

**NGATI TE ATA WAIOHUA  
CULTURAL IMPACT ASSESSMENT (OVERVIEW)**

**ANGA ATU ANA NGA WHAKAARO KI TE MOANA KI NGA WAHI TIKETIKE HEI KAINGA  
AHI MA TATOU**

“Point your thoughts in the direction of the moana and places of significance and you will see that this is the ideal place to light your fire”

*wahi nohoanga  
the old fishing village*



**KAHAWAI**

**COUNTIES ENERGY  
Proposed substation at 127 McLarin Road Glenbrook**

Cultural Impact Assessment

September 2022



## CONTENTS

Cover	
Contents	
1. Introduction	Pg 3
Kaiwhare	Pg 4
2. Subject Site	Pg 5-6
3. Cultural Site Visit and Archaeological Considerations	Pg 7-8
4. Cultural Aspirations	Pg 9
5. Conclusions and Recommendations	Pg 10-12
6. Removing Pine, Macrocarpa and noxious plants	Pg 13-14
7. Walkways/Pathways	Pg 15-16
8. Earthworks	Pg 17-18
9. Stormwater	Pg 19-25
10. Hazardous Substances	Pg 26
11. Wastewater	Pg 29
12. Intermittent Streams	Pg 30
13. Landscape Effects	Pg 31
14. Road/Park/Open Space Naming	Pg 32
15. Appendix 1: Preferred Plant Species	Pg 33-36

*Toku Mana*

*The Right to be Ourselves*



## 1.0 INTRODUCTION

### ***As stated in email correspondence from Jo Michalakakis (9/08/2022)***

- 1.1 Counties Energy are looking to designate a portion of 127 McLarin Road (Lot 1003 of a proposed subdivision being carried out by Kahawai Point Developments Limited) for a new substation. The property is part of a subdivision currently being carried out. Ngati Te Ata have been advised of the following:

In summary the following works being are proposed:

- The utility 11kV/33kV substation would consist of a switch room and two outdoor transformer bays.
  - The substation would be accessed off McLarin Road via a 4m shared accessway.
  - The property would have a connection to the reticulated stormwater network.
  - The substation would have the same plant palette used to complement the existing site and work with the planting scheme for Stage 5 of the subdivision developed by Boffa Miskell. This includes planting within the gullies, swales along both side of the driveway and low species near the entrance of the substation.
  - The timber fence at the entry would be a standard timber paling fence stained black with a black steel sliding gate.
  - There is an opportunity for your design input for a motif or similar for the large concrete panel that will be visible from the driveway and McLarin Road.
  - The draft Landscape Design Statement prepared by Align, was informed by the Boffa Miskell 2022 report for the wider subdivision (Kahawai Point Stage 5 Landscape Concept Document for Resource Consent) which adopted Maori Design Principles as outlined within their report; and ours.
  - Counties Energy will be offering accidental discovery protocol conditions for the designation. Earthworks will be required for foundations/building, transformer bays and access. Cuts are minimised and the total extent of works are shown in the attached earthworks cut/fill plan. Outside of the building platform, only topsoil would be removed.
- 1.2 The Cultural Impact Assessment (CIA) provides the traditional, cultural and historical associations of Ngati Te Ata to Glenbrook (Kahawai), the subject site and wider surrounds. To identify any issues, concerns or effects of the Counties Energy proposal on our cultural and natural heritage values, potential impact and interests.
- 1.3 Of equal importance is the cultural dimension and importance this proposal will provide Ngati Te Ata. This in terms of having a greater say in how some of our ancestral land is used and developed, and to provide the opportunities to open up whenua to our people and demonstrate through this proposal the reflection of the cultural dimension of Ngati Te Ata.



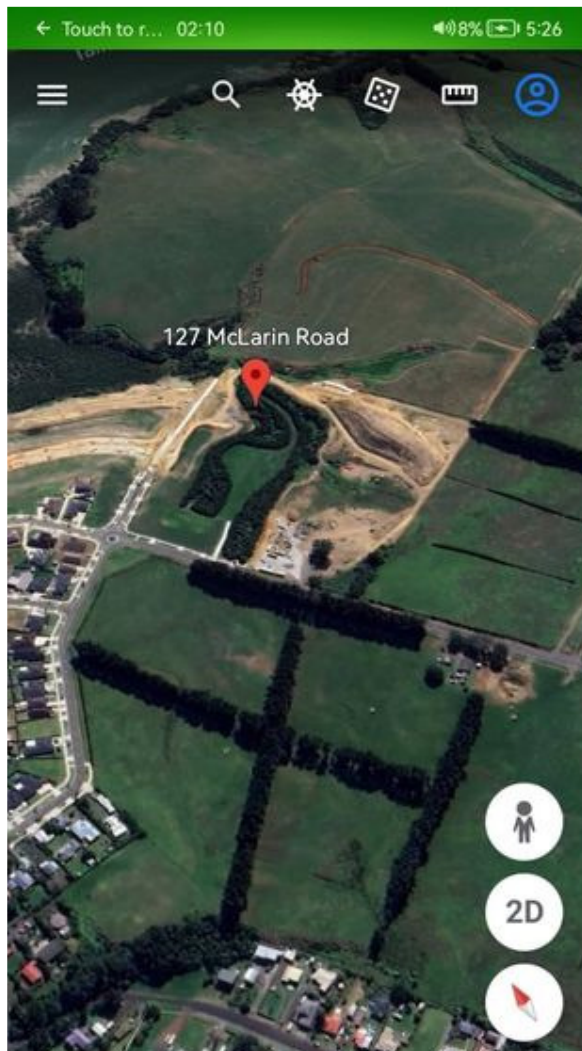
## KAHAWAI



*Kaiwhare the taniwha of the Manukau Harbour (in one of his many forms Tohora-Orca)*



## 2.0 SUBJECT SITE – 127 McLarin Road Kahawai





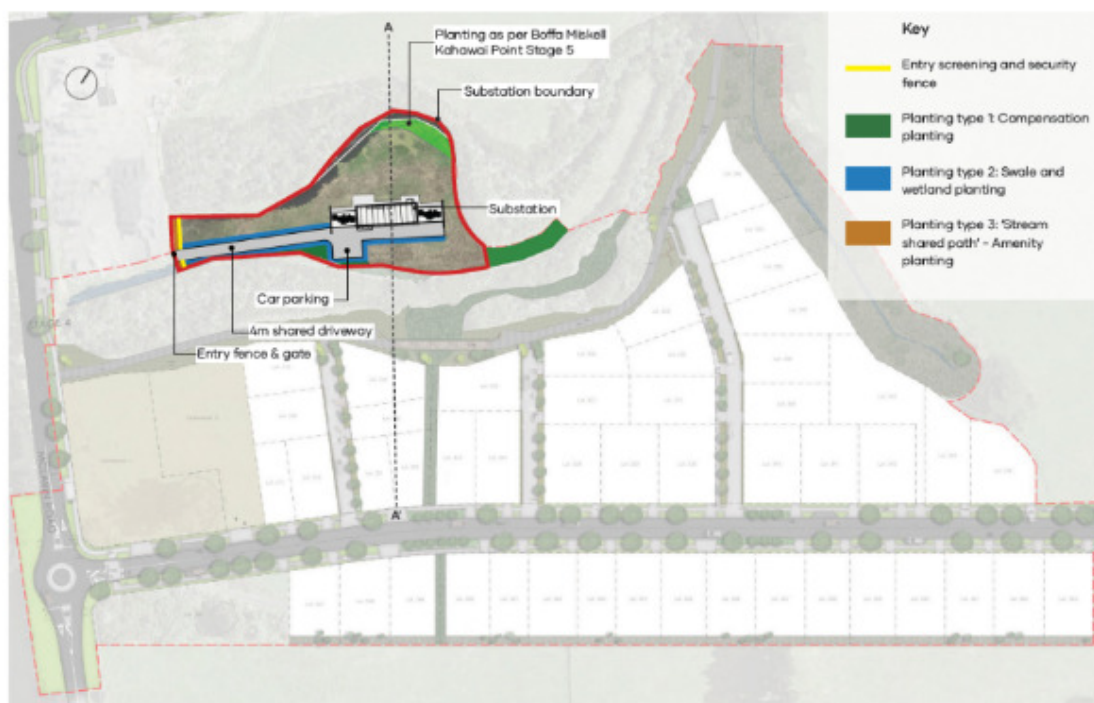


Fig. 4  
Plan is an overlay of Kahawai Point Stage 5 - Landscape Masterplan (Source: Boffa Miskell, 2022. Kahawai Point Stage 5 Landscape Concept Document for Resource Consent) and Aligns site plan with additional planting



### 3.0 CULTURAL SITE VISIT AND ARCHAEOLOGICAL CONSIDERATIONS

- 3.1 The most recent archaeological and heritage assessment was undertaken by CFG Heritage (August 2021) to identify constraints and inform the HD Project 2 Limited plan change at 80 McLarin Road. The Counties Energy site is in very close proximity. We have perused that report.
- 3.2 Ngati Te Ata Te Taiao (Heritage and Environment Unit) undertook an onsite with Counties Energy 24<sup>th</sup> August 2022.
- 3.3 At the time of submitting our CIA report we have received various documents including the Landscape Design Statement (2022).

