Draft Environmental Impact Assessment Report

Te Tau Papa o Avarua – Panamā Beautification & Punanga Nui Re-Organization Project

Prepared for the Cook Islands Investment Corporation

By Tiu Te Matangi Ltd

For Submission to the Cook Islands National Environment Service
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Tiu Te Matangi Ltd

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Acronyms and Abbreviations

ATM	Automated Teller Machine
BTIB	Business Trade and Investment Board
CBD	Central Business District
CIIC	Cook Island Investment Corporation
CITC	Cook Islands Trading Corporation
CINDC	Cook Islands National Disability Council
CMP	Constructional Plan
CCMP	CIIC Complaints Management Process
EC	Environmental Consultant
ESD	Environmental Significance Declaration
EIA	Environmental Impact Assessment
EPMS	Environmental Project Monitoring Specialist
EMP	Environmental Management Plan
EV	Electric Vehicle (Charging point)
HS/HSP	Health and Safety/Health and Safety Policy
ICI	Infrastructure Cook Islands
JD/CV	Job Description/Curriculum Vitae
LCD	Liquid-crystal display (Screen)
MoA	Ministry of Agriculture
MoT	Ministry of Transport
NES	National Environment Service
PPE	Personal Protective Equipment
PMU	Project Management Unit
PRCP	Project Register Complaint Process
PA	Public Announcement
PNM	Punanga Nui Market
REA	Rarotonga Environment Authority
SPCZ	South Pacific Convergence Zone
TOR	Terms of Reference
TMO	Te Marae Ora
TAU	Te Aponga Uira
TTV	To Tatou Vai
TTPBC	Te Tau Papa Beautification Committee

Executive Summary

1. The Project

- Te Tau Papa o Avarua – Panamā Beautification & Punanga Nui Re-Organization Project is part of the long term strategic plan of the Avarua Town Plan.
- The project seeks to embody structure and harmony, and embrace culture, social and environmental values as well as economic diversity within the Rarotonga central business district (CBD).
- This proposed work seeks to address the improvements required to public facilities, walk and cycle ways, recreational areas as well as the inefficiencies that are apparent throughout the Punanga Nui Market (PNM) area.
- In order to achieve this long term strategic plan, the proposal will address the following:
  1. Reorganization of the Punanga Nui Market and development of facilities that will enhance customer experience and service delivery from farmers, providers of arts and crafts, fishermen etc.;
  2. Beautification of green spaces and upgrade public toilets; and
  3. Beautification of the Panamā Reserve: provide walkways, picnic areas and upgrade public toilets.
- This work is being planned by the Cook Islands Investment Incorporation (CIIC) and will be guided by permitting agencies of Government in the appropriate areas to achieve health and safety standards to the environment including users of the various infrastructures.

2. Application for Project Permit

- This EIA Report is a requirement under Section 36 of the Environment Act 2003 (referred to in this report as the Act).
- Under the Act a project permit is required to carry out the proposed works outlined in this report, in particular those activities that have the potential to significantly and adversely impact the environment (local and island wide as per the risk assessment criteria).

3. Methodology for Impact Assessment

- The report describes the Environmental Impact Assessment (EIA) process which include: the requirement of the Act, how the assessment was undertaken, objectives of the EIA, public consultation process, relevant laws and policies that would apply, and the planning process and standards used.
- The report also describe the baseline environment where the proposed activities will be carried out.
- The baseline environment include: location of the project sites, land, climate, sea level and ocean current as the project sites are in the coastal zone, water resources, air, waste, noise and vibrations, terrestrial fauna and flora, aquatic biology, cultural heritage, social heritage, health and safety, economy, hazards and risks, erosion control and storage and handling of dangerous substances.
- Using the current knowledge of the baseline environment and their experience living in the Cook Islands, the assessment team lists the potential impacts of each activity and include positive and negative impacts and for each impact category, the immediate, the short and long term impacts.
- The impacts were further refined using levels of risks impact and probability to determine the overall significance of the impact as a combination of the consequences and probability ratings probability or the chances of the potential adverse impacts occurring.
- This process grouped the impacts into five groups:
  - Beautification of Avarua Town and Panamā Reserve;

- Improved Walk & Cycle Ways between Avarua and the Airport;
- Improved Public Toilets and Recreational Facilities in Central Avarua and Panamā;
- Restructured and Future Proofed PNM; and
- Traffic Management, pedestrian safety, convenient public bus stop/pick up, and visitor drop off and pick up stations.

4. Adverse Impacts identified that have potential to significantly affect the environmental

- Tables 1ES to 5ES below provide the list of the potential adverse environmental impacts caused by the project rated by the EIA team as significant.

Table 1ES: Significant potential adverse impacts for Output 1.

Output 1 – Beautification of Avarua Town and Panamā Reserve
Activity 1 – Tree trimming and Removal – Avarua Port to Panamā
Exposed tree wounds to infection reducing chances of survival
Open up the land to undesirable invasive plant species
Reduction of shaded areas
Exposed buildings and carpark areas to wind, sun and direct sea air
Maintenance cost issues to maintain the trimmed trees
Activity 2 – Gardens formation and gardening
Introduction of soil from offsite can lead to introduction of invasive species
Negligence and poor management of the garden could lead to the garden to not achieve the purpose intended
Maintenance cost issues to maintain the gardens
Damage from natural hazards
Activity 3 – Foreshore protection works and beautification
Efforts going to waste if maintenance plans are not followed
Damage from natural hazards
Invasive species could dominate the native species
Weakening of coastal protection structures by planted and non-planted trees

Table 2ES: Significant potential adverse impacts for Output 2.

Output 2 – Improved Walk & Cycle Ways between Avarua and the Airport
Activity 1 – Immediate site clearance for pathways – shrub, paves, service locations
Changed landscape
Open up the land to undesirable invasive plant species
Roots that have affected the old pathways not fully removed could cause problem for the new pathway
Activity 2 – Panamā to Avatiu Walk & Cycle Way design, construction works and site remediation
Inappropriate species around pathways especially those with massive and wide span root network would continue to damage pathway increasing HS risks to users
Possible root regrowth may not be detected leading to damaged pathways and increase HS risks to users in the future
Maintenance cost issues to maintain the sites
Damage from natural hazards

Output 2 – Improved Walk & Cycle Ways between Avarua and the Airport
Activity 3 – Installation of recycling and water stations & signage
Vandalism to the drinking fountains, hand washing, recycling stations and signs
Maintenance cost issues to maintain the amenities and signage
Damage from natural hazards
Activity 4 - Central Avarua footpath remedial work
Inappropriate species around pathways especially those with massive and wide span root network would continue to damage pathways increasing HS risks to users
Maintenance cost to maintain the facility including to investigate possible root regrowth leading to damaged pathways
Activity 5 – Solar lighting installation along the Panamā Reserve
Ongoing maintenance cost issues to maintain the facility

Table 3ES: Significant potential adverse impacts for Output 3.

Output 3 – Improved Public Toilets and Recreational Facilities in Central Avarua and Panamā
Activity 1 – Reconstruction & Waste water treatment system upgrade for central facilities across from the Police Station
Non-performance of upgraded wastewater system
Maintenance cost issues to maintain the amenity and support ongoing monitoring by wastewater engineer
Possible septic stench in the public area, as was common in the past as a result of overloading during peak public events
Activity 2 – Reconstruction & waste treatment system upgrade for Panamā Reserve
Inconvenience to the general public who use the area on Sunday during the times when the nearby Are Tāpae'anga is used for Maroro Tunutunu and for any funeral services that may occur during this time at the Catholic Cemetery
Non-performance of upgraded wastewater system
Maintenance cost issues to maintain the amenity and to support and ongoing monitoring by wastewater engineer
Possible septic stench in the public area, as was common in the past as a result of lack of monitoring and maintenance especially after a major event.
Activity 3 – Installation of Park Benches, paving & surrounds
Vandalism to the park benches
Activity 4 – Construction of fitness trail
Vandalism to the facility;

Table 4ES: Significant potential adverse impacts for Output 4.

Output 4 – Restructured and Future Proofed PNM
Activity 1 – Relocation, Remediation & Farmers market
Temporary disruption when relocating Farmer's Market, Fish Market, Reefside and Waffle Shack and preparing new and old site.
Frequent visitors to Farmer's Market, Fish Market, Reefside, and Waffle Shack will be inconvenienced.

Output 4 – Restructured and Future Proofed PNM
Increased parking space planned for peak times which usually happen on Saturdays and special events only during the year. This takes up open and clear space that can be available for other recreational purposes
Activity 2 – Installation of underground services, i.e. drainage, power, water connections and waste reticulation
Maintenance of underground and overhead services is the responsibility of the utility service providers. PNM will be relying on the Utilities for this service and this will have the potential to cause delays to services when required
Activity 3 – Reconstruction of the PNM playground at new site
There is possible security risk of random irresponsible parents being negligent and leaving their children unattended.
Damage from natural hazards
Activity 6 – Top soil, grassing and planting
There is risk of imported surface soil being washed down the new drainage system if not contained properly
Temporary increase in water use to make the grass and new plants grow
Bringing soil from elsewhere, especially acidic red soil have adverse effect on the marine environment if it reaches the sea, there is risk to the marine environment if this happens
Ongoing maintenance cost issues for gardens
Damage from natural hazards
Activity 8 – Building construction of new toilet block at Constitution Park
Non-performance of upgraded wastewater system
Possible septic stench in the public area, as was common in the past as a result of lack of monitoring and maintenance especially after a major event.
Damage from natural hazards
Activity 9 – Central waste water treatment system for toilet facility and market huts
Non-performance of upgraded wastewater system
Maintenance cost issues to maintain the amenity and to support ongoing monitoring by wastewater engineer
Possible septic stench in the public area, as was common in the past as a result of lack of monitoring and maintenance especially after a major event.
Damage from natural hazards
Activity 10 – Accessibility paving
Poor quality work due to poor workmanship
Damage from natural hazards
Activity 11 – Asphalt extension, remarking and signage of large carpark at PNM entrance
Temporary disruption of the PNM during Asphalt extension work if carried out during normal working hours
Poor quality work due to poor workmanship
Damage from natural hazards
Activity 12 – Paving bollards of walkway
Poor quality work due to poor workmanship
Damage from natural hazards

Table 5ES: Significant potential adverse impacts for Output 4b.

Output 4b – Traffic Management, pedestrian safety, convenient public bus stop/pick up, and visitor drop off and pick up
Activity 1 – - *Minimize traffic congestion along Main Roan and around PNM*
i. Temporary disruption to current traffic movement in problem areas identified during testing of traffic management plan
ii. Risk to the public if HS practices are not followed
iii. Frequent visitors to PNM will be inconvenienced
Activity 2 – *Health and safety at pedestrian crossing*
i. Temporary disruption to current chaotic practice in problem areas identified during testing of pedestrian crossing options
ii. Risk to the public if HS practices are not followed
Iii, Risk to pedestrians crossing the main roads especially during peak hours and days at the PNM
Activity 3 – *Convenient public bus stop and visitor drop off and pick up*
i. Temporary disruption to current chaotic practice in problem areas identified during testing to confirm proposed stations
ii. Risk to the public if HS practices are not followed
Activity 4 – *Provide adequate, convenient, marked and managed parking spaces*
i. Poor maintenance of parking areas, e.g. asphalt, compacted and well drained surfaces, security service and signage
ii. A lot of space that could be used for more commercial and recreational purposes is locked up into parking space
iii. Ensuring lighting of parking areas is functional at night

5. Mitigating Measures on Significant Adverse Environmental Impacts

- Tables 6ES to 10ES below provide recommended mitigating measures for the potential adverse environmental impacts for each activity likely to be significantly impacted.

Table 6ES: Mitigating measures on significant adverse environmental impacts for Output 1 activities.

Potential Adverse Environmental Impact	Recommended Mitigating Measures
1. Tree trimming & removal – Avarua Port to Panamā	
i. Expose tree wounds to infection reducing chance of survival	▪ Engage a qualified Arborist to survey and assess trees to be trimmed and identify those requiring treatment and how they should be treated. ▪ Under the advice and supervision of an Arborist, carry out all tree trimming and cutting to ensure tree wounds are either treated of cut to prevent infection. ▪ Where trees are to be replaced, adopt the policy to plant at least one other tree close by as a replacement policy. ▪ If the replaced tree is in the Panamā Reserve, chose a tree that is found in the coastal area and one that can survive normal sea spray with strong root system. ▪ All new trees must be part of a long term tree planting and nurturing programme to ensure the tree survive to its full potential.

ii. Open up the land to undesirable invasive plant species	▪ Once a decision is made to expose a large area from the protection of a large canopy tree, ensure invasive plant species that are found in the coastal area do not get the opportunity to establish itself. ▪ This can be achieved by regular inspection of the areas exposed, and each person tasked with this responsibility must have knowledge of the different stages of the common invasive plant species found on the island.
iii. Reduction of shaded areas	▪ A short and medium term but significant impact considering our humid and hot climate over summer, therefore trimming of trees must follow a tree management programme to prevent extensive loss of shade after each tree trimming exercise. ▪ For the long term consider replanting and maintaining trees that are tolerant to sea air and provide lot of shade.
iv. Expose buildings and car parking areas to wind, sun and direct sea air	▪ Consider the role of coastal vegetation, especially trees, in protecting premises and properties inland of coastal area from sea spray. ▪ Unless a matter of high risk to human health and safety trees in the coastal area must not be removed for any other reason maintaining the trees health is priority.
v. Maintenance cost issues to maintain the trimmed trees	▪ For reasons given above, high cost will be involved in maintaining of trees at the three project sites, the project management must ensure funds are readily available to cover the costs of an Arborist, known qualified and experienced tree trimming service providers and to buy plant materials from businesses that would also provide nurturing service.
2. Gardens formation and gardening	
i. Introduction of soil from offsite can lead to introduction of invasive species.	▪ All soil introduced to the project site must undergo a quarantining process to ensure there are zero potential for the introduction of invasive plant species. ▪ To guarantee the absence of any invasive species, the gardener must have the experience or have access to someone who is knowledgeable about invasive species to ensure invasive species are removed at an early stage once it is identified.
ii. Negligence and poor management of the gardens could lead to the garden to not achieve the purpose intended	▪ Engage persons that are passionate and knowledgeable about gardening and can keep gardens growing, through regular maintenance, e.g. watered and plants pruned to prevent overgrowing.
iii. Maintenance cost issues to maintain the gardens	▪ As above ▪ Use species that are easy to maintain, self-pruning, low and does not cover large areas. ▪ If the species are local but not self-pruning and low, someone or a team to carry out this work'

3. *Foreshore protection works and beautification*	
i. Efforts going to waste if maintenance plans are not followed	▪ Do not engage in passive foreshore protection if the resources are not available, the resources used will just be like money thrown away. ▪ Make sure engagement is supported by resources.
ii. Damage from natural hazards	▪ It is important to take a different approach to beautification, focus on healthy trees. ▪ It is important to use species of higher and lower canopies that are found in the coastal area as foreshore protection, e.g. seagrape or venevene ta'atai, tamanu, miro, utu, toa and pukatea. ▪ Coconut trees of the dwarf variety can be used as it is salt tolerant, shorter, and its root system is not threatening to walk and cycle ways. ▪ Other species such as nono, ngau, ngangie, poutukava can also found on coastal areas and these maintain their foliage during normal sea sprays and can recover very quickly. They provide fresh airflow through the area if maintained and managed properly ▪ Although some may want to move away from these trees to the more ornamental varieties, these species have proven to have survived cyclones and common in other Pacific Island Countries along their coastlines.
iii. Invasive species could dominate the native species	▪ Identify invasive species that are present in the foreshore area of the project sites, assess its role and relationship to the plant community in the area and carry out an eradication programme or manage its distribution to protect the coastal species.
iv. Weakening of engineered coastal protection structures by planted and non-planted trees.	▪ Protection of natural vegetation in the foreshore area, namely Panamā Reserve, is a must. ▪ Strengthening this protection can be achieved by ensuring the trees already growing are healthy. The advice of an Arborist will be valuable for this work. ▪ In the Township and PNM area it is important that the coastal rock revetment is protected and trees should not be growing in between the gaps of the revetment. Trees should be growing at the top of the revetment to hold and protect grounds behind the revetment.

Table 7ES: Mitigating measures on significant adverse environmental impacts for Output 2 activities.

Potential Adverse Environmental Impact	Recommended Mitigating Measures
1. *Immediate site clearance for pathways – shrubs, pavers, service locations*	
i. Changed landscape	▪ Engage a replanting programme that will quickly return the cleared areas back to a better and enhanced landscape.

	▪ Replanting programme should include planting materials that are suited to the environment and already growing before the site clearing and preparation work start. ▪ Tiare Māori or cardinia with its contained root system is well suited around the PNM, Avarua Town area and Panamā Reserve.
ii. Open up the land to undesirable invasive plant species	▪ Once the walk & cycle ways plan is decided, clearance work will start and the person in charge to ensure invasive plant species that are found in the coastal area do not get the opportunity to establish itself. ▪ This can be achieved by regular inspection of the areas exposed, and each person tasked with this responsibility must have knowledge of the different stages of the common invasive plant species found on the island so that it can be pulled out or weeded and not sprayed with chemicals.
iii. Roots that have affected the old pathways not fully removed could cause problem for the new pathways	▪ Common species where this have happened in the project area are the tree hibiscus or ‘au, utu, toa and tamanu. ▪ For the utu, toa, pukatea and tamanu, engage a method where roots are not harmed, but avoided. ▪ For the lower vegetation like as is the common cause around the Catholic Church, a complete removal of the ground to remove the ‘au tree roots and use methods to prevent regrowth penetration of roots.
2. Panamā to Avatiu Walk & Cycle Way design, construction works and site remediation	
i. Inappropriate species around pathways especially those with massive and wide span root network would continue to damage pathway increasing HS risks to users	▪ As in 1iii. ▪ Build around the utu, toa, pukatea and tamanu, engage a method where roots are not harmed, but avoided. ▪ In the case of the tree hibiscus or ‘au, complete removal of the ground to remove the roots and use methods to prevent regrowth and penetration into the new Walk & Cycle Ways.
ii. Possible root regrowth may not be detected leading to damaged pathways and increase HS risks to users in the future	▪ For the lower vegetation as mentioned above, a complete removal of the ground area where the tree is to remove all roots and prevent regrowth and penetration into the new Walk & Cycle Ways.
iii. Maintenance cost issues to maintain the sites	▪ Use species that are easy to maintain, self-pruning, low and does not cover large areas. ▪ If the species are local but not self-pruning and low, someone or a team must be engaged to carry out this work when required.
iv. Damage from natural hazards	▪ Options need to be explored on the basis of how easy it is to reconstructed walk & cycle ways after a hazard. ▪ Inundation from sea surge and sea flooding can affect concrete structures depending on how well the ground can handle the trauma of the impact of the event. ▪ Crushed compacted coral with water, as is done on airport runways on some of our Pa Enua may be used and can be

	replaced without much cost. This can be rolled occasionally and regularly as part of the pathway maintenance programme and to maintain a HS standard. ▪ This method will not use re-enforcing costly steel works.
3. Installation of recycling and water stations & signage	
i. Vandalism to the drinking fountains, hand washing, recycling stations and signs	▪ Installation of security cameras can be a consideration to catch the culprits ▪ Education and awareness programme on the media and other communication devices highlighting the important services these stations provide ▪ Consider community support watch activities.
ii. Maintenance cost issues to maintain the amenities and signage	▪ Accept there are unsavory and deviant characters in our society, the Management must have the funds available to replace parts or in whole the recycling, water stations and signs installed. ▪ With the anticipated high usage, it is expected that the equipment and signs will be up for replacement every 3 years. There will be funds available for a regular replacement.
iii. Damage from natural hazards	▪ Options need to be explored on the basis of affordability in replacing the stations. ▪ Having a drinking foundation that can easily be detached and reinstalled should be looked at. ▪ Inundation from sea surge, sea flooding and strong winds can cause destruction to the facility.
4. Central Avarua footpath remedial work	
i. Inappropriate species around pathways especially those with massive and wide span root network would continue to damage pathways increasing HS risks to users	▪ As in 1iii. ▪ Build around the utu, toa, pukatea and tamanu, engage a method where roots are not harmed, but avoided. ▪ For the tree hibiscus or ‘au as is the common cause around the Catholic Church, a complete removal of the ground to remove the ‘au tree roots and use methods to prevent regrowth and penetration into the new footpaths.
ii. Maintenance cost issues to maintain the facility including to investigate possible root regrowth leading to damaged pathways	▪ Use interlocking pavements as was used. It is easier to reinstall if distorted by roots. ▪ In the case of roots regrowth, interlocking pavements can be easily removed the roots removed and the pavement reinstalled. ▪ Have enough operating cost to maintain the footpaths.
5. Solar lighting installation along Panamā Reserve	
i. Ongoing maintenance cost issues to maintain the facility	▪ It is important to ensure all solar lighting is clear of any nearby tree that may shade the solar panels or make the light subjected to broken branches during windy conditions. ▪ Solar panels must be regularly cleaned to ensure that it is working at night.

Table 8ES: Mitigating measures on significant adverse environmental impacts for Output 3 activities.

Potential Adverse Environmental Impact	Recommended Mitigating Measures
1. Reconstruction & Waste water treatment system upgrade for central facilities across from the Police Station	
i. Non-performance of upgraded wastewater system	▪ The requirement of the Sewage Construction Permit issued under the Public Health (Sewage and Wastewater Treatment and Disposal) Regulations 2014 complied with. ▪ The wastewater engineer to provide a regular monitoring report to the Management and one after every major event where the use of the facility would most likely peak. ▪ The report would allow the Management of the facility to monitor how well the wastewater treatment system is performing and detect early any malfunction of the system.
ii. Maintenance cost issues to maintain the amenity and support ongoing monitoring by wastewater engineer	▪ The Management to ensure it has funds to support the cost of the wastewater engineer to provide regular reporting on the treatment system as required above.
iii. Possible septic stench in the public area, as was common in the past as a result of overloading during peak public events	▪ The requirement of the Sewage Construction Permit issued under the Public Health (Sewage and Wastewater Treatment and Disposal) Regulations 2014 complied with. ▪ The wastewater engineer to provide a regular monitoring report to the Management and one after every major event where the use of the facility would most likely peak. ▪ The report would allow the Management of the facility to monitor how well the wastewater treatment system is performing and detect early any malfunction of the system.
2. Reconstruction & waste treatment system upgrade for Panamā Reserve	
i. Inconvenience to the general public who use the area on Sunday during the times when the nearby 'Are Tāpae'anga is used for Māroro Tunutunu and for any funeral services that may occur during this time at the Catholic Cemetery	▪ Advice the vendor running the 'Are Tāpae'anga māroro tunutunu on the commencement and duration of the reconstruction work. ▪ Project Management Team to offer a portable toilet system to be used by the vendor and clients on Sundays until the reconstruction is completed. ▪ The same to be offered by the Project Management Team to families involved in any funeral service that may arise during this time.
ii. Non-performance of upgraded wastewater system	▪ The requirement of the Sewage Construction Permit issued under the Public Health (Sewage and Wastewater Treatment and Disposal) Regulations 2014 complied with. ▪ The wastewater engineer to provide a regular monitoring report to the Management and one after every major event where the use of the facility would most likely peak. ▪ The report would allow the Management of the facility to monitor how well the wastewater treatment system is performing and detect early any malfunction of the system.

iii. Maintenance cost issues to maintain the amenity and to support ongoing monitoring by wastewater engineer	▪ The Management to ensure it has funds to support the cost of the wastewater engineer to provide regular reporting on the treatment system as required above.
iv. Possible septic stench in the public area, as was common in the past as a result of lack of monitoring and maintenance especially after a major event	▪ The requirement of the Sewage Construction Permit issued under the Public Health (Sewage and Wastewater Treatment and Disposal) Regulations 2014 complied with. ▪ The wastewater engineer to provide a regular monitoring report to the Management and one after every major event where the use of the facility would most likely peak. ▪ The report would allow the Management of the facility to monitor how well the wastewater treatment system is performing and detect early any malfunction of the system.
3. Installation of Park Benches, paving & surrounds	
i. Vandalism to the park benches	▪ Installation of security cameras can be a consideration to catch the culprits ▪ Education and awareness programme on the media and other communication mediums highlighting the important services these stations provide and the need to protect them. ▪ Consider community support watch activities.
4. Construction of fitness trail	
i. Vandalism to the facility	▪ Installation of security cameras can be a consideration to catch the culprits ▪ Education and awareness programme on the media and other communication mediums highlighting the how important the fitness trail to keeping healthy and the need to protect them ▪ Consider community support watch activities.

Table 9ES: Mitigating measures on significant adverse environmental impacts for Output 4 activities.

Potential Adverse Environmental Impact	Recommended Mitigating Measures
1. Relocation, Remediation & Farmers market	
i. Temporary disruption when relocating Farmer's Market, Fish Market, Reefside and Waffle Shack and preparing new and old site	▪ It is proposed to have the farmers market building up and ready to go and implementing the changeover of the vendors location outside of operating hours, without affecting the normal opening hours ▪ The relocating work will take place after the new playground is completed, the old playground is deconstructed and the new site where the old playground was is prepared. ▪ The preparation work for the relocation will be carried out by professional small works contractors who will plan the move of the building during the week and before Friday.

	▪ Preparation work will include appropriate HS measures for PNM staff, small works contractors, the general public and the owners of the buildings. ▪ HS measures will include PPE for PNM staff and small works contractors, hazards and risks sign boards on both sites to inform those concern, thorough coordination of stakeholders by PMU, and at least a week of public notice through the main mediums of communication, e.g. TV, radio, Newspapers and appropriate Social Media outlet. ▪ Relocation would take place after hours, preferably at dawn to avoid early traffic on the main road and when the weather is fine and no rain (after April).
ii. Frequent visitors to Farmer's Market, Fish Market, Reefside, and Waffle Shack will be inconvenienced	▪ The hut owners will advise their clients of the times of their temporary closure well in advance of the move. This will include an information sign at the hut and through the main mediums of communication. ▪ The PMU will ensure the relocating is swift and the site preparation is for turnkey operation, i.e. all infrastructure services are in place and the hut owner will have a short time to prepare and reopen.
iii. Increased parking space planned for peak times which usually happen on Saturdays and special events only during the year. This takes up open and clear space that can be available for other recreational purposes	▪ Consideration to include service lines (i.e. drainage, power, water connections and waste reticulation) linked to the installed underground services and supplies at selected locations in the newly opened up parking spaces to allow mobile vendors to operate in the parking space during low peak days. ▪ The service lines at these locations is not restricted to buying and selling but can cater to a diversity of use.
2. Installation of underground services, i.e. drainage, power, water connections and waste reticulation	
i. Maintenance of underground and overhead services is the responsibility of the utility service providers. PNM will be relying on the Utilities for this service and this will have the potential to cause delays to services when required	▪ Improve working relationship between PNM Management and utility providers by being a good customer. ▪ The installed underground services are secure and easily accessed in the case of damages from a natural hazard or during normal conditions which would reduce time spent on a problem. This will help the utility serviceman to attend to other good customer's demands. ▪ A well trained asset manager at the PNM Management would assist utility service workers in the case of new staff and reduce time in dealing with an issue.
3. Reconstruction of the PNM playground at new site	
i. There is possible security risk of random irresponsible parent being negligent and leaving their children unattended	▪ Encourage parents to be with their children at the playground by PNM providing picnic benches and seats around the new playground. ▪ PNM Management to provide security service at the playground especially on peak days.

ii. Damage from natural hazards	▪ Options need to be explored on the basis of affordability in replacing the playground. ▪ Having equipment that can easily be detached and reinstalled should be looked at. ▪ Inundation from sea surge, sea flooding and strong winds can cause destruction to the facility.
6. Top soil, grassing and planting	
i. Introduction of invasive tree species through soil from offsite	▪ Gardens and grassed areas must be well contained and separated from drainage systems by paved surfaces to make it easier to detect that the garden structure has been broken which could result in heavy rain moving soil towards the drainage system. ▪ Gardeners must be passionate in their work and can easily detect problems that may lead to loss of soil. ▪ The use of chipped wood from wood chippers used by tree trimmers on garden surface to prevent direct rain impact causing soil to move towards drainage systems.
ii. Temporary increase in water use to make the grass and new plants grow	▪ Water conservation devices must be used to allow gardens to be nurtured especially for newly formed gardens and grassed areas. ▪ The Project Management Unit to use plants that are ready and already growing including natural grass turfs. ▪ The new underground service lines to include a system where gray water is stored and can be pumped to garden and grassed areas.
iii. Bringing soil from elsewhere, especially acidic red soil have adverse effect on the marine environment if it reaches the sea, there is risk to the marine environment if this happens	▪ Use constructional material on site for garden, e.g. soil from footing of the new toilet block at the Constitution Park, pathway remedial work along the Punanga Nui Drive, the underground service lines and compost from the PNM green waste dump at Panamā. ▪ As mentioned in 6i. above gardens must be well contained and separated from drainage systems by paved surfaces.
iv. Ongoing maintenance cost issues to maintain the gardens	▪ Engage persons that are passionate and knowledgeable about gardening and can keep gardens growing, through regular maintenance, e.g. watered and plants pruned to prevent overgrowing ▪ Use species that are easy to maintain, self-pruning, low and does not cover large areas. ▪ If the species are local but not self-pruning and low, someone or a team to carry out this work'
8. Building construction of new toilet block at Constitution Park	
i. Non-performance of upgraded wastewater system	▪ The requirement of the Sewage Construction Permit issued under the Public Health (Sewage and Wastewater Treatment and Disposal) Regulations 2014 complied with.

	▪ The wastewater engineer to provide a regular monitoring report to the Management and one after every major event where the use of the facility would most likely peak. ▪ The report would allow the Management of the facility to monitor how well the wastewater treatment system is performing and detect early any malfunction of the system.
ii. Possible septic stench in the public area, as was common in the past as a result of lack of monitoring and maintenance especially after a major event	▪ The Management to ensure it has funds to support the cost of the wastewater engineer to provide regular reporting on the treatment system as required above. ▪ Inspection of the system by the wastewater engineer especially after a major event in the area to ensure any overflow of the system is dealt with.
iii. Damage from natural hazards	▪ Design and construction of building must follow the approved plans under the Building Control and Standards Act 1991 and the Public Health Act 2004.
9. Central waste water treatment system for toilet facility and market huts	
i. Non-performance of upgraded wastewater system	▪ The requirement of the Sewage Construction Permit issued under the Public Health (Sewage and Wastewater Treatment and Disposal) Regulations 2014 complied with. ▪ The wastewater engineer to provide a regular monitoring report to the Management and one after every major event where the use of the facility would most likely peak. ▪ The report would allow the Management of the facility to monitor how well the wastewater treatment system is performing and detect early any malfunction of the system
ii. Maintenance cost issues to maintain the amenity and to support ongoing monitoring by wastewater engineer	▪ The Management to ensure it has funds to support the cost of the wastewater engineer to provide regular reporting on the treatment system as required above.
iii. Possible septic stench in the public area, as was common in the past as a result of lack of monitoring and maintenance especially after a major event	▪ The Management to ensure it has funds to support the cost of the wastewater engineer to provide regular reporting on the treatment system as required above. ▪ Inspection of the system by the wastewater engineer especially after a major event in the area to ensure any overflow of the system is dealt with.
iv. Damage from natural hazards	▪ Design and construction of building must follow the approved plans under the Building Control and Standards Act 1991 and the Public Health Act 2004
10. Accessibility paving	
i. Poor quality work due to poor workmanship	▪ The procurement process to be adhered to so that the best contractor on the island for this work is engaged.

ii. Damage from natural hazards	▪ Design and construction must follow the appropriate standard for such work (New Zealand and Australian Standards as per the advice of ICI road engineers.
11. Asphalt extension, remarking and signage of large carpark at PNM entrance	
i. Temporary disruption of the PNM during Asphalt extension work if carried out during normal working hours	▪ The asphalt work will take place after the identified building are removed and operating. ▪ The site preparation work will be carried out by professional small works contractors who will plan the work to be done after hours and before Friday. ▪ Preparation work will include appropriate HS measures for PNM staff, small works contractors, the general public and the owners of the buildings. ▪ HS measures will include PPE for PNM staff and small works contractors, hazards and risks sign boards on the work site to inform those concern, thorough coordination of stakeholders by PMU, and at least a week of public notice through the main mediums of communication, e.g. TV, radio, Newspapers and appropriate Social Media outlet. ▪ The asphalt work to take place after hours or at dawn to avoid early traffic on the main road and when the weather is fine and no rain (after April where).
ii. Poor quality work due to poor workmanship	▪ The procurement process to be adhered to so that the best contractor on the island for this work is engaged.
iii. Damage from natural hazards	▪ Design and construction must follow the appropriate standard for such work (New Zealand and Australian Standards as per the advice of ICI road engineers.
12. *Paving bollards of walkway*	
i. Poor quality work due to poor workmanship	▪ The procurement process to be adhered to so that the best contractor on the island for this work is engaged.
ii. Damage from natural hazards	▪ Design and construction must follow the appropriate standard for such work (New Zealand and Australian Standards as per the advice of ICI road engineers.

Table 10ES: Mitigating measures on significant adverse environmental impacts for Output 4b activities.

Potential Adverse Environmental Impact	Recommended Mitigating Measures
1. PNM - Minimize traffic congestion along Main Roan and around PNM	
i. Temporary disruption to current traffic movement in problem areas identified during testing of traffic management plan	▪ PMU to work with stakeholders (Police, ICI, MOT, Te Marae Ora, Cook's Buses, and Representative of Tour Groups) on how the test to minimize traffic congestion along the main road and around the PNM will be carried out. ▪ The test to allow the traffic to get use to the preferred scenarios, i.e. a. No "right-turn" at main entrance, b. a 30km zone between

	Avatiu and Avarua roundabouts, c. one-way/single lane entry into the PNM, d. 2 exit point for delivery vehicles only at the PNM ▪ Preparation work will include appropriate HS measures for traffic officers and appropriate signage at strategic points (to be determined by the Police) once the scenarios are confirmed. ▪ HS measures will include PPE for all staff and officers involved and signage at strategic points to be confirmed by the Police. ▪ Public information on the test will be released by PMU, and at least a week of public notice through the main mediums of communication, e.g. TV, radio, Newspapers and appropriate Social Media outlet. ▪ The test will take place during the week starting on a Monday to give a 5 day lead to the peak market day on Saturday.
ii. Risk to the public if HS practices are not followed during test	▪ As listed1i. ▪ To reduce risk, HS measures will include PPE for all staff and officers involved and signage at strategic points to be confirmed by the Police. ▪ Public information on the test will be released by at least a week of public notice through the main mediums of communication, e.g. TV, radio, Newspapers and appropriate Social Media outlet.
iii. Frequent visitors to PNM will be inconvenienced	▪ PMU will prepare a brief information pamphlet that will be given out to the public at the PNM and available on the Social Media at least a week before the test. ▪ A new signage will be installed at key strategic points at the PNM on this test. ▪ At least a week of public notice through the main mediums of communication, e.g. TV, radio, Newspapers and appropriate Social Media outlet will outline the test as appropriate.
2. PNM - Health and safety at pedestrian crossing	
i. Temporary disruption to current chaotic practice in problem areas identified during testing of pedestrian crossing options	▪ PMU to work with stakeholders (Police, ICI, MOT, CINDC and Te Marae Ora) on how the test to provide HS at pedestrian crossing will be carried out. ▪ The test Pedestrian crossing objectives include: a. Provide safe Pedestrian crossing; b. Provide pedestrian crossing where practicable; c. Improve pedestrian access from Avarua Township to the Airport, as much practicable. ▪ Preparation work will include appropriate HS measures for traffic officers and appropriate signage at strategic points (to be determined by the Police) once the test is confirmed. ▪ HS measures will include PPE for all staff and officers involved and signage at strategic points to be confirmed by the Police. ▪ Public information on the test will be released by PMU, and at least a week of public notice through the main mediums of communication, e.g. TV, radio, Newspapers and appropriate Social Media outlet.

	▪ The test will take place during the week starting on a Monday to give a 5 day lead to the peak market day on Saturday.
ii. Risk to the public if HS practices are not followed during test	▪ As listed1i. ▪ To reduce risk, HS measures will include PPE for all staff and officers involved and signage at strategic points to be confirmed by the Police. ▪ Public information on the test will be released by at least a week of public notice through the main mediums of communication, e.g. TV, radio, Newspapers and appropriate Social Media outlet.
Iii. Risk to pedestrians crossing the main roads especially during peak hours and days at the PNM	▪ As mentioned above the test will take place during the week starting on a Monday to give a 5 day lead to the peak market day on Saturday
3. PNM - Convenient public bus stop and visitor drop off and pick up	
i. Temporary disruption to current chaotic practice in problem areas identified during testing to confirm proposed stations	▪ PMU to work with stakeholders (Police, ICI, MOT, Te Marae Ora, Cook's Buses, and Representative of Tour Groups) on how the test to provide convenient public bus stop and visitor drop off and pick up at the PNM will be carried out. ▪ The test proposed safe and convenient bus drop off and pick up points for the general public, safe and convenient drop off and pick up for visitors and tour groups during peak hours; safe, convenient and sheltered drop off and pick up zone for buses and taxis ▪ Preparation work will include appropriate HS measures for traffic officers and appropriate signage at strategic points (to be determined by the Police) once the test is confirmed. ▪ HS measures will include PPE for all staff and officers involved and signage at strategic points to be confirmed by the Police. ▪ Public information on the test will be released by PMU, and at least a week of public notice through the main mediums of communication, e.g. TV, radio, Newspapers and appropriate Social Media outlet. ▪ The test will take place during the week starting on a Monday to give a 5 day lead to the peak market day on Saturday.
ii. Risk to the public if HS practices are not followed during test	▪ As mentioned above the test will take place during the week starting on a Monday to give a 5 day lead to the peak market day on Saturday
4. PNM - Provide adequate, convenient, marked and managed parking spaces	
i. Poor maintenance of parking areas, e.g. asphalt, compacted and well drained surfaces, security service and signage	▪ Under Output 4 11ii. It is important that the best contractor on the island for this work is engaged and one whose work is of the highest quality to ensure maintenance work is minimal. ▪ The parking area must always have a security warden to ensure vehicles are safe so that visitors (residents and tourists) to the PNM can enjoy their visit.

ii. A lot of space that could be used for more commercial and recreational purposes is locked up into parking space	▪ Consideration to include service lines (i.e. drainage, power, water connections and waste reticulation) linked to the installed underground services and supplies at selected locations in the newly opened up parking spaces to allow mobile vendors to operate in the parking space during low peak days. ▪ The service lines at these locations is not restricted to buying and selling but can cater to a diversity of use.
iii. Ensuring lighting of parking areas is functional at night	▪ It is important to ensure all solar lighting is clear of any nearby tree that may shade the solar panels or make the light subjected to broken branches during windy conditions. ▪ Solar panels must be regularly cleaned to ensure that it is working at night.

6. Recommendations

- In considering this application, the REA note the following:
  - Section 6.2 of the report described the potential positive and negative environmental impacts the project activities may have on the environment and covers immediate, short and long term impacts for each activity.
  - Section 6.4.1, further assessment using risk level assessment to determine the level of significance of those potential negative environmental impacts and described in section 6.4.1 of this report, and provided above in 4 and Tables ES to 5ES.
  - Section 6.4.2, provide recommended mitigating measures required to minimize and prevent those significant potential negative impacts from occurring. This is provided above in 5 and Tables 6ES to 10ES.
  - The environmental management plan (EMP) provided in Section 7 will manage those activities likely to cause significant adverse impact on the environment (local and island wide as indicated in the risk assessment) during implementation of this project. The EMP manages those activities through mitigating measures provided and corrective actions to keep the project within the performance criteria set for those activities.
  - The EMP will be used by CIIC to assist with the final design aspects of those proposed works likely to cause significant negative impact on the environment and monitored by those identified to do the monitoring and reporting, specifically, the National Environment Services (NES), the Environmental Project Monitoring Specialist (EPMS) and the Project Management Unit (PMU).

1. Introduction

- Te Tau Papa o Avarua – Panamā Beautification & Punanga Nui Re-Organization Project is part of the long term strategic plan of the Avarua Town Plan.
- The project seeks to embody structure and harmony, and embrace culture, social and environmental values as well as economic diversity within the Rarotonga central business district (CBD).
- This proposed work seeks to address the improvements required to public facilities, walk and cycle ways, recreational areas as well as the inefficiencies that are apparent throughout the Punanga Nui Market (PNM) area.
- In order to achieve this long term strategic plan, the proposal will address the following:
  1. Reorganization of the Punanga Nui Market and development of facilities that will enhance customer experience and service delivery from farmers, providers of arts and crafts, fishermen etc.;
  2. Beautification of green spaces and upgrade public toilets; and
  3. Beautification of the Panamā Reserve: provide walkways, picnic areas and upgrade public toilets.
- This work is being planned by the Cook Islands Investment Incorporation (CIIC) and will be guided by permitting agencies of Government in the appropriate areas to achieve health and safety standards to the environment including users of the various infrastructures.
- The implementation of activities will be contracted out to local contractors through the Government service procurement process and coordinated by CIIC.
- Tiu Te Matangi Ltd ('Environmental Consultant or EC) has been contracted by CIIC to prepare this Environmental Assessment Impact (EIA) Report, a requirement under the Environment Act 2003, and in accordance with the Terms of Reference (TOR) provided by the National Environment Service (NES).
- A copy of the TOR is provided as Attachment 1A in the Appendices.

2. Environmental Impact Assessment (EIA) Process

2.1 Requirement of the Environment Act

- The Environment Act 2003 (Referred to in this report as the 'the Act') provide the basis for which this EIA Report was prepared.
- The Act states – "No person shall undertake any activity which causes or is likely to cause significant environmental impacts except in accordance with a project permit issued under Section 36 of the Act."
- A person who proposes an activity of the kind referred to above shall:
  1. Apply to the permitting authority, in this case, the Rarotonga Environmental Authority (REA), for a project permit in respect of the Project;
  2. Prior to applying for a project permit, complete the NES environmental significance determination form, the ESD. The ESD for this project was submitted to the NES on 13/10/22 and attached to this Report as Attachment 1B of the Appendices;
  3. In the case the ESD requires for an EIA report, an EIA report is prepared in accordance with a TOR prepared by the NES; and
  4. Submit the final EIA report to the REA through the NES for consideration at their next meeting. This process has two possible outcomes:
     a. The application is approved and the NES informs the applicant by letter and outlines the conditions of the approval; or,

b. If there are any issues raised during the 30 day consultation period that are not satisfactorily addressed by the revised EIA Report, it is referred back to the applicant to review and address any aspects that may have been insufficiently covered.
   - The applicant can then re-submit the application to the REA for further consideration.
   - In the event of public feedback, applications can be declined until the issues raised have been properly addressed by the applicant.
   - Should the need arises the EC will work with NES and the proponent to address these issues throughout the EIA process.

2.2 How the assessment was undertaken

- Environmental values identified by the TOR likely to be affected by the project activities were assessed and the following tasks undertaken:
  - A review of information on those values based on available information (include official documents provided by CIIC) and local knowledge.
  - Consultations with some or all of the project partners, e.g. CIIC, PNM Management, NES, TMO, ICI and TAU may be carried out to identify mitigating measures on potential impacts that they may be able to assist with.
  - A field investigation and review of appropriate reports to verify the potential for adverse impacts to the environmental values identified were carried out. The field investigation included:
    - Identification of any threatened flora and fauna communities present;
    - Identify waste management issues and discuss possible solutions with the project partners, i.e. PNM Management;
    - Identify social and cultural issues that may be impacted upon and formulate mitigating options; and
    - Identify potential land issues that require the attention of the project proponent.
  - Risk assessments of events or proposed activities to assist in the planning and implementation stage. The risk assessment identified the following and is described in detail in Section 6.3.1:
    - The extent of the Impact, i.e. the area over which the impact will be experienced;
    - The magnitude of the impact, i.e. whether the impact will result in minor, moderate or major environmental economic and social (including human health) changes;
    - The duration of the impact, i.e. the time frame over which the impact will be experienced and its reversibility; and
    - The probability of the impact occurring.
  - Prepare an Environmental Management Plan for those activities likely to cause *significant* adverse effect on the environment.

2.2 Objectives of the EIA

The objectives of the EIA are to:

- Identify environmental values including social, economic including human health likely to be affected by the proposed project;
- Assess potential impacts, including positive and negative, that the project may have on those environmental values identified including risk assessment of events likely to increase harm to the environment;

- Recommend mitigating measures to *significant adverse impacts* identified to reduce or eliminate further environmental degradation to the immediate and surrounding environment;
- Inform affected persons and the general public during the EIA process about the project; and
- Consult with other stakeholders involved in the planning, management and implementation of this project;

2.3 Public Consultation and Submissions

- Public consultation will be in the form of the mandatory requirement under Section 36(5) of the Environment Act 2003.
- After the 30 days public consultation process, an addendum may be submitted after this process as part of the final EIA report to incorporate relevant issues raised during the 30 day consultation process.
- Relevant issues from the public consultation process will be incorporated into the design process and reflected in this EIA report and addressed in Sections 5 and 6.

2.4 Relevant Laws and Policies

2.4.1 Relevant Laws

- Provided in Table 1.0

2.4.2 Relevant Policies

- Provided in Table 2.0

2.5 Planning Process and Standards

- The Environment Act 2003 provide the foundation upon which other laws, guidelines, policies, standards, codes are discussed and incorporated into the planning process to ensure that the proposed activities are delivered with a high level of professional integrity and the quality of the environment is maintained, and if appropriate, enhanced.
- Technical standards to be applied in the detailed design will be consistent with the Infrastructure Cook Islands (ICI) Technical Standards and for buildings in accordance to appropriate New Zealand and Australia standards. All relevant permit applications, except for this project application, will be prepared and lodged to the relevant authority prior to any construction phase, and once the designs are completed.

Table 11: Relevant Laws

Law	Objective	Relevance to the Project
Building Control and Standards Act 1991	To control and standardize building practice	▪ For any building constructed for public use a building permit is required from the Building Controller and Building inspectors who will be required to regularly visit the building site from the start to the complete of any construction. The standard practice is that a completion report is signed between the Contractor (Builder) and the Building Controller. This assures that the building was constructed as per approved plan and certified in terms of durability and safety, and climate proofing especially for natural hazards, e.g. cyclones. ▪ It is recommended that the designers of any structure consult ICI and EMCI during the design works to take into account the recommendations of a recent review of the 1991 Act, in particular

Law	Objective	Relevance to the Project
		regarding to Parking spaces, setback conditions from access ways stream banks, emergency services, and elevations especially in areas close to the coastline.
Environment Act 2003	To provide for the protection, conservation, and management of the environment in a sustainable manner	▪ This is the principal Act under which this project application and EIA report is prepared. See section 2.1; ▪ The Act also provides for the setting up of a management plan in case the proponent wishes to protect the natural qualities of the Panamā Reserve as a protected area. Such a set up will give the reserve legal protection and therefore protected by law; ▪ The Act include specific sections to protect areas of concern such as; foreshore and Cook Islands Waters, the environment from pollution of Cook Islands Waters and Inland Waters, disposal of toxic waste, and protection of wetlands. ▪ Litter is defined under the Environment Act 2003 as including any refuse, rubbish, animal remains, glass, metal garbage, debris, dirt, filth, rubble, ballast, stones, earth, sewage, or waste matter, or any other thing of a like nature. This definition contributes to the definition of solid waste under Section 5.8.2 of this report.
Marine Resources Act 2005	To provide for the conservation, management and development the marine resources and related matters.	▪ Provide for the protection of fishery waters from contamination. Fishery waters include the reef flats, the reef and outside the reef area. In this project this would cover the marine environment in front of the Avarua Township, Punanga Nui Market and the Panamā Reserve.
Public Health Act 2004	To protect and safeguard the health of the people of the Cook Islands.	▪ Provide for the building of health standards for the following: o adequate and convenient supply of water for human consumption, adequate and convenient supply of water for sanitary purposes, adequate and convenient means (including suitable appliances) for storage and disposal of waste, adequate and convenient toilets, adequate drainage for safe and efficient removal and disposal of surface water and wastewater, and adequate lighting, space, and ventilation. o To ensure waste is safely stored, collected, treated, removed, transported, disposed of, and otherwise dealt with. o Emptying and disposal of septic tank waste in accordance to regulations or in a way to not cause any health hazard.
	Waste is defined	▪ Waste includes the following: Garbage, refuse, or litter; Hazardous waste; Wastewater; Building and demolition waste; Other discarded or superfluous things from open fires, incinerators, or industrial, commercial, mining, agricultural, community, or other activities. This extends the definition of waste to more than just litter.
		▪ Hazardous waste means any waste that is likely to be a health hazard if released into any waterway; and includes the following: (i) Animal waste, medical waste, or sewage; (ii) Sludge, other by-products, or other waste from devices, facilities, plants, or other systems that treat water, sewage, or pollution (for example, septic tanks, other sewage

Law	Objective	Relevance to the Project
		treatment facilities, water treatment plants, or sewage treatment plants)
		▪ Wastewater means dissolved or suspended waterborne waste; and Includes sewage
Public Health (Sewage and Wastewater Treatment and Disposal) Regulations 2014	To manage the sewage and wastewater treatment disposal.	▪ To provide for the application process for the Sewage Construction Permit (SCP). ▪ Preparation and submission of wastewater design report for approval by the Sewage and Sanitation Board of the Ministry of Health.
Food Act 1992-93	For the Licensing and control of premises for food production, manufacture and distribution; consumer affairs; food science, technology and nutrition; administration or commercial matters affecting food.	▪ To provide for licensed premises for preparation and sale of food, for hygiene purposes on those premises, including food contamination or spoilage and equipment and facilities used in the preparation of food..
Biosecurity Act 2008	To prevent the entry of animal and plant pest and disease and heir spread in the Cook Islands.	▪ To control the establishment and spread in the Cook Island animal, plant pests and diseases from overseas. ▪ To regulate the movement of animal and plant pests and diseases and of animals and plants and their products into and in the Cook Islands.

Table 12: Relevant Policies

Sector plans, policies, codes of practice	Brief Description of their relevance to the proposed works	How the plan, policy and code of practice may be used to manage issues identified
Strategic plan of the Avarua Town Plan	Panamā Beautification & Punanga Nui Re-Organization Project is one of the sub projects of the Avarua Town Plan.	Will address the improvements required to public facilities, walk and cycle ways, recreational areas as well as the inefficiencies that are apparent throughout the Punanga Nui Market (PNM) area.
NSDP – Goal 2 Expand economic opportunities, improve economic resilience and productive employment to ensure decent work for all.	The project is a facilitator to the NSDP goal 2 as it aims to expand economic growth by providing opportunities for vendors and hut	The proponent have identified in Section 3.1.2.3 issues that currently exist, in particular at the PNM. This Project is a move to deal with those issues as described in the proposed

Sector plans, policies, codes of practice	Brief Description of their relevance to the proposed works	How the plan, policy and code of practice may be used to manage issues identified
	owners and to provide the market place for their products.	activities and listed in Section 3.1.2.3.
NSDP – Goal 5 Build resilient infrastructure…to improve our standard of living	Build reliable, appropriate and acceptable infrastructure	Ensure appropriate options are designed and constructed for a safe and resilient infrastructure.
NSDP – Goal 6 Improve access to affordable, reliable, sustainable, modern energy and infrastructure	Promote regular and reliable transport	The proposal will be addressing traffic congestion and the preparation of an effective traffic management plan.
NSDP – Goal 11 Promote sustainable land use, management of terrestrial ecosystems and protect biodiversity	Protection of biodiversity – Ensuring the coastal environment is not contaminated through non-functional waste water systems and disposal of waste and ensuring invasive species remain protected from entering any cleared space during the implementation of the project.	Promotes appropriate best practice to carry out the proposed activities to improve the environment around construction sites and where modifications of the environment may takes place.
NSDP – Goal 12 Sustainable management of oceans, lagoons and marine resources	Support healthy coral reefs, protect marine areas, support sustainable fisheries, improve water quality, achieve sustainable benefits from marine resources	Promotes appropriate best practice to carry out the proposed activities in a way that protects and improve the environment on the reef flats, reefs and outer reefs.
NSDP – Goal 13 Strengthen resilience to combat the impacts of climate change and natural disasters	Promote resilient communities, build resilient infrastructure.	Enable the use of appropriate design, technology, and materials during construction and long term operation of the facilities.
CIG Workplace Health and Safety Policy, August 2019	A policy aimed at preventing ill-health in the workplace and reacting to incidents when they occur.	Provide caution and awareness to persons during the construction phase of this proposed activity and include the safety of the general public.

3. Proposal Need and Alternative

- The proposal is divided into three parts; the Punanga Nui Market, the Avarua Township and the Panamā Reserve area.
- This section provides a description of the purpose of the proposal, current issues that are being experienced, desired outcomes and proposed approaches, plans for implementation, the opportunities that could be developed.
- For each proposal a statement of an alternative proposal is provided.

3.1 Proposal Justification

3.1.1 Objectives

- Te Tau Papa o Avarua, a Government proposal to develop and improve the township area, has six objectives put together post Covid after a series of public consultation meetings on the island of Rarotonga. The six objectives are provided in the Table below.

Table 13: The six objectives to develop and improve the township area

Objectives	Description
Strong Community and economy	Broad-based retail economy
	Quality tourist/visitor experience
	Community facilities
	Healthy options
	Central producer markets
Safe multi-modal accessibility for all users	Designated parking areas
	Crossing and footpaths to improve pedestrian safety
	Dedicated bus drop off & pick up area
	Connected footpaths
	Promenade along coastal area
	Easy access to shared facilities
Generous public space network	Increase parking space at Constitution Park
	Event spaces
	Night lighting
	Green space for communal and recreational activities
Enhance Ecology throughout	Preserve indigenous plants
	Improve coastal conditions
	Coastal fringe park
Resilient infrastructure	Low impact provision
	Climate change based
	Energy efficient design
	Underground power
	Piping of services
	Treated waste water
	Efficient storm water
Celebrate heritage and local character	Native plantings
	Feature heritage buildings
	Encourage local arts
	Events calendar

3.1.2 Punanga Nui Market (PNM)

3.1.2.1 Location

- Located east of the Avatiu wharf and directly opposite the village of Te Rua O Te Tonga (Ruatonga), the PNM faces north and experiences the prevailing easterly winds and during times of unsettled weather

from November through to April (our wet and cyclone season) it sometimes become subjected to sea surges and coastal flooding depending on how extreme weather conditions become.

- The location also experiences the strong north to north west winds if and when a cyclone develop in the north west of the Cook Islands during the wet season.

Figure 1: PNM Layout

3.1.2.2 Purpose

- The Punanga Nui Market (PNM) was established in 1992 during the Pacific Arts and Cultural Festival and after the festival was re-designed for the benefit of local primary producers (fresh fruits and vegetables, roof crops, fresh fish, cooked foot etc.).
- As years passed, it expanded to include small local businesses specializing in crafts, wood carving, jewelry, music and a range of services.
- The original PNM site was a freelancing market where vendors could use the roadside to sell their homegrown and homemade products for income generation.
- In 1995 there was further development of the site, permanent huts were built in a village pattern by the Ministry of Works.
- The PNM has grown substantially in terms of the physical space it occupies as well as the type of vendors, function, and purpose.
- The changes have largely been ad hoc and tended to lack a coherent long-term plan for development informed by the physical environment and the interests of stakeholders.
- The PNM Improvement Project proposes works that will improve PNM efficiency, capacity, flow, aesthetic, access, accessibility and overall experience.

3.1.2.3 Current issues that are being experienced






ISSUES	
Disorganized and disconnected layout.	• Layout does not allow for the best use of the space in terms of access, capacity, growth, flow, organisation by types of stalls/zoning. Hut owners and vendors are disjointed due to random and adhoc developments since 1992. • The search for particular products can be a difficult task due to spread of services and lack of signage.
Lack of an effective traffic management plan.	• Traffic congestion during peak hours. • Informal parking arrangements due to limited marked parking spaces and signage. • No traffic wardens to co-ordinate traffic throughout the site. • Road access within close proximity to dining tables and fresh produce displays.
Pedestrian safety compromised by:	• Lack of dedicated or marked parking space for cars, trucks, motorbikes or bicycles • Lack of dedicated parking spaces for those with physical disabilities or the elderly • Intermittent or disconnected footpaths • Absence of pedestrian crossings • Absence of a dedicated bus drop off and pick up area
Lack of green spaces for recreational use.	• Coastal setting is underused and underappreciated. There is opportunity to provide picnic tables and create recreational spaces for public enjoyment. • Minimal natural shade due to tree removal activities over the years to accommodate more vendors.
Public facilities (playgrounds etc.) and toilets are not fit for purpose or not serving the public adequately.	• Some of the structures are in vulnerable, deteriorating states. • Existing public toilets are not fit-for-purpose or are in dire need of improvements and on-going maintenance. • Lack of consistency in quality and appearance of existing structures.

