



# **Kaituna River Re-diversion and Ongatoro/Maketu Estuary Enhancement Project**

## **Notice of Requirement and Resource Consent Application**

Bay of Plenty Regional Council  
5 Quay Street  
PO Box 364  
Whakatane 3158  
NEW ZEALAND

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Prepared by:



Opus International Consultants Ltd  
Concordia House, Pyne Street  
PO Box 800  
Whakatane 3158  
NEW ZEALAND

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Cover Photos:

Oblique aerial photos of (from left to right) Te Tumu Cut, Ford's Cut and Ongatoro/Maketu Estuary, and Maketu Township and entrance - Shane Iremonger, May 2014



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- Full pre-consent consultation report (Opus, 2013)
- Numerical Modelling (DHI, 2014)
- Maketu Estuary: Effect of Proposed Re-Diversion on Coastal Erosion (ECONOMOS, 2014)
- Summary of Effects Resulting from Water Level Changes, (Waterline, 2014)
- Terrestrial, Avian and Wetland Restoration Ecology (Opus, 2014)
- Ongatoto/Maketu Estuary Condition and Potential Ecological Effects (River Lake, 2014)
- Microbiological health risk of bathing and shellfish gathering (River Lake, 2014)
- Extent of wetland vegetation in Maketu Estuary - 1939 to 2011 (BoPRC, 2014)
- Social and Recreational Use Patterns (Bay of Plenty Polytechnic, 2014)
- Construction Description (Waterline, 2014)
- Cultural Impact Assessments (Various, 2014)<sup>1</sup>
  - Ngati Rangiwewehi
  - Ngati Whakaue ki Maketu
  - Tapuika
  - Waitaha, Ngati Makino, Ngati Pikiāo, and Ngati Tunohopu

## **Volume C**

- Construction Drawings
- Designation Plan

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<sup>1</sup> The author of the Waitaha, Ngati Makino, Ngati Pikiāo, and Ngati Tunohopu CIA have authorised release of the full CIA report to the consent authorities, but have requested it not be distributed to the wider public without their express permission.

# Notice of Requirement for a Designation

*Pursuant to Section 168(1) of the Resource Management Act 1991 (RMA)*

**TO: WESTERN BAY OF PLENTY DISTRICT COUNCIL**  
**Private Bag 12803**  
**Tauranga 3143**

**FROM: BAY OF PLENTY REGIONAL COUNCIL**  
**Natural Resource Operations**  
**PO Box 364**  
**Whakatane 3158**

Notice is given to Western Bay of Plenty District Council (WBoPDC) of a requirement by the Bay of Plenty Regional Council (BoPRC) for a designation of land for the construction, operation, and maintenance of the Kaituna River Re-diversion and Ongatoro/Maketu Estuary Enhancement Project.

## **1. The site to which the requirement applies is as follows:**

The extent of the proposed designation is shown on the Designation Plan and included as **Attachment 1**.

The Requirement applies to land owned by Western Bay of Plenty District Council, the Crown and private property owners. A schedule of the land to be designated and the legal description of that land is included as **Attachment 2**.

The Requirement is for the designation of land required for temporary construction activities (shown in purple on the designation plan), and of land required for construction of facilities and for the long term operation, access, inspection and maintenance and enhancement of the work (shown in blue on the designation plan). The designation of land for temporary construction activities will be uplifted once construction is complete, where reasonable.

Bay of Plenty Regional Council requires that the designation be included on the relevant planning maps and schedules in the District Plan applying to the land subject to the designation.

The location to which this Notice applies is generally described as land in the area of the lower Kaituna River and Ongatoro/Maketu Estuary (the estuary).

## **2. The nature of the proposed works is as follows:**

### *Project Summary*

Bay of Plenty Regional Council is proposing to re-divert water from the Kaituna River back into Ongatoro/Maketu Estuary (the estuary), establish wetlands, provide recreational opportunities, and undertake associated works. The re-diversion is a key component of the Kaituna River and Ongatoro/Maketu Estuary Strategy.

The re-diversion of water will involve the construction of a new channel linking the Kaituna River to the estuary via a series of culverts under Ford Road and the widening of Ford's Cut, which currently links the river to the estuary. To maximise the volume of freshwater that is diverted a salinity block will be constructed with natural materials. Wetlands will be created in two areas.

The Project will maximise ecological and cultural benefits. Over time the works will significantly improve the ecological health of the upper estuary; stop sedimentation issues in the lower estuary; increase the wetland area; and constitutes a significant step towards addressing the adverse effects of past modifications that have led to the degradation of the mauri of the river and estuary over time.

#### *Proposed Works*

The proposed works within the land to be designated involve the construction, operation, and maintenance of channels and culverts, associated establishment of wetlands, provision of recreational opportunities, and all associated activities.

The physical features and works will occur both above and below ground level and in water. In summary, the physical features of the proposed works within the area covered by the Notice include:

- Adding more culverts to the existing Ford's Cut culverts to create a larger inlet structure to allow more water from the river into the estuary and prevent return flow
- Excavating a channel from the river 1km upstream of Ford Road to meet the existing channel near Ford's Cut. This will require relocation of the stopbank to the south
- Blocking the downstream section of Ford's Loop (between Ford's Road and Ford Island) and construction of new moorings.
- A new public boat ramp and car parking, including provision for future additional car parking (subject to confirmation of funding)
- Widening and deepening of Ford's Cut
- Removal of the stopbanks around the land north of Ford's Cut and causeways in the upper estuary between Papahikahawai Island and Maketu Spit
- Reuse of excess material by spreading on land
- Shaping and restoring appropriate wetland ecosystems on low-lying areas of the land north of Ford's Cut.
- Accommodation of all of the required physical works
- Services relocation, temporary traffic management and all associated construction activities
- Site establishment activities, including storage of plant, equipment and materials; erosion and sediment control; machinery working and safety areas

Construction activities associated with the proposed works include the removal of vegetation, earthworks, relocation of services, establishment of a construction yard and lay down areas, traffic management, works in watercourses, works in the coastal marine area, construction of the physical works, restoration of wetlands, commissioning, installation and operation of monitoring equipment, and site reinstatement. Ongoing works include any other activities necessary for the long term operation and maintenance of the Project.

### **3. The nature of the proposed restrictions that would apply to the designated area as follows:**

The specific restrictions and conditions that would apply are as follows:

- Conditions that will apply to Bay of Plenty Regional Council when undertaking works authorised by the designation.

Designation Notation:

*"Kaituna River Re-diversion and Ongatoro/Maketu Estuary Enhancement"*

Explanatory note:



*“Kaituna River Re-diversion and Ongatoro/Maketu Estuary Enhancement” for the purpose of this designation shall enable works, in the absence of specific conditions to the contrary, to:*

- *Protect and, as practicable, enhance the integrity, form, functioning and resilience of the estuary and its ecosystems*
- *Enhance mauri*
- *Increase the volume of water flowing from the Kaituna River into Ongatoro/Maketu Estuary*
- *Improve the hydrological connectivity and functioning of the Ongatoro/Maketu Estuary*
- *Reduce accelerated sedimentation and associated adverse effects, including exacerbated erosion of adjacent shorelines*
- *Improve the ecology, and over time the water quality, of the Ongatoro/Maketu Estuary environment*
- *Establish and manage wetlands and adjacent ecosystems within and around Ongatoro/Maketu Estuary*
- *Support and promote kaitiakitanga and stewardship*
- *Improve opportunities for public access to and enjoyment of Ongatoro/Maketu Estuary*
- *Improve the resilience of the estuary and its various ecosystems to the effects of projected climate change*
- *Undertake works to avoid, remedy, or mitigate any adverse effects arising from the re-diversion.*
- *Monitor changes to the environment following the re-diversion.”*

In addition, the requirements of Section 9(4) and 176(1)(b) of the Resource Management Act 1991 (RMA) will apply. That is no person may, without the prior written consent of Bay of Plenty Regional Council, do anything in relation to the land that is subject to the designation that would prevent or hinder the work authorised by the designation.

It is proposed that works authorised by the designation will be subject to the conditions included in **Attachment 3** of this notice.

#### **4. The effects of the proposed work on the environment and proposed mitigation measures are:**

An assessment of the potential effects and the measures to avoid, remedy, or mitigate any potential adverse effects are set out in Part A Sections 8-9 of the accompanying report titled “Assessment of Environmental Effects” (hereafter referred to as the “accompanying AEE”).

##### *Positive Effects*

The proposed work is a significant step towards addressing past modifications that have led to the degradation of the ecology and mauri of the river and estuary over time. In summary, the Project will result in a new equilibrium being reached and the following positive effects:

- A significant improvement in the ecological health of the estuary, and particularly the upper estuary:
  - the flushing of amounts of excessive amount of accumulated algae and improved diversity and abundance of benthic fauna;
  - improved food supply for kaimoana such as cockles;
  - an increased likelihood of seagrass re-establishing in the estuary;
  - improved dissolved oxygen levels leading to improvements in the extent of habitat suitable for fish;

- the increase in wetland area will provide the potential for increase in wetland bird diversity and abundance; and
- up to 20 hectares of wetland will be created
- Stopping and partial reversal of the sedimentation issues in the lower estuary
- Significant reduction in the erosion risk on the shorelines adjacent to the flood tide delta
- Improved recreational opportunities and public foot access to the upper estuary from Ford Road as part of the wetland restoration, and a new public boat ramp and car parking at Ford Road (subject to confirmation of funding).

### *Potential Adverse Effects*

During construction, there will be a range of potential adverse effects within the immediate vicinity of the works area, including recreation and public access effects, vegetation effects, noise effects, archaeological and cultural heritage effects, erosion and sediment effects and visual effects. These will be temporary and can be mitigated with appropriate construction management. The potential adverse effects during construction include: recreation and public access effects, vegetation effects, noise effects, archaeological and cultural heritage effects, erosion and sediment effects and visual effects.

Post construction there will be some potential adverse effects but, where necessary, these will be addressed through mitigation and proposed monitoring and contingency conditions. In summary the potential adverse effects post construction include:

- A very minor impact on the percentage of time (from 2% to 3.3%) that the New Zealand guidelines for bathing suitability will be exceeded within the lower estuary<sup>2</sup>
- A slight exacerbation of the existing exceedance of the shellfish gathering guidelines in the estuary (2% to 9%). In practical terms this is expected to have very little if any impact on the existing situation for gathering shellfish. Currently it is recommended that shellfish are not gathered for up to 5 days following rainfall, and the Project will not change this situation. This impact is predicted to lessen over time.<sup>2</sup>
- A small increase in the concentration of nitrogen due to external loads in the mid and lower estuary (but this will be offset by reduced internal loads of nitrogen, and likely to be negated by the increased flushing from removing causeways and blockages in the estuary, and the extra volume of water re-diverted from the Kaituna River)
- Some changes in species composition of the vegetation in parts of an existing wetland in response to the predicted increase in salinity in the lower Kaituna River

Once completed, the Project will improve recreational access and substantial ecological beneficial effects are anticipated. The diversity and abundance of indigenous plants and animals will increase substantially as a result of the increased area of high value habitat and increased biological productivity.

The conditions proposed to avoid, remedy, or mitigate any potential adverse effects are set in **Attachment 3** of this Notice.

## **5. Alternative sites, routes and methods have been considered to the following extent:**

An evaluation of the alternative sites, routes, and methods considered for the proposed works has been undertaken and is set out in Section 6 of the accompanying AEE. It concludes that the proposed work is the best alternative, given the constraints of leaving Te Tumu Cut open and when considering the environmental, social, cultural, and economic parameters. That is, it is the alternative with the best overall outcome and which is able to be managed in a way

<sup>2</sup> Bacteria levels in the Kaituna River have decreased significantly since 1989 and are expected to continue declining, demonstrating that this aspect of water quality is improving.

which avoids, remedies or mitigates potential adverse effects, at a reasonable cost, and which therefore best meets the objectives (set out below).

The Project was formally settled upon as the preferred option for re-diversion of the Kaituna River in September 2013, following a number of feasibility studies that began in 2001. Full river re-diversion and partial re-diversion were considered. Multiple options have been evaluated and assessed taking into account feasibility, constraints, fresh to saltwater rations, wetland creation, and land access. All options were assessed against the Project Objectives.

Alternative locations for the contractor's site have been considered with the process of aiming to minimise impacts on landowners, site features, uses, and values.

Alternative construction methods have been considered and will continue to be considered as part of the detailed design process and further development of the construction methodology.

**6. The proposed work and designation are reasonably necessary for achieving the objectives of the Requiring Authority because:**

The Project Goal is:

*To significantly increase the volume of water (particularly fresh water) flowing from the Kaituna River into Ongatoro/Maketu Estuary by 2018 in a way that maximises the ecological and cultural benefits (particularly wetlands and kaimoana) while limiting the economic cost and adverse environmental effects to acceptable levels.*

To achieve the Project Goal, the specific objectives for the proposed works are as follows:

- 1. To work in an open, transparent and fair way that engages tangata whenua, the local community and other stakeholders and recognises their views and aspirations. This objective shall be achieved and measured by implementing and continually updating the project Communications and Engagement Plan..., including reviews of performance at least every six months.*
- 2. To determine the optimal path, volume and configuration of a Kaituna River re-diversion option that maximises ecological and cultural benefits while limiting economic costs and environmental effects to acceptable levels by modelling, expert advice, published literature and one phase of pre-consent community consultation by February 2014.*
- 3. To determine the optimal location, size, function, cost and restoration potential of at least 20 hectares of new wetlands to be created during the implementation of the re-diversion by February 2014.*
- 4. To lodge applications for any consents, designations or other permissions required to achieve the project goal by June 2014.*
- 5. To obtain all consents, designations, permissions and land required to achieve the project goal by October 2015, subject to legal processes.*
- 6. To begin the staged implementation of consented works by October 2015.*
- 7. To complete consented capital works by June 2018.*
- 8. To seek opportunities to achieve the non-funded actions in the Kaituna River and Ongatoro/Maketu Estuary Strategy through other council programmes or partnerships without compromising achievement of objectives 1 to 7, where such opportunities arise.*
- 9. To report publicly on progress against all actions in the Kaituna River and Ongatoro/Maketu Estuary Strategy each year.*

The proposed works and designation are reasonably necessary for achieving these objectives because:

- The proposed work is the most effective and efficient way in which to meet the Goal and Objectives as set out above
- The Project is set up to implement part of the Kaituna River and Ongatoro/Maketu Estuary Strategy in response to long-standing tangata whenua and community concerns about environmental degradation
- The designation allows Bay of Plenty Regional Council and/or its authorised agents to undertake works in accordance with the designation
- The designation enables the proposed works to be undertaken in a comprehensive and integrated manner

**7. The following resource consents are needed for the proposed activity and have been applied for:**

- Earthworks, vegetation clearance, and wetland works
- Occupation of space, erection of structures, reclamation, disturbance, excavation, and deposition of material in the coastal marine area
- Damming, taking and discharge of coastal water
- Erection of structures, disturbance to the bed of watercourses
- Damming, diversion and taking of water
- Discharge of water and other contaminants to land, water, and air

**8. The following consultation has been undertaken with parties that are likely to be affected:**

The Bay of Plenty Regional Council has consulted with groups and individuals considered to have a particular interest in the Project and its effects on the environment.

- Directly affected landowners and landowners adjacent to construction sites
- Tangata whenua
- Kaituna Catchment Control Scheme Ratepayer Liaison Group
- Bay of Plenty Regional Council staff including the Harbourmaster and Rivers and Drainage representatives
- Western Bay of Plenty District Council staff
- Other agencies - Department of Conservation, Fish and Game, Coastguard, Heritage New Zealand, New Zealand Transport Agency
- Recreational users
- Commercial operators
- Environmental interest groups (including Maketu Ongatoro Wetland Society)
- Wider community (via newsletters and open days)

The consultation undertaken to date is described in Section 7 of the accompanying AEE. Consultation is ongoing.

**9. Bay of Plenty Regional Council attaches the following information required to be included in this notice by the District Plan, Regional Plan, or any regulations made under the RMA:**

The following additional information is attached to this Notice:

- Attachment 1: Designation Plan
- Attachment 2: Schedule of land included in the designation
- Attachment 3: Proposed designation conditions

Supporting information is also included in the accompanying Assessment of Effects on the Environment (AEE). The AEE comprises:

**Volume A: Assessment of Effects on the Environment Report**

- Relevant Plan Schedules
- Relevant Objectives and Policies
- Proposed Designation and Resource Consent Conditions

**Volume B: Technical Assessments**

- Summary and Analysis of Options and Alternatives (BoPRC, 2013)
- Full pre-consent consultation report (Opus, 2013)
- Numerical Modelling (DHI, 2014)
- Maketu Estuary: Effect of Proposed Re-Diversion on Coastal Erosion (ECONOMOS, 2014)
- Summary of Effects Resulting from Water Level Changes, (Waterline, 2014)
- Terrestrial, Avian and Wetland Restoration Ecology (Opus, 2014)
- Ongatoro/Maketu Estuary Condition and Potential Ecological Effects (River Lake, 2014)
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- Social and Recreational Use Patterns (Bay of Plenty Polytechnic, 2014)
- Construction Description (Waterline, 2014)
- Cultural Impact Assessments (Various, 2014)<sup>3</sup>
  - Ngati Rangiwewehi
  - Ngati Whakaue ki Maketu
  - Tapuika
  - Waitaha, Ngati Makino, Ngati Pikiāo, and Ngati Tunohopu

**Volume C: Drawing Set**

- Designation Plan (Opus, 2014)
- Construction Drawings (Waterline and Opus, 2014)

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Pursuant to authority delegated by  
the Bay of Plenty Regional Council

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Date:

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<sup>3</sup> The author of the Waitaha, Ngati Makino, Ngati Pikiāo, and Ngati Tunohopu CIA have authorised release of the full CIA report to the consent authorities, but have requested it not be distributed to the wider public without their express permission.

**Address for Service:**

Bay of Plenty Regional Council  
c/- Opus International Consultants Ltd  
Concordia House, Pyne Street  
PO Box 800  
Whakatane 3158

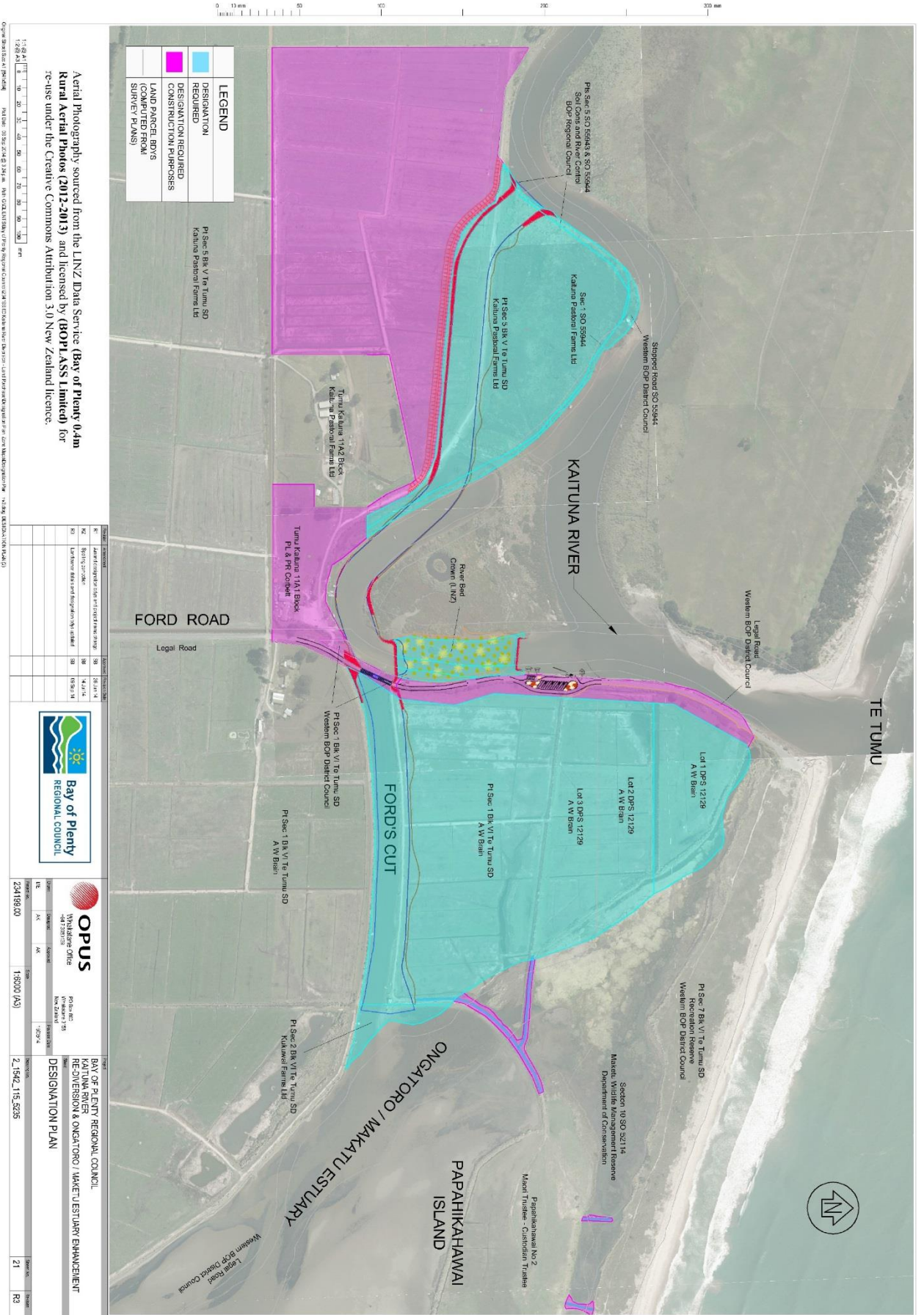
Attn: Stephanie Brown

Ph: (07) 308 0139

Fax: (07) 308 4757

Email: [stephanie.brown@opus.co.nz](mailto:stephanie.brown@opus.co.nz)

# Attachment 1 Designation Plan



Aerial Photography sourced from the LINZ Data Service (Bay of Plenty 0.4m Rural Aerial Photos (2012-2013)) and licensed by (BOP) MASS Limited for re-use under the Creative Commons Attribution 3.0 New Zealand licence.

Color	Legend
Cyan	DESIGNATION REQUIRED
Magenta	DESIGNATION REQUIRED CONSTRUCTION/IMPROVEMENTS
Yellow	LAND PARCEL BOUNDARIES (COMPILED FROM SURVEY PLANS)

RI	RE	REASON	REASON	REASON	REASON
RI	RE	REASON	REASON	REASON	REASON



**OPUS**  
 Waiwaka Office  
 441-250153  
 New Zealand

Project	Project No.	Project Name	Project Date	Project Status
BAY OF PLENTY REGIONAL COUNCIL	KAITUNA RIVER REVISION & ONGATORO / MAKATU ESTUARY ENHANCEMENT	DESIGNATION PLAN	2-19-2025	15-03-2025





## Attachment 2 Schedule of land included in the designation

Parcel #	Landowner	Legal Description	Title	Designation Required (Area ha)	Designation Required for Construction Purposes (Area ha)
1	Western BOP District Council	Stopped Road SO 55944	H954402.1 GN	0.8430	-
2	BOP Regional Council	Pts Sec 5 SO 55943 & SO 55944 Soil Cons and River Control	B051051 GN	0.5110	-
3	Kaituna Pastoral Farms Ltd	Pt Sec 5 Blk V Te Tumu SD, Sec 1 SO 55944	SA445/229	12.4230	23.3100
5	Kaituna Pastoral Farms Ltd	Tumu Kaituna 11A2 Block	SA979/136	-	0.3240
6	PL & PR Corbett	Tumu Kaituna 11A1 Block	SA28A/1100	-	2.9315
7	Western BOP District Council	Pt Secs 1 Blk VI Te Tumu SD (SO 38964)	GN 1961 p1335	0.1820	0.0936
8	AW Brain	Lot 1 DPS 12129, Lot 2 DPS 12129, Lot 3 DPS 12129 and Pt Sec 1 Blk VI Te Tumu SD	SA25A/575 SA25A/576 SA25A/577 SA25A/578	29.903	-
9	Kukuwai Farms Ltd	Pt Sec 2 Blk VI Te Tumu SD	SA220/249	0.6950	-
10	Crown (LINZ)	River Bed	No registration	0.9810	-
11	Maori Trustee - Custodian Trustee	Papahikahawai No.2 Block	331977	-	0.2650
12	Western BOP District Council	Pt Sec 7 Blk VI Te Tumu SD (Recreation Reserve)	GN 1981 p2585	-	0.0260
13	Department of Conservation	Section 10 SO 52114 (Maketu Wildlife Management Reserve)	GN 1995 p3510	-	0.0820
14	Western BOP District Council	Ford Road	Legal Road	0.4385	3.3800
TOTAL				45.9765	30.4121



## **Attachment 3 Proposed Conditions**

Note: these proposed conditions are subject to further refinement.

### **DEFINITIONS**

“District Council” means the Western Bay District Council’s Chief Executive Officer or nominee

“Requiring Authority” means the Bay of Plenty Regional Council

“RMA” means Resource Management Act 1991

“Project” means the Kaituna River Re-Diversion and Ongatoro/Maketu Estuary Enhancement Project and associated activities

“Works” means the construction works required to give effect to the Project

### **GENERAL CONDITIONS**

1. The Requiring Authority shall submit an Outline Plan of Works (OPW) for the Project in accordance with section 176A of the RMA, unless the District Council has waived the requirement for an OPW under section 176A(2)(c) of the RMA.
2. The District Council shall be notified in writing of the intention to commence construction work at least two months prior to the start of any construction activities on site.
3. Prior to commencement of works the Requiring Authority or their agent shall arrange and conduct a pre-construction site meeting between the District Council and all relevant parties, including the primary contractor. At a minimum, the following shall be covered at the meeting:
  - a) Scheduling and staging of the works
  - b) Responsibilities of all relevant parties
  - c) Contact details for all relevant parties
  - d) Expectations regarding communication between all relevant parties
  - e) Procedures for implementing any amendments to the management plans submitted
  - f) Site inspection
  - g) Confirmation that all relevant parties have copies of the contents of this consent document and all associated erosion and sediment control plans and methodology.
4. All operational personnel involved with the construction of the Project shall be made aware of, and have access to, all designation documents, conditions and schedules applicable to the construction of the Project.

### **COMPLAINTS**

5. The Requiring Authority upon receipt of any complaint in relation to construction shall promptly investigate the complaint, where appropriate remedy or mitigate the cause of the complaint and inform Bay of Plenty Regional Council as soon as practicable, but no later than 48 hours of receiving the complaint, of the details of the complaint and the action taken.
6. The Requiring Authority shall maintain and keep a complaint register for all aspects of operations in relation to construction activities. The register shall record the date, time and type of complaint, cause of the complaint, the action taken by the Requiring Authority in

response to the complaint and steps to prevent a reoccurrence. The register shall be available to the District Council at all times.

### **CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN**

7. At least one month prior to the commencement of construction activities the Requiring Authority shall submit to the District Council the Construction Environmental Management Plan (CEMP) outlining the construction activities and all practices and procedures to be adopted in the construction of the Project.
8. The objectives of the Construction Environmental Management Plan (CEMP) shall be:
  - a) To ensure that construction activities achieve compliance with conditions for these activities.
  - b) To minimise the environmental nuisance effects of construction activities.
  - c) To ensure that disturbance is limited to that necessary to undertake the construction works.
  - d) To minimise the release of sediment during disturbance to the bed of any waterway.
  - e) How the disturbance of the beds and margins of the coastal marine area and waterways will be limited to the extent necessary to undertake construction works, and avoid or mitigate adverse effects on the quality and passage of coastal and surface water and aquatic habitat.
  - f) To ensure that disturbance does not cause flooding or erosion.
9. The CEMP will address, as a minimum, the following aspects of the works:
  - a) Timing of construction works
  - b) Working hours
  - c) Restrictions on public access
10. The following Supplementary Management Plans shall form subsets of the main CEMP:
  - a) Erosion, Sediment & Dust Control Plan
  - b) Construction Traffic Management Plan
  - c) Commissioning Plan
11. In the event of any conflict between resource consent conditions and CEMP practices and procedures, the resource consent conditions shall be complied with.
12. The CEMP may be amended at any time provided that any amendments made maintain or enhance the degree and / or extent to which adverse environmental effects attributable to the construction, maintenance or operation of the Project are avoided or mitigated; and those amendments do not result in non-compliance with any resource consent condition.

**Note:** For clarity, the plans in conditions 10(a) and (c) relate to matters within the functions of Bay of Plenty Regional Council and not those of Western Bay of Plenty District Council.

### **COMPLIANCE WITH CEMP**

13. The Requiring Authority shall implement and comply with the CEMP and the Supplementary Management Plans set out in Conditions 7 to 12 inclusive.

### **TRAFFIC MANAGEMENT**

14. The Requiring Authority shall submit a Construction Traffic Management Plan (CTMP) to the Road Asset Manager for certification at least 15 Working Days prior to commencement of the works. The purpose of the CTMP is to outline the proposed procedures, requirements and

standards necessary for managing the traffic effects of the works to achieve the outcomes and standards contained in Conditions 15 to 19 inclusive.

15. Construction shall not commence until the Requiring Authority has received the Road Asset Manager's written certification of the CTMP.
16. In managing traffic during the works, the Requiring Authority shall achieve the following outcomes
  - a) Minimise the disruption to users of local travel routes; and
  - b) Maintain a safe passage for all travel routes, including road, river and footpath users affected by the Work.
17. The CTMP shall be consistent with the version of the New Zealand Transport Agency Code of Practice for Temporary Traffic Management (COPTTM) which applies at the time the CTMP is prepared. Where it is not possible to adhere to this standard, the COPTTM's prescribed Engineering Exception Decision (EED) process will be followed, which will include appropriate mitigation measures agreed with the Road Asset Manager.
18. The CTMP shall, as a minimum, address the following aspects of construction traffic:
  - a) Construction sequence and methodology for all traffic activity associated with the Project.
  - b) Hours of operation, including times and days when traffic-generating activities would occur.
  - c) Description of the types of vehicles that will be used on public roads.
  - d) Details and locations of where works will occur within the road reserve and the method of traffic management control to be used.
  - e) Management strategies where full compliance with safety standards may not be achieved, including active control of traffic at locations where full safe stopping distances cannot be achieved for the temporary traffic volumes expected.
  - f) Description of routes for haulage of materials on public roads, and measures for ensuring the road network is maintained in a satisfactory condition.
  - g) How provision will be made for access to affected properties during construction.
  - h) Temporary work-site access arrangements.
  - i) Procedures for liaison between the community, the Requiring Authority, the contractor and the relevant road controlling authorities about traffic related matters.
  - j) Monitoring of road closures and deviations to ensure that excessive disruption or traffic hazards are not created.
  - k) Monitoring of hazardous traffic conditions arising from dust on public roads.
  - l) On-going monitoring of traffic conditions to ensure road safety is maintained.
19. The Requiring Authority shall take the best practicable option to avoid the deposit of debris onto public roads during the construction period. Any facilities required to achieve this outcome shall be installed prior to works commencing.

#### **CONSTRUCTION NOISE**

20. The Requiring Authority shall ensure that all works shall be designed and carried out to ensure that the noise from the work complies with the New Zealand Construction Standard NZS6803:1999 "Acoustics - Construction Noise" at all times at 1 metre from the most exposed façade of any existing occupied dwelling.

## **EROSION, SEDIMENT AND DUST CONTROL**

21. The works shall not cause noxious, offensive or objectionable levels of dust beyond the designation boundaries.
22. An Erosion, Sediment and Dust Control Management Plan (ESDCP) will be prepared as part of the CEMP in accordance with Bay of Plenty Regional Council Guideline No. 2010/01 - "Erosion and Sediment Control for Land Disturbing Activities" and shall give effect to :
  - a) Best practicable methods for controlling dust emissions during construction;
  - b) Procedures for monitoring the effectiveness of the controls;
  - c) A complaints procedure; and
  - d) Inspection and auditing procedures and contingency plans for if controls fail.

## **ACCIDENTAL DISCOVERY PROTOCOL**

23. In the event of any archaeological site or koiwi being uncovered during the exercise of this consent, activities in the vicinity of the discovery shall cease. The Requiring Authority shall:
  - a) notify the District Council
  - b) consult with the relevant iwi and where appropriate ensure procedures are undertaken in accordance with:
    - i) Ngati Rangiwewehi koiwi and accidental discovery protocol
    - ii) Waitaha Raupatu Trust, Ngati Makino Heritage Trust, Komiti o Ngati Pikao (Ki Maketu), Ngati Tunohopu Accidental Discovery Protocols
    - iii) Te Taonga Tuturu Act - immediate notification of Tapuika representatives in the event that a site or objects of significance is discovered during works.

## **WETLAND PLAN**

24. A Wetland Plan shall be prepared and submitted to the District Council at least two months prior to the first planting season.
25. The objectives of the Wetland Plan shall be:
  - a) to demonstrate how works will be undertaken such that the land available results in a state where there is a sustainable cover of indigenous plants that is as close to the original natural species diversity that can be achieved taking into consideration the substantial and irreversible human-induced changes that have occurred to the landscape surrounding the estuary
26. The Wetland Plan shall provide details of how the above objective is to be achieved, including:
  - a) A map showing the locations of the proposed work;
  - b) Identification of the personnel or organisations that would carry out the work;
  - c) The timescale of activities;
  - d) Initial monitoring of site growing conditions (especially soil salinity, soil saturation, tidal induced sediment erosion and deposition) after re-diversion;
  - e) Creation of a planting zone plan based on site growing conditions and species tolerances;
  - f) Trial planting of plant species especially in areas where growing conditions are likely to be challenging (e.g. areas exposed to open tidal water and those with higher salinity);
  - g) Details of mass planting once species can be matched to site conditions with high confidence of success;

- h) Restoration planting plan produced that details the planting zones, species mixes, plant grades, site preparation and post-planting maintenance requirements;
  - i) Monitoring plan to objectively measure plant and species performance; and
  - j) Weed and pest control for each area and
27. The Requiring Authority may amend the Plan from time to time provided that the amendments have been made to improve wetland creation works or to reduce adverse environmental effects. Any updates to the Plan will be submitted to the District Council in advance of the relevant works commencing.
28. The Requiring Authority shall undertake all wetland works and weed and pest control in accordance with the Wetland Plan.

**Advice Note:** The Requiring Authority will be seeking an archaeological authority from Heritage New Zealand under section 12 of the Historic Places Act 1993, prior to the commencement of construction. The authority may include requirements for detailed investigations and monitoring effects and are also likely to require the preparation of a Heritage Management Plan (or an Archaeological Management Plan).

A lapse period of 10 years is sought.





# Form 9: Application for Resource Consent

*Pursuant to Section 88 of the Resource Management Act 1991 (RMA)*

**TO: BAY OF PLENTY REGIONAL COUNCIL**  
Resource Consents  
PO Box 364  
Whakatane 3158

**FROM: BAY OF PLENTY REGIONAL COUNCIL**  
Natural Resource Operations  
PO Box 364  
Whakatane 3158

(NOTE: address for service given below)

**1. Bay of Plenty Regional Council (BoPRC) applies for the following types of resource consent:**

Consent Type	Activity	Term Sought
Land use consent s9 RMA	Earthworks to create the proposed channel, widening of Ford's Cut, realignment and maintenance of the stopbank, removal of existing stopbanks, works to create wetland areas, realignment of Ford Road, filling of land, vegetation clearance as part of earthworks, enhancement of wetlands and vegetation clearance associated with construction of the proposed diversion channel	35 years
Coastal Permit S12 RMA	Occupation of land in the CMA by structures	35 years
	The erection/placement of culverts, moorings boat ramp facilities, wooden pole breakwater, monitoring equipment, footbridge and rock protection works (structures) and associated deposition on, and disturbance of, the foreshore and seabed including filling of areas and extraction of material	35 years
	Removal, damage, modification or destruction of indigenous vegetation, introduction of plants	35 years
	Reclamation of land	No term required
	Taking, diverting and damming of coastal water for construction purposes	35 years
Land use consent s13 RMA	Rock protection works along proposed channel and disturbance associated with constructing the opening of the channel where it is in the bed of the river	35 years
	Placement of a culvert and associated disturbance to maintain flows to the Lower Kaituna Wildlife Management Reserve	35 years
Water permit s14 RMA	To divert water from the Kaituna River down the new diversion channel (the point of diversion is above the CMA boundary) to the estuary, and from the Kaituna River through an additional culvert to the Lower Kaituna Wildlife Management Reserve	35 years

Consent Type	Activity	Term Sought
Discharge permit s15 RMA	The discharge of dewatering water, stormwater and water and contaminants to land, water and air from construction activities	35 years

**2. A description of the activity to which the application relates is:**

To enable the re-diversion of water from the Kaituna River back into Ongatoro/Maketu Estuary (the estuary), the establishing of wetlands, and undertaking associated works to achieve the Project Goal.

Further details are contained in the Assessment of Effects on the Environment (AEE) Report and appendices, and supporting Volumes B and C, which are attached to and form part of this resource consent application.

**3. The names and addresses of the owner and occupier of the land to which the application relates are as follow:**

Owner / Lessee	Address
Western Bay of Plenty District Council	Private Bag 12803, Tauranga 3143
Bay of Plenty Regional Council	PO Box 364, Whakatane 3158
Kaituna Pastoral Farms Ltd - AK Titchmarsh & LA Woolsey	360 Kaituna Road, RD 9, Te Puke 3189
PL & PR Corbett	83 Ford Road, RD 9, Te Puke 3189
Brain / Harwood Trust	c/- Adina Thorn Lawyers, PO Box 1753, Auckland 1140, Attn: Adina Thorn
AW Brain	c/- Adina Thorn Lawyers, PO Box 1753, Auckland 1140, Attn: Adina Thorn
BR & DA Dean	283 Te Tumu Rd, RD 9, Te Puke 3189
Papahikahawai 1 and 2 Trust	Papahikahawai Island Trust, c/- Kathy Jones - Trust Administrator, 1218 - 1224 Haupapa Street, Rotorua 3010
Crown land - Department of Conservation	Tauranga Area Office, 253 Chadwick Road West, Tauranga 3112

**4. The location to which the application relates is:**

The location is the lower Kaituna River and Ongatoro/Maketu Estuary and surrounding land.

**5. The following additional resource consents and approvals are required in relation to the proposal and have been applied for:**

No other regional or district resource consents are required. A notice of requirement for a designation has been lodged with Western Bay of Plenty District Council.

An "authority" from Heritage New Zealand under Section 12 of the Historic Places Act 1993 will be sought to destroy, damage or modify archaeological sites that may be impacted on by construction work in the event that such sites are discovered during construction.

The Applicant is also currently negotiating with landowners for the property rights required to implement the Project under the Public Works Act 1981.

**6. Attached, in accordance with the Fourth Schedule of the Resource Management Act 1991, is a description of the proposed activity and an assessment of the environmental effects the proposed activity may have on the environment.**

A description of the proposed activity and an assessment of the environmental effects is included in the AEE Report, and supporting Volumes B and C, which are attached to and form part of this application.