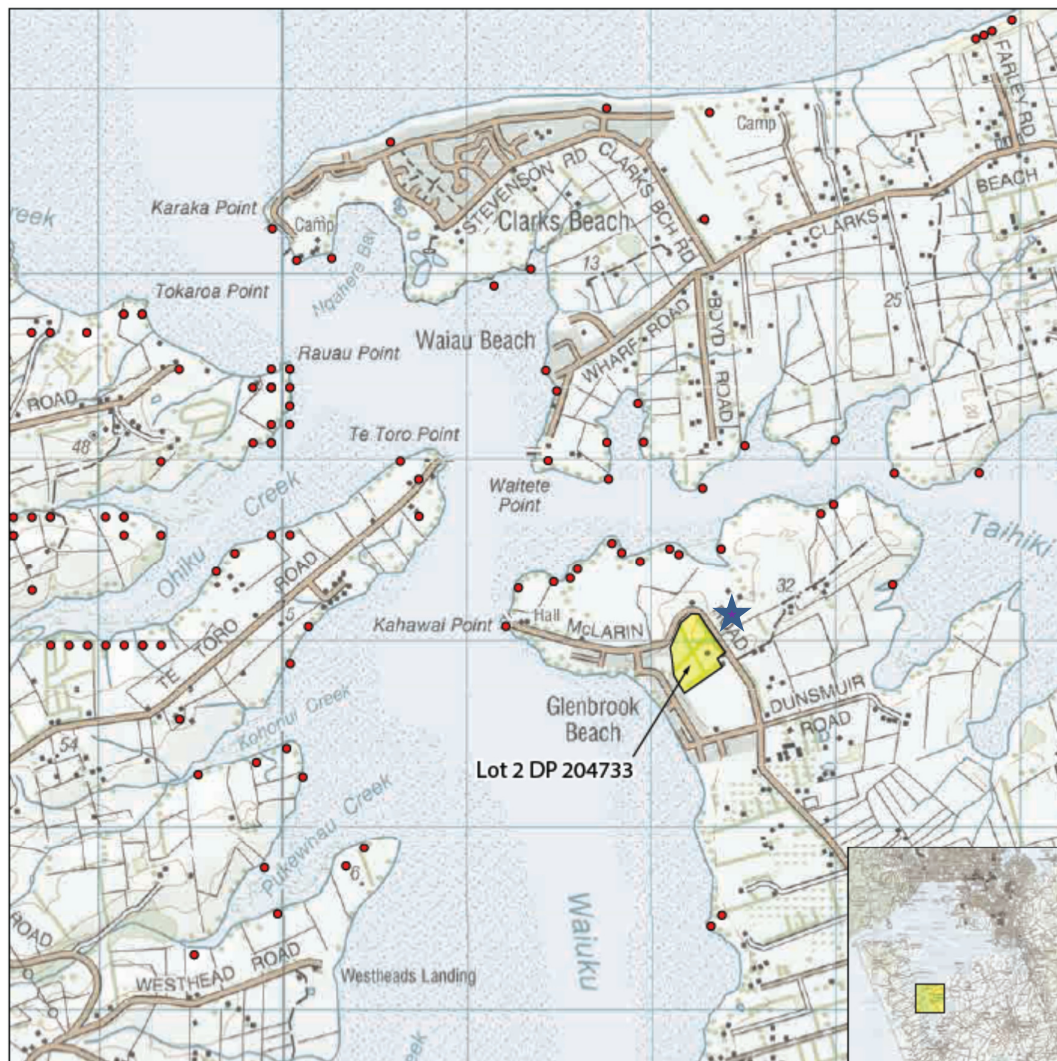


Figure 1. Location of the property and recorded archaeological sites recorded in the vicinity.

- 3.4 These sites are all Ngati Te Ata sites that intrinsically weave into our history and cultural landscape. Ngati Te Ata are the only mana whenua iwi for this area.
- 3.5 The CFG Heritage Archaeological Assessment conclusion was as follows:



No archaeological and heritage constraints on the proposed proposal have been identified. As a precautionary measure, any earthworks and ground disturbance undertaken should be under a HNZPT archaeological authority, and further research into the locations of John Kent and Te Wherowhero's children's graves should be undertaken as part of the HNZPT application.

The Recommendations are as follows:

- a) These recommendations are only made based on the archaeological potential that has been outlined above. Any other values associated with special interest groups, including tangata whenua, can only be determined by them.

It is recommended that:

- b) Further research into the locations of the graves of John Kent and Te Wherowhero's children should be undertaken as part of an assessment of effects for an application to HNZPT for an archaeological authority;
- c) since archaeological survey cannot always detect sites of traditional significance to Maori, or wahi tapu, the appropriate tangata whenua authorities should be consulted regarding the possible existence of such sites, and the recommendations in this report.

3.6 Ngati Te Ata support these recommendations.



## **4.0 CULTURAL ASPIRATIONS**

- 4.0 The cultural aspirations of Ngati Te Ata to follow are consistent with and align to Te Aranga principles mana (authority), whakapapa (naming), taiao (natural environment), mauri tu (environmental), oranga (health), mahi toi (creative expression), tohu (cultural landscape) and Ahi ka (living): Each development aspect should be assessed with these principles and following aspirations of Ngati Te Ata in mind:
- a) That Ngati Te Ata continue to exercise its rangatiratanga and kaitiakitanga regarding the subject site..
  - b) That Ngati Te Ata continue to have decision making input throughout the entirety of the proposal and future development of the site.
  - c) The creation of opportunities within the proposal area for Ngati Te Ata to pursue its social, cultural, economic and political development.
  - d) That Ngati Te Ata be availed first right of refusal or opportunity to enter into joint venture relationships regarding any commercial opportunities, i.e infrastructure and services.
  - e) To maintain Ngati Te Ata ahi kaa at the proposal area and create a physical base from which Kaitiaki responsibilities can be carried out.
  - f) To support the restoration of the river margin, foreshore and harbour at Kahawai, Taihiki Awa and the Manukau Harbour.
  - g) To support the use of the Taihiki Awa for customary fishing purposes and recreation e.g., waka ama.
  - h) To acknowledge and recognise places of significance within the proposal area.
    - i) The acknowledgement and recognition of Ngati Te Ata traditional and historical associations to the proposal area.
- 4.1 That Ngati Te Ata and Counties Energy work in strong collaboration on all these matters. Ngati Te Ata expect to have a key integral role in the future development of the proposal area.

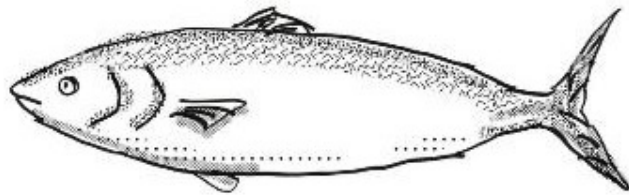


## 5.0 CONCLUSION and RECOMMENDATION

- The ultimate goal for Ngati Te Ata is the protection, preservation and appropriate management of our natural and cultural resources in a manner that recognises and provides for our interests and values, and enables positive environmental, social and economic outcomes. We support engagement and involvement that respects and provides for our cultural and traditional relationships to Glenbrook, its unique cultural identity, and input into shaping the physical, cultural, social and economic regeneration of these areas.
- We accept that power (energy) requirements are needed as increasing housing development and infrastructure occurs in this area.
- The chosen site for the Counties Energy substation at 127 McLarin **does not** adversely impact upon any cultural heritage.
- We acknowledge and support the following:
  - The utility 11kV/33kV substation would consist of a switch room and two outdoor transformer bays.
  - The substation would be accessed off McLarin Road via a 4m shared accessway.
  - The property would have a connection to the reticulated stormwater network.
  - The substation would have the same plant palette used to complement the existing site and work with the planting scheme for Stage 5 of the subdivision developed by Boffa Miskell. This includes planting within the gullies, swales along both side of the driveway and low species near the entrance of the substation.
  - The timber fence at the entry would be a standard timber paling fence stained black with a black steel sliding gate.
  - There is an opportunity for your design input for a motif or similar for the large concrete panel that will be visible from the driveway and McLarin Road.
  - The draft Landscape Design Statement prepared by Align, was informed by the Boffa Miskell 2022 report for the wider subdivision (Kahawai Point Stage 5 Landscape Concept Document for Resource Consent) which adopted Maori Design Principles as outlined within their report; and ours.
  - Counties Energy will be offering accidental discovery protocol conditions for the designation. Earthworks will be required for foundations/building, transformer bays and access. Cuts are minimised and the total extent of works are shown in the attached earthworks cut/fill plan. Outside of the building platform, only topsoil would be removed.
- That the motif of the **Hei Matau** (Fishing Hook) is used for the large concrete panel that will be visible from the driveway. This symbolizes the wahi nohoanga (fishing village) that once stood in this area and also our relationship to the sea through Tangaroa, strength and safe passage across the waters.

