

**ASHFORD PARK REHABILITATION:
STAGE 2 PLAN**

January 2022



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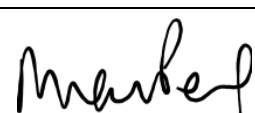

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DOCUMENT APPROVAL

Document title:	ASHFORD PARK REHABILITATION: STAGE 2 PLAN
Prepared for:	Winstone Aggregates
Version:	2
Date:	17 January 2022
Document name:	Ashford Park Stage 2 Rehabilitation

Author:	Madeleine van der Poel M.Sc. (Hons) Ecologist	
Reviewer:	Chris Wedding (M.Sc. (Hons)) Ecology Manager	

Reference: Bioresearches (2022). ASHFORD PARK REHABILITATION: STAGE 2 PLAN. Report for Winstone Aggregates. pp 17

Cover Illustration: Works at Ashford Park Quarry Rehabilitation (2017)

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1. INTRODUCTION

1.1 Background

Ashford Park is a former horse stud farm in Ōtaki, Kapiti Coast, owned by Winstone Aggregates. The park is positioned adjacent to the Ōtaki River and adjoins a gravel extraction and processing site owned by The Greater Wellington Regional Council and operated under licence by GBC Winstone (Figure 1).

Bioresearches was engaged by Winstone Aggregates (WITL) to prepare the Stage 2 of rehabilitation at Ashford Park. The existing quarry is planned over four stages, covering an expected 20 years of operation. Stage 1 (Bioresearches, 2017¹) referred to two sub-stages (1a and 1b) of the Stage 1 formed lake (Figure 1). Currently the Ashford Park Quarry is in the second stage of development, requiring Stage 2 of the rehabilitation plan.



Figure 1. Stages 1 and 2 of rehabilitation at Ashford Park. The Otaki Quarry (blue polygon) is adjacent to the Otaki River flowing along the southern boundary.

The purposes of this rehabilitation plan are;

- a) To protect and enhance indigenous ecological values, including the remaining remnant native vegetation and

¹ Bioresearches (2017), Ashford Park Stage 1 Rehabilitation Plan. Prepared for Winstone Aggregates. 23 pp

- b) To improve water quality of the lake.

1.2 Site Description

The site is largely occupied by fenced pasture. However, there are occasional scattered trees, both native and exotic; exotic shelter belts (pine, poplar, and macrocarpa) as well as small fragments of native forests that have a mostly healthy canopy of kohekohe-tītoki-tōtara forest but show evidence of historic grazing in the understory.

The two larger remnants of these native forest stands are to be retained as islands (Figure 2), which will be surrounded by the lake created by gravel extraction.



Figure 2. Ashford Park prior to quarry development (pre 2019). Large areas of pasture grass with exotic shelter belts. Two blue polygons indicate the native forest fragments that will be retained.

2. WEED MANAGEMENT

2.1 Introduction

Because the planting site will be sculpted post-excavation, there will be no weedy taxa present in the initial stages. However, plant weeds can smother the existing indigenous flora and inhibit growth of any new plantings therefore maintenance is crucial to ensure that there are no weed invasions during the early stages of planting.

Specific weed management recommendations can be found at Weed Busters (www.weedbusters.org.nz).

2.2 Herbicide Use

Where possible, regenerating weeds should be removed manually.

The utmost care must be taken to ensure that only herbicides appropriate for use near waterways is used. Only some foliar herbicides are suitable for use next to waterways, including *Diquat* and glyphosate products *Roundup*®, *Trounce*®, and *Zero*®. Other herbicides, such as metsulfuron and *Tordon*® *Brushkiller* can be applied directly to cut stumps. Herbicide pouring and dilution must not be carried out within 20 m of the stream or any storm water drains, and no herbicides may be used over water unless explicitly recommended on the manufacturer's label. At no point may herbicides be used in any manner which may result in contamination of waterways.

Great care shall be taken to protect all retained vegetation from contact with herbicide. The persons undertaking weed management should be suitably qualified, and be mindful of retained vegetation, potential contamination of waterways and the health of humans and wildlife when using herbicides.

3. RIPARIAN PLANTING PLAN

3.1 Staging

Planting should occur in two stages: the ‘**wet zone**’ planting in summer, and the ‘**dry zone**’ planting over winter (dry zone includes mitigation planting). The rationale for this is that during summer, the water level is likely to recede, allowing planting to occur in the emergent and submerged zones. Where inundation is unlikely, planting should occur over autumn to early winter to allow the establishment of root systems prior to the hotter summer months and increase plant survivorship.

