Submission to Regenerate Christchurch

On the 10 land use proposals

By

Greening the Red Zone

30 October, 2017

Greening the Red Zone's Vision – Introduction

Our strongly preferred vision for the red zone is not one of the ten options presented so far, but a combination of some of them. The primary use of the red zone should be based on ecological restoration. In our view, the red zone can encompass ecologically appropriate recreation, visitor attractions and appropriate productive land use as well.

In order for newly regenerating habitats to be sustainable, and allow fauna to flourish, we propose that 428 hectares of the land be devoted to ecological restoration, including all compatible activities. That leaves 170 hectares – preferably on the edges of the restored area – for complementary ideas that sit outside ecological restoration but are not environmentally destructive.

Our vision is that the whole of the red zone is an integrated ecological, recreational area and visitor attraction.

1. The "Open space corridor"

We were first introduced to the concept of a "green spine" at the ecology advisory workshop held on 29 September 2017, attended by several ecologists, hydrologists, and project champions.

At that time, we were told it totalled about 300ha and the primary purpose was ecological restoration. It would incorporate the area 150m either side of the river (except where the red zone was not 150m wide) and it would all be publicly accessible, with no private ownership or exclusion. We note that:

- the name has changed from "Green spine" to "Open space corridor", which is a marked and unacceptable change in emphasis.
- "the width of this open space corridor has yet to be confirmed and will vary", which directly contradicts earlier information.
- residential uses and productive land uses are included inside that area.
- it now only "could include"…"small pockets of ecological restoration".

We are dismayed at this about-turn, and note that it does not represent in any way what the people of Christchurch have asked for.

In the Community Needs Assessment survey published by Regenerate Christchurch earlier this year, the highest priority, listed by 79% of respondents as important or very important, was that communities living in and around, or visiting, the regenerated area are safe.

The second highest priority was "unique landscapes and indigenous wildlife and plants in the regenerated areas are protected and enhanced", which 75% of respondents said was important or very important.

However, when asked which one priority was the most important, the order reversed: 34% of respondents selected protecting unique landscapes and indigenous wildlife and plants as most important, while only half that number (17%) ranked safety first.

Added to this, the safety category included the desire to be safe from natural hazards, such as earthquakes and floods, again emphasising the importance of working with nature.

It is clear that the environment, especially cleaning up the river, is the most important priority for the people of Christchurch.

This must be prioritised in the green spine, which must focus on ecological restoration, and public accessibility to that restored environment.

As Regenerate Christchurch's own Land Use Assessment Report on Ecological Restoration notes:

"Riparian vegetation can influence the health of waterways and how they function, with many social and cultural benefits including aesthetics, recreation, and flood control…"

One of the key factors in restoring health to the Ōtākaro-Avon is the health of its neighbouring environment, and this will be most healthy when self-sustaining indigenous ecosystems are allowed to flourish. This is also one of the cheapest options.

We agree with the Flood Mitigation Land Use Assessment that "stopbanks are the best approach to addressing the risk posed by tidal and fluvial flooding from the Ōtākaro-Avon River". In general, permanent stopbanks should be further back from the edges of the river than they currently are, except where there is some ecological need for them to be closer.

We submit that:

- all references to the 150m area emphasise green spine, not open space
- the green spine must be 150m either side of the river, except where the red zone is less than 150m wide
- the green spine must be devoted to publicly accessible (including via cycle and footpaths) ecological restoration, including return of the flood plain, and also to naturally derived water-cleansing processes to help clean the river (storm water wetlands)
- there should be absolutely no residential housing within the green spine
- any other built structures within the green spine must be directly related to public enjoyment of the restored environment, such as seating, natural playgrounds, predator management, jetties, way-finding, education/interpretation, unobtrusive exercise stations, and foot and cycle bridges across the river etc.
- any element of any visitor attraction that is included within this space must be freely publicly accessible and

all other uses, including non-native productive land use, are located outside the green spine.

We agree with this conclusion from the Ecological Restoration Land Use Assessment:

“All developments must use environmentally sensitive planning, design and development principles (such as Low Impact Urban Design and Development) throughout” the entire red zone area.

2. Community spaces and places

The main aims for how the red zone is used must be enhancing the relationships between people and nature, and bringing the eastern and central parts of the city together.

We consider the red zone can deliver Regenerate Christchurch and Greening the Red Zone’s aims of connecting communities for a range of health, wellbeing, social, economic and environmental benefits to individuals as well as to Ōtautahi –Christchurch as a whole.