3.1.2.4 Desired Outcomes and Proposed Approaches

DESIRED OUTCOMES	APPROACH
A well connected establishment. All huts and vendors accessible by way of a footpath.	✓ Provide a footpath that connects all existing huts to ensure pedestrian accessibility, especially those in wheelchairs. ✓ Provide adequate disability parking space throughout the establishment and near facilities as much as practicable.
An organized market layout. Minimal displacement of hut owners and market vendors as much as practicable.	✓ Group all similar services together and streamline location of underground and overhead utilities throughout the site for ease of maintenance and future expansions when or if required. ✓ Relocate hut owners and vendors who obtrude access ways or plans for future growth by relocating them to a more suitable location. ✓ Revamp existing infrastructure to a state that is functional and complies with local standards and regulations. ✓ Remove buildings that pose a health and safety risk to all marker-goers.
Minimize traffic congestion by implementing a suitable and effective traffic management plan	✓ Implement and police an effective traffic management plan. Employ parking wardens and security if necessary. ✓ Provide adequate parking space for vehicles. ✓ Encourage shuttle transport between hotels and the PNM by providing a safe and sheltered pick-up and drop-off zone for buses & taxis.
Communal spaces that are interactive, revitalizing, comfortable and filled with native vegetation.	✓ Convert underused coastal setting into eating areas. Add picnic tables or benches for comfort. ✓ Rejuvenate and create low-maintenance green gardens throughout. ✓ Use native plants/trees in landscaping and eliminate use of introduced species as much as possible. ✓ Plant trees or shrubs that provide nutrient-absorbing properties and can be multi-purpose (bear fruit, provide shade, act as a wind barrier etc.). ✓ Incorporate footpath or promenade that extends from one end of the PNM to the other and place fitness equipment along the trail to encourage active and healthy lifestyles.
Fit-for-purpose infrastructure that also reflects Cook Islands culture, values and aspirations	✓ Upgrade public toilet at main entrance to PNM. ✓ Construct public toilet at Constitution Park. ✓ Improve the quality of service delivery by providing fit-for-purpose facilities such as: ✓ Farmers Market (for fresh fruits, vegetables, food crops, cooked food) ✓ Fish Market (fish and other seafood) ✓ Accessible public toilets ✓ Information Hub & Bus Shelter **Farmers market:** Tables or benches for vendors to display their produce, conveniently marked parking spaces near the market that will enable vendors to store their produce and cart onto the display units as required, open and well ventilated shelter, a supermarket experience, seating and eating areas within close proximity.

	Public toilet: Must include baby changing room, storage for cleaning products, disability toilets and easy access throughout, weatherproof, comfortable waiting areas, facilities for both men and women, appropriately landscaped gardens for a warm and welcoming ambience. **Fish market:** Must allow for a sufficient drainage system for frequent wash downs during operating hours, stainless fixtures and fittings as much as possible, lockable windows and doors for the security of moveable fit out and electrical appliances (chest freezers, etc.), doors and windows with the capacity to withstand wind loads of 74m/s, open and well ventilated environment to minimize fly infestation. <u>Cultural References:</u> Implement a cohesive aesthetic that reflects Cook Islands culture, values and aspirations. Consider the cultural and spiritual aspects of the site and how these can be incorporated into the building design, landscape or interior and exterior decoration. <u>Resilient and Sustainable Infrastructure:</u> Implement building materials that can be readily available locally for ease of maintenance and replacement. Implement building technologies and methodologies that are robust and can withstand Category 5 cyclones. Incorporate green building principles throughout the design to reduce environmental impacts, carbon emissions and improve our sustainability. <u>Indoor Environment Quality</u> Incorporate natural ventilation and sunlight penetration (with minimal glare) as much as practicable. Solar street lighting throughout the establishment. <u>Materials</u> Apply Life Cycle Analysis in the selection of materials Reuse demolition waste where possible Optimise use of recycled and recyclable materials Eliminate materials that emit VOCs and formaldehyde Minimise use of materials and building techniques with high embodied energy and water. Maximise use of materials certified by independent party – quality, energy & water efficiency. Waste management – minimise wastage in construction. <u>Water</u> Net-zero outcome Onsite water supplied by onsite harvesting and storage Treat and reuse wastewater onsite Minimise water use. Use water efficient fixtures certified by independent party, AAA+ rating. <u>Energy</u> Net zero outcome

	Onsite power generation Minimise energy consumption. Use energy efficient fixtures certified by independent parties. <u>Transport</u> Allow for EV charging onsite <u>Emissions</u> Zero ODP and below 10 GWP <u>Land use and ecology</u> Eliminate use of imported grass seeds
Information Hub - An area where market-goers can find information, an ATM, Vodafone services, etc.	✓ Provide a central information centre that is easily identifiable and accessible. This space may contain tourist information (accommodation, rental, activities, etc.), maps of the PNM as well as brief information about the vendors, ATMs, Vodafone Services, etc. ✓ Provide signage (in both English and Cook Islands Maori) throughout.

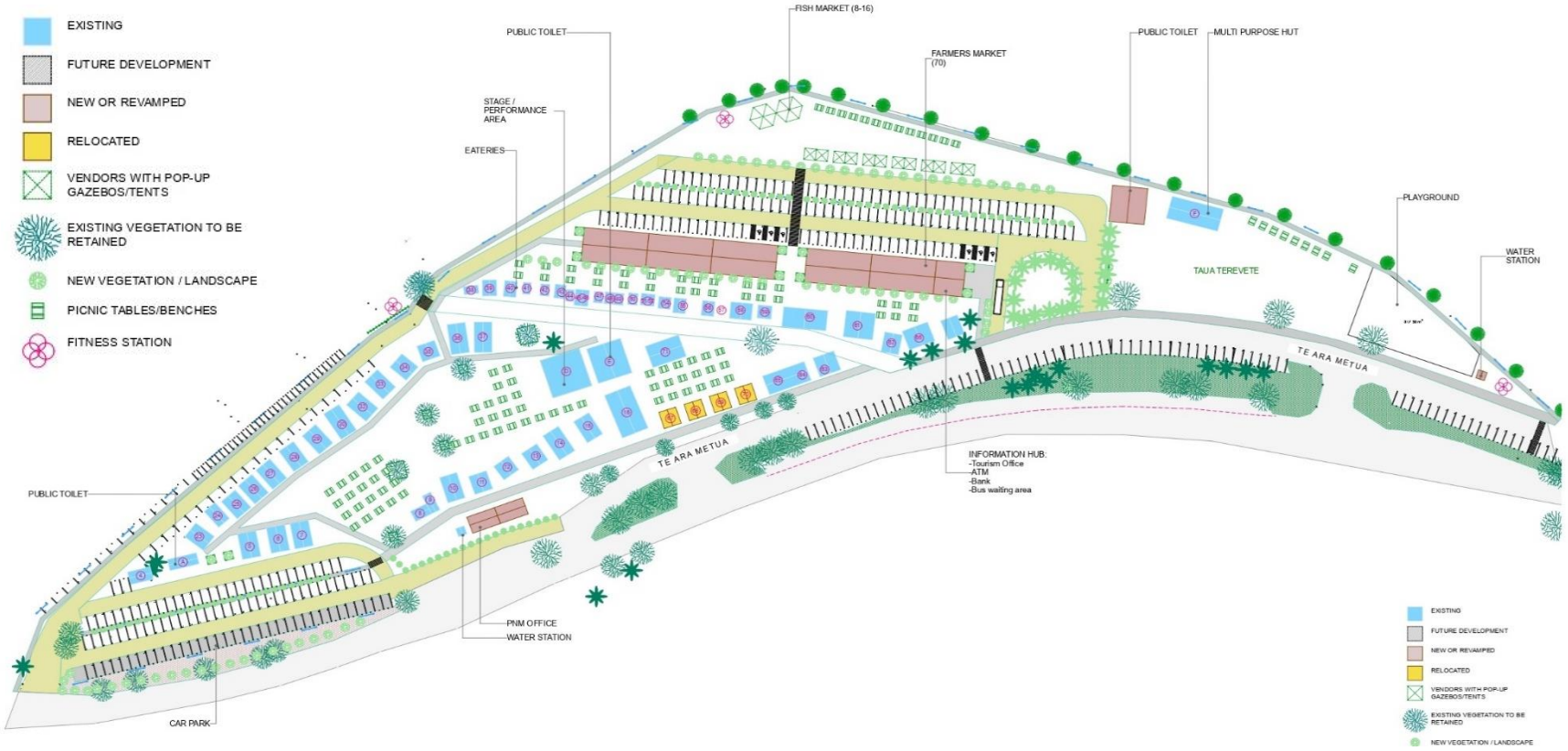
3.1.2.5 Plans

3.1.2.5.1 Proposed Re-Organization Plan

KEY MOVES:

- Increase capacity of carpark near main entrance.
- Farmers Market strategically relocated to ensure that “drive-through” experience is retained and 70 vendor spaces provided.
- Information Hub and waiting area disability/elderly drop off and tour buses. A separate bus pick up and drop off area is proposed to be located opposite the Avarua Catholic Church.
- Fish Market relocated to the coast with parking space and dining space with a view.
- Carpark in constitution hut.
- New public toilet next to Constitution Hut.
- Playground to be relocated to eastern end of Terevete Park. Daycare will remain as is. Current location of playground will be used to accommodate food vendors.

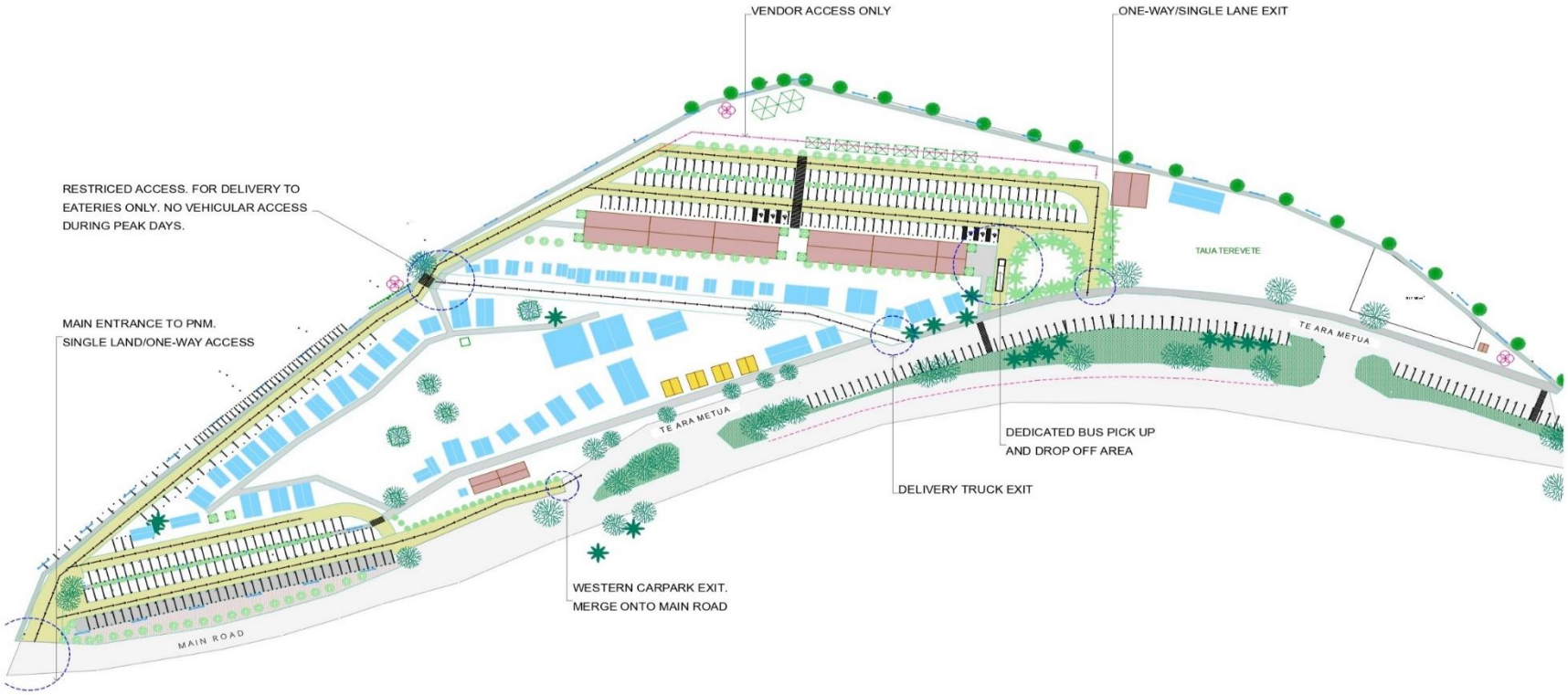
Figure 2: PNM Proposed Reorganization Plan



3.1.2.5.2 Proposed Road Network

- No “right-turn” at main entrance.
- 5m wide road access throughout.
- PNM becomes 10km zone.
- Implement 30km zone between Avatiu and Avarua roundabouts.
- One-way/single lane entry.
- 2 exit points for vehicles and 1 exit point for delivery vehicles only.
- Sheltered bus drop off and pick up area.

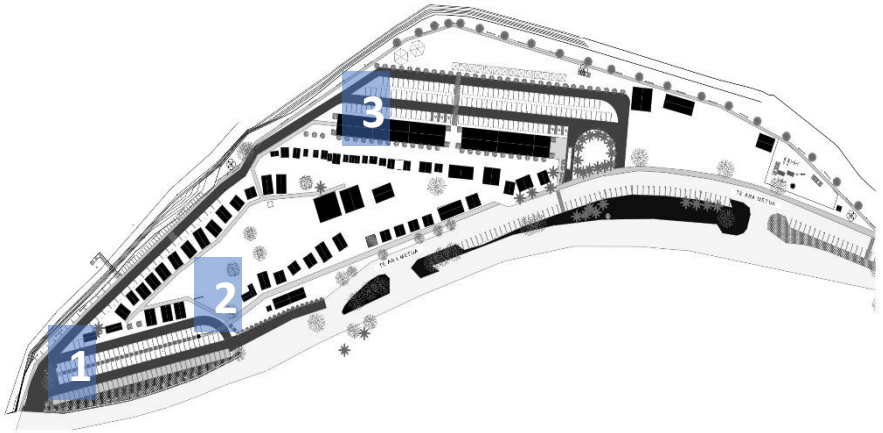
Figure 3: Proposed Road Network



3.1.2.5.3 Proposed Foot Traffic Access

Figure 4: Proposed Foot Traffic Access

- 1.5m wide footpaths throughout.
- 1.5m wide promenade along coastal fringe.
- 1m wide footpath/circulation within carparks.
- All buildings within the PNM to be accessible by pedestrians, partic
- Solar Street lights throughout.
- Pedestrian crossings throughout.



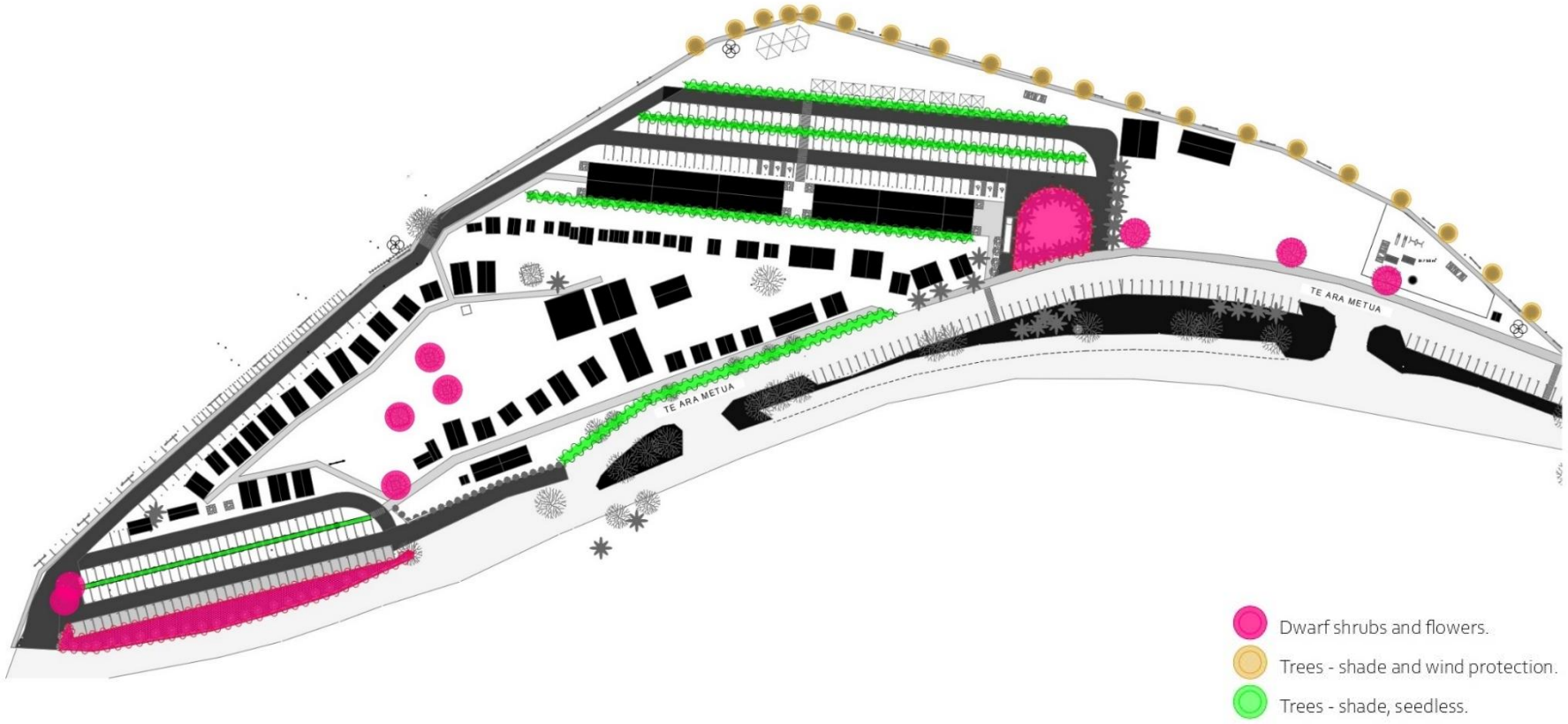
MAIN ENTRANCE TO PUNANGA NUI MARKET

FISH MARKET & OUTDOOR DINING TABLES

FISH MARKET & CONSTITUTION PARK

3.1.2.5.4 Proposed Landscape Plan for PNM – Rejuvenate Landscaped Areas and Garden Beds

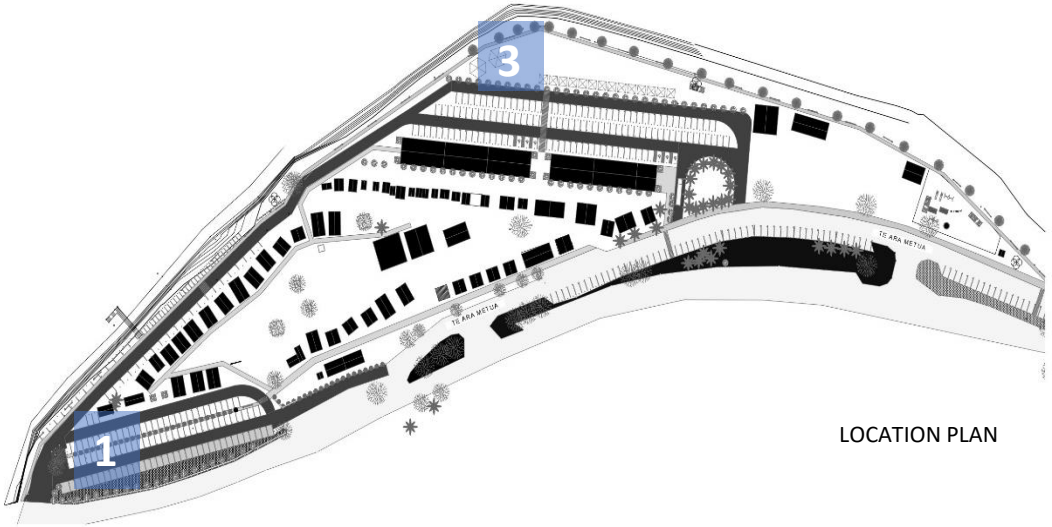
Figure 5: Proposed Landscape Plan for PNM



3.1.2.5.5 Opportunities

3.1.2.5.5.1 Entrance to PNM, Outdoor Dining Tables and Constitution Park

- Opportunity to incorporate a traditionally inspired feature at the main entrance of the PNM.
- Marked parking space for cars, motorbikes and bicycles.
- EV charging stations.
- Solar street lighting and signage for ease of navigation.
- Encourage an aesthetic that is coherent and reflects local heritage and character.
- Promenade along coastline of PNM and Constitution Park.
- Large roof areas to accommodate solar panels for solar power generation.



LOCATION PLAN

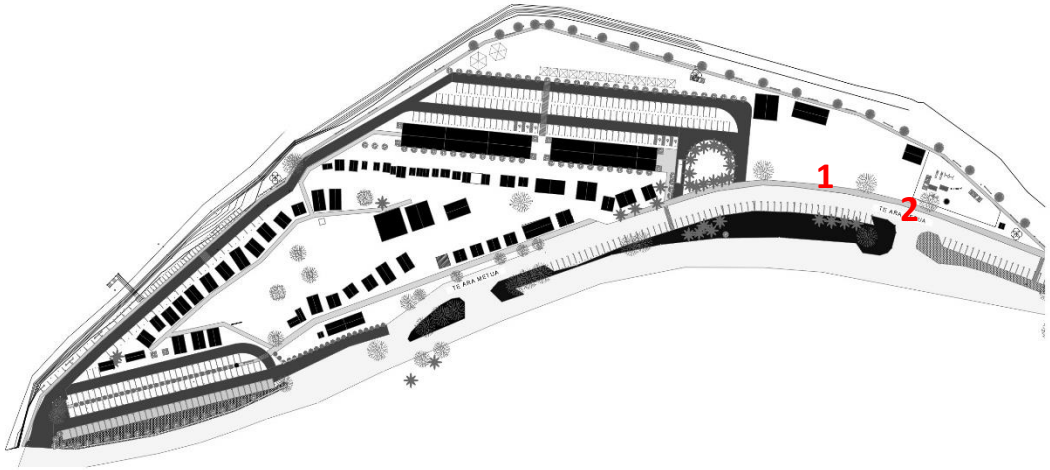
MAIN ENTRANCE TO PUNANGA NUI MARKET

FISH MARKET & OUTDOOR DINING TABLES WITH COASTAL VIEW

FISH MARKET & CONSTITUTION PARK

3.1.2.5.5.6.2 Dedicated bus drop off/pick up area and Pedestrian Crossing

- Waiting area for disability/elderly & tour bus passengers within close proximity to tourist information, ATM, etc.
- Well connected footpaths and walkways.
- Clearly marked road crossings and appropriate road signs.
- Clear signage throughout for ease of navigation.



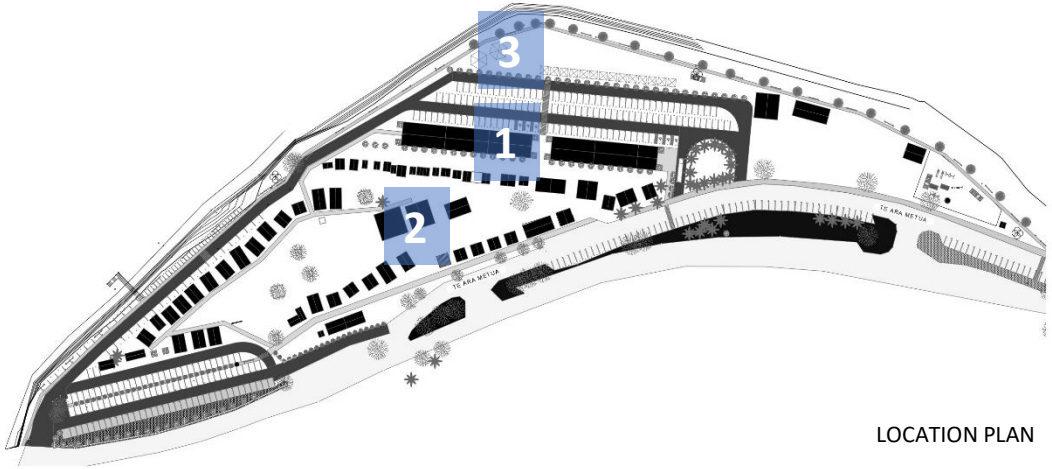
DEDICATED BUS DROP OFF/PICK UP AREA

DEDICATED BUS DROP OFF/PICK UP AREA

PEDESTRIAN CROSSING

3.1.2.5.5.6.3 Standard Design for Farmers Market, Public Toilet and Fish Market

- Infrastructure that is functional, easily accessible and user friendly.
- Infrastructure that is resilient to climate change and affordable to maintain in the long-term.
- Farmers market that retains its “drive-through” experience. Becomes first point of contact for visitors off the bus.
- Information hub/bus shelter attached to eastern entrance of Farmers Market.
- Standardize designs for future development of infrastructure including:
    1. Information Hub
    2. Farmers Market
    3. Public Toilets
    4. Fish Market
    5. **Private Enterprise (Consultants, etc.)**



LOCATION PLAN

ARE MAKETE | FARMERS MARKET

ARE MEANGITI | PUBLIC TOILETS

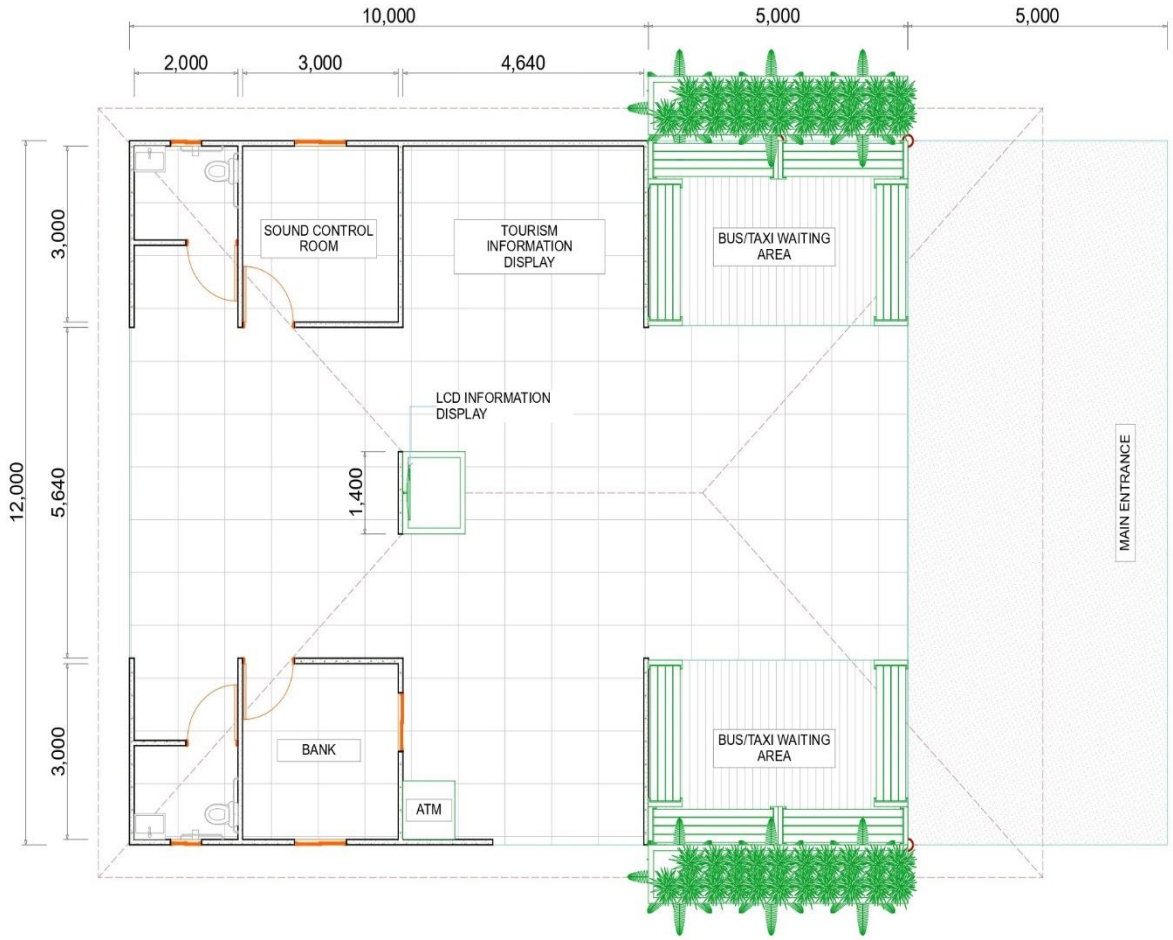
KAI MOANA | FISH MARKET

3.1.2.5.5.6.4 Standard Design for Information Hub

DESIGN INSPIRATION

Marae style entrance | Space where visitors can collect information about the market, make withdrawals (and change if necessary) and wait for public transport under shelter | LCD information screen

3.1.2.5.5.6.5 Information Hub (Plan)



SPECIAL FEATURES

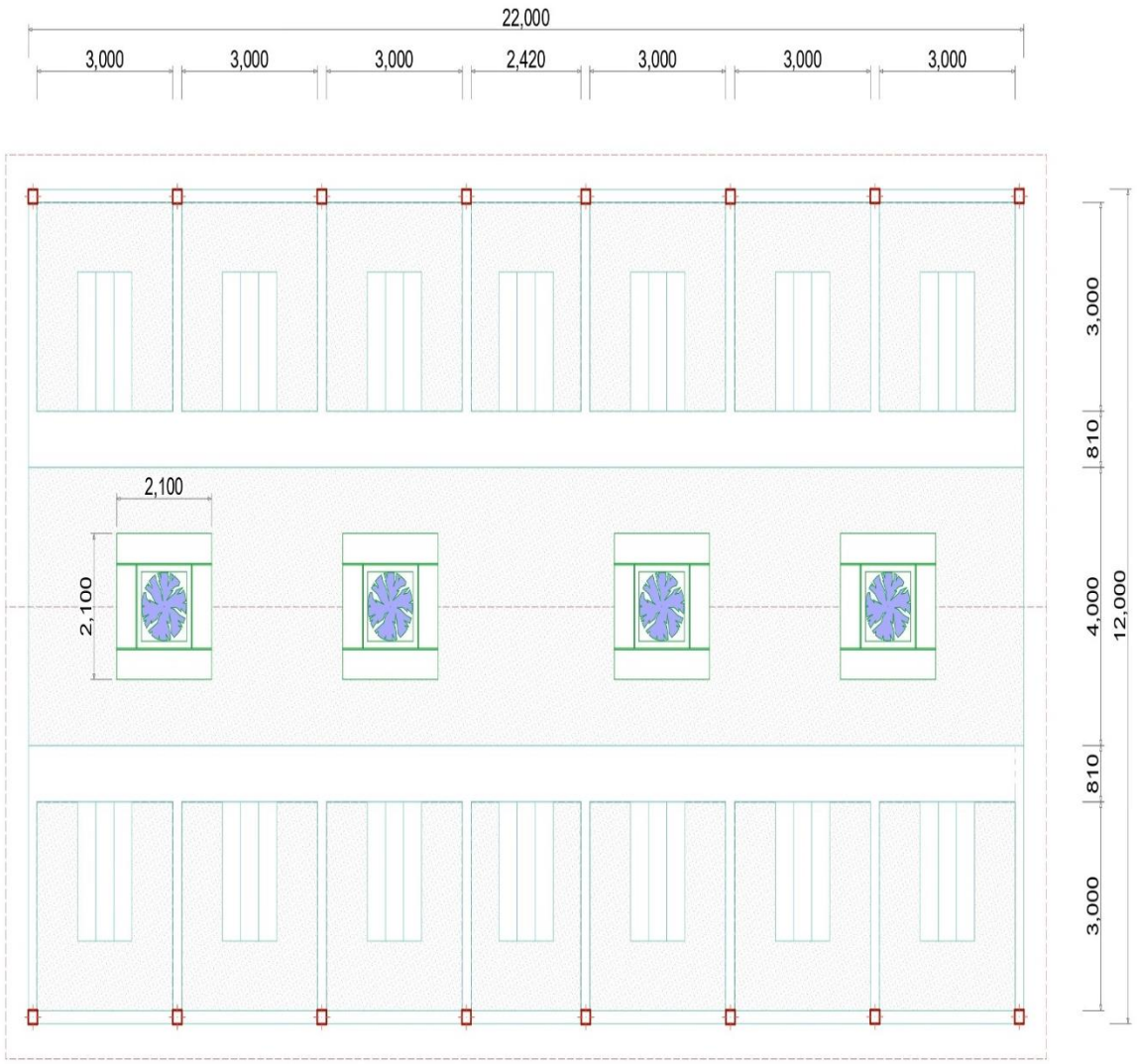
- Accessible toilet facilities for staff and visitors waiting for bus or taxi.
- Sound control room where announcements over a PA system can be managed.
- Tourist information display area and mobile LCD screen to display information or messages.
- Opportunity to accommodate banking facilities (for change only) and ATM services.
- Incorporate finishes with soft tones and textures to create a warm, welcoming and family oriented environment for all visitors.
- Sheltered.
- Single level building for ease of access by all, including those with physical challenges or the elderly.
- Concrete slab floor, timber construction and synthetic thatched roofing. Durable construction to ensure stability during a cyclone or strong wind.
- Use of construction materials that is readily available locally and easy to maintain in the long-term.
- Planter boxes filled with native, low-maintenance shrubs or flowers to help improve air quality.
- Marae style point of entry.
- Incorporate thatched roofing and traditional lashing techniques throughout.
- A traditional, welcoming and coherent aesthetic throughout.

3.1.2.5.5.6.6 Standard Design for Are Market and Farmers Market

DESIGN INSPIRATION

Traditional lashings | Open environment under a single roof | Timber construction. Truss designs that reflect traditional motifs and warm color

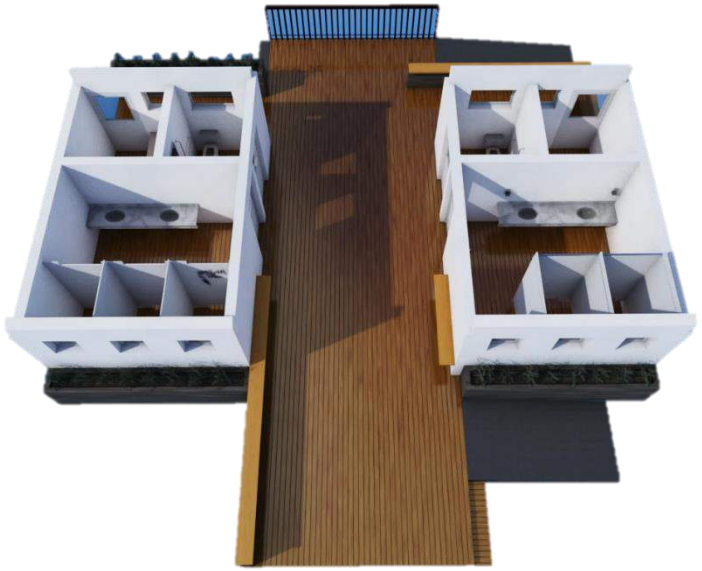
3.1.2.5.5.6.7 Standard Design and Layout Farmers Market Plan



SPECIAL FEATURES

- Each Farmer's Market will accommodate 14 vendors. Total capacity: 70 vendors.
- Incorporate finishes with soft tones and textures to create a warm, welcoming and family oriented environment for all visitors.
- Seating areas throughout.
- A sheltered market from where vendors can sell their fresh produce. Setup eliminates the need for vendors to provide their own shelter.
- Fitted with power points and lights to support evening use.
- Single level building for ease of access by all, including those with physical challenges or the elderly.
- Modular floor plan for ease of construction, minimal construction waste and supports future growth.
- Concrete slab floor, timber construction and synthetic thatched roofing. Durable construction to ensure stability during a cyclone or strong wind.
- Use of construction materials that is readily available locally and easy to maintain in the long-term.
- Display units that can be used as tables and seat benches when the market is not in use.
- Opportunity to provide drop-down sails for added weather protection.
- Seating areas complimented by planter boxes filled with native, low-maintenance shrubs or flowers to help improve air quality.
- Incorporate thatched roofing and traditional lashing techniques throughout.
- A traditional, welcoming and coherent aesthetic throughout.

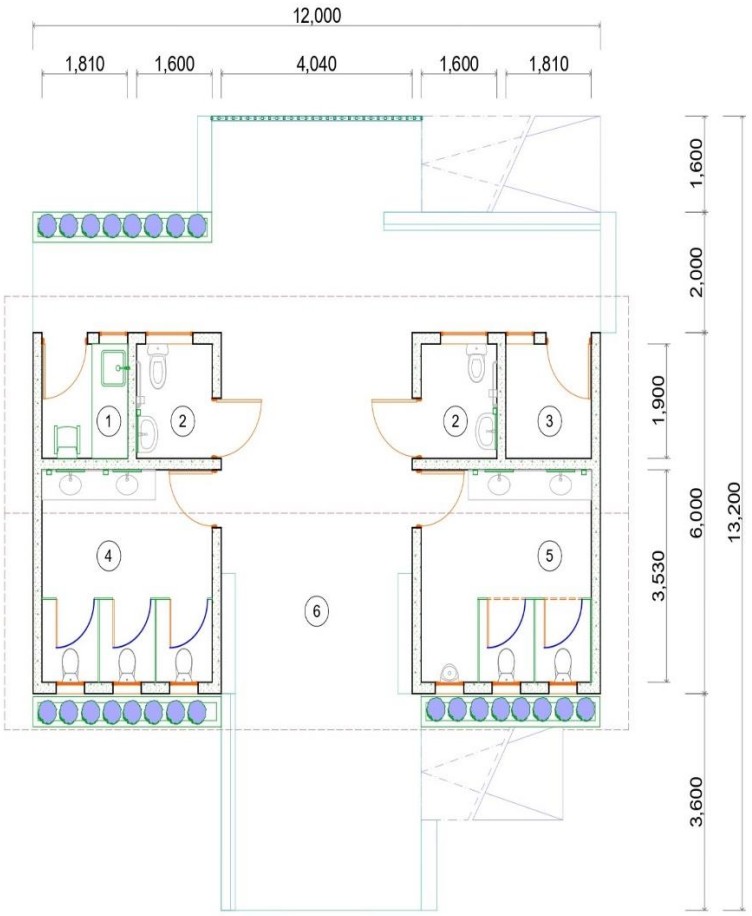
3.1.2.5.5.6.8 Are Meangiti/Public Toilets



DESIGN INSPIRATION

Traditional lashings and truss designs that reflect traditional motifs | Synthetic thatched roof | Warm color palette

3.1.2.5.5.6.9 Standard Design and Layout for Are Meangiti/Public Toilets Plan



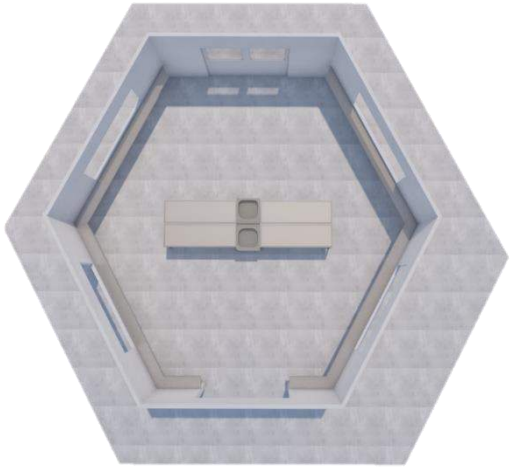
ID	DESCRIPTION
1	BABY CHANGING ROOM
2	ACCESSIBLE TOILET
3	CLEANERS STORAGE
4	TOILETS – VAINE
5	TOILETS – TANE
6	WAITING AREA





- A family friendly design that includes a baby changing room and accessible toilets.
- Designed to cater for up to 700 users per day.
- Onsite storm water collection system that will enable rainwater to be treated and reused for irrigation, washing and flushing.
- Non-slip ceramic tiles and ramps for ease of accessibility.
- Clear glazing as much as practicable to maximize natural lighting and ventilation throughout.
- Weatherproof waiting areas.
- Single level building for ease of access by all, including those with physical challenges or the elderly.
- Concrete slab floor, timber construction and synthetic thatched roofing. Durable construction to ensure stability during a cyclone or strong wind.
- Use of construction materials that is readily available locally and easy to maintain in the long-term.
- Seating areas complimented by planter boxes filled with native, low-maintenance shrubs or flowers to help improve air quality.
- Incorporate thatched roofing and traditional lashing techniques throughout.
- A traditional, welcoming and coherent aesthetic throughout.

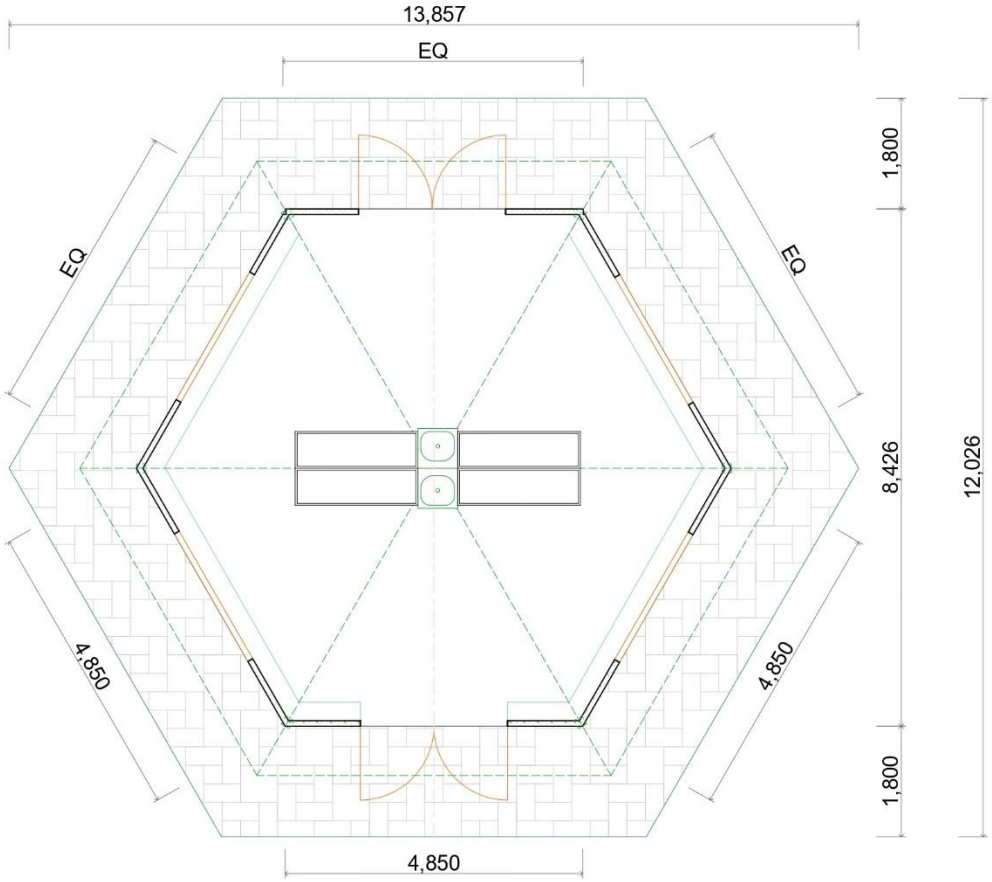
3.1.2.5.5.6.10 Standard Design for Kai Moana/Fish Market



DESIGN INSPIRATION

Synthetic thatched roof | Robust cold display units | Open environment, maximum air flow

3.1.2.5.5.6.11 Standard Design and Layout for Fish Market (Proposed Floor Plan)



SPECIAL FEATURES

- Each Fish Market will accommodate 4-8 vendors depending on quantity of products. Total capacity: 16.
- Incorporate finishes with soft tones and textures to create a warm, welcoming and family oriented environment for all visitors.
- Market is lockable outside of operation hours for security purposes (to protect equipment and to prevent vandalism)
- An aesthetic coastal setting where visitors can continue to enjoy fresh fish, seafood and māroro tunutunu.
- Windows allow sufficient airflow and has the ability to withstand minimum wind loads of 74 m/s.
- Stainless steel equipment and fittings for durability and longevity.
- Clear sealed concrete floors for durability and ease of maintenance. Floor falls toward a central drainage system for easy wash down at the end of each business day.
- Single level building for ease of access by all, including those with physical challenges or the elderly.
- Modular floor plan for ease of construction, minimal construction waste and supports future growth.
- Concrete slab floor, timber construction and synthetic thatched roofing. Durable construction to ensure stability during a cyclone or strong wind.
- Use of construction materials that is readily available locally and easy to maintain in the long-term.
- Footprint pays homage to existing Fish Market and the original stage that has been marked to be removed. Opportunity to explore whether materials from the existing fish market and stage can be salvaged and reused.
- Incorporate thatched roofing and traditional lashing techniques throughout.
- A traditional, welcoming and coherent aesthetic throughout.

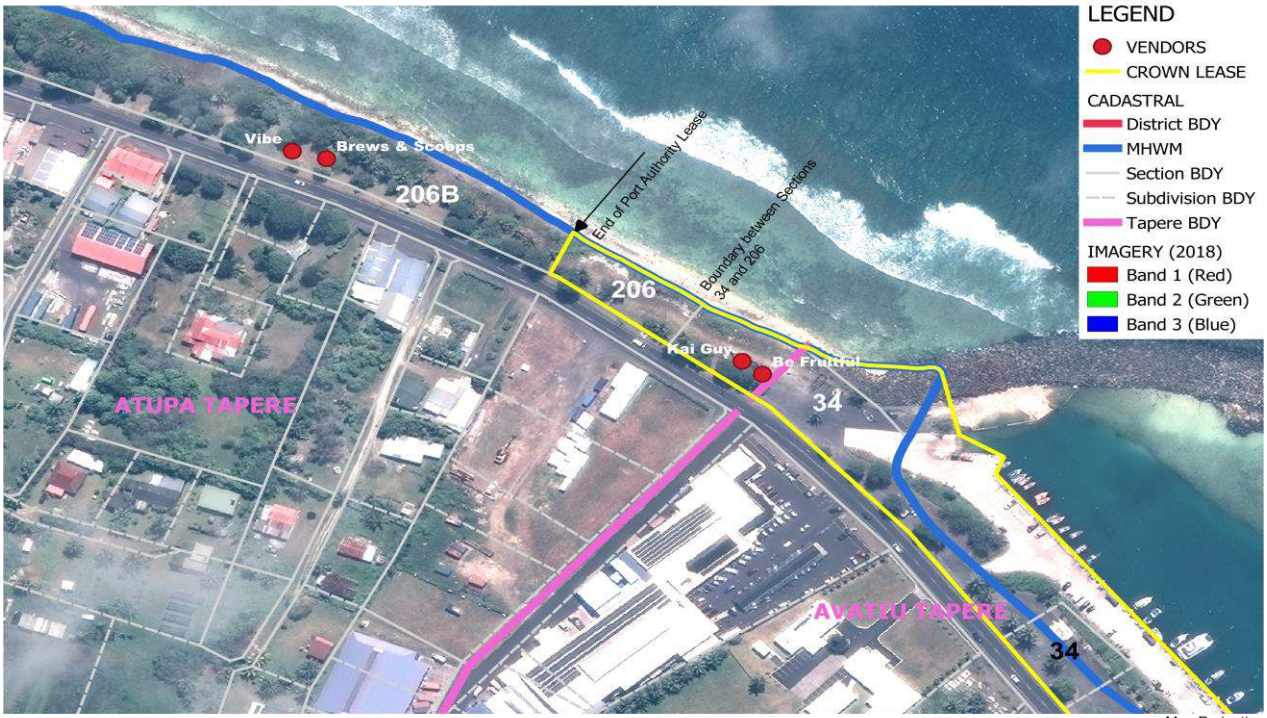
3.1.2.6 Benefit of Proposal

KEY MOVES	BENEFITS
Relocate Farmers Market to Constitution Park.	✓ Drive-through experience retained. ✓ 70 vendor spaces provided. Existing vendors accounted for. ✓ Capacity for carpark near main entrance increased. ✓ Dining alley between the eateries and Fresh Produce Market created, away from passing traffic and exhaust fumes.
Information Hub attached to eastern end of Farmers Market.	✓ Information Hub can contain tourist information, ATM, bank, PA system for notices and special announcements and toilet facilities. ✓ Bus stop pick up and drop off area within close proximity. Also functions s as a sheltered waiting area for bus and taxi passengers. ✓ Farmers Market becomes first point of contact for visitors off the bus. ✓ Parking available for visitors.
Fish Market relocated to the coast.	✓ Parking spaces available. ✓ Outdoor eating areas with a coastal view and natural shade.
New public toilet at Constitution Park.	✓ Central for visitors to the Fish Market, Terevete Park and playground + daycare services.
Taua Terevete retained as a family friendly space.	✓ Family friendly green space within close proximity to the playground. ✓ Opportunity to use the space for public activities remains. ✓ Opportunity to enhance the existing ecology and provide landscaped features for a more revitalizing visitor experience.
Small selection of vendors strategically relocated.	✓ Playground and daycare now isolated from visitor congestion around the eateries. Relocation aims to encourage parking throughout the township area and away from the PNM. ✓ Pedestrian crossing near the playground area to safely guide visitors from the township to the playground/PNM. ✓ Reduce traffic and visitor congestion at Reefside and the ATM by relocating Reefside to the eatery area and the ATM to the Information Hub.
Picnic/BBQ tables provided. Opportunity to plant more trees for natural shade to enhance visitor experience.	✓ Comfortable spaces for visitors to enjoy their meals or watch the Cultural Performances.
Connect all vendors with footpaths.	✓ All vendors within the PNM now accessible by pedestrians and people in wheelchairs.
Standardized design for future development of prominent infrastructure.	✓ Ease of construction when required. ✓ Standard designs make forward financial planning simpler. ✓ Will help set the minimum standards for a fee structure that is fair and consistent.

3.1.3 Avarua Township & Panamā Reserve Beautification

3.1.3.1 Location

- The project site is located in two areas, one part to the east of the PNM and the other part to the west of PNM.
- The eastern part covers the areas at shoreward of the CITC Main Store, the Energy Center to Polynesian Rentals and the Catholic Church to BTIB.
- The western part covers the area known as the Panamā Reserve; from the reclaimed area behind Kai Guy to the Catholic Cemetery.
- Like the PNM, the sites face north and experiences the prevailing easterly winds and during times of unsettled weather from November through to April (our wet and cyclone season) it sometimes become subjected to sea surges and coastal flooding depending on how extreme the weather condition become. The location also experiences the strong north to north west winds if and when a cyclone develop in the north west of the Cook Islands.
- The top photo shows an aerial view of the township area and the bottom photo shows the Panamā Reserve area.



AVATIU/ATUPA FORESHORE

0 25 50 m

Produced by CIIC from Survey Land records

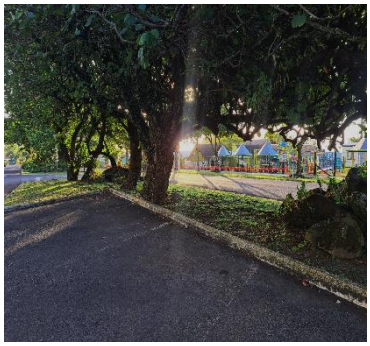
Map Projection WGS 84 (CRS84)

3.1.3.2 Purpose

- The beautification work aims to:
  - Provide a permeable path that will link people from the Avarua Township to the cemetery;
  - Rejuvenate the existing ecology and create interactive communal spaces;
  - Provide pedestrian crossings where practicable;
  - Provide clearly marked parking spaces for cars, motorbikes and people with physical disabilities;
  - Provide picnic tables, seat benches;
  - Encourage healthy lifestyles by incorporating fitness stations; and
  - Facilitate evening access by incorporating solar street lights.

CITC AVARUA

ENERGY CENTER – POLYNESIAN RENTALS



AVARUA CATHOLIC CHURCH - BTIB

PANAMĀ RESERVE

3.1.3.3 Current Issues that are being experienced

ISSUES	
Facilities are not fit-for-purpose or do not serve the public adequately.	• Public toilets opposite the Police Station and next to the Catholic cemetery are out of date and in need of an upgrade.
Health and safety of pedestrians compromised by:	• Intermittent or disconnected footpaths. • Footpaths damaged or displaced by the roots of large trees. • Absence of pedestrian crossings to guide pedestrians to the beach-side footpath on Te Ara Maire Nui drive. • Absence of a dedicated bus drop off and pick up area. • Narrow sections along the edge of the Catholic cemetery (Panamā Reserve)
Lack of dedicated parking spaces	• Parking spaces are largely informal. • No dedicated parking space for motorbikes other than that situated in front of the Bank of the Cook Islands (BCI). • Lack of dedicated parking spaces for those with physical disabilities or the elderly.
Lack of green spaces for recreational use.	• There is opportunity to provide picnic tables and create recreational spaces for public enjoyment. • Garden beds require rejuvenation. • Lack of effective street lighting.

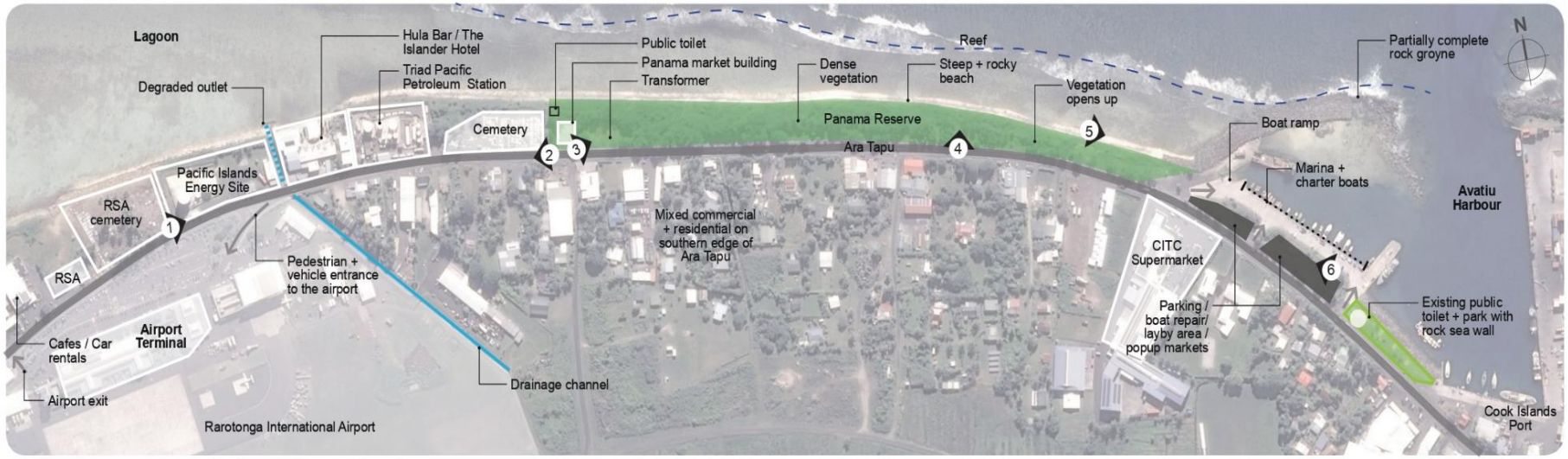
Footpaths damaged or displaced by the roots of large trees.

Existing garden beds in dire need of rejuvenation.

Public toilet opposite Police Station in need of an upgrade.

Public toilet next to the Catholic Cemetery in need of an upgrade.

Underused coastal view.



