



Walter Peak Station Trust,
Landscape
Management Plan
Annual Audit 2017

Walter Peak Station

November 2017



**Walter Peak Station Trust Landscape Management Plan
Annual Audit 2017**

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1 Introduction

1.1 Overview

In March 2014, Walter Peak Corporate Trustee Limited (WPCT) was granted resource consent (RM130610) to vary the conditions of land use consent RM010111. The variation related to the requirements to undertake, maintain, monitor, and release bonds associated with a landscape/vegetation restoration programme. The consent was granted subject to the implementation of a Landscape Management Plan (LMP). The LMP included an annual reporting requirement to Queenstown Lakes District Council (QLDC), detailing the work completed and the performance of the plantings, to be submitted to the QLDC on the last day of November. This report has been prepared to meet consent condition 11c of RM010111 and RM130610.

This report will be the fourth annual audit, with previous audits completed in spring of 2014, 2015, and 2016 (see (DCG, 2014) (DCG, 2015) (DCG, 2016)). Over the preceding years, all planting and landscape maintenance work has been completed in accordance with the LMP and the plant survival rates are consistent with the LMP performance objectives. At the end of the 2016 audit, Stage 1 and Stage 2a had been monitored for three years and had a success rate of 84%, which met the required success rate of 70% after three years. Stage 2b and 2c have only been monitored for two years, and still require one further monitoring round in spring 2017. Further, ongoing monitoring and reporting of the 5, 10, and 20-year performance objectives is also required.

This fourth annual audit report is structured as follows:

- Section 2: Details this year's landscape maintenance work;
- Section 3: Details the completion of the 2017 survey and results;
- Section 4: Describes the progress to date towards the generic and Stage specific measurement criteria, to achieve the site's seven overall ecological objectives; and,
- Section 4: Presents the Summary, including conclusions and recommendations.



1.2 Limitations

e3s performed the services in a manner consistent with the normal level of care and expertise exercised by members of the environmental science profession. No warranties, express or implied, are made. The confidence in the findings is limited by the Scope of Work.

The results of this assessment are based upon site inspections conducted by e3s personnel, and information provided in scientific literature. All conclusions and recommendations regarding the site are the professional opinions of e3s personnel involved with the project, subject to the qualifications made above. While normal assessments of data reliability have been made, e3s assumes no responsibility or liability for errors in any data obtained from regulatory agencies, statements from sources outside e3s, or developments resulting from situations outside the scope of this project.



2 Landscape Management Implementation

The LMP details the required installation of new plantings and ongoing maintenance of existing and new plantings. The site is divided into four stages (Stages 1, 2a, 2b, and 2c) for implementation of the LMP. The plans for each stage are provided in Appendix A.

2.1 Planting Requirements

All planting requirements under the LMP have been completed over two planting seasons in 2013 and 2014. Please refer to the previous annual audit reports for further details ((DCG, 2014) (DCG, 2015) (DCG, 2016)).

2.2 Planting Maintenance

Planting maintenance is required by the LMP to control weeds in and around the native plantings. This year's works occurred over two, one-week long trips between November 2016 and March 2017. Work was undertaken by 'J Whitaker Contracting' with four contractors on site at a time. Previous maintenance undertaken is detailed in previous annual audit reports (see (DCG, 2014) (DCG, 2015) (DCG, 2016)).

The key tasks completed during the maintenance period November 2016 to March 2017 included:

- Control of woody weeds (i.e. blackberry, broom, gorse, hemlock);
- Removal of shelters from some native plant species, such as *Austroderia richardii* (toetoe), *Carex secta*, and *Phormium* species (flax), which were being constrained by shelters and will now survive without the protection;
- Re-instating plant shelters that had been disturbed or removed, likely via wind and animal disturbance;
- Spraying around the native plantings to minimise competition from exotic rank grass growth (e.g. area 2c1 has a lot of rank grass that needs continued maintenance until native plantings can outcompete); and,



- Hand pulling or spraying of weeds growing within the plant shelters, again to minimise competition and smothering of the native plants from exotic weeds.

Further maintenance will be required between October 2017 and April 2018, including the following noted during this year's audit:

- Gorse and broom control across Stages 1, 2a, and the northern end of 2b1.
- Removal of shelters that are now constricting native plant growth in Stage 2c, e.g. from toetoe and flax plants.
- Weeding within shelters needed in Stage 2c, along with reinstating shelters, e.g. pulling up green mesh.
- Removal of green mesh where plants are tall enough in Stage 2b, and using shelters from dead plants around plants that have lost shelters.

Maintenance that the neighbouring farm manager has undertaken needs to continue. This includes ongoing deer control across the site, to prevent further losses of beech trees in particular, and regular checks of the site for livestock escapees. It is recommended that pest control for hares and cats is undertaken, as hares are continually seen in Stages 1 and 2a, and a cat was observed in Stage 1.

2.3 Irrigation Installation

An irrigation system was installed in October 2014 to the areas required under the LMP. Its operation has been sporadic due to engineering issues (as detailed in the 2016 annual audit report (DCG, 2016). However, the plants in the areas to be irrigated are now of an age that should survive without irrigation.



3 Performance Assessment

The LMP outlines measurement criteria to be recorded in order to quantify the success of the plantings and ultimately determine if the overall performance objectives have been met (see Section 3.2 of the LMP). The following sections detail the survey methodologies and results, which allow an objective assessment as to whether the criteria have been, or are on track to be met.

3.1 Permanent Photo Monitoring Sites

Twenty-three permanent photo monitoring points were established in 2014 (see Figure 1), and photographs have been taken every spring since. The specific methodology is detailed in the 2014 annual monitoring report (DCG, 2014).

On the 18th of October 2017, photographs were again taken from each of the permanent photo locations. A selection of photographs from points within each Stage is provided in Figure 2 to Figure 4 below, providing a comparison over time. These photos provide evidence of the growth of the native plantings within each of the Stages and plant communities. Observations from the photo monitoring points over time are discussed below.

There has been a visible increase in native vegetation cover from the planted beech trees in Stage 2b, as well as native bracken fern cover (not planted) (see Figure 4). In Stage 2c, the plantings are in the bottom of the gully and sections are at times saturated. This has led to plants such as toetoe and flax growing well (Figure 4). However, the beech trees are struggling and animal browse from sheep and deer has kept many of the native broadleaved species from growing above the shelter height.

In Stage 2a, the planted beech and *Pittosporum tenuifolium* trees are growing, with most beech trees greater than three metres in height (see Figure 2 and Figure 3). On the slopes where grey shrubland species were planted, the smaller-leaved *Olearia* and *Coprosma* species are growing well, however, there are reasonably sized areas where plants have not survived, or not grown much higher than the shelter. This likely reflects the dry and exposed nature of the grey shrubland planting areas when the plants were first installed. On the slopes now, between



the native plants, are rank exotic grasses which while will outcompete native seedlings do create a less exposed site.

In Stage 1, the beech trees near the lakeshore, and the flax and toetoe along the Mick O'Day Creek have visibly grown and increased their coverage (see Figure 2 and Figure 3).

The photographs from all 23 permanent photo monitoring points are compiled in Appendix B.





Figure 1: *Left* - Permanent photo monitoring locations and approximate photo direction. *Right* - A permanent photo monitoring point marked by 1.5 m waratah.



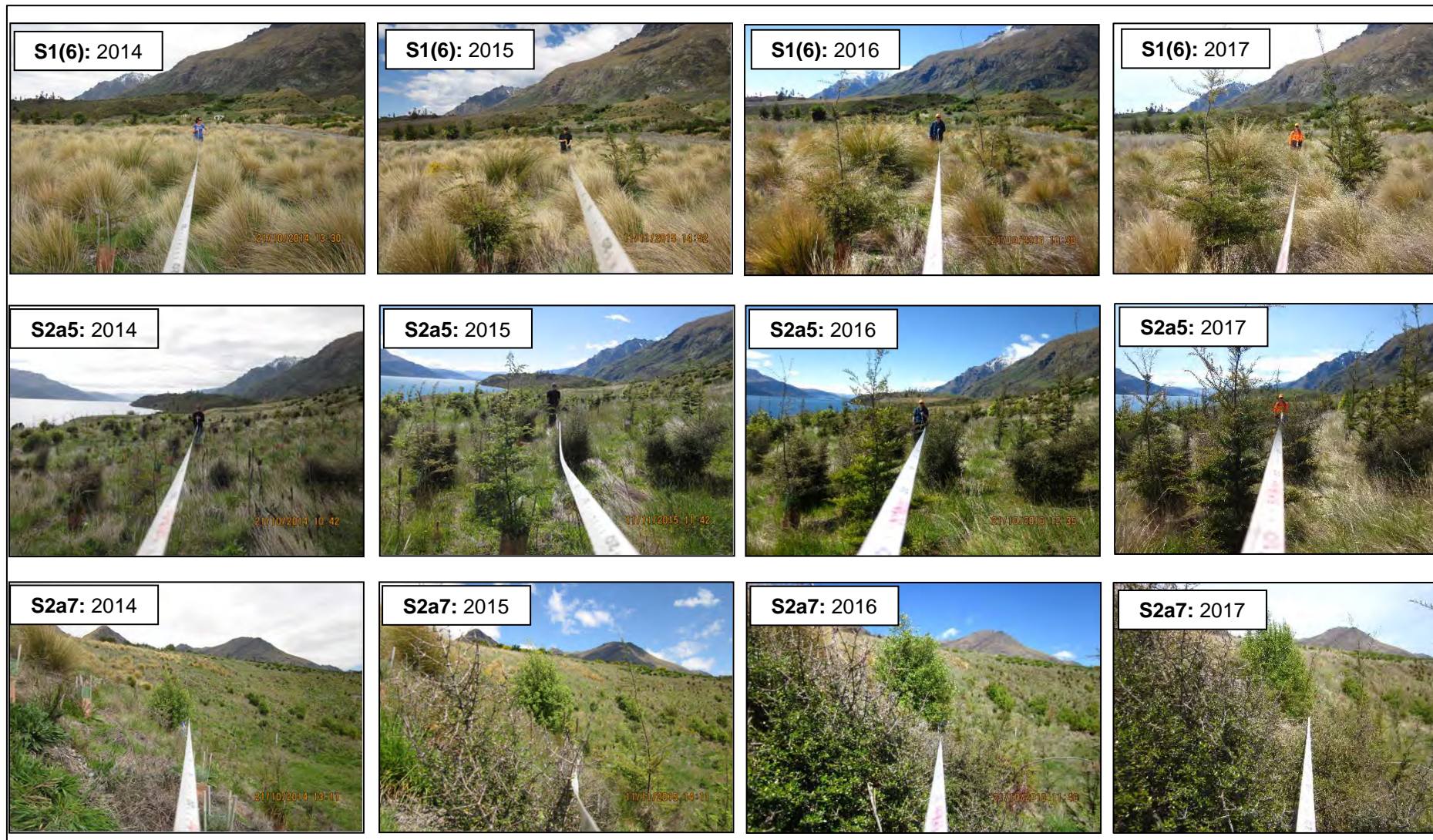


Figure 2: 2014 to 2017 Comparison of permanent photo monitoring locations (S1(6), S2a5 and S2a7).





Figure 3: 2014 to 2017 Comparison of permanent photo monitoring locations (S1(5), S2a6, S2a8).