Or the Kahawai (fish) due to the abundance of this prized kaimoana of the area and an important traditional and customary kai for Ngāti Te Ata.





Note: More detailed (actual) design will be done by our Ngati Te Ata designers

And:

Also, that a **Tuwatawata Pou Tokomanawa** is placed within the footprint of the substation location to symbolise our ancestral relationship to this area and as a sentinel guardian of the area.

They look like this (in black) – this is the Ngaati Te Ata Waiohua Pou on the Maungarei heritage walkway.



- Our protocols for earthworks are as follows: Ngati Te Ata supports the following Archaeological Discovery Protocols and recommends they are part of the consent conditions:

*If, at any time during site works, potential koiwi (human remains) or archaeological artefacts are discovered, then the following discovery protocol shall be followed:*



- *All earthworks will cease in the immediate vicinity (at least 10m from the site of the discovery) and iwi notified immediately and a suitably qualified archaeologist is consulted to establish the type of remains;*
- *If the material is identified by the archaeologist as human, archaeology or artefact, earthworks must not be resumed in the affected area (as defined by the archaeologist). Iwi protocol will take place in regards to reinterment to our urupa or other tikanga applied.*
- *The consent holder must immediately advise the Team Leader, Compliance Monitoring Central, Heritage New Zealand Pouhere Taonga and Police (if human remains are found) and arrange a site inspection with these parties;*
- *If the discovery contains koiwi, archaeology or artefacts of Maori origin, representatives from those Iwi groups with mana whenua interest in the area are to be provided information on the nature and location of the discovery; and*
- *The consent holder shall not recommence works until approved by the Team Leader, Compliance Monitoring Central,*

## **RECOMMENDATIONS**

1. That this report is received.
2. That the matters raised in this report are provided for.
3. That Ngaati Te Ata are kept informed of this application as it progresses.
4. That Ngaati Te Ata reserves the right to re-assess this application if there are any changes to this application from what was originally placed before us for cultural and environmental assessment.

*Ka whiti te ra ki tua o Rehua ka ara a kaiwhare i te rua*  
*As long as the sun shines Ngaati Te Ata will rise from the depths of the Manukau*



From this point on are our general issues, policies and mitigation measures - some may apply to this particular project and some may not - FYI:

## **5.1 ISSUE**

- 5.2 The cultural impact of removing pine trees, macrocarpa trees; and noxious plants.

## **5.2 CULTURAL IMPACT**

- 5.3 The effects of removing any pine trees, macrocarpa trees and noxious plants may result in some damage but any such damage is considered positive as:
- a. as noxious plants are hazardous to the health of people, environment and fauna
  - b. pine and macrocarpa trees in particular can be old and are likely to cause major damage if not removed are likely to load the banks and increasingly encourage instability. It is also likely they will become increasingly vulnerable to wind-throw or toppling and associated soil/slope damage
  - c. old pine trees that have fallen naturally have caused major damage to the integrity of cultural sites in the past. It was for this reason that Ngati Te Ata recommended and approved the excavation of the nearby Tapu Tiketike cultural site at Waitangi Falls.
  - d. replacing these exotic trees and noxious plants with more suitable native trees (see Appendix 1) will allow for the restoration of native bird life, marine life and assist the prevention and treatment of any potential residue stormwater flow into the harbour.

## **5.4 CULTURAL CONSIDERATION**

- 5.5 The removal of the exotic trees and noxious plants that are within the proposed plan area will have a positive cultural impact for Ngati Te Ata as:
- a. a traditional expert representing Ngati Te Ata will be present to monitor felling to ensure extraction does not destroy extant features and avoid further erosion of bankside and unnecessary damage to any road or river margin.
  - b. the Ngati Te Ata traditional expert will be consulted regarding any proposed archaeological excavation, monitor any agreed excavation, and participate in recording findings to note any cultural interpretive information that may add value to the proposal area.
  - c. heavy machinery used to extract the trees will be kept away from extant cultural features and care taken to avoid further erosion and other related damage.
  - d. tree removal and mulch and soil preparation will follow best practice methods.



- e. a native plant rahui revegetation zone should be planted surround the proposal area perimeter to support the prevention and treatment of any potential sediment stormwater flow whilst encourage the return of native birdlife.
- f. the native plants chosen be ideally eco sourced locally the most suitable native plants for the aforementioned purposes.
- g. the Ngāti Te Ata traditional expert representative be consulted in choosing the native plants and their placement.
- h. the use of a similar barrier silt bund as part of the landscaping to prevent potential sediment flow impact on any identified archaeological features.
- i. employment opportunities are availed to Ngāti Te Ata in the removal of the trees, noxious plants and landscaping.
- j. where possible, any shell uncovered during the removal of the pine trees and noxious plants, be set aside to form potential cultural displays e.g., art work and as a record of past occupation.
- l. excavated material is carefully reused on site, possibly as a source of siltbund/building/aggregate/landscape fill material.
- m. a tohu “whakairo” or “modern interpretation” its cultural surrounds acknowledging Ngati Te Ata rangatiratanga of the area, whakapapa, place names, and the great deeds of tupuna at any proposed park of the great chief Manukau who was responsible for Kahawai and whose spirit of bravery saved Ngati Te Ata from invasion.
- n. Ngati Te Ata nominate the artists/carvers to prepare the tohu, who will in turn work with the Ngati Te Ata traditional keepers of knowledge.
- o. signage reflecting the traditional history of Ngati Te Ata supporting the tohu. That this history acknowledges Te Ata i Rehia, founding ancestor of Ngati Te Ata and trace the whakapapa genealogy of those tupuna who maintained the exercise of Ngati Te Ata rangatiratanga at the proposal area (Kahawai), namely Papaka, (his hapu Ngāti Puaki), his son Manukau, the links to Katipa, Ngati Te Ata Treaty of Waitangi signatory and his hapu Te Uri Ngahu, through to Kaihau, the principal chief of Ngati Te Ata when the Treaty was signed.
- p. any taonga found during works or excavation is returned to Ngati Te Ata and displayed at the cultural research centre.

5.6 While not directly related to this proposal area, there are additional initiatives that will need to be worked through between Ngati Te Ata and Counties Energy as part of the relationship building moving forward.



