IN THE MATTER	of the Resource Management Act 1991
AND	
IN THE MATTER	of an application by SkyPlay Adventures Limited and Tauhara North 2 Trust (applicants) and Taupō District Council (Consent Authority) in relation to an application for Land Use Consent RM190270

STATEMENT OF EVIDENCE OF WILLIAM BRUCE SHAW ON BEHALF OF SKY PLAY ADVENTURES AND TAUHARA NORTH 2B TRUST

(14 September 2020)

INTRODUCTION

Qualifications and experience

1. I am the Lead Principal Ecologist and a Director of Wildland Consultants Ltd in Rotorua, and have been a practicing ecologist for more than 40 years. I have worked on many projects in Taupō District and have also undertaken ecological assessments of other zipline operations, e.g. the Canopy Tours operation[1] in Dansey Road Scenic Reserve, Rotorua, and the proposed operation at Ōkere Falls, Rotorua.

2. I have a Master of Science degree from the University of Canterbury, 1980, and a Bachelor of Science in Earth Sciences and Biology (double major) from the University of Waikato, 1977.

3. My professional memberships include the Royal Society of New Zealand (MRSNZ), the New Zealand Ecological Society, the New Zealand Institute of Forestry (MNZIF), the New Zealand Biosecurity Institute, the Ornithological Society of New Zealand, and the New Zealand Botanical Society.

4. I am the author of 24 conference papers, 25 scientific or technical publications, 39 published articles, and more than 500 ecological reports, species lists, and general ecological accounts.

5. I have been a practising ecologist since 1980, and have lectured in ecology and nature conservation at Lincoln College and the Waiariki Institute of Technology. I previously worked for a consulting firm in Christchurch, and have undertaken ecological survey work and related assessments in urban, rural, and remote back country situations over more than 40 years. From 1986-1990 I was employed as a Scientist by the Forest Research Institute, Rotorua, specialising in forest ecology, threatened plants, vegetation mapping, and the ranking and management of natural areas. From 1990 to 1996 I was a Conservancy Advisory Scientist (1990-1994) and then (1994-1996) Protection, Planning and Use Manager for the Department of Conservation. I also performed national-level roles with the Department.

6. Since 1996 I have been Principal Ecologist and a Director of Wildland Consultants Ltd. I have particular expertise in the evaluation of ecological significance, ecological management, especially ecological restoration, and the assessment of ecological effects of actual and proposed land uses.

7. Ecological evaluation is a discipline in which I have more than 35 years of experience having, in the 1980s, developed an ecological ranking system that was applied regionally and nationally by the

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[1] This project has implemented a comprehensive pest control operation in the Dansey Road Scenic Reserve, and has been referred to by the Department of Conservation as being a good example of a tourism operation with an integrated biodiversity protection programme.

Department of Conservation. I have also developed, for Environment Waikato, a technical guideline for application of natural heritage criteria in their Regional Policy Statement, been an advisor to the Ministry for the Environment on criteria for the evaluation of Section 6(c) of the Resource Management Act, developed ecological evaluation criteria for the Bay of Plenty Regional Policy Statement, and developed (with Dr Kelvin Lloyd) ecological criteria for the Canterbury Regional Policy Statement.

8. My professional experience in Taupō District extends over c.35 years and includes the following:

- Botanical surveys of reserves.
- Ecological assessments of proposed subdivisions.
- Ecological input for structure plans.
- Ecological assessments of Significant Natural Areas on private land.
- Provision of advice on the management of threatened ecosystems, habitats, and species, including management of pest plants and animals.
- Two major assessments of contorta pine, a serious pest plant across the Kāingaroa Plateau and adjacent inland ranges.
- Surveys and provision of management advice on geothermal areas.
- Ecological assessments of major infrastructure projects, such as the Taupō Eastern Arterial and the associated bridge over the Waikato River.
- Wetland surveys along the Waikato River.
- Avifauna surveys along the Waikato River.
- Ecological assessments of proposed tourism/recreational developments, such as mountain biking and walking trails, ziplines, ski facilities, and other activities.
- Botanical surveys of large tracts of indigenous forest.
- Forest condition surveys.
- Ecological assessments of large exotic plantation forest estates.
- Preparation of ecological restoration plans for terrestrial and wetland sites.

Documents and materials referenced

9. In producing this statement of evidence I have primarily relied on and referred to:

- Wildland Consultants (2019).
- Wildland Consultants (2020).

10. Where relevant, in this statement I have also referred to other materials including research and reference materials that I have considered in forming my opinion.

11. I have also referred to the Consent Application, the Planner's Report, and relevant submissions.

12. I have also considered the revised plans contained in Appendix Two of Mr Sapsford's evidence.

Expert witness code of conduct

13. I have been provided with a copy of the Code of Conduct for Expert Witnesses contained in the Environment Court's Practice Note dated 1 December 2014. I have read and agree to comply with that Code. This evidence is within my area of expertise, except where I state that I am relying upon the specified evidence of another person. I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

Involvement in project

14. I have been involved in the project from an early stage, including an initial early meeting with representatives of Sky Play Adventures and Tauhara North 2 Trust to discuss the concept. Subsequently I have overseen the field assessments undertaken by staff of Wildland Consultants Ltd and the evaluations of options for ecological restoration.

Purpose and scope of evidence

15. My evidence addresses ecological aspects of the application by SkyPlay Adventures Ltd and the Tauhara North 2B Trust for a zipline tour operation proposed on land administered by Taupō District Council and also within Huka Falls Scenic Reserve and on other land on the opposite side of the Waikato River also administered by the Department of Conservation.

Summary of conclusions

16. A comprehensive ecological field survey and evaluation has been undertaken. The site is secondary indigenous forest adjacent to the Waikato River. Ecological values of vegetation and habitats have been assessed. Potential effects of establishment and operation of the zipline and associated infrastructure have also been assessed.

17. If the potential adverse effects which have been identified are avoided or minimised, the overall adverse ecological effects of the proposed zip line river tour will be minor.

18. There is also considerable potential for ecological enhancement and for increasing participant awareness of the importance of ecological restoration and caring for the natural environment.

19. Intensive sustained pest animal control, weed control, and restoration planting are proposed.

20. These works have the potential to create significant net environmental gains through improvement of the ecological condition of the site and improved habitat for indigenous fauna.

KEY ELEMENTS OF THE PROPOSAL

21. Sky Play Adventures propose to establish a zipline-based river tour to showcase the story of the Waikato River. Aims of the tour are to increase the awareness of a wide range of people about the cultural significance of the river and the natural environment. Zip lines will be used as a way for people to experience the wonder of the river from another angle.

22. The proposed tour will include five zip lines which will cross above the Waikato River and a series of walking tracks. A shuttle bus will be used to transport participants from a welcome office to the start and end of the tour. The tour will start on the true right side of the Waikato River near the eastern margin of Huka Falls Scenic Reserve. The tour route will zig-zag downstream above the river and finish on the true left side of the river. For each section of zip line there will be a launching and landing platform positioned in relation to the topography of the site.

