Supplementary Ideas and considerations for:

Detailed Design Philosophy and

Cultural Identifiers

for the Ōtautahi North Western Cluster of Schools

A Ngāi Tūāhuriri Perspective

Detailed Design Philosophy

This supplementary document is designed to assist the school in the identification, ideas and considerations for detailed design. Further follow up with Ngā Tūāhuriri representatives will assist in ideas in how to utilise these ideas into treatments and design.

Contents

Ecosystem Services

This initial section includes Information on detailed landscape design and introduces the concept of Ecosystem Services (ES) and begins to explore what this concept might mean within the context of the detailed landscape design for any school rebuild or remediation.

WHAT ARE ECO-SYSTEM SERVICES

Ecosystem Services = Nature's function + Value to Humans.[1]
Ecosystem services are components of nature, directly enjoyed, consumed, or used to yield human well-being.[2]
Even though humanity is increasingly urban (e.g. 86% of New Zealanders live in urban areas[3]), people continue to depend on nature for our survival (e.g. oxygen, water, food) and well-being (e.g. green exercise[4]) which relates to the relational concepts of hauora (Māori health).

The concept of Ecosystems Services has emerged as a model for linking the functions in nature (e.g. pollination or pest management strategies) to human welfare (e.g. oxygen production, reductions in the use of carcinogenic (cancer causing) sprays. Given the increasing loss of

[1] Wratten, S., pers comms, 2015

[2] Boyd, J., & Banzhaf, S. (2007). What are ecosystem services? The need for standardized environmental accounting units. *Ecological Economics*, *63*(2), 616-626.

[3] Source: stats.govt.nz (2006 Census).

[4] "Green exercise" refers to physical exercise (walking, cycling) undertaken in natural environments, and is now well recognised for providing physical and psychological health benefits. There is also good evidence that viewing, being in, and interacting with natural environments has positive effects: reducing stress, increasing the ability to cope with stress, reducing mental fatigue, and improving concentration and cognitive function. For more information see, for example, http://www.greenexercise.org/

biodiversity, it is critical that this relationship is recognised, understood and provided for within a wide-range of regional, national and international decisions.[5]

The benefits people obtain from ecosystems include:[6]

PROVISIONING SERVICES – the products obtained from ecosystems, including, for example, genetic resources, food and fiber, and fresh water.

REGULATING SERVICES – the benefits obtained from the regulation of ecosystem processes, including, for example, the regulation of climate, water, and some human diseases.

CULTURAL SERVICES – the non-material benefits people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation, and aesthetic experience, including, e.g., knowledge systems, social relations, and aesthetic values.

SUPPORTING SERVICES – Ecosystem services that are necessary for the production of all other ecosystem services. Some examples include biomass production, production of atmospheric oxygen, soil formation and retention, nutrient cycling, water cycling, and provisioning of habitat.

URBAN ENVIRONMENTS

Cities are dependent on the ecosystems beyond the city limits (e.g. watersheds for potable water), but also benefit from internal urban ecosystems[7] (c.f. green corridors/ecological 'stepping stones'[8]) as well as corridor connections and enhancing greening spaces with native bio diversity in mind.

Globally, there is growing concern that the exploitation of ecosystems and land use intensification is causing widespread declines in ecosystem condition. Nationally, there is an urgent need to develop evidence-based policy that takes ecosystem services and limits into account.[9]

THE CAMPUS

To encourage greater awareness of the essential value that ecosystems provide humans, the notion of Ecosystem Services should be promoted as a primary design element of campus Landscape Design.

WHAT WOULD WE WANT TO ACHIEVE?

The outcomes we seek are:

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[5] Fisher, B., Turner, R. K., & Morling, P. (2009). Defining and classifying ecosystem services for decision making. Ecological economics, 68(3), 643-653.

[6] source http://www.greenfacts.org/glossary/def/ecosystem-services.htm

[7] Bolund, P., & Hunhammar, S. (1999). Ecosystem services in urban areas. *Ecological economics*, *29*(2), 293-301.

[8] "Green Corridors" refer to areas of habitat connecting wildlife populations separated by human activities or structures (e.g. roads, subdivisions, towns). Human activities and structures can split up and reduce natural habitat areas, causing animals to lose all of the resources they need to survive. Indeed, habitat fragmentation due to human development is an ever-increasing threat to biodiversity, and green corridors / ecological stepping stones are a possible mitigation. They allow for an exchange of individuals between populations, and can help facilitate the re-establishment of populations that have been reduced (eg kereru/native wood pigeon). For more information see, for example, http://www.thenatureofcities.com/2014/10/05/do-urban-green-corridors-work

[9] http://www.landcareresearch.co.nz/science/portfolios/ecosystem-services

a) HAUORA – Improved health & wellbeing (e.g. options for green exercise)

b) MĀTAURANGA MAORI – Greater understanding and awareness of cultural & natural heritage values (e.g. interactive landscape design, innovative interpretation that speak to the benefits of appropriate native ecosystems and education)

c) KAITIAKITANGA – More resilient environments (e.g. greater biodiversity; return of taonga/native species – plants, birds, bugs, bees etc.)

d) MAHINGA KAI – increased availability of seasonal foods and natural resources (e.g. lacebark for weaving; rongoā / natural medicines) not restricted to traditional wild foods, but encompassing suitable introduced species too. The key consideration is "do they add value to our well-being"?

e) TURANGAWAEWAE – a genuine and real presence of our culture within the landscape such that our children can see themselves and feel their culture "in their own school yard".

NB: We do not seek or promote an exclusive 'indigenous' planting palette. We simple want to return our natives to this landscape in a meaningful way.

WHAT THAT MIGHT MEAN "ON THE GROUND"

We could view the landscape design as one of many exemplars by:

1. Promoting the adoption of the concept of "eco-system services" within the ecological fabric of the new built and green environment.

2. Greater densities and higher percentages of native trees within the total campus area i.e. 80% native and 20% exotic.

3. The feature trees around campus should be predominantly smaller forest trees within their plant community companionship's which have properties that attract and support native bio diversity.

4. Rain gardens and swales should have plant community focuses (don't just plant for the sake of plantings sake think about their function and the story behind the function then becomes educational).

5. Inclusion of areas of gardens (mara) for sustenance and education within the grounds passive recreational areas and or adjacent to classrooms and or within dedicated areas.

6. Inclusion of Pa harakeke which could best be located within the schools passive recreation areas and or close to the connections to any Reserve or park areas.

7. Returning indigenous biodiversity to this area:

    a) That draws from plant and insect communities that used to be here and which can be attracted back into the area (e.g. korimako/bellbirds, tui, kereru/wood pigeon, etc.).

b) That utilises planting and landscape strategies that attract good insects which provide a service to humanity (e.g. butterfly gardens concept; bubble-bee hotels, gecko hotels etc.).

c) Providing learners, teachers and visitors with an opportunity for "green exercise".

d) Offering learners, teachers and visitors – particularly children and their whanau – a unique "outdoor classroom" experience that;

- Focusses on our natural and cultural heritage.
- Employs visual, aural, reading and kinaesthetic (VARK) means and mechanisms.[10]
- Encourages children and their families to explore and learn more about ecosystems services.

HOW TO GET THERE?

To facilitate these objectives, we encourage:

a) Reference to other local, national & international examples like "Greening the Waipara".[11]

b) The in-depth categorisation of flora and fauna – including ecotyping and microclimate analysis – to consider the right plants to utilise within the spaces available and associated conditions (e.g. soil & shading). This should be done in conjunction with local experts.

c) Consideration of new technologies and mediums like QR codes.[12]

d) Developing a robust set of key performance indicators (KPIs) to help guide and track performance.

DETERMINING "SUCCESS"

The benefits and outcomes of ES are multi-dimensional. To track the success of our endeavours, therefore, we suggest the development and utilisation of an appropriate range of indicators within the detailed design and implementation phases of the project. Cultural indicators, for example, will be informed by core Ngāi Tūāhuriri values, such as:

- manaakitanga ["care for a person's mana / holistic well-being],
- rangatiratanga [leadership],

[10] See, for example, the "Beginners Puzzle" from the Pegasus Bay Biodiversity Trail (attached at Appendix A).

[11] See http://bioprotection.org.nz/research/programme/greening-waipara for an example of industry innovation and uptake

[12] QR codes were originally designed for industrial uses, but have now become common in consumer advertising. Typically, a smartphone is used to scan the QR code and thereby access information that is stored on the web. They remove the need for a user to type search words into a web browser, and reduce the level of static storyboarding 'in the campus grounds'.

- whanaungatanga [family ties, connecting with each other],
- tohungatanga [professionalism], and
- kaitiakitanga [stewardship],

CONCLUDING REMARKS on Ecosystem Services

This section has looked to provide an insight into the notion of Ecosystem Services as it relates to landscape design and begin to explore what that might mean within the overall design.