## **6.0 ISSUE**

6.1 Walkways/Pathways.

## **6.2 CULTURAL IMPACT**

- 6.3 Ngati Te Ata support the development of internal neighbourhood parks and open space buffer zones. Internal neighbourhood parks are for passive and active recreation and open space buffer zones help to 'soften the edge' of new developments. Where possible the natural and cultural landscape should be preserved in the design and long-term maintenance of open space
- 6.4 Ngati Te Ata also support the use of 'park edge roads' along open space zones and esplanade or recreation reserves, rather than private property backing onto these spaces. This encourages a sense of public responsibility for these spaces and can help to reduce instances of illegal dumping
- 6.5 A very positive amenity for the local population and there is significant scope to link the heritage values from the proposal area to the Taihiki river margin within the design of any proposed walkway.
- 6.6 The linking Ngati Te Ata "heritage values" to any walkway design and features will be "very positive" to Ngāti Te Ata.
- 6.7 We acknowledge Mana whenua value sites may be affected by any walkway construction.
- 6.8 Instead of excavating the width and length of any walkway to achieve a consistent flat walking surface that may be a depth of 200mm to 300mm in parts, consideration of a raised platform, with staged posting. This will provide latitude to avoid potential extant Mana whenua values sites.
- 6.9 That any Ngati Te Ata mana whenua value sites found during excavation be used as focal points for potential "rest" seating and signage areas explaining their history and that of the area.
- 6.10 Notably, the Mana whenua value sites have been archaeologically categorised as mainly midden in the general Glenbrook (Kahawai) area. However, the earlier identification of settlement and hangi stones supports the oral evidence of Ngati Te Ata occupation and settlement patterns at Glenbrook Beach (Kahawai). It is noted that much of the area has been modified by ploughing or lost over time due to erosion.
- 6.11 Culturally, Ngati Te Ata consider walkways are a positive opportunity:
- a) to retell the disappearing history of the area
  - b) promote physical fitness and holistic wellbeing
  - c) link the Iwi, residents and neighbours in a positive environment
  - d) enable access to the water's edge
  - e) connect residents to focal points such as rest-seating areas, tohu and the park, where they can learn about the Ngati Te Ata traditional history of the area



## **6.12 CULTURAL CONSIDERATION**

- 6.13 Develop greenways plans (walk/pathways) that provide cycling and walking connections that are safe and enjoyable, while also improving local ecology and access to recreational opportunities.
- 6.14 That any pathway be called Kaiarara “To be inspired”, which is also the name of the stream located on the border of Kahawai.
- 6.15 Design requirements to avoid or mitigate negative impact.
- 6.16 Ngati Te Ata traditional expert be consulted regarding any proposed excavation, monitor any agreed excavation, and participate in recording findings to note any cultural interpretive information that may add value to the future development of the site.
- 6.17 Establish two rest-seating areas where signage and tohu can inform and add to the cultural beauty of the awa and moana.



## **7.0 ISSUE**

### **7.1 Earthworks**

## **7.2 CULTURAL IMPACT**

### **7.3 Potential adverse impact on taonga**

7.4 Earthworks/land modification can significantly affect our cultural heritage, especially wahi tapu or sites of significance. Earthworks can also affect land stability and water sources and result in the release of sediment. Ngati Te Ata have concerns with the large-scale number of earthworks expected as Kahawai keeps being developed, and the implications that this may have. It is therefore imperative that cultural monitoring is undertaken by our kaitiaki (alongside the project archaeologist) and monitoring agreements with Ngati Te Ata are in place as cultural remnants and taonga will undoubtedly be exposed during the future development of the site.

7.5 Concern about the source of the (possible) large amounts of fill that will be needed for the future development of the site. Will it be locally sourced or brought in from outside the area? If outside the areas, where from and will it be assessed for contaminants? Contaminants, while they can become inert over time, are activated when disturbed.

## **7.6 CULTURAL CONSIDERATION**

7.7 That a Ngāti Te Ata representative monitor preliminary works

7.8 That a Ngati Te Ata traditional expert be consulted regarding any proposed excavation, monitor any agreed excavation, and participate in recording findings to note any cultural interpretive information that may add value to the proposed development of the site in the future.

7.9 Review the Auckland Unitary Plan for provisions on volume of earthworks triggers for Ngāti Te Ata oversight.

7.10 Minimise earthworks and make maximum use of natural ground levels.

7.11 Ensure sufficient erosion and sediment control measures are in place for earthworks. Earthworks that have the potential to impact on waterways must have sufficient measures in place to ensure that adverse effects on water bodies are managed.

7.12 Effectively manage activities that accelerate soil erosion e.g., vegetation removal and intensive agricultural practises.

7.13 Effectively manage the impact of contaminated land on the surrounding environment. Ensure contaminated land is not used as fill.

7.14 When making decisions on future development projects, cumulative effects must be considered.

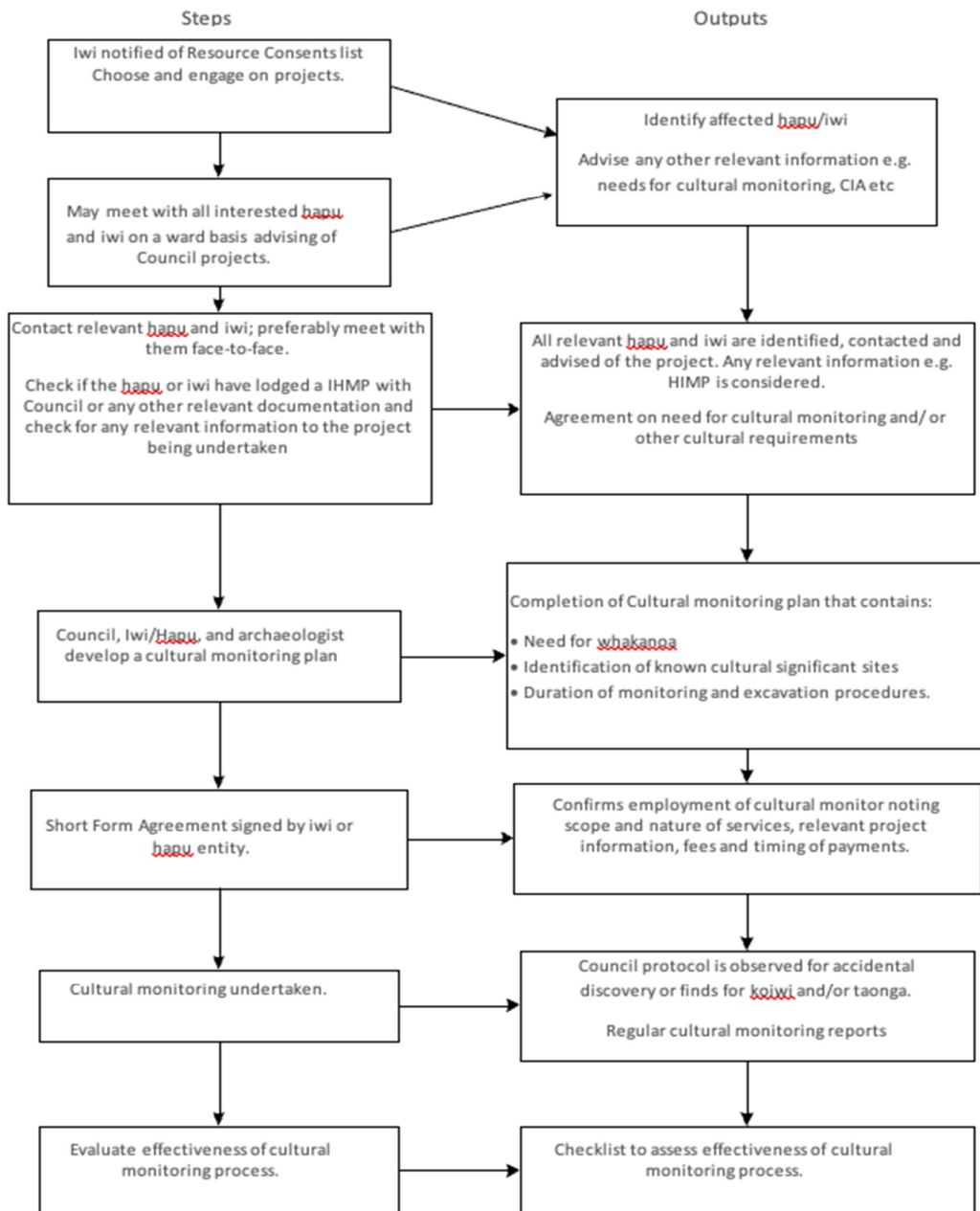
7.15 When undertaking earthworks developers must strive to achieve a much higher percentage of sediment retention onsite i.e., strive to meet best practice such as GD05, rather than just meeting 'bottom line' minimum requirements such as TP90. There are proven ways to reduce the amount of sediment entering the ecosystem and those which are supported are:

- a) create a series of sediment pools instead of just one fore bay silt pond



- b) use of filter/compost socks around cesspits and drains
- c) use of an organic flocculent rather than chemical, when a flocculent is necessary.
- d) use of super silt fences in conjunction with silt ponds as a 'treatment train approach' in the absence of silt fences use silt ponds, hay bales

### Cultural Monitoring Protocol Process





## **8.0 ISSUE**

### **8.1 Stormwater**

## **8.2 CULTURAL IMPACT**

- 8.3 Mixing of waters, especially clean roof water with contaminated run off. 'Clean' and 'contaminated' waters are not mixed i.e., no direct disposal of any waste into waterways, including wetlands.
- 8.4 Adverse impact upon the Mauri. Ngati Te Ata will always advocate the highest level of treatment of stormwater before it is discharged into our waterways, and that the protection of the mauri of all-natural waterways and the food producing capacity of natural waterways is protected and enhanced, as is their life supporting capacity. Our cultural position is that we advocate water conservation and efficient use of water, oppose the direct disposal of any waste into waterways and require that waste pass through the soils, or through other innovative means, before discharge.
- 8.5 Ngati Te Ata also promote the regeneration of any wetland (even if degraded) as wetlands featured prominently in the past as nature's natural filters. Natural wetlands should not be used as a stormwater filter device, or they will become a source of pollution. Natural wetlands should only be used to filter stormwater once it has passed through at least two forms of treatment.