23. To enhance the participant experience Sky Play Adventures intend to undertake activities to enhance the indigenous vegetation and habitats. They have identified opportunities to collaborate with Greening Taupō and other stakeholders in restoring the Waikato River Corridor.

Footprint of the proposed operation

24. The venture will require the following features to be developed:

- Platforms and towers which will act as launching and landing locations for the zip lines. Three of these will be within the Huka Falls Scenic Reserve (SNA 216), two will be located on Taupō District Council land above the reserve and three (Platforms 2 and 5 and Tower 8) will be on the true left side of the river.
- Wire cable for the five sections of zip lines between the platforms and towers.
- Existing tracks (Huka-Aratiatia Walkway; total length c.152 metres) will be used for a section of the tour between Platform 6 and Tower 7, and from Tower 10 to the shuttle bus stop or finish of the tour (Red Bridge and Te Totara Gully Tracks; total length of c.430 metres) on Karetoto Road. Two sections of walking track will be constructed to intersect with the existing track between Platform 6 and Tower 7. An old track will be upgraded for the section of the tour between Platforms 3 and 4.

EXISTING ENVIRONMENT

25. Detailed site-based descriptions are provided in a comprehensive report (Wildland Consultants 2019) which has been submitted with the application. The 2019 report represents my current thinking on the effects of the proposed development.

26. Field surveys were undertaken of the proposed site, including detailed assessments of each of the eight locations proposed for the zipline platforms. Short sections of walking track will also be required and these have also been evaluated in detail. Wildland Consultants (2019) report provides:

- Overviews of ecological and statutory contexts.
- Maps of vegetation pattern, along with the layout of the proposed zipline operation.
- Descriptions of vegetation and habitat types within the project area.
- Descriptions of the vegetation and habitats at each of the proposed platform sites, and along each proposed access track, along with site photographs.
- All vascular plants and bird seen at the site were recorded (refer to Sections 7 and 8 in Wildland Consultants 2019).
- Assessments of the likelihood of bats and lizards being present at the site.
- Overviews of aquatic species utilising the Waikato River, and terrestrial pest animals.
- An assessment of ecological values of the vegetation and habitats.
- The project area comprises secondary vegetation on slopes on both sides of the Waikato River. Six terrestrial vegetation and habitat types were identified and mapped, as set out in Section 5 and Figure 2 in Wildland Consultants (2019).
- Much of the area has a cover of secondary indigenous forest about eight metres tall, dominated by kōhūhū (*Pittosporum tenuifolium*), kānuka (*Kunzea robusta*), and whauwhaupaku (five finger; *Pseudopanax arboreus*).
- There are smaller areas dominated by ti kōuka (cabbage tree; *Cordyline australis*), blackberry (*Rubus* sp. (*R. fruticosus* agg.)), willows (crack willow/*Salix ×fragilis* and grey willow/*Salix cinerea*), and planted Tasmanian blackwood (*Acacia melanoxylon*).
- In addition to the more general vegetation mapping and descriptions provided in Wildland Consultants (2019), each proposed tower/platform and access/walking track was assessed in the field, site-by-site. Detailed descriptions of each site is provided in Section 6 of Wildland Consultants (2019), along with site photographs.

ASSESSMENT OF EFFECTS ON THE ENVIRONMENT

27. Wildland Consultants (2019) also provides:

- Assessments of potential ecological effects and options to avoid or minimise potentially adverse effects.

- A suggested approach for mitigation and ecological restoration.
- Overall conclusions.

28. The following potential effects have been identified:

- Loss and damage of vegetation:
  - Clearance for platforms and towers.
  - Clearance for zip lines.
  - Clearance for tracks.
  - Damage to tree roots.
  - Damage to adjoining vegetation.
- Erosion and sedimentation.
- Effects on indigenous fauna.
- Increased human presence.

29. The above matters are set out in detail in our report. The applications propose to adopt a low impact approach to the construction and operation of the zipline platforms and associated walking tracks.

30. Each of the above potential effects has been addressed comprehensively in Section 11 of Wildland Consultants (2019) with a range of detailed measures provided to avoid or minimise potential adverse effects.

31. The application is also proposing to implement an ecological restoration programme that will include:

- Pest plant control.
- Restoration planting.
- Pest animal control.

32. These matters were also addressed in Wildland Consultants (2019), along with relative priorities for this work.

33. The applicants subsequently sought additional advice on the costs of this restoration work. These matters are addressed comprehensively in Wildland Consultants (2020). They have also sought advice on a phased approach to implement further ecological restoration using the following approach:

- <u>Phase 1</u>

  Restoration within the local vicinity of the proposed ecotour operation: on the true right side of Waikato River within Huka Falls Scenic Reserve, and on the true left side of Waikato River within other Crown land.

- Phase 2

  Once the proposed ecotour operation has been established, Skyplay Adventures would like to expand ecological restoration activities downstream within the Waikato River Corridor. Phase 2 would involve ecological restoration works within land administered by the Department of Conservation, between State Highway 5 (SH5) and the Nga Awa Purua rapid, which is currently managed for conservation purposes.

- Phase 3

  Phase 3 would be restoration within land administered by the Department of Conservation, between SH5 and the Nga Awa Purua rapid, which is not currently managed for conservation purposes. Areas within Aratiatia Conservation Area, Aratiatia Rapids Recreation Reserve, and the Waikato River Margin are currently grazed pasture, exotic plantation pine forest, and an equestrian centre. These areas are suitable for fencing and restoration planting but may require further discussion with the Department and land users prior to ecological restoration work being undertaken.

SUBMISSIONS

34. Almost all of the many submissions in support of the application refer to environmental benefits that will result due to the proposed control of pest plants and pest animals.

35. One submission, from the Department of Conservation, is opposed in part to the application. The following statements in the Department's submission and covering letter are notable however:

    - "It is the D-G's view, that the concerns raised around the ecological enhancement and mitigation plans can be resolved in further consultation with the application." (Dave Lumley covering letter, 30 March 2020.)

    - "In principle, the D-G is relatively comfortable with what is being proposed. Recognising that there are overlapping iwi interests (discussed below), the D-G considers that further work needs to be done to address overlapping iwi interests over the site, and the certainty around ecological enhancements and mitigation measures." (Department of Conservation submission, 30 March 2020.)

36. The Department's submission goes on to identify the following specific matters:

    - A request for further information on "weed and pest control activities".

    - The need for a restoration plan.

    - Fauna monitoring.

    - Consent conditions that relate to the management of pests, weeds, fauna monitoring, and restoration.

37. The Department has also offered support for their staff to review any draft ecological enhancement and mitigation plans.

38. It should be noted that considerably more work has been done on potential ecological restoration since the Department's submission was received, in Wildland Consultants (2020), and this report is appended to my evidence.

39. The applicant intends to address all of the above by way of consent conditions and also through the separate concession process to be undertaken with the Department.