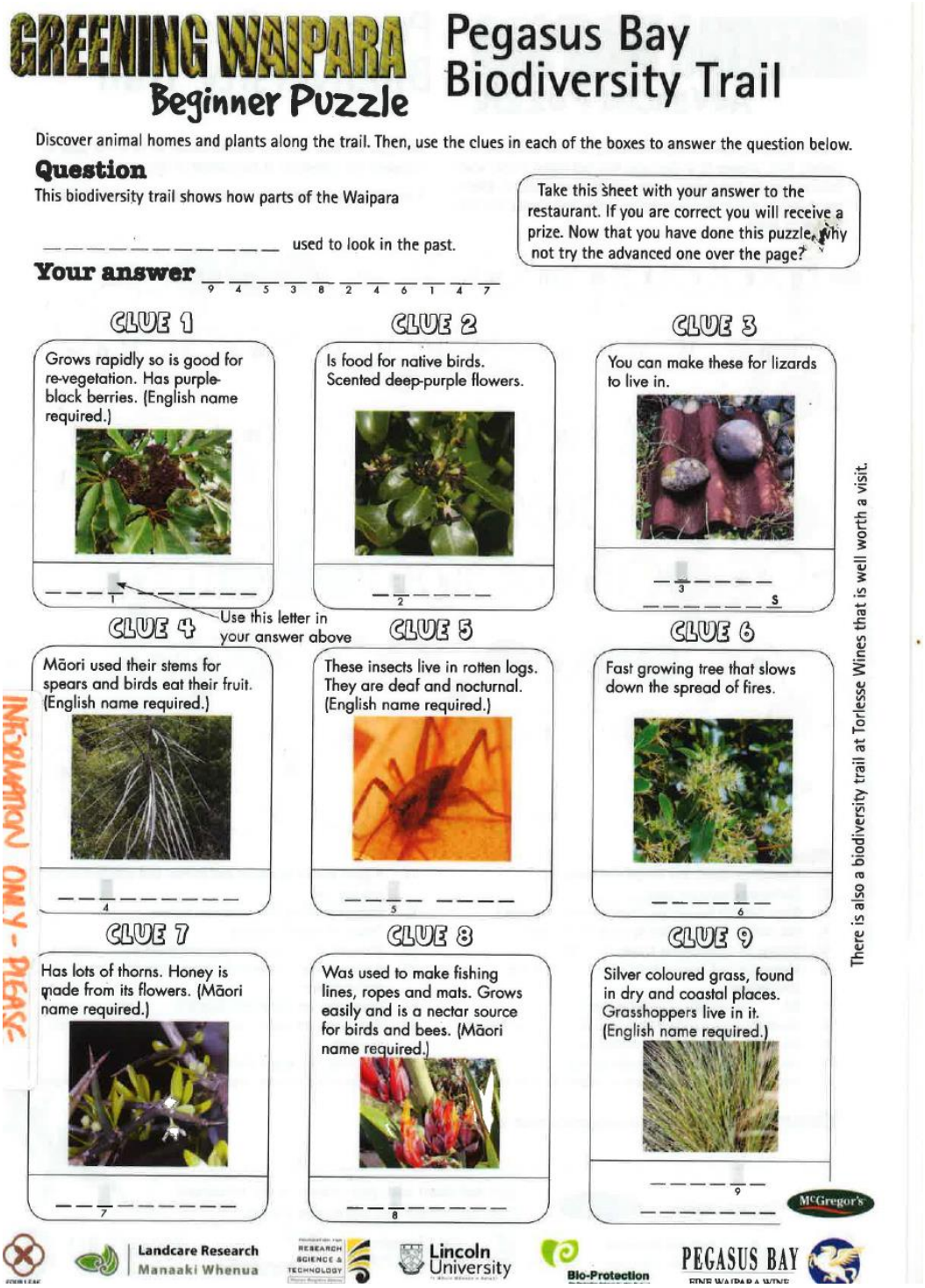
We have identified the outcomes Tūāhuriri wishes to be realised, and trust that they help inform and guide the design of the landscape areas so that it delivers a unique and exciting identity to your project.

Local experts in Ecosystem Services and Ecology are more than happy to discuss these aspects of the design in greater depth. We hope this discussion provides a platform for further input if required.

FIGURE 1 – Ecosystem Services Diagram

Source: ***www.metrovancouver.org***

FIGURE 2 – Engaging Children: an example.



RELATIONAL CONCEPTS and DESIGN OUTCOMES

- Sustainability [whakapūmautanga],
- Eco Literacy [rauwiringa kaiao Matatini],
- Eco system services [ratonga puunaha hauropi], and
- Education [mātauranga]

Further Values and Whakatauki

Whanaungatanga
(family)

We will respect, foster and maintain important relationships within the organisation, within the iwi and within the community.

Manaakitanga
(looking after our people)

We will pay respect to each other, to iwi members and to all others in accordance with our tikanga (customs).

Tohungatanga
(expertise)

We will pursue knowledge and ideas that will strengthen and grow Ngāi Tahu and our community.

Kaitiakitanga
(stewardship)

We will work actively to protect the people, environment, knowledge, culture, language and resources important to Ngāi Tahu for future generations.

Tikanga
(appropriate action)

We will strive to ensure that the tikanga of Ngāi Tahu is actioned and acknowledged in all of our outcomes.

Rangatiratanga
(leadership)

We will strive to maintain a high degree of personal integrity and ethical behaviour in all actions and decisions we undertake.

Whakaaro anō / other ideas

To develop a coherent theme for the naming and detailed design of the schools it is important to think about the natural, cultural and historical significance of the area, as well as the design of the classrooms and school.

Ngā Marohi / Recommendations:

The following section provides recommendations to assist further naming, theming, landscaping and final detailed design of Schools. It begins with a few general recommendations about the use of Te Reo Māori or bilingualism within the school. It also provides guidance on landscaping that reflects natural, cultural and historic values associated with the schools and the wider landscape.

Bilingual name/signage/branding for the Schools cluster:

To encourage and increase the use of Te Reo Māori within the school and its community and to acknowledge the importance of both official languages of New Zealand as well as shared Māori and Pākehā heritage the rebuilt school should consider adopting a dual name (as well as bilingual signage throughout the school).

Bilingual signage/Branding:

Generic bilingual signage and other branding would be important additions to the new school, to raise the profile and normalise the use of Te Reo Māori and the importance of New Zealand's bi-cultural heritage.

Signage could include:

English	*Te Reo Māori*
Welcome to ……School	*Nau mai, haere mai ki Te Kura o ……..*
Hall	*Whare-hui (plus specific name0*
Library	*Whare-pukapuka (could also have specific name)*
Office	*Tari (plus specific name for building/see below)*
Staff room	*Ruma-kaiako / Kāuta-kaiako /*
Learning centre	*Akomanga (generic) or Give each a specific name*
Carpark - Visitor (park) - Courier (park) - Special needs (park) - Principal / Deputy Principal - Staff/Teacher - Family	*Tauranga-waka* *- Manuhiri* *- Karere* *- Pararūtiki* *- Tumuaki / Tumuaki tuarua* *- Kaimahi/Kaiako* *- Whānau*
Playground	*Papa-tākaro*
Field/oval	*Ātea-purei or papa-purei*
Court (basketball/netball)	*Papa-utoka or papatau-pōro*
Courtyard	*Tahua / Ātea*
Toilet - Male/Boys - Female/Girls	*Wharepaku or Heketua* *Tāne / Tama* *Wāhine / Kōtiro*
Drinking fountains / taps	*Puna-wai*
Entrance/Gateway/Fence	*Waharoa (for main gate/entrance) / Kūwaha (for other gates/entrances) / Taiapa (fence)*

Path/Pathway	*Ara / huarahi*
Garden (vege)	*Māra-kai*
Raingarden	*Riu-uaua*
Stormwater basin	*Hāpua-āwhā*
Directions - North / East / South / West	 *- Raki / Rāwhiti / Toka / Uru*

Entrance way Design / Landscaping [13]

The detailed design of the entrance ways, incorporating any new Hall, Office and Car park area, will be an important feature of rebuild or remediation. There are a number of options for the inclusion of theming as well as naming and landscaping that can be considered. This includes:

- ✓ Te Aratika / Main Pathway - Consider specific treatment of the paving, to include a culturally inspired pattern, such as poutama (stairway – signifying the ascent to attaining knowledge).
- ✓ Consider the use of locally sourced materials within paving.
- ✓ Consider how the pathway area can be used for pōwhiri/welcoming and other significant events at the school (including senior graduation / procession etc) as both the Hall, internal courtyards offer appropriate spaces for pōwhiri, gathering and events.
- ✓ Te Waharoa / Main Gateway - Consider the development of a carved gateway that can depict local history.
- ✓ Consider other treatment of fencing at the main entrance and other entrance ways with appropriate symbolism drawn from local history.
- ✓ Ngā Pouwhenua /Carved Posts (or other vertical elements) - Consider the development of pouwhenua/carved posts or other vertical elements to depict, reflect and reinforce local history as well as representing the present and future make-up of the school and community. - Vertical elements can vary and carving can be very subtle, depicting not only Māori and European culture, but also including wider Polynesian, Asian as well as African culture/peoples – an important part of the modern school and community. Creating a pou or vertical element for each culture/region represented at the school as well as having uncarved posts (representing the future) could be considered.
- ✓ Ngā Tūtohu / Signage - Consider the development of signage for the entrance way that includes bilingual names as well as the potential for interpretation about the reasoning behind school designs etc
- ✓ Te Wharehui / School Hall and Te Tari / Office - Consider the use of window treatments – such as frosted stickers/etching, wall treatment/colouring/murals and other design features to incorporate symbolism into the School Hall and Office as they apply to the entrance and the formal use of the entrance area.
- ✓ Consider the retention and/or moving and reinstatement of existing flora within areas to provide a link to the ecotype and celebrating cultural values and local biodiversity.

[13] Also adopted from Pauling, C. (2014) Te Kura o Ōtūmatua / Halswell School, Ideas and considerations for detailed design and naming.

- ✓ Tauranga Waka / Car Park - Consider the use of bilingual signage for parking spaces such as 'MANUHIRI / VISITOR' as well as dedicated spaces for staff etc.
- ✓ Whakaaro anō / Other - Consider the use of other elements including lighting, seating and artwork (as well as water features) that incorporate cultural symbols and celebrate local history, biodiversity and values. Playground design is another area for utilising cultural symbols and artwork.

Landscape Planting and Landscape Design [14]

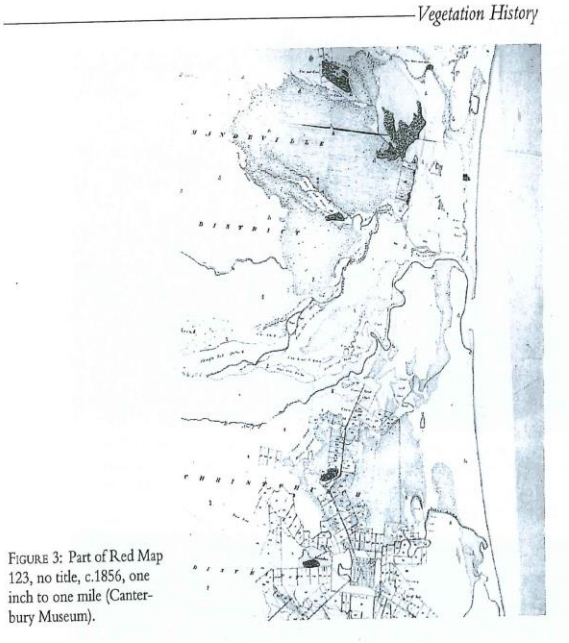


FIGURE 3: Part of Red Map 123, no title, c.1856, one inch to one mile (Canterbury Museum).

[15]

Landscape planting and design is a key way to incorporate and celebrate cultural (as well as natural heritage/biodiversity) values within the schools. This can be achieved through the use of native plants, particularly those that are natural to the area and/or grew there in the past, as well as those that were gathered or have particular uses.

Plants with traditional uses provide an educational element to landscaping through potential for interpretation, and experiential learning. Plants with edible berries provide a further unique aspect to planting, while also providing food for native birds such as kererū (wood pigeon), tūī and kōparapara (bellbird) and encouraging these species back to the school and community.

