

Hihi Wastewater Treatment Plant

CAPITAL WORKS BUSINESS CASE

HE WHENUA RANGATIRA
A DISTRICT OF SUSTAINABLE PROSPERITY & WELL-BEING

Project Code:	AAPXXXX	Project ID (Finance):	551302
Objective ref:	A1833495	Objective version #:	22

1 Purpose

This Project Brief details the investment need and provides the high-level approach for capital investment that will be further specified and developed during the Detailed Design stage.

Recommendation: *Hihi Wastewater Treatment Plant - Major plant upgrade with a membrane bioreactor package. This is an indicative business case with recommendations to complete preliminary works prior to confirming costs. These will confirm the suitability of the preferred solution and allow the final business case to be prepared.*

2 Problem / Opportunity

Problem:

- The existing plant infrastructure has been assessed as structurally unsound and unsafe, capacity is insufficient for both peak flow and peak load and the plant footprint is not within the designated boundary,
- Stormwater infiltration needs to be addressed,
- The plant's poor condition and insufficient capacity is now impacting operation and the environment is at high risk from contamination,
- The constructed wetlands are in poor condition and cannot perform adequately due to blocked pipes and overflowing basins,
- The existing Resource Consent is due for renewal in Nov-22 which will include new conditions for compliance,
- Operational maintenance of FNDC assets requires programming, this should include allowances for funding plant upgrades in accordance to their lifespans/spec requirements,
- FNDC records show evidential assessments and reports ranging from 2001 to 2019 confirming Hihi WWTP has unsafe and poor performing plant/assets still in use,
- Further investigations are required before the final business case can be submitted.

Opportunity:

- Upgrade of existing plant infrastructure to comply across all consent conditions,
- Improve quality and performance - upgrade system process to align with the capacity requirements for area of benefit,
- Value for money - providing a solution that will last 40 years,
- Membrane Bioreactor (MBR) – the proposed system has been selected based on modular buildability, these are purpose built, they can also be easily transported/relocated if required – this aligns with climate change predictions,
- Improve the Marchant Road Reserve's function and accessibility by moving the plant further back and relocating and upgrading the playground to the sea front and installing a public toilet, (the funding for this reserve has been moved out to prevent unnecessary renewal work),
- Upgrade the wetlands poor condition due to lack of maintenance – this will ensure compliance; for the resource consent renewal process due to commence in 2020.



Figure 1) Hihi, Te Hiku Ward, Far North District

3 Background

History on site location and community consultation:

Hihi is a small community on the east coast, off SH10 in the Far North ward of Te Hiku, see Figure 1. Hihi's population varies throughout the seasons; the approximate population over the winter months is 200 residents, then during the summer months the population increases to around 400. Hihi beach is also a very popular destination for tourists and during the Christmas holiday period (24 Dec to 7 Jan), the peak season of summer increases to over 600 in population.

The Hihi Wastewater treatment plant (WWTP) was built around 1975, it is located alongside the Hihi Marchant Road Reserve which sits within the boundary of residential properties, and the wetland marshes are located off Hihi Road, approximately 800m away from the plant. The plant undertakes both primary and secondary treatment processes, effluent is then pumped from the plant to wetland marshes for tertiary treatment before it is discharged by gravity to Hihi stream, a minor watercourse that runs through the settlement of Hihi before reaching the coast at Hihi beach. This WWTP employs an extended aeration, activated sludge process. The plant consists of two aerations tanks that operate in series followed by a sedimentation tank, which collects the clarified wastewater in an effluent storage tank, from here it is pumped through a rising main to a series of wetland cells.

Reports ranging from 2001 through to 2019 provide evidential data that Hihi treatment plant is structurally at the end of its life and has been patched up over the years to keep it operational whilst pending the outcome of the resource consent process due to expire 2022. This has resulted in adding more equipment to keep the plant functioning but not resolving all the underlying issues, which now cannot be resolved unless the plant is replaced.



Figure 2) WWTP shown inside recreational reserve

During 2006-2011, relocation of the plant was investigated after 79% of the community favoured moving the treatment plant from its existing location due to the environmental impacts the residents were subjected to e.g. odour, noise and general health and well-being. The most favoured location was shifting the plant to the wetlands with only the adjacent landowner (to the wetland lots) opposing, therefore investigations were initiated. Based on the conclusion of these studies; relocation to construct the new plant (using the MBR system) at the wetlands was unable to be justified on a cost/benefit basis. It was therefore removed as an option and further remedial options required investigation. The community were consulted, and reference was made stating they understood the implications of relocation and endorsed retaining the plant within the existing site.

Feasibility continued by proposing to stage the project, prioritising remediation of the aeration tank. Stage one would be for the aeration tank to undergo further investigations and Stage two would be to upgrade the plant as the final stage of works. Proposals were requested for stage one, but the remedial work estimates received came in well over budget and due to the unknown outcome of the consent process and a reluctance to fund this, no upgrade to the tank was initiated.

