

Environmental Impact Assessment

Backfill of Wetland (180m²) and Building Construction

Vaiakura Tapere, Section 94D1

Prepared for: Ani Thompson

October 2018

Table of Contents

Executive Summary

Glossary of Terms

1.0 Introduction	9
1.1 Proposal Proponent	9
1.2 Proposal Description	9
1.3 Proposal Objectives and Scope	9
1.4 Environment Impact Assessment Process	9
1.4.1 Methodology	
1.4.2 Objectives of the EIA	
1.4.3 Submission	
1.5 Public Consultation	10
1.5.1 Relevant Legislation and Policy Requirement	
1.5.2 Planning Process and Standards	
2.0 Proposal Need and Standards	12
2.1 Proposal Justification	12
2.2 Alternative to the Proposal	12
3.0 Description of the Proposal	13
3.1 Location	13
3.2 Staging	13
3.3 Emergency Management	14
3.4 Infrastructure Requirement	14
3.4.1 Transport	
3.4.2 Stormwater drainage	
3.5 Waste Management	15
3.5.1 Character and Quantity of waste materials	
3.5.2 Solid Waste Disposal	
4.0 Environmental Values and Management of Impacts	16
4.1 Land	16
4.1.1 Description of Environment Values	
4.1.1.1 Soils	
4.1.1.2 Landuse/Characteristics	
4.1.1.3 Landscape Character	
4.1.2 Potential Impacts and Mitigation Measures	
4.1.2.1 Landuse Suitability	
4.1.2.2 Land Contamination	
4.2 Climate	18
4.3 Water Resources and Quality	18
4.3.1 Description of Environmental Values	
4.3.2 Potential Impacts and Mitigation Measures	

4.4 Air	19
4.4.1 Description of Environmental Values	
4.4.2 Potential Impacts and Mitigation Measures	
4.5 Waste	19
4.5.1 Description of Environmental Values	
4.5.2 Potential Impacts and Mitigation Measures	
4.6 Noise and Vibration	19
4.6.1 Description of Environmental Values	
4.6.2 Potential Impacts and Mitigation Measures	
4.7 Nature Conservation	20
4.7.1 Description of Environmental Values	
4.7.1.1 Terrestrial Flora and Fauna	
4.7.2.2 Aquatic Biology	
4.7.2 Potential Impacts and Mitigation Measures	
4.8 Cultural Heritage	21
4.8.1 Description of Environmental Value	
4.8.2 Potential Impacts and Mitigation Measures	
4.9 Social	21
4.9.1 Description of Environmental Values	
4.9.2 Potential Impacts and Mitigation Measures	
4.10 Health and Safety	22
4.10.1 Description of Environmental Values	
4.10.2 Potential Impacts and Mitigation Measures	
4.11 Economy	22
4.11.1 Description of Environmental Values	
4.11.2 Potential Impacts and Mitigation Measures	
4.12 Hazards and Risks	23
4.12.1 Description of Environmental Values	
4.12.2 Potential Impacts and Mitigation Measures	
4.13 Erosion Control	23
4.13.1 Description of Environmental Values	
4.13.2 Potential Impacts and Mitigation Measures	
5.0 Environmental Management Plan	24
6.0 References	28

7.0 Recommended Appendices

A1	EIA TOR	29
A2	Final Project Construction Drawings	52
A3	Study Team	54

FIGURES

1.0	Project Site Location	13
2.0	Drainage Channels Location	14
3.0	Landuse adjacent Project Site	16
4.0	Aquatic Species, Tuna Maori	20

TABLE 1.0	Environmental Management Plan	27
------------------	--------------------------------------	-----------

Executive Summary

Backfill of Wetland (180m²) and Building Construction Ani Thompson, Manager Pacific Resort

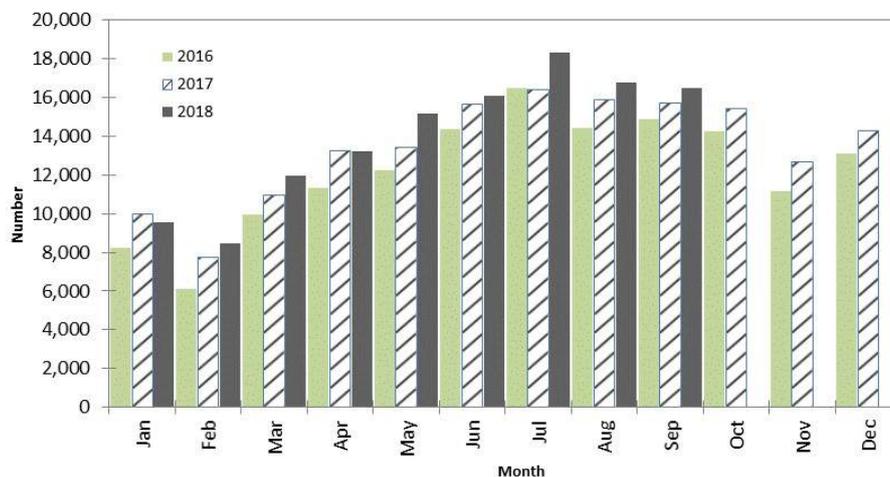
This report is prepared on the understanding the property will be backfilled a total area of 180 square meters, to add to the existing ground of 469 square meters. The total area of 649 square meters is used for the purpose of Building Construction of Two Bungalows for Rental and Residential use. The activity takes place on the Western section of the property.

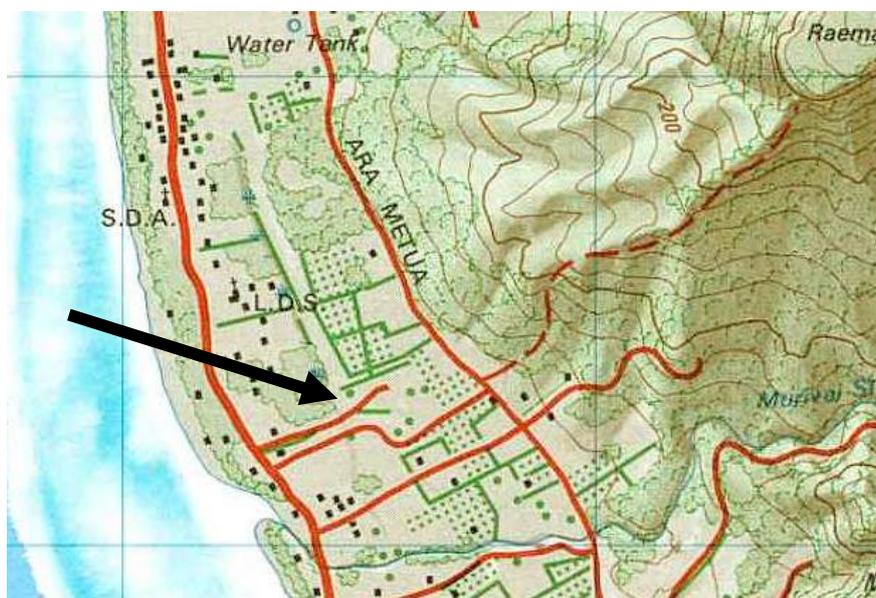
Surrounding areas to the West (Main Road) are developed with residential, agriculture and commercial lands. Landuse to the East are vacant, agriculture lands and wetlands in mature vegetation. Water flow is channeled across the access road through a 900mm culvert. A residence occupies the East end of the property.

Modern day living has changed this important Cultural landuse, into an economic resource, where agriculture lands are developed for construction of homes and rental accommodation. The Cook Islands economy is largely dependent on tourism, with recent numbers showing an increase in visitor arrivals from January 2016.

With the increase in tourist numbers, infrastructure, public utilities must provide services to accommodate our tourist industry.

Figure 1: Visitor Arrivals 2016-2018





Property Location

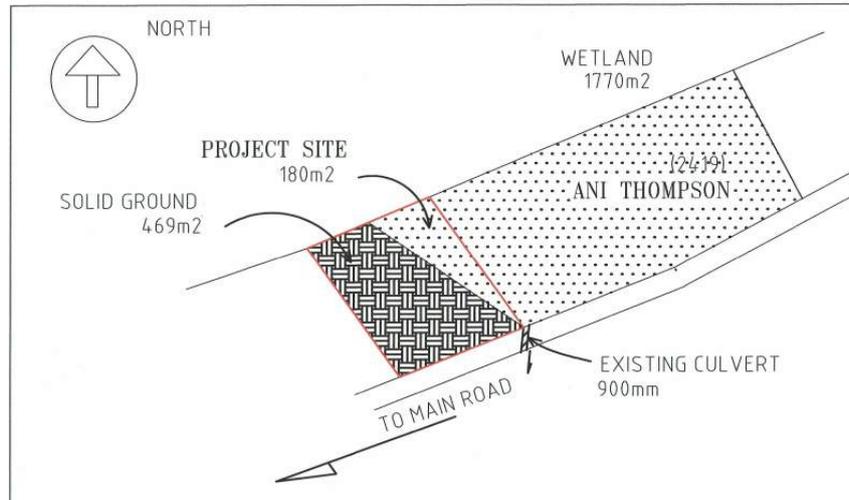
An alternative method is not viable, as the objective is the provision of additional home for the family, and on occasions, this can be used for rental accommodation. When the land is not developed, this will become overgrown with grass and trees, to become an eyesore to landowners, and the Public Health Department (health concerns).

This report is presented to the National Environment Service (NES) in preparation for a Project Permit to be discussed and considered by the Rarotonga Environment Authority (REA).

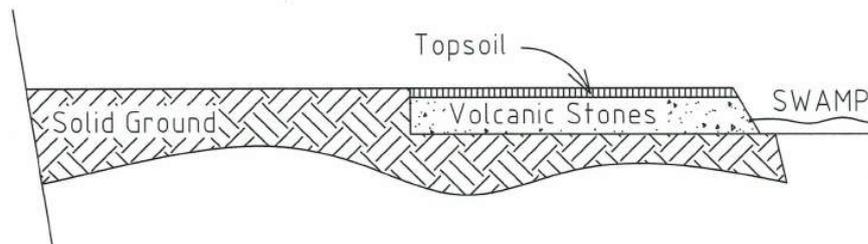
The total land contains 2419m² with 180 square meters to be backfilled for residential and rental purposes. The property is bordered by the beach ridge and the interior lands, forming a muddy depression (wetland 1040m²) where water is trapped for a short period in time. An escape route for the trapped water is the Murivai Stream, located to the South at approximately 400 meters, and is absorbed into the muddy depression very slowly (2-3 days).

The land is to be backfilled with volcanic soil from the nominated Contractors quarry. Backfill material is 180 square meters (approximately 180 cubic meters), with the project estimated to be completed within 5 days.

Construction for the two bungalows is currently in the design process by local Architects.



