



REPORT FOR: WENITA FOREST PRODUCTS LIMITED

DATE: 2ND APRIL 2014

SUBJECT: STREAM RESTORATION PROJECT

Paul Pope
Spiralis - Environmental Solutions Consultancy



I inspected a stream site in the Hope Hill area on the 1st April 2014 with Mike Mullen from Wenita Forest Products Ltd. The inspection was made to make recommendations for the revegetation of a tributary headwater section of the Otokia Creek catchment.

The surrounding vegetation has been production *Pinus radiata* and that has been felled in the last 18 months with remaining detritus wind-rowed as is the common practice. In discussion with Mike the creek has had logging detritus and material pushed back and away to ensure appropriate water flow.

The water flow from the bottom section of the creek was very slow and it was noted that a culvert had blocked water in the area. Below the stream water flow was consistent with type and scale of the creek.

An inspection of the vegetation left after the adjacent logging showed some native streamside species, predominantly;

Carex germinata

Carex secta

Isolepis nodosa

Noted on the site were some seedling tree and shrub species;

Melicytus ramiflorus

Aristotelia serrata

Predominantly the vegetation on both sides was a mix of exotic agricultural grasses, dock, gorse, fireweed, blackberry and thistle.

It was noted that the area lies below a significant section of emergent rimu forest and the presence of this forest will give an indication of the suitability of restorative species.

DISCUSSION

Wenita Forest Products Ltd has been recommended to undertake revegetation of the stream banks for approximately one kilometre of the headwater area. This recommendation was made as part of the Company's FSC audit due to the significance of the creek to the wider Otokia Catchment. That restoration is significant to the biodiversity health and connectivity of the area and to Wenita Forest Products Ltd as a good land manager practicing in a sustainable way.

The revegetation of the area is of significant capital value and will require careful planning and attention to detail, particularly over:

- Plant selection
- Timing of planting

- Site preparation
- Ongoing maintenance
- Public relations
- Catchment management

RECOMMENDATIONS

The length of the area (1km) available resources and the topography will largely determine the width of the restoration planting. In general it is recommended that the total width of the revegetation area be 10 metres from the edge of the stream landwards on both the true left (5 metres) & right (5 metres). There is likely to be some variation because of the position of wind-rows and the topography where the site narrows in places. Flexibility in plant selection for these areas is required.

Site preparation and an annual maintenance regime will be critical to the success of plant establishment and growth. Woody weeds and grasses will need pre and post planting site control. Schedules and timing should be monitored closely for planting success.

Retention and integration of existing native vegetation is highly desirable and where possible new planting should complement that existing material. Care will be required during site preparation and maintenance operations of this factor.

The funding availability of this project will largely determine the length of time that the project will take to complete. Providing that Wenita Forest Products Ltd is working within the recommendations of the FSC audit a timeframe of 4-6 years may be appropriate. However, this may need to be extended to include additional annual maintenance or planting as required.

The culvert at the south-east end of the site needs clearance and should remain clear at all times to ensure steady water flow.

Animal control may be required as necessary.

The site lies at the bottom of a steep narrow gulley and is likely to be prone to heavy frost during the winter. Successful planting is more likely in August and September when the seasons begin to change and air and ground temperatures begin to warm.

The nature of the site does mean that there is always a possibility that during high rainfall the site floods, erodes or is over-run. This poses a potential risk to the successful revegetation of the area, along with drought, pestilence or other land erosion.

PLANT SPECIES

Streamside Margin Species

<i>Typha orientalis</i>	bulrush, raupo (be aware this species can be invasive)
<i>Carex geminata</i>	cutty grass
<i>Carex secta</i>	purei
<i>Carex virgata</i>	swamp sedge
<i>Cortaderia richardii</i>	toe toe
<i>Juncus gregiflorus</i>	leafless rush
<i>Phormium tenax</i>	harakeke
<i>Leptocarpus similis</i>	jointed wire rush, oioi
<i>Isolepis nodosa</i>	knobby clubrush

