Te Pane a Mataaho - Māngere Mountain Tree Removal Methodology

17R Domain Road, Mangere Bridge, Auckland

Client: Tūpuna Maunga Authority

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Prepared by: Treescape Arboriculture Consultants

Treescape Ltd

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This assessment and report have been prepared on behalf of Treescape Ltd (Treescape) by Mr Matthew Priestley, Arboriculture Consultant, for the Tūpuna Maunga Authority

This report should be accepted and read in its entirety. No single statement or part of this report should be used individually in a manner that is outside the context of the whole report.

This assessment and report does not address the matter of environmental effects relating to arboriculture works as it was outside the scope of works.

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Acknowledge that information from relevant reports and/or plans supplied by others may have been used in the formulation of this report, to support the information provided and authorised.

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Contents

Introduction

The Tūpuna Maunga Authority has engaged Treescape Ltd to prepare a Tree Removal Methodology (Methodology) for the removal of 152 exotic trees on Te Pane a Mataaho - Māngere Mountain.

This Methodology includes an inventory of all exotic trees over 3m in height and their GPS locations. The Methodology has been informed by advice from specialists to avoid damage or disturbance of archaeological, cultural and historical features of the maunga.

This Methodology has been prepared by and/or overseen by appropriately qualified Arboriculture Consultants familiar with large scale tree removal. Treescape Limited undertook the recent removal works at Maungarei.

This Methodology does not give consideration to the environmental effects of the proposed tree removals. Reports by other specialists will assess ecological and landscape visual matters relevant to the wider restoration project.

Scope

Treescape Limited has been engaged by Tūpuna Maunga Authority to prepare a methodology for the removal of exotic species from Māngere Mountain. This has involved:

- Identifying each exotic tree, its location and the characteristics relevant to defining a removal method
- Determining operating methodologies for their removal that are cost effective, safe and best protect the archaeological, cultural and historical features of the maunga from damage or disturbance; and
- Defining the operations management system and practices required to minimise implementation risks

This Methodology will be used to inform a detailed Arboriculture Works Specification from which potential tree removal contractors can provide sufficiently complete and accurate service solution proposals and pricing estimates.

Scope Exclusions

- An assessment of the environmental effects of planned arboriculture works
- Detailed review and refinement of work specifications at an individual tree level

Operating Methods Assessment & Selection

Assessment & Selection Factors

The factors relevant to, and considered in, developing the Methodology are detailed below in Table 1 below. Assessment & evaluation of these factors, and their interconnection, has determined the specific operating methods selected for given areas and trees.

This section in the table on Overlays has been informed by advice from the project archaeologist and planner. The remaining sections are informed by the arboricultural expertise of the Treescape consultants.

Table 1: Assessment Factors

Category	Factor	Relevance
Overlays	Natural Features	Ground disturbance is not permitted in an natural / unmodified area of the maunga unless approved by the Archaelogist.
	Archaeological sensitivity	Archaelogically sensitive areas must be protected from damage or alteration. The default position is that no ground disturbance, regardless of how minor, is permitted. This eliminates all removal methods that involve tree / tree sections being lowered to the ground at its original location. Crane assisted dismantling can be used to remove trees located less than 40m - 70m (crane size dependent) from a suitable operating area. Any increased tolerance for ground disturbance would give rise to the possible use of crash mats to lessen the impact when lowering tree sections on to sensitive ground. Used in conjunction with rigging techniques that offer maximum control may be a solution that meet acceptable risk thresholds.
Physical Factors	Topography	As the land gradient becomes steeper so to does the level of complexity and risk associated with tree removal. Manually assisted felling and dismantling methods can be used but, for larger trees especially, controlling the direction and resting place of the fall and the feasibility of processing in situ and moving tree rings or logs are important considerations. Crane or helicopter assisted dismantling is highly likely a more cost effective, as well as lower risk, method for removing large trees from sloped areas.
	Built features / Land Modifications	Modifications such as roading and pathways provide potential work areas, or access ways to work areas, for large machinery. In modified areas ground distrurbance is permitted as the archaelogical effect has already occurred and the risk significantly reduced. The size, gradient and stability of the modified area(s) will determine the size and type of machinery that can be used.
Tree Factors	Provenance	Provence refers to a tree's place of origin. An objective of this project is remove any species not originating in NZ (exotics) from the maunga. Identifying exotics is a key function of the tree survey.
	Species	Tree species can define tree handling and removal requirements. E.g. species susceptible to diseases posing high biosecurity risk e.g. Dutch Elm, Myrtle and Kauri are subject to specific contols. Some, but not all species will require ringbarkng or injecting with herbicides in advance of removal if stumps are to be left to rot and decay.
	Size	Size is a key determinant of the tree removal method. Felling methods require a clear area to land the tree and is only feasible in non-sensitive areas. Cutting large trees into sufficiently small sections to be loaded into trucks is generally not cost effective when compared to dismantling into large sections that can be loaded by crane or helicopter.
	Quantity	When all but a few trees require crane or helicopter assisteed removal it is highly likely utilising these tools for the few will be more cost effective.
Regulatory Factors	Noise Disturbance	Noise restrictions will impact when and where helicopters and loud machinery can be operated.
	Traffic Management	Operating on or around roads will require either traffic management plans to be implemented or potentially temporary road closures.
	Health & Safety	An assessment of H&S risk relating to all aspects of planned operations for each site is mandatory and should be viewed as informing the evaluation and selection of tree removal methods.
Cost Factors	Method Cost	[redacted]
	Overall Cost [redacted]	[redacted]

Survey Area

The survey area is shown on Figure 1. A survey of the subject-site and all trees >3m in height was undertaken by Treescape Limited.

Figure 1: Aerial image of the subject site and surrounding area

Tree Population

Native Tree Species

Native species predominantly consist of pohutukawa (*Metrosideros excelsa*) and, to a lesser degree, puriri (*Vitex lucens*), kohekohe (*Dysoxylum spectabile*) and karaka (*Corynocarpus laevigatus*). This accounts for approximately 30% - 40% of species within the survey area.

Exotic Tree Species

In total 152 exotic trees (woody vegetation >3m in height) representing 15 species were identified within the survey area. A breakdown by species is given in Table 2 on the following page.

The greatest concentrations of exotics are in and around the recreational areas: the main track to the summit, the entrance road, playground area, road reserve and Memorial Hall.

Six (6) species account for >85% of exotics: Monterey cypress/macrocarpa (*Cupressus macrocarpa*) - 44 trees; Poplar (various) - 31 trees; Acmena (*Syzygium smithii*) - 24; Olive (*Olea europaea*) – 13 trees; Norfolk Island pine (*Araucaria heterophylla*) – 11 trees; Coral/flame tree *(Erythrina sp.)* – 11 trees.

Two species are prominent due to their size and / or positioning: *Norfolk Island Pines* - their significant size and characteristic form make these species a stand out and *Macrocarpa* - a significant number of large specimens are located on ridge lines and around the tihi are a strong visual feature of the maunga.

Three (3) species identified on site are listed as pests in the regional pest management strategy (RPMS): Tree privet (*Ligustrum lucidum*) and Acmena/monkey apple (*Syzygium smithii*) are classified as unwanted orrganisms. English hawthorn (*Crataegus laevigata*) is classified as a Surveillance Pest Plant. A further two (2) earmarked for further research: Feral olive (*Olea* sp.) and Moreton bay fig (*Ficus macrophylla*).