A multistage approach will be required to fully restore the vegetation within the riparian margins. The multistage approach is outlined below:

- **Stage 1: Site preparation**
Top soil removed during the excavation process will be used to dress the surface following margin formation. Soil depth should be no less than 300 millimetres.
Organic fibre matting may be used to prevent loss of topsoil where appropriate.
- **Stage 2: ‘Wet zone’ planting in summer**
Prepare planting area and plant species according to the planting schedule.
- **Stage 3: ‘Dry zone’ planting in winter**
Prepare planting area and plant species according to the planting schedule.
- **Stage 4: Maintenance**
Begin maintenance one month after planting. Maintenance will involve replacing any failed plantings and removing new growth of weed species
- **Stage 5: Ongoing maintenance**
Release all current plantings from any persistent invasive species or new incursions until at least a 75% canopy closure is achieved.

3.2 Lake margin

The final form of the permanent lake margin will include the planting areas adjacent to the 14.7 m limit of excavation as identified in the Condition 47a (Appendix 1) (F).

The amount of overburden for Stage 2 is approximately 96,000 m³. Some of this will be used in Stage 3 to construct noise bunds. However, the remainder will be used to construct the lake margins, along with a layer of topsoil (minimum 300 mm) to ensure water retention and provide nutrition for the plants. In the dry zone, mulch or organic material should be added to higher grade plants (PB8 and PB12).

3.3 Planting Schedule

The plant species recommended within the planting tables (below) are appropriate for restoration planting within riparian margins. A site-wide species list was created to meet the requirements of Condition 49 of the Kapiti Coast District Council Land Use Consent RM150184 (Appendix 1). The species recommended for Stage 2 are compatible with the species planted for Stage 1, to ensure there is connectivity across the site.

The proposed species have been separated into three zones, 'Riparian Dry', 'Emergent', and 'Submerged' zones, based on their profile from within the wetted margin to above the flood plain on dry land (Figure 3).

The total planting area for each zone is (as per GBC Winstone, 2016)² as follows:

- Mitigation planting (8 m wide): 3040 m²
- Dry zone (15 m wide): 12638 m²
- Wet zone
 - Emergent (6 m wide): 3451 m²
 - Submerged (8 m wide): 6920 m²