The following are key observations made from prior assessments reviewed on the Hihi WWTP, references to these are appended; 19.1) Appendice A - Hihi WWTP Referenced Material. It is important to highlight that these conditions are a direct result of sweating the asset past its use-by date and no investment towards the operational maintenance:

- The plant has been operated following a routine maintenance approach only; planned or proactive maintenance and renewals appear to have been deferred due to potential replacement of the plant,
- The plant is compromised by the absence of effective screening of influent,
- Hydraulic overloading adversely effects the performance of the clarifier,

- Overflow evidence results in serious loss of biomass, which adversely affects biological performance of the treatment plant, such overflows also create an unhygienic unacceptable mess,
- Residual life for each asset was given between 4-12 years, this indicated the plant would require replacement by 2013,
- The wetland cells have not been maintained and now require remediation and possible redesign, pipe blockages continue to restrict effluent from reaching all cells resulting in overflows from the first basin directly into open drains immediately adjacent to the basins,
- High sludge levels were identified within the wetland cells indicating substantial loss of biomass from the treatment plant,
- Monitoring results show high-quality effluent generally still obtained after wetland treatment,
- The wetland marshes are overgrown with weeds and unable to perform within the natural environment,
- There have been instances where excessive inflow and infiltration have caused the aeration tank to overflow and spill raw sewage and biosolids into the environment,
- The large aeration tank's central dividing wall has collapsed, and the aeration pipe work has rotted away, resulting in almost no air diffusion through the tank,
- Both aeration tanks are deemed structurally unsound and unsafe,
- The overall capacity of the treatment plant is no longer sufficient enough to manage peak flow and peak load, this causes intermittent very poor effluent passing to the tertiary wetlands,
- Five stormwater storage tanks installed at the rear of the plant currently sit outside the designation boundary,
- The plant and wetlands cannot cope with storm events, there are regular reports of overflows and flooding, the potential risk impact is **very high** against risk categories: financial, compliance and reputation.

The Hihi WWTP has received some upgraded features, such as installation of filtration and ultraviolet disinfection processes, as well as an upgrade to the on-site pump station in 2013. However, these upgrades have only masked the larger issues that could eventually result in health, safety, quality and environmental implications.

In conclusion the existing Hihi treatment plant is at the point of failure; it is structurally at the end of its life and can no longer meet the performance criteria for the community of Hihi Beach.

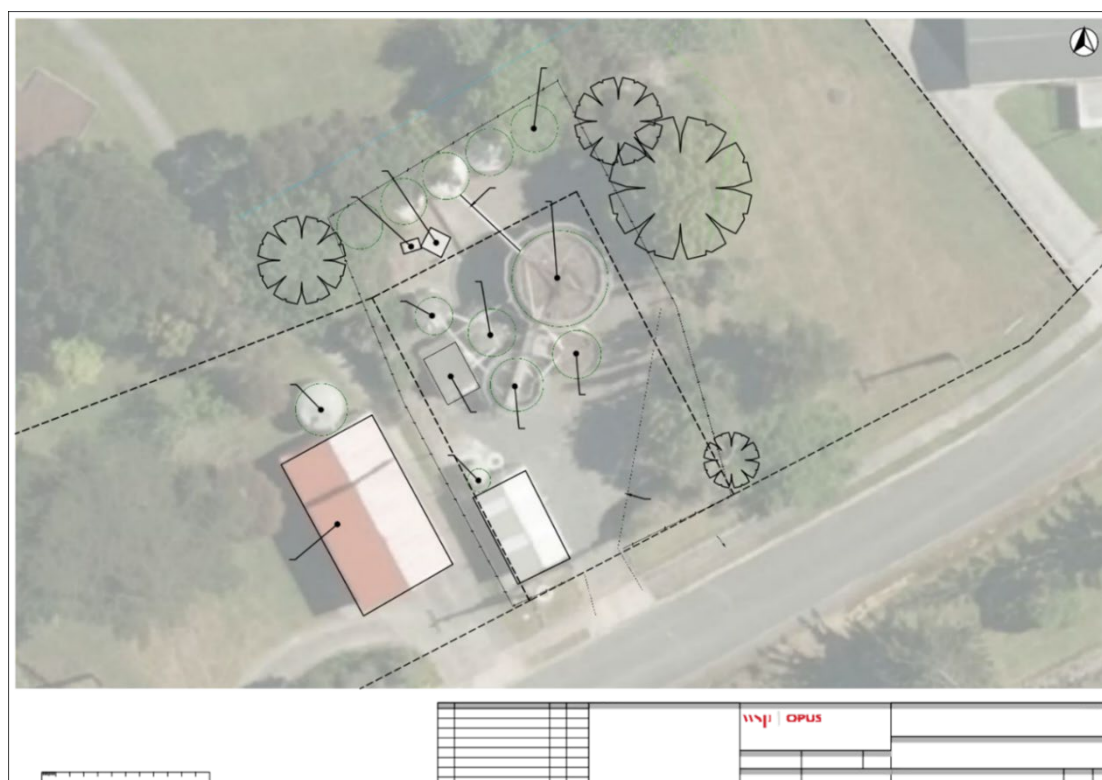


Figure 3) Hihi WWTP, Marchant Road – Site boundary and existing asset layout.

4 Objectives

The objectives for this project are:

- Undertaking works to meet compliance obligations - ensure that the treatment plant complies with the requirements of the Resource Consent to discharge treated effluent and aligns with conditions set under the District Plan.
- Investment to achieve a desirable community strategic outcome - replace assets at the end of their useful life thereby reducing operational expenditure.
- Maintaining an agreed level of service through upgrade of an asset - reduce operational expenditure by addressing and minimising risks associated with the current plant.