Poor pedestrian access to airport

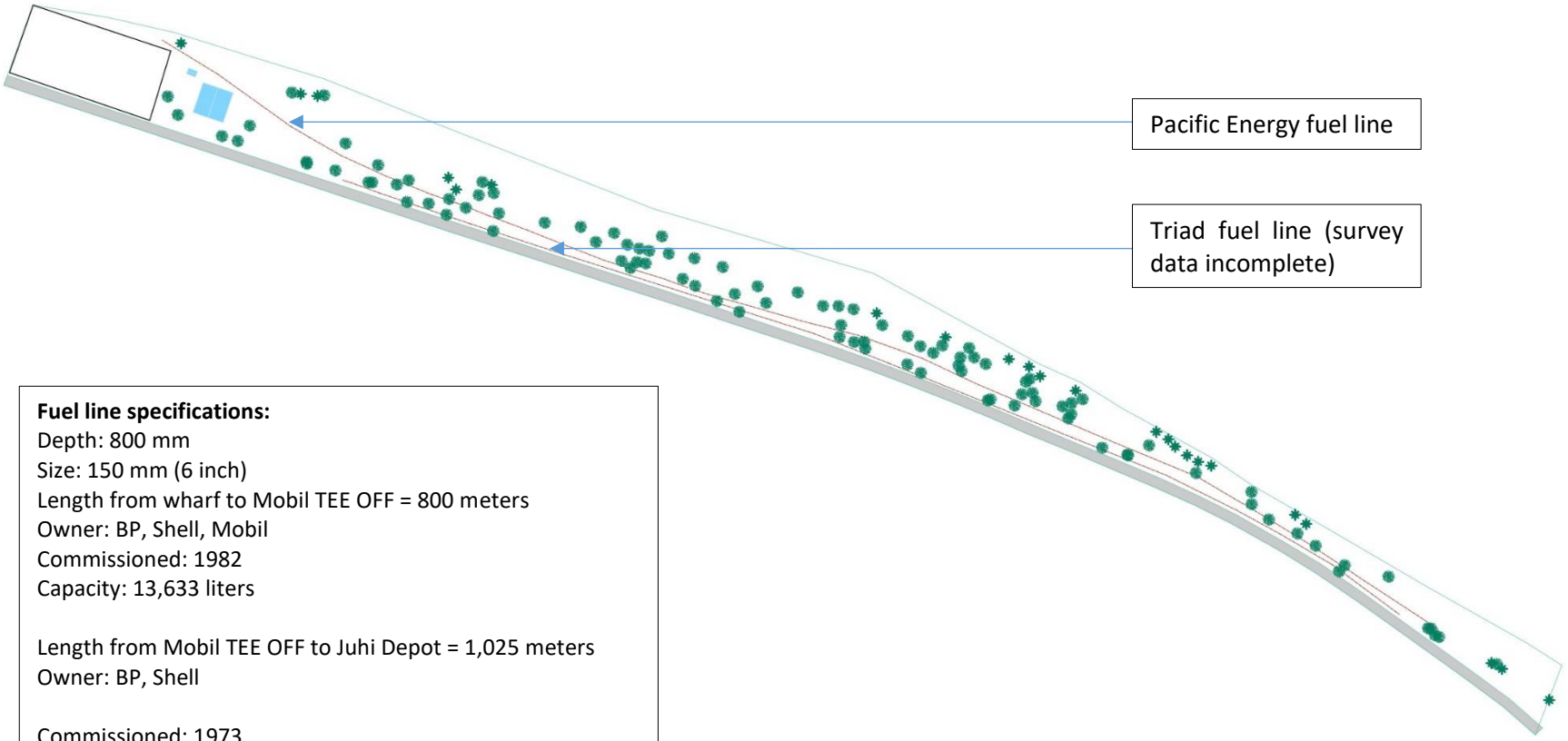
Narrow sections along edge of cemetery

Entrance to Panamā Reserve

Mixture of dense tree planting and mixed tree/shrub planting along coastal edge

Informal parking and connection through lawn areas

Entrance to marina + boat ramp with parking boat lay by area above



Fuel line specifications:
Depth: 800 mm
Size: 150 mm (6 inch)
Length from wharf to Mobil TEE OFF = 800 meters
Owner: BP, Shell, Mobil
Commissioned: 1982
Capacity: 13,633 liters

Length from Mobil TEE OFF to Juhi Depot = 1,025 meters
Owner: BP, Shell

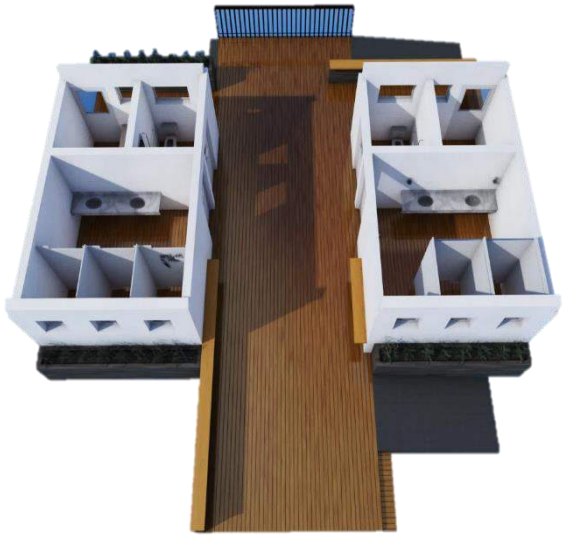
Commissioned: 1973
Capacity: 15,793 liters

3.1.3.4 Desired Outcomes and Proposed Approaches

DESIRED OUTCOMES	APPROACH
Upgrade public facilities and toilets	✓ Upgrade two existing public toilets; opposite Police station and next to the Catholic cemetery (Panamā) ✓ Upgrade the existing playground (Rotary).
Improve pedestrian access and experience from Avarua Township to the Airport as much practicable.	✓ Improve existing footpaths within the Avarua Township area. ✓ Add pedestrian crossing that connects the garden islands to the footpath that extends from the Avarua Harbour to the PNM. ✓ Construct a permeable footpath and cycle-way from the western end of the Avatiu harbour to the end of the Panamā Reserve (Catholic cemetery). ✓ Provide bus stops (Avarua Catholic Church & Panamā)
Rejuvenate landscaped areas and garden beds.	✓ Rejuvenate existing ecology and create more garden beds that incorporate low-maintenance, native plants and shrubs as much as possible. ✓ For safety reasons, consider short plants or shrubs that do not entirely obscure visitors or allow clear line of site throughout the park. ✓ Incorporate trees that don't have intrusive roots that may damage footpaths. .
Green spaces that are family friendly and interactive.	✓ Provide additional picnic tables or park benches. ✓ Provide fitness stations throughout to promote and encourage healthy lifestyles. ✓ Provide effective solar street lighting throughout.

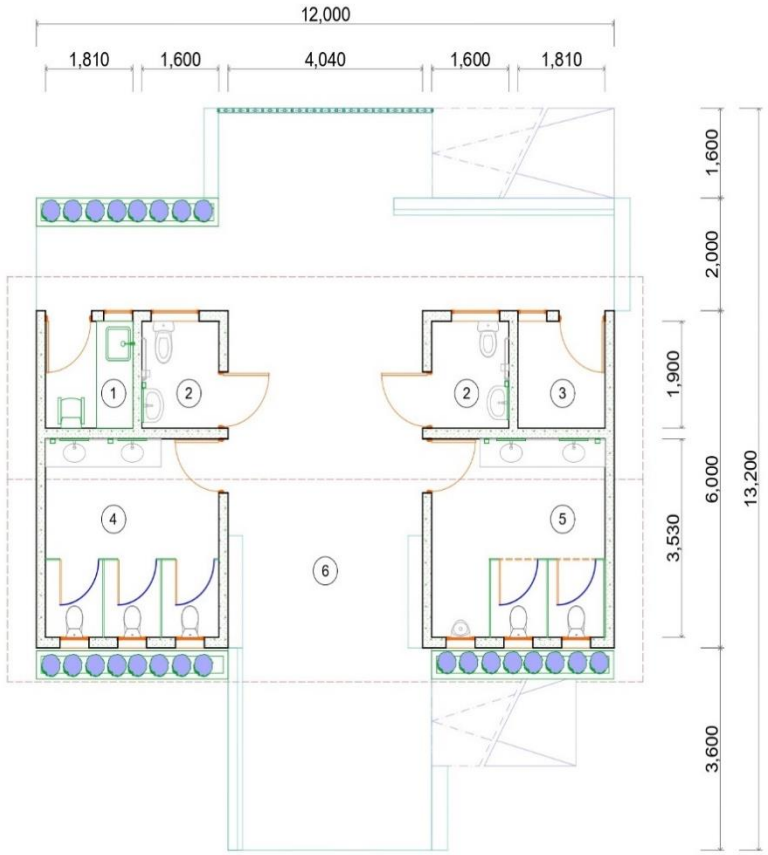
3.1.3.5 Plans and Opportunities

3.1.3.5.1 Upgrade Public Toilets & Facilities



DESIGN INSPIRATION

Traditional lashings and truss designs that reflect traditional motifs | Synthetic thatched roof | Warm color palette



ID	DESCRIPTION
1	BABY CHANGING ROOM
2	ACCESSIBLE TOILET
3	CLEANERS STORAGE
4	TOILETS – VAINE
5	TOILETS – TANE
6	WAITING AREA

SPECIAL FEATURES

- A family friendly design that includes a baby changing room and accessible toilets.
- Designed to cater for up to 700 users per day.
- Onsite storm water collection system that will enable rainwater to be treated and reused for irrigation, washing and flushing.
- Non-slip ceramic tiles and ramps for ease of accessibility.
- Clear glazing as much as practicable to maximize natural lighting and ventilation throughout.
- Weatherproof waiting areas.
- Single level building for ease of access by all, including those with physical challenges or the elderly.
- Concrete slab floor, timber construction and synthetic thatched roofing. Durable construction to ensure stability during a cyclone or strong wind.
- Use of construction materials that is readily available locally and easy to maintain in the long-term.
- Seating areas complimented by planter boxes filled with native, low-maintenance shrubs or flowers to help improve air quality.
- Incorporate thatched roofing and traditional lashing techniques throughout.
- A traditional, welcoming **and coherent aesthetic throughout.**

3.1.3.5.2 Upgrade Rotary Playground

10

M13071-12P
Crazy Scrambler, Greenline

Age: 1+ Years

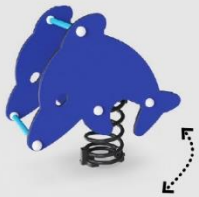
The Crazy Scrambler has motivated joyful play for generations: with it's timeless design, it attracts children again and again. The rocking sensation makes them stay and play. Apart from the joy in rocking, the responsive movement also trains the understanding of cause and effect in young children: that actions have an effect on the world.

11

PCM103-0601
Pirate Dolphin Springer

Age: 2+ Years

The springer is a playground classic with a strong appeal to all children. Every springer in our range is just waiting for a child to unlock its imaginative potential.

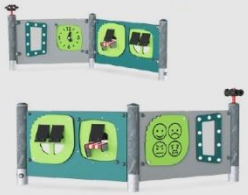


12

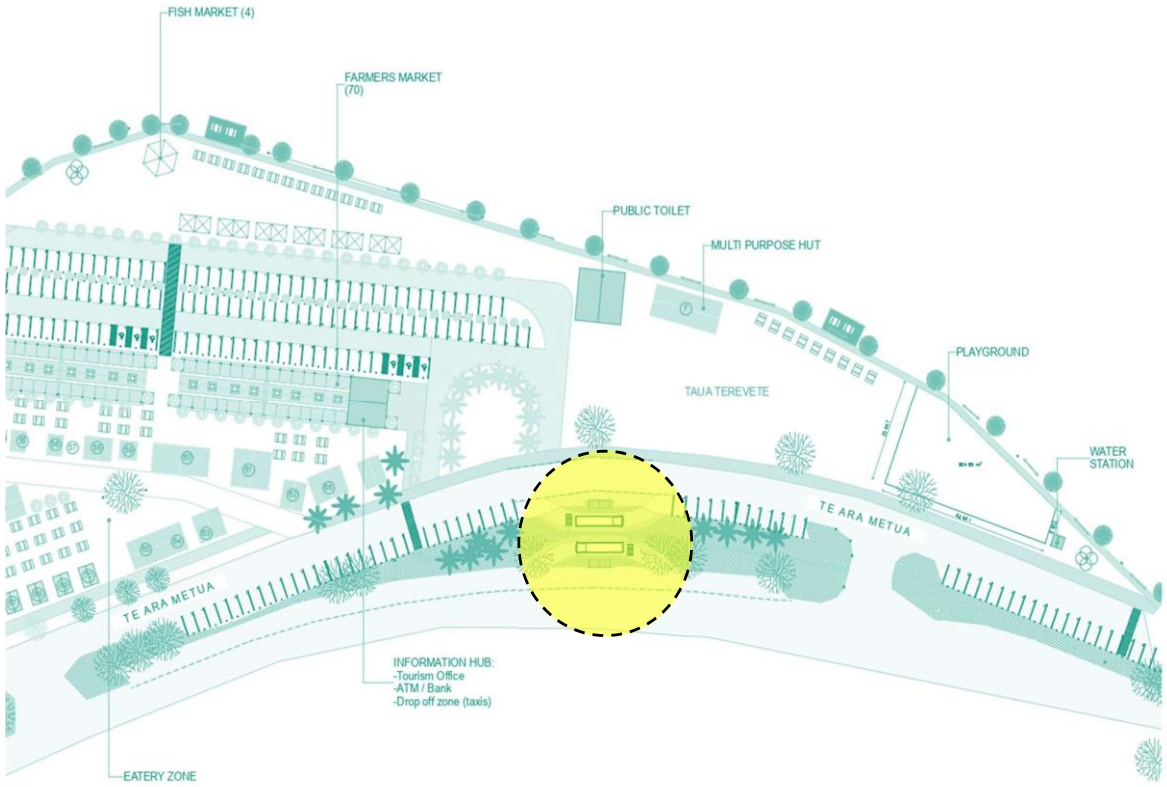
PCM003221-0950
Play Panel 2 - Emotions

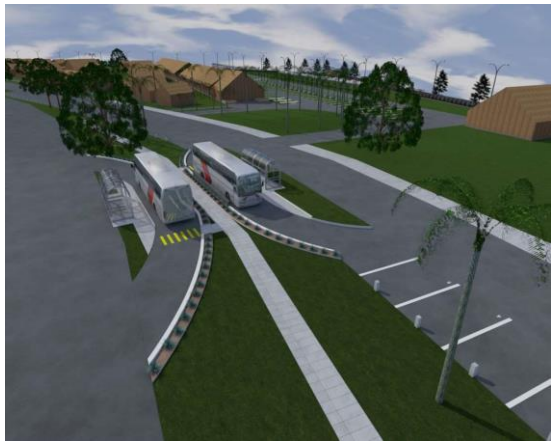
Age: 6m+ Years

The Emotions Play Panels immensely attract young children with their variation of rich, responsive play textures. The sense of touch is hugely stimulated with the conveyor belt. The tactile stimulation, apart from being deeply satisfying for children, stimulate their fine motor and language abilities.



3.1.3.5.3 Bus Stop at Avarua Catholic Church (Anti-Clockwise)





3.1.3.5.4 Bus Stop at Panamā Reserve (Clockwise)

3.1.3.5.5 Design Aspiration – Rejuvenate Landscaped Areas Garden Beds

FURNITURE

STREET LIGHTING

WATERFRONT

Features:

- ✓ Coastal promenade with look-out areas;
- ✓ Greens spaces for picnics and outdoor activities;
- ✓ Permeable paving throughout to enhance experience and aid drainage;
- ✓ Trees that provide shade and wind protection as much as possible. Avoid incorporating trees or plants with large roots that could damage footpaths or underground services.
- ✓ Solar street lighting throughout.
- ✓ Outdoor furniture that is comfortable and resilient to weathering.
- ✓ Opportunity to incorporate traditional motifs throughout.

3.1.3.5.6 Design Aspiration – Rejuvenate Landscaped Areas Garden Beds & Proposed Native Plants

Andonidia merrillii
christmas or manilla palm
broadleaf evergreen

Strelitzia reginae
bird of paradise
evergreen, shrub

***Cordyline fruiticosata* 'Baby Ti'**
rauti
tropical shrub

***Cordyline fruiticosata* 'Variegated Yellow'**
rauti
tropical shrub

***Dracaena trifasciata* 'Laurentii'**
mother in laws tounge, snake plant
succulent

Monstera deliciosa
fruit salad plant
tropical vine, shrub

***Alpinia purpurata* 'Alba'**
white ginger
tropical shrub

***Heliconia psittacorum* 'Andromeda'**
parakeet flower
tropical perennial herb

Cordyline fruiticosata
rauti
tropical shrub

Ophiopogon japonicus
dwarf lily turf
grass

Strelitzia reginae
bird of paradise
evergreen, shrub

Alpinia purpurata
red ginger
tropical shrub

Dypsis lutescens
yellow cane palm
palm

***Dracaena trifasciata* 'Laurentii'**
mother in laws tounge, snake plant
succulent

Ophiopogon japonicus
dwarf lily turf
grass

Existing Vegetation and plant beds

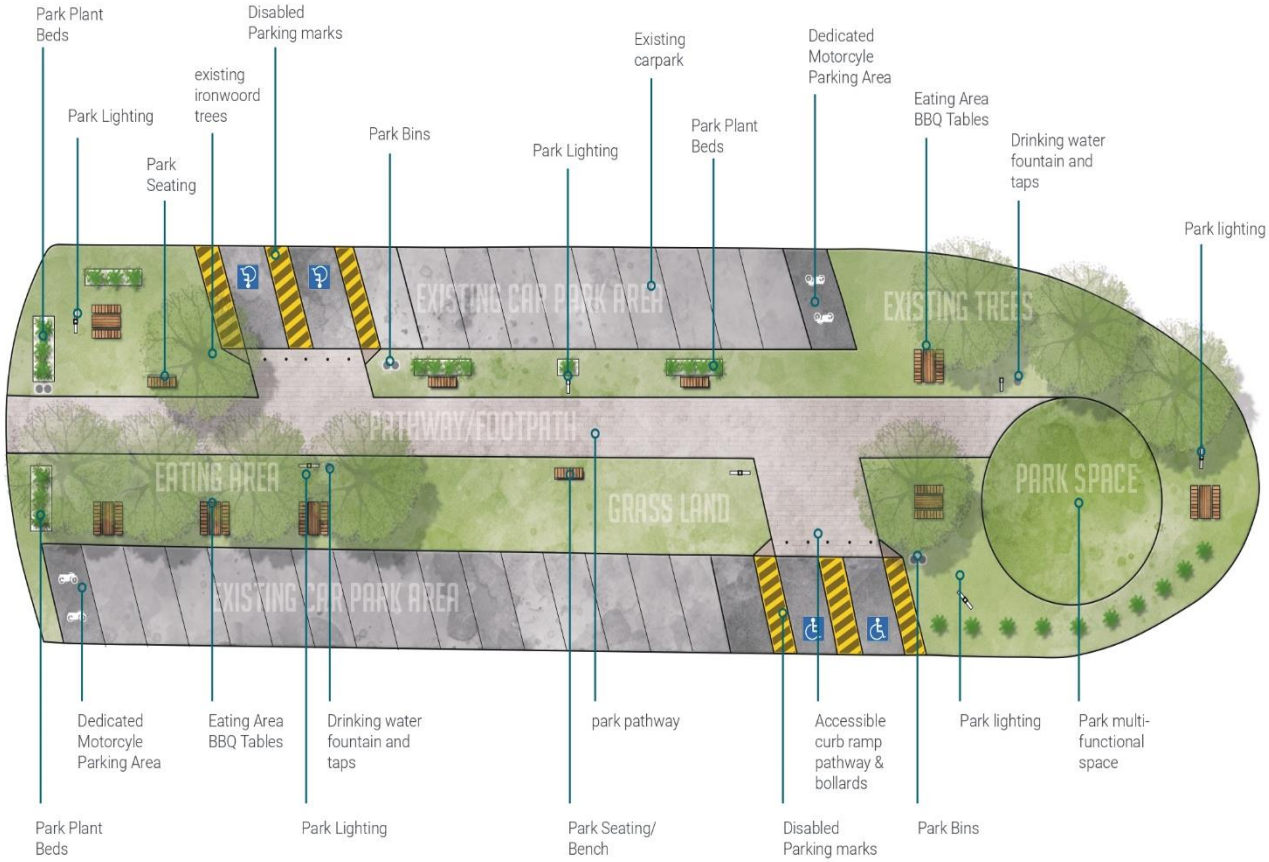
Due to the nature of the site and the surrounding area, many of the existing vegetation on site (particularly the ironwood trees) are to remain due to the cost of removal and the public stakeholders interest in minimising the number of tree removals in the CBD area.

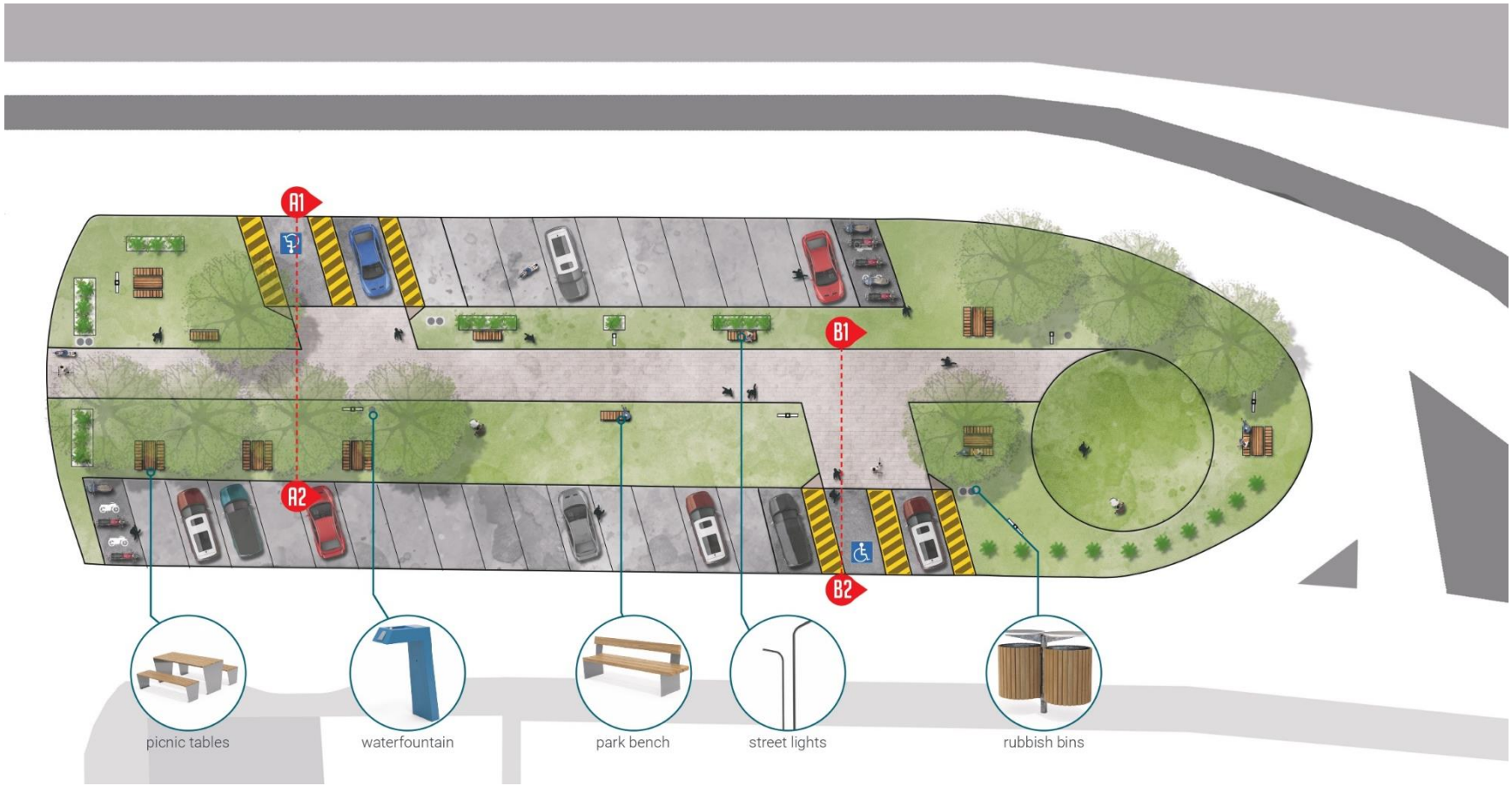
The ironwood trees also provide shelter during the hurricane and strong windy seasons for the CBD area.

As stated previously, in the Stage 2 documentation, any new plant beds will require maintenance from time to time to ensure that plants and flowers on site do not overgrow.

Plant beds on site can use any combination of the plants listed to the left.

3.1.3.5.7 Design Aspiration – Rejuvenate Landscaped Areas Garden Beds at CITC Avarua

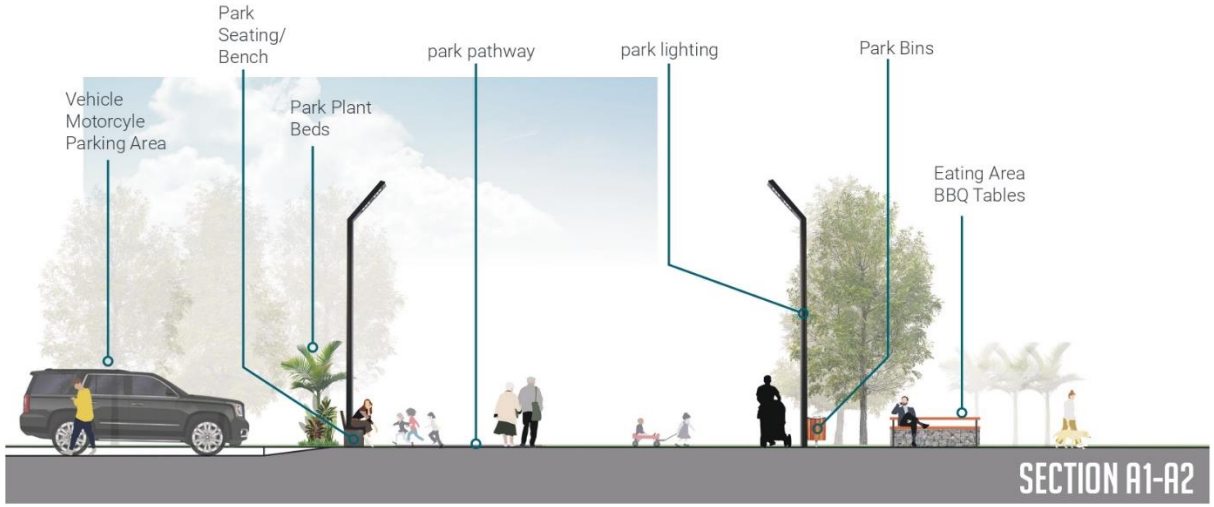



A1
A2
B1
B2
picnic tables
waterfountain
park bench
street lights
rubbish bins

3.1.3.5.8 Design Aspiration – Rejuvenate Landscaped Areas Garden Beds at CITC Avarua (Section A1-A2)

X-Section of Landscape Design

Cross section is taken from the northwestern side of the site from the disabled parking, cutting through the site towards the southern end where the proposed eating area resides. Section shows site elements towards the east.

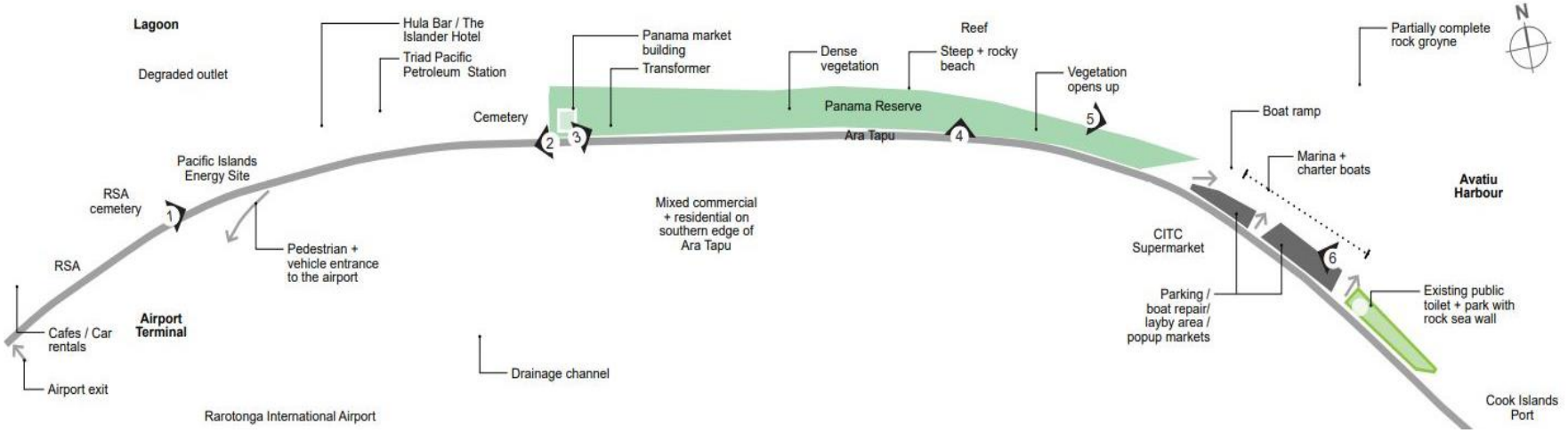


3.1.3.5.9 Design Aspiration – Rejuvenate Landscaped Areas Garden Beds at Panamā Reserve

PANAMĀ RESERVE

The Panamā Reserves extends from the Kai Guy at the western end of the Avatiu Harbor to the Catholic cemetery. The area is underused, lacks parking space and a safe route for pedestrians. Much of the fauna requires rejuvenation and the coastal setting is underappreciated.

Objective: Provide an access way for pedestrians between the Avatiu Harbor and the Catholic cemetery marked parking spaces, an accessible and fully functional public toilet, and recreational spaces without impacting existing underground services and fuel



Panama Reserve Legend

Proposed

- Existing Lighting
- Proposed Lighting
- Proposed Taps/Water fountains
- Site Info Signs
- Litter/Rubbish Bins
- Proposed Reserve Walkway
- Proposed seating area
- Proposed bus depot

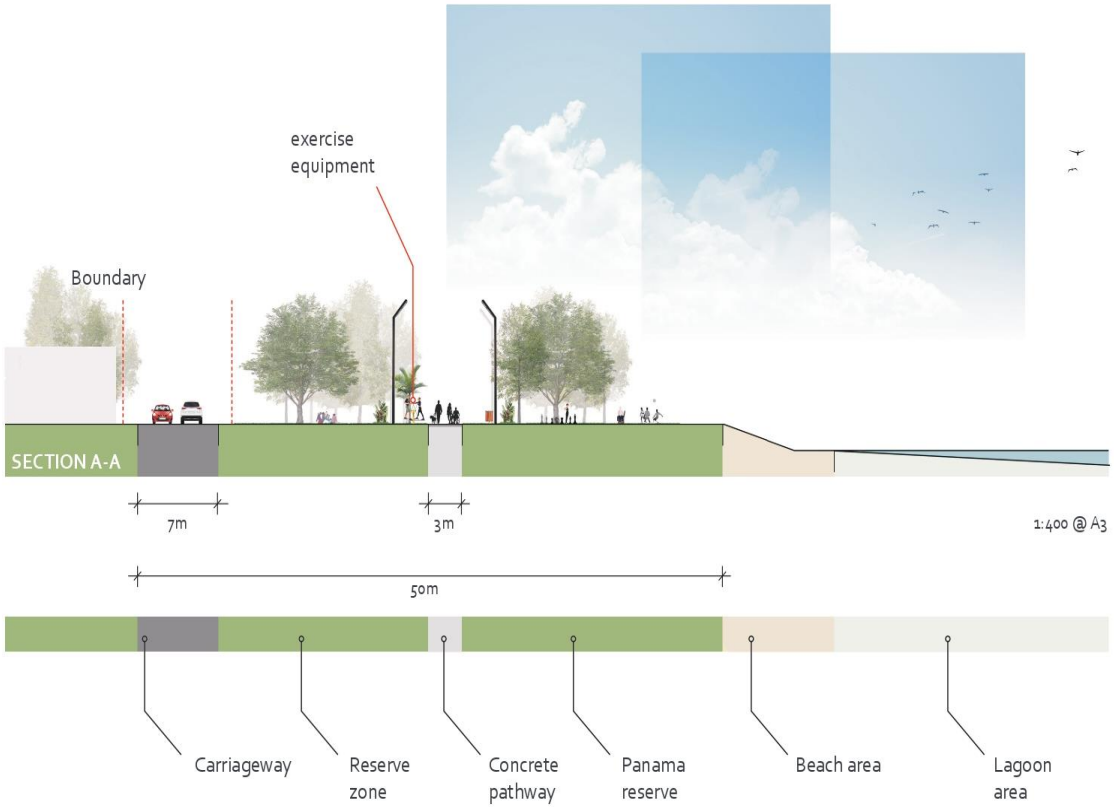
1. water fountain and tap
2. 3m wide west to east reserve path connection
3. site info signs - info and history about reserve
4. new proposed lights
5. site info sign - info about accessway
6. proposed rubbish bins
7. proposed seating area
8. site info sign - fishermans roadside shop
9. area for rest
10. new proposed lighting
11. accessway to beach
12. site info sign - wind breaker
13. rest area & water fountain
14. rubbish bins
15. proposed bus stop
16. pathway continues

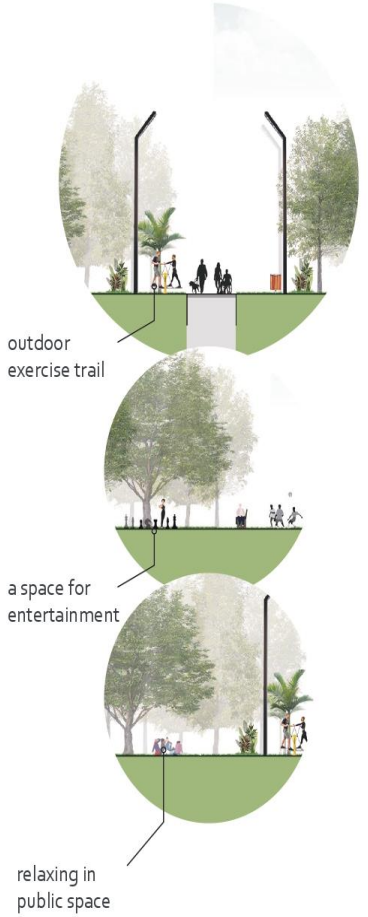
Scale: 1:2500 @ A3

Tamatoa Taruia | Landscape Architect
Design | Planning | Management | Consultations

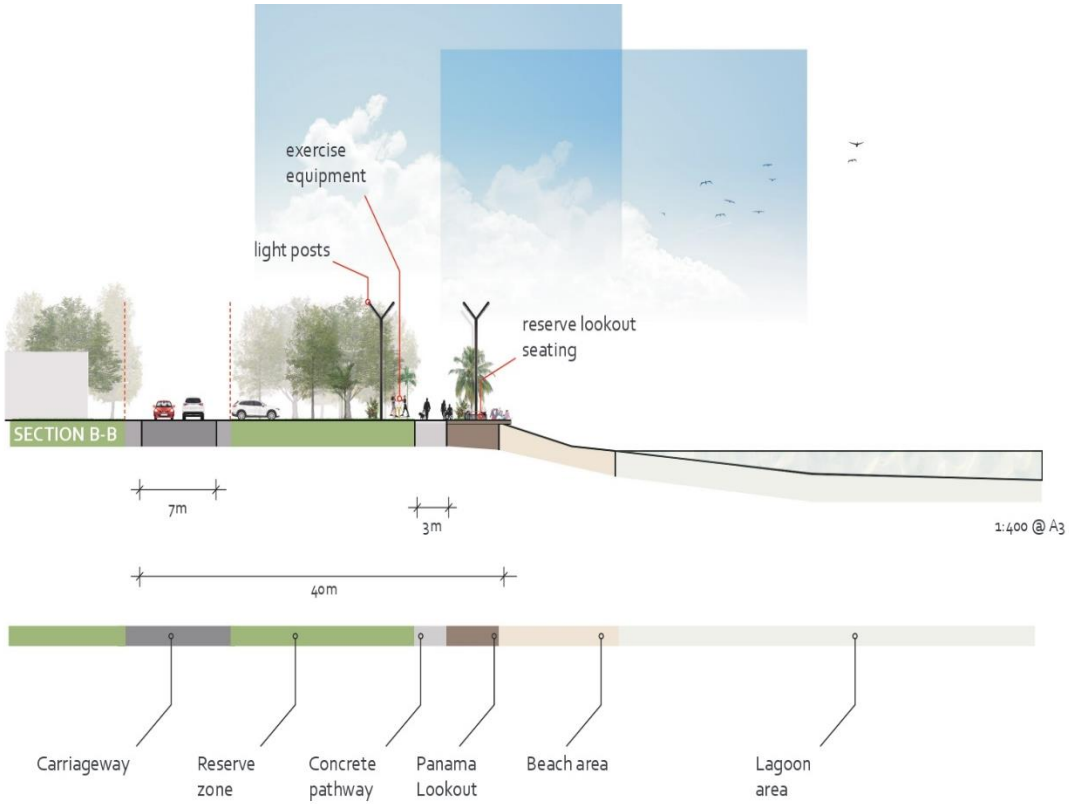
Pg 13

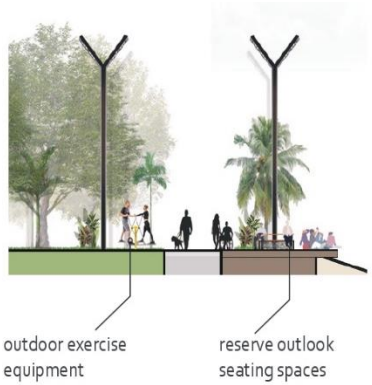

A

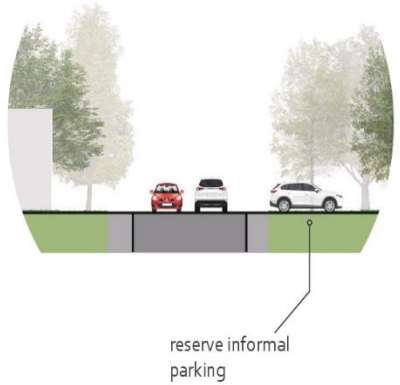

exercise
equipment
Boundary
SECTION A-A
7m
3m
1:400 @ A3
50m
Carriageway
Reserve
zone
Concrete
pathway
Panama
reserve
Beach area
Lagoon
area


outdoor
exercise trail
a space for
entertainment
relaxing in
public space


B


exercise equipment
light posts
reserve lookout seating
SECTION B-B
7m
3m
1:400 @ A3
40m
Carriageway
Reserve zone
Concrete pathway
Panama Lookout
Beach area
Lagoon area


outdoor exercise equipment
reserve outlook seating spaces


reserve informal parking

4. Proposed Works

4.1 Proposed Works by Output, Inputs to Resource Activities and Potential Environmental Values Impacted as per TOR

Table 14: Proposed Works by Output, Inputs to Resource Activities and Potential Impacts on Environmental Values (Adopted from Te Tau Papa o Avarua, APD_v2)

Outputs from the Results Diagram	Activities to Delivery Outputs	Inputs to Resource Activities	Potential Environmental Value Impacted (as per TOR)
PMU = Project Management Unit, PS = Professional Services, Reassigned = CIIC staff as needed, SWC = Small Works Contractors, TSC + Term Service Contractors, Utilities = TAU, ICI, TTV and/or Vodafone, MH = Machinery Hire, MS = Material Supply.			
Output 1 – Beautification of Avarua Town and Panamā Reserve	1. Tree trimming and removals – Avarua port to Panamā	CW	Landscape, Air, Noise, Waste, Nature Conservation, Terrestrial Fauna and Flora, Social, Health & Safety, Hazards & Risks, Erosion Control, Storage and Handling of Dangerous Substances.
	2. Gardens formation and planting	TSC, MS, MH	Land, Soils, Landuse, Landscape, Water resource, Waste, Nature Conservation, Terrestrial Fauna and Flora, Health & Safety, Storage and Handling of Dangerous Substances
	3. Foreshore protection works & beautification	PMU Engineer, CW, TSC, MS, MH	Landuse, Landscape, Climate, Waste, Waste Water, Nature Conservation, Terrestrial Fauna and Flora, Marine Biology, Social, Health & Safety, Hazards & Risks,
Output 2 – Improved walk & Cycle Ways between Avarua Harbor and Airport	1. Immediate site clearances for pathways – scrubs, pavers, services relocation	SWC, TSC, MS, MH	Land, Soil, Landuse, Landscape, Health & Safety, Social, Erosion Control, Terrestrial Fauna and Flora, Storage and Handling of Dangerous Substances.
	2. Panamā to Avatiu walk & cycle way, design, construction works & site remediation	TSC, MS, MH, Utilities	Land, Soils, Landuse, Landscape, Water Resource, Air, Waste, Terrestrial Fauna and Flora, Health & Safety, Storage and Handling of Dangerous Substances
	3. Central Avarua footpath remedial works	TSC, MS, MH	Land, Soils, Landuse, Landscape, Water Resource, Waste, Terrestrial Fauna and Flora, Health & Safety, Storage and Handling of Dangerous Substances

	4. Solar lighting installation along Panamā Reserve	PMU, MS, CW	Landuse, Landscape, Climate, Noise and Vibrations, Cultural Heritage, Social, Health & Safety
Output 3 - Improved public toilets and recreational facilities in central Avarua and Panamā	1. Reconstruction & wastewater treatment system upgrades for central facilities across from Police Station	SWC, MS, MH, Utilities	Landscape, Water Resources, Air, Waste, Aquatic Biology, Social, Health & Safety, Hazard & Risk, Storage and Handling of Dangerous Substances
	2. Reconstruction & wastewater treatment system upgrades for Panamā Reserve	SWC, MS, MH, Utilities	Landscape, Water Resources, Air, Waste, Aquatic Biology, Social, Health & Safety, Hazard & Risk, Storage and Handling of Dangerous Substances
	3. Installation of recycling and water stations & signage	TSC, MS, Utilities	Landscape, Water Resources, Waste, Social, Health & Safety
	4. Provision of park benches & paving surrounds	TSC, MS, Utilities	Landscape, Water Resources, Waste, Social, Health & Safety
	5. Construction of fitness trails and look out areas	TSC, MS, Utilities	Landscape, Water Resources, Waste, Social, Health & Safety
Output 4 - Restructured and future-proofed Punanga Nui Market	1. Relocation, remediation & farmers market construction	TSC, SWC, MS	Landscape, Social, Health & Safety
	2. Minimize traffic congestion		Social, Health & Safety
	3. Installation of underground services i.e. drainage power, water connections, wastewater reticulation	CW, Utilities	Land (Land Contamination), Climate, Water Resources, Waste, Energy, Social, Health & Safety, Hazards & Risks
	4. Reconstruction of the PNM playground at new site	CW, MS, MH	Land (Land Suitability), Climate, Social, Health & Safety, Hazards & Risks

	5. Deconstruction of old PNM playground	TSC	Landuse, Noise & Vibrations, Social, Health & Safety.
	6. Relocation of specified huts	TSC, CW, MH	Landuse, Noise & Vibrations, Social, Health & Safety.
	7. Top soil, grassing and planting	TSC, MS, MH	Land, Soils, Landscape, Terrestrial Fauna and Flora, Social, Health & Safety, Hazards & Risks
	8. Solar street lighting installation	PMU, MS, CW	Landuse, Landscape, Climate (cyclones), Air, Social, Health & Safety, Hazards & Risks
	9. Building construction of new toilet block at Constitution Park and coastal look out areas.	CW, SWC, MS, MH	Landuse, Landscape, Climate (cyclones), Air, Social, Health & Safety, Hazards & Risks
	10. Central wastewater treatment system for toilet facility and market huts	CW	Land (Land Contamination), Climate, Water Resources, Waste, Energy, Social, Health & Safety, Hazards & Risks
	11. Accessibility paving	CWC	Land, Soils, Landuse, Landscape, Terrestrial Fauna and Flora, Health & Safety, Storage and Handling of Dangerous Substances
	12. Asphalt extension, remarking and signage of large carpark at PNM entrance	CW	Land, Soils, Landuse, Landscape, Terrestrial Fauna and Flora, Health & Safety, Storage and Handling of Dangerous Substances
	13. Paving and bollards of walkways	PMU Engineer, TSC, MS, MH	Land, Soils, Landuse, Landscape, Air, Waste, Terrestrial Fauna and Flora, Health & Safety, Storage and Handling of Dangerous Substances

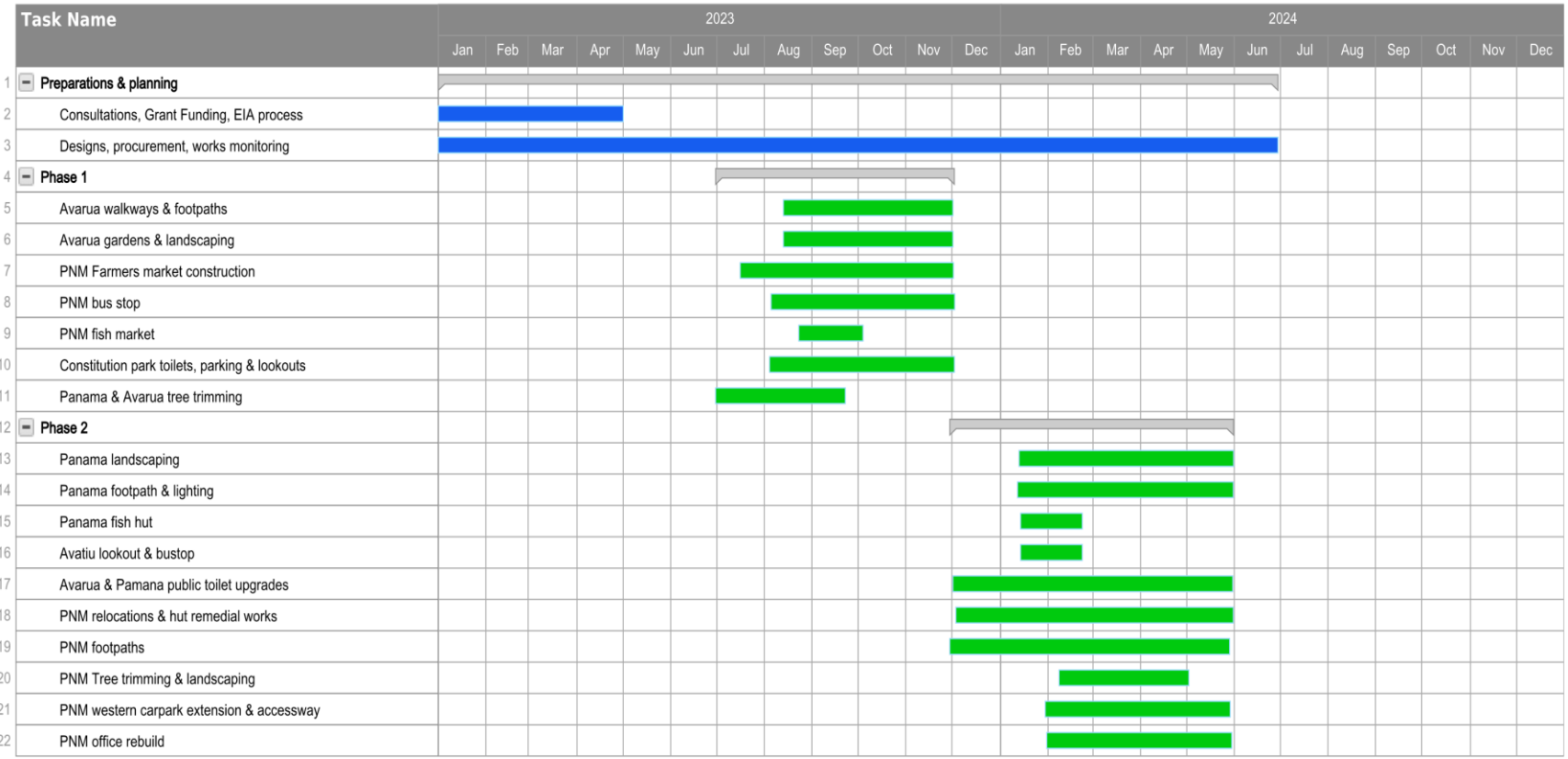
4.2 Implementation Plan

- This project will be implemented over a 15 months from April 2023. See Figure 6 below.

- Completion is expected to be reached by June 2024 subject to a number of milestone target dates being met including obtaining environmental consents.
- The Implementation Gantt Chart below shows the staging of works by Output and Area.

Figure 6: Implementation Gantt showing the staging of works by Output and Area

TTPA Phased Work Programme



5. Description of the Baseline Environment

5.1 Location

- The PNM is located on reclaimed land, previously a wetland and mudflat, remains an environmentally sensitive area prone to natural hazards such as sea surge, sea flooding and flooding from the Avatiu Stream to the west. The site also experiences strong north easterly winds.
- These natural events mentioned above affected the area in the past during the cyclone season from November through to April and have at least a 20 - 60% chance that it will happen again.
- Similarly, the other project sites, the Avarua Township area and the Panamā Reserve faces the same natural hazards but without the effect of flooding from the Avatiu Stream.
- With the exception of the Panamā Reserve area, the project sites were extensively modified by Government and community after major cyclones, Sally in 1987 being the last.
- After each cyclone Government and community restoration works pushed back to the coastline debris brought in by the cyclone to maintain the natural configuration of the Panamā coastline.
- The natural Vegetation in the Panamā area remained an important natural feature and has helped reduce the effects of coastal erosion during normal sea surge and sea flooding in the area.

5.2 Land

5.2.1 Soil

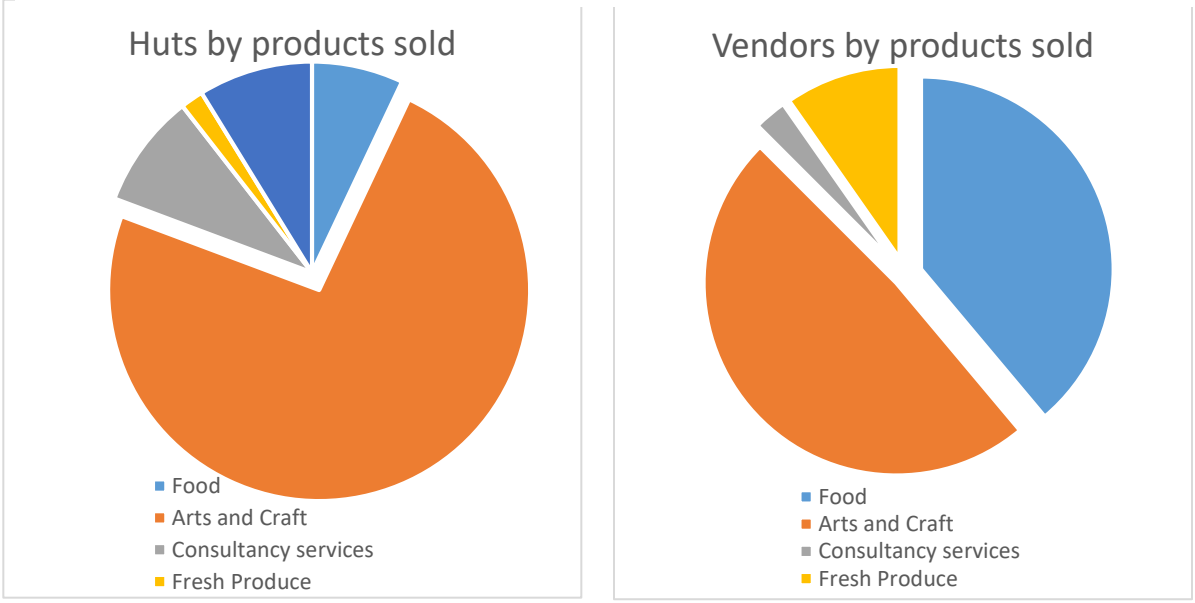
- The soil type in the area from the CITC main store to Polynesian Rentals, in front of the Catholic Church and the PNM is a mixture of pockets of inland soil but mainly of coral origin.
- The PNM area is comprised of a mixture of fills obtained over the years to reclaim and build up this area. The area have been the subject of reclamation work since the mid 60's up until the early 2000s.
- Excavated material from the maintenance work of both the Avatiu and Avarua Harbor were used to build up this area.
- Prior to the 1992 Pacific Cultural Arts Festival, the reclamation work got stepped up to prepare the PNM site for the festival and large amounts of fill from the Avana stream mouth were used as fill to elevate the land.
- In the early 2000s to 2009 large amounts of coral spoil from the redevelopment of the Avatiu Wharf was used to extend the reclaimed area to the area now referred to as the Constitution Park and the Terevete Park.
- The Panamā Reserve area remained in its natural state and is mainly coral silt, sand, gravel, cobbles and boulders with thin layers of organic material from decaying plant materials. The area was build up through time by the accumulation of coral material pushed inland by natural hazards as mentioned in 5.1 and by normal high seas events.
- Soil composition is therefore very mixed but predominantly coral in origin well drained and high permeability.

5.2.2 Landuse/Characteristics

- The PNM, was previously part of the Avatiu Stream estuary and home to the *Koiti-kura* or the fiddler crab. The estuary had significant ecological importance as a fish nursery and feeding ground.

- The project area is explained in 5.2. The Avarua Town area and the PNM is part of the Rarotonga's CBD and include the Maire Nui Drive, the Terevete and Constitution Park used for business and social events.
- The Maire Nui drive provide a two lane one way clockwise and anticlockwise road through the town area with parking space on both sides of the road way.
- There is one toilet facility in the town area located opposite the Police station and picnic tables from the garden area in front of the CITC Main Store to the BSP and Island Craft parking area.
- There are walkways provided by disjointed concrete and paved foot paths in some areas and just walking tracks in some areas from the Avarua Harbor to the Catholic Cemetery.
- After the Pacific Culture and Arts Festival in 1992 the PNM became the Cultural Centre for the Cook Islands.
- In the PNM we have vendors, hut owners and amenities with some parking spaces provided. Issues and concerns are listed in section 3.1.2.3.
- There are 78 vendors (57 active and 21 inactive) in the PNM. Vendors are involved in selling fresh fruits, food, arts and crafts and consultancy services.
- There are 69 hut owners and 8 amenities in the PNM. Of the 69 Huts, 54 are active and 15 are inactive. The hut owners are involved in selling food, arts and crafts, consultancy services fresh produce and other services.
- The Huts cover 2,514m^2 of the PNM area or 3 quarter acre sections of land.
- Of the 8 amenities, 3 are public toilets, 2 are performance stages, 1 multi-purpose hut, 1 playground and one office for the PNM management. The amenities cover 1,451m^2 of the PNM area or 1 and a half quarter acre section.
- Selling arts and craft is no doubt the main product business activity at PNM followed by food. See Figure 7 below.

Figure 7: An illustration of the products and services provided by huts and by vendors



.

- The Reserve area have one community building, Te 'Are Tāpae'anga and one public toilet next to the community building and the Catholic Cemetery to the west.
- The Reserve is used by loose vendors selling take away foods, doing *māroro-tunutunu* at the 'Are Tāpae'anga on Sundays, and fisherman selling reef and ocean fish hung from the back of vehicles or from a tree.

- There are also parking spots in the Reserve for some businesses on the inland side of the main road.

Figure 8: To the left, an example of parking spots in the Panamā Reserve and to the right a parking spot in the Town area

See above in Figure 8.

- The Panamā Reserve area also accommodates the underground fuel lines of the main fuel suppliers for the island. The fuel lines run from Avatiu Harbor to the supplier's storage and business depots near the Airport.

5.2.3 Landscape Character

- The town area is a typical man-made landscape with coastline protection structures of volcanic rock revetment from the Avarua Harbor to the Avatiu Stream mouth.
- The reclaimed land that forms the seaward side of the town area is flat with roads and parking spaces associated with business premises, gardens along the walkways and open spaces at the Constitution and Terevete Park.
- The gardens and pathways which is a character of the areas along the Maire Nui Drive require ongoing maintenance for health and safety reasons and also to ensure soils from the garden do not end up in the marine environment through the drainage systems. See Figure 9 below.

Figure 9: Some of the landscape characters identified; L-R. Damaged foot path by roots, footpath requiring maintenance and drainage systems around gardens.

- At the Panamā Reserve area, it is typical natural coastal area with natural vegetation providing protection to premises on the inland side from sea air and sea sprays. The foreshore remains in its natural state and made up of coarse coral material typical of an area subjected to frequent high seas.