Table 2: Tree Population Breakdown by Species

SPECIES	TOTALS
Acmena smithii, Syzyium - lilly pilly, monkey apple	**15**
Araucaria heterophylla- Norfolk Island pine	**9**
Crataegus laevigata - English hawthorn	**0**
Cupressus macrocarpa - Monterey cypress	**44**
Cupressus x leylandii - Leyland cypress	**1**
Erythrina sp. - coral/flame tree	**10**
Ficus macrophylla-Morton Bay fig	**1**
Idesia polycarpa - Chinese wonder tree	**3**
Ligustrum lucidum - tree privet	**11**
Magnolia grandiflora - N Am evergreen magnolia	**1**
Melia azedarach - Indian bead	**4**
Olea sp. - olive	**12**
Populus sp. - Poplar	**32**
Quercus sp. - Oak	**5**
Unknown	**4**
	152

Operating Methods

The operating methods are the various tree removal and processing techniques.

Tree Removal

A suite of tree removal method options appropriate for the range of works required has been developed. These have been selected for inclusion on the basis of feasible, effectiveness and cost. Selected methods are listed below and described in Appendix A.

- Ring barking, spraying, drill and fill methods
- Manual felling
- Machine assisted manual felling
- Manual dismantling
- Manual dismantling using rigging techniques
- MEWP assisted dismantling
- Crane assisted dismantling
- Helicopter assisted dismantling

Debris Processing

A suite of processing method options appropriate for the range of works required has been developed. These have been selected for inclusion on the basis of feasibility, effectiveness and cost. Selected methods are listed below and described in Appendix B.

- Cut and leave
- Mulch on-site
- Mulch off-site
- Cut logs on-site
- Cut logs off-site

Operations Plan

Operating Zones

Groupings of trees with same methodology have been bundled into Tree Removal Operating Zones.

Modified areas of sufficient size and proximity to removal works have been identified as Processing Sites.

Figure 2 below identifies the recommended location and boundaries of both Tree Removal Operating Zones (green bordered areas) and Processing Sites (yellow bordered areas). The coloured dots represent the locations of exotic trees, with the colour representing the primary removal method.

The operating zones are detailed more fully in Table 4 on the page 11.

Figure 2: Map of Operating Zones, Tree Locations & Removal Methods

Trees for Removal

Tree Inventory

The species and quantities of exotic trees identified in each operating zone on Mangere maunga are summarised in Table 3 on the following page and itemised in full in Appendix C.

Table 3: Summary of Exotic Trees

SPECIES	A - Summit Walkway	B - Tihi and Slopes	C - Domain Road Area	D - Plaground Area	E - Sports Field Area	F - SW Boundary Area	G - Memorial Hall Area	TOTALS
Acmena smithii, Syzyium - lilly pilly, monkey apple	0	0	11	0	0	4	0	**15**
Araucaria heterophylla- Norfolk Island pine	1	0	8	0	0	0	0	**9**
Crataegus laevigata - English hawthorn	0	0	0	0	0	0	0	**0**
Cupressus macrocarpa - Monterey cypress	3	26	15	0	0	0	0	**44**
Cupressus x leylandii - Leyland cypress	0	0	0	0	1	0	0	**1**
Erythrina sp. - coral/flame tree	10	0	0	0	0	0	0	**10**
Ficus macrophylla-Morton Bay fig	1	0	0	0	0	0	0	**1**
Idesia polycarpa - Chinese wonder tree	0	0	1	0	0	0	2	**3**
Ligustrum lucidum - tree privet	0	0	0	0	0	0	11	**11**
Magnolia grandiflora - N Am evergreen magnolia	0	0	0	0	1	0	0	**1**
Melia azedarach - Indian bead	0	0	0	0	0	0	4	**4**
Olea sp. - olive	1	11	0	0	0	0	0	**12**
Populus sp. - Poplar	0	0	1	13	3	0	15	**32**
Quercus sp. - Oak	0	1	0	0	3	0	1	**5**
Unknown	0	0	0	0	0	0	4	**4**
TOTALS	**16**	**38**	**36**	**13**	**8**	**4**	**37**	**152**

Operating Methods

Tree Removal Methods

The tree removal method standard includes:

- Felling a tree (as one section) or dismantling a standing tree by cutting and removing it in sections
- Leaving the remnant stump and root system in place – N.B. mandatory in archaeologically sensitive areas.
- Any pre-treatment of the tree.

The recommended operating methods are outlined in the Table 5 on the page 12.

The following variations to the method standard are identified for consideration by the relevant other experts.

Leaving stumps Felling trees but not grinding out stumps, as in orthodox arboricultural situations, avoids any chance of affecting archaeologically sensitive areas.

Use of Crash Mats Crash mats will be used to minimise ground disturbance impact when lowering tree sections on to sensitive ground as part of manual dismantling operations.

Used in conjunction with rigging techniques that offer maximum control may be a solution that meet acceptable risk thresholds.

Debris Processing Methods

Cuts from trees removed by helicopter assisted dismantling can be loaded directly into the method of transport. Cuts from all other trees will require further processing (at a designated Processing Site) into section sizes suitable for loading.

Processing Sites

Two processing areas are proposed for the helicopter and crane assisted dismantling methods:

Process. Site #	Area Description
1	Area of flat grass area behind kindergarten
2	Sports Field

During helicopter operations one processing site will be utilised to process removed trees and one as a refuelling site for the helicopter.

Processing Methods

As it relates to this Maunga, the Tūpuna Maunga Authority preference is that with the exception of specific logs that may be suitable for carving, processing is mulch on site. Where surplus to requirements, the mulch will be removed off site.

