City Rail Link
Tree Assessment

Prepared for Auckland Transport

9 August 2012

Technical Report Revision History

Revision Nº	Prepared By	Description	Date
0	S Chapman & S McBride	Preparation of draft report	30/3/12
1	S Chapman	Revision of draft report	13/6/12
2	S Chapman	Final Report	9/8/12
3	S Chapman	Final Report (removal of NoR 7 and optimisation of NoR 6)	10/12/12

Technical Report Review and Acceptance

Action	Name	Signed	Date
Prepared by	S Chapman		9/8/12
Reviewed by	D Slaven		9/8/12
Approved by	D Slaven		9/8/12
on behalf of	Boffa Miskell Ltd		

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Appendices

1 Glossary of Terms

Term / Acronym	Meaning
AEE	Assessment of Environmental Effects
CMJ	Central Motorway Junction
CRL	City Rail Link
GPS	Global Positioning System
NAL	North Auckland Line
NoR	Notice of Requirement
Strata (designation)	Designation of land layer between the ground surface and the sub-strata designation. This starts at a nominated distance below the surface and extends down to meet the sub-strata designation (the tunnel envelope)
Sub-strata (designation)	Designation of land starting below the strata designation to the centre of the earth (provides for the rail tunnels)
Surface (designation)	Designation of the ground surface (including air space above the land below to the centre of the earth).

2 Executive Summary

The City Rail Link (CRL) designation will affect a number of trees. Much of the designation is subterranean therefore the trees that are most likely to be affected are those within the station construction footprint and surface designation areas. Most of the affected trees are exotic street trees and with two exceptions none are scheduled or protected. The two exceptions are two tulip trees growing in the Mayoral Drive section of the designation (from Wellesley Street West to Vincent Street) – both of these are in close proximity to proposed Aotea Station surface works and may be affected.

At the time this assessment was conducted 42 trees and tree groups were identified as requiring removal, with a further 18 being identified as requiring protection from construction activities if retained. However, it is noted that treescapes are constantly changing with time, and given that the timing of the CRL construction is yet to be determined a reassessment of effects on trees will be required at the construction stage.

Avoiding and mitigating the potential adverse effects of constructing the CRL will require the relocation of trees where appropriate and feasible, the protection of certain trees from construction impacts, and replacement planting. A Tree Protection Plan should be developed and implemented at the construction stage.

A potential positive effect of the CRL is the opportunity to incorporate the use of appropriate native species in replacement and landscape plantings.

3 CRL Description

3.1 CRL Description

The City Rail Link (CRL) is a 3.4km underground passenger railway (including two tracks and three underground stations) running between Britomart Station and the North Auckland Line (NAL) in the vicinity of the existing Mount Eden Station. The CRL also requires and additional 850m of modifications within the NAL. For ease of reference in this report, the stations included in the CRL NoR have been temporarily named Aotea Station, Karangahape Station and Newton Station. The stations will be formally named in the future. A fuller description of the CRL is provided in the Assessment of Environmental Effects (AEE) which supports the NoR and the CRL 2012 Concept Design Report[1].

This technical expert report has been prepared by Boffa Miskell Ltd to provide an independent expert assessment of the actual and potential effects associated with the proposed CRL from an arboricultural perspective.

This CRL Tree Assessment is an appendix of the AEE which supports the NoR to be served by Auckland Transport on Auckland Council to designate the CRL for future construction, operation and maintenance. The NoR covers surface land (strata), land only below surface (sub strata), and protection designations (also sub-strata) within the Auckland City District Plan (both Isthmus and Central Area Sections).

Boffa Miskell Ltd confirms that the content of this report has been written with reference to the Key Project Parameters set out in the 2012 Concept Design Report (CDR).

3.2 Areas of CRL Description of Particular Relevance to this Technical Report

The areas of the CRL which are relevant to this tree assessment are surface designation areas where trees are present.

[1] 2012 Concept Design Report prepared by Aurecon, Mott MacDonald, Jasmax, Grimshaw.

4 Existing Environment

A total of 206 trees or groups of trees were identified during walkovers of the CRL. Of this 206, approximately 160 are Council owned trees (primarily within road reserves). The road reserves throughout the CRL are generally formed of either block paving or bitumen footpaths. A total of 42 trees and tree groups are within the CRL surface designation, and a further 18 are within a few metres of surface designation areas. Trees immediately adjacent to surface designation areas may require protection during construction. The remaining 146 trees and tree groups are either above the subterranean parts of the designation where no surface works are to be undertaken, or are a sufficient distance from the designation footprint to remain unaffected.