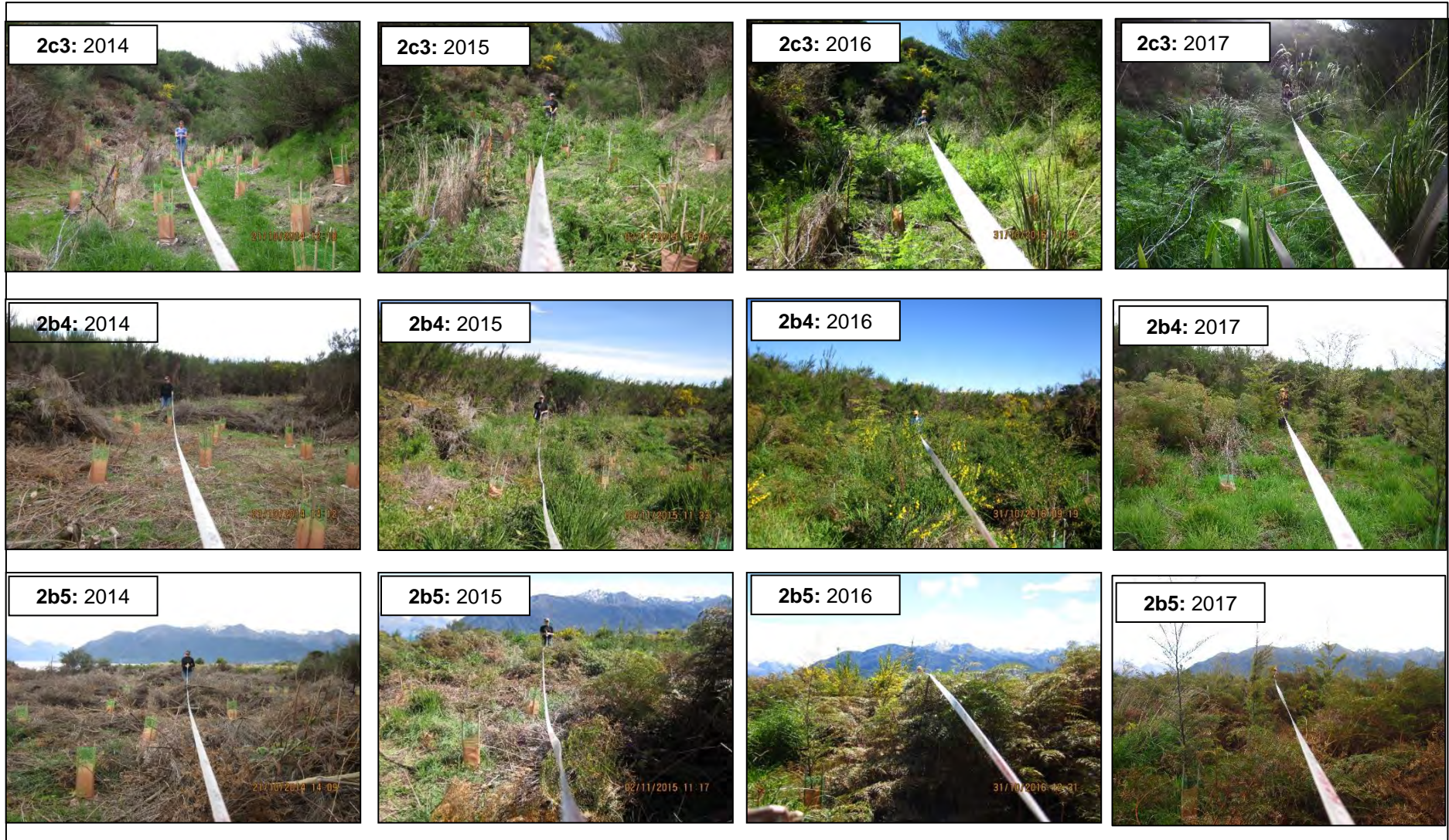


Figure 4: 2014 to 2017 Comparison of permanent photo monitoring locations (2c3, 2b4 and 2b5).



3.2 Aerial Photography

Aerial photographs were taken of the site in 2014 and again this year (2017), with each at a high resolution of approximately one inch per pixel. The aerial imagery is to support the assessment of indigenous vegetation cover within the planted areas. The aerial images for a selection of the plant communities in Stage 1 and Stage 2a were compared to assess the success of the new and existing plantings over time.

Within Stage 1, areas B11, M1, R1, and W2 were compared and the aerial images are located in Appendix C. The comparison between the 2014 and 2017 aerials for each of these areas is detailed below:

- **B11** is a beech dominated planting area, and over the last three years there has been an increase in native vegetation cover of the beech trees, tussock species, and in particular Pittosporum trees. The beech planted last within this area are now just visible after three years growth (refer to left-middle section in aerial image).
- **M1** is a lakefront planting area and there has been a noticeable increase in indigenous vegetation cover of tussock and hebe species. There are only small patches visible now where exotic rank grass is the dominant cover.
- In both the riparian and wetland planting areas (**R1** and **W2**), there has been an increase in native vegetation cover, and the diversity of species planted is also more obvious, with flax, toetoe, hebe and grey shrubland species all now noticeable.

In Stage 2a, areas K2, G3, G2, and B2, were compared and the aerial images are located in Appendix C. The comparison between the 2014 and 2017 aerials for each of these areas is detailed below:

- **K2** is a lakefront planting area, where there has been a very visible increase in the size of the native plantings, in particular of the Pittosporum trees and tussock species. To the south of the pump shed in the aerial, there is an area dominated by exotic grass species, however over the rest of this area the native cover has increased over the past three years.
- **G3** is a grey shrubland planting area and over the past three years the increase native vegetation cover is obvious, in particular of the Olearia and Coprosma species which need considerable growth before they become clearly visible. There are sections within G3 where there has been some plant loses that rank grass now covers.



- **G2** is another grey shrubland planting area. On the northern side of the road in this area, an increase in cover and diversity of native plantings is now obvious from 2014 to 2017, in particular of the smaller leaved species, such as *Olearia* and *Coprosma* species. On the southern side of the road, the grey shrubland species visible in 2014 have increased in cover, in particular at either end of this section. However, little native cover appears in-between these more obvious plantings, likely due to losses from the hot and exposed conditions of this north facing steep slope.
- **B2** is a beech tree dominated planting area, where the trees have become more obvious over the past three years, increasing the native vegetation cover. The beech trees should only continue to increase their cover over time and shade out the exotic rank grass given the expected stature of beech trees.



3.3 Survey Monitoring Results 2016

The percentage vegetation cover at each photo monitoring point, within the 10 by 10 m grid, is presented in Table 1. The cover has been split into three categories: native, exotic, and bare ground. The percentage cover has also been compared to the 2014 results for a temporal comparison. Specifically, the percentage change in vegetation cover and overall percentage increase since 2014.

Native Vegetation Cover

Of the 23 monitored areas none have decreased in native cover and 21 areas have seen an increase in native vegetation cover. The largest increase in native vegetation cover has occurred in 2b5, with an increase from 5% in 2014 to 60% this year, i.e. a 55% change in cover since 2014. This increase is due to native bracken fern, which hasn't been planted, but often is the first native colonising species following disturbance (i.e. from the clearance of weeds for planting in 2014). The next greatest increase is in S1(5), from 5% in 2014 to 50% this year, i.e. a 45% change in cover since 2014 and has largely been caused by growth of the planted native flax and toetoe plants.

The 2b2 area has the smallest increase in native cover from 5% to 10% over the three years, i.e. a 5% change in cover since 2014. This is likely due to the increased height but not width of the planted native beach trees, and exotic rank grass in between.

Two areas, S1(1) and 2c1, have seen no increase in native vegetation cover since 2014. In 2c1, the percentage native vegetation cover has been below or at 5%, likely because of greater competition from rank grass and a more exposed environment, given the location at the bottom of the gully. The S1(1) area has consistently had 50% native vegetation cover, although comparison of the 2014 and 2017 photos does indicate an increase in height of plants, and some width given there is less exotic grass between the tussocks visible over the three years (see Figure 5).



Exotic and Bare Ground Cover

Thirteen of the 23 areas have had a decrease in exotic vegetation cover. The greatest decrease has occurred in S2a(5) (in Stage 2a), with a decrease from 92% to 49% in exotic cover over the three years, as the planted beech trees have increased in width, as well as height, shading out more of the exotic rank grass, i.e. a -43% change in cover since 2014.

There has been an increase in exotic vegetation cover in seven areas, which has generally been caused by a decrease in bare ground colonised by exotic species, (i.e. between -18 to -90% change in bare ground cover in these areas since 2014). Further, in these seven areas, increases in native vegetation cover have also occurred.

Vegetation Cover within Planting Stages

When broken down into the planting Stages, the 2017 survey results show the following (see Table 1 below):

Stage 1 and Stage 2a - Lakeshore, beech and grey shrubland areas

- The native vegetation cover varies between 20 to 80% within the plant communities. The riparian area (R1/S1(4)) has seen the greatest increase in native vegetation cover, with an increase of 45% since 2014, which is an overall 900% increase since 2014. The beech tree area (B1/S2a(5)) has had the next highest change, with a 43% increase in native vegetation cover, and an overall percentage increase of 567% since 2014.
- The exotic vegetation cover also varies from 20 to 80%, which is largely made up of exotic grass species between plantings. However, the percentage change in exotic vegetation has generally decreased, or remained the same, in 13 of the 15 Stage 1 and 2a areas.
- Bare ground and dead vegetation cover varies between 0 and 10%, with all areas seeing a decrease or remaining the same.



Stage 2b – Beech trees and grey shrubland

- Native vegetation cover varies from 10 to 60%. Increases in the native vegetation coverage were only 5 and 7%, for 2b2 and 2b3, which is largely due to exotic rank grass covering all areas between planted beech trees. The other areas (2b1, 2b4 and 2b5), saw changes of up to 55% which is due to native bracken fern and an increase in the width of the planted beech trees.
- The exotic vegetation cover in these areas varies from 40 to 90% and has increased in four of the five planting areas. This increase is due to exotic species covering what was once bare ground, rather than a decrease in native cover, highlighted by the -44 to -90% decrease in bare ground coverage since 2014. Over time, the beech trees should shade out the exotic species.

Stage 2c – Gully with ephemeral creek

- The native vegetation cover increases with distance up the gully, from 5% coverage in 2c1 at the gully entrance by the lakeshore, to 15% in 2c2 half way up, and 35 % coverage in 2c3 at the head of the gully.
- The change in native vegetation cover since 2014 has seen a 10 and 30% increase in 2c2 and 2c3 respectively. However, there has been no change in 2c1. This is an improvement, as in 2016 there was a decrease in native vegetation cover, however, the 2c1 area has a lot of rank grass, which will need continued maintenance until that can outcompete the rank grass.
- An increase in exotic vegetation cover of 10% in 2c2 is likely where exotic species now cover the bare ground previously present (as seen by the -20% change in bare ground cover since 2014).

In summary, 21 of the 23 monitored areas have increased in native vegetation cover, with 14 areas having seen at least an overall 200% increase in native vegetation cover since 2014.





Figure 5: Photos from S1(1) in 2014 (top) and 2017 (bottom).



Table 1: Percentage vegetation cover within 10 x 10 m grids for 2017 & changes in vegetation cover since 2014.

Planting Stage	Plant Community/ Photo Point	% Native Vegetation Cover			% Exotic Vegetation Cover			% Bare ground/Dead Vegetation		
		2017 (%) Cover	% Change* in Cover (2014-2017)	Overall % Increase since 2014	2017 (%) Cover	% Change* in Cover (2014-2017)	Overall % Increase since 2014	2017 (%) Cover	% Change* in Cover (2014-2017)	Overall % Increase since 2014
Stage 1	M1 / S1(1)	50	0	0	50	0	0	0	0	0
	B11 / S1(2)	20	15	300	78	3	4	2	-18	-90
	V1 / S1(3)	25	20	400	70	-5	-7	5	-15	-75
	R1 / S1(4)	27	20	260	73	-15	-17	0	-5	-100
	R1 / S1(5)	50	45	900	40	-20	-33	10	-25	-71
	B9 / S1(6)	80	20	33	20	-19	-49	0	-1	-100
Stage 2a	K2 / S2a(1)	50	12	32	48	-12	-20	2	0	0
	K2 / S2a(2)	60	30	100	40	-28	-41	0	-2	-100
	G3 / S2a(3)	20	16	400	80	-14	-15	0	-2	-100
	G3 / S2a(4)	30	23	329	70	-22	-24	0	-1	-100
	B1 / S2a(5)	50	43	567	49	-43	-46	1	0	0
	G4 / S2a(6)	20	15	300	80	-15	-16	0	0	0
	G4 / S2a(7)	35	28	367	55	-18	-24	10	-10	-50
	G1 / S2a(8)	60	20	50	40	0	0	0	-20	-100
	G1 / S2a(9)	45	15	50	45	10	29	10	-25	-71
Stage 2b	2b1	25	20	400	74	24	48	1	-44	-98
	2b2	10	5	100	90	40	80	0	-45	-100
	2b3	12	7	140	88	-7	-7	0	0	0
	2b4	40	35	700	60	55	1100	0	-90	-100
	2b5	60	55	1100	40	35	700	0	-90	-100
Stage 2c	2c1	5	0	0	90	0	0	5	0	0
	2c2	15	10	200	45	10	29	40	-20	-33
	2c3	35	30	600	55	-20	-27	10	-10	-50

Note:

A "% Change in Cover" is calculated as the difference between the 2014 cover percentage and the 2017 cover percentage. A 2017 percentage cover of 45 % and a 2014 percentage cover of 5 % would result in a "% Change in Cover" of 40 %. A negative percentage is a decrease in cover.

