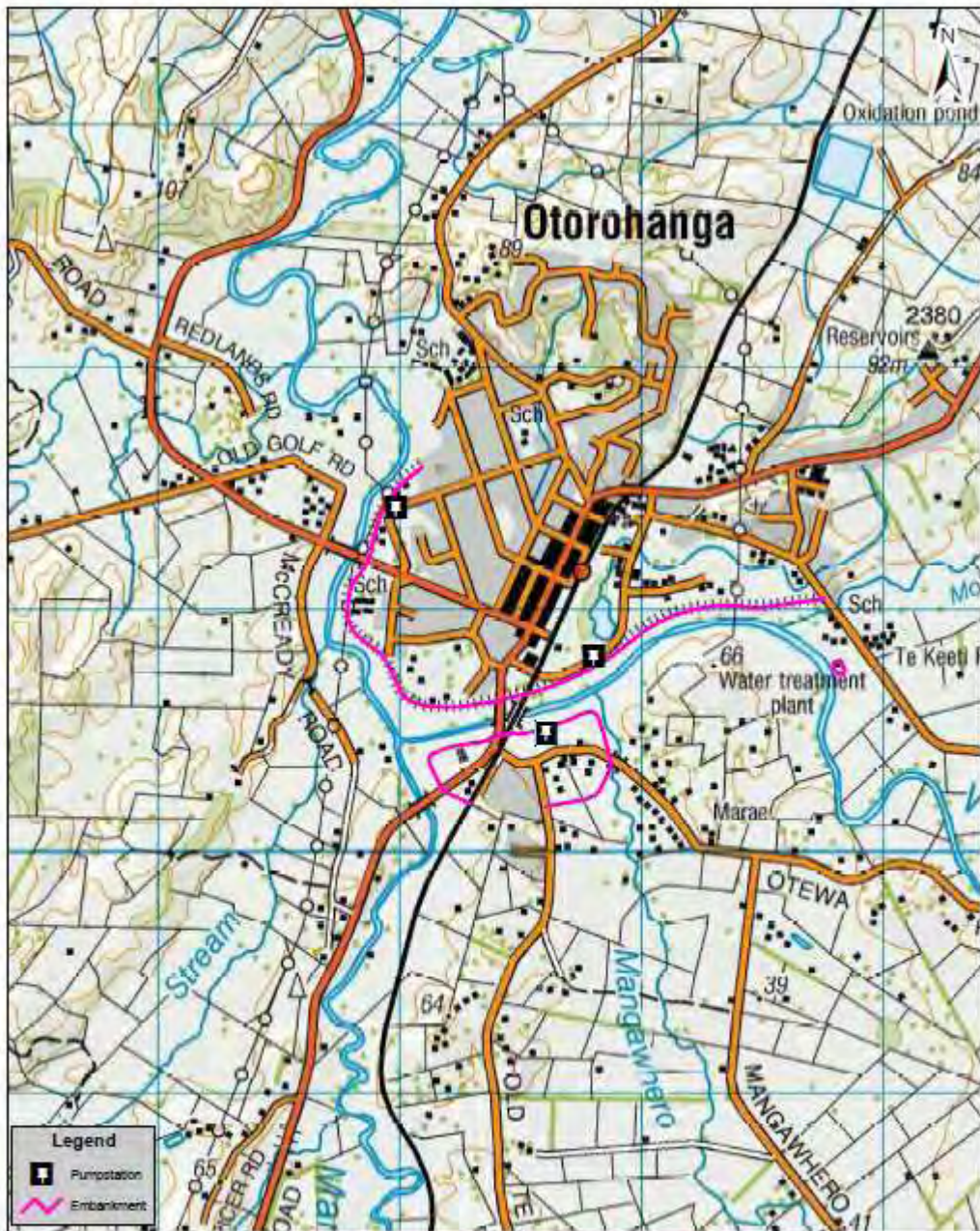
### **STOCK EXCLUSION REQUIREMENTS**

45. It has been brought to my attention that some changes are proposed to the stock exclusion requirements in Schedule C (2) to require fencing to be placed 10 metres from the edge of a drain or watercourse management by Council or a territorial authority.
46. In respect of the fencing of drains and water ways managed by Council, I advise as follows:
  - a. The majority of existing Council-managed drains and waterways are already fenced in a location that is suitable for ongoing maintenance of the channels. Most maintained drains and watercourses are otherwise adequately captured by 2 (a) with some falling into 2(b) of Schedule C;
  - b. Most Council drains are on private land and a 10 metre wide strip with no stock access will require ongoing maintenance by the landowner and the cost of shifting the existing fences will be significant for landowners.
  - c. Maintenance activities are undertaken for short periods each year, only a matter of hours per year for each property involved.
  - d. The existing WRP Rule 4.2.18.1 largely addresses ICMD's need to ensure access for maintenance purposes is not impeded

47. In my opinion, this change is not required to enable efficient maintenance of drains. Mr Mayhew will address the planning issues and provide an option which ensures that any fencing required under Schedule C does not conflict with the existing requirements under Rule 4.2.18.1.