We agree that engagement with local communities, including on a neighbourhood level, is important to achieving the aims.

We emphasise that community spaces and places do not need to be built places and spaces.

For example, food forests and community gardens can be used as a way of connecting communities to nature. We consider they should be placed in the outer areas of the red zone, with logical links to existing communities.

Community gardens need to be developed based on a community’s desire to have such a garden, and to grow, maintain and equitably harvest it. They cannot be imposed on communities but need to develop from them.

3. How recreational activities and visitor attractions work in with ecological restoration

We see ecological restoration as the basis for recreational activities, visitor attractions and unique eco businesses that will attract visitors – both locals and tourists. It also has great potential for education about the environment, fitting in with the *Laboracity* concept.

All groups advocating ecological restoration suggest some land should be put aside for productive use, such as community gardens, mahinga kai, food forests, or even sustainable native forestry. Some of those productive uses we see as part of ecological restoration (mahinga kai, sustainable native forestry). Some are complementary and should be on the outer edges of the red zone (community gardens, food forests).

For example, among the proposals for recreational activities and visitor attractions that Greening the Red Zone supports as part of, or fitting seamlessly into, ecological restoration are:

- The Dark Sky Park (visitor attraction) – throughout
- Natural playground network (recreation and education) – throughout
- Mahinga Kai (customary productive use) – throughout
- Waitākiri Eco-sanctuary (visitor attraction) – in a single place but working seamlessly with and feeding into the rest of the ecologically restored red zone

- Cycle paths and walkway network (recreation, visitor attraction) – throughout
- Lower Avon Heritage Trail (visitor attraction, recreation) – throughout
- New wetlands for water management (flood mitigation, water quality improvement) – throughout, but importantly Waikākāriki – Horseshoe Lake
- Eco-campsite (visitor attraction) (single place)
- Art trails (visitor attraction, community space and place) – possibly throughout
- A BMX course in a naturally restored environment (recreation, visitor attraction) – single place
- Horse-trekking trail (recreation, visitor attraction) – throughout or through part of the restored area
- Eco-friendly educational facilities – throughout
- Sustainable eco-businesses enhancing and complementing the restored ecosystems and their use (economic activity) – in various locations on the outer edges of the red zone
- Unobtrusive environmental interpretation.

There are many more possibilities that would fit well with the ecological restoration of the area.

4. Visitor attractions

It is very difficult to comment on the appropriate placement of the proposed visitor attractions without knowing what they are. However, we fully agree they should all be “principally with an environmental theme”.

We are concerned about the currently indicated placement, or spread, of the visitor attractions. All the options currently skew the visitor attractions to the west and middle of the red zone. We advocate for a more even spread of visitor attractions throughout and more towards the east, to draw people out to the New Brighton area – notwithstanding issues of sea level rise. The people of east Christchurch have been the ones most affected by the destructive impacts of the earthquakes on their neighbourhoods and communities. Those communities have so much to gain from thoughtfully targeted placement of visitor attractions and recreational activities.

We acknowledge that the placement of visitor attractions will depend on the nature of the land, the water table, and the floodplain footprint.

We assume that the attraction inside the Avonside Loop is the proposed Eden Project. We consider that there may be many synergies between our proposals and the development of the Eden Project, or some elements of it such as an interactive environmental education pavilion. However, that will require working together on design and size of the project. We have serious concerns about the magnitude of cost associated with such proposals and the realistic income that can be generated in such a small domestic market compared with the parent Project.

Again, we emphasise that any visitor attractions, including the Eden Project, must allow for an undisturbed ecologically restored green spine of 150m alongside both sides of the river with free

access to everyone. The current proposal for the Eden Project does not appear to allow for that. If the Eden Project is to proceed it will need to re-design its footprint to accommodate the green spine.

Another concern we have is the size and placement of the proposed car park. This is not a good ecological use of the land. The area is close enough to the western end of the red zone for the car park to be closer to the city, and outside the red zone. Electric shuttle buses could operate from there, or people could walk or hire bikes from near the carpark, encouraging small local businesses. However, we accept that there will need to be a (smaller) car and bus park near the entrance of the Project as well to allow for visitors with accessibility needs.

We are concerned to note that there is no visitor attraction on the site of the proposed Waitākiri Eco-sanctuary. The site proposed for that is the only suitable site in the red zone because of the area required for a dryland predator-free zone. Without a predator-free zone there can be no secure source of our endangered, charismatic wildlife that can colonise the remainder of the corridor. This function is sometimes referred to as the Halo Effect.