"Overall % Increase since 2014" is calculated as the difference in percentage cover from 2014 to 2017 divided by the percentage cover in 2014. A 2017 percentage cover of 45 % and a 2014 percentage cover of 5 % would result in an "Overall % Increase since 2014" of 800 %. This means there is an 800 % increase in vegetation since 2014. A negative percentage is a decrease in cover.



3.4 Plant Performance Review

The 2016 Annual Audit saw the completion of the three years of plant performance monitoring for Stages 1 and 2a (DCG, 2016). These Stages had a success rate of 84 %, which met the required success rate of 70 % after three years.

With completion of this year's annual audit (2017), the plant performance of Stage 2b and 2c have now been monitored for three years. Figure 6 and Figure 7 below present the overall failure rates within defined planting areas, as well as the performance of the past years. The following details the overall performance up to spring 2017 in Stage 2b and 2c:

- Of the 1,772 plants planted into the five Stage 2b areas, 344 have died resulting in a failure rate of 19%. Only two additional plants died during 2017.
- Of the 1,419 plants planted into the three Stage 2c areas, 393 have died resulting in a failure rate of 28%. An additional 88 plants died during 2017, causing an increase in the failure rate from 21% to 28%.
- It was noted when counting dead plants in Stage 2c that many plants were alive but not growing above the shelter height. This was observed to be due to animal browse, likely caused by deer, sheep, and hare. Many of the plants in Stage 2c will not grow above shelter height without greater protection.

Please note, the highest failure rate over the 2015 to 2017 period has been used. For example, in Stage 2b5 during the 2016 audit 74 plants were counted as dead, however, during this year's audit only 72 were counted. The discrepancy is due to not always being able to locate plants or empty shelters, with empty shelters easily overgrown. The highest failure rate for each planting area is used, in this case 74 plants for Stage 2b5.

In summary, of the 3,191 plants planted in spring 2014 in Stages 2b and 2c, a total of 2,454 plants have survived, which equates to a 77% success rate. Given the completion of the three years of plant performance monitoring for Stages 2b and 2c this success rate (77%) meets the required success rate of 70% after three years.





Figure 6: Stage 2b Planting Performance. *In spring 2014 the Stage 2b plants had just been planted and therefore not considered an 'audit' year.





Figure 7: Stage 2c Planting Performance 2015 to 2017. *In spring 2014 the Stage 2c plants had just been planted and therefore not considered an 'audit' year.



4 Landscape Management Plan Measurement Criteria

The LMP details measurement criteria to track planting performance (Section 3.2.1 of the LMP) to ensure the seven overall ecological objectives are met (listed in Section 3.1 of the LMP). There are five generic measurement criteria with regards to new plantings and also Stage specific performance measures. These criteria and the progress to date is detailed below.

4.1 Generic Criteria for New Plantings

Five criteria must be met for all new plantings in all Stages, which have been detailed below in Table 2, along with the results to date.

Table 2: Generic Criteria for New Plantings and the Results.

Criteria		Results/Assessment Date
1	Within two years of gaining consent to vary the landscape plan, all plantings (as described in section 2.1 and shown on the planting plans) shall be completed.	Completed – see (DCG, 2014).
2	A total of 70% of new plant survival shall be achieved three years after installation. Infill planting will be undertaken to achieve 70% survival of the original plantings in the event this measurement criteria is not achieved.	Greater than 70% survival achieved for all Stages, see Section 3.4 of this report and (DCG, 2016).
3	Within 5 years of planting, the assemblage of native plant species established on the site will be representative of the sites pre-human vegetation cover.	There are a range of native plant species that are now present on site, with the riparian and wetland areas in Stage 1 in particular showing a diversity of species in the vegetation cover now present (see Section 3.2 above). Five years will be 2018 for Stage 2b and 2c.



<p>4</p>	<p>Indigenous vegetation cover of 80% of the new planting areas shall be achieved within 10 years of planting.</p>	<p>Ten years will be 2022 for Stage 1 and 2a, and 2023 for Stage 2b and 2c. Nevertheless, the percentage native vegetation cover recorded at photo monitoring reports and the interpretation of the aerial photos, both detailed above, indicate a trajectory towards greater indigenous cover.</p>
<p>5</p>	<p>A total of four vegetation communities (lakeshore, beech forest, grey shrubland and wetland/riparian) shall be established and self-sustaining on the site within 10 years of planting, including the capacity to support associated native invertebrates, lizards and birds.</p>	<p>Ten years will be 2022 for Stage 1 and 2a, and 2023 for Stage 2b and 2c. However, there is evidence of natural regeneration occurring already within Stage 1, with native tussocks and Hebe seedlings observed on site, see Figure 8.</p>



Figure 8: Native tussock (top) and *Veronica cupressoides* (bottom) seedlings, which have established from native plantings.



4.2 Stage Specific Criteria

Each planting Stage has specific performance measurements, which are detailed in Table 3 below, along with the results to date.

Table 3: Stage Specific Performance measurements and Results.

Stage	Criteria	Results/Assessment Date
1	1 All forest plantings will have established (requiring only minor maintenance work) within 5 years of planting.	Majority of beech trees are at least 3m in height (see Figure 2: S1(6)). The only maintenance required is deer control see Figure 9.
	2 The Mick O'Day riparian plantings will have established (requiring only minor maintenance work) within 5 years.	The riparian plantings have established well (Figure 10). However, there are still spaces between native plantings, which require maintenance for weed control of rank grass, gorse, broom etc., see Figure 3: S1(5).
	3 Woody vegetation in the wetland area will have established (requiring only minor maintenance work) within 5 years.	In the wetlands the Coprosma, Olearia, flax and toetoe species have established. However, the kahikatea have not established and the spaces between native plantings require maintenance for weed control of rank grass, gorse, broom etc., see Figure 11.
2a	1 All beech tree plantings shall have established (requiring only minor maintenance work) within 5 years of planting.	Majority of beech trees are at least 3m in height (see Figure 2: S2a5). The only maintenance required is deer control (see Figure 9).
	2 Beech trees to obtain a height of 4 metres within 10 years of planting.	On track to meet this in 2022, see comment above.
	3 Beech litter shall be accumulating within the beech stands within 10 years of planting as is occurring in the beech stand at Walter Peak.	Beech litter has started to accumulate, see Figure 12.



	4	All grey shrubland, wetland and kowhai plantings shall have established (requiring only minor maintenance work) within 5 years of planting.	The wetland, kowhai, grey shrubland plants that have survived have established and will continue to gain height over the next 5 to 10 years (see Figure 13). However, in all areas there have been losses, leaving spaces between native plantings, which require continued maintenance for weed control of rank grass, gorse, broom etc., see Figure 14.
2b	1	All beech tree plantings shall have established (requiring only minor maintenance work) within 5 years of planting.	Five years will be 2018 for Stage 2b. However, the beech trees are establishing, with maintenance required to keep weeds down around shelters, see Figure 4: 2b4, 2b5.
	2	Beech trees planted into the broom in Stage 2b shall be starting to overtop the broom within 5 years of planting.	Five years will be 2018 for Stage 2b. However, the beech are starting to overtop the bracken fern, but not yet the broom, see Figure 4: 2b4, 2b5.
	3	At least one beech seeding event shall have been undertaken into the gullies within 5 years of planting.	A beech seeding event couldn't be completed this year due to a lack of a beech mast event occurring.
2c	1	Within 5 years of planting, the plantings in the gully bottom will have established (requiring only minor maintenance work).	Five years will be 2018 for Stage 2c. However, while some plants are starting to establish (e.g. flax and toi toi), animal browse over the years has prevented many plants from growing above the shelter height, see Figure 15.
	2	Within 5 years of implementation, native seedlings will be establishing within the stands of bracken fern.	Five years will be 2018 for Stage 2c. However, no evidence of seedling establishment has been observed.



Overall, the site is on track to meet the generic and stage specific criteria, with plant survival rates above 70%, plantings flowering, and natural regeneration already occurring. However, there are two key Stage specific criteria still to be completed (i.e. Criteria 3 for Stage 2b and Criteria 2 for Stage 2c (Table 3)), and consideration of the ongoing maintenance for achieving 80% cover in the new planting areas.

The two Stage specific criteria still to be completed are beech seeding events in Stage 2b and the observation of native seedlings establishing within the stands of bracken fern in Stage 2c. The previous season there was no beech mast, therefore sufficient viable beech seed was not available. However, a seeding event must occur as soon as the next beech mast event occurs. The gullies currently contain a number weeds, including willows and broom, see Figure 16. However, if the willows were killed (via drill and fill) and patches of broom cleared throughout the gullies and fenced for beech seeding events, beech trees should establish.

No seedlings have been observed within Stage 2c, this will in part be caused by a lack of maturity of the plants planted, due to many having the inability to grow above the height of the shelter due to animal browse. At this stage it seems unlikely that seedlings will be observed within Stage 2c next year. To help seedlings establish, increased and continued pest control is required, in particular of deer and hares, as well as livestock.

To achieve the 80% indigenous vegetation cover of the new planting areas within 10 years, as per Generic Criteria 4 (Table 2), two aspects of ongoing maintenance are critical. Firstly, greater control measures to prevent animal browse, with regards to deer, hare, and sheep. Secondly, while the 70% survival rate for the site has been met, where plants have died, there is rank grass and woody weeds establishing, which will require weed control in perpetuity. Further native planting to reduce these gaps would decrease the ongoing maintenance requirements and help achieve 80% indigenous vegetation cover.





Figure 9: Example of deer damage to beech tree.



Figure 10: Established riparian plantings.





Figure 11: Top: establishing wetland planting; bottom: large patches of rank grass between wetland plantings.





Figure 12: Beech litter accumulation.



Figure 13: Lakeshore kowhai in flower.





Figure 14: Spacings between native plants contain rank grass and broom.



Figure 15: Lack of growth above shelters due to animal browse.





Figure 16: Gullies into which beech seeding events must occur.



5 Summary

The 2017 Annual Audit has been completed and is detailed within this report, including the ongoing site maintenance and native planting growth. This has been in line with the Landscape Management Plan approved by Council.

The previous annual audits have detailed all the planting completed, each years landscape maintenance work, and the plant survival rates, all of which have been consistent with the LMP performance objectives (see (DCG, 2014) (DCG, 2015) (DCG, 2016)). At the end of 2016, Stage 1 and Stage 2a had been monitored for three years with a success rate of 84 %, which meets the required success rate of 70% after three years (DCG, 2016). Now Stage 2b and Stage 2c have also been monitored for three years and have a success rate of 77%, which meets the required 70% survival rate.

The photo monitoring photos provided a visual representation of the increase in native vegetation cover. A noticeable increase in beech tree and bracken fern cover in Stage 2b was observed. In Stage 2c, plant species adapted to wet conditions (e.g. toetoe and flax) are increasing in cover. However, other species are struggling, and animal browse is preventing broadleaved species from increasing in cover. In Stage 2a, the planted beech and *Pittosporum tenuifolium* have increased in height, and the smaller-leaved grey shrubland *Olearia* and *Coprosma* species are continuing to grow. However, there are areas where grey shrubland plants have not survived, or grown as quickly, which is likely due to the dry and exposed nature of these areas. In Stage 1, the beech trees near the lakeshore, and the flax and toetoe along the Mick O'Day Creek have visibly increased their coverage.

The increase in native vegetation cover observed within the photo monitoring points was also reflected in the estimates of percentage coverage. Twenty-one out of the 23 monitored sites have seen an increase in native vegetation cover since 2014, and thirteen sites have decreased in exotic vegetation cover.

The comparison of the 2014 and 2017 aerial photographs confirms the trends observed in the data from the photo monitoring points. There has been an increase in the native vegetation cover, with the increase in size of the native plantings particularly obvious in the pittosporum, tussock, and beech species. The



aerial images also show there are patches within the planting areas where there have been losses and exotic rank grass now dominates the ground cover, in particular, sections of the grey shrubland planting areas.