Ghassan Basheer

APPENDIX



**Legend**

- Pumpstation
- Embankment

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**Waipa Zone  
 - Otorohanga**

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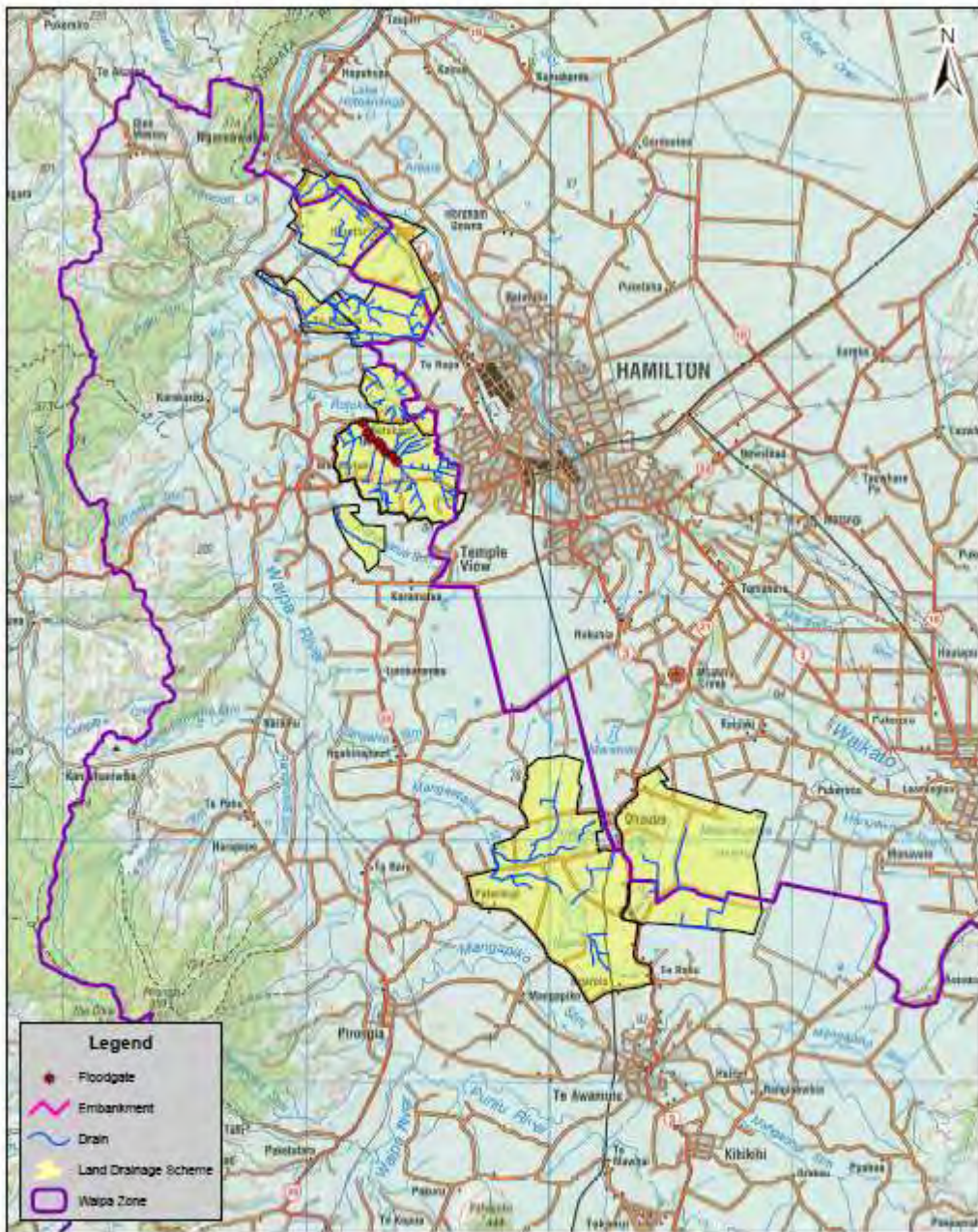