Such a sanctuary would be especially effective if there was support from the surrounding neighbourhood and in other areas across the city, to actively manage pest mammals. There are already community proposals for a rolling front of predator management through the eastern and southern areas of the city backing on to Banks Peninsula. This approach would complement the wider national initiative to achieve a predator-free Aotearoa-New Zealand by 2050.

The other issue we wish to draw attention to in relation to visitor attractions is the impact on the proposed Dark Sky Park. Most proposed attractions would be compatible with the Dark Sky Park so long as their opening hours do not extend past daylight. However, the outdoor stage of the Eden Project may be least compatible. Specific consideration needs to be given to this issue.

5. Waikākāriki-Horseshoe Lake and Reserve

This area will be vital to mitigating and filtering stormwater flows into the Ōtākaro-Avon. Stormwater volumes going through Horseshoe Lake have increased since the earthquakes, partly due to sub-division development, such as the Prestons' subdivision. The newly widened QEII Drive and Northern motorway link will also increase stormwater runoff draining into Waikākāriki-Horseshoe Lake.

Stormwater, once filtered through the restored treatment wetlands, will be cleaner before entering the river. Such planting will also provide protection from flooding, and bring recreational and biodiversity benefits.

6. Land swap and proposed Bexley Golf course

We strongly oppose building a golf course in Bexley. Our main objection is an ecological one, and the likely short life of such a large investment in an area prone to sea level rise.

Building a golf course completely undercuts the ecological restoration of an area that can be easily, and cheaply, restored to a premier salt marsh/estuarine wetland. It would be a natural extension of the integrated city-to-sea flow of natural regenerated ecosystems. It will also provide a habitat for a number of critically endangered species. It would be a natural recreational area and a visitor attraction in its own right.

The proposed area for a new golf course would need to be built up, which would have negative ecological outcomes. In addition, we are concerned about the necessity of using fertilisers, herbicides and irrigation on the golf course, which would pollute the estuary.

The biggest benefit to Christchurch as a whole, and particularly the surrounding neighbourhoods, such as South Brighton, is to use the natural ability of the salt marsh and estuary to protect existing residential areas from flooding, high tides and storm surges. These events will become more frequent with climate change and sea level rise.

Regenerating the salt marsh will be a far cheaper and more rational option. If the stop banks are breached and the tide allowed to find its natural level, the saltwater will kill exotic grasses and weeds and enable natural self-generation of saltmarsh vegetation. The existing successful model for this is in Charlesworth Reserve.

The salt marsh would allow for birds that have increasingly constrained habitats to self-colonise the new areas. We append a paper written by Andrew Crossland, which lists a number of birds already present in Bexley, and those that could be expected to come back to the area if the wetland/forest is restored.[1]

Building and engineering a new golf course in this area, which is already naturally regenerating, would be poor planning and use of resources.

We also understand there to be widespread local resistance in New Brighton and North New Brighton to losing the amenity and green space that the Rāwhiti golf course offers. We simply do not support the loss of green space from the area when there is no demonstrated unfulfilled demand for affordable housing, the swap would lead to negative ecological impacts on the Bexley salt marsh and there are other options.

We submit greater research and community consultation needs to take place in the Brighton communities, in conjunction with the City Council's plans for revitalising the area, to understand the community needs, including its needs for housing and recreation spaces.

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[1] Checklist to the birds of the Avon-Heathcote Estuary, the Bromley Oxidation Ponds and environs. Unpublished report to the Parks Unit, CCC.

7. Residential use

Our strong preference is for no housing. However, we can accept some under certain conditions.

Any housing should be spread out in small pockets along the outer edges of the red zone and connected to existing neighbourhoods. Also, given the relatively short life of this land for housing, any buildings should be mobile so they can be uplifted and moved inland as required.

However, there is a conflict between residential and forest uses, both of which need to be on flood-free land, which is scarce in the red zone. For this reason, we do not support any residential development within the green spine or in other critical connections between forest habitat and the river.

If there is any housing included in other parts of the red zone, sustainable design, materials and building techniques must be used. The buildings and their use must have the lightest possible impact on the surrounding environment. Therefore, we do not see any benefit in the large tracts of concentrated housing that are proposed on the Rāwhiti or Avondale golf courses or on the area in Burwood on the south side of Travis Road opposite Travis Wetland, and alongside the Anzac Drive mahinga kai area. Building on the latter area would make the construction of the Eco-sanctuary impossible.