Table 4: Description of Operating Zones

Area	Name	Description	Physical Properties	Historical-Cultural Characteristics.	Viable Access Points	No. Exotic Trees	Tree Population Description	Processing Site Suitability
A	Summit walkway	This area flanks both sides of the first part of main track that runs along the inside of the southern ridge of the crater rim and leads to the summit (tihi).	Ridge line has undulating ground and low-moderate gradient Slopes are moderate-steep gradient	Any area off the track is classified as archaeologically sensitive. The track itself is classified as a modified area with no significance.	Track running through area	15	15 exotic trees are located in this area. Specimens of note include a large Moreton Bay fig (*Ficus macrophylla*), three large Norfolk Island pines (*Araucaria heterophylla*) and a group of flame trees (*Erythrina x sykesii*).	No
B	Tihi and slopes	This area includes the summit (tihi) and surrounding slopes on the northern inner and outer rim of the volcanic cone.	Steep gradient	High cultural significance High archaelogical sensitivity	None in promxity	38	38 exotics trees are located in this area. Macrocarpa predominate with approx. 20 grouped around the tihi and along the adjoining westward track. Note: Several pohutukawa and a few Puriri are located amongst the macrocarpa.	No
C	Domain Road area	This area flanks the entry road running from Domain Road to the main car park.	Low-moderate gradient Modified Area	The domain road area is adjacent to a tar road, and parts of this area are considered to be of archaeological significance.	Domain Road	36	36 exotics trees are located in this area. Norfolk Island pines predominate; A few large Monterey cypress, medium sized poplars and small-medium sized pin oaks and acmena/monkey apples.	No
D	Playground area	This area is located at the base of the north eastern slopes and includes a flat grassed area, skate ramp and playground.	Flat gradient Modified area	This area has been highly modified of little or no archaeological significance.	No operating restictions	13	13 exotics trees are located in this area. Various poplar species make up all tree. A group along the northern boundary are marked by a commemorative plaque.	Yes - the large flat modified area will also serve as a processing site for crane and helicopter removals.
E	Sports field area	This area is between a sports field and the entrance road. This area is dominated by exotic trees which provide a buffer between the entrance road and the sports field, and would provide shaded areas during the summer.	Flat gradient Modified area	This area has been highly modified of little or no archaeological significance.	No operating restictions	8	8 exotics trees are located in this area. 3 x pin oaks (*Quercus palustris*), 1 x large Norfolk Island pine (*Araucaria heterophylla*), 1 x medium evergreen magnolia (*Magnolia grandiflora*) and 3 x medium poplars (*Populus* sp.) Two outlying exotics, a cypress (*Cupressus* sp.) and a tree privet pest plant (RPMS unwanted organism) near the south eastern boundary road.	Yes - the large flat modified area will also serve as a processing site for crane and helicopter removals.
F	SW Boundary area	This area has a line of trees that are congruous with the western and southern boundaries of the site.	Low-moderate gradient	Archaeological features are thought to be present.	None in promxity	4	4 x acmena/monkey apples (Syzygium smithii) have established in amongst the natives that line the boundary.	No
G	Memorial Hall area	This area includes exotic trees situated in grass areas alongside the access road between Domain road and Taylor road.	Flat gradient Modified area	This area is considered to be highly modified with only a low potential for archaeology to be present.	No operating restictions	38	37 exotic trees are located in this area. 15 medium poplars (*Populus* spp.) are grouped along the edge of the road. The remainder are tree privet (*Ligustrum* sp.), 3 x wonder trees (*Idesia polycarpa*), 4 x unknown exotic species and 4 x Indian bead trees (*Melia azedarach*).	No

Table 5: Summary Operating Methods

Area	Description	# Trees	Cupressus macrocarpa - Monterey cypress	Populus sp. - Poplar	Acmena smithii, Syzygium - Lilly pilly, monkey appl	Olea sp. - olive	Araucaria heterophylla- Norfolk Island pine	Ligustrum lucidum - tree privet	Erythrina sp. - coral/flame tree	Quercus sp. - Oak	Melia azedarach - Indian bead	Unknown	Idesia polycarpa - Chinese wonder tree	Crataegus laevigata - English hawthorn	Cupressus x leylandii - Leyland cypress	Ficus macrophylla-Morton Bay fig	Magnolia grandiflora - N Am evergreen magnolia	1. Ring-barking / spraying / drill and fill	2. Manual Felling	3. Machine Assisted Felling	4. Manual Dismantling	5. Manual Rigging	6. MEWP Assisted Dismantling	7. Crane Assisted Dismantling	8. Helicopter Assisted Dismantling	Processing Site 1	Processing Site 2	Processing in situ	Cut & Leave	Mulch On Site	Mulch Off Site	Cut Logs on Site	Cut Logs Off Site	Tree Removal Method Selection Notes	Processing Method Selection Notes
A	Summit walkway	16	3	0	0	1	1	0	10	0	0	0	0	0	0	1	0								x	x			x				No proximity to access point, large quantity of trees to be removed, area of archaeological sensitivity.	Area of archaeological sensitivity Cut material to be moved to Processing Site 1
B	Tihi and slopes	39	26	0	0	12	0	0	0	1	0	0	0	0	0	0	0								x		x		x				Steep gradient, no proximity to access point, large quantity of trees to be removed, area of archaeological sensitivity.	Cut material to be moved to Processing Site 2.
C	Domain Road area	36	15	1	11	0	8	0	0	0	0	0	1	0	0	0	0							x		x	x			x				Proximity to the access road, large quantity of trees and specimen to be removed.	Cut material can be lifted on to the road, carpark or direct to Processing Site 1 or 2
D	Playground area	13	0	13	0	0	0	0	0	0	0	0	0	0	0	0	0		x	x	x	x				x				x				Modified area, no archaelogical sensitivity. Removal methods that risk ground disturbance are permited with the approval / under supervision of project archaeologist.	Cut material to be processed either within work area or at Processing Site 1
E	Sports field area	8	0	3	0	0	0	0	0	3	0	0	0	0	1	0	1		x	x	x	x					x			x				No archaeological sensitivity. Removal methods that risk ground disturbance are permited with the approval / under supervision of project archaeologist.	Cut material can be processed either within work area or at Processing Site 2
F	SW Boundary area	3	0	0	0	0	0	0	0	0	0	2	0	1	0	0	0				x							x			x			Access point limited to 4WD ute. Area of patchy archaeological sensitivity. Removal method manual dismantling with crash pads.	Cut material can be processed within this work area
G	Memorial Hall area	37	0	15	0	0	0	11	0	1	4	4	2	0	0	0	0		x	x	x	x	x				x		x					Modified area with low potential archaelogical sensitivity. Removal methods to be a combination with crash mat provision where appropriate.	Cut material can be processed within this work area

Operational Management Requirements

Appendix E sets out operational management requirements for carrying out the works.

The requirements focus on compliance with health and safety, regulation compliance and client relationship.

This would form part of a delivery plan and its purpose to achieve the desired outcomes within the various requirements and constraints of the project, as well as providing reassurance to the Authority, it is recommended that the contractor be required to adequately demonstrate appropriate operations management system controls.

Appendix A: Description of Tree Removal Methods

Method	Description
Ringbarking, spraying, drill and fill methods	Where trees can be left to die and decay in situ, various techniques can be employed to kill a standing tree. Removing a complete ring of bark near the base of the tree can effectively kill the upward portion of many types of tree that exhibit secondary growth. Other alternative methods involve the application of herbicide via holes drilled in the base of the stem or direct spraying of the foliage or basal bark. The trees will die after a period and will slowly decay and fall apart in sections or fail at the root plate or base.
Manual felling	The tree is cut at the base using approved felling techniques. A pre-installed pull rope can be hand pulled by ground staff or attached to a hand winch to assist with directional felling. The cutting arborist (herein after referred to as the cutter) may use other tools such as hammer and wedges, felling lever, or jack to push open the back cut to assist with directional felling. Once the final cut (the back cut) has been completed, and the tree begins to fall, the cutter retreats from the base of the tree via pre-planned escape route. If pull assisted felling is being employed, the cutter may have the opportunity to retreat via the escape route before the tree is pulled over. A felled tree is typically dismantled using approved snedding or delimbing techniques to remove side branches. Logs can be cut to required lengths.
Machine assisted manual felling	The excavator operator positions the excavator in an appropriate position to push the tree in the intended direction of fell or is attached to a pull line and positioned to pull the tree in the intended felling direction. The cutter makes felling cuts at the base of the tree. Once the final cut (the back cut) has been completed, the cutting arborist retreats from the base of the tree via pre planned escape route. The excavator then pushes or pulls the tree over. A felled tree is typically dismantled using approved snedding or delimbing techniques to remove side branches. Logs can be cut to required lengths.
Manual dismantling	The tree may be accessed using a mobile elevated work platform (MEWP or by a climber with a rope and harness. Approved cutting techniques can be used to cut the tree in sections. Sections can be cut and allowed to free fall to the ground or can be cut and snapped off by hand and then thrown to the ground. Cut sections can be pushed by the climber or pulled by ground staff using a pull line to assist cut sections to fall in a particular direction. Additional impact prevention measures can be implemented for sensitive sites such as the use of padding or impact resistant materials for crash pads.
Manual dismantling using rigging techniques	The tree can be accessed using a MEWP or by a climber with a rope and harness. The tree can be dismantled in sections using approved cutting techniques. Where there are targets below and/or debris needs to be lowered or relocated in a controlled manner, rigging techniques can be employed. Rigging typically involves the use of a system of ropes, pulleys/rings, and a ground based friction device, and other hardware. Rigging techniques can be used to lift or lower cut sections, or more advanced techniques such as sky/speed line or compound rigging can be used to transport cut material to another location. Using appropriate rigging techniques can reduce or avoid the impact of falling debris. Additional impact prevention measures can be implemented for sensitive sites such as the use of padding or impact resistant materials for crash pads.
MEWP assisted dismantling	The MEWP operator will position the truck and set it up in an appropriate place. The work platform is used to access the tree. From the platform, the tree can be dismantled using proper cutting and rigging procedures. If the work is near overhead power lines, an insulated boom, insulated tools and other specialist equipment can be utilised by competent and suitably qualified staff to clear vegetation from the power lines. Specific procedures need to be followed for work around overhead power lines. The voltage, weather and proximity of vegetation, vehicles, tools, and staff all need to be considered. When working near overhead power lines, a dedicated safety observer