5.2.4 Landuse Suitability

- Land is a scarce resource in our country. To get land for public recreational and market purposes it is acceptable to use reclaimed lands in areas not suitable to be built on. Considering the sites faces the cyclone tracks and extreme sea conditions risks have to be taken in providing infrastructural support to the facilities aimed at supporting recreational, business and social activities
- The PNM is a non-engineered reclaimed land with its coastline protected by volcanic rock revetments and gabion structures along the eastern bank of the Avatiu Stream.
- The Avarua Township area was developed in the same way as the PNM and also prone to sea surge and sea flooding.
- The Panamā Reserve have not been reclaimed and have retained its natural configuration and natural vegetation. The project proposal for the area is perhaps the most suitable in this project.
- In the development of new and upgraded amenities in the area such as toilet facilities and huts that sell food, the free draining soil type and the high water table associated with the inland wetlands that is common to all project sites further adds major challenges to the project.

5.2.5 Land Contamination

As mentioned above, the soil composition of the project sites are very mixed but predominantly coral in origin well drained and high permeability. Any release of wastewater, cleaning and coolant's substances from the amenities and huts need to be disposed of properly to prevent those hazardous substances from going directly into the marine environment.

The high water table associated with the lands and the prevalent salt intrusions caused by water currents and sea surges during times of extreme weather provide the potential for land contamination from natural sources as well.

5.2.6 Soil Erosion

- There is no erosion issues under normal high seas and sea surge at PNM and Avarua Township as the foreshore area is protected by a coastal protection rock revetment structure from the Avarua Harbor to the western boundary of the PNM. At the eastern boundary of the PNM, both sides of the Avatiu Stream is protected using gabion stream bank protection.
- However the Panamā Reserve remains in its natural configuration protected by natural coastal rubble build by high seas and cyclone conditions. As mentioned above, the area still have its natural vegetation of iron wood, utu, pukatea and venevene forest.
- In the Panamā Reserve erosion has happened in the past but only after extreme high seas followed by a period of re-establishment to its former coastline.

5.3 Climate

5.3.1 Rainfall

- There are two distinct seasons prevailing on the project site; the wet and dry season. The wet season also our summer coincides with our cyclone season which runs from November through to April. The dry season is from April to November.
- The annual rainfall on Rarotonga has decreased since 1950. Between 1950 and 1980, the maximum mean monthly rainfall was 249 mm in January, while the minimum was 97 mm in July.
- The project sites are located on the leeward side of the island, which is the driest exposure with an average rainfall of 1950 mm (see Baldi et al. 2009).
- This amount is 1.3 times less than rainfall in Titikaveka on the southern exposure.
- These differences are the result of the persistent south-east trade winds and the effect of the mountains, which bring a mean annual rainfall of 4000 mm at the center of the island and declining to 2500 mm on the southern side.

5.3.2 Air Temperature

- Air temperature is an indication of how warm and cool the air is in the project site and on Rarotonga in general.
- Air Temperature on Rarotonga undergoes much greater seasonal variations than the northern group.
- Average maximum temperatures vary between 25.0^{o}C and 29.5^{o}C, while the average minimum temperatures vary between 19.1^{o}C and 23.9^{o}C.
- The summertime highs are normally recorded in January or February, and the winter lows are recorded during July, August, and September (Baldi et al., 2009).
- In recent years, the minimum air temperature of 13.1°C was reached in August 1998, and the maximum of 34.2°C was reached in March 2001.
- Within the last 40 years the lowest temperature was recorded at 9.8°C in August 1965 (see Baldi et al., 2009).

5.3.3 Climate cycles

- The project sites are north facing and have experienced severe climate conditions influenced by climate cycles that influence our weather patterns in the Cook Islands.
- There are two climatic cycles that influence weather patterns in the Cook Islands: the Inter-decadal Pacific Oscillation (IPO) and the El Niño Southern Oscillation (ENSO; La Niña and El Niño).
- Previous studies by Linsley et al. (2005) and subsequently by Rongo et al. (2009) showed that IPO has a significant signature in the Cook Islands that normally exhibits a phase reversal every 20 – 30 years.
- In addition, studies have shown that IPO is coupled with ENSO, such that during the positive phase of the IPO, El Niño events are more frequent while in the negative phase La Niña dominates (Verdon and Frank, 2006).
- Both cycles have contrasting effects on climate conditions in the southern and the northern Cook Islands. During the last negative phase of the IPO (1947 -1977), the northern group experienced less rain while wetter conditions were experienced in the southern group.
- The opposite is true for the positive phase of the IPO (1978 – 2006). Because the positive IPO is coupled with El Niño events and cyclone frequency increases during El Niño events, generally such a scenario is disastrous for the southern group and may have an effect on the project sites.
- During 2004 and 2005 when the IPO was positive and during an El Niño years, six major hurricanes passed through the region with four impacting the southern Cook Islands.

5.3.4 Climate change projection

- Although some studies show that El Niño events are predicted to become more frequent and stronger under future climate change impact scenarios, the IPCC report (IPCC, 2007) indicated that current models show no dramatic changes in the severity and frequency of El Niño events.
- While hurricane frequencies are also predicted to become less, some suggest that they will be stronger with more Category 5 cyclones expected.
- With the recent shift of IPO to the negative phase in 2008, the climate on Rarotonga is expected to experience higher frequency of La Niña events resulting in wetter conditions and perhaps less humid.
- Flooding from the Avatiu stream may be a factor to consider for the next few decades. This could affect sediment increase around stream mouth area.

5.3.5 Cyclones

- Generally, cyclone season in the Cook Islands occurs during the summer period between November and April.
- During this period, the SPCZ extends from the west, and in the Cook Islands it is located over the southern group (Sturman and McGowan, 1999), which results in a northwest to southeast pathway.
- From 1820 to 2006, a total of 143 cyclone impacted the Cook Islands, while 119 of those affected the southern Cook Islands (de Scally, 2008; Figure 10).
- Though the frequency of cyclones impacting the northern Cook Islands are lower because of the location of the SPCZ south and west of the group, analysis between 1970 and 2007 showed a higher frequency of cyclones affecting the Northern group in recent years.
- In the southern Cook Islands, the recurrence interval is estimated at 1.4 years (Baldi et al, 2009). Cyclones that impact the southern Cook Islands follow two tracks: 1) one that originates from the Samoa, Wallis-Futuna, and northern Tonga area and traverses on a northwest to southeast direction, and 2) one that originates in the northern Cook Islands area and traverses a northeast to southwest track (Kerr, 1976).
- Although the direction of cyclone winds experienced at the proposed sites may vary depending on the position of the cyclone, generally winds from a direct hit blow from the northwest to north direction followed by a more intense southerly wind.

5.4 Sea level

- Tide levels for Avatiu Harbor are presented in Table 9. The spring tidal range in Avatiu Harbor is up to 0.68m.
- During El Niño years, sea level on Rarotonga can drop by a few centimeters below average. For example, the 1997/98 El Niño event caused sea level to drop by 20 cm below average and remained low for almost a year.
- These sea level drops have had detrimental effects on lagoon reef organisms around Rarotonga. For example, the 2009 El Niño event resulted in massive coral bleaching on reefs in close proximity to the proposed site at Avatiu Harbor (Figure 4).
- Based on the short-term sea level rise analyses performed by the National Tidal Facility Australia for over ten years on Rarotonga, a rate of +1.1 mm per year has been observed (within the global average of around 1 or 2 mm per year, published by the IPCC [2001]).

Figure 10: Cyclones Recorded in the Cook Islands from 1820 – 2006 (de Scally, 2008)

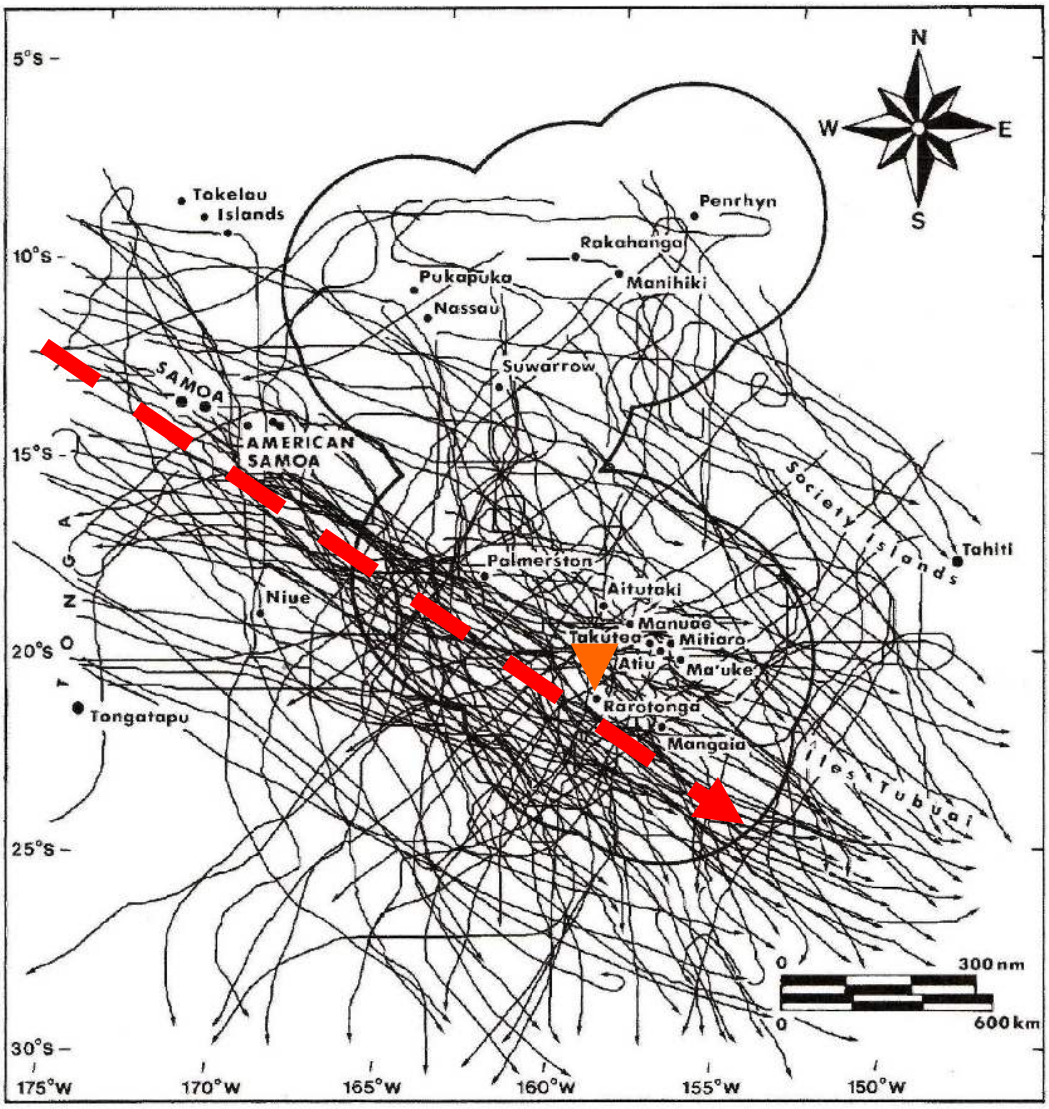


Table 15: Avatiu Harbor Water Levels

Tide Level	Elevation (mCD)
Highest Astronomical Tide (HAT)	1.09
Mean High Water Springs (MHWS)	0.92
Mean High Water Neaps (MHWN)	0.78
Mean Sea Level (MSL)	0.58
Mean Low Water Neaps (MLWN)	0.38
Mean Low Water Springs (MLWS)	0.24
Lowest Astronomical Tide (LAT)	0.09

5.5 Ocean Current

- Current flow in the southern group is very much influenced by the trade winds.
- Currents during the summer months have a west-south-west flow, and a north-north-west flow during the winter.
- Because the proposed sites are located on the leeward exposure of the island, generally the current is weak.
- Although variability in current occurs during the seasons, generally a westward flow is prevalent during the summer and an eastward flow during the winter (T. Rongo, unpublished data).
- This contrasting current flow between the summer and winter have also been confirmed by fishermen with local knowledge through years of observation.
- To date, current studies on Rarotonga have been limited. However, a study conducted in 1991 at two locations (Avarua in front of Trader Jacks, and directly out from the former Motutoa in Nikao) between February and March provided some valuable information.
- The result of the study indicated that the predominant current at Avarua was a southeast to southwest direction, flowing towards the reef (Holden, 1992).
- Current speed ranged between 5 to 10 cm/sec with a few short duration peaks of up to a maximum of 20 – 30 cm/sec. At the Nikao site, the current was stronger with a west to north-west flow and speed ranged from 0 to 91 cm/sec.

- Using biological data, Rongo et al. (2009) suggested that eddying effect may be experienced at the Avarua area, resulting in a high retention of spawning materials. The reefward current flow indicated during the 1991 study.

5.6 Water Resources

- There swamplands Inland of all project sites indicating ground water levels are high during times of high rainfall as described in Section 5. 2.
- The swamplands associated with the Vaikapuangi Stream, the Avatiu Stream near the PNM and the Atupa Stream contributing to the Avatiu and Panamā area are indications of how water laden the project sites are during normal and high rainfall times.
- Influenced by the north easterly trade winds and the ocean currents as described in this report also influences the seas water intrusion to the project sites.
- Keeping the project areas free of storm water is an important part of this project. All project areas are prone to storm water surge created by flooding from streams, ground water and sea surge.
- The Avarua Township have storm water drainage system dispersing excess surface water.
- There are no current storm water drainage system at the Panamā Reserve area and dispersal of flood waters is through the airport drainage west of the Islander Hotel and the Aretere Sports Centre at Avatiu.
- The MMR Rarotonga water quality report for January 2021 show excellent percent dissolved oxygen at 104 and a very low enterococci at <1 (MPN per 100ml). Sample site at the lagoon area inland of the Pāni.

5.7 Air

- The project sites experiences the north easterly trade winds during most of the year with a slight shift to the north-west during the cyclone season.
- This wind direction brings fresh air to the project sites and increase natural air flow in the area.
- As mentioned in Section 5.2.2, air temperature on Rarotonga undergoes greater seasonal variations compared to the northern group averaging between 25.0°C and 29.5°C during the warmer months from November through to April and between 19.1°C and 23.9°C during cooler months from May through to October.

5.8 Waste

- Waste is described under the Environment Act 2003 as litter. Public Health Act 2004 described waste as includes the following: Garbage, refuse, or litter; Hazardous waste; Wastewater; Building and demolition waste; Other discarded or superfluous things from open fires, incinerators, or industrial, commercial, mining, agricultural, community, or other activities.
- The details of the above is provided in Section 2.5, Table 5.0.

5.8.1 Wastewater System

- Sources of wastewater are toilet facilities and the eateries found in the PNM area.
- Wastewater is defined under the Public Health Act 2004 and there are one toilet facility in the Avarua Township area, located opposite the Police Station, and at the PNM, one is located north of the Fish Market and the other next to the Are Pa Metua behind the central Stage.
- On the Panamā Reserve, there is one toilet located at the end of the reserve east of the Catholic Cemetery and on the foreshore.
- The toilet next to the 'Are Pā Metua and the Police station have been upgraded to a secondary treatment wastewater system.
- There is no data available on the condition of the treatment systems installed and the volume of waste and sludge removed from these premises since their installment.
- In terms of individual eateries, each have a soak pit and some have grease traps installed, otherwise according to the Management of the PNM, each eatery deal with their own disposal and maintenance of what they have.

5.8.2 Solid Waste (Garbage, refuse of litter)

- Sources of solid waste are from consumables, e.g. packaging, containers and green waste. Green waste are those generated from vegetation on the various premises including the open spaces and along the existing gardens and walkways.
- There are no data on how much solid waste is generated from the consumables and green wastes mentioned above.
- All solid waste other than green waste are disposed of at the Rarotonga Waste Management Facility at Arorangi.
- Green waste is disposed of at a green waste dump set up by the PNM Management at a site agreed by the landowners at Panamā (W.Taripo, January 2023).

Figure 11: Recycle bins distributed throughout the PNM

- There is no separation of waste by vendors and hut owners, however all bins at the PNM are labeled (for plastics, paper, glass and general). See Figure 11.0 above
- For Avarua Town area and the Panamā Reserve, due to issues with people bringing their household rubbish to the public rubbish containers the management of those areas no longer provide rubbish receptacles.
- According to PNM Management no waste audit have been done to collect data on the type of waste generated on the premises to enable a better waste management policy.

5.9 Noise and Vibrations

- Sources of noise on the project site are from main road transport, air transport with the regular local internal and international flights, and the sound of blowers used by PNM staff in the morning on work days.
- On Saturdays when the PNM is open for business, early morning to mid-day, additional to the regular noise levels include local music, performing artists on some Saturdays and normal people noise.
- Landing international flights may contribute to some vibration noise otherwise the effect is insignificant.

5.10 Nature Conservation

5.10.1 Terrestrial Flora and Fauna

- Significant native vegetation on the project sites include common coastal high canopy plants such as the *tamanu* or Polynesian mahogany, *pukatea* or pisonia, *utu* or barringtonia, *pūnū* or coconut, *toa* or ironwood.
- The lower canopy plants like *miro* or Pacific rosewood and *ʻau* or tree hibiscus are common along the huts.
- The common and more sea spray tolerant venevene or seagrape is found growing in the Panamā Reserve area.

- The smaller vegetation include *nono* or mulberry tree, the *nga'u* or scaevola growing along the top of the beach along Panamā Reserve, the *maire-tutae-puaka* or oak leaf fern growing around mainly utu and pukatea trees, the *pō'ue* or beach pea and *kākā-paetai*.
- On the ornamental trees, the *tiare Māori* or cardinia is the most common.
- Common introduced small trees are the golden shower and *pātai*.
- Along the Avatiu stream and the water's edge are the *kōtuku* or reef heron, *kuriri*, *teuē* and kākaia or white tern.
- On stormy days the *kōta'a* or frigate bird (storm bird) is seen hoovering over the coastline and the project site.

5.10.2 Aquatic Biology

- *Kourā-vai*, *kokopu*, *tilāpia* and *tuna-pateka* or fresh water eels and some fresh water tolerant mullet species are found along the Avatiu stream and stream mouth.
- The Avatiu reef area – particularly the fore reef – has been investigated since the early 1990s as part of an island wide reef monitoring program for Rarotonga.

Figure 12: Show the two monitoring sites used to show biodiversity in the area.

- Within the Avarua township area, there were two sites established on the fore reef that will be of interest to this project. The sites are provided in Figure 12 above. The sites: 1) one site directly west of the Avatiu passage, and 2) one site west of the Avarua Harbor ("Boiler"); both sites were established to monitor the impacts of land-based activities of the respective catchment areas (Avatiu and Takuvaine).
- While the marine environment of the township embayment has been considered an important "sink" area for biodiversity (e.g., Rongo et al., 2009), this was mainly attributed to the "Boiler" site. In support, we see some differences in biodiversity and overall reef health between the sites (Table 16 and 17, and Figure 13) where the number of species was the highest at Avarua for both fish and corals.

Table 16: Biodiversity measures for corals at respective sites

Site	S	N	d	J'	H'
Nikao	17	107	3.424	0.9125	2.302
Avatiu	18	89	3.787	0.8474	2.449
Avarua	14	183	2.495	0.8540	2.254
Kiikii	15	99	3.047	0.8061	2.183

S = number of species, N = number of individuals, d = species richness, and H' = species diversity. Highest values are indicated in blue. Data taken from Rongo et al. (2009).

Table 17: Biodiversity measures for fishes at sites

Site	S	N	d	J'	H'
Nikao	37	883	5.307	0.563	2.033
Avatiu	41	396	6.687	0.748	2.777
Avarua	60	720	8.968	0.700	2.866
Kiikii	39	552	6.019	0.725	2.655

S = number of species, N = number of individuals, d = species richness, J' = evenness and H' = species diversity. Highest values are indicated in blue. Data taken from Rongo et al. (2009).

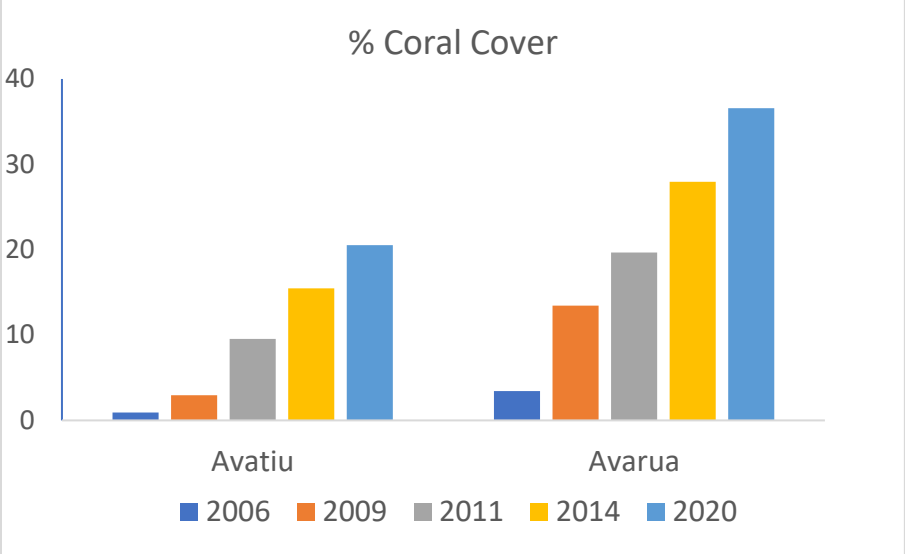
- Since 2006, coral cover on the fore reef have been slowly increasing at Avatiu and Avarua (Figure 13) as well as around Rarotonga following the Crown-of-Thorns Starfish outbreak of the 1990s and the five major cyclones in 2005, which decimated the reefs around Rarotonga.
- The streams of Takuvaine, Vaikapuangi, and Avatiu may have an accumulative effect on the Avatiu site, possibly contributing to this slow recovery in comparison with the Avarua site (see Figure 13). In addition, the general flow of the plume from these streams tends to be westward.

REEF STRESSORS

- Considering the current situation of reefs in the region and especially here on Rarotonga, it is not advisable to carry out activities that will further stress an environment already facing multiple stressors (e.g., climate change factors, eutrophication, and development).
- In particular, Rarotonga's reefs are currently going through a taramea or Crown-Of-Thorns Starfish outbreak that are killing corals on the fore reefs. At present, the taramea population are concentrated on reefs between Avarua Harbor on the northern exposure and the Rarotongan Hotel on the western exposure. Local NGO, Kōrero o Te 'Ōrau, is leading the operation to remove the taramea.

- Despite this effort, a large area of reefs surrounding the Avatiu Harbor area has been decimated. With this in mind, any added stress at this point would likely compromise the recovery of the surrounding reefs of Avatiu.

Figure 13: Average percent hard coral cover at Avatiu and Avarua sites in 2006 (Rongo et al., 2006), 2009 (Rongo et al, 2009), 2011 (Rongo and van Woesik, 2011), 2014 (Rongo et al., 2015), and 2020 (T. Rongo, report in progress)



5.11 Cultural Heritage

- The PNM was established in 1992 during the Pacific Arts and Cultural Festival and later re-designed for the benefit of local primary producers (fresh fruits and vegetables, roof crops, fresh fish, cooked foot etc.).

Figure 14: A typical Cultural Show at the PNM on Saturday

  - In 1995 there was further development of the site, permanent huts were built in a village pattern to reflect how our villages used to be.
  - The reef flat and reefs north of the PNM was part of the fishing grounds for the people of Ngāti-Ānautoa Karika in Ruatonga. Though this practice by the Villagers of Ruatonga has become less since the area was reclaimed and developed.
  - Some people of the village still go through the area to access the reef to do *pātuki* fishing and other reef fishing practices.
  - The reef area in front of the Avarua Township is marked by the historic presence of the Boiler of the Maitai, locally known as the "Pāni". The Maitai was grounded on the reef during the Christmas of 1916.
- The PNM became known for a decade at least as the venue for the Pacific Arts and Cultural Festival of 1992 where countries show cased their crafts and traditional practices and included carving wood and teaching how to carve and the types of wood to carve, building traditional houses, traditional medicine

making, costume and tapa making, cooking various dishes, etc. This helped to set the scene for the market and how it developed. See Figure 14.

- To the west of the project site, is the lands of the Ngāti-Uritaua and the Ngāti-Pūtua Tribes. These areas have cultural significance to both tribes. The Ngāti-Uritaua tribe owning the lands that is drained by the Avatiu Stream located next to the PNM. The Avatiu Harbor known to Ngāti-Uritaua as Arai-Ava have cultural significance to the tribe.
- The land of the Panamā Reserve was formerly the land of the Ngāti-Pūtua Tribe. According to William Taripo (Landowner) the name came about in the early 1900s as his family tried to dig a channel towards the sea to drain excess flood waters. When they realized the sea was higher than the swamp they stopped as they did not want the sea to come in during times of high seas. This work was being done at the same time the Panamā Canal was being built and that was how the place got its name.
- Today, to maintain its link to the land, the tribe is involved in cleaning up and tidying up the land by organizing the family to do this on a regular basis.

5.12 Social Heritage

- The project sites are besides the main business areas on Rarotonga and in the case of the PNM is where people would congregate not only to buy and sell goods and services but also to socialize. As described in this report, these areas are shoreward of the CITC Main Store, the Energy Center to Polynesian Rentals and the Catholic Church to BTIB, and the PNM. The western part covers the area known as the Panamā Reserve; from the Kai Guy caravan to the Catholic Cemetery.
- During the week all areas are busy and on Sunday the main Catholic Church in town provide the main activity apparent by the vehicles parked on the Maire Nui Drive parking space and at times especially during Easter and Christmas the parking extends onto the Constitution and the Terevete Parks at the PNM.
- The project areas are also bounded on the inland side by main population centers. As described in Section 5.12, inland of the Avarua Township are the people of Takuvaine and Tūtakimoa, inland of the PNM are the homes of the Ngāti-Ānautoa Karika tribe, and to the west of the project site is the Ngāti-Uritaua and Ngāti-Pūtua tribes.
- These are population centers whose people also interact with the project area and are therefore users of the area whether buying or selling things, recreational or gathering food on the reef.

5.13 Health and Safety

Punanga Nui Market

- The safety of vendors, users of permanent huts and the public from the event of a fire occurring in the PNM facilities is a concern expressed by the Management of the PNM. They have two fire gathering locations; one to the east of the administration area towards the Avatiu Harbor and the other at the reclaimed area to the north. All vendors and hut owners are responsible for their own fire-fighting equipment as per the Government Health and Safety Policy (HSP).
- The safety of buildings and facilities during the cyclone season remain the responsibility of the hut owners. Threat from sea surge and flooding and therefore damage to property remains highly likely.
- The current Management indicated that with regards to hut owners, they are responsible for the security of their premises and are required to observe developing weather conditions and reports during the cyclone season.

- All PNM personnel are geared with PPE while on the job and while on the premises. Each vendor and hut owner is responsible for their PPE requirements and must comply with Government's HSP.

Figure 15: One of the issues the project will endeavor to address is the issue of traffic congestion, one of the main examples of areas where traffic is held up is at the entrance to the PNM

- There have been numerous medical emergency requirements over the years at PNM. The PNM management have expressed concern as this can be disruptive to the trading at the market and an in-house medical facility is a consideration.
- PNM Management indicated the need to allow a spot for a trained physician person to be on the premises so that medical emergencies can be dealt with quickly and efficiently but have yet to see how this can be developed.

Avarua Township

- The safety of the road infrastructure during the cyclone season remain an area of high risk. Threat from sea surge and sea flooding and therefore damage to the roads remains highly likely.
- There are no current HSP for this area except for the speed limit imposed by the Police on both directions. There is only pedestrian crossing at the 'Are Tāpae'anga opposite the Police Station.
- Main common road crossing areas in the project site are at the Ruatonga Meeting house, the Bond Store and the area from the Catholic Church but there are no pedestrian crossing in these areas.
- This project will address these issues in a traffic management plan.
- The old pathways built during the construction of the Maire Nui Drive and gardens separating the clockwise and anticlockwise roads is in a dire condition and parts of it unusable. Tree roots is the main cause of damage especially those opposite the Catholic Church area due to no proper maintenance. It

is also a health and safety risk to users. Other parts of the pathway through town needs rebuilding as shown below.

Panamā Reserve

- The safety of road infrastructure, underground service lines, and private dwellings to the inland of the main road remain areas of concern during the cyclone season. Risk from sea surge and flooding remain likely, It is therefore important when plans are considered for trimming of trees and building around trees there is a need for careful planning and execution of such plans.
- Figure 16 is an example of trees hanging over a community building placing it under risk of damage during times of high winds.
- The Panamā Reserve area is used by private enterprises for mobile trading, used by nearby businesses and the public for parking purpose, and used by the public for recreational purposes. The area is also used by fuel companies for their underground service fuel lines that run from the Avatiu Wharf westwards to their destinations. These companies include Toa Ltd, Pacific Energy Enterprises Ltd and Triad Petroleum Ltd.
- There are no organize parking in this area.

Figure 16: Overgrowth of trees is a hazard waiting to happen, in this case over the Are

5.14 Economy

- In economic terms, the project sites currently provide the opportunity for vendors and hut owners to sell their products and this have been growing since the establishment of the PNM.
- Government in recognition of this growth has provided support to the PNM by providing as best as it can parking spaces, places where people can trade, the necessary infrastructure to cater for this growth such as toilet facilities, parking spaces and open spaces for use during special events whether for business or social purposes.
- The efforts of Government not only support the use of the project sites and their wellbeing, it also support the wellbeing of the Avarua business center that spans from the Avarua Township Commercial area to the Rarotonga International Airport.
- In the Avarua Township area, it supports the three Banks (BSP, BCI and ANZ), CITC Main store, Energy Center, Foodland, Vonias, Marekos, Island Craft, small businesses in Mana Court, Cafes, Prime Foods, Offices of Trust Corporations, the Police Station and Government Offices, Vehicle hire and rental companies, etc.
- In the PNM, we have 54 Hut owners and 57 active vendors operating on the premises during the week and almost 100% operate during the Saturday market day. There is no data available to show the revenue generated by PNM but it is an area that helps local people to sell their produce, arts and craft and food.
- In the Panamā Reserve area, it support CITC Supermarket with vendors selling fresh produce including fish on Saturdays, Turtles Sports shop, Tile shop, PTS Plumbing, Cook Islands Steel Industry, Cook Islands Motor Centre and Tire Centre, Cook Islands Building Supply and the mobile vendors that set up in the Panamā Reserve area.

Figure 17: A typical Saturday morning at the PNM

5.15 Hazards and Risks

- There are a number of hazards and associated risks already in place in the project area both natural and waiting to happen that create emergency situation. Some of the hazards are mentioned in Section 5.13.
- Natural hazards include sea surge and sea flooding during extreme weather conditions such as cyclones or a head on cyclone. The extent of the risk depends on the magnitude and direction of approach of the cyclone. Figure 8.0 in Section 5.2.5 shows most cyclones that move towards Rarotonga is from the north-west. There is risk of high winds and sea flooding to all three project sites.

Figure 18: Wedelia Daisy, a common naturalized invasive plant in the Panamā Reserve and dried Pukatea branches at the top of this photo

- Hazards caused by invasive species both native and introduce species can cause unhealthy trees to be a risk to the wellbeing of people that use areas like the Panamā Reserve. Figure 18 above shows two creepers one native and the other introduced competing for space and covering almost 50% of a seagrape tree.
- Flooding from the Avatiu Stream west of the PNM is also a potential hazard that will affect the PNM depending on the size and height of flood waters especially during the months of November through to April, our cyclone season.
- Coastal erosion along the Panamā Reserve have been a feature in the past and could be a hazard in the area placing the dwellings and businesses inland under high risk during a cyclone. . Normally, as was the experience in the past, large amount of coral debris were removed from the foreshore and dumped in the reserve area temporary impeding the use of the main road.
- Letting trees overgrow increases hazard situations such as falling branches and uprooted trees during extreme weather conditions.

5.16 Erosion Control

- See 5.2.6
- For the PNM and the Avarua Township, the coastal rock revetments installed around 2012 provided protection for the Maire Nui Drive and landscape behind from coastal erosion during high seas.
- The engineered rock revetments were installed to prevent direct contact with the fill material used to reclaim the foreshore area in town and using geotech textiles. The sizes of the rocks used allows the energy of incoming waves to be dissipated and therefore reducing the impact on the areas behind the rock revetments.
- There have been efforts to plant vegetation on the top of these structures to provide some strength to the revetments.

Figure 19: Coastal and stream protection. From Left to Right: West to east of Avarua Town foreshore, east to west of Avarua Town foreshore and Avatiu bridge and stream

- The gabions lining the Avatiu stream west of the PNM was designed to protect the stream banks from stream erosion during flooding. One advantage of this structure is that it is rock solid and let's water flow through the gaps. Wire baskets used for gabions can be subjected to heavy wear and tear due to wire abrasion by bed load movement in the streams with high velocity. Fortunately the Avatiu Stream does not flood much, only occasionally and during the rainy season.

5.17 Storage and Handling of Dangerous Substances

- Dangerous substances in the project area are restricted to the underground fuel lines from the Avatiu harbor to the fuel depots around the Rarotonga Airport. See Section 3.1.3.3 and Figure 20 below.
- The companies involved, TRIAD Petroleum Ltd, Toa Petroleum Ltd and Pacific Energy Ltd have their Health and Safety procedures in the case of emergency.
- The fuel lines are inspected regularly under each company's rules and regulations.
- In the PNM, dangerous substances are restricted to cleaning chemicals, VOCs from refrigeration and air conditioning equipment used in some of the huts involved in food preparation.
- There are no inventory of what equipment use VOCs and how they are serviced and refilled. It is understood that all dangerous substances used for cooling equipment are stored in control environments by the suppliers.

Figure 20: Show a strip of the Panamā Reserve area showing the approximate location of the fuel lines.

6. Impacts Assessment

6.1 Methodology

- Using current knowledge of existing environment, the EIA team assessed the potential impact (s) the planned activities may have on the environment both positive and negative, and in the immediate, short and long term.
- Immediate potential impacts cover physical, social (including human health) and economic changes to the environment when work begins.
- Short term impacts cover those impacts that help progress the initial impacts either positive or negative.
- Long term impacts are those changes that achieves the project objectives, and if negative, those changes that are significant and requires mitigation measures.
- Where Health and Safety (HS) risks are expected, appropriate HS practices will be carried out and include proper personal protective equipment (PPE) for those involved in the physical work and clear signage at the work site (s) showing hazards and risks for public safety and awareness purposes.
- Where there are potential impacts, this is stated and where there are no impacts, a nil impact is provided.
- Tables 18, 19, 20, 21 and 22 below provide a matrix of the likely potential impacts on the environment (Local and island wide) the activities planned for Outputs of the Tau Papa O Avarua Project may have on the environment.

6.2 Potential Impacts of the project on the environment

6.2.1 Output 1 - Beautification of Avarua Town and Panamā Reserve

Table 18: Planned Output 1 - Beautification of Avarua Town and Panamā Reserve and the potential impacts on the environment from the three planned activities

Potential Impacts					
Positive			Negative		
Immediate/Construction	Short Term	Long Term	Immediate/Construction	Short Term	Long Term
1. Tree trimming & removal – Avarua Port to Panamā					
1. Allows the next activities of the project to start; 2. Positive change in Landscape, e.g., more natural lighting and airflow; 3.	1. Preparation for other activities can start, e.g. pathways, remedial works, composting and gardening; 2. Cut surfaces treated to	1. Positive change to the landscape; 2. Other activities in the area ready to start; 3. Keep and maintain already growing trees; 4.	1. Temporary disruption to existing use; 2. Expose tree wounds to infection increasing risk of survival; 3. High health and safety risk to	1. Temporary disruption to existing use; 2. Delay in commencement of work due to availability issues, poor planning and bad weather; 3.	1. Risk of trimmed and treated trees not recovering from being cut; 2. Buildings, carparks and other premises that cut trees

Potential Impacts					
Positive			Negative		
Immediate/Construction	Short Term	Long Term	Immediate/Construction	Short Term	Long Term
Opportunity for sick and damaged trees identified in the pre-survey by arborist to be treated or removed; 4. Green waste become available for composting to be used later in the project; and 5. Appropriate HS practices will be carried out during construction.	prevent infection, pending advice from the arborist; 3. Dying and dried up branches increasing HS risks removed; 4. Trimmed materials are quickly and safely removed and without delay from the sites; 5. HS procedures applied to ensure staff and contractors are safe; and 6. Trimmings chipped and removed for composting and used for the landscaping work.	Trimmed and treated trees easier to prune and maintain; 5. Compost material available for existing and new gardens; and 6. Opportunity to introduce easier to maintain species.	the public and current users of the area; 4. Open up the land to undesirable invasive plant species; 5. Expose the area, especially buildings and car parking areas to wind, sun and direct sea air.	Trimmed and treated trees at risk of not growing back due to adverse weather conditions or if not properly cut and treated; 4. Changing landscape and users having to adjust; 5. Reduction of shaded areas; and 6. Undesirable invasive plant species will start to grow if exposed areas are used or are poorly maintained.	use to protect from sea air, wind or shade are now unprotected; 3. Changed landscape, more exposed; 4. Having to plant and nurture new replacement trees that will take time to bring back the protection and shade that cut trees once provided will be costly; 5. Risk of maintenance cost issues to maintain the trimmed trees.
2. Gardens Formation and Gardening					
1. Opportunity to do the following: re-use other constructional waste on site especial soil, use chipped wood from the tree trimming, and use compost that is currently being made by the PNM Management; 2 plan and garden around old trees that have large exposed roots; and 3.	1. Use compost made by PNM from its green waste station at Panamā; 2. Introduce local plants that are salt resistance and from the same type environment and plants that have other uses and values to our local people, e.g. for medicinal plants; 3.Create more garden beds that incorporate	1. Rejuvenated ecology with low maintenance native plants and shrubs, low plants or shrubs that do not entirely obscure clear lines of site through the park or area where gardens are being planned; 2. Safe footpaths unaffected by	1. Temporary disruption to existing use; 2. If work is not completed in time planned there is the risk of damage to newly formed gardens from heavy rainfall, windy conditions, surface water flooding, dry weather, depending on the time of the year the work is done; 3. Introduction of foreign	1. Temporary disruption to existing use; 2. Delay in commencement of work and working progress due to availability issues, poor planning and bad weather; 3. Vandalism by unsavory characters; and 4. Poor garden management may slow gardening process.	1. Negligence and poor management of the gardens could lead to the garden to not achieve the purpose intended. This risk is based on past performance on such projects; 2. Risk of maintenance cost issues to maintain the, e.g. not to let it overgrow; and 3. Risk of

Potential Impacts					
Positive			Negative		
Immediate/Construction	Short Term	Long Term	Immediate/Construction	Short Term	Long Term
Appropriate HS practices will be carried out during construction.	low maintenance native plants and shrubs, low plants that do not obscure clear lines of site through the area where the gardens are; and 4. Introduce trees that don't have intrusive roots and easy to maintain to prevent damage to footpaths and infrastructure.	roots, etc., reducing HS risks to users.	soil, especially inland soil that is acidic is harmful to the marine environment if washed off site; and 4. Introduction of soil from offsite can lead to introduction of invasive species.		damage from natural hazards.
3. Foreshore protection works and beautification					
1. New initiatives get to be started as green solutions would take time to become effective; 2. Involve arborists, people with 'green fingers' and people who is passionate with gardening to carry out the work; 3. Replanting of suitable trees for foreshore protection, a low key activity, would add value to existing trees, especially along the Panamā Reserve; 4. Opportunity to use	1. A programme of replanting after the initial planting of suitable trees would provide support to the natural protection provided by existing trees in the Panamā Reserve; 2. Ongoing pruning programme will improve the health of exiting trimmed and treated trees and the newly planted; 3. Will not do any work in the foreshore except to plant well-chosen and	1. Improved protection to the areas designated for carparks, picnic tables and seat benches, proposed lookout points, walk ways, water stations, and fitness stations; 2. Reduce the impact of salt spray during times of extreme weather conditions; and 3. Will encourage people to use the area for health, recreational and for fitness purposes.	1. If inappropriate tree species are used, i.e. not salt tolerant and suitable for the foreshore, it is wasteful use of resources and funds that could be used elsewhere; and 2. There is the problem of not keeping up with the maintenance of structures and plants planted and could have the same effect as above.	1. Delay in commencement of work and working progress due to availability issues, poor planning and bad weather; 2. Vandalism by unsavory characters; 3. Poor planting and plant maintenance programme; and 4. Risk of newly planted trees to salt air and dry weather especially those brought in from nurseries.	1. Risk of the efforts going to waste if maintenance plans are not followed and risk of damage from natural hazards; 2. Invasive species that are accidentally introduced or particular species that may be invasive could dominate the native species. Species like pō'ue and kākā paetai that are the dominant creepers on the foreshore; and 3. planted and non-planted trees can

Potential Impacts					
Positive			Negative		
Immediate/Construction	Short Term	Long Term	Immediate/Construction	Short Term	Long Term
compost prepared under this project; and 5. Appropriate HS practices will be carried out during construction.	appropriate plant species.				weaken engineered coastal protection structures,

6.2.2 Output 2 - Improved Walk & Cycle Ways between Avarua and the Airport

Table 19: Planned Output 2 - Improved Walk & Cycle Ways between Avarua Harbor and the Airport and the Potential Impacts on the environment from the five planned activities

Potential Impacts					
Positive			Negative		
Immediate/Construction	Short Term	Long Term	Immediate/Construction	Short Term	Long Term
1. Immediate site clearance for pathways – shrubs, pavers, service locations					
1. Allows the construction of pathways and service locations to start; 2. Positive change in Landscape, e.g., more natural lighting and improved working space; 3. More green waste and soil from the clearance work become available for gardening and landscaping around the pathway sites during the project; 4. Removal	.1. Use of appropriate machinery to excavate and remove plants with extensive root system; and 2. Materials from clearance is removed safely and quickly without delay and cleared areas fenced ready for work to start.	1. Sites for pathways properly prepared for construction of new path ways, i.e. footpaths within the Avarua Township area; 2. Planning for pedestrian crossing that connects the garden islands to the footpath that extends from the Avarua Harbor to the PNM can start; and 3. Planning for permeable footpath and Cycle Way	1. Temporary disruption to existing use; 2. Health and safety risks to people using the area; 3. Changed landscape; 4. Expose land to surface water flooding and wind erosion; 5. Open up the land to undesirable invasive plant species; and6. Risk of roots that have affected the old pathways not fully removed could cause	1. Delay in the clearance and removal work; 2. Reduction of shaded areas; 3. Exposed land; 4. Current users of the area will take time to adjust to the changed landscape; and 5. Undesirable invasive plant species will start to grow if construction works is slow to start and if areas are poorly maintained before construction.	1 If clearing and removing of roots are not thorough, remaining vegetation and root system of some species especially those of plants with extensive and massive root system could continue to damage new pathways increasing HS risks to users.

Potential Impacts					
Positive			Negative		
Immediate/Construction	Short Term	Long Term	Immediate/Construction	Short Term	Long Term
of roots that have caused damages to the old pathways will be possible; and 5. Appropriate HS practices will be carried out during construction.		from the western end of the Avatiu harbor to the end of the Panamā Reserve at the Catholic Cemetery.	problem for the new pathways.		
2. Panamā to Avatiu Walk & Cycle Way design, construction works and site remediation.					
1. Allows for the designed walk & cycle ways construction works to start; and 2. Appropriate HS practices will be carried out during construction.	.1. Use of contractors with good workmanship reputation for the construction of the new walk & cycle ways including reconstruction of previous pathways; 2. Construction work is carried quickly; and 3. Keep the sites safe and ready for construction work.	1. Link pedestrians, and wheel chair users to clear and safe access from the Avarua Town area to the Catholic cemetery; and 2. Healthy living for those who love to walk for fitness and for recreational purposes.	1. Temporary disruption to exiting use; 2. HS risks to people using the area; and 3. If work is not completed in time there are the risks of added debris in the case the work areas becoming inundated by sea surge or surface water flooding during extreme weather conditions.	1. Delay in commencement of work and working progress due to availability issues, poor planning, design and bad weather; and 2. Vandalism by unsavory characters.	1. Inappropriate species around pathways especially those with massive and wide span root network would continue to damage pathway increasing HS risks to users; 2. Risk of possible root regrowth may not be detected leading to damaged pathways and increase HS risks to users in the future; 3. Risk of maintenance cost issues to maintain the amenities; and 4. Risk of damage from natural hazards.
3. Installation of recycling and water stations & signage					
1. Allow for the sites for the recycling station and	1. Use of contractors with good workmanship	1. Secure and well managed drinking	1. Temporary disruption to exiting use; and 2.	1. Delay in commencement of work	1. Risk of vandalism to the drinking fountains,

Potential Impacts					
Positive			Negative		
Immediate/Construction	Short Term	Long Term	Immediate/Construction	Short Term	Long Term
the sites for the water station (Drinking water fountain and hand washing station to be prepared for construction or installation; 2. Signs associated with the two stations to be designed and installed; and 3. Appropriate HS practices will be carried out during construction.	reputation for the installation work; and 2. Construction and installation is carried out quickly without delay.	fountains, hand washing stations and recycling stations with the appropriate signage to cater for users of Walk and Cycle Ways from the Avarua Township to the Catholic Cemetery.	Temporary HS risks to people using the area during installation and construction.	and working progress due to availability issues, poor planning and bad weather; and 2. Vandalism by unsavory characters.	hand washing stations, recycling stations and signs; 2. Risk of maintenance cost issues to maintain the amenities and signage; and 3. Risk of damage from natural hazards.
4. Central Avarua footpath remedial work.					
1. Allows for the remedial work to be carried out on the existing Central Avarua Footpaths including excavation and removal of roots causing damage to pavements; and 2. Appropriate HS practices will be carried out during construction.	1. Use of contractors with good workmanship reputation for the installation work; and 2. Remedial work is carried out quickly without delay.	1. Improved existing footpaths within the Avarua Township area; 2. Linkage to added pedestrian crossing that connects the garden islands to the footpath that extends from the Avarua Harbour to the PNM; 3. A permeable footpath and cycle-way from the western end of the Avatiu harbour to the end of the Panamā Reserve (Catholic cemetery); 4. Healthy living for those who love	1. Temporary disruption to exiting uses and users; 2. HS risks to people using the area during construction; 3. If work is not completed on time there are the risks of surface water flooding of the site during extreme weather conditions.	1. Slow work progression could increase HS risks to the public.	1. Inappropriate species around pathways especially those with massive and wide span root network would continue to damage pathways increasing HS risks to users; and 2. Risk of maintenance cost issues to maintain the facility including to investigate possible root regrowth leading to damaged pathways.

Potential Impacts					
Positive			Negative		
Immediate/Construction	Short Term	Long Term	Immediate/Construction	Short Term	Long Term
		to walk and those that do it for recreational purposes; and 5. Encourage people to walk instead of driving through town to do shopping.			
5. Solar lighting installation along Panamā Reserve.					
1. Allow for the installation of solar lighting to be prepared; and 2. Appropriate HS practices will be carried out during construction.	1. Use of contractors with good workmanship reputation for the installation work; and 2. Installation work is carried out quickly without delay.	1. Parking in the allocated areas are possible at night; 2. Increase security to users of Walk & Cycle Ways during the evenings and early mornings; 3. Provide a well-lit footpath and cycle-way that will link pedestrians from the Avarua Township to the Airport; and 4. Provide effective solar street lighting throughout.	1. Temporary disruption to existing use. And 2. HS risks to people using the area during installation.	1. Slow work progression could increase HS risks to the public.	1. Risk of maintenance cost issues for the ongoing maintenance of the solar lights facility

6.2.3 Output 3 - Improved Public Toilets and Recreational Facilities in Central Avarua and Panamā

Table 20: Planned Output 3 - Improved Public Toilets and Recreational Facilities in Central Avarua and Panamā and the Potential Impacts on the environment from five planned activities

Potential Impacts					
Positive			Negative		
Immediate/Construction	Short Term	Long Term	Immediate/Construction	Short Term	Long Term
1. Reconstruction & Waste water treatment system upgrade for central facilities across from the Police Station					
1. Wastewater system upgrade is completed so nil impact for this activity; 2. Allows for the preparation works for improvement of the interior to the facility; and 3. Appropriate HS practices will be carried out during construction.	1. Use of construction materials that is readily available locally and easy to maintain in the long-term; 2. Use of contractors with good workmanship reputation for the interior work; and 3. Reconstruction work is carried out quickly without delay.	1. Upgraded wastewater system that will reduce ground contamination from waste water, prevent raw sewage going into the ground and into the marine environment, and eliminate septic tank stench after possible overload of system during public events; and 2. Improved interior that include family friendly design, non-slip ceramic tiles and ramps for ease of accessibility, clear glazing as much as practicable to maximize natural lighting and ventilation throughout, Weatherproof waiting areas, ease of access by all, including those with	1. Nil for wastewater system upgrade; 2.HS risks to the public if HS practices are not followed including non-compliance to identified hazards and risks on the sign board at the work site.	1. Nil for wastewater system upgrade; 2. Delay in materials arriving on site can delay the work causing inconvenience to the general public; 3. Lack of WASH facilities for the area during construction (interior work).	1. Risk of non-performance of upgraded wastewater system; 2. Risk of maintenance cost issues to maintain the amenity and support ongoing monitoring by wastewater engineer; 3. Risk of possible septic stench in the public area, as was common in the past as a result of overloading during peak public events; and 4. Risk of damage from natural hazards.

Potential Impacts					
Positive			Negative		
Immediate/Construction	Short Term	Long Term	Immediate/Construction	Short Term	Long Term
		physical challenges or the elderly, durable construction to ensure stability during cyclones or strong wind.			
2. Reconstruction & waste treatment system upgrade for Panamā Reserve					
1. Allows for the preparation work to upgrade the wastewater treatment system; 2. Allow for the reconstruction of the public toilet; and 3. Appropriate HS practices will be carried out during construction.	1. Use of construction materials that is readily available locally and easy to maintain in the long-term; 2. Use of contractors with good workmanship reputation for the reconstruction and upgrade work; and 3. Work is carried out quickly with delay.	1. Upgraded wastewater system that will reduce ground contamination from waste water, prevent raw sewage going into the ground and the marine environment, and eliminate septic tank stench after possible overload of system during public events. 2. Improved interior that will include family friendly design, on-slip ceramic tiles and ramps for ease of accessibility, clear glazing as much as practicable to maximize natural lighting and ventilation throughout, Weatherproofed waiting areas, ease of access by all, including those with	1. Risk to the public if HS practices are not followed including non-compliance to identified hazards and risks on the sign board at the work site; 2. Temporary disruption to current uses; and 3. Cause inconvenience to the general public who use the area on Sunday during the times when the nearby ʻAre Tāpae'anga is used for Māroro Tunutunu and for any funeral services that may occur during this time at the Catholic Cemetery; and 4. There is the risk that Public Health and Building Inspectors may not turn up to inspect the work	1. Delay in materials arriving on site can cause delay to the reconstruction process; and 3. Lack of WASH facilities for the area during construction.	1. Risk of non-performance of upgraded wastewater treatment system; 2. Risk of maintenance cost issues to maintain the amenity and to support ongoing monitoring by wastewater engineer; 3. Risk of possible septic stench in the public area, as was common in the past as a result of lack of monitoring and maintenance especially after a major event; and 4. Risk of damage from natural hazards.

Potential Impacts					
Positive			Negative		
Immediate/Construction	Short Term	Long Term	Immediate/Construction	Short Term	Long Term
		physical challenges or the elderly, durable construction to ensure stability during cyclones or strong wind.	when required during the reconstruction of the wastewater and treatment system.		
3. Installation of Park Benches, lookout points, and paving					
1. Allow for the safe and proper preparation of sites and for the installation of Park benches, lookout points and for the paving of the surrounding areas where appropriate; and 2. Appropriate HS practices will be carried out during construction.	1. Use of construction materials that is readily available locally and easy to maintain in the long-term; 2. Use of contractors with good workmanship reputation for the reconstruction and upgrade work; and 3. Work is carried out quickly without delay.	1. Improved use of green space and coastal areas with a view that are family friendly and interactive; 2. Promote and encourage healthy lifestyles; and 3. Provide a safe place to enjoy the view, landscape and nature filled atmosphere.	1. Temporary disruption to the current use of the area; and 2. HS risks to the general public if HS practices are not complied with during construction.	1. Prolonged delay to the installation, decking and paving works; and 2. delay in materials arriving on site can cause delay to the installation and construction process	1. Risk of vandalism to the park benches and lookout points; 2. Risk of ongoing maintenance cost issues to maintain the amenity; and 3. Risk of damage from natural hazards.
4. Construction of fitness trail.					
1. Allow for the safe and proper preparation of site for the proper construction of the fitness trail; and 2. Appropriate HS practices will be carried out during construction.	1. Use of construction materials that is readily available locally and easy to maintain in the long-term; 2. Use of contractors with good workmanship reputation for the installation; and 3. Work is carried out quickly without delay.	1. Improved use of green spaces that are family friendly and interactive; and 2. Promote and encourage healthy lifestyles.	1. Temporary disruption to the current use of the area; and 2. HS risks to the general public if HS practices are not complied with during installation.	1. Prolonged delay to the construction works; and 2. Delay in materials arriving on site can cause delay to the installation process.	1. Risk of vandalism to the facility; 2. Risk of ongoing maintenance cost issues in maintaining the amenity; and 3. Risk of damage from natural hazards.

6.2.4 Output 4 – Restructured and Future Proofed PNM

Table 21: Planned Output 4 - Restructured and Future Proofed PNM and the Potential Impacts on the environment from 12 planned activities

Potential Impacts					
Positive			Negative		
Immediate/Construction	Short Term	Long Term	Immediate/Construction	Short Term	Long Term
1. Relocation, Remediation & Farmers market					
1. Allows relocation and remediation work to begin and to get those businesses relocated back into operation as soon as possible; and 2. Appropriate HS practices will be carried out during construction.	1. To expedite the move without delay the steps planned to relocate must be followed. Hut, owners and vendors who obtrude access ways or plans for future growth must be relocated; 2. Remove buildings that pose a health and safety risk to all market-goers as quickly and as safely as possible; and 3. Revamp existing infrastructure as quickly as possible to a state that is functional and complies with local standards and regulations.	1. Increased parking space available; 2. Improved quality of service delivery by providing fit-for-purpose facilities such as: Farmers Market (for fresh fruits, vegetables, food crops, cooked food); 3. Tables or benches are provided for vendors to display their produce; 4. Conveniently marked parking spaces near the market that will enable vendors to store their produce and cart onto the display units as required; 5. Open and well ventilated shelter; 6. A supermarket experience, seating and eating areas	1. Temporary interruption when relocating Farmer's Market, Fish Market, Reefside and Waffle Shack and preparing new and old site; 2. Frequent visitors to Farmer's Market, Fish Market, Reefside, and Waffle Shack will be inconvenienced; and 3. HS risks to the general public if HS practices are not complied with.	1. Delays in the relocation and resettlement can lead to loss of income and more disruption to the individual businesses and their operations; 2. HS risks if the planned relocation is not professionally carried out; and 3. Businesses being relocated and settled can be inconvenienced.	1. Increased parking space planned for peak times which usually happen on Saturdays and special events only during the year. This takes up open and clear space that can be available for other recreational purposes.