Trees growing in built up areas such as Central Auckland are exposed to additional compromising factors compared with trees within a residential environment. Some of these compromising factors include:

- Concentrated vehicle traffic and associated exhaust fumes and pollution.
- More pedestrian traffic that can compact the small planting pit surrounding the tree.
- More exposure to bark and trunk wounds from vehicles and members of the public.
- Less permeable area for water and air filtration to the root system.
- Limited area for root development due to positioning of roads and buildings.
- Exposure to increased activity within the root system with the installation of typically more underground services and drains.

The trees within the CRL designation footprint are mostly large street trees that have successfully established and are adapting to the difficult street tree growing environment.

Various tree species are found within or in close proximity to the CRL designation footprint. They include:

4.1 Britomart Station to Customs Street

Primarily mixed natives (titoki, puriri, kauri, pohutukawa and cabbage tree) and exotics in planter boxes or planter containers, with the occasional specimen tree within the road reserve. The trees and tree groups in this section are either outside the designation or are in movable planter boxes.

4.2 Albert Street from Customs Street to Wellesley Street West

Primarily evergreen magnolia planted as a tree-lined avenue. There are also the occasional fringing alder and several pohutukawa trees in a raised planter. Seventeen of the 28 trees and tree groups identified within this section of the designation footprint are within or in very close proximity to proposed surface works. None of the affected trees are native, notable or scheduled.

4.3 Mayoral Drive from Wellesley Street West to Vincent Street

A mixture of mainly tulip trees (scheduled) and Queensland box gums. The occasional group or row of a mixture of native and exotic trees (some of which are within private property) are also located along this section of the CRL. Within this section of the designation footprint two tulip trees are in close proximity to proposed Aotea Station surface works and may be affected. A number of evergreen magnolias and honey locusts are within the footprint of the proposed Aotea Station construction yard at the Auckland Civic Centre carpark near the intersection of Wellesley Street West and Mayoral Drive. The remaining trees in the section are above subterranean parts of the designation and will not be affected by surface works.

4.4 Vincent Street

Primarily an avenue of London plane with the occasional Queensland box gum and silver birch in the avenue. Two native trees, within private property, also overhang the designation. The CRL designation footprint is entirely subterranean through this section therefore none of the trees will be affected.

4.5 Pitt Street from Vincent Street to Karangahape Road

Scheduled London plane trees are located at the top end of Greys Avenue, which is outside any surface designation footprint areas. The potentially effected trees within this section include a liquidambar and a London plane at the corner of Pitt Street and Beresford Square. Those trees are within the surface works area for the proposed Karangahape Road station.

4.6 Mercury Lane

One small planted titoki at the top end of Mercury Lane along with a second larger titoki at the entrance of the car park near the bottom end of the lane are located within the surface designation area, as are also two small street trees in a traffic island where Mercury Lane intercepts Canada Street.

4.7 CMJ motorway to the NAL

A small number of street trees are present within this subterranean section of the CRL designation. These trees will not be affected. A few trees on private property are also within this section of the corridor and will similarly remain unaffected. A proposed works site for the assembly and operation of the Tunnel Boring Machine includes a number of trees and tree groups some or all of which will require removal. The proposed works site is bounded by Nikau Street, Ngahura Street, Mt Eden Road, Flower Street and the existing NAL.

5 Technical Assessment Methodology

A walkover of the CRL was carried out on the 25th and 26th of March 2012. The site walkover was conducted within publicly owned land. Where trees were located within private land, a visual inspection of the tree was carried out from the adjacent road reserve at positions offering good views of those trees. No private land was accessed during the site walkover.

The methodology for the tree assessment involved a visual inspection of each tree or groups of trees, carried out from ground level. The purpose of the visual inspection was to:

1. Identify the species of tree or group of trees;
2. Record an estimated tree height, girth, canopy spread and GPS waypoints;
3. Briefly assess the general condition of the tree or groups of trees; and
4. Identify any obvious signs that would suggest structural problems with the tree or any areas where further investigation is warranted.

Field notes were collated during the site walkover. The field notes included the marking of the trees on high resolution aerial imagery. Upon completion of the field work, a Tree List was collated. This is attached to this report as Appendix A. Each tree is mapped (using its unique reference number) on the Tree Survey Plan (Appendix B).

In relation to the data collection, the following limitations are noted:

- Where a tree species is not entirely certain, a '?' is inserted adjacent to the common name (and/or the genius or species). This happened only on very few occasions.
- Tree heights were measured with a Nikon Forestry 550 laser rangefinder where a clear view of the tree was possible. Where a row of trees exist (for example Vincent Street) a sample of the tree height was collected and applied to the entire row. Tree height measurements should be treated as estimates only.
- Trunk girths were recorded at 1.4m above ground level. Where there are multiple trunks, the cumulative measurement of all trunks greater than 250mm was recorded. A random subsample of the trees was measured and the girth rounded to the nearest 100mm. Tree girth measurements should be treated as estimates only.
- The canopy measurement was typically the diameter of the canopy spread running parallel with the road. This was measured by stepping out the distance of the tree canopy. Each step of the surveyor measures approximately 0.875m. Quick calculations to convert the steps to metres are recorded within the Tree List. Canopy spread measurements should be treated as estimates only.
- GPS waypoints were collected using the Garmin GPSMAP® 62s. Typical accuracy of the device in open areas is ±3-4m. However, due to the presence of buildings and dense tree canopy in some parts of the CRL route, accuracy levels were up to ±12m. The GPS waypoints were downloaded and assessed. Where appropriate, waypoints were manually amended to provide a more accurate position. All GPS waypoints should be treated as estimates only.
    - For groups of trees, GPS waypoints were typically marked from near the centre of the group.
    - For trees within private property, no GPS waypoints were collected on site. For these trees waypoints were manually plotted against aerial photographs and in relation to surrounding trees that had been marked.

- Unless otherwise specified within the Tree List, the general condition of the tree takes into account:
    - The vitality of the tree in relation to its growing environment;
    - The shapeliness of the canopy; and
    - The form of the branch structure.
- During the time of the inspection, autumn leaf abscission was occurring in some deciduous trees (e.g. tulip trees). It may be that where twiggy deadwood is noted, the twigs may have dropped its leaf early, rather than being dead. Some species of tree can shed their leaves at different times, even specimens adjacent to each other.
- The identification of any structural flaws with the tree is limited to those clearly visible during the visual inspections. Examples of such flaws included pockets of decay, large pieces of deadwood, 'included branch' unions and cracking of the root plate. Flaws not so obvious could include (but not be limited to) bark wounds on the upper surface of limbs, pockets of decay high in the canopy and root decay without clear death of buttress roots, or fungi adjacent to the trunk.

Appendix 2 of the Auckland City Council District Plan – Central and Isthmus Sections was reviewed to identify Scheduled or Notable Trees. Trees nominated for Scheduled or Notable tree status are listed in Plan Change 305 of the Isthmus Section. A review by street address was carried out on Council's website to identify any nominated trees potentially affected by the CRL. Further information on the protection of trees is outlined in Section 7 (Legislative Framework) of this report.

6 Assessment of Effects on the Environment and Options for Avoiding, Remedying or Mitigating Adverse Effects

6.1 Planning Framework

The relevant District Plan (Central Area and Isthmus sections) tree protection rules provide guidance when assessing the potential effects on trees within the CRL designation footprint and can be summarised as follows:

6.1.1 Within the Central Area (Rule 10.11.1 & 14.2B.5 of the District Plan):

- Trees on private property are not protected unless they are listed in Appendix 2 of the Central Area District Plan.
- Trees can be protected by the site and surrounding rules for Heritage buildings and features. They are also protected on Maori Heritages areas, Archaeological features and Geological features.
- Trees greater than 6m or with a girth greater than 600mm (measured at 500mm above ground level) are protected in roads and open spaces.
- Trees may also be protected by way of a previous resource consent or covenant listed on the Certificate of Titles.

6.1.2 Within the Isthmus Section (Rule 5C.7.3.3 of the District Plan):

- Throughout all zones
    - Trees that are listed within Appendix 2 of the District Plan (Scheduled of Notable trees) are protected. Trees that are also subject to Plan Change 305 ('Nominated tree plan') are also protected until the rule change comes into effect.
    - Trees that are subject to a previous resource consent condition or are referenced within the property's Certificate of Title are protected.
- Trees that are on roads or unzoned land
    - Trees greater than 6m or with a girth greater than 600mm (measured at 500mm above ground level) are protected.

6.2 Potential Adverse Effects: Construction

6.2.1 Surface Works

A total of 42 trees and tree groups sit within the surface works footprint of the CRL designation and will therefore require removal or relocation. Notwithstanding this, given that the CRL construction timetable is not yet confirmed and further given that treescapes are dynamic within the urban environment and change over time, a reassessment will be required leading up to the construction phase to confirm which trees are suitable candidates for relocation at that time.

Similarly, for the trees adjacent to the surface works footprint an assessment of appropriate protection measures required to mitigate potential adverse effects (e.g. to avoid root damage or loss) will need to be addressed once detailed construction designs are available.

Notable trees within the designation are the 19 evergreen magnolia trees that form an avenue down Albert Street and the oriental plane located on the corner of Albert and Victoria Street West. The evergreen magnolias are 6-12m in height and appear to be in good condition with no obvious structural problems.

Some of the smaller of these magnolia trees may be transplanted or relocated to temporary storage during construction, since evergreen magnolia trees can tolerate transplanting. However, due to the site conditions and potential for underlying services and drains, a more detailed assessment is required into the feasibility of transplant candidates, and this should be considered at the construction phase of the CRL.

The Harvey Tree, an oriental plane tree (T33), is within the surface designation area and may need to be removed to accommodate excavations. A City of Auckland Historical Place plaque identifying the tree is present beneath the tree.