**As this application includes a resource consent for reclamation, information is attached to show the area proposed to be reclaimed, including its location, the position of all new boundaries, and the portion of that area (if any) to be set apart as an esplanade reserve or esplanade strip.**

**Any other information required to be included in the application by the regional plan, the RMA, or any regulations made under the RMA is included in the AEE Report supporting this application.**

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Pursuant to authority delegated by  
the Bay of Plenty Regional Council

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Date:

**Address for Service:**

Bay of Plenty Regional Council  
c/- Opus International Consultants Ltd  
Concordia House, Pyne Street  
PO Box 800  
Whakatane 3158

Attn: Stephanie Brown

Ph: (07) 308 0139  
Fax: (07) 308 4757  
Email: [stephanie.brown@opus.co.nz](mailto:stephanie.brown@opus.co.nz)



# Part 1: Introduction

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## 1.1 Overview

The Applicant, Bay of Plenty Regional Council (BoPRC), seeks resource consents and confirmation of a Notice of Requirement (NoR) to enable it to re-divert water from the Kaituna River back into Ongatoro/Maketu Estuary (the estuary), establish wetlands, provide recreational opportunities and undertake associated works to achieve the **Project Goal**, which is:

***To significantly increase the volume of water (particularly fresh water) flowing from the Kaituna River into Ongatoro/Maketu Estuary by 2018 in a way that maximises the ecological and cultural benefits (particularly wetlands and kaimoana) while limiting the economic cost and adverse environmental effects to acceptable levels.***

Historically the Kaituna River entered the sea via the estuary with an outlet near the present day Maketu Surf Club. Since 1900 there has been major work undertaken in the lower Kaituna River catchment to reduce the flood risk to surrounding property and enable it to be drained for farming. This has included the construction of stop banks along parts of the river and estuary margin and the 1956 Te Tumu diversion, which directed the river out to sea before it reached the estuary.

Naturally occurring events and human intervention have regularly changed the amount of river water entering the estuary over the last hundred years. Some of these changes have contributed to adverse ecological and cultural effects, such as:

- Accelerated in-filling of the estuary (largely due to the increased volume and speed of sea water coming through the estuary entrance on the incoming tide) with up to 70% of the tidal prism<sup>4</sup> lost since 1956.
- A reduction in the habitat for native plants and animals with between 92% and 95% of the salt marsh and freshwater wetland disappearing since 1956.
- A reduction in the ecological health of the estuary associated with increased salinity and loss of large freshwater inflows
- A decline in the mauri of the estuary and lower Kaituna River, with associated impacts on tangata whenua relationships with the area.
- A decline in the size and abundance of kaimoana species.

These effects have resulted in calls from the Maketu community for the Kaituna River to be re-diverted back into the estuary since at least 1979. There have also been calls at a national level to address the degradation. As part of a process to address these adverse effects of historical activities, BoPRC and other agencies together with the community developed the non-statutory 'Kaituna River and Ongatoro/Maketu Estuary Strategy' (BoPRC, 2009). The Kaituna River Re-diversion and Ongatoro/Maketu Estuary Enhancement Project (the Project) is the first significant step in a staged approach that is required to implement the Strategy.

This AEE Report supports the resource consent application and notice of requirement (NoR). Pursuant to section 184 and section 125 of the Resource Management Act 1991 (RMA), a 10 year lapse period is sought for the NoR and the resource consents.

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<sup>4</sup> Tidal prism - volume of water in the estuary between mean high tide and mean low tide

## 1.2 The Project

The Project maximises the total volume of water which flows into the estuary from the Kaituna River during each tidal cycle, while also maximising the freshwater component of water flowing into the estuary, taking into account all of the relevant constraints.

The Project will re-divert an additional 15% (for a total of 20%) of the river's flow back into the estuary, and create up to 20 hectares of wetland. This will improve the ecological health of the estuary and restore some of the mauri (life-force) of the area by allowing salt marsh and other wetland areas to return, create more suitable habitat for a wider range of indigenous species, and reduce the rate at which sand fills in the estuary.

The main features of the Project are:

- Adding more culverts to the existing Ford's Cut culverts to create a larger inlet structure to allow more water from the river into the estuary and prevent return flow.
- Excavating a channel from the river 1km upstream of Ford Road to meet the existing channel near Ford's Cut. This will require relocation of the stopbank to the south.
- Blocking the downstream section of Ford's Loop (between Ford's Road and Ford Island) and construction of new moorings.
- A new public boat ramp and car parking, including provision for future additional car parking (subject to confirmation of funding).
- Widening and deepening of Ford's Cut.
- Removal of the stopbanks around the land north of Ford's Cut and causeways in the upper estuary between Papahikahawai Island and Maketu Spit.
- Placement of material as part of erosion protection and ecological enhancement works on and adjacent to the southern edge of Papahikahawai Island.
- Reuse of excess material by spreading on land.
- Shaping and restoring appropriate wetland ecosystems on low-lying areas of the land north of Ford's Cut.

The volume of water to be re-diverted varies considerably depending on the tidal range, which drives the difference in water levels between the river and estuary. The mean flow in the lower Kaituna River is around 2,900,000m<sup>3</sup> per tidal cycle. Of this, approximately 315,000m<sup>3</sup> (11%) can be re-diverted during neap tides, 574,000m<sup>3</sup> (20%) during mean tides, 788,000m<sup>3</sup> (27%) during spring tides, and more during flood events.

The proposed works, which are considered to be the preferred option to achieve the Project Goal, are shown on Figure 1 on the following page. The full extent of the proposed works is shown in detail on the Construction Plans, while the extent of the new designation is illustrated in the Designation Plans. These plans are contained in Volume C.

The Project was known as the Kaituna River Re-diversion and Wetland Creation Project until recently. On completion of the technical investigations it became apparent that this did not fully reflect the scope and benefit of the Project. Hence the Project was renamed the Kaituna River Re-diversion and Ongatoro/Maketu Estuary Enhancement Project.

## 1.3 Purpose and Scope of this AEE Report

This AEE Report and supporting documentation have been prepared in support of the NoR to Western Bay of Plenty District Council (WBoPDC) and applications for resource consents to BoPRC which would authorise, under the RMA, the construction, operation and maintenance of the Project.



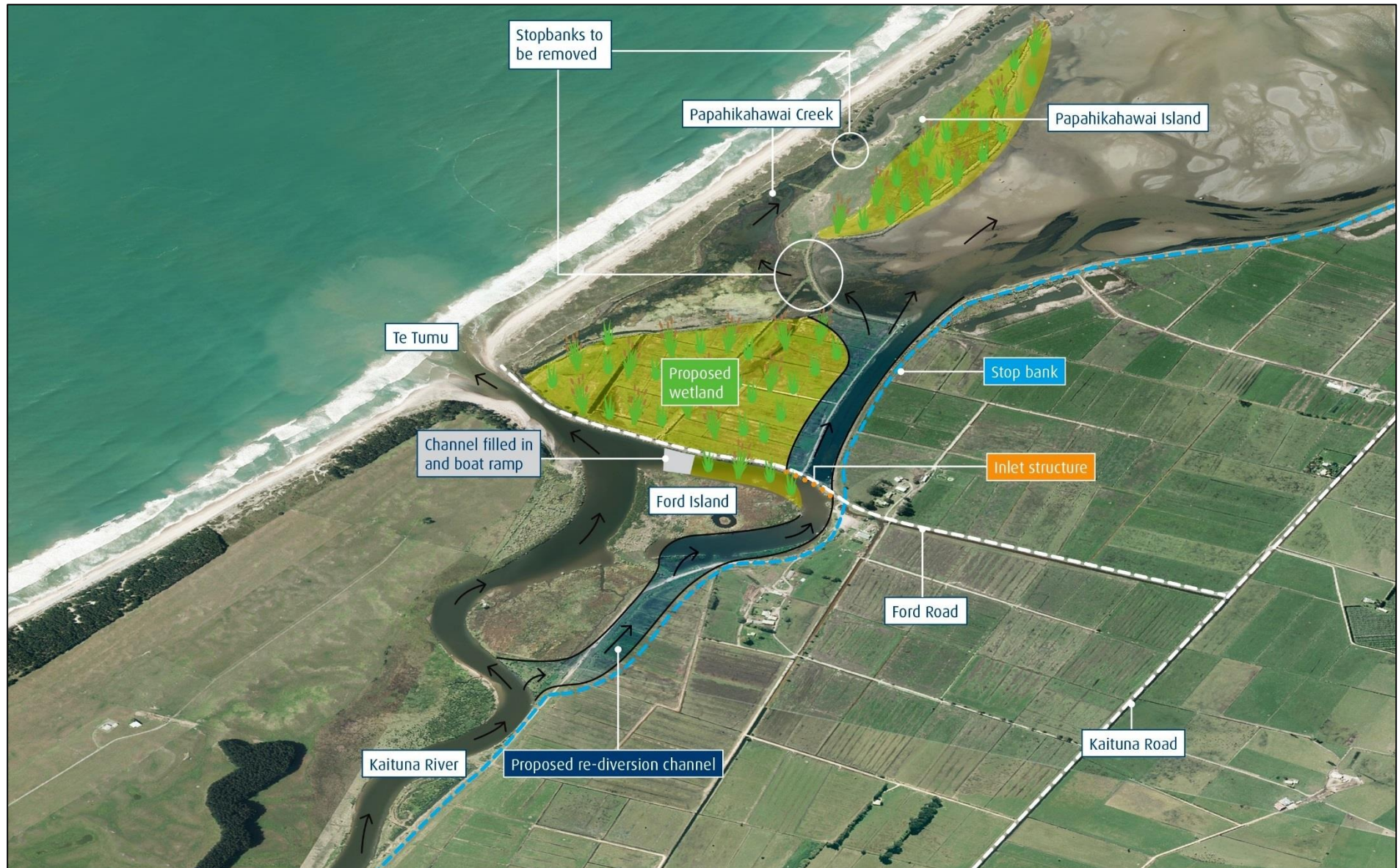


Figure 1: Proposal overview plan

Section 88 of the RMA requires that an application for resource consent(s) include, in accordance with Schedule 4, an assessment of effects on the environment in such detail as corresponds with the scale and significance of the effects that the activity may have on the environment. This AEE Report includes a comprehensive and integrated assessment of environmental effects, which addresses all aspects relevant to the consideration and determination of the NoR and resource consent applications.

## 1.4 Structure of this Application

The application comprise three volumes: this AEE Report including the Forms, the supporting technical reports, and a series of plans and drawings. The matters covered include:

### Volume A: Statutory Forms and AEE Report

- A description of the context of the Project, including a description of the history and objectives of the Project, and the reasons for the works.
- A description of the existing environment, including a description of the receiving environment (for discharges).
- A description of the operation and construction of the Project.
- Identification of the parties affected by the Project, a description of consultation undertaken in the development of the Project and how this has influenced the design process.
- An assessment of the actual or potential effects on the environment of the construction, operation, and maintenance of the Project, including a description of proposed mitigation measures.
- An assessment of the Project against relevant provisions of statutory policies and plans.
- Proposed Designation and Resource Consent Conditions (subject to further refinement)

### Volume B: Technical Reports

- Summary and Analysis of Options and Alternatives (BoPRC, 2013)
- Full pre-consent consultation report (Opus, 2013)
- Numerical Modelling (DHI, 2014)
- Summary of Effects Resulting from Water Level Changes, (Waterline, 2014)
- Maketu Estuary: Effect of Proposed Re-Diversion on Coastal Erosion (ECONOMOS, 2014)
- Terrestrial, Avian and Wetland Restoration Ecology (Opus, 2014)
- Ongatoro/Maketu Estuary Condition and Potential Ecological Effects (River Lake, 2014)
- Microbiological health risk of bathing and shellfish gathering (River Lake, 2014)
- Extent of wetland vegetation in Maketu Estuary - 1939 to 2011 (BoPRC, 2014)
- Social and Recreational Use Patterns (Bay of Plenty Polytechnic, 2014)
- Construction Description (Waterline, 2014)
- Cultural Impact Assessments (Various, 2014)<sup>5</sup>
  - Ngati Rangiwewehi
  - Ngati Whakaue ki Maketu
  - Tapuika

<sup>5</sup> The author of the Waitaha, Ngati Makino, Ngati Pikiiao, and Ngati Tunohopu CIA have authorised release of the full CIA report to the consent authorities, but have requested it not be distributed to the wider public without their express permission.



- Waitaha, Ngati Makino, Ngati Pikiāo, and Ngati Tunohopu

Appendix C: Plans and Drawings

- Designation Plan (Opus, 2014)
- Construction Drawings (Waterline and Opus, 2014)

## Part 2: Reasons for the Project

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### 2.1 Overview

This section provides the background to the Project, setting out the:

- History of the Project
- Project Objectives
- Context of the Project
- Need for the Project
- Benefits of the Project

The following sections present a summary of the above matters, many of which are described in detail in the “Summary and Analysis of Options and Alternatives”(BoPRC, 2013) in Volume B.

### 2.2 History of the Project

To understand the history of the Project, it is necessary to understand the history of the area, and previous works undertaken to alter the natural course of the Kaituna River.

Maketu was the final landing place of Te Arawa waka, and it was from here that Te Arawa people settled the area around Rotorua. The coastal presence of Te Arawa at Maketu was interrupted by a Ngai Te Rangi occupation, which was ended with the Battle of Te Tumu in 1836. The Cultural Impact Assessments prepared for the Project (refer Volume B) provide further detail around the Maori history and cultural significance of the area, as discussed in Section 3 of this AEE.

Subsequent development of the lower Kaituna River catchment for agriculture and horticulture resulted in significant works to drain wetland to create farmland, and to manage the impact of flooding. Since 1900 there has been major work undertaken to realign, divert, and stopbank the lower Kaituna River. A summarised timeline of these works is shown at Figure 2 on the following page.

In the late 19<sup>th</sup> century, the Kaituna River flowed into the estuary along the southern shoreline of Papahikahawai Island. The river broke out to sea at Te Tumu in a major flood and coastal storm in 1907, reducing the estuary to a tidal system, and causing extensive sedimentation and disruption of both navigation and local kaimoana in the estuary. In response, a suite of works was planned by the River Board in 1925 to improve the lower river and estuary environment, including the creation of Ford’s Cut in 1926. This was an attempt to assist and speed up the eastward migration of the Kaituna River mouth back to the estuary entrance following the natural breakout at Te Tumu.

Schemes for improved flood protection in the lower Kaituna River were investigated during the 1940’s and 50’s. Initial proposals provided for maintenance of river flow through the estuary. However, funding pressure eventually resulted in a revised scheme with diversion of the river and construction of an artificial outlet at Te Tumu. Te Tumu Cut was opened to the sea in February 1957, and directed the river out to sea before it reached the estuary. Ford’s Cut and Papahikahawai Creek were also blocked at this time. Further stopbanking, realignment, and diversion of the lower Kaituna River continued during the late 1970’s and early 1980’s by the Kaituna Catchment Control Scheme.

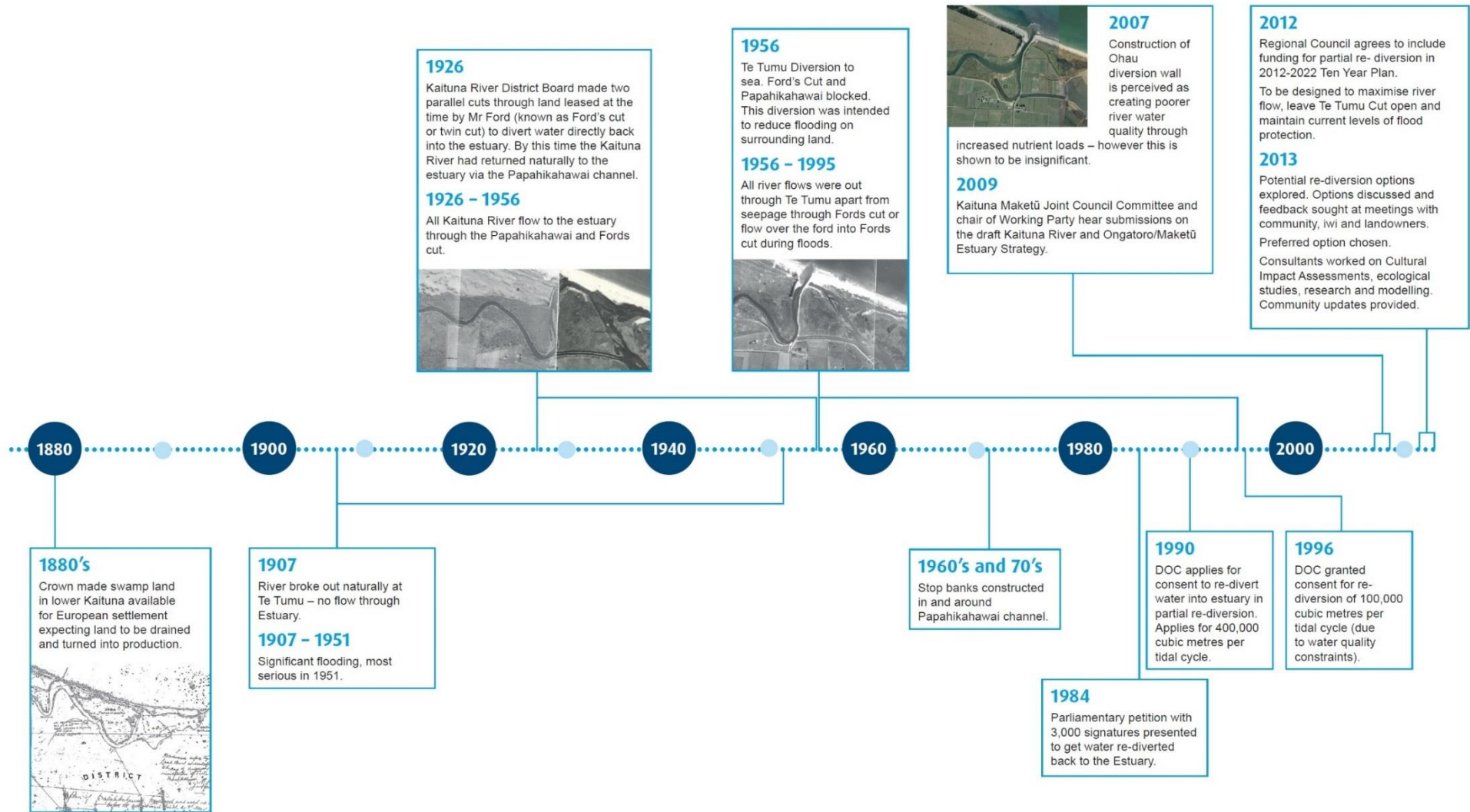


Figure 2: Timeline of Kaituna River and Ongatoro/Maketu Estuary

Since the river was diverted out to sea through Te Tumu Cut, with relatively small or no flow to the estuary through Ford's Cut, there have been numerous debates on how to re-divert water back through the estuary and address the major changes to estuary morphology and ecology following the diversion.

In 1984, a Parliamentary Petition resulted in a Cabinet Paper and the preparation of a Restoration Strategy (Department of Conservation (DoC), 1989) which was supported by the government of the time subject to conditions around a catchment management strategy, water quality and flood risk. The proposal recommended in the DoC Restoration Strategy was very similar to the current proposal. An application was subsequently lodged by DoC to undertake a partial re-diversion of 400,000m<sup>3</sup> per tidal cycle.

However, resource consent was only granted for up to 100,000m<sup>3</sup> per tidal cycle due to water quality concerns (Consent No. 02 2636). The decision was appealed by several parties. The last of the appeals were dismissed in 1996, and the partial re-diversion of the Kaituna River through Ford's Cut was implemented by DoC.

A new coastal permit was granted in 1998 (Consent No. 04 0277) for a period of five years following expiry of the original consent. A subsequent renewal of the consent for a further 5 years was approved by BoPRC in January 2014 (Consent No. 67316). The existing DoC consent will be replaced by the applications that form part of this report. An application for surrender of the DoC consent will be made once physical works on this Project have been commenced.

## 2.3 Project Objectives

As stated under Part 1 of this AEE Report, the Project Goal is:

*To significantly increase the volume of water (particularly fresh water) flowing from the Kaituna River into Ongatoro/Maketu Estuary by 2018 in a way that maximises the ecological and cultural benefits (particularly wetlands and kaimoana) while limiting the economic cost and adverse environmental effects to acceptable levels.*

To achieve the Project Goal, a number of objectives were identified. These are:

- 1. To work in an open, transparent and fair way that engages tangata whenua, the local community and other stakeholders and recognises their views and aspirations. This objective shall be achieved and measured by implementing and continually updating the project Communications and Engagement Plan..., including reviews of performance at least every six months.*
- 2. To determine the optimal path, volume and configuration of a Kaituna River re-diversion option that maximises ecological and cultural benefits while limiting economic costs and environmental effects to acceptable levels by modelling, expert advice, published literature and one phase of pre-consent community consultation by February 2014.*
- 3. To determine the optimal location, size, function, cost and restoration potential of at least 20 hectares of new wetlands to be created during the implementation of the re-diversion by February 2014.*
- 4. To lodge applications for any consents, designations or other permissions required to achieve the project goal by June 2014.*
- 5. To obtain all consents, designations, permissions and land required to achieve the project goal by October 2015, subject to legal processes.*

6. *To begin the staged implementation of consented works by October 2015.*
7. *To complete consented capital works by June 2018.*
8. *To seek opportunities to achieve the non-funded actions in the Kaituna River and Ongatoro/Maketu Estuary Strategy through other council programmes or partnerships without compromising achievement of objectives 1 to 7, where such opportunities arise.*
9. *To report publicly on progress against all actions in the Kaituna River and Ongatoro/Maketu Estuary Strategy each year.*

## 2.4 Context of the Project

As discussed below improving the health of the estuary is consistent with the strategic policy framework, including:

- Treaty Settlements and Co-governance
- Kaituna River District Act 1926
- Kaituna River and Ongatoro/Maketu Estuary Strategy
- Regional Policy Statement, Regional Plans, and District Plan

### 2.4.1 Treaty Settlements and Co-governance

The Bay of Plenty region's Treaty of Waitangi landscape is complex and dynamic. Waitangi Tribunal Inquiries and Treaty settlements covering fisheries and historical claims have been active and a priority in the region since the 1980s. A number of different iwi and hapu have an interest in all or part of the Project area, including but not limited to:

- Tapuika
- Ngati Whakaue ki Maketu
- Ngati Rangiwewehi
- Waitaha
- Ngati Pikiāo
- Ngati Makino
- Ngati Tunohopu
- Tuhourangi

Of these groups, Ngati Makino, Ngati Pikiāo (as part of the Affiliate Te Arawa Iwi and Hapu claim), Ngati Rangiwewehi, Tapuika, and Waitaha have agreed Treaty Settlements with the Crown. These settlements include Statutory Acknowledgements which have been formally recognised by BoPRC. Ngati Tunohopu and Ngati Whakaue ki Maketu are currently in negotiations with the Office of Treaty Settlements regarding their claims.

The Tapuika Claims Settlement Act 2014 established a framework for co-governance of the Kaituna River. A statutory body, Te Maru o Kaituna (the Kaituna River Authority), will be established and charged with co-governance of the river. Membership will be drawn from local authorities, Tapuika, and other iwi with associations to the Kaituna River. The purpose of the Authority is the restoration, protection, and enhancement of the Kaituna River and it is empowered to have regard to the social and economic well-being of people and communities. The inaugural meeting of the Authority was held on 17 July 2014, and the Project was presented to the Authority by Project Team representatives.

The Authority has a number of other functions in relation to the Kaituna River, including the preparation and approval of the Kaituna River document. The purpose of the Kaituna River document is to promote the restoration, protection, and enhancement of the

environmental, cultural, and spiritual well-being of the river. Once developed, the Kaituna River document will need to be considered when preparing or amending planning documents prepared under the RMA, and will also need to be considered on an interim basis when assessing resource consent applications. At the time of lodgement, work on the Kaituna River document has not commenced.

## 2.4.2 Kaituna River District Act

The Kaituna River District Act 1926 provides wide powers to the Kaituna River Board (now Bay of Plenty Regional Council) to manage the Kaituna River and catchment, including any drainage, diversions, or works. The Act's purpose is to *"make provision for the improvement of waterways of the Kaituna River and its tributaries, and for the protection from damage by water of certain lands in the Kaituna Auckland District"*.

In 1996 the High Court determined that the Act is still the primary legislative instrument on matters relating to the diversion or management of Kaituna River flows (in *Brain v AG* CP 6/95, 27 May 1996), and has acknowledged that the objective of the Act extends to cover not only flood protection works but also estuary enhancement and restoration.

## 2.4.3 Kaituna River and Ongatoro/Maketu Estuary Strategy

In September 2009, following a period of community and stakeholder engagement, the non-statutory Kaituna River and Ongatoro/Maketu Estuary Strategy ("the Strategy") was adopted by BoPRC to *"...provide a framework for local authorities, government agencies, tangata whenua, local communities, industry organisations, and non-governmental organisations to co-ordinate and prioritise their actions that will achieve the vision and outcomes of the Strategy by 2018."*

The Strategy was prepared by BoPRC, WBoPDC, Tauranga City Council (TCC), and Rotorua District Council (RDC) - working with representatives from the Kaituna/Maketu community - including iwi, hapu, individuals, community groups, and organisations. The Strategy describes the river and estuary in terms of the people, the issues, the place, and the historic changes. It sets out community concerns in relation to kaitiakitanga, water quality in the river, urban and industrial development, flood management, health of the estuary, wetlands and aquatic habitats, recreation and other issues.

The vision for the Strategy is to ensure that as a wider community our policies and plans, our activities and actions *"celebrate and honour Kaituna River and Ongatoro/Maketu Estuary life as taonga"*. The Strategy says that:

*In practical terms, achieving the vision and outcomes of the Strategy means different things to different people within the community. For some, achieving the vision will mean that:*

- *The waters of the river and estuary are clean enough to swim in*
- *There is enough water in the river and estuary to support:*
  - *the mauri of the river and estuary*
  - *good water quality*
  - *wetland restoration*
  - *a range of recreational and non-recreational uses*
- *Wetlands are restored in the Lower Kaituna Catchment*
- *There are thriving populations of indigenous flora and fauna, native plants, koura, eels, fish, whitebait, trout and waterfowl*
- *Tangata whenua are easily able to get kaimoana, and other kai for themselves and their manuhiri.*

The Strategy identified four key outcomes to achieve the vision:

1. *Improving water quality*
2. *Restoring healthy ecosystems*
3. *Ensuring sustainable resource use*
4. *Supporting kaitiakitanga and local people's stewardship.*

Under each of the key outcomes, the Strategy lists management goals, significant actions, and strategic actions. Of particular relevance to the Project are the management goals and significant actions listed under "restoring healthy ecosystems", as outlined below:

**Management Goal:** *Improve the coastal and tidal environment*

**Significant Action:** *Kaituna River to the Ongatoro/Maketu Estuary re-diversion (exploring options to increase water flow from the river to the estuary).*

**Management Goal:** *Protect and enhance existing wetlands, while increasing the extent of wetlands in the lower Kaituna Catchment, to provide for Maori cultural values and uses of wetlands, habitats for endangered and indigenous wetland species (including birds, fish and flora) and habitats of waterfowl*

**Significant Action:** *Create at least 100 hectares of wetland in the lower Kaituna Catchment by 2018.*

The Implementation Plan in Chapter 8 of the Strategy identifies BoPRC as the lead agency for both of these actions. The Project contributes directly to these actions by increasing flow into the estuary, improving habitat, and creating up to 20 hectares of wetland out of the 100 hectares identified in the Strategy.

#### 2.4.4 Regional Policy Statement and Regional Plans

Regional policy and planning documents contain a number of objectives important to the strategic management direction for the river and estuary. In addition, the land north of Ford's Cut is listed in the Schedule of Identified Significant Ecological Features under the District Plan. The relevant objectives and policies are outlined in the Statutory Assessment at Section 10 of this AEE Report.

## 2.5 Need for the Project

Investigations from the 1980's to the present have found that the effects created by the 1956 Te Tumu Cut and consequent removal of the Kaituna River flow from the estuary, as well as other changes such as stop-banking, reclamation, land drainage and discharges of nutrients and bacteria adjacent from land uses are:

- Significant ecological impacts associated with increased salinity and loss of large freshwater inflows, including:
  - Significant loss of wetland marsh in upper estuary (about 160 hectares or 95%).
  - Significant change in habitat of lower estuary.
  - Significant changes in estuarine biota, including kaimoana species.
  - Alterations in the upper estuary associated with causeways and pastoral farming.
  - Problems with nuisance sea lettuce and algae.
  - Significant changes in fish populations.
- Significant changes in estuarine processes, sedimentation and morphology including:

- Major change in balance between outflows (significantly decreased) and flood tide inflows (significantly increased).
- Decreased tidal prism and some ongoing loss due to sedimentation as system adjusts towards new dynamic equilibrium.
- Significant expansion of flood tide delta in lower estuary - accompanied by changes in bed levels, channels, and banks in this area.
- Erosion of landward shorelines associated with expansion of flood tide delta.
- Occasional spit breaching (twice in last 30 years) and associated issues (sediment input, navigation issues, and bank and channel changes) with periods of flood tide delta expansion.
- Reduction in entrance and ebb tide delta dimensions and changes to shorelines around the harbour entrance (due to major decrease in outflow tidal prism).
- Decreased flows through upper harbour channels - probably accompanied by slow sedimentation (restricted by sediment supply) and changes in sediment character.

The changes and state of the environment, together with cultural and community concerns, demonstrate that significant effects have occurred that need to be addressed.

### 2.5.1 Need for the Designation

Part VIII of the RMA allows for requiring authorities to request land be designated in District Plans for projects and works for which the Requiring Authority has financial responsibility. BoPRC is a Requiring Authority and has financial responsibility for the designation and the works proposed.

A Land Requirement Schedule listing the properties directly affected by the designation and the area of land on each of these properties required is shown in the attached NoR form and is illustrated in the Designation Plans in Volume C.

Through its 10 Year Plan 2012-2022, BoPRC has agreed to fund certain goals in the Strategy and to coordinate its overall implementation. The Project is set up to implement part of the Strategy in response to long-standing tangata whenua and community concerns about environmental degradation. The Project is intended to be a significant step towards remedying ecological impacts and cultural grievances created by past works.

The designation is considered both reasonably necessary and to be the preferred planning mechanism for the Project. Over the long term, a designation provides greater certainty and flexibility than a resource consent. This certainty is important as BoPRC will need to make a long term commitment to this Project, which will result in some permanent land use changes. A resource consent would result in less certainty for BoPRC and the community in terms of process and outcome, and there is less scope for minor changes to design detail once approved.

Providing for the Project by way of designation will therefore allow for consistent, sustainable management of the lower Kaituna River and the estuary. This mechanism is also considered the most appropriate way to signal the long term intentions and commitment of BoPRC to the public via the District Plan.

## 2.6 Benefits of the Project

The Project is a significant step towards addressing past modifications that have led to the degradation of the mauri of the river and estuary over time, as discussed in detail in the Volume B technical reports. In summary, the Project will result in a new equilibrium and the following benefits:



- A significant improvement in the ecological health of the estuary, and particularly the upper estuary:
  - the flushing of algae and improved diversity and abundance of benthic fauna
  - improved food supply for kaimoana such as cockles;
  - an increased likelihood of seagrass re-establishing in the estuary;
  - improved dissolved oxygen levels leading to improvement in the extent of habitat suitable for fish;
  - the increase in wetland area will provide the potential for increase in wetland bird diversity and abundance; and
  - up to 20 hectares of wetland will be created.
- Stopping and partial reversal of the sedimentation issues in the lower estuary;
- Significant reduction in the erosion risk on the shorelines adjacent to the flood tide delta;
- Maintenance of the existing navigability of Te Tumu Cut;
- Improved recreational opportunities and public foot access to the upper estuary from Ford Road as part of the wetland restoration, and a new public boat ramp and car parking at Ford Road (subject to confirmation of funding).

The benefits of the Project are considered in more detail in Section 8 of this AEE.



## Part 3: Statutory Approvals Sought under the RMA

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### 3.1 Overview

The Applicant proposes to designate land for the Project and the works also require a number of resource consents. The RMA outlines the relevant considerations for the determination of the NoR and applications for resource consent. In this section the key statutory matters under the RMA and their relevance to the Project are set out, being:

- NoR for a designation and outline plans (Part 8 of the RMA)
- Application for resource consent (Part 6 of the RMA).

This section only sets out the statutory matters. The assessment of the Project in relation to these matters is provided in Section 10 of this report.

### 3.2 Notice of Requirement

The Applicant, as a local authority, has requiring authority status and is seeking designation for the Project as part of undertaking their legislative functions. The Applicant is lodging a NoR for the designation of land in the Western Bay of Plenty District Plan for the construction, operation and maintenance of the Project.

A designation is a planning mechanism that enables existing or future infrastructure to be efficiently managed and land requirements associated with future infrastructure to be signalled in district plans. Where a designation is provided in a district plan, any provisions that might normally apply, including zoning and land use controls, do not apply to public works or projects or works undertaken by a requiring authority (in this case the BoPRC) under the designation. There is no current designation for the Project in the District Plan.

The prescribed form for a NoR is set out in Form 18 of the Resource Management (Forms, Fees, and Procedure) Regulations 2003. The NoR for the Project has been prepared in accordance with these regulations.

#### 3.2.1 Purpose of the Designation

The purpose of the designation is:

*“Kaituna River Re-diversion and Ongatoro/Maketu Estuary Enhancement”*

Explanatory note:

*“Kaituna River Re-diversion and Ongatoro/Maketu Estuary Enhancement” for the purpose of this designation shall enable works, in the absence of specific conditions to the contrary, to:*

- *Protect and, as practicable, enhance the integrity, form, functioning and resilience of the estuary and its ecosystems*
- *Enhance mauri*
- *Increase the volume of water flowing from the Kaituna River into Ongatoro/Maketu Estuary*
- *Improve the hydrological connectivity and functioning of the Ongatoro/Maketu Estuary*

- *Reduce accelerated sedimentation and associated adverse effects, including exacerbated erosion of adjacent shorelines*
- *Improve the ecology, and over time the water quality, of the Ongatoro/Maketu Estuary environment*
- *Establish and manage wetlands and adjacent ecosystems within and around the Ongatoro/Maketu Estuary*
- *Support and promote kaitiakitanga and stewardship*
- *Improve opportunities for public access to and enjoyment of Ongatoro/Maketu Estuary*
- *Improve the resilience of the estuary and its various ecosystems to the effects of projected climate change*
- *Undertake works to avoid, remedy, or mitigate any adverse effects arising from the re-diversion*
- *Monitor changes to the environment following the re-diversion.*

The physical extent of the proposed designation is shown on the designation plan included as Attachment 1 of the NoR. The designation includes permanent works as well as temporary construction works. The designation area at each of the sites for the construction phase of the Project allows for the following:

- Adding more culverts to the existing Ford's Cut culverts to create a larger inlet structure to allow more water from the river into the estuary and prevent return flow
- Excavating a channel from the river 1km upstream of Ford Road to meet the existing channel near Ford's Cut. This will require relocation of the stopbank to the south
- Blocking the downstream section of Ford's Loop between Ford Road and Ford Island and construction of new moorings with a public boat ramp and car parking
- Widening and deepening of Ford's Cut
- Reuse of excess material by spreading on land and placement in Ford Loop for wetland creation
- Shaping and restoring appropriate wetland ecosystems on low-lying areas of the land north of Ford's Cut
- Accommodation of all of the required physical works
- Services relocation, temporary traffic management and all associated construction activities
- Site establishment activities, including storage of plant, equipment, and materials; erosion and sediment control; machinery working and safety areas

Section 176A provides that an outline plan must be submitted to a territorial authority before commencing construction of a project or work under a designation.

The Applicant will finalise the Project's design and submit outline plans to WBoPDC prior to the commencement of works onsite, for all relevant aspects of the Project (in conjunction with addressing various matters via management plans).

On completion of construction, the extent of the designations will be reviewed. Areas of the designations not required for permanent works, inspection, or maintenance activities will be removed where it is reasonable to do so. This is a relatively simple process under s182 of the RMA.

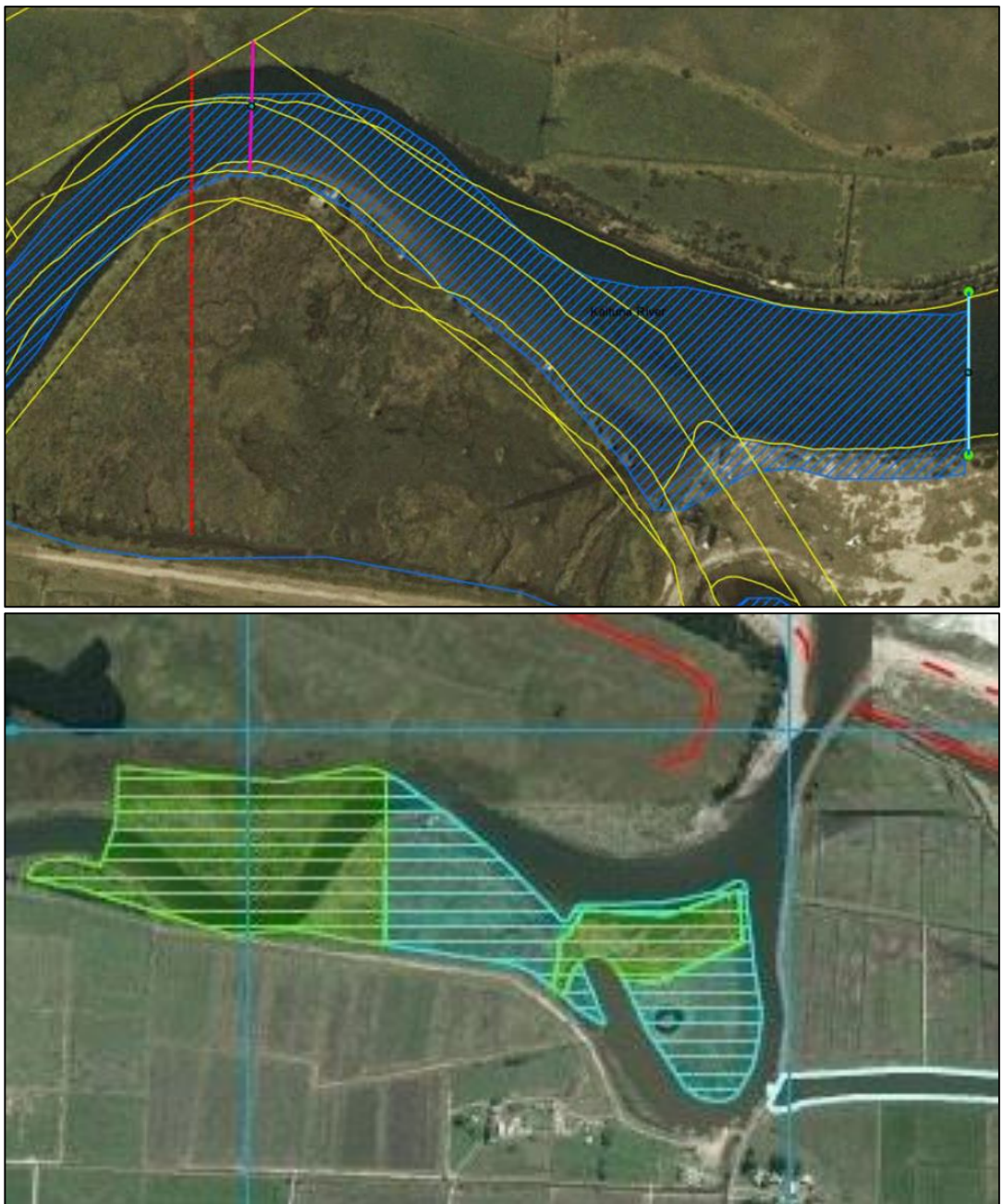
### **3.3 Resource Consents Required**

A suite of regional resource consents are required for the Project under the Operative Regional Coastal Environment Plan (RCEP), the Regional Water and Land Plan (RWLP), and

the Regional Air Plan (RAP). The Applicant is applying for resource consents for the following broad groups of activities:

- Section 9 RMA: Land use consent for earthworks and works in the riparian margins
- Section 12 RMA: Coastal Permits for occupation, placement of structures, disturbance, and reclamation of the foreshore or seabed; and the damming, taking and discharge of coastal water
- Section 13 RMA: Land use consent for works affecting the bed of rivers
- Section 14 RMA: Water permits for dewatering and diversion of water
- Section 15 RMA: Discharge permits for discharge of sediment-laden water from construction and the discharge to air from earthworks.

