## Appendix 14: Revegetation concept

# Revegetation Concept for Waitarakao repatriation.

Categories and generally layout for post-construction installation along the new lengths of the Seadown drain. These are based on the follow cross-sections and plans for drain construction. The plans and lists are **approximations to communicate the general concept**, while the final surface area for plants and materials ordering and contract formation can be drawn up following the drafting of the final designs. The final tweaks to the extents of the different categories will be determined later; there could feasibly be both reductions for cost compliance or increases to meet the interests of stakeholders.


*Figure 1, draft design drawings for Seadown drain migration*

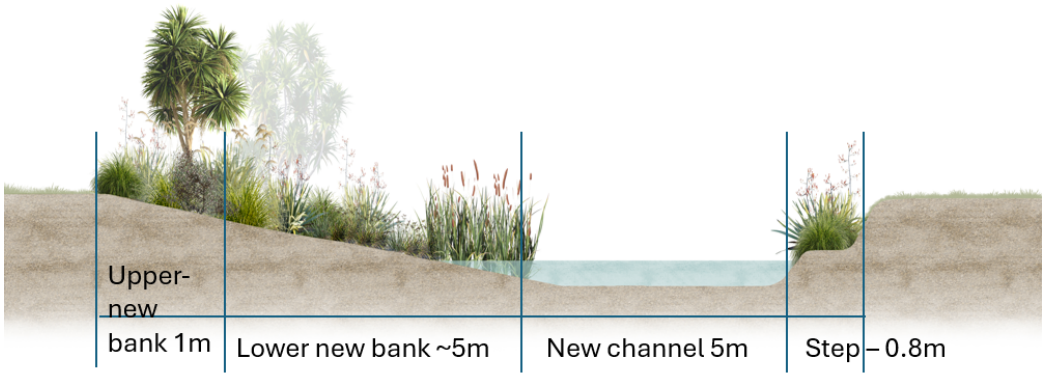



*Figure 2, drain transect with approximate widths*

A coarse mapping exercise was undertaken, applying the transect and creating riparian widths requiring replant. The coarse sections were drawn for the Aorangi road to drain section only. They can provide a useful view of how the intended revegetation concept will be applied to the site as well as densities and layouts useful for costing out. The categories were established as:

- The step in front of the bank on the true left (yellow)
- The lower slope of the new, wide bank on the true right (purple)
- The upper part of the true right new slope (red)
- Amenity sections of taller planting at culvert ends or entry points to the site (orange).

These categories are applied in the following maps and produce the total plant numbers given in table one. Sections nearest or connected to the existing wetlands were not proposed for replanting. This will be planned for as needed.


*Figure 3, cross section applied to Seadown drain section between Aorangi road and the re-engagement*

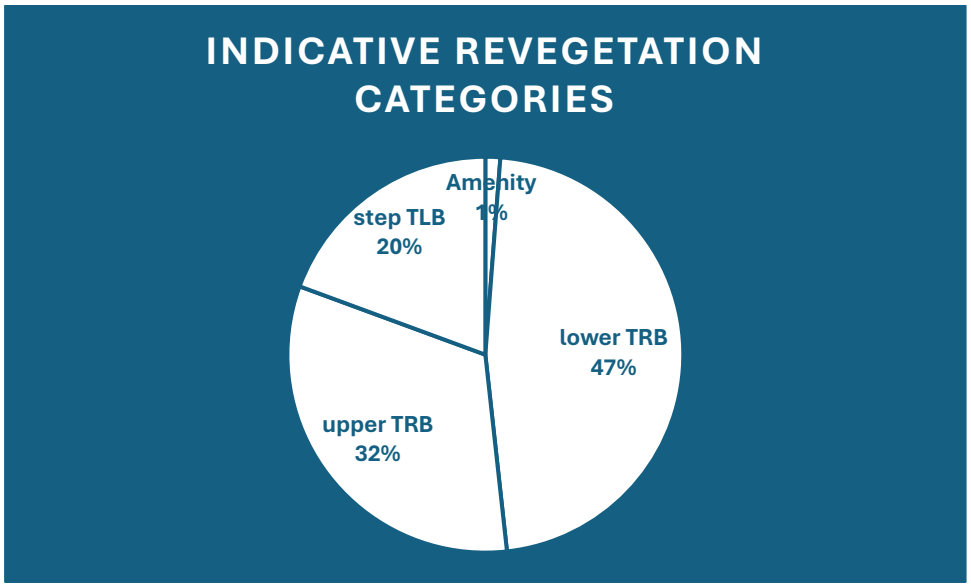

*Figure 4, close up sections of the applied transect*

*Table 1, area and plants in each category*

**Waitarakao; Aorangi road to re-connect**

| | coarse revegetation & repatriation planning | | | |
|---|---|---|---|---|
| Area m2 | Amenity | lower TRB | upper TRB | step TLB |
| | 25 | 1283 | 1137 | 997 |
| | 25 | 1136 | 527 | |
| | 25 | | | |
| | 50 | | | |
| totals | 125 | 2419 | 1664 | 997 |
| density 2x ppm | | 4838 | 3328 | 1994 |

These categories will contain different lists of plants to meet the various criteria. The dominant species installed at the site will be Phormium tenax, Harakeke.