Bund Planting

Local native plants that would be thrive on the bund and add to cultural and biodiversity values include:

Māori Name	Common Name	Scientific Name	Height/Colour/Uses
Grass like			
harakeke	flax	*Phormium tenax*	2-3m / Green with brown flower heads (korari) / Used for fibre / food / medicine
toetoe		*Cortaderia richardii*	1-2m / light green with light brown / white flower heads / Used for a variety of domestic uses (including in houses)

[14] Also adopted from Pauling, C. (2014) Te Kura o Ōtūmatua / Halswell School, Ideas and considerations for detailed design and naming.

[15] Molloy, B. P. (Ed.). (1995), p. 89.

Shrubs			
kokomuka	hebe	*Hebe strictissima*	2m / bright green with white flowers / Generally used for medicine
mikimiki	coprosma	*Coprosma rubra*	2-4m / reddish brown colour with white berries / Berries eaten / good for birds
		C. crassifolia	2-4m /dark green with yellow berries / Berries eaten / good for birds
		C. intertexta	2m / Green with pale blue fruit / Berries eaten / good for birds
		C. virescens	pale green colour, 3m
kōwhai riki	dwarf kōwhai	*Sophora prostrata*	2m / Dark green/brown with orangey- yellow flowers / unique to Canterbury
makaka	native broom	*Carmichaelia australis*	3-4 m / Light green with purple and white flowers / unique to Canterbury
manakura	shrubby mahoe	*Melicytus micranthus*	2 m / light green with dark purple berries
raukawa		*Raukaua anomalus*	3m / dark green with dark brown berries
Medium Trees			
kōwhai		*Sophora microphylla*	6-9m / Green with yellow flowers / seasonal marker / food of kererū
kānuka		*Kunzea reicoides*	9-15m / Green with white flowers / various domestic and medicinal uses
tī kouka	cabbage tree	*Cordyline australis*	4-12m / Green with white flower/seed bushels / Used for food (kauru)
kaikomako		*Pennantia corymbosa*	4-6m / dark green with white flowers & fruit / Used in firemaking / good for birds
whauwhaupaku	five finger	*Pseudopanax arboreus*	4-8m / glossy green with small brown fruit / attractive to birds
horoeka	lancewood	*Pseudopanax crassifolius*	3-5m / distinctive juvenile and adult forms / green with brown fruit / attractive to birds

Boundary Planting

Local native plants that would work well around the school boundary include those listed below, as well as those shown above for the bund planting:

Large Trees

Māori Name	Common Name	Scientific Name	Height/Colour/Uses
kahikatea	white pine	*Dacrycarpus dacrydiodes*	24-48m / Green with red-orange berries / berries eaten, bark and wood used for medicine and dying / good for birds
mataī	black pine	*Prumnopitys taxifolia*	24m / brown with red berries / berries eaten and timber used / good for birds
pōkākā		*Elaeocarpus hookerianus*	6-12m / Green with white flowers and purple fruit / bark used for dying
tōtara		*Podocarpus totara*	24-30m / bright green with red berries / berries eaten and timber used for whare and waka / good for native birds
Medium Trees/Shrubs			
houhi	lacebark	*Hoheria angustifolia*	6-9m / Green with white flowers / Bark-fibre used for weaving
koromiko	hebe	*Hebe salicifolia*	5m / green with white flowers / used for medicine
manatū	ribbonwood	*Plagiathus regius*	6-9m / / Green with white flowers / Bark-fibre used for weaving
ngaio		*Myoporum laetum*	3-9m / bright green with white flowers / used for medicine
porokaiwhiri	pigeonwood	*Hedycarya arborea*	6m / dark green with large orange-red fruit / popular food of kererū
tarata	lemonwood	*Pittosporum eugeniodes*	3-6m / light green with fragrant flowers / tree gum used as chewing gum/medicine

Raingardens and Stormwater basins

The following native plants are suggested by Ignatieva, Meurk, van Roon, Simcock and Stewart 2008 for both raingardens and thin soiled (50-150mm) green roofs in Christchurch:

Pūrei / *Carex virgata*, *C. flagellifera*, *C. comans*, *C. testacea*, other short tussock sedges, mīkoikoi/NZ iris, tūrutu/inkberry, wiwi/rushes, oioi/*Apodasmia similis*, dwarf toetoe/*Chionochloa flavicans*, knobby clubrush/*Ficinia nodosa*, wind grass/*Anemanthele lessoniana*, waiū/sea spurge/*Euphorbia glauca, ninihi/*sand convolvulus/*Calystegia soldanella*, mikimiki / *Coprosma propinqua*, sand coprosma, korokio/*Corokia cotoneaster*, shrub pōhuehue, scrambling pohuehue, mat pohuehue and tauhinu/*Ozothamnus leptophyllus*. *Crassula sieberiana, Zoysia minima*, Oxalis exilis**, NZ St John's wort*, *Acaena buchananii*, A.microphylla*, Cotula australis, Carex breviculmis, C. resectans*, Geranium sessiliflorum*, Gnaphalium audax*, Horokaka/NZ iceplant*, onion-leaved orchid, sun orchid, sand convolvulus*, *Convolvulus verecundus, Epilobium cinereum, E. nummulariifolium, E. rostratum*, sea spurge, *Haloragis erectus, Lachnogrostis spp.*, Leptinella minor*, L. serrulata**, NZ linen flax, blue tussock, *Deyeuxia avenoides*, plume grass*, blue wheat grass, rice grass, *Poa lindsayi, P. imbecilla*, danthonias*, Dichondra brevifolia*, D. repens*, adders tongue fern*, Gonocarpus aggregatus*, knobby clubrush, *Stackhousia minima, Stellaria gracilenta*, mīkoikoi/NZ iris, scabweeds (*Raoulia australis, R. monroi, R. tenuicaulis)*, Pyrrosia eleagnifolia, Einadia spp., Helichrysum filicaule*, holy grass, NZ groundsels, pātiti/silver tussock, *Festuca actae*, F.novae-zelandiae, F. coxii*, mat pohuehue*, leafless pohuehue*, *Coprosma atropurpurea, C. petriei and Leucopogon fraseri*.

Planting in and around storm water basins could also be considered using native wetland species as well as the following plants suggested by Ignatieva et al 2008:

Shrubs and tussocks in a wet swale base

Oioi, NZ flax, toetoe, *Carex virgata*, umbrella sedge, *Juncus edgarae*, *J. sarophorus*, *Baumea* spp.,*Coprosma propinqua*, marsh ribbonwood, karamu, weeping mapau and raupo (where bulk doesn't matter).

Tress in dip and slope

Cabbage tree, ribbonwood, manuka, lacebark, kohuhu, broadleaf, karamu, kaikomako, kowhai, akeake and totara.

Shrubs and tussocks (dry swale)

Wind grass, rushes (*Juncus distegus*, *J. australis*, *J. pallidus*), oioi, knobby clubrush, hunangamoho, koromiko, *Coprosma propinqua*, *C. crassifolia*, *C. virescens*, *C. rubra*, *Olearia bullata*, korokio, weeping mapou, kakaha/bush lily (Astelia), shrub pohuehue, NZ iris, inkberry and mountain flax.

Mown swales

Cotulas including *Leptinella maniototo*, biddibid, pennywort, *Pratia* spp., *Plantago triandra*, *Gnaphalium* spp., NZ dock, mat coprosma species, mat pohuehue, *Oxalis exilis*, *Dichondra brevifolia, D. repens* and *Selliera radicans.*

Courtyard/Classrooms, Entrance Way, Sports field and other areas

Considering the planting of particular native specimen trees (and/or retaining some of the existing native trees, including a number of medium sized tōtara) to sit alongside/with other exotic trees (both planned and existing) provides another opportunity to express bi-culturalism and even multiculturalism within the school. Good native specimen trees include:

Māori Name	Common Name	Scientific Name	Height/Colour/Uses etc
Medium Trees/Shrubs			
horoeka	lancewood	*Pseudopanax crassifolius*	3-5m / distinctive juvenile and adult forms / green with brown fruit / attractive to birds
houhi	lacebark	*Hoheria angustifolia*	6-9m / Green with white flowers / Bark-fibre used for weaving
kōwhai	*Sophora microphylla*		6-9m / Green with yellow flowers / seasonal marker / food of kereru
porokaiwhiri	pigeonwood	*Hedycarya arborea*	6m / dark green with large orange-red fruit / popular food of kererū
raukawa		*Raukaua edgerleyi*	6m / Green scented flowers / Used traditionally as an aromatic
tītoki	NZ Ash	*Alectryon excelsus*	4-6m / distinctive green leaves with red and black fruit with seed / seeds used to make an oil for food and medicine
Large Trees			
karaka	NZ Laurel	*Corynocarpus laevigatus*	6-15m / dark green with large orange fruit / traditional seasonal marker
pāhautea	NZ Cedar	*Libocedrus bidwillii*	20m / cone shaped / cold hardy
pōkākā		*Elaeocarpus hookerianus*	6-12m / Green with white flowers and purple fruit / bark used for dying
tōtara		*Podocarpus totara*	24-30m / bright green with red berries / berries eaten and timber used for whare and waka / good for native birds
rimu	red pine	*Dacrydium cupressinum*	20-40m / distinctive dropping bronze branches/leaves with red fruit / Berries eaten/ timber and bark used for medicine and dying

A further more in-depth list is provided within Appendix 1 and details: species, anticipated mature size, characteristics, urban use, mahinga kai and rongoā values, other cultural values and customary uses and ecological values based on Taonga species. These are native plants of special cultural significance and importance to Ngāi Tahu. [16]

Additional information to assist planting/design

The following links, references and organisation can provide further information to support to decisions around landscaping as well as sourcing plants and getting them in the ground:

Planting Guideline's

Insight Report: Streamside Planting in New Zealand Prepared for Rachel Barker, Greenspace 8 July 2005, This document contains: Links to relevant websites, Details of books and pamphlets on streamside planting and NZ native plants, Article abstracts and Full text articles http://resources.ccc.govt.nz/files/InsiteReportStreamsidePlanting-streamsideplanting.pdf

To find out more about the plant species that existed in Christchurch before humans arrived see Christchurch Ecosystems and Planting Guides Indigenous ecosystems of Otautahi Christchurch, Sets 1 4. Lucas Associates (available from Christchurch City Libraries) which is a good guide to Eco typing of differing landscape areas. http://www.lucas-associates.co.nz/christchurch-banks-peninsula/christchurch-ecosystems/

Web Sites

Christchurch City Council (2008) Biodiversity Strategy, http://www.ccc.govt.nz/thecouncil/policiesreportsstrategies/strategies/healthyenvironmentstrategies/biodiversity.aspx

[16] Adopted from Harris, N.K., et al, (2014) Planting Guidelines and in development.