The type of resource consents required are influenced by the location of the coastal marine area (CMA) defined in the RCEP, as shown on Figure 3 below.



**Figure 3: CMA & River Mouth Locations (top) and Map 16a of the RCEP (bottom)**

The top image in Figure 3 is an extract from the CMA & River Mouth Locations map for the Kaituna River which forms part of the RCEP. The bottom image is an extract from Map 16a of the RCEP, showing sites of significance on land (green lines) and sites of district or local significance in the CMA (blue lines)<sup>6</sup>. The short pink vertical line on the top image represents the CMA boundary agreed in 2008, the light blue line is the river mouth boundary, while the long red line is the previous CMA boundary agreed in 1993.

This previous CMA boundary is reflected in the boundary between the sites of significance on land and in the CMA shown on Map 16a of the RCEP. These boundaries determine whether an activity is in the CMA, which determines which of the RWLP and the RCEP applies, and therefore the resource consent requirements.

The Proposed Regional Coastal Environmental Plan (pRCEP) was notified on 24<sup>th</sup> June 2014. The Council has resolved to delay the legal effect of the majority of the rules, and those few permitted activity rules not encompassed by the resolution are not relevant to the Project. Therefore, a rules assessment of the pRCEP is not required.

The resource consents required for the Project are set out in Table 1.

**Table 1: Resource consents required from the Regional Council**

Consent Type	Activity	Regional Rule(s)	Activity Class	Scope of Application
Land use consent s9	Earthworks	RWLP - 1C	Discretionary	Earthworks to create the proposed channel, widening of Ford’s Cut, realignment and maintenance of the stopbank, removal of existing stopbanks, works to create wetland areas, realignment of Ford Road, marine facilities, log collection area, filling of land and associated enabling works
	Vegetation clearance	RWLP - 2C	Discretionary	As required during earthworks
	Wetlands	RWLP - 85	Discretionary	Enhancement of wetland - consistent with Policy 135. Vegetation clearance associated with construction of the proposed channel
Coastal Permit s12	Occupation of land and any related part of the coastal marine area, which is land of the Crown, or is vested in Environment Bay of Plenty	RCEP - 12.2.4(a)	Discretionary	Occupation of land in the CMA by structures - 2 boat moorings, public boat ramp and associated facilities, culverts, rock protection works, wooden pole breakwater, and monitoring equipment

<sup>6</sup> These sites are identified on the basis of their botanical value or marshbird habitat value in the CMA. The sites on land signal areas worthy of protection that are outside the Regional Council’s jurisdiction to regulate.

Consent Type	Activity	Regional Rule(s)	Activity Class	Scope of Application
	Occupation in other areas of the CMA where not vested with Crown or Regional Council	S12 RMA	Discretionary	Footbridge, rock protection works
	Erection or placement of any structure in the CMA	RCEP - 13.2.4(h)	Discretionary	The erection/placement of culverts, moorings boat ramp facilities, wooden pole breakwater, footbridge and rock protection works (structures)
	Maintenance of structures in the CMA	RCEP - 13.2.4(f)	Permitted	Ongoing maintenance of structures
	Disturbance, Deposition and Extraction	RCEP - 14.2.4(e)	Discretionary	Works associated constructing structures or features - deposition on and disturbance of the foreshore or seabed for that purpose
		RCEP - 14.2.4(j)	Discretionary	Removal, damage, modification or destruction of indigenous vegetation and introduction of vegetation
		RCEP - 14.2.4(b)	Discretionary	Removal of causeways/stopbanks, channel invert and slope works, creation of bunds, filling of areas, extraction of material - disturbance of, deposition on, dredging of, or removal of sand, shingle and shell from the foreshore or seabed, not expressly provided for or prohibited by the other rules
	Taking, diverting and damming of coastal water	RCEP - 10.2.4(g)	Discretionary	Diversion of water for construction purposes- any diversion of coastal water not expressly provided for by rule 10.2.4(f)
		RCEP - 102.4(d)	Discretionary	Taking of water in order to dewater during installation of the culverts. The taking of coastal water from within harbours or estuaries at rates or quantities greater than 15 cubic metres a day
		RCEP - 10.2.4(e)	Discretionary	The temporary damming of coastal water or open coastal

Consent Type	Activity	Regional Rule(s)	Activity Class	Scope of Application
				water for construction purposes (sheet piling)
	Discharges from construction	RCEP - 9.2.4(b)	Discretionary	Any discharge of contaminants (namely sediment) during construction
	Reclamation	RCEP - 15.2.4(b)	Discretionary	Reclamation of area adjacent to Ford Island for wetland, salinity block and recreational purposes (includes the salinity block) - not expressly provided for or prohibited by other rules
Land use consent s13	Construction of proposed channel where it is outside of the Coastal Marine Area	RWLP - 71	Discretionary	Rock protection works along proposed channel and disturbance associated with constructing the opening of the channel where it is in the bed of the river
	Construction of culvert to maintain flows to the Lower Kaituna Wildlife Management Reserve	RWLP - 71	Discretionary	Placement of a culvert and associated disturbance to maintain flows
Water Permit s14	Diversion of water	RWLP - 48	Discretionary	To divert water from the Kaituna River down the new diversion channel (the point of diversion is above the CMA boundary) to the estuary
	Diversion of water	RWLP - 48	Discretionary	To divert water from the Kaituna River through a new culvert intake to the Lower Kaituna Wildlife Management Reserve
Discharge Permit s15	Discharge of water and contaminants (namely sediment) during construction to land and water (outside of coastal waters))	RWLP - 37	Discretionary	The discharge of dewatering water and contaminants to land and water from construction activities
	Air discharge - dust from construction	RAP 19(z)	Discretionary	Discharge of dust where it may result in objectionable or offensive particulates beyond the boundary of the subject property or into water. A cautious approach has been applied and consent is sought.



For the avoidance of doubt, the Applicant is seeking resource consents under the rules above and any other rules which may apply to the activity, even if not specifically noted.

### **3.3.1 NES / Contaminated Land**

Land use consent under the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (NESCS) is not required from WBoPDC. There is nothing held on property files with the District Council, nor does BoPRC hold any information relevant to the sites indicating that the NES would be applicable. No other historical records have been identified which could indicate the presence of potentially contaminated soil.

### **3.4 Lapse Period**

Pursuant to section 184 and section 125 of the Resource Management Act 1991 (RMA), a 10 year lapse period is sought for the NoR and the resource consents. Construction is intended to commence in BoPRC's 2015/2016 financial year (July - June), but this is dependent on the acquisition of property rights for the affected land. An extended lapse period will accommodate any uncertainties in the programme that may arise.

### **3.5 Other Matters**

#### **3.5.1 Archaeological Authority**

The Historic Places Act 1993 (HPA) promotes the identification, protection, preservation and conservation of the historic and cultural heritage of New Zealand. Protection and management of archaeological sites is managed by Heritage New Zealand (formerly known as the New Zealand Historic Places Trust). It is illegal to destroy, damage or modify archaeological sites without an authority to do so from Heritage New Zealand under section 12 of the HPA. An authority will be sought to destroy, damage or modify archaeological sites that may be impacted on by construction work in the event that such sites are discovered during construction.

#### **3.5.2 Floodway and Drainage Bylaw**

The Bay of Plenty Regional Council Floodway and Drainage Bylaw 2008 requires that: *except with the prior written authority of the Council no person shall erect or permit to be erected any stopbank, or defence against water without the prior written authority of the Council.* An application to BoPRC under this Bylaw will be required to relocate the section of the stopbank where the proposed re-diversion channel is to be located.

#### **3.5.3 Existing Resource Consents**

The Department of Conservation (DoC) hold a coastal permit for the existing culverts that enable the current diversion of the Kaituna River. While these consents do not expire until 2019, DoC has proposed that an application for their surrender will be made once physical works on this Project have been commenced. The applications that form part of this report will replace the DoC consents.



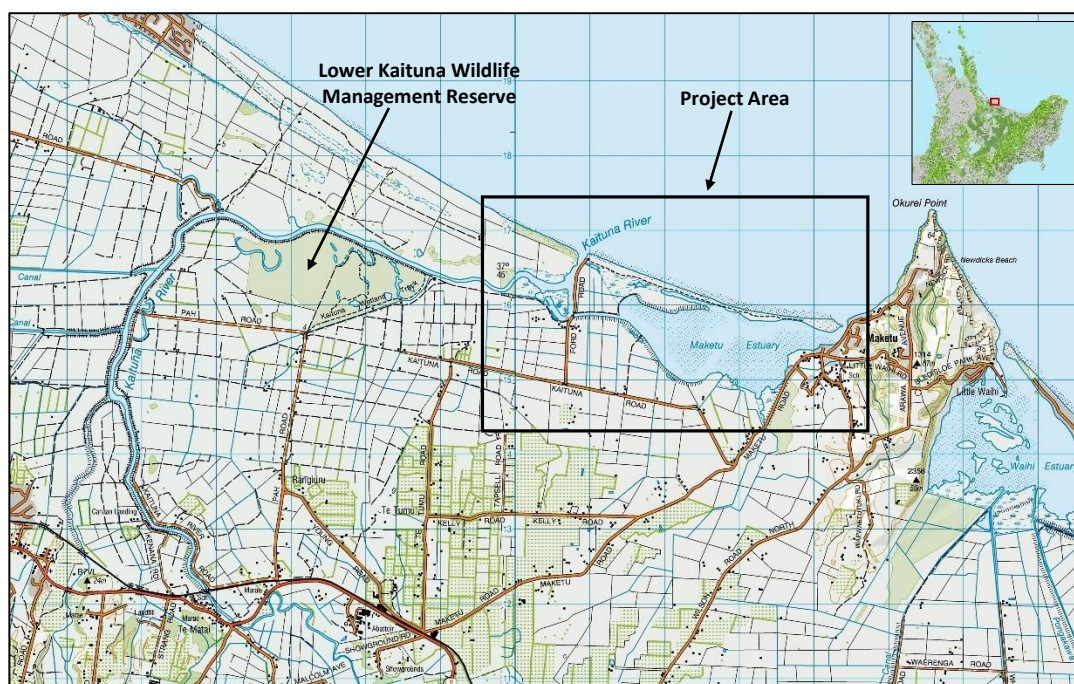
## Part 4: Description of the Environment

### 4.1 Overview

This section contains a description and broad overview of the existing environment. It is based on information from a number of sources, including the technical reports that comprise Volume B of this AEE. These reports should be referred to in relation to more detailed information about specific aspects of the existing environment.

### 4.2 General Location and Context

The Kaituna River and Ongatoro/Maketu Estuary (the estuary) are located in the central Bay of Plenty, approximately 25km east of Mount Maunganui. The lower Kaituna River forms the boundary between Western Bay of Plenty District and Tauranga City. The township of Maketu is located on the western side of Okurei Point near the estuary entrance, while Te Puke is located approximately 10 km to the southwest. An overview of the lower Kaituna River and Maketu areas is presented at Figure 4.



**Figure 4: Location Plan (1 square = 1km)**

The Kaituna River flows 53 km from the Okere arm of Lake Rotoiti to the sea at Te Tumu. The first 25 km is fast flowing and drops some 260 m through a number of waterfalls and an incised gorge. The remaining 28 km is slower flowing, dropping just 20 m in altitude as it meanders through alluvial terraces of the mid Kaituna River and the peat and sand deposits of the lower Kaituna basin before entering the sea through Te Tumu cut. The total catchment area of the river is approximately 1,250 km<sup>2</sup>, about half of which drains into Lakes Rotorua and Rotoiti.

The estuary is a shallow, inter-tidal estuary covering an area of about 233 ha, including 13 hectares within Papahikahawai lagoon which is largely isolated from the rest of the estuary. The major freshwater input to the estuary is from the Kaituna River through Ford's Cut, which is the only link from the river to the estuary. During a mean tidal cycle the river delivers approximately 2,900,000m<sup>3</sup> of water to the sea. Since the partial re-

diversion by DoC in 1996, 95% of this flow exits to the sea at Te Tumu Cut and 5% is re-diverted through Ford’s Cut into the estuary (during a mean tidal cycle this is approximately 150,000m<sup>3</sup>). The Waitipuia Stream enters in the southern part of the estuary (mean flow about 0.34m<sup>3</sup>/sec), as do a number of small drains.

The coastal sand dune country to the northwest of Te Tumu Cut is currently used for farming, but is zoned by Tauranga City Council for future residential development in accordance with the SmartGrowth Strategy, as shown on Figure 5 below.

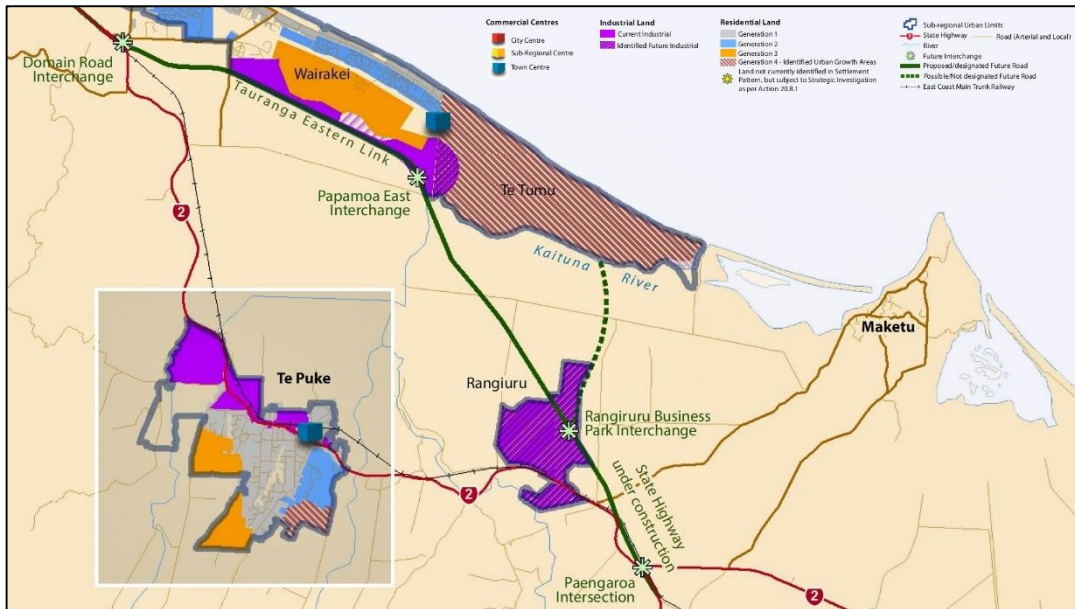


Figure 5: Extract from SmartGrowth Map 6 - Eastern Corridor (August 2013)

### 4.3 Land Use, Landscape and Natural Character

Prior to significant clearance by Maori and Europeans, the landscape around the estuary and the Lower Kaituna River would have supported a mix of swamp forest dominated by kahikatea, and extensive freshwater wetlands with large areas of flax. Extensive areas of manuka were also reported around the estuary area. Two historic images of the lower Kaituna River and the estuary taken in 1963 are provided below at Figures 6 and 7 as a visual guide to the extent of environmental changes over the past 50 years.



Figure 6: Lower Kaituna River, Te Tumu Cut, and Ongatoro/Maketu Estuary in 1963 (image sourced from National Library of NZ)

The estuary itself contained extensive areas of saltmarsh in the tidal zone, with sea rush dominant at the tidal edge and oioi and saltmarsh ribbonwood common behind the sea rush in the slightly more elevated areas. Extensive eelgrass beds occurred above the mid-tide zone in the central portions of the estuary. The upper estuary, including land now farmed north of Ford's Cut, was freshwater wetland dominated by sedges, flaxes and associated vegetation. When compared to more northern estuaries (such as Tauranga), mangroves appear never to have been abundant or large within the estuary.



**Figure 7: Lower Kaituna River and Te Tumu Cut in 1963 (image sourced from National Library of NZ)**

Since the early 1900's, approximately 14,000 hectares of wetland in the area has been drained, cleared, and converted to farmland. Extensive stopbanking and land drainage has also reduced the natural character of the estuary, estuarine margins, river, and surrounding wetland and terrestrial areas while creating productive farmland.

Today, only 3% of the Bay of Plenty's original wetlands remain. The 259 hectare Kaituna Wildlife Management Reserve is located 2.5km upstream from the mouth of the river. The Reserve, jointly managed by DoC, Fish & Game, and BoPRC, is the largest remaining expanse of wetland in the area. Arawa wetland, on the south-eastern side of Maketu Road, is another significant area of wetland habitat, along with smaller areas on the lower Kaituna River to the west of Ford Island.

The present day environment surrounding the Project site is predominantly rural in nature, largely consisting of open farmland within the lower Kaituna basin. The lower regions of the catchment are predominantly productive river-flat plains with extensive drainage schemes (Kaituna Flood Protection and Drainage Scheme), and the dominant land use is dairy farming. The Project area and immediate surrounds is shown in Figures 8 to 21.





**Figure 8: Farm drainage network and stopbanks adjacent to upper estuary**

The upper regions of the lower Kaituna River catchment (downstream of the lakes) are dominated by pastoral and exotic forestry with some sub-catchments retaining extensive native forest cover. In recent years there has been some conversion of exotic forestry to dairy farms. Much of the mid-section of this catchment has had suitable land converted to horticulture with kiwifruit being dominant.



**Figure 9: Outlet of Ford Road drain showing pumping station**

Before it was cleared for farming, Papahikahawai Island in the estuary (refer figure 9) supported estuarine wetlands on the low-lying land to the southeast (now mud and sand flats), freshwater wetlands on the flats above mean high water and upstream of the zone of saltwater influence (now also largely mud and sand flats), hardy salt tolerant mid-dune species on the coastal-facing slopes, and “scrub” species on the wetland margins and exposed south-facing slopes with trees such as cabbage tree, ngaio, houpara and karo. Some larger coastal trees, such as karaka, puriri, and whau may have grown in the more sheltered areas.



**Figure 10: View of mid estuary showing Maketu Spit and Papahikahawai Creek in foreground, and eastern end of Papahikahawai Island**

The Maketu spit is the most intact coastal dune system in the area, and is an important habitat for a variety of native flora and fauna. Historically, the spit would have had an intermittent cover of fore- and mid-dune species, many of which are still present today. Pingao and spinifex would have anchored the seaward side of the dune (spinifex predominates there today) and spinifex, pohuehue, shore bindweed, sand coprosma, coastal flax, and toe toe would have dominated the landward side of the dunes. It is unlikely that the dunes ever remained sufficiently stable to enable small stands of coastal trees to establish due to the infrequent breaching of the spit at Te Tumu by the Kaituna River and the subsequent eastward migration of the river mouth back to Maketu.



**Figure 11: Lower estuary with Maketu Spit in the foreground, Maketu township centre left, and Arawa wetland centre right**





Figure 12: Aerial Photograph of Project area





**Figure 13: Looking down Maketu Estuary from the Ford Road area with Ford's Cut in the centre of the photo. The edge of Ford Island can be seen in the bottom of the photo.**





Figure 14: Te Tumu Cut looking west



Figure 15: Maketu Spit from Te Tumu Cut end of spit



Figure 16: Maketu Spit and Papahikahawai Lagoon



Figure 17: Papahikahawai Creek and Island



**Figure 18: Ford Road at the existing culverts with the Kaituna River**



**Figure 19: Kaituna River looking upstream from Ford Road**





**Figure 20: Ford's Cut looking towards the estuary**



**Figure 21: Farm land between Ford's Cut, Ford Road and Maketu Spit**

### 4.3.1 Plan Schedules

The Regional Coastal Environment Plan (RCEP) lists the estuary area as having a number of values (see Appendix 1):

- Areas of Significant Conservation Value
- Areas of Significant Cultural Values
- Significant Indigenous Vegetation Areas

The District Plan includes (see Appendix 1):

- Significant ecological feature - estuary area, spit, and land north of Ford's Cut.
- Outstanding landscape feature - estuary.
- Flood hazard - adjacent to the Kaituna River and estuary, the area where it is proposed to create wetland, and Maketu township.
- Coastal protection - open coastline - Maketu spit.

The Regional Policy Statement - Variation 1 (Coastal Policy) also lists the river and estuary as having high natural character (see Appendix 1). For the river the main values are around the Lower Kaituna Wildlife Management Reserve and spawning areas for native fish. The listing notes that the river has been managed with stopbanks and significantly modified and channelled which diminishes its natural character. The listing includes a number of smaller remnant wetlands adjacent to the lower Kaituna River which are considered regionally significant under the RPS criteria.

Maketu Estuary, spit, dunelands and saltmarshes have moderate to high diversity but modification to natural processes has occurred. The listing notes the community support the restoration and management of the estuary as natural feature.

## 4.4 Geology and Geomorphology

Much of the Bay of Plenty region is within the Taupo Volcanic Zone, which occurs where the Pacific plate subducts under the Australian plate. The consequence of this is volcanism and geothermal activity in a band parallel to the subduction zone, which dominates the geological landscape of the area.

Along the coast, post-glacial sea level rise has led to the formation of barrier islands and spits, some of which are anchored to outcropping harder rock islands such as Maketu (Okurei Point). Behind these, embayments have formed harbours and estuaries. Back from the coast, alluvial plains have formed from the deposition of sediment by the major rivers. Some of these plains are low-lying and swampy, including the Lower Kaituna basin and Maketu areas.

The geomorphology of the coastal environment is influenced by the dominant swell pattern, littoral sediment drift, and sediment inputs from the Kaituna River. Maketu and Te Tumu are subject to a wave sheltering effect from Motiti Island (north swells) and Okurei Point (northeast and east swells), with predominantly north east swell generated waves from December to April and wind generated waves more apparent for May to November.

The mean net eastward sediment transport for the coastline west of Okurei Point was calculated to be 52,000m<sup>3</sup> per year (but values are highly variable year to year). The Kaituna River contributes approximately 7,000m<sup>3</sup> of bed load sediment per year - significantly less than sediment supplied by littoral transport.

## 4.5 Flows and Sediment

### 4.5.1 Flows

The Kaituna River at Te Matai has an average flow of  $39\text{m}^3/\text{s}$  with around half the flow sourced from Lake Rotoiti (at Okere). Flow from the lake is affected by the operation of the Okere Gates. Flood flows in the lower Kaituna River are significantly influenced by the Mangorewa River, which is a major tributary. Other significant tributaries include the Waiari Stream, Raparapahoe Canal, and Kopuaroa Canal, which drain the hill country behind Te Puke. The discharge of stormwater from the Papamoa urban growth area within Tauranga City also contributes to flows in the lower Kaituna River.

The existing configuration of channels and flows in the lower Kaituna River at Te Tumu is shown in Figure 22. On an average tide, at average river levels,  $2,900,00\text{m}^3$  of water flows through the lower Kaituna River on each tidal cycle. The volume of water which enters the estuary through the estuary entrance at Maketu (not the river mouth at Te Tumu Cut) is  $824,600\text{m}^3$  on an average tide, while the volume of water which exits through the estuary mouth is  $959,300\text{m}^3$ .



**Figure 22: Existing situation at Te Tumu showing the location of channels and stopbanks**

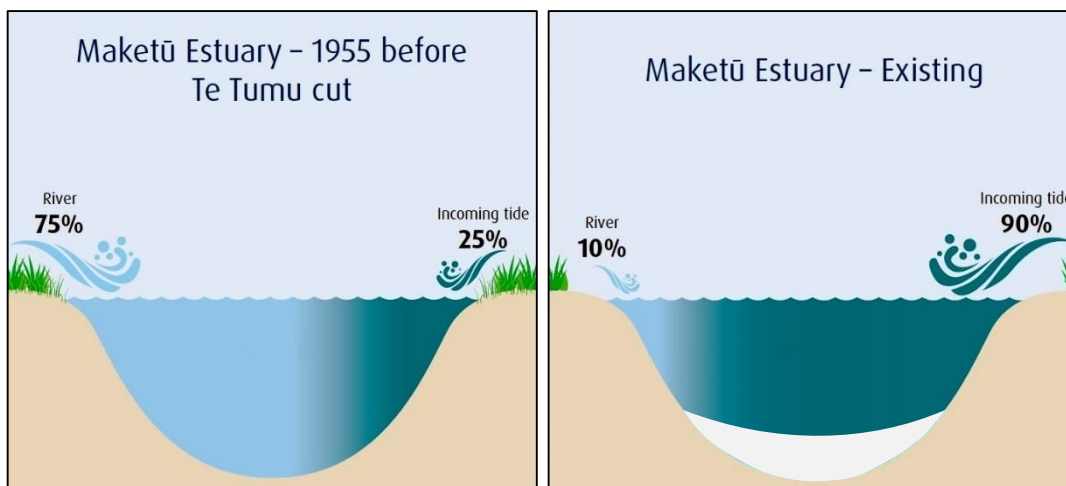
In 1990 the Minister of Conservation applied for resource consent for a partial diversion of the Kaituna River to the estuary. Under the consent, flows were increased gradually from  $20,000\text{m}^3$  per tidal cycle to the maximum of  $100,000\text{m}^3$  - under 4% of the river's mean flow and contributing some 7% of the mean tide estuary volume.

### 4.5.2 Sediment

One of the major concerns for the Maketu community is sand that has gradually filled in the lower estuary, largely because Te Tumu Cut's construction in 1956 took away the Kaituna River's ability to flush out coastal sediment brought into the estuary on incoming tides. The diversion through Te Tumu Cut also removed the river-borne sediment inputs from the estuary, but this contribution was small relative to the sediment supplied by littoral drift and brought into the estuary as a result of the change to a flood-tide-dominated lower estuary. Overall, the removal of the river from the estuary in 1956

significantly altered the lower harbour through enlargement of the flood tide delta<sup>7</sup>, as shown on Figure 23 on the following page.

Prior to diversion, most of the estuary tidal prism was infilled by river flows which also augmented ebb discharges on outgoing tides. At this time, the flood tide delta was a relatively minor feature. Following the diversion of the river through Te Tumu, flood tide inflows markedly increased to compensate for the loss of river flows, significantly changing the balance between inflows and outflows and causing significant expansion of the flood tide delta and increased erosion of adjacent shorelines.



**Figure 23: Pre-diversion and Existing Inflows to Ongatoto/Maketu Estuary.**

The drawing on the right shows the existing situation, and illustrates that the flood tide delta has expanded and accelerated sedimentation of the estuary.

## 4.6 Natural Hazards

### 4.6.1 Flooding and Drainage

The Kaituna River at Te Matai (approximately 12.5km upstream from Te Tumu Cut) has a mean flow of 36m<sup>3</sup>/s and an estimated 1% Annual Exceedance Probability (AEP) flood flow of 410m<sup>3</sup>/s. Prior to the establishment of the River Board and works to control the lower Kaituna River, there were frequent and sometimes severe floods over relatively large areas of the low-lying plains, including especially large events in 1907 and 1951.

Land along the lower Kaituna River benefits from the Kaituna Catchment Control Scheme, which provides flood protection and drainage of ground and surface water from the farmland adjacent to the lower river and the estuary. The objectives of the scheme are to provide security from floods of up to the 1% AEP event, and provide satisfactory drainage for the Kaituna Basin. In the Lower Kaituna area the scheme consists of:

- 67 kilometres of stopbank
- 88 kilometres of canals and drains
- Seven pump stations (and 14 pumps)
- Three weir structures
- Five major floodgate structures
- Riverbank protection - six kilometres of planting and 1.5 kilometres of rock or rubble

<sup>7</sup> A flood tide delta is an accumulation of sand on the shoreward side of an inlet, estuary, or harbour. They are formed by sediments carried from the sea into the harbour by flood tide currents and deposited as the currents decelerate.



- Mole/groyne structure at the Kaituna River mouth

The greatest determinant of peak water levels in the lower river and estuary is the level of the sea during high spring tides, especially if combined with low pressure systems and storm surge. The Maketu township foreshore is un-protected by the scheme, and as a result is already at risk of flooding. Large parts of the township and the surrounding area are identified as a flood hazard area on the District Plan maps.

In addition, significant areas of land are regularly subjected to surface flooding during rainfall events, including the Otumakoro Stream catchment in Maketu township which drains to the estuary via a culvert under Maketu Road at Spencer Avenue.

#### 4.6.2 Erosion

The expansion of the flood tide delta following the 1956 diversion enlarged the flood tide delta and aggravated erosion on surrounding shorelines in the lower harbour. Prior to diversion of the river in 1956, the estuary channel adjacent to the beach at Maketu extended only along the outer central areas of beach. Following the diversion, the channel extended further landward and around the front of the township due to the increased flood tide inflows. The enlargement of the flood tide delta also tended to push this channel towards adjacent shorelines.

These changes in wave and tidal forces on the shoreline aggravated erosion and contributed to the need for early rock sea wall protection evident by the late 1960's. In more recent years, Beach Road has been widened into the estuary, requiring the placement of extensive rock protection which has encroached over much of the beach width and into the adjacent channel.

Along Maketu spit, ongoing expansion of the flood tide delta since the diversion has periodically eroded the landward margin of the spit and led to breaching of the spit - for instance, in 1979 and 1994. Following the breaches, the entrance slowly migrates eastwards back to its original position and the pattern of channel and banks inside the estuary recovers; with this process taking at least 4-5 years following the breaches in 1979 and 1994.

A further period of flood tide delta expansion is presently occurring, causing severe erosion, and narrowing of the spit in the area approximately 600-800 m from the entrance. This may lead to further breaching of the spit in the next few years. The present erosion is located further upstream than any of the other breaches since the river was diverted. Accordingly, a breach in the present area of severe spit erosion may cause more significant disruption of inner harbour morphology than has occurred previously.

### 4.7 Terrestrial, Wetland and Avian Ecology

The existing indigenous vegetation in and adjacent to the estuary is a tiny fragment of what was present in this area before drainage and land development, construction of stopbanks, and the diversion of the Kaituna River. The main features of the existing vegetation around the estuary margins are:

- Large sections of estuary margin along the southern stopbanks have very little natural vegetation because of the close proximity of the stopbanks to the estuary channel.
- A small area of salt marsh remains adjacent to Maketu Road which appears to be stable and in reasonable health. Several smaller areas of salt marsh remain scattered



around the estuary, including in the old Kaituna River channel near the Maketu Spit carpark and off the eastern-most tip of Papahikahawai Island.

- The vegetation composition along the Maketu spit margin adjacent to Papahikahawai lagoon is strongly influenced by high salinity and lack of daily tidal movement, as the stopbanks and causeways isolate this area from the rest of the estuary.
- Salt-tolerant and freshwater wetland plant species are present in the low-lying grazed pasture areas on Papahikahawai Island and the area proposed for wetland (Brain land), despite persistent grazing by livestock.
- The wetland adjacent to the lower Kaituna River immediately west of Ford Island provides the most contiguous area of mature wetland vegetation in the area, with a mix of freshwater and moderately salt-tolerant species spread in a mosaic depending on elevation and water intrusion.
- The Arawa wetland, on the south-eastern side of Maketu Road, is larger than the wetland west of Ford Island but is currently isolated from the estuary by flap gates on the Waitipuia Stream.
- The landward-facing dune vegetation on the Maketu Spit is in relatively healthy condition because of the effective rabbit control and planting undertaken by local community groups.

The estuary is a recognised site of high ecological value for shorebirds, especially annual migrants from the northern hemisphere. Twenty two migratory species have been recorded in or near the estuary over the last 30 years, and another 29 native species, many of them shorebirds, have also been observed. The number of shorebird and water species occurring in the Maketu estuary and Kaituna River near its mouth does not appear to have varied greatly over the past 30 years, with most of the species recorded in 1996 still present in 2012-13. In total, 61 bird species have been recorded at the estuary and in Te Tumu Cut area since 1984. Of the species recorded, the following are considered to be threatened or at risk:

- Four (black-billed gull, NZ dabchick, grey duck and white heron) have a threat classification of “nationally critical”.
- Three (reef heron, Australasian bittern and black-fronted tern) have a threat classification of “nationally endangered” status.
- Eight (banded dotterel, black shag, Caspian tern, lesser knot, northern NZ dotterel, pied shag, red-billed gull, and wrybill) have a threat classification of “national vulnerable”.
- Eight (banded rail, white-fronted tern, eastern bar-tailed godwit, little black shag, pied stilt, royal spoonbill, South Island pied oystercatcher, and variable oystercatcher) are considered to be “at risk”.

Although little information exists about the state of the estuary’s avifauna before 1970 (no surveys have been found that pre-date the loss of salt marsh and freshwater wetlands in and around the estuary), shorebird numbers over time are likely to be closely related to the abundance and diversity of fauna in the intertidal zone. On this basis, the abundance of shorebirds is likely to have once been considerably greater.

The diversity and abundance of marshland and wetland bird species in the estuary is now small, reflecting the substantial loss of salt marsh and freshwater wetland habitat since the river diversion. Less than half of the species that inhabit the Kaituna Wildlife Management Reserve have been recorded in the estuary and around Te Tumu Cut. The wetland west of Ford Island and the remaining areas of salt marsh in the estuary are important remnant areas of high ecological value for wetland bird species.

## 4.8 Water Quality

A full assessment of the water quality of the estuary and the lower Kaituna River is included in the technical reports in Volume B. A hydro-dynamic and numerical model was developed to inform the ecological assessments and extrapolate water quality sampling data. The modelling assessed the effects of external loads on salinity, bacteria (i.e. shellfish collection and bathing suitability), and nutrient concentrations, it did not incorporate internal loads. The results of the model informed ecological assessments along with water quality sampling. The current water quality of the estuary and the lower Kaituna River in relation to these factors is described below.

### 4.8.1 Salinity

During mean river flow and tidal conditions, the water flowing through Ford’s Cut into the estuary currently comprises 87% freshwater. Under mean river flows the salinity in the upper, middle, and lower estuary is:

Location	Water surface	Estuary bed
Upper	5-15	10-15
Middle	15-25	15-30
Lower	25-35	25-35

All units are PSU - practical salinity units (0 = fresh water, 35 = sea water)

### 4.8.2 Oxygen

The accumulation of algae in the middle and upper parts of the estuary causes very high rates of primary production, which in turn results in low concentrations of dissolved oxygen (DO), particularly in the upper estuary and in Papahikahawai lagoon, and to a lesser extent in the mid estuary. The concentration of DO in these areas is significantly worse than guideline values for protection of fish and sufficient to exclude many fish species from these sections of the estuary during the early morning when concentrations are lowest. The Papahikahawai lagoon has particularly poor DO, which is likely to cause avoidance behaviour even in very tolerant fish species.

### 4.8.3 Bacteria

Since 1989, bacteria levels in the Kaituna River have decreased significantly (the median has decreased fivefold), demonstrating that this aspect of water quality is improving. Microbial concentrations in the estuary are considerably higher during and immediately following rain events. A detailed analysis of microbiological health risk of bathing and shellfish gathering in the estuary is included in Volume B.

Faecal coliforms are an indicator of potential pathogens or faecal contamination in water (for example the faecal coliform bacteria includes *Escherichia coli*). The Ministry for the Environment’s guidelines for water quality acceptable for shellfish gathering state that the median faecal coliform content (of samples taken) should not exceed 14 faecal coliforms /100ml, and not more than 10% of samples should exceed 43 faecal coliforms /100ml.

Sampling of bacteria in shellfish and shellfish waters from 2001-2011 indicates that water quality in the lower estuary complied with the shellfish gathering guidelines. Bacteria in the shellfish flesh samples were within guideline values most of the time (median values) but occasionally exceed acceptable limits. High values are mostly associated with rain

events - collecting shellfish after rain is not currently recommended. The bacteria come from a number of sources including rural and urban drains and streams, waterfowl, septic tanks, run-off from grazed land and directly from the Kaituna River.

Enterococci is often a better indicator of bacteria concentrations in saline environments as they show a slower decay rate in saline environment and are thought to more closely mimic many pathogens than do other indicators. Microbial bathing quality is monitored weekly over summer near the estuary entrance. From 2007 to 2014, enterococci levels in the lower estuary consistently met the bathing water guidelines. Bimonthly water quality sampling by BoPRC at the boat ramp shows similar results. Enterococci concentrations in the estuary are highest where drains enter the estuary and where the Kaituna River enters the estuary at Ford's Cut.

#### 4.8.4 Nutrients

The estuary is subject to nutrient loads from both external sources (e.g. rivers and drains) and internal sources (e.g. release from sediment). Parts of the estuary are currently highly eutrophic due to poor flushing and high internal loading from anoxic sediments and cyanobacteria, particularly in the Papahikahawai lagoon.

The influence of the Waitipua Stream and drain inputs result in the southern estuary having a higher external nutrient load than other parts of the estuary, and have a significant influence on the mid and lower estuary when it rains.

### 4.9 Aquatic Ecology

A full assessment of the aquatic ecology of the estuary and lower Kaituna River is included in the technical reports in Volume B. The existing ecological condition of the estuary and river is summarised below.

#### 4.9.1 Algae

The health of the estuary has reduced with the proliferation of algae and the loss of seagrass beds. Currently, about 30% (71 ha) of the estuary is covered in algae of greater than 50% cover. The dominant algae species are sea lettuce (*Ulva* sp.) and *Gracilaria* sp. There are dense accumulations of free-floating macro-algae common in the upper estuary, mid-estuary and along the margins of the southern estuary.

Papahikahawai lagoon is dominated by floating mats of algae and cyanobacteria. Anoxic mud beneath these mats is estimated to cover 29% (68 ha) of the estuary to depths of between 1 to 25 cm. Current speeds in the upper estuary, south of Papahikahawai Island and in Papahikahawai lagoon are relatively low, which contributes to the accumulation of algae and associated anoxic, organic mud.

#### 4.9.2 Benthic invertebrate fauna

Benthic invertebrate fauna are valued as fishery (e.g. pipi, cockle) and are an important food source for fish and birds. They are also useful as bioindicators to detect and monitor environmental changes. This is because they integrate water and sediment quality conditions over time, and rapidly respond to natural and/or anthropogenic-caused stress.

The estuary was historically renowned for its plentiful supply of pipi, tuangi (cockle) and titiko, and may have supported mussel and oyster beds prior to diversion. Pipi are still common in the lower estuary, but mussel have declined and oysters are now rare. The

lower estuary is generally in reasonable ecological health with a relatively diverse range of macrofauna and dense populations of cockle, wedge shell, and pipi. The mid-estuary, east of Papahikahawai Island, has a relatively diverse range and moderate to high abundance of macrofauna, including cockle and wedge shell. The western part of the mid-estuary generally has low species richness and low shellfish abundance, although horn shell is often abundant.