Potential Impacts					
Positive			Negative		
Immediate/Construction	Short Term	Long Term	Immediate/Construction	Short Term	Long Term
		within close proximity; 7. Fish Market relocated to the coast with parking space and dining space with a view; 8. Dining alley between the eateries and Fresh Produce Market created, away from passing traffic and exhaust fumes; 9. Capacity for carpark near main entrance increased; 10. Farmers Market becomes first point of contact for visitors off the bus; and 11. There is opportunity to use large roof area to accommodate solar panels for solar power generation contribution to the power grid.			
2. Installation of underground services, i.e. drainage, power, water connections and waste reticulation					
1. Allows for the: a. Reorganization of power services, b. installation of new connections to	1. Effective coordination by PMU of the various stakeholders involved e.g. TAU, TTV, Vodafone,	1. All underground services, i.e. drainage, power, water and waste reticulation are	1. Temporary interruption to PNM activities during normal working hours while	1. Poor management delays relocation and resettlement can lead to loss of income.	1. Maintenance of underground and overhead services is the responsibility of

Potential Impacts					
Positive			Negative		
Immediate/Construction	Short Term	Long Term	Immediate/Construction	Short Term	Long Term
the current water services and reticulation, and c. Upgrading of current drainage systems; and 2. Appropriate HS practices will be carried out during construction.	vendors, hut owners, the general public so that the installation work can proceed smoothly; and 2. Opportunity for PMU to train staff of PNM to have an onsite technical asset manager that will include knowing the utility service system as one of his/her responsibilities.	grouped together throughout the site for ease of maintenance and future expansions when or if required; 2. All the utility services mapped for maintenance purposes; and 3. Trained onsite technical asset manager to help management maintain the assets and underground services.	excavating and laying down utility service lines; 2. HS risks to the general public if appropriate HS practices are not complied with; and 3. Frequent visitors to PNM will be inconvenienced.		the utility service providers. PNM will be relying on the Utilities for this service and this will have the potential to cause delays to services when required; 2. Risk of ongoing maintenance cost issues of service; and 3. Taking into account the location of the PNM, risk of total damage from natural hazards is a concern.
3. Reconstruction of the PNM playground at new site					
1. Allows for the reconstruction of the playground; and 2. Appropriate HS practices will be carried out during reconstruction.	1. Use of contractors with good workmanship and reputation for the reconstruction; and 2. Work is carried out safely without delay.	1. Playground located away from the visitor congested area around the eateries; 2. Spread and encourages parking throughout the township area and away from the PNM; and 3. Pedestrian crossing near the playground area to safely guide visitors from the township to	1. Temporary disruption during excavation and reconstruction to PNM activities during normal working hours; 2. HS risks to the general public if HS practices are not complied with during reconstruction; and 3. Frequent visitors to PNM will be inconvenienced.	1. Delay of reconstruction slows down the relocation of four vendors; 2. Delays in the work can affect the businesses in the area which could lead to unplanned loss of income; and 3. HS risks to the general public if HS practices are not complied with during reconstruction.	1. There is possible security risk of random irresponsible parent being negligent and leaving their children unattended; and 2. Risk of damage from natural hazards.

Potential Impacts					
Positive			Negative		
Immediate/Construction	Short Term	Long Term	Immediate/Construction	Short Term	Long Term
		the playground and the PNM.			
4. Deconstruction of old PNM playground					
1. Allows for the reconstruction of the playground; 2, Allows for reuse of the playground area and 3. Appropriate HS practices will be carried out during deconstruction.	1. Use of contractors with good workmanship and reputation for the deconstruction; and 2. Work is carried out safely without delay.	1. Old PNM Playground space available for four vendors that fit within the opened up space and compliment the eatery zone.	1. Temporary disruption during deconstruction work if carried out during normal working hours; 2. HS risks to the general public if HS practice is not complied with during deconstruction; and 3. Frequent visitors to PNM will be inconvenienced.	1. Those parents whose children are regular users of the facility to be advised of the change; 2. Old site will need to be fenced for HS reasons; and 3. Frequent visitors to PNM will be inconvenienced.	Nil
5. Relocation of specified huts					
1. Allows for the relocation of the specific huts; 2. Allows for increased parking space; and 3. Appropriate HS practices will be carried out during relocation.	1. Traffic management to allow the relocation to go smoothly to prevent any HS issues arising.	1. Farmers Market strategically relocated to ensure that "drive-through" experience is retained and 70 vendor spaces provided; 2. Reduce traffic and visitor congestion at Reefside and the ATM by relocating Reefside to the eatery area and the ATM to the	1. Temporary disruption during relocation if moving time is carried out during normal working hours; 2. HS risks to the general public if HS practices are not complied with during relocation; 3. Frequent visitors to PNM will be inconvenienced.	1. Delays due to weather, coordination issues, availability of machinery and manpower may delay relocation of specific huts; and 2. Frequent visitors to PNM continue to be inconvenienced.	Nil

Potential Impacts					
Positive			Negative		
Immediate/Construction	Short Term	Long Term	Immediate/Construction	Short Term	Long Term
		Information Hub; 3. Dining alley between the eateries and Fresh Produce Market created, away from passing traffic and exhaust fumes; 4. More parking spaces available; 5. Outdoor eating areas with a coastal view and natural shade; and 6. Onsite storm water collection system that will enable rainwater to be treated and reused for irrigation.			
6. Top soil, grassing and planting					
1. Allows for grassing and planting in the planned spaces; and 2. Appropriate HS practices will be carried out during the garden works.	1. Utilize the services of those that raise planting material to provide already growing plants and those with expertise to grass and provide already prepared soil material for planting; and 2. Engage people whose business is to nurture new plants and gardens.	1. Family friendly green space within close proximity to the playground; 2. Plenty of space for public activities; and 3. Enhanced existing ecology and landscaped features for the public to enjoy.	1. Temporary disruption to the use of the areas where gardening will be carried out due to machinery use to cart top soil, and garden building; 2. Frequent visitors to PNM will be inconvenienced; 3. There is risk of imported surface soil being washed down the new	1. Delays due to weather, coordination issues, availability of machinery and manpower may delay the work; and 2. Frequent visitors to PNM continue to be inconvenienced.	1. Bringing soil from elsewhere, especially acidic red soil have adverse effect on the marine environment if it reaches the sea, 2. Risk of ongoing maintenance cost issues to maintain the gardens; and 3. High risk of damage from natural hazards.

Potential Impacts					
Positive			Negative		
Immediate/Construction	Short Term	Long Term	Immediate/Construction	Short Term	Long Term
			drainage system if not contained properly; 4. HS risks to the general public if HS practices are not complied with during the garden works; and 5. Temporary increase in water use to make the grass and new plants grow.		
7. Solar street lighting installation					
1. Allows for the installation of solar street lighting; 2. Opportunity to install an EV charging station; and 3. Appropriate HS practices will be carried out.	1. Effective coordination work that will facilitate the installation; and 2. Good workmanship to ensure quality work is carried out properly and safely without delay.	1. Working solar street lighting throughout; 2. Solar street lighting and signage for ease of navigation; and 3. EV charging station provided.	1. Temporary disruption during installation works if carried out during normal working hours; 2. HS risks to the general public if HS practices are not complied with during installation; and 3. Frequent visitors to PNM will be inconvenienced.	1. Delays due to weather, coordination issues, availability of machinery, equipment and manpower: and 2. Frequent visitors to PNM continue to be inconvenienced.	1. High risk of damage from natural hazards and man-made hazards, e.g. untrimmed trees, careless serviceman; and 2. Risk of ongoing maintenance cost issues to maintain the facility.
8. Building construction of new toilet block at Constitution Park					
1. Allow for the safe and proper preparation of site for durable and proper construction; and 2. Appropriate HS practices will be carried out during construction	1. Have all materials, required machineries on site to expedite the work; 2. Use of construction materials that are readily available locally and easy to maintain in the long-term;	1. A family friendly designed building; non-slip ceramic tiles and ramps for ease of accessibility, clear glazing as much as practicable to	1. Temporary disruption during construction of the new toilet block especially if construction works is carried out during normal working hours; 2. HS risks to the	1. Delay in building materials could cause delay to the reconstruction work; 2.HS risks to the general public if HS practices are not	1. Risk of non-performance of upgraded wastewater system; 2. Risk of maintenance cost issues to maintain the amenity and to

Potential Impacts					
Positive			Negative		
Immediate/Construction	Short Term	Long Term	Immediate/Construction	Short Term	Long Term
and to have the activity completed successfully without delay.	and 3. Engage contractors who have good reputation and workmanship and can build without delay.	maximize natural lighting and ventilation throughout, weatherproof waiting areas; a single level building for ease of access by all, including those with physical challenges or the elderly, durable construction to ensure stability during cyclones or strong wind, planter boxes filled with native, low-maintenance shrubs or flowers to help improve air quality; Traditional lashing techniques throughout; Opportunity for power generation panels to be installed on the roof to contribute to the solar power grid, wastewater system that will reduce ground contamination from wastewater, prevent raw sewage	general public if HS practices are not complied with; and 3. Frequent visitors to PNM will be inconvenienced.	complied with; and 3. Inconvenience to the general public	support ongoing monitoring by wastewater engineer; 3. Possible risk of septic stench in the public area, as was common in the past as a result of lack of monitoring and maintenance especially after a major event; and 4. Risk of damage from natural hazards.

Potential Impacts					
Positive			Negative		
Immediate/Construction	Short Term	Long Term	Immediate/Construction	Short Term	Long Term
		going into the ground and into the marine environment, and eliminate septic tank stench after a possible overload during public events.			
9. Central waste water treatment system for toilet facility and market huts					
1. Allow for the safe and proper preparation of site for a central waste treatment system for toilet facility and market huts; and 2. Appropriate HS practices will be carried out during site preparation and construction.	1. Have all materials and required machineries are on site to expedite the work; 2. Use of construction materials that is readily available locally and easy to maintain in the long-term; 3. Use of contractors with good workmanship and reputation for the construction; and 4. Work is carried out safely without delay	1. A central wastewater treatment system built to cater for the current toilet systems on the PNM and that of huts should they wish to build their own toilet; 2. A system with monitoring and reporting arrangements between the PNM Management and the registered wastewater engineer who designed the system; 3. A system approved under the Sewage Construction Permit under the Public Health (Sewage and	1. Risk to the public if HS practices are not followed during construction; 2.Temporary disruption to current toilets at PNM.	1. Delays due to weather, coordination issues, availability of machinery, materials and manpower.	1. Risk of non-performance of upgraded wastewater system; 2. Risk of maintenance cost issues to maintain the amenity and to support ongoing monitoring by wastewater engineer; 3. Risk of septic stench in the public area after possible overload of the system during major events as was common in the past as a result of lack of monitoring and maintenance; and 4. Risk of damage from natural hazards.

Potential Impacts					
Positive			Negative		
Immediate/Construction	Short Term	Long Term	Immediate/Construction	Short Term	Long Term
		Wastewater Treatment and Disposal) Regulations 2014 and in compliance with the Building Permit issued by the Building Controller under the Building Control and Standards Act 1991 to ensure a durable building; 4. Also take note of the EMCI review report of the Building Control and Standards Act in the following areas: best practice landuse planning, requirement for car park, building set-backs from access ways, minimum floor levels to allow for future climate change induced sea levels the height of 1m above mean high water mark (0.5m for sea level rise and 0.5m for increased storm surge); and 5. A			

Potential Impacts					
Positive			Negative		
Immediate/Construction	Short Term	Long Term	Immediate/Construction	Short Term	Long Term
		system designed for future development.			
10. Accessibility paving					
1. Allow for the safe and proper preparation of site for construction. 2. Appropriate HS practices will be carried out during paving.	1. Have all materials, required machineries on site to expedite the work; 2. Use of contractors with good workmanship and reputation for the construction; and 3. Work is carried out safely without delay.	1. All buildings within the PNM to be accessible by pedestrians, particularly those in wheelchairs; 2. 1.5m wide paved footpaths throughout; 3. 1m wide paved footpath/circulation within carparks; 4. Pedestrian crossings throughout. Intermittent or disconnected footpaths; 6.Damaged footpaths or displaced by the roots of large trees is fixed; and 7. Pedestrian crossings to guide pedestrians to the beach-side footpath on Te Maire Nui drive.	1. Temporary disruption of the PNM use in certain areas during construction and paving works during normal working hours; 2. Risk to the public if HS practices are not followed; 3. Frequent visitors to PNM will be inconvenienced.	1. Delays due to weather, coordination issues, availability of machinery and manpower; and 3. Risk of availability of materials during scheduled construction times	1. Risk of poor quality work due to poor workmanship; and 2. Risk of damage from natural hazards.
11. Asphalt extension, remarking and signage of large carpark at PNM entrance					

Potential Impacts					
Positive			Negative		
Immediate/Construction	Short Term	Long Term	Immediate/Construction	Short Term	Long Term
1. Allow for the safe and proper preparation of site for Asphalt extension works; 2. Appropriate HS practices will be carried out during construction.	1. Effective scheduling of work and include coordinating contractors/subcontractors, e.g. supplier of service, supplier of materials, equipment and machineries for this work; 2. Have all involved on site on scheduled times; 3. Use of construction materials that are readily available locally; and 4. Engage contractors who have good reputation and workmanship and can complete the work on time.	1. Increased carpark capacity near main entrance; 2. 5m wide road access throughout the PNM; 3. Marked parking space for cars, motorbikes and bicycles; and 4. Security service provided.	1. Temporary disruption of the PNM during Asphalt extension work if carried out during normal working hours; 2. Risk to the public if HS practices are not followed during the sealing process; and 3. Frequent visitors to PNM will be inconvenienced.	1. Delays due to weather, coordination issues, availability of machinery and equipment, and manpower; and 2. Risk of availability of construction materials during scheduled work time.	1. Risk of poor quality work due to poor workmanship; and 2. Risk of damage from natural hazards.
12. Paving bollards of walkway					
1. Allow for the safe and proper preparation of site for construction; 2. Appropriate HS practices will be carried out during paving; and 3. Signage will include hazards and risks to inform the public	1. Have all materials, required and machineries on site to expedite the work; 2. Use of construction materials that are readily available locally and easy to maintain in the long-term; and 3. Engage contractors who have good reputation and workmanship and can complete the work on time.	1. All bollards of walkways paved and visible at night.	1. Temporary disruption of the PNM during construction and paving works during normal working hours; 2. Risk to the public if HS practices are not followed during paving; and 3. Frequent visitors to PNM will be inconvenienced.	1. Delays due to weather, coordination issues, availability of machinery and manpower; and 2. Risk of availability of construction materials during scheduled work time.	1. Risk of poor quality work due to poor workmanship; and 2. Risk of damage from natural hazards.

Potential Impacts					
Positive			Negative		
Immediate/Construction	Short Term	Long Term	Immediate/Construction	Short Term	Long Term

6.2.5 Output 4b - Traffic Management, pedestrian safety, convenient public bus stop/pick up, and visitor drop off and pick up

Table 22: Output 4b - Minimize Traffic Congestion, pedestrian safety, convenient public bus stop/pick up and visitor drop off and pick up

Potential Impacts					
Positive			Negative		
Immediate/Construction	Short Term	Long Term	Immediate/Construction	Short Term	Long Term
1. PNM - Minimize traffic congestion along Main Roan and around PNM					
1. Allow for the preparation and testing of proposed traffic management plan to minimize traffic congestion; and 2. Appropriate HS practices will be carried out during testing and to complete the work without delay.	1. PMU to work with stakeholders ASAP to prepare a draft traffic management plan, do the tests, collect and analyse data to determine best options to be included into the draft traffic management plan. Stakeholders to include the Police, ICI, MOT, Te Marae Ora, Cook's Buses, and Representative of Tour Groups; 2. Testing of various traffic	1. Effective traffic management plan; 2. Eliminate bottleneck point and allow traffic to flow at PNM entrance when traffic from Avatiu direction is heavy; 3. Eliminate the safety hazard caused by the 2-way traffic at Constitution Park; 4. Prevent Inward traffic colliding with outward traffic at exit point at the Constitution Park; 5. Eliminate traffic	1. Create disturbance and temporary disruption to current traffic movement in problem areas identified during testing of proposed traffic management plan; 2. Risk to the public if HS practices are not followed; and 3. Frequent visitors to PNM will be inconvenienced.	1. Risk of stakeholders not working together in doing their parts to the testing of the proposed traffic management plan; and 2. Irresponsible members of the general public causing havoc during peak hours, especially during testing times;	1. Traffic congestion along the main road during peak times at the PNM; and 2. Risk to the public if HS practices are not followed during the test.

	management scenarios to begin immediately to allow the traffic to get use to the preferred scenarios, i.e. a. No "right-turn" at main entrance, b. a 30km zone between Avatiu and Avarua roundabouts, c. one-way/single lane entry into the PNM, d. 2 exit point for delivery vehicles only at the PNM.	congestion due to outward traffic, visitors parking in front of Reef side and visitors ignoring the "wrong-turn" sign in order to access the ATM; and 6. Resolve bottleneck point where traffic merge onto the main road from Ruatonga road when traffic is heavy and don't give way.			
2. PNM - Health and safety at pedestrian crossing					
1. Allow for the testing of proposed pedestrian crossing including those for in wheel chairs and with disability; and 2. Appropriate HS practices will be carried out during the tests and to complete the activity successfully without delay.	1. PMU to work with stakeholders ASAP to do the tests, collect and analyse data to determine best options. Stakeholders to include the Police, ICI, MOT, CINDC and Te Marae Ora; 2. Pedestrian crossing objectives include: a. Provide safe Pedestrian crossing; Provide pedestrian crossing where practicable; b. Improve pedestrian access from Avarua Township to the Airport, as much practicable.	1. Safe and appropriately located pedestrian crossing, including those for in wheelchairs and with disability; and 2. Main safe pedestrian crossing from current locations are: Catholic Church Parking area to Constitution Park; Inside new parking area inside the Constitution Park; and from Avarua Town area to east of the new Playground.	1. Create disturbance and temporary disruption to current chaotic practice in problem areas identified during testing of pedestrian crossing options; 2. Risk to the public if HS practices are not followed; and 3. Frequent visitors to PNM will be inconvenienced.	1. Risk of stakeholders not working together in doing their parts to the testing of proposed pedestrian crossings; and 2. Irresponsible members of the general public causing havoc during peak hours, especially during testing times;	1. High risk to pedestrians crossing the main roads especially during peak hours and days at the PNM; and 2. Risk to the public if HS practices are not followed during the test.

3. PNM - Convenient public bus stop and visitor drop off and pick up station.					
1. Allow for the testing of proposed traffic management scenarios to achieve safe and convenient public bus stop and visitor drop off and pick up station around the PNM; and 2. Appropriate HS practices will be carried out and to complete the activity successfully without delay.	1. PMU to work with stakeholders ASAP to do the tests, collect and analyse data to determine best options. Stakeholders to include the Police, ICI, MOT, Te Marae Ora, Cook's Buses, and Representative of Tour Groups; and 2. Test proposed safe and convenient bus drop off and pick up points for the general public, safe and convenient drop off and pick up for visitors and tour groups during peak hours; safe, convenient and sheltered drop off and pick up zone for buses and taxis.	1. Relieved traffic congestion; 2. Safe and convenient bus drop off and pick up point at for the general public; and 3. Safe, convenient and sheltered drop off and pick up zone for buses and taxis.	1. Create disturbance and temporary disruption to current chaotic practice in problem areas identified during testing to confirm proposed stations; 2 HS issues for the general public during peak hour if appropriate HS practices are not followed; and 3. Frequent visitors to PNM will be inconvenienced.	1. Delay in the testing of proposed traffic management scenarios to achieve safe and convenient public bus stop and visitor drop off and pick up station around the PNM in the testing; 2. Risk of stakeholders not working together in doing their parts to the testing of proposed bus stop and visitor drop off points; and 3. Irresponsible members of the general public causing havoc during peak hours, especially during testing times;	1. High risk to pedestrians, passengers from buses and taxis crossing the main roads especially during peak hours and days at the PNM; 2. Risk to the public if HS practices are not followed during the test; and 3. Risk of damage from natural hazards
4. PNM - Provide adequate, convenient, marked and managed parking spaces					
1. Allow for improved, expanded and well managed parking spaces; and 2. Appropriate HS practices will be carried out and to complete the activity successfully without delay.	1. PMU to work with stakeholders to ensure the proposed parking plans meet the requirements identified; and 2. Stakeholders to include the Police, ICI, MOT, Te Marae Ora and CINDC.	1. Adequate, convenient, marked with signage, safe and well managed parking space; 2. Adequate disability parking space throughout the project areas; 3. Marked parking spaces near the market to enable	1. Create temporary disruption to current parking issues; and 2. Health and Safety issues for the general public during peak hour's contractors; 3. Frequent visitors to PNM will be inconvenienced.	1. Delay in the construction of proposed parking spaces as marked in the plan; and 2. Risk of stakeholders not working together.	1. Risk of poor maintenance of parking areas, e.g. asphalt, compacted and well drained surfaces, security service and signage; 2. Risk of damage from natural hazards; and 3. A lot of space that could be

		vendors to store their produce and cart onto the display units as required; 4. Dedicated and marked parking space for cars, trucks, motorbikes or bicycles; 5. Dedicated security service provided; and 6. Solar lighting to improve visibility and security at night.			used for more commercial and recreational purposes is locked up into parking space; and 4. Ensuring lighting of parking areas is functional at night.

6.3 Significance of Adverse Impacts

6.3.1 Methodology

- The EIA team used current knowledge of the existing environment, social management systems and available environmental and social research studies for the site of the proposed works to assess the potential significance of risks during the construction and operational phase after work is commissioned.
- The following scoring methodology assesses the significance of possible risks occurring during the construction and operational stages. This assessment is conducted according to the following criteria and is identified in Tables 23 and 24 with detail provided in Tables 25 - 29.
  - Impact (consequences) of the event on the project's objectives if it occurs
  - Likelihood (probability) of the event occurring
  - Significance of the impact

Table 23: Levels of risk impact and probability (Source: SPREP and NES)

Risk Criteria	Definition of Rating	Score
Impact (I)	**A:** Extent – The area over which the impact will be experienced	Local = 1 Island = 2 National = 3
	B: Intensity – The magnitude of the impact, i.e. whether the impact will result in minor, moderate, major or massive environmental, social and economic (including human health) changes	Low = 1 Medium = 2 High = 3
	C: Duration – The time frame over which the impact will be experienced and its reversibility.	Short Term – 1 Mid Term – 2 Long Term – 3
Impact Consequences (Combined Score): Minor 3 – 4; Moderate 5 – 6; Major 7 – 8; Massive 9 – 10.		
Probability (P) – Likelihood of the impact occurring	Improbable - Unlikely to occur during project lifetime	1
	Possible - May occur during project lifetime 20%-60% chance of occurring	2
	Probable - Likely to occur during the project lifetime >60-90% chance of occurring	3
	Highly probable - Highly likely to occur, or likely to occur more than once during project lifetime	4

Table 24: Matrix showing overall significance of the impact as a combination of the consequences and probability ratings probability (Source: SPREP and NES

		Probability of Occurrence			
		Improbable	Possible	Probable	Highly Probable
Consequences of Impact	Minor	Very Low	Very Low	Low	Low
	Moderate	Low	Low	Medium	Medium
	Major	Medium	Medium	High	High
	Massive	High	High	Very High	Very High

6.4 Assessed Potential Adverse Environmental Impacts and Recommended Mitigation of those Impacts

6.4.1 Assessment of Potential Adverse Impacts (Significance of Impacts) Identified in Section 6.2

- Tables 25 - 29 provide a summary of the significance of the potential adverse environmental Impact the project have on the environment.

6.4.1.1 Output 1 Activities

Table 25: Impacts Assessment on Potential Adverse Environmental Impacts on the Activities of Output 1

Potential Adverse Environmental Impact	Impact Assessment					Significant Impact?
	Risks of Impact			Impact Consequences		
	Extent	Intensity	Duration	Consequences	Probability	
Impact of Project on the Environment						
Output 1 - Beautification of Avarua Town and Panamā Reserve						
1. Tree trimming & removal – Avarua Port to Panamā						
Temporary disruption to existing use	1-Local	1-Low	1-Short	3-Minor	4	Low
Expose tree wounds to infection increasing risk of survival	1-Local	3-High	3-Long	7-Major	4	High
High HS risk to the public and current users of the area	1-Local	2-Medium	1-Low	4-Minor	2	Very Low
Open up the land to undesirable invasive plant species	1-Local	3-High	3-Long	7-Major	4	High
Reduction of shaded areas	1-Local	2-Medium	2-Medium	5-Moderate	3	Medium
Expose buildings and car parking areas to wind, sun and direct sea air	1-Local	2-Medium	2-Medium	5-Moderate	3	Medium
Maintenance cost issues to maintain the trimmed trees.	1-Local	3-High	3-Long	7- Major	4	High
2. Gardens formation and gardening						
Temporary disruption to existing use	1-Local	1-Low	1-Short	3-Minor	4	Low
Damage to newly formed gardens from natural hazards (heavy rainfall, windy conditions, surface water flooding, dry weather)	1-Local	3-High	2-Medium	6-Moderate	2	Low
Introduction of foreign soil, especially inland soil that is acidic and harmful to the marine environment if washed off site	1-Local	3-High	2-Medium	6-Moderate	2	Low
Introduction of soil from offsite can lead to introduction of invasive species.	1-Local	3-High	3-High	7-Major	3	High

Potential Adverse Environmental Impact	Impact Assessment					Significant Impact?
	Risks of Impact			Impact Consequences		
	Extent	Intensity	Duration	Consequences	Probability	
Impact of Project on the Environment						
Negligence and poor management of the gardens could lead to the garden to not achieve the purpose intended	3-National	3-High	2-Medium	8-Major	3	High
Maintenance cost issues to maintaining gardens	1-National	3-High	3-High	7-Major	3	High
Damage from natural hazards	1-Local	3-High	2-Medium	6-Moderate	2	Low
3. Foreshore protection works and beautification						
Efforts going to waste if maintenance plans are not followed	1-Local	3-High	3-Long	7-Major	3	High
Damage from natural hazards	1-Local	3-High	2-Medium	6-Moderate	3	Medium
Invasive species could dominate the native species	1-Local	3-High	3-Long	7-Major	3	Medium
Weakening of engineered coastal protection structures by planted and non-planted trees.	1-Local	3-High	3-Long	8-Massive	3	Very High

6.4.1.2 Output 2 Activities

Table 26: Impacts Assessment on the Potential Adverse Environmental Impacts on the Activities of Output 2

Potential Adverse Environmental Impact	Impact Assessment`					Significant Impact?
	Risks of Impact			Impact Consequences		
	Extent	Intensity	Duration	Consequences	Probability	
Impact of Project on the Environment						
Output 2 - Improved Walk & Cycle Ways between Avarua and the Airport						
1. Immediate site clearance for pathways – shrubs, pavers, service locations						
Temporary disruption to existing use	1-Local	1-Low	1-Short	3-Minor	3	Low
HS risks to people using the area	1-Local	2-Medium	1-Short	4- Minor	3	Low
Changed landscape	1-Local	1-Low	3-Long	5-Moderate	3	Medium
Expose land to surface water flooding and wind erosion	1-Local	2-Medium	1-Short	4-Minor	2	Very Low
Open up the land to undesirable invasive plant species	1-Local	3-High	3-Long	7-Major	4	High
Roots that have affected the old pathways not fully removed could cause problem for the new pathways	1-Local	3-High	3-Long	7-Major	3	High

Potential Adverse Environmental Impact	Impact Assessment`					Significant Impact?
	Risks of Impact			Impact Consequences		
	Extent	Intensity	Duration	Consequences	Probability	
Impact of Project on the Environment						
2. Panamā to Avatiu Walk & Cycle Way design, construction works and site remediation						
Inappropriate species around pathways especially those with massive and wide span root network would continue to damage pathway increasing HS risks to users	1-Local	3-High	3-Long	7-Major	3	High
Possible root regrowth may not be detected leading to damaged pathways and increase HS risks to users in the future	1-Local	3-High	3-Long	7-Major	3	High
Maintenance cost issues to maintain the sites	1-Local	3-High	3-Long	7-Major	3	High
Damage from natural hazards	1-Local	3-High	1-Short	5-Moderate	3	Medium
3. Installation of recycling and water stations & signage						
Temporary disruption to existing use	1-Local	1-Low	1-Short	3-Minor	3	Low
Temporary HS risks to people using the area during installation	1-Local	2-Medium	1-Short	4- Minor	3	Low
Vandalism to the drinking fountains, hand washing, recycling stations and signs	1-Local	3-High	1-Short	5-Moderate	4	Medium
Maintenance cost issues to maintain the amenities and signage	1-Local	3-High	3-High	7-Major	3	High
Damage from natural hazards	1-Local	3-High	1-Short	5-Moderate	3	Medium
4. Central Avarua footpath remedial work						
Temporary disruption to existing uses and users	1-Local	2-Medium	1-Short	4-Minor	3	Low
HS risks to people using the area during construction	1-Local	2-Meium	2-Medium	5-Moderate	2	Low
If work is not completed in time there are the risks of surface water flooding of the site during extreme weather conditions	1-Local	1-Low	1-Short	3-Minor	2	Very Low
Inappropriate species around pathways especially those with massive and wide span root network would continue to damage pathways increasing HS risks to users	1-Local	3-High	3-Long	7-Major	3	High
Maintenance cost to maintain the facility including to investigate possible root regrowth leading to damaged pathways	1-local	3-High	3-Long	7-Major	3	High
5. Solar lighting installation along Panamā Reserve						
Temporary disruption to existing use	1-Local	1-Low	1-Short	3-Minor	2	Very Low
HS risks to people using the area during installation	1-Local	1-Low	1-Short	3-Minor	2	Very Low

Potential Adverse Environmental Impact	Impact Assessment`					Significant Impact?
	Risks of Impact			Impact Consequences		
	Extent	Intensity	Duration	Consequences	Probability	
Impact of Project on the Environment						
Ongoing maintenance cost issues to maintain the facility	1-Local	3-High	3-Long	7-Major	3	High

6.4.1.3 Output 3 Activities

Table 27: Impacts Assessment on the Potential Adverse Environmental Impacts on the Activities of Output 3

Potential Adverse Environmental Impact	Impact Assessment					Significant Impact?
	Risks of Impact			Impact Consequences		
	Extent	Intensity	Duration	Consequences	Probability	
Impact of Project on the Environment						
Output 3 - Improved Public Toilets and Recreational Facilities in Central Avarua and Panamā						
1. Reconstruction & Wastewater treatment system upgrade for central facilities across from the Police Station						
HS risks to people who do not follow identified hazards and risks on the sign board at the work site.	1-Local	3-High	1-Short	5-Moderate	2	Low
Non-performance of upgraded wastewater system	1-LocaL	3-High	1-Short	5-Moderate	3	Medium
Maintenance cost issues to maintain the amenity and support ongoing monitoring by wastewater engineer	1-Local	3-High	3-Long	7-Major	3	High
Possible septic stench in the public area, as was common in the past as a result of possible overloading during peak public events	1-Local	3-High	3-Long	7-Major	3	High
Damage from natural hazards	1-Local	3-Major	2-Medium	6-Moderate	2	Low
2. Reconstruction & waste treatment system upgrade for Panamā Reserve						
HS risks to people who do not follow identified hazards and risks on the sign board at the work site.	1-Local	3-High	1-Short	5-Moderate	2	Low
Temporary disruption to current uses.	1-Local	3-High	2-Medium	6-Moderate	2	Low
Inconvenience to the general public who use the area on Sunday during the times when the nearby ʻAre Tāpae'anga is used for Māroro Tunutunu and for any funeral services that may occur during this time at the Catholic Cemetery	2-Island	3-High	2-Medium	7-Major	3	High

Potential Adverse Environmental Impact	Impact Assessment					Significant Impact?
	Risks of Impact			Impact Consequences		
	Extent	Intensity	Duration	Consequences	Probability	
Impact of Project on the Environment						
Public Health and Building Inspectors may not turn up to inspect the work when required during the reconstruction of the wastewater and treatment system	1-Local	3-High	1-Short	5-Moderate	2	Low
Non-performance of upgraded wastewater system	1-Local	3-High	1-Short	5-Moderate	3	Medium
Maintenance cost issues to maintain the amenity and to support ongoing monitoring by wastewater engineer	1-Local	3-High	3-Long	7-Major	3	High
Possible septic stench in the public area, as was common in the past as a result of lack of monitoring and maintenance especially after a major event	1-Local	3-High	3-Long	7-Major	3	High
Damage from natural hazards	1-Local	3-Major	2-Medium	6-Moderate	2	Low
3. Installation of Park Benches, paving & surrounds						
Temporary disruption to the current use of the area	1-Local	2-Medium	1-Short	4-Minor	2	Very Low
HS risks to the general public if HS practices are not complied with during installation and paving,	1-Local	1-Low	1-Short	4-Minor	2	Very Low
Vandalism to the park benches	1-Local	3-High	3-Long	7-Major	3	High
Damage from natural hazards	1-Local	3-Major	2-Medium	6-Moderate	2	Low
4. Construction of fitness trail						
Temporary disruption to the current use of the area	1-Local	2-Medium	1-Short	4-Minor	2	Very Low
HS risks to the general public if HS practices are not complied with.	1-Local	2-Medium	1-Short	4-Minor	2	Very Low
Vandalism to the facility;	1-Local	3-High	3-Long	7-Major	3	High
Damage from natural hazards	1-Local	3-Major	2-Medium	6-Moderate	2	Low

6.4.1.4 Output 4 Activities

Table 28: Impacts Assessment on the Potential Adverse Environmental Impacts on the Activities of Output 4

Potential Adverse Environmental Impact	Impact Assessment					Significant Impact?
	Risks of Impact			Impact Consequences		
	Extent	Intensity	Duration	Consequences	Probability	
Impact of Project on the Environment						
Output 4 – Restructured and Future Proofed PNM						
1. Relocation, Remediation & Farmers market						
Temporary disruption when relocating Farmer's Market, Fish Market, Reefside and Waffle Shack and preparing new and old site.	2-Island	2-Medium	1-Short	5-Moderate	3	Medium
Frequent visitors to Farmer's Market, Fish Market, Reefside, and Waffle Shack will be inconvenienced.	2-Island	2-Medium	1-Short	5-Moderate	3	Medium
HS risks to the general public if HS practices are not complied with during relocation.	1-Local	1-Low	1-Short	3-Minor	1	Very Low
Increased parking space planned for peak times which usually happen on Saturdays and special events only during the year. This takes up open and clear space that can be available for other recreational purposes	1-Local	3-High	3-Long	7-Major	3	High
2. Installation of underground services, i.e. drainage, power, water connections and waste reticulation						
Temporary interruption to PNM activities during normal working hours while excavating and laying down utility service lines	1-Local	2-Medium	1-Short	4-Minor	3	Low
HS risks to the general public if appropriate HS practices are not complied with during installation	1-Local	2-Medium	1-Short	4-Minor	2	Very Low
Frequent visitors to PNM will be inconvenienced	1-Local	1-Low	1-Short	3-Minor	2	Very Low
Maintenance of underground and overhead services is the responsibility of the utility service providers. PNM will be relying on the Utilities for this service and this will have the potential to cause delays to services when required	2-Island	3-High	3-Long	8-Major	3	High
Taking into account the location of the PNM, risk of total damage from natural hazards is a concern	1-Local	3-High	3-Medium	6-Moderate	2	Low
3. Reconstruction of the PNM playground at new site						

Potential Adverse Environmental Impact	Impact Assessment					Significant Impact?
	Risks of Impact			Impact Consequences		
	Extent	Intensity	Duration	Consequences	Probability	
Impact of Project on the Environment						
Temporary disruption during excavation and construction to PNM activities during normal working hours	1-Local	1-Low	1-Short	3-Minor	1	Very Low
HS risks to the general public if HS practices are not complied with during reconstruction	1-Local	1-Low	1-Short	3-Minor	2	Very Low
Frequent visitors to PNM will be inconvenienced	1-Local	1-Low	1-Short	3-Minor	2	Very Low
There is possible security risk of random irresponsible parent being negligent and leaving their children unattended	2-Island	3-High	3-Long	8-Major	3	High
Damage from natural hazards	1-Local	3-High	3-Long	7-Major	3	High
4. Deconstruction of old PNM playground						
Temporary disruption during deconstruction work if carried out during normal working hours	1-Local	2-Medium	1-Short	4-Minor	2	Very Low
HS risks to the general public if HS practices are not complied with during deconstruction	1-Local	2-Medium	1-Short	4-Minor	2	Very Low
Frequent visitors to PNM will be inconvenienced	1-Local	1-Low	1-Short	3-Minor	2	Very Low
5. Relocation of specified huts						
Temporary disruption during relocation if moving time is carried out during normal working hours	1-Local	3-High	1-Short	5-Moderate	2	Low
HS risks to the general public if HS practices are not complied with during relocation	1-Local	3-High	1-Short	5-Moderate	2	Low
Frequent visitors to PNM will be inconvenienced	1-Local	2-Medium	1-Short	4-Minor	2	Very Low
6. Top soil, grassing and planting						
Temporary disruption to the use of the areas where gardening will be carried out due to machinery use to cart top soil, and garden building	1-Local	2-Medium	1-Short	4-Minor	2	Very Low
Frequent visitors to PNM will be inconvenienced	1-Local	2-Medium	1-Short	4-Minor	2	Very Low
There is risk of imported surface soil being washed down the new drainage system if not contained properly	2-Island	3-High	3-Long	8-Major	2	Medium
HS risks to the general public if HS practices are not complied with during gardening	1-Local	1-Low	1-Short	3-Minor	2	Very Low

Potential Adverse Environmental Impact	Impact Assessment					Significant Impact?
	Risks of Impact			Impact Consequences		
	Extent	Intensity	Duration	Consequences	Probability	
Impact of Project on the Environment						
Temporary increase in water use to make the grass and new plants grow	2-Island	2-Medium	3-Long	7-Major	3	High
Bringing soil from elsewhere, especially acidic red soil have adverse effect on the marine environment if it reaches the sea, there is risk to the marine environment if this happens	2-Island	3-High	3-Long	8-Major	3	High
ongoing maintenance cost issues to maintain the gardens	1-Local	2-Medium	3-Long	6-Moderate	3	Medium
Damage from natural hazards	1-Local	3-High	3-Long	7-Major	2	Medium
7. Solar street lighting installation						
Temporary disruption during installation works if carried out during normal working hours	1-Local	1-Low	1-Short	3-Minor	2	Very Low
HS risks to the general public if HS practices are not complied with during installation	1-Local	2-Medium	1-Short	4-Minor	2	Very Low
Frequent visitors to PNM will be inconvenienced.	1-Local	1-Low	1-Short	3-Minor	2	Very Low
Damage from natural hazards and man-made hazards, e.g. untrimmed trees, careless serviceman	1-Local	2-Medium	2-Medium	5-Moderate	2	Low
8. Building construction of new toilet block at Constitution Park						
Temporary disruption during construction of the new toilet block especially if construction works is carried out during normal working hours	1-Local	3-High	1-Short	5-Moderate	2	Low
Risks to the general public if HS practices are not complied with during construction,	1-Local	2-Medium	1-Short	4-Minor	2	Very Low
Frequent visitors to PNM will be inconvenienced	1-Local	1-Low	1-Short	3-Minor	2	Very Low
Non-performance of upgraded wastewater system	1-Local	3-High	3-Long	7-Major	3	High
Possible septic stench in the public area, as was common in the past as a result of lack of monitoring and maintenance especially after a major event	1-Local	3-High	3-Long	7-Major	3	High
Damage from natural hazards	1-Local	3-High	3-Long	7-Major	3	High
9. Central waste water treatment system for toilet facility and market huts						

Potential Adverse Environmental Impact	Impact Assessment					Significant Impact?
	Risks of Impact			Impact Consequences		
	Extent	Intensity	Duration	Consequences	Probability	
Impact of Project on the Environment						
Temporary disruption to current uses	1-Local	2-Medium	1-Short	4-Minor	2	Very Low
Risk to the public if HS practices are not followed	1-Local	1-Low	1-Short	3-Minor	2	Very Low
Non-performance of upgraded wastewater system	1-Local	3- High	3-Long	7-Major	3	High
Maintenance cost issues to maintain the amenity and to support ongoing monitoring by wastewater engineer	1-Local	3-High	3-Long	7-Major	3	High
Possible septic stench in the public area, as was common in the past as a result of lack of monitoring and maintenance especially after a major event	1-Local	3-High	3-Long	7-Major	3	High
Damage from natural hazards	1-Local	3-High	3-Long	7-Major	2	Medium
10. Accessibility paving						
Temporary disruption of the PNM use in certain areas during construction and paving works during normal working hours	1-Local	2-Medium	1-Short	4-Minor	2	Very Low
Risk to the public if HS practices are not followed	1-Local	2-Medium	1-Short	4-Minor	2	Very Low
Frequent visitors to PNM will be inconvenienced	1-Local	1-Low	1-Short	3-Minor	2	Very Low
Poor quality work due to poor workmanship	1-Local	3-High	3-Long	7-Major	3	High
Damage from natural hazards	1-Local	3-high	3-Long	7-Major	3	High
11. Asphalt extension, remarking and signage of large carpark at PNM entrance						
Temporary disruption of the PNM during Asphalt extension work if carried out during normal working hours	1-Local	3-High	1-Short	5-Moderate	3	Medium
Risk to the public if HS practices are not followed	1-Local	1-Low	1-Short	3-Minor	2	Very Low
Frequent visitors to PNM will be inconvenienced	1-Local	2-Medium	1-Short	4-Minor	2	Very Low
Poor quality work due to poor workmanship	1-Local	2-Medium	3-Long	6-Moderate	3	Medium
Damage from natural hazards	1-Local	3-High	3-Long	6-Moderate	3	Medium
12. Paving bollards of walkway						
Temporary disruption of the PNM during construction and paving works during normal working hours	1-Local	1-Low	1-Short	3-Minor	1	Very Low
Risk to the public if HS practices are not followed	1-Local	1-Low	1-Short	3-Minor	1	Very Low
Frequent visitors to PNM will be inconvenienced	1-Local	1-Low	1-Short	3-Minor	1	Very Low
Poor quality work due to poor workmanship	1-Local	3-High	2-Medium	6-Moderate	3	Medium

Potential Adverse Environmental Impact	Impact Assessment					Significant Impact?
	Risks of Impact			Impact Consequences		
	Extent	Intensity	Duration	Consequences	Probability	
Impact of Project on the Environment						
Damage from natural hazards	1-Local	3-High	3-Long	7-Major	3	High

6.4.1.5 Output 4b Activities

Table 29: Impacts Assessment on the Potential Adverse Environmental Impact on the Activities of Output 4b

Potential Adverse Environmental Impact	Impact Assessment					Significant Impact?
	Risks of Impact			Impact Consequences		
	Extent	Intensity	Duration	Consequences	Probability	
Impact of Project on the Environment						
Output 4b - Traffic Management, pedestrian safety, convenient public bus stop/pick up, and visitor drop off and pick up						
1. PNM - Minimize traffic congestion along Main Roan and around PNM						
Temporary disruption to current traffic movement in problem areas identified during testing of traffic management plan	2-Island	3-High	1-Short	6-Moderate	3	Medium
Risk to the public if HS practices are not followed during the test	1-Local	3-High	1-Short	5-Moderate	3	Medium
Frequent visitors to PNM will be inconvenienced	2-Island	3-High	1-Short	6-Moderate	3	Medium
Traffic congestion along the main road during peak times at the PNM	1-Local	3-High	1-Short	5- Moderate	2	Low
2. PNM - Health and safety at pedestrian crossing						
Temporary disruption to current chaotic practice in problem areas identified during testing of pedestrian crossing options	1-Local	3-High	1-Short	5- Moderate	3	Medium
Risk to the public if HS practices are not followed during test	1-Local	3-High	1-Short	5-Moderate	3	Medium
Frequent visitors to PNM will be inconvenienced	1-Local	3-High	1-Short	5-Moderate	2	Low
Risk to pedestrians crossing the main roads especially during peak hours and week days at the PNM	1-Local	3-High	1-Short	5-Moderate	3	Medium
3. PNM - Convenient public bus stop and visitor drop off and pick up station						
Temporary disruption to current chaotic practice in problem areas identified during testing to confirm proposed stations	2-Island	3-High	1-Short	6-Moderate	3	Medium

Potential Adverse Environmental Impact	Impact Assessment					Significant Impact?
	Risks of Impact			Impact Consequences		
	Extent	Intensity	Duration	Consequences	Probability	
Impact of Project on the Environment						
HS issues for the general public during peak hour if appropriate HS practices are not followed during test	2-Island	3-High	1-Short	6-Moderate	2	Low
Frequent visitors to PNM will be inconvenienced	1-Local	2-Medium	1-Short	4-Minor	3	Low
High risk to pedestrians, passengers from buses and taxis crossing the main roads especially during peak hours and days at the PNM	2-Island	3-High	1-Short	6-Moderate	2	Low
Risk to the public if HS practices are not followed during test	1-Local	3-High	1-Short	5-Moderate	3	Medium
4. PNM - Provide adequate, convenient, marked and managed parking spaces						
Temporary disruption to current parking issues	1-Local	1-Low	1-Short	3-Minor	3	Low
Health and Safety issues for the general public during peak hour's contractors	1-Local	2-Medium	1-Short	4-Minor	3	Low
Frequent visitors to PNM will be inconvenienced	1-Local	1-Low	1-Short	3-Minor	3	Low
Poor maintenance of parking areas, e.g. asphalt, compacted and well drained surfaces, security service and signage	1-Local	3-High	3-Long	7-Major	2	Medium
A lot of space that could be used for more commercial and recreational purposes is locked up into parking space	2-Island	3-High	3-Long	8-Major	3	High
Ensuring lighting of parking areas is functional at night	1-Local	3-High	3-Long	6-Major	3	High

6.4.2 Mitigating Measures on Significant Adverse Environmental Impacts

- Tables 30 - 34 provide mitigating measures on significant adverse environmental impacts for the activities of each output.

6.4.2.1 Output 1 Activities – Beautification of Avarua Town and Panamā Reserve

Table 30: Mitigating measures on significant adverse environmental impacts for Output 1 activities.

Potential Adverse Environmental Impact	Recommended Mitigating Measures
1. Tree trimming & removal – Avarua Port to Panamā	
i. Expose tree wounds to infection reducing chance of survival	▪ Engage a qualified Arborist to survey and assess trees to be trimmed and identify those requiring treatment and how they should be treated. ▪ Under the advice and supervision of an Arborist, carry out all tree trimming and cutting to ensure tree wounds are either treated of cut to prevent infection. ▪ Where trees are to be replaced, adopt the policy to plant at least one other tree close by as a replacement policy. ▪ If the replaced tree is in the Panamā Reserve, chose a tree that is found in the coastal area and one that can survive normal sea spray with strong root system. ▪ All new trees must be part of a long term tree planting and nurturing programme to ensure the tree survive to its full potential.
ii. Open up the land to undesirable invasive plant species	▪ Once a decision is made to expose a large area from the protection of a large canopy tree, ensure invasive plant species that are found in the coastal area do not get the opportunity to establish itself. ▪ This can be achieved by regular inspection of the areas exposed, and each person tasked with this responsibility must have knowledge of the different stages of the common invasive plant species found on the island.
iii. Reduction of shaded areas	▪ A short and medium term but significant impact considering our humid and hot climate over summer, therefore trimming of trees must follow a tree management programme to prevent extensive loss of shade after each tree trimming exercise. ▪ For the long term consider replanting and maintaining trees that are tolerant to sea air and provide lot of shade.

iv. Expose buildings and car parking areas to wind, sun and direct sea air	▪ Consider the role of coastal vegetation, especially trees, in protecting premises and properties inland of coastal area from sea spray. ▪ Unless a matter of high risk to human health and safety trees in the coastal area must not be removed for any other reason maintaining the trees health is priority.
v. Maintenance cost issues to maintain the trimmed trees	▪ For reasons given above, high cost will be involved in maintaining of trees at the three project sites, the project management must ensure funds are readily available to cover the costs of an Arborist, known qualified and experienced tree trimming service providers and to buy plant materials from businesses that would also provide nurturing service.
2. *Gardens formation and gardening*	
i. Introduction of soil from offsite can lead to introduction of invasive species.	▪ All soil introduced to the project site must undergo a quarantining process to ensure there are zero potential for the introduction of invasive plant species. ▪ To guarantee the absence of any invasive species, the gardener must have the experience or have access to someone who is knowledgeable about invasive species to ensure invasive species are removed at an early stage once it is identified.
ii. Negligence and poor management of the gardens could lead to the garden to not achieve the purpose intended	▪ Engage persons that are passionate and knowledgeable about gardening and can keep gardens growing, through regular maintenance, e.g. watered and plants pruned to prevent overgrowing.
iii. Maintenance cost issues to maintain the gardens	▪ As above ▪ Use species that are easy to maintain, self-pruning, low and does not cover large areas. ▪ If the species are local but not self-pruning and low, someone or a team to carry out this work'
3. *Foreshore protection works and beautification*	
i. Efforts going to waste if maintenance plans are not followed	▪ Do not engage in passive foreshore protection if the resources are not available, the resources used will just be like money thrown away. ▪ Make sure engagement is supported by resources.
ii. Damage from natural hazards	▪ It is important to take a different approach to beautification, focus on healthy trees. ▪ It is important to use species of higher and lower canopies that are found in the coastal area as foreshore protection, e.g. seagrape or venevene ta'atai, tamanu, miro, utu, toa and pukatea. ▪ Coconut trees of the dwarf variety can be used as it is salt tolerant, shorter, and its root system is not threatening to walk and cycle ways.

	▪ Other species such as nono, ngau, ngangie, poutukava can also found on coastal areas and these maintain their foliage during normal sea sprays and can recover very quickly. They provide fresh airflow through the area if maintained and managed properly ▪ Although some may want to move away from these trees to the more ornamental varieties, these species have proven to have survived cyclones and common in other Pacific Island Countries along their coastlines.
iii. Invasive species could dominate the native species	▪ Identify invasive species that are present in the foreshore area of the project sites, assess its role and relationship to the plant community in the area and carry out an eradication programme or manage its distribution to protect the coastal species.
iv. Weakening of engineered coastal protection structures by planted and non-planted trees.	▪ Protection of natural vegetation in the foreshore area, namely Panamā Reserve, is a must. ▪ Strengthening this protection can be achieved by ensuring the trees already growing are healthy. The advice of an Arborist will be valuable for this work. ▪ In the Township and PNM area it is important that the coastal rock revetment is protected and trees should not be growing in between the gaps of the revetment. Trees should be growing at the top of the revetment to hold and protect grounds behind the revetment.

6.4.2.2 Output 2 Activities – Improved Walk & Cycle Ways between Avarua and the Airport

Table 31: Mitigating measures on significant adverse environmental impacts for output 2 activities.

Potential Adverse Environmental Impact	Recommended Mitigating Measures
1. Immediate site clearance for pathways – shrubs, pavers, service locations	
i. Changed landscape	▪ Engage a replanting programme that will quickly return the cleared areas back to a better and enhanced landscape. ▪ Replanting programme should include planting materials that are suited to the environment and already growing before the site clearing and preparation work start. ▪ Tiare Māori or cardinia with its contained root system is well suited around the PNM, Avarua Town area and Panamā Reserve.

ii. Open up the land to undesirable invasive plant species	▪ Once the walk & cycle ways plan is decided, clearance work will start and the person in charge to ensure invasive plant species that are found in the coastal area do not get the opportunity to establish itself. ▪ This can be achieved by regular inspection of the areas exposed, and each person tasked with this responsibility must have knowledge of the different stages of the common invasive plant species found on the island so that it can be pulled out or weeded and not sprayed with chemicals.
iii. Roots that have affected the old pathways not fully removed could cause problem for the new pathways	▪ Common species where this have happened in the project area are the tree hibiscus or ‘au, utu, toa and tamanu. ▪ For the utu, toa, pukatea and tamanu, engage a method where roots are not harmed, but avoided. ▪ For the lower vegetation like as is the common cause around the Catholic Church, a complete removal of the ground to remove the ‘au tree roots and use methods to prevent regrowth penetration of roots.
2. Panamā to Avatiu Walk & Cycle Way design, construction works and site remediation	
i. Inappropriate species around pathways especially those with massive and wide span root network would continue to damage pathway increasing HS risks to users	▪ As in 1iii. ▪ Build around the utu, toa, pukatea and tamanu, engage a method where roots are not harmed, but avoided. ▪ In the case of the tree hibiscus or ‘au, complete removal of the ground to remove the roots and use methods to prevent regrowth and penetration into the new Walk & Cycle Ways.
ii. Possible root regrowth may not be detected leading to damaged pathways and increase HS risks to users in the future	▪ For the lower vegetation as mentioned above, a complete removal of the ground area where the tree is to remove all roots and prevent regrowth and penetration into the new Walk & Cycle Ways.
iii. Maintenance cost issues to maintain the sites	▪ Use species that are easy to maintain, self-pruning, low and does not cover large areas. ▪ If the species are local but not self-pruning and low, someone or a team must be engaged to carry out this work when required.
iv. Damage from natural hazards	▪ Options need to be explored on the basis of how easy it is to reconstructed walk & cycle ways after a hazard. ▪ Inundation from sea surge and sea flooding can affect concrete structures depending on how well the ground can handle the trauma of the impact of the event. ▪ Crushed compacted coral with water, as is done on airport runways on some of our Pa Enua may be used and can be replaced without much cost. This can be rolled occasionally and regularly as part of the pathway maintenance programme and to maintain a HS standard.

	▪ This method will not use re-enforcing costly steel works.
3. Installation of recycling and water stations & signage	
i. Vandalism to the drinking fountains, hand washing, recycling stations and signs	▪ Installation of security cameras can be a consideration to catch the culprits ▪ Education and awareness programme on the media and other communication devices highlighting the important services these stations provide ▪ Consider community support watch activities.
ii. Maintenance cost issues to maintain the amenities and signage	▪ Accept there are unsavory and deviant characters in our society, the Management must have the funds available to replace parts or in whole the recycling, water stations and signs installed. ▪ With the anticipated high usage, it is expected that the equipment and signs will be up for replacement every 3 years. There will be funds available for a regular replacement.
iii. Damage from natural hazards	▪ Options need to be explored on the basis of affordability in replacing the stations. ▪ Having a drinking foundation that can easily be detached and reinstalled should be looked at. ▪ Inundation from sea surge, sea flooding and strong winds can cause destruction to the facility.
4. Central Avarua footpath remedial work	
i. Inappropriate species around pathways especially those with massive and wide span root network would continue to damage pathways increasing HS risks to users	▪ As in 1iii. ▪ Build around the utu, toa, pukatea and tamanu, engage a method where roots are not harmed, but avoided. ▪ For the tree hibiscus or ‘au as is the common cause around the Catholic Church, a complete removal of the ground to remove the ‘au tree roots and use methods to prevent regrowth and penetration into the new footpaths.
ii. Maintenance cost issues to maintain the facility including to investigate possible root regrowth leading to damaged pathways	▪ Use interlocking pavements as was used. It is easier to reinstall if distorted by roots. ▪ In the case of roots regrowth, interlocking pavements can be easily removed the roots removed and the pavement reinstalled. ▪ Have enough operating cost to maintain the footpaths.
5. Solar lighting installation along Panamā Reserve	
i. Ongoing maintenance cost issues to maintain the facility	▪ It is important to ensure all solar lighting is clear of any nearby tree that may shade the solar panels or make the light subjected to broken branches during windy conditions. ▪ Solar panels must be regularly cleaned to ensure that it is working at night.

6.4.2.3 Output 3 Activities – Improved Public Toilets and Recreational Facilities in Central Avarua

Table 32: Mitigating measures on significant adverse environmental impacts for output 3 activities

Potential Adverse Environmental Impact	Recommended Mitigating Measures
1. Reconstruction & Waste water treatment system upgrade for central facilities across from the Police Station	
i. Non-performance of upgraded wastewater system	▪ The requirement of the Sewage Construction Permit issued under the Public Health (Sewage and Wastewater Treatment and Disposal) Regulations 2014 complied with. ▪ The wastewater engineer to provide a regular monitoring report to the Management and one after every major event where the use of the facility would most likely peak. ▪ The report would allow the Management of the facility to monitor how well the wastewater treatment system is performing and detect early any malfunction of the system.
ii. Maintenance cost issues to maintain the amenity and support ongoing monitoring by wastewater engineer	▪ The Management to ensure it has funds to support the cost of the wastewater engineer to provide regular reporting on the treatment system as required above.
iii. Possible septic stench in the public area, as was common in the past as a result of overloading during peak public events	▪ The requirement of the Sewage Construction Permit issued under the Public Health (Sewage and Wastewater Treatment and Disposal) Regulations 2014 complied with. ▪ The wastewater engineer to provide a regular monitoring report to the Management and one after every major event where the use of the facility would most likely peak. ▪ The report would allow the Management of the facility to monitor how well the wastewater treatment system is performing and detect early any malfunction of the system.
2. Reconstruction & waste treatment system upgrade for Panamā Reserve	
i. Inconvenience to the general public who use the area on Sunday during the times when the nearby 'Are Tāpae'anga is used for Māroro Tunutunu and for any funeral services that may occur during this time at the Catholic Cemetery	▪ Advice the vendor running the 'Are Tāpae'anga māroro tunutunu on the commencement and duration of the reconstruction work. ▪ Project Management Team to offer a portable toilet system to be used by the vendor and clients on Sundays until the reconstruction is completed. ▪ The same to be offered by the Project Management Team to families involved in any funeral service that may arise during this time.

ii. Non-performance of upgraded wastewater system	▪ The requirement of the Sewage Construction Permit issued under the Public Health (Sewage and Wastewater Treatment and Disposal) Regulations 2014 complied with. ▪ The wastewater engineer to provide a regular monitoring report to the Management and one after every major event where the use of the facility would most likely peak. ▪ The report would allow the Management of the facility to monitor how well the wastewater treatment system is performing and detect early any malfunction of the system.
iii. Maintenance cost issues to maintain the amenity and to support ongoing monitoring by wastewater engineer	▪ The Management to ensure it has funds to support the cost of the wastewater engineer to provide regular reporting on the treatment system as required above.
iv. Possible septic stench in the public area, as was common in the past as a result of lack of monitoring and maintenance especially after a major event	▪ The requirement of the Sewage Construction Permit issued under the Public Health (Sewage and Wastewater Treatment and Disposal) Regulations 2014 complied with. ▪ The wastewater engineer to provide a regular monitoring report to the Management and one after every major event where the use of the facility would most likely peak. ▪ The report would allow the Management of the facility to monitor how well the wastewater treatment system is performing and detect early any malfunction of the system.
3. Installation of Park Benches, paving & surrounds	
i. Vandalism to the park benches	▪ Installation of security cameras can be a consideration to catch the culprits ▪ Education and awareness programme on the media and other communication mediums highlighting the important services these stations provide and the need to protect them. ▪ Consider community support watch activities.
4. Construction of fitness trail	
i. Vandalism to the facility	▪ Installation of security cameras can be a consideration to catch the culprits ▪ Education and awareness programme on the media and other communication mediums highlighting the how important the fitness trail to keeping healthy and the need to protect them ▪ Consider community support watch activities.