## **8.6 CULTURAL CONSIDERATIONS**

- 8.7 In catchments that are served by separated stormwater drainage and sewerage systems, the improvement to the quality of stormwater has been identified as an essential element towards protection of aquatic ecosystem of the receiving waters.
- 8.8 PAUP prescribes "the application of stormwater contaminant treatment™ to High Contaminant Generating Activities (HCGAs), which are those land use activities that generate and discharge contaminants at a level where treatment will result in a substantial reduction in contaminant concentration and load. PAUP has determined as:
- a. parking areas, and associated access-ways that are exposed to rainfall and carry more than 50 vehicles per day;
  - b. building roofing, spouting, and external walls cladding and architectural features using materials with an: o exposed surface or surface coating of metallic zinc or any alloy containing greater than 10% zinc; o exposed surface or surface coating of metallic copper or any alloy containing greater than 10% copper; or o exposed treated timber surface or any roof material with a copper-containing or zinc-containing algaecide.
- 8.9 Contaminants picked up from streets, paths, car parks, access-ways, roofing, spouting, external walls cladding and architecture features, are carried in stormwater runoff and deposited in streams, groundwater, river margin and coastal areas. These processes can have a significant effect on the quality, health and functioning of our freshwater and marine environments. This proposed development activity and resulting pollutants has the potential to adversely impact cultural values including:



- a) the relationship of Ngati Te Ata to wai (water) and thus the mauri (life force) and oranga (livelihood) of wetlands, streams, the Taihiki Awa and Manukau Harbour.
- b) the harm to fish particularly Kahawai to which the area is traditionally renowned for, and the young kanae (mullet) and patiki (flounder) to which the Taihiki Awa is considered a nursery for; the harm to shell fish and thus the adverse impact upon kutai (mussel) and tio (oyster), and subsequently the adverse impact upon mahinga mataitai, (customary shellfish gathering sites) in the Taihiki Awa and Manukau Harbour.
- c) the harm to wildlife populations, killing native vegetation, foul drinking water supplies, erode and destabilise mana whenua sites of significance and the Taihiki Riverbank and make traditional recreational areas (e.g., waka ama) unsafe and unpleasant.

8.10 Proposed water sensitive design compliment the cultural aspirations of Ngati Te Ata. The stormwater management train commencing at the source, and supported through quantity and quality systems provides added value. This section assesses the following stormwater path from its source:

- a. Rain barrels and cisterns
- b. Permeable pavements
- c. Tree pits
- d. Vegetated Swales
- e. Rain gardens
- f. Wetlands
- g. Reed Pits
- h. Native Plants Rahui Strips
- i. Silt Bund

#### 8.11 Rain Barrels and Cisterns

8.12 Rain barrels and cisterns harvest rainwater for reuse. Rain barrels are placed outside a building at roof down spouts to store rooftop runoff for later reuse in lawn and garden watering. Cisterns store rainwater in significantly larger volumes in manufactured tanks or underground storage areas. Rainwater collected in cisterns may also be used in non-potable water applications such as toilet flushing. Both cisterns and rain barrels can be implemented without the use of pumping devices by relying on gravity flow instead. Rain barrels and cisterns are low-cost water conservation devices that reduce runoff volume and, for very small storm events, delay and reduce the peak runoff flow rates. Both rain barrels and cisterns can provide a source of chemically untreated "softwater" for gardens and compost, free of most sediment and dissolved salts or significantly contaminated water. It is recommended that either rain barrels or smaller cisterns be included in every home building covenant or public building.



### House barrel to garden



### 8.13 Permeable Pavement

- 8.14 Permeable pavement is an alternative to asphalt or concrete surfaces that allows stormwater to drain through the porous surface to a stone reservoir underneath. The reservoir temporarily stores surface runoff before infiltrating it into the subsoil. The appearance of the alternative surface is often similar to asphalt or concrete, but it is manufactured without fine materials and instead incorporates void spaces that allow for storage and infiltration. Underdrains may also be used below the stone reservoir if soil conditions are not conducive to complete infiltration of runoff. It is recommended that a permeable pavement be covenanted for every home driveway, footpath, public pathways and carparks.



### 8.15 Tree Pits

- 8.16 Coupled with permeable pavements, a series of tree pits located below street level to ensure facilitation, will account for approximately 42% of street stormwater.
- 8.17 Tree pits collect stormwater runoff from small car park areas or roads. Runoff filters through the tree roots and surrounding soil mix, trapping sediment and pollutants before flowing to a piped stormwater system.<sup>1</sup>



Before



After



### 8.18 Vegetated Swales

- 8.19 Vegetated swales are open channels that collect stormwater and allows it to infiltrate into the ground. The plants (ideally as opposed to grass) cover the side slopes and bottom providing a filtration surface for the water and help slow the flow rate. Many swales have an underdrain pipe to manage larger storms.
- 8.20 Swales support runoff from streets supporting the Tree pits theme and providing immediate mitigating retention and treatment. As a naturally flowing green area swales also intercept the typical urban house and concrete look, whilst providing recreational social and cultural activity gathering opportunity. For these reasons swales are culturally pleasing and at-least 1 swale ought to feature in the proposed future development of the site.



Vegetated Swale

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<sup>1</sup>Auckland City Council, Tree Pits Construction Guide at:

<http://www.aucklandcouncil.govt.nz/EN/environmentwaste/stormwater/Documents/treepitsconstructionguide.pdf>



## 8.21 Rain Gardens

- 8.22 A rain garden is a bioretention area that helps manage stormwater discharges. It is a shallow depression in the ground that also captures runoff from driveways or roofs etc. and allows it to soak into the ground, rather than running across roads, capturing, absorbing and filtering pollutants returning cleaner water through the ground to nearby waterways. Rain gardens also reduce flooding by sending the water back underground, rather than into the street and stormwater drains. Besides helping to improve water quality and to reduce flooding, rain garden plants provide habitat for beneficial insects and wildlife! When designed properly, the rain garden fills with a few inches of water after a storm and the water slowly filters into the ground. Because water is only in the rain garden for a day or two, it does not become a breeding ground for mosquitoes and can provide attractive landscape features for a development site. Rain gardens should be placed between stormwater runoff sources (roofs, driveways, parking lots) and runoff destinations (storm drains, streets, streams).
- 8.23 Rain gardens and swales are best practice contributing options for contaminated road runoff treatment and fully compliment and break up the tree pit look and pressure to detention basins.
- 8.24 The use of native plants for tree pits and rain gardens not only adds to best stormwater practice and rejuvenate native bird and marine life, but also reflect traditional history.
- 8.25 The Tarata tree traditionally used for welcoming and treating manuwhiri a kura, "special visitors", and used for (tamoko) could feature at the entrance of 80 McLarin Rd Glenbrook (Kahawai). Again, traditionally there was a grove of Tarata named "Nga Uru Tarata a Huatau", "The Tarata grove of Huatau" which it is recommended feature in the future development of the site. Huatau, is the parent of Te Ata I Rehia, the founding ancestor of Ngati Te Ata. Other examples include the Ti Kouka tree which assisted in saving the life of the great Ngati Te Ata chief Manukau and should feature in surrounding the Tohu commemorating the memorable deeds of this tupuna.
- Similarly, the Kauri tree was a symbol of kaitiakitanga or guardianship and were planted at the entrance of waterways or the base of paa the symbolic guardian of its inhabitants. It is recommended that during the (future) ceremony opening at 80 McLarin Rd that a selected Kauri tree be planted at the entrance of the Taihiki Awa and Manukau harbour. The Kauri tree to be named Te Wairua o Kaiwhare, which signifies spirituality through the gathering point of two significant waterways, the Taihiki Awa and Manukau harbour, protected by Kaiwhare, the taniwha tupuna, ancestral guardian of the Manukau harbour. There should be a plaque with the name and an explanation accompanying the tree.
- 8.26 There are a variety of native plants and trees that tell a story significant to Ngati Te Ata. For example, for Ngati Te Ata the lemon fragrant Tarata tree is also a useful windbreaker, the Karaka trees signifies a new start and were appropriately planted in numbers next to pa and places of permanent occupation. Hinau and Raupo tell a story about the aroha between two famous tupuna, and the Hinau, Mahoe and Patete tell another story related the strength of the "matariki" "common people" as the ridge pole of ancestral whare tupuna. These and other native plants could feature depending on the layout of the proposal and placement appropriateness.