In the southern margin of the estuary, shellfish (cockle and wedge shell) are sparse as are most other infauna. The upper estuary can be characterised by low diversity and low abundance of benthic macrofauna. Epifauna are generally limited to crab holes, mud snail, and estuarine snail. The more western parts have particularly poor ecological health - in the worst sites (with dense algae and anoxic mud) no benthic fauna are present. Years of algae decomposition in the Papahikahawai lagoon have formed a thick layer (10 to 25cm) of anoxic, organic mud over the surface. No benthic invertebrates were found in the lagoon as part of survey work for this Project.

### 4.9.3 Fish

The estuary provides a nursery and feeding ground for a number of fish species. There are 24 fish species that either utilise or travel through the estuary or Kaituna River mouth. Fish commonly observed in the main body of the estuary are kahawai, mullet, flounder, and parore. Fish common around the estuary margins are shortfin eel, cockabully, common bully, giant bully, inanga, and the introduced mosquito fish. However, the current extent of suitable habitat is reduced by low dissolved oxygen concentrations, and by extensive areas of anoxic sediments that exclude invertebrates.

Diadromous fish species in the lower Kaituna River include: torrent fish (*Cheimarrichthys fosteri*), giant kokopu (*Galaxias argenteus*), koaro (*Galaxias brevipennis*), banded kokopu (*Galaxias fasciatus*), lamprey (*Geotria australis*), common smelt (*Retropinna retropinna*) and black flounder (*Rhombosolea retiaria*). Rainbow and brown trout are also present. The amount of potential whitebait habitat in the lower Kaituna River is substantially less than in the past due to drainage of wetlands, loss of riparian vegetation, and the use of flap gates on drains and streams.

The saline wedge<sup>8</sup> which propagates up the Kaituna River on the incoming tide suggests that potential inanga spawning habitat would be in the vicinity of the Lower Kaituna Wildlife Management Reserve some 2.5 to 3.1 km from the river mouth. Observations of inanga egg sites indicate that inanga can spawn over a much wider range (about 1.7 to 6.6 km upstream from river mouth).

### 4.9.4 Kaituna River macroinvertebrate fauna

The aquatic macroinvertebrate community can provide an indication of river health and the food available for fish. A survey undertaken for the Project found low Macroinvertebrate Community Index (MCI) scores at most sites, reflecting the dominance of taxa tolerant of wide changes in salinity. The dominant taxa at all transects were amphipods and snails (*Potamopyrgus* sp.).

The greatest abundance and species diversity of aquatic macroinvertebrates in the lower Kaituna River tidal zone occurs on the stream banks and riparian margins. The bed tends

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<sup>8</sup> A saline wedge describes the situation in a tidal river mouth or estuary, where denser saline seawater intrudes in as a wedge at the bottom while fresh water flows out and over it at the top.

to have few taxa due to the mobile pumice sands. Pipi are abundant near the mouth (e.g. from 0.7km upstream) where the water is more saline and the substrate more stable.

## 4.10 Cultural and Historic Environment

### 4.10.1 Cultural Values

The relationship between tangata whenua, the Kaituna River, and the estuary is culturally and historically very significant - it has sustained the people since the landing of Te Arawa waka at Maketu. Not surprisingly, the area is rich in history and includes some of the earliest recorded areas of occupation in the Bay of Plenty.

To better understand the cultural history, values, and report on the cultural impacts of the Project, four Cultural Impact Assessments (CIA) were commissioned. The CIAs cover the interests of Ngati Whakaeu ki Maketu, Tapuika, Ngati Rangiwewehi, Ngati Makino, Ngati Pikiāo, Waitaha, and Ngati Tunohopu. The CIAs form part of Volume B of these applications<sup>9</sup>. The CIAs note:

- The Kaituna River and the estuary is a taonga for a number of reasons including as:
  - a source of food - highly valued fishing grounds that have sustained the people since the landing of Te Arawa canoe
  - a source of flax for building material and clothing
  - the location of numerous settlements
  - the location of significant sites
- The degradation of the mauri of the river and estuary over time has been significant and the impact on the surrounding environment considerable
- No consultation occurred over the years with tangata whenua when the various diversion works were carried out
- The erosion of cultural values has impacted on the health and wellbeing of tangata whenua including a loss of cultural knowledge

The CIAs contain a number of recommendations that are addressed in Section 9. Through consultation with the community it is clear that many of the cultural values expressed in the CIAs are shared with a wide range of local community members. Both Maori and non-Maori members of the community thought the area had conservation value and also mentioned intrinsic values.

### 4.10.2 Archaeological Sites

Historic maps showing the original alignment of the river are an indicator of where archaeological remains (both prehistoric and historic) are likely to be found. Although the Project area has been disturbed by modern developments there is potential for intact archaeological remains to exist and for this reason an archaeological authority will be sought under the Historic Places Act.

There are four sites recorded in the New Zealand Archaeological Association database however none of these are included in the District Plan. It is important to note that the location of the sites in the database are only an indication of a site in the area and the

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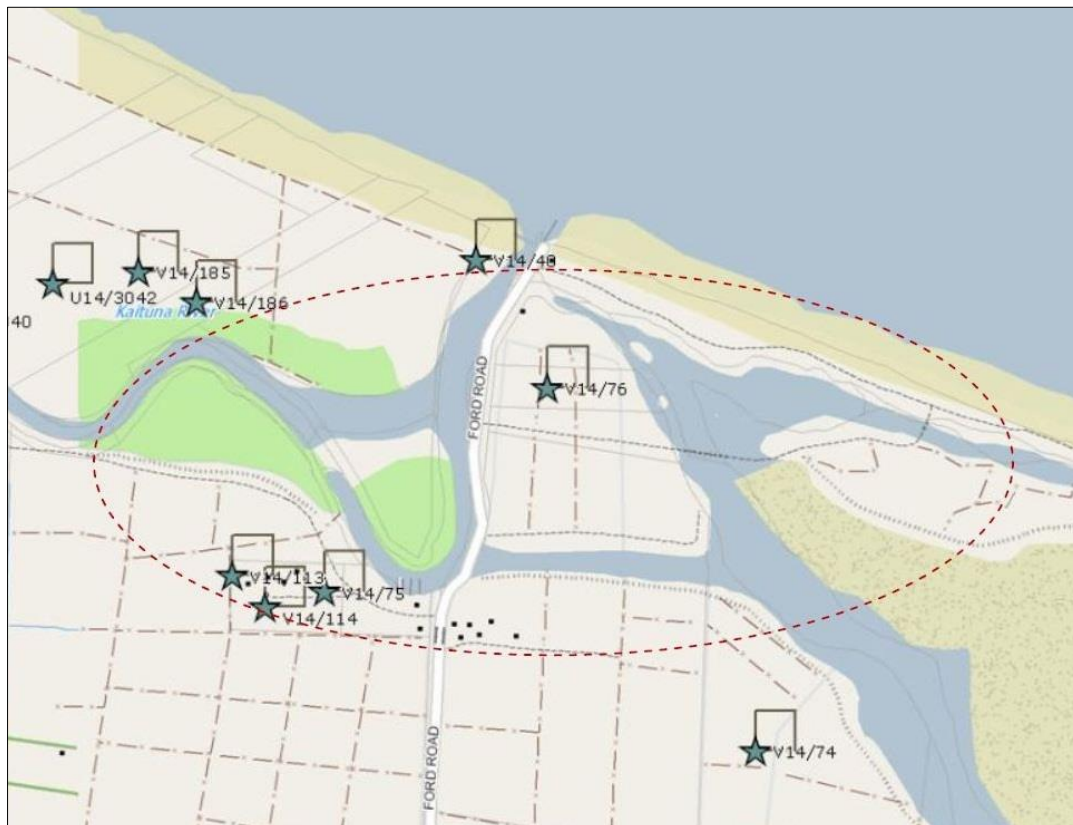
<sup>9</sup> The author of the Waitaha, Ngati Makino, Ngati Pikiāo, and Ngati Tunohopu CIA have authorised release of the full CIA report to the consent authorities, but have requested it not be distributed to the wider public without their express permission.

exact location can sometimes differ. The recorded sites are listed in Table 2 below and shown on Figure 24 below.

**Table 2: Recorded archaeological sites from the NZAA database**

Site Ref.	Location	Site Type	Description (notes on site form)
V14/75	220m west of Ford Road and on a bend in the original course of the Kaituna River	Unclassified	Local said the site was a pre-European Village
V14/76	On land north of Ford’s Cut, approximately 300m south of the beach and 100m east of Ford Road	Midden/oven	Landowner said found extensive midden and a number of adzes during ploughing on land some years ago
V14/113	800m north of Kaituna Road and 500m west of Ford Road	Midden/oven	From 0.25-1.0m deep in places for 700m
V14/114	730m north of Kaituna Road and 450m west of Kaituna Road	Artefact find	Landowner reported finding adzes in paddock
V14/40	<i>Te Tumu Pa - see below</i>		

The location of the culturally significant Ngai Te Rangi pa site of Te Tumu (V14/40) has recently been considered in the Environment Court in relation to appeals on the Tauranga City Plan (the boundary with WBoPDC being the Kaituna River).



**Figure 24: Map of Archaeological Sites (New Zealand Archaeological Association)**

## 4.11 Social and Recreational Environment

The Kaituna River and estuary are important recreational areas in the region. The Strategy notes:

*The river and estuary are used for both active and passive recreational pursuits....The Ongatoro/ Maketu Estuary is an excellent location for kite boarding and wind surfing, and offers a safe swimming area, with the adjacent park catering for whanau picnics. Schools also use these areas of the estuary for seashore studies. In the right conditions the Ongatoro/Maketu Estuary mouth and the Kaituna Cut at Te Tumu offer excellent surfing opportunities. The river and estuary have traditionally been used for eeling and whitebaiting, both of which are still popular. Surf-casting for kahawai and snapper is very popular at the mouths of the river and estuary. Netting for fish and shellfish gathering are also popular activities in the Ongatoro/Maketu Estuary and lower reaches of the Kaituna River.*

As part of the Project a survey was undertaken to learn more about how people use the lower reaches of the Kaituna River, the estuary, and Maketu beach areas for social and recreational purposes and to assess the impacts on users as a consequence of the Project. In summary, the survey showed:

- The most popular activities were walking and picnicking, followed by swimming (in summer) and fishing
- Te Tumu Cut was the most popular spot for fishing, with people observed there at all tide times and even in poor weather
- Boats are putting out to sea through both the estuary entrance and Te Tumu Cut - both of these bars are only navigable around high-mid tide times and when the sea is fairly flat, except for highly skilled operators of vessels with shallow draughts, such as the Coastguard jet boat
- On a scale of 1 to 10 (very poor - excellent) the health of the estuary (4.75) was rated slightly lower than that of the lower Kaituna River (5.26)
- Maori respondents highly valued the access to kaimoana and cultural values, followed by fishing, recreation, family, and home

## 4.12 Infrastructure

Within the Project area and adjacent locations there are a number of existing built structures, including:

- Ford Road
- At the Kaituna River mouth at Te Tumu Cut, a car parking area and rock protection structure
- The existing culverts under Ford Road - Department of Conservation consent
- Private boat ramp and mooring facilities
- Dairy farms - sheds, pumps and houses, and utilities
- Water supplies to adjacent farmland and Lower Kaituna Wildlife Management Reserve
- Stopbanks, Land drainage network, culverts, flap gates, and pumping stations





## Part 5: Description of the Project

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### 5.1 Overview

This section describes the Project, outlining the various construction activities, their programming, and risks that have been considered. These matters are discussed in detail in the Construction Description (Waterline, 2014) which is included in Volume B.

The Applicant proposes to re-divert an additional 15% (for a total of 20%) of the Kaituna River's flow back into the estuary. The design of the proposed re-diversion attempts to maximise the total volume of water which flows into the estuary from the river during each tidal cycle, while also maximising the freshwater component of the water flowing into the estuary. The Project will also create wetland area.

The key features of the work are:

- Add more culverts to the existing Ford's Cut culverts to create a larger inlet structure to allow more water from the river into the estuary and prevent return flow.
- Excavate a channel from the river at the western end of the wetland west of Ford Island (approximately 900m west of Ford Road) to meet the existing channel south of Ford Island in Ford's Loop. This will require relocation of the existing stopbank to the south of the new channel.
- Blocking the downstream section of Ford's Loop (between Ford's Road and Ford Island) and construction of new moorings.
- A new public boat ramp and car parking, including provision for future additional car parking (subject to confirmation of funding).
- Widen Ford's Cut to at least 60 metres at the inlet structure, widening to at least 100 metres at the estuary and deepen to RL-1.5m, leaving it with "soft" gently sloping edges in addition to these widths.
- Creation of chenier island features to protect Papahikahawai Island and low-lying land north of Ford's Cut from erosion.
- Remove the stopbanks/causeways between Papahikahawai Island and Maketu Spit, and between the land north of Ford's Cut and Papahikahawai Island.
- Shape and restore wetlands on the low-lying land north of Ford's Cut and on reclaimed land in Ford's Loop.
- Provide for environmental enhancements on Papahikahawai Island by the landowners and supported by BoPRC as part of a Biodiversity Management Plan (BMP)

The overview plan (Figure 1) illustrates the key features. The Project is described in detail in the various technical appendices in Volume B and shown on the Construction Drawings in Volume C.

### 5.2 Construction Activities

The construction activities can be broken up into a number of components, some of which will be undertaken concurrently. All works can be undertaken over one construction season and have been planned to minimise effects on the environment, and on recreational and commercial users of the river and estuary.

The various components of the construction activities are described in Table 3 on the following pages, along with the estimated duration and timing of works, total earthworks quantities, and construction drawing sheet number.

**Table 3: Construction Activities**

Component	Estimated Duration	Earthworks Quantities	Drawing Sheet No.	Description / Mitigation
Site establishment and supply of materials	4 weeks	Nil	19	<p>Initial activities will focus on the establishment of a contractor's site on land owned by Mr Boy Corbett. The site includes offices, telecommunications, power and water supplies, canteen and ablution facilities, secure storage areas and storage areas for fuel, materials, vehicles, and equipment.</p> <p>Temporary fencing, signage, and security will also be installed. Safe access for the public, commercial boat users, the coastguard, and adjacent landowners will be provided. Traffic movements will be high as equipment and materials are delivered. This will be managed with appropriate traffic controls, signage, and water trucks (to manage dust) as required.</p>
Install new culverts (inlet structure)	10 weeks	6,000m <sup>3</sup> excavated for re-use 500m <sup>3</sup> imported foundation material	14	<p>21 new concrete box culverts (2.5m high x 2.5m wide x 5m long) will be installed on either side of the existing culverts beneath Ford Road. Flap gates will be installed on the downstream (estuary) side of the culverts to prevent backflow from the estuary to the river. The culverts will be precast in shorter units off site and assembled on site after placement in the excavation. At the southern end of the culverts on the west side of Ford Road, a platform will be cut into the causeway with a ramp to allow access for log removal.</p> <p>As the foundations for the new culverts are approximately 2m below high tide level, the area will be protected by sheet piling and dewatered. Water pumped from the excavation will be discharged to land north of Ford's Cut. Excavated material will be stockpiled for reuse, and used to raise areas of adjoining land. After the sheet piling is removed following installation of the new culverts, the flap gates on the new and existing culverts will be locked closed until all works are complete to prevent flow into the estuary and manage sedimentation.</p> <p>Erosion and sediment controls will be established around stockpile and fill areas, and some of the existing drains on the land north of Ford's Cut will be blocked to prevent sediment laden water pumped from the excavations from entering the estuary. Ford Road will be closed to the public for an expected duration of 10 weeks during installation of the new culverts. The closure is scheduled to occur from late August to early November in the draft construction programme, to avoid times of high recreational use during summer.</p>

Component	Estimated Duration	Earthworks Quantities	Drawing Sheet No.	Description / Mitigation
Construct New Stopbank	8 weeks	20,000m <sup>3</sup> fill	16	<p>To replace the existing stopbank which will be removed to make way for the proposed re-diversion channel, a new stopbank will be constructed, with a crest level of RL 3.2m, crest width of 3 metres and side slopes of 1 in 3 in accordance with specifications agreed with the BoPRC Natural Hazards Group. The stopbank will be built using material excavated from along the line of the new channel, and will be covered with topsoil and planted.</p> <p>Erosion and sediment controls will be installed to manage stormwater runoff from the exposed areas. Existing farm services for the adjacent farm will be relocated, replaced, or avoided as required. Full flood protection will be maintained by the existing stopbank. Final works to tie-in the new stopbank to the existing stopbanks will be undertaken during fine weather and the timing will be agreed with the BoPRC Natural Hazards Group.</p>
De-construct Existing Stopbank	8 weeks	18,000m <sup>3</sup> excavated	16	<p>Once the new stopbank is complete, the existing stopbank can be de-constructed. The northern toe of the stopbank will be retained below RL1.3m as a bund to prevent short-circuiting of high salinity water from the river entering the new channel. Material removed from the stopbank will be used as fill to build the car parking area for the new boat ramp. Erosion, sediment, and dust controls will be employed as required.</p>
Construct (but not commission) New Re-Diversion Channel Inlet	1 week	150m <sup>3</sup> excavated	16	<p>Material from the stopbank will also be used to provide temporary construction access to enable construction of the new channel inlet. The excavation of the inlet will be exposed to river and tidal flows, during which time sediment will be released to the river. Work is scheduled in the draft construction programme to occur during late October, during the latter part of the whitebait fishing season and before times of high recreational use during summer.</p>
Construct New Re-Diversion Channel	8 weeks	45,000m <sup>3</sup> excavated 1,500m <sup>3</sup> imported rock fill	16	<p>Following de-construction of the existing stopbank, the new re-diversion channel will be excavated. Small sections will be left temporarily at the upstream and downstream ends to block flow into the channel and contain suspended sediment from the works. Erosion, sediment, and dust controls will be employed as required.</p> <p>The excavated material will be used to construct the new stopbank (see above) and the remainder used as fill for the new car parking areas. The southern bank of the new channel will be lined with imported rock rip-rap. There will be a 5m wide berm</p>

Component	Estimated Duration	Earthworks Quantities	Drawing Sheet No.	Description / Mitigation
				between the top of the southern bank of the new channel and the northern toe of the new stopbank.
Construct New Moorings, Parking Area, Boat Ramp	6 weeks	14,000m <sup>3</sup> fill	3	<p>New moorings for the Coastguard and commercial fisherman will be constructed adjacent to Ford Road. A new public boat ramp and car parking area will also be constructed, subject to funding. Structural fill for the parking area and realigned Ford Road will be sourced from the removed stopbank and from the new channel. The boat ramp will be constructed by re-shaping the channel side and re-arranging the existing rock rip-rap, with additional rock imported as required.</p> <p>Concrete will be laid to form the wet section of the ramp and roading gravel will be used for the dry section and the car parking. The moorings will be created with driven timber piles, and the jetties and gangways will be proprietary floating units. Space adjacent to the moorings will be created for the Coastguard and commercial fisherman shore facilities (<i>to be provided by others, not as part of this Project</i>). The boat ramp includes space for temporary tie up alongside.</p> <p>The structural earthworks for the car parking and boat ramp, and the construction of the new moorings are scheduled in the draft construction programme to occur during November, prior to the times of high recreational use during the Christmas holiday period. This will enable relocation of the Coastguard and commercial fisherman prior to Christmas, with completion of the boat ramp, car parking, and realignment of Ford Road scheduled to occur during January. Erosion and sediment controls will be installed to control runoff from exposed areas as required.</p> <p>Excavation of the river channel is required to provide adequate depth for the moorings, and will be undertaken over 2-3 days by a shore based excavator. Once completed the moorings can be occupied for their uninterrupted use. There will be temporary discharge of sediment to the river when the boat ramp is constructed, the channel is excavated, and during installation of wooden poles for the breakwater and the moorings.</p>
Create Salinity Block in Ford's Loop	8 weeks	50,000m <sup>3</sup> fill	15	<p>The existing channel (known as Ford's Loop) that feeds water from the river to the existing culverts will be closed to prevent the estuary filling with highly saline water. This closure is referred to as the "salinity block". A permanent rock fill will be placed at the northern end to act as a containment bund with a crest level above spring high tides. At the southern end a permanent, low height, rock fill toe will be pushed across the channel at approximately low tide level to provide containment. Weaker</p>

Component	Estimated Duration	Earthworks Quantities	Drawing Sheet No.	Description / Mitigation
				fill material will be placed in between the rock fills to form a new wetland area, which will slope gently from north to south. The northern rock fill will provide walking access to Ford Island <sup>10</sup> and the substrate of the new wetland. The rock fills will be constructed first to contain the weaker fill and reduce the release of sediment into the river. To minimise sediment discharge, silt curtains and silt screens will also be deployed in the channel.
Improve Ford's Cut and Deepen River Loop	10 weeks	63,000m <sup>3</sup> excavated	16	<p>Ford's Cut will be widened and deepened, and the channel south of Ford Island will be deepened, to improve the flow capacity of the re-diversion. The work will be undertaken using a combination of barge mounted and land based excavators, and suction dredges. The northern bank of Ford's Cut will be shaped to prevent direct flow from Ford's Cut entering the new wetland area to the north. The bank will slope back from Ford's Cut on a shallow gradient (i.e. 1:5 to 1:30) starting from below the spring low tide level to provide better habitat diversity and to help flush algae.</p> <p>No excavation will occur on the southern bank or channel edge to protect the existing stopbank and rock erosion protection. Excavated material from Ford's Cut will be used to create the salinity block and new wetland area in Ford's Loop, with excess material placed against the east side of Ford Road north of Ford's Cut. Excavated material from the river loop will be used to raise areas of adjacent land. Rock fill will be placed around Ford Island, against the south bank, and adjacent to the new culverts as protection against erosion.</p> <p>Because of the salinity block, the work area will be subject only to very low tidal flows from the upper estuary and Ford Road drain outflows. Silt screens and curtains will be installed at the estuary end of Ford's Cut to minimise the release of sediment to the estuary. Uncontrolled sediment will be released while the connection is made between Ford's Cut and estuary. This will be of short duration (days) and can be undertaken on incoming tides to minimise sediment travel distances.</p>
Remove Upper Estuary Stopbanks and Causeways	2 weeks (to be undertaken progressively over a longer period)	15,000m <sup>3</sup> excavated	20	The causeways linking Papahikahawai Island to the Maketu spit will be progressively removed over a number of weeks to allow flushing of poor quality water and sediments from Papahikahawai lagoon. The causeways will be removed by excavator and the material spread on Papahikahawai Island for re-contouring and planting by

<sup>10</sup> Discussions are ongoing with the owners of Ford Island to provide vehicle access. If agreement is reached, stronger engineered fill will be used for the northern rockfill with details to be confirmed during detailed design. Legalisation of the physical access to Ford Island is not part of the Project.

Component	Estimated Duration	Earthworks Quantities	Drawing Sheet No.	Description / Mitigation
				<p>the owners as part of a Biodiversity Management Plan. The stopbanks around the land north of Ford’s Cut will be flattened, re-contoured, and planted where elevations allow.</p> <p>A temporary culvert will be installed in the causeway connecting the land north of Ford’s Cut to Papahikahawai Island, to enable flushing of Papahikahawai Lagoon while retaining vehicle access to the island.</p> <p>Once all rehabilitation material is delivered to the island the causeway will be progressively removed by excavator with the underlying bed will be shaped to match estuary bed levels. Material removed will be used on the adjacent land to shape new wetland areas. The removal of the final causeway material down to the estuary bed is below high tide level. There will therefore be a short term discharge of suspended sediment to the estuary during high tide.</p>
New culvert intake for Lower Kaituna Wildlife Management Reserve	-	-	-	<p>To compensate for the reduction of water levels in the Kaituna River and associated flow to the wetland in the Reserve (10,500m<sup>3</sup> for spring tide) an additional culvert at intake 2 is proposed to be installed as part of the Project. A trench will be dug from the river to the toe of the existing stopbank and through the bank. The culvert will be laid in the trench and backfilled and the stopbank re-constructed.</p> <p>The culvert is likely to have a diameter of 0.9 m, invert of -0.5 m (Moturiki Datum) and length of 20 m, allowing an additional 13,300m<sup>3</sup> to the wetland for a spring tide, ensuring that any adverse effects as a result of the Project will be fully mitigated. The final details will be agreed with the stakeholders (DoC, Fish and Game, and BoPRC Natural Hazards) during detailed design.</p>
Open New Channel Inlet	1 week	2,000m <sup>3</sup> fill		<p>After completion of all excavation and filling works and installation of the new culverts, the new channel will be commissioned (opened) to allow water to flow from the river to the estuary. This will be undertaken by excavators working off temporary platforms, taking care to not disturb the previously placed rock rip-rap and channel entrance.</p> <p>Sediment will be released from the work sites and will move with the tidal and river flows. However, the durations are short (5 to 6 days) and the silt curtains and screens can be left in place at the estuary end of Ford’s Cut. The excavated material will be used to raise areas of adjoining land.</p>

Although the activities are generally set out in the likely construction sequence, this is subject to change through detailed design and with contractor input. A number of activities can also take place concurrently. A draft construction programme is appended to the Construction Description Report in Volume B. A construction management plan will be required by the conditions of consent and will provide further detail on each of these aspects, to be certified by the consent authority prior to commencement.

### 5.3 Commissioning and Operation

Prior to commissioning of the re-diversion, the Commissioning Section of the Environmental Management Plan will be prepared and submitted to the consent authorities. When the final channel block is removed and water is allowed to flow again through the new channel to the estuary, only the four existing culverts will be open. This will limit the flow rates and flow velocities to current levels, which will minimise initial disturbance of sediments. Observations will be made of all critical areas, including:

- Erosion and sedimentation in key locations
- Flow velocities at key locations
- Water quality
- Water levels

The new culverts will then be progressively opened in accordance with the plan, increasing the re-diverted flow from 150,000m<sup>3</sup> up to approximately 400,00m<sup>3</sup> per mean tidal cycle. After a period of 12 months, all of the new culverts will be opened and the flow increased up to approximately 600,000m<sup>3</sup>, subject to monitoring the effects of the initial re-diversion and resolving any unanticipated operational issues, should they arise.

Section 8.5 of this AEE Report identifies the need to mitigate increased flood risk in the lower estuary at Maketu as a result of the Project. This will be done by managing the flows through the new culverts in accordance with the flood management section of the Operation and Maintenance Manual (see section 8.5.2 and Appendix 3 - Draft Conditions).

### 5.4 Wetland Works

In addition to the re-diversion of the Kaituna River and associated construction activities, the Project will re-establish freshwater, estuarine margin and saltmarsh wetlands (where environmental conditions allow it) on up to 20 hectares of land within and adjacent to the estuary. The areas of wetland creation as part of the Project lie on two blocks of land - 19 hectares on the land north of Ford's Cut and 0.5 hectares in the Ford's Loop channel. Details of the recommendations for wetland creation are contained in the technical reports in Volume B. The full extent of the vegetated wetland area is dependent on the acquisition of the necessary property rights, for which negotiations are ongoing, as well as the detailed site-specific attributes of the land following re-diversion.

A further 8 hectares of wetland creation (and a similar area of terrestrial habitat) on Papahikahawai Island are proposed as part of environmental enhancements by the landowners and supported by BoPRC's Land Management Group. These works are the subject of a Biodiversity Management Plan (BMP) currently in preparation, which will describe various land management initiatives to improve the environmental values of the property. These initiatives focus primarily on retirement of land from farming, replanting with native vegetation and pest control. The BMP is being prepared so that it is consistent with the Project.

The re-establishment of wetlands in these areas which are directly linked to the estuary will greatly benefit the ecology of the estuary after re-diversion. The primary objective is to 'restore' the land available to a state where there is a sustainable cover of indigenous plants that is as close to the original natural species diversity as possible, given the significant changes to the estuary over the last 100 years.

The species chosen for planting and the wetland types created will be determined by the nature and extent of tidal influences, soil salinity, and soil saturation that occur after stopbanks and causeways are removed.

To ensure restoration efforts are successful, a Wetland Plan will be prepared as part of the detailed design of the Project. The strategy will include the following:

- Initial monitoring of site growing conditions (especially soil salinity, soil saturation, tidal induced sediment erosion and deposition) after re-diversion
- Creation of a planting zone plan based on site growing conditions and species tolerances
- Trial planting of plant species, especially in areas where growing conditions are likely to be challenging (e.g. areas exposed to open tidal water and those with higher salinity)
- Details of mass planting once species can be matched to site conditions with high confidence of success
- Weed and pest control, beginning as soon as livestock are removed and continuing for at least 5 years following planting
- Monitoring plan to objectively measure plant and species performance

Each of the wetland areas will require different strategies that reflect land ownership and the environmental conditions and risks that will arise following the re-diversion, and each area will need to have a planting plan produced that details the planting zones, species mixes, plant spacing, plant grades, site preparation and post-planting maintenance requirements. Trial plantings are recommended prior to any mass plantings to ensure species tolerances are well understood and well matched to monitored soil conditions. These trial plantings will provide information that will allow species to be selected for planting at all three wetland creation sites.

Due to peat shrinkage over the past 50 years a portion of the land north of Ford's Cut is now too low to form vegetated wetland, and will likely revert to estuarine mud and/or sand flats instead once the surrounding stopbanks have been removed.

From an ecological perspective, the removal of stopbanks around the land north of Ford's Cut and on the southern shore of Papahikahawai Island is preferred to enable natural hydrological conditions to develop and to optimise the quality of habitat available for terrestrial and aquatic fauna. However, there is a risk that complete removal will accelerate erosion and create areas of estuarine sand flat as well as vegetated estuarine wetland habitat. A progressive approach to stopbank removal is therefore proposed in association with erosion protection works on Papahikahawai Island, as outlined below.

## 5.5 Papahikahawai Island Works

In order to protect the southern shoreline of Papahikahawai Island from erosion following re-diversion, it is proposed to undertake erosion protection works in conjunction with the environmental enhancements planned by the owners as part of a BMP (described above). The intervention is discussed in more detail in the technical reports in Volume B, and will form part of the detailed Wetland Strategy discussed above.



Initially, works on Papahikahawai Island as part of the Project will involve:

- Removal of the causeways linking the island to the Maketu Spit and to the land north of Ford's Cut (as described in the sections above).
- Construction of a small bridge for foot and light vehicle (i.e. ATVs) from the Maketu Spit to the island across Papahikahawai Creek.
- Excavation of appropriately located and sized breaks in the bund on the southern shoreline of the island (details to be agreed with landowners) to restore hydraulic connectivity with the estuary and enhance wetland recovery behind the bund, while maintaining erosion protection. These breaches will be monitored and adjusted as required subject to landowner agreement.
- Stockpiling materials suitable for future potential erosion control (e.g. coarse sand with very low silt and mud content) on the island.

Over the longer term, works on Papahikahawai Island could involve:

- Maintenance of the existing bund along the southern shoreline to maintain erosion protection until such time as the erosion risk is understood and is able to be managed. This may include periodic placement of sand along the seaward face if required to offset accelerated erosion. The sand will stockpiled during the initial work.
- Significant or even complete removal of the bund at a later date subject to monitoring and trials, and subject to landowner agreement.

Both the owners of Papahikahawai and BoPRC wish to restore wetland vegetation on the estuary side of the bund. However, this is highly unlikely to be successful without significant intervention first to change the bed levels and reduce the exposure of the island shoreline to erosive forces, especially wave energy. To achieve this, subject to landowner agreement, future works may include:

- Placement of material over part of the intertidal flats to lift bed levels to required elevations for the vegetation communities being restored.
- Placement of material to form chenier island type features to assist wetland recovery, retention of placed sediment, increased habitat diversity, wave shelter, erosion protection, etc.)
- Use of other natural features or vegetation as appropriate to assist wetland recovery or provide erosion protection

Even if these works are undertaken, it is possible that conditions will remain unsuitable for wetland restoration on the estuary side of the existing bund.



## Part 6: Consideration of Alternatives

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### 6.1 Overview

A range of options for the Project were identified and assessed to respond to the objectives for the Project. Under the RMA, a consideration of alternative sites, routes, and methods is relevant in certain specific respects, including:

- In relation to an NoR, whether adequate consideration has been given to alternative sites, routes and methods of undertaking the work (where a Requiring Authority does not have an interest in the land sufficient for undertaking the work, or it is likely that work will have a significant adverse effect on the environment) - section 171(1)(b)
- In relation to resource consent applications, the Fourth Schedule states that an AEE should include a description of possible alternative locations or methods for undertaking the activity where it is likely that the activity will have a significant adverse effect on the environment, Schedule 4 clause 1(b).
- In relation to applications for discharge permits, section 105 requires decision makers to have regard to various matters including "any possible alternative methods of discharge, including discharge into any other receiving environment".

A number of options have been considered and assessed by BoPRC and an iterative process has been undertaken to reach the agreed preferred option for the Project. This section sets out the consideration of alternatives for the Project as required by the RMA, and provides an overview of the processes undertaken for investigating and considering alternatives before deciding on the preferred option.

### 6.2 Option and Evaluation Process

The following sections present a summary of the option investigation and evaluation process, which is described in detail in the "Summary and Analysis of Options and Alternatives"(BoPRC, 2013) included in Volume). The Project was formally established in 2012 following a number of feasibility studies. The pre-feasibility studies and subsequent investigations can be split into three stages:

- Pre-2011: Pre-feasibility Studies
- 2011-2012: Feasibility Studies
- 2012-present: Preliminary Design and Detailed Investigation
- Alternative options raised during consultation

#### 6.2.1 Pre-2011: Pre-feasibility Studies

From 2001 to 2011 over 15 options for a full re-diversion or partial re-diversion were considered. The focus until this time had been on technical feasibility of options that significantly increased the total flow of water from the river to the estuary without increasing flood levels upstream. There were no stated constraints on cost, water quality, flood risk, or land availability for the works. Table 4 summarises the options investigated at the pre-feasibility stage.

Each of the options investigated in the pre-feasibility studies was assessed against the Project objectives, cost, scale of benefits derived, and feedback from landowners, tangata whenua, stakeholders, and the community. Numerous variations of Option N were subsequently investigated in more detail.

**Table 4: Summary of Options Considered - 2001 to 2013**

Option ID	Option description
A - Status quo	Leave the river and estuary in their current states with 4% of flow going through Ford's Cut.
B	Remove the culverts and causeway at the inlet to Ford's Cut.
C	Remove the culverts and causeway at the inlet to Ford's Cut and open river to Papahikahawai Creek. Remove spit causeways and removal/retention of island causeway.
D	Remove block in river channel at upstream of loop.
E	Remove block in river channel at upstream of loop and put a weir across Te Tumu at RL 1.0m (high tide level).
F	Remove the culverts at the inlet to Ford's Cut and open river to Papahikahawai Creek and remove the upstream block in the river loop.
G	Remove the culverts and causeway at the inlet to Ford's Cut and open river to Papahikahawai Creek and remove the upstream block in the river loop and construct a weir at Te Tumu at RL 1.5m. Remove spit causeways and removal/retention of island causeway.
H	Full diversion. Mouth at Te Tumu completely closed off. Ford's Cut structures and causeway removed. Papahikahawai Creek opened. Remove spit causeways and removal/retention of island causeway.
I	Double the number of culverts between Ford's Cut and estuary including flapgates. Re-shape Ford's Cut.
J	Existing culverts at Ford's Cut lowered to be submerged at mid tide (invert level at -1.6m RL). Re-shape Ford's Cut.
K	Remove culverts and causeway between river and estuary at Ford's Cut, but with the opening defined by two large culverts (as a bridge).
L	Remove culverts and causeway between river and estuary at Ford's Cut, and replace with large culverts that are flood gated to prevent backflow into the river. Re-shape Ford's Cut.
M	Open river to Papahikahawai Creek and construct weir at low level. Remove spit causeways and removal/retention of island causeway.
N	Open Papahikahawai Creek with large flood-gated culverts. Increase capacity of Ford's Cut and its inlet culverts. Remove spit causeways and removal/retention of island causeway.
P	Lower the level of Ford Rd to allow high tide flow from river across the land north of Ford's Cut. Open Papahikahawai Creek. Remove spit causeways and removal/retention of island causeway.
R	Full diversion with flood relief. Installation of two mechanically controlled gate structures at Te Tumu and at Ford's Cut. Te Tumu gate closed in normal flow conditions, opened in flood conditions. Ford's Cut gate open in normal conditions and closed in flood conditions. Remove spit causeways and removal/retention of island causeway.

## 6.2.2 2011-2012: Feasibility Studies

In September 2012 BoPRC received a report that narrowed down the range of options available, their feasibility, and consentability. In that report three groups of options were compared to the status quo: (i) low flow partial diversion; (ii) maximum flow partial diversion (i.e. a variation on Option N); and (iii) full diversion.

During this stage all the options were re-considered and checked against the critical constraints. Additional emphasis was placed on fresh to saltwater ratios, opportunities for wetland creation, land access, and consenting risk (i.e. the significance of any adverse environmental effects). The Regional Council agreed that the maximum flow partial diversion options were likely to achieve many of the Project objectives while also carrying lower consenting risk and being more affordable than a full diversion.

## 6.2.3 2012-present - Preliminary Design and Detailed Investigation

During late 2012 and early 2013 further analysis of the maximum flow partial diversion options was undertaken, particularly the size of the channel, the intake location, and its route into the estuary. In mid-2013, two variations of Option N for the re-diversion were presented to the community.

These options (1 and 2) had no flow from the river to Papahikahawai lagoon, and provided additional capacity at the existing culverts to maximise the freshwater component of the diversion (and minimise resultant salinity in the estuary). Both of the options required the purchase or acquisition of the land north of Ford's Cut. Stopbanking the land was not considered viable due to the disproportionate estimated cost when compared with the property value.

Alternative options for protecting only some of this land with stopbanks were also explored, but were found to have a disproportionate cost in comparison to the value of the land. BoPRC are therefore seeking to acquire all the land north of Ford's Cut, pay compensation to the landowners and use the land for wetland.

The primary difference between the options was that Option 1 involved the excavation of a new channel from the Ford Road inlet structure across land north of Ford's Cut and into Papahikahawai lagoon, with Ford's Cut filled. The primary flowpath through the estuary from this option was expected to develop north of Papahikahawai Island. Option 2 involved widening and deepening of the existing Ford's Cut channel, with the resultant primary flow path through the estuary developing south of Papahikahawai Island.

Following consultation with iwi, landowners, environmental groups, the local community, and other key stakeholders (see Part 7 of this AEE for details), a modified version of Option 2 designed to further maximise the freshwater component of the diversion was adopted as the preferred option. That option was preferred as it reduced the risk of erosion and breaches of Maketu Spit, and also reduced the extent of excavation required (and is therefore less expensive) in comparison to Option 1.

The preferred option was approved by BoPRC in September 2013 for detailed investigation and preparation of resource consent applications and the NoR. The detailed investigations have resulted in a number of refinements to the option that was approved in 2013. These refinements are described in detail in the technical reports in Volume B and in the plans and drawings in Volume C.

