Business Case – Mangawhai Wastewater Treatment Plant Balance Tank

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APPROVED BY		TITLE		DATE	

This business case is required to be reviewed & approved by the Portfolio Oversite Group (POG). Please submit to PMO@Kaipara.govt.nz

VERSION HISTORY				
VERSION	APPROVED BY	REVISION DATE	DESCRIPTION OF CHANGE	AUTHOR
Draft		17/09/2020	Initial Draft	Donnick Mugutso
Rev 1		21/09/20	Edits and detail added	Mark Bell
Rev 2		17/02/21	Budgets and Milestone Edits	Mark Bell & Donnick Mugutso

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Executive Summary

Write this last and keep it short! Briefly introduce the project and the reason for embarking on it. Summarize what is required to successfully execute the project. This should provide the reader with all the information they need to have a solid overview of the project and its requirements.

Growth occurring in Mangawhai means that the existing waste water treatment plant requires upgrades to account for this. A cost effective solution to this is to construct a concrete balance tank. The overall purpose of this balance tank is improve the overall efficiency of the plant by balancing out the brief periods of high inflow of wastewater and so that the existing plant can still function as designed. This balance tank will also be capable of being repurposed in future as a 3rd batch reactor tank.

This project is for the design and the construction of this balance tank and the associated civil works to achieve it's intended purpose. This business case is requesting $2,869,000 funding to complete the required design and construction works"

Project Overview

Problem/ Opportunity

What are the main problems we are trying to solve or opportunities we want to achieve?

The growth in Mangawhai and frequent storms has increased peak inflows to the Mangawhai Wastewater Treatment Plant. This has caused the current design limit of 70l/s to be exceeded and peak inflows of wastewater reaching 100l/s have been recorded in the past. These peak inflows exceed the wastewater plant's ability to batch process the waste water as designed, lowering the standard of effluent treatment and also resulting in overflows at key pump stations in the reticulated network.

This purpose of this project is to provide a buffering balance tank to the peak flows thereby reducing the likelihood of overflows and environmental non-compliance.

There is an opportunity to utilise the balance tank as a reactor tank in future for future plant upgrades, so the size and design of the tank will take this into account.

Background

Briefly describe any background context to the project. Offer an explanation here as to why this project is taking place (i.e. Compliance, Sustaining, Maintenance, Improvement, Growth (Compliance), Growth.)

The Mangawhai CWWTP was completed in 2010 to treat the wastewater from the community of Mangawhai and Mangawhai Heads. When the plant was first connected 1250 properties were connected to the system. Today that number is over 2000, with 3000 expected before 2030. The area is experiencing rapid growth, with a prediction of 3 x current population by 2043. This means that several wastewater assets, particularly to the North of the catchment, including Jack Boyd Drive PS, will require upgrade.
The impact of growth is currently being modelled by WSP to determine a plan of strategic asset upgrades and/or renewals. However, before this occurs the wastewater model will need to be calibrated and this exercise is not expected to be completed until August 2021.
In the meantime, any intervention on the network may not be future proofed and may need be re-considered in the following years (for example upsizing a pipe which 3 years later will require another upgrade).
*Studies conducted by WSP identified that the WWTP is limited to an incoming flow of **70 l/s** (from the downstream outfall pumpstation on Thelma Rd). The restriction is due to the current capacity of the Cyclic Activated Sludge System (CASS) of the WWTP. This limits what the network can discharge to the WWTP.*

Project Deliverables
Overall solution to the problem/ opportunity identified and the specific deliverables of the project as relates to this.
Your solution and deliverables should be specific to problem.

The overall solution is to build an 800m^3 balancing tank which can be converted to a reactor tank in future. The tank will provide a buffer to the peak flows and is sized and designed to act as reactor tank in future.

Benefits
The benefits should be a measurable improvement achieved by investment through this project. This could be items such as meeting safety compliance, meeting capacity requirements etc. They should link to the Problem/ Opportunity of the project and the deliverables. Ensure you have at least one main benefit

The benefits of this project are:

- Benefit 1: Buffer peak flows and increase the inflows from by 42%, from 70/s to 100l/s without waste water overflows occurring in the network.
- Benefit 2: Increase in the temporary storage capacity of the wastewater treatment plant by 33%.