PLANNERS REPORT

40. The Planner's Section 42A Report, on Page 30 (Paragraph 12.77) contains the following conclusion in relation to ecological aspects of the proposal:

> "Overall, I am satisfied that appropriate conditions can be imposed to mitigate adverse effects on ecology both through any construction phase and in terms of the ongoing operation of the activity. The additional ecological enhancement and restoration measures will also have positive effects and can be adopted into consent conditions should the Commissioners be mindful to grant consent."

41. This is consistent with the comment above from the Department of Conservation about the need for consent conditions that "relate to management of pests, weeds, fauna monitoring, and restoration."

42. I provide further comments on the proposed conditions in the recent section.

PROPOSED CONDITIONS

43. Paragraphs 21-24 set out the requirements of an Ecological Restoration Plan to address the following:

    (a) Control of pest plants.

    (b) Control of pest animals.

    (c) Indigenous planting, including species to be used, eco-sourcing, planting spacings and management.

    (d) Monitoring.

    (e) Education initiatives.

    (f) Any collaborative initiatives identified with other entities undertaking conservation works in the area.

    (g) Details of consultation and feedback from the Department of Conservation.

44. Timing of the above actions.

45. A monitoring report is also to be provided on each of the above activities for five years from commencement of the ecological restoration works, with ongoing monitoring as required.

46. In my opinion, this is an appropriate set of ecological conditions.

CONCLUSIONS AND RECOMMENDATIONS

47. The proposed Huka Falls guided zip line operation will be located within secondary indigenous forest in Huka Falls Scenic Reserve (SNA 216) and on the opposite (true left) side of the Waikato River.

48. This site is of moderate to high ecological value and is an important corridor for the movement of indigenous fauna throughout the wider landscape. The cultural and ecological significance of the Waikato River, and in particular the Huka Falls, is a key reason for the location of the proposed tour.

49. The largest potential ecological effects of the operation will result from clearance and trimming of vegetation during the construction and maintenance of five platforms, three towers, zip lines, and associated walking tracks. There is potential for adverse ecological effects if any larger indigenous trees are cleared or damaged, or if erosion was to occur, although this is unlikely as the applicants propose to use a low-impact approach.

50. If the potential adverse effects which have been identified are avoided or minimised, the overall adverse ecological effects of the proposed zip line river tour will be minor.

51. There is also considerable potential for ecological enhancement and for increasing participant awareness of the importance of ecological restoration and caring for the natural environment.

52. Minor adverse ecological effects of the proposed operation can be reduced to less than minor through mitigation.

53. Intensive sustained pest animal control, weed control, and restoration planting are proposed.

54. These works have the potential to create significant net environmental gains through improvement of the ecological condition of the site and improved habitat for indigenous fauna.

55. Ecological restoration at this site will complement previous and current work within the Waikato River Corridor, such as that undertaken by Greening Taupō. This work will be an integral part of the 'story' associated with the zip line tour.

56. A comprehensive ecological restoration plan is to be produced, including provisions to address ongoing on-the-ground management and monitoring.

57. In my view, this is a comprehensive package of works that will result in ecological gains.

REFERENCES

Wildland Consultants 2019: Assessment of ecological effects for a proposed zip line tour near Huka Falls. *Wildland Consultants Ltd Contract Report No. 5077*. Prepared for SkyPlay Adventures, Taupō. 49 pp.

Wildland Consultants 2020: Potential costs for ecological restoration works associated with a proposed zip line operation near Huka Falls. *Wildland Consultants Ltd Contract Report No. 5077e*. Prepared for SkyPlay Adventures, Taupō. 16 pp.

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POTENTIAL COSTS FOR ECOLOGICAL RESTORATION WORKS ASSOCIATED WITH A PROPOSED ZIP LINE OPERATION NEAR HUKA FALLS

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POTENTIAL COSTS FOR ECOLOGICAL RESTORATION WORKS ASSOCIATED WITH A PROPOSED ZIP LINE OPERATION NEAR HUKA FALLS

Contract Report No. 5077e

DRAFT

July 2020

Project Team:
Angela Simpson - Report author
William Shaw - Project management

Prepared for:
Sky Play Adventures
Taupō

Reviewed and approved for release by:

W.B. Shaw
Director/Lead Principal Ecologist
Wildland Consultants Ltd

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1. INTRODUCTION

Wildland Consultants (2019) provides an assessment of ecological effects for a proposed zipline and ecotour operation near Huka Falls, Taupō. That report identified potential ecological restoration work that could be undertaken in conjunction with the zipline operation. Three phases have been suggested for the restoration work:

- Phase 1

  Restoration within the local vicinity of the proposed ecotour operation: on the true right side of Waikato River within Huka Falls Scenic Reserve, and on the true left side of Waikato River within other Crown land.

- Phase 2

  Once the proposed ecotour operation has been established, Skyplay Adventures would like to expand ecological restoration activities downstream within the Waikato River Corridor. Phase 2 would involve ecological restoration works within land administered by the Department of Conservation, between State Highway 5 (SH5) and the Nga Awa Purua rapid, which is currently managed for conservation purposes.

- Phase 3

  Phase 3 would be restoration within land administered by the Department of Conservation, between SH5 and the Nga Awa Purua rapid, which is not currently managed for conservation purposes. Areas within Aratiatia Conservation Area, Aratiatia Rapids Recreation Reserve, and Waikato River Margin are currently grazed pasture, exotic plantation pine forest, and an equestrian centre. These areas are suitable for fencing and restoration planting but may require further discussion with the Department and land users prior to ecological restoration work being undertaken.

An overview map of these three phases is presented in Figure 1. Various notes are provided below on that potential work, followed by indicative costings.

2. PHASE 1

2.1 Overview

Ecological restoration could be undertaken within the local vicinity of the proposed ecotour operation. Weed control and restoration planting, and pest animal control, could be undertaken on the true right side of Waikato River within Huka Falls Scenic Reserve. Weed control and restoration planting could be undertaken on the true left side of Waikato River within other Crown land.

2.2 Weed control and restoration planting - Huka Falls Scenic Reserve

Eight areas of blackberry vineland are suitable for weed control are restoration planting in Huka Falls Scenic Reserve. These key areas are shown in Figure 2 and Table 1, and are described below. Additional weed control should be undertaken throughout the reserve within the local vicinity of the proposed tour.

Table 1: Key areas for weed control and restoration planting in Huka Falls Scenic Reserve.

Key Area	Area (ha)
A	1.21
B	0.15
C	0.13
D	0.30
E	0.15
F	0.22
G	0.33
H	0.07
Total	**2.55**

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Vegetation Type 4: Blackberry vineland (total about 2.5 hectares)

Vineland dominated by blackberry (*c.*2-3 metres tall) with bracken scattered throughout. Gorse, broom, and Himalayan honeysuckle are common. There is occasional Chinese privet (*c.*3 metres tall) and kōhūhū is scattered in places (*c.*6 metres tall).

