

Western Springs Pines: Consideration of Alternative Management Options – Ecological Perspective

The Tree Consultancy Company

October 2020



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DATE: 21 OCTOBER 2020

REFERENCE: BIORESEARCHES (2020). WESTERN SPRINGS PINES: CONSIDERATION OF ALTERNATIVE MANAGEMENT OPTIONS – ECOLOGICAL PERSPECTIVE. PREPARED FOR THE TREE CONSULTANCY COMPANY.

COVER ILLUSTRATION: PINE TREES AND INDIGENOUS UNDERSTORY VEGETATION WITHIN WESTERN SPRINGS, 1 OCTOBER 2020

CONTENTS

Page

1	INTRODUCTION	1
1.1	Purpose of the Report	1
1.2	Report Scope	1
1.3	Independence	2
1.4	Site description	2
2	The three management options.....	4
2.1	Option 1 - Full stand removal in line with the consented works.....	4
2.2	Option 2 - Staged removals (e.g. meet WLB’s objective in a stepwise fashion over time).....	4
2.3	Option 3 - Select removals (e.g. removing trees based solely on risk management).....	4
2.4	Option 4 – Status Quo (no management)	5
3	Effects on ecology.....	6
4	Summary.....	10
5	Recommendation	12
	Appendix – Reference Information	13

1 INTRODUCTION

Western Springs Reserve, Grey Lynn, has been closed to the public since 2018 due to an elevated risk of the existing exotic Monterey pine trees (*Pinus radiata*) falling during adverse weather events. There is various evidence and expert opinion from specialists, including arborists, ecologists, geotechnical engineers and landscape architects, with regard to the risk of failure of the pines and impacts on other values, including ecological values, of clearance of the pines. However, there remains some disagreement as to the best way to manage the reserve, particularly the pine trees, some of which are at imminent risk of failure.

Auckland Council have been granted a resource consent to remove the stand of Monterey pines (*Pinus radiata*) at Western Springs. The stand of pines is approximately 100 years old and is exhibiting a decline in stand health, and increased risk of failure as a result of various factors such as wind throw, insect damage and other age-related factors.

The resource consent was appealed by the Society for the Protection of Western Springs Forest Incorporated to the Environment Court in 2019. Subsequently a new set of conditions was issued following mediation between parties and the appeal dismissed.

1.1 PURPOSE OF THE REPORT

The purpose of this report is to provide a review of four options for the Western Springs pine tree stand, including three clearance methods and a 'do nothing' approach. The review includes consideration of supplied information, including arboricultural and ecological, and determines likely outcomes for the ecological values at Western Springs Reserve.

1.2 REPORT SCOPE

There is disagreement between stakeholders regarding the most appropriate way to manage the vegetation, particularly the pine trees. Bioresearches has been commissioned to provide an independent assessment of the proposed approaches and associated methods (including 'do nothing'). The four methods are:

- a. Full stand removal in line with the consented works
- b. Staged removals (e.g. meet Waitemata Local Board's objective in a stepwise fashion over time)
- c. Select removals (e.g. removing trees based solely on risk management)
- d. Maintain the status quo ('do nothing').

The contents of this assessment is based solely on ecological values. It does not consider pine tree health, risk of failure, land stability, landscape and visual effects, or the pros and cons of each tree removal method from an arboriculture perspective. However, information relating to these aspects may be referred to in this report where ecological outcomes may be affected.

Existing documents were provided and reviewed (Appendix 1). A site visit was undertaken on Thursday 1 October 2020.

This report does not constitute a full assessment of effects, rather it is intended to inform potential effects based on assessments already undertaken (e.g. Wildlands 2016) and revised management options. If a decision is reached to manage the site in a way other than the currently consented clear felling option, a new assessment of ecological effects may be required to inform any resource consent applications.

1.3 INDEPENDENCE

Bioresearches are fully independent of this process to date. We have no conflicts of interest with regard to the project and have no intention of tendering for, or providing ongoing services in relation to this project in the future. The author of this assessment is Canterbury based.

1.4 SITE DESCRIPTION

Full detailed site descriptions have been provided in various reports including the ecological assessment (Wildlands 2018) and the evidence of Nicholas Goldwater (2018). A summary description of the site is as follows. The site comprises an approximately 3.2 ha block of mixed forest vegetation. The block is dominated by old, senescing radiata pines, with a mixed indigenous dominated sub-canopy and understory though exotic species are also present. Indigenous species in these vegetation tiers are common both in the immediate area, and in the wider ecological district. A list of vegetation species encountered within the site can be found in the Wildlands report; however, this should not be considered an exhaustive list and it is possible other species are also present within the site. The block of vegetation is contiguous with mixed vegetation contained within the boundaries of Auckland Zoo, located on the northern and western boundaries of the site.