6.4.2.4 Output 4 Activities – Restructured and Future Proofed PNM

Table 33: Mitigating measures on significant adverse environmental impacts for output 4 activities.

Potential Adverse Environmental Impact	Recommended Mitigating Measures
1. Relocation, Remediation & Farmers market	
i. Temporary disruption when relocating Farmer's Market, Fish Market, Reefside and Waffle Shack and preparing new and old site	▪ It is proposed to have the farmers market building up and ready to go and implementing the changeover of the vendors location outside of operating hours, without affecting the normal opening hours ▪ The relocating work will take place after the new playground is completed, the old playground is deconstructed and the new site where the old playground was is prepared. ▪ The preparation work for the relocation will be carried out by professional small works contractors who will plan the move of the building during the week and before Friday. ▪ Preparation work will include appropriate HS measures for PNM staff, small works contractors, the general public and the owners of the buildings. ▪ HS measures will include PPE for PNM staff and small works contractors, hazards and risks sign boards on both sites to inform those concern, thorough coordination of stakeholders by PMU, and at least a week of public notice through the main mediums of communication, e.g. TV, radio, Newspapers and appropriate Social Media outlet. ▪ Relocation would take place after hours, preferably at dawn to avoid early traffic on the main road and when the weather is fine and no rain (after April).
ii. Frequent visitors to Farmer's Market, Fish Market, Reefside, and Waffle Shack will be inconvenienced	▪ The hut owners will advise their clients of the times of their temporary closure well in advance of the move. This will include an information sign at the hut and through the main mediums of communication. ▪ The PMU will ensure the relocating is swift and the site preparation is for turnkey operation, i.e. all infrastructure services are in place and the hut owner will have a short time to prepare and reopen.
iii. Increased parking space planned for peak times which usually happen on Saturdays and special events only during the year. This takes up open and clear space that can be available for other recreational purposes	▪ Consideration to include service lines (i.e. drainage, power, water connections and waste reticulation) linked to the installed underground services and supplies at selected locations in the newly opened up parking spaces to allow mobile vendors to operate in the parking space during low peak days. ▪ The service lines at these locations is not restricted to buying and selling but can cater to a diversity of use.
2. Installation of underground services, i.e. drainage, power, water connections and waste reticulation	

i. Maintenance of underground and overhead services is the responsibility of the utility service providers. PNM will be relying on the Utilities for this service and this will have the potential to cause delays to services when required	▪ Improve working relationship between PNM Management and utility providers by being a good customer. ▪ The installed underground services are secure and easily accessed in the case of damages from a natural hazard or during normal conditions which would reduce time spent on a problem. This will help the utility serviceman to attend to other good customer's demands. ▪ A well trained asset manager at the PNM Management would assist utility service workers in the case of new staff and reduce time in dealing with an issue.
3. Reconstruction of the PNM playground at new site	
i. There is possible security risk of random irresponsible parent being negligent and leaving their children unattended	▪ Encourage parents to be with their children at the playground by PNM providing picnic benches and seats around the new playground. ▪ PNM Management to provide security service at the playground especially on peak days.
ii. Damage from natural hazards	▪ Options need to be explored on the basis of affordability in replacing the playground. ▪ Having equipment that can easily be detached and reinstalled should be looked at. ▪ Inundation from sea surge, sea flooding and strong winds can cause destruction to the facility.
7. Top soil, grassing and planting	
i. Introduction of invasive tree species through soil from offsite	▪ Gardens and grassed areas must be well contained and separated from drainage systems by paved surfaces to make it easier to detect that the garden structure has been broken which could result in heavy rain moving soil towards the drainage system. ▪ Gardeners must be passionate in their work and can easily detect problems that may lead to loss of soil. ▪ The use of chipped wood from wood chippers used by tree trimmers on garden surface to prevent direct rain impact causing soil to move towards drainage systems.
ii. Temporary increase in water use to make the grass and new plants grow	▪ Water conservation devices must be used to allow gardens to be nurtured especially for newly formed gardens and grassed areas. ▪ The Project Management Unit to use plants that are ready and already growing including natural grass turfs. ▪ The new underground service lines to include a system where gray water is stored and can be pumped to garden and grassed areas.

iii. Bringing soil from elsewhere, especially acidic red soil have adverse effect on the marine environment if it reaches the sea, there is risk to the marine environment if this happens	▪ Use constructional material on site for garden, e.g. soil from footing of the new toilet block at the Constitution Park, pathway remedial work along the Punanga Nui Drive, the underground service lines and compost from the PNM green waste dump at Panamā. ▪ As mentioned in 6i. above gardens must be well contained and separated from drainage systems by paved surfaces.
iv. Ongoing maintenance cost issues to maintain the gardens	▪ Engage persons that are passionate and knowledgeable about gardening and can keep gardens growing, through regular maintenance, e.g. watered and plants pruned to prevent overgrowing ▪ Use species that are easy to maintain, self-pruning, low and does not cover large areas. ▪ If the species are local but not self-pruning and low, someone or a team to carry out this work'
8. Building construction of new toilet block at Constitution Park	
i. Non-performance of upgraded wastewater system	▪ The requirement of the Sewage Construction Permit issued under the Public Health (Sewage and Wastewater Treatment and Disposal) Regulations 2014 complied with. ▪ The wastewater engineer to provide a regular monitoring report to the Management and one after every major event where the use of the facility would most likely peak. ▪ The report would allow the Management of the facility to monitor how well the wastewater treatment system is performing and detect early any malfunction of the system.
ii. Possible septic stench in the public area, as was common in the past as a result of lack of monitoring and maintenance especially after a major event	▪ The Management to ensure it has funds to support the cost of the wastewater engineer to provide regular reporting on the treatment system as required above. ▪ Inspection of the system by the wastewater engineer especially after a major event in the area to ensure any overflow of the system is dealt with.
iii. Damage from natural hazards	▪ Design and construction of building must follow the approved plans under the Building Control and Standards Act 1991 and the Public Health Act 2004.
9. Central waste water treatment system for toilet facility and market huts	
i. Non-performance of upgraded wastewater system	▪ The requirement of the Sewage Construction Permit issued under the Public Health (Sewage and Wastewater Treatment and Disposal) Regulations 2014 complied with. ▪ The wastewater engineer to provide a regular monitoring report to the Management and one after every major event where the use of the facility would most likely peak.

	▪ The report would allow the Management of the facility to monitor how well the wastewater treatment system is performing and detect early any malfunction of the system
ii. Maintenance cost issues to maintain the amenity and to support ongoing monitoring by wastewater engineer	▪ The Management to ensure it has funds to support the cost of the wastewater engineer to provide regular reporting on the treatment system as required above.
iii. Possible septic stench in the public area, as was common in the past as a result of lack of monitoring and maintenance especially after a major event	▪ The Management to ensure it has funds to support the cost of the wastewater engineer to provide regular reporting on the treatment system as required above. ▪ Inspection of the system by the wastewater engineer especially after a major event in the area to ensure any overflow of the system is dealt with.
iv. Damage from natural hazards	▪ Design and construction of building must follow the approved plans under the Building Control and Standards Act 1991 and the Public Health Act 2004
10. Accessibility paving	
i. Poor quality work due to poor workmanship	▪ The procurement process to be adhered to so that the best contractor on the island for this work is engaged.
ii. Damage from natural hazards	▪ Design and construction must follow the appropriate standard for such work (New Zealand and Australian Standards as per the advice of ICI road engineers.
11. Asphalt extension, remarking and signage of large carpark at PNM entrance	
i. Temporary disruption of the PNM during Asphalt extension work if carried out during normal working hours	▪ The asphalt work will take place after the identified building are removed and operating. ▪ The site preparation work will be carried out by professional small works contractors who will plan the work to be done after hours and before Friday. ▪ Preparation work will include appropriate HS measures for PNM staff, small works contractors, the general public and the owners of the buildings. ▪ HS measures will include PPE for PNM staff and small works contractors, hazards and risks sign boards on the work site to inform those concern, thorough coordination of stakeholders by PMU, and at least a week of public notice through the main mediums of communication, e.g. TV, radio, Newspapers and appropriate Social Media outlet. ▪ The asphalt work to take place after hours or at dawn to avoid early traffic on the main road and when the weather is fine and no rain (after April where).

ii. Poor quality work due to poor workmanship	▪ The procurement process to be adhered to so that the best contractor on the island for this work is engaged.
iii. Damage from natural hazards	▪ Design and construction must follow the appropriate standard for such work (New Zealand and Australian Standards as per the advice of ICI road engineers.
13. *Paving bollards of walkway*	
i. Poor quality work due to poor workmanship	▪ The procurement process to be adhered to so that the best contractor on the island for this work is engaged.
ii. Damage from natural hazards	▪ Design and construction must follow the appropriate standard for such work (New Zealand and Australian Standards as per the advice of ICI road engineers.

6.4.2.5 Output 4b Activities – Traffic Management, pedestrian safety, convenient public bus stop/pick up, and visitor drop off and pick up

Table 34: Mitigating measures on significant adverse environmental impacts for output 4b activities.

Potential Adverse Environmental Impact	Recommended Mitigating Measures
1. *PNM - Minimize traffic congestion along Main Roan and around PNM*	
i. Temporary disruption to current traffic movement in problem areas identified during testing of traffic management plan	▪ PMU to work with stakeholders (Police, ICI, MOT, Te Marae Ora, Cook's Buses, and Representative of Tour Groups) on how the test to minimize traffic congestion along the main road and around the PNM will be carried out. ▪ The test to allow the traffic to get use to the preferred scenarios, i.e. a. No "right-turn" at main entrance, b. a 30km zone between Avatiu and Avarua roundabouts, c. one-way/single lane entry into the PNM, d. 2 exit point for delivery vehicles only at the PNM ▪ Preparation work will include appropriate HS measures for traffic officers and appropriate signage at strategic points (to be determined by the Police) once the scenarios are confirmed. ▪ HS measures will include PPE for all staff and officers involved and signage at strategic points to be confirmed by the Police. ▪ Public information on the test will be released by PMU, and at least a week of public notice through the main mediums of communication, e.g. TV, radio, Newspapers and appropriate Social Media outlet.

	▪ The test will take place during the week starting on a Monday to give a 5 day lead to the peak market day on Saturday.
ii. Risk to the public if HS practices are not followed during test	▪ As listed1i. ▪ To reduce risk, HS measures will include PPE for all staff and officers involved and signage at strategic points to be confirmed by the Police. ▪ Public information on the test will be released by at least a week of public notice through the main mediums of communication, e.g. TV, radio, Newspapers and appropriate Social Media outlet.
iii. Frequent visitors to PNM will be inconvenienced	▪ PMU will prepare a brief information pamphlet that will be given out to the public at the PNM and available on the Social Media at least a week before the test. ▪ A new signage will be installed at key strategic points at the PNM on this test. ▪ At least a week of public notice through the main mediums of communication, e.g. TV, radio, Newspapers and appropriate Social Media outlet will outline the test as appropriate.
2. PNM - Health and safety at pedestrian crossing	
i. Temporary disruption to current chaotic practice in problem areas identified during testing of pedestrian crossing options	▪ PMU to work with stakeholders (Police, ICI, MOT, CINDC and Te Marae Ora) on how the test to provide HS at pedestrian crossing will be carried out. ▪ The test Pedestrian crossing objectives include: a. Provide safe Pedestrian crossing; b. Provide pedestrian crossing where practicable; c. Improve pedestrian access from Avarua Township to the Airport, as much practicable. ▪ Preparation work will include appropriate HS measures for traffic officers and appropriate signage at strategic points (to be determined by the Police) once the test is confirmed. ▪ HS measures will include PPE for all staff and officers involved and signage at strategic points to be confirmed by the Police. ▪ Public information on the test will be released by PMU, and at least a week of public notice through the main mediums of communication, e.g. TV, radio, Newspapers and appropriate Social Media outlet. ▪ The test will take place during the week starting on a Monday to give a 5 day lead to the peak market day on Saturday.
ii. Risk to the public if HS practices are not followed during test	▪ As listed1i. ▪ To reduce risk, HS measures will include PPE for all staff and officers involved and signage at strategic points to be confirmed by the Police.

	▪ Public information on the test will be released by at least a week of public notice through the main mediums of communication, e.g. TV, radio, Newspapers and appropriate Social Media outlet.
Iii. Risk to pedestrians crossing the main roads especially during peak hours and days at the PNM	▪ As mentioned above the test will take place during the week starting on a Monday to give a 5 day lead to the peak market day on Saturday
3. PNM - Convenient public bus stop and visitor drop off and pick up	
i. Temporary disruption to current chaotic practice in problem areas identified during testing to confirm proposed stations	▪ PMU to work with stakeholders (Police, ICI, MOT, Te Marae Ora, Cook's Buses, and Representative of Tour Groups) on how the test to provide convenient public bus stop and visitor drop off and pick up at the PNM will be carried out. ▪ The test proposed safe and convenient bus drop off and pick up points for the general public, safe and convenient drop off and pick up for visitors and tour groups during peak hours; safe, convenient and sheltered drop off and pick up zone for buses and taxis ▪ Preparation work will include appropriate HS measures for traffic officers and appropriate signage at strategic points (to be determined by the Police) once the test is confirmed. ▪ HS measures will include PPE for all staff and officers involved and signage at strategic points to be confirmed by the Police. ▪ Public information on the test will be released by PMU, and at least a week of public notice through the main mediums of communication, e.g. TV, radio, Newspapers and appropriate Social Media outlet. ▪ The test will take place during the week starting on a Monday to give a 5 day lead to the peak market day on Saturday.
ii. Risk to the public if HS practices are not followed during test	▪ As mentioned above the test will take place during the week starting on a Monday to give a 5 day lead to the peak market day on Saturday
4. PNM - Provide adequate, convenient, marked and managed parking spaces	
i. Poor maintenance of parking areas, e.g. asphalt, compacted and well drained surfaces, security service and signage	▪ Under Output 4 11ii. It is important that the best contractor on the island for this work is engaged and one whose work is of the highest quality to ensure maintenance work is minimal. ▪ The parking area must always have a security warden to ensure vehicles are safe so that visitors (residents and tourists) to the PNM can enjoy their visit.

ii. A lot of space that could be used for more commercial and recreational purposes is locked up into parking space	▪ Consideration to include service lines (i.e. drainage, power, water connections and waste reticulation) linked to the installed underground services and supplies at selected locations in the newly opened up parking spaces to allow mobile vendors to operate in the parking space during low peak days. ▪ The service lines at these locations is not restricted to buying and selling but can cater to a diversity of use.
iii. Ensuring lighting of parking areas is functional at night	▪ It is important to ensure all solar lighting is clear of any nearby tree that may shade the solar panels or make the light subjected to broken branches during windy conditions. ▪ Solar panels must be regularly cleaned to ensure that it is working at night.

7. Environmental Management Plan (EMP)

7.1 Purpose of this plan

- The purpose of this EMP is to provide for the management of those activities likely to cause significant negative impact on the environment of the project sites during the implementation of this project and to provide mitigating measures and corrective actions to keep the project to within the performance criteria set for those activities.

- The EMP will be used by the following:
  - CIIC to assist with the final design aspects of all proposed works.
  - NES and EPMS to monitor the approved conditions of the project permit.

7.2 Environmental Objectives

- The environmental objectives of the EMP are:
  - To prevent further degradation to the environment in and around the project sites;
  - To enhance those parts of the environment that will be changed by the project to benefit the people and the natural environment; and
  - To advise the Contractors of the requirement of the Environment Act 2003 through this EIA report for the preparation of the CP and HSP.

7.3 Environmental policies

- The following general environmental principles based on sound environmental practices shall be applied:
  - Construction works and activities will not commence until the EIA and EMP has been approved;
  - Construction works will be undertaken in compliance with all current legislation and any conditions imposed on the EIA Approval;
  - The construction and operation works will use best practice environmental management to ensure adverse environmental effects are avoided, remedied or mitigated; and
  - Social disturbance as a result of construction works will occur and reestablishment of all areas modified to the state it was before the construction and, in some areas, better.

7.4 Reporting and Reviewing (Reporting and auditing

- Once work has commenced, weekly compliance monitoring checks of the site will be undertaken by the EPMS (Environmental Project Monitoring Specialist) appointed to be responsible to make sure that the EMP is being implemented and to advise on any issues as they arise.

- A review of the monitoring information as it becomes available will be incorporated into the compliance monitoring report.
- The weekly environmental reports will be summarized into the final monitoring and evaluation reports for the EMP implementation and this report will be provided to the NES at the completion of the proposed works.

7.5 Feedback and Adjustment

- If need be, CIIC will confirm, a feedback process with the NES for adjustments to the EMP prior to construction. This will include a feedback process for the NES, stakeholders and the general public.
- A Project Register Complaint Process (PRCP) will be developed which will include as a minimum the following:
  - Complainant details including location
  - Area of works relating to complaint
  - Nature of complaint/likely incident giving rise to complaint
  - Time and date complaint received and by whom
  - Course of action including name of person to be responsible for implementing response action (s), changes to prevent reoccurrence or mitigate effectiveness
  - Verification action occurred
  - Record of follow up with complaint and date complaint issue is closed Complaints received during the operation of the project will be addressed through the CIIC Complaints Management Process (CCMP)

7.6 Environmental Management Plan for each Output and activities identified as significant

7.6.1 Output 1 – Beautification of Avarua Town and Panamā Reserve

7.6.1.1 Tree Trimming & Removal Avarua Port to Panamā

7.6.1.1.1 Tree wounds exposed to infection reducing chances of survival

1. Tree Trimming & removal – Avarua Port to Panamā						
Impact	i. Tree wounds exposed to infection reducing chances of survival					
Objectives	Rejuvenate landscaped areas and garden beds					
Performance Criteria	Rejuvenate existing ecology and create more garden beds that incorporate low-maintenance, native plants and shrubs as much as possible. For safety reasons, consider short plants or shrubs that do not entirely obscure visitors or allow clear line of site throughout the park. Incorporate trees that don't have intrusive roots that may damage footpaths. Cut trees appropriately when trimming, treat infected trees, remove dead trees, replace removed trees					
Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight
	Pre-construction					
	PMU to form a stakeholders committee, the **Te Tau Papa Beautification Committee** (TTPBC) comprised of MoA practical representative, experienced gardener, an experienced nursery developer, arborist, and Environmental Project Monitoring Specialist (EPMS). The role of the TTPBC is to advice the PMU on all aspects of the rejuvenation of landscape areas and garden beds.	PMU, CIIC	Committee minutes and advice	Throughout the design, construction, decommissioning and corrective actions when required.	EPMS	PMU, CIIC and TTPBC
	Engage a qualified Arborist to survey and assess trees to be trimmed and identify those requiring treatment and how they should be treated.	PMU, CIIC	JD and CV	One off	PMU, CIIC	PMU, CIIC
	Where trees are to be replaced, adopt the **plant-another-tree policy**, i.e. to plant at least one other tree close by as a replacement.	PMU, CIIC, TTPBC	Replanting Programme	One off	PMU, CIIC and EPMS	PMU, CIIC
	Construction					

	Under the advice and supervision of an Arborist, carry out all tree trimming and cutting and ensure tree wounds are either treated or cut to prevent infection.	Contractor, Arborist	Completion Report	One off	EPMS	TTPBC, PMU
	If the replaced tree is in the Panamā Reserve, chose a tree that is found in the coastal area and one that can survive normal sea spray and with strong root system.	Contractor, Arborist	Report on Plants planted and type	Quarterly	EPMS	TTPBC, PMU
	All new trees must be part of a long term tree planting and nurturing programme to ensure the tree survive to its full potential.	Contractor/ Nursery Contractor	Reports on Plants Planted and type	Quarterly	PMU, MoA, NES	TTPBC, PMU
	Decommissioning					
	Tree trimming completed, all trees treated recovered and the new ones planted have established growth.	Contractor/ Nursery Contractor	Completion Report	6 months after completion of project	EPMS	TTPBC, PMU
Corrective Action	If new trees planted dies due to natural hazards, vandalism or negligence the following will be implemented: ▪ A replanting scheme will be initiated with a nurturing programme ▪ Replanting and nurturing programme reviewed, if need be, modified. Complaints will be addressed through the project Grievance Redress Mechanism					

7.6.1.1.2 Land opened to undesirable invasive plant species

1. Tree Trimming & removal – Avarua Port to Panamā						
Impact	ii. Open up land to undesirable invasive plant species					
Objectives	Rejuvenate landscaped areas and garden beds					
Performance Criteria	Rejuvenate existing ecology and create more garden beds that incorporate low-maintenance, native plants and shrubs as much as possible. For safety reasons, consider short plants or shrubs that do not entirely obscure visitors or allow clear line of site throughout the park. Incorporate trees that don't have intrusive roots that may damage footpaths. Cut trees appropriately when trimming, treat infected trees, remove dead trees, replace removed trees					
Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight

	Pre-construction					
	Identify invasive species found in the coastal areas of Rarotonga	TTPBC, PMU	Manual	One off	EPMS, NES	PMU, CIIC
	Construction					
	A member of the TTPBC tasked to Inspect regularly areas exposed through the tree trimming program.	TTPBC, Contractor	Report	Weekly	EPMS, NES	PMU, CIIC
	Ensure invasive plant species that are found in the coastal area are removed manually	TTPBC Contractor	Report	Weekly	EPMS	PMU, CIIC
	Decommissioning					
	Removal of undesirable invasive species is an ongoing programme. Landscape workers, gardeners and reserve managers will continue the programme after the completion of this project.	PMU, CIIC	Completion Report	One off	EPMS, PMU, Contractor	PMU, CIIC
Corrective Action	If invasive species continue to appear, due to natural hazards and negligence the following will be implemented: ▪ Investigate those in charge with the view to improve attitude to achieve objectives ▪ Eradication programme will be reviewed, modified if required. Complaints will be addressed through the project Grievance Redress Mechanism					

7.6.1.1.3 Reduction of shaded areas

1. Tree Trimming & removal – Avarua Port to Panamā						
Impact	iii. Reduction of shaded areas					
Objectives	Rejuvenate landscaped areas and garden beds					
Performance Criteria	Rejuvenate existing ecology and create more garden beds that incorporate low-maintenance, native plants and shrubs as much as possible. For safety reasons, consider short plants or shrubs that do not entirely obscure visitors or allow clear line of site throughout the park. Incorporate trees that don't have intrusive roots that may damage footpaths. Cut trees appropriately when trimming, treat infected trees, remove dead trees, replace removed trees					
Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight
	Pre-construction					

	Prepare a tree management program using **spot-trim** to reduce the shock of exposure after trimming an area	TTPBC	Spot trim report	weekly	EPMS, Arborist	PMU, CIIC
	Construction					
	Spot-trim as per the tree management program	Contractor. Arborist	Spot-trim report	Weekly	EPMS, Contractor, Arborist	PMU, CIIC
	Carry out a replanting program of trees that are tolerant to sea air.	TTPBC, Contractor, Nursery Contractor	Number and type of trees planted.	Weekly	EPMS, Contractor, Nursery contractor	PMU, CIIC
	Carry out maintenance program on new trees planted	Contractor, Nursery Contractor	Completion report	Weekly	EPMS	PMU, CIIC
	Decommissioning					
	After completion of spot-trim program continue nurturing and maintenance program.	Contractor, Nursery Contractor	Completion report	Completion Report	EPMS	PMU, CIIC
Corrective Action	Spot-trim allows trees to be selectively trimmed in an area identified to be trimmed to be trimmed in sections. This prevents mass trimming that causes shock exposure of an area and other lower plant species to strong light and wind. It also keeps some shade for people to enjoy. Should a spot-trim area becomes over-trimmed, at least only a smaller section is affected. Complaints will be addressed through the project Grievance Redress Mechanism					

7.6.1.1.4 Buildings, car parking areas exposed to wind, sun and direct sea air

1. Tree Trimming & removal – Avarua Port to Panamā	
Impact	iv. Expose buildings, and car parking areas to wind, sun and direct sea air
Objectives	Rejuvenate landscaped areas and garden beds
Performance Criteria	Rejuvenate existing ecology and create more garden beds that incorporate low-maintenance, native plants and shrubs as much as possible. For safety reasons, consider short plants or shrubs that do not entirely obscure visitors or allow clear line of site throughout the park. Incorporate trees that don't have intrusive roots that may damage footpaths. Cut trees appropriately when trimming, treat infected trees, remove dead trees, replace removed trees

Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight
	Pre-construction					
	Prepare a tree management program using spot-trim to reduce the shock of exposure	TTPBC	Spot trim report	weekly	EPMS, Arborist	PMU, CIIC
	Adopt a **No-removal-of-trees-in-the-foreshore** policy	TTPBC	No trees removed in the foreshore	weekly	EPMS, PMU	PMU, CIIC
	Construction					
	Spot-trim according to tree management program	Contractor. Arborist	Implementation Report	Weekly	EPMS, Contractor, Arborist	PMU, CIIC
	Cary out a replanting program of trees using species that are tolerant to sea air.	Contractor, Nursery Contractor	Implementation Report	Weekly	EPMS, Contractor, Nursery contractor	PMU, CIIC
	Carry out maintenance program on new trees planted	Contractor Nursery Contractor	Implementation report	weekly	EPMS, Contractor, Nursery contractor	PMU, CIIC
	Decommissioning					
	After completion of spot-trim program continue nurturing and maintenance program	Contractor	Completion report	Completion Report	Contractor	PMU, CIIC
Corrective Action	Spot-trim allows trees to be selectively trimmed in an area identified to be trimmed to be trimmed in sections. This prevents mass trimming that causes shock exposure of an area and other lower plant species to strong light and wind. It also keeps some shade for people to enjoy. Should a spot-trim area becomes over-trimmed, at least only a smaller section is affected. Complaints will be addressed through the project Grievance Redress Mechanism					

7.6.1.1.5 Maintenance cost issues to maintain the trimmed trees

1. Tree Trimming & removal – Avarua Port to Panamā

Impact	v. Maintenance cost issues to maintain the trimmed trees					
Objectives	Rejuvenate landscaped areas and garden beds					
Performance Criteria	Rejuvenate existing ecology and create more garden beds that incorporate low-maintenance, native plants and shrubs as much as possible. For safety reasons, consider short plants or shrubs that do not entirely obscure visitors or allow clear line of site throughout the park. Incorporate trees that don't have intrusive roots that may damage footpaths. Cut trees appropriately when trimming, treat infected trees, remove dead trees, replace removed trees					
Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight
	Pre-construction					
	Develop the criteria for an initiative packages that will encourage youth and community groups, individuals, families or tribes to **adopt-a-tree**.	TTPBC, PMU, CIIC	List of the adoptees	Quarterly	PMU, CIIC	PMU, CIIC
	Construction					
	Promote initiative packages for an adopt-a-tree through the media including social media	PMU, CIIC	Advertisements	One off and when required	PMU, CIIC	PMU, CIIC
	Engage adopt-a-tree groups, individuals, families or tribes to choose trees to look after.	PMU, CIIC	List of adoptees	One off and when required	PMU, CIIC	PMU, CIIC
	Train adopt-a-tree groups , individuals, families or tribes on how to plant, nurture and maintain trees to its full potential	Contractor, Arborist, Nursery Contractor	Training manual	Every 6 month	PMU, CIIC	PMU, CIIC
	Decommissioning					
	Adopt-a-tree can be a group, family, tribe or individual who takes full responsibility of maintaining a tree. In the case of a new tree, the adopt-a-tree adoptee will plant, nurture into maturity and maintain the full grown tree. In the case of an already grown tree, the adopt-a-tree group or individual will either maintain the tree or pay for its maintenance.	Adopt-a-tree adoptees	Completion report	Completion Report	Contractor	PMU, CIIC
Corrective Action	If an adopt-a-tree adoptee are unable to fulfill their obligations, the following will be implemented: ▪ An investigation will be carried out to identify the reasons, review, modify if needed and reengage or look for another adoptee. Complaints will be addressed through the project Grievance Redress Mechanism					

7.6.1.2 Gardens formation and gardening

7.6.1.2.1 Introduction of invasive tree species through soil from offsite

2. Gardens formation and gardening						
Impact	i. Introduction of invasive tree species through soil from offsite					
Objectives	Rejuvenate landscaped areas and garden beds					
Performance Criteria	Rejuvenate existing ecology and create more garden beds that incorporate low-maintenance, native plants and shrubs as much as possible.					
Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight
	Pre-construction					
	Identify invasive species found in the coastal areas of Rarotonga	TTPBC	Manual - Checklist	One off	PMU, NES	PMU, CIIC
	Construction					
	Quarantine soil introduce to the project sites to ensure zero potential for introduced invasive species	TTPBC, Contractor	Checklist-reporting	One off	EPMS, NES	PMU, CIIC
	Keep an eye out for invasive species in the garden, manually remove and destroy properly	PMU	Checklist-reporting	Quarterly	EPMS, NES	PMU, CIIC
	Decommissioning					
	Removal of invasive undesirable species is an ongoing programme. Landscape workers, gardeners and reserve managers will continue the programme after the completion of this project.	PMU, CIIC	Report	Completion Report	PMU, Contractor	PMU, CIIC
Corrective Action	If invasive species continue to appear, due to natural hazards and negligence the following will be implemented: ▪ Investigate those in charge with the view to improve attitude to achieve objective ▪ Eradication programme will be reviewed and modified. Complaints will be addressed through the project Grievance Redress Mechanism					

7.6.1.2.2 Negligence and poor management of the gardens

2. Gardens formation and gardening						
Impact	ii. Negligence and poor management of the gardens					
Objectives	Rejuvenate landscaped areas and garden beds					
Performance Criteria	Rejuvenate existing ecology and create more garden beds that incorporate low-maintenance, native plants and shrubs as much as possible.					
Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight
	Pre-construction					
	Engage a persons that are passionate and knowledgeable about gardening to be the gardeners for the project.	TTPBC, PMU, CIIC	Well develop and kept garden	Quarterly	EPMS	PMU, CIIC
	Construction					
	Formation of gardens	Gardeners, Contractors	As provided in the proposal	One off	EPMS	PMU, CIIC
	Nurturing of plants grown from already growing plant materials	PMU, CIIC, Contractor Nursery	Number of plants	Quarterly	EPMS	PMU, CIIC
	Regular garden maintenance	PMU, CIIC	Well maintained Garden	Quarterly	EPMS	PMU, CIIC
	Decommissioning					
	Formation and maintenance of gardens is an ongoing programme. Landscape workers, gardeners and reserve managers will continue the programme after the completion of this project.	PMU, CIIC	Report	Completion Report	PMU, Contractor	PMU, CIIC
Corrective Action	If maintenance of gardens continue to be an issue the following will be implemented: ▪ Investigate those in charge with the view to improve attitude to achieve objective, and if there are no improvement dismiss and recruit new workers. Complaints will be addressed through the project Grievance Redress Mechanism					

7.6.1.2.3 Garden overgrowth increases maintenance cost

2. Gardens formation and gardening						
Impact	iii. Garden overgrowth increase maintenance cost					
Objectives	Rejuvenate landscaped areas and garden beds					
Performance Criteria	Rejuvenate existing ecology and create more garden beds that incorporate low-maintenance, native plants and shrubs as much as possible.					
Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight
	Pre-construction					
	Inventory of local or existing garden plants that are self-pruning, with attractive features, suited to the environment, can tolerate sea air and can handle free draining soil and are low maintenance.	TTPBC	Manual - Checklist	One off	PMU, CIIC	PMU, CIIC
	Construction					
	Nurturing of plants grown from already growing plant materials	PMU, CIIC, Contractor Nursery	Number of plants	Quarterly	EPMS	PMU, CIIC
	Regular garden maintenance	PMU, CIIC	Well maintained Garden	Quarterly	EPMS	PMU, CIIC
	Decommissioning					
	Maintenance of gardens is an ongoing programme. Landscape workers, gardeners and reserve managers will continue the programme after the completion of this project.	PMU, CIIC	Report	Completion Report	PMU, Contractor	PMU, CIIC
Corrective Action	If cost of maintenance of gardens continue to be an issue the following will be implemented: ▪ Investigate the current practice and species use, review and modify the practice to achieve objective Complaints will be addressed through the project Grievance Redress Mechanism					

7.6.1.3 Foreshore protection works and beautification

7.6.1.3.1 Efforts going to waste if maintenance plans are not followed

3. Foreshore protection works and beautification						
Impact	i. Efforts going to waste if maintenance plans are not followed					
Objectives	Rejuvenate landscaped areas that incorporate low-maintenance, native plants and shrubs as much as possible. For safety reasons, consider short plants or shrubs that do not entirely obscure visitors or allow clear line of site throughout the park. Incorporate trees that don't have intrusive roots that may damage footpaths					
Performance Criteria						
Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight
	Pre-construction					
	Nil					
	Construction					
	Engage in **non-structural-foreshore protection** works, e.g. planting of appropriate plants to protect the foreshore.	TTPBC, PMU, CIIC	Number of trees planted and nurtured	Quarterly	EPMS	PMU, CIIC
	Decommissioning					
	See Activities listed in 1. Tree Trimming & Removal – Avarua Port to Panamā					
Corrective Action	See Corrective Action Plans for 1. Tree Trimming & Removal- Avarua Port to Panamā					

7.6.1.3.2 Damage from natural hazards

3. Foreshore protection works and beautification	
Impact	ii. Damage from Natural Hazards
Objectives	Rejuvenate landscaped areas that incorporate low-maintenance, native plants and shrubs as much as possible. For safety reasons, consider short plants or shrubs that do not entirely obscure visitors or allow clear line of site throughout the park.

	Incorporate trees that don't have intrusive roots that may damage footpaths					
Performance Criteria	Adopt a **No-removal-of-trees-in-the-foreshore** policy Engage in the **adopt-a-tree** policy Carry out **plant-another-tree policy**					
Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight
	Pre-construction					
	Nil					
	Construction					
	Beautification to focus on healthy trees. See 1. Tree Trimming & Removal – Avarua Port to Panamā.	TTPBC, Contractor, Arborist	Report on Plants planted and type	Quarterly	EPMS	PMU, CIIC
	Use species found in the coastal area as foreshore protection, e.g. seagrape or venevene ta'atai, tamanu, miro, utu, toa and pukatea. See 1. Tree Trimming & Removal – Avarua Port to Panamā.	TTPBC, Contractor, Arborist	Report on Plants planted and type	Quarterly	EPMS	PMU, CIIC
	Coconut trees of the dwarf variety can be used as it is salt tolerant, shorter, and its root system is not threatening to walk and cycle ways. See 1. Tree Trimming & Removal – Avarua Port to Panamā.	TTPBC, Contractor, Arborist	Report on Plants planted and type	Quarterly	EPMS	PMU, CIIC
	Can use other species such as nono, ngau, ngangie, poutukava can also found on coastal areas and can recover very quickly. See 1. Tree Trimming & Removal – Avarua Port to Panamā.	TTPBC, Contractor, Arborist	Report on Plants planted and type	Quarterly	EPMS	PMU, CIIC
	Decommissioning					
	Tree trimming completed, all trees treated recovered and new ones planted have established growth.	Contractor/ Nursery Contractor	Completion Report	6 months after completion of project	EPMS	PMU
Corrective Action	If new trees planted dies due to natural hazards the following will be implemented: ▪ A replanting scheme will be initiated with a nurturing programme ▪ Replanting and nurturing programme reviewed and modified. Complaints will be addressed through the project Grievance Redress Mechanism					

7.6.1.3.3 Invasive species threatens native plants

3. Foreshore protection works and beautification						
Impact	iii. Invasive species threaten native species					
Objectives	Rejuvenate landscaped areas that incorporate low-maintenance, native plants and shrubs as much as possible. For safety reasons, consider short plants or shrubs that do not entirely obscure visitors or allow clear line of site throughout the park. Incorporate trees that don't have intrusive roots that may damage footpaths					
Performance Criteria	Maintain sound foreshore protection practices					
Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight
	Pre-construction					
	Identify invasive species found in the coastal areas of Rarotonga	TTPBC, PMU	Manual	One off	EPMS, NES	PMU, CIIC
	Construction					
	A member of the TTPBC tasked to Inspect regularly areas exposed through the tree trimming program.	TTPBC, Contractor	Report	Weekly	EPMS, NES	PMU, CIIC
	Ensure invasive plant species that are found in the coastal area are removed manually	TTPBC Contractor	Report	Weekly	EPMS	PMU, CIIC
	Decommissioning					
	Removal of undesirable invasive species is an ongoing programme. Landscape workers, gardeners and reserve managers will continue the programme after the completion of this project.	PMU, CIIC	Completion Report	One off	EPMS, PMU, Contractor	PMU, CIIC
Corrective Action	If invasive species continue to appear, due to natural hazards and negligence the following will be implemented: ▪ Investigate those in charge with the view to improve attitude to achieve objectives ▪ Eradication programme will be reviewed, modified if required. Complaints will be addressed through the project Grievance Redress Mechanism					

7.6.1.3.4 Weakening of engineered coastal protection structures by planted and non-planted trees

3. Foreshore protection works and beautification						
Impact	iv. Weakening of engineered coastal protection structures by planted and non-planted trees					
Objectives	Rejuvenate landscaped areas that incorporate low-maintenance, native plants and shrubs as much as possible. For safety reasons, consider short plants or shrubs that do not entirely obscure visitors or allow clear line of site throughout the park. Incorporate trees that don't have intrusive roots that may damage footpaths					
Performance Criteria	Maintain sound foreshore protection practice					
Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight
	Pre-construction					
	Identify and review the status of foreshore areas in the project sites that are protected by engineered structures. In the Township and PNM area it is important that the coastal rock revetment is protected and trees should not be growing in between the gaps of the revetment.	PMU, CIIC	Status report of Avarua rock coastal revetment	One off	EPMS	PMU, CIIC
	Construction					
	Under the supervision of ICI engineers remove tree species that are growing along the slope of the Avarua rock coastal revetment.	PMU, CIIC, ICI, Contractors	Tree removal plan	Quarterly	EPMS	PMU, CIIC
	Strengthening the protection of the Avarua rock coastal revetment by ensuring the trees already growing (planted or non-planted) that are in the right place are healthy. The advice of an Arborist will be valuable for this work.	TTPBC, Arborist, PMU	Tree management plan	Quarterly	EPMS	PMU, CIIC
	Decommissioning					
	Once the relevant actions are taken to protect the engineered structures a maintenance plan must be put in place for ongoing implementation by CIIC.	TTPBC, CIIC	Maintenance Plan	Quarterly	EPMS	PMU, CIIC

Corrective Action	If the removing of planted and non-planted tree species that have the potential to weakened the engineered coastal protection structure are complex due to the difficulty in removal by a small contractor, the following will be implemented: ▪ Investigate the potential impact the tree structure will have on the engineered structure during extreme weather conditions, e.g. a cyclone, with the primary view of ensuring the function of the engineered structure is not compromised by the tree, modify if required or continue with appropriate removal action. Complaints will be addressed through the project Grievance Redress Mechanism

7.6.2 Output 2 – Improved Walk & Cycle Ways between Avarua and the Airport

7.6.2.1 Immediate site clearance for pathways – shrubs, pavers, service locations

7.6.2.1.1 Changed landscape

1. Immediate site clearance for pathways – shrubs, pavers, service locations						
Impact	i. Changed landscape					
Objectives	Improve pedestrian access and experience from Avarua Township to the Airport as much practicable					
Performance Criteria	Improve existing footpaths within the Avarua Township area. Add pedestrian crossing that connects the garden islands to the footpath that extends from the Avarua Harbour to the PNM. Construct a permeable footpath and cycle-way from the western end of the Avatiu harbour to the end of the Panamā Reserve (Catholic cemetery). Incorporate trees that don't have intrusive roots that may damage footpaths					
Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight
	Pre-construction					
	Prepare ready to plant stage planting material to replace any shrubs and plants removed	TTPBC, Nursery Contractor, Gardeners	Number of plants ready for planting	One off	EPMS,	PMU, CIIC
	Construction					
	Engage in a replanting programme that will quickly return the cleared areas back to a better and enhanced landscape.	TTPBC, Nursery Contractor, Gardeners	Number of plants ready for planting	Quarterly	EPMS	PMU, CIIC

	Replanting programme should include planting materials that are suited to the site environment and already growing before the site clearing and preparation work start.	Nursery Contractor, Gardeners	Number of plants and type ready for planting	Quarterly	EPMS	PMU, CIIC
	Tiare Māori or cardinia with its contained root system is well suited around the PNM, Avarua Town area and Panamā Reserve.	Nursery Contractor, Gardeners	Number of plants ready for planting	Quarterly	EPMS	PMU, CIIC
	Decommissioning					
	After construction of Walk & Cycle Ways the cleared landscape must be maintained.	PMU, CIIC	Report	Completion Report	EPMS	PMU, CIIC
Corrective Action	If prepared planting materials does not grow due to dry conditions, vandalism or other natural hazards the following will be implemented: ▪ Purchase or use extra plant materials from the Contractor to replace dead plant materials ▪ Review and modify nurturing and maintenance practices. Complaints will be addressed through the project Grievance Redress Mechanism					

7.6.2.1.2 Open up the land to undesirable invasive plant species

1. Immediate site clearance for pathways – shrubs, pavers, service locations						
Impact	ii. Open up the land to undesirable invasive plant species					
Objectives	Improve pedestrian access and experience from Avarua Township to the Airport as much practicable					
Performance Criteria	Improve existing footpaths within the Avarua Township area. Add pedestrian crossing that connects the garden islands to the footpath that extends from the Avarua Harbour to the PNM. Construct a permeable footpath and cycle-way from the western end of the Avatiu harbour to the end of the Panamā Reserve (Catholic cemetery). Incorporate trees that don't have intrusive roots that may damage footpaths					
Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight

	Pre-construction					
	Identify invasive species found in the coastal areas of Rarotonga	TTPBC, PMU,	Manual	One off	EPMS, NES	PMU, CIIC
	A member of the TTPBC tasked to inspect regularly areas exposed through the site clearance activity. The person must have practical knowledge of the different stages of the common invasive plant species found on the island.	TTPBC, Contractor, Gardener	Report	Weekly	EPMS, NES	PMU, CIIC
	Construction					
	The member of the TTPBC in charge to ensure invasive plant species that are found in the coastal area do not get the opportunity to establish itself.	TTPBC, Nursery Contractor, Gardeners	Number of Invasive species removed	Quarterly	EPMS	PMU, CIIC
	Regular inspection of the areas exposed, and pulling out or weed (not sprayed with chemicals) invasive species from the cleared areas	Qualified gardeners	Number of Invasive species removed	Quarterly	EPMS	PMU, CIIC
	Decommissioning					
	After sites are cleared the contractor to maintain an invasive species free status until Walk & Cycle Ways are constructed.	PMU, CIIC	Report	Completion Report	EPMS	PMU, CIIC
Corrective Action	If invasive species continue to appear, due to natural hazards and negligence the following will be implemented: ▪ Investigate those in charge with the view to improve attitude to achieve objective ▪ Eradication programme will be reviewed and modified. Complaints will be addressed through the project Grievance Redress Mechanism					

7.6.2.1.3 Roots that have affected the old pathways not fully removed could cause problem for the new pathways

1. Immediate site clearance for pathways – shrubs, pavers, service locations	
Impact	iii. Roots that have affected the old pathways not fully removed could cause problem for the new pathways
Objectives	Improve pedestrian access and experience from Avarua Township to the Airport as much practicable
Performance Criteria	Improve existing footpaths within the Avarua Township area. Add pedestrian crossing that connects the garden islands to the footpath that extends from the Avarua Harbour to the PNM.

	Construct a permeable footpath and cycle-way from the western end of the Avatiu harbour to the end of the Panamā Reserve (Catholic cemetery). Incorporate trees that don't have intrusive roots that may damage footpaths					
Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight
	Pre-construction					
	Nil					
	Construction					
	For sites involving tree hibiscus or 'au roots or similar plants e.g. in front of the Catholic Church), the option may include removing the ground and roots up to 600mm deep and installing permeable interlocking concrete pavement. https://www.cement.org/cement-concrete/paving/buildings-structures/concrete-homes/products/permeable-interlocking-concrete-pavement	Contractor	Constructional Plan	One off	EPMS	PMU. CIIC
	For sites where utu, toa, pukatea and tamanu trees are present, engage a method where roots are not harmed, but avoided. Thorough assessment of the site to help decide on the best option would be required.	Contractor	Constructional Plan	One off	EPMS	PMU, CIIC
	Decommissioning					
	After pathways sites cleared it will be ready for reconstruction work.	PMU, CIIC	Report	Completion Report	EPMS	PMU, CIIC
Corrective Action	If site is not appropriately cleared and prepared or if affected by natural hazards after clearing the following will be implemented: ▪ Re-evaluate the sites to ensure it is prepared for the pathway option chosen. Complaints will be addressed through the project Grievance Redress Mechanism					

7.6.2.2 Panamā to Avatiu Walk & Cycle design, construction works and site remediation

7.6.2.2.1 Inappropriate species around pathways especially those with massive and wide span root network continue to damage pathway increasing HS risks to users

2. Panamā to Avatiu Walk & Cycle Way design, construction works and site remediation						
Impact	i. Inappropriate species around pathways especially those with massive and wide span root network would continue to damage pathway increasing HS risks to users					
Objectives	Improve pedestrian access and experience from Avarua Township to the Airport as much practicable					
Performance Criteria	Improve existing footpaths within the Avarua Township area. Add pedestrian crossing that connects the garden islands to the footpath that extends from the Avarua Harbour to the PNM. Construct a permeable footpath and cycle-way from the western end of the Avatiu harbour to the end of the Panamā Reserve (Catholic cemetery). Incorporate trees that don't have intrusive roots that may damage footpaths					
Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight
	Pre-construction					
	Prepare to ready to plant stage planting material to replace any inappropriate shrubs and plants removed	TTPBC Nursery Contractor, Gardeners	Number of plants ready for planting	One off	EPMS	PMU, CIIC
	Construction					
	Engage in a replanting programme that will quickly return the cleared areas back to a better and enhanced landscape.	TTPBC, Nursery Contractor, Gardeners	Number of plants ready for planting	Quarterly	EPMS, Contractor, Gardeners	PMU, CIIC
	Replanting programme should include planting materials that are suited to the site environment and already growing before the site clearing and preparation work start.	Nursery Contractor, Gardeners	Number of plants and type ready for planting	Quarterly	EPMS, Nursery Contractor, Gardeners	PMU, CIIC

	For sites where utu, toa, pukatea and tamanu trees are present, engage a method where roots are not harmed, but avoided. Thorough assessment of the site to help decide on the best option would be required.	Contractor	Constructional Plan	One off	EPMS, Contractor	PMU, CIIC
	In the case of the tree hibiscus or ‘au, complete removal of the ground to remove the roots and use methods to prevent regrowth and penetration into the new Walk & Cycle Ways.	Contractor	Constructional Plan	One off	EPMS, Contractor	PMU, CIIC
	Decommissioning					
	After reconstruction work and replanting program risks to users minimal and landscape enhanced put in place and implement a maintenance program.	PMU, CIIC	Report	Completion Report	EPMS, Contractor	PMU, CIIC
Corrective Action	If site or any part of the reconstruction still poses risks to users or the landscape is inappropriate the following will be implemented: ▪ Re-evaluate the potential risks to users and modify is required. Complaints will be addressed through the project Grievance Redress Mechanism					

7.6.2.2.2 Possible root regrowth may not be detected leading to damaged pathways and increase HS risks to users in the future

2. Panamā to Avatiu Walk & Cycle Way design, construction works and site remediation						
Impact	ii. Possible root regrowth may not be detected leading to damaged pathways and increase HS risks to users in the future					
Objectives	Improve pedestrian access and experience from Avarua Township to the Airport as much practicable					
Performance Criteria	Improve existing footpaths within the Avarua Township area. Add pedestrian crossing that connects the garden islands to the footpath that extends from the Avarua Harbour to the PNM. Construct a permeable footpath and cycle-way from the western end of the Avatiu harbour to the end of the Panamā Reserve (Catholic cemetery). Incorporate trees that don’t have intrusive roots that may damage footpaths					
Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight

	Pre-construction					
	Review construction plans	Contractor, PMU, CIIC	Construction and work program	One off	EPMS, Contractor, PMU, CIIC	PMU, CIIC
	Construction					
	Thorough review of the clearance work prior to construction	Contractor, PMU, CIIC	Construction and work program	One off	EPMS, Contractor, PMU, CIIC	PMU, CIIC
	Decommissioning					
	After reconstruction work and replanting program risks to users minimal and landscape enhanced put in place and implement a maintenance program.	PMU, CIIC	Report	Completion Report	EPMS, Contractor	PMU, CIIC
Corrective Action	If site any part of the reconstruction still poses risks to users or the landscape is inappropriate the following will be implemented: ▪ Re-evaluate the potential risks to users and modify is required. Complaints will be addressed through the project Grievance Redress Mechanism					

7.6.2.2.3 Maintenance costs issues to maintain sites

2. Panamā to Avatiu Walk & Cycle Way design, construction works and site remediation						
Impact	iii. High maintenance cost to maintain the sites					
Objectives	Improve pedestrian access and experience from Avarua Township to the Airport as much practicable					
Performance Criteria	Improve existing footpaths within the Avarua Township area. Add pedestrian crossing that connects the garden islands to the footpath that extends from the Avarua Harbour to the PNM. Construct a permeable footpath and cycle-way from the western end of the Avatiu harbour to the end of the Panamā Reserve (Catholic cemetery). Incorporate trees that don't have intrusive roots that may damage footpaths					
Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight

	Pre-construction					
	Nil					
	Construction					
	Use plant species that are low-maintenance, native if possible, low or short, self-pruning, does not cover large area, and don't have intrusive roots that may damage footpaths.	TTPBC, Nursery Contractor, Gardeners	Number of plants ready for planting	Quarterly	EPMS, Contractor	PMU, CIIC
	If the species are local but not self-pruning and low, someone or a team must be engaged to carry out this work when required.	TTPBC, Nursery Contractor, Gardeners	Number of plants ready for planting	Quarterly	EPMS, Contractor	PMU, CIIC
	Decommissioning					
	After reconstruction work and replanting program risks to users minimal and landscape enhanced someone or a team must be engaged to regularly maintain the Walk & Cycle Ways.	TTPBC, PMU, CIIC	Report	Completion Report	EPMS, Contractor	PMU, CIIC
Corrective Action	If the impacts identified above are not being addressed the following will be implemented: ▪ Re-evaluate the potential risks from the impacts of the construction and remedial work, modify where required. Complaints will be addressed through the project Grievance Redress Mechanism					

7.6.2.2.4 Damage from natural hazards

2. Panamā to Avatiu Walk & Cycle Way design, construction works and site remediation	
Impact	iv. Damage from natural hazards
Objectives	Improve pedestrian access and experience from Avarua Township to the Airport as much practicable
Performance Criteria	Improve existing footpaths within the Avarua Township area. Add pedestrian crossing that connects the garden islands to the footpath that extends from the Avarua Harbour to the PNM. Construct a permeable footpath and cycle-way from the western end of the Avatiu harbour to the end of the Panamā Reserve (Catholic cemetery). Incorporate trees that don't have intrusive roots that may damage footpaths

Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight
	Pre-construction					
	Design options need to be explored on the basis of how easy it is to reconstructed walk & cycle ways after a hazard, e.g. cyclone.	PMU, Contractors, CIIC	Construction plans	One off	PMU, Contractors, CIIC	PMU, CIIC
	Walk & Cycle Ways construction plans approved by ICI.	PMU, Contractors, CIIC, ICI	Construction plans	One off	PMU, Contractors, CIIC, ICI	PMU, CIIC
	Construction					
	Reconstruction of approved Walk & Cycle Ways	PMU, Contractors, CIIC, ICI	Construction plans	One off	EPMS, Contractors	PMU, CIIC
	Inspect potential for root intrusions that may impact on HS of users	PMU, Nursery Contractors, CIIC	Construction plans	One off	EPMS, Contractors	PMU, CIIC
	Inspect potential for risks from breaking branches (dried and untrimmed)	PMU, Contractors, CIIC	Construction plans	One off	EPMS, Contractors	PMU, CIIC
	Inspect potential for invasive species overgrowth from surrounding.	PMU, Gardeners, Contractors, CIIC	Construction plans	One off	EPMS Contractors, Gardeners	PMU, CIIC
	Decommissioning					
	After reconstruction work and replanting program risks to users minimal and landscape enhanced someone or a team must be engaged to regularly maintain the Walk & Cycle Ways.	PMU, CIIC	Report	Completion Report	EPMS, PMU, Contractor	PMU, CIIC
Corrective Action	If the impacts identified above are not being addressed the following will be implemented: ▪ Re-evaluate the potential risks from the impacts of the construction and remedial work, modify where required. Complaints will be addressed through the project Grievance Redress Mechanism					

7.6.2.3 Installation of recycling and water station & signage

7.6.2.3.1 Vandalism to the drinking fountains, hand washing, recycling stations and signs

3. Installation of recycling and water stations & signage						
Impact	i. Vandalism to the drinking fountains, hand washing, recycling stations and signs					
Objectives	Improve pedestrian access and experience from Avarua Township to the Airport as much practicable					
Performance Criteria	Improve existing footpaths within the Avarua Township area. Add pedestrian crossing that connects the garden islands to the footpath that extends from the Avarua Harbour to the PNM. Construct a permeable footpath and cycle-way from the western end of the Avatiu harbour to the end of the Panamā Reserve (Catholic cemetery). Incorporate trees that don't have intrusive roots that may damage footpaths					
Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight
	Pre-construction					
	Inquire into appropriate and effective security cameras	PMU, CIIC	Quotes/Information	One off	PMU, CIIC	PMU, CIIC
	Develop appropriate education and awareness programs	PMU, CIIC and Communication Expert	Awareness materials	One off	PMU, CIIC and Communication Expert	PMU, CIIC
	Discuss support for community watch with community leaders	PMU, CIIC, Vendors and Hut owners	Meeting minutes	Ongoing	PMU, CIIC, Vendors and Hut owners	PMU, CIIC
	Construction					
	Installation of security cameras can be a consideration to catch the culprits	PMU, CIIC	Video footage	24/7	EPMS, PMU	PMU,CIIC
	Education and awareness programme on the media and other communication devices highlighting the important services these stations provide	PMU, CIIC	Incidences	Ongoing	EPMS, PMU	PMU, CIIC

	Consider community support watch activities.	PMU, CIIC, Community	Incidences	Ongoing	EPMS, CIIC, Community	CIIC, Community
	Decommissioning					
	After installation of recycling and water stations and signage implement security and support programs.	PMU, CIIC	Report	Completion Report	PMU, Contractor	PMU, CIIC
Corrective Action	If vandalism becomes an issue and continues the following will be implemented: ▪ Re-evaluate the effectiveness of the actions taken modify, implement changes if required. Complaints will be addressed through the project Grievance Redress Mechanism					

7.6.2.3.2 Maintenance cost issues to maintain the amenities and signage

3. Installation of recycling and water stations & signage						
Impact	ii. High maintenance cost to maintain the amenities and signage					
Objectives	Improve pedestrian access and experience from Avarua Township to the Airport as much practicable					
Performance Criteria	Improve existing footpaths within the Avarua Township area. Add pedestrian crossing that connects the garden islands to the footpath that extends from the Avarua Harbour to the PNM. Construct a permeable footpath and cycle-way from the western end of the Avatiu harbour to the end of the Panamā Reserve (Catholic cemetery). Incorporate trees that don't have intrusive roots that may damage footpaths					
Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight
	Pre-construction					
	Inquire into appropriate and effective security cameras	PMU, CIIC	Quotes/Information	One off	PMU, CIIC	PMU, CIIC
	Inquire into appropriate affordable water stations taking into account there will be vandalism, misuse, and the likelihood of a natural disaster like a cyclone occurring is at 20-60% chance as per the risk assessment.	PMU, CIIC, ICI	Quotes/Information	One off	PMU, CIIC and Communication Expert	PMU, CIIC

	Inquire into appropriate affordable recycling station receptacles taking into account there will be vandalism, misuse, and the likelihood of a natural disaster like a cyclone occurring is at 20-60% chance as per risk assessment.	PMU, CIIC, ICI	Quotes/Information	Ongoing	PMU, CIIC, Vendors and Hut owners	PMU, CIIC
	Construction					
	Install appropriate and affordable security camera system	PMU, CIIC	Quotes/Information	One off	EPMS, PMU	PMU, CIIC
	Install affordable water stations	PMU, CIIC	Operating water station	24/7	EPMS, PMU	PMU,CIIC
	Install affordable recycling station receptacles	PMU, CIIC	Operating recycling station	24/7	EPMS, PMU	PMU,CIIC
	Decommissioning					
	After installation of the amenities and signage implement the security and support programs.	PMU, CIIC	Report	Completion Report	EPMS, PMU, Contractor	PMU, CIIC
Corrective Action	If the event there are issues with the chosen options the following will be implemented: ▪ Re-evaluate the effectiveness of the actions taken, modify, implement changes is required. Complaints will be addressed through the project Grievance Redress Mechanism					

7.6.2.3.3 Damage from natural hazards

3. Installation of recycling and water stations & signage	
Impact	iii. Damage from natural hazards
Objectives	Improve pedestrian access and experience from Avarua Township to the Airport as much practicable
Performance Criteria	Improve existing footpaths within the Avarua Township area. Add pedestrian crossing that connects the garden islands to the footpath that extends from the Avarua Harbour to the PNM.