2.2.1 Key areas labelled on map as A, B, C, D (total 1.8 hectares)

Blackberry should be mulched (accessible from farmland in places) or slashed. Cut and paste shrubs of gorse, broom, Himalayan honeysuckle, and Chinese privet. Avoid damaging existing indigenous trees. Then plant with indigenous species (such as kōhūhū, kānuka, mānuka, whauwhaupaku, and a few tōtara to create taller canopy): cost for planting at about two metres spacings, with tōtara every 10 metres. Then follow-up control of pest plants (blackberry, broom, Chinese privet) and maintenance of plantings regularly (at least twice a year) for at least three years. Some infill planting will be required one year after initial planting.

Prioritise the larger area of blackberry vineland along farm margin (Area A 1.2 hectares). Undertake work in Areas B-D at the same time if affordable, or after Area A.

2.2.2 Key areas labelled on map as E, F, G, H (total 0.8 hectares)

These areas within Huka Falls Scenic Reserve are less urgent for weed control because they have a greater cover of indigenous species present than Areas A-D. Dense areas of blackberry should be mulched/slashed (best access is on foot from the Huka Falls walkway). Other pest plants should be controlled (cut and paste method is probably sufficient as they are mostly shrub species). Avoid damaging existing indigenous trees. Then plant indigenous species (such as kōhūhū, kānuka, mānuka,

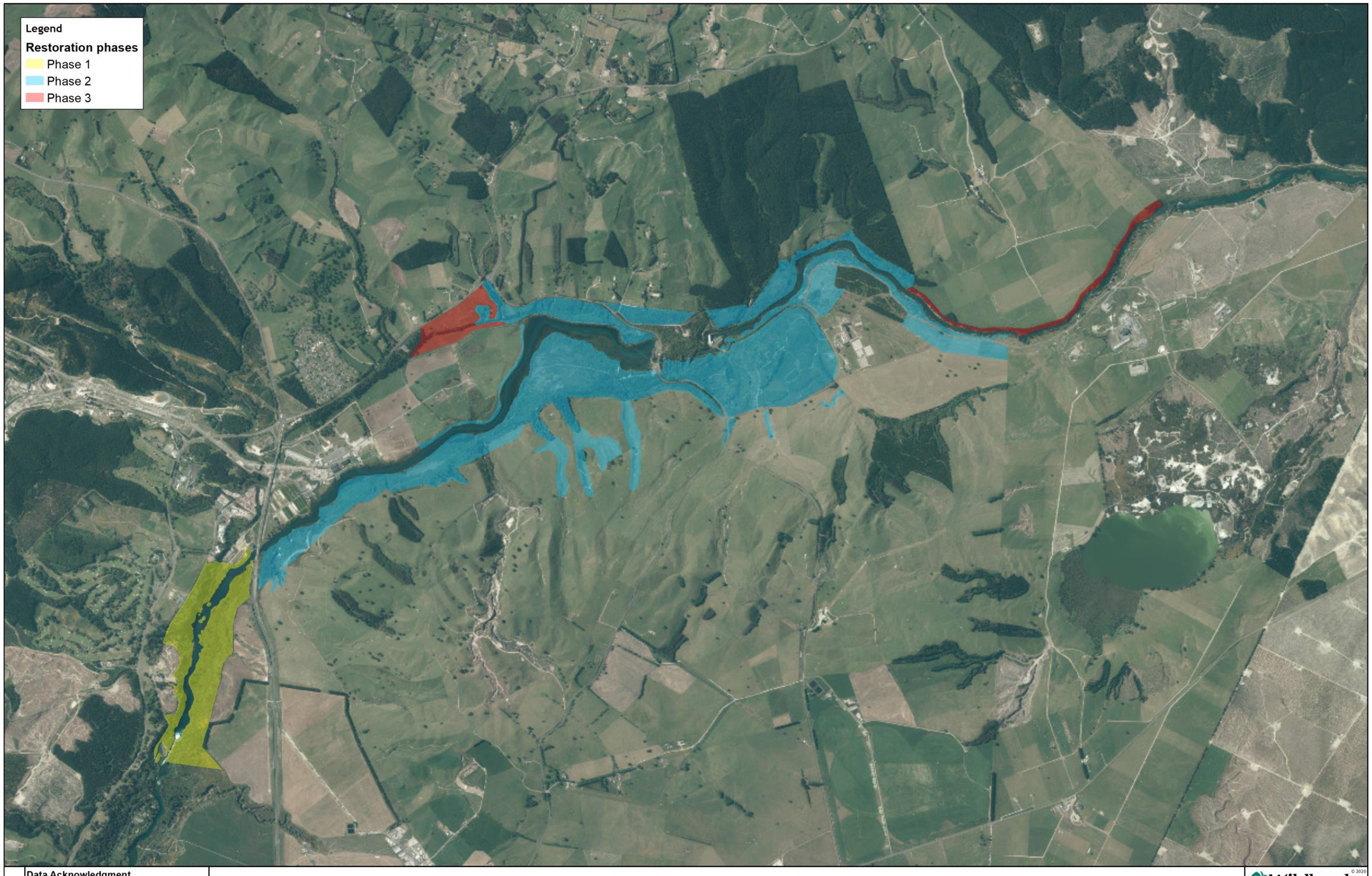

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Figure 1. Overview of phases of potential restoration works associated with a proposed tour near Huka Falls, Waikato River

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Date:	3/07/2020
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whauwhaupaku, and a few tōtara to create taller canopy) as needed (cost for planting at about two metres spacings, with tōtara every 10 metres). Then follow-up control of pest plants (blackberry, broom, Chinese privet) and maintenance of plantings regularly (at least twice a year) for at least three years. Some infill planting one year after initial planting.

Prioritise the areas alongside proposed track (Areas G and H = 0.4 hectares total). Undertake work in Areas E and F at the same time if affordable, or after Areas G and H.

2.2.3 Key area I (not shown on map)

Remaining wilding radiata pines - which are scattered throughout Huka Falls Scenic Reserve - should be killed standing using stem poisoning. Costs are based on controlling about five mature trees (each about 20 metres tall).

Wilding pine saplings should also be controlled before they become large trees by hand pulling, and/or cut and paste methods for larger saplings, or by using basal bark spray (a one day walk-through of site each year).

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Climbing spindleberry (*Celastrus orbiculatus*) has been controlled within Huka Falls Scenic Reserve previously, and was not observed during the site visit in 2019. Ongoing control of climbing spindleberry should be undertaken but this cannot be costed at this stage.

2.3 Weed control and restoration planting - other Crown land

Platform 2 and Platform 5 of the proposed ecotour operation are to be located within a narrow parcel of Crown land on the true left side of the Waikato River, immediately below Huka Falls. Tower 8 of the proposed ecotour operation is to be located within another parcel of Crown land on the true left side of the Waikato River, below Karetoto Road.

On the true left side of the Waikato River, within other Crown land, there is one area of blackberry vineland that is suitable for weed control and restoration planting. There are also two areas of whauwhaupaku-whekī-kōhūhū forest within other Crown land which would benefit from weed control. These key areas are shown in Figure 2 and Table 2, and described below.