Project Scope

In Scope
Briefly describe what deliverables will be considered within the scope of the project. What is required to be designed and built, changed or implemented, do not forget enabling activities such as stakeholder engagement or risk mitigation activities.

- Stakeholder engagement
- Detailed Design
- Preparation, lodgement and approval of Building Consent
- Contract preparation
- Procurement of the works
- Construction of the tank and associated works including
  - New 800m3 above ground concrete tank
  - Upgrade of Inlet works structure to enable 100 l/s incoming flow, and flow management to limit flow to treatment to 70 l/s,
  - cleaning mechanism and tank emptying system,
  - Upgrade of pumps at Outfall PS to the new duty.
  - Control systems to manage the flow management system including link to Outfall PS to control pumped flow rates when Balance tank is full.
- Construction supervision and Management, Surveillance and Quality Assurance
- Commissioning of the tank

Out of Scope
Briefly describe what will be considered Out of scope of the project

- Network modelling work
- Treatment plant process modelling work

Constraints and Assumptions

Detail key assumptions, such as expected funding, and constraints, such as the need for special equipment or technical resources.

The following assumptions have been made:

- **Modelling:** The Balance tank system will be designed for a maximum flow to the CWWTP of 100l/s, of which 30 l/s will pass to balance tank (the rest will flow directly through the WWTP). This will allow increase in pass forward flow at the Outfall Pump Station (OPS) and reduce the frequency of use of the emergency storage.
  However, no catchment modelling has been undertaken (currently underway) so the tank capacity is based on the size of a new CASS reactor. Should additional capacity be required, a further tank can be constructed later.
- **Geotechnical condition**: It is assumed that the geotechnical condition of the area of the CWWTP is suitable for construction. A preliminary review of historic information indicated that no additional measures are expected. For detailed design, as part of the construction is out of the current operational boundary geotechnical tests will be undertaken to confirm the conditions and design amended as required.
- **Inlet screen** the upgrade to the inlet works requires disconnection and relocation of the inlet screen and pipework. It is a constraint that the flow to the CWWTP can be shut off for up to 6 hours and the emergency storage capacity at the OPS can be utilised. – This is weather dependent.

- **Archaeological:** It is assumed from historical information that the area for construction has no archaeological or ecological constraints.
- **Contaminated land** It is assumed from historical information that the area for construction is not contaminated

A concept design of the balance tank has been undertaken. Key project risks are identified on Section 7 and full risk list outlined in Appendix G, Risk Register of the report; as **Attachment C** in Council Briefing document of 3 March 2021.

Dependencies

Consider any dependencies this project may have (e.g. does it require other projects' completion before it can begin?)

The success of the project will depend on:

1. Funding approval - There is $650,000 in the current Annual Plan and the Engineer's Estimate is $2,094,168. Implementation of the project will depend on approval form Council to bring forward future budgets to cover the budget deficit.
2. The timeliness of completion will depend on how quickly Building Consent is granted
3. Approval of the revised budgets of $2,869,000 to cover scope enhancement.

Procurement

State the Procurement approach as indicated in the Procurement Manual.
Attach to this business case the Procurement Plan (>500k) or Procurement Plan Lite (<500K) as required.

Procurement plan is appended, which in short proposes direct appointment of design consultant and open tender for the construction of the physical works.

Risk Analysis

Consider and document here any risks to the project known at this time

Risk Description	Impact	Mitigating Actions	Risk Level (high, medium, low)

To avoid duplication, please refer to the risks identified in the appended procurement plan, and the detailed risk register appended.

Links with other projects

Consider and document here how other projects may be affected by, or in turn may affect, this project. Does this project link with an overarching strategy or vision? What are the impacts of this?

There is a link with the modelling work currently underway with WSP, and a link with the relining of outfall pump station. The modelling been taken account in the concept design from WSP, and the relining of outfall pump station is currently being completed and will no net effect on this project.