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## Waipa Zone



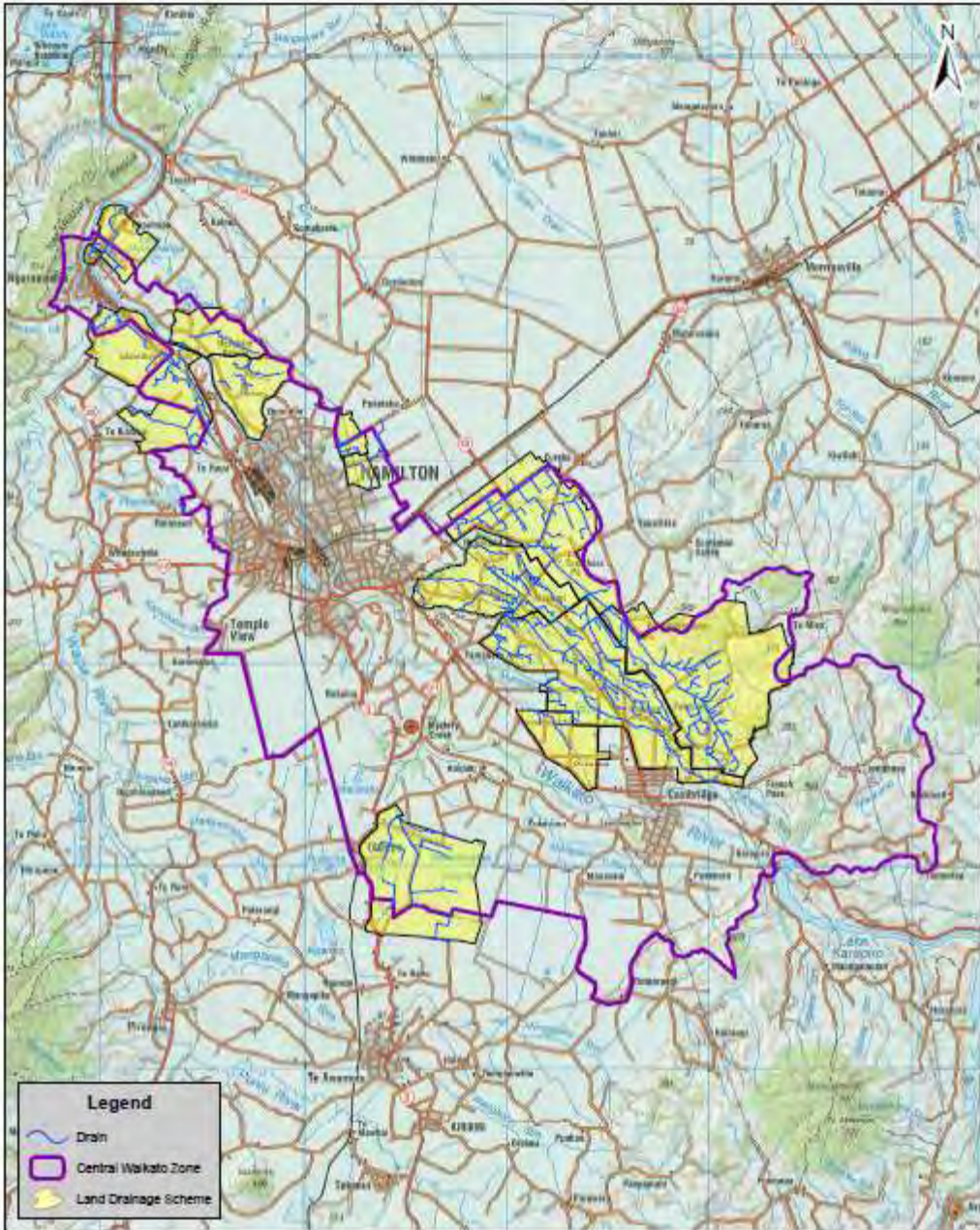
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 File: REQ149133\_Waipā  
 Flood Assets and Drainage



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**Legend**

-  Drain
-  Central Waikato Zone
-  Land Drainage Scheme

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**Central Waikato Zone**

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**Lower Waikato Zone**

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0 3 6 9 12 15 18 km  
 Scale of A3  
 = 1:300,000

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