A number of invasive pest plants are present within the site including tradescantia (*Tradescantia fluminensis*), wild ginger (*Hedychium gardnerianum*) and mile-a-minute (*Dipogon lignosus*). It is understood that pest management has resulted in reductions in weed biomass; however, recent closure of the block to contractors for health and safety purposes will prevent ongoing management and likely result in the reinvasion of pest plants to areas where they have been previously under control.

Motions Creek flows along the south western boundary of the site, and there are a number of overland flow paths throughout the site, following the topography of the slope. At least one overland flow path, in the northern portion of the site, is likely to contain water on a permanent to semi-permanent basis and therefore, may provide habitat for indigenous fish species such as eels (*Anguilla* sp.) and banded kōkopu (*Galaxias fasciatus*). These species are known from Motions Creek.

The site supports a range of common native and exotic birds. It is directly adjacent to Western Springs Lake which provides dabbling bird habitat and wading bird roosts. It is likely that copper skink

(*Oligosoma aeneum*), a common, 'Not Threatened' (Hitchmough *et al.*, 2016¹) indigenous skink is present throughout the site. It is considered unlikely that geckos are present in the site although it should be noted that forest gecko (*Mokopirirakau granulatus*) and elegant gecko (*Naultinus elegans elegans*) have been recorded within the adjacent Auckland Zoo grounds.

Long-tailed bats (*Chalinolobus tuberculatus*) are known to use mature *P. radiata* pines as solitary, communal, and maternity (breeding) roosting habitat. No bats were detected during a survey undertaken by Wildlands (2018). Wildlands considered it unlikely that bats would be present as the pines within the site reportedly did not contain the cracks and holes that bats tend to favour. However, Wildlands did not completely discount their presence. Bioresearches' site visit revealed that the pines did support an abundance of cracks and holes that bats could potentially use (we observed many being used by rosellas and kingfishers throughout our brief visit) but we also consider it highly unlikely bats would utilise the habitat for the following reason. The distribution pattern of long-tailed bats in the Auckland Region strongly correlates with rural or peri-urban areas, and bats generally avoid more urbanised landscapes (those supporting residential, commercial, and industrial land use, e.g. Avondale and New Lynn) where vegetation cover and habitat suitability is much more limited. The nearest confirmed record of a long-tailed bat to Western Springs is the Waitakere Ranges, more than 10 km away. Based on the results of Wildlands' survey and our assessment of the unsuitability of surrounding environment to support long-tailed bats, we consider the presence of bats should be discounted from the deciding factors for this project and we have not included the presence of bats in our assessment.

¹ Hitchmough, R.; Barr, B.; Lettink, M.; Monks, J.; Reardon, J.; Tocher, M.; van Winkel, D.; Rolfe, J. 2016: Conservation status of New Zealand reptiles, 2015. New Zealand Threat Classification Series 17. Department of Conservation, Wellington. 14 p.

2 THE THREE MANAGEMENT OPTIONS

2.1 OPTION 1 - FULL STAND REMOVAL IN LINE WITH THE CONSENTED WORKS

The current consented plan is to clear fell the pine trees while avoiding specific areas identified as having higher indigenous vegetation values. These areas are identified in the Wildlands report. It is important to note that while it is called 'clear felling' it is not synonymous with how a production forestry block is clear felled (i.e. all vegetation stripped from the area). Pines will be directionally felled to land on or near an access track/s, avoiding where possible, as much native understory as possible. Some logs will be left within the site to decompose naturally, in turn, providing habitat for invertebrates, lichen, fungi and lizards, while the remainder will be removed from the site. Planting of indigenous canopy, sub-canopy and understory vegetation would then be conducted, with vegetation maintenance continuing for a period of time to ensure establishment. Pest plant and animal control would also be implemented. Canopy tree species such as kāuri, taraire and rimu are planned to be planted in year 2. It is expected that by this time, the pioneer planting will have had time to establish and provide shelter and protection for the young canopy species. This replicates natural successional processes.