If there is any residential development, consideration should be given to the use of covenants to encourage and/or prevent certain uses of the housing (e.g. would uses such as holiday letting or Airbnb be acceptable?), to control what is planted in gardens, and what kinds of pets can be kept or how they are managed.

However, there is not a current shortage of housing in the east of the city and it is much more economically viable and sustainable to maintain the ecological restoration of the greatest area possible.

We support the trialling and development of innovative building solutions for seismically active areas, and areas prone to flooding, but we do not believe this needs to take place in the red zone. We consider the best social and economic returns for the local communities, with the least negative ecological impact, would be from spreading such innovative builds throughout the currently economically depressed suburbs of Aranui, New Brighton, South Brighton, North New Brighton, North Beach and Wainoni.

There is already vacant land from the closure and merger of primary schools in those areas that could be used for the development of affordable housing options, such as the sites of the former Freeville, Central New Brighton, Wainoni, Aranui and Avondale primary schools. Avondale primary school is directly across the road from the Avondale golf course and could be used for housing without having to move the golf course.

In addition, in New Brighton and North New Brighton, there are a number of vacant sections that could be used to integrate new sustainable and earthquake-proof affordable housing into the existing neighbourhoods.

Housing to accommodate tourists drawn by the unique ecologically restored red zone will also be needed in those neighbourhoods and locally owned sustainable eco-stay businesses could be encouraged with community involvement in the development of new building solutions. Building in those areas could also provide jobs for the locals.

As with visitor attractions, careful thought and planning must be given to any residential development to minimise any negative effect on the Dark Sky Park.

8. An out-of-river flatwater sports lake

We do not support the development of an out-of-river lake of any size because of the potential ecological degradation. In addition, it is an extremely expensive option with few identified economic benefits for attracting new competitions to New Zealand. We agree that the focus should be on growing local participation in water sports through enhanced training facilities, rather than attracting international events.

In that light, we recommend serious consideration is given to the option of widening, straightening, and dredging a 1.1 kilometre stretch of the river. We understand such a proposal has been put to Regenerate Christchurch. A feasibility study would be necessary.

We consider this to be the least ecologically damaging, as well as likely the cheapest way to improve local training facilities for rowing, waka ama and other flatwater sports and recreation. The river course margins can be sensitively restored to a natural riparian habitat.

We are aware that the water quality of the river needs to be addressed not only within the red zone but also upstream.

9. Costs & benefits

The Ecological Restoration Land Use Assessment report mentions savings in infrastructure, maintenance, and hazard management costs as a benefit but does not quantify these savings. Likewise it does not quantify the value of improved ecosystem services. And it misses entirely the savings in physical and mental health costs that such restoration will bring, even though such savings have been well established in scientific literature (we refer you to our earlier submissions). In order to understand the true value of ecological restoration it is essential to include the value of savings, or avoided costs, in any cost-benefit analysis.

The report estimates that ecological restoration of 400ha will cost $40m, based on $100,000 per ha. Although this per hectare figure has been publicly used many times, our research with restoration ecologists suggests that it significantly over-estimates costs. It is based on even plant coverage across the entire area, and paying commercial rates for all plants and labour.

Yet, as the report itself notes, nodal or patch planting can and has been successfully used in ecological restoration projects. Likewise, many successful restoration projects, such as Charlesworth and Travis wetlands (highlighted in the report), rely heavily on volunteer labour.

Since submitting our first cost estimates to Regenerate Christchurch earlier this year, we have continued our research. Based on that research, and using a nodal planting method, we estimate the plant costs for the entire area will be just over $5 million. This includes spraying and combi guards, but does not include labour. We attach our research as Appendix 2.

While it is admirable that different combinations of land use are put to the public to gauge support, ultimately any decisions must be made on a robust analysis of costs and benefits. Ultimately, the best combination of land uses will be the one that brings the most benefits, for the least cost, to the most people.

Conclusion

The Greening the Red Zone Committee submits that:

The residential red zone forms a riparian, flood plain and partly land-filled corridor along the tidal reaches of the Ōtākaro-Avon. This dynamic and changing environment represents a significant opportunity to see the return of strong ecological values to the city. This in turn will bring widespread benefits including in human mental and physical health and well-being, increased social cohesion, cultural connections, outdoor learning experiences, education and economic development, biodiversity, stormwater cleansing and flood mitigation.

We strongly recommend that, among the three proposals put forward for public discussion later this year, one is a realistic depiction of ecological restoration covering at least 428 hectares, including a list of all activities that could take place within it, with other, complementary activities around the edges – including space for the Eco-sanctuary. This is the ecological option the people of Christchurch want to be presented with, and which is inexplicably missing from the current options.