Construction of the Aotea, Karangahape and Newton stations will require the removal of nine trees or groups of trees that lie within their construction footprints. These trees or tree groups are T34, T147, T148, T149, T153, T177, T178, T179 and T194. Most of the trees are not outstanding specimens. The feasibility of relocating some or all of the pohutukawa within the row referenced as T34 should be investigated at the time of construction.

A further four trees are located just beyond the designation footprint at the stations. An assessment of the extent of potential root loss from the excavations and the likely impact on these trees will need to be addressed at the construction stage.

6.2.2 Changes to Groundwater and Water Tables

Groundwater changes can affect tree health. Groundwater is particularly important for trees in the central city as tree roots are typically beneath impervious surfaces and surface water is discharged into stormwater pipes. The protection of trees in close proximity to the surface designation from any impacts arising from groundwater changes should be investigated at the construction stage.

6.2.3 Positioning of Vent Stacks

The trees at the proposed vent stack location near Britomart should be relocated.

6.2.4 Vibration

Vibration has the potential to affect trees by disturbing soil and impacting upon tree roots. In extreme cases, disturbance arising from vibration may lead to root severance. Vibration effects arising from the CRL construction should be managed by implementing appropriate measures to protect trees abutting surface works areas.

6.2.5 General Construction Activities

Specific measures to avoid and mitigate adverse effects on individual trees and tree groups from general construction activities will need to be developed and implemented at the construction stage. Examples of activities that have the potential to adversely impact on trees by causing root damage or compaction, canopy damage, or clearances for machinery access/construction, etc include the following:

- Storage areas for machinery, materials, spoil, equipment, etc.
- Heat damage from exhaust fumes or similar discharges onto trunks or canopy
- Toxic run off/spills
- Damage arising from physical impacts of vehicles/machinery

6.3 Adverse Effects: Operational

6.3.1 Vibration

It is unlikely that vibration arising from the operation of the CRL will adversely affect trees. The vast majority of the CRL is deep enough to be well below tree roots. The existing environment is already subject to traffic-related vibration at and near the surface, and therefore any increase in vibration arising from the CRL operation is likely to be inconsequential in relation to tree health.

6.4 Positive Effects

There are potential opportunities to incorporate the reintroduction of native trees into post-construction landscape planting proposals.

6.5 Effects and Mitigation Conclusion

The adverse effects on trees arising from the construction and operation of the CRL should be managed by relocating trees where both appropriate and feasible, and by replacing trees that need to be removed (at least one specimen tree, with a minimum grade of 45L, for each tree removed).

It will be possible to retain most of the trees abutting the surface works areas of the CRL designation by implementing appropriate protection measures. A Tree Protection Plan should be prepared and implemented at the construction stage.

7 Conclusion

An indicative construction methodology is provided in the 2012 Concept Design. Trees in areas where the CRL designation is at the surface, and those within the station construction footprints, are most likely to be affected. For the rest of the CRL, the underground tunnelling construction methodology is unlikely to impact on the trees located at the surface above.

Tree removal is required where surface works will occur. This would constitute an adverse effect on the local treescape if no mitigation measures are implemented. Where appropriate, transplanting and replacement planting are considered appropriate mitigation measures. Construction plans including proposed timing of works will need to be reviewed by a suitable qualified expert during consenting to determine which trees may be transplant candidates at that time, and what protection measures may be required for retained trees.

A Tree Protection Plan should be prepared at the construction stage to ensure potential adverse effects on trees are managed appropriately.