5 Benefits

The benefits of this project are:

- Meeting the requirements for the area to align with flow rates, loading and volume capacity,
- Health, safety and quality compliance for the community, operational team and the environment,
- Value for money – existing asset has been sweated beyond its design life and is now at the point of failure, the proposed solution has a 40-year life span and modular buildability which can be relocated if required.

6 Project Deliverables

A strategic analysis of prior condition assessments and options analysis has been performed; from this we identified some areas that have not been fully investigated or completed. Based on these findings the project deliverables have been staged.

It is important to note that some deliverables are dependent on another. In this case the recommendation is to initiate the deliverables under each stage and complete in parallel. Refer to **Error! Reference source not found.** showing high level timelines.

Initiation Phase	
Stage 1 – Feasibility (In Scope)	Specific exclusions (out of Scope)
Prepare indicative business case that identifies what further investigation and actions are required to enable completion of the business case.	
Structural assessment required for aeration tank.	
Temporary measures to stabilise aeration tank (interim mitigation is required until new plant is implemented). Pending an up to date structural report of the tank, possible solutions could include; <ul style="list-style-type: none"> • Temporary bund around plant, • Tank repairs – install new central dividing wall, concrete and steel options, waterproofing options include coating or a liner, • Secondary tank option (temporary) - onsite options, modular unit, smaller unit just for overflow, • Investigation into reducing stormwater infiltration and a consultation strategy to implement this. 	
Stage 2 – Master planning (In Scope)	Specific exclusions (out of Scope)
Site Survey	
Certificate of Titles for directly affected properties	
Cultural Impact Assessment	
Arborist Report – Reserve/Plant	
Conservation & Ecology Report - Wetlands	

Planning Assessment	
Consultation Report	
Landscape Plan - Wetlands	
Wetland Remediation Assessment/Redesign Options	
Condition assessment of Whatuwhiwhi Screen – several reports, including the Opus Feasibility have suggested that this screen could be refurbished and used at Hihi.	
Consultation - Public Meeting	
Conceptual Drawings - package plant sizing needs to be obtained and reviewed to ensure sizing suitability of the system. Investigations covering; connecting existing plant/services to new plant; reviewing installation of package plant details; working with supplier to recognise site constraints; infrastructure anomalies, etc, whatuwhiwhi screen refurbishment (tbc); investigation into remediation / upgrade work to reserve and neighbouring property consultation if required.	
Final Business Case	
Preliminary Design Phase	
(In Scope)	Specific exclusions (out of Scope)
Early contractor involvement and Supplier to complete preliminary design, specifications, phasing of construction/implementation, proposed methodology, site constraints, operational methodology for changeover and decommissioning.	
Implementation Phase	
Design / Build Contract (In Scope)	Specific exclusions (out of Scope)
Staged construction methodology (proposed) Stage 1: Enabling works: Stage 2: Construction, Installation, commissioning: Stage 3: Demolition / Decommissioning/ Reinstatement/Reserve Upgrade Stage 4: Wetlands upgrade Stage 5: SW infiltration – Note: The issue of stormwater infiltration could be investigated/addressed now as a mitigation measure for the current plant loading, as well as a benefit for the new plant	To be confirmed: <ul style="list-style-type: none"> Package Plant – MBR system supplied, Reserve upgrade, relocate playground, accessway, (not fully scoped yet), Possible Whatuwhiwhi screen refurbishment.
Whatuwhiwhi screen refurbishment and installation (tbc)	

7 Critical Success Factors

The purpose of this Indicative Business Case is to highlight what actions are still required to put together a robust and well-informed business case. The below factors should be understood as critical to successful project delivery, they should inform the selection of options for the business case and have not yet been implemented.

Critical Success Factors	Justification
Site Survey	Existing storage tanks at plant (Lot 78 DP 73991) are sitting outside the designated boundary.
Cultural Impact Assessment	Cultural assessment confirming if the locations have any archaeological sites significant to maori, are heritage or/and have cultural historical data

	associated. (lwi and community previously requested confirmation of this).
Planning Assessment	Required to determine whether or not to 'notify', e.g. limited or public notification. (lwi and community previously requested confirmation of this).
Landscape Plan – Wetlands	Required under the conditions applying to designation FN164A. (lwi and community also previously requested confirmation of this).
Wetland Remediation Assessment	Required under the conditions applying to designation FN164A.
Arborist Report/Other/Reserve Options - Plant	Planner to provide advice of benefits.
Early contractor involvement; <ul style="list-style-type: none"> confirm installation and construction methodology (connecting existing plant/services to new plant), review the design of the package plant, confirming new layout within site boundary, minimising unknown site anomalies, concept drawings of package plant showing new plant layout fits within site footprint. landscape plan/remediation proposal for reserve (scope to be defined). 	ECI is a collaborative process and with clear objectives and 'best for project' behaviours it will add value to procurement and project delivery. Involving contractors in the preliminary design process is an efficient means of designing and planning site specific infrastructure. Minimising risk, recognising innovative opportunities and providing rationale solutions are just a few of the benefits having a contractor's specialist knowledge early during planning and design.