Pathway Rain Garden



Park Rain Garden



### 8.27 Wetlands

- 8.28 Wetlands are among the most effective stormwater practices in terms of pollutant removal and also offer aesthetic and habitat value.
- 8.29 Wetlands provide better filtration of contaminants, for example than ponds, including dissolved particulates due to densities of wetland plants, incorporation of contaminants in soils, adsorption, plant uptake, and biological microbial decomposition. In addition, wetlands, being shallow water bodies do not have the safety issues associated with deeper open water models.
- 8.30 Wetlands are also important cultural features and traditionally, were in themselves wahi rahui, special places set aside to catch eels and, in some instances, (between Waiuku and Maioro) were places of Ngati Te Ata occupation where pa were erected on stakes. The construction of a smaller scaled model of a pa on stakes could feature at one of the Wetland sites to reflect this unique tradition or a model scale displayed in the Cultural Centre.

#### Stormwater relating to Wetlands

- 8.31 When making decisions on future development projects, cumulative effects must be considered.
- 8.32 Water levels of all significant wetlands shall be maintained and stabilised to prevent further deterioration in wetland ecological condition and, where possible, wetland water levels shall be restored to enhance habitat and expand wetland area. Where necessary, this shall be achieved by placing restrictions on the amount of surface and subsurface drainage installed adjacent to wetlands.
- 8.33 Ensure that all land use practices that have the potential to impact on wetlands have efficient sediment, drainage, discharge, fertilizer application, and riparian buffer control practices in place to ensure that adverse impacts on wetlands are prevented.
- 8.34 No discharges of point or non-point source wastewater to ecologically or culturally significant wetlands. All stormwater discharged to ecologically or culturally significant wetlands shall be treated in such a way that ensures the ecological condition and cultural use of the wetland is not compromised. Stormwater should be discharged to a forebay (preferably two).

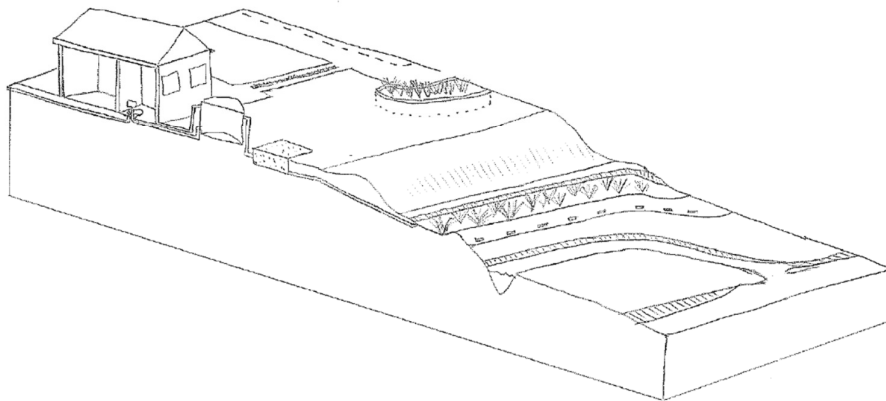


### 8.35 STORMWATER DEVELOPMENT SUMMARY

- 8.36 The focus on water sensitive design and stormwater flow quantity and quality control mechanisms effectively as aforementioned mitigates cultural impact issues. This CIA stormwater assessment provides further opportunity to recognise and provide for the cultural and traditional relationship of Ngati Te Ata to its waterways, sites of significance and customary practices.

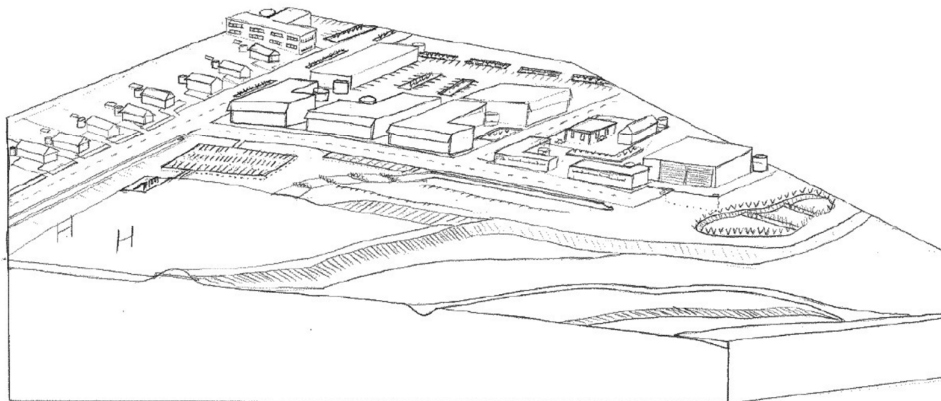
**Figure 2: Example treatment train approach for a residential development**

Showing a residential development with roof tanks for reuse, and groundwater recharge, then through a swale and dry basin/wetland system prior to discharge.



**Figure 3: Example treatment train approach for an industrial development**

Showing an industrial development with onsite treatment with roof water tanks for clean water reuse and groundwater recharge, and roading passing through vegetated swales/rain gardens then into a wetland prior to discharge





## **9.0 ISSUE**

### **9.1 Hazards**

## **9.2 CULTURAL IMPACT**

- 9.3 As with the cultural impact on the future development of the site itself, the resulting pollutants from construction activity via clearing, grading and building also has the potential to adversely impact cultural values including:
- a) the relationship of Ngati Te Ata to wai (water) and thus the mauri and oranga of wetlands, streams, the Taihiki Awa and Manukau Harbour.
  - b) the harm to fish, shell fish and thus impact upon customary fishing, gathering of kutai and tio, and seriously impact mahinga mataitai, the customary shellfish gathering sites in the Taihiki Awa and Manukau Harbour.
  - c) the harm to wildlife populations, killing native vegetation, foul drinking water supplies, erode and destabilise mana whenua sites of significance and the Taihiki Riverbank and make traditional recreational areas (e.g. waka ama) unsafe and unpleasant.
- 9.4 During the clearing and grading stage, sediment is likely to be the primary pollutant of concern, whereas during the building phase, concrete wash, paints, varnishes, and other materials are being used on a daily basis, increasing the likelihood of spills.
- 9.5 Several pollutants of concern are associated with construction activities, including the following: sediment; pesticides; fertilizers used for vegetative stabilization; petrochemicals (oils, gasoline, and asphalt degreasers); construction chemicals such as concrete products, sealers, and paints;
- d) Pesticides, Insecticides, rodenticides, and herbicides are used on construction sites to improve human health conditions, reduce maintenance and fire hazards, and curb the growth of weeds and woody plants. Pesticides used on the agriculturally used farmland will be present. Common pesticides employed include synthetic, relatively water-insoluble chlorinated hydrocarbons, organophosphates, carbamates, and pyrethrins. Over-application of pesticides indicate that small construction sites are potential sources of high amounts of erosion and that sediment loads from the active construction phase are significantly higher than those during the preconstruction and post-construction periods.
  - e) Petroleum products used during construction include fuels and lubricants for vehicles, power tools, and general equipment maintenance. Specific petroleum pollutants include gasoline, diesel oil, kerosene, lubricating oils, and grease. Asphalt paving can be particularly harmful because it releases various oils after application until fully cured.
  - f) Fertilizers are used on construction sites when revegetating graded or disturbed areas. Fertilizers contain nitrogen and phosphorus, which in large doses can adversely affect surface water quality, causing eutrophication.
  - g) Solid wastes specifically macrocarpa and pine trees (including pine needles) and noxious weeds removed during land clearing contribute to the load of solid wastes generated during construction activities.



Other common wastes are wood and paper from packaging and building materials, scrap metals, sanitary wastes, rubber, plastic and glass, and masonry and asphalt products. Improper disposal of food containers, paint canisters, cigarette packages, leftover food, and aluminium foil also contributes solid wastes to the construction site.