Overall, the plantings have met the 70% survival rate, native vegetation cover is increasing, and natural regeneration is occurring on site. Therefore, the implementation of the revegetation project currently meets the conditions of the resource consents RM130610 and RM010111. Moving forward, there are two key Stage specific criteria still to be completed (i.e. a beech seeding event and establishment of native seedlings), as well as how the generic criteria of achieving 80% native cover in the new planting areas within 10 years will be achieved. To ensure the site continues to meet these and other LMP requirements, we recommend a seeding event occur as soon as the next beech mast event occurs, greater pest control occur to eliminate animal browse, ongoing broom and gorse control across the site, and consideration of minor infill planting.



6 References

- DCG. (2014). *Walter Peak Station Trust, Landscape Management Plan, Annual Audit 2014*. Davis Consulting Group Ltd: Submitted to QLDC, November 2014.
- DCG. (2015). *Walter Peak Station Trust, Landscape Management Plan, Annual Audit 2015*. Davis Consulting Group Ltd: Submitted to QLDC, November 2015.
- DCG. (2016). *Walter Peak Station Trust, Landscape Management Plan, Annual Audit 2016*. November 2016: Submitted to QLDC, November 2016.



Appendices

Appendix A: Landscape Management Plan

Landscape Management Plan Walter Peak Station Trust



September 2013



*Davis Consulting Group Limited
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Document ID: 12009*

Landscape Management Plan – Walter Peak Station Trust Subdivision

Document Status

Version	Purpose of Document	Prepared By	Reviewer	Review Date
A	Draft for review	GD	NS	14 May 2012
B	Draft for review	GD	GD	19 July 2013
C	Draft for review	GD	GD	3 Sept 2013
O	FINAL	GD	GD	5 Sept 2013

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1.0 INTRODUCTION

1.1 Overview

On behalf of Walter Peak Station, Davis Consulting Group Limited (DCG) and Land Limited (LAND) have prepared the following landscape management plan (LMP) to support landscape and ecological restoration work that is set out in the following report:

- Davis Consulting Group Contract Report (July 2013) Review of Walter Peak Developments Landscape Works and Consideration of Alternative Approaches.

The LMP has been prepared to guide the implementation of the Walter Peak subdivision landscape and restoration activities in order to ensure the expectations of landuse consent conditions are achieved. The LMP is a living document that should be updated annually to reflect the performance of the landscape and restoration work and meet any additional challenges that are currently not foreseeable.

1.2 Scope of the Ecological Documentation

The LMP documentation is set out as follows:

- Section 2: Details the planting and maintenance programme for existing plantings;
- Section 3: Documents project performance objectives and measurement criteria; and
- Section 4: Presents an implementation strategy designed to ensure that appropriate management measures are implemented to achieve the planting performance goals.

2.0 PLANTING PROGRAMME AND MAINTENANCE OF EXISTING PLANTINGS

The following section documents the planting requirements as set out in the consent variation being applied for. A series of plans (see Figures 1, 2, 3 and 4) have been prepared, which show the locations of the plantings within the four landscape planting stages (i.e. Stages 1, 2a, 2b and 2c). Plantings associated with each stage are detailed below.

2.1 Planting Requirements

2.1.1 Stage 1

The planting requirements for Stage 1 are set out in Figure 1 and summarised below:

- A total of 16 groups of 10 beech trees are to be planted into Areas B8, B9 and B11 to assist with the development of a forest representative of the original vegetation. Within the groups plants should be at 1.5 metre centres and shall be a v150 grade. The red beech plantings need to be located on sites that are sheltered with deeper soils.
- Twenty groups of 20 plants in Area V1 are required to assist with development of vegetation behind the lodge and adjacent to the site entrance road. The plantings will consist of a mix of mountain beech, *Pittosporum tenuifolium*, broadleaf, wineberry and *Coprosma lucida*. These shall be planted at 1.5 metre centres and can be v150 grade.
- A total of 14 groups of 10 plants in Area M1 located to the east of Mick O'Day Creek and north of the proposed lodge. The plant mix shall consist of red beech, mountain beech, kowhai and pittosporum.
- Planting of 400 plants into the riparian margin of Mick O'Day Creek (R1 area in Figure 3). The plantings should be dominated by *Carex secta* but also include flax and toetoe and shall be a v150 grade. Such appropriately selected plant species can withstand flooding events unless the whole substrate is removed in a major flood.
- Planting of ten groups of woodland species and kahikatea into the wetland area (W2 area in Figure 3), which will further improve existing values. A total of ten plants per group should be planted and include the following species kahikatea, *Olearia lineata*, *Olearia bullata*, *Coprosma propinqua* and *Coprosma rugosa*. The plant size used for planting in the wetland area shall be v150 grade.
- Control of grey willow, broom and himalayan honeysuckle needs to occur in the wetland area (W2 area in Figure 3). Removal of broom and other woody weeds also needs to occur in areas B8 to B11 and M1. We note that no herbicide spraying should be undertaken so as to avoid killing the regenerating silver tussock. Grey willow also needs to be removed in the M1 planting area.

2.1.2 Stage 2a

The planting requirements for Stage 2a are set out in Figure 2 and summarised below:

- Planting of a total of 30 groups of beech trees into areas defined for forest planting (B1 to B7 in Figure 4). A total of 25 beech trees should be planted per group and at 1.5 metre centres at a PB3 grade. The re-planting of beech, with careful maintenance, will provide the basis for forest development representative of the original vegetation cover.
- Planting a total of 77 groups of grey shrubland species into the G1, G2, G3 and G4 areas. A total of 25 shrubs will be planted per group.
- In the tussock planting areas we do not believe that any further planting is required to meet the consent conditions.
- Planting a total of 10 groups of wetland plant species in the W1 area (see Figure 4), to assist wetland and riparian development. A total of 25 plants per group are proposed for planting and include *Carex secta*, toetoe, kowhai, flax and *Olearia* species. We note that re-planting close to future construction activity (i.e. the house sites) should not occur until after the houses are built to prevent unnecessary loss of plantings.
- Planting a total of 6 groups of kowhai, with 5 plants per group, into the K1 and K2 areas (see Figure 4) along the lakeshore.

2.1.3 Stage 2b

Figure 3 provides a plan showing indicative areas where we propose to plant stands of beech. The proposed planting associated with Stage 2b will include the planting of approximately 2500 trees which will consist of 80% mountain beech and the remaining 20% consisting of a mix of broadleaf, lemonwood, putaputaweta, *Coprosma lucida* and wineberry. The trees will provide a seed supply to assist natural regeneration of the gullies over time (in excess of 20 years). Most of the plants (2000) shall be a v150 grade however 500 larger grade plants (such as PB5) should be utilised for planting into the favourable sites within the broom. This approach is designed to support natural regeneration through the broom and also assist with the inoculation of the soil with mycorrhizae to further promote strong recruitment and growth of beech trees in the gullies. In order to assist beech forest development beech tree seeding will be undertaken at year 5 in an attempt to increase the rate of forest development. Subsequent seeding events will be undertaken based on the outcomes of the first seeding event.

2.1.4 Stage 2c

Figure 4 provides a plan showing the area to be planted. Approximately 1500 plants will be planted into the gully bottom with a selection of species such as mingimingi, toetoe, tree daisy and flax. Beech, broadleaf, shining leaved coprosma, wineberry and pseudopanax species will be planted on the margins of the gully bottom. All plants shall be a V150 grade.

2.2 Maintenance of Existing Plantings

2.2.1 Stage 1

The lakeshore and marina plantings are well established. The maintenance effort associated with Stage 1 is woody weed control, particularly grey willow in the wetland and broom developing within the lakeshore and marina plantings.

Some mowing of tracks will be undertaken but grass control is not proposed where plants have established. This approach has been adopted as established plants will not be affected by weed growth and will out-compete introduced grasses over time. Furthermore, while present, the weeds will provide shelter and reduce rabbit/hare browsing as they prefer short grass swards to move through as opposed to longer grass. The presence of introduced grass will result in reduced pest control requirements.

2.2.2 Stage 2a

While there has been significant loss of plants in Stage 2a the plants that have established are now 2 – 3 years old and will require only minor maintenance efforts from now on. Weed control around the established plants is not proposed as the weeds should no longer effect plant development as explained above.

2.2.3 Stages 2b and 2c

To date there has been no planting undertaken in Stages 2b and 2c. Maintenance measures will be those associated with the plantings in Section 2.1.3 and 2.1.4 and as detailed in the Implementation strategy in Section 4.

3.0 PROJECT PERFORMANCE OBJECTIVES AND MEASUREMENT CRITERIA

3.1 Objectives

The overall objectives of the restoration and landscape works are to provide ecological compensation consistent with the expectations of the consent order and to mitigate the landscape effects for consented building sites. Specific ecological objectives considered in the consent order include:

1. Significantly increase the diversity of native species on the site and reduce weed dominance;
2. Re-establish onto the site most of the plant species that would have dominated the pre-human vegetation;
3. Establish plantings that have the ability to self-sustain themselves by seeding both within the development and providing a seed source for the wider area;
4. Establishment of riparian vegetation adjacent to the lower reaches of Mick O'Day Creek to enhance the instream habitat of the creek;
5. Provide habitat for a diverse range of native invertebrates, skinks, geckos and birds;
6. Establishment of communities that over time (approx. 20 years) become relatively stable systems requiring minimal maintenance;
7. Establishment of forests that over time develop into more complex systems resembling their original condition with increased biological diversity.

3.2 Measurement Criteria

This section provides measureable criteria designed to track planting performance over time. Failure to achieve the measurement criteria shall trigger a review of the planting programme (see Section 2) and implementation strategy (Section 4) to determine if additional measures are required.

3.2.1 New Plantings

For all new plantings in all landscape stages the following criteria shall be achieved:

- Within two years of gaining consent to vary the landscape plan, all plantings (as described in section 2.1 and shown on the planting plans) shall be completed;
- A total of 70% of new plant survival shall be achieved three years after installation. Infill planting will be undertaken to achieve 70% survival of the original plantings in the event this measurement criteria is not achieved;
- Within 5 years of planting, the assemblage of native plant species established on the site will be representative of the sites pre-human vegetation cover;

- Indigenous vegetation cover of 80% of the new planting areas shall be achieved within 10 years of planting; and
- A total of four vegetation communities (lakeshore, beech forest, grey shrubland and wetland/riparian) shall be established and self-sustaining on the site within 10 years of planting, including the capacity to support associated native invertebrates, lizards and birds.

In addition to the above generic criteria a number of stage specific performance measurements are set out below.

Stage 1

- All forest plantings will have established (requiring only minor maintenance work) within 5 years of planting;
- The Mick O'Day riparian plantings will have established (requiring only minor maintenance work) within 5 years; and
- Woody vegetation in the wetland area will have established (requiring only minor maintenance work) within 5 years.

Stage 2a

- All beech tree plantings shall have established (requiring only minor maintenance work) within 5 years of planting;
- Beech trees to obtain a height of 4 metres within 10 years of planting (see example of 10 year old beech trees at Walter Peak in Plate 1);
- Beech litter shall be accumulating within the beech stands within 10 years of planting as is occurring in the beech stand at Walter Peak; and
- All grey shrubland, wetland and kowhai plantings shall have established (requiring only minor maintenance work) within 5 years of planting.

Stage 2b

- All beech tree plantings shall have established (requiring only minor maintenance work) within 5 years of planting;
- Beech trees planted into the broom in Stage 2b shall be starting to overtop the broom within 5 years of planting (see Plate 2); and
- At least one beech seeding event shall have been undertaken into the gullies within 5 years of planting.

Stage 2c

- Within 5 years of planting, the plantings in the gully bottom will have established (requiring only minor maintenance work); and
- Within 5 years of implementation, native seedlings will be establishing within the stands of bracken fern.



Plate 1: A photograph of a stand of beech trees approximately 10 years old near Mick O'Day Creek on the WPS site.



Plate 2: A representative photograph of what the beech trees planted into broom in Stage 2b might look like once they start to overtop the broom within 5 years of planting.