Trees and Shrubs

<i>Aristotelia serrata</i>	wineberry, makomako
<i>Carpodetus serratus</i>	marble leaf, putaputaweta
<i>Plagianthus divaricatus</i>	saltmarsh ribbonwood
<i>Coprosma aerolata</i>	
<i>Coprosma rotundifolia</i>	
<i>Coprosma propinqua</i>	mingimingi
<i>Cordyline australis</i>	cabbage tree, Ti kouka
<i>Coriaria sarmentosa</i>	tutu
<i>Fuchsia excorticata</i>	fuchsia, kotukutuku
<i>Griselinia littoralis</i>	broadleaf, papauma
<i>Elaeocarpus hookerianus</i>	pokaka
<i>Hebe salicifolia</i>	koromiko
<i>Hoheria angustifolia</i>	mountain ribbonwood
<i>Kunzea ericoides</i>	kanuka
<i>Dacrycarpus dacrydioides</i>	kahikatea
<i>Leptospermum scoparium</i>	tea tree, manuka
<i>Melicytus ramiflorus</i>	whiteywood, mahoe
<i>Pseudowintera colorata</i>	pepper tree
<i>Pittosporum tenuifolium</i>	kohuhu
<i>Pittosporum eugenoides</i>	tarata
<i>Plagianthus regius</i>	manatu
<i>Pseudopanax arboreus</i>	
<i>Schefflera digitata</i>	seven-finger, pate
<i>Sophora microphylla</i>	kowhai

Possible Additions

<i>Dacrydium cupressinum</i>	rimu
<i>Podocarpus totara</i>	totara
<i>Prumnopitys ferruginea</i>	miro
<i>Prumnopitys taxifolia</i>	black pine, matai
<i>Olearia lineata</i>	

The choice of plants is not conclusive but represents a good broad range of endemic native species that should be utilised in this type of streamside revegetation. All species should be eco-sourced. Central to streamside revegetation is overhanging grass or sedge species that provide areas for fish to lay eggs. This is particularly in the case of inanga. The area 2 metres from the edge of the stream should utilise intermediate size shrubs and flax with larger tree and shrub species spanning back to the 5 metre mark. Taller species will help to cool the water temperature for fish and invertebrates. The addition of large emergent podocarp species such as rimu, matai or miro is probably more of a romantic gesture to the previous vegetation forms once available on the site. However from a public relations perspective there is a degree of the “feel good” factor in planting a small number of these specimens. The recommendation of Bulrush (*Typha orientalis*) should only be considered around the ponding area at the culvert area. This species can be highly invasive. It was noted a pond in this area seemed to have been created as a water supply. If that is the case care around planting this area is required for access and to decrease the risk to damaging a re-vegetated area.

The project will be heavily dependent on the streamside and margin species of the proposed list.

There would be very strong value in undertaking monitoring of the project to gain an understanding of the benefits of the revegetation to the overall health of the Otokia Creek Catchment. The use of SHMAK monitoring before revegetation is undertaken using a non-vegetated site as a control against the restoration efforts would be extremely useful in future FSC audits of the progress of the project. The development of photo monitoring points from a fixed bearing along sections of the creek that showed progress of the project would also be useful.

Engaging with the community to participate in the planting and reporting on progress to them would also be highly advantageous.



Figure One - The culvert on the south east end of the creek must be kept clear for water flow and any spawning activity of fish in the area.



Figure Two - Overview of vegetation types in the south east end of the creek



Figure Three - Overview of creek position in relationship to the road, wind rowing and forest harvesting. Note the available width of the area.



Figure Four - Podocarp remnant gives an indication of suitability of species for the revegetation area.



Figure Five - Central stream site showing availability of width in relation to wind rows and the natural creek terrace.



Figure Six - Upper section of the creek in the north west corner of the site.

This project is fairly major undertaking that will require staging over a period of time. It is a positive addition to the wider Otokia Creek Catchment and one that should provide positive ecological gains to the area. The role of such revegetation is an important one to wider issues of biological connectivity in other similar and disparate habitats.

A handwritten signature in black ink, appearing to read 'Paul Pope', with a stylized, flowing script.

Paul Pope
Senior Consultant/Director
Spiralis Ltd
Environmental Solutions Consultancy