	is positioned to watch the MEWP operator to ensure no part accidentally comes in contact with the overhead lines. When working on network lines the network operator's control centre needs to be notified about timing and location of work. A MEWP may also be utilised to dismantle trees that are unsafe to climb or difficult for a climber to access. The MEWP operator can cut small sections that can be snapped off by hand. The MEWP can be used to fly the held piece over to an appropriate position where they can be safely dropped.
Crane assisted dismantling	The crane will be setup in an appropriate location. A climber will access the tree using a rope and harness or via the crane. The lifting dogman will direct the crane operator to manoeuvre the hook to the climber. The climber will attach the crane hook using chains or sling to the section to be cut. The dogman will direct the crane operator to apply appropriate tension and position the hook over the section's centre of gravity. The climber will descend to a position agreed with the dogman to perform the cut sequence. Once directed by the dogman, the climber will proceed to cut the section to release it in a controlled manner. As the piece is released, the dogman will direct the crane operator to lift the section smoothly up and away from the climber. The crane operator will fly the load to the processing site where he will be directed by the landing dogman to lower and settle the section. Once the section has been stabilised, the sling/chains can be released by ground staff. The crane operator then directs the hook back to the climber for the next lift and the sequence is repeated.
Helicopter assisted dismantling	A suitably qualified climbing arborist (herein after referred to as the climber) will access the tree using a rope and harness. The tree may be pre-stropped (long choker slings/strops attached prior, to minimise flying time). The climber will check and adjust if necessary sling. The lifting dogman will direct the helicopter pilot to manoeuvre the helicopter hook to the climber. The hook is attached to the helicopter via a long line. The climber will attach the sling to the hook and signal the dogman. The lifting dogman will direct the pilot to take up the slack and position the helicopter over the load's centre of gravity. The lifting dogman will communicate with the climber to place the cuts at an appropriate point to ensure the load is within the helicopter's lifting capabilities and so the loaded can be lifted smoothly away from the climber. Once the climber has completed the cut procedure, the lifting dogman will direct the pilot to lift the load away from the climber and transport it to the processing site, via planned extraction zones. The landing dogman will direct the pilot to lower and release the load at the processing site. All machinery, vehicles and staff are kept clear of the flight path and suspended load. Once the load has been released, the pilot will return for the next lift, and the procedure will be repeated. During flying operations, only work that is strictly necessary is to be carried out within the landing zone, e.g. releasing slings and safe placement of loads. Loads are only to be approached once they have been safely landed and stabilised.

Appendix B: Description of Tree Processing Methods

Method	Description
Cut and Leave	Material can be left as it lies or stacked into eco piles that will provide habitat and decay over time returning nutrients to the soil.
Mulch On Site	Where mulch can be utilised on site, the chipped material can be chipped directly into a pile or chipped into a truck and tipped at an accessible location. If the cut material is to be chipped directly onto the site, a track mounted chipper can be used for less accessible sites.
Mulch Off Site	Chip-able material can be fed manually or by an excavator into a wood chipper that sprays the chip into the back of a tipper truck. Two 10t trucks will operate in rotation to remove mulch from site when processing higher volumes with an excavator. Truck movements can be up to 8-10 movements to and from site per day.
Log On Site	Logs can be left in length or cut into manageable sizes for the public to remove for firewood.
Log Off Site	Larger logs can be cut up and loaded into a truck manually, or loaded in larger lengths with a loader, crane, hiab or excavator. Logs can be transported from site in up to 5m lengths using a 10t tip truck or hiab truck with of 5m deck which can tow a trailer with additional 5m deck. Truck movements are estimated to be up to 4-5 movements to and from site per day.