## 6.2.4 Alternative options raised during consultation

Through consultation with the community there were other options proposed. One of those was to “reconfigure the system” to behave as it did prior to the construction of Te Tumu Cut, but also maintain a flood release at Te Tumu Cut and retain Ford’s Cut as it is. The key features of this option are:

- Full re-diversion of the river through a new cut through Ford Road linking the river to Papahikahawai lagoon via its original course at Te Tumu.
- A weir across Te Tumu Cut to prevent high salinity inflows from the sea entering the estuary through the new channel, with a permanent low point for triggering the breach for flood relief.
- Direct the full flow of the re-diversion down Papahikahawai Creek by retaining the causeway (possibly with culverts through it) linking the land north of Ford’s Cut to Papahikahawai Island, at least in the short-medium term.
- Make a deliberate breach of Maketu Spit at the narrowest point where there is existing erosion.

The purpose of this option, which was stated to the Project team, is to prevent erosion of the back of Maketu Spit and encourage the main channel to exit Papahikahawai Creek and turn southwards at the deliberate breach toward the Maketu foreshore, and then turn east and finally north to exit at the Maketu entrance. As time allows the spit toe would erode and the lower estuary deepen as the flow path returns to the south-eastern side of the lower estuary and so mirrors the lower Whakatane River estuary.

An engineering assessment of this option was undertaken in March 2014. The assessment noted that the higher freshwater flows to the estuary (compared to the Project) would have a significant positive effect on salinity and associated ecological benefits. However, there remained a great deal of uncertainty around the morphological effects of the option and associated impacts. In particular, potential adverse effects relating to drainage scheme operation, flood scheme operation, erosion of Papahikahawai Creek, and the deliberate spit breach could be significant. In addition, the weir at Te Tumu Cut would mean that navigation and fishing will be lost (although the navigability of the estuary entrance at Maketu could potentially improve in the long term).

The assessment concluded that the reliable, timely, flood release at Te Tumu Cut remains a major uncertainty of this option. With the current state of science and technology the only known potential solution that provides high reliability is a gate structure which would have a significant construction cost and potentially significant adverse effects. After discussing this assessment, and considering the risks and benefits of this option, the Project Team determined not to undertake any further investigation and modelling work.

## 6.3 Statutory Assessment of Alternatives

### 6.3.1 Alternative Sites, Routes or Methods

BoPRC does not have an interest in all the land required for the Project. While in many cases negotiations are well underway, the BoPRC will continue to seek to acquire the necessary property interests after the NoR has been lodged. Property acquisitions will likely not be completed by the time the NoR has been determined, and therefore a consideration of alternative sites, routes and methods is required under s171(1)(a).

However it is important to note that the Project will not have significant adverse effects on the environment, the opposite is true. Should the status quo remain the health of the

estuary will likely continue to decline or at least stay in its current degraded state. In terms of the resource consent application, the requirement to consider alternatives is therefore only relevant to the discharge consents.

The requirement to consider alternatives is not a requirement to thoroughly investigate all potential options and demonstrate that the proposal is the best one. In summary:

- The territorial authority must be satisfied that the Requiring Authority has not acted arbitrarily or only given cursory consideration to alternatives.
- It is not for the Court to assess the relative merits of each alternative, the test is whether BoPRC has carried out sufficient investigations as to alternatives.
- The assessment of effects of alternatives should reflect the weighting of the matters under Part 2.

BoPRC has undertaken a lengthy and iterative process of assessment to determine the preferred option and has provided a comprehensive range of technical reports in the assessment of effects as well as including an outline of the various alternatives it has considered in this application. It has accordingly fulfilled its obligations under the RMA.

### **6.3.2 Alternative Locations and Methods**

In respect of the Project, the assessment of effects at Part 8 of this AEE found that, overall, taking into account the mitigation proposed, the Project will not have any significant adverse effects on the environment.

### **6.3.3 Alternative Discharge Methods and Receiving Environment**

In developing the construction methodology and erosion and sediment controls, consideration was given to: avoiding to the extent possible sensitive environments; the physical limitations of the site; and discharging to ground in preference to surface water. In doing so, all alternative methods and environments were assessed for their suitability and considered to be either not practicable or to result in more significant adverse effects and therefore not appropriate.

## **6.4 Summary**

The Project is the preferred solution for achieving the Project Goal and objectives, and is based on the outcome of an evaluation of the engineering, economic, social, cultural, and environmental aspects of the alternatives considered.





## Part 7: Consultation and Engagement

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### 7.1 Overview

The Project is part of a wider strategy that has been developed with significant input from key stakeholders and, as outlined previously, is in response to ongoing calls from the community to address the declining health of the estuary and its surrounding environment. Once the preferred option was selected, the formal consultation and engagement process commenced.

Consultation and engagement on the Project has been undertaken in two stages. A summary of each phase is provided below. A Communication Plan was prepared, prior to the commencement of the consultation and engagement programme, outlining the principles and processes to be undertaken. The following general tools and techniques were used throughout the process:

- Public meetings and drop in sessions
- Displays at community events
- Newsletters and media releases
- Project website - updated as necessary
- Face to face meetings - meetings were set up as they were required or requested
- Database - an internal database was set up and maintained to include names and contact details

The overall aim was to provide the community with opportunities for active engagement prior to decisions being made, to ensure informed decision making that reflected to the extent practicable the views and preferences of the community.

### 7.2 Preliminary Phase

Between May and August 2013, the Project Team consulted with tangata whenua, other stakeholders, and the general public on two options for the Project. The Project was publicised in local media and information posted on the Council's website. Responses were invited from iwi, landowners, environmental groups, the local community, and other key stakeholders. The purpose of the preliminary phase was to determine the community's preferred option for the Project, and to identify key themes.

During the preliminary phase the Project Team received 35 separate responses from individuals, local authorities, central government agencies, community organisations, and tangata whenua. Feedback was also received at public meetings and community events. The Project team also held targeted meetings with 23 parties, many of whom subsequently provided written responses following their meeting. A summary of the findings of the preliminary phase is provided below. A full copy of the Pre-Consent Consultation Report is in Volume B.

#### 7.2.1 Preferred Option

Almost three quarters of respondents expressed outright or conditional support for the Project, with only 6% expressing outright opposition. The responses did not provide a clear direction on a preferred option. Of the responses received, 20% preferred Option 1 with 14% preferring Option 2 - 66% of responses did not express a preference for either option. Common reasons cited by respondents who indicated a preferred option related

to flushing of Papahikahawai lagoon and restoring flow to Papahikahawai Creek, and concerns regarding erosion of Papahikahawai Island and Maketu Spit.

### 7.2.2 Key Themes

The responses highlighted a number of common issues in relation to the perceived benefits of the Project, areas of concern or confusion, and general comments.

These common issues may be loosely grouped together into the key themes identified below:

- Navigation and Erosion
- Landscape and Access
- Cultural and Social
- Ecology
- Natural Hazards

### 7.2.3 Summary of Preliminary Phase

The responses received clearly show that while there is broad support for the Project in principle, at the time of consultation many respondents had outstanding concerns that needed to be addressed through the technical studies. Key issues raised and suggestions for modifications to the Project included:

- As inadequate level of consultation up to that point, and a need for more consultation as the process continued.
- Concerns that the resource to be expended on the Project could be better spent in other areas
- Views that any diversion of the river should be via its original course and Papahikahawai Creek.
- Suggestions that there should be a full re-diversion of the river flows to the estuary with closure of Te Tumu Cut.
- Comments that it is important to establish good and clear relationships with BoPRC.
- Suggestions that the intake should be moved further upstream to increase the freshwater component of diversion.

## 7.3 Pre-Lodgement Phase

Following the completion of technical studies, a second round of community engagement was held. The primary purpose of the pre-lodgement phase was to inform the community and key stakeholders of the results of the technical studies which support the assessment of effects and to discuss the details with directly affected parties. This phase also enabled the Project team to outline the process and timeframe for the lodgement of the resource consent applications and the NoR, and explain how people can make a submission once the applications are notified.

A public meeting was held on 21 November 2013 at Maketu where the community was informed of the selection of the preferred option, and updated on the progress of the technical studies. Subsequently, there was a public meeting on 6 March 2014 at Maketu where the results of the hydraulic modelling were presented, a community drop-in workshop on 3 May 2014 to explain in more detail the results of the studies, and a final public meeting on 8 May 2014 to provide details of the final scheme and explain the application process. These were carried out alongside the regular updates via local media (including *Te Puke Times* and *Mai Maketu*), Project newsletters, and BoPRC's website.

Direct one-on-one consultation with directly affected parties and stakeholders also occurred throughout this stage, including landowners, river users, and WBoPDC (as the roading authority). The key aspects of consultation with the various parties were the design of the moorings and boat ramp area, details regarding the location of the new intake channel, realignment of Ford Road, and private land requirements for the Project. Table 5 below summarises the nature of the meetings.

**Table 5: Parties Consulted**

Group	Number of Meetings	Reason for meeting
Affected Landowners	Multiple	To discuss alignment of new intake channel, restoration of biodiversity, possible land requirement and designation.
Adjacent Landowners	Two	To discuss the Project, concerns raised by landowners.
BoPRC (Kaituna River Scheme & Natural Hazards Group)	Multiple	To discuss the impact of the Project on flood levels for the Kaituna River Scheme and at Maketu.
BoPRC and WBoPDC (Consent Authorities)	Three	To provide Project updates, to discuss peer review of technical reports, process for notifying the consent application and NoR, and appointment of commissioners to hear the applications.
DoC and Fish and Game	One	To discuss impact of the Project on water levels in the Lower Kaituna Wildlife Management Reserve, and potential mitigation works.
Tangata whenua	Multiple	To discuss results of technical investigations and the cultural impact assessments.
River Users	Two, plus correspondence	To discuss design of new moorings, boat ramp, and car parking area; and transfer of current operations from Ford's Loop to the new facilities. Note: the Harbourmaster was also consulted.
WBoPDC	Two, plus correspondence	To discuss design of new moorings, boat ramp, and car parking area and the realignment of Ford Road.

## 7.4 Summary

The responses received from the community during both of the consultation phases enhanced the Project Team's understanding of the history of the area and the values important to the community. In particular, the responses highlighted the strong community feelings about previous attempts to control the outlet of the Kaituna River and restore freshwater flows to the estuary. The consultation responses influenced the selection and design of the preferred option which was the subject of detailed investigation. The key themes identified also informed the technical studies that support the assessment of effects at Part 8 of this AEE.

Consultation will be ongoing as the details of some aspects of the design are confirmed. In addition, consultation will occur during the construction phase to ensure people are kept up to date with construction activities.



## Part 8: Assessment of Effects

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### 8.1 Overview

This section outlines the assessment of actual and potential environmental effects of the Project, including positive effects. The environmental assessments undertaken for the Project involved collaborative input from a broad range of engineering, environmental, social, and cultural specialists. The technical reports which support the assessment are detailed in Volume B.

Mitigation measures are identified in each section where relevant. The proposed conditions contained in Appendix 3 implement the mitigation measures, where appropriate. In addition, the recommended approach to environmental monitoring is set out in Part 9 of this AEE. This approach will be enshrined in conditions of consent.

### 8.2 Effects Identification

The Project team worked together to identify the potential negative and positive environmental effects of the construction work, river re-diversion, and wetland creation. This included developing measures to ensure that any adverse effects are appropriately avoided, remedied, or mitigated.

To assess the potentially positive and adverse effects of the proposed option, field work was undertaken and a suite of numerical models were developed. The numerical models were utilised to assess the hydrodynamic (how the water moves and what levels it comes to), morphological (form and shape of the river and estuary), and water quality (salinity, nutrients and bacteria) effects of the proposed option. The models were then used, as appropriate, by the technical experts in their assessments of the Project.

The assessments have found a number of positive, neutral, or adverse effects in relation to the following matters:

- Cultural Values
- Flooding and Drainage
- Shoreline Erosion
- Navigation and Geomorphology
- Water Quality
- Ecology Values
- Social and Recreational Values
- Natural Character and Landscape Values
- Property
- Construction Effects

The above matters are discussed in detail below, followed by an effects summary section.

### 8.3 Positive Effects

The Project is a significant step towards enhancement of a badly degraded estuarine environment, and is a key step in implementing the Kaituna River and Ongatoro/Maketu Estuary Strategy. The wide range of anticipated positive effects on the estuary are discussed in detail in the various technical reports in Volume B. A key positive effect is the increase in the volume of freshwater that will flow into the estuary - an important

component of the Project Goal. Modelling predicts that the preferred option will nearly quadruple the current volume of water flowing from the river into the estuary, as outlined in Table 6 below.

**Table 6: Modelled changes in total and freshwater volume of proposed re-diversion through Ford's Cut during average river flows**

Tide	Total volume (m <sup>3</sup> ) per tidal cycle			Freshwater volume (m <sup>3</sup> ) per tidal cycle		
	Existing	Proposed	Difference	Existing	Proposed	Difference
Neap	101,300	315,000	213,700	100,300	302,600	202,300
Mean	153,700	574,500	420,800	133,700	436,000	302,900
Spring	186,600	787,800	601,200	100,400	370,300	269,900

Many of the positive effects of the Project are a direct result of this increase in freshwater flows. The Project will lead to improved cultural, ecological, and social conditions, especially over the longer term. The wide range of positive effects are discussed throughout the assessment of effects in the following sections.

## 8.4 Cultural Values

The relationship between tangata whenua, the Kaituna River, and the estuary is culturally and historically very significant - it has sustained the people since the landing of Te Arawa waka at Maketu. It is acknowledged that historical modifications to the Kaituna River have resulted in significant adverse impacts on cultural values in the area.

The Project is expected to have a significant positive effect on cultural values by addressing past modifications that have led to the degradation of the mauri of the river and estuary over time. The Project will also have positive effects on traditional cultural practices which depend on the ecological health of the estuary. While there is some uncertainty around the exact nature of the effects on kaimoana, the Project will tend to improve conditions for edible fish and shellfish by increasing the available habitat extent and increasing dissolved oxygen levels within that habitat (which currently limit biodiversity in the upper estuary).

BoPRC has engaged with tangata whenua in several ways throughout the development of the Project, and commissioned Cultural Impact Assessments (CIA) to better understand the cultural values and report on the cultural impacts of the Project. The CIAs cover the interests of Ngati Whakaue ki Maketu, Tapuika, Ngati Rangiwewehi, Waitaha, Ngati Makino, Ngati Pikiāo, and Ngati Tunohopu. Copies of the CIAs are included in Volume B, but some are subject to conditions on public release<sup>11</sup>.

The CIAs provide general support for the Project from tangata whenua, recognising the objective of the Project and the range of positive effects predicted. In some cases, the support was conditional on other environmental management considerations such as water quality improvement, or preference towards a greater re-diversion. As a result of the CIA findings and associated outcomes sought, the following recommendations have been made to avoid remedy or mitigate adverse effects on cultural values:

<sup>11</sup>The author of the Waitaha, Ngati Makino, Ngati Pikiāo, and Ngati Tunohopu CIA have authorised release of the full CIA report to the consent authorities, but have requested it not be distributed to the wider public without their express permission.

- Acknowledgement that historical modifications to the Kaituna River have resulted in significant adverse impacts on cultural values
- Cultural monitoring during earthworks and post re-diversion in accordance with an Accidental Discovery Protocol (ADP)
- Consideration of timing and staging of works to minimise impacts on fish passage, habitats and spawning areas, and kaimoana gathering
- Ongoing involvement of tangata whenua in restoration activities and enhancement of cultural resources
- Continued investigations into the feasibility of full re-diversion of the river to the estuary in the future

Other recommendations were received for actions in the wider Kaituna River catchment. These include that the Project takes steps toward addressing past modifications that have led to the degradation of the mauri of the river and estuary over time. Some of the recommendations/outcomes sought are matters that are for the wider attention of Council and outside the scope of this specific Project. However, BoPRC has accepted in principle the recommendations/outcomes sought. Ongoing consultation will ensure that appropriate measures are implemented to address actual and potential effects on tangata whenua.

## 8.5 Flooding and Drainage

Flooding is an existing hazard in the Kaituna River and at Maketu, with the current primary source of flood risk at Maketu being flooding from the sea (i.e. during storm surges coinciding with high spring tides). The Project will alter the existing regime of water levels in the lower Kaituna River and the estuary during normal weather conditions, low flow conditions, and when the river is in flood. This is because the flow from the river into the estuary increases as a result of the Project.

The following are locations where water levels, if raised by the Project, could have potentially adverse effects due to increased flood risk:

- Land adjacent to the lower Kaituna River
- Farmland around the upper and middle reaches of the estuary
- Land and buildings around the Maketu township foreshore.

The effects of these water level changes have been investigated on water supplies, land drainage, and flooding. To assess the effects of the Project on flooding and drainage, a number of combinations of river flows and sea levels were investigated for the lower Kaituna River, the estuary, and Maketu township for:

- normal and low river flows
- heavy rain on the farmland
- high water flows/levels and effects on stopbanks and the drainage scheme
- high water levels and Maketu flooding

The conclusions from the 'Summary of Effects resulting from Water Level Changes' technical report (attached in Volume B) are summarised below.

During normal river flows in the lower river, there will be slightly higher low tides and lower high tides as a result of the Project, and these changes will be magnified during high river flows. There will also be longer periods of higher mid and low tides after the flood peaks. These higher water levels will affect the operation of the Ford Road gravity drain and pump station which drains the surrounding farmland, by reducing the flow rate

through the gravity culverts and increase the time the pumps have to operate to maintain the desired water levels in the drains. However, the Project also lowers the water levels during floods, providing some benefits to flood protection and drainage. There is no effect further upstream (i.e. at the Diagonal Drain outlet).

During low river flows, the Project causes water levels to be lower in the river, which reduces the volume of water entering the wetland of the Lower Kaituna Wildlife Management Reserve by about 10%. This can be effectively mitigated by adding an additional culvert intake (see section 8.5.1).

In the upper estuary, from Ford’s Cut along the southern shoreline of the estuary to Singleton’s pump station, the Project raises water levels during floods a minimal amount and the existing stopbank system can accommodate the rise. During normal river flows there will be slightly higher low and high tide water levels in the estuary, and these changes will be magnified during high river flows. There will also be longer periods of higher low tides after the flood peaks. As in the lower river, higher water levels will affect the operation of the drainage scheme on farmland surrounding the upper estuary.

Along the shoreline of the lower estuary, from Singleton’s pump station through Maketu township to the boat ramp, the Project results in higher water levels during floods. In the more frequent events the increase in flood level is approximately 20cm, and the increase in flooded land is small and primarily grass reserve.

In the less frequent 1% AEP (1 in 100 year) river flood combined with a 5% AEP (1 in 20 year) sea level, without controlling flow from the river to the estuary the effect of the increased water levels caused by the Project is potentially significant. However, this potential increased flood risk can be mitigated by controlling flood flows through the new culverts in accordance with an Operation and Maintenance Manual (see section 8.5.2).

The critical flood event at Maketu (i.e. that which generates the highest water levels) remains the 5% AEP (1 in 20 year) river flood combined with a 1% AEP (1 in 100 year) sea level, during which some areas of Maketu are already at risk of severe flooding. The increase in water levels during this event as a result of the Project is minimal.

At the outlet of the Otumakoro Stream under Maketu Road at Spencer Avenue, an upgraded culvert crossing is necessary now to alleviate flooding in the area. The increased water levels in the estuary caused by the Project will have a negligible effect on water levels upstream of this culvert, or any correctly designed new culvert.

Table 7 below provides a summary of the effects of the Project on flooding and drainage, along with proposed measures to mitigate those effects where required.

**Table 7: Summary of Effects on Flooding and Drainage, and Proposed Mitigation**

Location	Effects of the Project	Mitigation Measures
Lower Kaituna River (to Ford Road drain)	The Ford Road pump station will need to operate for longer to maintain water levels in the Ford Road drain	Provide compensation to the Scheme for the increased running costs at the Ford Road pump station due to increased pumping times
	Surrounding farmland will take longer to drain due to reduced gravity drainage	Fund additional gravity culvert at the Ford Road drain (as part of an already planned upgrade)



	There will be 10% less water entering the Lower Kaituna Wildlife Management Reserve	Provide an additional culvert to supply water to the Lower Kaituna Wildlife Management Reserve (see section 8.5.1)
Upper Estuary (Ford Road drain to Singleton's drain)	Small increase in water levels in the upper estuary during floods	No mitigation required - the existing stopbanks can accommodate the rise
	The Singleton's and Dean's pump stations will need to operate for longer to maintain water levels in the surrounding farm drains	Provide compensation to the Scheme for the increased running costs at the Singleton's and Dean's pump stations due to increased pumping times
	Surrounding farmland will take longer to drain due to reduced gravity drainage	Fund additional gravity culverts at Singleton's drain, Burgess drain, and two unnamed drains between Ford's Cut and Singleton's drain.
Lower Estuary (Singleton's drain to Maketu entrance)	Increased flood risk in the lower estuary, including around Maketu township, during the 1%AEP event (1 in 100 year)	Control of flows through the new culverts into the estuary (see section 8.5.2)
	Negligible effect on water levels in the Otumakoro Stream upstream of the culvert under Maketu Road	No mitigation required - flooding in this area is an existing issue and is not exacerbated by the Project

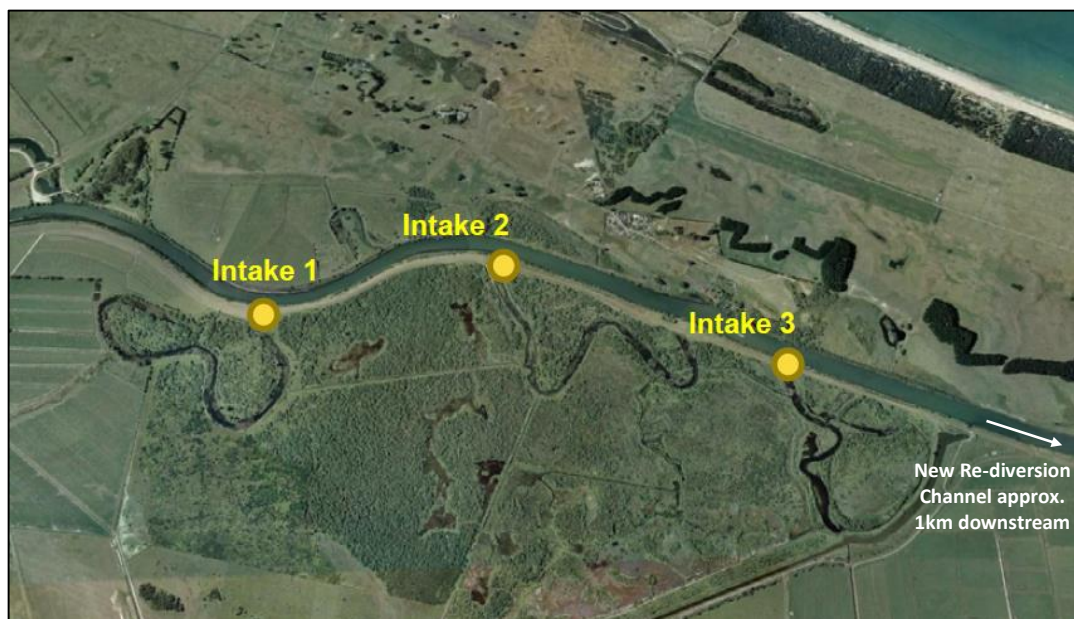
Based on the preliminary investigations, the effects of the Project and proposed mitigation measures have been discussed with the manager of the Scheme, the Natural Hazards Group of BoPRC, and with the stakeholders in the Lower Kaituna Wildlife Management Reserve. More detailed investigations are required in consultation with the stakeholders before the mitigation measures are finalised (see Appendix 3 - Draft Conditions). However, the measures proposed are practical, and have been agreed in principle with the stakeholders.

### 8.5.1 Lower Kaituna Wildlife Management Reserve Water Supply Intakes

The wetland of the Lower Kaituna Wildlife Management Reserve relies on high river levels to supply water through three intakes of flap-gated culverts. The wetland and the location of the intakes are shown in Figure 25 on the following page. There is a concern that any reduction in water levels within the river as a result of the proposed option will have a negative impact on the wetland as less water will enter the wetland from the river each tidal cycle.

To assess the impact of the reduction in water levels at the water intakes a simplified model of the river and wetland was developed (DHI modelling report, section 9.2). The modelling showed that the Project will slightly reduce water levels at the intake locations during low river flows over a spring tide. Peak water levels are reduced by approximately 5 cm, which results in a 10% reduction in water flowing from the Kaituna River into the wetland due to reduced flood and high tide peak water levels.

To compensate for the reduction of water levels and associated flow to wetland, an additional culvert is proposed to be installed as part of the Project. The detailed design and location of the new culvert will be agreed with the Lower Kaituna Wildlife Management Reserve stakeholders (DoC, Fish and Game, and BoPRC Natural Hazards).



**Figure 25: Lower Kaituna Wildlife Management Reserve intakes**

### 8.5.2 Operation and Maintenance Manual - Flood Management

The increased flood risk at Maketu as a result of the Project can be managed by controlling the additional flows from the Kaituna River through the new culverts during flood events. At times where flooding risk is increased, the flow into the estuary will be restricted, meaning there will be no additional effects caused by the Project.

Operational controls will be placed on the culverts as part of the flood management section of the Operation and Maintenance Manual (OMM). The flood management section of the OMM will be prepared by the Project in conjunction with the manager of the Kaituna Catchment Control Scheme, the Natural Hazards Group of BoPRC, and WBoPDC. It will use existing models of flood forecasting and add in additional components for accurate sea level prediction (these are already commercially available in New Zealand and BoPRC is a subscriber to the service). Outputs from this work will include the required culvert closing regime at Ford Road during high river flows to limit flood levels at Maketu.

The flood management section of the OMM will include:

- Installation and monitoring of a telemetered water level recording device in the estuary near Maketu township to continuously record water levels in the estuary and transmit these to BOPRC.
- Continued operation and monitoring of the existing water level devices in the Kaituna River at Te Matai and at the Ford Road pump station.
- Receipt of the continuous record of sea level from the NIWA gauge at Tauranga (Moturiki).
- Development of a sea level prediction model to provide predicted sea levels.
- Use of the flood forecasting model being developed by BoPRC that allows prediction of flows in the Kaituna River, and water levels at Ford Road and in the estuary. This model will use the water level data received from the recording sites described above and the hydraulic model developed by DHI for the Project.
- Design and installation of devices on the new culverts that allow practical and reliable reduction of flow into the estuary.

- Tabulated water levels in the river and the estuary at which warnings will be issued and actions taken i.e. closure of certain culverts.
- A governance structure to implement, maintain, and improve the flood management procedures, including clearly defined roles, responsibility, and risk for the operation and maintenance of the culverts.

Restricting flood flows has the potential to reduce some of the benefits of the Project to the ecological health and natural functioning of the estuary. However, restricting flow at the culverts will be required very infrequently because the flood events during which flows would be restricted are very rare (i.e. the 1%AEP flood event has a probability of 1/100 of occurring in any one year). Therefore for a very high proportion of the time, the maximum possible benefits of the Project will be achieved (in terms of scouring out some of the sand in the lower estuary).

An alternative option for mitigating the increased flood risk at Maketu as a result of the Project is raising (or building) stopbanks. However, this would rely on cooperation from WBoPDC and the Maketu community, as it involves mitigation of the existing flood risk as well as the incremental increase caused by the Project. It is therefore not within the scope of the Project to provide mitigation of this type. There is currently no strategy to manage the existing flood risk at Maketu, other than the control of new development under the District Plan. Should raising or building of stopbanks at Maketu take place in the future, the OMM could be amended to reflect this.

## 8.6 Shoreline erosion

Shoreline erosion is an existing hazard around much of the estuary. The altered regime of water levels and current speeds in the lower Kaituna River and the estuary has the potential to alter the risk of erosion. The potential effects on erosion have been assessed (see technical report on erosion and morphology in Volume B). Locations which are particularly at risk of shoreline erosion and may be affected by the Project include Maketu Spit, the estuary foreshore through Maketu township and the estuary entrance, Papahikahawai Island, and the existing and proposed channel edges in the lower Kaituna River.

The existing risk of the Maketu Spit being breached is high due to erosion resulting from the ongoing expansion of the flood tide delta. The delta is a negative effect arising from the 1956 diversion, and its expansion is causing flow to be pushed against the Maketu Spit at this location. The serious nature of the present spit erosion means that there is a high risk a spit breach will occur in the short term, with or without the Project. This is a naturally occurring process and part of the existing environment. Therefore, no mitigation of this existing risk is proposed as part of the Project.

The Project will arrest the current expansion of the flood tide delta, and over time the delta is expected to reduce in size. This will significantly reduce the risk of serious erosion along the landward side of the spit and the associated risk of breaching in the medium to long term (and possibly even preventing these breaches), resulting in long term benefits to the estuary. However, the Project may slightly increase the risk of erosion and a subsequent breach for a short period immediately following re-diversion. This risk will reduce as the channel and flood tide delta dimensions adjust to the altered sediment transport residuals.

If a spit breach occurred before (or even during) the Project, this would not significantly affect implementation or exacerbate any short-term effects of the Project. In fact, given

the increased ebb tide directed sediment transport and decreased flood tide directed transport predicted by the modelling, it is possible that the Project would increase the rate of recovery and sediment flushing following the breach.

The expected reduction in size of the flood tide delta, along with the altered flow regime and subsequent change from a flood tide to an ebb tide dominated system (see section 8.7), will also reduce coastal erosion risk along the main foreshore of the township from the boat ramp to beyond the marae, and may encourage natural recovery of a beach in some areas along this shoreline. This is a significant positive effect of the Project.

In recent years, Beach Road has been widened into the estuary, with associated upgrade of the rock protection. The modelling predicts a significant increase in maximum current speed adjacent to the more seaward areas of this rock wall, with some deepening of the adjacent channel towards the seaward end due to scour. These changes are not likely to adversely affect the rock protection, which is designed to a more than adequate standard to accommodate any additional scour in the channel.

Seaward of the surf club current speeds are relatively unaffected and the Project is therefore unlikely to exacerbate erosion in this area. Similarly, ocean shoreline erosion seaward of the camp ground will not be affected.

The original area of Papahikahawai Island has been significantly reduced over the last 50 years through erosion caused by loss of wetland. This is an adverse effect of the 1956 diversion of the river through Te Tumu Cut. The lower areas of the island along the southern shoreline are currently protected from further erosion by a bund which was constructed in the 1970s. The Project will result in a significant increase in water velocity and sediment transport over the intertidal flats adjacent to this shoreline. Without effective mitigation, this could result in further adverse erosion effects on the island.

From an ecological perspective, removal of the bund over time would better reconnect and restore wetlands in the low area behind the bund. However, without providing alternative “natural protection” from erosion through restoration of saltmarsh, this is likely to cause significant erosion of the low lying parts of the island. Options for mitigation of erosion risk therefore include retention and maintenance of the existing stopbank, restoration of saltmarsh and wetlands (either through natural recovery or assisted by human intervention), or a combination of both.

As a minimum, the existing bund will be maintained to protect low lying areas of Papahikahawai Island. This maintenance may include periodic placement of material along the seaward face of the bund to offset aggravated erosion. The Project also proposes human intervention to restore wetlands along the seaward edge of the island to provide protection from erosion and enhance the natural character and ecology of the estuary. This intervention will be the subject of a detailed Wetland Strategy as discussed in section 5.5 of this AEE, and covered in detail in the technical reports in Volume B.

The additional flow through Papahikahawai Creek resulting from the removal of the stopbanks and causeways in the upper estuary and reconnection of Papahikahawai lagoon to the estuary will encourage scour of the channel bed, but will not increase the risk of serious erosion of Papahikahawai Island or the Maketu Spit.

The flow velocities in the new diversion channel, Ford’s Loop, and Ford’s Cut are predicted to be relatively low even during flood situations, with peak velocities generally averaging less than 1.5 m/s. Although these velocities are unlikely to promote significant erosion of the channel banks, the consequences of the adjacent stopbank failing during a major

event would be very significant. As a precaution, rock protection will be placed along the southern bank of the new channel to protect the stopbank.

Rock protection will also be placed at the inlet to the new channel, and at other locations where high velocities are most likely to occur close to the shoreline, and along both the northern and southern banks immediately adjacent to the culvert structure. The shallow batter slopes on the northern edge of the new channel and Ford's Cut will protect these

In summary, the Project will have a significant positive effect on shoreline erosion in the estuary. There is a significant existing risk of a breach of Maketu Spit, which will be slightly elevated immediately following the Project. This risk will reduce over time due to the marked reduction in flood tide delta expansion and size.

## 8.7 Navigation and Geomorphology

The modelling has considered the effect of the Project on water depths, sediment transport, and currents both at the estuary entrance and at Te Tumu Cut to assess any effect on the geomorphology and subsequent navigability of the entrances. To determine the extent of any changes, the bathymetry (depths/bed levels) were modelled and compared for the existing and proposed situations. The altered tidal flow regime in the estuary as a result of the Project is expected to stop and partially reverse the sedimentation issues in the lower estuary - particularly issues associated with the expansion of the flood tide delta (discussed under section 8.6 above).

Currently the Coastguard, a commercial fisherman, and the barge use private mooring facilities just upstream of the existing culverts at Ford Road. The proposed mooring facilities are a response to concerns raised during consultation that leaving the boats where they are currently could increase the risk of them being struck by debris coming down the river, cause potential conflicts with other river users, and would increase the distance for the boats to travel from their moorings to the sea.

At Te Tumu Cut, although there is a relatively large increase in the volume of water which enters the river on the flood tide, the volume exiting on the outgoing tide declines only marginally (2-6%). This is because as water flows from the river to estuary through the re-diversion channel it is replaced by incoming sea water. The majority of sediment transport occurs on ebb tide in the lower river since current speeds are largest at this time. As there is little difference in the ebb tide volume, there is very little difference in residual sediment transport patterns within the lower river for the existing and proposed situations. This suggests that no new areas of deposition are likely to develop in the lower river following re-diversion. It is also predicted there will be no significant change to channel depth and navigability at Te Tumu Cut as a result of the Project.

In the upper estuary, some erosion of bed levels in Papahikahawai lagoon and near the exit of Ford's Cut is predicted as a result of increased flow from the river. The current rate of infilling of the estuary will be greatly reduced, and much of the accumulated fine sediment in the lagoon will be flushed out. However, this may be offset by the supply of additional sediment from the river. If this supply is significant there is the possibility that some areas of deposition may occur within the upper estuary. These changes are associated with the partial restoration of natural sediment transport in the upper estuary, and are not expected to result in adverse effects.

The estuary entrance will change from a flood tide to an ebb tide dominated system as a result of the Project. Under typical conditions, the ratio for water exiting versus entering the estuary through the estuary entrance increases from approximately 1.2 to 1.9. As

noted under section 8.5.2 of this AEE, this is predicted to arrest the current expansion of the flood tide delta in the lower estuary, and over time the delta is expected to erode and reduce in size - particularly in the western and middle sections of the delta.

The altered flow regime will reduce any silting up of the channel at the estuary entrance, and may deepen it over time, potentially improving navigation at Maketu. However, as noted under section 8.6 of this AEE, the reduction in erosive flows adjacent to the foreshore of Maketu township may encourage the recovery of a natural beach in these areas. This could result in shallowing of the channel which could affect the present boat ramp location, the use of which is already compromised by shallow water at low tides.

Consultation with the Coastguard and two commercial operators who currently have boats permanently moored in Ford's Loop in the lower Kaituna River identified potential adverse effects associated with higher flow speeds and debris from the diversion channel damaging their moorings and boats. The coastguard was also concerned about the safety of navigation to Te Tumu Cut in the event of a call out during a flood event. In response, the Project proposes to build two new moorings (the Motiti Island barge operator was happy to stay in the current location) in Ford's Loop immediately to the north of the salinity block. Moving the moorings avoids any adverse effects. The moorings have been designed in consultation with users, WBoPDC, and discussed with the Harbourmaster.

A new public boat ramp and car parking area is also proposed adjacent to the new moorings between Ford Road and Ford Island, subject to funding being secured through BoPRC's and WBoPDC's 2015/2016 Annual Plans. The proposed ramp is supported in principle by the Project Team and staff from WBoPDC. The new ramp would provide an additional public facility to complement those at Bell Road and at Maketu and provide for future residential growth and recreational use of the area.

The boat ramp is being provided as an additional positive benefit of the Project, not as mitigation for any adverse effects. It has been included as part of the Project as there are significant efficiencies to be had if construction of the boat ramp is combined with the Project. In the event that funding is not secured, recreational boat users can continue to utilise the existing private boat ramp adjacent to Ford Road. The additional distance that boats will need to travel to Te Tumu Cut as a result of the project is considered minor.

In summary, recreational boaters, the Coastguard, commercial fishermen, and other river users will still be able to use Te Tumu Cut following re-diversion as they do today. There is not expected to be any effect on the navigability of Te Tumu Cut as a result of the Project.

## **8.8 Water Quality**

### **8.8.1 Overview**

The re-diversion of Kaituna River flow into the estuary will cause a range of physical and chemical changes to the estuary and its environment. Since 1989, bacteria levels in the river have decreased significantly (the median has reduced fivefold), demonstrating that this aspect of water quality is improving. In contrast, nitrogen concentrations in the lower river have doubled since 1975. The changes in bacteria and nutrient levels from the river (external load) and estuary (internal load) need to be considered together. The key chemical changes are discussed below.

### 8.8.2 Salinity

The model was used to assess the impacts of the proposed option on salinity characteristics within the river and estuary, with focus on:

- The ratio of freshwater to saltwater that will enter the estuary through the re-diversion channel for different states of neap / spring tidal cycle
- The overall change to salinity within the estuary
- The impact on the extent of the saline wedge within the Kaituna River

The comparison of mean salinity for mean flows and the seven day five year low river flow for the existing situation and proposed at the water surface and estuary bed are presented in Table 8.

**Table 8: Summary of predicted salinity within estuary (0 = fresh water, 35 = sea water)**

Location	River flow	Salinity (PSU)			
		Water surface		Estuary bed	
		Existing	Proposed	Existing	Proposed
Proposed wetland north of Ford’s Cut	7 day 5yr low	N/A	20 - 25	N/A	20 - 25
	Mean	N/A	10 -15	N/A	10 -15
Upper Estuary	7 day 5yr low	20 - 25	20 - 25	20 - 25	20 - 30
	Mean	5 - 15	10 - 15	10 - 15	10 - 20
Mid Estuary	7 day 5yr low	25 - 30	20 - 25	25 - 35	20 - 30
	Mean	15 - 25	10 - 20	15 - 30	15 - 25
Lower Estuary	7 day 5yr low	30 - 35	25 - 35	30 - 35	25 - 35
	Mean	25 - 35	20 - 30	25 - 35	20 - 30
Southern Drains	7 day 5yr low	0 - 20	0 - 20	0 - 20	0 - 20
	Mean	0 - 20	0 - 20	0 - 20	0 - 20

Overall, mean salinities will increase slightly in upper estuary and decrease throughout the rest of the estuary. Lower salinities will have a positive effect on the estuary as they allow a wider range of estuarine wetland plants to grow and provide better germination and growing conditions for most salt-tolerant species too. The extent of this decrease in salinity is relatively small in most parts of the estuary except the impounded section of Papahikahawai lagoon. Generally, the higher the river’s flow the lower the salinity in the estuary.