2.2 OPTION 2 - STAGED REMOVALS (E.G. MEET WLB'S OBJECTIVE IN A STEPWISE FASHION OVER TIME)

Staged removal involves removing areas of the pines on two or more occasions. This could involve removing whole areas at one time (e.g. quadrants) or removing selected trees over a number of occasions. It is important to note the exact methodology for this has not been developed and the number of stages and time between each stage is unknown. However, it would likely require machinery to access the site on two or more occasions, potentially over areas that have already been cleared and/or planted. Felling is likely to be undertaken in a similar method to the full stand removal option, with pines felled directionally to avoid areas of higher value native vegetation with some logs left on site and the remainder removed. Once each stage is removed, planting of native vegetation would occur also in a staged manner. It is assumed that pest plant and animal management will occur within the planted areas only, as health and safety risks involved with accessing the remaining pines will remain the same as they currently are.

2.3 OPTION 3 - SELECT REMOVALS (E.G. REMOVING TREES BASED SOLELY ON RISK MANAGEMENT)

Removal of selected trees would involve felling trees based solely on risk management. The risk and therefore, which trees will be felled, will be determined by other parties such as arborists. It is unknown if planting will occur following tree removal. The ability to plant will likely depend on the area cleared as well as health and safety factors. Pest plant and animal management will also depend on any outcomes of health and safety risk assessments. Pines felled selectively will remain on site as there will not be sufficient access to enable removal of any logs. The exact method of tree felling will also depend on a number of factors and will be determined by the arborists undertaking the felling. Some factors that may influence the felling method include the state of the tree, angle of lean, and nearby structures. It is anticipated the ability to fell directionally will be more limited due to the proximity of other trees, though this will become easier over time as pines are removed.

2.4 OPTION 4 – STATUS QUO (NO MANAGEMENT)

Retaining the status quo involves no active management of the pine trees. Rather, management would be reactive, as it is now. Pines would be felled if they become damaged, or pose an imminent risk of failure (safety or property damage). Affected pines would be felled in the most appropriate direction to minimise or avoid damage to adjacent trees and structures. Once felled, they would be cut up and left in situ within the reserve.

3 EFFECTS ON ECOLOGY

The following section outlines the potential effects for each of the three options

The potential effects for each management option is tabulated to compare the potential effects (positive and negative) of the option on ecological values. Here, this review uses the Ecological Impact Assessment Guidelines (EciAG), published by Environment Institute of Australia and New Zealand Inc. (EIANZ 2018²) to compare the potential outcomes of the four management options. The EciAGs provide a standardised matrix framework that allows ecological effects assessments (Table 1) to be clear and transparent. The EciAG framework is generally used in impact assessments in New Zealand as good practice.

While the Wildlands report did not assign explicit ecological values to each ecological component, this review has determined the ecological values (as identified from the review process) to be **Moderate**, based on Ecological Impact Assessment guidelines for determining ecological value (EIANZ, 2018²).

The magnitude of effect for each effect has also been assigned based on EIANZ guidelines².

The overall level of effect, the component of an assessment that informs the need and/or level of mitigation required, is determined using both the ecological value, and the magnitude of effect an activity has on the ecological value. The level of effect is determined using Table 10 from the EIANZ guidelines and is given in Table 1 below.

Table 1: Criteria for describing the level of effect

		ECOLOGICAL VALUE				
		VERY HIGH	HIGH	MODERATE	LOW	NEGLIGIBLE
MAGNITUDE OF EFFECT	VERY HIGH	Very High	Very High	High	Moderate	Low
	HIGH	Very High	Very High	Moderate	Low	Very Low
	MODERATE	High	High	Moderate	Low	Very Low
	LOW	Moderate	Low	Low	Very Low	Very Low
	NEGLIGIBLE	Low	Very Low	Very Low	Very Low	Very Low
	POSITIVE	Net Gain	Net Gain	Net Gain	Net Gain	Net Gain

² EIANZ, 2018, Ecological Impact Assessment, EIANZ guidelines for use in New Zealand: terrestrial and freshwater ecosystems, 2nd Edition, Environment Institute of Australia and New Zealand, Melbourne.