Appendix C: Itemised Tree Inventory

Item No.	Tree Species	Operating Zone	Latitude	Longitude	RPMS Status	dbh_mm	height_approx_m_	canopy_spread_	Proposed Removal Method
1	Cupressus macrocarpa - Monterey cypress	C - Domain Road area	-36.9478	174.787008	Not Pest Species	250	12	10	Manual dismantle - Crash mats
2	Cupressus macrocarpa - Monterey cypress	C - Domain Road area	-36.9478	174.787008	Not Pest Species	250	12	10	Manual dismantle - Crash mats
3	Cupressus macrocarpa - Monterey cypress	C - Domain Road area	-36.9478	174.787008	Not Pest Species	250	12	10	Manual dismantle - Crash mats
4	Cupressus macrocarpa - Monterey cypress	C - Domain Road area	-36.9478	174.787008	Not Pest Species	250	12	10	Manual dismantle - Crash mats
5	Cupressus macrocarpa - Monterey cypress	C - Domain Road area	-36.9478	174.787008	Not Pest Species	250	12	10	Manual dismantle - Crash mats
6	Cupressus macrocarpa - Monterey cypress	C - Domain Road area	-36.9478	174.787008	Not Pest Species	250	12	10	Manual dismantle - Crash mats
7	Cupressus macrocarpa - Monterey cypress	C - Domain Road area	-36.9478	174.787008	Not Pest Species	250	12	10	Manual dismantle - Crash mats
8	Cupressus macrocarpa - Monterey cypress	C - Domain Road area	-36.9478	174.787008	Not Pest Species	250	12	10	Manual dismantle - Crash mats
9	Cupressus macrocarpa - Monterey cypress	C - Domain Road area	-36.9478	174.787008	Not Pest Species	250	12	10	Manual dismantle - Crash mats
10	Cupressus macrocarpa - Monterey cypress	C - Domain Road area	-36.9478	174.787008	Not Pest Species	250	12	10	Manual dismantle - Crash mats
11	Cupressus macrocarpa - Monterey cypress	C - Domain Road area	-36.9478	174.787008	Not Pest Species	250	12	10	Manual dismantle - Crash mats
12	Melia azedarach - Indian bead	G - Memorial Hall area	-36.9461	174.786187	Not Pest Species	200	5	5	Helicopter Assisted Felling
13	Melia azedarach - Indian bead	G - Memorial Hall area	-36.9461	174.786187	Not Pest Species	200	5	5	Helicopter Assisted Felling
14	Melia azedarach - Indian bead	G - Memorial Hall area	-36.9461	174.786187	Not Pest Species	200	5	5	Helicopter Assisted Felling
15	Melia azedarach - Indian bead	G - Memorial Hall area	-36.9461	174.786187	Not Pest Species	200	5	5	Manual Felling
16	Ligustrum lucidum - tree privet	G - Memorial Hall area	-36.9459	174.786386	Unwanted Organism	700	12	10	Helicopter Assisted Felling
17	Ligustrum lucidum - tree privet	G - Memorial Hall area	-36.9459	174.786386	Unwanted Organism	700	12	10	Helicopter Assisted Felling
18	Ligustrum lucidum - tree privet	G - Memorial Hall area	-36.9459	174.786386	Unwanted Organism	700	12	10	Helicopter Assisted Felling
19	Ligustrum lucidum - tree privet	G - Memorial Hall area	-36.9459	174.786386	Unwanted Organism	700	12	10	Helicopter Assisted Felling
20	Ligustrum lucidum - tree privet	G - Memorial Hall area	-36.9459	174.786386	Unwanted Organism	700	12	10	Helicopter Assisted Felling
21	Ligustrum lucidum - tree privet	G - Memorial Hall area	-36.9459	174.786386	Unwanted Organism	700	12	10	Helicopter Assisted Felling
22	Ligustrum lucidum - tree privet	G - Memorial Hall area	-36.9459	174.786386	Unwanted Organism	700	12	10	Helicopter Assisted Felling
23	Ligustrum lucidum - tree privet	G - Memorial Hall area	-36.9459	174.786386	Unwanted Organism	700	12	10	Helicopter Assisted Felling
24	Ligustrum lucidum - tree privet	G - Memorial Hall area	-36.9459	174.786386	Unwanted Organism	700	12	10	Helicopter Assisted Felling
25	Ligustrum lucidum - tree privet	G - Memorial Hall area	-36.9459	174.786386	Unwanted Organism	700	12	10	Crane Assisted Felling
26	Populus x euramericana - hybrid poplar P. nigra x P. deltoides	G - Memorial Hall area	-36.946	174.785904	Not Pest Species	600	25	10	Helicopter Assisted Felling
27	Populus x euramericana - hybrid poplar P. nigra x P. deltoides	G - Memorial Hall area	-36.946	174.785904	Not Pest Species	600	25	10	Helicopter Assisted Felling
28	Populus x euramericana - hybrid poplar P. nigra x P. deltoides	G - Memorial Hall area	-36.946	174.785904	Not Pest Species	600	25	10	Helicopter Assisted Felling
29	Populus x euramericana - hybrid poplar P. nigra x P. deltoides	G - Memorial Hall area	-36.946	174.785904	Not Pest Species	600	25	10	Helicopter Assisted Felling
30	Populus x euramericana - hybrid poplar P. nigra x P. deltoides	G - Memorial Hall area	-36.946	174.785904	Not Pest Species	600	25	10	Helicopter Assisted Felling
31	Populus x euramericana - hybrid poplar P. nigra x P. deltoides	G - Memorial Hall area	-36.946	174.785904	Not Pest Species	600	25	10	Helicopter Assisted Felling
32	Populus x euramericana - hybrid poplar P. nigra x P. deltoides	G - Memorial Hall area	-36.946	174.785904	Not Pest Species	600	25	10	Helicopter Assisted Felling
33	Populus x euramericana - hybrid poplar P. nigra x P. deltoides	G - Memorial Hall area	-36.946	174.785904	Not Pest Species	600	25	10	Helicopter Assisted Felling
34	Populus x euramericana - hybrid poplar P. nigra x P. deltoides	G - Memorial Hall area	-36.946	174.785904	Not Pest Species	600	25	10	Helicopter Assisted Felling
35	Populus x euramericana - hybrid poplar P. nigra x P. deltoides	G - Memorial Hall area	-36.946	174.785904	Not Pest Species	600	25	10	Helicopter Assisted Felling
36	Populus x euramericana - hybrid poplar P. nigra x P. deltoides	G - Memorial Hall area	-36.946	174.785904	Not Pest Species	600	25	10	Helicopter Assisted Felling
37	Populus x euramericana - hybrid poplar P. nigra x P. deltoides	G - Memorial Hall area	-36.946	174.785904	Not Pest Species	600	25	10	Helicopter Assisted Felling
38	Populus x euramericana - hybrid poplar P. nigra x P. deltoides	G - Memorial Hall area	-36.946	174.785904	Not Pest Species	600	25	10	Helicopter Assisted Felling
39	Populus x euramericana - hybrid poplar P. nigra x P. deltoides	G - Memorial Hall area	-36.946	174.785904	Not Pest Species	600	25	10	Helicopter Assisted Felling
40	Populus x euramericana - hybrid poplar P. nigra x P. deltoides	G - Memorial Hall area	-36.946	174.785904	Not Pest Species	600	25	10	Crane Assisted Felling
41	Quercus palustris- pin oak	G - Memorial Hall area	-36.9461	174.786354	Not Pest Species	430	8	15	Manual Felling
42	Unknown	G - Memorial Hall area	-36.9467	174.786271	Unknown	100	3	2	Helicopter Assisted Felling
43	Unknown	G - Memorial Hall area	-36.9467	174.786271	Unknown	100	3	2	Helicopter Assisted Felling
44	Unknown	G - Memorial Hall area	-36.9467	174.786271	Unknown	100	3	2	Helicopter Assisted Felling
45	Unknown	G - Memorial Hall area	-36.9467	174.786271	Unknown	100	3	2	Manual Felling
46	Araucaria heterophylla- Norfolk Island pine	G - Memorial Hall area	-36.9468	174.786639	Not Pest Species	1350	35	20	Manual Dismantling
47	Idesia polycarpa - Chinese wonder tree	G - Memorial Hall area	-36.9465	174.786033	Not Pest Species	800	7	10	Helicopter Assisted Felling
48	Idesia polycarpa - Chinese wonder tree	G - Memorial Hall area	-36.9465	174.786033	Not Pest Species	800	7	10	Helicopter Assisted Felling
49	Idesia polycarpa - Chinese wonder tree	G - Memorial Hall area	-36.9465	174.786033	Not Pest Species	800	7	10	Manual Dismantling