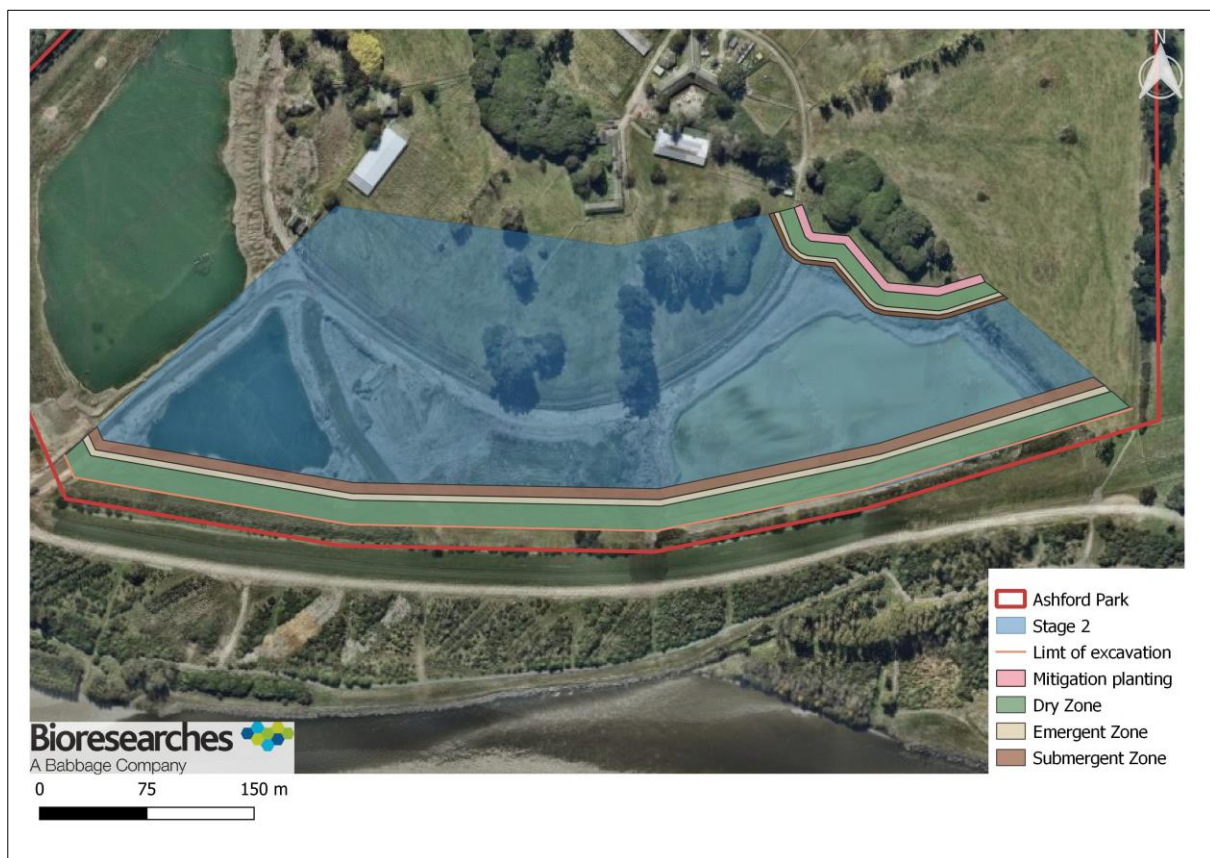


Figure 3. The approximate locations of the planting zones for Stage 2 of the rehabilitation plan. Including the setback as identified in Condition 47a.

² GBC Winstone (2016). Ashford Park Gravel Extraction Rehabilitation Strategy. 34 pp.

Table 1. Plant species for the mitigation planting around the eastern forest fragment (total area: 3040 m²)

Botanical name	Common name	Container size	Spacing (m)	Composition (100%)	# Plants/m ²	# plants + 10%
<i>Alectryon excelsus</i>	titoki	PB3	5	10%	14	15
<i>Brachyglottis repanda</i>	rangiora	PB5	1.4	5%	90	99
<i>Dysoxylum spectabile</i>	kohekohe	PB5	5	5%	7	8
<i>Geniostoma ligustrifolium</i>	hangehange	PB3	1.4	7%	125	138
<i>Knightia excelsa</i>	rewarewa	PB5	5	5%	7	8
<i>Melicytus ramiflorus</i>	mahoe	PB3	1.4	20%	358	394
<i>Melicope simplex</i>	poataniwha	PB3	5	5%	7	8
<i>Pseudopanax crassifolius</i>	lancewood	PB5	5	10%	14	15
<i>Nestigis lanceolata</i>	white maire	PB5	5	3%	4	5
<i>Pittosporum tenuifolium</i>	kohuhu	PB3	5	5%	7	8
<i>Coprosma rhamnoides</i>	twiggy coprosma	PB3	1.4	10%	179	197
<i>Coprosma rotundifolia</i>	round-leaved coprosma	PB3	1.4	10%	179	197
<i>Beilschmiedia tawa</i>	tawa	PB8	5	5%	7	8
Total:				100%	999	1099

Table 2. Plant species for riparian planting in the Dry Zone (total area: 12638 m2)

Botanical name	Common name	Container size	Spacing	Composition	# Plants/m2	# plants + 10%
<i>Coprosma robusta</i>	karamu	PB3	1.5	10%	649	713
<i>Nestigis lanceolata</i>	white maire	PB5	5	10%	58	64
<i>Melicytus ramiflorus</i>	mahoe	PB3	1.5	5%	324	357
<i>Myrsine australis</i>	mapou	PB5	2	5%	182	201
<i>Pittosporum eugenoides</i>	lemonwood	PB8	1.5	5%	324	357
<i>Pseudopanax arboreus</i>	five-finger	PB3	1	10%	1459	1605
<i>Olearia paniculata</i>	akiraho	PB8	1	5%	730	803
<i>Leptospermum scoparium</i>	manuka	PB8	1.5	5%	324	357
<i>Kunzea robusta</i>	kanuka	PB8	1.5	5%	324	357
<i>Elaeocarpus dentatus</i>	hinau	PB12	5	5%	29	32
<i>Geniostoma ligustrifolium</i>	hangehange	PB5	1.5	7%	454	499
<i>Knightia excelsa</i>	rewarewa	PB12	5	5%	29	32
<i>Hedycarya arborea</i>	pigeonwood	PB8	5	10%	58	64
<i>Myoporum laetum</i>	ngaio	PB8	5	5%	29	32
<i>Metrosideros robusta</i>	northern rata	PB12	5	3%	18	19
<i>Pseudopanax crassifolius</i>	lancewood	PB12	5	5%	29	32
Total:				100%	5022	5525

Table 3. Plant species for riparian planting in the Wet Zone (total area: 10371 m²)