Project Site Plan



Project Site Cross Section

Pre-Construction

Prior to backfilling the property:

1. Property boundaries must be identified to enable construction to be performed within the boundary limits

Construction

1. A coarse layer of volcanic rocks is spread over the fill area
2. A coarse layer of sculping material is spread over the area
3. Finishing layer of topsoil is applied

Compaction

Compaction of the site is achieved by movement of machinery over the fill. Two trucks are required to transport fill to the site. Final top surface finish is best achieved by a Grader or Loader to provide a level surface.

Environmental Impacts

Impacts to the environment are assessed on the ecology in the area, agriculture uses, solid and liquid wastes, and construction disturbance to include noise.

The ecology in the area is affected temporarily during the backfill process. Backfilling creates disturbance to animals that live in the muddy waters such as freshwater eels. Existing adjacent wetlands however provide new homes for these animals.

Solid and liquid wastes are controlled through the Environment Act 2003, and the Public Health Sewage Code July 2008.

Construction impacts refer to disturbance of the adjacent properties as a product of machinery noise and vibration, although both can be tolerated for the duration of the activity.

Social impacts are best resolved through the 30 day public consultation period. During the public consultation process, the general public provides written responses to the Environment Service about the project.

Legal Framework

A legal framework is established whereby prior to all construction works on Land and Water, three (3) permits must be obtained from the relevant authorities namely;

- I. the National Environment Service (NES), dealing with environmental concerns
- II. Public Health (Ministry of Health), activities that may affect Public Health, for example disposal of liquid and solid wastes.
- III. Building Control Office (Infrastructure Cook Islands), authority for the issuing of building permits.

The Legal Framework for this project will require all three permits to be approved.

Glossary of Terms

EIA	Environmental Impact Assessment
NES	National Environment Service
REA	Rarotonga Environment Authority

1.0 Introduction

1.1 Proposal Proponent

The project proponent is Miss Ani Thompson of Arorangi, a Cook Island resident.

1.2 Proposal Description

The proposal is the backfilling of 180 square meters of wetland with volcanic rock debris. The Stages of work are:

Stage 1. Positioning of Construction Work Signs

Public Safety is paramount on any construction site. Where necessary, traffic signs are to be posted warning motorists and pedestrians alike on construction activities in the immediate area. Construction Signs and or cones are to be placed on the roadside immediately before the construction zone.

Stage 2. Coarse Backfill material

Volcanic material (sculpting material rocks and stones) is provided from the Contractors quarry.

Stage 3. Surface finish

Top surface finish requires a layer of topsoil from the Contractors yard. On completion of Stage 3, the property is removed of excess material, cleared and tidied.

1.3 Proposal Objective and Scope

The objective is to backfill dormant wetland, and transform available land for the purpose of construction of two bungalows.

Development around the island and in the Arorangi District, indicates the improvement of existing lands, to assist with the development and growth of the country. The consequence of not proceeding with the proposal will result with a loss of an asset to the landowners, and the loss of economic gain to the community through purchases at the stores.

The current land has potential for development for future benefit to be gained.

1.4 Environmental Impact Assessment

1.4.1 Methodology

The EIA is a report prepared for public consultation, on the needs for the project, impacts of the project, adverse effects and mitigating measures. The report is submitted to NES and advertised to the public for a period of 30 days. During the 30 days, the public review the report, and can send comments back to NES. Comments must be in writing. Submissions received are discussed and the final decision made by the REA. Written submissions determine the sensitivity of the project, whereby additional information may be required to address sensitive issues.

1.4.2 Objectives of the EIA

The main objective of the EIA is to provide readers with sufficient information, enabling a decision to be made whether to accept, or decline the proposal. The objective therefore is to provide available information relevant to the proposal, the likely effects of the proposal on environmental values, and how these can be reduced or protected. The Environment Management plan (EMP) is included and provides management measures for the proposal, during and after construction.

1.4.3 Submissions

The EIA is advertised to the public for a period of 30 days, where written responses are addressed to NES, and discussed by the REA. A decision is then made (supported by Public responses), to accept or decline the project.

1.5 Public Consultation Process

In addition to the legislated EIA process during the 30 day period, it may be required to hold community meetings, to debate on major issues that may be seen as significant, during from the 30 day public consultation period.

1.5.1 Relevant Legislation

The Environment Act 2003 provides the legal framework for the management of any land prior to development. It establishes the roles and functions of NES, which includes the protection and management of the environment and its resources, in a sustainable manner among numerous other functions. Currently 5 islands have adopted the act, as a means to safeguard their environment. These islands are Aitutaki Atiu Mauke Mitiaro and Rarotonga.

This project is considered under the **Environment Act 2003 Part 5**, the **Environment Impact Assessment** Section 36 (1-3). Section 36 implies: (1) No person shall undertake activity likely to cause significant environmental impact, unless a project permit is obtained from the permitting authority, the REA. (2) A project permit is obtained through a written report to the NES, setting out all activities that impact on the environment. (3) Every application for a project permit shall be submitted to the Service and shall include an environmental impact assessment, setting out details of –

- (a) the impact of the project upon the environment and in particular -
 - (i) the adverse effects that the project will have on the environment; and
 - (ii) a justification for the use or commitment of depletable or non-renewable resources (if any) to the project; and
 - (iii) a reconciliation of short-term uses and long-term productivity of the affected resources; and
- (b) the proposed action to mitigate adverse environmental effects and the proposed plan to monitor environmental impacts arising out of the project; and
- (c) the alternatives to the proposed project.

1.5.2 Planning Process and Standards

The proposal falls under the Environment Act 2003 Part 5, the Environment Impact Assessment, which implies, “No person shall undertake activity likely to cause significant environmental impact, unless a project permit is obtained from the permitting authority, the Rarotonga Environment Authority”.

The project is monitored by the relevant development Agencies to comply with legislation, standards, codes and guidelines during the construction process.

2.0 Proposal need and Standards

2.1 Proposal Justification

Miro Consultants was approached by Ani Thompson requesting the preparation of an EIA report for the Arorangi property. The property was identified as part swamp, with the aim to fill 180 square meters, for a total area of 649 square meters for housing development.

The proposal provides for economic benefits and employment, with additional benefits to local stores and businesses on the island.

2.2 Alternatives to the Proposal

The proposal is seen to be the focus for the proponent in utilizing available land for the construction of a residence. Land is passed through each generation, to use the land for a specific purpose, suitable to the family.

Design for homes varies in size, and construction materials. The majority of homes can be designed on the island. However, there are designs available online, and each design can be provided as a pre-cut design.

Design is basically suitable for a small family.

Since the family land is available for development, there is no other alternative for home construction.

3.0 Description of the Proposal

3.1 Location

The property is offset from the Main Road at approximately 200 meters. A gravel access leads from the Main Road. Landuse in the area is residential, wetland and agriculture lands.

The property is bordered by the access road to the South boundary, with residential and wetlands on the remaining boundaries.

There is evidence on previous use of the property for agriculture purposes, although the land has remained without production for over ten years.

The tapere has developed through the years, with new construction of homes. Development can also be seen on the island, through construction of homes and rental accommodation, to provide for the rise in tourist numbers.



Figure 1.0 Project Site Location

3.2 Staging

The proposal is programmed to involve the following activities:

- Backfilling of the site
- Clean up on completion of works
- Improvement of existing drainage culvert (900mm)

Construction is programmed to commence on approval of all permits required for construction. The proposal for backfilling is a construction activity requiring a medium sized Excavator, Bobcat, and trucks for carting backfill to the location.

The property will be landscaped on completion to protect and enhance environmental values on the property and adjacent lands.

The proposal is estimated to be completed within 5 working days.

3.3 Emergency Management

Emergency Management procedures for the project are seen to be very little. To ensure continuous smooth operation of the project, management of the project involves a daily inspection of each days activity, and the likely sources of construction accidents, therefore the following are recommended:

- Install construction signs and cones at the entry into the access road, off the Main Road
- Safety wear “dayglow” to be worn for machinery operators
- Machinery operator to perform daily check on machinery, for faulty mechanical parts
- Machinery operators to be familiar with work tasks

Disruption to community utility networks (water supply, electricity) is unaffected by the proposal, as the proposal involves backfill of wetland. The project workings hours are estimated at 8.00am to 4.00pm daily.

3.4 Infrastructure Requirement

The project location does not interfere with infrastructure and traffic flow in the area, however the property access road does link to the Main Road.

3.4.1 Transport

Access roads linking to several properties will be disrupted during cartage of fill material. Material for backfill will be delivered daily, and is not expected to create a greater than the ordinary working day, disturbance to traffic movement.

3.4.2 Stormwater Drainage

A drainage system for the immediate area is a natural collection and disposal area for stormwater and surfacewater on the surrounding lands. There is no engineered design Stormwater Drainage in the area, although two natural streams in the District (Betela and Akaoa) channel surface water to the lagoon (see map below).

An existing culvert is improved to address storm water flow.



Figure 2.0 Drainage Channels Location

3.5 Waste Management

3.5.1 Character and Quantities of Waste Material

Waste material is not a product of the project. The project uses material from volcanic deposits, this material is used for the filling of land sections on the island.

The volume of material is free of harmful substances and does not contaminate water or soil, hence the reason for the use of this material.

Where building construction is concerned, Waste Management is addressed during the application process for construction, when relevant building permits are required by legislation. Liquid waste is approved by the Public Health through approved and licensed liquid waste treatment systems.

3.5.2 Solid Waste Disposal

Solid Waste materials are recommended to follow through with the recycle, reduce, reuse and refuse waste programme.

Solid waste (construction materials) is stockpiled onsite for use on small items relevant to the home, eg, bbq tables, and seating.

Household rubbish, organic rubbish, can be disposed onsite, with general awareness of public health regulations.

4.0 Environmental Values and Management of Impacts

4.1 Land

4.1.1 Description of Environment Values

The immediate area is developed with residential and agriculture properties. The property is occupied by an existing home on solid ground, and a portion of wetland calculated at 1040 square meters.

Wetlands provide a filtering system for the purpose of trapping nutrients and sediments. Wetlands through non-use of the land become unpleasant, due to overgrowth of vegetation and ponding of water that can cause unpleasant odours, and may cause mosquito breeding.

Wetlands are currently used for agriculture purposes, and when the land cannot be maintained for this purpose, landuse can be exchanged for residential use.

Landuse is changing as the country slowly adapts to the changing environment (economic, political, social) through development initiatives of government and the community.

4.1.1.1 Soils

Vaikai Soils form the wetlands in the area and those around the island. Vaikai Soils almost encircle the island. The upper A Horizon is dark brown to the lower G Horizon of consolidated clayey layers. Vaikai Soils are poorly drained, have a high water table with slow surface runoff. These soils do not influence erosion, although during continuous rainfall, wetlands become flooded for several days. Vaikai Soils provide food sources for animals, and a habitat for insects. The disturbance to this plot of land enables these animals and insect to seek shelter along the matrix of wetlands in the immediate area.