Effect/attribute	Option 1 - Full clearance	Option 2 - Staged clearance	Option 3 - Selected clearance	Option 4 – Status quo
Vegetation	<p>Magnitude of effect: High (but temporary) Overall level of effect: Moderate</p> <ul style="list-style-type: none"> All pine trees removed (clear-felled). Access track cleared of all vegetation. Access track has been redesigned to work better with the contours of the site, it does encroach on some of the areas identified as higher value by Wildlands but overall impact has negligible difference. Maintain identified areas of higher value indigenous vegetation where possible (approx. 26% of site). Period of works short, matter of weeks to months (anticipated up to 12 weeks). Damaged understory able to be limited with managed and directional felling in the most efficient way. 	<p>Magnitude of effect: Moderate to high (depending on time to clear pines) Overall level of effect: Low</p> <ul style="list-style-type: none"> All pine trees removed. Unknown number and size of stages. Access track cleared of all vegetation, potentially several times, including regenerating species as access is required for different stages. Maintain identified areas of higher value indigenous vegetation where possible (approx. 26% of site). Period of works short, matter of days to weeks, but multiple periods required. New disturbance and destruction during each works period. High magnitude of effect if stages are immediately after each other (i.e. the same as full clearance) Moderate magnitude of effects if period (3+ months) between stages. Damaged understory able to be limited with managed and directional felling in the most efficient way. Fauna will continue to utilise unimpacted vegetation, but will still be displaced when it is cleared. Potentially displaced multiple times. 	<p>Magnitude of effect: Moderate to high (depending on time to clear pines) Overall level of effect: Low</p> <ul style="list-style-type: none"> Pine trees removed as needed over time. Ultimately all pines removed but may not occur for a number of years. Unknown number of felling instances. All trees likely left in situ as removing will be difficult around existing trees. Will provide some habitat but eventually there will be a lot of wood on the ground. Maintain identified areas of higher value indigenous vegetation in most instances. Potentially some damage during tree felling. Unknown period of time for all trees to be felled, potentially several years. Some disturbance during each felling occasion. Limited ability to provide for new plantings due to lack of access for planting and weed management contractors. Potential for felled trees to damage any new plantings and specimen trees if directional felling cannot be completed due to proximity of existing pines. Fauna will continue to utilise unimpacted vegetation. 	<p>Magnitude of effect: Moderate to high (depending on time to clear pines) Overall level of effect: Low</p> <ul style="list-style-type: none"> Pine trees removed as needed over time. Ultimately all pines removed but may not occur for a significant number of years. Unknown number of felling instances, potentially a significant number. All trees left in situ as removing will be difficult around existing trees. Will provide some habitat but eventually there will be an excess of wood on the ground potentially taking a significant amount of time to decompose. Understory mostly maintained. Unknown period of time for all trees to be felled, potentially decades. Some disturbance during each felling occasion. Highly limited ability to provide for new plantings due to lack of access for planting and weed management contractors. Felled and failed trees will damage understory including plantings and native specimen trees Fauna will continue to utilise unimpacted vegetation.
Native fauna (birds and lizards)	<p>Magnitude of effect: Moderate mitigated to low Overall level of effect: Low</p> <ul style="list-style-type: none"> Common native species present. Disturbance during clearance. Potential loss of common native nests/eggs/chicks if clearance occurs during breeding season, able to be mitigated by felling outside of breeding season. No species solely reliant on habitat, species able to utilise adjacent Auckland Zoo and Wester Springs vegetation, adjacent and nearby residential gardens. Directly adjacent unaffected habitat available for species ‘hopping’ across isthmus. Some habitat remains within the retained native vegetation. New, better quality habitat provided once planted vegetation has established. Temporary effects mitigated once plantings have established. Lizard Management Plan already prepared. 	<p>Magnitude of effect: Moderate mitigated to low Overall level of effect: Low</p> <ul style="list-style-type: none"> Common native species present. Disturbance during clearance, potentially multiple times. Potential loss of nests/eggs/chicks if clearance occurs during breeding season, able to be mitigated by felling outside of breeding season. No species solely reliant on habitat, species able to utilise adjacent Auckland Zoo and Wester Springs vegetation, adjacent and nearby residential gardens. Always maintain some vegetation for species ‘hopping’ across isthmus. Patches of habitat remain in native vegetation outside of stage being cleared and in replacement plantings of stages cleared prior. New, better quality habitat provided once planted vegetation has established. Lower initial impacts, but impacts spread out over time potentially providing ongoing stress to species for foreseeable future. Lizard Management Plan already prepared. Lizards will still need to be searched for and rescued/relocated from each stage. Once first stage/s complete, subsequent rescued lizards can be released into previous stages providing adequate habitat available and pest control is in place. 	<p>Magnitude of effect: Low Overall level of effect: Low</p> <ul style="list-style-type: none"> Common native species present. Disturbance during felling, multiple times (unknown number). Potential loss of nests/eggs/chicks if clearance occurs during breeding season, unknown ability to be mitigated by felling outside of breeding season if felling only occurs as a reactive/emergent measure. No species solely reliant on habitat, species able to utilise adjacent zoo and Wester Springs vegetation, adjacent and nearby residential gardens. Always maintain some vegetation for species ‘hopping’ across isthmus. Vegetation remains relatively undisturbed providing mostly continuous habitat in some form, but arguably lower quality that what would be provided by purposeful native plantings. Lower initial impacts, but impacts spread out over time potentially providing ongoing stress to species for foreseeable future. Likely not necessary to rescue and relocated lizards for felling unless felling significant area of trees. Large quantities of trees felled and left in situ will provide some habitat. 	<p>Magnitude of effect: Low Overall level of effect: Low</p> <ul style="list-style-type: none"> Common native species present. Disturbance during felling, multiple times (unknown number). Potential loss of nests/eggs/chicks if trees fail during breeding season. Cannot be mitigated as failure can occur at any time. No species solely reliant on habitat, species able to utilise adjacent zoo and Wester Springs vegetation, adjacent and nearby residential gardens. Slow change from exotic dominated to native dominated habitat for fauna. Always maintain some vegetation for species ‘hopping’ across isthmus. Vegetation remains relatively undisturbed providing mostly continuous habitat in some form, but lower quality that what would be provided by purposeful native plantings. Lower initial impacts, but impacts spread out over a very long period of time potentially providing ongoing stress to species for foreseeable future. Not necessary to rescue and relocated lizards unless felling significant area of trees.

