3/3/21

Western Springs – Tree Removal Methodology

Scope

To provide an outline of the methodology to enable tree removal operations within Western Springs forest from pre-works phase to site completion detailing individual steps from site preparation and establishment, physical works, and reinstatement.

Survey and Mark Out

Initial survey and mark out will consist of the following:

- Scope site and review track position in relation to site contours, access to felled trees and view form Western Springs Park
- Peg access track alignment prior to commencement of works
- Extent of track to be marked out on overall site plan (4m wide track, 2m each site of the alignment).
- Mark out the location of 3x individual culverts to be installed.
- Mark out Super silt fence location
- Initial survey of PAP areas.
- Identify and mark out surface utilities e.g., manholes/storm water.
- Mark out Area 1 and Area 2

Immediately prior to physical works

- Flagging tape will be installed to visually identify PAP areas.
- Delineation between areas 1 and 2 are to be marked with 50 x 50 wooden stakes.
- Trees and totems that have been identified to be retained will be marked with Hi-Viz ribbons.

Installation of security fencing

Temporary fencing will be installed along all areas of the site that could be accessible to the public. The entrance from west view road is already isolated by semi-permanent fencing so additional fencing is not required. This will result in the entire site becoming fully fenced with the only potential access through the main site entrance (staging area).

Before the prestart meeting required for condition 20 of the resource consent (LUC60321424,) an on-site meeting will be held to determine the alignment of silt and security fencing with the project manager, contractor, compliance and monitoring officer, works ecologist and sediment and erosion control consultant to determine the alignment of silt fence and be granted approval to install both the silt fence and security fence prior to the prestart meeting to allow for track construction to commence as per the "Western Springs Tree Removal Program"

- Security fencing will be installed and consist of 1.8m high steel panels with weighted bases shacked together.
- Fencing is to be installed as indicated on the Overall site plan on the eastern side of Motions Creek.
- Security fencing is to be installed prior to commencement of physical works.

Initial sediment control

Before the prestart meeting required for condition 20 of the resource consent (LUC60321424,) an on-site meeting will be held to determine the alignment of silt and security fencing with the project manager, contractor, compliance and monitoring officer, works ecologist and sediment and erosion control consultant to determine the alignment of silt fence and be granted approval to install both the silt fence and security fence prior to the prestart meeting to allow for track construction to commence as per the "Western Springs Tree Removal Program"

- A super silt fence will be installed as indicated on the overall site plan along Motions Creek.
- The super silt fence will be installed behind the security fence to prevent potential vandalism.
- The super silt fence will be installed west of the pine trees to be felled to prevent damage from falling trees.
- Silt fencing will be installed consistent with the specifications in the ESCP. Hi viz protective caps will be placed on waratah stakes.
- The indicative location of the super silt fence is shown in the overall site plan Exact location of the super silt fence will be selected in conjunction with the supervising ecologist and located to minimise impact to root protection zones and avoid vegetation removal.
- A regular silt fence is shown on the overall site plan on the aggregate access track from within the compound area. The silt fence will be installed to where a minor cut is made on this section of the access track.

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During Works:

- During the execution of the works the integrity of the silt fence will be inspected daily
- Track condition will be monitored daily and remediated if required as per direction of works ecologist or sediment consultant.
- Once trees are felled towards the track, slash (foliage and small branches) will be used as track coverage to stabilise the site and reduce exposed soil.
- Once a large chipper is established, some of the resultant chip will be dispersed with an excavator bucket or broadcast directly to further reduce exposed ground.