Item No.	Tree Species	Operating Zone	Latitude	Longitude	RPMS Status	dbh_mm	height_approx_m_	canopy_spread_m	Proposed Removal Method
50	Populus x euramericana - hybrid poplar P. nigra x P. deltoides	D - Playground area	-36.94664697	174.7852026	Not Pest Species	600	17	15	Helicopter Assisted Felling
51	Populus x euramericana - hybrid poplar P. nigra x P. deltoides	D - Playground area	-36.94664697	174.7852026	Not Pest Species	600	17	15	Helicopter Assisted Felling
52	Populus x euramericana - hybrid poplar P. nigra x P. deltoides	D - Playground area	-36.94664697	174.7852026	Not Pest Species	600	17	15	Helicopter Assisted Felling
53	Populus x euramericana - hybrid poplar P. nigra x P. deltoides	D - Playground area	-36.94664697	174.7852026	Not Pest Species	600	17	15	Helicopter Assisted Felling
54	Populus x euramericana - hybrid poplar P. nigra x P. deltoides	D - Playground area	-36.94664697	174.7852026	Not Pest Species	600	17	15	Manual Dismantling
55	Populus nigra - Lombardy poplar, black poplar	C - Domain Road area	-36.94762293	174.7862297	Not Pest Species	400	14	5	Helicopter Assisted Felling
56	Populus nigra - Lombardy poplar, black poplar	C - Domain Road area	-36.94762293	174.7862297	Not Pest Species	400	14	5	Helicopter Assisted Felling
57	Populus nigra - Lombardy poplar, black poplar	C - Domain Road area	-36.94762293	174.7862297	Not Pest Species	400	14	5	Crane Assisted Felling
58	Populus x euramericana - hybrid poplar P. nigra x P. deltoides	C - Domain Road area	-36.9475881	174.7861	Not Pest Species	400	16	10	Helicopter Assisted Felling
59	Populus x euramericana - hybrid poplar P. nigra x P. deltoides	C - Domain Road area	-36.9475881	174.7861	Not Pest Species	400	16	10	Helicopter Assisted Felling
60	Populus x euramericana - hybrid poplar P. nigra x P. deltoides	C - Domain Road area	-36.9475881	174.7861	Not Pest Species	400	16	10	Helicopter Assisted Felling
61	Populus x euramericana - hybrid poplar P. nigra x P. deltoides	C - Domain Road area	-36.9475881	174.7861	Not Pest Species	400	16	10	Crane Assisted Felling
62	Populus x euramericana - hybrid poplar P. nigra x P. deltoides	E - Sports field area	-36.94820696	174.7855664	Not Pest Species	500	17	20	Helicopter Assisted Felling
63	Populus x euramericana - hybrid poplar P. nigra x P. deltoides	E - Sports field area	-36.94820696	174.7855664	Not Pest Species	500	17	20	Helicopter Assisted Felling
64	Populus x euramericana - hybrid poplar P. nigra x P. deltoides	E - Sports field area	-36.94820696	174.7855664	Not Pest Species	500	17	20	Crane Assisted Felling
65	Quercus palustris- pin oak	E - Sports field area	-36.9488145	174.7853138	Not Pest Species	400	15		Helicopter Assisted Felling
66	Quercus palustris- pin oak	E - Sports field area	-36.9488145	174.7853138	Not Pest Species	400	15		Helicopter Assisted Felling
67	Quercus palustris- pin oak	E - Sports field area	-36.9488145	174.7853138	Not Pest Species	400	15		Crane Assisted Felling
68	Acmena smithii, Syzyium - lilly pilly, monkey apple	C - Domain Road area	-36.9482079	174.7851036	Unwanted Organism	500	8	8	Helicopter Assisted Felling
69	Acmena smithii, Syzyium - lilly pilly, monkey apple	C - Domain Road area	-36.9482079	174.7851036	Unwanted Organism	500	8	8	Helicopter Assisted Felling
70	Acmena smithii, Syzyium - lilly pilly, monkey apple	C - Domain Road area	-36.9482079	174.7851036	Unwanted Organism	500	8	8	Helicopter Assisted Felling
71	Acmena smithii, Syzyium - lilly pilly, monkey apple	C - Domain Road area	-36.9482079	174.7851036	Unwanted Organism	500	8	8	Helicopter Assisted Felling
72	Acmena smithii, Syzyium - lilly pilly, monkey apple	C - Domain Road area	-36.9482079	174.7851036	Unwanted Organism	500	8	8	Helicopter Assisted Felling
73	Acmena smithii, Syzyium - lilly pilly, monkey apple	C - Domain Road area	-36.9482079	174.7851036	Unwanted Organism	500	8	8	Crane Assisted Felling
74	Acmena smithii, Syzyium - lilly pilly, monkey apple	C - Domain Road area	-36.94777021	174.7853659	Unwanted Organism	800	10	15	Helicopter Assisted Felling
75	Acmena smithii, Syzyium - lilly pilly, monkey apple	C - Domain Road area	-36.94777021	174.7853659	Unwanted Organism	800	10	15	Helicopter Assisted Felling
76	Acmena smithii, Syzyium - lilly pilly, monkey apple	C - Domain Road area	-36.94777021	174.7853659	Unwanted Organism	800	10	15	Helicopter Assisted Felling
77	Acmena smithii, Syzyium - lilly pilly, monkey apple	C - Domain Road area	-36.94777021	174.7853659	Unwanted Organism	800	10	15	Crane Assisted Felling
78	Cupressus macrocarpa - Monterey cypress	B - Tihi and slopes	-36.94733399	174.7845693	Not Pest Species	2200	20	20	Helicopter Assisted Felling
79	Cupressus macrocarpa - Monterey cypress	B - Tihi and slopes	-36.94733399	174.7845693	Not Pest Species	2200	20	20	Helicopter Assisted Felling
80	Cupressus macrocarpa - Monterey cypress	B - Tihi and slopes	-36.94733399	174.7845693	Not Pest Species	2200	20	20	Helicopter Assisted Felling
81	Cupressus macrocarpa - Monterey cypress	B - Tihi and slopes	-36.94733399	174.7845693	Not Pest Species	2200	20	20	Helicopter Assisted Felling
82	Cupressus macrocarpa - Monterey cypress	B - Tihi and slopes	-36.94733399	174.7845693	Not Pest Species	2200	20	20	Helicopter Assisted Felling
83	Erythrina sp. - coral/flame tree	A - Summit walkway	-36.950993	174.7839267	Not Pest Species		15		Helicopter Assisted Felling
84	Erythrina sp. - coral/flame tree	A - Summit walkway	-36.950993	174.7839267	Not Pest Species		15		Helicopter Assisted Felling
85	Erythrina sp. - coral/flame tree	A - Summit walkway	-36.950993	174.7839267	Not Pest Species		15		Helicopter Assisted Felling
86	Erythrina sp. - coral/flame tree	A - Summit walkway	-36.950993	174.7839267	Not Pest Species		15		Helicopter Assisted Felling
87	Erythrina sp. - coral/flame tree	A - Summit walkway	-36.950993	174.7839267	Not Pest Species		15		Helicopter Assisted Felling
88	Erythrina sp. - coral/flame tree	A - Summit walkway	-36.950993	174.7839267	Not Pest Species		15		Helicopter Assisted Felling
89	Erythrina sp. - coral/flame tree	A - Summit walkway	-36.950993	174.7839267	Not Pest Species		15		Helicopter Assisted Felling
90	Erythrina sp. - coral/flame tree	A - Summit walkway	-36.950993	174.7839267	Not Pest Species		15		Helicopter Assisted Felling
91	Erythrina sp. - coral/flame tree	A - Summit walkway	-36.950993	174.7839267	Not Pest Species		15		Helicopter Assisted Felling
92	Erythrina sp. - coral/flame tree	A - Summit walkway	-36.950993	174.7839267	Not Pest Species		15		Helicopter Assisted Felling