Appendix A

Tree List

Tree #	Common name	Botanical name	Estimated height (m)	Estimated girth (mm)	Estimated spread (m)	Arboricultural comments
G1	Titoki x 56 Puriri x 9 London Plane x 18 Japanese Maple x 3	*Alectryon excelsus* *Vitex lucens* *Platanus x acerifolia* *Acer palmatum*	3 to 6	260	2	All trees are within a timber planter box sitting on ground. Most planter boxes have one tree per planter. Can easily be shifted to another location.
G2	Kauri x 18	*Agathis australis*	2 to 6.5	120 to 440	1.5	Feature planting formed of three rows of six trees. Two within the NE corner are more recent planting and the most NE tree has snapped. Overall condition of most of the Kauri is good. Further investigation into feasibility of transplanting is required.
G3	Pohutukawa x 4	*Metrosideros excelsa*	2	120	1	Fairly recent planting (say within the last 1 – 2 years) within circular concrete planter boxes. Likely to be successfully transplanted if required.
G4	Cabbage Tree x 3	*Cordyline australis*	1 to 2.5	260	1	Planted in two concrete planters with understory *Coprosma* sp*. and Carex* sp*.* Could potentially be transplanted.
T5	Queensland Box Gum x 4	*Lophostemon confertus*	11	Cum. 2000	7	Overall in good condition. No obvious signs of structural problems.
T6	Pohutukawa	*Metrosideros excelsa*	7	Cum. >2000	12	Three trunks from near base. A branch has previously been torn near the NE canopy edge.
T7	Honey Locust	*Gleditsia triacanthos*	4	570	5	Tree is within a raised concrete planter (approx. knee height). A power pole and lamp are directly adjacent. Overall condition is considered good.
T8	Evergreen Magnolia	*Magnolia grandiflora*	8	800	6	Located within a small concrete planter. Two lamps are either side of the canopy. Overall condition is good.
T9	Italian Alder	*Alnus cordata*	15	930	7	Good health and shapeliness. On the fringe of the rail link envelope.
T10	Evergreen Magnolia	*Magnolia grandiflora*	3.5	330	3	Tree potentially could be transplanted, if required.
T11	Evergreen magnolia	*Magnolia grandiflora*	6	640	4	In a concrete planter with Mondo grass beneath. Healthy crown.
T12	Evergreen Magnolia	*Magnolia grandiflora*	6	640	4	Same as above (T11). Slight sweep of crown towards the west.
T13	Elm	*Ulmus* sp.	8	800	4	Could be within private land. Camellia hedge beneath.
T14	Evergreen Magnolia	*Magnolia grandiflora*	6	600	2	Overall condition is fair to good. Is within a knee height concrete planter within Mondo grass.
T15	Evergreen Magnolia	*Magnolia grandiflora*	6	600	3	Similar growing environment as above. This tree is in good condition.
T16	Evergreen Magnolia	*Magnolia grandiflora*	6	600	3	Same as above (T15).
T17	Evergreen Magnolia	*Magnolia grandiflora*	12	1100	5.5	Good overall condition. Base is approximately 1m from the edge of the kerb. A lamp post is adjacent to the tree.
T18	Evergreen Magnolia	*Magnolia grandiflora*	12	1100	5.5	Same as above.

T19	Evergreen Magnolia	*Magnolia grandiflora*	12	1100	5.5	Tree divides into two trunks at approximately 2m above ground level. Healthy canopy and overall in good condition.
T20	Evergreen Magnolia	*Magnolia grandiflora*	10	600	7	Healthy canopy with no obvious signs of structural problems.
T21	Evergreen Magnolia	*Magnolia grandiflora*	9	820	4	Healthly tree that divides into two stems at approx. 4m above ground level.
T22	Evergreen Magnolia	*Magnolia grandiflora*	9	800	4	Overall in good condition.
T23	Evergreen Magnolia	*Magnolia grandiflora*	10	1300	8	Overall in good condition.
T24	Evergreen Magnolia	*Magnolia grandiflora*	7	600	5	No obvious structural problems. Overall in good condition.
T25	Evergreen Magnolia	*Magnolia grandiflora*	7	800	8	Tree roots can be seen running along the face of the kerb and channel. Tree is adjacent to a power pole.
T26	Evergreen Magnolia	*Magnolia grandiflora*	6	600	5	Overall in good condition. A power plinth is located adjacent to the tree.
T27	Common Alder	*Alnus glutinosa*	5	300	3	Overall condition is good. Is located to the side of the rail link envelope.
T28	Common Alder	*Alnus glutinosa*	10	500	5.5	There are bark wounds on the western side of the trunk to 1.5m or so above ground level. Healthy looking canopy. As with T27, is located to the side of the rail link envelope.
T29	Evergreen Magnolia	*Magnolia grandiflora*	10	1000	9	Overall condition is good. A power pole is located adjacent to the canopy.
T30	Evergreen Magnolia	*Magnolia grandiflora*	8	800	8	Thin canopy and assessed to the in fair condition. Leaves appear larger than adjacent Magnolia's. This could be a sign of stress.
T31	Evergreen Magnolia	*Magnolia grandiflora*	9	1000	8	Overall condition is good.
T32	Evergreen Magnolia	*Magnolia grandiflora*	9	800	8	Overall condition is good.
T33	Oriental Plane	*Platanus orientalis*	12	1200	14	'The Harvey Tree'. Overall condition is poor.
T34	Pohutukawa x 11	*Metrosideros excelsa*	7	600	3	Within or directly adjacent to footprint of Aotea Station. Row of trees that have been planted within a raised garden bed. Transplanting of some may be feasible if required.
T35	Tulip Tree	*Liriodendron tulipifera*	6	800	7	Overall in good condition. There is one tear wound on the road side of the trunk.
T36	Tulip Tree	*Liriodendron tulipifera*	10	600	4	Some twiggy deadwood and a thinner crown than the adjacent tree.
T37	Tulip Tree	*Liriodendron tulipifera*	8	1000	7	Overall condition is good.
T38	Tulip Tree	*Liriodendron tulipifera*	8	800	6	The central stem of the tree has been lost; affecting the form.
T39	Tulip Tree	*Liriodendron tulipifera*	11	1600	8	Some pavement lifting beneath the tree. Largest Tulip within the immediate vicinity and in good health.
T40	Tulip Tree	*Liriodendron tulipifera*	11	900	5	Large 'kink' in the trunk at approximately 2m above ground level. Healthy canopy.
T41	Tulip Tree	*Liriodendron tulipifera*	7	900	7	Central leader is dead. Overall the tree is in poor health. Lowest southern limb is also dead.