Table 2: Key areas for weed control in other Crown land.

Key Area	Area (ha)
J	1.0
K	1.7
L	2.5
Total	**5.2**

Vegetation Type 4: Blackberry vineland

Vineland dominated by blackberry (*c.*2-3 metres tall) with bracken scattered throughout. Gorse, broom, and Himalayan honeysuckle are common. There is

occasional Chinese privet (*c.*3 metres tall) and kōhūhū is scattered in places (*c.*6 metres tall).

Vegetation Type 2: Whauwhaupaku-whekī-kōhūhū forest

Forest (*c.*8 metres tall) dominated by whauwhaupaku, whekī, and kōhūhū. Other species which are common in the canopy are māhoe, makomako, kānuka, rangiora, and whekī-ponga. Kōwhai occurs near the river margins in places. Patches of dead standing wilding pines are present and some live wilding pines remain.

2.3.1 Key area labelled on map as J (1.0 hectare)

Blackberry vineland is present on both sides of the existing track in the northern area of Crown land. This vineland could be controlled and restored to indigenous cover. Blackberry should be mulched or slashed. Shrubs of gorse, broom, Himalayan honeysuckle, Chinese privet should be controlled using cut and paste methods. Avoid damaging existing indigenous trees. Then plant with indigenous species (such as kōhūhū, kānuka, mānuka, whauwhaupaku, and a few tōtara to create taller canopy) (cost for planting at about two metres spacings, with tōtara every 10 metres). Undertake follow-up control of pest plants (blackberry, broom, Chinese privet) and maintenance of plantings regularly (at least twice a year) for at least three years. Some infill planting one year after initial planting.

2.3.2 Key areas labelled on map as K and L (total 4.2 hectares)

A few wilding radiata pines which are scattered within the other Crown land could be controlled using poison-standing methods Cost based on controlling about five mature trees (each about 20 metres tall).

Wilding pine saplings should also be controlled before they become large trees (by hand pulling, and/or cut and paste methods for larger saplings) (a one day walk-through of site each year).

Other pest plants that are also likely to be scattered and/or locally present within Key Areas K and L include cotoneaster, broom, Chinese privet, gorse, and Himalayan honeysuckle. Such shrubs should be controlled using cut and paste methods.

2.4 Pest animal control -Huka Falls Scenic Reserve

Predator Free Taupō have established and maintain a network of DOC200 traps along the Huka-Aratiatia Walkway.

Potential locations for additional trapping lines which could be established and maintained by the ecotour are: B. Farm margin, and C. Proposed tracks (as per Figure 3). The most benefit for the reserve is likely to be achieved by installing pest control along the farm margin. Possum traps could be installed at *c.*100 metre intervals, and rat traps and bait stations could be installed at *c.*50 metre intervals. At these spacings, about 14 possum traps and about 28 rat stations could be installed along the farm margin. Two or three possum traps and six rat traps could be installed

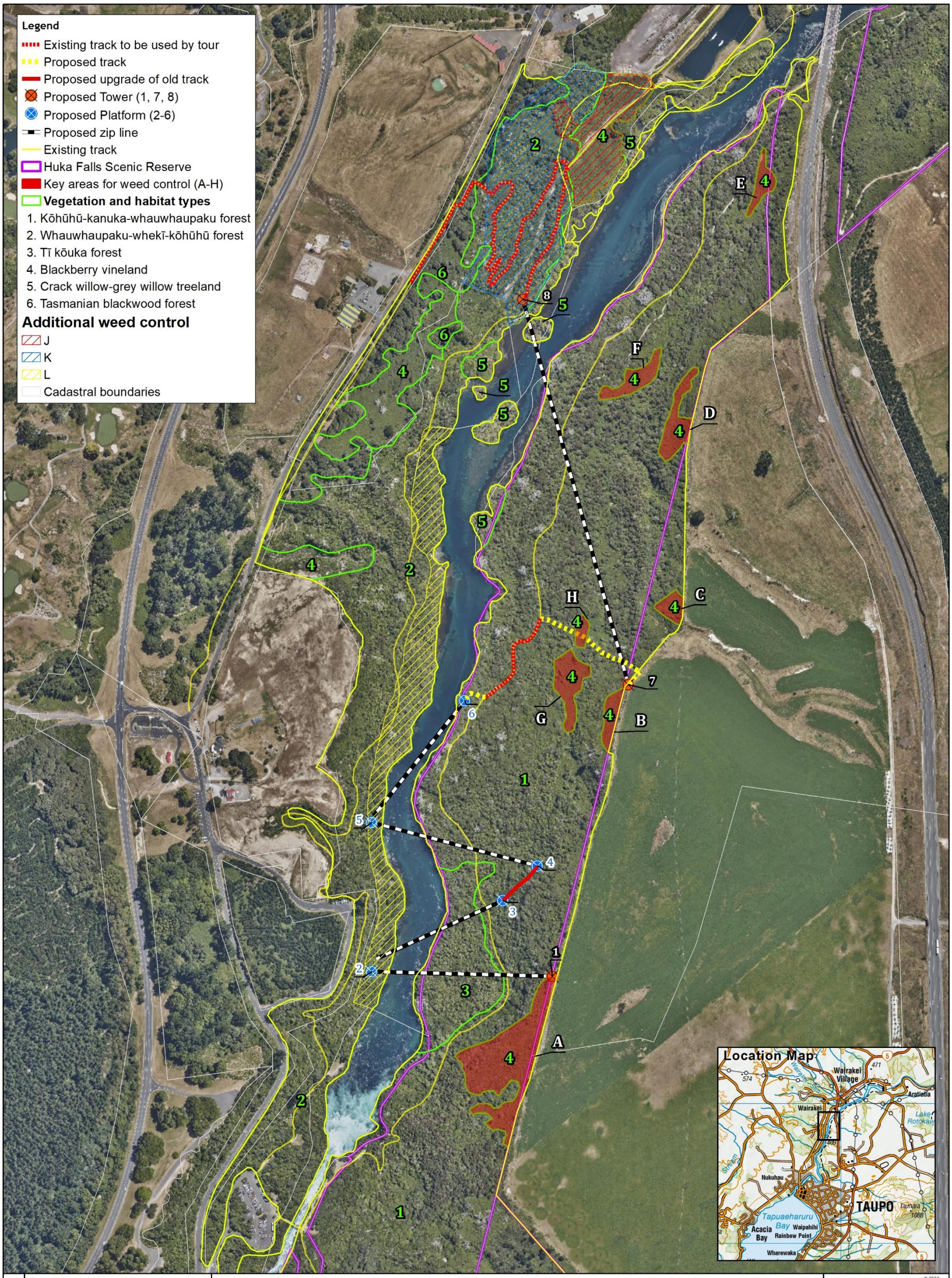

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Figure 2. Phase One: Key areas for weed control within the site of the proposed tour, Huka Falls Scenic Reserve and other Crown land