- h) Construction chemicals such as paints, acids for cleaning masonry surfaces, cleaning solvents, asphalt products, soil additives used for stabilization, and concrete-curing compounds are used on construction sites and can be carried off in runoff. Other pollutants, such as wash water from concrete mixers, acid and alkaline solutions from exposed soil or rock, and alkaline-forming natural elements, can also be present and contribute to nonpoint source pollution. Improperly stored construction materials, such as creosote-or pressure-treated lumber or solvents, can lead to leaching of pollutants to surface water and ground water. Improper fuelling and servicing of vehicles can lead to dumping of significant quantities of petroleum products onto the ground. These pollutants can enter waterways. Oils, waxes, and water insoluble pesticides can form surface films on water and solid particles. Oil films can also concentrate water-soluble insecticides. Once present in runoff, these pollutants can be nearly impossible to control other than by the use of Very costly water treatment facilities.

## **9.6 CULTURAL CONSIDERATIONS**

- 9.7 Conducting an inventory of all materials used on-site and assessing the potential they pose for contact with runoff will help in implementing effective controls.
- 9.8 Contractors are to use the following practices to guide disposal of hazardous materials:
  - i. Determine what hazardous materials are being used on-site and which hazardous waste streams are generated as a result of construction activities. Once all of the hazardous materials used and hazardous wastes generated are identified, implement an appropriate waste management and disposal strategy.
  - ii. Know the applicable hazardous waste regulations and the associated requirements for storing, marking, and disposing of wastes. Someone on-site should be trained to properly manage hazardous wastes. If waste disposal obligations are not clearly understood, contact the correct regulatory agency to find out what specific requirements must be followed.
  - iii. Use as much of a product as possible before disposing of containers. Containers that are not empty but have been stored for disposal can be sources of drips, leaks, or spills, and they can contaminate landfills or other disposal areas.
  - iv. Do not remove the original product label from the container. It contains important use, safety, and disposal information about the product.
- 9.9 Properly store, handle, and apply fertilizers and detergents. A number of steps can be taken to reduce the risks of nutrient pollution and limit the contact between runoff and nutrients:



#### 9.10 Develop and implement a spill control plan

- a) Construction sites should be equipped with suitable equipment to contain and clean up spills of hazardous materials in the areas where the materials are stored or used. Accidental spills of materials used at construction sites can be sources of runoff pollution if not addressed appropriately. All spills should be cleaned up immediately after they occur. Creation of a site-specific spill control and response plan in combination with spill response training for designated on-site personnel can be effective in dealing with accidental spills and preventing the contamination of soil, water, and runoff.
- b) Preparation of a spill containment, control, and countermeasures (SPCC) plan might be required to meet regulatory requirements (e.g., 8-30 Management Measure 8: Construction Site Erosion, Sediment, and

Chemical Control requirements regarding storage of specified chemicals above certain volume thresholds). Site managers should be aware of all applicable requirements and should contact regulatory authorities if requirements are not known. Even if a formal plan is not required, preparing one is recommended. In general, an SPCC plan should include guidance to site personnel on the following:

- i) Proper notification when a spill occurs
- ii) Site responsibility with respect to addressing the clean-up of a spill
- iii) Stopping the source of a spill
- iv) Cleaning up a spill;
- v) Proper disposal of materials contaminated by the spill;
- vi) Location of spill response equipment programs; and
- vii) Training for designated on-site personnel. A periodic spill “fire drill” should be conducted

#### 9.11 Develop and implement a waste disposal program

Implementation of good waste disposal practices at construction sites can help to significantly reduce the potential for runoff contamination. Wastes generated at construction sites can include surplus maintenance chemicals, refuse building materials, hazardous wastes, or contaminated soil and spill clean-up materials. General practices to manage such wastes include solid waste disposal, recycling, hazardous waste management, and spill prevention and clean-up measures.

- 9.12 Risk of adverse effects on human, cultural, spiritual, or environmental well-being shall be prioritised over risks to individual properties when assessing natural hazard risks and/or the need for hazard protection structures.
- 9.13 Hazard management structures, activities, and schemes and their ongoing function should strive to maintain and restore ecosystem function and habitat, and cultural and/or spiritual well-being.



## **10.0 ISSUE**

### **10.1 Wastewater**

## **10.2 CULTURAL IMPACT**

10.3 Ngati Te Ata assume all future urban development in Glenbrook will be reticulated e. no on-site waste disposal. We are concerned what the effects of both residential and industrial trade wastes will be on existing infrastructure. We do recognise that the South West Wastewater upgrade project will be a big improvement on the current situation from my understanding and has capacity for the proposal area.

10.4 Discharge of effluent into natural water bodies is culturally offensive, land-based treatment is required instead.

10.5 Effects of new urban development on existing wastewater infrastructure including increased risk of cumulative adverse effects as land uses change and development intensifies.

## **10.6 CULTURAL CONSIDERATIONS**

10.7 Land-based treatment of effluent is preferred

10.8 Exploration of natural processes rather than mechanical to treat wastewater, including vermiculture.

10.9 When making decisions on future development projects, cumulative effects must be considered.

## **10.10 CULTURAL ASPIRATIONS**

10.11 Ngati Te Ata has long aspired to remove all wastewater discharge from the Manukau Harbour.

10.12 New ideas and innovative technologies need to be explored for the treatment of wastewater. For example, using power free natural aerating processes, instead of mechanical pumps etc. to treat wastewater to advanced secondary levels. Nature is one huge recycling mechanism. It harnesses these forces that have been quietly working together for thousands of years to break down and decompose waste all around us. It then positions them in an enclosed eco-system that simulates the forest floor, to treat and break down your wastewater until it is perfectly safe to be re-introduced into the environment, via the soil.

10.13 The use of sand and organic filters is considered to have significant beneficial effects on Wastewater and stormwater runoff through a sand bed removing floatables, particulate metals, and pollutants. Sand and organic filters provide water quality treatment, reducing sediment, biochemical oxygen demand, and faecal coliform bacteria. Sand and organic filters are typically used as a component of a treatment train to remove pollution from stormwater before discharge to receiving waters.



## **11.0 ISSUE**

### **11.1 Intermittent Steams**

## **11.2 CULTURAL IMPACT**

- 11.3 The removal of a portion of a stream could have adverse cultural effects if not properly managed.
- 11.4 Waiora is a common expression to denote the life-giving properties water provides. To lose the “ora” or “life” of a waterway intermittent or perennial is serious, its mauri, life force permanently removed. The holistic Maori view of the connectivity between life systems means that the negative loss of one system is likely to impact on another or other systems.
- 11.5 The ecological and hydrological significance of intermittent streams are considered to:  
*provide the same ecological and hydrological functions as perennial streams by moving water, nutrients, and sediment throughout the watershed. When functioning properly, these streams provide landscape hydrologic connections; stream energy dissipation during high-water flows to reduce erosion and improve water quality; surface and subsurface water storage and exchange; ground-water recharge and discharge; sediment transport, storage, and deposition to aid in floodplain maintenance and development; nutrient storage and cycling; wildlife habitat and migration corridors; support for vegetation communities to help stabilize stream banks and provide wildlife services; and water supply and water-quality filtering. They provide a wide array of ecological functions including forage, cover, nesting, and movement corridors for wildlife.<sup>11</sup>*

## **11.6 CULTURAL CONSIDERATIONS**

- 11.7 In terms of the cultural dimension itself, Ngati Te Ata's position is that active streams should be retained where possible. It is accepted that in some cases an intermittent stream can be lost where appropriate mitigation takes place.
- 11.8 Ngati Te Ata would only want to support the removal of the intermittent stream if other alternatives have been explored fully.



## **12.0 ISSUE**

### **12.1 Landscape Effects**

## **12.2 CULTURAL IMPACT**

- 12.3 When Ngati Te Ata look at the land it is not simply a lump of dirt with blades of grass now covered with modern facilities. It is much more, grand. The land is our tupuna, and like our waterways they stir the inner minds memories and stories of past events and ancestors.
- 12.4 The view of the Taihiki Awa looking across to Waitete Pa invokes images of our tupuna in their waka, the men fishing on the point and surrounds, tamariki playing on the water's edge, the women gathered around an open fire sharing stories; the view of the Waiuku Awa looking back to Waiuku encourages the mind to travel back in time to Te Pae o Kaiwaka and how grand the principal pa of Ngati Te Ata was; the view of the Manukau Awa looking across to Te Tumu o Taumoana, the battleground where Manukau's leadership saved Ngati Te Ata from invasion; and from any location at Kahawai looking toward the western skyline to "Te Tuara o Kaiwhare" the backbone of the taniwha tupuna, the Ngati Te Ata ancestral guardian Kaiwhare, where the hapu, pa and kainga of Ngati Te Ata were sited upon virtually every nook and cranny.