4.1.1.2 Landuse/Characteristics

Lands to the East of the property are wetlands, with inflow of surface water from the surrounding lands. Lands to the West are most likely used for agriculture planting, with remnants of plants and mud plains present during inspection of the area. Wetlands are primarily used for taro plantations, and today, acres of land remain dormant and undeveloped.

Adjacent properties to the East are maintained with taro plantation, in contrast to properties further to the East. These remain in wetland and covered in mature vegetation.



Figure 3.0 Landuse adjacent the Project Site

4.1.1.3 Landscape Character

The site is within an area of low depression, forming the wetlands in the Arorangi District. On either side of the wetlands are elevated lands used for dry land agriculture plantations and Residential Homes.

The wetland has not been used for over ten years, and due to the changing economic climate, landuse is chosen by the landowner for residential development.

It is assumed on completion of the proposal, landscaping and vegetation cover provide for habitats of species in the area. The property and adjacent properties create “patches” of developed land within an area dominated by wetlands. “Corridors” however exist to connect each separate patch, maintaining the habitat of existing wildlife.

4.1.2 Potential Impacts and Mitigation Measures

This section describes the objectives and practical measures for protecting or enhancing the land-based environmental values identified through observations and general knowledge noted in the previous section.

4.1.2.1 Landuse Suitability

The proposal site is offset from the Main Road, in an area of wetland. Agriculture plots are established in the area, with wetlands developed and other wetlands in mature vegetation.

The site in question was previously used for agriculture and has remained in vegetation for over ten years. Recent uses for this plot of land is additional water pollution, through tethering of domestic animals in the wetland.

In reflection of the current economic climate, the landowner has decided to improve the land through a new landuse for the property.

Potential environmental harm to adjacent areas is guided by existing legislation and community initiatives. Current new legislation by the Ministry of Health, National Environment Service, along with existing Community plans, policies and goals, provides for a guideline to preserve village customs, and the environment for the next generation.

This report follows these guidelines with Project Management, and through inspection by the relevant stakeholders.

4.1.2.2 Land Contamination

Land contamination is not a product of the project, due to the nature of the fill material. This material is used in the district for backfilling properties.

Contaminated land in the vicinity of the project cannot be proved, either from chemicals, or rejected materials.

Contamination is likely to occur from domestic animal waste, as domestic animals was noted to be tethered within the flood channels in the area.

4.2 Climate

The climatic factor that affects the proposal and the wider community is the cyclone season. Rainfall, flooding, wind speed and wind direction, can produce wide spread damage to the islands infrastructure and buildings during a cyclone. The frequency, magnitude and associated risks can cause widespread damage.

The proposal has considered flooding in the area. During heavy rainfall, the area become flooded, up to a level which suffocate and destroy mature taro crops. The area has slow drainage, with only two outlets, the Murivai Stream to the South, and the drainage system outlet at Arorangi School.

To climatic factor to affect wetlands is heavy rainfall, therefore flooding. There is no climatic factor that affects this proposal.

4.3 Water Resources and Quality

4.3.1 Description of Environmental Values

Ground water is located at depth and can be contaminated by nutrients from several sources to include:

- I. agriculture chemicals from inland plantations
- II. animal wastes
- III. sub-standard sewage treatment systems

All forms of nutrients travel through surface water channels and underground streams, to reach the lagoon environment.

Nutrients become trapped within the soil phase, together with soil particles (sediment) loosened by rain. However, larger amounts of nutrients, sediment and organic debris flow into the lagoon and ocean through open streams.

Environmental values are protected through existing wetlands in surrounding areas adjacent the property.

4.3.2 Potential Impacts and Mitigation Measures

The amount of water falling on the site generally flows into the wetland depressions. Properties in surrounding lands have the same outcome concerning surface water.

Surface water is treated by the soil phase, prior to reaching the water table. All nutrients entering the soil phase are treated to the minimum level. Higher treatment options involve the removal of nutrients to a minimum level that is less harmful to the environment.

4.4 Air

4.4.1 Description of Environmental Values

Air within the area does not contain harmful substances. Apart from machinery exhaust fumes, there is no direct contamination to air quality from the proposal.

4.4.2 Potential Impacts and Mitigating Measures

Air quality can be reduced through ensuring machinery are fitted with a Warrant of Fitness, that comply with regulations of foul air emission.

4.5 Waste

4.5.1 Description of Environmental Values

Wastes from the construction project are nil.

Soils can be used on the property as fill material along the banks of wetlands, and it does not need to be carted away. The Landowner is consulted for use of the materials as flood bank protection.

4.5.2 Potential Impacts and Mitigating Measures

Solid waste disposal onsite, will follow the four R waste principle of Reuse, Recycle, Reduce, Refuse.

Solid waste is packaged and placed by the roadside for collection by private contractors during the operation phase.

4.6 Noise and Vibration

4.6.1 Description of Environmental Values

Occupational Health and Safety principles apply during the construction phase. As previously identified, a limited number of machinery is required to spread and compact fill material.

The noise level will be audible, however due to the interior location, residential homes will not be affected. Machinery noise will be audible, although not considered to be harmful due to the short duration of the project.

4.6.2 Potential Impacts and Mitigating Measures

Machinery must be checked on a daily basis to ensure safety of operation. Noise reduction devices must be fitted, and ensure the machinery possess a warrant of fitness for safety operation.

Trucks carting fill material will be operational and is recommended to be fitted with noise reduction devices, to mitigate noise levels.

It is assumed the number of residents on adjacent lands will be working during the hours of construction.

4.7 Nature Conservation

4.7.1 Description of Environmental Value

Wetlands environmental value is the ability to trap nutrients and sediments from reaching the lagoon. The land in this proposal was previously used for the planting of taro, and has been dormant for over ten years.

Backfilling the property diminish available wetlands to trap nutrients and sediments, but not totally remove the ability of wetlands to trap nutrients.

Firstly:

1. Wetlands cover the area from Vaiakura to Rutaki, estimated at 4.3 hectares
2. Project site consist of 0.04 hectares
3. There are no rare species or vegetation in the area, or environmentally sensitive plants or weeds

4.7.1.1 Terrestrial Flora and Fauna

Plants exist to absorb water, and to hold soil particles together. Various plant species exist in the wetlands. Plants found in this environment are; water grass *mauku-angai-puaka*, and beach hibiscus *au*.

These plants have cultural value, where the water grass is used as food for the domestic pig. While the beach hibiscus branch and leaves are used domestically for various purposes.

The dominate grass is water grass, with other grass species considered as weeds.

4.7.1.2 Aquatic Biology

An Aquatic survey was not conducted and is assumed to be similar to all wetlands. The wetlands of the area have a very low gradient which during cyclonic events, prevent rapid flow of water, hence flooding occur in the area. Although reports are available and studies performed, little data can be translated from the scientific names used. Therefore, species identification is limited, and identified using Maori names, followed by the scientific name.

True freshwater Fish and Crustacean can be identified to exist in most streams on the island. The Fish is identified as “Tuna Maori” *Anguilla obscura*, found in lowland swamps and ponds. The species are not endemic to Rarotonga, but is known to habitat taro plantations when looked after for cultivation.

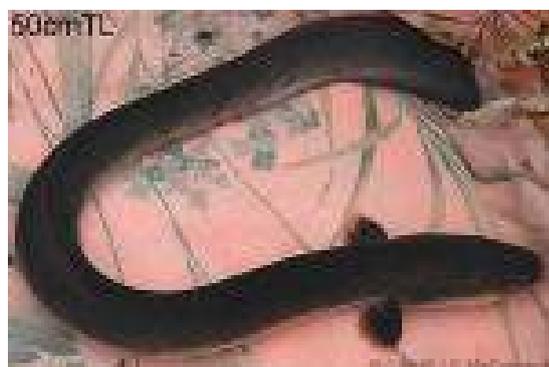


Figure 4.0 Aquatic Species, Tuna Maori

4.7.2 Potential Impacts and Mitigating Measures

Because the fill material is volcanic origin, there is low impact upon species. The species identified above (Tuna Maori) require water and plant cover as their home. These two factors identify the habitat for biological species in the area. Vegetation on the stream banks and surrounding properties serve to maintain and provide a habitat for the identified species.

4.8 Cultural Heritage

4.8.1 Description of Environmental Values

Modern society has altered the daily lifestyles of the community, through the adoption of western culture and practices, nevertheless, traditional culture persist through customary practices and national cultural events held each year.

A large percentage of the area remain in wetland, providing a habitat for freshwater species, food for domestic animals and wood for outdoor activities such as open fire cooking. The cultural importance is the wetlands, used for the planting of Taro.

Although small portions of wetlands remain dormant, traditional values of farming persist to maintain the agricultural production of taro, either through wetland production or dryland production, among other root crops such as kumara, maniota and meika.

4.8.2 Potential Impacts and Mitigation Measures

The impacts on the cultural heritage can be viewed from developments in the area.

Development has altered the lifestyle on the island through modern homes, food and new technology. Cultural values remain within each village, and change slowly with the modern world.

Village policies and goals maintain some aspect of cultural heritage, through church services and arts and crafts.

4.9 Social

4.9.1 Description of Environmental Values

Infrastructure and services, road traffic, will be affected by the increase in building developments on the island, whether Residential, Commercial or Industry.

During the construction phase, infrastructure and services provide for the construction of the project to be achieved.

1. It is normal practice to install Traffic signs informing drivers using the access road, of the project ahead, this project is no different from other construction projects
2. Noise and dust is a factor of machinery operation, and project management. Machinery are checked and fitted with low emission noise filters, with dust nuisance mitigated through medium spraying of low quality water to dampen soil
3. Recreational, Cultural Sites and Sports Facilities is not affected by the project

4.9.2 Potential Impacts and Mitigation Measures

The project is a positive for the community, exchanging unproductive native land for clean and tidy surroundings, providing employment, vehicle services, for the community.

The project is filling of wetland, and future construction of a home. Therefore, Social Impacts can be best put to the public for their responses. Negative and positive responses are received through the 30 day consultation period, providing for the public opinion on the project. The public response, enable the REA to reach a decision on the project.

4.10 Health and Safety

4.10.1 Description of Environmental Values

Construction of the project follows Civil Engineering practices, whereby all construction projects follow acceptable standards and procedures.

In addition to road signage, fencing the site provides security, along with placement of cones around the work area assisting to protect the construction site, and the public. The community is therefore warned and aware of construction activity in the area.

4.10.2 Potential Impacts and Mitigation Measures

Once construction signage and cones are installed, it is a signal to motorists to be aware that they are entering a construction zone. Careful driving by slowing down is essential in preventing vehicle accidents.

All machinery must be checked for compliance relating to noise pollution, and warrant of fitness. Where the site is dry, it will be necessary to provide for a water spray truck to wet soil particles and prevent dust forming.