	Botanical name	Common name	Container size	Spacing	Composition	# Plants/m ²	# plants + 10%
Emergent (3451 m²)	<i>Austroderia fulvida</i>	toetoe	PB5	1	15%	598	658
	<i>Carex lessoniana</i>	swamp sedge	PB5	0.5	10%	1594	1753
	<i>Carex secta</i>	purei	PB5	0.5	10%	1594	1753
	<i>Coprosma tenuicaulis</i>	swamp coprosma	PB5	1.5	10%	177	195
	<i>Juncus australis</i>	wiwi	PB5	0.5	5%	797	877
	<i>Juncus pallidus</i>	giant rush	PB8	0.5	10%	1594	1753
	<i>Coprosma robusta</i>	karamu	PB8	1.5	15%	266	292
	<i>Phormium tenax</i>	flax	PB8	1.5	15%	266	292
	<i>Melicytus ramiflorus</i>	mahoe	PB5	1.5	10%	177	195
	Total				100%	7062	7769
Submerged (6920 m²)	<i>Carex maorica</i>	maori sedge	PB5	0.5	15%	4794	5274
	<i>Carex secta</i>	purei	PB5	0.5	25%	7991	8790
	<i>Carex virgata</i>	pukio	PB8	0.5	15%	4794	5274
	<i>Eleocharis sphacelata</i>	kutakuta	PB5	0.5	10%	3196	3516
	<i>Eleocharis acuta</i>	sharp spike sedge	PB5	0.5	20%	6393	7032
	<i>Sparganium subglobosum</i>	maru	PB5	0.5	15%	4794	5274
		Total				100%	31963

3.4 Planting Procedure

The planting procedure should be undertaken in accordance with the following:

- Planting should be undertaken within either the summer or winter depending on the zone.
 - Wet zone: Plant in summer
 - Mitigation and Dry zone: Plant in winter
- Prior to planting, all plants should be thoroughly watered and be allowed to drain, out of direct sunlight.
- When on site, the plants should be set out according to the spacing recommended (Tables 1 - 3).
- The holes for the plants should be dug at least 1.5-2 times larger than the plant root ball.
- Plants should be carefully removed from the bag. If the plant is root bound, untangle the roots carefully to help them grow.
- After placing the plant in the hole, backfill around the plant. The collar of the plant should be located above the soil, i.e., at the same level as it was in the bag.

3.5 Plant Sourcing

All native plants shall be ecosourced from indigenous species from the Manawatu Plains Ecological District, with seeds collected as close to the site as possible. Eco-sourcing protects the genetic lineage of plants in the area and ensures plants would be adapted to the specific regional climatic conditions.

3.6 Plant Maintenance

Plant maintenance will include manually removing weed species should they establish and should occur every three to four months until at least a 75% canopy closure is achieved.

Plant maintenance may require watering and/or nutrient provision where required, and replacement of plants that do not survive. Except as tablets or pellets placed within the holes prior to planting, application of fertilizer to the soils should be avoided as this will enter the lake and promote algal growth. For the dry zone and mitigation planting area, mulch should be applied prior to planting and top up biannually.

A 10% allowance has been made for die-off within the planting schedule (refer Tables 1 - 3). Plant replacement should be of the same species, should a particular species continue to fail a substitute species may be used (consult with the Ecologist). Any replacement planting should conform to the intention of the Planting Plan. Replacement plants should be of the same size as the plan to be replaced and shall be planted in the correct season based on the zone.

3.7 Maintenance and Revegetation Monitoring Schedule

A sample schedule of the enhancement activities required at the Site, as outlined in this Plan, is presented in Table 5. The timing of the maintenance is contingent on weeding being undertaken late in the initial year/early in year one, and the initial planting being undertaken in May-June (year one). However, should the timing of the initial weeding/planting differ, the timing of the maintenance activities will need to be adjusted accordingly (refer above).

Table 4. Sample planting and maintenance activity schedule.

Time	Activity	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Year one	Wet-zone Planting	Green											
	Dry-zone Planting				Green								
	Plant maintenance							Blue		Blue		Blue	
Year two	Plant maintenance	Blue		Blue		Blue		Blue			Blue		
Year three	Plant maintenance	Blue			Blue			Blue			Blue		
Year four	Plant maintenance	Blue			Blue			Blue				Blue	
Year five +	Plant maintenance			Blue				Blue				Blue	

Green indicates planting and blue is maintenance (weeding or replacement of failed individuals)

4. SUCCESS PARAMETERS

4.1 Success Parameters

The common problem within a rehabilitation project such as Ashford Park can be a lack of quantifiable success parameters. In order to track the progress of this project certain parameters should be measured to ensure successful establishment of the plantings. Therefore, its success can be considered achieved if, *native riparian vegetation achieves 90% survival and a minimum of 75% canopy cover after 5 years following completion of extraction activity.*

5. PEST MANAGEMENT

5.1 Pest Animals

Rabbits and pukeko can compromise restoration efforts by consuming the young foliage on new plantings. To protect vegetation during the first 2 years of establishment we recommend installing environmentally friendly plant guards. Our recommendation is to use bio-degradable plant guards for their usage near waterways on the riparian planting borders. See Appendix I for an example of bio-degradable planting guard.

