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From: Don Paterson [mailto:nat.opc@xtra.co.nz]
Sent: Thursday, 18 April 2013 4:26 p.m.
To: 'Pim de Monchy'
Subject: RE: Aerial Photos Te Puke to Maketu Flatlands in Flood

Hi Pim

I have listed some bullet points for our discussion as follows and I have also attached a less congested list to this email:

- River water the world over flows on river water and not on the bottom of the river. That is why we see plants, fish, insects and sediment remaining on river beds

- The top portion of a river flows on the bottom portion of a river because friction between water molecules is less than it is against surrounding obstacles

- River water does flow down-hill relative to its volumetric weight and relative to any obstruction to its flow, including its own downstream volume

- The erosive force of a river flow is due to its trajectory and to its velocity

- As river water falls and turns it gains energy which creates turbulence which lifts and carries sediment

- When a river bends there is erosive force subjected to the outside of the bend and sediment accumulates on the inside of a bend where flow is slower

- The lower Kaituna River flow rate is to a large degree determined by a salt water barrier that it must flow on top of for it to leave the constraints of the river stop-banks

- Kaituna River fresh water leaving the lower Kaituna River through the current Te Tumu exit does flow on top of itself and then on top of the salt water wedge that comes into the lower Kaituna River from the sea

- When the ocean is high due to high tide and also due to low pressure systems, then the level of the lower Kaituna River water rises because of a dam of salt water that is restricting Kaituna River fresh water from exiting on top of the saline sea water

- When the tide falls the blocking salt water is lowered by 2 meters and the lower Kaituna River water exits more quickly from the river and onto the sea

- The lower Kaituna River water level remains relatively constant because the Te Tumu bar height remains constant and that height is determined by high tide wave action depositing sand on the bar

- If the bar height was being reduced significantly on an outgoing tide then the lower Kaituna River would drop by two metres as a result and it does not do so

- The current Te Tumu mouth salt water wedge stops spawning Kaituna River galaxius from ever reaching Maketu Estuary as they spawn at the top of that wedge

- Stopping a salt water wedge from entering the lower Kaituna River at Te Tumu could ensure the successful reestablishment of maritime marsh galaxius spawning habitat in Maketu Estuary and could also ensure that Kaituna River catchment galaxius could find it, which could potentially start to rebuild local inshore coastal fisheries production

- Introduction of the entire low-tide Kaituna River flow into Maketu Estuary as had previously existed for most of recorded history, and via Papahikahawai Channel and in isolation from a Te Tumu exit that would then only exist for high tide flood relief, would ensure that spawning Kaituna River galaxius could reach Maketu Estuary maritime marsh spawning habitat to be recreated, and they could then start to recreate the Kaituna River catchment ecosystem that had previously existed

- This could see significant enhancement of Kaituna River catchment ecosystem production. Local inshore coastal and fresh water tuna fisheries food chains could be recreated and could utilize the existing significant carrying capacity of the Kaituna River catchment including the Rotorua Lakes

- Moving the southern Maketu Estuary stop-bank back to Kaituna Road and also removing the Papahikahawai Island stop-bank could allow most of the original extent of Maketu Estuary maritime marsh galaxius spawning habitat to be re-established, to allow for a maximum potential rebuild of local inshore coastal fisheries and fresh water tuna fisheries food chains. I speculate that tuna eat kokopu, bully, inanga and koaro when they can catch them and that many fish species eat returning elvers.

- High tide Kaituna River flow could exit at both Te Tumu and at Maketu Estuary mouth and this could then double the present high tide flow of lower Kaituna River fresh water onto the ocean's salt water wedge

- Maketu Estuary's carrying capacity could still further increase the flow rate of fresh water exiting the lower Kaituna River at high tide

- Maketu Estuary has a safer and more suitable entrance for boating than does Te Tumu

- Maketu Estuary could provide a sheltered harbour mooring area

- Maketu Estuary could be connected to the lower Kaituna River by a sheltered Papahikahawai deep water channel and so any boating developments planned for the lower Kaituna River could be advantaged

- Concentrated Kaituna River flow through Papahikahawai Channel could see depth maintained in that channel

- Low tide Kaituna River flow through Papahikahawai Channel could provide maximum scour potential in the lower Maketu Estuary

- The trajectory of water leaving Papahikahawai Channel, if Maketu Estuary Spit was breached at its narrowest point to the east of Papahikahawai Island and opposite Whakaue Marae where it is currently being eroded most by a Fords Twin Cuts flow that is in isolation from a protective Papahikahawai Channel flow, could then remove the enlarged toe of Maketu Estuary spit and could deepen and maintain the lower Maketu Estuary as a sheltered deep-water harbour anchorage without further cost

- A successful reestablishment of significant coastal fishery food chains at Maketu has the potential to demonstrate enormous revenue creation for New Zealand from similar works in other areas

- Leaving Te Tumu entrance open to Kaituna River low tide flow would stop this potential national gain from occurring

- Te Tumu mouth exit can still be used for high tide flood relief but it does not serve any purpose by leaving it open to low tide Kaituna River flow, and far worse than that it would continue to destroy local fisheries production potential until it is partially blocked as I have previously recommended and described in writing to Mary-Anne Macleod, Chief Executive, BOP Regional Council on1 October 2012.

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