8 Options

8.1 Options identified

There are three (3) options available at this stage:

- Option 1 – Do minimum
- Option 2 – Relocation of WWTP to wetlands
- Option 3 – Upgrade existing plant and install new MBR system – refer to Figure 4) Option 3 - Site layout proposed solution

8.2 Options analysis

The Opus (2006) Consultation Plan identified the following items as key factors from the community's perspective;

- Main concern – the environment
- Elimination/reduction in odour from existing WWTP
- Provision of emergency WW storage
- Gain more reserve area for community
- Landscape improvements

The options analysis has currently been completed on three options for consideration. These are high level observations, which have highlighted several areas that require additional investigations to complete the feasibility and master planning for Hihi WWTP. We recommend investigation a fourth option as an alternative to an MBR plant on the current site or Marchant Reserve.

Category	Option 1 – Do minimum	Option 2 – Relocation of WWTP to wetlands	Option 3 – Major upgrade – MBR packaged plant and reserve land swap
Benefits	Funding available, Shortest programme.	Removal of treatment plant from residential area and beachfront will have >50% of community in favour. Existing plant can continue to function whilst new plant is built (existing plant will require do minimum remediation as an interim measure).	New asset can manage peak flows and loads, odour and noise levels can be managed properly. It can be shifted further back into reserve, extending and upgrading the community reserve towards the beachfront. A new system will be compliant with RC conditions and has a 40yr lifespan. Modular system can be relocated if required (50yr sea-level-rise predictions).
Capital Expense	Cheapest option. Funds available to complete delivery 20/21.	Most expensive option. Funds available to do minimum 20/21 as interim measure. More funding will be required to relocate.	Second most expensive. Best value for money. Best long-term operational system for Whole Of Life.
Operating Impact	High risk of operational issues including overflows. Operational team and community exposed to non-compliant standards for health, safety and quality.	Top Energy confirm FNDC will need to make provision for electrical capacity at the new plants point of supply, new pump station and main transfer will need more investigations. Longest programme which may require remediation of existing as an interim measure.	New system for operational team to learn and manage. Training required, provision for operational assistance during DLP.
Rating Implications	Lowest impact on rates	Highest impact on rates	Second highest impact on rates, which could be the highest risk.
Risks	RC conditions renew 2022. High likelihood the plant and wetlands will not meet all conditions set. Plant location at risk of sea-level-rise-prediction within 50yrs. The plants poor function and flow issues won't be resolved through the do minimum so there is a high risk of community and operational team exposure to health issues.	More land may be required and relocation of the plant will be subject to consenting. Longest programme. Landowners bordering the wetland property may oppose. Rate impacts will be substantial.	Rate impacts; community oppose option to shift plant further back into reserve (even with the reserve upgrade provision), noise and odour should be eliminated through the new MBR.

Interdependencies	Site survey required to confirm boundary and establish if existing storage tanks are outside designation.	New designation/consent, public notification, cultural impact assessment, conservation report, community consultation and new site location investigations for relocation will be required including servicing e.g. power capability, rising main capacity etc.	This solution requires all critical success factors to be completed prior to implementation e.g. site survey, planning assessment, cultural impact assessment, conservation report, community consultation. Public notification may be required – this will be determined during the planning assessment.
Stakeholders	Neighbouring properties to reserve and plant on Marchant Rd, Community, Iwi Operational team Public Visitors / Tourists	Neighbouring properties to reserve and plant on Marchant Rd and landowners for wetland site for new plant. Community, Iwi Operational team	Community, Iwi Operational team Public Visitors / Tourists

Table 1) Options analysis



Figure 4) Option 3 - Site layout proposed solution

THE FOLLOWING SECTIONS EXPLAIN DELIVERY OF THE RECOMMENDED OPTION.

9 Recommendation

Preferred Option - Major Upgrade - Membrane Bioreactor (MBR) Packaged Plant and Reserve Land Swap

- 1) Membrane Bioreactors (MBRs) offer treatment of wastewater from communities to an extremely high level. A membrane bioreactor is a biological wastewater treatment system that incorporates a microfiltration membrane on the discharge to remove virtually all suspended solids, bacteria, and protozoa from wastewater.
- 2) The land swap proposal shown in Figure 4) Option 3 - Site layout proposed solution, has been identified as a key element for providing the best value and long-term solution for Hihi and FNDC;
 - Opportunity to upgrade the reserve for the community and provide an improved accessible recreational reserve footprint,
 - Moving the plant further back behind the fire station is a better use of space and footprint,
 - The rear corner is slightly elevated; this removes the risk of predicted sea-level-rise, shown below in Figure 5.
- 3) Temporary stabilisation and/or mitigating measures on the existing aeration tank and plant capability to continue operating during design and construction (approx. 2 years).