Effect/attribute	Option 1 - Full clearance	Option 2 - Staged clearance	Option 3 - Selected clearance	Option 4 – Status quo
Freshwater	<p>Magnitude of effect: Moderate mitigated to low Overall level of effect: Low</p> <ul style="list-style-type: none"> No machinery to cross Motions Creek tributary in northern portion of site (i.e. Area 2 in Wildlands report Figure 3). Vegetation around tributary maintained if possible as well as much of the vegetation adjacent to Motions Creek. Suitable erosion and sediment control will mitigate effects on freshwater. 	<p>Magnitude of effect: Moderate mitigated to low Overall level of effect: Low</p> <ul style="list-style-type: none"> No machinery to cross Motions Creek tributary in northern portion of site (i.e. Area 2 in Wildlands report Figure 3). Vegetation around tributary maintained if possible as well as much of the vegetation adjacent to Motions Creek. Suitable erosion and sediment control will mitigate effects on freshwater. Multiple stages mean multiple opportunities for sediment to enter waterways. Also requires several reinstatements of erosion and sediment control methods, increasing disturbance to riparian zone and instream habitat depending on methods utilised. 	<p>Magnitude of effect: Low Overall level of effect: Low</p> <ul style="list-style-type: none"> Likely limited impacts on freshwater as machinery not likely to be used for individual tree felling. Vegetation around tributary maintained if possible as well as much of the vegetation adjacent to Motions Creek. Suitable erosion and sediment control will mitigate effects on freshwater. 	<p>Magnitude of effect: Low Overall level of effect: Low</p> <ul style="list-style-type: none"> Likely limited impacts on freshwater as machinery not likely to be used for individual tree felling. Vegetation around tributary maintained if possible as well as much of the vegetation adjacent to Motions Creek. Unlikely any erosion and sediment control required as site will not be actively managed.
Sediment	<p>Magnitude of effect: Moderate mitigated to low Overall level of effect: Low</p> <ul style="list-style-type: none"> Main effects of sediment on waterways. Works temporary and short-term in nature. Aquatic biota currently experience periods of elevated sediment levels. Clear felling is not the same as production forestry clear felling. Suitable erosion and sediment control will mitigate effects. Rapid replanting of area to stabilise site. 	<p>Magnitude of effect: Moderate mitigated to low Overall level of effect: Low</p> <ul style="list-style-type: none"> Main effects of sediment on waterways. Multiple stages mean multiple instances of potential sediment inputs. Works temporary and short term in nature, but multiple stages over foreseeable future. Aquatic biota currently experience periods of elevated sediment levels. Suitable erosion and sediment control will mitigate effects. Retention of staged areas reduces exposed ground, reducing sediment sources. Rapid replanting of area to stabilise site. 	<p>Magnitude of effect: Low Overall level of effect: Low</p> <ul style="list-style-type: none"> Limited impact of sediment as limited pathways for generation if no machinery used and no access track cut. Likely limited requirement for erosion and sediment control as less need for machinery and majority of trees left in situ 	<p>Magnitude of effect: Negligible Overall level of effect: Very low</p> <ul style="list-style-type: none"> Limited impact of sediment as limited pathways for generation if no machinery used and no access track cut. Likely no requirement for erosion and sediment control as no need for machinery or earthworks.
Weed and animal control	<ul style="list-style-type: none"> Weed and animal control can occur instantly and throughout the site. Methods can be adapted to specific weeds. Management ongoing as needed. 	<ul style="list-style-type: none"> Weed and animal control can occur within cleared stages as they are made safe to access. Uncleared stages likely remain unavailable for access for weed and pest control contractors. Methods can be adapted to specific weeds. Management ongoing as needed within stages that have been cleared. 	<ul style="list-style-type: none"> Weed and animal control cannot occur until it is safe for contractors to enter site, potentially in several years. May take several years to get weeds and pest animals under control if there is a significant period of no control due to limited access. Potential for weeds to overtake native vegetation in parts. Methods can be adapted to specific weeds. 	<ul style="list-style-type: none"> Weed and animal control cannot occur until it is safe for contractors to enter site, potentially in several years. May take several years to get weeds and pest animals under control if there is a significant period of no control due to limited access. Potential for weeds to overtake native vegetation in parts.
Replacement vegetation	<ul style="list-style-type: none"> Planting can occur immediately over entire site. Ongoing plant maintenance over entire site as required e.g. replacement of dead plants, infilling of gaps. Successional planting in year 2 once some shelter established. Some natural establishment from seedbank in soil from existing indigenous vegetation. All vegetation will be of same age until natural recruitment occurs. 	<ul style="list-style-type: none"> Planting will occur in stages as stages are cleared of pines. Some planted vegetation may be damaged/destroyed as subsequent stages are cleared. Ongoing plant maintenance within cleared stages. Successional planting in year 2 once some shelter established. Some natural establishment from seedbank in soil from existing indigenous vegetation. Planted vegetation will be of different ages potentially buffering against effects of climatic disturbance such as drought. 	<ul style="list-style-type: none"> Replacement/enrichment/enhancement planting cannot occur until deemed safe to do so. Likely not for several years, until pines have been felled. Maintenance of plantings and management of weeds cannot occur until deemed safe to do so. Likely not for several years, until pines have been felled. Ultimate time period for establishing native canopy much longer due to lack of access. Some natural recruitment may occur but high potential to be affected by weeds. 	<ul style="list-style-type: none"> Replacement/enrichment/enhancement vegetation not likely to occur due to limited access to area. Ultimate time period for establishing native canopy much longer, potentially decades, due to lack of access. Some natural recruitment may occur but high potential to be affected by weeds.