Christchurch City Council (2010) Ecological heritage sites, http://www.ccc.govt.nz/learning/educationforsustainability/naturalenvironment/ecologicalheritagesites.aspx

Christchurch City Council, (Circa 2000), Nga Taonga O Nga Iwi, http://resources.ccc.govt.nz/files/TreasuredPlantsOfThePeople-naturalenvironment.pdf

Christchurch City Council, (2005) Christchurch City and Lowland Canterbury, Streamside Planting, http://resources.ccc.govt.nz/files/StreamsidePlantingGuide-streamsideplanting.pdf

University of Canterbury and Lincoln UniversityWaterways Centre for Freshwater Management, All Resources > Waterway Restoration, http://waterways.ac.nz/Research_database/Database_operation/search.php?sub=55

Environment Canterbury, Putting Biodiversity into our backyard, http://ecan.govt.nz/advice/biodiversity/pages/backyard-biodiversity.aspx

- **Plants should be sourced locally at all times if practical**

Environmental standards:

These standards are developed to inform the building services approach which sets precedents for sustainable buildings and provides recommendations on building performance approaches that reflect Ngāi Tahu environmental values.

Practical interpretations of Ngāi Tahu environmental values are relevant to building performance standards and green space/public realm design.

The Mauri Model Decision Making Framework – A Tikanga Māori Framework for Sustainable Design provides us with an assessment guide to better understand the degree to which design proposals might align with Ngāi Tahu values and aspirations. As demonstrated by the House of Tahu project and Te Hononga (Christchurch Civic Building), Ngāi Tahu wants to support and promote sustainable developments.

Whilst in the past, there has been a dearth of culturally based methods for assessing sustainability; the Mauri Model assessment tool (and those similar) provides a potential option to better measure design proposals against Ngā Tahu environmental and cultural values. Awatere (2008) has adapted the Mauri Model framework to create a broad evaluation tool to assist the assessor of any proposal to evaluate a development or activity against values framed within a Mātauranga Māori environmental context. [17] The tool demonstrates in a practical sense how mātauranga Māori, and in this case – mātauranga Ngāi Tahu - can inform environmental design standards for the new school.

House of Tahu – Cultural Sustainability/Assessment criteria is a Cultural Sustainability Assessment undertaken In 2006, by Te Rūnanga o Ngāi Tahu in relation to the development of a

[17]See Awatere, S., 2012. Building Mana Whenua Partnerships for Urban Design. Lincoln: Landcare Research , Awatere S, Pauling C, Hoskins R, Rolleston S 2008. Tū Whare Ora: an assessment tool for papakāinga. Hamilton: Landcare Research & Awatere, S., Harmsworth, G., Rolleston, S., Pauling, C., Morgan, T. K. K. B., & Hoskins, R. 2011. Kaitiakitanga o ngā ngahere pōhatu: Kaitiakitanga of urban settlements. Lincoln: Landcare Research.

proposed tribal headquarters building to be built within the Christchurch City centre (Pauling & Morgan, 2006)[18] .

This development is known as the House of Tahu and the proposed site was the site of the former King Edward Barracks (on the block bounded by Durham Street, Hereford Street, Cashel Street and Montreal Street). The site proposed for House of Tahu has some proximity to the site for the Precinct and, we would posit, raises some similar environmental and cultural issues in terms of design (less so for function). The House of Tahu assessment involved a review of relevant tribal policy, planning, design, interview and survey information. As well as the facilitation of a cultural design assessment workshop, using the Mauri Model. Issues identified by Ngāi Tahu as critical for the development of House of Tahu, included those relating to:

- manawhenua inclusion
- water management
- waterway, mahinga kai and wāhi tapu protection and enhancement, and
- the restoration of cultural landscapes.

Current Ngāi Tahu policy positions also support an aspiration for urban developments to decrease the overall impact on existing infrastructure, and to find and implement alternative, low impact and self-sufficient solutions for water, waste, energy and biodiversity issues. Solutions specifically mentioned within Ngāi Tahu environmental policy (Te Rūnanga o Ngāi Tahu, 2007), as well as at the House of Tahu assessment workshop included:

- the use of composting or waterless toilet/sewage systems
- rainwater collection and grey water recycling
- land or wetland based storm water and sewage treatment and disposal systems
- solar or wind based energy generation, and
- the protection and enhancement of native flora, fauna and habitats, with a focus on potential mahinga kai and cultural use.

The issue of restoring cultural landscapes through native restoration, enhancing views and connections to landscape features, historical interpretation and the use and incorporation of traditional materials, design elements and artwork within developments were also outlined. The Cultural Sustainability Review for the House of Tahu (2006) identified a list of Ngāi Tahu cultural sustainability indicators that provide a checklist for guiding future urban design, including remediation and anchor projects. These indicators, like Awatere's, include:

- Ngā Wai Tūpuna (ancestral waters): Protection of natural waterways and the appropriate use/reuse, treatment & disposal of water (particularly onsite and/or land based systems for storm water, grey water and wastewater).

[18]Pauling, C. & Morgan, K. 2006. Te Kaupapa o Te Whare - House of Tahu Cultural Sustainability Assessment. Christchurch: Ngāi Tahu Property Ltd.

- Ngā Otaota Māori (indigenous habitats): Protection & enhancement of native flora, fauna, habitats and ecosystems, particularly waterways & wetlands).

- Wāhi Tapu/Taonga (sites of significance): Acknowledgement, protection, interpretation and enhancement of culturally significant sites.

Assessment Tool kit

A toolkit was developed from *"An Example of Modern Māori Learning Environments, A Ngāi Tūāhuriri Perspective, New Brighton Schools Merger ,Cultural Identifiers"* to provide a strategic overview and to assist schools within the Ngāi Tūāhuriri Takiwā to identify with and provide for the relationship of mana whenua within the remediation and rebuild process. It builds on the environmental standards discussed within the previous section.

It must be noted that the New Brighton School merger is an exemplar and specific to the general location of the school, mana whenua and localised environments.

The toolkit has been designed so it can be adopted and adapted by further Hapū of Ngāi Tahu to utilise and who may be faced with school remediation's and rebuilds within their Takiwā.

Reference to relevant Iwi Management Planning Documents have also been included within the toolkit. This provides a further layer of considerations to the relevant Government, Governance Boards and Design Teams when considering planning for remediation and rebuilds.

The toolkit has been developed into a matrix format see Appendix 2 and builds on and includes content and excerpts from the original exemplar. References to the identified hapū and takiwā from the exemplar are excluded for the specific purpose of developing a generalised template for use by other hapū specific to their own area.

The toolkit has the function of indicating the main issues and values from a mana whenua perspective. How those issues and values can be threaded into the process of engagement, preliminary and detailed design phases, through to implementation and the build phases of the school remediation or rebuild are also included where applicable. Place specifics, issues and values are for the mana whenua of their particular takiwā to indicate. Further reference to whom and how to engage with are also provided.

The toolkit matrix includes:

Considerations to identify	**Key steps to take**	**Identifiers to consider**	**Potential themes to include**
They are designed to indicate why the school should engage	**They are designed to indicate how the process can be undertaken**	**They are designed to give the details of what to consider and include in the preliminary and detailed design phases**	**They are designed as a list of potential topics which can be drawn upon to include within the overall design**
Evaluation and assessment criteria **Designed as a checklist against mana whenua values and issues**			

To summarise getting mana whenua involved in co-construction of the implementation of plans with the Ministry of Education (MOE) including helping with new build schools and schools with major remediation or redevelopment is a critical component in demonstrating relationships built on partnership and good faith. A partnership that is culturally inclusive in building design, and around storying (or narratives) of flora and fauna from a mana whenua perspective demonstrates a positive move towards and maintaining the partnership principles of the Treaty of Waitangi and in turn reflects authentic new learning environments post-earth quake.

The opportunity to influence the design also shows partnership through threading the history and storying of the mana whenua into the fabric of the school. 'What is this place and what happened in this place' with regard to their journeying and settlement to the area informs the inquiry of how to best co-partner with the place and its inhabitants. [19]

Whakamutunga / Conclusion

This document provides a range of ideas to assist with incorporating cultural values, and specifically Te Ngāi Tūāhuriri / Ngāi Tahu values into the detailed design and ongoing development of the School.

These ideas include suggestions for the:

- Naming, theming and bilingual signage for the School;

- Appropriate suggestions for Māori names for the schools and any new buildings;

- Cultural design ideas of entrance way area; and

- Native landscape planting for the bund, boundary, rain gardens and other areas around the school.

The document also includes links and references for further reading and support for the ideas provided.

A key next step would be to discuss these ideas, refine and/or decide on those that may be taken forward and engage with Te Ngāi Tūāhuriri Rūnanga to get their further feedback and support for development/implementation.

Considering this is an initial scoping exercise it will be necessary for the schools to further engage with the Te Ngāi Tūāhuriri Education Committee who will provide guidance, education and support. They will also identify mana whenua experts who can be engaged with to provide further Māori language, environmental, architecture, landscape and cultural advice into any detailed designs.

[19] Harris, N.K. (2014) Assessment toolkit from *"An Example of Modern Māori Learning Environments, A Ngāi Tūāhuriri Perspective, New Brighton Schools Merger ,Cultural Identifiers"*

Disclaimer

Prepared for the Board of Trustees by Nigel Harris

On Behalf of Ngāi Tūāhuriri Education Committee©

Disclaimer and Limitations: Limitations are based on the scope of the report and multiple layers available and regionally specific interpretations. Although the author has made every effort to ensure that the information in this report was correct at this time, the author does not assume and hereby disclaim any liability to any party for any loss, damage, or disruption caused by errors or omissions, whether such errors or omissions result from negligence, accident, or any other cause.

This report was generated through a series of literature searches, external discussions with historian, archival searches, web based searches for relevant information and use of design ideas based on existing in-depth knowledge of environment, mahinga kai and mana whenua association to the area.

Appendix 1 Taonga species are native plants of special cultural significance and importance to Ngāi Tahu.

In depth native species for Schools

NOTE: Taonga species are native plants of special cultural significance and importance to Ngāi Tahu.