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Scale: 1:5,000
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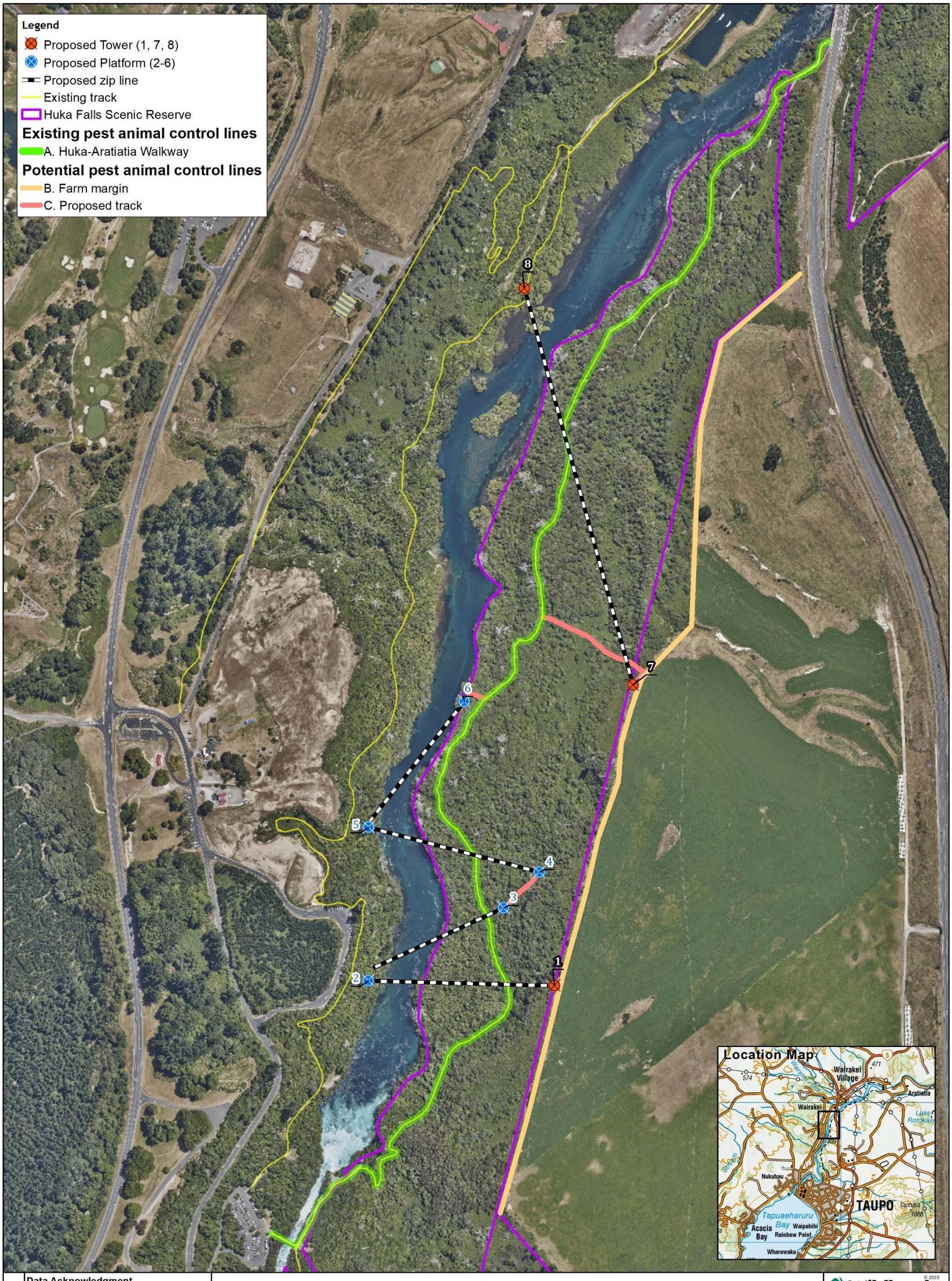


Figure 3. Phase One: Potential and existing pest animal control lines, Huka Falls Scenic Reserve

along the proposed tracks. Possum traps (about 21 traps at *c.*100 metre intervals) could also be installed alongside the Huka-Aratiatia Walkway to complement the existing network of DOC200 traps. Such a network of pest animal control within this section of Huka Falls Scenic Reserve would provide a good level of ongoing habitat protection for indigenous vegetation and fauna.

Guidelines for costing:

- **Establishment of trap lines** (see Figure 3): establish a total of 38 possum traps (costs based on Trapinators) and 34 rat traps (costs based on DOC200), over 3.8 kilometres of easily walkable terrain.

- **Farm margin** (1.4 kilometres, labelled as B on Figure 3):
  - Install 14 possum traps (e.g. Sentinel, Trapinator, Goodnature A12) at about 100 metre spacings.
  - Install 28 rat traps (DOC200, Victor, and/or Goodnature A24 self-resetting traps) at about 50 metres spacings.

- **Proposed tracks** (0.3 kilometres, labelled as C on Figure 3):
  - Install three possum traps (e.g. Sentinel, Trapinator, Goodnature A12) at about 100 metre spacings.
  - Install six rat traps (DOC200, Victor, and/or Goodnature A24 self-resetting traps) at about 50 metres spacings.

- **Additional trapping along the Huka Aratiatia Walkway** (2.1 kilometres, labelled as A on Figure 3):
  - Install 21 possum traps (e.g. Sentinel, Trapinator, Goodnature A12) at about 100 metre spacings.
  - DOC200 traps are already present along this walkway.

- **Costs for annual trap checking and maintenance** for a total of 38 possum traps (costs based on Trapinators) and 34 rat traps (costs based on DOC200), over 3.8 kilometres of easily walkable terrain.

3. PHASE 2

3.1 Overview

A manageable area for expansion of restoration activities downstream of the proposed ecotour operation has been identified on the margins of the Waikato River between SH5 and the Parariki Stream. Phase 2 could be restoration within land administered by the Department of Conservation, between SH5 and the Nga Awa Purua rapid, that is currently managed for conservation purposes. Restoration of this area would improve the ecological condition of this part of the "Waikato River Corridor" and would complement previous and ongoing restoration and conservation work undertaken by Greening Taupō and the Department.

This larger-scale project will require engagement, collaboration, and coordination with landowners, land managers, Ngāti Tahu-Ngāti Whaoa, Mercury New Zealand, Greening Taupō, Department of Conservation, and district and regional councils.

Protected areas administered by the Department of Conservation that are present along the immediate margins of most of this reach of the river are:

- Aratiatia Conservation Area.
- Aratiatia Rapids Scenic Reserve.
- Aratiatia Rapids Recreation Reserve.
- Huka Falls Scenic Reserve.
- Waikato River Marginal Strip.