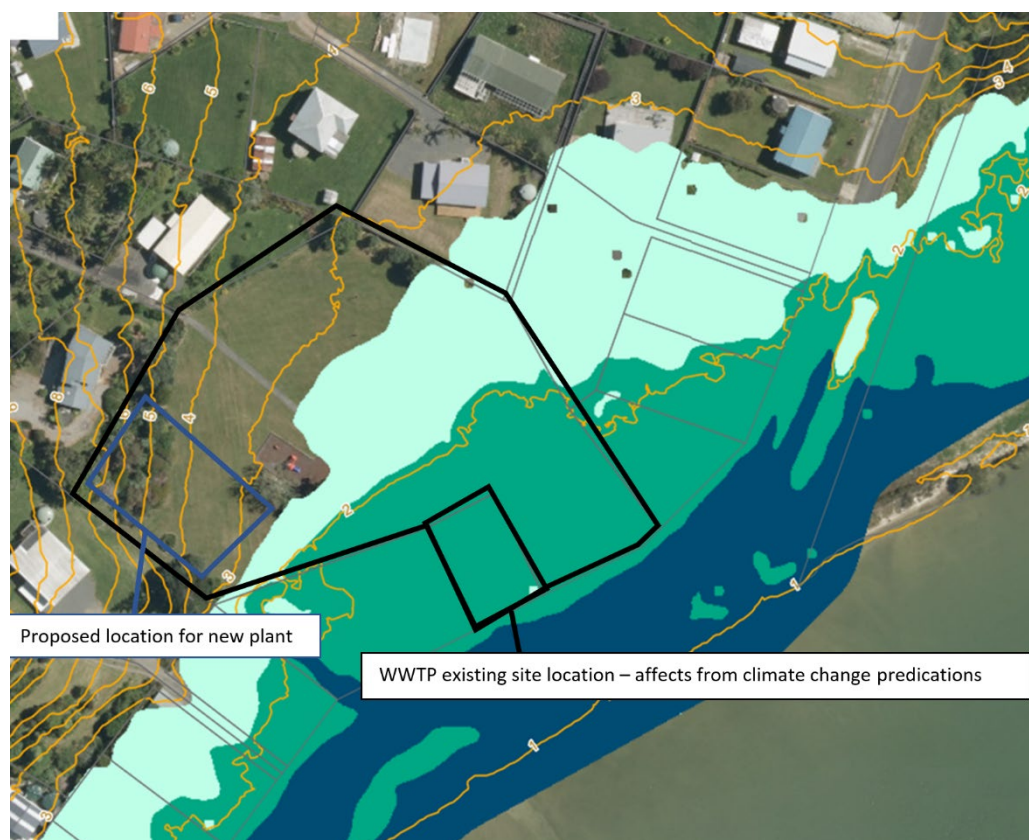


Figure 5) NRC climate change predictions. Blue: 1-in-100-year storm event (flooding by sea), Green: 1-in-50-year storm event from sea-level-rise, Pastel Green: 1-in-100 storm event from sea-level-rise.

To ensure the preferred option is the best solution for FNDC and Hihi community the following items should be completed;

Hoskin Civil to engage and complete alongside FNDC team:

- Site survey
- Planning Assessment
- Cultural Impact Assessment
- Landscape Plan for Plant
- Conservation and Ecology Report for Wetlands

- Wetlands Remediation Assessment
- Consultation Report
- Public Meeting
- ECI and supplier engagement – conceptual drawings of package plant, existing and proposed site layout plans, site constraints, delivery and installation phasing.
- Hoskin Civil will provide a recommendation report outlining a complete scope of work for project delivery under an open tender, including a programme timeline, phasing requirements and critical path items.

These report findings will mitigate the high-risk items associated with the recommended option, which will then define the remaining evidence to submit Hihi WWTP final business case.

10 Procurement

10.1 Procurement Approach

1. Hoskin Civil Ltd can commence engagement for the recommended consultant assessments and reports highlighted under scope deliverables and critical success factors. These items are required to provide certainty in the proposed solution and alleviate the community's concerns by providing clarification around any environmental impacts. All reports can be direct sourced as they will be under the FNDC procurement threshold value.

Deliverables include:

- Certificate of Titles – boundary properties of plant, wetlands, stream,
- Site Survey – confirmation of plant boundary required, existing storage tanks currently sit outside boundary on desktop assessment,
- Cultural Impact Assessment
- Conservation and Ecology Report
- Planning Assessment – FNDC or external planner (pending on internal capacity),
- Consultation Report – prepare three option analysis for public meeting,
- Wetland Remediation Assessment – proposal for redesign and remediation options with estimates.

2. Early Contractor Involvement (ECI) – Engage three proposals/quotations through a Closed tender, this removes complacent expectations and provides more competitive pricing.

Deliverables include:

- Collaboratively scope the construction methodology alongside the plant supplier to problem solve out or mitigate high risk items and recognise any 'out of scope' anomalies.
- Assess existing infrastructure with plant supplier confirming the main works required for the package plant to be installed within footprint availability.
- Work with consultants delivering the above assessments (working with Hoskin Civil and the consultant) to cover off any additional items that will provide additional benefits to project delivery.
- Programme timeline for detailed design completion and construction for community consultation.
- Work with key stakeholders (if required) including neighbouring properties to resolve individual property concerns.
- Be forthcoming with innovative and sustainable solutions.
- Remain committed to the ECI delivery model, providing the community with a value for money service.
- Provide preliminary drawings showing layout of proposed package plant within the designated boundary. Include concepts of existing infrastructure remaining, and phasing required to keep plant operational during construction, including demolition and decommissioning,
 - Contact supplier/s to confirm if this is part of their delivery if not include in ECI contract.