	Construct a permeable footpath and cycle-way from the western end of the Avatiu harbour to the end of the Panamā Reserve (Catholic cemetery). Incorporate trees that don't have intrusive roots that may damage footpaths					
Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight
	Pre-construction					
	Design options need to be explored on the basis of how easy it is to remove and reinstall in the case of a natural disaster, before and after a cyclone.	PMU, Contractors, CIIC	Construction plans	One off	EPMS, PMU, Contractors	PMU, CIIC
	Water stations and recycle stations to follow construction plans approved by ICI.	PMU, Contractors, CIIC, ICI	Construction plans	One off	EPMS, PMU, Contractors, ICI	PMU, CIIC
	Construction					
	Install water and recycle stations that can be easily removed and reinstalled before and after a cyclone	PMU, Contractors, CIIC, ICI	Construction plans	One off	EPMS, PMU, Contractors, ICI	PMU, CIIC
	Installation of security cameras can be a consideration to catch the culprits	PMU, CIIC	Video footage	24/7	EPMS, PMU	PMU,CIIC
	Decommissioning					
	After installation of amenities and signage implement security and support programs.	PMU, CIIC	Report	Completion Report	EPMS, PMU, Contractor	PMU, CIIC
Corrective Action	In the event there are issues with the chosen options, the following will be implemented: ▪ Re-evaluate the effectiveness of the actions taken modify, implement changes is required. Complaints will be addressed through the project Grievance Redress Mechanism					

7.6.2.4 Central Avarua footpath remedial work

7.6.2.4.1 Inappropriate species around pathways especially those with massive and wide span root network would continue to damage pathways increasing HS risks to users

4. **Central Avarua footpath remedial work**						
Impact	1. Inappropriate species around pathways especially those with massive and wide span root network would continue to damage pathways increasing HS risks to users					
Objectives	Improve pedestrian access and experience from Avarua Township to the Airport as much practicable					
Performance Criteria	Improve existing footpaths within the Avarua Township area. Add pedestrian crossing that connects the garden islands to the footpath that extends from the Avarua Harbour to the PNM. Construct a permeable footpath and cycle-way from the western end of the Avatiu harbour to the end of the Panamā Reserve (Catholic cemetery). Incorporate trees that don't have intrusive roots that may damage footpaths					
Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight
	Pre-construction					
	Prepare to ready to plant stage planting material to replace any inappropriate shrubs and plants removed	TTPBC, Nursery Contractor, Gardeners	Number of plants ready for planting	One off	Nursery Contractor, Gardeners	PMU, CIIC
	Construction					
	Engage in a replanting programme that will quickly return the cleared areas back to a better and enhanced landscape.	TTPBC, Nursery Contractor, Gardeners	Number of plants ready for planting	Quarterly	EPMS, Nursery Contractor, Gardeners	PMU, CIIC
	Replanting programme should include planting materials that are suited to the site environment and already growing before the site clearing and preparation work start.	TTPBC, Nursery Contractor, Gardeners	Number of plants and type ready for planting	Quarterly	EPMS, Nursery Contractor, Gardeners	PMU, CIIC
	Build around the utu, toa, pukatea and tamanu, engage a method where roots are not harmed, but avoided. Thorough	TTPBC, Contractor	Constructional Plan	One off	EPMS, PMU, Contractor	PMU, CIIC

	assessment of the site to help decide on the best option would be required.					
	In the case of the tree hibiscus or ‘au, as is common cause around the Catholic Church, complete removal of the ground to remove the roots and use methods to prevent regrowth and penetration into the remedied footpath.	Contractor	Constructional Plan	One off	EPMS, PMU, Contractor	PMU, CIIC
	Decommissioning					
	After remedial and replanting program is completed, a regular monitoring is required to ensure risks to users remain zero and enhanced landscape is maintained.	PMU, CIIC	Report	Completion Report	EPMS, PMU, Contractor	PMU, CIIC
Corrective Action	If any part of the remedial work still poses risks to users or the landscape is inappropriate the following will be implemented: ▪ Re-evaluate the potential risks to users and modify if required. Complaints will be addressed through the project Grievance Redress Mechanism					

7.6.2.4.2 Maintenance cost issues to maintain the facility including to investigation to possible root regrowth leading to damaged pathways

4. **Central Avarua footpath remedial work**						
Impact	ii. High maintenance cost to maintain the facility including to investigate possible root regrowth leading to damaged pathways					
Objectives	Improve pedestrian access and experience from Avarua Township to the Airport as much practicable					
Performance Criteria	Improve existing footpaths within the Avarua Township area. Add pedestrian crossing that connects the garden islands to the footpath that extends from the Avarua Harbour to the PNM. Construct a permeable footpath and cycle-way from the western end of the Avatiu harbour to the end of the Panamā Reserve (Catholic cemetery). Incorporate trees that don’t have intrusive roots that may damage footpaths					
Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight
	Pre-construction					

	Review construction plans	Contractor, PMU, CIIC	Construction and work program	One off	EPMS, Contractor	PMU, CIIC
	Construction					
	Thorough review of the clearance work prior to construction	Contractor, PMU, CIIC	Construction and work program	One off	EPMS, Contractor	PMU, CIIC
	Use interlocking pavements as was used. It is easier to reinstall if distorted by roots.	Contractor, PMU, CIIC	Construction and work program	One off	EPMS, Contractor, PMU	PMU, CIIC
	In the case of roots regrowth, interlocking pavements can be easily removed the roots removed and the pavement reinstalled.	Contractor, PMU, CIIC	Construction and work program	One off	EPMS, Contractor, PMU	PMU, CIIC
	Have enough operating cost to maintain the footpaths					
	Decommissioning					
	After remedial and replanting program is completed, regular monitoring is required to ensure risks to users remain zero and enhanced landscape is maintained.	PMU, CIIC	Report	Completion Report	EPMS, PMU, Contractor	PMU, CIIC
Corrective Action	If any part of the remedial work still poses risks to users or the landscape is inappropriate the following will be implemented: ▪ Re-evaluate the potential risks to users and modify if required. Complaints will be addressed through the project Grievance Redress Mechanism					

7.6.2.5 Solar lighting installation along Panamā Reserve

7.6.2.5.1 Ongoing cost issues to maintain the facility

5. Solar lighting installation along Panamā Reserve	
Impact	i. High cost of ongoing maintenance of facility
Objectives	Improve pedestrian access and experience from Avarua Township to the Airport as much practicable

Performance Criteria	Improve existing footpaths within the Avarua Township area. Add pedestrian crossing that connects the garden islands to the footpath that extends from the Avarua Harbour to the PNM. Construct a permeable footpath and cycle-way from the western end of the Avatiu harbour to the end of the Panamā Reserve (Catholic cemetery). Incorporate trees that don't have intrusive roots that may damage footpaths					
Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight
	Pre-construction					
	Field inspection of the proposed sites for the installation must be undertaken to ensure all potential hazards under normal conditions are eliminated, e.g. overhanging branches, interfering tree roots are not in the way and direct exposure to sea air.	PMU, CIIC, Contractor	Checklist of potential hazards and proposed actions	One off	EPMS, Contractor	PMU, CIIC
	Review cleaning panel maintenance program.	PMU, CIIC, Contractor	Checklist of cleaning program.	One off	EPMS, Contractor	PMU, CIIC
	Review installation plans	PMU, CIIC, Contractor	Revised plan	One off	EPMS, PMU, Contractor	PMU, CIIC
	Construction					
	Follow revised plan and prepare sites for installation	PMU, CIIC, Contractor	Revised plan	One off	EPMS, PMU, Contractor	PMU, CIIC
	Decommissioning					
	After installation is completed, regular monitoring is required to ensure risks from hazards during normal conditions remain at zero and panels are regularly cleaned as per maintenance plan.	PMU, CIIC, Contractor	Report	Completion Report	EPMS, PMU, Contractor	PMU, CIIC
Corrective Action	If site or any part of the installation work is unsatisfactory and not qualified for signoff the following will be implemented: ▪ Re-evaluate the potential risks to users and modify if required. Complaints will be addressed through the project Grievance Redress Mechanism					

7.6.3 Output 3 – Improved Public toilets and recreational facilities in central Avarua

7.6.3.1 Reconstruction & wastewater treatment system upgrade for central facilities across the Police Station

7.6.3.1.1 Non-performance of upgraded wastewater system

1. Reconstruction & wastewater treatment system upgrade for central facilities across the Police Station						
Impact	i. . Non-performance of upgraded wastewater system					
Objectives	Improve pedestrian access and experience from Avarua Township to the Airport as much practicable					
Performance Criteria	Improve existing footpaths within the Avarua Township area. Add pedestrian crossing that connects the garden islands to the footpath that extends from the Avarua Harbour to the PNM. Construct a permeable footpath and cycle-way from the western end of the Avatiu harbour to the end of the Panamā Reserve (Catholic cemetery). Incorporate trees that don't have intrusive roots that may damage footpaths					
Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight
	Pre-construction					
	Complete application for Sewage Construction Permit under the Public Health (Sewage and Wastewater Treatment and Disposal) Regulations 2014.	PMU, CIIC, Waste Water Engineer	Application and Permit	One off	EPMS, PMU	PMU, CIIC
	Complete application for building permit under the Building Code and Standards Act 1991 and take into account of review of Act by EMCI.	PMU, CIIC, Waste Water Engineer	Application and Permit	One off	EPMS, PMU	PMU, CIIC
	Construction					
	Construction as per permit and appropriate inspectors on site during construction (relevant times)	Waste Water Engineer, Building Inspector, Health Inspector PMU, CIIC	Approved Permits	Prior to, during and decommissioning	EPMS, PMU	PMU, CIIC
	Decommissioning					

	After installation and sign off with the appropriate authorities, the waste water engineer to provide regular monitoring report to facility management and one after every major event where the use of the facility would most likely peak.	PMU, CIIC	Approved Permits and monitoring reports	As per Agreement with wastewater engineer	EPMS, PMU	PMU, CIIC
Corrective Action	If site the system shows sign of non-functioning the following will be implemented: ▪ Re-evaluate the potential risks and chances of happening again including increased cost of maintenance, modify, and repair if required. Complaints will be addressed through the project Grievance Redress Mechanism					

7.6.3.1.2 Maintenance cost issues to maintain the amenity and to support ongoing monitoring by wastewater engineer

1. Reconstruction & wastewater treatment system upgrade for central facilities across the Police Station						
Impact	ii. High maintenance cost to maintain the amenity and support ongoing monitoring by wastewater engineer					
Objectives	Improve pedestrian access and experience from Avarua Township to the Airport as much practicable					
Performance Criteria	Improve existing footpaths within the Avarua Township area. Add pedestrian crossing that connects the garden islands to the footpath that extends from the Avarua Harbour to the PNM. Construct a permeable footpath and cycle-way from the western end of the Avatiu harbour to the end of the Panamā Reserve (Catholic cemetery). Incorporate trees that don't have intrusive roots that may damage footpaths					
Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight
	Pre-construction					
	As part of the applications to the Public Health and Building Inspectors, CIIC to enter into an agreement with the wastewater engineer engaged to carry our regular monitoring of the system used and one after every major event where the use of the facility would most likely peak	CIIC and wastewater engineer (WWE)	Sewage Construction Permit and agreement between WWE and CIIC	As per agreement	EPMS, and facility Manager	PMU, CIIC
	Construction					

	Carry out system monitoring as per agreement	CIIC and WWE	AS per agreement	As per agreement	EPMS, PMU	PMU, CIIC
	Ensure Budget allocations through national Government Budget	PMU, CIIC	Annual Budget Document	Annually	PMU, CIIC	PMU, CIIC
	Decommissioning					
	After the agreement is signed and monitoring starts the WWE and Facility Manager to be in communication, Where the facility Manager is not knowledgeable about wastewater systems, capacity building will be initiated after his/her appointment	CIIC	Communication records, CV	Quarterly	CIIC and Facility Manager	PMU, CIIC
Corrective Action	If the system shows sign of non-functioning the following will be implemented: ▪ Re-evaluate the performance of the parties involved, review and modify if required. Complaints will be addressed through the project Grievance Redress Mechanism					

7.6.3.1.3 Septic stench in the public area, as was common in the past as a result of overloading during peak public events

1. Reconstruction & wastewater treatment system upgrade for central facilities across the Police Station						
Impact	iii. Septic stench in the public area, as was common in the past as a result of overloading during peak public events					
Objectives	Improve pedestrian access and experience from Avarua Township to the Airport as much practicable					
Performance Criteria	Improve existing footpaths within the Avarua Township area. Add pedestrian crossing that connects the garden islands to the footpath that extends from the Avarua Harbour to the PNM. Construct a permeable footpath and cycle-way from the western end of the Avatiu harbour to the end of the Panamā Reserve (Catholic cemetery). Incorporate trees that don't have intrusive roots that may damage footpaths					
Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight
	Pre-construction					

	As part of the applications to the Public Health and Building Inspectors, CIIC to enter into an agreement with the wastewater engineer engaged to carry our regular monitoring of the system used and one after every major event where the use of the facility would most likely peak	CIIC and wastewater engineer (WWE)	Sewage Construction Permit and agreement between WWE and CIIC	As per agreement	EPMS, facility Manager	PMU, CIIC
	Construction					
	Carry out system monitoring as per agreement	CIIC and WWE	AS per agreement	As per agreement	EPMS, PMU	PMU, CIIC
	Ensure Budget allocations through national Government Budget	PMU, CIIC	Annual Budget Document	Annually	PMU, CIIC	PMU, CIIC
	Decommissioning					
	After the agreement is signed and monitoring starts the WWE, EPMS and Facility Manager to be in communication, Where the facility Manager is not knowledgeable about wastewater systems, capacity building will be initiated after his/her appointment	CIIC	Communication records, CV	Quarterly	EPMS, Facility Manager	PMU, CIIC
Corrective Action	If site the stench continues the following will be implemented: ▪ Re-evaluate the performance of the parties involved, review and modify if required. Complaints will be addressed through the project Grievance Redress Mechanism					

7.6.3.2 Reconstruction & wastewater treatment system upgrade for Panamā Reserve

7.6.3.2.1 Inconvenience to the general public who use the area on Sunday during the times when nearby Are Tāpae'anga is used for Māroro Tunutunu and for any funeral services that may occur during this time at the Catholic Cemetery.

2. Reconstruction & wastewater treatment system upgrade for Panamā Reserve		
Impact	i.	Inconvenience to the general public who use the area on Sunday during the times when the nearby Are Tāpae'anga is used for Maroro Tunutunu and for any funeral services that may occur during this time at the Catholic Cemetery

Objectives	Improve pedestrian access and experience from Avarua Township to the Airport as much practicable					
Performance Criteria	Improve existing footpaths within the Avarua Township area. Add pedestrian crossing that connects the garden islands to the footpath that extends from the Avarua Harbour to the PNM. Construct a permeable footpath and cycle-way from the western end of the Avatiu harbour to the end of the Panamā Reserve (Catholic cemetery). Incorporate trees that don't have intrusive roots that may damage footpaths					
Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight
	Pre-construction					
	Carry out investigation on the operation of the Are Tāpae'anga with a view to confirming the provision of a portable toilet every Sunday and who to contact for the arrangements	PMU, CIIC	Portable toilet and temporary cleaning facility.	Every Sunday during Construction	PMU, CIIC	PMU, CIIC
	Construction					
	Advice the vendor running the Are Tāpae'anga māroro tunutunu on the commencement and duration of the reconstruction work.	PMU, CIIC, Contractors	Communication	Every Sunday during Construction	PMU, CIIC	PMU, CIIC
	Provide portable toilet system and cleaning facility until the reconstruction is completed.	PMU, CIIC, Contractors	Portable toilet and temporary cleaning facility.	Every Sunday during Construction	PMU, CIIC	PMU, CIIC
	The same to be offered by the Project Management Team to families involved in any funeral service that may arise during this time.	PMU, CIIC, Contractors	Portable toilet and temporary cleaning facility.	When a situation arises	PMU, CIIC	PMU, CIIC
	Decommissioning					
	The facility to provide an easy to clean and maintain toilet and cleaning facility including an outdoor shower and fish cleaning area for the fishermen that use the area.	PMU, CIIC, Contractors	User friendly community facility	Ongoing	PMU, CIIC	PMU, CIIC
Corrective Action	If facility does not properly serve the community use, the following will be implemented: ▪ Re-evaluate the facility use, review and modify if required.					

	Complaints will be addressed through the project Grievance Redress Mechanism

7.6.3.2.2 Non-performance of upgraded wastewater system

2. Reconstruction & wastewater treatment system upgrade for Panamā Reserve						
Impact	ii. . Non-performance of upgraded wastewater system					
Objectives	Improve pedestrian access and experience from Avarua Township to the Airport as much practicable					
Performance Criteria	Improve existing footpaths within the Avarua Township area. Add pedestrian crossing that connects the garden islands to the footpath that extends from the Avarua Harbour to the PNM. Construct a permeable footpath and cycle-way from the western end of the Avatiu harbour to the end of the Panamā Reserve (Catholic cemetery). Incorporate trees that don't have intrusive roots that may damage footpaths					
Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight
	Pre-construction					
	Complete application for Sewage Construction Permit under the Public Health (Sewage and Wastewater Treatment and Disposal) Regulations 2014.	PMU, CIIC, Waste Water Engineer	Application and Permit	One off	PMU, CIIC	PMU, CIIC
	Complete application for building permit under the Building Code and Standards Act 1991 and take into account of review of Act by EMCI.	PMU, CIIC, Waste Water Engineer	Application and Permit	One off	PMU, CIIC	PMU, CIIC
	Construction					
	Construction as per permit and appropriate inspectors on site during construction (relevant times)	Waste Water Engineer, Building Inspector, Health Inspector PMU, CIIC	Approved Permits	Prior to, during and decommissioning	EPMS, Building Inspector, Health Inspector, PMU	PMU, CIIC
	Decommissioning					

	After installation and sign off with the appropriate authorities, the waste water engineer to provide regular monitoring report to facility management and one after every major event where the use of the facility would most likely peak.	PMU, CIIC	Approved Permits and monitoring reports	As per Agreement with WWE	EPMS, PMU	PMU, CIIC
Corrective Action	If the system shows sign of non-functioning the following will be implemented: ▪ Re-evaluate the potential risks and chances of happening again including increased cost of maintenance, repair if required. Complaints will be addressed through the project Grievance Redress Mechanism					

7.6.3.2.3 Maintenance cost issues to maintain the amenity support and ongoing monitoring by wastewater engineer

2. Reconstruction & wastewater treatment system upgrade for central facilities across the Police Station						
Impact	iii. High maintenance cost to maintain the amenity and support ongoing monitoring by wastewater engineer					
Objectives	Improve pedestrian access and experience from Avarua Township to the Airport as much practicable					
Performance Criteria	Improve existing footpaths within the Avarua Township area. Add pedestrian crossing that connects the garden islands to the footpath that extends from the Avarua Harbour to the PNM. Construct a permeable footpath and cycle-way from the western end of the Avatiu harbour to the end of the Panamā Reserve (Catholic cemetery). Incorporate trees that don't have intrusive roots that may damage footpaths					
Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight
	Pre-construction					
	As part of the applications to the Public Health and Building Inspectors, CIIC to enter into an agreement with the wastewater engineer engaged to carry our regular monitoring of the system used and one after every major event where the use of the facility would most likely peak	CIIC and wastewater engineer (WWE)	Sewage Construction Permit and agreement between WWE and CIIC	As per agreement	CIIC and facility Manager	PMU, CIIC
	Construction					

	Carry out system monitoring as per agreement	CIIC and WWE	AS per agreement	As per agreement	EPMS, PMU	PMU, CIIC
	Ensure Budget allocations through national Government Budget	PMU, CIIC	Annual Budget Document	Annually	PMU, CIIC	PMU, CIIC
	Decommissioning					
	After the agreement is signed and monitoring starts the WWE, EPMS and Facility Manager to be in communication, Where the facility Manager is not knowledgeable about wastewater systems, capacity building will be initiated after his/her appointment	CIIC	Communication records, CV	Quarterly	EPMS, Facility Manager	PMU, CIIC
Corrective Action	If site the system shows sign of non-functioning the following will be implemented: ▪ Re-evaluate the performance of the parties involved, review and modify if required. Complaints will be addressed through the project Grievance Redress Mechanism					

7.6.3.2.4 Septic stench in the public area as was common in the past as a result of lack of monitoring and maintenance

2. Reconstruction & wastewater treatment system upgrade for central facilities across the Police Station						
Impact	iv. Septic stench in the public area, as was common in the past as a result of overloading during peak public events					
Objectives	Improve pedestrian access and experience from Avarua Township to the Airport as much practicable					
Performance Criteria	Improve existing footpaths within the Avarua Township area. Add pedestrian crossing that connects the garden islands to the footpath that extends from the Avarua Harbour to the PNM. Construct a permeable footpath and cycle-way from the western end of the Avatiu harbour to the end of the Panamā Reserve (Catholic cemetery). Incorporate trees that don't have intrusive roots that may damage footpaths					
Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight
	Pre-construction					

	As part of the applications to the Public Health and Building Inspectors, CIIC to enter into an agreement with the wastewater engineer engaged to carry our regular monitoring of the system used and one after every major event where the use of the facility would most likely peak	CIIC and wastewater engineer (WWE)	Sewage Construction Permit and agreement between WWE and CIIC	As per agreement	CIIC and facility Manager	PMU, CIIC
	Construction					
	Carry out system monitoring as per agreement	CIIC and WWE	AS per agreement	As per agreement	EPMS, PMU	PMU, CIIC
	Ensure Budget allocations through national Government Budget	PMU, CIIC	Annual Budget Document	Annually	PMU, CIIC	PMU, CIIC
	Decommissioning					
	After the agreement is signed and monitoring starts the WWE, EPMS and Facility Manager to be in communication, Where the facility Manager is not knowledgeable about wastewater systems, capacity building will be initiated after his/her appointment	CIIC	Communication records, CV	Quarterly	EPMS, Facility Manager	PMU, CIIC
Corrective Action	If the stench continues the following will be implemented: ▪ Re-evaluate the performance of the parties involved, review and modify if required. Complaints will be addressed through the project Grievance Redress Mechanism					

7.6.3.3 Installation of Park Benches, paving & surrounds

7.6.3.3.1 Vandalism to the facility

3. Installation of park benches, paving & surrounds	
Impact	i. Vandalism to the facility
Objectives	Improve pedestrian access and experience from Avarua Township to the Airport as much practicable

Performance Criteria	Improve existing footpaths within the Avarua Township area. Add pedestrian crossing that connects the garden islands to the footpath that extends from the Avarua Harbour to the PNM. Construct a permeable footpath and cycle-way from the western end of the Avatiu harbour to the end of the Panamā Reserve (Catholic cemetery). Incorporate trees that don't have intrusive roots that may damage footpaths					
Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight
	Pre-construction					
	Inquire into appropriate and effective security cameras	PMU, CIIC	Quotes/Information	One off	PMU, CIIC	PMU, CIIC
	Develop appropriate education and awareness programs	PMU, CIIC and Communication Expert	Awareness materials	One off	PMU, CIIC and Communication Expert	PMU, CIIC
	Discuss support for community watch with community leaders	PMU, CIIC, Vendors and Hut owners	Meeting minutes	Ongoing	PMU, CIIC, Vendors and Hut owners	PMU, CIIC
	Construction					
	Installation of security cameras can be a consideration to catch the culprits	PMU, CIIC	Video footage	24/7	EPMS, PMU	PMU,CIIC
	Education and awareness programme on the media and other communication devices highlighting the important services these stations provide	PMU, CIIC	Incidences	Ongoing	PMU, CIIC	PMU, CIIC
	Consider community support watch activities.	PMU, CIIC, Community	Incidences	Ongoing	CIIC, Community	CIIC, Community
	Decommissioning					
	After installation of park benches, paving & surrounds implement security and support programs.	PMU, CIIC	Report	Completion Report	EPMS, PMU, Contractor	PMU, CIIC
Corrective Action	If vandalism becomes an issue and continues, the following will be implemented: ▪ Re-evaluate the effectiveness of the actions taken modify, implement changes if required. Complaints will be addressed through the project Grievance Redress Mechanism					

7.6.3.4 Construction of fitness trail

7.6.3.4.1 Vandalism to the facility

4. Installation of fitness trail						
Impact	ii. Vandalism to the fitness trail					
Objectives	Improve pedestrian access and experience from Avarua Township to the Airport as much practicable					
Performance Criteria	Improve existing footpaths within the Avarua Township area. Add pedestrian crossing that connects the garden islands to the footpath that extends from the Avarua Harbour to the PNM. Construct a permeable footpath and cycle-way from the western end of the Avatiu harbour to the end of the Panamā Reserve (Catholic cemetery). Incorporate trees that don't have intrusive roots that may damage footpaths					
Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight
	Pre-construction					
	Inquire into appropriate and effective security cameras	PMU, CIIC	Quotes/Information	One off	PMU, CIIC	PMU, CIIC
	Develop appropriate education and awareness programs	PMU, CIIC and Communication Expert	Awareness materials	One off	PMU, CIIC and Communication Expert	PMU, CIIC
	Discuss support for community watch with community leaders	PMU, CIIC, Vendors and Hut owners	Meeting minutes	Ongoing	PMU, CIIC, Vendors and Hut owners	PMU, CIIC
	Construction					
	Installation of security cameras can be a consideration to catch the culprits	PMU, CIIC	Video footage	24/7	EPMS, PMU	PMU,CIIC
	Education and awareness programme on the media and other communication devices highlighting the important services the fitness trail.	PMU, CIIC	Incidences	Ongoing	PMU, CIIC	PMU, CIIC

	Consider community support watch activities.	PMU, CIIC, Community	Incidences	Ongoing	CIIC, Community	CIIC, Community
	Decommissioning					
	After installation of fitness trail implement security and support programs.	PMU, CIIC	Report	Completion Report	PMU, Contractor	PMU, CIIC
Corrective Action	If vandalism becomes an issue and continues, the following will be implemented: ▪ Re-evaluate the effectiveness of the actions taken modify, implement changes if required. Complaints will be addressed through the project Grievance Redress Mechanism					

7.6.4 Output 4 – Restructure and future proofed PNM

7.6.4.1 Relocation, remediation & farmers market

7.6.4.1.1 Temporary disruption when relocating farmer's market, fish market, Reefside and waffle Shack and preparing new and old site

1. Relocation, remediation & farmers market						
Impact	i. Temporary disruption when relocating Farmer's Market, Fish Market, Reefside and Waffle Shack and preparing new and old site					
Objectives	An organized market layout that supports future market growth without displacing existing hut owners and vendors as much as practicable.					
Performance Criteria	Relocate hut owners and vendors who obtrude access ways or plans for future growth by relocating them to a more suitable location. Revamp existing infrastructure to a state that is functional and complies with local standards and regulations.					
Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight
	Pre-construction					
	The farmers market building will be up and ready to go and implementing the changeover of the vendors location outside of operating hours, without affecting the normal opening hours. Planned relocation will include the following: take place after the new playground is completed, the old playground deconstructed, and the new site where the old playground is prepared; engage the service of professional small works contractors who will plan the move during the week and before	PMU, ICI, Management of PNM.	Buildings to be relocated, prepared sites, small works contractors agreement, hazards and risks boards,	During Design and planning	PMU, CIIC	PMU, CIIC

	Friday appropriate HS measures will be used for PNM staff, small works contractors, the general public and the owners of the buildings; hazards and risks sign boards on both sites to inform those concern, thorough coordination of stakeholders by PMU, and at least a week of public notice through the main mediums of communication, e.g. TV, radio, Newspapers and appropriate Social Media outlet; and relocation would take place after hours, preferably at dawn to avoid early traffic on the main road and when the weather is fine and no rain (after April where).		communication information			
	Construction					
	Decommissioning of new playground	PMU, CIIC, Small Works Contractor	Constructed new Playground	As per activity	EPMS, PMU	PMU, CIIC
	The old playground deconstructed and site prepared	PMU, CIIC, Small Works Contractor	Site prepared and ready	As per activity	EPMS, PMU	PMU, CIIC
	Appropriate HS measures for PNM staff, small works contractors, the general public and the owners of the buildings during relocation work.	PMU, CIIC, Small Works Contractor	Appropriate PPE	During Move	EPMS, PMU	PMU, CIIC
	Hazards and risks sign boards on both sites to inform those concern, thorough coordination of stakeholders by PMU, and at least a week of public notice through the main mediums of communication, e.g. TV, radio, Newspapers and appropriate Social Media outlet	PMU, CIIC, Small Works Contractor	Communication Information	Two weeks before move and during move	EPMS, PMU	PMU, CIIC
	Decommissioning					
	After relocation of premises the surrounding areas will be re-landscaped, paved and existing infrastructure revamped to a state that is functional and complies with local standards and regulations	PMU, CIIC	Report	Completion Report	EPMS, PMU, Contractor	PMU, CIIC
Corrective Action	If there are issues with the revamping of existing infrastructure to tie in with the installation of the underground services planned to improve and group similar service lines to ease servicing and maintenance, the following will be implemented:					

	▪ Review revamping exercise with the view to align to the planned underground service line installation, modify and implement changes if required. Complaints will be addressed through the project Grievance Redress Mechanism

7.6.4.1.2 Frequent visitors to Farmer's Market, Fish Market, Reefside, and Waffle Shack will be inconvenience

1. Relocation, remediation & farmers market						
Impact	ii. Frequent visitors to Farmer's Market, Fish Market, Reefside, and Waffle Shack will be inconvenienced					
Objectives	An organized market layout that supports future market growth without displacing existing hut owners and vendors as much as practicable.					
Performance Criteria	Relocate hut owners and vendors who obtrude access ways or plans for future growth by relocating them to a more suitable location. Revamp existing infrastructure to a state that is functional and complies with local standards and regulations.					
Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight
	Pre-construction					
	Construction					
	The hut owners will advise their clients of the times of their temporary closure well in advance of the move. This will include an information sign at the hut and through the main mediums of communication.	Hut Owners, PNM Management	Communication Information	Two weeks before move and during move	EPMS, PMU	PMU, CIIC
	The PMU will ensure the relocating is swift and the site preparation is for turnkey operation, i.e. all infrastructure services are in place and the hut owner will have a short time to prepare and reopen	PMU, CIIC Contractors	All infrastructure services are in place, completion report	Before and after the move	EPMS, PMU, hut owners	PMU, CIIC
	Decommissioning					

	Once huts are in operation, owners will update their information advising regular clients and visitors that they are back in business.	Hut owners, PNM Management	Business as usual	One off	PNM Management	PMU, CIIC
Corrective Action	If there are delays with the turnkey operation, the following will be implemented: ▪ Review current status, address any issues arising, modify process and implement changes if required. Complaints will be addressed through the project Grievance Redress Mechanism					

7.6.4.1.3 Increased parking space planned for peak times which usually happen on Saturdays and special events only during the year. This takes up open and clear space that can be available for other recreational purposes

1. Relocation, remediation & farmers market						
Impact	iii. Increased parking space planned for peak times which usually happen on Saturdays and special events only during the year. This takes up open and clear space that can be available for other recreational purposes					
Objectives	An organized market layout that supports future market growth without displacing existing hut owners and vendors as much as practicable.					
Performance Criteria	Relocate hut owners and vendors who obtrude access ways or plans for future growth by relocating them to a more suitable location. Revamp existing infrastructure to a state that is functional and complies with local standards and regulations.					
Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight
	Pre-construction					
	Review existing proposal and consider the potential for use of parking spaces for other purposed, therefore, extend service lines.	PMU, CIIC, Contractors	Parking uses	One off	EPMS, PMU, Contractors, PNM Management.	PMU, CIIC
	Construction					
	Extend service lines (i.e. drainage, power, water connections and waste reticulation) during installation work to certain areas	PMU, CIIC, Contractors	Future uses	One off	EPMS, PMU, Contractors,	PMU, CIIC

	in the parking area to allow mobile vendors to operate in the parking space during low peak days.				PNM Management.	
	Decommissioning					
	Extension of service lines to be installed at selected locations during activity for installation of service lines. The service lines at these locations will not be restricted to buying and selling but can cater to a diversity of use.	PMU, CIIC, Contractors	Future uses	One off	EPMS, PMU, Contractors, PNM Management.	PMU, CIIC
Corrective Action	If these proposed changes are already in the proposed plan and require no further action, the following will be implemented: ▪ Nil action. Complaints will be addressed through the project Grievance Redress Mechanism					

7.6.4.2 Installation of underground services, i.e. drainage, power, water connections and waste reticulation.

7.6.4.2.1 Maintenance of underground and overhead services is the responsibility of the utility service providers. PNM will be relying on the Utilities for this service and this will have the potential to cause delays to services when required

2. Installation of underground services, i.e. drainage, power, water connections and waste reticulation						
Impact	i. Maintenance of underground and overhead services is the responsibility of the utility service providers. PNM will be relying on the Utilities for this service and this will have the potential to cause delays to services when required					
Objectives	An organized market layout that supports future market growth without displacing existing hut owners and vendors as much as practicable					
Performance Criteria	Group all similar services together and streamline location of underground and overhead utilities throughout the site for ease of maintenance and future expansions when or if required					
Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight
	Pre-construction					
	Improve working relationship between PNM Management and utility providers by being a good customer – Keep paying the bill on time.	CIIC and PNM Management	Monthly Bills	Monthly	CIIC and PNM Management	CIIC

	Design underground service lines, approved by ICI to be installed properly and safely for easy access when requiring maintenance or when dealing faults, malfunctioning and replacement of lines when needed, e. g. after a major natural hazard.	PMU, CIIC, Contractor	Approved Plan by ICI	One off	PMU, CIIC, Contractor	PMU, CIIC
	Involve a qualified person in the area of asset management during the design and construction phases of the project.	PMU, CIIC and PNM Management	Procurement process and CV	One off	PMU, CIIC and PNM Management	PMU, CIIC
	Construction					
	Follow approved installation plan	PMU, CIIC, Contractor	Approved plan	One off	EPMS, PMU, Contractor	PMU, CIIC
	Qualified asset management staff at PNM involved in the construction supervision.					
	Decommissioning					
	Upon completion of installation, finalize and digitize information for easy access on file, provide clear markings on site of access points to each service line including HS markings and associated emergency protocols.	PMU, CIIC, Contractors	Future uses	One off	EPMS, PMU, Contractors, PNM Management.	PMU, CIIC
Corrective Action	If there are any changes to the approved plan that MUST be made due barriers such as tree roots of substrate difficulties, the following will be implemented: ▪ Refer the plan back to the design team to review with the view to protect the wellbeing of established trees as much as possible, modify, if needed. Complaints will be addressed through the project Grievance Redress Mechanism					

7.6.4.3 Reconstruction of the PNM playground at new site

7.6.4.3.1 There is possible security risk of random irresponsible parents being negligent and leaving their children unattended

3. Reconstruction of the PNM playground at new site	
Impact	i. There is possible security risk of random irresponsible parents being negligent and leaving their children unattended.

Objectives	An organized market layout that supports future market growth without displacing existing hut owners and vendors as much as practicable Upgrade public facilities and toilets					
Performance Criteria	Upgrade the existing playground (Rotary)					
Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight
	Pre-construction					
	PNM Management to create an app that parents can have on their phone enabling them to watch their child especially those parents that are at the PNM to meet a business associate, a friend or other family members. This service to be only available for young children that can be under adult supervision.	PMU, CIIC, Contractors	Appropriate app	One off	PMU, CIIC, Contractors	PMU, CIIC
	Develop emergency protocol in the case of an emergency risk to the safety of children and users of the playground area.	PMU, CIIC, Contractors	Emergency Protocol	One off	EPMS, PMU, Contractors	PMU, CIIC
	Construction					
	Install security cameras around the playground to be linked to the app	PMU, CIIC, Contractors and PNM Management	Site Plan	One off	EPMS, PMU, Contractors	PMU, CIIC
	Encourage parents to be with their children at the playground by PNM providing picnic benches and seats around the new playground.	PMU, CIIC, Contractors	Site Plan	One off	PMU, Contractors	PMU, CIIC
	PNM Management to provide security service at the playground especially on peak days	PMU, CIIC, Contractors	Site Plan	One off	EPMS, PMU, Contractors	PMU, CIIC
	Provide regular refresher training of PNM security officers on the emergency protocol on the HS protocol of the Playground	PMU, CIIC, Contractors	Site Plan	One off	PMU, CIIC, Contractors	PMU, CIIC
	Decommissioning					
	Upon completion of installation, finalize and digitize information for easy access on file. Regularly refresh PNM to carry out refresher training on emergency protocol for the playground.	PMU, CIIC, Contractors	Future uses	One off	EPMS, PMU, Contractors, PNM Management.	PMU, CIIC

Corrective Action	If there are any changes to the approved reconstruction plan, the following will be implemented: ▪ Refer the plan back to the design team to review with the view to protect the wellbeing of the users of the playground, modify, if needed. Complaints will be addressed through the project Grievance Redress Mechanism

7.6.4.3.2 Damage from natural hazards

3. Reconstruction of the PNM playground at new site						
Impact	ii. Damage from natural hazards					
Objectives	An organized market layout that supports future market growth without displacing existing hut owners and vendors as much as practicable Upgrade public facilities and toilets					
Performance Criteria	Upgrade the existing playground (Rotary)					
Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight
	Pre-construction					
	The proposed site is located within the foreshore area and subject to specific environmental restrictions and also exposed to natural hazards such as wind and in the case of cyclones, sea surge and sea flooding. The design team may design for easy removal and installation in the case of a cyclone.	PMU, CIIC, Contractors	Plan and types of equipment	One off	PMU, CIIC, PNM Management	PMU, CIIC
	Construction					
	Install easy to remove and reinstall safe playground equipment.	PMU, CIIC, Contractors	Plan and types of equipment	One off	EPMS, PMU, PNM Management	PMU, CIIC
	Decommissioning					
	After reconstruction the PNM Management to prepare a playground use manual that may include observing the weather and closing the playground at times of extreme weather conditions and just normal rain and windy days	PMU, CIIC, Contractors	Plan and types of equipment	One off	PMU, CIIC, PNM Management	PMU, CIIC

Corrective Action	If there are any changes to the approved reconstruction plan, the following will be implemented: ▪ Refer the plan back to the design team to review with the view to protect the wellbeing of the users of the playground, modify, if needed. Complaints will be addressed through the project Grievance Redress Mechanism

7.6.4.6 Top soil, grassing and planting

7.6.4.6.1 There is risk of imported surface soil being washed down the new drainage system if not contained properly

6. Top soil, grassing and planting						
Impact	i. There is risk of imported surface soil being washed down the new drainage system if not contained properly					
Objectives	Improve pedestrian access and experience from Avarua Township to the Airport as much practicable Rejuvenate landscaped areas and garden beds.					
Performance Criteria	Rejuvenate existing ecology and create more garden beds that incorporate low-maintenance, native plants and shrubs as much as possible. For safety reasons, consider short plants or shrubs that do not entirely obscure visitors or allow clear line of site throughout the park. Incorporate trees that don't have intrusive roots that may damage footpaths.					
Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight
	Pre-construction					
	Design team to ensure gardens and grassed areas are well contained and separate from drainage systems to make it easier to detect that the garden structure has been broken which could result in heavy rain moving soil towards the drainage system.	TTPBC, PMU, Contractors	Approved garden plan	One off	EPMS, PMU	PMU, CIIC
	Construction					
	Install paved surfaces between garden structure and drainage systems.	PMU, CIIC, Contractors	Approved garden plan	One off	EPMS, PMU	PMU, CIIC
	Employ/engage passionate gardeners who will easily detect problems that may lead to loss of soil.	PMU, CIIC, PNM Management	Procurement detail, CV	One off	PMU, PNM Management	PMU, CIIC

	Use chipped wood on garden surface to prevent direct rain impact causing soil to move away from the garden.	PMU, CIIC, Contractors	Approved garden plan	One off	EPMS, PMU	PMU, CIIC
	Decommissioning					
	After formation of gardens and grassing of areas the PNM Management to prepare a work plan for all gardened and grassed areas to ensure opportunities for soil going into the drainage system is prevented.	TTPBC, PMU, Contractors	Approved garden work plan	Quarterly	EPMS, PMU, PNM Management	PMU, CIIC
Corrective Action	If there are any changes to the approved garden and grassed areas plan, the following will be implemented: ▪ Refer the plan back to the design team to review with the view to protect the wellbeing of the marine environment, modify, if needed. Complaints will be addressed through the project Grievance Redress Mechanism					

7.6.4.6.2 Temporary increase in water use to make the grass and new plants grow

6. Top soil, grassing and planting						
Impact	ii. Temporary increase in water use to make the grass and new plants grow					
Objectives	Improve pedestrian access and experience from Avarua Township to the Airport as much practicable Rejuvenate landscaped areas and garden beds.					
Performance Criteria	Rejuvenate existing ecology and create more garden beds that incorporate low-maintenance, native plants and shrubs as much as possible. For safety reasons, consider short plants or shrubs that do not entirely obscure visitors or allow clear line of site throughout the park. Incorporate trees that don't have intrusive roots that may damage footpaths.					
Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight
	Pre-construction					
	Design team to include in the underground service lines a distribution system for gray water connected to gardens and grassed surfaces for irrigation purposes.	TTPBC, PMU, Contractors	Plan	One off	EPMS, PMU, Contractors	PMU, CIIC
	Construction					

	Install water conservation devices on garden and grassed surface areas to allow gardens to be nurtured especially for newly formed gardens and grassed areas.	TTPBC, PMU, Contractors	Plan	One off	EPMS, PMU, Contractors	PMU, CIIC
	Use plants that are ready and already growing including natural grass turfs.	TTPBC, PMU, Contractors	Plan	One off	EPMS, PMU, Contractors	PMU, CIIC
	Decommissioning					
	After formation of gardens and grassing of areas the PNM Management to prepare a work plan for all gardened and grassed areas to ensure efficient use of gray water for irrigation and the use of water conservation devices on the irrigation system.	PMU, CIIC, Contractors	Plan	Quarterly	EPMS, PMU, PNM Management	PMU, CIIC
Corrective Action	If there are any changes to the approved garden and grassed areas plan, the following will be implemented: ▪ Refer the plan back to the design team to review with the view to conserving water in the long term, modify, if needed. Complaints will be addressed through the project Grievance Redress Mechanism					

7.6.4.6.3 Bringing soil from elsewhere, especially acidic red soil have adverse effect on the marine environment if it reaches the sea, there is risk to the marine environment if this happens

6. Top soil, grassing and planting						
Impact	iii. Bringing soil from elsewhere, especially acidic red soil have adverse effect on the marine environment if it reaches the sea, there is risk to the marine environment if this happens					
Objectives	Improve pedestrian access and experience from Avarua Township to the Airport as much practicable Rejuvenate landscaped areas and garden beds.					
Performance Criteria	Rejuvenate existing ecology and create more garden beds that incorporate low-maintenance, native plants and shrubs as much as possible. For safety reasons, consider short plants or shrubs that do not entirely obscure visitors or allow clear line of site throughout the park. Incorporate trees that don't have intrusive roots that may damage footpaths.					
Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight

	Pre-construction					
	Design team to ensure gardens and grassed areas are well contained and separate from drainage systems to make it easier to detect that the garden structure has been broken which could result in heavy rain moving soil towards the drainage system.	PMU, CIIC, Contractors	Approved garden plan	One off	EPMS, PMU	PMU, CIIC
	Design team to include in the constructional plans of each component of the project that include excavation of land for all excavated soils or similar materials on site, if not reused on the site to be stockpiled and used for gardening purposes elsewhere in the project areas.	PMU, CIIC, Contractors	Approved constructional plan	One off	EPMS, PMU	PMU, CIIC
	Construction					
	Use constructional material on site for garden, e.g. soil from footing of the new toilet block at the Constitution Park, pathway remedial work along the Punanga Nui Drive, the underground service lines and compost from the PNM green waste dump at Panamā.	PMU, CIIC, Contractors	Approved constructional plan	One off	EPMS	PMU, CIIC
	Install paved surfaces between garden structure and drainage systems.	PMU, CIIC, Contractors	Approved garden plan	One off	EPMS	PMU, CIIC
	Use chipped wood on garden surface to prevent direct rain impact causing soil to move away from the garden.	PMU, CIIC, Contractors	Approved garden plan	One off	EPMS	PMU, CIIC
	Decommissioning					
	After formation of gardens and grassing of areas the PNM Management to prepare a work plan for all gardened and grassed areas to ensure opportunities for soil going into the drainage system is prevented.	PMU, CIIC, Contractors	Approved garden work plan	Quarterly	EPMS	PMU, CIIC
Corrective Action	If there are any changes to the approved garden and grassed areas plan, the following will be implemented: ▪ Refer the plan back to the design team to review with the view to protect the wellbeing of the marine environment, modify, if needed. Complaints will be addressed through the project Grievance Redress Mechanism					

7.6.4.6.4 Ongoing maintenance cost issues to maintain gardens

6. Top soil, grassing and planting						
Impact	iv. High maintenance cost to maintain gardens					
Objectives	Improve pedestrian access and experience from Avarua Township to the Airport as much practicable Rejuvenate landscaped areas and garden beds.					
Performance Criteria	Rejuvenate existing ecology and create more garden beds that incorporate low-maintenance, native plants and shrubs as much as possible. For safety reasons, consider short plants or shrubs that do not entirely obscure visitors or allow clear line of site throughout the park. Incorporate trees that don't have intrusive roots that may damage footpaths.					
Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight
	Pre-construction					
	Design team to prepare for the procurement for employing/engaging persons that are passionate and knowledgeable about gardening. Do not engage persons just to give them a job!	TTPBC, PMU, PNM Management	Procurement detail, CV	One off	EPMS, PMU, PNM Management	PMU, CIIC
	Construction					
	Engage persons that are passionate and knowledgeable about gardening and can keep gardens growing, through regular maintenance, e.g. watered and plants pruned to prevent overgrowing	PMU, PNM Management	Procurement detail, CV	One off	EPMS, PMU, PNM Management	PMU, CIIC
	Use species that are easy to maintain, self-pruning, low and does not cover large areas.	TTPBC, PMU, PNM Management	Plan	One off	EPMS, PMU, PNM Management	PMU, CIIC
	Engage by way of contractors a team to maintain trees and keep them low.'	PMU, CIIC, PNM Management	Procurement detail, CV	One off	EPMS, PMU, PNM Management	PMU, CIIC

	Decommissioning					
	After formation of gardens and grassing of areas the PNM Management to prepare a work plan for all gardened and grassed areas to ensure no expensive tree trimming or garden reconstruction is required.	PMU, CIIC, Contractors	Approved garden work plan	Quarterly	EPMS, PMU, PNM Management	PMU, CIIC
Corrective Action	If there are any changes to the approved garden and grassed areas plan, the following will be implemented: ▪ Refer the plan back to the design team to review with the view to keep the maintenance costs of gardens and grassed surfaces at a minimal by using best environmental practices, modify, if needed. Complaints will be addressed through the project Grievance Redress Mechanism					

7.6.4.8 Building construction of new toilet block at Constitution Park

7.6.4.8.1 Non-performance of upgraded wastewater system

	8. Building construction of new toilet block at Constitution Park					
Impact	i. Non-performance of upgraded wastewater system					
Objectives	Construct public toilet at Constitution Park.					
Performance Criteria	To include: Baby changing room and storage for cleaning products Toilet for the disability that is easy to access throughout Weatherproof with comfortable waiting areas Facilities for both men and women Appropriately landscaped gardens around the outside for a warm and welcoming ambience.					
Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight
	Pre-construction					
	Complete application for Sewage Construction Permit under the Public Health (Sewage and Wastewater Treatment and Disposal) Regulations 2014.	PMU, CIIC, Waste Water Engineer	Application and Permit	One off	EPMS, PMU	PMU, CIIC

	Complete application for building permit under the Building Code and Standards Act 1991 and take into account of review of Act by EMCI.	PMU, CIIC, Waste Water Engineer	Application and Permit	One off	EPMS, PMU	PMU, CIIC
	Construction					
	Construction as per permit and appropriate inspectors on site during construction (relevant times)	Waste Water Engineer, Building Inspector, Health Inspector PMU, CIIC	Approved Permits	Prior to, during and decommissioning	EPMS, WWE, Building Inspector, Health Inspector, PMU	PMU, CIIC
	Decommissioning					
	After installation and sign off with the appropriate authorities, the waste water engineer to provide regular monitoring report to facility management and one after every major event where the use of the facility would most likely peak.	PMU, CIIC	Approved Permits and monitoring reports	As per Agreement with wastewater engineer	EPMS, WWE, PMU	PMU, CIIC
Corrective Action	If the system shows sign of non-functioning, the following will be implemented: ▪ Re-evaluate the potential risks and chances of happening again including increased cost of maintenance, modify and repair, if required. Complaints will be addressed through the project Grievance Redress Mechanism					

7.6.4.8.2 Septic stench in the public area, as was common in the past as a result of lack of monitoring and maintenance

8. Building construction of new toilet block at Constitution Park	
Impact	ii. Septic stench in the public area, as was common in the past as a result of lack of monitoring and maintenance
Objectives	Construct public toilet at Constitution Park.
Performance Criteria	To include: Baby changing room and storage for cleaning products Toilet for the disability that is easy to access throughout Weatherproof with comfortable waiting areas

	Facilities for both men and women Appropriately landscaped gardens around the outside for a warm and welcoming ambience.					
Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight
	Pre-construction					
	As part of the applications to the Public Health and Building Inspectors, CIIC to enter into an agreement with the wastewater engineer engaged to carry our regular monitoring of the system used and one after every major event where the use of the facility would most likely peak	CIIC and wastewater engineer (WWE)	Sewage Construction Permit and agreement between WWE and CIIC	As per agreement	EPMS, Facility Manager	PMU, CIIC
	Construction					
	Carry out system monitoring as per agreement	CIIC and WWE	AS per agreement	As per agreement	EPMS, PMU	PMU, CIIC
	Ensure Budget allocations through national Government Budget	PMU, CIIC	Annual Budget Document	Annually	EPMS, PMU	PMU, CIIC
	Decommissioning					
	After the agreement is signed and monitoring starts the WWE, EPMS and Facility Manager to be in communication, Where the facility Manager is not knowledgeable about wastewater systems, capacity building will be initiated after his/her appointment	CIIC	Communication records, CV	Quarterly	EPMS, CIIC and Facility Manager	PMU, CIIC
Corrective Action	If site the stench continues, the following will be implemented: ▪ Re-evaluate the performance of the parties involved, review and modify if required. Complaints will be addressed through the project Grievance Redress Mechanism					

7.6.4.8.3 Damage from natural hazards

8. Building construction of new toilet block at Constitution Park

<table>
<tr><td>Impact</td><td colspan="6">iii. Damage from natural hazards</td></tr>
<tr><td>Objectives</td><td colspan="6">Construct public toilet at Constitution Park.</td></tr>
<tr><td>Performance Criteria</td><td colspan="6">To include:
Baby changing room and storage for cleaning products
Toilet for the disability that is easy to access throughout
Weatherproof with comfortable waiting areas
Facilities for both men and women
Appropriately landscaped gardens around the outside for a warm and welcoming ambience.</td></tr>
<tr><td rowspan="8">Mitigating Measures</td><td></td><td>Implementation</td><td>Monitoring Parameter</td><td>Monitoring Frequency</td><td>Monitoring Responsibility</td><td>Oversight</td></tr>
<tr><td colspan="6">Pre-construction</td></tr>
<tr><td>Design options need to be explored on the basis of how easy it is to remove and reinstall in the case of a natural disaster, e.g. before and after a cyclone.</td><td>PMU, Contractors, CIIC</td><td>Construction plans</td><td>One off</td><td>EPMS, PMU, Contractors</td><td>PMU, CIIC</td></tr>
<tr><td>Design and construction of building must follow the approved plans under the Building Control and Standards Act 1991 and the Public Health Act 2004.</td><td>PMU, Contractors, CIIC</td><td>Construction plans</td><td>One off</td><td>EPMS, PMU, Contractors</td><td>PMU, CIIC</td></tr>
<tr><td colspan="6">Construction</td></tr>
<tr><td>Wastewater system to follow construction plans approved by ICI and Public Health.</td><td>PMU, Contractors, CIIC, ICI</td><td>Construction plans</td><td>One off</td><td>EPMS, PMU, Contractors, ICI</td><td>PMU, CIIC</td></tr>
<tr><td colspan="6">Decommissioning</td></tr>
<tr><td>After the construction is completed, a completion certificate must be signed off by the Contractors that built the building and Contractors that build the wastewater system to guarantee their durability and functionality under hazard conditions.</td><td>PMU, CIIC, Contractors, ICI and Te Marae Ora.</td><td>Construction Plans and completion report.</td><td>After construction</td><td>EPMS, PMU, CIIC</td><td>PMU, CIIC</td></tr>
<tr><td>Corrective Action</td><td colspan="6">If site the wastewater system shows sign of non-functioning, the following will be implemented:
▪ Re-evaluate the potential risks and chances of happening again including increased cost of maintenance, repair if required.
Complaints will be addressed through the project Grievance Redress Mechanism</td></tr>
</table>

7.6.4.9 Central wastewater treatment system for toilet facility and market huts

7.6.4.9.1 Non-performance of upgraded wastewater system

9. Central wastewater treatment system for toilet facility and market huts						
Impact	i. Non-performance of upgraded wastewater system					
Objectives	Construct public toilet at Constitution Park.					
Performance Criteria	To include: Baby changing room and storage for cleaning products Toilet for the disability that is easy to access throughout Weatherproof with comfortable waiting areas Facilities for both men and women Appropriately landscaped gardens around the outside for a warm and welcoming ambience.					
Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight
	Pre-construction					
	Complete application for Sewage Construction Permit under the Public Health (Sewage and Wastewater Treatment and Disposal) Regulations 2014.	PMU, CIIC, Waste Water Engineer	Application and Permit	One off	EPMS, PMU	PMU, CIIC
	Complete application for building permit under the Building Code and Standards Act 1991 and take into account of review of Act by EMCI.	PMU, CIIC, Waste Water Engineer	Application and Permit	One off	EPMS, PMU	PMU, CIIC
	Construction					
	Construction as per permit and appropriate inspectors on site during construction (relevant times)	Waste Water Engineer, Building Inspector, Health Inspector PMU, CIIC	Approved Permits	Prior to, during and decommissioning	EPMS, WWE, Building Inspector, Health Inspector, PMU	PMU, CIIC

	Decommissioning					
	After installation and sign off with the appropriate authorities, the waste water engineer to provide regular monitoring report to facility management and one after every major event where the use of the facility would most likely peak.	PMU, CIIC	Approved Permits and monitoring reports	As per Agreement with wastewater engineer	EPMS, WWE, PMU	PMU, CIIC
Corrective Action	If site the system shows sign of non-functioning, the following will be implemented: ▪ Re-evaluate the potential risks and chances of happening again including increased cost of maintenance or repair if required. Complaints will be addressed through the project Grievance Redress Mechanism					