3.2.2 Objective Assessment of Landscape and Restoration Planting Performance

In order to objectively determine measurement criteria have been met, an inventory of the percentage indigenous vegetation cover will be recorded over time for the entire landscape area. An estimation of percentage vegetation cover within each plant community will be recorded from the same location point each year. Permanent photo points shall be established to support the assessment.

In addition, aerial photography will be completed at the end of planting in October 2014 with follow up photography completed following three years of growth in October 2017. Interpretation of this photography, in addition to fixed photo points and a qualitative assessment of canopy cover will provide an accurate assessment of the development of both the existing and new plantings.

The timeframe for planting, plant maintenance and performance assessment is provided in Figure 5.

Figure 5: Planting and Performance Assessment Timeline

		Years									
		1	2	3	4	5	6	7	8	9	10
Planting	Stage 1, 2a, 2b & 2c	█									
	Stage 2b	█		█							
Maintenance	Stage 1, 2a, 2b & 2c	█									
Performance Assessment	Stage 1, 2a, 2b & 2c	█									
Auditing	Stage 1, 2a, 2b & 2c	█					█				

Key:

█	Planting of Stages 1, 2a, 2b & 2c
█	Seeding of Stage 2b with mountain beech seed
█	Maintenance of existing and re-planted areas
█	Estimate of overall percentage vegetation cover for each plant community within each Stage
█	Annual auditing
█	Biennial auditing (dependant on approval from Queenstown Lakes District Council)

4.0 IMPLEMENTATION STRATEGY

4.1 Measures to Ensure Project Performance Criteria are Met

The overall objective of the project is the establishment of ecological restoration zones, such as forest, grey shrubland and wetland, which over time (15 – 20 years) will develop into more complex, relatively stable systems resembling their original condition with increased plant diversity and requiring minimal maintenance. The implementation strategy to achieve this objective is set out in detail below.

4.1.1 Project planning & management

The planning and management for the landscape works are outlined below:

- The project management team (PMT) that will oversee the project will include an ecologist and landscape architect;
- The PMT will select a landscape contractor to undertake all plantings and maintenance;
- The PMT will manage the supply of plants for the planting programme and ensure plants arrive onto the property at a time when the landscape contractor is ready to plant. This will minimise the time plants will be onsite before planting occurs.
- Implementation of the landscape management plan is set out in Figure 5 (i.e. planting, maintenance, performance assessment and auditing), with allowance for changes to occur based on project progress;
- All planting will occur with plants of appropriate size (V150 or PB3 as detailed in Section 2.1), being eco-sourced where possible and planted in groups;
- The species to be planted have been chosen based on the success of previous plantings and expert planting experience of the PMT;
- The final species choice and planting locations are detailed in Figures 1 - 4;
- The landscape contractor will carry out all planting and maintenance to the standard expected by the PMT (as outlined in the planting procedures and maintenance below);
- The plantings and maintenance will be monitored for 10 years from the date of first planting, as set out in Section 3.2, Section 4.2 and Figure 5.

4.1.2 Planting procedures

The planting procedures to be followed are outlined below:

- Before any planting occurs, an irrigation dripper system will be set up to irrigate all new plants planted into the Stage 2a area.

- A shaded, irrigated nursery must be maintained on site, where plants can be accounted for prior to installation.
- Plants of the correct species and size will be sourced by the PMT.
- The plants must be appropriately transported to the site so that no unnecessary damage, dehydration or deterioration of the specimens occurs. The PMT will manage this process with the nursery.
- Once onsite the plants shall be left in the on-site nursery for no longer than two weeks before planting occurs.
- If long grass is present at the planting sites spot spraying with Gallant shall be undertaken, then planting will occur through the dying/dead grass.
- Plants must be transferred directly from bags/pots into their plant hole. *Please note - plants shall not be removed from bags/pots and laid out while awaiting planting.*
- All plants must be thoroughly watered prior to planting.
- Planting shall only occur in the late winter/early spring.
- All plantings must be pocket planted as per the group numbers, distances and location on Figures 3 and 4.
- Plant shelters and weed mats shall be installed around all plants to reduce the risk of pest browse, assist with weed control and provide wind shelter.

The dripper irrigation system referred to above will be installed by Waterforce, experienced irrigation professionals. Figure 10 provides an irrigation plan which has been prepared to allow for irrigation to the Stage 2a planting area.

4.1.3 Planting maintenance

WPS has engaged an experienced landscape maintenance contractor for the project. A contract is in place that provides for 4 contractors to undertake 6 weeks of maintenance per year for a period of 3 years. Most of the maintenance effort will occur over the spring/early summer period when vegetative growth is most vigorous. In the event additional work is identified during routine monitoring of the project the landscape maintenance contractor will be engaged to complete additional work if deemed necessary by the PMT.

Specific plant maintenance measures required to assist the establishment of development of plantings are listed below:

- In the Stage 1 wetland area grey willow, broom, himalayan honeysuckle and other woody weeds must be controlled.
- Control of broom and other woody weeds is required in all areas, except where it is acting as a nursery for native plantings in Stage 2b and 2c.

- Re-planting will occur where any of the new plants have failed but with consideration of why failure occurred and any adjustments made before replacement.
- Any additional maintenance that is identified through the bi-annual/annual auditing and performance (detailed in Section 4.2) and the quantification of planting performance (detailed in Section 3).

In addition to the above we note that over time (>20 years) it is possible that beech trees will start to seed and establish outside the areas planted in beech. For the purposes of maintaining views from the lodge in Stage 1 and the house sites in Stage 2a this management plan specifically allows for the removal of any beech that establish in community M in Stage 1 and below an altitude of 340m in communities G, K and W in Stage 2a. Figures 1 and 2 clearly show the distribution of these communities.

4.1.4 Pest Protection

The rabbit population on Walter Peak Station is considered very low and according to the Walter Peak Station manager, hares are more likely to browse the new plantings. In order to mitigate this issue all new plants will be planted with protective shelters. Furthermore, the management measure of spraying the grass around the plantings that was undertaken by the previous landscape contractors will not be continued. This will result in rank grass growing between the plants and also allow for the ongoing regeneration of bracken fern. Rabbits and Hares prefer to move through short grass swards which should further reduce rabbit and hare browsing on the new plantings.

Once the plants are established, assumed to be at year three, ongoing protection of the plants from rabbits and hares should not be necessary. We understand from the site manager that possums may be more of a concern, however at this stage possums do not appear to be a significant issue in the development of the plantings. Notwithstanding this point, the plantings will be monitored and should possum browsing be identified, a management response will be implemented.

4.1.5 Stock Grazing

Two areas of the subdivision site will continue to be managed by Walter Peak Station for stock grazing purposes. Figure 11 shows the location of the grazing areas. Walter Peak Station will ensure stock proof fencing is maintained to ensure the stock are prevented from entering the landscape areas.

4.1.6 Irrigation Maintenance

Maintenance of the irrigation system will be required to ensure all new plants are being watered effectively. The landscape contractor will be responsible for maintaining the irrigation system

and will be onsite at least 6 times during the Spring/Summer period when irrigation will be most critical. In addition, the Walter Peak Station manager can check the irrigation system during dry periods to ensure the irrigation system is operating effectively and can advise the PMT if maintenance efforts are necessary.

4.2 Audit and Review of Performance

4.2.1 Annual Audit

At the completion of the planting programme (i.e. the end of year 2) an audit of planting performance will be completed on an annual basis for the first three years. This audit is in addition to the quantification of planting performance outlined in Section 3.2.2. Providing the plantings are establishing in accordance with the performance criteria at the end of year 5 in Section 3.2.1, it may be possible to reduce the number of site audits to biennial after three years. Such a change will be determined in consultation with QLDC.

At a minimum, all audits shall record the following:

- The number of plants that have failed during the year ;
- The number of each species that have failed during the year ;
- Provide recommendations for any additional maintenance works required.

In addition to recording the above information, the photographs of plantings shall be taken annually from defined locations to record plant development. Figures 6 – 9 provide plans showing the location of photo monitoring points in each planting stage. The photos shall be taken in the direction shown on the plans.

Within one month of each audit a brief factual report shall be submitted to QLDC, which will include a summary of the four points listed above, as well as a summary of the quantification of planting performance outlined in Section 3.0. If performance criteria are not achieved the audit report shall review why this has occurred and what the mitigation efforts will be to improve performance.

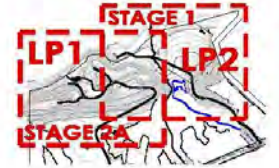
4.2.2 Audit at Year Three

Following three years of growth a review of planting progress will be undertaken and an assessment made to determine if 70% of the new plantings have established. If less than 70% of the plants have survived, a programme of infill planting will be undertaken. The scale and nature of infill planting will be assessed should this be required and approval sought from the QLDC.

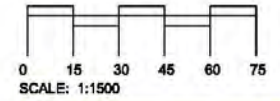
Figures

LEGEND

- B beech
- V mix of beech, kowhai, broadleaf, wineberry, coprosma & pittosporum
- M mix of beech, kowhai & pittosporum
- R riparian
- W wetland
- existing tussock, no further planting



**ATTACHMENT 3
LP2**



Notes:
Verify all dimensions on site. Do not scale from this plan. Ensure all construction complies with New Zealand Standards, rules and regulations. All drawings to be read in conjunction with Architectural, Survey and Structural Engineering plans and specifications. Alert all discrepancies to the Landscape Architect prior to construction.



Project: WALTER PEAK
Title: ECOLOGICAL PLANTING STRUCTURE STAGE 1

Location: WALTER PEAK, QUEENSTOWN

Rev	Description	By	Date
A	plant revisions	JD	19.07.13
B	plant revisions	JD	02.09.13

Scale: 1:1500 **Job No:** 2465
Drawn / Checked: JD / RL **Date:** 05.10.12

Drawing No: LP2B

This drawing is supplied on the understanding that the information herein will not be passed to any other party without written permission that being obtained from LAND LAB.

GROUPS	Area B8	Area E9	Area B11	Area M1	Area R1	Area W2	Area V1
No. of groups within area	1	5	10	14	40	10	20
No. of plants per group	10	10	10	10	10	10	20
PLANTS	common name						
<i>Aristotelia serrata</i>	wineberry						
<i>Carex secta</i>	200						
<i>Coprosma crassifolia</i>							
<i>Coprosma lucida</i>	80						
<i>Coprosma propinqua</i>	20						
<i>Coprosma rugosa</i>	20						
<i>Cortaderia richardii</i>	100						
<i>Dactyloctenium aegyptium</i>	20						
<i>Discaria tomentosa</i>							
<i>Griselinia littoralis</i>	20						
<i>Nothofagus fusca</i>	red beech						
<i>Nothofagus solandri</i> var <i>cliffortioides</i>	10	30	70	42	80		
<i>Oleana bullata</i>	20						
<i>Oleana fimbriata</i>	tree daisy						
<i>Oleana lineata</i>	20						
<i>Oleana odorata</i>	tree daisy						
<i>Phormium tenax</i>	flax						
<i>Pittosporum tenuifolium</i>	20						
<i>Sophora microphylla</i>	kowhai						
NOTES							
A: Grey willow is starting to infest the wetland area - control measures need to be taken asap							x
B: Locate red beech in most sheltered and wet areas i.e. base of banks	x	x	x				
C: Beech tree groups to be located to maintain view corridors from ledge platform building	x	x	x	x			
E: Remove willow once beech established				x			
F: Control of broom	x	x	x	x			x x
G: Control of Himalayan Honeyeucalypt							x

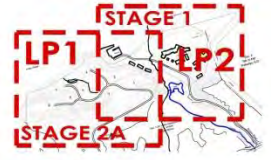


Figure 1: Stage 1 Planting and Maintenance Plan

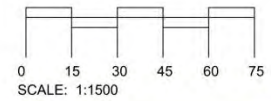
	Area B1	Area B2	Area B3	Area B4	Area B6	Area B7	Area G1	Area G2	Area G3	Area G4	Area K1	Area K2	Area K3	Area K4	Area K5	Area W1
GROUPS																
No. of groups within area	5	5	4	5	7	4	10	9	18	40	1	1	1	1	2	10
No. of plants per group	25	25	25	25	25	25	25	25	25	25	5	5	5	5	5	25
No. of plants per group at larger grade	5	6	7	7	7	5										
PLANTS	common name															
Carex secta																100
Coprosma crassifolia							25	21	45	100						
Coprosma lucida																
Coprosma propinqua				mingimingi			25	21	45	100						
Coprosma rugosa							25	24	45	100						
Corokia cotoneaster							25	24	45	100						
Cortaderia richardii				toitoi												25
Dacrycarpus dacrydiodes				kahikatea												
Discaria toumatou				matagouri			50	45	90	200						
Nothofagus fusca				red beech												
Nothofagus solandri var cliffortioides		125	125	100	125	175	100									
Olearia bullata																25
Olearia fimbriata				tree daisy			50	45	90	200						
Olearia lineata																25
Olearia odorata				tree daisy			50	45	90	200						
Phormium tenax				fax												50
Pittosporum tenuifolium																
Sophora microphylla				kowhai							5	5	5	5	10	25
Tussock varieties																
NOTES																
A. Grey willow is starting to infest the wetland area - control measures need to be taken asap.																
D. Group sizes will be 25m2 with a total of 25 plants at 1.0m crs.		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

LEGEND

-  W wetland
-  B beech
-  existing grey shrubland, no further planting
-  G grey shrubland
-  existing tussock, no further planting
-  K kowhai



ATTACHMENT 3 LP1



Notes:
 Verify all dimensions on site. Do not scale from this plan. Ensure all construction complies with New Zealand Standards, rules and regulations. All drawings to be read in conjunction with Architectural, Survey and Structural Engineering plans and specifications. Alert all discrepancies to the Landscape Architect prior to construction.