4.11 Economy

4.11.1 Description of Environmental Values

The economic environment is assumed to be healthy, with the building projects on the increase, and several government projects in progress.

There is also the steady number of visitors, indicated by the increased number of flight arrivals per week.

4.11.2 Potential Impacts and Mitigation Measures

The proposal provides firstly a second home for the family, and secondly, an income source, when the home is put to rental for visitors to our shores.

The wider community receives an income, through trade at the local stores, and possible rental transport from service providers.

4.12 Hazards and Risks

4.12.1 Description of Environmental Values

Construction of the project follows Civil Engineering practices, to include the construction procedure. Backfilling of the wetland is guided by engineering methods, with experienced Contractors familiar with the work procedure. It is assumed there is no Hazard or Risks associated with this project.

4.12.2 Potential Impacts and Mitigation Measures

There are always risks associated with any project, and for this project, the presence of onlookers.

However, potential impacts are reduced through following safety precautions identified; signage, cone barrier, fencing of the site, to mitigate hazard and risks associated with construction projects.

The proposal has low risk during the construction, where all stages of the proposal is regulated and supervised, and the employment of experienced Contractors familiar with the task.

There is no risk to possible onlookers, as everyday is a working day for everyone.

4.13 Erosion Control

4.13.1 Description of Environmental Values

Placement of fill material increases the amount of solid fill and changes the property landuse into residential use.

The compacted backfill material provides a level surface, and with grass growth, retains soil particles on the site, thus preventing erosion.

4.13.2 Potential Impacts and Mitigation Measures

Erosion is a direct response to heavy continuous rain, over a 24 hour period. Erosion is noticeable along the main streams on the island, where water speed (velocity) is greatest, to loosen soil particles exposing the land to more erosion.

The project site is low in elevation, where water flow is less than one meter per second. The property is used for flood control, and does not cause erosion.

The existing culvert crossing the access road is improved to manage the flood water of the property.

5.0 Environmental Management Plan (EMP)

1.0 Introduction

The Environmental Management Plan (EMP) is developed to address and manage environmental aspects and impacts (biological, physical, social, cultural, economic) that may be affected.

1.1 Purpose of the document

The purpose of the document is to:

- Outline guidelines for the construction and management of the project for sound management of environmental issues relating to the execution of all works during construction, and the operation phase of the project.
- Identify impacts and provide mitigating measures to adverse impacts.
- Reduce environmental impact through sound and effective management practices.

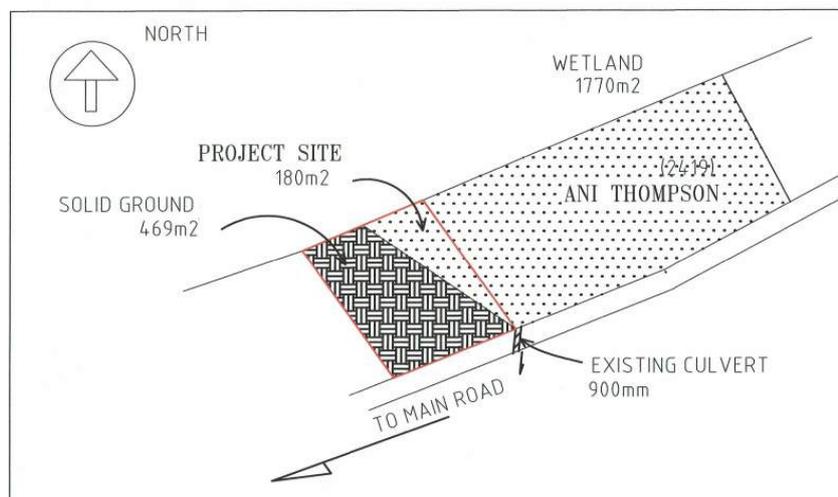
1.2 Scope of Works

The project involves backfilling of wetland to provide a platform for future residential home construction. The property is adjacent the access road with adjacent lands wetlands, to the East and West.

Activities comprise of the following during the construction.

Construction

- spread backfill material over the site and grade material to the boundary edge
- improve existing culvert to manage the passage of water across the access road as indicated on the Project Site Plan below.
- grade backfill surface to the West to merge with Solid Ground



PROJECT SITE PLAN

1.3 Stakeholders

- Ani Thompson
- National Environment Service
- Arorangi community

2.0 Potential Environmental Issues start here,

2.1 Key Issues

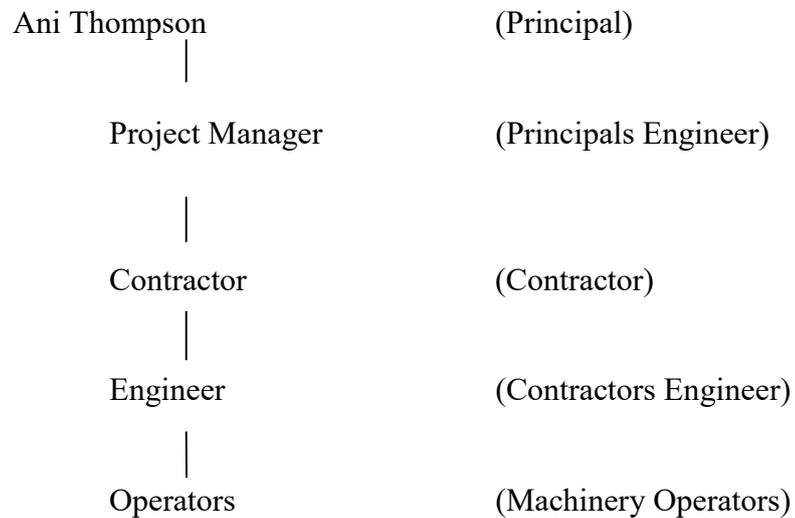
The following key issues associated with this project are:

- Land
- Climate
- Water Resources and Quality
- Air
- Waste
- Noise and Vibration
- Nature Conservation
- Cultural Heritage
- Social
- Health and Safety
- Economy
- Hazards and risk
- Erosion Control

3.0 Environmental Management Procedures

3.1 Management Structure

The management structure for the project consists:



3.2 Monitoring and Reporting

Monitoring is an essential part of the EMP as it establishes the projects performance against set objectives. A schedule for monitoring and reporting must be developed at the outset to:

- Identify any negative impacts
- Assess the effectiveness of control measures
- Demonstrate compliance with regulatory conditions
- Identify necessary corrective action

Monitoring of the project is required to ensure proper management of the site during the operation phase. It safeguards the project, the community, and stakeholders from irreversible impacts.

In addition, monitoring is required as a result of a complaint.

3.3 Complaints

Complaints provide a valuable feedback mechanism, and assist to minimize potential impacts, allowing project practices to be refined and improved.

All complaints are to be directed to the Proponent who shall maintain a complaints register. A copy is then forwarded to the approval authority (REA), to keep all Stakeholders informed. An initial response to the complaint will be provided within 24 hours of receiving the complaint by the Proponent, and copied to Stakeholders. Any complaint not satisfactorily resolved, is decided at a combined meeting of Stakeholders.

3.4 Inspections

Inspection is required on a daily basis by the approval authorities, to ensure activities comply with permit approval.

Stakeholders are also expected to monitor the project closely.

3.5 Working Hours

Construction working hours for the project will be daily until completion of the project estimated to be within 5 days. Daily hours of work will be 8 hours per day. Working hours are to be finalized between the Proponents and service providers, and is assumed to be Monday to Friday at 8am to 4pm.

4.0 Environmental Management Plan

Based upon the Environment Issues and Environment Management Structure listed above, the following Table 1.0 provides an Environmental Management Plan for the proposal.

TABLE 1.0 Environmental Management Plan

Issue	Activity	Potential Impact	Monitoring/Reporting	Mitigation
Land	Backfill area of wetland, improve existing drainage	Manage operation daily, road signs construction cones	Maintain boundary limits	Supervision performed on a daily basis. Seal off surface by daily rolling of fill materials
Climate	Drainage channel	Construction activity performed during fine weather only	Check that drainage channels are clear of obstructions, to enable water flow	Clear drains regularly allowing free water flow channels
Water resource and quality	Backfill material use quarry waste material	Contamination of fill material, leaks from machinery faults	Fill materials checked for contamination, non-compliance of machinery with faulty operation	Daily site inspection of materials and machinery onsite
Air	Quality	Machinery Warrant Of Fitness fitted to all plant	Note exhaust fumes, fuel and oil leakage	All faulty machinery to be repaired, and fitted with Warrant Of Fitness
Waste	Solid waste	Excess backfill material to be removed	Remove littering of surrounding lands from project materials	Estimate quantities required, no excess materials onsite
Noise and Vibration	Machinery	Work to proceed within working hours	Ensure noise reduction devices fitted	Ensure machinery is fitted with Warrant Of Fitness

Nature Conservation	Improvement of vacant land, provide drainage	Backfill of wetland with volcanic material	Provide solid ground for residential purposes	Migration on terrestrial and aquatic animals to adjacent wetlands through open drain, and culvert
Cultural Heritage	Wetland	Wetland is converted into clean and tidy section for future generations	Changing landscapes indicate development on the island	Environmental Impact Assessment required on all developments
Social	Backfilling of wetlands	Development of dormant land into Positive use of the land	Monitor project on a daily basis during backfill	Environmental Impact Assessment required on all developments
Health and Safety	Backfilling	Place construction signage and cones within construction site	Daily check on placement of construction signage	Employ professional and skilled workmen familiar with project
Economy	Backfill vacant land, Residential home construction	Enhancement of the vacant land, Construction of a residence	Provision of employment to the community, accommodation to tourists	Improvement of adjacent lands, community support
Hazards and Risk	Backfilling	Employ skilled contractors, ensure construction signage is positioned	Report all accidents major or minor	Construction methods to comply with Civil Engineering practices
Erosion Control	Stormwater drainage	Grade finished surface to drainage channels identified	Monitor project during wet weather	Clear drainage system regularly

6.0 References

Environment Act 2003

MFEM Migration Statistics July 2016

NEMS 1993

Rarotonga Environment Policy on Wetlands, Island Friends Limited August 2002

APPENDIX A1: Terms of Reference

TERMS OF REFERENCE (TOR) FOR AN ENVIRONMENTAL IMPACT
ASSESSMENT (EIA) REPORT

ANI THOMPSON – BACKFILLING OF A WETLAND.

VIAKURA PART SECTION 94D1

**BETERA TAPERE,
ARORANGI DISTRICT**

Table of Contents:

Part A. Information and Advice on the preparation of the EIA.

1. Introduction
2. EIA Objectives
3. Stakeholder Consultation
4. General EIA Format

Part B. Content of the EIA.