T42	Tulip Tree	*Liriodendron tulipifera*	7	900	7	Thin canopy with twiggy deadwood. A power pole is adjacent to the canopy.
T43	Tulip Tree	*Liriodendron tulipifera*	7	600	4	Tree is in poor condition with a dead upper canopy. It appears that the central stem has snapped out previously.
T44	Tulip Tree	*Liriodendron tulipifera*	8	600	6	Thinning canopy. Trunk wound towards the northern side.
T45	Tulip Tree	*Liriodendron tulipifera*	5	450	3	Central leader has previously been removed and two lateral branches have now assumed the dominate leaders. Form of the tree is poor and the health fair.
T46	Tulip Tree	*Liriodendron tulipifera*	13	1300	10	Tall and overall a good specimen.
G47	Griselinia x 3 Titoki x 3 Cabbage tree	*Griselinia littoralis* *Alectryon excelsus* *Cordyline australis*	To 5.5m	600	5	Group of trees on the bank to the side of, and below, an adjacent bus stop. Overall condition of the trees is good.
T48	Honey Locust x 14	*Gleditsia triacanthos*	To 7	800	5	Mixed row of young to semi-mature trees within an adjacent carpark. In some areas the overhang is 2 to 3m over the footpath. By and large the condition of the trees is good.
T49	Queensland Box Gum	*Lophostemon confertus*	13	1600	12	Good specimen however there is no fluting at the base of the trunk. Further investigation should be carried out to ensure not root decay.
T50	Queensland Box Gum	*Lophostemon confertus*	8	1200	7	Good specimen.
T51	Tulip Tree	*Liriodendron tulipifera*	9	1100	5	Good specimen. Small trunk wound at base.
T52	Tulip Tree	*Liriodendron tulipifera*	9	1100	5	Good specimen.
T53	Tulip Tree	*Liriodendron tulipifera*	6	1000	5	Central leader has been lost and the road side canopy is almost non-existent. Poor shapeliness.
T54	Queensland Box Gum	*Lophostemon confertus*	12	2000	10	Very good tree. Lamp post is to the south of the tree.
T55	Tulip Tree	*Liriodendron tulipifera*	6	400	3	Central leader of the tree has been lost. Shapeliness and form is poor to fair.
T56	Queensland Box Gum	*Lophostemon confertus*	11	1500	9	Fair condition. A girdling root is located near the SW side of the trunk. Twiggy deadwood present.
T57	Tulip Tree	*Liriodendron tulipifera*	14	1300	9	Western canopy side has been light suppressed by adjacent vegetation. Good health.
T58	Queensland Box Gum	*Lophostemon confertus*	9	1800	13	Overall condition is good. Some twiggy deadwood is within the canopy.
T59	Tulip Tree	*Liriodendron confertus*	10	800	5	Overall condition is good.
T60	Queensland Box Gum	*Lophostemon confertus*	10	2	8	Some twiggy deadwood and a thinning upper canopy. A power pole is adjacent to the tree.
T61	Tulip Tree	*Liriodendron tulipifera*	12	1300	6	Some lifting of the pavement to the western trunk edge. Kink in the trunk at 4m above ground level. Central leader of the tree may have been removed at some point as the trunk divides into two co-dominant stems.