SPECIES	ANTICIPATED MATURE SIZE	CHARACTERISTICS	URBAN USE	MAHINGA KAI and RONGOĀ VALUES	OTHER CULTURAL VALUES and CUSTOMARY USES	ECOLOGICAL VALUES
Large Trees						
Hinau *Elaecarpus dentatus*	H-5m-10m (in cultivation) w-3m-5m	-Lowland forest tree -Attractive tidy canopy tree -Slow growing -Can be temperamental	-Sheltered wet low lying areas. - Ecological restoration such as pockets of forest or naturalised areas within an urban environment.	-Rongoā: bark steeped in a hot bath for skin illnesses. Fruit was made into a gruel through boiling for general recovery from illness. -Kai: edible berries. -Craft uses: mordant to make black dye.	-Ngāi Tahu taonga species.[20]	-Flowers and berries provide kai for native manu -Tall forest canopy tree for bird life and movement -High ability to sequester carbon
Kahikatea White pine *Dacrycarpus dacrydioides*	H-9m-12m (in cultivation) W-4m	-Attractive large canopy tree with straight truck -Does not reach full forest size in cultivation -Must grow in damp soil -Slow growing	-Low-lying damp areas. - Ecological restoration such as pockets of forest or naturalised areas within an urban environment.	- Kai: edible summer berries. Fleshy aril or koroī is edible. -Rongoa: leaves used to treat kidney and other urinary problems. Boiled leaves can be applied to bruises. -Craft uses: wood used for bird spears	-Soot obtained from burning the heartwood supplied pigment for ta moko. -Considered rākau rangatira (chiefly tree) -Ngāi Tahu taonga species	-High ability to sequester carbon -Flowers and berries provide kai for native manu -Tall forest canopy tree for bird life and movement
Matai Black pine *Prumnopitys taxifolia*	H-10-20m (in cultivation) W-6m	-large lowland forest tree Slow growing	-ecological restoration such as pockets of forest or naturalised areas within an urban environment.	-Kai: edible summer berries. Sap was drunk…Matai beer. -Rongoa: sap of the tree used as a disinfectant of consumption. -Craft and building uses: fine grained timber used for carving, building, musical instruments, cooking vessels and hunting spears.	-Sometimes acted as markers of mahinga kai sites -Considered rākau rangatira (chiefly tree) -Ngāi Tahu taonga species	-Flowers and berries provide kai for native manu -Tall forest canopy tree for bird life and movement -high ability to sequester carbon
Totara *Podocarpus totara*	H-10m (in cultivation) W-6m	-Attractive large canopy tree with straight truck -Does not reach full forest size in cultivation -Slow growing	-Attractive formal street tree -Feature tree in open reserve areas. -Ecological restoration.	-Kai: edible berries -Rongoā: leaves boiled with mānuka to treat scurvy and reduce fever. -Building uses: Highly valued for timber-straight strong but soft timber was carved for waka and carving.	-Considered rākau rangatira (chiefly tree). - Ngāi Tahu taonga species	-Flowers and berries provide kai for native manu -Tall forest canopy tree for bird life and movement -High ability to sequester carbon. -Can grow in damp or dry soils
Medium to Small Trees						
Horoeka Lancewood *Pseudopanax crassifolius*	H-5m W-3m	-Architectural juvenile form which lasts for 10 plus years. -Adult form is a small canopies tree	-Planted in clusters within a street garden setting or street tree. -Planted in clusters with other natives in a naturalised setting.			-Flowers provide kai for native manu and bees.
Houhi puruhi Narrow leaved lacebark *Hoheria angustifolia*	H-5-6m W-2m	-Open delicate appearance -Narrow upright elongated form -Very hardy	-Small spaces such as narrow berms. -Grouped informally with other natives - Delicate dappled texture -A good screening tree	-Craft uses: inner bark had lace like qualities, used to make purses, kete. -Rongoa: infusion of bark taken for colds, or jelly for sore eyes.	-Ngāi Tahu taonga species	-Flowers provide kai for native manu. -Shading to waterways.
Kapuka Broadleaf *Griselinia littoralis*	H-3-5m W-3-4m	Large shrub, small tree -shrubby neat compact form -Attractive large glossy green leaves	-Screening, hedging -Backdrop species against a wall. -Planted with other natives in a naturalised setting. -Can be clipped to desired shape.	-Rongoā: inner bark used on scrofula and venereal disease. -Building uses: Timber was known for its durability. -Kai: edible fruit although very bitter.	-Ngāi Tahu taonga species	
Kanuka *Kunzea ericoides*	H-5-8m W-3-4m	-Tall, open formed tree -Attractive trunk and branch system	-Best within an ecological setting with other natives. -Planted in clusters to create an urban forest aesthetic -Attractive floral display around Christmas time.	-Rongoā: leaves infused to make a tea to treat kidney and bladder complaints and reduce fever in children. The seeds were chewed for stomach complaints. Extract of the oil has antibiotic / anti-viral qualities. Also used for breathing difficulties such as asthma, hay fever and sinuses; and an effective remedy against intestinal parasites. -Kai: tea -Craft uses: hard timber was used for weapons, digging tools, waka paddles and many more items. -Building uses: Inner bark used for weather proofing dwellings.	-Highly valued taonga species due to its multiple uses	-Flowers provide kai for native manu and bees -Colonising species -Can grow in dry conditions
Kohutu / rautawhiri *Pittosporum tenuifolium*	H-4m-5m W-3m	-Large shrub, small tree -Shrubby compact form. -Attractive light green colour. delicate texture -Fast growing.	-Screening, hedging -Backdrop species against a wall -Planted with other natives in a naturalised setting. -Can be clipped to desired shape	-Rongoā: gum used in making scents. Resin mixed with puha and chewed for bad breath and saw gums. Also used for skin diseases.	-Branches used by tohanga in ceremonial proceedings such as birth or lifting of tapu. Also used to beckon manuhiri onto the marae. -Ngāi Tahu taonga species	-Flowers and berries provide kai for native manu and bees
Kotukutuku Tree fuschia *Fuchsia excorticate*	H-3-6m (up to 15m in the bush) W-3-4m	-Deciduous -Canopy tree. -Attractive flowers.	-Plant with other natives -Stream and river banks -Perching islands within green corridors.	-Kai: edible purple berries, taste like tamarillo.	-Ngāi Tahu Taonga species	-Honey like nectar and berries are very attractive to native manu.
Kowhai *Sophora microphylla*	H-6-7m W-3-4m	-Attractive open canopy tree. -Massive display of yellow flowers during Spring.	-Small open canopy street tree. -Raingardens -Biofiltration swales	-Rongoā: used for itch and other skin diseases. Most of the tree can be used for rongoa practices.	-Flowers mark the time for planting kūmara. -Ngāi Tahu taonga species	-Flowers provide kai for native manu. -Shading of waterways. -Con handle damp or dry

[20] Ngāi Tahu Claims Settlement Act 1998, Section 288 Special association with taonga species acknowledged. The Crown acknowledges the cultural, spiritual, historic, and traditional association of Ngāi Tahu with the taonga species. See appendix 1 from s 287, Schedule 97, Taonga species.

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			(along the higher edges) -looks attractive planted in informal clusters. Stream / river edge. Ecological enhancement planting. -Can establish in confined growing conditions such as tree pits.	-Craft uses: yellow dye from the leaves. Wood is very durable, used for fencing.		conditions
Mānuka *Leptospermum scoparium*	H-3-4m W-2-3m	-Bushy large shrub small tree. -Fast growing. -Suffers from sooty mould / mānuka blight.	-Planted in clusters with other natives in ecological restoration or enhancement areas. -Raingardens -Not suitable where clear sightlines are required.	-Rongoā: leaves infused to make a tea to treat kidney and bladder complaints and reduce fever in children. The seeds were chewed for stomach complaints. Extract of the oil has antibiotic / ant-viral qualities. Also used for breathing difficulties such as asthma, hay fever and sinuses; and an effective remedy against intestinal parasites. -Kai: tea -Craft uses: building such as fencing. Inner bark used for weather proofing dwellings.	-Highly valued Ngāi Tahu taonga species due to its multiple uses	-Flowers and provide kai for native manu and bees. -Fast growing colonising species.
Manutu Ribbonwood *Plagianthus regius*	H-5-6m W-2-3m	-Airy open delicate appearance. -Upright form. -Very hardy. -semi deciduous -fast growing	-Raingardens -Biofiltration swales -Confined spaces such as tree pits -Grouped informally with other natives - Delicate dappled texture -Can grow in confined conditions			-Flowers and provide kai for native manu and bees -Fast to establish. -Shading to waterways. -Can grow in damp conditions
Mapou *Myrsine australis*	H-3-5m W-2m	-Small tree large shrub. -Fresh green leaves, red tinges with wavy edges	-Grouped informally with other natives. -Used in restoration plantings.	-Rongoā: boiled leaves to make tea for toothache and cleaning teeth. -Craft: The branch wood was used for digging sticks and adze handle sockets.	-Ngāi Tahu taonga species	-Berries highly attractive to native manu. -Native restoration planting.
Ngaio *Myoporum laetum*	H-3-6m W-3-4m	-Small rounded tree. -Poisonous to farm animals.	-Grouped informally with other natives. -Used in restoration plantings. -Can tolerate dry exposed conditions. -Provides shelter. -Fast growing. -Not suitable where clear sightlines are required unless pruned.	-Rongoā: Inner bark rubbed on gums and chewed for dental problems. Inner bark applied to skin disease, juice extracted and applied to sores. -Kai: berries are edible. -Other: Juice from leaves used as insect repellent for sand flies and mosquitoes	-Ngāi Tahu taonga species	-Flowers and provide kai for native manu and bees. -Berries provide kai for manu. -Native restoration planting.
Ponga Silver tree fern *Cyathea dealbata*	H-10m W-5-8m	-Tree fern -Highly attractive iconic tree. -Provides soft dappled light and texture.	-Plant amongst other natives for protection from wind and frost. -Stream and river margins.	-Rongoā: Pith used to make poultice, skin disease. -Craft: trunks used in building whare.	-Ngāi Tahu taonga species	-Native restoration planting.
Tarata Lemonwood *Pittosporum eugenoides*	H-6m W-4m	-Bushy tree -Requires canopy lifting to create canopy form.	-Street tree (if canopy lifted) -Attractive when used in informal setting with other natives.	-Rongoa: leaf infused in hot water for drinking. Good for rheumatism, sore throat and can be used as an antiseptic. gum used in making scents.	-Ngāi Tahu taonga species	-Flowers and provide kai for native manu and bees -Native restoration planting
Ti kouka Cabbage tree *Cordyline australis*	H-6m-10m W-2m -3m	-Distinctive form -Very hardy -Deep tap root-stable -Drops large leaves.	-Formal medium to small street tree -Feature tree - Planted in clusters with other natives in ecological restoration or enhancement areas - Raingardens -Biofiltration swales. -Wetland restoration / stormwater ponds.	-Kai: young tap root (kauru) was highly prized as a sugary food source. Growing tip is also edible. -Rongoa: eating of the shoots helped to prevent scurvy. -Craft uses: The fibrous leaves were used in weaving. Timber was fireproof, so was used by settlers to line fireplaces.	-Highly valued by Ngai Tahu as a taonga species. -Planted as landscape markers To locate sites of significance and give direction. -The flowers of Ti would signal how the summer was going to be for kaura harvesting.	-Flowers and berries provide kai for native manu and bees. -Erosion control
Whauwhaupaku Fivefinger *Pseudopanax arboreus*	H-4-5m W-2m	-Small tree, large shrub. -Fast growing, hardy. -Glossy large leaves.	-With other natives in ecological restoration planting or amenity planting against a wall where busy growth habit will not cause sightline issues.	-Craft uses: Khaki dye, The gum, pia houhou, used in join of water vessel to prevent leakage. Small logs stripped of their bark made slippery skids to move heavy canoes.		-Fast growing species, ideal for native restoration planting. -Berries provide kai for native manu.
Shrubs						
Akeake *Dodonaea viscosa*	H-3-6m W-2m	-Large bushy shrub	-With other natives in ecological restoration planting or amenity planting against a wall where busy growth habit will not cause sightline issues. -shelter, screening	-Rongoā: externally for burns and scalds, internally to reduce fever. Leaves chewed for toothache. -Craft uses: Durable timber, used for rods and handles.		-Coastal and hill side species. -Fast growing species, ideal for native restoration planting. -Very drought tolerant.
Horopito *Pseudowintera colorate*	H-2m W-1-2m	-Large bushy shrub -Distinctive red mottled leaves. -Provides colour	-Planted in clusters with other natives in ecological restoration or enhancement areas. -Will need to be pruned where clear sightlines are required.	-Rongoā: leaf is chewed then, applied to wounds, which heal rapidly. Leaves also were chewed to relieve toothache	-Small branches were sometimes used by the tohunga to lift tapu.	-Native restoration planting.
Karamu *Coprosma robusta*	H-2-4m W-2m	-Large bushy shrub or small tree. -Fast growing	-Planted in clusters with other natives in ecological restoration or enhancement areas. -Not suitable where clear sightlines are required.	-Rongoā: leaves compressed can be applied to relieve pain and aches. Sap applied to treat scabies.	-Branches used in traditional ceremonies. -Ngāi Tahu taonga species	-Colonising species -Enriches soil with nitrogen -Flowers and berries provide food for native manu
Karamu Shining karamu *Coprosma lucida*	H-3-4m W-2-3m	-Large bushy shrub or small tree. -Fast growing -Glossy green leaves, attractive orange berries	-Hedging -Shelter -Planted in clusters with other natives in ecological restoration or enhancement areas. -Not suitable where clear	-Rongoā: leaves compressed can be applied to relieve pain and aches. Sap applied to treat scabies.	-Ngāi Tahu taonga species	-Colonising species -Enriches soil with nitrogen -Flowers and berries provide food for native