Executive Summary

Glossary of Terms

1. Introduction

- 1.1 Proposal Proponent
- 1.2 Proposal Description
- 1.3 Proposal Objectives and Scope
- 1.4 Environmental Impact Assessment (EIA) Process
 - 1.4.1 Methodology of the EIA
 - 1.4.2 Objectives of the EIA
 - 1.4.3 Submissions
- 1.5 Public Consultation Process
 - 1.5.1 Relevant Legislation and Policy Requirement
 - 1.5.2 Planning Process and Standards

2. Proposal Need and Standards

- 2.1 Proposal Justification
- 2.2 Alternatives to the Proposal

3. Description of the Proposal/Development

- 3.1 Location
- 3.2 Staging
- 3.3 Emergency Management
- 3.4 Infrastructure Requirement
 - 3.4.1 Transport
 - 3.4.2 Storm Water Drainage

4. Environmental Values and Management of Impacts

- 4.1 Land
 - 4.1.1 Description of Environment Values
 - 4.1.1.1 Soils
 - 4.1.1.2 Landuse/Characteristics
 - 4.1.1.3 Landscape Character
 - 4.1.2 Potential Impacts and Mitigation Measures
 - 4.1.2.1 Landuse Suitability
 - 4.1.2.2 Land Contamination

4.2 Climate

4.3 Water Resources & Quality

- 4.3.1 Description of Environmental Values
- 4.3.2 Potential Impacts and Mitigation Measures

4.4 Air

4.4.1 Description of Environmental Values

4.4.2 Potential Impacts and Mitigation Measures

Terms of Reference for an Environment Impact Assessment Report

4.5 Waste

4.5.1 Description of Environmental Values

4.5.2 Potential Impacts and Mitigation Measures

4.6 Noise and Vibration

4.6.1 Description of Environmental Values

4.6.2 Potential Impacts and Mitigation Measures

4.7 Nature Conservation

4.7.1 Description of Environmental Values

4.7.1.1 Terrestrial Flora & Fauna

4.7.1.2 Aquatic Biology

4.7.2 Potential Impacts and Mitigation Measures

4.8 Cultural Heritage

4.8.1 Description of Environmental Values

4.8.2 Potential Impacts and Mitigation Measures

4.9 Social

4.9.1 Description of Environmental Values

4.9.2 Potential Impacts and Mitigation Measures

4.10 Health and Safety

4.10.1 Description of Environmental Values

4.10.2 Potential Impacts and Mitigation Measures

4.11 Economy

4.11.1 Description of Environmental Values

4.11.2 Potential Impacts and Mitigation Measures

4.12 Hazards and Risk

4.12.1 Description of Environmental Values

4.12.2 Potential Impacts and Mitigation Measures

4.13 Erosion Control

4.13.1 Description of Environmental Values

4.13.2 Potential Impacts and Mitigation Measures

5. Environment Management Plan (EMP)

6. References

7. Recommended Appendices

A1 Final TOR for this EIA

A2 Final Project Design/Drawings

A3 Study Team

A4 Consultation Report

A5 Specialist Studies

A6 Contacts

Part A. Information and Advice on the preparation of the EIA.

1. Introduction

This document forms the Terms of Reference (TOR) for an Environmental Impact Assessment Report (EIA) for a residential development. The objective of the TOR is to identify those matters that should be addressed in the EIA report. The TOR is based on the outline of the proposed proposal given as part of the application and also the National Environment Service's (NES) own assessment of the project site.

In order to clarify the nature and level of investigations that are envisaged in the TOR, the proponent may consult further with relevant stakeholders, ie.

Government representatives and authorities, community interest organisations and groups to participate in the process especially during the preparation of the EIA to ensure that all matters as conveyed in the TOR are addressed.

An executive summary should be provided in the EIA and be able to be provided separately for public information.

2. EIA Objectives

The objective of the EIA is to identify potential environmental, social and economic impacts of the proposal and to ensure that adverse impacts are avoided where possible. Consistent with this objective, the EIA should be a self-contained and comprehensive document containing sufficient information to make an informed decision on the potential impacts. This document should provide:

- *for interested bodies and persons*: a basis for understanding the proposal, alternatives and preferred solutions, the existing environment that would be affected, both on and off the site, the impacts that may occur, and the measures to be taken to mitigate all adverse impacts.
- *for groups or persons with rights or interests in land*: an outline of the effects of the proposed proposal on that land, including access arrangements.
- *for government decision makers*: a framework against which decision-makers are able to consider the environmental aspects of the proposed proposal in view of legislative and policy provisions and provide sufficient information to decide whether the proposal can proceed; OR as appropriate, set conditions for approval to ensure environmentally sound development and, where required by legislation, recommend an environmental management and monitoring program.
- *for the proponent*: a definitive statement of measures or actions to be undertaken to minimise any adverse impacts during and following the Terms of Reference for an Environment Impact Assessment Report Implementation of the proposed proposal. A draft Environmental Management Plan (EMP) that describes acceptable impacts and environmental management strategies to agreed performances criteria is the recommended means of achieving this objective.

The proponent is required to address the TOR to the satisfaction of the National Environment Service and the completion of the EIA does not mean that the proposal will necessarily be approved.

The EIA should be a standalone document and it should contain sufficient information and other appended studies/surveys to avoid the need to retrieve previous reports.

3. Stakeholder Consultation

To facilitate the assessment process, the proponent is strongly encouraged to regularly consult with relevant/appropriate stakeholders throughout the EIA process.

It is the responsibility of the proponent, in consultation with appropriate stakeholders, to identify legislation, policies and methodologies relevant to the EIA process, and to determine the appropriate parts of the community to be consulted. Copies of the EIA shall be provided to the community and, on request, to relevant individuals with an interest in the proposal.

4. General EIA Format

The EIA should be written in a format matching the TOR. The EIA must include appendices containing at least the following:

- a copy of this TOR
- a list of persons and agencies consulted during the EIA with their contacts
- the names of, and work undertaken by, all personnel involved in the preparation of the EIA.

Maps, diagrams and other illustrative material should be included in the EIA. The EIA should be produced on A4 size paper capable of being photocopied, with maps and diagrams on A4 or A3 size. An electronic copy of the EIA should also be submitted to the National Environment Service for display on the NES website during the consultation period of the project Terms of Reference for an Environment Impact Assessment Report

Part B. Content of the EIA.

(It is strongly recommended that the Environmental Impact Assessment (EIA) Report follow the heading structure of the Terms of Reference (TOR))

EXECUTIVE SUMMARY

The Executive Summary should be written as a stand alone, able to be reproduced on request and distributed to interested parties who may not wish to read or purchase the EIA as a whole. The structure of the Executive Summary should generally follow that of the EIA but focus on key issues to enable the reader to obtain a clear understanding of the proposal and its potential adverse and beneficial environmental, social and economic impacts and the management measures to be implemented by the proponent to mitigate all residual impacts. The Executive Summary must include:

The Executive Summary must include:

- the title of the proposal;
- name and contact details of the proponent, and a discussion of previous projects undertaken by the proponent and their commitment to effective environmental management;
- a concise statement of the aims and objectives of the proposal;
- the legal framework, decision-making authorities and advisory agencies;
- an outline of the background to and need for the proposal, including the consequences of not proceeding with the proposal;
- an outline of the alternative options considered and reasons for the selection of the proposed development option;
- a brief description of the proposal (pre-construction, construction and operational activities) and the existing environment, utilising visual aids where appropriate;
- an outline of the principal environmental impacts predicted and the proposed environmental management strategies (including waste minimisation and management) and commitments to minimise the significance of these impacts.

GLOSSARY OF TERMS

A glossary of technical terms, acronyms and abbreviations should be provided.

1. INTRODUCTION

The function of the introduction is to explain why the EIA has been prepared and what it sets out to achieve. In particular, the introduction should address the level of detail of information required to meet the level of approval being sought (for example, whether the proponent is seeking only a preliminary approval or a full approval from NES).

1.1 Proposal Proponent

Provide details of the proposal proponents, including details of any joint venture, if any. Terms of Reference for an Environment Impact Assessment Report

1.2 Proposal Description

A brief description of the key elements of the proposal should be provided and illustrated. Any major associated infrastructure requirements should also be summarised. A brief description should be provided of studies or surveys that have been undertaken for the purposes of developing the proposal and preparing the EIA. This should include reference to relevant baseline studies or investigations undertaken previously.

1.3 Proposal Objectives and Scope

A statement of the objectives which have led to the development of the proposal and a brief outline of the events leading up to the proposal's formulation, including alternatives, envisaged time scale for implementation, anticipated establishment costs and actions already undertaken within the proposal area. Describe the current status of the proposal and outline the relationship of the proposal to other developments or actions that may relate whether or not they have been approved. The consequences of not proceeding with the proposal should also be discussed.

1.4 Environmental Impact Assessment (EIA) Process

The purpose of this section is to make clear the methodology and objectives of the environmental impact assessment under the relevant legislation.

1.4.1 Methodology of the EIA

This section should provide a description of the EIA process steps, timing and decisions to be made for relevant stages of the proposal. This section should also indicate how the consultation process (which will be described in detail in section 1.5) would integrate with the other components of the impact assessment, including the stages, timing and mechanisms for public input and participation.

The information in this section is required to ensure:

- that relevant legislation is addressed;
- readers are informed of the process to be followed;
- that stakeholders are aware of any opportunities for input and participation.

1.4.2 Objectives of the EIA

While the TOR provides guidance on the scope of the information requested for the proposal, the TOR should not be seen as exhaustive or limiting. It is important for proponents and their consultants to recognise that there cannot be perfect knowledge in advance of undertaking an EIA of what the EIA studies may find. In addition, it is essential that the main text of the EIA should address all relevant matters concerning environmental values, impacts on those values and proposed mitigation measures. No relevant matter should be raised for the first time in an appendix or the draft environmental management plan (EMP). Terms of Reference for an Environment Impact Assessment Report

The EIA is a public document. Its purpose is not only to provide information to regulatory agencies, but also to inform the public of the scope, impacts and mitigation measures of the proposal. As such the main text should be written in plain English avoiding jargon as much as possible. Additional technical detail may be provided in appendices. The main text should not assume that a reader would have a prior knowledge of the proposal site. It should not be necessary for the reader to have visited the site to understand the issues involved in the proposal. In brief, the EIA objectives should be to provide public information on the need for and likely effects of the proposal, to set out acceptable standards and levels of impacts (both beneficial and adverse) on environmental values, and demonstrate how environmental impacts can be managed through the protection and enhancement of the environmental values. Discussion of options and alternatives and their likely relative environmental management outcomes is a key aspect of the EIA. The role of the EIA in providing the proposal's draft EMP should also be discussed, with particular reference to the EMP's role in providing management measures that can be carried over into conditions that would be attached to NES approval.

1.4.3 Submissions

The reader should be informed as to how and when public submissions on the EIA will be addressed and taken into account in the decision-making process.

1.5 Public Consultation

It is recommended that an open community consultation process be carried out in addition to the legislated environmental impact assessment process. Copies of the draft EIA will be provided to all relevant stakeholders and individuals with an interest in the proposal.