The Amenity sections will be smaller pockets of higher stature vegetation. These plants will be of a coastal-estuarine suitability and should form dense stands of vegetation with a rounded profile while remaining tolerant of annual inundation. The upper TRB sections will be largely tall-grass species of a higher flowering stature while still being able to be 'reached-over'. These plants will be largely tolerant of inundation several times a year. The lower TRB plants will be more inundation tolerant; true wetland species. More-brackish tolerant species will be added to a fairly standard selection. The TLB step will be robust tall grasses of a limited stature for annual maintenance access. These species are listed in Table 2.

*Table 2, Species within each revegetation category*

| Step TLB list | | | | |
|---|---|---|---|---|
| Species: | Common name: | proportion: | Number: | #rounded: |
| Phormium tenax | Harakeke | 0.3 | 598.2 | 598 |
| Carex virgata | Pukio | 0.2 | 398.8 | 399 |
| Carex geminata | Rautahi | 0.2 | 398.8 | 399 |
| Juncus procerus | Giant rush | 0.05 | 99.7 | 100 |
| Juncus edgareae | Wiwi | 0.05 | 99.7 | 100 |
| Austraderia richardii | Toe-toe | 0.2 | 398.8 | 398 |
| | | 1 | 1994 | 1994 |
| upper TRB | | | | |
| Species: | Common name: | proportion: | Number: | #rounded: |
| Phormium tenax | Harakeke | 0.3 | 998.4 | 999 |
| Carex virgata | Pukio | 0.1 | 332.8 | 333 |
| Carex geminata | Rautahi | 0.2 | 665.6 | 666 |
| Juncus procerus | Giant rush | 0.05 | 166.4 | 166 |
| Juncus edgareae | Wiwi | 0.05 | 166.4 | 165 |
| Austraderia richardii | Toe-toe | 0.2 | 665.6 | 666 |
| Apodasmia similis | Oioi | 0.05 | 166.4 | 166 |
| Carex secta | Pukio/ Kuwei | 0.05 | 166.4 | 167 |
| | | 1 | 3328 | 3328 |
| lower TRB | | | | |
| Species: | Common name: | proportion: | Number: | #rounded: |
| Apodasmia similis | Oioi | 0.08 | 387.04 | 387 |
| Carex secta | Pukio/ Kuwei | 0.05 | 241.9 | 242 |
| Scheonoplectus tabernaemontanii | Kuawa | 0.2 | 967.6 | 968 |
| Carex geminata | Rautahi | 0.2 | 967.6 | 968 |
| Cyperus ustulatus | Giant umbrella sedge | 0.1 | 483.8 | 484 |
| Typha australis | Raupō | 0.1 | 483.8 | 484 |
| Carex litorosa | Sea sedge | 0.05 | 241.9 | 242 |
| Phormium tenax | Harakeke | 0.1 | 483.8 | 484 |
| Austraderia richardii | Toe-toe | 0.1 | 483.8 | 483 |
| Isolepis prolifera | *na* | 0.01 | 48.38 | 48 |
| Ranunculus glabrifolius | Waoriki | 0.01 | 48.38 | 48 |

| | | | | |
|---|---|---|---|---|
| | | 1 | 4838 | 4838 |
| Amenity | | | | |
| Species: | Common name: | proportion: | Number: | #rounded: |
| Phormium tenax | Harakeke | 0.3 | 37.5 | 37 |
| Coprosma propinqua | Miki | 0.1 | 12.5 | 12 |
| Leptospermum scoparium | Mānuka | 0.1 | 12.5 | 12 |
| Cordyline australis | Tī kouka | 0.1 | 12.5 | 12 |
| Muehlenbeckia astonii | Shrubby Toraro | 0.1 | 12.5 | 13 |
| Muehlenbeckia complexa | Small-leaved Pōhuehue | 0.1 | 12.5 | 13 |
| Ozothamnus leptophylla | Tauhinu | 0.1 | 12.5 | 13 |
| Myoporum laetum | Ngaio | 0.1 | 12.5 | 13 |
| | | 1 | 125 | 125 |

Finally, the costings of what is planned for this section are provided in the following tables. Note that this is indicative only, the most helpful ellements being the cost per metre for each category as this can inform final design revegetation.

*Table 3, costings associated with the installation*

| Section | Area m2 | # Plants | $ per unit | $ guard unit | $ install | $ maintenance | total | $ per m | Year 2 maintenance total | |
|---|---|---|---|---|---|---|---|---|---|---|
| Amenity | 125 | 125 | $3.50 | $2.60 | $3.00 | $3.50 | $1,575.00 | $12.60 | $3.50 | $437.50 |
| lower TRB | 2419 | 4838 | $3.50 | $2.60 | $3.00 | $3.50 | $60,958.80 | $25.20 | $3.50 | $16,933.00 |
| upper TRB | 1664 | 3328 | $3.50 | $2.60 | $3.00 | $3.50 | $41,932.80 | $25.20 | $3.50 | $11,648.00 |
| step TLB | 997 | 1994 | $3.50 | $2.60 | $3.00 | $3.50 | $25,124.40 | $25.20 | $3.50 | $6,979.00 |
| *total* | | 10285 | | | | | $129,591.00 | | | $35,997.50 |