Effect/attribute	Option 1 - Full clearance	Option 2 - Staged clearance	Option 3 - Selected clearance	Option 4 – Status quo
Key risk factors	<ul style="list-style-type: none"> Inputs of sediment to waterways if erosion and sediment control not enacted properly 	<ul style="list-style-type: none"> Damage to planted vegetation when subsequent site access is required for future stages Ongoing disturbance and displacement of fauna species (birds and lizards) Inputs of sediment to waterways if erosion and sediment control not enacted properly 	<ul style="list-style-type: none"> Vegetation may become heavily influenced by weeds due to limited ability to access site for control while pines are present. Pest animal species become established due to limited ability to access site for control while pines are present. Limited ability for canopy species to recruit naturally at a rate that will achieve canopy closure in a timely fashion. Limited ability to avoid felling trees during bird breeding season. Much higher potential for trees to be blown over or fall over natural, damaging any existing or planted vegetation in their path. 	<ul style="list-style-type: none"> Vegetation may become heavily influenced by weeds due to limited ability to access site for control while pines are present. Pest animal species become established due to limited ability to access site for control while pines are present. Limited ability for canopy species to recruit naturally at a rate that will achieve canopy closure in a timely fashion. Limited ability to avoid felling trees during bird breeding season. Much higher potential for trees to be blown over or fall over natural, damaging any existing or planted vegetation in their path. Excess of wood within reserve. Potentially a very long time until all decomposed, may hinder seedling recruitment.
Key positive outcomes	<ul style="list-style-type: none"> Ability to rapidly establish diverse vegetation community including species that would have naturally occurred in the area. Single disturbance event allowing fauna to recolonise. Immediate access for weed and pest animal control, including ongoing access. 	<ul style="list-style-type: none"> Ability to establish diverse vegetation community including species that would have occurred naturally Not all planted vegetation will be the same age increasing ability of site to buffer against climatic effects such as drought. 	<ul style="list-style-type: none"> Significantly reduced pathways for sediment to enter waterway compared to other options 	<ul style="list-style-type: none"> Maintain existing vegetation. Very little risk of sediment inputs to waterways.