Greening the Red Zone Committee

30 October, 2017

Appendix 1

CHECKLIST to the BIRDS of the AVON-HEATHCOTE ESTUARY, the BROMLEY OXIDATION PONDS & ENVIRONS

Including: the Avon-Heathcote Estuary, South New Brighton Spit, Sumner Bay, Scarborough Head, McCormacks Bay, the Lower Heathcote River, Heathcote Valley Floodplain, Charlesworth Reserve, Linwood Avenue Canal, the Linwood Paddocks, Bromley Oxidation Ponds, Bexley Wetland and the Lower Avon River.

(10th update to December 2014)

Compiled by **Andrew Crossland**

Regional Parks Team
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Key

Origin:

o	= oceanic species
w	= wetland/coastal species
t	= terrestrial/non wetland species
bold	= native or endemic sp. or sub.sp.
italics	= Australian visitor
std font	= human-introduced (exotic)
underlined	= northern hemisphere migrant

Maximum numbers (2000s):

*****	over 2000 (abundant[1])
****	over 500 (abundant[2])
***	over 200 (very common)
**	over 50 (common)
*	10 - 50 (less common)
#	< 10 (uncommon)

Status:

R	= resident all year round
Rb	= resident and breeding
RS	= resident with seasonal population influxes
V	= vagrant or irregular visitor
S	= seasonal or regular visitor
Ex	= extinct

Yellow = found at Bexley, Blue = likely to return if salt marsh restored

SPECIES RECORDED 1840 to 2014

Grebes

1.	**Australasian Crested Grebe** *(Podiceps cristatus australis)*	*w V*	*#*
2.	*Hoary-headed Grebe* (*Poliocephalus poliocecphalus)*	*w V*	*#*
3.	**Australasian Little Grebe** *(Tachybaptus n. novaehollandiae)*	*w V*	*#*

Petrels and allies

4.	**Grey-headed Albatross** *(Thalassarche chrystoma)*	*o V*	
5.	**Northern Giant Petrel** *(Macronectes halli)*	*o S*	
6.	**Sooty Shearwater** *(Puffinus grieseus)*	*o V*	
7.	**Huttons Shearwater** *(Puffinus huttoni)*	*o S*	
8.	**Common Diving Petrel** *(Pelecanoides urinatrix urinatrix)*	*o V*	
9.	**Mottled Petrel** *(Pterodroma inexpectata)*	*o V*	
10.	**Antarctic Fulmar** *(Fulmarus glacialoides)*	*o V*	
11.	**Broad-billed Prion** *(Pachyptila vittata)*	*o V*	
12.	**Fairy Prion** *(Pachyptila turtur)*	*o V*	
13.	**Cape Petrel** *(Daption capense capense)*	*o V*	

Penguins

14.	**Yellow-eyed Penguin** *(Megadyptes antipodes)*	*w S*	*#*
15.	**White-flippered Penguin** *(Eudyptula minor albosignata)*	*w Rb*	*
16.	**Little Blue Penguin** *(Eudyptula minor)*	*w S*	*#*
17.	**Eastern Rockhopper Penguin** (*Eudyptes chrysccome filholi)*	*o V*	*#*
18.	**Fiordland Crested Penguin** *(Eudyptes pachryhnchus)*	*o V*	*#*
19.	**Erect-crested Penguin** (*Eudyptes sclateri)*	*o V*	*#*

Gannets

20.	**Australasian Gannet** *(Morus serrator)*	*w S*	*#*

Cormorants and Shags

21.	**Black Cormorant** (*Phalacrocorax carbo novaehollandiae)*	*w Rb*	**
22.	**Pied Cormorant** (*Phalacrocorax varius varius)*	*w Rb*	***
23.	**Little Cormorant** (*Phalacrocorax melanoleucos brevirostris)*	*w Rb*	**
24.	**Little Black Cormorant** *(Phalacrocorax sulcirostris)*	*w Rb*	*#
25.	**Spotted Shag** *(Stictocarbo punctatus punctatus))*	*w Rb*	****

Herons and Allies

26.	**White-faced Heron** (*Ardea n. novahollandiae)*	*w RbS*	**
27.	**White Heron** (*Egretta alba modesta)*	*w S*	*#*
28.	*Intermediate Egret* (*Egretta intermedia)*	*w V*	*#*