7.6.4.9.2 Maintenance cost issues to maintain the amenity and to support ongoing monitoring by wastewater engineer

9. *Central wastewater treatment system for toilet facility and market huts*						
Impact	ii. High maintenance cost to maintain the amenity support ongoing monitoring by wastewater engineer					
Objectives	Construct public toilet at Constitution Park.					
Performance Criteria	To include: Baby changing room and storage for cleaning products Toilet for the disability that is easy to access throughout Weatherproof with comfortable waiting areas Facilities for both men and women Appropriately landscaped gardens around the outside for a warm and welcoming ambience.					
Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight
	Pre-construction					
	As part of the applications to the Public Health and Building Inspectors, CIIC to enter into an agreement with the wastewater engineer engaged to carry our regular monitoring of the system used and one after every major event where the use of the facility would most likely peak	CIIC and wastewater engineer (WWE)	Sewage Construction Permit and agreement between WWE and CIIC	As per agreement	EPMS, Facility Manager	PMU, CIIC

	Construction					
	Carry out system monitoring as per agreement	CIIC and WWE	AS per agreement	As per agreement	EPMS, PMU	PMU, CIIC
	Ensure Budget allocations through national Government Budget	PMU, CIIC	Annual Budget Document	Annually	PMU, CIIC	PMU, CIIC
	Decommissioning					
	After the agreement is signed and monitoring starts the WWE, EPMS and Facility Manager to be in communication, Where the facility Manager is not knowledgeable about wastewater systems, capacity building will be initiated after his/her appointment	CIIC	Communication records, CV	Quarterly	EPMS, Facility Manager	PMU, CIIC
Corrective Action	If site the system shows sign of non-functioning, the following will be implemented: ▪ Re-evaluate the performance of the parties involved, review and modify if required. Complaints will be addressed through the project Grievance Redress Mechanism					

7.6.4.9.3 Septic stench in the public area, as was common in the past as a result of lack of monitoring and maintenance

9. Central wastewater treatment system for toilet facility and market huts						
Impact	iii. Septic stench in the public area, as was common in the past as a result of lack of monitoring and maintenance					
Objectives	Construct public toilet at Constitution Park.					
Performance Criteria	To include: Baby changing room and storage for cleaning products Toilet for the disability that is easy to access throughout Weatherproof with comfortable waiting areas Facilities for both men and women Appropriately landscaped gardens around the outside for a warm and welcoming ambience.					
Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight
	Pre-construction					

	As part of the applications to the Public Health and Building Inspectors, CIIC to enter into an agreement with the wastewater engineer engaged to carry our regular monitoring of the system used and one after every major event where the use of the facility would most likely peak	CIIC and wastewater engineer (WWE)	Sewage Construction Permit and agreement between WWE and CIIC	As per agreement	EPMS, Facility Manager	PMU, CIIC
	Construction					
	Carry out system monitoring as per agreement	CIIC and WWE	AS per agreement	As per agreement	EPMS, PMU	PMU, CIIC
	Ensure Budget allocations through national Government Budget	PMU, CIIC	Annual Budget Document	Annually	PMU, CIIC	PMU, CIIC
	Decommissioning					
	After the agreement is signed and monitoring starts the WWE, EPMS and Facility Manager to be in communication, Where the facility Manager is not knowledgeable about wastewater systems, capacity building will be initiated after his/her appointment	CIIC	Communication records, CV	Quarterly	EPMS, Facility Manager	PMU, CIIC
Corrective Action	If the stench continues, the following will be implemented: ▪ Re-evaluate the performance of the parties involved, review and modify if required. Complaints will be addressed through the project Grievance Redress Mechanism					

7.6.4.9.4 Damage from natural hazards

9. Central wastewater treatment system for toilet facility and market huts	
Impact	iv. Damage from natural hazards
Objectives	Construct public toilet at Constitution Park.
Performance Criteria	To include: Baby changing room and storage for cleaning products

	Toilet for the disability that is easy to access throughout Weatherproof with comfortable waiting areas Facilities for both men and women Appropriately landscaped gardens around the outside for a warm and welcoming ambience.					
Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight
	Pre-construction					
	Design options need to be explored on the basis of how easy it is to remove and reinstall in the case of a natural disaster, before and after a cyclone.	PMU, Contractors, CIIC	Construction plans	One off	EPMS, PMU, Contractors	PMU, CIIC
	Design and construction of building must follow the approved plans under the Building Control and Standards Act 1991 and the Public Health Act 2004.	PMU, Contractors, CIIC	Construction plans	One off	EPMS, PMU, Contractors	PMU, CIIC
	Construction					
	Wastewater system to follow construction plans approved by ICI and Public Health.	PMU, Contractors, CIIC, ICI	Construction plans	One off	EPMS, PMU, Contractors, ICI	PMU, CIIC
	Decommissioning					
	After the construction is completed, a completion certificate must be signed off by the Contractors that built the building and Contractors that build the wastewater system to guarantee their durability and functionality under hazard conditions.	PMU, CIIC, Contractors, ICI and Te Marae Ora.	Construction Plans and completion report.	After construction	EPMS, PMU	PMU, CIIC
Corrective Action	If the wastewater system shows sign of non-functioning, the following will be implemented: ▪ Re-evaluate the potential risks and chances of happening again including increased cost of maintenance, repair if required. Complaints will be addressed through the project Grievance Redress Mechanism					

7.6.4.10 Accessibility paving

7.6.4.10.1 Poor quality work to poor workmanship

10. Accessibility paving						
Impact	i. Poor quality work due to poor workmanship					
Objectives	Improve pedestrian access and experience from Avarua Township to the Airport as much practicable					
Performance Criteria	Improve existing footpaths within the Avarua Township area. Add pedestrian crossing that connects the garden islands to the footpath that extends from the Avarua Harbour to the PNM. Construct a permeable footpath and cycle-way from the western end of the Avatiu harbour to the end of the Panamā Reserve (Catholic cemetery).					
Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight
	Pre-construction					
	The procurement process to be adhered to so that the best contractor on the island for this work is engaged	PMU, CIIC	Procurement process	One off	EPMS, PMU	PMU, CIIC
	Prepare constructional plan approved by ICI	PMU, CIIC, ICI, Contractor	Constructional Plan	One Off	EPMS, PMU, ICI	PMU, CIIC, ICI
	Construction					
	Appropriate HS measures for PNM staff and the contractors.	PMU, CIIC, Small Works Contractor	Appropriate PPE	During construction	EPMS, PMU	PMU, CIIC
	Carry out paving as per constructional plan	PMU, CIIC, ICI, Contractors	Constructional Plan	During construction	EPMS, PMU, ICI	PMU, CIIC
	Decommissioning					
	After construction work complete the required landscaping work.	PMU, CIIC	Report	Completion Report	EPMS, PMU, Contractor	PMU, CIIC
Corrective Action	If workmanship is not to standard required, the following will be implemented: ▪ Re-evaluate the constructional plan, modify and redo if required. Complaints will be addressed through the project Grievance Redress Mechanism					

7.6.4.10.2 Damage from natural hazards

10. Accessibility paving						
Impact	ii. Damage from natural hazards					
Objectives	Improve pedestrian access and experience from Avarua Township to the Airport as much practicable					
Performance Criteria	Improve existing footpaths within the Avarua Township area. Add pedestrian crossing that connects the garden islands to the footpath that extends from the Avarua Harbour to the PNM. Construct a permeable footpath and cycle-way from the western end of the Avatiu harbour to the end of the Panamā Reserve (Catholic cemetery).					
Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight
	Pre-construction					
	The procurement process to be adhered to so that the best contractor on the island for this work is engaged	PMU, CIIC	Procurement process	One off	EPMS, PMU	PMU, CIIC
	Prepare constructional plan approved by ICI	PMU, CIIC, ICI, Contractor	Constructional Plan	One Off	EPMS, PMU, ICI	PMU, CIIC, ICI
	Construction					
	Appropriate HS measures for PNM staff and the contractors.	PMU, CIIC, Small Works Contractor	Appropriate PPE	During construction	EPMS, PMU	PMU, CIIC
	Carry out paving as per constructional plan	PMU, CIIC, ICI, Contractors	Constructional Plan	During construction	EPMS, PMU, ICI	PMU, CIIC
	Decommissioning					
	After the construction is completed, a completion certificate must be signed off by the Contractors to guarantee their durability and functionality under hazard conditions.	PMU, CIIC, Contractors, ICI and Te Marae Ora.	Construction Plans and completion report.	After construction	EPMS, PMU	PMU, CIIC
Corrective Action	If workmanship is not to standard required, the following will be implemented: ▪ Re-evaluate the constructional plan, modify and redo if required.					

	Complaints will be addressed through the project Grievance Redress Mechanism

7.6.4.11 Asphalt extension, remarking and signage of large carpark at PNM entrance

7.6.4.11.1 Temporary disruption of the PNM during Asphalt extension work if carried during normal working hours

11. Asphalt extension, remarking and signage of large carpark at PNM entrance						
Impact	i. Temporary disruption of the PNM during Asphalt extension work if carried during normal working hours					
Objectives	Minimize traffic congestion by implementing a suitable and effective traffic management plan.					
Performance Criteria	Provide adequate parking space for vehicles.					
Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight
	Pre-construction					
	Planned relocation will include the following: take place after the new playground is completed, the old playground deconstructed, and the new site where the old playground is prepared; engage the service of professional small works contractors who will plan the move during the week and before Friday; appropriate HS measures will be used for PNM staff, small works contractors, the general public and the owners of the buildings; hazards and risks sign boards on both sites to inform those concern, thorough coordination of stakeholders by PMU, and at least a week of public notice through the main mediums of communication, e.g. TV, radio, Newspapers and appropriate Social Media outlet; and relocation would take place after hours, preferably at dawn to avoid early traffic on the main road and when the weather is fine and no rain (after April where).	PMU, ICI, Management of PNM.	Buildings to be relocated, prepared sites, small works contractors agreement, hazards and risks boards, communication information	During Design and planning	EPMS, PMU	PMU, CIIC
	Construction					

	Appropriate HS measures for PNM staff and the contractors.	PMU, CIIC, Small Works Contractor	Appropriate PPE	During Move	EPMS, PMU	PMU, CIIC
	Hazards and risks sign boards on site to inform those concern, thorough coordination of stakeholders by PMU, and at least a week of public notice through the main mediums of communication, e.g. TV, radio, Newspapers and appropriate Social Media outlet	PMU, CIIC, Small Works Contractor	Communication Information	Two weeks before move and during move	EPMS, PMU	PMU, CIIC
	Decommissioning					
	After the asphalt work the surrounding areas will be re-landscaped, paved and existing infrastructure revamped to a state that is functional and complies with local standards and regulations	PMU, CIIC	Report	Completion Report	EPMS, PMU, Contractor	PMU, CIIC
Corrective Action	If there are issues with the revamping of existing infrastructure (to tie in with the installation of the underground services planned to improve and group similar service lines to ease servicing and maintenance) to enable the parking area to be used by vendors during other events, the following will be implemented: ▪ Review revamping exercise with be carried out with the view to align to the planned underground service line installation, modify and implement changes, if required. Complaints will be addressed through the project Grievance Redress Mechanism					

7.6.4.11.2 Poor quality work due to poor workmanship

11. Asphalt extension, remarking and signage of large carpark at PNM entrance						
Impact	ii. Poor quality work due to poor workmanship					
Objectives	Minimize traffic congestion by implementing a suitable and effective traffic management plan.					
Performance Criteria	Provide adequate parking space for vehicles.					
Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight

	Pre-construction					
	The procurement process to be adhered to so that the best contractor on the island for this work is engaged.	PMU, CIIC	Experienced with examples of work	One off	PMU, CIIC	PMU, CIIC
	Prepare asphalt constructional plan programme and approved by ICI	PMU, CIIC, ICI, Contractor	Asphalt work plan	One Off	EPMS, PMU, ICI	PMU, CIIC, ICI
	Construction					
	Appropriate HS measures for PNM staff and the contractors.	PMU, CIIC, Small Works Contractor	Appropriate PPE	During construction	EPMS, PMU	PMU, CIIC
	Carry out asphalt work as per constructional plan	Contractors	Constructional Plan	During construction	EPMS, PMU	PMU, CIIC
	Decommissioning					
	After asphalt work mark parking area with the required signage including for HS and disability parking spaces.	PMU, CIIC, Contractor, ICI	Report	Completion Report	EPMS, PMU, Contractor, ICI	PMU, CIIC
Corrective Action	If site or any part of the asphalt work poses risks to users or the landscape is inappropriate, the following will be implemented: ▪ Re-evaluate the potential risks to users and modify if required. Complaints will be addressed through the project Grievance Redress Mechanism					

7.6.4.11.3 Damage from natural hazards

11. Asphalt extension, remarking and signage of large carpark at PNM entrance						
Impact	iii. Damage from natural hazards					
Objectives	Minimize traffic congestion by implementing a suitable and effective traffic management plan.					
Performance Criteria	Provide adequate parking space for vehicles.					
Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight

	Pre-construction					
	Design and construction must follow the appropriate standard for such work (New Zealand and Australian Standards as per the advice of ICI road engineers)	PMU, Contractors, CIIC, ICI	Construction plans	One off	EPMS, PMU, Contractors, ICI	PMU, CIIC
	Construction					
	Appropriate HS measures for PNM staff and the contractors.	PMU, CIIC, Small Works Contractor	Appropriate PPE	During construction	EPMS, PMU	PMU, CIIC
	Carry out asphalt work as per constructional plan	Contractors	Constructional Plan	During construction	EPMS, PMU	PMU, CIIC
	Decommissioning					
	After the construction is completed, a completion certificate must be signed off by the Contractors to guarantee their durability and functionality under hazard conditions. Carry out the required signage including for HS and disability parking spaces.	PMU, CIIC, Contractor, ICI	Report	Completion Report	EPMS, PMU, Contractor, ICI	PMU, CIIC
Corrective Action	If site or any part of the asphalt work poses risks to users or the landscape is inappropriate, the following will be implemented: ▪ Re-evaluate the potential risks to users and modify is required. Complaints will be addressed through the project Grievance Redress Mechanism					

7.6.4.12 Paving of pollards of walkways

7.6.4.12.1 Poor quality work due to poor workmanship

12. Paving of pollards of walkways	
Impact	i. Poor quality work due to poor workmanship
Objectives	Improve pedestrian access and experience from Avarua Township to the Airport as much practicable
Performance Criteria	Improve existing footpaths within the Avarua Township area. Add pedestrian crossing that connects the garden islands to the footpath that extends from the Avarua Harbour to the PNM.

	Construct a permeable footpath and cycle-way from the western end of the Avatiu harbour to the end of the Panamā Reserve (Catholic cemetery).					
Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight
	Pre-construction					
	The procurement process to be adhered to so that the best contractor on the island for this work is engaged	PMU, CIIC	Procurement process	One off	PMU	PMU, CIIC
	Prepare constructional plan approved by ICI	PMU, CIIC, ICI, Contractor	Constructional Plan	One Off	EPMS, PMU, ICI	PMU, CIIC, ICI
	Construction					
	Appropriate HS measures for PNM staff and the contractors.	PMU, CIIC, Small Works Contractor	Appropriate PPE	During construction	EPMS, PMU	PMU, CIIC
	Carry out paving as per constructional plan	PMU, CIIC, ICI, Contractors	Constructional Plan	During construction	EPMS, PMU, ICI	PMU, CIIC
	Decommissioning					
	After construction work is completed landscape work will be carried out.	PMU, CIIC	Report	Completion Report	EPMS, PMU, Contractor	PMU, CIIC
Corrective Action	If workmanship is not to the standard required, the following will be implemented: ▪ Re-evaluate the constructional plan, modify and redo if required. Complaints will be addressed through the project Grievance Redress Mechanism					

7.6.4.12.2 Damage from natural hazards

12. Paving of pollards of walkways	
Impact	ii. Damage from natural hazards
Objectives	Improve pedestrian access and experience from Avarua Township to the Airport as much practicable

Performance Criteria	Improve existing footpaths within the Avarua Township area. Add pedestrian crossing that connects the garden islands to the footpath that extends from the Avarua Harbour to the PNM. Construct a permeable footpath and cycle-way from the western end of the Avatiu harbour to the end of the Panamā Reserve (Catholic cemetery).					
Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight
	Pre-construction					
	Design and construction must follow the appropriate standard for such work (New Zealand and Australian Standards as per the advice of ICI road engineers.	PMU, Contractors, CIIC, ICI	Construction plans	One off	EPMS, PMU, Contractors, ICI	PMU, CIIC
	Design options need to be explored on the basis of how easy it is to reconstruct after a hazard, e.g. cyclone.	PMU, Contractors, CIIC	Construction plans	One off	EPMS, PMU, Contractors	PMU, CIIC
	Construction					
	Appropriate HS measures for PNM staff and the contractors.	PMU, CIIC, Small Works Contractor	Appropriate PPE	During construction	EPMS, PMU	PMU, CIIC
	Carry out paving as per constructional plan	PMU, CIIC, ICI, Contractors	Constructional Plan	During construction	EPMS, PMU, ICI	PMU, CIIC
	Decommissioning					
	After the construction is completed, a completion certificate must be signed off by the Contractors to guarantee their durability and functionality under hazard conditions. Carry out the required landscape work.	PMU, CIIC	Report	Completion Report	EPMS, PMU, Contractor	PMU, CIIC
Corrective Action	If workmanship is not to standard required, the following will be implemented: ▪ Re-evaluate the constructional plan, modify and redo if required. Complaints will be addressed through the project Grievance Redress Mechanism					

7.6.5 Output 4b – Traffic Management, pedestrian safety, convenient bust stop/pick up, and visitor drop off and pick up

7.6.5.1 PNM – Minimize traffic congestion along Main Road and around PNM

7.6.5.1.1 Temporary disruption to current traffic movement in problem areas identified during testing of traffic management plan

1. Minimize traffic congestion along the main road and around PNM						
Impact	i. Temporary disruption to current traffic movement in problem areas identified during testing of traffic management plan					
Objectives	Minimize traffic congestion by implementing a suitable and effective traffic management plan.					
Performance Criteria	Implement and police an effective traffic management plan.					
Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight
	Pre-construction					
	PMU to work with stakeholders (Police, ICI, MOT, Te Marae Ora, Cook's Buses, and Representative of Tour Groups) on how the test to minimize traffic congestion along the main road and around the PNM will be carried out.	PMU and stakeholders	Traffic Management Plan	One off	PMU and stakeholders	PMU, CIIC
	Preparation of public information on the test by PMU, and at least a week of public notice should be planned for release through the main mediums of communication, e.g. TV, radio, Newspapers and appropriate Social Media outlet.	PMU and stakeholders, communications expert	Prepared Public Information	One off	PMU and stakeholders, communication expert	PMU, CIIC
	Plan the test to take place during the week starting on a Monday to give a 5 day lead to the peak market day on Saturday.	PMU and stakeholders	Traffic Management Plan	One off	PMU and stakeholders	PMU, CIIC
	HS preparatory work to include appropriate HS measures for traffic officers and appropriate signage at strategic points (to be determined by the Police) once the scenarios are confirmed.	PMU and stakeholders	Traffic Management Plan	One off	PMU and stakeholders	PMU, CIIC
	Construction					

	Carry out the test to allow the traffic to get use to the preferred scenarios, i.e. a. No "right-turn" at main entrance, b. a 30km zone between Avatiu and Avarua roundabouts, c. one-way/single lane entry into the PNM, d. 2 exit point for delivery vehicles only at the PNM	PMU, stakeholders, Police	Traffic Management Plan	Daily	PMU, CIIC, Police	PMU, CIIC
	Release public information on the test at least a week of public notice through the main mediums of communication, e.g. TV, radio, Newspapers and appropriate Social Media outlet.	PMU and stakeholders, communications expert	Prepared Public Information	One off	PMU and stakeholders, communication expert	PMU, CIIC
	Decommissioning					
	As per Traffic Management Plan	PMU and stakeholders	Traffic Management Plan	One off	PMU and stakeholders	PMU, CIIC
Corrective Action	Monitor progress of activities taken and report to the PMU and stakeholders with the view to improve flow and maintain a high level of HS, If there are ongoing issues, following will be implemented: ▪ Review traffic management plan, with the view to improve the flow and maintain a high level of HS, modify and redo if required. Complaints will be addressed through the project Grievance Redress Mechanism					

7.6.5.1.2 Risk to the public if HS practices are not followed

1. Minimize traffic congestion along the main road and around PNM						
Impact	ii. Risk to the public if HS practices are not followed					
Objectives	Minimize traffic congestion by implementing a suitable and effective traffic management plan.					
Performance Criteria	Implement and police an effective traffic management plan.					
Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight
	Pre-construction					

	PMU to work with stakeholders (Police, ICI, MOT, Te Marae Ora, Cook's Buses, and Representative of Tour Groups) on how the test to minimize traffic congestion along the main road and around the PNM will be carried out.	PMU and stakeholders	Traffic Management Plan	One off	PMU and stakeholders	PMU, CIIC
	Preparation of public information on the test by PMU, and at least a week of public notice should be planned for release through the main mediums of communication, e.g. TV, radio, Newspapers and appropriate Social Media outlet.	PMU and stakeholders, communications expert	Prepared Public Information	One off	PMU and stakeholders, communication expert	PMU, CIIC
	HS preparatory work to include appropriate HS measures for traffic officers and appropriate signage at strategic points (to be determined by the Police) once the scenarios are confirmed.	PMU and stakeholders	Traffic Management Plan	One off	PMU and stakeholders	PMU, CIIC
	Construction					
	Release public information on the test at least a week of public notice through the main mediums of communication, e.g. TV, radio, Newspapers and appropriate Social Media outlet.	PMU and stakeholders, communications expert	Prepared Public Information	One off	PMU and stakeholders, communication expert	PMU, CIIC
	Decommissioning					
	As per Traffic Management Plan	PMU and stakeholders	Traffic Management Plan	One off	PMU and stakeholders	PMU, CIIC
Corrective Action	Monitor progress of activities taken and report to the PMU and stakeholders with the view to maintain a high level of HS, If there are ongoing issues, following will be implemented: ▪ Review traffic management plan, with the view maintain a high level of HS, modify and redo if required. Complaints will be addressed through the project Grievance Redress Mechanism					

7.6.5.1.3 Frequent visitors to PNM will be inconvenienced

1. **Minimize traffic congestion along the main road and around PNM**

Impact	iii. Frequent visitors to the PNM will be inconvenienced					
Objectives	Minimize traffic congestion by implementing a suitable and effective traffic management plan.					
Performance Criteria	Implement and police an effective traffic management plan.					
Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight
	Pre-construction					
	Preparation of public information on the test by PMU, and at least a week of public notice should be planned for release through the main mediums of communication, e.g. TV, radio, Newspapers and appropriate Social Media outlet.	PMU and stakeholders, communications expert	Prepared Public Information	One off	PMU and stakeholders, communication expert	PMU, CIIC
	HS preparatory work to include appropriate HS measures for traffic officers and appropriate signage at strategic points (to be determined by the Police) once the scenarios are confirmed.	PMU and stakeholders	Traffic Management Plan	One off	PMU and stakeholders	PMU, CIIC
	Preparation of public information on the test by PMU, and at least a week of public notice should be planned for release through the main mediums of communication, e.g. TV, radio, Newspapers and appropriate Social Media outlet.	PMU and stakeholders, communications expert	Prepared Public Information	One off	PMU and stakeholders, communication expert	PMU, CIIC
	Construction					
	Release public information on the test at least a week of public notice through the main mediums of communication, e.g. TV, radio, Newspapers and appropriate Social Media outlet.	PMU and stakeholders, communications expert	Prepared Public Information	One off	PMU and stakeholders, communication expert	PMU, CIIC
	Decommissioning					
	As per Traffic Management Plan	PMU and stakeholders	Traffic Management Plan	One off	PMU and stakeholders	PMU, CIIC
Corrective Action	Monitor progress of activities taken and report to the PMU and stakeholders with the view to maintain a high level of HS, If there are ongoing issues, following will be implemented:					

	▪ Review traffic management plan, with the view maintain a high level of HS, modify and redo if required. Complaints will be addressed through the project Grievance Redress Mechanism

7.6.5.2 PNM – Health and Safety at pedestrian crossing

7.6.5.2.1 Temporary disruption to current chaotic practice in problem areas identified during testing pedestrian crossing options

2. Health and safety at pedestrian crossing						
Impact	i. Temporary disruption to current chaotic practice in problem areas identified during testing pedestrian crossing options					
Objectives	Improve pedestrian access and experience from Avarua Township to the Airport as much practicable.					
Performance Criteria	Improve existing footpaths within the Avarua Township area. Add pedestrian crossing that connects the garden islands to the footpath that extends from the Avarua Harbour to the PNM.					
Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight
	Pre-construction					
	PMU to work with stakeholders (Police, ICI, MOT, CINDC and Te Marae Ora) on how the test to provide HS at pedestrian crossing will be carried out. The test Pedestrian crossing objectives include: a. Provide safe Pedestrian crossing; b. Provide pedestrian crossing where practicable; c. Improve pedestrian access from Avarua Township to the Airport, as much practicable.	PMU and stakeholders	Traffic Management Plan	One off	PMU and stakeholders	PMU, CIIC
	Preparation of public information on the test by PMU, and at least a week of public notice should be planned for release through the main mediums of communication, e.g. TV, radio, Newspapers and appropriate Social Media outlet.	PMU and stakeholders, communications expert	Prepared Public Information	One off	PMU and stakeholders, communication expert	PMU, CIIC

	HS preparatory work to include appropriate HS measures for traffic officers and appropriate signage at strategic points (to be determined by the Police) once the scenarios are confirmed.	PMU and stakeholders	Traffic Management Plan	One off	PMU and stakeholders	PMU, CIIC
	Preparation of public information on the test by PMU, at the sites marked in the proposal and at least a week of public notice should be planned for release through the main mediums of communication, e.g. TV, radio, Newspapers and appropriate Social Media outlet.	PMU and stakeholders, communications expert	Prepared Public Information	One off	PMU and stakeholders, communication expert	PMU, CIIC
	Construction					
	Carry out the test to allow the traffic to get use to the preferred crossing sites marked in the proposed works with the following objectives: a. Provide safe Pedestrian crossing; b. Provide pedestrian crossing where practicable; c. Improve pedestrian access from Avarua Township to the Airport, as much practicable.	PMU, stakeholders, Police	Traffic Management Plan	Daily	PMU, CIIC, Police	PMU, CIIC
	Release public information on the test at least a week of public notice through the main mediums of communication, e.g. TV, radio, Newspapers and appropriate Social Media outlet.	PMU and stakeholders, communications expert	Prepared Public Information	One off	PMU and stakeholders, communication expert	PMU, CIIC
	Decommissioning					
	As per Traffic Management Plan	PMU and stakeholders	Traffic Management Plan	One off	PMU and stakeholders	PMU, CIIC
Corrective Action	Monitor progress of activities taken and report to the PMU and stakeholders with the view to maintain a high level of HS, If there are ongoing issues, following will be implemented: ▪ Review traffic management plan, with the view maintain a high level of HS, modify and redo if required. Complaints will be addressed through the project Grievance Redress Mechanism					

7.6.5.2.2 Risk to the public if HS practices are not followed

2. Health and safety at pedestrian crossing						
Impact	ii. Risk to the public if HS practices are not followed					
Objectives	Improve pedestrian access and experience from Avarua Township to the Airport as much practicable.					
Performance Criteria	Improve existing footpaths within the Avarua Township area. Add pedestrian crossing that connects the garden islands to the footpath that extends from the Avarua Harbour to the PNM.					
Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight
	Pre-construction					
	PMU to work with stakeholders (Police, ICI, MOT, CINDC and Te Marae Ora) on how the test to provide HS at pedestrian crossing will be carried out. The test Pedestrian crossing objectives include: a. Provide safe Pedestrian crossing; b. Provide pedestrian crossing where practicable; c. Improve pedestrian access from Avarua Township to the Airport, as much practicable.	PMU and stakeholders	Traffic Management Plan	One off	PMU and stakeholders	PMU, CIIC
	Preparation of public information on the test by PMU, and at least a week of public notice should be planned for release through the main mediums of communication, e.g. TV, radio, Newspapers and appropriate Social Media outlet.	PMU and stakeholders, communications expert	Prepared Public Information	One off	PMU and stakeholders, communication expert	PMU, CIIC
	HS preparatory work to include appropriate HS measures for traffic officers and appropriate signage at strategic points (to be determined by the Police) once the scenarios are confirmed.	PMU and stakeholders	Traffic Management Plan	One off	PMU and stakeholders	PMU, CIIC
	Construction					
	Carry out the test to allow the traffic to get use to the preferred crossing sites marked in the proposed works with the following objectives: a. Provide safe Pedestrian crossing; b. Provide pedestrian crossing where practicable; c. Improve pedestrian	PMU, stakeholders, Police	Traffic Management Plan	Daily	PMU, CIIC, Police	PMU, CIIC

	access from Avarua Township to the Airport, as much practicable.					
	Release public information on the test at least a week of public notice through the main mediums of communication, e.g. TV, radio, Newspapers and appropriate Social Media outlet.	PMU and stakeholders, communications expert	Prepared Public Information	One off	PMU and stakeholders, communication expert	PMU, CIIC
	Decommissioning					
	As per Traffic Management Plan	PMU and stakeholders	Traffic Management Plan	One off	PMU and stakeholders	PMU, CIIC
Corrective Action	Monitor progress of activities taken and report to the PMU and stakeholders with the view to maintain a high level of HS, If there are ongoing issues, following will be implemented: ▪ Review traffic management plan, with the view maintain a high level of HS, modify and redo if required. Complaints will be addressed through the project Grievance Redress Mechanism					

7.6.5.2.3 Risk to pedestrian crossing the main roads especially during peak hours and days at the PNM

3. Health and safety at pedestrian crossing						
Impact	iii. Risk to pedestrians crossing the main roads especially during peak hours and days at the PNM					
Objectives	Improve pedestrian access and experience from Avarua Township to the Airport as much practicable.					
Performance Criteria	Improve existing footpaths within the Avarua Township area. Add pedestrian crossing that connects the garden islands to the footpath that extends from the Avarua Harbour to the PNM.					
Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight
	Pre-construction					
	PMU to work with stakeholders (Police, ICI, MOT, CINDC and Te Marae Ora) on how the test to provide HS at pedestrian crossing will be carried out.	PMU and stakeholders	Traffic Management Plan	One off	PMU and stakeholders	PMU, CIIC

	The test Pedestrian crossing objectives include: a. Provide safe Pedestrian crossing; b. Provide pedestrian crossing where practicable; c. Improve pedestrian access from Avarua Township to the Airport, as much practicable.					
	Preparation of public information on the test by PMU, and at least a week of public notice should be planned for release through the main mediums of communication, e.g. TV, radio, Newspapers and appropriate Social Media outlet.	PMU and stakeholders, communications expert	Prepared Public Information	One off	PMU and stakeholders, communication expert	PMU, CIIC
	HS preparatory work to include appropriate HS measures for traffic officers and appropriate signage at strategic points (to be determined by the Police) once the scenarios are confirmed.	PMU and stakeholders	Traffic Management Plan	One off	PMU and stakeholders	PMU, CIIC
	Construction					
	Carry out the test to allow the traffic to get use to the preferred crossing sites marked in the proposed works with the following objectives: a. Provide safe Pedestrian crossing; b. Provide pedestrian crossing where practicable; c. Improve pedestrian access from Avarua Township to the Airport, as much practicable.	PMU, stakeholders, Police	Traffic Management Plan	Daily	PMU, CIIC, Police	PMU, CIIC
	Release public information on the test at least a week of public notice through the main mediums of communication, e.g. TV, radio, Newspapers and appropriate Social Media outlet.	PMU and stakeholders, communications expert	Prepared Public Information	One off	PMU and stakeholders, communication expert	PMU, CIIC
	Decommissioning					
	As per Traffic Management Plan	PMU and stakeholders	Traffic Management Plan	One off	PMU and stakeholders	PMU, CIIC
Corrective Action	Monitor progress of activities taken and report to the PMU and stakeholders with the view to maintain a high level of HS, If there are ongoing issues, following will be implemented: ▪ Review traffic management plan, with the view maintain a high level of HS, modify and redo if required.					

	Complaints will be addressed through the project Grievance Redress Mechanism

7.6.5.4 PNM – Convenient public bus stop and visitor drop off and pick up

7.6.5.4.1 Temporary disruption to current chaotic practice in problem areas identified during testing to confirm proposed stations

4. Convenient public bus stop and visitor drop off and pick up						
Impact	i. Temporary disruption to current chaotic practice in problem areas identified during testing to confirm proposed stations					
Objectives	Minimize traffic congestion by implementing a suitable and effective traffic management plan					
Performance Criteria	Provide bus stops (Avarua Catholic Church & Panamā) Encourage shuttle transport between hotels and the PNM by providing a safe and sheltered pick-up and drop-off zone for buses & taxis.					
Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight
	Pre-construction					
	PMU to work with stakeholders (Police, ICI, MOT, Te Marae Ora, Cook's Buses, and Representative of Tour Groups) on how the test to provide convenient public bus stop and visitor drop off and pick up at the PNM will be carried out.	PMU and stakeholders	Traffic Management Plan	One off	PMU and stakeholders	PMU, CIIC
	The test proposed safe and convenient bus drop off and pick up points for the general public, safe and convenient drop off and pick up for visitors and tour groups during peak hours; safe, convenient and sheltered drop off and pick up zone for buses and taxis.	PMU and stakeholders	Traffic Management Plan	One off	PMU and stakeholders	PMU, CIIC
	Preparation of public information on the test by PMU, and at least a week of public notice should be planned for release through the main mediums of communication, e.g. TV, radio, Newspapers and appropriate Social Media outlet.	PMU and stakeholders, communications expert	Prepared Public Information	One off	PMU and stakeholders, communication expert	PMU, CIIC

	Plan the test to take place during the week starting on a Monday to give a 5 day lead to the peak market day on Saturday.	PMU and stakeholders	Traffic Management Plan	One off	PMU and stakeholders	PMU, CIIC
	HS preparatory work to include appropriate HS measures for traffic officers and appropriate signage at strategic points (to be determined by the Police) once the scenarios are confirmed.	PMU and stakeholders	Traffic Management Plan	One off	PMU and stakeholders	PMU, CIIC
	Construction					
	Carry out the test to allow the traffic to get use to the proposed drop off and pick up points.	PMU, stakeholders, Police	Traffic Management Plan	Daily	PMU, CIIC, Police	PMU, CIIC
	Release public information on the test at least a week of public notice through the main mediums of communication, e.g. TV, radio, Newspapers and appropriate Social Media outlet.	PMU and stakeholders, communications expert	Prepared Public Information	One off	PMU and stakeholders, communication expert	PMU, CIIC
	Decommissioning					
	As per Traffic Management Plan	PMU and stakeholders	Traffic Management Plan	One off	PMU and stakeholders	PMU, CIIC
Corrective Action	Monitor progress of activities taken and report to the PMU and stakeholders with the view to improve flow and maintain a high level of HS, If there are ongoing issues, following will be implemented: ▪ Review traffic management plan, with the view to improve the flow and maintain a high level of HS, modify and redo if required. Complaints will be addressed through the project Grievance Redress Mechanism					

7.6.5.4.2 Risk to the public if HS practices are not followed

4. Convenient public bus stop and visitor drop off and pick up	
Impact	ii. Risk to the public if HS practices are not followed

Objectives	Minimize traffic congestion by implementing a suitable and effective traffic management plan					
Performance Criteria	Provide bus stops (Avarua Catholic Church & Panamā) Encourage shuttle transport between hotels and the PNM by providing a safe and sheltered pick-up and drop-off zone for buses & taxis.					
Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight
	Pre-construction					
	PMU to work with stakeholders (Police, ICI, MOT, Te Marae Ora, Cook's Buses, and Representative of Tour Groups) on how the test to provide convenient public bus stop and visitor drop off and pick up at the PNM will be carried out.	PMU and stakeholders	Traffic Management Plan	One off	PMU and stakeholders	PMU, CIIC
	The test proposed safe and convenient bus drop off and pick up points for the general public, safe and convenient drop off and pick up for visitors and tour groups during peak hours; safe, convenient and sheltered drop off and pick up zone for buses and taxis.	PMU and stakeholders	Traffic Management Plan	One off	PMU and stakeholders	PMU, CIIC
	Preparation of public information on the test by PMU, and at least a week of public notice should be planned for release through the main mediums of communication, e.g. TV, radio, Newspapers and appropriate Social Media outlet.	PMU and stakeholders, communications expert	Prepared Public Information	One off	PMU and stakeholders, communication expert	PMU, CIIC
	Plan the test to take place during the week starting on a Monday to give a 5 day lead to the peak market day on Saturday.	PMU and stakeholders	Traffic Management Plan	One off	PMU and stakeholders	PMU, CIIC
	HS preparatory work to include appropriate HS measures for traffic officers and appropriate signage at strategic points (to be determined by the Police) once the scenarios are confirmed.	PMU and stakeholders	Traffic Management Plan	One off	PMU and stakeholders	PMU, CIIC
	Construction					
	Carry out the test to allow the traffic to get use to the proposed drop off and pick up points.	PMU, stakeholders, Police	Traffic Management Plan	Daily	PMU, CIIC, Police	PMU, CIIC

	Release public information on the test at least a week of public notice through the main mediums of communication, e.g. TV, radio, Newspapers and appropriate Social Media outlet.	PMU and stakeholders, communications expert	Prepared Public Information	One off	PMU and stakeholders, communication expert	PMU, CIIC
	Decommissioning					
	As per Traffic Management Plan	PMU and stakeholders	Traffic Management Plan	One off	PMU and stakeholders	PMU, CIIC
Corrective Action	Monitor progress of activities taken and report to the PMU and stakeholders with the view to improve flow and maintain a high level of HS, If there are ongoing issues, following will be implemented: ▪ Review traffic management plan, with the view to improve the flow and maintain a high level of HS, modify and redo if required. Complaints will be addressed through the project Grievance Redress Mechanism					

7.6.5.5 PNM – Provide adequate, convenient, marked and managed parking spaces

7.6.5.5.1 Poor maintenance of parking areas, e.g. asphalt, compacted and well drained surfaces, security service and signage

5. Provide adequate, convenient, marked and managed parking spaces						
Impact	i. Poor maintenance of parking areas, e.g. asphalt, compacted and well drained surfaces, security and signage					
Objectives	Minimize traffic congestion by implementing a suitable and effective traffic management plan.					
Performance Criteria	Implement and police an effective traffic management plan. Employ parking wardens and security if necessary. Provide adequate parking space for vehicles.					
Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight
	Pre-construction					
	The procurement process to be adhered to so that the best contractor on the island for this work is engaged.	PMU, CIIC	Experienced with examples of work	One off	PMU, CIIC	PMU, CIIC

	The parking area must always have a security warden to ensure vehicles are safe so that visitors (residents and tourists) to the PNM can enjoy their visit.					
	Construction					
	Appropriate HS measures for PNM staff and the contractors.	PMU, CIIC, Small Works Contractor	Appropriate PPE	During construction	PMU, CIIC	PMU, CIIC
	Provide formal parking arrangements with marked parking spaces for cars, trucks, motorbikes or bicycles, dedicated parking spaces for those with physical disabilities or the for elderly, and signage,	Contractors	Constructional Plan	During construction	PMU, CIIC	PMU, CIIC
	Decommissioning					
	Employ traffic wardens to co-ordinate traffic throughout the site and provide security in the parking areas during peak days and hours and at night during nigh events.	PMU, CIIC, PNM Management	Security Plan	After completion of Parking construction	PMU, CIIC, PNM Management	PNM Management
Corrective Action	If site or any part of the dedicated parking is not appropriately and conveniently allocated for the designated users the following will be implemented: ▪ Review the potential risks to users and modify if required. Complaints will be addressed through the project Grievance Redress Mechanism					

7.6.5.5.2 A lot of space that could be used for more commercial and recreational purposes is locked up into parking space

5. Provide adequate, convenient, marked and managed parking spaces	
Impact	ii. A lot of space that could be used for more commercial and recreational purposes is locked up into parking space
Objectives	Minimize traffic congestion by implementing a suitable and effective traffic management plan.

Performance Criteria	Implement and police an effective traffic management plan. Employ parking wardens and security if necessary. Provide adequate parking space for vehicles.					
Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight
	Pre-construction					
	The design team to consider including service lines (i.e. drainage, power, water connections and waste reticulation) linked to the installed underground services and supplies at selected locations in the newly opened up parking spaces to allow mobile vendors to operate in the parking space during low peak days. The service lines at these locations to not restrict activities to buying and selling but to a diversity of use.	PMU, CIIC, Contractors	Underground service line plan	One off	PMU, CIIC, Contractors	PMU, CIIC
	Construction					
	Included in 5.6.4.2.					
	Decommissioning					
	As in 5.6.4.2					
Corrective Action	As in 5.6.4.2					

7.6.5.5.3 Ensuring lighting of parking areas is functional at night

5. Provide adequate, convenient, marked and managed parking spaces	
Impact	iii. Ensuring lighting of parking areas is functional at night
Objectives	Minimize traffic congestion by implementing a suitable and effective traffic management plan.

Performance Criteria	Implement and police an effective traffic management plan. Employ parking wardens and security if necessary. Provide adequate parking space for vehicles.					
Mitigating Measures		Implementation	Monitoring Parameter	Monitoring Frequency	Monitoring Responsibility	Oversight
	Pre-construction					
	Field inspection of the proposed sites for the installation must be undertaken to ensure all potential hazards under normal conditions are eliminated, e.g. overhanging branches, interfering tree roots are not in the way and direct exposure to sea air.	PMU, CIIC, Contractor	Checklist of potential hazards and proposed actions	One off	PMU, CIIC, Contractor	PMU, CIIC
	Review cleaning panel maintenance program.	PMU, CIIC, Contractor	Checklist of cleaning program.	One off	PMU, CIIC, Contractor	PMU, CIIC
	Review installation plans	PMU, CIIC, Contractor	Revised plan	One off	PMU, CIIC, Contractor	PMU, CIIC
	Construction					
	Follow revised plan and prepare sites for installation	PMU, CIIC, Contractor	Revised plan	One off	PMU, CIIC, Contractor	PMU, CIIC
						PMU, CIIC
	Decommissioning					
	After installation is completed, regular monitoring is required to ensure risks from hazards during normal conditions remain at zero and panels are regularly cleaned as per maintenance plan.	PMU, CIIC, Contractor	Report	Completion Report	PMU, Contractor	PMU, CIIC
Corrective Action	If site or any part of the installation work is unsatisfactory and not qualified for signoff the following will be implemented: ▪ Re-evaluate the potential risks to users and modify if required. Complaints will be addressed through the project Grievance Redress Mechanism					

8. Conclusion Remark

Overall Number of Adverse Impacts Identified from the initial impact assessment

- Based on the number activities listed by the proponent for the Project, one hundred and thirty three adverse environmental impacts were identified by the assessment team.
- Assessment of the significance of each impact as a combination of the consequences and probability of occurrence showed 46.6 percent of the impacts were not significant (i.e. very low to low) and 53.4 percent were significant (i.e. medium to very high) and needed mitigation.

Table 35: Number of adverse impacts identified and level of significance determined

Output	# Impacts	Significance level as a combination of the consequences and probability of occurrence				
		Very Low	Low	Medium	High	Very High
1	18	1	4	4	9	0
2	23	4	6	4	9	0
3	22	5	8	2	7	0
4	59	28	6	10	15	0
4b	11	0	0	9	2	0
Total	133	38	24	29	42	0

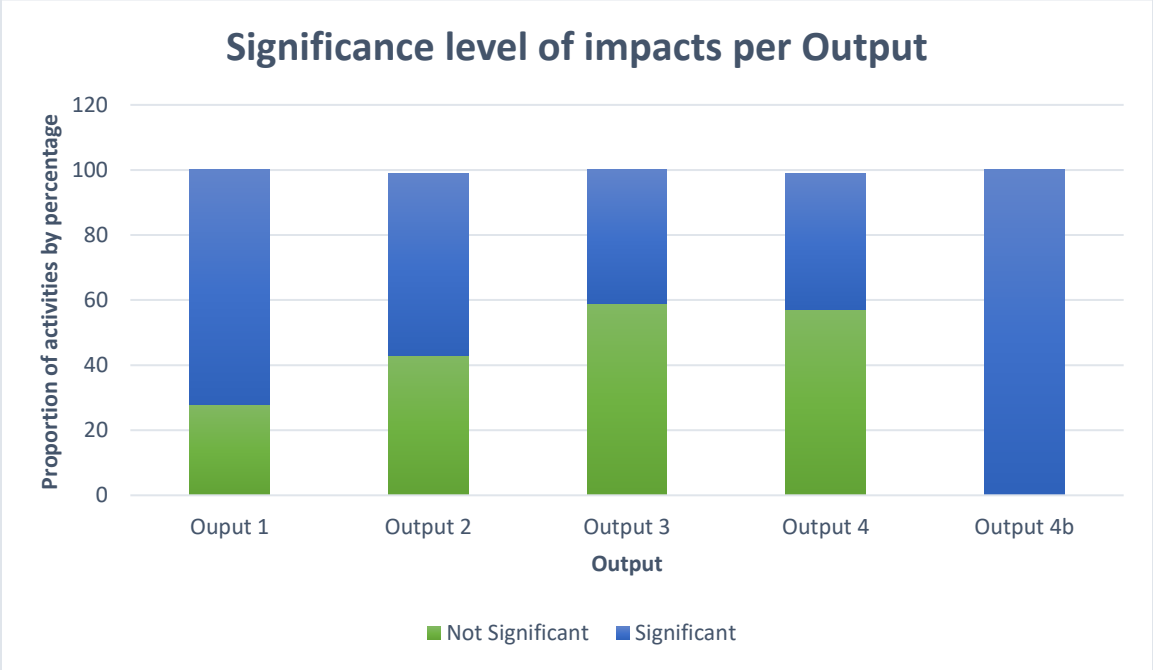
Outputs are 1 = Beautification of Avarua Town and Panamā Reserve; 2 = Improve Walk & Cycle Ways between Avarua and the Airport; 3 = Improve Public Toilets and Recreational Facilities in Central Avarua; 4 = Restructured and future proofed PNM; and 4b = Traffic Management, pedestrian safety, convenient public bus stop/pick up, and visitor drop off and pick up.

- The impacts identified show it is important to address the traffic management issue being proposed. See figure 19 below.
    - This include the preparation and implementation of a traffic management plan for road traffic, pedestrian safety, convenient bus stop/pick up, and visitor drop off and pick up.
    - This impact is evident during Saturdays and during any major event that takes place at the PNM and in town.
    - The implementation of the traffic management plan to be developed by appropriate stakeholders would be phased according to the completion of activities that have a direct impact on the components identified in the traffic management plan.
    - The plan to include an extensive public awareness support program.
- The upgrade of wastewater systems and treatments and the construction of new ones including a central wastewater and treatment system at the PNM are important activities.
    - These activities are covered under Outputs 3 and 4 and cover the bulk of impacts.
    - Important considerations to note are the laws controlling the constructing of buildings and wastewater systems.
    - These must be followed so the systems can provide the positive services, i.e. for health and safety reasons that the overall project is aiming to provide in toilet facilities.
    - The mitigating measures for wastewater and treatment systems recognizes the importance of a monitoring agreement between the service provider and the Project Management to ensure the system (s) constructed/installed/upgraded are monitored and reported on regularly.

- It is also provided that the Management must also have the capacity to technically understand the systems and the reports for maintenance purposes.
- It is noted that the three areas where wastewater systems are located, the systems may be similar and in the same kind of environment but their level of use varies.

- The impacts show the trimming and removal of trees in Output 1 is very important. This is a major area of work that supports the objectives of the overall Avarua Town Plan as it has cross-cutting benefits and impacts through the other three Outputs.
  - It impacts on shade, parking, protection from the elements (sun, sea spray and wind), infrastructure (such as buildings, solar lighting, drinking fountains, etc.) esthetics, waste, construction of walk and cycle ways, invasive species (introduction of invasive species) and the foreshore.
  - Output 1 identifies the need for a Te Tau Papa Beautification Committee (TTPBC) to advice on the activities of this output and outputs with the same impacts.
  - It also recognizes the need for an arborist and experienced contractors on tree trimming, nursery development and gardeners who are passionate about gardening to advice the TTPBC.
  - It also recognizes the need to include the community in the management and maintenance of gardens and trees to reduce maintenance costs and increase community involvement.
- The impacts show that paving works require good workmanship, parking requires proper management (including catering to our vulnerable people, security service and the versatility to be used for other purposes).
- The impacts recognizes the issue of vandalism to facilities such as to drinking water stations, recycle stations, fitness trails, look out points and how important it is to provide some form of security services around these facilities.
- Impacts show relocation of buildings and other infrastructure can be handled with no related significant impact.

Figure 21 Analysis of level of significance per output:



- The EMP designed to mitigate the potential adverse environmental impacts identified can be reviewed to improve the efficiency and effectiveness of the EPMS and PMU to address the impacts identified in this EIA report.

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10. Appendices

A1 Final TOR for this EIA

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

COOK ISLANDS INVESTMENT CORPORATION

TE TAU PAPA O AVARUA

AVARUA – PANAMA

BEAUTIFICATION & PUNANGA NUI RE-ORGANISATION PROJECT.

Table of Contents:

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 the Avarua – Panama Beautification & Punanga Nui reorganization proposal on the Avarua Township under the land title Crown lands, 32, 34, 206B, Avarua District Project. 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, i.e. Government representatives and authorities, community interest organizations 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 minimize any adverse impacts during and following the 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

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 standalone, 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 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, utilizing visual aids where appropriate;
An outline of the principal environmental impacts predicted and the proposed environmental management strategies (including waste minimization and management) and commitments to minimize 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.

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 summarized. 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 recognize 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).

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 within the three (3) districts (Te Au o Tonga, Puaikura, Takitumu District) 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 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 Rarotonga Community are not in favor of the proposed project, 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 Avarua Township area (Avarua, Avatiu/Ruatonga and Panama) 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

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 pedestrian or cycle paths within proposed site and 5 kilometers of the site boundaries;
existing public passenger transport services within 5 kilometers of the site boundaries, including school bus, schedules bus etc.;
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;

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 and as well at the nearby businesses, plantation owners and private dwelling 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 bearing in mind the businesses private dwelling nearby which will surely be disrupted by heavy transportation during the construction process;

3.4.2 Energy
The EIA should describe energy especially electricity requirements required to service the proposed project both during construction and operation.

Will there be extra sub-stations to be added to the existing ones in the area.

3.4.3 Water Supply and Storage
Since Avarua Township, water pressure is normal and at times low; the EIA should provide information on water supply required during the construction phase of the project and also during operation. In particular, the proposed and optional sources of water supply should be described (e.g. any surface storage such as tanks or public water supply lines).

Estimated rates of supply and discharge from the source (average and maximum rates) should be given. Any proposed water conservation and management measures should be described. Determination of potable water demand should be made for the proposal, including the temporary demands during the construction period.

Should seek advice from TTV.

3.4.4 Storm Water Drainage
A description should be provided especially to the existing storm water drainage system in the area, refer to main drainage located around the main road boundary of the businesses nearby. The EIA should indicate the sources of the drainage water, e.g. streams, road and the potential quality and location of discharge to the lagoon.

Surface water runoffs will also collect on the main road & nearby businesses/private dwelling grounds especially at times of construction therefore will there be any new drainage to be done for that?

3.4.5 Sewerage
The management of final wastewater from any proposed sewage system is of particular importance. Although a new toilet is proposed, the EIA should provide details of the proposed arrangements for the management of sewage generated especially during the construction of the project. Details should be provided in relation to the predicted sources and quantities of sewage generated (including proposed & existing) system and the proposed method for collection and treatment.

A description of the site and the surrounding environment:
Plan which shows:

– The location of the toilet facility within the overall development indicating site buffers and adjacent land uses.

– Potentially impacted neighbors.

Site plan which shows:

– Site boundaries

– 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 (Avarua/Panama)

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, relocation, construction, operations, decommissioning, rehabilitation and associated works for the proposal. Measures should minimize environmental harm and maximize socioeconomic 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, pollution, 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, and 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 e.g. 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 Avarua township areas, Avarua 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, i.e. Panama, Ruatonga, Parekura and the Punanga Nui Market, Crown lands 32, 34, 206B.

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 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 these project areas to natural or induced hazards, floods, high seas etc. should also be addressed. The relative frequency, magnitude and risk of these events should be considered, with particular relevance to the changing climatic conditions, i.e., 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
Eutrophication's (DO, N, P)
Harmful or Toxic substances
Sanitation (Coliform, E Coli)

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, streams and the stabilization 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.

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 minimized

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 minimization, 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

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 minimize the waste of materials

Reuse old materials suitable for other uses where possible

Recycle waste where possible

Store waste from ablution facilities appropriately (e.g. 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 including the usage of Explosive materials.

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 residents and businesses from both construction of the proposal should be detailed. Transport, timing of explosive material and access requirements to and from the site should be detailed. The likely impacts of new development on existing transport infrastructure should be investigated.

Management of equipment and machinery - Use machinery and equipment with minimal noise output levels
Fit all machinery with appropriate noise reduction equipment including timeframe of the usage of explosive onsite.

Avoid disturbance to local residents, businesses for workers and recreational users - Restrict access to the site during works which cause high level noise impacts

- Notify residents, businesses of the times of expected high noise levels
- Post warnings around the site during times of high levels of noise
- 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 foreshore, wetlands, and 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.

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, dredging, to lay of the piping should be described, 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.

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 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 business, community centers, 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, waste or oil spillage etc.) of any onsite development, during construction, will be managed;
Business, 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 analyzed 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 odors, 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 including workers working onsite.
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 & employee's, is to ensure that the hazards and risk to public health and safety is minimized

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, odor, 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 minimized

 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:

 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 existing and proposed sensitive areas such as residential areas, business, 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. Explosive material usage, cyclone and flooding may pose risks and procedures to minimize 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 minimize risk of erosion

4.13.2 Potential Impacts and Mitigation Measures

Minimize disturbance to the section - Avoid drainage of stormwater directly into the sea

Manage stormwater appropriately - Establish sediment and erosion controls around stockpiles where appropriate
Minimize size of stockpiles
Minimize the creation of hard, impervious surfaces
Establish diversion drains around disturbed areas
Drain stormwater into appropriate infrastructure
Minimize 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)
Minimize the use of large machinery
Store machinery and construction materials away from sensitive areas
Minimize the risk of erosion caused by vegetation clearance -Minimize 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
Major Erosion
Sediment deposition

4.14 STORAGE AND HANDLING OF DANGEROUS SUBSTANCES

The EIA should include an integrated risk management plan for the site. The EIA should identify any dangerous goods to be stored and/or handled on site and that such storage and/or handling must comply with any local regulation, if any.

4.14.1 Description of Environmental Values

The use and storage of dangerous substances on site. Ensure that the risk associated with the storage and use of dangerous substances is minimized

4.14.2 Potential Impacts and Mitigation Measures

Reduce the potential for spillage of chemicals - Store chemicals and dangerous substances in sealed containers (e.g. portable Bunding)
Minimize the amount of dangerous substances and chemicals stored on site
Store chemicals and dangerous substances safely
Inspect for leakages regularly and replace/fix
Dispose of dangerous chemicals and substances appropriately - Use licensed contractors
Dispose of chemicals and substances off site
Ensure the safe storage of chemicals and dangerous substances - Store chemicals and dangerous substances in sealed containers
Manage works practices to reduce risk of unsafe conditions
Maintain records of all dangerous substances and chemicals on site Identify each container of chemicals or dangerous substances by use of labels and correct identification

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 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 recognized format

7. RECOMMENDED APPENDICES

A1 Final TOR for this EIA

A copy of the TOR should be included in the EIA. 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 crossreferencing.

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 Te Au o Tonga, Avarua Township and the whole of Rarotonga community should be recorded and included. The Consultation Report should summaries 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
Noise and air quality
Hydrographical Survey
Bathymetrical Survey
Environmental Action plan to supplement EMP
Site investigations
Excavation plans and equipment

A6 Contacts

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

A2 Study Team

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A3 Consultation Report

(To be inserted after mandatory requirement under the Environment Act 2003)

A4 Specialist Studies

Rongo, T. Aquatic Biology Survey of Avatiu Harbor. 2020. (Incorporated into the EIA Report)