Indigenous vegetation and habitat types present within the protected areas include whauwhaupaku-kōhūhū forest, broadleaved species scrub, and bracken fernland (Department of Conservation 2002). Lake Aratiatia provides good habitat for water birds. Common indigenous forest birds utilise habitats on the river margins and kārearea/bush falcon (*Falco novaeseelandiae* "bush"; At Risk-Recovering as per Robertson *et al.* 2017) have been recorded near the Aratiatia Rapids (Department of Conservation 2002). The Aratiatia bike/walking tracks are used by local residents and are also popular with visitors who are drawn to watch the daily opening of the Aratiatia Dam.

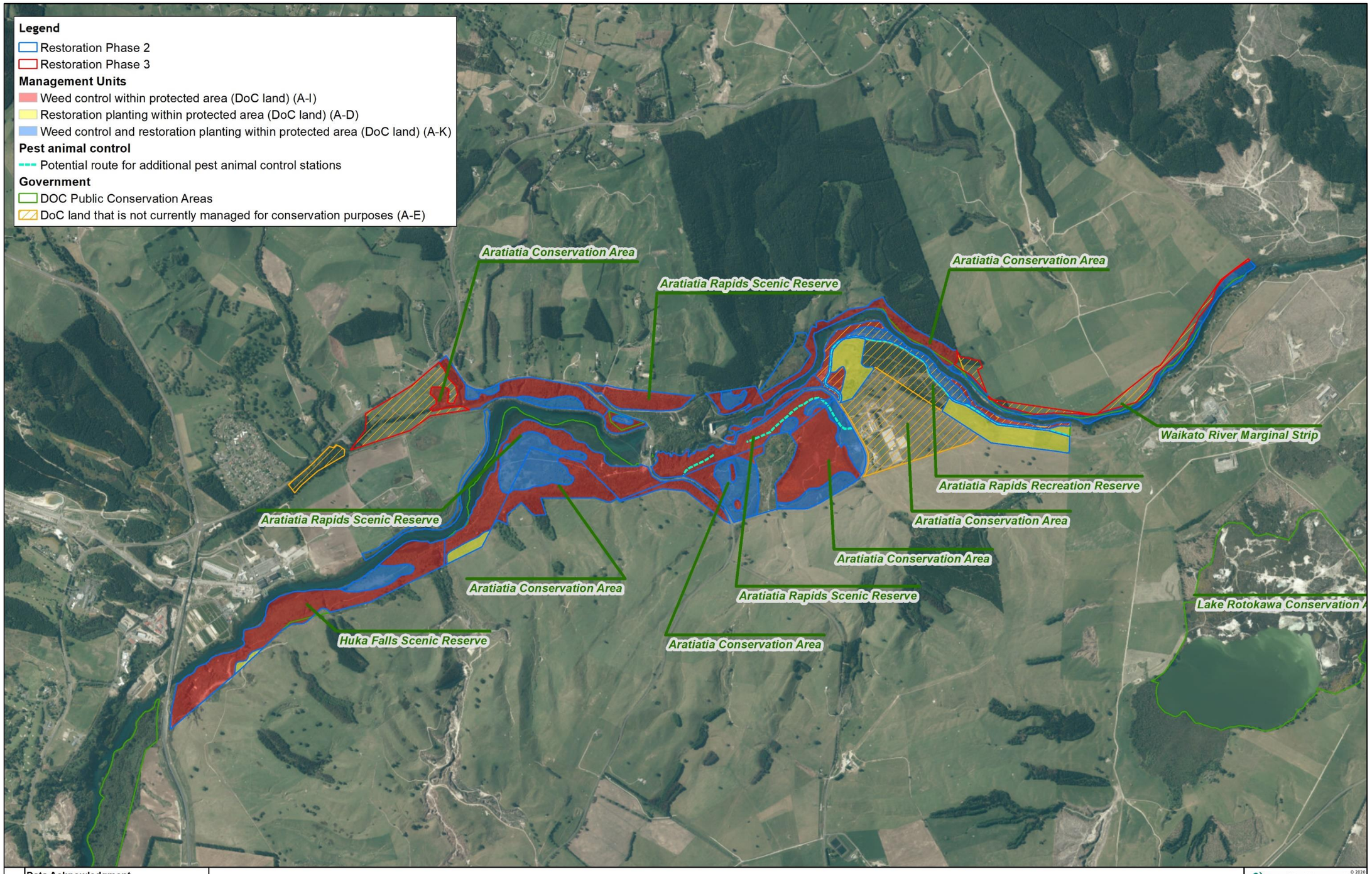
Pest plants that are present and should be controlled within the project area include wilding pines, blackberry, broom, lupin, Himalayan honeysuckle, gorse, wild rose, and monkey musk (Department of Conservation 2002). Pest animals that are a priority for control are possums, rats, and mustelids. Control of rabbits, hares, and feral cats would probably also be beneficial in places.

3.2 Management units

The ecological state of the Phase 2 project area could be enhanced by weed control, restoration planting, and pest control. Areas where weed control and restoration planting could be undertaken have been identified as management units (see Table 3) and these are mapped in Figure 4. A potential layout (total of *c.*3.8 kilometres long) for the installation of pest animal control stations along existing tracks and roads is also shown in Figure 4.

Table 3: Management units for ecological restoration works between State Highway 5 and the Nga Awa Purua rapid, Waikato River.

Management Unit	Area (ha)
Weed control within protected area (DOC land) (A-I)	182.9
Restoration planting within protected area (DOC land) (A-D)	31.5
Weed control and restoration planting within protected area (DOC land) (A-K)	63.7
Total	**278.1**



Data Acknowledgment
Map contains data sourced from LINZ
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Figure 4. Phase Two and Three: Management units for ecological restoration, SH5 to Nga Awa Purua rapids, Waikato River

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4. PHASE 3

4.1 Overview

Restoration could be undertaken as a later stage within Department of Conservation land, between SH5 and the Nga Awa Purua rapid, that is not currently managed for conservation purposes. Areas within Aratiatia Conservation Area, Aratiatia Rapids Recreation Reserve, and Waikato River Margin are currently grazed pasture, exotic plantation forest, and an equestrian centre. These areas are suitable for fencing and restoration planting but will require further discussion with the Department of Conservation and land users prior to restoration. It is unlikely that the equestrian centre area would be used for ecological restoration purposes.

4.2 Key areas

Areas where weed control and restoration planting could be undertaken have been identified as management units (see Table 4) and these are mapped in Figure 4.

Table 4: Management units for ecological restoration works between State Highway 5 and the Nga Awa Purua rapid, Waikato River.

Management Unit	Area (ha)
A. Aratiatia Conservation Area	3.7
B. Aratiatia Conservation Area	35.5
C. Aratiatia Conservation Area	38.9
D. Aratiatia Rapids Recreation Area	53.0
E. Waikato River Marginal Strip	10.9
Total	**103.1**

5. INDICATIVE COSTS

5.1 Notes on costings

Weed Control and Restoration Planting

Costs include initial weed control, one round of follow-up weed control in the first year, site preparation, restoration planting, and one round of infill planting in the first year (costs for ongoing work would need to be provided separately).