Public consultation should commence as early as possible especially in the Betela Tapere and should be comprehensive and promote discussion on all aspects of the proposal including strategic decision making and design. It may include interviews with individuals, public meetings, interest group meetings, production of regular summary information and updates, and other consultation mechanisms to encourage and facilitate active public consultation.

The public consultation process should identify broad issues of concern and provide information to local community and specific interest groups. Consultation should have a specific focus on impact identification and mitigation of adverse social, economic and environmental issues, and it should directly inform all other relevant components of the EIA (particularly social impact analysis).

Details of the public consultation process and the major issues emerging from that process should be clearly addressed in the EIA. The consultation process should be integrated with the social assessment component of the Terms of Reference for an Environment Impact Assessment Report EIA. Matters which become apparent through the consultation process such as community conflict or concerns which derive from fears about impacts from the proposal on the natural environment should be included in the social impact assessment section of the EIA.

1.5.1 Relevant Legislation and Policy Requirement

This section should explain the legislation and policies controlling the approval process. Reference should be made to the Environment Act 2003 and other relevant Cook Islands laws relevant to the proposal.

This information is required to assess how the legislation applies to the proposal, which agencies have jurisdiction, and whether the proposed impact assessment process is appropriate

1.5.2 Planning Process and Standards

This section should discuss the proposal's consistency with existing land uses or long-term policy framework for the area, if any, and with legislation, standards, codes or guidelines available to monitor and control operations on site.

2. PROPOSAL NEED AND STANDARDS

2.1 Proposal Justification

The justification for the proposal should be described, with particular reference made to the economic and social benefits, including employment and spin-off business development, which the proposal may provide.

2.2 Alternatives to the Proposal

This section should describe feasible alternatives especially in terms of the sites and designs. For example if the Betela Community are not in favour of the proposed site, will there be any alternative site for the project OR are there any alternative designs if the community asked for other alternative designs? Such alternatives, if any, should be discussed in sufficient details to enable full understanding of such options.

3. DESCRIPTION OF PROPOSAL/DEVELOPMENT

3.1 Location

This section should describe the local context of the proposal and associated infrastructure and illustrated on maps at suitable scales, including identification and potential impacts on surrounding land uses. Real property descriptions of the proposal site should be provided. This section shall also demonstrate how the proposal relates to the Betela Tapere and also the Island as a whole.

Maps should show the precise location of the proposal area and in particular the location and boundaries of land tenures, in place or proposed, to which the proposal area is or will be subject Terms of Reference for an Environment Impact Assessment Report The following information should be provided for all components of the proposal:

- distances to boundaries of land resumptions;
- slopes and elevations;
- site drainage and erosion controls;
- proposals for rehabilitation, if any;
- access arrangements, daily traffic generated, and internal roads.

3.2 Staging

Details of the likely staging of the proposal and timing of the staging are required, if any. A plan showing the likely sequencing of such development stages for the project should be incorporated and indicate the natural features to be retained during the stages and management measures to maintain the natural features during these stages.

The staging of the project should be described and illustrated showing approximate site boundaries, development sequencing and timeframes. The estimated numbers of people to be employed during the life of the project should also be provided.

3.3 Emergency Management

In relation to emergency management, provide:

- details of emergency management plans to be put in place during construction, including procedures and notifications;
- emergency access provisions;
- an assessment of the potential disruption to community utility networks (i.e., water, electricity);
- details as to any permanent and/or temporary road closures or vehicle limitations to existing public road access.

3.4 Infrastructure Requirement

This section should provide descriptions, with concept and layout plans, of requirements, if any, for constructing, upgrading or relocating all infrastructures required supporting the proposed development.

The matters to be considered include such infrastructure as roads (traffic), pedestrian pathways, and power lines and other cables, telecommunications, water etc.

3.4.1 Transport

Describe:

existing road infrastructure and all other infrastructure contained within the road reserves within of the site boundaries, including private roads and public roads which are expected to be used by construction employees especially for the transportation of materials to the site during construction and operational phases for each stage of development;

Terms of Reference for an Environment Impact Assessment Report Information should also be provided on road transportation requirements on public roads for each of the proposed stages, including:

Connectivity from the proposed development site to the existing main road. It is anticipated that the proposed scale of development will surely disrupt normal traffic movements at the Betela area;

The volume, composition (types and quantities), origin and destination of goods to be moved including construction materials, plant, wastes, hazardous materials , if any;

The volume of traffic generated by workforce personnel, visitors and service vehicles;

Details of vehicle traffic and transport of heavy and oversize indivisible loads (including types and composition);

Any alternate proposal for relocation or realignment of access to the project site which will surely be disrupted by heavy transportation during the construction process;

3.4.2 Storm Water Drainage

A description should be provided especially to any existing storm water drainage system in the area, refer to main drainage located on the main road. The EIA should indicate the sources of the drainage water, e.g. road and the potential quality and location of discharge to the lagoon.

Surface water runoffs will also collect on site especially at times of construction therefore will there be any new drainage to be done for that?

– storm water collection/drainage systems.

A detailed environmental management plan that sets out the framework for management and mitigation of environmental impacts including contingencies for managing system failures and incidents.

A description of any potential releases of contaminants, the environmental impacts and the actions that will be taken to prevent the likelihood of environmental harm.

3.5 Waste Management

3.5.1 Character and Quantities of Waste Materials

Provide an inventory of wastes, likely to be generated by the proposal and methods of disposal having regard to the best practice waste management strategies. In particular, identify proposals for waste avoidance, reuse, recycling, treatment and disposal in the appropriate sub-section below.

3.5.2 Solid Waste Disposal

In general terms describe the proposed location, site suitability, dimensions and volume of any landfill/disposal site requirements for solid wastes generated by the proposal. Terms of Reference for an Environment Impact Assessment Report

4. ENVIRONMENT VALUES AND MANAGEMENT OF IMPACTS

The functions of this section are to:

- Describe the existing environmental values of the area which may be affected by the proposal;
- Describe the potential adverse and beneficial impacts of the proposal on the identified environmental values. Any likely environmental harm on the environmental values should be described;
- Present environmental protection objectives and the standards and measurable indicators to be achieved;
- Examine viable alternative strategies for managing impacts. These alternatives should be presented and compared in view of the stated objectives and standards to be achieved. Available techniques, including best practice, to control and manage impacts to the nominated objectives should be discussed. This section should detail the environmental protection measures incorporated in the planning, construction, operations, decommissioning, rehabilitation and associated works for the proposal. Measures should minimise environmental harm and maximise socio-economic and environmental benefits of the proposal. Preferred measures should be identified and described in more detail than other alternatives.

This section should address all elements of the environment, such as land, water, coast, air, waste, noise, nature conservation, cultural heritage, social and community, health and safety, economy, hazards and risk, in a way that is comprehensive and clear. To achieve this, the following issues should be considered for each environmental value relevant to the proposal:

- Environmental values affected** — describe the existing

environmental values of the area to be affected.

- Impact on environmental values** — describe quantitatively the likely impact of the proposal on the identified;
- Monitoring programs** — describe the monitoring parameters, monitoring points, frequency, data interpretation and reporting proposals. Auditing programs: describe how progress towards achievement of the objectives will be measured, reported and whether external auditors will be employed. Include scope, methods and frequency of auditing proposed;
- Management strategies** — describe the strategies to be used to ensure the environmental protection objectives are achieved and control strategies implemented eg. continuous improvement framework including details of corrective action options, reporting (including any public

reporting), monitoring, staff training, management responsibility pathway, and any environmental management systems and how they are relevant to each element of the environment;

□ **Information quality** — information given under each element should also state the sources of the information, how recent the information is, how any background studies were undertaken (e.g. intensity of field work sampling), how the reliability of the information was tested, and what uncertainties (if any) are in the information

4.1 Land

4.1.1 Description of Environment Values

This section describes the existing environment values of the land area that may be affected by the proposal. It should also define and describe the objectives and practical measures for protecting or enhancing land-based environmental values, describe how nominated quantitative standards and indicators may be achieved, and how the achievement of the objectives will be monitored, audited and managed.

4.1.1.1 Soils

A soil profile for the surrounding Betela area should be conducted at a suitable scale, with particular reference to the physical and chemical properties of the materials that will influence erosion potential and storm water run-off quality. Information should also be provided on soil stability and suitability especially the proposed site.

4.1.1.2 Landuse/Characteristics

The EIA should provide a description of past and current land tenures and land uses of the site and surrounding areas, AND ALSO Maps at suitable scales showing existing land uses and tenures, and the proposal footprint, should be provided for the entire proposal area and surrounding land that could be affected by the development. The maps should identify areas of conservation value and areas in any locality that may be impacted by the proposal.

4.1.1.3 Landscape Character

This section should describe in general terms the existing character of the landscape that will be affected by the proposal.

The landscape character of the property and its surrounds should be described in the context of landscape ecology and incorporate the concepts of patch-corridor-matrix in describing the pattern of existing vegetation.

4.1.2 Potential Impacts and Mitigation Measures

This section defines and describes the objectives and practical measures for protecting or enhancing the land-based environmental values identified Terms of Reference for an Environment Impact Assessment Report through the studies outlined in the previous section. It should describe how nominated quantitative standards and indicators may be achieved, and how the achievement of the objectives will be monitored, audited and managed.

4.1.2.1 Landuse Suitability

The potential for the proposal to change existing and potential land uses on the site and adjacent areas should be detailed.

The potential environmental harm caused by the proposal on the adjacent areas currently used for nature conservation, agriculture, urban development, transport corridors, recreation, tourism, other business.

4.1.2.2 Land Contamination

The EIA should describe the possible contamination of land from aspects of the proposals including waste, irrigation with treated effluent, reject product/materials and spills at chemical and fuel storage areas.

The EIA should also address management of any existing or potentially contaminated land in addition to preventing and managing land contamination resulting from project activities.

4.2 Climate

This section should describe the rainfall patterns (including magnitude and seasonal variability of rainfall), air temperatures, humidity, wind (direction and speed) and any other special factors (e.g. temperature) that may affect air quality within the proposed project site. Extremes of climate (droughts, floods, cyclones, etc) should also be discussed with particular reference to water management at the proposal site, including flooding and rainfall-shortfall affecting water supply. The vulnerability of the area to natural or induced hazards, floods should also be addressed. The relative frequency, magnitude and risk of these events should be considered, with particular relevance to the changing climatic conditions, ie, climate change.

The potential impacts due to climatic factors should also be addressed in the relevant sections of the EIA.