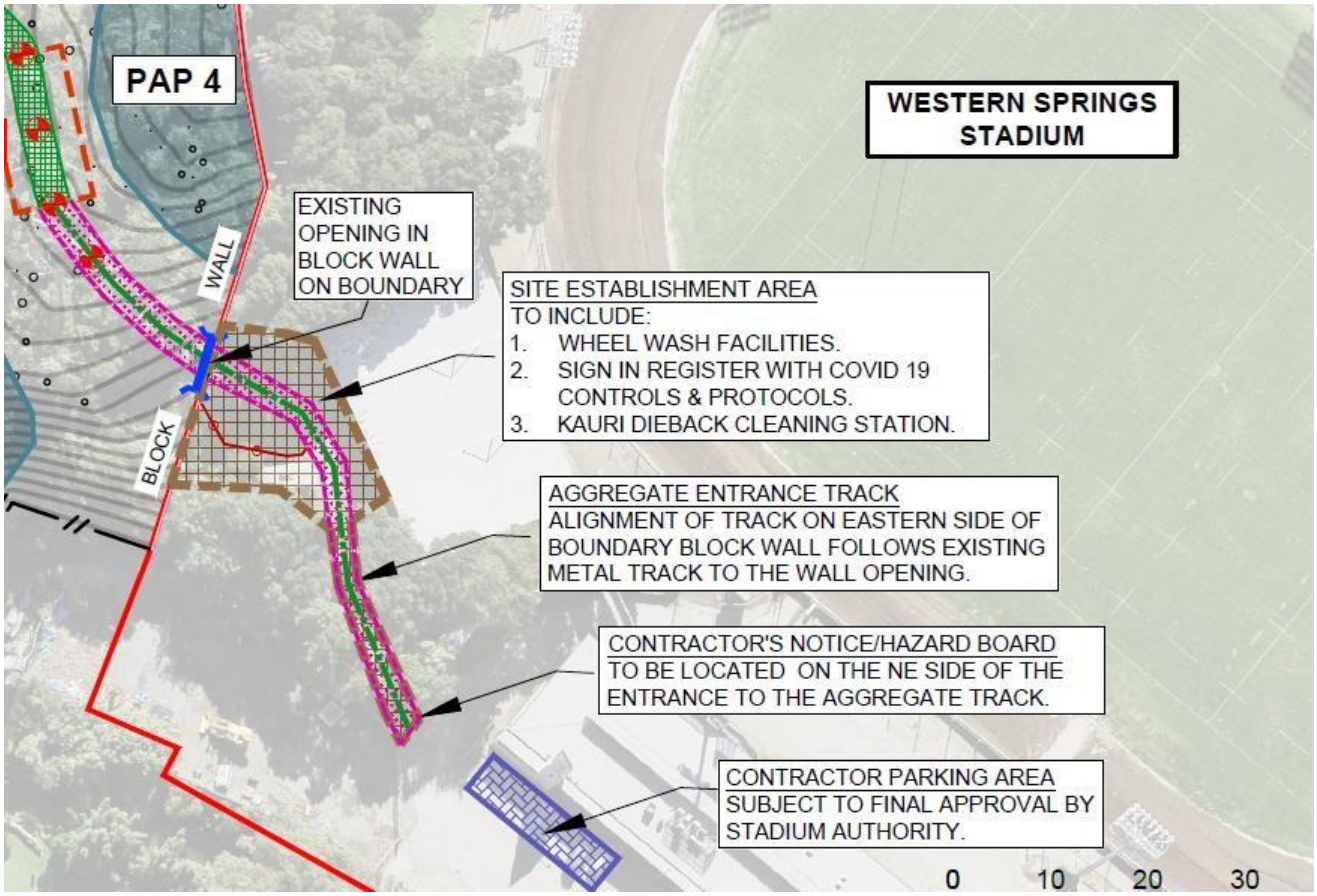
Site Establishment Area

A staging area (referred to as site establishment area) will be set up at the entrance site as per the map below. Facilities that will including within the staging area will include:

- Kauri Die Back Protocols and controls (Information, brushes, disinfectant spray)
- Accommodation for wheel wash facilities including a storage cube for water and a pressure washer.
- Fuel storage area will be allocated to diesel fuel storage. The diesel will be stored on site with towable trailer (light trailer bowser)
- A portable toilet will be provided within the staging area throughout the duration of works.
- A sign-in stand with for staff, contractors, and visitors. This will include COVID 19 contract tracing and sanitizing facilities.

Machinery will arrive on a tractor-trailer transport unit.

- Machinery transport trucks will access the site via stadium road.
- The unit will then be reversed to the compound area to unload.
- Where machinery may track over paved surfaces, protective synthetic mats or wooden dunnage will be used to protect the paved surface from damage.
- There will 3x planned establishments to site and 3x planned disestablishments from site (1 for each of the tracked machines that will be utilised on site)



Formation of Track

Once the security fencing and silt fencing are installed, the plywood that currently covers the site access will be removed and the first excavator will be established on site. This machine will commence on the formation of the "site establishment area" and the "Access Track".