T62	Queensland Box Gum	*Lophostemon confertus*	12	2100	9	Open canopy and somewhat thinning in the upper portion.
T63	Tulip Tree	*Liriodendron tulipifera*	10	1300	11	Very good specimen.
T64	Tulip Tree	*Liriodendron tulipifera*	6	800	3	Upper southern canopy edge is poor with extensive twiggy deadwood. Shapeliness is fair with the trunk heading westerly at ±1.5m above ground level.
T65	Tulip Tree	*Liriodendron tulipifera*	5	600	4	Some twiggy deadwood. Form is fair as a secondary leader may have previously been removed.
T66	Queensland Box Gum	*Lophostemon confertus*	8	2000	10	Healthy tree with some surface root activity.
T67	Tulip Tree	*Liriodendron tulipifera*	6	800	6	Good health and shapeliness
T68	Tulip Tree	*Liriodendron tulipifera*	4	900	4	Overall condition is poor. The road side canopy edge is almost non-existent.
G69	Evergreen Magnolia, Lemonwood, Queensland Box Gum & Coprosma	*Magnolia grandiflora Pittosporum eugenioides Lophostemon confertus Coprosma sp.*	To 10m	-	-	Group of trees on bank above street. Group is partly on private property.
G70	Nikau Palm x 7 Kowhai x 1	*Rhopalostylis sapida Sophora microphylla*	To 4m	800	1	Small planting that is within private property.
T71	Tulip Tree	*Liriodendron tulipifera*	4	600	3	NE canopy is in poor condition. Twiggy deadwood present.
T72	Tulip Tree	*Liriodendron tulipifera*	6	900	6	Fair to good form.
T73	Tulip Tree	*Liriodendron tulipifera*	8	900	5	Head of tree is dead. Also twiggy deadwood within the canopy.
T74	Tulip Tree	*Liriodendron tulipifera*	10	1200	11	Minor trunk wound on the road side that has grown over well. Minor twiggy deadwood.
T75	Tulip Tree	*Liriodendron tulipifera*	13	1300	7	Tightly compressed union a ±3m above ground level. Good health and fair form.
T76	Tulip Tree	*Liriodendron tulipifera*	12	1500	11	Tree divides into two leaders at approximately 7m above ground level. Girdling root present at base.
T77	Tulip Tree	*Liriodendron tulipifera*	7	1200	7	Poor condition. Lots of deadwood within canopy.
T78	Tulip Tree	*Liriodendron tulipifera*	10	1300	9	Tree divides into two stems at ±7m above ground level. Overall condition is good.
T79	Tulip Tree	*Liriodendron tulipifera*	7	1300	7	The central leader has been removed and deadwood is present over the road. Poor condition.
G80	Lemonwood & Karo	*Pittosporum eugenioides Pittosporum crassifolium*	To 8	-	-	Mixed group that has been trimmed back off the footpath. Trees are on private property.
T81	Titoki	*Alectryon excelsus*	6	800	6	Healthy and broadly spreading tree.
T82	Queensland Box Gum	*Lophostemon confertus*	6	1500	5	Poor form. Many lateral branches have been removed. Understory of *Carex* sp*., Phormium* sp. and *Arthropodium* sp*.*
T83	Cabbage Tree	*Cordyline australis ?*'Purpurea'	6	250	1	Good specimen – purple leaved. Understory of *Carex* sp*., Phormium* sp. and *Arthropodium* sp*.*

T84	Queensland Box Gum	*Lophostemon confertus*	9	2000	14	Bark is splitting and cracking in places. Cambium tissue visible within the splitting. Cause unknown but is not presently compromising the structural integrity of the tree. Healthy tree with good shapeliness.
T85	Tulip Tree	*Liriodendron tulipifera*	12	1500	9	Good health and shapeliness. Fair branch structure. *Carex* sp. has been planted beneath.
T86	Tulip Tree	*Liriodendron tulipifera*	6	700	6	Good shapeliness and fair branch structure. Twisting trunk and stem at ±2m above ground level.
T87	Tulip Tree	*Liriodendron tulipifera*	9	1200	8	Good health and form.
T88	Tulip Tree	*Liriodendron tulipifera*	8	1100	8	Good health and shapeliness. Fair branch structure.
T89	Tulip Tree	*Liriodendron tulipifera*	12	1100	8	Tree divides into three leaders at approximately 3m above ground level. Fair branch structure.
T90	Tulip Tree	*Liriodendron tulipifera*	11	1100	8	Good health with a good to fair branch structure.
T91	Tulip Tree	*Liriodendron tulipifera*	11	1400	9	Tree divides into two trunks at approximately 2m above ground level. Some swelling at the union and a seam running along the union on the western side.
T92	Tulip Tree	*Liriodendron tulipifera*	13	1300	9	A thin crown and twiggy deadwood.
T93	Tulip Tree	*Liriodendron tulipifera*	13	1300	9	Tree divides into three trunks at ±4m above ground level. Some twiggy deadwood on hotel side of canopy.
T94	Tulip Tree	*Liriodendron tulipifera*	12	1200	9	Fair branch structure.
T95	Tulip Tree	*Liriodendron tulipifera*	13	1500	9	Tree divides into two stems at ±3m above ground level. Branch structure is fair. The trunk leans towards the road.
T96	Tulip Tree	*Liriodendron tulipifera*	11	1500	9	Trunk divides into three stems at around 4m above ground level. Fair branch structure.
T97	Tulip Tree	*Liriodendron tulipifera*	11	1100	9	Fair to good branch structure.
T98	Liquidambar	*Liquidambar styraciflua*	13	1300	10	Girdling roots present at base. Tree is in good health with a fair branch structure.
T99	London Plane	*Platanus x acerifolia*	17	2500	17	Mature tree with a canopy that has developed from an old pollard. Good condition.
T100	London Plane	*Platanus x acerifolia*	16	2500	17	Mature tree in good condition. A stormwater catch pit is located immediately to the east of the trunk.
T101	London Plane	*Platanus x acerifolia*	18	2500	17	Mature tree with an old trunk wound towards the northern side.
T102	London Plane	*Platanus x acerifolia*	14	1150	11	Overall in good condition.
T103	London Plane	*Platanus x acerifolia*	9	1200	6	Trunk wound towards the SE edge. Trunk swelling and wound wood development is forming.
T104	London Plane	*Platanus x acerifolia*	14	1200	14	Overall in good condition.
T105	London Plane	*Platanus x acerifolia*	14	1200	10	Small girdling root near base.
T106	London Plane	*Platanus x acerifolia*	22	2500	17	Mature tree.
T107	London Plane	*Platanus x acerifolia*	22	2500	17	Mature tree with a large cavity on the road side of the trunk.
T108	Silver Birch	*Betula pendula*	16	1400	7	Tree within private property.
T109	London Plane	*Platanus x acerifolia*	9	1500	9	Small trunk wound on the road side.