			sightlines are required.			
Koromiko *Hebe salicifolia*	H-1.5m -2m W-2m	-Large shrub with white attractive flowers.	-Ecological enhancement plantings. -Use smaller growing cultivars such as 'Snow Caps' for a more compact and tidy form.	-Rongoā: vapour baths; leaves used as a poultice for ulcers; liquid from boiled leaves used as a gargle; cure for diarrhoea and dysentery.	-Ngāi Tahu taonga species	-Colonising species -enriches soil with nitrogen -Flowers provide food for native manu and bees
Mikimiki *Coprosma propinqua*	H-1-2m W-1m	-Divaricating shrub.	-Amenity shrub gardens. -Stream / river edges planted in clusters with other natives in ecological restoration or enhancement areas.			
Pale green coprosma *Coprosma virescens*	H2-3m W-1-2m	-Divaricating shrub. -Attractive orange coppery coloured branches.	-Amenity shrub gardens. -Hedging - Planted in clusters with other natives in ecological restoration or enhancement areas.			-Tolerant of poor / dry conditions.
Pikopiko Shield fern *Polystichum richardii*	H-1-2m W-1-2m	-Small to medium fern.	-amenity planting. -can be difficult to establish, requires shelter.	-Kai: young fond shoots are eaten.		
Pohuehue *Muehlenbeckia astonii*	H-1-2m W-1m	-Divaricating attractive shrub.	-very hardy, can tolerate dry soils. -amenity shrub gardens. -informal hedging - planted in clusters with other natives, provides texture.	-Kai: edible small berries.		
Grasses, perennials and small ferns						
Aruhe bracken *Pteridium esculentum*	H-1-2m W-1-2m	-Medium sized fern.	-this is an aggressive species so is best suited to large ecological restoration areas where it has room to develop.	-Rongoā: The root was boiled or baked to cure diarrhoea. Tender shoot eaten to cure dysentery. -Kai: the root was a very important source of carbohydrate for Ngāi Tahu pre European arrival. The root was sometimes sweetened with tutu juice -Craft and building uses: Fronds used to line floor of storage pits.	-Highly valued Ngāi Tahu taonga species. -Aruhe was cultivated on mass in pre European times.	-Fast growing colonising species. -Very hardy to a range of conditions.
Harakeke *Phormium tenax*	H-2m W-2m	-Tall shrub with sward like leaves. -Attractive bronze flower spikes.	-Stream / river edge. -ecological restoration areas. -Rain gardens, bio-filtration swales and wetlands.	-Craft uses: contain one of the strongest natural fibres known. Leaves and fibres (moka) are used for weaving kete, clothes, rope and fishing nets. -Rongoā: juices from the root were used for skin problems such as boils. Gum from flax used to stuff into a hole in the tooth for toothache. -Kai: nectar from the flower is edible and was used as a sweetener. -Building uses: Travelling parties carried flax to tie the sticks and bind the thatching for pahuri, rough shelters.	-Ōtautahi was once a rich source of harakeke which enabled the flax trade. -Highly valued Ngāi Tahu taonga species	-Flowers provide food for native manu and bees.
Kakaha *Astelia fragrans*	H-1m-1.5m W-1m	Sward like leaves.	-planted in clusters as an ecological enhancement species. -raingardens and bio-filtration swales	-Craft uses: incorporated into weaving to give different hues.		-Hardy species -Wet or dry habitats -Produces a fruit which is enjoyed by birds
Makau Hen and chicken fern *Asplenium gracillimum*	H-1m W-1m	Small to medium sized fern with attractive foliage.	-Amenity planting. -Ecological enhancement planting. -Requires some shelter and shade.	-Kai: young fond shoots are eaten (known also as NZ asparagus).		
Mīkoikoi NZ Iris *Libertia ixioides*	H-.4m W-.4m	Low growing ornamental perennial with sward like golden / green leaves and attractive flowers	-Amenity planting. -Mass ground cover planting. - Ecological enhancement planting. -Stream / river edges. -Tolerant of a range of conditions.			-Provides habitat for native invertebrate and lizards.
Purei *Carex secta*	H-1m W-1m	-Green grass shrub.	-Stream / river edge. -Amenity planting. -Rain gardens, bio-filtration swales and wetlands. -very attractive, provides a soft natural aesthetic. Can grow in wet or dry conditions.	-Building uses: thatch for huts.		-Excellent along stream / river banks. -Provides habitat and sheltered areas for fish. -Helps absorb toxins from waterways. -Helps stabilise stream / river banks.
Sedge *Carex solandari*	H-.5m W-.5m	-Small grass shrub.	-Stream / river edge. -Rain gardens, bio-filtration swales. -very attractive, provides a soft natural aesthetic.			-Excellent along stream / river banks. -Provides habitat and sheltered areas for fish.
Toitoi *Cortaderia richardii*	H-2m W-2m	-Large grass with drooping leaves. -attractive arching flower plumes	-Stream / river edge. -ecological restoration planting. -Provides a soft natural aesthetic.	-Rongoā: flower plume applied to wounds to stop the flow of blood; ashes made a poultice for burns; sap from steam could treat thrush in babies; sap of young steam for diarrhoea. -Building uses: flower stems (kakaho) used to line whare walls and ceilings (there was a preference for deep yellow stems).	- Ngāi Tahu taonga species	-Excellent along stream / river banks. -Provides habitat and sheltered areas for fish.
Turutu	H-.6m	-Small tufted, flax like plant.	-Amenity planting.			-Provides habitat for native

Blue berry *Dianella nigra*	W-.6m	-Distinctive purple berries which are poisonous.	-Mass ground cover planting. -Tolerant of a range of conditions.			invertebrate and lizards.
Upoko-tangata Umbrella sedge Cyperus ustulatus	H-.6m -1m W-1m	-Wetland grass	-Wetland species, used in ecological restoration. -very vigorous. -Stormwater ponds.	-Craft uses: Leaves, stripped of outside edges, used for mats and baskets -Building uses: Used for outer thatch of houses		-Good wetland species, quick to establish. -Cleanses water. -Provides habitat and sheltered areas for fish.
Wind grass *Anemanthele lessoniana*	H-1m -1.5m W-1m-1.5m	-Grass with bright green leaves with arching steams. -Flower plumes have an attractive pinkish hue.	-Amenity planting. -Mass planting. -Tolerant of a range of conditions.			
Wiwi Juncus gregiflorus / Juncus pallidus	H-1-2m W-1m	-Wetland / swamp land rush.	-Wetland species, used in ecological restoration. -very vigorous. -Stormwater ponds. -Damp areas.	-Craft uses: Used in making nets to catch whitebait. -Building uses: outer thatching of whare.	-Ngāi Tahu taonga species	-Good wetland and swamp species, quick to establish. -Cleanses water. -Provides habitat and sheltered areas for fish
Groundcovers						
Bidibid, piripiri *Acaena nova-zealandiae*	Groundcover Spreading	-Spreading ground cover. -Bright green leaves with spiny read seed heads.	-Mass groundcover planting. -Vigorous growth habit.	-Rongoā: leaves boiled and taken as a tonic for kidney and bladder problems and venereal disease.		
Kiokio Small hard fern *Blechnum penna-marina*	H-.15 -.3m W-spreading	-Groundcover fern with red tinge to leaves.	-Amenity planting. -Mass planting. -Prefers semi shaded position.			
Panakeneke Creeping pratia *Pratia angulate*	Groundcover Spreading	-Groundcover with delicate white flowers followed by reddish purple berries.	-Amenity planting. -Mass planting.	-Kai: Leaves can be cooked and eaten as greens		
Climbers						
Kohia Native passionvine *Passiflora tetrandra*	Climber	-Climber with glossy dark green leaves and scented small white flowers in Spring, followed by bright orange fruit.	-Climber on structures or growing up trees.	-Rongoā: Oil from seeds used as salve for wounds and sore breasts. -Craft uses: lashing handles to adzes. -Building uses: travelling parties sometimes carried aka-tororaro to tie the sticks and bind the thatching for rough shelters. -Other: oil from seeds and flowers are scented.	-Ngāi Tahu taonga species	
Pua whānanga Bush clematis *Clematis paniculata*	Climber up to 9m	-Climber with a stunning display of white flowers during Spring.	-Climber on structures or growing up trees. -Roots need to be shaded.	-Rongoā: A decoction of the bark and stems inhaled for head colds. -Kai: honey from flowers can be eaten.		