Access Track

- From the initial uphill section of the track through to the top of the first incline (close to staging area 1); Landtex geotextile roading fabric will be installed (4m wide).
- Crushed aggregate will be imported into site by 4 axle trucks via stadium road
- Aggregate will be spread by a 20t excavator evenly over the geotextile cloth and track rolled for compaction.
- This track will allow for wheeled vehicle access up to a level area within the worksite for any load out requirements (if they are to occur), fueling and servicing of plant and import of tools and equipment for works.
- The route will be cleared by hand felling all lower canopy vegetation to a width 2m either side of the track. Large fallen trees will be mechanically settled and then cut into sections as required to safely place these out of the construction footprint.
- The track will be formed using a "Cut and Place" methodology where the excavated material will be used to build up the lower side and avoid the need to remove or import material from site.
- The track will be designed to be 4m wide to minimise impact and footprint.
- Where the track requires curvature to (around ridges and corners) the track will be required to be made slightly wider to accommodate turning plant equipment
- Where track encounters standing Pines or enters within the danger zone of a particularly high-risk tree (dead and decayed and at risk of falling) these will be felled as part of the track installation program (with supervision form ecologist). These will be minimal but necessary to keep site safe.
- Large stumps in the track alignment will be ground out to enable construction of the track. This is preferable to excavation to minimize disturbance.
- Track installation to continue to "landing" 5 but will stop at the walking track.
- Truck turn-a-round point to be created at landing 4 (least invasive) with the turning bay to be on top side of track (shown on Overall site Plan).
- Culverts (300mm storm boss pipes) will be installed when track progress reaches these points (as per sediment control plan)
- Felled debris to be used to cover exposed lower batters of track during construction.
- A minor cut will be made on the aggregate access track within the Site Establishment Area as shown on the "Overall Site Plan" with a regular silt fence installed downhill of the excavated area.

Felling works

Daily pre-start.

- Each day a prestart meeting will take place between the Treescape project manager, Treescape site supervisor and supervising ecologist.
- The trees that are to be felled each day will be identified and documented as well as a review of the prior day's activities and the general site condition and risks. This is programmed for 7am (no machinery use).

Felling methodologies

Each tree will be assessed to determine the safest and most practical means of felling to minimise the impact to underlying vegetation and enable extraction as directed by the supervising ecologist. All felling is carried out with radio communication to all treescape staff on site.

Please refer to SOP and SWMS documents for further detail and task risk assessment and controls.

Manual felling

- Where safe to do so, trees may be felled without machine assistance by an arborist using chainsaw and felling wedges. All Trees within strike range of the Zoo fence or Private properties will have added directional aids and all trees within two tree lengths require an exclusion zone.

Machine assist (pushing)

- Excavator grapples are fitted with a crown shaped reinforced steel section designed to push trees to assist with felling. Where appropriate the excavator will direct the trees fall by pushing the tree in the intended direction of fall while under the control of the tree faller and with directional felling cuts being applied (unless tree is too rotten to safely fell)

Machine assist (grappling)

- Excavators can "grab" trees with grapple attachment and assist the tree in the intended direction of fall with a slewing and pulling motion. Again, this is while under the control of the tree faller and with directional felling cuts being applied.

Machine assist (pull)

- An arborist places a rated cable or pulling line at a suitable height on the tree (height dependent on tree location and angle)
- The machine will take the tension of the tree before the arborist placed directional felling cuts then retreats to a safe location.
- The arborist then instructs the excavator operator via radio to pull the tree over in the intended direction.
- Tree is the settled and de-coupled.

Manual dismantling

- Where a tree cannot be felled whole (building not vacated or tree to remain as

totem) they will be manually climbed by an arborist and dismantled in sections. This methodology is dependent on the condition/integrity of the tree as many are too decayed to safely climb and/or dismantle. Trees to be assessed on a case-by-case basis.