4 SUMMARY

The 100-year-old stand of pine trees at Western Springs has been steadily reducing in numbers over the past years due to the trees succumbing to age related problems. The pines remaining on the site are at risk for failure over time, potentially threatening property and life. A resource consent has been issued to clear fell the site; however, concern has been expressed about the lack of consideration of alternative methods of pine tree management. This report provides an assessment of three options (full stand removal/clear felling, staged removal, selective removal), and discusses the effects these options would have on ecological values only. Ultimately the three options will all result in a Low level of ecological effects due to the moderate ecological values of the site (containing common native species, but representing a reasonable sized habitat), and low magnitude of effect (with the exception of clear felling where the magnitude is considered to be moderate for vegetation and low for the remainder of ecological values).

A summary of key themes to be considered is provided below.

- The existing native vegetation is low quality native scrub with a small number of canopy trees. Without intervention a native canopy will not develop naturally for many decades.
- The overall level of ecological effects for all three options is Low. It is generally accepted that only where the level of effects is moderate or higher, mitigation is necessary.
- No species (based on survey undertaken by Wildlands (2018) and a review of all existing information) rely solely on the area for habitat. The majority of species are common natives equally capable of persisting in the adjacent Auckland Zoo, Western Springs pond area and residential gardens.
- The area would remain closed to the public and contractors (weed/pest management, planting contractors) if the pines are not felled. This limits the ability to restore the area with more native vegetation and control the weeds.
- Staged clearance, where each stage immediately follows the preceding stage, is essentially the same as clear felling and has the same level of effects.
- Staged clearance, where there is a stand down period between stages, extends the disturbance period potentially indefinitely in the absence of information on the duration of the stages.
- Staged clearance and selected clearance do not reduce overall level of effects. Both options result in the pines being removed and the understorey vegetation affected. While these options do reduce the magnitude of effect for each clearance event, over time the overall outcome remains the same irrespective of the clearance method.
- Forestry favours staged clearance, but each stage immediately follows the preceding one, which essentially is the same as the clear fell scenario (Option 1).
- Clearing selectively increases the risk that a tree may fail naturally, falling and damaging any existing or planted native vegetation.
- While clear felling will result in fauna displacement (birds and lizards), this will be temporary. With appropriate planting it is expected that all bird and lizard species known to occur at the site will return as soon as the vegetation has re-established.
- Removing the pine trees will have no significant impact on the ability of existing native vegetation to persist on the site despite changes in shelter, light, water availability. Removal of wilding pines from mixed or indigenous vegetation is a common occurrence throughout

New Zealand and generally has positive effects for indigenous biodiversity, providing ongoing management is appropriate.

- Felling selected trees and leaving wood in situ will provide habitat, however leaving excessive volumes of wood on the forest floor may hinder seedling establishment and will damage vegetation should any logs become unstable and move.
- Overland flow paths are not expected to be altered providing any physical works to facilitate pine clearance are undertaken in a sensitive manner, and/or relevant resource consents are obtained to allow for changes to flow paths.
- Managing the area from a completely ecological perspective would require removal of the pine trees. The pines themselves do not provide any significant habitat that cannot be provided by indigenous species within a relatively short period after planting. An entirely native community would be preferential from an ecological perspective as habitat values would be higher and the community would be more reminiscent of what would 'naturally' occur at the site.

5 RECOMMENDATION

Taking into account only the ecological values of the site, and the risk of damaging ecological values through the three different management methodologies, as well as maintaining status quo, it is recommended that either the site is clear felled as per the existing consent, or felled in stages with each stage immediately following the preceding stage.

The ecological values of the area are considered to be predominantly moderate, largely due to the presence of indigenous fauna. The vegetation consists of common native scrubby species, with a smaller number of potential canopy species and abundant weeds. Clear and staged felling will enable areas of existing native vegetation to be retained providing felling occurs in a manner that avoids as much of this area as possible. Any remaining native vegetation can be planted with canopy species, where appropriate.

While the existing vegetation, including both the pines and the native understory, does provide habitat for indigenous fauna, no fauna species is solely reliant on this habitat for their persistence. Birds will be able to utilise adjacent residential gardens, as well as the grounds of Auckland Zoo and the remainder of Western Springs until native plantings establish within the cleared area. Lizards can be readily managed using the existing Lizard Management Plan, with updates if necessary to accommodate staged pine clearance.