3. Design and Build – Two-staged open tender under a major works contract recommended including, but not limited to;

- Manage supply, delivery and installation of package plant directly with supplier,
- Separable portions:

- Enabling works (pending scope but may include; land extension, temporary playground relocation, reserve upgrade, reserve remediation)
- Plant Supply and Installation
- Demolition, Decommissioning
- Remediation, reserve works (tbc)

11 Project Timeline

The indicative timeline below is aligned to the delivery approach and staging, major milestones include:

- April-20 - Master planning complete
- May-20 – Final Business Case submission
- Dec-20 – Preliminary Design complete
- Apr-21 – D&B contract start

Task	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Oct-20	Nov-20	Dec-20	Jan-21	Feb-21	Mar-21	Apr-21
Indicative Business Case													
Temporary Remediation/ Stabilisation Measures													
Complete Masterplanning													
Final Business Case													
Preliminary Design ECI													
Procurement													
D&B - based on preliminary solution													

12 Project Cost

12.1 Funding

Funding to be provided, requested 25/10/2019

Funding (\$)	2019/20	2020/21	2021/22	All years
Opex				
Professional Services -	0	0	0	0
Capex				
New (XXNNNN-49XX)	0	0	0	0
Renewal (XXNNNN-49XX)	0	0	0	0
Total	0	0	0	0

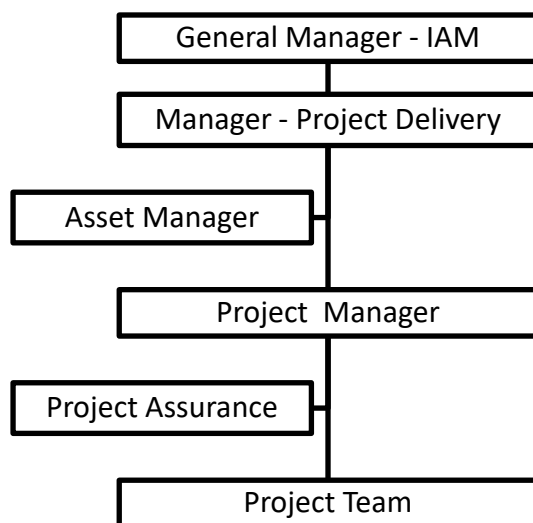
12.2 Cost Estimation

Master planning (Professional Services – external consulting)				
OPEX	2019/20	2020/21	2021/22	All years
Option 1	32,000	TBC	TBC	TBC
Option 2	250,000	TBC	TBC	TBC
Option 3	200,000	TBC	TBC	TBC
Option 4	TBC	TBC	TBC	TBC

High-level estimates based on QS review Oct-19

13 Project Approach

13.1 Project Governance



Name & Position	Project Roles *
Andy Finch General Manager – IAM	Executive Sponsor
David Clamp Manager – Project Delivery	Senior Responsible Owner
Name Asset Manager	Business Representative
Name Operations Manager	Business Representative
Name Maintenance Manager	Business Representative

* Responsibilities for project roles are detailed in the Capital Works Project Management Framework.

13.2 Project Management

Management of the project will be undertaken following requirements and procedures detailed in Far North District Council's Capital Works Project Management Framework, and consistent with expectations for a **Complex** project.

13.3 Project Constraints, Assumptions & Dependencies

The following items can be resolved, Hoskin Civil can deliver these items alongside FNDC – refer to Recommendations and Timeline sections.

Type	Description	Action required
Dependency	Site Survey	Hoskin Civil/FNDC
Dependency	Cultural Impact Assessment	Hoskin Civil/FNDC
Dependency	Planning Assessment	Hoskin Civil/FNDC
Dependency	Design of Package Plant – site footprint and installation methodology must be confirmed	Hoskin Civil/FNDC
Dependency	Landscape Plan	Hoskin Civil/FNDC
Dependency	Arborist Plan	Hoskin Civil/FNDC
Assumption	Wetland Remediation Assessment – include under Landscape Plan	Hoskin Civil/FNDC
Constraint	Consultation Report / Public Meeting	Hoskin Civil/FNDC

14 Quality considerations

Quality requirements:

The Hihi WWTP has an existing resource consent due to expire in Nov-2022, the sites listed are also designated and have conditions set under the district plan.

Resource Consent:

- Northland Regional Council (NRC) have four monitoring sites, three are located at the constructed wetlands and one is at the WWTP site,
- Resource Management Act and the Regional Water and Soil Plan apply to this site/activity,
- Hihi WWTP existing resource consent: RC – CON19940739901

Endorsed: 14-05-2008
Expiry: 30/11/2022
Conditions:

- 1) the discharge of treated wastewater into an unnamed tributary of Hihi Beach (Hihi Stream).
- 2) To discharge contaminants to ground via seepage from the base of an artificial wetland.
- 3) To discharge contaminants (primarily odour) to air from wastewater treatment facilities.

Far North District Council Plans:

1. Existing Site (Lot 78 DP 73991)
 - District Plan – Underlying zone Coastal Residential with a Designation (FN164) for the purpose of Hihi Sewage Treatment and Disposal – applying to Lot 78 DP 73991 and SO 69378 Blk IV Mangonui SD.
2. Neighbouring Site (Part Lot 71 DP73991)
 - District Plan – Recreation reserve land zoned recreational activities subject to the Reserves Act.
3. Wetland Site (Part Lot 1 37697 and Part Lot 2 DP 88975)
 - District Plan – Rural Production Zone with designation FN164A. The designation was approved on 1 May 2008 – Consent number RC 2061079. This decision was issued by the Environment Court, it has specific conditions that apply to the site.