4.3 Water Resources & Quality

4.3.1 Description of Environmental Values

This section describes the existing environment for water resources & quality that may be affected by the proposal in the context of environmental values.

i.e. - **Surface waterways**

- **Groundwater**

- **General (temp, salinity, pH, clarity, BOD etc...)**

- **Turbidity of suspends solids**

- **Eutrophications (DO, N, P)**

- **Harmful or Toxic substances**

- **Sanitation (Coliform, E Coli)**

Terms of Reference for an Environment Impact Assessment Report

4.3.2 Potential Impacts and Mitigation Measures

This section is to assess potential impacts on water resource environmental values identified in the previous section. It will also define and describe the objectives and practical measures for protecting or enhancing water resource environmental values, to describe how nominated quantitative standards and indicators may be achieved, and how the achievement of the objectives will be monitored, audited and managed.

Water management controls should be described, addressing surface and groundwater quality, quantity, drainage patterns and sediment movements. The beneficial (environmental, production and recreational) use of nearby surface and groundwater should be discussed, along with the proposal for the diversion of affected creeks and the stabilisation of those works. Monitoring programs should be described which will assess the effectiveness of management strategies for protecting water quality during the construction and operation of the proposal.

Avoid loss of construction materials to water - Adopt work practices which minimise work over water

Prefabricate off-site as far as is practicable

Prevent the deposition of materials through wind action by maintaining a clean site, fixing materials down where necessary and recovering debris

4.4 Air

4.4.1 Description of Environmental Values

This section describes the existing air environment that may be affected by the proposal. Reduction of Potential Air Pollution by ensuring that the pollution of air is minimised

4.4.2 Potential Impacts and Mitigation Measures

This section defines and describes the objectives and practical measures for protecting or enhancing environmental values for air, to describe how nominated quantitative standards and indicators may be achieved, and how the achievement of the objectives will be monitored, audited and managed. Information should be submitted on the use of new technologies and planning responses such as residential densities, public transport options, etc to reduce air emissions arising from the proposal.

4.5 Waste

4.5.1 Description of Environmental Values

This section should complement other sections of the EIA by providing technical details of waste treatment and minimisation, with proposed emission, discharge and disposal criteria, while other sections describe how those emissions, discharges and disposals would impact on the relevant environmental values.

The purpose of this format is to concentrate the technical information on waste management into one section in order to facilitate its transfer into the EMP.

Ensure that waste is stored and disposed of appropriately, with minimum impacts on the environment Terms of Reference for an Environment Impact Assessment Report

4.5.2 Potential Impacts and Mitigation Measures

This section defines and describes the objectives and practical measures for protecting or enhancing environmental values from impacts by wastes, describes how nominated quantitative standards and indicators may be achieved for waste management, and how the achievement of the objectives will be monitored, audited and managed.

This section should assess the potential impact of all wastes to be generated and provide details of each waste in terms of:

- on-site treatment methods proposed for the wastes ;
- methods of disposal (including the need to transport wastes off-site for disposal) proposed to be used for any trade wastes, liquid wastes and solid wastes;

- the potential level of impact on the surrounding community due to nuisance;
- proposed discharge/disposal criteria for liquid and solid wastes;

Plan works to minimise the waste of materials

Reuse old materials suitable for other uses where possible

- Recycle waste where possible
- Store waste from ablution facilities appropriately (eg in tanks)
- Store waste in enclosed bins with no exposure to the elements
- Avoid large stockpiles of materials on site
- Avoid overloading bins
- Avoid storing waste on site for long periods of time
- Provide sufficient recycling and waste bins on site
- Use licensed contractors for the disposal of waste
- Dispose of waste on a regular basis or as needed
- Maintain records of disposal times and contractors

4.6 Noise and Vibration

4.6.1 Description of Environmental Values

This section describes the existing environment values that may be affected by noise and vibration from the proposal. The area will surely be affected by the noise especially from the heavy machinery during construction.

4.6.2 Potential Impacts and Mitigation Measures

This section defines and describes the objectives and practical measures for protecting or enhancing environmental values from impacts by noise and vibration, describes how nominated quantitative standards and indicators may be achieved for noise and vibration management, and how the achievement of the objectives will be monitored, audited and managed.

The likely noise impacts upon existing residents from both construction of the proposal should be detailed. Transport and access requirements to and from the site should be detailed. The likely impacts of new development on existing transport infrastructure should be investigated. Terms of Reference for an Environment Impact Assessment Report

A discussion should be provided of measures to prevent or minimise environmental nuisance and harm.

- Management of equipment and machinery - Use machinery and equipment with minimal noise output levels

Fit all machinery with appropriate noise reduction equipment

- Avoid disturbance to local residents, workers and recreational users - Restrict access to the site during works which cause high level noise impact. Prepare a noise and vibration hazard plan

Maintain levels of noise and vibration to a level of acceptance.

4.7 Nature Conservation

4.7.1 Description of Environmental Values

This section describes the existing environmental values for nature conservation that may be affected by the proposal.

Describe the environmental values of nature conservation significance for the affected area in terms of:

- integrity of ecological processes, including habitats of rare and threatened species or geographically restricted, locally endemic or scientifically significant species or populations;
- conservation of resources;
- biological diversity, including habitats of rare and threatened species or geographically restricted, locally endemic or scientifically significant species or populations;
- integrity of landscapes and places including wilderness and similar natural places;
- aquatic and terrestrial ecosystems in terms of the Biodiversity.

A discussion should be presented on the nature conservation values of the areas likely to be affected by the proposal. The flora and fauna communities which are rare or threatened, environmentally sensitive localities including waterways, riparian zone, and littoral zone, rainforest remnants, old growth indigenous forests, wilderness and wildlife corridors should be described. The description should include a plant species list, a vegetation map at appropriate scale and an assessment of the significance of native vegetation, from a local perspective. The EIA should identify issues relevant to sensitive areas, or areas, which may have, low resilience to environmental change. Areas of special sensitivity include wetlands, wildlife breeding or roosting areas.

The occurrence of pest plants/weeds and animals in the project area should be identified to prevent and contain the spread and movement of declared weeds and pest animals onto and from the development site. Terms of Reference for an Environment Impact Assessment Report

4.7.1.1 Terrestrial Flora & Fauna

Sensitive or important vegetation types should be highlighted and their value as habitat for fauna and conservation of specific rare floral community types. The existence of rare or threatened species should be specifically addressed, including the existence of any listed threatened species.

The terrestrial vegetation communities within the affected areas should also be located or mapped.

- Any plant communities of cultural, commercial or recreational significance should be identified;
- Location and abundance of any exotic or weed species.

4.7.1.2 Aquatic Biology

A biota surveys/studies of the project site be conducted unless there was previous studies done with reports made available for the EIA.

The description of the fauna and flora present or likely to be present in the area should include:

- fish species, mammals, reptiles, amphibians, crustaceans and aquatic invertebrates occurring in the waterways within the affected area, and/or those in any associated freshwater and marine environment;
- any rare or threatened marine species

4.7.2 Potential Impacts and Mitigation Measures

The EIA should address any actions of the proposal or likely impacts that will occur on the marine environment.

The potential environmental harm to the ecological values of the area arising from the construction and operation of the proposal including clearing, and the direct/indirect effects on marine lives should be discussed. Short-term and long-

term effects should be considered with comment on whether the impacts are reversible or irreversible. Mitigation measures and/or offsets should be proposed for adverse impacts.

4.8 Cultural Heritage

4.8.1 Description of Environmental Values

This section describes the existing cultural heritage values that may be affected by the proposal. Describe the environmental values of the cultural landscapes of the affected area in terms of the physical and cultural integrity of the landforms. A cultural heritage study of the area may be required.

4.8.2 Potential Impacts and Mitigation Measures

This section defines and describes the objectives and practical measures for protecting or enhancing cultural heritage environmental values, describes how nominated quantitative standards and indicators may be Terms of Reference for an Environment Impact Assessment Report achieved for cultural heritage management, and how the achievement of the objectives will be monitored, audited and managed.

4.9 Social

4.9.1 Description of Environmental Values

This section describes the existing social values that may be affected by the proposal and should also include future social benefits resulting from the proposal including increased access and mobility.

The social amenity and use of the proposal area and adjacent areas for recreational, industrial, educational, community and government, centres, residential and other relevant purposes should be described. Consideration should be given to:

- Community infrastructure and services, access and mobility;
- Description of how the environmental impacts (noise, dust, water quality, waste treatment etc) of any onsite accommodation, during construction, will be managed;
- Recreational, cultural, leisure, community and sporting facilities and activities in relation to the affected area.

4.9.2 Potential Impacts and Mitigation Measures

This section defines and describes the objectives and practical measures for protecting or enhancing social values, describes how nominated quantitative standards and indicators may be achieved for social impacts management, and how the achievement of the objectives will be monitored, audited and managed. The social impact assessment of the proposal should consider the information gathered in the community consultation program and the analysis of the existing socio-economic environment, and describe the proposal's impact, both beneficial and adverse, on the local community. The impacts of the proposal on local residents, community services and recreational activities are to be analysed and discussed.

4.10 Health and Safety

4.10.1 Description of Environmental Values

This section describes the existing community values for public health and safety that may be affected by the proposal. For proposals proposing air emissions, and/or those with the potential to emit odours, nearby and other potentially affected populations should be identified and described. Particular attention

should be paid to those sections of the population, such as children and the elderly, who are especially sensitive to environmental health factors. Consideration must also be given to health and safety aspects of erosion control structures and water storages or other structures that may impact on public health and safety especially for children in and near waterways and drainage infrastructure.

The protection of the health and safety of the public, is to ensure that the hazards and risk to public health and safety is minimised Terms of Reference for an Environment Impact Assessment Report

4.10.2 Potential Impacts and Mitigation Measure

This section defines and describes the objectives and practical measures for protecting or enhancing health and safety community values, describes how nominated quantitative standards and indicators may be achieved for social impacts management, and how the achievement of the objectives will be monitored, audited and managed.

The EIA should assess the effects on the proposal workforce of occupational health and safety risks and the impacts on the community in terms of health, safety, and quality of life from proposal operations and emissions. Any impacts on the health and safety of the community, workforce, suppliers and other stakeholders should be detailed in terms of health, safety, quality of life from factors such as air emissions, odour, dust and noise.

The protection of the health and safety of the public, is to ensure that the hazards and risk to public health and safety is minimised

Reduce the potential for risk to the health and safety of the public - Restrict access to the site through use of temporary fencing

Use signage to notify the public of works and nature of potential danger

Notification of residents of works

4.11 Economy

4.11.1 Description of Environmental Values

This section describes the existing economic environment that may be affected by the proposal. The character and basis of the local economy should be described including:

existing housing market, particularly rental accommodation which may be available for the proposal workforce, transportation etc.

economic viability (including economic base and economic activity, future economic opportunities)

The economic impact statement should include estimates of the opportunity cost of the proposal.

4.11.2 Potential Impacts and Mitigation Measures

The function of this section is to define and describe the objectives and practical measures for protecting or enhancing economic values, to describe how nominated quantitative standards and indicators may be achieved for economic management, and how the achievement of the objectives will be monitored, audited and managed.