Project: WALTER PEAK
Title: ECOLOGICAL PLANTING STRUCTURE STAGE 2A
Location: WALTER PEAK, QUEENSTOWN

Rev	Description	By	Date
A	plant revisions	JD	22.07.13
B	plant revisions	JD	02.09.13

Scale: 1:1500 **Job No:** 2465
Drawn / Checked: RB / JD **Date:** 05.10.12

This drawing is supplied on the understanding that the information herein will not be passed to any other party without written permission first being obtained from LAND Ltd. **Drawing No: LP1B**



Figure 2: Stage 2a Planting and Maintenance Plan



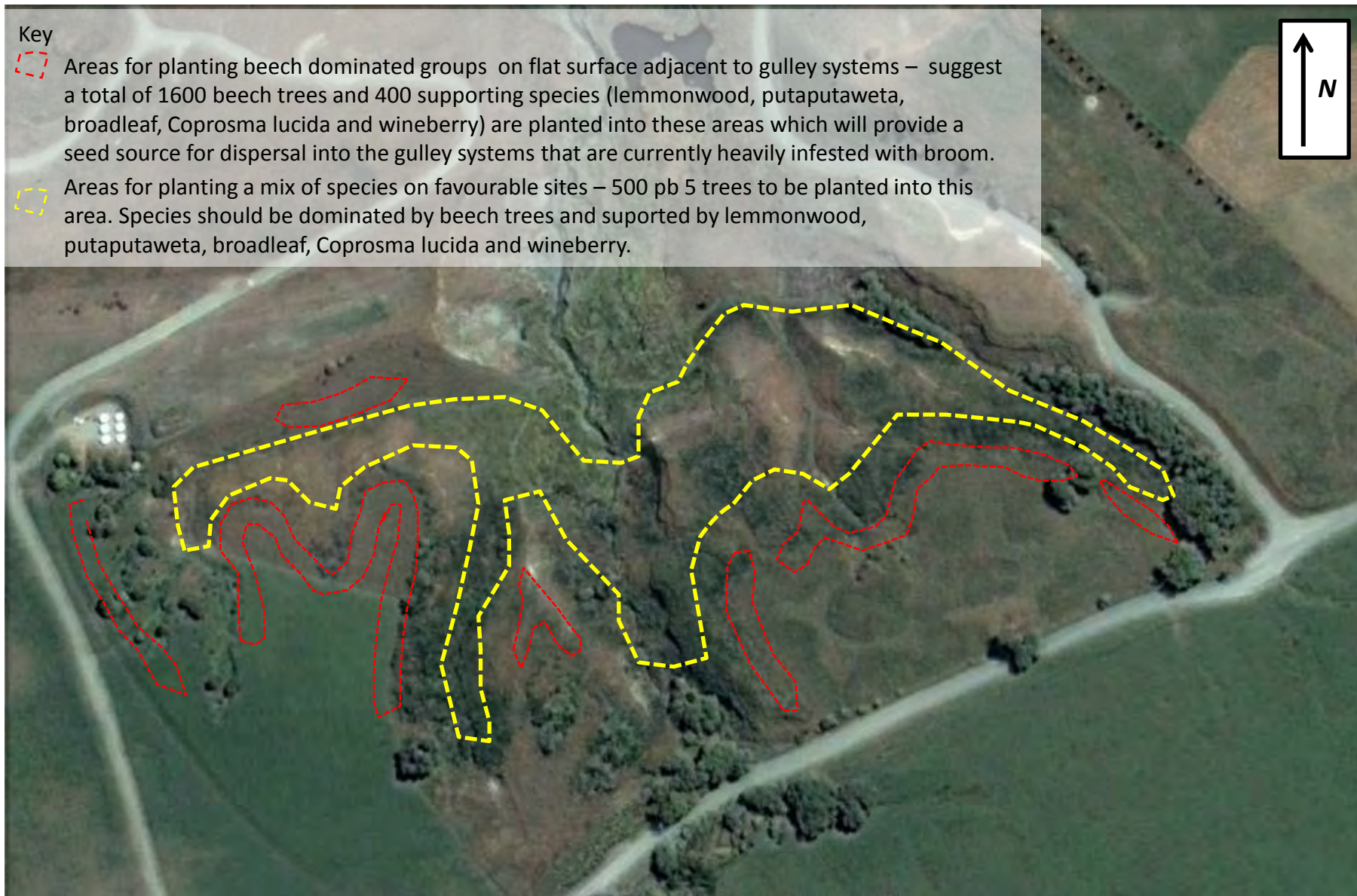


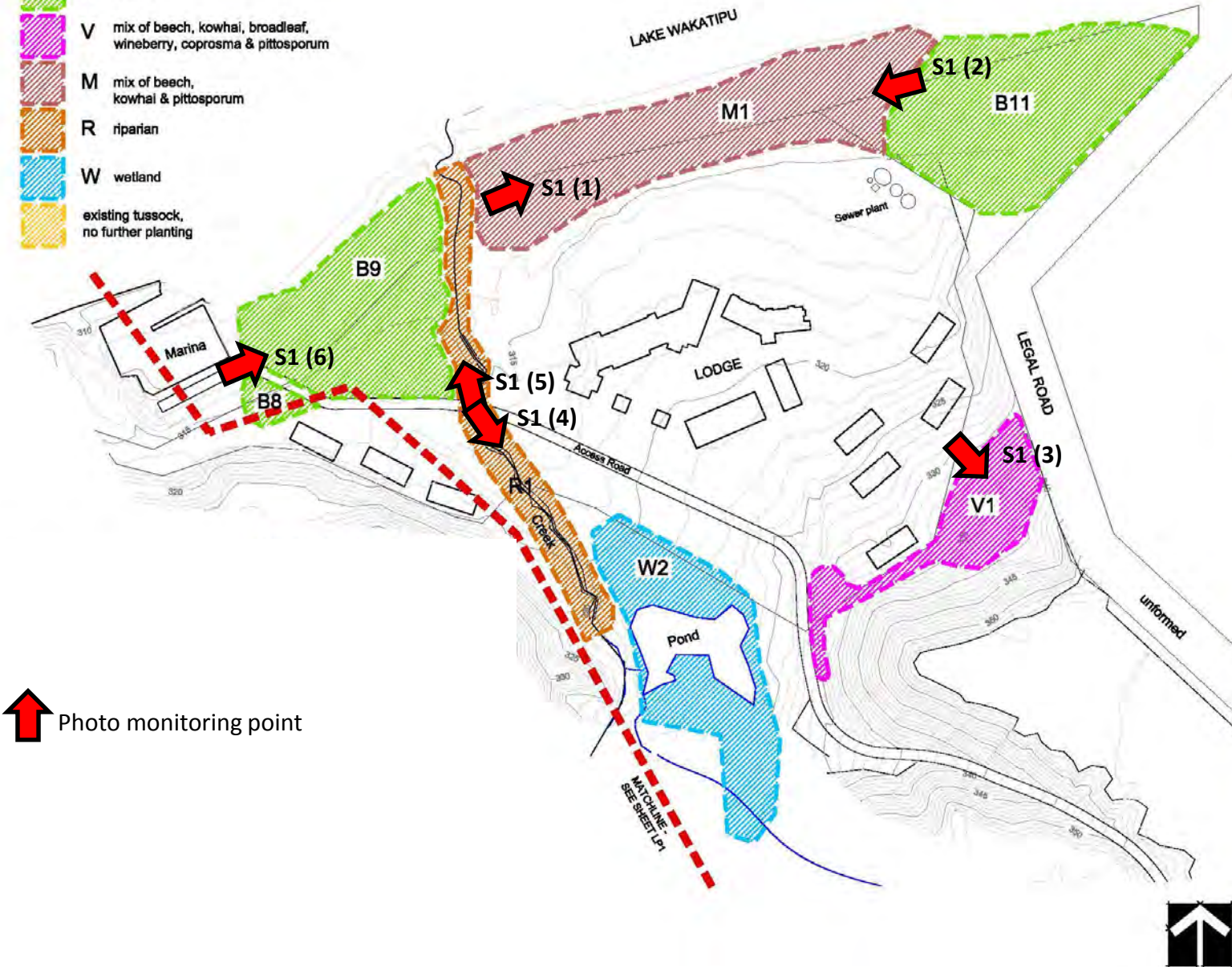
Figure 3: Stage 2b Planting and Maintenance Plan




Figure 4: Stage 2c Planting and Maintenance Plan

LEGEND

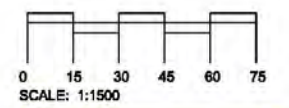
-  B beech
-  V mix of beech, kowhai, broadleaf, wineberry, coprosma & pittosporum
-  M mix of beech, kowhai & pittosporum
-  R riparian
-  W wetland
-  existing tussock, no further planting



 Photo monitoring point



**ATTACHMENT 3
LP2**



Notes:
Verify all dimensions on site. Do not scale from this plan. Ensure all construction complies with New Zealand Standards, rules and regulations. All drawings to be read in conjunction with Architectural, Survey and Structural Engineering plans and specifications. Alert all discrepancies to the Landscape Architect prior to construction.



Project:
WALTER PEAK

Title:
ECOLOGICAL PLANTING STRUCTURE STAGE 1

Location:
WALTER PEAK, QUEENSTOWN

Rev	Description	By	Date
A	plant revisions	JD	19.07.13
B	plant revisions	JD	02.09.13

Scale:
1:1500

Drawn / Checked:
JD / RL

Job No:
2465

Date:
05.10.12

Drawing No:
LP2B

This drawing is supplied on the understanding that the information herein will not be passed to any other party without written permission first being obtained from LAND L&A.

Figure 6: Stage 1 Photo Monitoring Point Locations

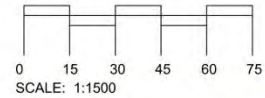
Figure 7: Stage 2a Photo Monitoring Point Locations

LEGEND

- W wetland
- B beech
- existing grey shrubland, no further planting
- G grey shrubland
- existing tussock, no further planting
- K kowhai



ATTACHMENT 3
LP1



Notes:
Verify all dimensions on site. Do not scale from this plan. Ensure all construction complies with New Zealand Standards, rules and regulations. All drawings to be read in conjunction with Architectural, Survey and Structural Engineering plans and specifications. Alert all discrepancies to the Landscape Architect prior to construction.