Far North District Zoning for Hihi WWTP designations are shown in Figure 8) FNDC Zoning and Designations – refer FN164 and FN164A. These site locations are referenced as per above for 1), 2) and 3), these are shown in **Error!**

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Noise

Noise is relatively minor with an MBR system, the blowers will be housed as they are the largest noise source on the plant. Screening and planting will be initiated through a landscape plan to provide a sufficient barrier to noise.

Odour

Odour concerns are minimal; the grit and screenings facility that is proposed is the most likely source of offensive odours. Options would be investigated; however, a biofilter is the preferred option if the odours are to be managed aggressively.

Quality tolerances:

Lower standards have been adopted over the past few years during feasibility investigations to source the best outcome for Hihi. Quality has been compromised due to costs and timing around the consenting process, this has been managed extremely well by the operational team and the community as the circumstances have been less than desirable and continue to decline.

WWTP, Marchant Road:

Most recently, adverse conditions for the activated sludge process have resulted in the accumulation of foaming from filamented bacteria, this bacterium is difficult to eliminate due to its unique characteristic of nocardia; a part of nocardia's natural growth cycle is spread through the bacterium branching out and breaking, these cells then begin to dissipate, the gram-positive genus continues to branch out, break off and spread.

Constructed Wetlands:

The constructed wetlands have also been neglected due to insufficient funding and maintenance. Observations made from a recent site visit confirmed a lack of operational maintenance resulted in wetland basins that were performing poorly. Several prior reports indicate the wetlands poor condition is nothing new, stating the basins overflow due to blocked pipes regularly. At the site visit the first cell was clearly struggling to perform showing the basin overflowing into an open drain caused from blocked pipes. The marshes are covered in weeds, there is minimal visibility of scheduled plant life, vegetation or aquatic planting and no sign of animal life – these natural elements are key to a wetlands function and success.

A conservation report should be acquired, reporting on the ecology and flows in the receiving stream, local species, monitoring and effects of current systems in place, water features and flora and fauna. An assessment of the current

design/cell layout requires options for remediation to bring the wetlands back to the distinct ecosystem they should be and serve as home to a wide range of plant and animal life.



Figure 6) Constructed wetlands, the first cell overflowing into the open drain which goes directly into cell 2.



Figure 7) Overgrown marshes and high sludge levels within the wetland cells indicating substantial loss of biomass from the treatment plant.