## **12.5 CULTURAL CONSIDERATIONS**

- 12.6 Within this cultural context, the entire future development of the site is a key landscape and culturally attuned feature – and connects to what was known as a wahi nohoanga a seasonal fishing village and encampment. These landscape attributes will all need to be maintained and enhanced in the future development of the site.
- 12.7 The Wetlands are another dominant culturally attuned feature. The Park and vegetated swales, rain gardens, tohu, water feature and (any) existing pohutukawa that hug the banks, add significant cultural value making an ideal place to light one's fire.
- 12.8 The roads and paths, are also, in our view potential landscape features and because they are all designed to connect the residents with the waterways, wetlands and each other, they will also be positive culturally attuned value adding landscape amenities.
- 12.9 Several control conditions are recommended they include managing landscape, natural character and visual effects which serve to avoid and manage the adverse effects of built development e.g., a control relating to the exterior of all buildings.



## 13.0 ISSUE

### 13.1 Road/Park/Open Space Naming

We advocate Principle 4 in the Auckland Council Road Naming Guidelines

#### **Principle 4:**

**The use of Māori road names is actively encouraged**

- 4.1 Tāmaki Makaurau, Auckland, has a rich history that is reflected throughout the region. Road names often reflect significant events, people, landscapes and biodiversity. In turn this creates and consolidates a sense of place and identity. The use of Māori road names is actively encouraged, to support a Māori identity that is Auckland's point of difference in the world, and to contribute to the visibility of Auckland's extensive and rich Māori history.

#### **Advice note:**

*The Auckland Council local boards, as the decision-makers on road naming, expect to see evidence of engagement with relevant mana whenua in the local area regarding proposed road names. A summary of which iwi have been contacted, and the feedback received, will be presented to the relevant local board as part of all road naming applications. Mana whenua may suggest additional road name options of their own, which the local boards will also take into consideration in their decision-making. These names will be assessed against the Road Naming Guidelines by council staff before being presented to the local board along with the applicant's preferred name options.*

Auckland Council Road Naming Guidelines (V1, August 2019) Page | 5

## 13.2 CULTURAL IMPACT

Ngati Te Ata does not support names that have no meaning or historical tie to the area. These names play an integral part in the representation of Ngati Te Ata as mana whenua in Kahawai and are permanent yet subtle portrayals of our presence within the rohe (tribal area).

- 13.3 Developers may unknowingly not be aware that some names they offer may be offensive to Ngati Te Ata.

## 13.4 CULTURAL CONSIDERATION

- 13.5 The following names are options to show intent rather than definite designations and would need to be discussed further in consultation between the author, Iwi and planners when more detail is available regarding the location and intent of each road and pathway. There are also other special names that for the present have been retained but will be discussed when more definite details come to hand.

- 13.6 These are tupuna ancestor names that have had significant relationships with Kahawai:

Papaka, Manukau, Aperahama Ngakainga, Te Rangikorongota, Te Katipa, Te Wairakau, Oiroa



Appendix 1:

Species	Common name	Depth range
<b>Urban: Scree Garden Plants</b>		
Sedges, Knobby club rush, Silver and other tussock grasses, tussock sedge and swamp kiokio (fern), Rengarenga, Pohuehue, NZ Iris, NZ linen flax and reeds in swales		
Korokio, Pohuehue, Mikimiki, NZ flax, Lancewood and cotulas in the lawn		
<b>Esplanade reserve: Coastal Bank Revegetation</b>		
<i>Astelia banksii</i>	coastal astelia	
<i>Coprosma robusta</i>	karamu	
<i>Cordyline australis</i>	cabbage tree / ti kouka	
<i>Hebe stricta</i>	koromiko	
<i>Sophora microphylla</i>	kowhai	
<i>Macropiper excelsum</i>	kawakawa	
<i>Vitex lucens</i>	puriri	
<i>Phormium tenax</i>	NZ flax/ harakeke	
<i>Myoporum laetum</i>	ngaio/ mousehole tree	
<i>Pseudopanax lessonii</i>	houpara/ coastal five finger	
<i>Metrosideros excelsa</i>	pohutukawa	
<i>Entelea arborescens</i>	whau	
<i>Cyathea dealbata</i>	silver fern	
<i>Dicksonia fibrosa</i>	wheki-ponga	
<i>Pittosporum crassifolium</i>	karo	
<i>Blechnum novae-zelandiae</i>	kiokio	
<i>Coprosma</i> sp.		
<i>Pittosporum eugenoides</i>	tarata/ lemonwood	
<i>Kunzea ericoides</i>	kānuka/ white tea-tree	
<i>Leptospermum scoparium</i>	mānuka/ tea-tree	



Wetland and stream: Bank planting		
<i>Sophora microphylla</i>	kowhai	
<i>Macropiper excelsum</i>	kawakawa	
<i>Vitex lucens</i>	puriri	
<i>Hebe stricta</i>	koromiko	
<i>Phormium tenax</i>	NZ flax	
<i>Carex lessoniana</i>	ruatahi	
<i>Phormium cookianum</i>	wharariki/ mountain flax	
<i>Cyathea dealbata</i>	silver fern	
<i>Dicksonia fibrosa</i>	wheki-ponga	
<i>Pittosporum crassifolium</i>	karo	
<i>Coprosma robusta</i>	karamu	
<i>Blechnum novae-zelandiae</i>	kiokio	
<i>Myoporum laetum</i>	ngaio	
<i>Coprosma</i> sp.		
<i>Kunzea ericoides</i>	kānuka/ white tea-tree	
<i>Leptospermum scoparium</i>	mānuka/ tea-tree	
Wetland: Margin moist soil planting		
<i>Cortaderia fulvida</i>	toetoe	
<i>Phormium tenax</i>	NZ flax/ harakeke	
<i>Cordyline australis</i>	cabbage tree / ti kouka	
<i>Blechnum novae-zelandiae</i>	swamp kiokio	
<i>Carex virgata</i>	small samp sedge	
<i>Carex secta</i>	makura/ purei	
<i>Sophora microphylla</i>	kowhai	
<i>Macropiper excelsum</i>	kawakawa	
<i>Carex flagellifera</i>		
<i>Kunzea ericoides</i>	kānuka/ white tea-tree	
<i>Leptospermum scoparium</i>	mānuka/ tea-tree	



Wetland: Shallow bench (0-0.3m)		
Apodasmia similis	oioi/ jointed wire rush	0-0.3m
Baumea arthropphylla		0-0.1m
Carex secta	makura/ purei	0-0.4m
Carex ustulatus	giant umbrella sedge	0-.1m
Eleocharis acuta	sharp spike sedge/ spike rush	0-.1m
Bolboschoenus fluviatilis	march clubrush/ river bulrush	0-.15
Wetland: Shallow pond slopes (0.3-1.1m)		
Baumea articulata	jointed twig rush	0-0.36m
Eleocharis sphacelata	kuta	0-01.5m
Schoenoplectus tabernaemontani	lake clubrush/ softstem bulrush	0-1.2m
Typha orientalis	raupo/ bulrush	0-1m
Wetland: Open water (1.1-2m)		
Myriophyllum propinquum	water milfoil	0-3.5m
Nitella hookeri	stonewort	0.3-10m
Ruppia polycarpa	horses mane weed	0.1-3m
Stream: Edge planting		
Carex dissita	purei/flat leaved sedge	
Carex secta	makura/ purei	
Carex lessoniana	spreading swamp sedge	
Carex virgata	small swamp sedge	
Dacrycarpus dacrydioides	kahikatea/ white pine	
Kunzea ericoides	kānuka/ white tea-tree	
Leptospermum scoparium	mānuka/ tea-tree	
Stream: Marginal planting		
Carex lambertiana	forest sedge	
Carex virgata	small swamp sedge	



<i>Cordyline australis</i>	cabbage tree / ti kouka	
<i>Kunzea ericoides</i>	kānuka/ white tea-tree	
<i>Leptospermum scoparium</i>	mānuka/ tea-tree	
<i>Carex secta</i>	makura/ purei	
<i>Cortaderia fulvida</i>	toe toe	
<i>Carex lessoniana</i>	ruatahi	