Project:
WALTER PEAK

Title:
ECOLOGICAL PLANTING STRUCTURE STAGE 2A

Location:
WALTER PEAK, QUEENSTOWN

Rev	Description	By	Date
A	plant revisions	JD	22.07.13
B	plant revisions	JD	02.09.13

Scale:
1:1500

Job No:
2465

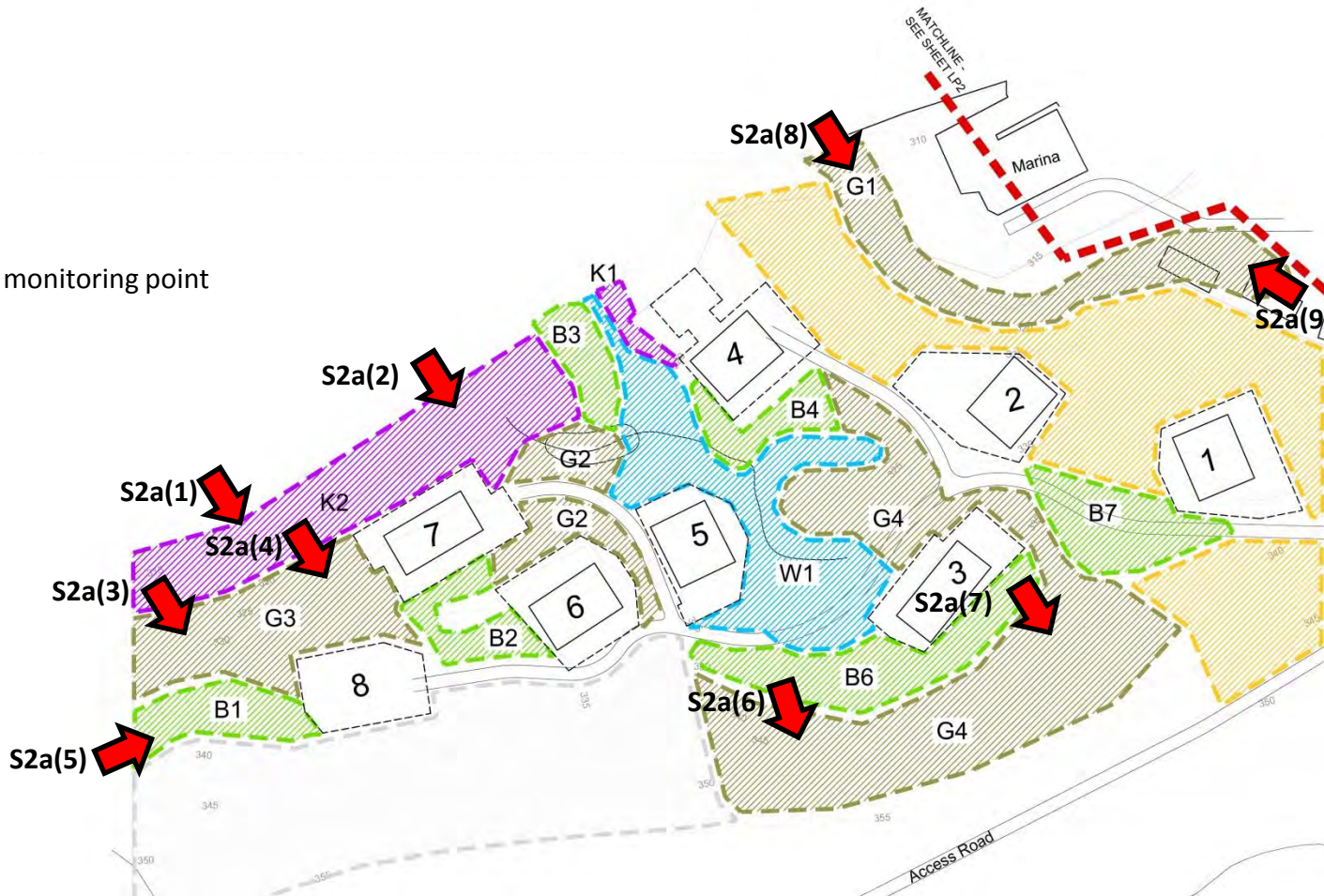
Drawn / Checked:
RB / JD

Date:
05.10.12

This drawing is supplied on the understanding that the information herein will not be passed to any other party without written permission first being obtained from LAND Ltd.