29.	*Little Egret* (*Egretta garzetta)*	*w V* #
30.	**Reef Heron** *(Egretta sacra sacra)*	*w V* #
30a.	*Reef Heron (White Phase)* *(Egretta sacra ssp.)*	*w V* #
31.	*Cattle Egret* (*Bubulcus ibis)*	*w S* #
32.	**Australasian Bittern** (*Botarus poiciloptilus)*	*w S* #
33.	**Royal Spoonbill** (*Platalea regia*)	*w RS* **
34.	*Glossy Ibis* (*Plegadis falcinellus)*	*w V* #

Waterfowl

35.	Mute Swan (*Cygnus olor)*	*w V* #
36.	**Black Swan** (*Cygnus atratus)*	*w RbS* ****
37.	Canada Goose *(Branta Canadensis maxima)*	*w RbS* *****
38.	Greylag (Feral) Goose (*Anser anser)*	*w Rb* *
39.	Cape Barren Goose *(Cereopsis novaehollandiae)*	*w V* #
40.	**Paradise Shelduck** (*Tadorna variegata)*	*w RbS* *****
41.	*Chestnut-breasted Shelduck* *(Tadorna tadornoides)*	*w V* #
42.	*Australian Wood Duck* (*Chenonetta jubata)*	*w V* #
43.	Mallard (*Anas p. platyrhynchos)*	*w RbS* *****
44.	**Grey Duck** (*Anas s. superciliosa)*	*w RbS* *
45.	**Grey Teal** (*Anas gracilis)*	*w RbS* *****
46.	*Chestnut Teal* (*Anas castanea)*	*w V* #
47.	**Brown Teal** (*Anas aucklandica chlorotis)*	*w V* #
48.	**New Zealand Shoveler** (*Anas rhynchotis)*	*w RbS* *****
49.	**New Zealand Scaup** (*Aythya novaseelandiae)*	*w RbS* *****
50.	*White-eyed Duck* *(Aythya australis)*	*w V* #

Raptors (Birds of Prey)

51.	**Australasian Harrier** (*Circus approximans)*	*w RbS* *
52.	**New Zealand Falcon** (*Falco novaeseelandiae)*	*t S* #
53.	*Nankeen Kestrel* (*Falco cenchroides cenchroides*	*t V* #

Gamebirds

54.	Red-legged Partridge *(Alectoris rufa)*	*t V* #
55.	California Quail (*Callipepla californica brunnescens)*	*t Rb* #
56.	**New Zealand Quail** *Cortunix novaezelandiae novaezelandiae*	*t Ex*
57.	Ring-necked Pheasant (*Phasianus colchicus)*	*t Rb* #
58.	Feral Chicken *(Gallus gallus gallus)*	*t Rb* *

Rails/Gallinules

59.	**Buff Weka** *(Gallirallus australis hectori)*	*w Ex*
60.	**Marsh Crake** (*Porzana pusilla affinis)*	*w S* *
61.	**Pukeko** (*Porphyrio porphyrio melanotus*	*w RbS* ****
62.	**Australasian Coot** *(Fulica atra australis)*	*w S* *

Waders

63.	**South Island Pied Oystercatcher** (*Haematopus ostralegus)*	*w RS*	*****
64.	**Variable Oystercatcher** *(Haematopus unicolor)*	*w RS*	**
65.	**Pied Stilt** (*Himantopus himantopus)*	*w RbS*	***
66.	**Black Stilt** *(Himantopus novaezelandiae)*	*w V*	#
67.	**Red-necked Avocet** (*Recurvirostra novaehollandiae)*	*w Ex*	
68.	**Spur-winged Plover** (*Vanellus miles)*	*w RbS*	**
69.	**New Zealand Dotterel** (*Charadrius obscurus)*	*w V*	#
70.	**Banded Dotterel** (*Charadrius bicinctus)*	*w RbS*	**
71.	*Red-capped Dotterel* (*Charadrius ruficapillus)*	*w V*	#
72.	**Black-fronted Dotterel** *(Charadrius melanops)*	*w V*	#
73.	**Wrybill** (*Anarhynchus frontalis*)	*w S*	#
74.	Pacific Golden Plover *(Pluvialis fulva)*	*w V*	#
75.	Grey Plover *(Pluvialis dominica)*	*w V*	#
76.	Turnstone *(Arenaria interpres)*	*w S*	#
77.	Red Knot *(Calidris canutus canutus)*	*w S*	#
78.	Sanderling *(Calidris alba)*	*w V*	#
79.	Curlew Sandpiper *(Calidris ferruginea)*	*w V*	#
80.	Sharp-tailed Sandpiper *(Calidris acuminata)*	*w V*	#
81.	Pectoral Sandpiper *(Calidris melanotos)*	*w V*	#
82.	Red-necked Stint *(Calidris rufficollis)*	*w V*	#
83.	Asian Dowitcher *(Limnodromus semipalmatus)*	*w V*	#
84.	Eastern Curlew *(Numenius madagascariensis)*	*w S*	#
85.	Asiatic Whimbrel (*Numenius phaeopus variegatus)*	*w S*	#
86.	American Whimbrel (*Numenius phaeopus hudsonicus)*	*w V*	#
87.	Eastern Bar-tailed Godwit (*Limosa lapponica baueri)*	*w RS*	*****
88.	Hudsonian Godwit *(Limosa haemastica)*	*w S*	#
89.	Asiatic Black-tailed Godwit *(Limosa limosa melanuroides)*	*w S*	#
90.	Alaskan Tattler *(Tringa incana)*	*w V*	#
91.	Siberian Tattler *(Tringa brevipes)*	*w S*	#
92.	Lesser Yellowlegs *(Tringa flavipes)*	*w V*	#