Appendix 2 Remediation and Rebuild Toolkit

Key steps	Considerations	Identifiers	Potential themes to include Environmental and cultural performance
Recognition of the relationships of Mana Whenua to the area	Identify who the local mana whenua are[21]	Providing narrative on their historical relationship to the area. Historical evidence mahinga Kai places of significance people landscapes natural resources historical narratives Ngāi Tahu tradition's and legends Modern ecosystem identifiers associated land forms species of flora and fauna Associated traditional uses of flora and fauna Environmental standards the use of composting or waterless toilet/sewage systems rainwater collection and grey water recycling land or wetland based storm water and sewage treatment and disposal systems solar or wind based energy generation, and the protection and enhancement of native flora, fauna and habitats, with a focus on potential mahinga kai and cultural use.	Provide for improved native flora and fauna and mahinga kai values; Reference (symbolic or otherwise) to previous areas of habitation through storying and naming of areas and buildings within the new school precinct Utilising Ngāi Tahu names, history and Mahinga kai associated with the area; the placement of markers and art works (space made available in consultation with an identified artist and architect) associated with Ngāi Tahu Opening of cultural spaces with indoor and outdoor connectedness utilising naming and identifiers of indigenous flora and faun The application of the Ngāi Tahu cultural sustainability indicators as assessment criteria on the design and development Protection and enhancement of any receiving waterway or storm water run-off through upgraded best practice storm water or run off Treatment and disposal and other low impact urban design requirements to improve water quality, reticulation and utilisation Inclusion of gardens (Māra) with native plantings associated to the area in keeping with the geography and landscape as well as use and purpose such as edibles and medicinal qualities (Rongoā).
Provision of a suite of 'Cultural Identifiers' relevant to for input and informing the Preliminary Design Phase	Identify early in the preliminary design phase who to engage with and how that relationship will be developed	Providing options for informing the naming's and design of the new school and its associated environments. Relational concepts for naming Consideration of Buildings Outdoor areas Associated spaces	

[21] Most contacts are generally through the local Papatipu Rūnanga and the contacts can be found on - http://ngaitahu.iwi.nz/te-runanga-o-ngai-tahu/papatipu-runanga/

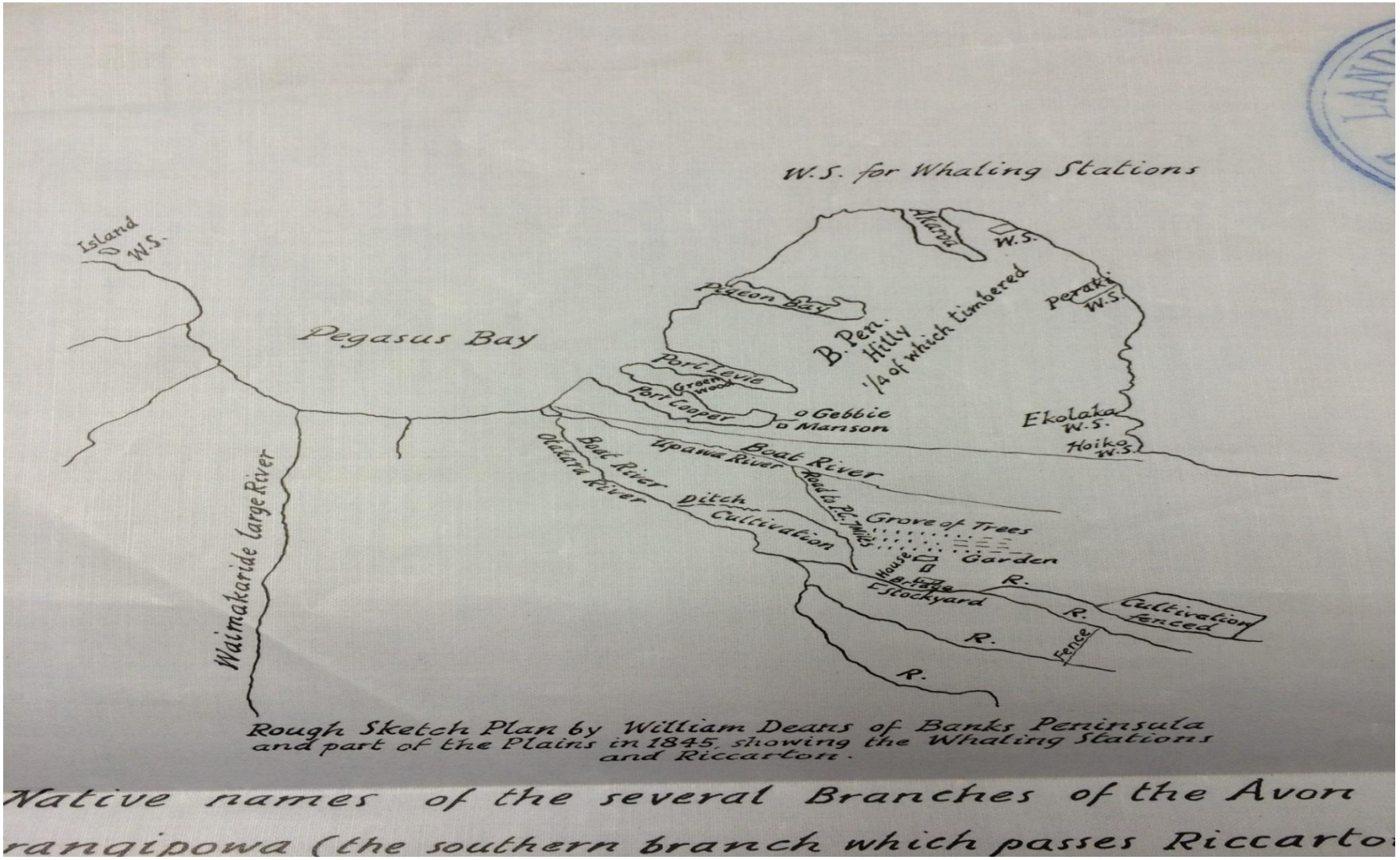
Inclusion of those relationships and identifiers into the Detailed Design Stage	Include the suite of relevant narratives and information gained from the preliminary design phase into the detailed design phase	Inform and influence the school environment as to the associated relationships and culturally appropriate identifiers to the area as a measure of authentic engagement.

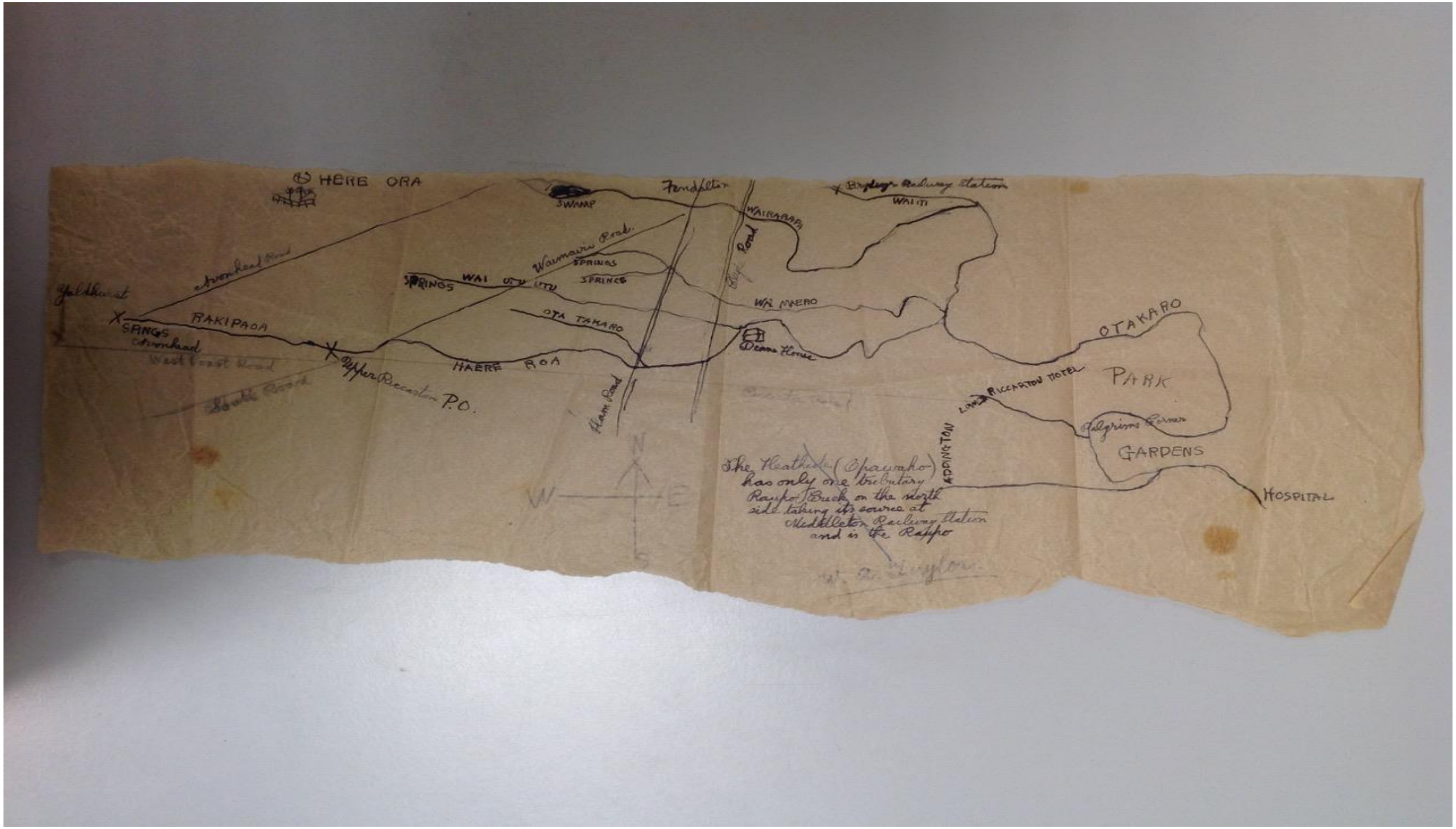
Evaluation and assessment criteria designed as a checklist against mana whenua values and issues Values are scored between 0 and 5, where 0 does not address any Māori values, 3 addresses some values, and 5 address all values.		SCORE
Does the proposal protect and/or enhance natural waterways, and consider the appropriate use/reuse, treatment and disposal of water?	5: Protects and enhances natural waterways, i.e. sustainable water use and there is no discharge into waterways. 0: Waterways are befouled and/or unsustainable water use	
Does the proposal protect and/or enhance native flora, fauna, habitats, ecosystems, and biodiversity (particularly waterways and wetlands)?	5: Ecosystems are protected and enhanced, biodiversity is enhanced and landscaping and riparian zones use native plants. 0: Ecosystems are destroyed, biodiversity loss occurs, landscaping and riparian zone use non-native plants	
Does the proposal consider the reduction of waste and pollution (to air, land, water and coastal environments) as well as minimise the reliance on and/or improve existing infrastructure (e.g. sewage, storm-water and energy systems)?	5: Low impact urban design solutions are used, sustainable transport options are utilised, and kaitiaki have access to mahinga kai. 0: Urban design is unsustainable and access to mahinga kai is prohibited.	
Does the proposal consider investment in technology, knowledge, products, and systems that are energy, water and resource efficient, and involve on-going monitoring and reporting?	5: Most buildings have a greenstar rating of 5 or a homestar rating of 10, recycled timber is used, renewable energy is utilised, and raw materials are sourced locally. 0: The majority of buildings have poor, if any, greenstar or homestar ratings, non-renewable energy is utilised, and raw materials are sourced externally.	
Does the proposal implement management systems that encourage clients, employees and suppliers to identify, and act upon opportunities to protect biodiversity, prevent pollution, and continually improve environmental performance?	5: Clients, employees and suppliers are to empowered to protect biodiversity, prevent pollution, and continually improve environmental performance. 0: Clients, employees and suppliers are not empowered to protect biodiversity, prevent pollution, and continually improve environmental performance. [22]	