Item No.	Tree Species	Operating Zone	Latitude	Longitude	RPMS Status	dbh_mm	height_approx_m_	canopy_spread_m	Proposed Removal Method
93	Cupressus macrocarpa - Monterey cypress	B - Tihi and slopes	-36.948	174.7833	Not Pest Species	1200	1000 - 1499	15	Helicopter Assisted Felling
94	Cupressus macrocarpa - Monterey cypress	B - Tihi and slopes	-36.948	174.7833	Not Pest Species	1200	1000 - 1499	15	Helicopter Assisted Felling
95	Cupressus macrocarpa - Monterey cypress	B - Tihi and slopes	-36.948	174.7833	Not Pest Species	1200	1000 - 1499	15	Helicopter Assisted Felling
96	Cupressus macrocarpa - Monterey cypress	B - Tihi and slopes	-36.948	174.7833	Not Pest Species	1200	1000 - 1499	15	Helicopter Assisted Felling
97	Cupressus macrocarpa - Monterey cypress	B - Tihi and slopes	-36.948	174.7833	Not Pest Species	1200	1000 - 1499	15	Helicopter Assisted Felling
98	Cupressus macrocarpa - Monterey cypress	B - Tihi and slopes	-36.948	174.7833	Not Pest Species	1200	1000 - 1499	15	Helicopter Assisted Felling
99	Cupressus macrocarpa - Monterey cypress	B - Tihi and slopes	-36.948	174.7833	Not Pest Species	1200	1000 - 1499	15	Helicopter Assisted Felling
100	Cupressus macrocarpa - Monterey cypress	B - Tihi and slopes	-36.948	174.7833	Not Pest Species	1200	1000 - 1499	15	Helicopter Assisted Felling
101	Cupressus macrocarpa - Monterey cypress	B - Tihi and slopes	-36.948	174.7833	Not Pest Species	1200	1000 - 1499	15	Helicopter Assisted Felling
102	Cupressus macrocarpa - Monterey cypress	B - Tihi and slopes	-36.948	174.7833	Not Pest Species	1200	1000 - 1499	15	Helicopter Assisted Felling
103	Cupressus macrocarpa - Monterey cypress	B - Tihi and slopes	-36.948	174.7833	Not Pest Species	1200	1000 - 1499	15	Helicopter Assisted Felling
104	Cupressus macrocarpa - Monterey cypress	B - Tihi and slopes	-36.948	174.7833	Not Pest Species	1200	1000 - 1499	15	Helicopter Assisted Felling
105	Cupressus macrocarpa - Monterey cypress	B - Tihi and slopes	-36.948	174.7833	Not Pest Species	1200	1000 - 1499	15	Helicopter Assisted Felling
106	Cupressus macrocarpa - Monterey cypress	B - Tihi and slopes	-36.948	174.7833	Not Pest Species	1200	1000 - 1499	15	Helicopter Assisted Felling
107	Cupressus macrocarpa - Monterey cypress	B - Tihi and slopes	-36.948	174.7833	Not Pest Species	1200	1000 - 1499	15	Helicopter Assisted Felling
108	Cupressus macrocarpa - Monterey cypress	B - Tihi and slopes	-36.948	174.7833	Not Pest Species	1200	1000 - 1499	15	Helicopter Assisted Felling
109	Cupressus macrocarpa - Monterey cypress	B - Tihi and slopes	-36.948	174.7833	Not Pest Species	1200	1000 - 1499	15	Helicopter Assisted Felling
110	Cupressus macrocarpa - Monterey cypress	B - Tihi and slopes	-36.948	174.7833	Not Pest Species	1200	1000 - 1499	15	Helicopter Assisted Felling
111	Cupressus macrocarpa - Monterey cypress	B - Tihi and slopes	-36.948	174.7833	Not Pest Species	1200	1000 - 1499	15	Helicopter Assisted Felling
112	Cupressus macrocarpa - Monterey cypress	B - Tihi and slopes	-36.948	174.7833	Not Pest Species	1200	1000 - 1499	15	Helicopter Assisted Felling
114	Acmena smithii, Syzyium - lilly pilly, monkey apple	F - SW Boundary area	-36.9505	174.78017	Unwanted Organism	800	600 - 999	17	Manual dismantling -crash mats
116	Acmena smithii, Syzyium - lilly pilly, monkey apple	F - SW Boundary area	-36.9511	174.78036	Unwanted Organism	750	600 - 999	17	Manual dismantling -crash mats
117	Acmena smithii, Syzyium - lilly pilly, monkey apple	F - SW Boundary area	-36.9524	174.78096	Unwanted Organism	800	600 - 999	11	Manual dismantling -crash mats
118	Cupressus x leylandii - Leyland cypress	E - Sports field area	-36.9502	174.7865	Not Pest Species	400	300 - 599	5	Manual Felling
119	Ligustrum lucidum - tree privet	E - Sports field area	-36.9502	174.78659	Unwanted Organism	200	0 - 299	6	Manual Felling
120	Quercus palustris- pin oak	G - Memorial Hall area	-36.9463	174.78574	Not Pest Species	400	300 - 599	12	Manual Dismantling
121	Quercus palustris- pin oak	G - Memorial Hall area	-36.9465	174.78571	Not Pest Species	530	300 - 599	13	Manual Dismantling
122	Araucaria heterophylla- Norfolk Island pine	G - Memorial Hall area	-36.9467	174.78644	Not Pest Species	1350	1000 - 1499	35	Manual Dismantling
123	Populus x euramericana - hybrid poplar P. nigra x P. deltoides	G - Memorial Hall area	-36.9473	174.78568	Not Pest Species	930	600 - 999	17	Crane Assisted Felling
124	Araucaria heterophylla- Norfolk Island pine	C - Domain Road area	-36.9477	174.78675	Not Pest Species	700	600 - 999	20	Crane Assisted Felling
125	Cupressus macrocarpa - Monterey cypress	C - Domain Road area	-36.9478	174.78654	Not Pest Species	2800	2500 - 2999	27	Crane Assisted Felling
126	Araucaria heterophylla- Norfolk Island pine	C - Domain Road area	-36.9478	174.78613	Not Pest Species	1130	1000 - 1499	18	Crane Assisted Felling
127	Magnolia grandiflora - N Am evergreen magnolia	E - Sports field area	-36.9485	174.78548	Not Pest Species	400	300 - 599	7	Crane Assisted Felling