Drawing No:
LP1B

Photo monitoring point



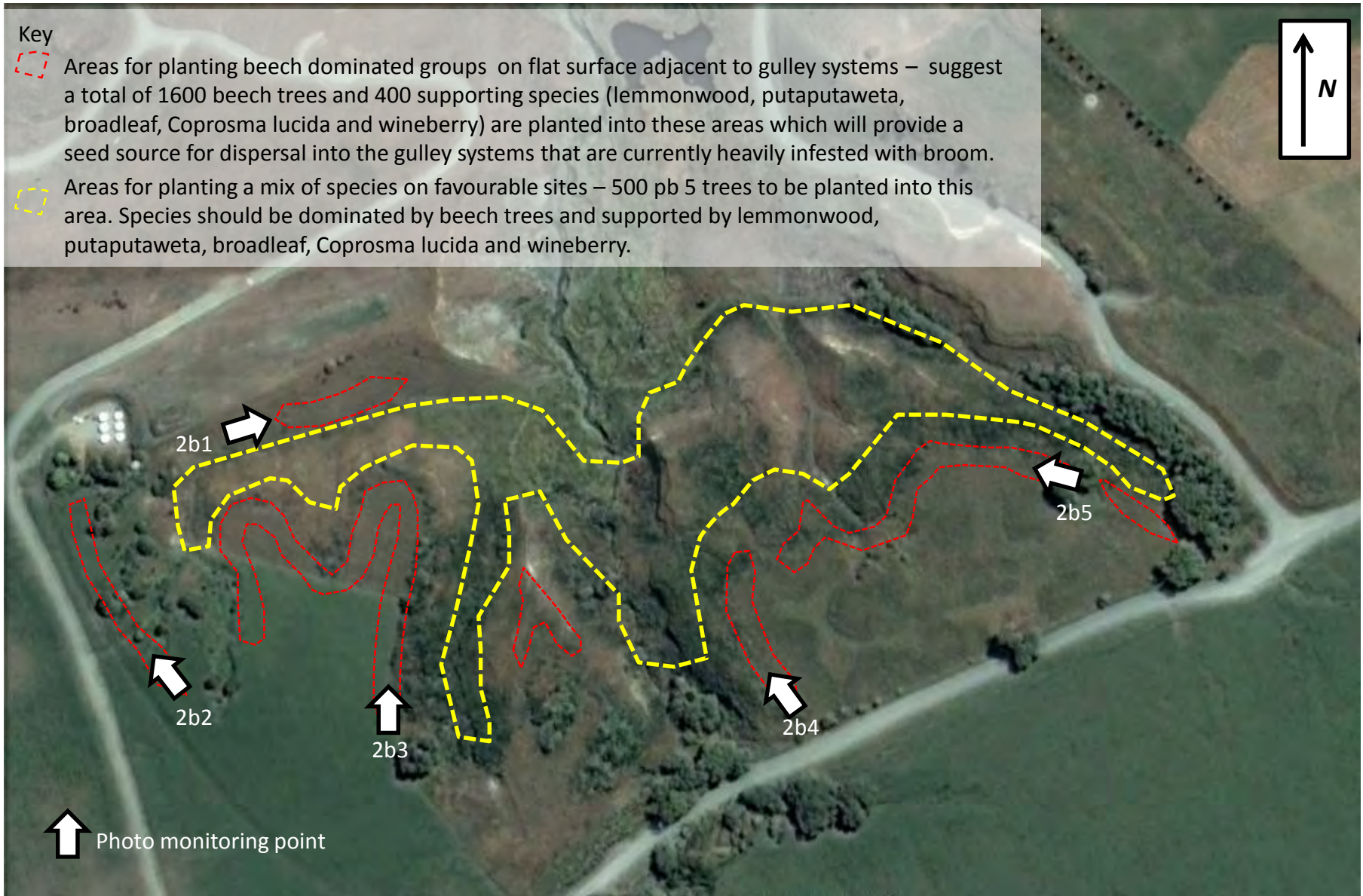


Figure 8: Stage 2b Photo Monitoring Point Locations



Figure 9: Stage 2c Photo Monitoring Location Plan

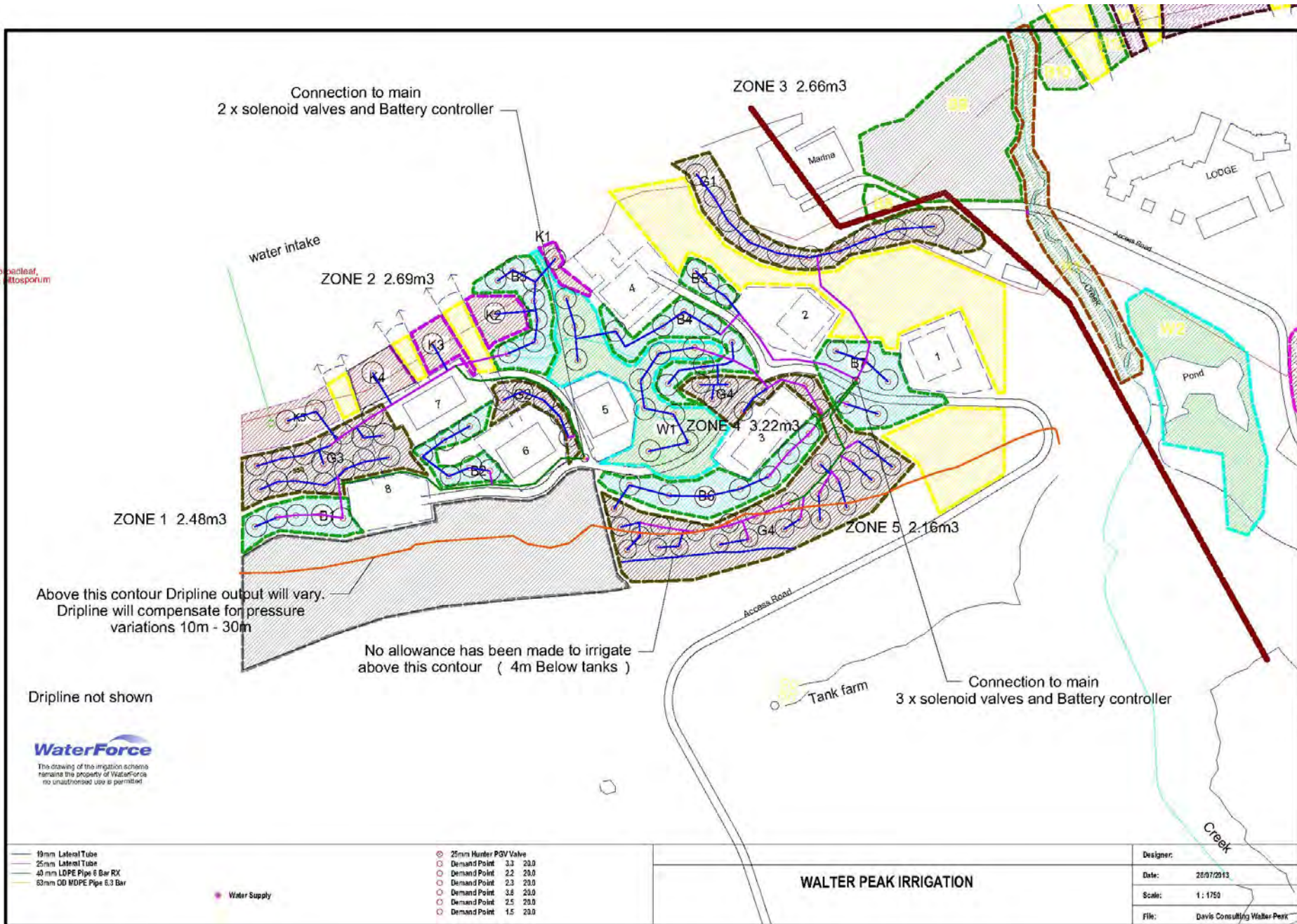


Figure 10: Irrigation Plan

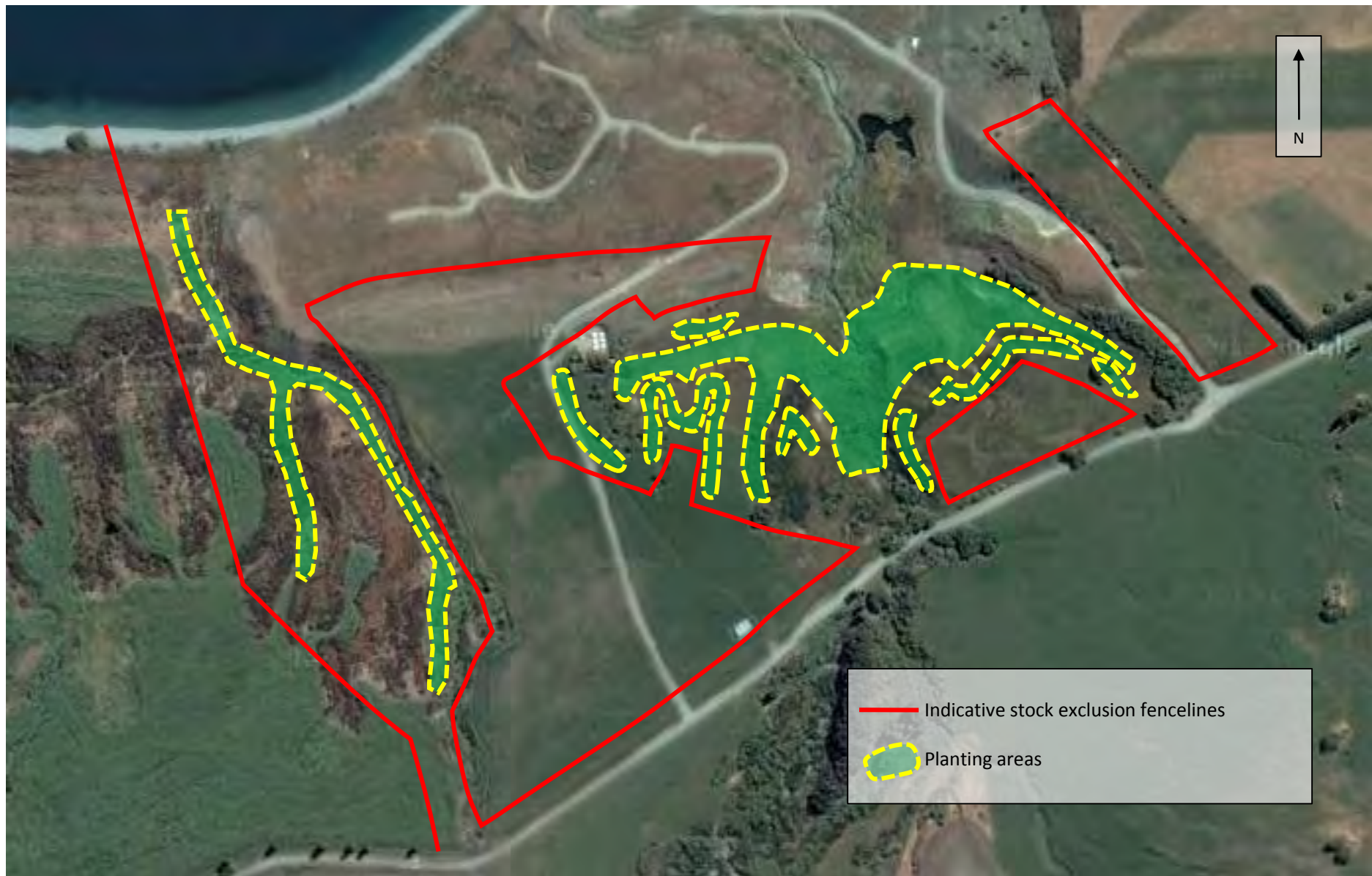


Figure 11: Indicative Grazing Area Plan

Appendix B: Monitoring Photos 2017

Permanent Photo Points.

Stage 1 - S1(1)



Stage 1 - S1(2)



Stage 1 - S1(3)



Stage 1 - S1(4)



Stage 1 - S1(5)



Stage 1 - S1(6)



Stage 2a – S2a(1)



Stage 2a – S2a(2)



Stage 2a – S2a(3)



Stage 2a – S2a(4)



Stage 2a – S2a(5)



Stage 2a – S2a(6)



Stage 2a – S2a(7)



Stage 2a – S2a(8)



Stage 2a – S2a(9)



Stage 2b – 2b1



Stage 2b – 2b2



Stage 2b – 2b3



Stage 2b – 2b4



Stage 2b – 2b5



Stage 2c – 2c1



Stage 2c – 2c2



Stage 2c – 2c3

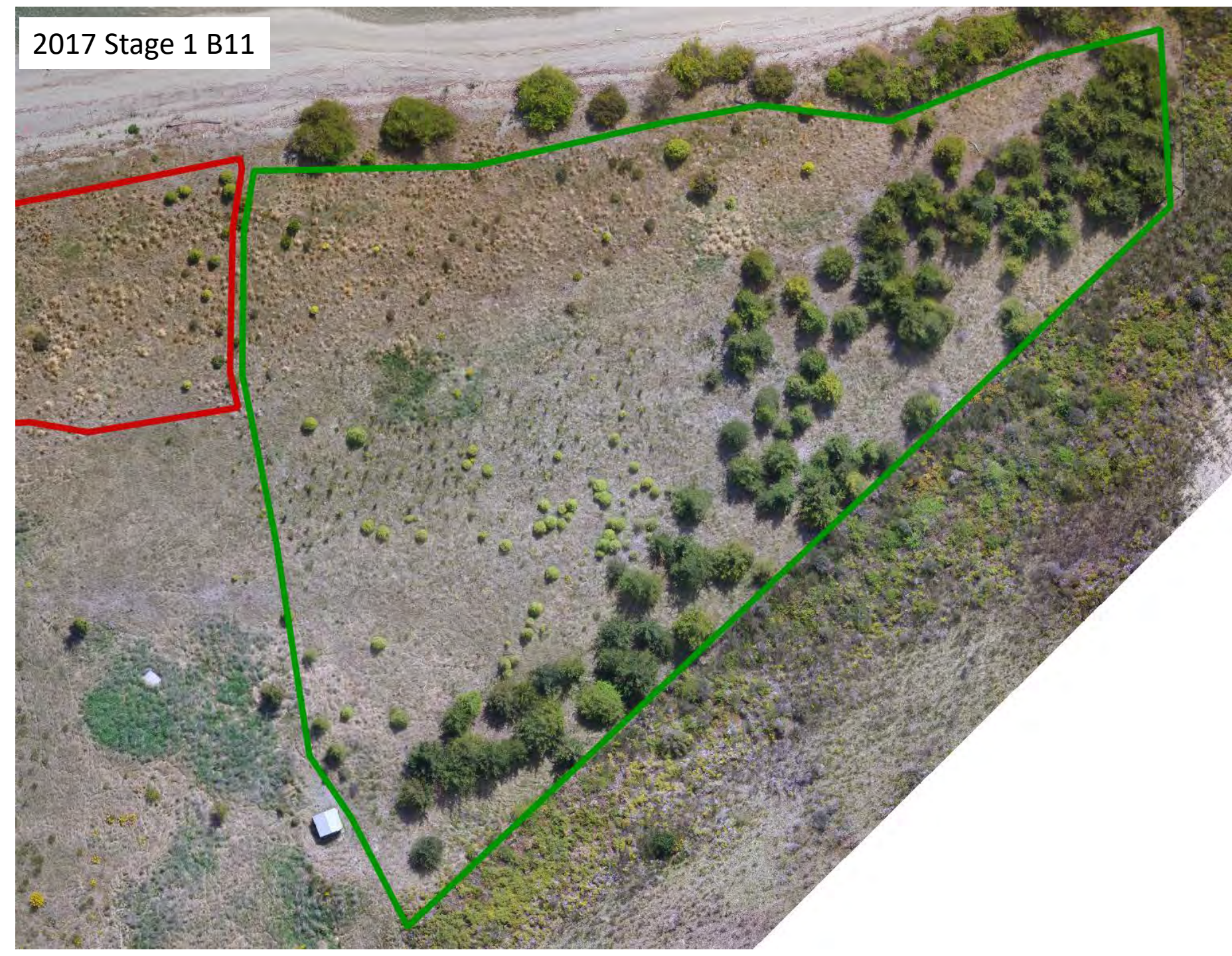


Appendix C: Selected Aerial Images 2014 & 2017.

2014 Stage 1 B11



2017 Stage 1 B11



2014 Stage 1 M1



2017 Stage 1 M1



2014 Stage 1 R1



2017 Stage 1 R1



2014 Stage 1 W2



2017 Stage 1 W2



2014 Stage 2a B2



2014 Stage 2a G2



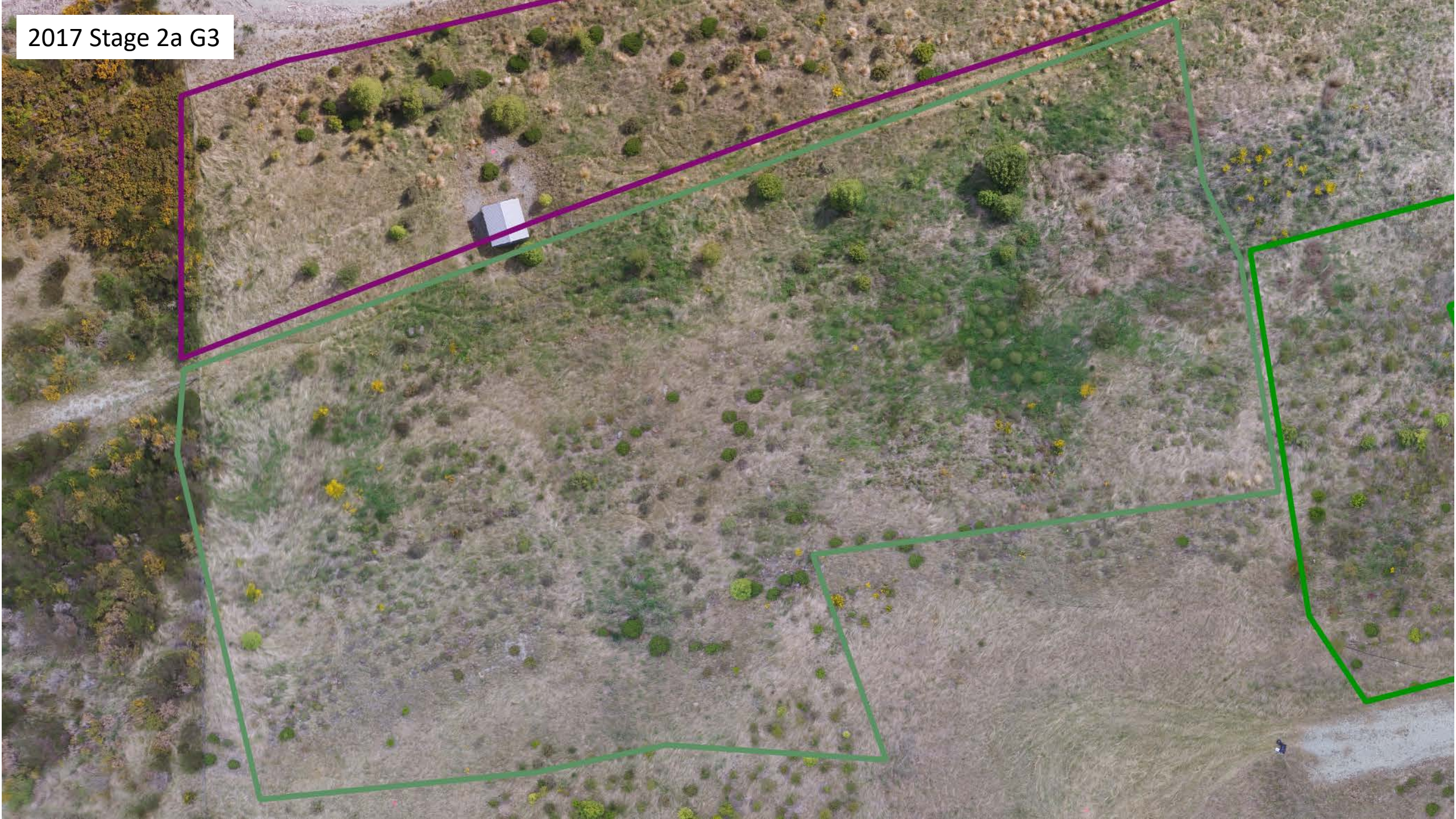
2017 Stage 2a G2



2014 Stage 2a G3



2017 Stage 2a G3



2014 Stage 2a K2



2017 Stage 2a K2