Skuas, Gulls and Terns

93.	**Brown (Sub-Antarctic) Skua** *(Catharacta skua lonnbergi)*	*w V*	#
94.	Arctic Skua *(Stercorarius parasiticus)*	*w S*	#
95.	Pomarine Skua *(Stercorarius pomarinus)*	*w S*	#
96.	**Black-backed Gull** (*Larus dominicanus)*	*w RbS*	*****
97.	**Red-billed Gull** (*Larus novahollandiae)*	*w RbS*	*****
98.	**Black-billed Gull** (*Larus bulleri*)	*w RbS*	***
99.	*Whiskered Tern* *(Chlidonias hybrida)*	*w V*	#
100.	White-winged Black Tern *(Chlidonias leucopterus)*	*w V*	#
101.	*Gull-billed Tern* *(Gelochelidon nilotica)*	*w V*	#
102.	**Black-fronted Tern** (*Sterna albostriata*)	*w S*	**
103.	**Caspian Tern** (*Sterna caspia*)	*w RS*	**
104	Crested Tern *(Sterna bergii)*	*w V*	#
105.	**White-fronted Tern** (*Sterna striata*)	*w RbS*	****
106.	**Fairy Tern** *(Sterna nereis davisae)*	*w Ex*	

107.	Eastern Little Tern *(Sterna albifrons sinensis)*	*w S*	#

Pigeons and Doves

108.	Rock Pigeon (*Columba livia)*	*t R*	****
109.	**New Zealand Pigeon** *(Hemiphaga novaeseelandiae)*	*t S*	#
110	Barbary Dove *(Streptopelia roseogrisea)*	*t V*	#

Parrots and Cockatoos

111.	Sulphur-crested Cockatoo *(Cacatua galerita)*	*t V*	#
112.	**South Island Kaka** *(Nestor meridionalis meridionalis)*	*t V*	#

Cuckoos

113.	Oriental Cuckoo *(Cuculus saturatus)*	*t V*	#
114.	**Shining Cuckoo** (*Chrysococcyx lucidus*)	*t Sb*	*

Owls

115.	Morepork *(Ninox novaeseelandiae)*	*t V*	
116.	Little Owl (*Athene noctua*)	*t Rb*	*

SWIFTS

117.	Spine-tailed swift *(Hirundapus caudacutus caudacutus)*	*t V*	#

Kingfishers

118.	**New Zealand Kingfisher** (*Halcyon sancta*)	*w RbS*	**

Swallows

119.	**Welcome Swallow** (*Hirundo tahitica*)	*w RbS*	***

Passerines

120.	Skylark (*Alaudu arvensis*)	*t RbS*	
121.	**New Zealand Pipit** (*Anthus novaseelandiae)*	*t S*	*
122.	Dunnock (*Prunella modularis*)	*t RbS*	
123.	Blackbird (*Turdus merula*)	*t RbS*	
124.	Song Thrush (*Turdus philomelos)*	*t RbS*	
125.	**South Island Fernbird** (*Bowdleria punctata punctata)*	*t Ex*	
126.	**Brown Creeper** *(Mohua novaeseelandiae)*	*t Ex*	
127.	**Grey Warbler** (*Gerygone igata)*	*t RbS*	*