Felling Trees Within Proximity to Auckland Zoo

A number of trees are within falling distance of the elephant enclosure within Auckland Zoo and requires an exclusion area when felling trees that have the potential to fall into the property of Auckland Zoo and pose a threat to both animal and human safety.
Referenced within the "Western Springs Construction Management Plan" page 7 (Produced by Treescape 3/3/2021):

> *"An exclusion zone is likely to be required for parts of Auckland Zoo, the most likely to be effected are the main containment facility perimeter fence and associated zoo assets, Elephant containment area inclusive of animal habitats and buildings, staff and service areas and associated property. , enclosure and staff lunch area. The total impact during physical felling works is expected to be up to 3.5 hours per day for 3 days and Auckland Zoo is considering whether they can accept this requirement. Dependent on the ability to facilitate this, these days do not have to occur consecutively on project. Indication of the dates will be given 15 workings days prior to commencement of the felling operations and daily updates 5 workings days prior to the activities. Once further information is produced detailing the height of each individual tree and falling distance annotated on a ariel map, Auckland Zoo will review these areas that may require exclusion zones and advise their ability to facilitate mitigation measures."*

The proposed dates that the zoo will be affected are provided in the "Western Springs Tree Removal Program". During these dates, Auckland Zoo will arrange for elephants to be contained outside the exclusion zone for approximately 3.5 hours per day to enable Treescape to carry out the felling of the specific trees. If the elephants are able to be comfortably housed for longer at the discretion of the zoo, a greater number of trees can be felled to reduce the number of days required to fell the trees.

Within 5 working leading up the felling of these particular trees, Auckland Zoo will receive daily contact from the site supervisor/project manager leading up to felling to ensure that the specific times that Auckland Zoo are impacted are adhered to.
Warren is also invited to attend Daily pre-start meetings on the days leading up to felling of the trees in question.

Reference the "Areas for Vacation" map for the effected zones.

The primary point of contact at Auckland zoo is:

- Warren Spencer
- 027 493 6135
- Warren.Spencer@aucklandzoo.co.nz

Extraction and Processing

Where approved to do so, sections for extraction will be cut too appropriate size and hauled to the access track where they may be broken down and stacked for chipping. The chip stacks will be placed in localized piles where space has become available due to damage form the felling operation adjacent to the track. This is to take advantage of these areas and minimize the need to clear additional undergrowth.

Cut material can be extracted by

- Grabbing and hauling with an excavator grapple. Where possible these sections will be lifted to minimize scarification.
- Attaching a cable and rated strop to excavator grapple to haul material close enough to the be handled by an excavator.
- Use of a winch bucket attachment haul material where material over a larger distance (unlikely to be required).

Processing cut material

- Some logs (as directed for extraction by ecologist) may be split onsite to reduce the size and then chipped or placed flat side down as habitat creation for fauna
- Use of a 800hp 25t tracked woodchipper fed by excavators on site.
- Resultant wood chip will be directed into suitable areas adjacent to track and ideally on the upper side where space allows. This chip will be kept clean and used for the final reinstatement of the area.
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Sediment control

- Daily the large branches/ heads of trees will be used to cover exposed soil to minimize the risk of sediment dislodgement.
- Logs/slash to be stacked in low piles below track once felling is completed in the area to stop run off.
- Hay used (from stockpile onsite) to cover exposed soil from felling/extraction operations daily.
- No stacking material in overland water courses or in a way to restrict culvert operation.

Track reinstatement

- Track reinstatement can commence when the relevant section of track no longer requires use for tree felling or processing. (This allows some of the track to be reinstated whilst works continues site to minimise the total exposed earth on site.
- Earth that was displaced for track construction will be excavated and placed back along the alignment.
- The operator will shape excavated material to return the track to the natural gradient prior to works commencing.
- Minimal compaction will be made we required to ensure that earth is sufficiently stabilised.
- Once and area has been reinstated exposed earth will be hay mulched.
- Geotextile cloth and aggregate will be removed and trucked off site.

Reference Documents

- “Overall Site Plan”
- SWMS-NZ-05 - Land Clearing
- SOP-TRE-01 - Excavators in Tree work
- SOP-TRE-04 - Tree Felling Machine Assisted
- “Areas for Vacation” Map