Item No.	Tree Species	Operating Zone	Latitude	Longitude	RPMS Status	dbh_mm	height_approx_m_	canopy_spread_m	Proposed Removal Method
128	Araucaria heterophylla- Norfolk Island pine	C - Domain Road area	-36.94862402	174.7853548	Not Pest Species	1350	35	20	Crane Assisted Felling
129	Araucaria heterophylla- Norfolk Island pine	C - Domain Road area	-36.94885138	174.7850119	Not Pest Species	1050	30	20	Crane Assisted Felling
130	Araucaria heterophylla- Norfolk Island pine	C - Domain Road area	-36.94865657	174.7850504	Not Pest Species	1480	30	20	Crane Assisted Felling
131	Cupressus macrocarpa - Monterey cypress	C - Domain Road area	-36.94807484	174.785198	Not Pest Species	900	13	11	Crane Assisted Felling
132	Cupressus macrocarpa - Monterey cypress	C - Domain Road area	-36.94800606	174.7852253	Not Pest Species	900	18	13	Crane Assisted Felling
133	Olea sp. - olive	B - Tihi and slopes	-36.94800708	174.7840567	Under Review	300	4	4	Helicopter Assisted Felling
134	Olea sp. - olive	B - Tihi and slopes	-36.94800708	174.7840567	Under Review	300	4	4	Helicopter Assisted Felling
135	Olea sp. - olive	B - Tihi and slopes	-36.94800708	174.7840567	Under Review	300	4	4	Helicopter Assisted Felling
136	Quercus robur - English oak	B - Tihi and slopes	-36.94803735	174.7839775	Not Pest Species	500	5	6	Helicopter Assisted Felling
137	Olea sp. - olive	B - Tihi and slopes	-36.94731122	174.7826914	Under Review	1000	7	8	Helicopter Assisted Felling
138	Olea sp. - olive	B - Tihi and slopes	-36.94895801	174.7814422	Under Review	800	7	8	Helicopter Assisted Felling
139	Olea sp. - olive	B - Tihi and slopes	-36.94790177	174.7813895	Under Review	600	5	5	Helicopter Assisted Felling
140	Olea sp. - olive	B - Tihi and slopes	-36.9481164	174.7809875	Under Review	1000	9	10	Helicopter Assisted Felling
141	Olea sp. - olive	B - Tihi and slopes	-36.94828842	174.7812202	Under Review	700	4	6	Helicopter Assisted Felling
142	Olea sp. - olive	B - Tihi and slopes	-36.94835433	174.7810348	Under Review	600	5	7	Helicopter Assisted Felling
143	Olea sp. - olive	B - Tihi and slopes	-36.94852984	174.7811951	Under Review	450	5	6	Helicopter Assisted Felling
144	Olea sp. - olive	B - Tihi and slopes	-36.94891889	174.7802952	Under Review	800	7	8	Helicopter Assisted Felling
145	Olea sp. - olive	B - Tihi and slopes	-36.9489631	174.7814405	Under Review	600	4	6	Helicopter Assisted Felling
146	Cupressus macrocarpa - Monterey cypress	A - Summit walkway	-36.95087657	174.7816932	Not Pest Species	2020	20	16	Helicopter Assisted Felling
147	Cupressus macrocarpa - Monterey cypress	A - Summit walkway	-36.95120665	174.7819481	Not Pest Species	1838	12	16	Helicopter Assisted Felling
148	Olea sp. - olive	A - Summit walkway	-36.95154562	174.7821805	Under Review	1500	7	10	Helicopter Assisted Felling
149	Ficus macrophylla-Morton Bay fig	A - Summit walkway	-36.95154474	174.7830248	Under Review	2360	18	20	Helicopter Assisted Felling
150	Olea sp. - olive	A - Summit walkway	-36.95149612	174.7829044	Under Review	1200	8	10	Helicopter Assisted Felling
151	Araucaria heterophylla- Norfolk Island pine	A - Summit walkway	-36.95138489	174.7830966	Not Pest Species	1270	25	20	Helicopter Assisted Felling
152	Cupressus macrocarpa - Monterey cypress	A - Summit walkway	-36.95129491	174.7833139	Not Pest Species	2800	16	15	Helicopter Assisted Felling
153	Cupressus macrocarpa - Monterey cypress	A - Summit walkway	-36.95121038	174.7835069	Not Pest Species	2000	6	0	Helicopter Assisted Felling
154	Cupressus macrocarpa - Monterey cypress	C - Domain Road area	-36.94954942	174.7853349	Not Pest Species	2600	25	18	Crane Assisted Felling
155	Araucaria heterophylla- Norfolk Island pine	C - Domain Road area	-36.94927056	174.785169	Not Pest Species	1180	25	20	Crane Assisted Felling
156	Araucaria heterophylla- Norfolk Island pine	C - Domain Road area	-36.94919185	174.7850539	Not Pest Species	1050	25	14	Crane Assisted Felling
157	Araucaria heterophylla- Norfolk Island pine	C - Domain Road area	-36.9491191	174.7850772	Not Pest Species	900	25	10	Crane Assisted Felling

Appendix E: Recommended Operational Management Requirements

Health and Safety

A detailed plan showing the contractor's health and safety policy and site specific hazards plans and how it will be specifically applied to the works;

Environmental Management

A detailed plan showing the processes and procedures the contractor will use to ensure the service meets all of the legislative / regulatory requirements;

Resource Plan

A detailed plan showing the resources (equipment and labour) the contractor will use to ensure the works meet all of the requirements stated in an agreement yet to be drawn up. This agreement would detail the number of staff, qualification levels and competencies with regard to arboricultural operations. This plan will also include management of response work requests, including 24/7 call centre or equivalent processing to take account of incidents which could arise at the site;

Traffic Management Plan

A detailed plan showing the processes and procedures the contractor will use to ensure that appropriate traffic management systems, procedures and plans are used to ensure the work processes meet all of the legislative requirements:

(i) The contractor is to adopt/develop, implement and manage suitable generic and specific traffic management plans (TMPs) so that the works requiring public highway access can be undertaken in accordance with the relevant legislative requirements;

(ii) Temporary traffic control shall be in accordance with 'The NZTA Code of Practice for Temporary Traffic Management' and any other Codes of Practice adopted by the Authority, depending upon the specific traffic control requirements for the site; and

Relationship Management Plan

A detailed plan showing the processes and procedures the contractor will use to ensure that all communications relating to the management and operation of the works facilitates understanding and provides a 'No surprises' regime. This is likely to be a high profile undertaking and regular exchanges of information will be required to field potential external queries and inform timely intervention where matters unexpectedly deviate from the plan.

Emergency Work Plan

A detailed plan showing the processes and procedures the contractor will use to manage any Emergency Work that is required to be undertaken as part of the works;

Business Continuity Plan

A detailed plan showing the processes and procedures the contractor will use to manage uninterrupted continuation of the works;

Risk Mitigation Plan

A detailed plan showing the processes and procedures the contractor will use to manage risk assessment and management of risks identified by the contractor. The contractor will need to ensure Public liability cover of at least $2 million indemnity is current for the duration of the works;

Information and Reporting

A detailed plan showing the processes for gathering, managing, checking and reporting information;

Billing

A detailed plan showing the processes for ensuring invoicing is on time, with enough information for the Authority to be able to easily ask questions, understand what is being billed for, and assess the progress of works to date.

Quality Management Plan (QMP)

A detailed Quality Management Plan should be provided by the contractor.

It may prove expedient for the Authority to agree with any prospective contractor the standard to be adopted for the purposes of the contract as a baseline reference point. The content of the Quality Management Plan should include but not be limited to:

- Quality management processes to ensure all works are delivered to the appropriate standard and comply with all relevant industry practises and legislation;
- A compliments and complaints procedure, including a process for effectively responding to complaints; and
- All other things necessary to ensure the quality of the works as may be required by the Authority.

The Quality Management Plan should be approved in writing by the Authority. If such a quality management plan is rejected by the Authority the contractor should address all issues regarding the Quality Management Plan made known to the contractor by the Authority and re-submit until approval is obtained.

Variation to the QMP may be required from time to time by mutual agreement.

The contractor must regularly update and maintain the Quality Assurance Plan throughout the works period.

Best Practice Standards

All operations shall have regard to arboricultural best practice. In general, the determination of good practices can be gleaned from the following:

- https://www.nzarb.org.nz/Safety++Compliance/Guides.html **(NZ)**
- BS 5837:2012 Trees in relation to design, demolition and construction– Recommendations **(UK)**
- BS 3998:2010 Tree work. Recommendations **(UK)**
- ANSI A300 (series) American National Standard for Tree Care Operations **(USA)**
- AS 4970-2009 Protection of trees on development sites **(Aus)**
- AS 4373—2007 Pruning of amenity trees **(Aus)**

Working Hours

The contractor shall need to ensure that all works, particularly helicopter extractions, which generate excessive noise or other hindrances are carried out at times that minimise the impact to the public and local residents and comply with any relevant bylaws and/or specific noise restrictions.