128.	**South Island Fantail** (*Rhipidura fuliginosa)*	*t RbS*	*
129.	**South Island Tomtit** *(Petroica m. macrocephala)*	*t Ex*	
130.	**South Island Robin** *(Petroica australis australis)*	*t Ex*	
131.	**Silvereye** *(Zosterops lateralis)*	*t RbS*	****
132	**Bellbird** (*Anthornis melanura)*	*t RbS*	*
133.	**Tui** *(Prosthemadera novaeseelandiae)*	*t V*	
134.	Yellowhammer (*Emberiza citrinella)*	*t RbS*	
135.	Cirl Bunting (*Emberiza cirlus*)	*t S*	
136.	Chaffinch (*Fringilla coelebs)*	*t RbS*	
137.	Greenfinch (*Carduelis chloris)*	*t RbS*	
138.	Goldfinch (*Carduelis carduelis*)	*t RbS*	
139.	Redpoll (*Carduelis flammea)*	*t RbS*	
140.	House Sparrow (*Passer domesticus)*	*t RbS*	
141.	Starling (*Sturnus vulgaris)*	*t RbS*	
142	**South Island Saddleback** *(Philesturnus c. carunculatus)*	*t Ex*	
143.	White-backed Magpie (*Gymnorphina tibicen)*	*t RbS*	
144.	Rook *(Corvus frugilegus)*	*t Ex*	

144 species recorded 1840 – 2014, including 53 resident species, 26 seasonal visitors, 56 vagrants and 9 species now locally extinct.

Appendix 2

Estimated Costings for the Ecological Restoration of the Red Zone

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for: Greening the Red Zone Incorporated Society

Summary

Christchurch's residential red zone, located in the eastern suburbs, forms a riparian, floodplain and partly land-filled corridor along the tidal reaches of the Avon-Ōtākaro. This dynamic and changing environment represents a significant opportunity to see the return of ecological values to the city that will bring widespread benefits, including human health and wellbeing, social cohesion, cultural connection, outdoor learning experience, biodiversity and flood mitigation.

In this proposal we outline preliminary costings for the ecological restoration of approximately 430 hectares of the red zone using Nodal planting. This method consists of a low-intensity/input planting of source patches that feed regeneration, complemented by selective weed management, with a timeline approaching 50 years for forest regeneration.

The total cost for a five-year restoration plan, using the basic nodal model, as also used by Tuhaitara Park, is approximately $5.1 M. This figure does not include labour costs as those would become part of a more detailed development of a restoration work plan. We do, however, envisage that most of the plantings would be carried out by a largely volunteer labour force, although this would require at least 1-2 fulltime position equivalents to project manage and co-ordinate with groups. The ongoing maintenance will be approximately $43,000 per annum for the total 430 hectares.

Site preparation on the filled land will likely require ripping, however, we have not included this in the costs as it will depend upon the location of the stop-banks which has yet to be decided.

Nodal planting method proposed

Canterbury is a difficult place to get plants established compared with other warmer New Zealand locations with greater rainfall, which will be a contributing factor in establishment and maintenance of the site.

The cost of plants represents a small part of total restoration costs. Species of Carex planted along riparian margins can usually be planted without “combi-guards”, however, other sites will need such protection and release spraying at least twice a year in first five years.

Once the position of stop-banks has been defined, the mix of forest and wetland restoration and amenity planting will be set and the species for each habitat/soil/drainage condition determined from regional restoration guides (i.e. DOC Motukarara Conservation Nursery; Quail Island Restoration Trust; Lucas, Meurk, & Lynn 1995-6). These guides contain a description of the native plant assemblage for each ecosystem and a recommended list of species for planting (and their respective staging).

Once this has been determined a more comprehensive plan can be developed which incorporates the following factors: desired outcome, map of the site (size, micro-habitat, topography, micro-climate, drainage), plant composition, staging, spacings, public amenity (walking/cycling tracks, culverts, bridges, interpretation signage), key stakeholders (including potential funders, which has often been local businesses).

It will be desirable to consider how to incorporate regionally distinctive or threatened species as the project develops. We anticipate that work would be in collaboration with local nurseries as these can require a 1-2 year lead-in to ensure plant material is available at the right time.

Item	**Method costs**
	Nodal planting. e.g. Tuhaitara Park
Spraying (per hectare)	**2,000**
Plant Costs (per plant)	
• Plants	3.95
• Combi-guard	1.03
Subtotal	**4.98**
• Number of plants per hectare	2,000
• Plant costs per hectare	9,960
• Subtotal per hectare over 5 years (planting and maintenance)	11,960
• Area of Project (hectare)	430
Total cost of project over 5 years	**$5,142,800**