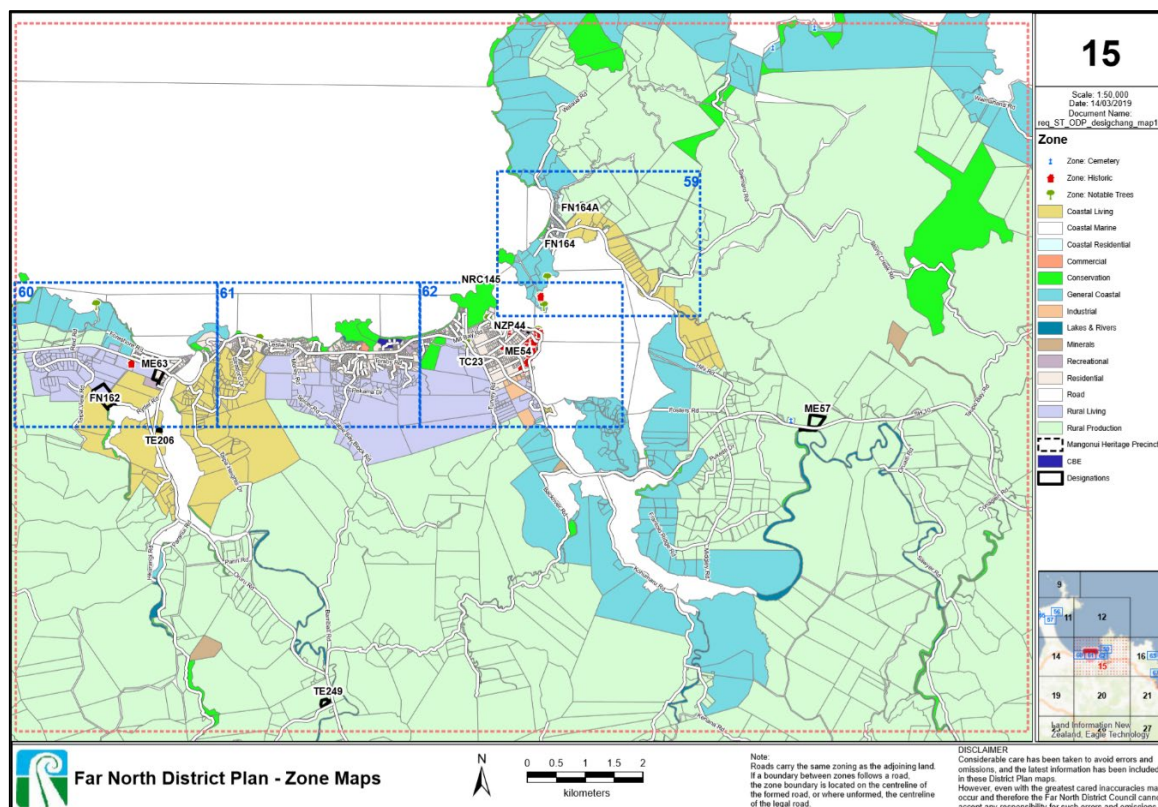


Figure 9) FNDC Zoning and Designations – refer FN164 and FN164A



Figure 8) Treatment Plant - Consented Site Locations

15 Risks & Issues

RAG	Risk / Issue description	Risk owner
A	Site footprint - existing site location is very small and should be extended. Extension further back requires a planning assessment, site survey (boundary confirmation). Preferred solution should be extended further back into reserve. Reserve can then be relocated at the coastal sea front (as preferred by community).	FNDC Planning/Asset Management
A	Community – odour & noise of new plant (previous concerns and this will be highlighted when the reserve neighbouring properties are advised the plant may be relocated closer to their properties)	FNDC Planning/Asset Management
R	Rate impacts – funding options to decrease impact on residents	FNDC Finance/ Asset Management/Delivery
A	Resource consent expiry 2022 – new conditions to be met	FNDC Finance/ Asset Management/Delivery
R	Plant not upgraded – HSQE impacts: operational team H&S onsite and community health and environment is compromised. e.g. activated sludge has the bacterium nocardia growing within it, quality control is poor, overflows are imminent.	FNDC Health & Safety/Asset Management
R	Aeration tank structural integrity fails, resulting in spillage into the environment and harbour.	FNDC Health & Safety/Asset Management
A	Construction and Decommissioning: existing plant to remain operational until new plant is commissioned and existing houses to be connected to the new system as the existing treatment plant will be decommissioned.	Project Delivery / coordination with community
R	The plant and wetlands cannot cope with storm events, which results in overflows and flooding, the potential risk impact is very high, due to risk of an environmental spill into the harbour.	FNDC Asset Management
R	Wetlands excluded from renewal scope for remediation – non-compliance.	FNDC Asset Management
A	Post construction/implementation operational management – contractual assurance that the operational team are skilled to do all maintenance duties required with new plant. MBRs require advanced specialist maintenance which must be programmed, failure to do so can result in major failures.	FNDC Asset Management/Delivery
R	Climate change - sea-level-rise predictions and/or 1 in 50 storm event occurs = Environmental spill/harbour contamination	FNDC Asset Management/Delivery

16 Key Stakeholders

Stakeholder	Interest level	Influence level	Recommended approach	Dependency
FNDC Asset Management	High	Empower	Indicative BC	N/A
FNDC Project Delivery	Medium	Inform	Indicative BC	N/A
FNDC Planning	High	Collaborate	Indicative BC	N/A
FNDC Finance	High	Involve	Indicative BC	N/A
NRC	High	Involve	Planning assessment	Critical success factors
Community	High	Inform	Consultation Report - Public Meeting	Critical success factors
Iwi	High	Inform	Consultation Report - Public Meeting	Critical success factors
QEII Trust	Medium	Inform	Consultation Report	Critical success factors
MBR Supplier	High	Involve	Proposal request	Site survey, ECI involvement

ECI - Contractor	High	Collaborate	Contract - Medium Works	Critical success factors can progress alongside ECI investigations.
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17 Document sign off

Role	Name, title	Signature	Date
Prepared by:	Jody Kelly Project Manager, Hoskin Civil Ltd	V01 - drafted for Asset Management review	25-Oct-19
Reviewed by:	Bill Down Asset Manager, FNDC		
Reviewed by:			
Approved by:			

18 Appendices

18.1 Appendice A - Hihi WWTP Referenced Material

<i>Date issued</i>	<i>File name</i>	<i>Description of detail</i>	<i>Author/Company</i>
Dec-2001	200112 Conditional Assessment of WT Assets at Kaikohe & Kaitaia and WWT Assets at Hihi & Kerikeri copy	Condition Assessment	Harrison Grierson Consultants Limited
Jul-2005	Preliminary Options Evaluation - Hihi WWTP New Site Investigations	Relocating Plant Options	MWH
Apr-2006	Proposed Hihi WWTP Relocation Hihi Road, Hihi- Consultation Report#2	Relocation Consultation Report	Opus
Jun-2006	2006 Hihi	Preliminary Design Report	Opus
Aug-2006	200608 - Hihi Wastewater Treatment Plant O & M Manual	Plant Operations Manual	FNDC
May-2008	Resource Consent - CON 19940739901	RC Confirmation	NRC
Dec-2012	NRC Issue Abatement Notice - Condition 6 of RC non-compliant	Monitoring results - e-coli quality upgrade required	NRC
Dec-2012	Outline Plan Waiver RC2130159	Pump shed	FNDC
Mar-2013	20130320 Hihi WWTP NRC monitoring report 20 March 2013	Monitoring Report for RC	NRC
May-2014	2014-05 FT report	Aeration tanks - condition assessments	Fraser Thomas
Sep-2014	201409 FT report 2014-09-09 Fraser Thomas	Options Analysis	Fraser Thomas
Apr-2015	2015-04-23 TSL proposal	Aeration Tank renewal	TSL
Dec-2015	2015-12-23 Hihi WWTP Options Analysis Report - Final signed	Options Analysis	Opus
Mar-2019	20190326 Hihi WWTP Conceptual design Options Signed (002)	Conceptual design options	Opus