Alternative Analysis

Provide an overview of options other than the proposed solution considered to address the business problem

There are 2 alternative options available at this stage:

- Option 1 – Do nothing
- Option 2 – An alternative design – basic tank which cannot be use as a reactor in future

Category	Option 1 – Do nothing	Option 2 Alternative design
Benefits	Not spending budgets at this time, not increasing existing budget.	Possible lower cost solution for smaller tank.
Capital Expense	Nil	100 – 200k
Operating Impact	Significant	Nil
Risks	Overflows in the reticulated network, inadequately treated effluent.	Additional costs for fruitless cost effective alternative. May produce asset which becomes redundant if the plant is future upgraded not using batch reactors.
Interdependencies with other projects/ initiatives	Not compatible with long term expansion of the plant.	Concept design did not locate an alternative

Major Project Milestones

Provide target completion dates for the standard milestones below and insert additionally identified milestones as needed. You may also insert a timeline diagram or attached a project schedule to further show the interdependencies between activities

Milestone Deliverable	Start Date	End Date
Project Approval by Council	30 Sept 2020	
Appointment of Professional Services	1 Oct 2020	1 Oct 2020
Detailed design	1 Oct 2020	16 Dec 2020
Tender on Tenderlink , evaluation and award	22 Feb 2021	16 Apr 2021
Construction in Stages through to Commissioning	14 May 2021	01 June 2022

Resource Requirements

Describe what resources the project will require (include items such as equipment where this is a limited resource)

Role	Company/Council	Duration (estimate)	Hours per week (estimate)
Mark Bell	KDC	52 weeks	2
Bill Down	KDC	52 weeks	6
Dallas Dreadon	KDC	52 weeks	4
Andrew Springer	WSP	16 weeks	10
Eros Foschieri	WSP	52 weeks	10
Curt Martin	Censeo	52 weeks	0.5
Contractors		26 weeks	

Cost

Funding Request

Detail below what funding is required for the project

Internal Funding Required	OPEX: $	CAPEX: $2,869,000	TOTAL: $2,869,000
Budgeted in LTP	YES, this is partially funded in the LTP.		
Planned Budget (where	OPEX:	CAPEX: $2,100,000	TOTAL:$2,100,000

budgeted in LTP)			
Externally Funded?	NO		
Funding Source			$ AMOUNT:
TOTAL COST	OPEX:	CAPEX:$2,869,000	TOTAL:$2,869,000

Funding History

Detail below any previous funding requests which have been approved (where applicable)

Previous Request/s				
	20/21 Upgrade WWTP	*Opex*	*Capex*	*Total*
	Existing Approved Spend	$	$650,000	$650,000
	20/21 Budget		$1,450,000	$1,450,000
Current Request				
	21/22 Budget		$769,000	$769,000
	Total Current Requests			
	Requested Approved Cost Budget	**$**	**$2,869,000**	**$2,869,000**

Health and Safety

Outline any specific Health & Safety risks/issues associated with this project and how they will be managed. These may be referenced in supporting documentation such as the Risk Register.

Construction is a hazardous activity that will involve heavy vehicles, equipment, working at height, excavations, and numerous other activates. To address this the following principles will be followed:

1. *All site activities will be consulted in advance with the operations team to eliminate conflict and reduce risks.*
2. *Safety in design processes shall be followed and consider construction methods, sequencing, interfaces with existing plant and operation and maintenance, long term operation and maintenance.*
3. *Contractor selection will be to a recognized contractor with track record and accreditation for safety management.*
4. *Throughout contract period, frequent site inspections, project management meetings and weekly liaison with operations will manage interfaces of greatest risk.*
5. *A Hazard Register will be developed in design and maintained as a live document through the delivery of the project, with residual risks being relayed through training and documentation in the O&M manuals.*
6. *Work by contractor and subcontractors will be by method statement that shall be reviewed and approved prior to work commencing on that task.*
7. *The H&S responsibility during construction will be the contractor's responsibility to manage, but it is the responsibility of all contractors, subcontractors, consultants, operators, maintainers and KDC personnel to take an active part in safe working, observation and rectification of issues.*

The balance tank and inlet modifications will not introduce any new hazards to the operational site that require special attention. The greatest risk to personnel being working at height that is managed by safe access walkways, stairs as the existing plant. The design of the balance tank will enable cleaning from outside of the tank to avoid man entry.

Attachments

Attach. #	Description	Doc #/File Name	Comments
1	*Procurement Plan*	*Att 1*	KDC procurement plan >500k