Further assessment criteria	Checklist against rebuild activities	Self-assessment answers
Manawhenua (customary authority): Acknowledgement, recognition and provision for tangata whenua kawa, tikanga, history and ongoing mana.	Manawhenua: How does the design proposal (the proposal) acknowledge, recognise & provide for Ngāi Tūāhuriri kawa, tikanga, history, identity & ongoing mana & ensure the appropriate expression & interpretation of te reo Māori, kawa, tikanga, history, cultural symbols & artwork through?	1 2
Tikanga (best practice): Sustainable buildings that are energy efficient and have ongoing monitoring and reporting in design, construction and operation.	Tikanga (best practice): How does the proposal include Sustainable buildings that are energy efficient and have ongoing monitoring and reporting in design, construction and operation?	1 2
Ngā Wai Tūpuna/ Waimāori: Waterways and waters of importance are protected from discharges.	Ngā Wai Tūpuna/ Waimāori: How does the proposal protect &/or enhance waterways, particularly Te Ihutai, & consider the appropriate use/reuse, treatment & disposal of water?	1 2
Ngā Otaota Māori/ Mahinga Kai: Places where food is produced and procured are not compromised.	Ngā Otaota Māori/ Mahinga Kai: How does the proposal protect &/or enhance native flora, fauna, habitats ecosystems, & biodiversity & promote enhanced mahinga kai outcomes?	1 2
Wāhi Tapu/Taonga: Culturally significant sites are protected and treated with respect and dignity.	Wāhi Tapu/Taonga: How does the proposal acknowledge, protect, enhance &/or appropriately interpret culturally significant sites?	1 2
Kaitiakitanga (stewardship): Reduction of pollution emissions (air, land, water, coast) and reliance on existing infrastructure (sewage, storm water, energy).	Kaitiakitanga: How does the proposal consider the reduction of waste & pollution (to air, land, water & coastal environments) as well as minimising the reliance on &/or improving existing infrastructure (such as sewage, storm-water & energy systems)?	1 2
Tohungatanga (expertise): Cost effective and efficient construction and operation and the ability to provide a return on investment – balancing economic, social, cultural and environmental wellbeing.	Tohungatanga: How does the proposal consider investment in technology, knowledge, products & systems that are energy, water & resource efficient, & involve ongoing monitoring & reporting of results?	1 2
Whakapapa/Mātauranga (traditional knowledge): Use of native, local, recycled and/or renewable resources that provide a connection to and protect/enhance the local landscape and Ngāi Tahu identity/integrity.	Whakapapa/ Mātauranga: How does the proposal encourage the use of native, local, recycled &/or renewable resources & products that provide a connection to, &/or protect and enhance the Te Waipounamu landscape and Ngāi Tahu identity & integrity?	1 2
Whānaungatanga/Tūrangawaewae (sense of belonging): Providing a place where Ngāi Tahu are welcome, encouraged and proud to visit. Manaaki (hospitality): The ability of the built environment to manaaki (care for) manuhiri (guests) and provide a healthy, inspiring environment for all people	Whānaungatanga/Tūrangawaewae/Manaaki: How does the proposal provide places where Ngāi Tahu & manuhiri alike are welcome, encouraged & proud to be involved?	1 2
Rangatiratanga (leadership): The expression of te reo, kawa, tikanga, history, identity, cultural symbols and artwork of Ngāi Tahu whānau, hapū and iwi.	Rangatiratanga/Tikanga: How does the proposal implement management systems that encourage clients, employees & suppliers to identify, & act upon opportunities to protect biodiversity, prevent pollution, & continually improve environmental performance?	1 2

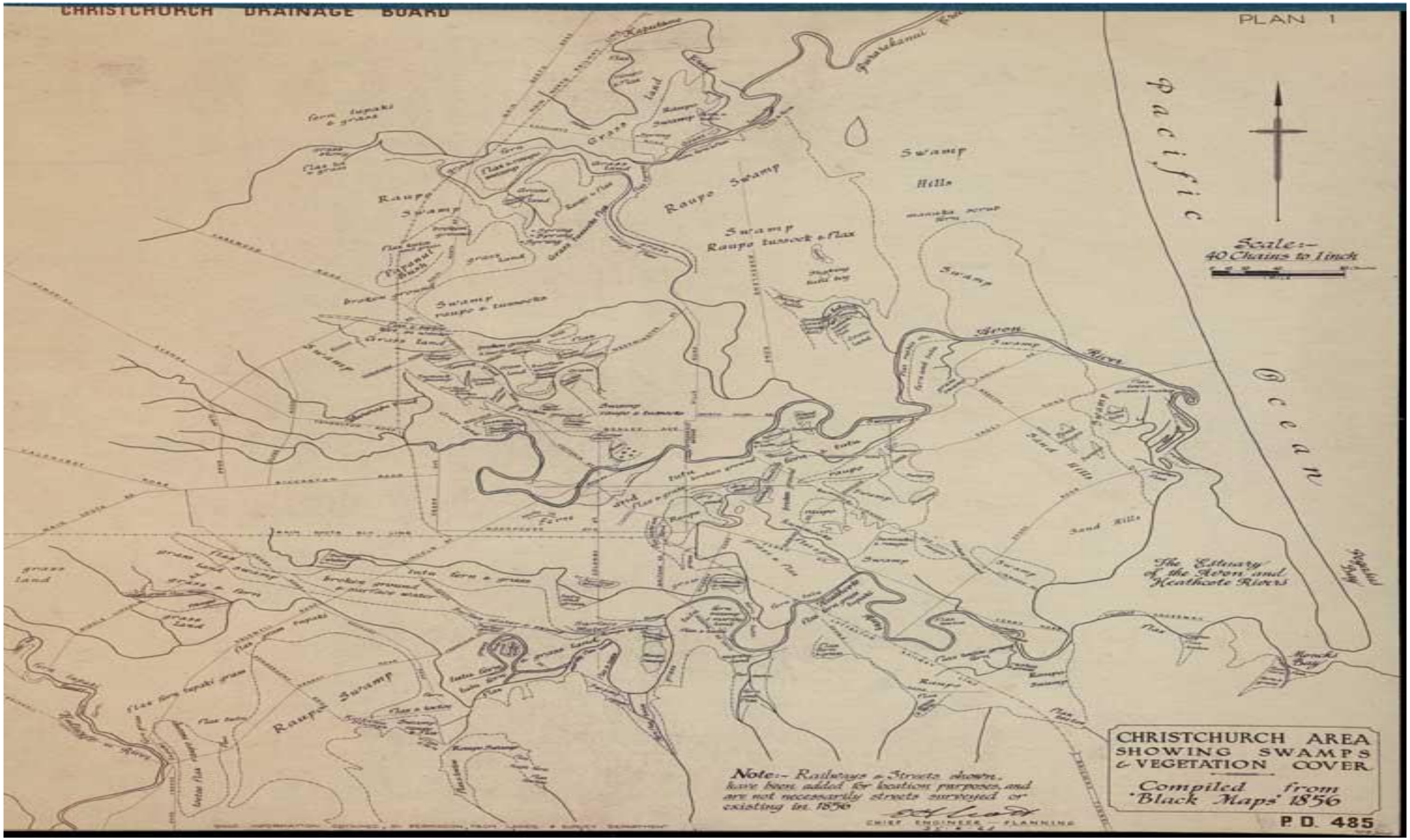
[22] Unique to this table is the framing of Māori concepts within a Māori environmental paradigm. It can be used to balance environmental, social, cultural, and economic aspirations while meeting Mana Whenua expectations. Given the challenge of applying mātauranga Māori to the financial and construction criteria for a project such as the remediation or rebuild process, a Mātauranga Māori values evaluation tool provides an information source to complement standard or "orthodox" project assessments as a cost-benefit analysis. Self-assessment is the main criteria of how to view responsiveness.

The following maps are the Deans map of the area and vegetation cover in 1856





HERE ORA
SWAMP
Fendalton
Bryndwyr Railway Station
WAITI
WAIRARAPA
Road
Waimairi Road.
Avonhead Road
SPRINGS
SPRINGS
SPRINGS
WAI UTU UTU
Yaldhurst
RAKIPAOA
SPRINGS
Avonhead
West Coast Road
South Road
Upper Riccarton P.O.
HAERE ROA
OTA TAKARO
WAI MAERO
Deans House
Ham Road
OTAKARO
RICCARTON HOTEL
PARK
ADDINGTON
Pilgrims Corner
GARDENS
HOSPITAL
N
W
E
S
The Heathcote (Opawaho)
has only one tributary
Raupo Creek on the north
side taking its source at
Middleton Railway Station
and is the Raupo


CHRISTCHURCH DRAINAGE BOARD
PLAN 1
Pacific Ocean
Scale:- 40 Chains to 1 inch
Raupo Swamp
Swamp
Hills
Avon River
Sand Hills
The Estuary of the Avon and Heathcote Rivers
Note:- Railways & Streets shown, have been added for location purposes, and are not necessarily streets surveyed or existing in 1856
CHRISTCHURCH AREA
SHOWING SWAMPS
& VEGETATION COVER
Compiled from 'Black Maps' 1856
P.D. 485