- For each new planting, use an environmentally friendly and bio-degradable plant guard from New Zealand Made EmGuard™ to prevent accessibility to young new unestablished plantings.
- <https://www.futurecology.co.nz/emguards>
- The condition of the guards and plants shall be checked 1 year after installation to verify if plantings have established well enough to continue after the guard protection will or has bio-degraded.



Photo 1. Example of bio-degradable planting guard to prevent browse pressure

Additionally, shooting pukekos and rabbits can be used as an option to control numbers to increase seedling survival. For shooting outside the game bird season (1 May – 27 June) a special permit is required.

6. APPENDIX

Appendix 1: Condition 47

47. Before excavation within each stage is completed and before commencing of each subsequent stage of extraction activity (where applicable), a detailed staged rehabilitation plan shall be prepared and submitted for the certification of the resource consents and compliance manager, KCDC for the stage that has been extracted in accordance with the overall rehabilitation strategy to ensure the operation facilitates a progressive staged rehabilitation process. A copy of the draft plan shall be provided to the CLG prior to the time it is submitted to the team leader development control, KCDC for certification. The CLG shall be given a period of two weeks in which to forward any comments it may have on the draft plan to the team leader development control, KCDC prior to any certification being given. All works shall be undertaken in accordance with the certified staged rehabilitation plan.

Note: the council should respond within 10 working days of receiving the stage plan with certification or any requested amendments. The detailed stage rehabilitation plan shall identify the following:

- a. The final form of permanent lake margins to accommodate re-vegetation for that stage including areas adjacent to the 14.7 metre minimum set back from the toe of the stop bank (as at January 2016) as indicated in the blue line on the plan titled Crystals bend Otaki river Otaki limit of excavation along site boundaries drawing no. W15015-001 dated 20 January 2016, along the southern boundary;
- b. Timing of the proposed rehabilitation works taking into account operational constraints/requirements (for example, continued use of the haul roads and bunds) and how this will be achieved;
- c. The volume of overburden and topsoil necessary to create permanent lake margins;
- d. Species, plant numbers and timing of planting to occur;
- e. On-going maintenance of planted areas to ensure establishment; and
- f. Any work necessary to facilitate future recreation access through the site.

Appendix 2: Condition 49

49. Prior to any construction activities commencing, the consent holder shall prepare and submit for the certification of the Resource Consents and Compliance Manager, KCDC, a Planting Plan prepared in accordance with the landscape strategy; the plan titled “Ashford Park Planting Plan RG4” prepared by Boffa Miskell and dated 10 February 2016 and the Rehabilitation Strategy submitted with the application. A copy of the Draft Plan shall be provided to the CLG prior to the time it is submitted to the Resource Consents and Compliance Manager, KCDC for certification. The CLG shall be given a period of two weeks in which to forward any comments it may have on the draft plan to the Resource Consents and Compliance Manager, KCDC prior to any certification being given. The Planting Plan shall identify the following:

- a. Existing boundary vegetation on-site to be retained to ensure effective screening is maintained along the boundaries of the Site;
- b. Additional areas of planting necessary to:
 - provide an effective visual screen of quarry activities at the quarry boundary of the Ōtaki Māori Racing Club, 197 Rahui Road and 72 Te Roto Road;
 - reinforce stands of deciduous species; and
 - address any gaps between existing tree belts where there are views from adjoining properties.

Note: The detailed design of the planting (in the vicinity of the Project stages that are relevant to these landowners) in accordance with the plan titled “Ashford Park Planting Plan RG4” prepared by Boffa Miskell and dated 10 February 2016 shall be finalised in consultation with the owners and occupiers of the following properties:

- the Ōtaki Māori Racing Club
- 197 Rahui Rd
- 72 Te Roto Rd

The results of this consultation shall be submitted to KCDC when the Planting Plan is submitted for certification.

- c. Species, plant numbers and timing of any additional screen planting together with planting notes to ensure such planting will become successfully established and achieve its desired effect;
- d. Measures to ensure that all identified screen vegetation will be protected and maintained throughout the operation period; and
- e. Species to be used for the Stage Plans for the lake margins in the Riparian Dry Zone, Emergent Zone, Submerged Zone along with planting notes to ensure such planting will become successfully implemented to achieve its desired effect.”