The maximum extent of the saline wedge in the Kaituna River during normal river flows will be 200-250m further upstream which is a negligible distance when compared to the natural variability in the location of the salt wedge due to existing river flows and tides. However, during low river flows there is a small adverse effect on the floating intakes extracting water from the river for irrigation and stock water supplies. To mitigate for this effect, the project will provide a combination of improved extraction controls to prevent saltwater contamination, and additional storage for stock water.

### 8.8.3 Oxygen

Oxygen is fundamental for all living cells, including aquatic organisms, and the concentration of dissolved oxygen (DO) is a key aspect of fish habitat quality. Oxygen solubility in water is driven by a number of processes including the rate of depletion (e.g. through Biological Oxygen Demand (BOD)), the rate of re-aeration (e.g. through photosynthesis and turbulence), temperature and salinity.

DO concentrations frequently change on a diurnal cycle. Accumulation of decomposing vegetation and organic rich mud will exert an oxygen demand and further reduce DO concentrations. The ANZECC (2000) guidelines sets a minimum DO for marine waters at 80% saturation (or greater than 6 mg/L). This is a reasonably conservative value appropriate for sensitive fish communities.

Respiration and photosynthesis from the accumulation of *Ulva* sp. and *Gracilaria* sp. in the middle and upper parts of the Maketu estuary causes very large diurnal fluctuations in DO. The daily minimum DO concentration was commonly less than 2 mg/L in the mid-estuary and commonly less than 1 mg/L in the upper estuary and in Papahikahawai lagoon. This is sufficiently low to kill many fish species if they remained in these areas.

The larger inflow of water entering the estuary from the river as a result of the Project will improve dissolved oxygen levels in the estuary by:

- increasing the pulse of oxygenated water from the river
- increasing current speed in many parts of the estuary which will increase the re-aeration
- increasing the flushing of free-floating macroalgae that currently accumulate in the channels and backwaters of the upper and mid-estuary.

The upper estuary and Papahikahawai lagoon will have the greatest improvement in DO concentrations as a result of the Project. The southern part of the estuary, near Waitipua Stream, is expected to improve, but to a lesser extent because the modelling indicates less change in currents and flushing from this area.

### 8.8.4 Nutrients

Algal growth rates are strongly influenced by the amount of nutrients available for growth. Fast-growing species tend to have higher nutrient requirements than slow-growing species.

The availability of nutrients for algal growth is a function of the nutrient loads from both external sources (e.g. rivers and drains) and internal sources (e.g. release from sediment). Parts of the Maketu estuary are highly eutrophic and are likely to be partially decoupled from external nutrient sources due to high internal loading from anoxic sediments and N-fixing cyanobacteria.

The potential change in nitrogen (N) and phosphorus (P) concentrations in the estuary as a result of the re-diversion were modelled using a dilution model that included mean inputs from the Kaituna River, surrounding drains and the ocean. The model did not include any biological processes (e.g. nutrient uptake) or internal loading from sediments or fauna. However, the model still provides useful information for assessing how nutrient concentrations in the estuary may change due to changes in external loading.



The modelling shows that the highest nutrient concentrations in the estuary are in isolated pockets near drain inputs, and in the southern estuary due to the influence of Waitipua Stream.

Using the outputs from the model and calculations on the loading of nutrients, the technical reports have concluded that it is likely that the nutrient flux from anoxic mud associated with algal accumulations is a major source of nutrients and probably a more important source than nutrients available in the overlying waters. Therefore flushing the sediments would significantly reduce the nutrients available for growth of macro-algae. In addition, increased flushing will directly remove nutrients contained in algal biomass and reduce the accumulation of this nutrient pool.

The re-diversion will have only a minor impact on algal growth in the southern estuary. Modelling indicates that the influence of the Waitipua Stream and drain inputs result in the southern estuary having the highest concentration of (externally sourced) nutrients and is a significant influence on the mid and lower estuary during rain events. In order to see ecological improvements in this part of the estuary, attention needs to be given to managing nutrients (N and P) entering the estuary from Waitipua Stream and the drains. Although outside the scope of this Project, BoPRC are working with landowners to address this situation.

The key effects on nutrient levels arising as a result of the Project can be summarised as:

- The re-diversion will cause a small decrease in nutrient concentration in the upper estuary and a small increase in the mid and lower estuary.
- The small increase in external nutrient load will be balanced by a decrease in internal nutrient load due to the flushing of anoxic mud and algal accumulations from the upper estuary, mid-estuary, and Papahikahawai lagoon.
- Retirement of the 34 hectares of farmland north of Ford's Cut (19 hectares) and on Papahikahawai Island (15 hectares) and creating up to 20 hectares of wetland as part of the Project will, in the long term, contribute to a reduction in nutrients entering the estuary from this land.
- Internal nutrient loading is likely to be particularly strong in the Papahikahawai lagoon currently, due to nitrogen-fixing by cyanobacteria and release of N and P from deep anoxic mud. These nutrient loads will be substantially reduced due to the Project.
- The re-diversion will cause a small decrease in nutrients in the southern part of the estuary, and will push the influence of the Waitipua Stream towards the west.

### 8.8.5 Bacteria

A detailed analysis of the impact of the Project on the microbiological health risk of bathing and shellfish gathering in the estuary is included in Volume B. Bacteria enter the estuary from a number of sources including rural and urban drains and streams, waterfowl, septic tanks, run-off from grazed land. The main load of bacteria to the estuary is via the Kaituna River, Waitipua Stream, and surrounding drains - the impact of these has been modelled. However, other sources such as wildfowl, septic tanks, and direct stormwater runoff have not been included in the model and may have a significant localised impact in parts of the estuary. The impact of these will not change as a result of the proposed re-diversion.

The modelling indicates that water from the Kaituna River alone causes the shellfish gathering guideline of 43 MPN/100mL to be exceeded 13 percent of the time currently and may increase to 21 percent of the time after the re-diversion, i.e. this is respectively 2% and 9% more than the allowable 10% exceedance. The detailed analysis of

microbiological health risk of bathing and shellfish gathering in Volume B explains what this means in more detail.

In summary, most of the time the bacteria levels in the estuary waters meet the shellfish gathering guidelines now, but there are occasions when they do not. The higher levels of bacteria resulting in the guidelines being exceeded are mostly associated with rain events. It is currently recommended that people avoid gathering shellfish from the estuary for between 2 and 5 days after rain. The exact timing depends on how long it takes for the shellfish to depurate<sup>12</sup> (i.e. 'clean out') the bacteria. The literature tells us that 90 to 95% of bacteria and viruses are gone within two days, but after a larger rain or flood event this can take longer. That is why it is recommended, to be safe, that people wait up to 5 days.

The modelling indicates that, after the re-diversion, the bacteria levels will continue to meet the guidelines most of the time. However, during those times they are already exceeded currently, there may be higher levels of bacteria found in the shellfish. The guidelines are quite complex, but put simply, if you collect 100 pipi, the guideline says that only 10 of them should be at or above 43MPN/100ml. Currently, if you collect 100 pipi following a rainfall event, you can expect that 12 of them will exceed the 43MPN/100ml. After the re-diversion, you can expect about 19 out of those 100 pipi will exceed that limit, instead of the 10 "allowed" under the guideline.

In practical terms this should not affect the amount of time that shellfish can be safely gathered. For several days following rainfall events, people should still avoid gathering shellfish from the estuary. If you do gather shellfish during these times, the chance of you getting one that has been affected by bacteria is slightly higher. The re-diversion will also not change the health risk of shellfish gathering due to biotoxins (e.g. PSP).

The microbial contact recreation (i.e. swimming) guideline is rarely exceeded in the estuary (less than 1% of samples exceed 280 Enterococci per 100mL which triggers resampling under the 'action' mode). The re-diversion will cause a small increase in the concentration of bacteria in the lower estuary, but the change is negligible in terms of overall health risk for bathing. It will still be rare for enterococci concentrations to increase beyond the 'surveillance' mode, and only about 1% of samples will trigger resampling under the 'action' mode. In practical terms, the Project will not affect the current situation.

The concentration of faecal indicator bacteria in the Kaituna River has significantly declined since 2005. This improving trend may continue as discharges are managed in the wider catchment. If these changes happen, then the shellfish gathering risk will also decrease over the long term.

## 8.9 Ecology

### 8.9.1 Overview

Large areas of the estuary are in very poor ecological condition, characterised by dense accumulations of algae, anoxic sediments, dissolved oxygen dropping to very low concentrations on a daily basis and a lack of shellfish and benthic fauna. The worst areas are in parts of the upper estuary, where there is no benthic fauna. As a consequence of the physical and chemical changes arising from the Project, there will be changes to

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<sup>12</sup>Depuration is the purification of shellfish due to the defecation of sediment and any undigested food material in the gut. The rate of depuration varies with temperature, salinity and tidal cycle,

estuarine margin vegetation and the species that live in and/or rely on that vegetation as a consequence of altering the freshwater inflow.

The Project is expected to have significant positive effects on the ecological health of the estuarine ecosystem, particularly in the upper estuary. Improvements include:

- Flushing of algae and improved diversity and abundance of benthic fauna
- Improved food supply for kaimoana such as cockles
- Increased likelihood of seagrass re-establishing in the estuary
- Improved dissolved oxygen levels leading to improvements in the extent of habitat suitable for fish
- Increase in wetland area will provide the potential for increase in wetland bird diversity and abundance
- Creation of up to 20 hectares of wetland (and enabling creation of a further 8 hectares on Papahikahawai Island by the landowners), increasing diversity and abundance of wetland species
- Potential increase in the diversity and abundance of wetland birds

### 8.9.2 Algae and Seaweed

Algae in The estuary is found both attached to substrate and free-floating in channels. Free-floating algae accumulate in low velocity areas, back waters and along the estuary margin, where it can continue to grow if conditions are suitable. The cover and biomass of algae (e.g. *Gracilaria* sp., *Ulva* sp. etc.) in the estuary is determined to a large extent by the net export of algae flushed from the estuary, the grazing pressure from macrofauna and fish, and algal growth rates. Key factors determining the growth rate of algae include water temperature, salinity, external nutrient supply (e.g. from streams) and internal nutrient supply (e.g. from the estuary sediment).

Many of these factors are inter-connected with positive and negative feed-back loops. For example, high nutrient loads favour fast-growing algal species that generate excessive biomass. Decomposition of high algae biomass can lead to anoxic sediment; anoxic sediments lead to accelerated release of dissolved phosphorus and ammonium and reduced denitrification<sup>13</sup>. This increased nutrient availability stimulates further algal growth.

The re-diversion will increase maximum and residual current speeds sufficiently in the upper and mid-estuary to flush accumulations of free-floating algae and organic mud to the ocean. These areas currently accumulate algae and have poor benthic invertebrate species diversity and abundance; ecological health is therefore expected to considerably improve as a result of increased flushing. Some areas of low velocity will remain (e.g. in the southern estuary and the western end of what is now Papahikahawai lagoon) where accumulations of algae and mud may continue to persist, but overall there is expected to be a reduction in mud and algal biomass. There will not be a significant increase in risk for potential for blue-green algae blooms within the lower estuary.

Seagrass beds support a high productivity and diversity of invertebrate fauna and are generally considered to be a sign of a healthy estuary. Despite seagrass (*Zostera muelleri*) once being dominant in the mid and upper estuary, now only a tiny remnant remains. Lower salinity and less algae as a result of the Project is expected to increase the

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<sup>13</sup> Denitrification is the reduction of nitrates back into nitrogen gas (N<sub>2</sub>), completing the nitrogen cycle. This process is usually performed by bacteria in anaerobic conditions (e.g. waterlogged soils). The bacteria use nitrates in the soil to carry out respiration and consequently produce nitrogen gas, which is inert and unavailable to plants.

likelihood of seagrass seed germination and potentially open up additional habitat for colonisation.

### 8.9.3 Distribution of shellfish and benthic macrofauna

Benthic invertebrate fauna are valued as a fishery (e.g. pipi, cockle) and are an important food source for fish and birds. They are also useful as bio-indicators to detect and monitor environmental changes. This is because they integrate water and sediment quality conditions over time, and rapidly respond to natural and/or anthropogenic-caused stressors.

The changes in salinity due to the Project are expected to have negligible impact on the distribution of cockle or pipi up the estuary. Parts of the estuary currently occupied by cockle are predicted to remain above 20 psu (median salinity in bottom water during mean flow), so changes in feeding behaviour as a result of lower salinity are not expected to occur. Similarly, the predicted decrease in salinity in the channels of the lower estuary is relatively small and not sufficient to impact on pipi beds (median salinity remaining above 24 psu during a mean river flow).

It is possible that the increase in salinity near the channel of the upper estuary may open up additional cockle habitat, but this will only occur if there is a reduction in anoxic mud associated with algal growth in the upper estuary. Therefore, a general decrease in salinity in the estuary is expected to have only minor effects on the distribution of shellfish and cockle in the estuary.

A general increase in current speeds across most of the estuary, and in particular an increase residual current speed towards the ocean, will have overall positive impacts on benthic invertebrate fauna by improving the rate of food supply for filter feeders such as cockle and by reducing the extent of the estuary that is currently degraded by accumulations of free-floating algae and the associated anoxic mud. Improvements will be particularly evident in the upper estuary, mid-estuary south of Papahikahawai Island and in what is currently Papahikahawai lagoon.

### 8.9.4 Fish

The estuary provides a nursery and feeding ground for a number of fish species. The estuary and Kaituna River mouth are commonly fished for kahawai, mullet, flounder, and whitebait. However, the current extent of habitat suitable for fish in the estuary is reduced by low dissolved oxygen concentrations and suitable feeding habitat is indirectly reduced by extensive areas of anoxic sediments that exclude invertebrates.

It is expected that the reduction of algal biomass and anoxic mud as a result of the Project will both improve dissolved oxygen levels and improve habitat for benthic invertebrate fauna, which in turn provides fish habitat and feeding areas for a wide range of species.

The additional freshwater diverted into the estuary as a result of the Project will increase the salinity in the Kaituna River downstream of the intake. Fish in the lower Kaituna River have wide salinity tolerances and there is a wide diversity of fish in Ford's cut (with similar high salinity) so overall the increased salinity downstream of the proposed intake is not expected to have a significant impact on fish.

The re-diversion is expected to result in the saline wedge travelling an additional 200 metres upriver. This change will not affect potential inanga spawning sites because the

change is negligible in the context of natural variability caused by differences in river flow and variations in spring tide tidal heights.

About 100m of current wetland margin will be lost to form the proposed intake for the new re-diversion channel, about 1.3km upstream of the river mouth at Te Tumu Cut. To address this loss it is proposed that the northern side of the new channel has a 'soft' planted margin and gently sloping banks down to below spring low tide. This will maximise the potential for new whitebait rearing habitat.

### 8.9.5 Kaituna River macroinvertebrate fauna

The aquatic macroinvertebrate community can provide an indication of river health and the food available for fish. Below the new intake the river will become more saline after the diversion. This section is a zone of transition and is currently dominated by saline tolerant species. The change is likely to result in a shift in the composition of invertebrate species on the river edge towards more saline tolerant species, but the overall effect is expected to be minor.

The bed of the main river channel is already saline in this section so there will be negligible effect on river bed fauna. However it is possible that the spatial extent of pipi beds in the lower Kaituna River may extend further upstream towards the proposed intake as the section of the river below the proposed intake becomes saline for longer periods of time.

### 8.9.6 Vegetation

None of the predicted physical and chemical changes as a result of the re-diversion will have significant adverse effects on the vegetation on the edges of, and surrounding the estuary. In summary:

- The two main areas of remaining salt marsh and wetland linked to the estuary are likely to remain intact and healthy following river re-diversion.
- Changes to salinity and removal of stopbanks in the north-western corner of the estuary (Papahikahawai lagoon) may create conditions suitable for salt marsh or salt/freshwater wetland species to establish naturally or be replanted.
- The wetland west of Ford Island, to the north of the new re-diversion channel, is valued as a habitat for threatened birds such as the Australasian bittern (*Botaurus poiciloptilus*) and North Island fernbird (*Bowdleria punctata vealeae*). There is a moderate but significant risk of decline of some of the vegetation in response to the predicted increase in salinity in the Kaituna River adjacent to this wetland. However, vegetation collapse within the wetland is not considered likely as a result of the re-diversion. Monitoring and mitigation have been recommended to minimise the likelihood of wetland retreat in this area.
- Predicted increases in current speeds may mean that conditions in the area of the large former salt marsh (which was located off the southern edge of Papahikahawai Island and has since disappeared) remain unsuitable for the re-establishment of salt marsh or for freshwater wetlands.

In addition to the above, the Project will create up to 20 hectares of new and restored wetland on the land north of Ford's Cut and in Ford's Loop, and enable creation of a further 8 hectares of wetland on Papahikahawai Island by the landowners. The wetland creation will be guided by the detailed Wetland Strategy (see section 5.5 of this AEE Report and proposed conditions), and will have a significant positive effect on the extent and variety of wetland vegetation species in and around the estuary.

### 8.9.7 Birds

The number of shorebird and water species occurring in the estuary and Kaituna River near its mouth does not appear to have varied greatly over the past 30 years. The Project will not result in significant adverse effects on birds. As the Project is increasing the area of wetlands, this will in turn have a positive effect on the available habitat for wetland bird species and quite possibly lead to an increase in wetland bird diversity and abundance.

### 8.9.8 Summary of Ecological Effects

The Project will result in significant positive benefits to the ecology of the upper estuary and Papahikahawai lagoon area. There may be a short term risk to water quality from flushing of algae and anoxic sediments from the Papahikahawai lagoon area following removal of the causeways and stopbanks, but this removal will be carried out in stages to lessen any impacts. There will be overall positive effects on filter feeders and fish species due to improved habitat and greater food supply.

The proposed creation of wetland in accordance with the detailed Wetland Strategy will increase the extent and variety of wetland habitat in the estuary, with resultant positive effects on a number of species.

Of the physical and chemical changes that are likely to occur as a result of the Project, none are expected to have significant adverse effects on the vegetation on the edges of and surrounding the estuary. However, there is a potential risk of adverse effects on the area of freshwater wetland west of Ford Island in the lower reaches of the Kaituna River that will need to be managed and conditions are proposed to address these.

### 8.10 Social and Recreational

The survey of social and recreational use of the lower Kaituna River, the estuary, and Maketu beach highlighted the strong values placed on the estuary and surrounds by the community. The area is very popular for visitors, especially over summer. Fishing and kaimoana gathering in particular are popular and valued activities.

The Project is not expected to adversely affect current social and recreational use patterns of the river and estuary. There will be no change to swimming safety in the lower estuary. Improvements to the ecological health of the estuary are also expected to indirectly improve social and recreational values due to improved habitat for fish and shellfish species and a reduction in algae.

The Project will also have the following direct positive social and recreational effects:

- Improved recreation access with a new public boat ramp at Ford Road. Pedestrian and vehicle access to and from the parking area to the boat ramp will be designed in a way to reduce the potential traffic and safety effects on users of Ford Road.
- Improved public foot access to the upper estuary from Ford Road as part of the wetland creation on the land north of Ford's Cut.

There will be some disruption of recreational use of the areas in which physical works will take place during the construction phase of the Project. The draft construction approach and programme (see Part 5 of this AEE Report) has been designed to minimise these effects, and avoid the times of highest use. These effects are discussed in more detail under section 8.13 of this AEE.

## 8.11 Natural Character and Landscape

The re-diversion will result in changes to the existing character of the land surrounding the estuary, particularly to the low-lying land north of Ford's Cut which is currently used for pastoral farming. Section 6(a) of the RMA directs that particular regard be had to the preservation of the natural character of wetlands, rivers and their margins.

There is no definition of natural character in the RMA but through case law in relation to the coastal environment, and to some degree rivers, there is useful guidance. Case law has confirmed that the word "natural" is a word indicating a product of nature, as opposed to man-made structures. So "natural" can be taken to mean a range of qualities and features created by nature and includes both indigenous and exotic vegetation and wildlife and the estuary, the main distinction being that they are not manmade.

Therefore the main components of natural character are: natural processes, natural elements, and natural patterns. The primary purpose of the Project is to take a step towards partial restoration of the natural processes that existed in the lower Kaituna River and estuary prior to the human interventions of the last 100 years. The natural character values of the river and estuary have been assessed through Variation 1 (Coastal Policy) to the Proposed Regional Policy Statement.

The technical reports have considered in some detail the existing vegetation, wildlife, and fauna of the estuary, along with the significant benefits from up to 20 hectares of additional wetland that will be created as part of the Project. By restoring natural process and improving the ecological health of the estuary, the Project will enable a higher degree of natural character to develop over time as the landscape changes from pastoral land use to wetland, thereby enhancing the natural character.

The structures proposed (additional culverts, boat ramp, and mooring facilities) in the lower Kaituna River will introduce an additional built element, altering the existing character of the immediate area. However, this area is previously modified with Ford Road and adjacent rock protection, the current culverts, and Te Tumu Cut. Any adverse effects on natural character in the lower river are likely to be minor.

Those parts of the estuary and lower Kaituna River which currently have high natural character values, including the Maketu Spit, will not be affected by the Project. Rather, the improvements to ecological health and enhancement of natural character values across the estuary will improve the natural character of the wider landscape.

## 8.12 Property

The Project will directly affect private landowners (5 owners affected across 16 separate parcels of land), including parts of two farms in particular. Council is working through options with the landowners and is seeking to purchase land where necessary. The loss of property will be mitigated by compensating property owners. Other landowners such as Papahikahawai Trust (which manages Papahikahawai Island's two titles on behalf of the multiple Maori owners) are working with Council to change land use and restore biodiversity through suitable partnership arrangements.

## 8.13 Construction Effects

Construction of the Project has the potential to cause short term adverse environmental effects. A full description of the construction and staging strategies identified to minimise

the disruption and effects caused during construction are outlined in the Construction Description in Volume B.

The key construction effects relate to earthworks and stockpiling, access along Ford Road and general amenity effects on landowners and recreational users. Overall, these effects can be avoided, remedied, or mitigated through the design and implementation of effective controls, and preparedness for contingency actions.

### **8.13.1 Erosion and Sediment Control**

A significant volume of earthworks are required to create the new channel, move stopbanks, widen Ford's Cut, infill a section of Ford's Loop and remove the causeways in the upper estuary. Effective erosion and sediment control will therefore be critical to avoid adverse effects on the estuary and river. The flow of water from the river into the estuary will be stopped for the duration of construction, as this will have a lesser effect than releasing significant quantities of sediment to the estuary from in-channel works.

The contractor will be required to prepare and implement an Erosion, Sediment, and Dust Control Plan (ESDCP), which will be prepared in accordance with the BoPRC's Erosion and Sediment Control Guidelines for Land Disturbing Activities (2010). The ESDCP will be based around the following key measures:

- Earthworks in dry areas (i.e. above normal tidal and river flows) will be managed with conventional erosion and sediment controls, including topsoil bunds and silt fences.
- Earthworks in wet areas (i.e. excavation of new channels and widening deepening of existing channels) will be separated from river and tidal flows where possible. Where this is not possible, silt curtains will be installed across channel outlets and around work areas to minimise the release of suspended sediment to the estuary and river.

Water removed from the excavation site for the new culverts will be discharged onto the land north of Ford's Cut in excavated soakage areas. The existing drains on this land will be blocked (temporarily) to prevent water entering the estuary. Once earthworks are complete, this area will be stabilised as part of the Wetland Plan before being exposed to flows from the estuary.

The area of land adjacent to Ford's Loop, which will be raised using material excavated for the Project, will be surrounded by soakage drains and silt fences. The drain will be filled and silt fences removed after the areas have been established in grass. The area of land south of the new stopbank which will be raised drains to flat pasture land with no or little risk of sediment entering water. Where required, low height soil bunds will be placed around the perimeter of the fill.

### **8.13.2 Dust Control**

The construction phase of the Project has the potential to generate adverse dust effects. The most likely affected receptors are the nearby residences, along with recreational and commercial river users. Potential sources of dust include wind-blown dust from exposed surfaces and stockpiles, and vehicle movements throughout the site.

A range of appropriate dust mitigation measures are available to ensure that dust emissions are kept to acceptable levels, particularly during adverse weather conditions. These measures will be set out in the ESDCP to be prepared by the Contractor, and will include (but not necessarily be limited to) the following:



- Watering to keep construction materials damp
- Controlling the speed of vehicles and machinery operating within the construction area and on access roads
- Liaison with nearby residents and the local community regarding any concerns or complaints
- Avoiding as far as practicable the stockpiling of materials with dust generation potential close to sensitive receiving areas

### 8.13.3 Noise and Vibration

Noise generated by construction activities may affect three nearby residences (which are all located within 200m of the works area) along with recreational and commercial river users. In this case, the construction methodology will be designed to comply with the New Zealand Standard NZS 6803:1999 "Acoustics - Construction Noise".

For potentially high impact activities, monitoring of effects at property boundaries so as to ensure any induced vibration is not affecting any property or stakeholders adversely will be required of the Contractor. Should problems be anticipated and/or encountered then works will be stopped and the construction methods reassessed.

Noise and vibration generated below water levels (e.g. for sheet piling) may also temporarily affect fish movement in the river. However, the duration of any adverse effects will be minimal.

### 8.13.4 Traffic and Access

During the construction of the Project, there will be times of high traffic movements along Kaituna Road and Ford Road, particularly during the establishment phase as portacombs, equipment and materials are delivered by heavy vehicles. This will create traffic safety issues and increase noise and dust levels but these effects are short term, minor and can be managed with appropriate traffic controls, signage and water trucks.

Traffic safety controls will include speed restrictions, safety fencing, and signage in accordance with applicable traffic management regulations. Safe access throughout the construction will also be provided to the two adjacent landowners (Mr Allan Titchmarsh and Mr Boy Corbett).

Ford Road will be closed to the public for approximately 10 weeks during installation of the new culverts. This is scheduled to occur from late August to early November prior to the high summer recreation use time. However, the closure is proposed to take place during the whitebait fishing season which runs from mid-August to the end of November. Access to 230 metres of river bank along which whitebait run (from the river mouth at Te Tumu up to the first bend in the river) will be restricted during this time. This is considered to be a less than minor effect, given that the remainder of the river will still be accessible.

Access to the existing boat moorings and boat ramp in Ford's Loop will not be affected by the closure of Ford Road, and will be retained until completion of the new facilities adjacent to Ford Road. This will ensure there is no adverse effect on recreational and commercial river users or the coastguard.

### **8.13.5 Staging**

Staging the works and timing key parts to avoid disruption to public access and recreational use, and minimise effects on fish spawning and bird breeding, is proposed. Periods of high recreational use of the area include summer when the local community and visitors use the area for walking, fishing, boating and kayaking. The whitebait running season from mid-August to end of November is also a period of high use.

Generally speaking, the summer months are better for earthworks when more daylight hours and warmer temperatures allow wet soils to dry and compact and to dry out after any rainfall. Summer also reduces the likelihood of floods although the risk of sub-tropical lows is always present. Winter work can be contemplated for less weather sensitive works such as localised excavation to waste and construction of culverts. Landscape planting and grassing is best undertaken in late summer and autumn.

### **8.13.6 Fill Suitability**

Soil tests have been undertaken to determine the suitability of the material for fill. The results show that the material is suitable for agricultural land uses and ecological restoration.

### **8.13.7 Archaeology and Heritage**

The Project area is known to have been occupied by Maori for a significant period of time with a number of recorded archaeological sites in the area. A number of the recorded sites are located in close proximity to the physical works required for the Project. In addition, earthworks for the Project could potentially modify or damage unrecorded archaeological sites during excavation.

As noted under section 3.5.1 of this AEE, an authority will be sought from Heritage New Zealand to destroy, damage or modify archaeological sites that may be impacted on by construction work in the event that such sites are discovered during construction.

Earthworks for the Project will be observed by cultural monitors on behalf of tangata whenua, and will be undertaken in accordance with an Accidental Discovery Protocol (ADP). The ADP will provide guidance on the steps to be taken if an archaeological site is found during earthworks.

## **8.14 Summary**

The Project is a significant step towards partial restoration of a badly degraded estuarine environment and a key step in implementing the Kaituna River and Ongatoro/Maketu Estuary Strategy.

The Project may give rise to some adverse effects, as outlined above. However, the potential adverse effects can be avoided, remedied, or mitigated both through the design and construction of the Project, and through ongoing monitoring and contingency measures. Taking into account the proposed mitigation, the adverse effects caused by the Project are considered to be acceptable.

Construction related effects have been assessed and can all be managed through appropriate mitigation measures at the time of construction. Management plans will be prepared for temporary traffic management, and erosion and sediment control.

The mitigation measures identified above, and as described in detail in each of the relevant technical reports in Volume B, are detailed in a set of draft conditions for both the NoR and the resource consent. These draft conditions are discussed in Part 9 of this AEE and contained in Appendix 3 of this document.

The Project will have an extremely positive effect on the ecological health and mauri of the estuary, and will assist in the renewal of natural processes and functioning of the estuary.

When the Kaituna River was diverted via the Te Tumu Cut in 1956 some of the adverse changes occurred rapidly, but many took some 20 years to become evident. It is likely that some of the positive changes identified may also take place over a long timeframe as the system adjusts to a new equilibrium.

Overall, the Project will lead to improved cultural, ecological, and social conditions.



## Part 9: Proposed Environmental Management & Monitoring

### 9.1 Overview

A number of consents are required and mitigation measures have been proposed within the application. To assist with how these will be given effect to, this section discusses the approach to the proposed conditions. We have taken two approaches to the proposed conditions attached in Appendix 3. The approaches are:

- Providing exact wording.
- For the monitoring schedule providing general notes about the need for and type of condition without providing the exact wording.

This acknowledges that submissions are likely to be received on the conditions and the consent authorities will have their own view. Equally it is not unusual for the nature and wording of conditions to evolve, if needed, as one means to address matters raised during the formal notification and hearing processes. Therefore the draft conditions in Appendix 3 are subject to further refinement.

In drafting the conditions we have considered:

- Where some level of uncertainty remains, what further information and investigations are needed to confirm the expected outcomes from the modelling and other technical investigations, and to ensure that adverse effects are able to be identified and managed.
- What is currently monitored, whether it be as part of BoPRC obligations as part of the Project or the existing DoC consent (Consent No. 67316, expires December 2018) to divert the Kaituna River, and how continued access to that monitoring information can be formalised through conditions.
- What is required in terms of construction and post construction monitoring.

### 9.2 Current Monitoring

The regular monitoring currently undertaken in the area is outlined in Table 9 below. Note the list excludes any work undertaken as part of the Project investigations.

**Table 9: Current Monitoring**

Attribute	What and where	Who
Water level/flows	Continuous levels or flows: <ul style="list-style-type: none"> <li>- Lower Kaituna Wildlife Management Reserve (level)</li> <li>- Kaituna River at Te Matai (water level and rainfall)</li> <li>- Raparapahoe tributary (water level)</li> <li>- Ford's Cut (water level on river side of culverts)</li> <li>- Groundwater bore #3043 lower Kaituna</li> <li>- Wave buoy off Pukehina coast</li> </ul>	BoPRC

Attribute	What and where	Who
	- Waiari Stream (NIWA)	
Cross sections	Numerous cross section from Te Matai flow recorder to Te Tumu Cut	BoPRC
Water Quality	- Ford's Cut, mid estuary, mid to lower estuary (once a year in February at low mid and high tide)	DoC consent
	- Maketu surf club -bathing water quality (weekly during bathing season) - Lower Kaituna river at Te Matai, Te Tumu (NERMN - monthly) - Maketu boat ramp (NERMN 2 monthly)	BoPRC
Shellfish	- Bacteria testing of shellfish at three mid to lower estuary sites (February each year) - Density and size of shellfish at five sites	DoC consent
	- Bacteria testing The estuary main channel (annual - summer)	BoPRC
Ecology (fauna)	- Benthic macrofauna - 4 sites in estuary (part of NERMN)	BoPRC
	- Bird survey (annual and seasonal)	Birds NZ (formerly Ornithological Society)
	- Invertebrate and lizard monitoring - Shorebird nesting outcomes	Maketu Ongatoro Wetlands Society
	- Maketu Taiapure Committee has undertaken a baseline survey of shellfish beds in the lower The estuary	Maketu Taiapure Committee
Ecology (flora)	- Wetland extent monitoring (next due 2014/2015) - Seagrass mapping - 5 yearly - Mangrove mapping - 5 yearly - Duneland extent and condition monitoring (transects) - 5 yearly - Duneland vegetation mapping (10 yearly)	BoPRC
Sediment	Sediment size - 4 sites in estuary (annual NERMN)	BoPRC
Navigability	No formal monitoring. However, the Coastguard takes a depth sounding most times they use Te Tumu Cut	-
Other	Aerial photography (5 yearly) LIDAR	BoPRC

## 9.3 Proposed Monitoring

The numerical modelling study focused on hydrodynamics, morphology, and water quality of the lower river and estuary in order to quantify and characterise the existing situation and expected changes to that as a result of the Project. Through consultation a number of issues were also raised that needed to be addressed and the ecological investigations also have a number of recommendations. There are also activities during construction that need to be considered.

While in most areas the technical reports have identified that adverse effects are unlikely, the Applicant has recognised that the Project will take place in a complex natural environment and is therefore proposing to monitor various aspects to ensure that its predictions are accurate and that, should adverse effects arise, they are able to be identified quickly and addressed where necessary.

In consultation with the various technical experts, and taking into account the conclusions of the effects assessments, the Applicant proposes to monitor the following areas:

### Hydrodynamics / Morphology

- changes to the overall hydrodynamics of the river and estuary from the additional volume of water
- water levels at the intake structure, in the lower river and in the estuary
- changes in flow into the Lower Kaituna Wildlife Management Reserve due to the diversion

### Natural hazards

- potential for scour to occur in the estuary in undesirable locations

The potential for erosion on private land has been considered and appropriate measures are proposed so monitoring is not proposed.

### Water quality

- changes to nutrient concentrations within the estuary with additional nutrient rich river water entering the estuary
- impacts on bathing water suitability and shellfish collection at key sites within estuary
- changes to the overall salinities that will occur within the estuary

### Ecology

- change in algae cover and biomass in the estuary
- change in the distribution and abundance of shellfish and benthic fauna
- change in the composition of intermittently inundated wetlands as a result of changes in salinity or increased tidal fluctuations

### Structures

- operating regime and condition of the intake structure (i.e. the culverts) including response to rainfall and flood events

**Water clarity during construction** End of Ford's Cut and Papahikahawai Creek. Visual inspection daily during the construction phase to assess whether there is any visible

plume as a result of the work. If extending more than a specified distance then a photo will be taken and a water sample collected to measure settleable solids.

**Cultural monitors:** As agreed between BOPRC and the iwi with mana whenua for each location (e.g. Rangiwewehi for Papahikahawai) to be on site during relevant physical works. In addition, regular reporting to Te Maru o Kaituna (Kaituna River Authority) and other iwi as appropriate when that body is established and operating.

**Commissioning of Culverts** - a commissioning plan will be prepared that will include:

- a detailed regime for opening the culverts
- erosion and sedimentation monitoring at key locations - the new inlet, Te Tumu, Papahikahawai Island, the estuary entrance, Maketu foreshore, the back of the spit, the flood tide delta, and Ford's Cut
- flow velocities at key locations - the estuary entrance, Te Tumu, the boat ramps, Papahikahawai lagoon, the culverts, and the new inlet.

### 9.3.1 Monitoring post construction

The following monitoring is proposed post construction and commissioning:



**Table 10: Proposed Monitoring/Management**

Attribute	What and where	Frequency	Rationale
Management	Operation and Maintenance Manual that includes: <ul style="list-style-type: none"> <li>- Staging of re-diversion flow</li> <li>- The flow regime operating rules for the diversion including identification of the triggers and responses to manage flood events in accordance with the conditions of this consent</li> <li>- Operational procedures for the culvert gates.</li> <li>- Procedures for the maintenance and removal of debris at the culverts.</li> <li>- Procedures for inspecting and maintaining erosion protection works.</li> </ul>		
Water level/flows	<ul style="list-style-type: none"> <li>- Installation of a telemetered water level recording device in the estuary near Maketu township.</li> <li>- Continued operation and monitoring of the existing water level recording devices in the Kaituna River at Te Matai and at the Ford Road pump station.</li> <li>- Receipt of the continuous record of sea level from the NIWA gauge at Tauranga (Moturiki).</li> <li>- Installation of devices on the new culverts that allow practical and reliable reduction of flow into the estuary.</li> </ul>	Single investigation within 18 months of commissioning. Assessment of flow to occur when river is at about mean flow and include at least once on mean tide and spring tide.	This is to provide validation of the modelled estimates to show that it complies with consented flows
Erosion	<ul style="list-style-type: none"> <li>- Papahikahawai Island - Establishment of permanent markers (including coastal profiles from RL 2m down to MHWS, plus RTK GPS shoreline survey) from which to measure any erosion or accretion of the island. Minimum of four sites to the west and south of the island - each extending at least 50 m offshore to pick up changes in near shore depths over time.</li> </ul>	Permanent transects to be measured annually up to diversion and then twice a year for first three years. Thereafter, monitoring frequency to be assessed by review but continued for at least 10 years after completion of diversion.	To monitor erosion on Papahikahawai Island
	<ul style="list-style-type: none"> <li>- Maketu Spit - RTK GPS shoreline survey and several coastal profiles from RL 2m down to MHWS</li> </ul>	1 month before diversion and thereafter annually for 5 years, then as required.	To monitor spit erosion

	- Maketu township and Beach Road shoreline - RTK GPS survey (dune toe or seaward edge vegetation) where relevant and cross-sections (minimum of 6 sites in total - 2 along Beach Road and 4 distributed around township from Park Road foreshore to marae; each section extending to at least 50 m offshore)	1 month before diversion and thereafter annually for 5 years, then as required.	To monitor township shoreline changes
	- Aerial photo analysis	As collected by BOPRC	To monitor macro-scale changes throughout Project area
Water Quality	- Salinity, nutrient and bacterial monitoring at three sites (Ford's cut, mid estuary, Maketu boat ramp)	3x year in summer at high and low tide	To provide assessment of the change in water quality
Shellfish	- Bacteria testing of shellfish at 3 sites (lower-mid estuary)	3x year in summer (same day as water sampling)	To provide assessment of the change in shellfish quality
	- Density and size assessment at three sites in the mid estuary area	Annual for the first five years	
Ecology (fauna)	- Algae distribution and species	Algae - broad scale mapping twice a year for the first five years then review further need.	This would be to show that no adverse impacts have been caused (show any improvement)
	- Distribution of benthic macrofauna across estuary	Once within first five years	
Ecology (flora)	- Wetland west of Ford Island - fixed permanent plots to assess species composition. The focus will be on the wetland margin where changes in salinity are expected to occur. Note that a permanent transect (Opus transect 7) has already been established to provide a pre-diversion baseline.	Annually for first five years	To determine the response to the re-diversion in terms of wetland vegetation.
	- Papahikahawai channel. Permanent transect monitoring to assess change as a result of water level fluctuations (Transect 2 and 3)	5 yearly	
	- Photopoint monitoring of salt marsh remnants and the small Sarcocornia patch in Papahikahawai Creek	Annual for at least 20 years following re-diversion	

Wetland Creation	- Paired, marked plots of vegetation on land north of Ford's Cut to assess the success of restoration planting	In years 2, 5 and 10 after initial planting	To monitor the success of the restoration
Sediment	- Sediment particle size distribution in top 2cm. - Locate sites at Papahikahawai Creek and several sites near end of Ford's cut. To include TP, TN, TOC, algae cover and anoxic depth (plus any changes in extent of anoxia). - Where appropriate this should be integrated with macrofauna sampling	Annual for first 5 years	To show no adverse impact
Cultural	- Cultural monitor - via Te Maru o Kaituna (Kaituna River Authority), or direct back to iwi we have consulted with - Involvement of tangata whenua in restoration planning and implementation. Maximise opportunities to improve tangata whenua capability by offering training in monitoring techniques and procuring monitoring services locally where this is possible (i.e. within competence range, suitably independent and consistent with contract/procurement policies/law	Depends on location, scale of works, and level of interest and capacity from the iwi with mana whenua, but seek to maximise involvement and capacity	BOPRC with: Te Maru o Kaituna, Ngati Rangiwewehi (for Papahikahawai Island), and others as agreed to implement CIA recommendations
Reporting	Report in August each year monitoring results	Annual	To provide monitoring results



## Part 10: Statutory Assessment

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### 10.1 Overview

This section outlines the statutory and planning provisions that are relevant to the NoR and consenting of the Project. The assessment of the Project against relevant statutory documents generally follows the hierarchy of those documents, as shown below.