4.12 Hazards and Risk

4.12.1 Description of Environmental Values

This section describes the potential hazards and risk that may be associated with the proposal. An analysis is to be conducted into the potential impacts of both natural and induced emergency situations and counter disaster and rescue procedures as a result of the proposal on Terms of Reference for an Environment Impact Assessment Report existing and proposed sensitive areas such as residential areas, water reserves, roads, places of residence and work, and recreational areas. The degree and sensitivity of risk should be detailed

4.12.2 Potential Impacts and Mitigation Measures

The EIA should define and describe the objectives and practical measures for protecting people and places from hazards and risk, describes how nominated quantitative standards and indicators may be achieved for hazard and risk management, and how the achievement of the objectives will be monitored, audited and managed. Storms and Sea surge may pose risks and procedures to minimise the impacts on the project.

4.13 Erosion Control

4.13.1 Description of Environmental Values

This section addresses the reduction of potential erosion of sand, soil and waterways by ensuring that works are managed to minimise risk of erosion

4.13.2 Potential Impacts and Mitigation Measures

Manage stormwater appropriately - Establish sediment and erosion controls around stockpiles where appropriate

Minimise size of stockpiles

Minimise the creation of hard, impervious surfaces

Establish diversion drains around disturbed areas

Drain stormwater into appropriate infrastructure

Minimise the risk of erosion caused by machinery and disturbance to soils/land
- Control access points to a limited number

Fence off and restrict access to areas with a high potential for erosion (e.g. waterway outlets)

Minimise the use of large machinery

Store machinery and construction materials away from sensitive areas

Minimise the risk of erosion caused by vegetation clearance -Minimise extent of clearance required

Progressively mulch and revegetate areas cleared as part of works

Prepare revegetation plan for larger operations

Use drift fencing to control sand movement created by vegetation clearance

Restrict access to areas of high erosion potential

Beach erosion

Sediment deposition

5. ENVIRONMENT MANAGEMENT PLAN (EMP)

The EMP should be developed from the mitigation measures detailed above. Its purpose is to set out the proponents' commitments to environmental management. That is, how environmental values will be protected and enhanced. The EMP is an integral part of the EIA, but should be capable of being read as a stand-alone document without reference to other parts of the Terms of Reference for an Environment Impact Assessment Report EIA. The EMP should not raise any issues or propose mitigation measures not already addressed in the body of the EIA.

The general contents of the EMP should comprise:

- The mechanisms for implementation of the EMP in association with the staging and timing of the development and ongoing management once the development is completed;
- The proponents' commitments to acceptable levels of environmental performance, including environmental objectives, i.e. levels of expected environmental harm, performance standards and associated measurable indicators, performance monitoring and reporting;
- Impact prevention or mitigation actions to implement the commitments to the project;
- Corrective actions to rectify any deviation from performance standards;

A complaints mechanism should be established as part of the EMP to address community issues. A complaints register could log details of all complaints received and action taken.

Through the EMP, the EIA's commitments to environmental performance can be used as regulatory controls through conditions to comply with those commitments. Therefore, the EMP is a relevant document for proposal approvals, environmental authorities and permits, and may be referenced by them.

6. REFERENCES

All references consulted should be presented in the EIA in a recognised format

7. RECOMMENDED APPENDICES

A1 Final TOR for this EIA

A copy of the TOR should be included in the EIS. Where it is intended to bind appendices in a separate volume from the main body of the EIA, the TOR at least should be bound with the main body of the EIA for ease of cross-referencing.

A2 Final Project Design/Drawings

All A3 OR A4 drawings and designs be included

A3 Study Team

The qualifications and experience of the study team and specialist sub-consultants and expert reviewers should be provided.

A4 Consultation Report

Outcomes of consultation meetings in the Betela /Arorangi community Terms of Reference for an Environment Impact Assessment Report should be recorded and included. The Consultation Report should summarise the results of the community consultation program, providing a summary of the groups and individuals consulted, the issues raised, and the means by which the issues were addressed. The discussion should include the methodology used in the community consultation program including criteria for identifying stakeholders and the communication methods used. The consultation process should be integrated with the social impact assessment component of the EIA. Matters which become apparent through the consultation process such as community conflict or fears about impacts of the proposal on the natural environment should also be recorded in the social impact assessment of the EIA.

A5 Specialist Studies

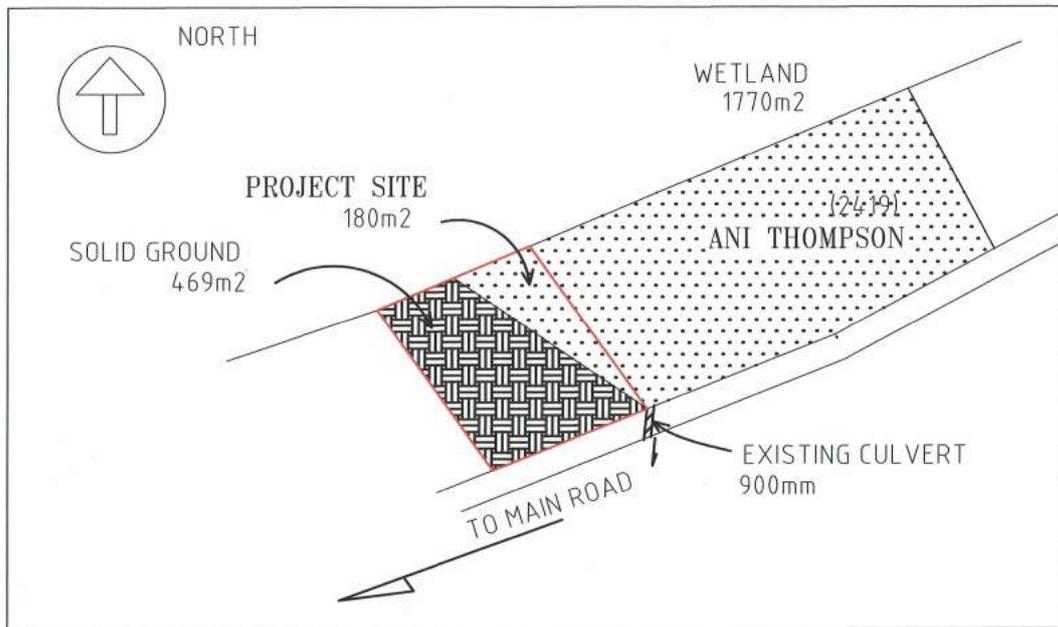
Any reports generated on specialist studies undertaken as part of the EIA are to be included as appendices. These may include:

- geology**
- soil survey and land suitability**
- groundwater**
- flora and fauna**
- coral survey**
- noise and air quality**
- Environmental Action plan to supplement EMP**
- Site investigations**
- Excavation plans and equipment**

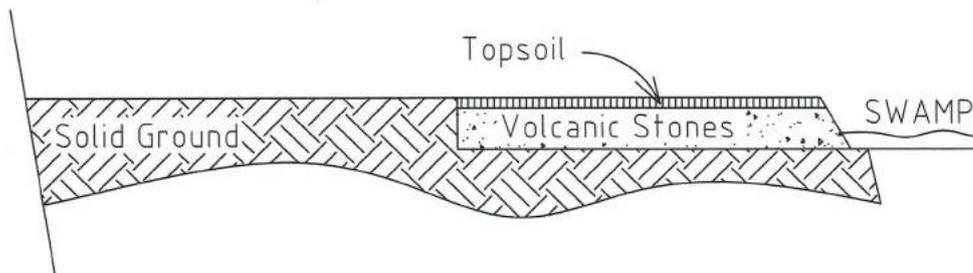
A6 Contacts

A contact of relevant experts/professionals interviewed or has contributions to the EIA.

APPENDIX A2: Final Project Design Drawings



Project Site Plan



Project Site Cross Section

APPENDIX A3: Study Team

CV: Samuel W Brown

January 2018

1. **Position:** Director
2. **Name of Firm:** Miro Consultants, Cook Islands Limited
3. **Name of Staff:** Samuel W Brown
4. **Nationality:** Cook Island Maori
5. **Education:**
 - Certificate of Completion: Pacific ACP States: Regional Training Workshop on Geological Technological Biological & Environmental Aspects of Deep Sea Minerals: SPC: Fiji August 2012
 - Graduate Certificate in Business AUT: USP Rarotonga July 2012
 - Real Estate Salesperson Certificate: Unitech Auckland May 2008
 - Property Valuation Certificate: Malaysia 1994
 - NZ Certificate in Civil Engineering (Civil) NZCE: Auckland 1987
6. **Membership of Professional Associations:**
 - Nil
7. **Other Training:**
 - Cook Islands Boatmaster Certificate 2009
 - Restricted Radio Telephone Operators Certificate 2010
8. **Countries of Work Experience:** New Zealand, Cook Islands
9. **Languages:**

	Speaking	Reading	Writing
English	good	good	good
Cook Island Maori	good	good	good

10. Employment Record:

From: Jan 2018 To current status

Employer: Miro Consultants, Cook Islands Limited, Rarotonga Cook Islands

Client

National Environment Service....Environment Impact Assessment and Engineering Reports.

Cook Islands residents....Property valuations.

Position Held: Civil and Environmental Engineer, Project Engineer, Property Valuer.

From: Jan 2016 To: Dec 2017

Employer: Miro Consultants, Cook Islands Limited, Rarotonga Cook Islands

Client

Cook Island residents....

National Environment Service....Environment Impact Assessment and Engineering Reports.

Cook Islands residents....Property valuations.

Position Held: Civil and Environmental Engineer, Project Engineer, Property Valuer.

From: Jan 2015 To: Dec 2016

Employer: Miro Consultants, Cook Islands Limited, Rarotonga Cook Islands

Client

Cook Island residents....

National Environment Service....Environment Impact Assessment and Engineering Reports.

Cook Islands residents....Property valuations.

Position Held: Civil and Environmental Engineer, Project Engineer, Property Valuer.

From: Jan 2014 To: Dec 2015

Employer: Miro Consultants, Cook Islands Limited, Rarotonga Cook Islands

Cook Island residents....

National Environment Service....Environment Impact Assessment and Engineering Reports.

Cook Islands residents....Property valuations.

Position Held: Civil and Environmental Engineer, Project Engineer, Property Valuer.

From: Jan 2013 To: Dec 2014

Employer: Miro Consultants, Cook Islands Limited, Rarotonga Cook Islands

Client

National Environment Service....EIA and Engineering reports preparation

Cook Islands residents....Property valuations.

Positions held: Civil and Environmental Engineer, Property Valuer.

From: Jan 2012 To: Dec 2013

Employer: Miro Consultants, Cook Islands Limited, Rarotonga Cook Islands

Client

National Environment Service.... EIA and Engineering reports preparation

Cook Island residents.... Residential home design CAD.

Cook Islands residents....Property valuations.

Positions held: Civil and Environmental Engineer, Property Valuer.