Both clear felling and staged (immediately successive stages) clearance provide the opportunity to rapidly plant the cleared areas with an appropriately selected and diverse vegetation community. Planted vegetation can be managed post planting to ensure plant survival, and provide weed and pest management. Planted vegetation is expected to provide some habitat, including food sources and shelter, within the first two years and will increase significantly over time. Within a relatively short time period, it is expected the planted area will provide significantly higher ecological value habitat, than is currently present on the site.

If either of these options are selected, it is recommended the following occur:

- Pine clearance to occur outside of bird nesting season (i.e. only to occur between March and August)
- Lizard management plan to be enacted, with adjustments as necessary to accommodate staged clearance
- Planting to occur as soon as practicable after clearance. Pioneer species to be planted year one, enrichment planting to occur year two.
- Enrichment species should be planted within any remaining native vegetation.
- Plant maintenance to occur for a minimum of five years following completion of planting. Plant maintenance to include replacement of any plants that have died.
- Weed management to occur throughout the planted site for a minimum of five years. After five years, management can occur as necessary.
- Pest animal management to occur for a minimum of five years. After five years, management can be reviewed and adjusted depending on the outcomes of the five years of management.
- Erosion and sediment control to be developed and implemented according to industry best practice, including the development of any access tracks to require the smallest earthworks footprint as practicable.

APPENDIX – REFERENCE INFORMATION

#	Date	Author	Document Description
1.	8 December 1988	P W Langston, Ministry of Forestry	Western Springs Pine Forest Management
2.	11 November 2013	Envivo	Site plan of Western Springs Park
3.	June 2016	Wildland Consultants Limited	Ecological assessment and management plan for the proposed removal of pines at Western Springs park
4.	3 June 2016	Geoconsult	LUC60321424 Geotechnical Investigation Report
5.	28 May 2018	Gerald Collett, GeoTree Limited	Memorandum: Western Springs – Stand of radiata pines below West View Road
6.	30 May 2018	Ridley Dunphy Environmental Limited	LUC60321424 site plan (Erosion and sediment control plan)
7.	June 2018	David Stejskal	Western Springs pine trees arboricultural assessment
8.	8 June 2018	Chris Inglis, SPS Biosecurity Limited.	Report on Tree Health in Western Springs
9.	30 August 2018	Stuart Fraser, SCION	Forest Health Reference Laboratory Pathology Report
10.	19 November 2018	Glenn Pope, Ridley Dunphy Environmental Limited	Statement of Evidence – ENV-2018-AKL-000104
11.	23 November 2018	Philip Williams	Statement of Evidence – ENV-2018-AKL-000104
12.	26 November 2018	David Stejskal	Statement of Evidence – ENV-2018-AKL-000104
13.	26 November 2018	Gerald Collett	Statement of Evidence – ENV-2018-AKL-000104
14.	26 November 2018	Nicholas Goldwater	Statement of Evidence – ENV-2018-AKL-000104
15.	26 November 2018	Peter Kensington	Statement of Evidence – ENV-2018-AKL-000104

16.	12 February 2019	Gerald Collett, GeoTree Limited	Memorandum - Western springs pines - immediate problem trees along West View Road boundary
17.	16 February 2019	Marcus James	Statement Arboricultural Report
18.	18 February 2019	Simon Chapman, Ecology New Zealand	Letter to Deborah Manning regarding resource consent application to remove pine trees, Western Springs park.
19.	19 March 2019	Christopher Benton, Ask the Arborist Limited	Letter to the Commissioners regarding Western Springs pine stand
20.	24 July 2019	Gerald Collett, GeoTree Limited	Memorandum Western Springs – stand of radiata pines below West View Road
21.	22 August 2019	Various	Expert Conference – Arborists (ENV-2018-AKL-000104): Joint Arborists Witness Statement (signed) and associated documents e.g. Western Springs Pine Tree Survey (Preliminary Data)
22.	27 September 2019	Environment Court	Consent order
23.	22 November 2019	Gavin Donaldson	Arboricultural memorandum for Waitemata Local Board regarding pine trees at Western Springs reserve
24.	28 November 2019	Paul Amaral	Falling trees risk assessment
25.	10 October 2019	Auckland Council	Auckland Council Safety Management Framework
26.	12 December 2019	Craig Webb	Western Springs Forest risk assessment
27.	3 February 2020	Auckland Council	Auckland Council Enterprise Risk Framework v4
28.	5 March 2020	Denis Cooper, Fire & Emergency NZ	Fire hazard report
29.	6 August 2020	Friends of Western Springs Forest	Western Springs forest ecological transformation plan
30.	7 September 2020	Gavin Donaldson	Email regarding Western Springs pines