### 10.2 Notice of Requirement

#### 10.2.1 Section 171 RMA

Section 171 of the RMA applies to a NoR for a new designation.

*171 Recommendation by territorial authority*

*(1) When considering a requirement and any submissions received, a territorial authority must, subject to Part 2, consider the effects on the environment of allowing the requirement, having particular regard to -*

*(a) any relevant provisions of -*

*(i) a national policy statement:*

*(ii) a New Zealand coastal policy statement:*

*(iii) a regional policy statement or proposed regional policy statement:*

*(iv) a plan or proposed plan; and*

*(b) whether adequate consideration has been given to alternative sites, routes, or methods of undertaking the work if -*

*(i) the requiring authority does not have an interest in the land sufficient for undertaking the work; or*

*(ii) it is likely the work will have a significant adverse effect on the environment; and*

*(c) whether the work and designation are reasonably necessary for achieving the objectives of the requiring authority for which the designation is sought; and*

*(d) any other matter the territorial authority considers reasonably necessary in order to make a recommendation on the requirement.*

*(4) The territorial authority may recommend to the requiring authority that it-*

*(a) confirm the requirement:*

*(b) modify the requirement:*

*(c) impose conditions:*

*(d) withdraw the requirement.*

The extent to which the proposed designation is able to satisfy Section 171 and Part 2 of the RMA is considered below.

#### 10.2.2 National Policy Statements

There are four National Policy Statements (NPS) in place. The New Zealand Coastal Policy Statement (NZCPS) and NPS for Freshwater Management are considered to be of relevance.

The Project involves work in the coastal marine area. An assessment of the objectives and policies of the NZCPS has been made in Appendix 3. Particular regard needs to be given to these when considering an application under s104. The Supreme Court has recently considered the NZCPS policies in the context of a plan change for aquaculture<sup>14</sup>. The Supreme Court decision clarifies that some of the policies require the protection of areas with significant natural values in the coastal environment. The effect of the decision is to give primacy to the preservation of significant natural values.

However, the Court said the NZCPS does not direct that minor or temporary effects not be allowed and acknowledged that some uses or developments may enhance the values of an area. The Project has some effects on areas identified as having important values but these are minor and/or temporary. In addition, the Project will enhance some of the values. As such the Project is consistent with the policies of the NZCPS.

The NPS for Freshwater Management sets out objectives and policies that direct local government to manage water in an integrated and sustainable way, while providing for economic growth within set water quality and quantity limits.

The Project involves the diversion of water and temporary discharges during construction which have the potential to affect water quality and ecosystems. Both of these activities require resource consent from BoPRC. The AEE has identified potential changes in bacteria and nutrient levels.

In summary, the Project will result in significant positive benefits to the ecology of the upper estuary and Papahikahawai lagoon area, although there may be a short term risk to water quality from flushing of the lagoon area. There will be overall positive effects on filter feeders due to improved habitat and greater food supply. For these reasons, the Project is considered consistent with the relevant objectives.

### **10.2.3 National Environmental Standards**

There are five National Environmental Standards (NES) in force as regulations. There are no NES considered relevant to the proposed designation.

### **10.2.4 Regional Policy Statement**

In considering the proposed requirement, WBOPDC must have particular regard to a regional policy statement.

The Bay of Plenty Regional Policy Statement (RPS) has been operative since December 1999. The Proposed RPS was notified in November 2010, decisions released in 2012. The Proposed RPS is subject to appeals but with the majority of these having been resolved meaning more weight should be applied to the Proposed RPS.

The RPS is a broad policy document which considers all of the regionally significant resource management issues and provides objectives, policies, and methods to address those issues. It sets out how natural and physical resources are to be managed in an integrated way to promote sustainable management. Section 171(1)(a) of the RMA directs WBOPDC to have particular regard to the RPS when considering the effects on the environment of allowing the requirement.

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<sup>14</sup> *Environmental Defence Society Inc. v The New Zealand King Salmon Company Limited* [2014] NZSC 38.

The key issue is whether the proposed designation is consistent with the relevant objectives and policies of the RPS. Objectives and policies from both the Operative and Proposed RPS that are relevant to consideration of the Project are listed in Appendix 2, along with an assessment as to the consistency of the Project with these. The Project gives effect to a number of objectives and policies focussing on the restoration and enhancement of the natural character and ecological functioning of the environment, particularly the coastal environment.

Specifically, the Project is about enhancing the mauri of an area of cultural significance in response to calls from local iwi (Proposed RPS Objective 17), the restoration and enhancement of the natural character and ecological functioning of the coastal environment (Proposed RPS Objective 2), restoration and rehabilitation of natural communities and habitats of indigenous flora, fauna and ecosystems (Objective 20/Policy MN 4B). It is noted that the Proposed RCEP specifically states that the Kaituna River to Ōngātoto/Maketū Estuary Strategy should be taken into account when making decisions on the management of land and water resources, including coastal waters (Policy WQ2). Overall, the Project is consistent with the objectives and the associated policies.

### 10.2.5 District Plan

The Western Bay of Plenty District Plan (District Plan) provides a framework to help manage the use, development, and protection of the physical and natural resources of the district. Specifically, the District Plan sets down objectives, policies, and rules to guide the use and development of land in a way that promotes the wellbeing of people and the environment.

A designation means that the District Plan rules no longer apply. However, regard needs to be had as to whether the designation is consistent with the direction set by the District Plan policies.

Objectives and policies from the District Plan that are relevant to consideration of the Project are listed in Appendix 2, along with an assessment as to the consistency of the Project with these. The Project is supported by objectives and policies relating to enhancement of the natural environment, protection of landscape, and avoidance of natural hazards. Overall, the Project is consistent with these objectives and the associated policies.

### 10.2.6 Alternative sites, routes or methods

Section 171(1)(b) requires the territorial authority to consider whether adequate consideration has been given to alternative sites, routes, or methods of undertaking the work if:

- The requiring authority does not have an interest in the land sufficient for undertaking the work; or
- It is likely the work will have a significant adverse effect on the environment.

BOPRC currently does not have an interest in all of the land required for the proposed public works. However, BoPRC is currently in the process of negotiating the acquisition of the necessary property rights. Construction of the Project will not commence until BoPRC has acquired all of the land needed for the Project.

The location of the Kaituna River and estuary are fixed, and therefore cannot be located in any alternative site that would achieve the same objective for the Applicant. However

within the bounds of the Project, considerable time and resource has been invested in determining the best re-diversion option and associated works.

The various options have been outlined in Part 6 of this AEE and are reported in more detail in Volume B. There is sufficient detail for WBoPDC to determine that adequate consideration has been given by the Applicant as to alternative sites, routes, or methods of undertaking the proposed work.

### 10.2.7 Reasonable Necessity

Section 171(1)(c) requires the territorial authority to consider whether the work and designation are reasonably necessary for achieving the objectives of the requiring authority for which the designation is sought. The need for the proposed work and designation has been outlined in the NoR and has been demonstrated as being reasonably necessary for the Applicant to achieve its objectives.

### 10.2.8 Other Matters

Section 171(1)(d) requires the territorial authority to consider any other matter it considers reasonably necessary to make a recommendation on the requirement. It is not considered there are no other matters WBoPDC needs to consider in order to make a recommendation on the NoR.

## 10.3 Resource Consent Application

### 10.3.1 Section 104 RMA

Section 104 of the RMA applies to the consideration of resource consent applications.

#### *104 Consideration of applications*

- (1) *When considering an application for a resource consent and any submissions received, the consent authority must, subject to Part 2, have regard to -*
- (a) *any actual or potential effects on the environment of allowing the activity; and*
  - (b) *any relevant provisions of -*
    - (i) *a national environmental standard;*
    - (ii) *other regulations;*
    - (iii) *a national policy statement;*
    - (iv) *a New Zealand coastal policy statement;*
    - (v) *a regional policy statement or proposed regional policy statement;*
    - (vi) *a plan or proposed plan; and*
  - (c) *any other matter the consent authority considers relevant and reasonably necessary to determine the application.*
- (2) *When forming an opinion for the purposes of subsection (1)(a), a consent authority may disregard an adverse effect of the activity on the environment if a national environmental standard or the plan permits an activity with that effect.*
- (2A) ...

An assessment of the actual or potential effects on the environment has been undertaken in Section 8. The extent to which the proposed resource consent is able to satisfy Section 104(1)(b) and(c) and Part 2 of the RMA is considered below.



### 10.3.2 National Environmental Standards

There are five National Environmental Standards (NES) in force as regulations. The following NES are considered relevant.

The NES for Air Quality includes standards for PM10 - fine particulate. Air quality may be a potential issue during construction where fugitive dust emissions from earthworks have the potential to create an adverse effect. However, dust can be managed and controlled through specific on-site measures to ensure that the NES standards are complied with. The contractor will be required to prepare and implement an Erosion, Sediment, and Dust Control Plan (ESDCP) which will identify how fugitive dust emissions will be managed. The ESDCP also forms part of the proposed conditions in Appendix 3.

### 10.3.3 Other Regulations

There are no other regulations relevant to the consideration of this resource consent application.

### 10.3.4 National Policy Statements

There are four National Policy Statements (NPS) in place. The Coastal Policy Statement and Freshwater Management are considered to be of relevance. As discussed above at 10.2.2, the Project is consistent with both these National Policy Statements.

### 10.3.5 Regional Policy Statement

The relevant objectives and policies of both the Operative and Proposed RPS are listed in Appendix 2, along with an assessment as to the consistency of the Project with these.

Specifically, the Project is about enhancing the mauri of an area of cultural significance in response to calls from local iwi (Proposed RPS Objective 17), the restoration and enhancement of the natural character and ecological functioning of the coastal environment (Proposed RPS Objective 2), restoration and rehabilitation of natural communities and habitats of indigenous flora, fauna and ecosystems (Objective 20/Policy MN 4B). It is noted that the Proposed RCEP specifically states that the Kaituna River to Ōngātoro/Maketū Estuary Strategy should be taken into account when making decisions on the management of land and water resources, including coastal waters (Policy WQ2).

As discussed above at 10.2.4, the Project is consistent with these objectives and policies.

### 10.3.6 Regional Plans

Section 171(1)(a) of the RMA directs WBOPDC to have particular regard to the Regional Coastal Environment Plan (RCEP), the Regional Water and Land Plan (RWLP) and the Regional Air Plan (RAP).

The key issue is whether the proposed works are consistent with the relevant objectives and policies of these plans.

#### Regional Coastal Environment Plan

The 19 topics covered in the RCEP include all resource management issues relating to the coastal marine area and issues pertaining to the coastal environment. The RCEP was adopted in December 2002 with changes in 2011 to reflect the NZCPS.

Objectives and policies from the RCEP that are relevant to consideration of the Project and which are considered in this AEE relate to coastal water, structures, disturbance, reclamation, and occupation. These relevant objectives and policies are listed in Appendix 2, along with an assessment as to the consistency of the Project with these.

The Project supports objectives and policies focussing on the restoration and enhancement of the natural character and ecological functioning of the coastal environment, and is consistent with objectives and policies relating to avoidance of natural hazards. Overall, therefore, it is considered the Project is consistent with the relevant objectives and policies in the RCEP.

### **Regional Land and Water Plan**

The Operative RWLP (incorporating changes) addresses the sustainable management of natural resources within the region. Objectives and policies from the RWLP that are relevant to consideration of the Project and which are considered in this AEE relate to discharges (Chapter 4), water quantity (Chapter 5) and river beds and margins and wetlands (Chapter 6) in terms of access to water bodies, ecology, and amenity, landscape, and cultural values. These relevant objectives and policies are listed in Appendix 2, along with an assessment as to the consistency of the Project with these.

The Project supports objectives and policies focussing on the promotion of kaitiakitanga and tangata whenua involvement in resource management, protection of land, water, and soil resources, and the enhancement of the natural character of rivers and wetlands, and is consistent with objectives and policies relating to avoidance of natural hazards. Overall, therefore, it is considered the Project is consistent with the relevant objectives and policies in the RWLP.

### **Proposed Regional Coastal Environment Plan**

The Proposed Regional Coastal Environment Plan (pRCEP) was notified on 24 June 2014. As the pRCEP has only just been notified, and has been not been subject to testing, little weight should be applied to the Plan. However, for completeness, the relevant objectives and policies are listed in Appendix 2.

The 6 topics covered in the pRCEP include all resource management issues relating to the coastal marine area and issues pertaining to the coastal environment. Objectives and policies from the pRCEP that are relevant to consideration of the Project and which are considered in this AEE relate to natural heritage, water quality, coastal hazards, and public space. Overall, the Project is considered to be consistent with the relevant objectives and policies in the pRCEP.

### **10.3.7 Assessment of Section 105 Matters**

Section 105(1) RMA sets out the matters that a consent authority must have regard to when considering a resource consent application for a discharge permit. In particular, consideration needs to be given to:

- *the nature of the discharge;*
- *the sensitivity of the receiving environment to adverse effects;*
- *the applicant's reasons for the proposed choice; and*
- *any possible alternative methods of discharge, including discharge into any receiving environment.*

As some of the applications relating to the Project are for permits to discharge contaminants into water, onto land and into air section 105 is relevant. All of the discharges are construction related so temporary in nature.

The discharges relate to earthwork activities where sediment or dust may be discharged. The receiving environment has been described in section 4. The location of the Project is fixed and there are no alternative locations or methods for the discharges.

### **10.3.8 Section 107 RMA**

Section 107 of the RMA places restrictions on granting discharge permits (e.g., to discharge sediment from construction). In particular, the Council must not grant a discharge permit if, after reasonable mixing, the contaminant, or water being discharged is likely to give rise to certain effects in the receiving waters. These effects include any one or more of the following in the receiving waters:

- the production of any conspicuous oil or grease films, scums or foams or floatable or suspended materials
- any conspicuous change in the colour or visual clarity
- any emission of objectionable odour
- the rendering of fresh water unsuitable for consumption by farm animals
- any significant adverse effects on aquatic life

However a consent authority may grant a discharge permit or a coastal permit to do something despite it having those effects if it is satisfied that the discharge is of a temporary nature and that it is consistent with the purpose of the RMA to do so.

During construction there will be times where there is a discharge of sediment to water. It is possible there will be a change in the colour or visual clarity of the water. However, this will be of a temporary nature, and will be minimised as far as practicable through the use of appropriate erosion and sediment controls.

## **10.4 Other Matters**

### **10.4.1 Iwi Management Plans**

The relevant plans are:

- Nga Aukati Taonga o Tapuika me Waitaha is a joint Iwi Management Plan prepared by Tapuika and Waitaha in 1993.
- Ngati Rangiwewehi Iwi Environmental Management Plan (2012)
- Ngati Whakaue Iwi Resource Management Plan (August 2011)

The CIAs note the policies of particular relevance to this proposal.

### **10.4.2 Other Statutory Approvals Required**

As outlined in Section 3.5.1 of this AEE, an authority from Heritage New Zealand under Section 12 of the Historic Places Act 1993 will be required to destroy, damage or modify archaeological sites that may be impacted on by construction work.

## 10.5 RMA Part 2 Assessment

### 10.5.1 Overview

Section 104(1)(b) of the RMA sets out the matters that decision-makers are required to have regard to when considering an application for resource consent and any submissions received. Similarly, section 171(1)(a) of the RMA sets out the matters that decision-makers must have particular regard to when considering a NoR and any submissions received.

Any such consideration however is subject to Part 2 of the RMA which sets out the purpose and principles of the RMA. The purpose of the RMA as stated in section 5 is to promote the sustainable management of natural and physical resources.

Part 2 of the RMA provides further direction on the matters of national importance (section 6), other matters (section 7), and the principles of the Treaty of Waitangi (section 8) which need to be considered and responded to.

### 10.5.2 Section 6

Section 6 covers matters of national importance that shall be recognised and provided for. Section 6 states:

*“In achieving the purpose of this Act, all persons exercising functions and powers under it, in relation to managing the use, development and protection of natural and physical resources, shall recognise and provide for the following matters of national importance:”*

The Section 6 matters of relevance to this application are discussed below.

Section 6(a) requires recognition and provision for ‘**The preservation of the natural character of ...wetlands, and lakes and rivers and their margins and the protection of them from inappropriate subdivision, use and development**’. The impacts of the Project on the river and margins and wetlands are addressed in section 8. The Project is about enhancing the environment so is not inappropriate use or development. While a key objective of the Project is creating wetlands with up to 20 hectares of new wetland proposed, there is a small section of existing wetland that will be affected by the proposed channel. The edges of the proposed channel and the widening of Ford’s Cut have been designed to ensure the ‘edges’ will not be eroded but will also provide ecological connection to the adjacent land, or wetland.

In regards to the protection of **outstanding natural features and landscapes** from inappropriate subdivision, use, and development (Section 6(b)), the estuary area is identified in the RCEP as an ‘outstanding landscape (coastal)’. The physical works proposed in the estuary are related to enhancement works and so do not constitute inappropriate use or development.

The protection of areas of **significant indigenous vegetation and significant habitats of indigenous fauna** is addressed in Section 6(c). The RCEP identifies sites of significance (on land) and sites of district or local significance (coastal marine) area over Ford Island and the wetland west of Ford Island. The pRCEP identifies the estuary as “Indigenous Biological Diversity Area A” and the lower Kaituna River as “Indigenous Biological Diversity Area B”. The significance of the areas, in relation to the Project, has been assessed in the ecology reports (Volume B). Overall, the Project will result in substantial beneficial effects to the ecology of the estuary. The diversity and abundance of indigenous plants and

animals will increase significantly as a result of the increased area of high value habitat and increased biological productivity.

Section 6(d) addresses the **maintenance and enhancement of public access** to and along the coastal marine area, lakes, and rivers. During construction there will be some restrictions on public access in the interests of public safety and to reduce the construction time required to install the culverts. However, these restrictions should be limited in both time and geographic extent. Post-construction, public access to and along the coastal marine area and the river will be maintained and may be enhanced with additional land being owned by BoPRC.

In regards to the **relationship of Maori** and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga (Section 6(e)), CIA's were prepared and presented as part of the application documents, detailing the relationship of Maori to the area, culture, values and other matters. There is general support from local iwi for the Project, but equally a desire by some to see a full diversion of the river into the estuary (i.e. more work of the kind proposed by this Project). Tangata whenua concerns about the effect of past modifications on the estuary were one of the key drivers of the Kaituna River and Ongatoro/Maketu Estuary Strategy and the subsequent setting up the Project. In addition, the Project Goal specifically aims to maximise the cultural benefits of the re-diversion.

Under Section 6(f), **historic heritage** is to be protected from inappropriate use and development. There are a number of recorded, and likely to be unrecorded archaeological sites within the footprint. An archaeological authority will be sought from Heritage New Zealand that will enable the sites to be modified, damaged or destroyed during construction should this be required.

### 10.5.3 Section 7

Section 7 covers other matters that shall be given particular regard to. The provisions that are relevant to this application are discussed below.

The purpose of **kaitiakitanga** (Section 7(a)) is to ensure sustainability (of whanau, hapu, or iwi) in physical, spiritual, economic, and political terms. There are a number of concepts included in kaitiakitanga. The courts have found that kaitiakitanga requires:

- Ongoing involvement, and is a responsibility to care for something of great value to the survival of the iwi or hapu
- Tangata whenua to be provided with the opportunity to exercise guardianship of the natural and physical resources in accordance with tikanga Maori.

Section 7(b) requires a consideration of whether a proposal is an **efficient use and development of natural and physical resources**. The Project utilises existing infrastructure where practicable, notably the existing culverts beneath Ford Road and the existing channel of Ford's Cut.

The Project provides for the **maintenance and enhancement of amenity values** (Section 7(c)). The Project will result in an improvement in amenity values with the provision of recreational opportunities and the wetland creation. In the short term existing fishing/food gathering opportunities will be maintained but are expected to improve over time in the estuary as habitat improves.

In having regard to the **intrinsic values of ecosystems** (Section 7(d)) it is necessary to consider the RMA definition of ‘intrinsic values’ being:

*in relation to ecosystems, means those aspects of ecosystems and their constituent parts which have value in their own right, including—*

- (a) Their biological and genetic diversity; and*
- (b) The essential characteristics that determine an ecosystem's integrity, form, functioning, and resilience:*

The ecology of the lower Kaituna River and estuary has been heavily impacted from past activities. Substantial beneficial effects are anticipated. The diversity and abundance of indigenous plants and animals will increase substantially as a result of the increased area of habitat and increased biological productivity.

The **quality of the environment** (Section 7(f)) requires an all-encompassing view of the environment. There will be some impacts on the quality during construction. Post construction the environment will improve over time as additional freshwater flows through the estuary (with its added benefits) and the wetland creation work is completed.

The **effects of climate change** (section 7(i)), where relevant, have been included in the modelling and technical assessments.

#### 10.5.4 Section 8

*Section 8 states: “In achieving the purpose of this Act, all persons exercising functions and powers under it, in relation to managing the use, development, and protection of natural and physical resources, shall take into account the principles of the Treaty of Waitangi (Te Tiriti o Waitangi).”* The wording “shall take into account” requires decision makers to consider the principles of the Treaty with all other matters.

CIA’s have been prepared and presented as part of the application documents. The CIA’s were useful in identifying matters that are required to be recognised and provided for in making an informed decision. There is general support from local iwi for the Project. Tangata whenua concerns about the effect of past modifications on the estuary are one of the key drivers of the Project.

Consultation between the applicant and tangata whenua has occurred throughout the development of the Project, and discussions are ongoing with regard to facilitating tangata whenua involvement during construction of the Project and in related estuary enhancement initiatives following re-diversion.

#### 10.5.5 Section 5

The purpose of the RMA is to promote the sustainable management of natural and physical resources. Section 5 goes on to elaborate on the definition of sustainable management, noting:

- (2) In this Act, “sustainable management” means managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural wellbeing and for their health and safety while -*
  - (a) Sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and*
  - (b) Safeguarding the life-supporting capacity of air, water, soil, and ecosystems; and*

*(c) Avoiding, remedying, or mitigating any adverse effects of activities on the environment.*

The Project is entirely consistent with the purpose of the RMA. The Applicant is seeking to protect an important natural and cultural resource - Ongatoro/Maketu Estuary - in a way that will allow the community to provide for their social, economic, and cultural wellbeing and for their health and safety.

The Project will ensure that the estuary is sustained for future generations, and that the life-supporting capacity of both the estuary and its surrounding environment is safe-guarded into the future. The assessment of environmental effects has demonstrated that all adverse effects that could arise as a result of the Project can be avoided, remedied, or mitigated to an acceptable level.





## Part 11: Conclusion

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The Bay of Plenty Regional Council seeks resource consents and confirmation of a NoR to enable it to re-divert water from the Kaituna River back into Ongatoro/Maketu Estuary (the estuary), establish wetlands, provide recreational opportunities and undertake associated works to achieve the Project Goal. The Project is a significant step towards partial restoration of a badly degraded estuarine environment and a key step in implementing the Kaituna River and Ongatoro/Maketu Estuary Strategy.

The degradation has occurred as a result of a number of human interventions in the natural functioning of the estuary environment over the last hundred years, and the Project is an attempt to provide redress for the local community and enhance the ecological health and functioning of an important natural resource. Overall, the Project will lead to improved cultural, ecological, and social conditions, especially in the long term. Some positive effects will be immediate, while others will take time to take effect and require a long term stepped view.

The need for the proposed work has been outlined in the NoR and the Project has been demonstrated as being reasonably necessary for BoPRC as the Requiring Authority to achieve its objectives.

It is considered that the Project will have an extremely positive effect on the ecological health of the estuary, and will assist in the renewal of natural processes and functioning of the estuary.

The Project may give rise to some adverse effects, as outlined above. The potential adverse effects can be avoided, remedied, or mitigated both through the design and construction of the Project, and through ongoing monitoring and contingency measures. Taking into account the proposed mitigation, the adverse effects are considered to be at an acceptable level.

The key RMA tests for consideration of both a NoR and a resource consent, as contained in Sections 171 and 104 RMA respectively, are assessed in Section 10. It is the conclusion of this assessment that the proposed designation and resource consent application meets the purpose and principles of the RMA.



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# Appendices

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## Appendix 1 - Plan Schedules

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# Regional Coastal Environment Plan

## Third Schedule - Areas of Significant Conservation Value

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<b>SITE NAME:</b>	<b>MAKETU/WAIHI ESTUARIES AND OKUREI POINT</b>	
<b>SITE NUMBER:</b>	<b>ASCV-7</b>	<b>MAP SHEET: 15, 16b, 17b</b>

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In the mid part of the Maketu estuary there are extensive intertidal flats and channels which contain large cockle and pipi beds. Significant numbers of juvenile flounder, kahawai (*Arripis trutta*), yellow eye mullet (*Aldrichetta forsteri*), grey mullet and eels are found in the Maketu and Waihi estuaries.

The Kaituna River Mouth, Maketu/Little Waihi estuary complex meet the following Ramsar criteria for an internationally significant wetland.

- 1(c) It is a particularly good representative example of a common type of wetland.
- 2(a) It supports an appreciable assemblage of rare, vulnerable or endangered species or subspecies of plant or waterfowl and an appreciable number of individuals of any one or more of these species.
- 2(c) It is of special value as a habitat of plants or waterfowl at a critical stage of their biological cycle. In the case of international migrants – it is summering over. For other species it is during breeding.
- 3(c) Percentage of individuals of a population.
  - (a) Of the variable oystercatcher national population, 5.6%, i.e. 112 birds reside at the wetland.
  - (b) Of the New Zealand dotterel national population, 1.4%, i.e. 42 birds reside at the wetland.

Maketu and Little Waihi Estuary are important feeding and roosting areas for migratory birds and for waders. Forty-eight species of waders, wetland and shorebirds as well as migrant visitors are found in Maketu and Little Waihi Estuaries and Kaituna wetlands. The waterfowl include nine nationally vulnerable species, including the New Zealand dotterel (*Charadrius obscurus*) which breeds on Maketu Spit, caspian tern (*Hydroprogne caspia*), banded rail (*Rallus philippensis assimilis*) which breeds in the area, wrybill (*Anarhynchus frontalis*), Australasian bittern (*Botaurus stellaris poiciloptilus*), banded dotterel (*Charadrius bicinctus*), reef heron (*Egretta sacra*), white heron (*Egretta alba modesta*), royal spoonbill (*Platalea regia*) of which there are some dozen birds. Nationally rare species found in this area include the variable oystercatcher (*Haematopus unicolor*), Pacific golden plover, far eastern curlew, Asiatic whimbrel, sharp-tailed sand piper, curlew sandpiper, red necked stint, sanderling and eastern little tern and the regionally vulnerable North Island fernbird.

Maketu and Little Waihi Estuaries are important feeding areas for waders such as eastern bar-tailed godwit, pied stilt and variable oyster catcher, ruddy turnstone, red necked stint, whimbrel sp., golden plover, Mongolian dotterel, pectoral sandpiper and sharp-tailed sand piper. These birds arrive in September and depart in February – March. Of interest is the departure to Siberia and other northern latitudes when large numbers of birds arrive from further south to feed before continuing their migration north, and thus Maketu and Little Waihi are important staging posts for migration.

The entrances of Maketu and Little Waihi Estuaries are located on either side of the Okurei Point headland. This geomorphological phenomenon of converging littoral drift is the only example found in New Zealand. In addition, only one example is known from Australia, making the New Zealand example of international significance. DOC Ref: 04-010.

## Seventh Schedule - Significant Indigenous Vegetation Areas

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<b>SITE NAME:</b>	<b>KAITUNA SAND DUNES</b>	<b>MAP SHEET: 15</b>
<b>RANKING:</b>	<b>NATIONAL</b>	<b>SITE NO: SSL-32</b>

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This site contains a relatively large population of *Austrofestuca littoralis*, a species classed as rare. This is the best population of *Austrofestuca littoralis* in the Bay of Plenty and is a representative example of sand dune communities in the region. *Desmoschoenus spiralis* (pingao), classed as local, also grows at this site.

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<b>SITE NAME:</b>	<b>KAITUNA RIVER</b>	<b>MAP SHEET: 16a</b>
<b>RANKING:</b>	<b>DISTRICT</b>	<b>SITE NO: SSL-33, SSCMA-33</b>

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This site contains one of the last small remnants of the Kawa swamp, a once large wetland covering much of the Maketu Plains. Some of the vegetation types present here are not well-represented at other sites in the ecological district.

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<b>SITE NAME:</b>	<b>MAKETU SPIT</b>	<b>MAP SHEET: 16a</b>
<b>RANKING:</b>	<b>DISTRICT</b>	<b>SITE NO: SSL-34</b>

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This site contains a small population (five plants) of *Austrofestuca littoralis*, a species classed as rare.

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## Fourteenth Schedule - Areas of Significant Cultural Values

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<b>SITE NAME:</b>	<b>MAKETU/WAIHI ESTUARIES AND OKUREI POINT</b>	
<b>SITE NUMBER:</b>	<b>ASCV-7</b>	<b>MAP SHEET: 15, 16b, 17b</b>

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The Maketu Estuary is a regionally important tauranga waka (Arawa canoe final landing) and mahinga kai. The Maketu Estuary is of immense cultural and historical importance to Te Arawa ("mai Maketu ki Tongariro" – from Maketu to Tongariro). Numerous pa and 67 middens have been located on the land adjacent to the estuary. Okurei is also of very high spiritual significance to local Te Arawa.





2810000 2811000  
 HORIZONTAL DATUM: New Zealand Geodetic Datum 2000  
 For practical purposes, NZGD2000 equates to WGS84  
 VERTICAL DATUM: Mean Sea Level  
 PROJECTION: New Zealand Transverse Mercator 2000

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- Areas Sensitive to Coastal Hazards
- Harbour Line
- Toe of Foredune
- Site of Significance (On Land)
- Site of District or Local Significance (Coastal Marine Area)

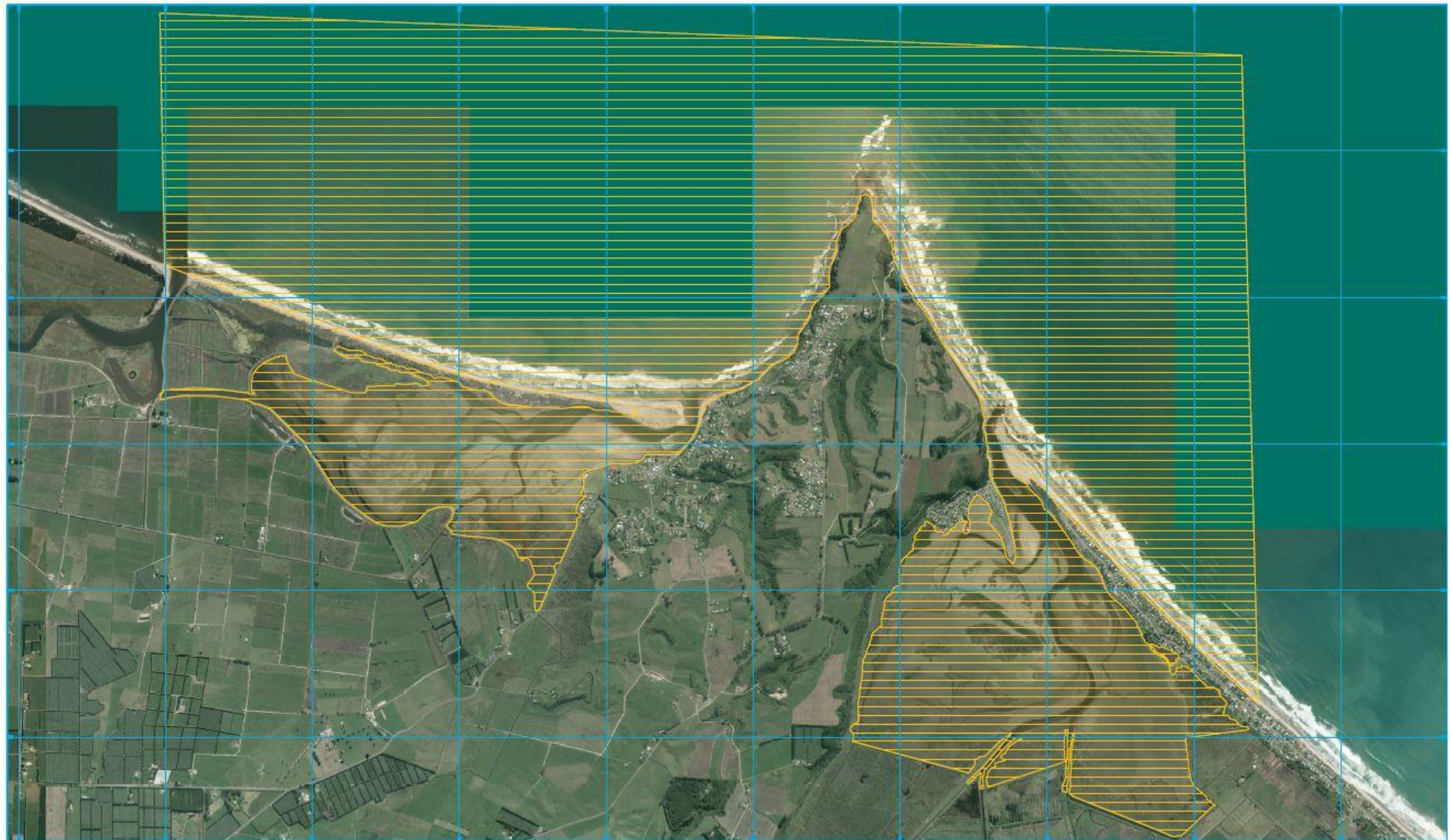
## Kaituna River Mouth with Coastal Plan Layers (Map16a)



Scale 1:30000

GIS-477025  
 Printed 5/05/2014





810000

2811000

2812000

2813000

2814000

2815000

2816000

2817000


2818000

2819000

HORIZONTAL DATUM: New Zealand Geodetic Datum 2000  
 For practical purposes, NZGD2000 equates to WGS84  
 VERTICAL DATUM: Mean Sea Level  
 PROJECTION: New Zealand Transverse Mercator 2000

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 Area of Significant Conservation or Cultural Value (Coastal Marine Area)



Scale 1:34000

### Kaituna River Mouth with Coastal Plan Layers (Map16b)

GIS-477025  
 Printed 5/05/2014







810000 2811000 2812000 2813000 2814000 2815000 2816000 2817000 2818000 2819000

HORIZONTAL DATUM: New Zealand Geodetic Datum 2000  
 For practical purposes, NZGD2000 equates to WGS84  
 VERTICAL DATUM: Mean Sea Level  
 PROJECTION: New Zealand Transverse Mercator 2000

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-  Regionally Significant Feature and Landscape (1993)
-  Outstanding Landscape (Coastal) (2006)

### Kaituna River Mouth with Coastal Plan Layers (Map16c)



Scale 1:34000

GIS-477025  
 Printed 6/05/2014



# Western Bay of Plenty District Plan

## Appendix 1: Schedule of Identified Significant Ecological Features

Site No	District Plan Map Ref	Name	Habitat
V14/1	H12; H13	Maketu Sandspit 1	Duneland Vegetation
V14/2	H12; H13; U152	Maketu Estuary	Saltmarsh and Wetlands
V14/3	H13	Arawa Wetlands	Willow forest and Freshwater wetland
V14/10	H13; U152	Maketu Sandspit 2	Spinifex sand field
SBS 5	H12	Ford Road	Bird Nesting and Roosting Site

## Appendix 2: Schedule of Identified Outstanding Landscape Features

Natural Features and Landscapes

S19 - Maketu Estuary Landward Edge Protection Yard C.P.1

Includes the water body of the estuary up to MHWS and its landward edge 40m inland on land zoned Rural.

S24 - Open Coastal Landscape Landward Edge Protection Yard

The area identified contains all land adjoining the open coastline, zoned Rural and within 100m of MHWS.

## Appendix 4: Schedule of Proposed Esplanade Reserves and Strips

1. An esplanade strip of 10m in width or 20m in width where topography dictates a wider strip is necessary to provide public access shall be set aside along the rivers and streams identified in the District Plan namely:

(xxxvi) the true right bank of the Kaituna River downstream from Maungarangi Road to the Kaituna River mouth;

# Regional Policy Statement -Variation 1 (Coastal Policy)

Main attributes (includes those that enhance and diminish natural character)								
Name	Amount of natural character	General description of area	Attributes that enhance natural character	Water	Land cover and land use	Terrestrial biotic	Abiotic systems and landform	Perceptual
Kaituna River (KR) Map 23	High	The Kaituna River mouth originally exited at the Maketu Harbour mouth and seawalls and retaining are present to manage erosion and water flow into the estuary, at the river cut. The Kaituna wetland is a remnant feature of the wider wetland that once extended immediately behind the dune environment in this area.	<ol style="list-style-type: none"> <li>1. Kaituna wetlands vegetation cover and water body.</li> <li>2. Flood plains and intertidal zone within the river corridor comprising remnant wetlands and spawning areas for native fish.</li> </ol>	<ol style="list-style-type: none"> <li>1. The water body of the Kaituna River has been managed within stop banks to manage the flood risk. Lower flood plains within the stop banks form part of the intertidal and flood plain environment.</li> </ol>	<ol style="list-style-type: none"> <li>1. The Kaituna River comprises a distinctive rear coastal wetland.</li> </ol>	<ol style="list-style-type: none"> <li>1. The Kaituna River wetlands have moderate diversity, are modified by weed infestations, and provide habitat for a range of indigenous wetland fish and bird species.</li> <li>2. The flood plains and wetlands alongside the river provide spawning habitats for native fish species.</li> </ol>	<ol style="list-style-type: none"> <li>1. The Kaituna River and Maketu Estuary have been significantly modified and channelled.</li> </ol>	<ol style="list-style-type: none"> <li>1. Parts of the Kaituna River display highly natural processes and patterns, including intertidal zones and the Kaituna wetlands.</li> <li>2. The natural floodplains remains visible and reflects the dynamic nature of the river system.</li> </ol>
Maketu Estuary (ME) Map 23	High	The Maketu Estuary and dune sand spit are an example of an historic wetland and river system set behind a sandy coastal edge. Modification to the natural patterns and processes has occurred from the creation of a new river mouth for the Kaituna River, stopping the major flows of water into the Maketu Estuary.	<ol style="list-style-type: none"> <li>1. Native saltmarsh and intertidal vegetation cover within the estuary.</li> <li>2. Dune planting and natural processes occurring on the dune feature.</li> <li>3. Extensive intertidal zone within the estuary within minimal modification.</li> </ol>	<ol style="list-style-type: none"> <li>1. Water outlet into the Estuary is highly modified, however, the vegetation patterns within the estuary are largely unmodified.</li> </ol>	<ol style="list-style-type: none"> <li>1. The dune system remains unmodified</li> <li>2. Some maerua are located within the estuary.</li> </ol>	<ol style="list-style-type: none"> <li>1. The Maketu Estuary, spit, dunelands and saltmarshes have moderate to high diversity with regional significance, are modified by weed infestations, and provide habitat for a very high diversity of indigenous fauna species, notably wading birds.</li> </ol>	<ol style="list-style-type: none"> <li>1. The natural coastal processes are dominant for the coastal dune system.</li> <li>2. The estuary has undergone modification to the intertidal zone from the Kaituna River cut modification.</li> </ol>	<ol style="list-style-type: none"> <li>1. Despite the modification to the water body the estuary and dune feature appear largely unmodified and highly natural.</li> <li>2. The community support the restoration and management of this natural feature.</li> </ol>

## **Appendix 2 - Relevant Objectives and Policies**

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## **Appendix 3 - Proposed Conditions**

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## Designation - Draft Conditions

Note: these proposed conditions are duplicated from Attachment 3 to the NoR and are included here for completeness. All conditions are subject to further refinement.