Pest Animal Control Costing

Costs include establishment of the trap networks along the potential routes.

5.2 Phase 1

Indicative costs are set out in Table 5 below.

Table 5: Indicative costs for weed control and restoration planting, and pest animal control within Huka Falls Scenic Reserve, and for weed control and restoration planting in other Crown land.

Job Set Up Including SSSP, maps, programming, work plans and pre start meeting. **Initial Control A-I** Cut and paste pest tree and shrub species, foliar spray blackberry in A-H. Slash/mulch blackberry in A-H by hand once dead. Poison standing remaining wilding radiata pines throughout area I. Control sapling wilding pines throughout area I. **Follow-Up Control A-I** Control any pest plant species missed on the initial plus any that require more than one control round.	Staff/labour Disbursements Goods and Services Tax	23,347.50 725.00 24,072.50 3,610.88 $27,683.38
Restoration Planting A-H Site preparation, source plants, layout and plant PBs A-D, infill planting A-D (10% of original planting)	Staff/labour Disbursements Goods and Services Tax	19,067.50 32,640.00 51,707.50 7,756.13 $59,463.63
Initial Control J-L Cut and paste pest tree and shrub species, foliar spray blackberry in A-H. Slash/mulch blackberry in A-H by hand once dead. Poison standing remaining wilding radiata pines throughout area I. Control sapling wilding pines throughout area I. **Follow-Up Control J-L** Control any pest plant species missed on the initial plus any that require more than one control round.	Staff/labour Disbursements Goods and Services Tax	11,210.00 595.00 11,805.00 1,770.75 $13,575.75
Restoration Planting J Site preparation, source plants, layout and plant PBs in area J, infill planting in area J (10% of original planting)	Staff/labour Disbursements Goods and Services Tax	7,502.50 12,948.00 20,450.50 3,067.58 $23,518.08

Pest Animal Control - Huka Falls Scenic Reserve Installation of pest animal traps (34 DOC200 and 38 Trapinator across 3.8 km), GPS, and map locations of traps	Staff/labour Disbursements Goods and Services Tax	1,690.00 6,433.00 8,123.00 1,218.45 $9,341.45
GRAND TOTAL	Staff/labour Disbursements Goods and Services Tax	61,817.50 53,341.00 116,158.50 17,423.79 $133,582.29

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5.3 Phase 2

Methods and costings for Phase 2 are indicative approximations based on a desktop assessment. Methods and costs will need to be refined based on detailed site visits prior to starting restoration works.

Table 6: Indicative costs for weed control and restoration planting, and pest animal control within land administered by the Department of Conservation, between State Highway 5 and Nga Awa Purua rapids.

Weed Control Within Protected Area (DOC Land) (A-I) **Based on estimation that weed cover 55 hectares or 1/3 of total area:** **Initial control:** Cut and paste pest tree and shrub species, foliar spray blackberry. Slash/mulch blackberry by hand once dead. Poison standing remaining wilding radiata pines. Control sapling wilding pines. **Follow-Up Control:** Control any pest plant species missed on the initial plus any that require more than one control round.	Staff/labour Disbursements Goods and Services Tax	210,380.00 14,235.00 224,615.00 33,692.25 $258,307.25

Restoration Planting on Protected Land Site preparation, source plants, layout and plant PBs A-H, infill planting (10% of original planting)	Staff/labour Disbursements Goods and Services Tax	184,702.50 408,101.00 592,803.50 88,920.53 $681,724.03
Weed Control and Restoration Planting Within Protected Area (DOC land) (A-K) **For 63.7 hectares:** **Planting** Site preparation, source plants, layout and plant PBs, infill planting (10% of original planting) **For 31.9 hectares:** **Initial control:** Cut and paste pest tree and shrub species, foliar spray blackberry. Slash/mulch blackberry by hand once dead. Poison standing remaining wilding radiata pines. Control sapling wilding pines. **Follow-Up Control:** Control any pest plant species missed on the initial plus any that require more than one control round.	Staff/labour Disbursements Goods and Services Tax	1,184,660.00 832,931.00 2,017,591.00 302,638.65 $2,320,229.65
Pest Animal Control Installation of pest animal traps (76 DOC200 and 38 Trapinator along 3.8 km), GPS, and map locations of traps	Staff/labour Disbursements Goods and Services Tax	2,345.00 10,860.00 13,205.00 1,980.75 $15,185.75
GRAND TOTAL	Staff/labour Disbursements Goods and Services Tax	1,582,087.50 1,266,127.00 2,848,214.50 427,232.18 $3,275,446.68

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5.4 Phase 3

Methods and costings for Phase 3 are indicative approximations based on a desktop assessment. Methods and costs will need to be refined based on detailed site visits prior to starting restoration works. Costs do not include land use conversion, such as harvesting of exotic plantation pine forest.

Table 7: Indicative costs for weed control and restoration planting, and pest animal control within land administered by the Department of Conservation that is not currently managed for conservation purposes (A-E), between State Highway 5 and Nga Awa Purua rapids.

Management Unit A **Restoration planting following harvest of pine plantation** Site preparation, source plants, layout and plant PBs, infill planting (10% of original planting) **Management Unit B** **Restoration planting onto pasture** Site preparation, source plants, layout and plant PBs, infill planting (10% of original planting) **Management Unit C** **Suitable for restoration planting following change in land use** Not costed. **Management Unit D** **Restoration planting following harvest of pine plantation** Site preparation, source plants, layout and plant PBs, infill planting (10% of original planting) **Management Unit E** **Restoration planting onto pasture** Site preparation, source plants, layout and plant PBs, infill planting (10% of original planting)	Staff/labour 480,537.50 Disbursements 1,333,496.00 1,814,033.50 Goods and Services Tax 272,105.03 $2,086,138.53

5.5 Additional set-up costs

Costs do not include purchase of vehicles, machinery, and tools, job set-up, PPE, and health and safety planning.

For a 'self-contained' project to be initiated and maintained, the following would be necessary: vehicles (and a trailer), tools, PPE, and access to an operational base. These have not been costed above and, subject to the scale of the project, could involve the following:

- Operational base - annual $15,000
- Vehicle (ute or van) - one off $50,000
- Trailer - one off $3,000
- Tools - one off $10,000
- PPE - one off $10,000

- Project set-up - one off $10,000
- H&S Planning - one off $2,000

To sustain the project, it will also be necessary to have the following:

- A project manager, say $60,000/annum.

- Ongoing work, maintaining trap lines and plantings. Trap lines would need to be maintained on a permanent basis while each planting area will require seasonal maintenance for at least five years. This could potentially involve 2-3 staff or contractors, say at $120,000/annum, in total.

ACKNOWLEDGMENTS

Adrian Pike initiated this project, coordinated the site visit, and provided useful information on the proposed operation. Rowan Sapsford (Roam Consulting) provided useful background information on current and previous restoration projects within and adjacent to the site.

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