### DEFINITIONS

“District Council” means the Western Bay District Council’s Chief Executive Officer or nominee

“Requiring Authority” means the Bay of Plenty Regional Council

“RMA” means Resource Management Act 1991

“Project” means the Kaituna River Re-Diversion and Ongatoro/Maketu Estuary Enhancement Project and associated activities

“Works” means the construction works required to give effect to the Project

### GENERAL CONDITIONS

1. The Requiring Authority shall submit an Outline Plan of Works (OPW) for the Project in accordance with section 176A of the RMA, unless the District Council has waived the requirement for an OPW under section 176A(2)(c) of the RMA.
2. The District Council shall be notified in writing of the intention to commence construction work at least two months prior to the start of any construction activities on site.
3. Prior to commencement of works the Requiring Authority or their agent shall arrange and conduct a pre-construction site meeting between the District Council and all relevant parties, including the primary contractor. At a minimum, the following shall be covered at the meeting:
  - a) Scheduling and staging of the works
  - b) Responsibilities of all relevant parties
  - c) Contact details for all relevant parties
  - d) Expectations regarding communication between all relevant parties
  - e) Procedures for implementing any amendments to the management plans submitted
  - f) Site inspection
  - g) Confirmation that all relevant parties have copies of the contents of this consent document and all associated erosion and sediment control plans and methodology.
4. All operational personnel involved with the construction of the Project shall be made aware of, and have access to, all designation documents, conditions and schedules applicable to the construction of the Project.

### COMPLAINTS

5. The Requiring Authority upon receipt of any complaint in relation to construction shall promptly investigate the complaint, where appropriate remedy or mitigate the cause of the complaint and inform Bay of Plenty Regional Council as soon as practicable, but no later than 48 hours of receiving the complaint, of the details of the complaint and the action taken.
6. The Requiring Authority shall maintain and keep a complaint register for all aspects of operations in relation to construction activities. The register shall record the date, time and type of complaint, cause of the complaint, the action taken by the Requiring Authority in

response to the complaint and steps to prevent a reoccurrence. The register shall be available to the District Council at all times.

### **CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN**

7. At least one month prior to the commencement of construction activities the Requiring Authority shall submit to the District Council the Construction Environmental Management Plan (CEMP) outlining the construction activities and all practices and procedures to be adopted in the construction of the Project.
8. The objectives of the Construction Environmental Management Plan (CEMP) shall be:
  - a) To ensure that construction activities achieve compliance with conditions for these activities.
  - b) To minimise the environmental nuisance effects of construction activities.
  - c) To ensure that disturbance is limited to that necessary to undertake the construction works.
  - d) To minimise the release of sediment during disturbance to the bed of any waterway.
  - e) How the disturbance of the beds and margins of the coastal marine area and waterways will be limited to the extent necessary to undertake construction works, and avoid or mitigate adverse effects on the quality and passage of coastal and surface water and aquatic habitat.
  - f) To ensure that disturbance does not cause flooding or erosion.
9. The CEMP will address, as a minimum, the following aspects of the works:
  - a) Timing of construction works
  - b) Working hours
  - c) Restrictions on public access
10. The following Supplementary Management Plans shall form subsets of the main CEMP:
  - a) Erosion, Sediment & Dust Control Plan
  - b) Construction Traffic Management Plan
  - c) Commissioning Plan
11. In the event of any conflict between resource consent conditions and CEMP practices and procedures, the resource consent conditions shall be complied with.
12. The CEMP may be amended at any time provided that any amendments made maintain or enhance the degree and / or extent to which adverse environmental effects attributable to the construction, maintenance or operation of the Project are avoided or mitigated; and those amendments do not result in non-compliance with any resource consent condition.

**Note:** For clarity, the plans in conditions 10(a) and (c) relate to matters within the functions of Bay of Plenty Regional Council and not those of Western Bay of Plenty District Council.

### **COMPLIANCE WITH CEMP**

13. The Requiring Authority shall implement and comply with the CEMP and the Supplementary Management Plans set out in Conditions 7 to 12 inclusive.

### **TRAFFIC MANAGEMENT**

14. The Requiring Authority shall submit a Construction Traffic Management Plan (CTMP) to the Road Asset Manager for certification at least 15 Working Days prior to commencement of the

works. The purpose of the CTMP is to outline the proposed procedures, requirements and standards necessary for managing the traffic effects of the works to achieve the outcomes and standards contained in Conditions 15 to 19 inclusive.

15. Construction shall not commence until the Requiring Authority has received the Road Asset Manager's written certification of the CTMP.
16. In managing traffic during the works, the Requiring Authority shall achieve the following outcomes
  - a) Minimise the disruption to users of local travel routes; and
  - b) Maintain a safe passage for all travel routes, including road, river and footpath users affected by the Work.
17. The CTMP shall be consistent with the version of the New Zealand Transport Agency Code of Practice for Temporary Traffic Management (COPTTM) which applies at the time the CTMP is prepared. Where it is not possible to adhere to this standard, the COPTTM's prescribed Engineering Exception Decision (EED) process will be followed, which will include appropriate mitigation measures agreed with the Road Asset Manager.
18. The CTMP shall, as a minimum, address the following aspects of construction traffic:
  - a) Construction sequence and methodology for all traffic activity associated with the Project.
  - b) Hours of operation, including times and days when traffic-generating activities would occur.
  - c) Description of the types of vehicles that will be used on public roads.
  - d) Details and locations of where works will occur within the road reserve and the method of traffic management control to be used.
  - e) Management strategies where full compliance with safety standards may not be achieved, including active control of traffic at locations where full safe stopping distances cannot be achieved for the temporary traffic volumes expected.
  - f) Description of routes for haulage of materials on public roads, and measures for ensuring the road network is maintained in a satisfactory condition.
  - g) How provision will be made for access to affected properties during construction.
  - h) Temporary work-site access arrangements.
  - i) Procedures for liaison between the community, the Requiring Authority, the contractor and the relevant road controlling authorities about traffic related matters.
  - j) Monitoring of road closures and deviations to ensure that excessive disruption or traffic hazards are not created.
  - k) Monitoring of hazardous traffic conditions arising from dust on public roads.
  - l) On-going monitoring of traffic conditions to ensure road safety is maintained.
19. The Requiring Authority shall take the best practicable option to avoid the deposit of debris onto public roads during the construction period. Any facilities required to achieve this outcome shall be installed prior to works commencing.

## **CONSTRUCTION NOISE**

20. The Requiring Authority shall ensure that all works shall be designed and carried out to ensure that the noise from the work complies with the New Zealand Construction Standard NZS6803:1999 "Acoustics - Construction Noise" at all times at 1 metre from the most exposed façade of any existing occupied dwelling.

## **EROSION, SEDIMENT AND DUST CONTROL**

21. The works shall not cause noxious, offensive or objectionable levels of dust beyond the designation boundaries.
22. An Erosion, Sediment and Dust Control Management Plan (ESDCP) will be prepared as part of the CEMP in accordance with Bay of Plenty Regional Council Guideline No. 2010/01 - "Erosion and Sediment Control for Land Disturbing Activities" and shall give effect to :
  - a) Best practicable methods for controlling dust emissions during construction;
  - b) Procedures for monitoring the effectiveness of the controls;
  - c) A complaints procedure; and
  - d) Inspection and auditing procedures and contingency plans for if controls fail.

## **ACCIDENTAL DISCOVERY PROTOCOL**

23. In the event of any archaeological site or koiwi being uncovered during the exercise of this consent, activities in the vicinity of the discovery shall cease. The Requiring Authority shall:
  - a) notify the District Council
  - b) consult with the relevant iwi and where appropriate ensure procedures are undertaken in accordance with:
    - (i) Ngati Rangiwewehi koiwi and accidental discovery protocol
    - (ii) Waitaha Raupatu Trust, Ngati Makino Heritage Trust, Komiti o Ngati Pikao (Ki Maketu), Ngati Tunohopu Accidental Discovery Protocols
    - (iii) Te Taonga Tuturu Act - immediate notification of Tapuika representatives in the event that a site or objects of significance is discovered during works.

## **WETLAND PLAN**

24. A Wetland Plan shall be prepared and submitted to the District Council at least two months prior to the first planting season.
25. The objective of the Wetland Plan shall be to demonstrate how works will be undertaken such that the land available results in a state where there is a sustainable cover of indigenous plants that is as close to the original natural species diversity that can be achieved taking into consideration the substantial and irreversible human-induced changes that have occurred to the landscape surrounding the estuary
26. The Wetland Plan shall provide details of how the above objective is to be achieved, including:
  - a) A map showing the locations of the proposed work;
  - b) Identification of the personnel or organisations that would carry out the work;
  - c) The timescale of activities;
  - d) Initial monitoring of site growing conditions (especially soil salinity, soil saturation, tidal induced sediment erosion and deposition) after re-diversion;
  - e) Creation of a planting zone plan based on site growing conditions and species tolerances;
  - f) Trial planting of plant species especially in areas where growing conditions are likely to be challenging (e.g. areas exposed to open tidal water and those with higher salinity);
  - g) Details of mass planting once species can be matched to site conditions with high confidence of success;

- h) Restoration planting plan produced that details the planting zones, species mixes, plant grades, site preparation and post-planting maintenance requirements;
  - i) Monitoring plan to objectively measure plant and species performance; and
  - j) Weed and pest control for each area and
27. The Requiring Authority may amend the Plan from time to time provided that the amendments have been made to improve wetland creation works or to reduce adverse environmental effects. Any updates to the Plan will be submitted to the District Council in advance of the relevant works commencing.
28. The Requiring Authority shall undertake all wetland works and weed and pest control in accordance with the Wetland Plan.

**Advice Note:** The Requiring Authority will be seeking an archaeological authority from Heritage New Zealand under section 12 of the Historic Places Act 1993, prior to the commencement of construction. The authority may include requirements for detailed investigations and monitoring effects and are also likely to require the preparation of a Heritage Management Plan (or an Archaeological Management Plan).

A lapse period of 10 years is sought.

# Resource Consents - Draft Conditions

**Note:** the draft conditions are subject to further refinement.

## Definitions

“District Council” means the Western Bay District Council’s Chief Executive Officer or nominee

“Consent Holder” means the Bay of Plenty Regional Council’s Natural Resource Operations Group or nominee

“Regional Council” means the Bay of Plenty Regional Council’s Chief Executive Officer or nominee

“RMA” means Resource Management Act 1991

“Project” means the Kaituna River Re-Diversion and Ongatoro/Maketu Estuary Enhancement Project and associated activities

“Works” means the construction works required to give effect to the Project

## SCHEDULE 1: GENERAL CONDITIONS - ALL CONSENTS

### PRE-CONSTRUCTION

1. The Regional Council shall be notified in writing of the intention to commence construction work at least two months prior to the start of any construction activities on site.
2. Prior to commencement of works the Consent Holder or their agent shall arrange and conduct a pre-construction site meeting between the Regional Council and all relevant parties, including the primary contractor. At a minimum, the following shall be covered at the meeting:
  - a) Scheduling and staging of the works
  - b) Responsibilities of all relevant parties
  - c) Contact details for all relevant parties
  - d) Expectations regarding communication between all relevant parties
  - e) Procedures for implementing any amendments to the management plans submitted
  - f) Site inspection
  - g) Confirmation that all relevant parties have copies of the contents of this consent document and all associated erosion and sediment control plans and methodology.
3. All operational personnel involved with the construction of the Project shall be made aware of, and have access to, all consent documents, conditions and schedules applicable to the construction of the Project.

### COMPLAINTS

4. The Consent Holder upon receipt of any complaint in relation to construction shall promptly investigate the complaint, where appropriate remedy or mitigate the cause of the complaint and inform the Regional Council as soon as practicable, but no later than 48 hours of receiving the complaint, of the details of the complaint and the action taken.
5. The Consent Holder shall maintain and keep a complaint register for all aspects of operations in relation to construction activities. The register shall record the date, time and type of complaint, cause of the complaint, the action taken by the Consent Holder in response to the



complaint and steps to prevent a reoccurrence. The register shall be available to the Regional Council at all times.

#### **ACCIDENTAL DISCOVERY PROTOCOL**

6. In the event of any archaeological site or koiwi being uncovered during the exercise of this consent, activities in the vicinity of the discovery shall cease. The Requiring Authority shall:
  - a) notify the Bay of Plenty Regional Council
  - b) consult with the relevant iwi and where appropriate ensure procedures are undertaken in accordance with:
    - i) Ngati Rangiwewehi koiwi and accidental discovery protocol
    - ii) Waitaha Raupatu Trust, Ngati Makino Heritage Trust, Komiti o Ngati Pikao (Ki Maketu), Ngati Tunohopu Accidental Discovery Protocols
    - iii) Te Taonga Tuturu Act - immediate notification of Tapuika representatives in the event that a site or objects of significance is discovered during works.

#### **REVIEW**

7. The Bay of Plenty Regional Council may, once in any year, on the five last working days of [specify month], serve notice of its intention to review the conditions of these consents under section 128 of the Resource Management Act 1991 for the purpose of:
  - a) Dealing with any adverse effect on the environment which may arise from the exercise of the consents and which it is appropriate to deal with at a later stage; or
  - b) Requiring the adoption of the best practicable option to remove or reduce any adverse effect on the environment; or
  - c) Requiring the Consent Holder to carry out monitoring in addition to or instead of that required by the consents

#### **HAZARDOUS SUBSTANCES/SPILL CONTINGENCY**

8. No maintenance of vehicles or temporary fuel storage shall take place in or within 20 metres of open excavations, exposed groundwater or any waterway.
9. The Consent Holder shall maintain on site at all times measures to prevent spills of hazardous substances entering land or water. These measures shall include but not be limited to:
  - a) The equipment, systems and procedures to be used to minimise the risk of spills or leaks of hazardous substances
  - b) The spill management and containment equipment to be maintained at all times on site, and its location
  - c) Procedures for containing, managing, cleaning and disposing of any spill or leak, or contaminated material to be removed from the site as a result of a spill or leak
  - d) Procedures to notify and report to the Consent Holder and the Bay of Plenty Regional Council within 24 hours of a spill or leak occurring, including a maintained schedule of emergency contact names and numbers
  - e) An inspection schedule for all storage containers, refuelling areas, and plant
  - f) Procedures to be followed to identify causes of spills or leaks
10. In the event of a spill of hazardous substances on the site, the Consent Holder shall record and provide to the Bay of Plenty Regional Council within 24 hours of the spill:
  - a) The date, time and volume of the spill
  - b) The substance spilt

- c) Measures taken to contain and absorb the spilt substance
- d) The cause of the spill, and the measures taken since to prevent a repeat of the incident

## **MANAGEMENT PLANS**

### **Construction Environmental Management Plan**

11. At least one month prior to the commencement of construction activities the Consent Holder shall submit to the Regional Council the Construction Environmental Management Plan (CEMP) outlining the construction activities and all practices and procedures to be adopted in the construction of the Project.
12. The objectives of the Construction Environmental Management Plan (CEMP) shall be:
  - e) To ensure that construction activities achieve compliance with conditions for these activities.
  - f) To minimise the environmental nuisance effects of construction activities.
  - g) To ensure that disturbance is limited to that necessary to undertake the construction works.
  - h) To minimise the release of sediment during disturbance to the bed of any waterway.
  - i) How the disturbance of the beds and margins of the coastal marine area and waterways will be limited to the extent necessary to undertake construction works, and avoid or mitigate adverse effects on the quality and passage of coastal and surface water and aquatic habitat.
  - j) To ensure that disturbance does not cause flooding or erosion.
13. The CEMP will address, as a minimum, the following aspects of the works:
  - k) Timing of construction works
  - l) Working hours
  - m) Restrictions on public access
14. The following supplementary management plans shall form subsets of the main CEMP:
  - a) Erosion, Sediment & Dust Control Plan
  - b) Construction Traffic Management Plan
  - c) Commissioning Plan
15. In the event of any conflict between resource consent conditions and CEMP practices and procedures, the resource consent conditions shall be complied with.
16. The CEMP may be amended at any time provided that any amendments made maintain or enhance the degree and / or extent to which adverse environmental effects attributable to the construction, maintenance or operation of the Project are avoided or mitigated; and those amendments do not result in non-compliance with any resource consent Condition.

**Note:** For clarity, the plan in condition 14(b) relate to matters within the functions of Western Bay of Plenty District Council and not those of Bay of Plenty Regional Council.

### **Erosion, Sediment and Dust Control Plan**

17. The objectives of the Earthworks, Sediment and Dust Control Plan shall be:
  - a) To ensure construction activities achieve compliance with the conditions of consent for these activities.
  - b) To ensure that the effects of erosion on water quality are minimised

- c) To ensure consistency with Bay of Plenty Regional Council Guideline No. 2010/01 - "Erosion and Sediment Control for Land Disturbing Activities"
18. The Erosion, Sediment & Dust Control Plan (ESDCP) shall be prepared in general accordance with Bay of Plenty Regional Council Guideline No. 2010/01 - "Erosion and Sediment Control for Land Disturbing Activities" and shall clearly define the sediment and erosion control measures and dust control measures to be implemented for each stage of the works authorised by this consent. The Plan shall include, but not be limited to:
- a) A locality map detailing as a minimum the location of roads, property boundaries, surface waterways and crossings, the direction of stormwater flows, and the erosion, sediment and dust control devices
  - b) A site description, including land type, climate, topography, vegetation soils, and water bodies
  - c) A detailed programme of works identifying:
    - i) each stage of construction
    - ii) an estimate of the maximum area of bare ground (cumulative total) exposed at each stage of construction
    - iii) an estimate of the total length of exposed roads, trenches and tracks
    - iv) the volume of earthworks proposed.
  - d) Contour information at suitable intervals to show the contour of the land within and around the motorway alignment;
  - e) Detailed drawings and specifications of all designated erosion and sediment control measures selected from the Erosion and Sediment Control Guidelines, including contingency measures, on-site catchment boundaries, measures to be taken at the temporary construction management areas and off-site sources of runoff with supporting calculations, including all key design parameters. The measures may consist of but not be limited to the following:
    - i) clean water diversion channels
    - ii) decanting earth bunds or sediment ponds
    - iii) on-site silt trapping devices, such as hay bales, silt fences, filter cloth barriers and rock filters
    - iv) soakage pits, infiltration basins and / or swales
    - v) design information as is necessary to demonstrate that run-on water is controlled, "clean" and "dirty" water is separated where possible, land surface is protected from erosion, and sediment is managed.
  - f) A description of the mitigation and rehabilitation measures proposed.
  - g) A programme for managing exposed areas including progressive stabilisation and minimising exposed areas by:
    - i) ensuring that any earthworks and/or vegetation clearance should where practicable, be limited to the footprint of the works
    - ii) staging of the construction
    - iii) providing best practice measures, vegetative or structural, to protect exposed soil from erosion.
  - h) Measures to ensure that the tracking of mud or earth onto the existing road network is reduced to the practicable minimum;
  - i) A schedule outlining the frequency and methods of inspection, monitoring and maintenance of all erosion, sediment control and dust control measures as may be

necessary to achieve compliance with the conditions of any consents subject to this Schedule.

- j) Details of any proposed monitoring to demonstrate the effectiveness of the proposed measures.
  - k) Include emergency procedures that set out measures that will be implemented if there is a significant sediment discharge to surface water.
19. The Consent Holder shall carry out inspections, at a minimum frequency of weekly, of all working areas of the site in order to ensure they are well maintained and that erosion and sediment control devices remain effective.

#### **Commissioning Plan**

20. The Consent Holder shall submit to the Bay of Plenty Regional Council, Attention: XX a detailed commissioning plan at least one month prior to commissioning of the diversion culverts. The Commissioning plan shall as a minimum address discharge quality and procedures for the management of any floods.

#### **Compliance with CEMP**

21. The Consent Holder shall implement and comply with the CEMP and the Supplementary Management Plans set out in conditions 11 to 20 inclusive.

#### **OPERATION AND MAINTENANCE MANUAL**

22. The consent shall be exercised in accordance with an Operation and Maintenance Manual prepared by the Consent Holder. The purpose of the Manual is to detail those procedures to be adopted by the Consent Holder, or parties under its control with respect to the Project, to ensure compliance with consent conditions of these resource consents relating to the flow regime.
23. The objectives of the Operational and Maintenance Manual shall be:
- a) To ensure that procedures are in place to operate the diversion in accordance with consent conditions in relation to flow regime and discharges.
  - b) To specify how erosion control works will be maintained.
  - c) To specify how the culverts are to be controlled to provide security from flood events of up to the 1% AEP event where the Project changes the flood risk from acceptable to unacceptable (i.e. overtopping of Maketu Road), and provide satisfactory drainage for the Kaituna Basin.
24. The Operation and Maintenance Manual shall address the following matters:
- a) The flow regime operating rules for the diversion including identification of the triggers and responses to manage flood events in accordance with the conditions of this consent
  - b) Operational procedures for the culvert gates.
  - c) Procedures for the maintenance and removal of debris at the culverts.
  - d) Procedures for inspecting and maintaining erosion protection works.
25. The Manual shall be provided to the Bay of Plenty Regional Council, Attention: XX at least one month prior to the commissioning of the diversion culverts. The Manual shall be prepared by a suitably qualified person and shall detail as how the effects of the flow regime and diversion are minimised and managed.

26. The Consent Holder shall implement and comply with the Operation and Maintenance Manual set out in conditions 22 to 26 inclusive.

#### **DRAINAGE REPORT**

27. The Consent Holder shall prepare a Drainage Report to further investigate and quantify the effects of the re-diversion on the operation of the Kaituna Catchment Control Scheme, and the supply of water to the Lower Kaituna Wildlife Management Reserve. The Report shall be prepared by a suitably qualified person, and shall include details of the following mitigation measures:
  - a) Financial contribution to provide compensation for the increased running costs at the Ford Road, Singleton's, and Dean's pump station as a result of the re-diversion, payable to the Kaituna Catchment Control Scheme.
  - b) Financial contribution to the planned upgrade of the culverts draining into the Kaituna River from the Ford Road drain, payable to the Kaituna Catchment Control Scheme.
  - c) Financial contribution to the design and construction of additional culverts draining into the estuary between Ford's Cut and Singleton's pump station, payable to the Kaituna Catchment Control Scheme.
  - d) Design and construction of a new culvert to provide an additional water supply intake to the Lower Kaituna Wildlife Management Reserve.
28. The amount of the financial contributions required under Condition 27(a), 27(b), and 27(c) above shall be determined in consultation with the manager of the Kaituna Catchment Control Scheme and the Natural Hazards Group of the Bay of Plenty Regional Council.
29. The design and construction of the new culvert for the Lower Kaituna Wildlife Management Reserve required under Condition 27(d) above shall be developed in consultation with the Regional Council, Fish and Game, the Department of Conservation, and Te Maru o Kaituna River Authority.
30. The Drainage Report required by Condition 27, together with evidence of consultation required by Conditions 28 and 18, shall be provided to the Regional Council at least one month prior to the commissioning of the re-diversion culverts.
31. The new culvert for the Lower Kaituna Wildlife Management Reserve shall be constructed and commissioned, in accordance with the design and construction methodology under Condition 27(d), at least one month prior to the commissioning of the re-diversion culverts.

#### **WETLAND PLAN**

32. A Wetland Plan shall be prepared and submitted to Consents Manager at least two months prior to the first planting season.
33. The objective of the Wetland Plan shall be to demonstrate how works will be undertaken such that the land available results in a state where there is a sustainable cover of indigenous plants that is as close to the original natural species diversity that can be achieved taking into consideration the substantial and irreversible human-induced changes that have occurred to the landscape surrounding the estuary
34. The Wetland Plan shall provide details of how the above objective is to be achieved, including:
  - a) A map showing the locations of the proposed work;
  - b) Identification of the personnel or organisations that would carry out the work;
  - c) The timescale of activities;

- d) Initial monitoring of site growing conditions (especially soil salinity, soil saturation, tidal induced sediment erosion and deposition) after re-diversion;
  - e) Creation of a planting zone plan based on site growing conditions and species tolerances;
  - f) trial planting of plant species especially in areas where growing conditions are likely to be challenging (e.g. areas exposed to open tidal water and those with higher salinity);
  - g) details of mass planting once species can be matched to site conditions with high confidence of success;
  - h) restoration planting plan produced that details the planting zones, species mixes, plant grades, site preparation and post-planting maintenance requirements;
  - i) Monitoring plan to objectively measure plant and species performance; and
  - j) Weed and pest control for each area.
35. The Consent Holder may amend the Plan from time to time provided that the amendments have been made to improve wetland creation works or to reduce adverse environmental effects. The Consent Holder shall provide a copy of the amended Plan to XX prior to its implementation
36. The Consent Holder shall undertake all wetland works and weed and pest control in accordance with the Wetland Creation Strategy and Plan.

## **MONITORING AND SAMPLING PROGRAMMES AND REPORTING OF RESULTS**

### **Monitoring Programme**

37. The Consent Holder shall prepare an Environmental Monitoring Programme that details the monitoring required under Resource Consents XX and XX. The Programme shall be submitted to the Regional Council [specify timeframe] and:
- a) Be carried out by suitably experienced and qualified specialists.
  - b) Be designed and carried out using scientifically accepted methods which shall aim to obtain results with a high level of confidence.
  - c) Be designed so as to be capable of testing and verifying the performance measures listed in these consent conditions.
  - d) Be consistent with all conditions of these consents and the Consent Holder shall undertake all sampling, monitoring and reporting in accordance with the Programme.
  - e) Include a description of the method(s) and frequency to be used for monitoring, including that undertaken for internal/management purposes.
  - f) Include a map and if appropriate photos of all sampling sites.
  - g) Specify the name of any laboratory and method of analysis of all samples collected.
  - h) Detail the operation and maintenance of any automatic sampling or monitoring equipment.

### **Reporting**

38. For each of the [annual/etc.] surveys, the Consent Holder shall by 1 August provide a written monitoring report outlining the results of that survey, and an interpretation of those results, to the Consents Manager of the Bay of Plenty Regional Council. This report shall cover the period to the end of the April preceding the July reporting date.
39. The report referred to in Condition X shall also include an assessment of the effectiveness of the adaptive management regime for the staged re-diversion and operation of the culverts

undertaken in accordance with Resource Consent [section 14 water permit to divert]  
Condition X.

40. The monitoring parameters, site locations and frequency of sampling outlined in the Environmental Monitoring Programme and any other alterations may be reviewed as part of the each monitoring report.

**Advice Note:** For clarification, the CEMP prepared in relation to the Bay of Plenty Regional Council resource consents will be the same CEMP as that prepared in relation to the designation submitted to Western Bay of Plenty District Council.

## Consent 1: Land Use Consent (s9 RMA)

- *Earthworks to create the proposed channel, widening of Ford's Cut, realignment of the stopbank, removal of existing stopbanks, works to create wetland areas, realignment of Ford Road, filling of land, vegetation clearance as part of earthworks, enhancement of wetlands and vegetation clearance associated with construction of the proposed diversion channel*

**Duration:** 35 years

**Lapse Period:** 10 years

### GENERAL

1. This consent shall be exercised in accordance with the conditions specified in Schedule 1: General Conditions - All Consents.

### DESCRIPTION

2. The works shall be limited to the following:
  - a) Channel construction
  - b) Stopbank realignment
  - c) Realignment of Ford Road and car parking facilities
  - d) Widening of Ford's cut
  - e) Filling of land
  - f) Wetland creation works
  - g) Vegetation clearance

As shown on the Construction Plans (Drawing No. 2-1542-115-6235, Sheets 1 to 20) which form part of this consent.

3. There shall be no storage of fuel or lubricants, refuelling, or lubrication of vehicles or machinery within 20 metres of the Kaituna River, Ford's Cut or Maketu Estuary.
4. Along the alignment of the proposed channel full flood protection shall be maintained by the existing stopbank except for when the tie-ins are made at each end. The period under which the tie-ins shall be agreed with the Bay of Plenty Regional Council Natural Hazards Group prior to the works being undertaken.



## Consent 2: Coastal Permit (s12 RMA)

- *Erection and placement of structures; works associated constructing structures - deposition on and disturbance of the foreshore or seabed for that purpose; removal, damage, modification or destruction of indigenous vegetation; removal of causeways; channel invert works; any disturbance of, deposition on, dredging of, or removal of sand, shingle and shell from the foreshore or seabed*
- *To take, divert and dam coastal water*
- *To occupy the coastal marine area with structures*

**Duration:** 35 years

**Lapse Period:** 10 years

### GENERAL

1. This consent shall be exercised in accordance with the conditions specified in Schedule 1: General Conditions - All Consents.

### DESCRIPTION

2. The construction of structures shall be limited to the following:

- a) 21 box culverts and associated concrete aprons
- b) rip-rap lining of channel edges
- c) public boat ramp and temporary mooring jetty
- d) two wooden jetties and gangways
- e) wooden pole breakwater
- f) salinity block rock protection and southern toe rock and ramp
- g) footbridge

As shown on the Construction Plans (Drawing No. 2-1542-115-6235, Sheets 1 to 20) which form part of this consent.

3. The taking, diverting and damming of coastal water shall be limited to the following:

- a) to divert water to enable construction
- b) to take water in order to dewater during installation of the culverts
- c) the damming of coastal water or open coastal water for construction purposes (sheet piles)
- d) Dredging of channel to provide adequate depth for the 2 moorings

4. The occupation of space by structures shall be limited to the following:

- a) 21 box culverts and associated concrete aprons
- b) rip-rap lining of channel edges
- c) public boat ramp and temporary mooring jetty
- d) two wooden jetties and gangways
- e) wooden pole breakwater
- f) salinity block rock and southern toe rock and ramp
- g) footbridge

5. Any scour or erosion of the Coastal Marine Area at the entrance or exit points of the culverts, shall be effectively stabilised, to the satisfaction of the Chief Executive of the Regional Council or delegate

## **Consent 3: Coastal Permit (s12 RMA)**

- *Reclamation of foreshore and seabed in the coastal marine area*

**Duration:** No term required

**Lapse Period:** 10 years

### **GENERAL**

1. This consent shall be exercised in accordance with the conditions specified in Schedule 1: General Conditions - All Consents.

### **DESCRIPTION**

2. The reclamation of foreshore and seabed in the coastal marine area shall be limited to the following:

- a) placement of fill to form the salinity block between Ford Road and Ford Island

As shown on the Construction Plans (Drawing No. 2-1542-115-6235, Sheets 1 to 20) which form part of this consent.

## Consent 4: Land Use Consent (s13 RMA)

- *Rock protection works along proposed channel and disturbance associated with constructing the opening of the channel where it is in the bed of the river*
- *Installation of a culvert at the Lower Kaituna Wildlife Management Reserve*

**Duration:** 35 years

**Lapse Period:** 10 years

### GENERAL

1. This consent shall be exercised in accordance with the conditions specified in Schedule 1: General Conditions - All Consents.

### DESCRIPTION

2. The construction of structures shall be limited to the following:
  - a) Rock protection works along the proposed channel;
  - b) A culvert at Lower Kaituna Wildlife Management Reserve

As shown on the Construction Plans (Drawing No. 2-1542-115-6235, Sheets 1 to 20) which form part of this consent.

3. The channel inlet construction shall not occur during whitebait fishing season (15 August - 30 November).
4. The Consent Holder shall use natural rock and soil material, where practicable. All fill material shall be placed and compacted so as to minimise any erosion and/or instability.

## Consent 5: Water Permit (s14 RMA)

- To divert water from the Kaituna River down the new diversion channel (the point of diversion is above the CMA boundary)

**Duration:** 35 years

**Lapse Period:** 10 years

### GENERAL

1. The culverts shall be commissioned in accordance with the Commissioning Plan and staged re-diversion trigger of:
  - a) Stage 1: Increase the re-diverted flow from 150,000 to ~400,000 m<sup>3</sup> per mean tidal cycle
  - b) Stage 2: Increase the re-diverted flow to ~600,000 m<sup>3</sup> after a period of one year, subject to monitoring the effects of stage 1
2. The culverts shall be operated in a manner that does not change the existing flood risk at Maketu township
3. Provision shall be made to ensure that the passage of fish through the structure is unimpeded at all times that the gates are open.
4. The top level of the diversion control structure shall not be less than 2.20m (Moturiki Datum).

### MONITORING

5. The following monitoring shall be undertaken:

Attribute	What and where	Frequency
Management	Operation and Maintenance Manual that includes: <ul style="list-style-type: none"> <li>- Staging of re-diversion flow</li> <li>- The flow regime operating rules for the diversion including identification of the triggers and responses to manage flood events in accordance with the conditions of this consent</li> <li>- Operational procedures for the culvert gates.</li> <li>- Procedures for the maintenance and removal of debris at the culverts.</li> <li>- Procedures for inspecting and maintaining erosion protection works.</li> </ul>	-
Water level/flows	<ul style="list-style-type: none"> <li>- Installation of a telemetered water level recording device in the estuary near Maketu township.</li> <li>- Continued operation and monitoring of the existing water level recording devices in the Kaituna River at Te Matai and at the Ford Road pump station.</li> </ul>	Single investigation within 18 months of commissioning. Assessment of flow to occur when river is at about mean flow and include at least once on mean tide and spring tide.

	<ul style="list-style-type: none"> <li>- Receipt of the continuous record of sea level from the NIWA gauge at Tauranga (Moturiki).</li> <li>- Installation of devices on the new culverts that allow practical and reliable reduction of flow into the estuary.</li> </ul>	
Erosion	<ul style="list-style-type: none"> <li>- Papahikahawai Island - Establishment of permanent markers (including coastal profiles from RL 2m down to MHWS, plus RTK GPS shoreline survey) from which to measure any erosion or accretion of the island. Minimum of four sites to the west and south of the island - each extending at least 50 m offshore to pick up changes in near shore depths over time.</li> </ul>	<p>Permanent transects to be measured annually up to diversion and then twice a year for first three years. Thereafter, monitoring frequency to be assessed by review but continued for at least 10 years after completion of diversion.</p>
	<ul style="list-style-type: none"> <li>- Maketu Spit - RTK GPS shoreline survey and several coastal profiles from RL 2m down to MHWS</li> </ul>	<p>1 month before diversion and thereafter annually for 5 years, then as required.</p>
	<ul style="list-style-type: none"> <li>- Maketu township and Beach Road shoreline - RTK GPS survey (dune toe or seaward edge vegetation) where relevant and cross-sections (minimum of 6 sites in total - 2 along Beach Road and 4 distributed around township from Park Road foreshore to marae; each section extending to at least 50 m offshore)</li> </ul>	<p>1 month before diversion and thereafter annually for 5 years, then as required.</p>
	<ul style="list-style-type: none"> <li>- Aerial photo analysis</li> </ul>	<p>As collected by BOPRC</p>
Water Quality	<ul style="list-style-type: none"> <li>- Salinity, nutrient and bacterial monitoring at three sites (Ford's cut, mid estuary, Maketu boat ramp)</li> </ul>	<p>3x year in summer at high and low tide</p>
Shellfish	<ul style="list-style-type: none"> <li>- Bacteria testing of shellfish at 3 sites (lower-mid estuary)</li> </ul>	<p>3x year in summer (same day as water sampling)</p>
	<ul style="list-style-type: none"> <li>- Density and size assessment at three sites in the mid estuary area</li> </ul>	<p>Annual for the first five years</p>
Ecology (fauna)	<ul style="list-style-type: none"> <li>- Algae distribution and species</li> </ul>	<p>Algae - broad scale mapping twice a year for the first five years then review further need.</p>
	<ul style="list-style-type: none"> <li>- Distribution of benthic macrofauna across estuary</li> </ul>	<p>Once within first five years.</p>
Ecology (flora)	<ul style="list-style-type: none"> <li>- Wetland west of Ford Island - fixed permanent plots to assess species composition. The focus will be on the wetland margin where changes in salinity are expected to occur. Note that a permanent transect (Opus transect 7) has already been established to provide a pre-diversion baseline.</li> </ul>	<p>Annually for first five years</p>

	- Papahikahawai channel. Permanent transect monitoring to assess change as a result of water level fluctuations (Transect 2 and 3)	5 yearly
	- Photopoint monitoring of salt marsh remnants and the small Sarcocornia patch in Papahikahawai Creek	Annual for X years following re-diversion
Wetland Creation	- Paired, marked plots of vegetation on land north of Ford's Cut to assess the success of restoration planting	In years 2, 5 and 10 after initial planting
Sediment	- Sediment particle size distribution in top 2cm. - Locate sites at Papahikahawai Creek and several sites near end of Ford's cut. To include TP, TN, TOC, algae cover and anoxic depth (plus any changes in extent of anoxia). - Where appropriate this should be integrated with macrofauna sampling	Annual for first 5 years
Cultural	- Cultural monitor - via Te Maru o Kaituna (Kaituna River Authority), or direct back to iwi we have consulted with - Involvement of tangata whenua in restoration planning and implementation. Maximise opportunities to improve tangata whenua capability by offering training in monitoring techniques and procuring monitoring services locally where this is possible (i.e. within competence range, suitably independent and consistent with contract/procurement policies/law	Depends on location, scale of works, and level of interest and capacity from the iwi with mana whenua, but seek to maximise involvement and capacity
Reporting	Report in August each year monitoring results	Annual

## Consent 6: Discharge permit (s15 RMA)

- *The discharge of dewatering water, stormwater and water and contaminants to land, water and air from construction activities*

**Duration:** 35 years

**Lapse Period:** 10 years

### GENERAL

1. This consent shall be exercised in accordance with the conditions specified in Schedule 1: General Conditions - All Consents.

### MONITORING

2. Visual inspection shall be undertaken on a daily basis during the construction phase at the inlet of the proposed channel (when works are being undertaken in this area), the estuary end of Ford's Cut, and Papahikahawai Creek to assess whether there is any visible plume as a result of the work. If extending more than [x] metres then a photo will be taken and a water sample collected to measure settleable solids.