T110	Karaka	*Corynocarpus laevigatus*	9	Cum. 1000	5	Overall in good condition. Tree is within private property.
T111	Cabbage Tree	*Cordyline australis*	8	Cum. 1000	4	Five primary trunks with a canopy that overhangs the footpath. Within private property.
T112	Silver Birch	*Betula pendula*	11	900	4	Overall condition is good.
T113	London Plane	*Platanus x acerifolia*	12	1700	11	Overall condition is good.
T114	London Plane	*Platanus x acerifolia*	17	1700	11	Overall condition is good.
T115	London Plane	*Platanus x acerifolia*	21	2500	17	Mature tree with an old pruning wound on the road side of the trunk.
T116	London Plane	*Platanus x acerifolia*	21	2500	17	Mature tree.
T117	London Plane	*Platanus x acerifolia*	21	2500	17	Mature tree.
T118	London Plane	*Platanus x acerifolia*	19	1700	17	Overall condition is good.
T119	London Plane	*Platanus x acerifolia*	21	2500	17	Mature tree with two old pruning wounds on the road side of the trunk.
T120	London Plane	*Platanus x acerifolia*	21	2500	17	Mature tree with good wound wood development around pruning wounds.
T121	London Plane	*Platanus x acerifolia*	21	3000	17	Overall condition is good.
T122	Queensland Box Gum	*Lophostemon confertus*	20	1400	7	Tall and slender tree. Mushrooms are present at the base of the tree and may impact on the tree's health.
T123	London Plane	*Platanus x acerifolia*	17	1200	10	Canopy has been light suppressed by the northern tree (T122). Canopy leans towards the south.
T124	London Plane	*Platanus x acerifolia*	21	3000	17	Mature tree. Bark wound is present on the underside of the pollard knuckle on the road side.
T125	London Plane	*Platanus x acerifolia*	21	3000	17	Mature tree with a dense canopy.
T126	London Plane	*Platanus x acerifolia*	17	1600	10	Some twiggy deadwood internally.
T127	London Plane	*Platanus x acerifolia*	21	2500	17	Mature tree with some minor deadwood.
T128	London Plane	*Platanus x acerifolia*	21	2500	17	Mature tree.
T129	London Plane	*Platanus x acerifolia*	21	2500	17	Mature tree
T130	London Plane	*Platanus x acerifolia*	18	2500	17	Trunk leans towards the road. No obvious root-plate movement.
T131	London Plane	*Platanus x acerifolia*	17	1000	14	Overall condition is good.
T132	London Plane	*Platanus x acerifolia*	17	1200	14	Overall condition is good.
T133	London Plane	*Platanus x acerifolia*	16	2500	17	Mature tree.
T134	London Plane	*Platanus x acerifolia*	12	1000	10	Overall condition is good.
T135	London Plane	*Platanus x acerifolia*	16	2000	15	Mature tree.
T136	London Plane	*Platanus x acerifolia*	16	2500	15	Mature tree.
T137	London Plane	*Platanus x acerifolia*	16	2500	15	Mature tree.
T138	London Plane	*Platanus x acerifolia*	16	2500	16	Mature tree.
T139	London Plane	*Platanus x acerifolia*	12	1200	10	Overall condition is good.
T140	London Plane	*Platanus x acerifolia*	17	3000	17	Tree at the upper end of the street and somewhat detached from the row of trees. Can be considered to be a solitary tree.
G141	Puka x 2 Kohuhu Chinese Windmill Palm	*Meryta sinclairii* *Pittosporum tenuifolium* *Trachycarpus fortunei*	To 3m	-	-	Group located within private land.
T142	Liquidambar	*Liquidambar styraciflua*	11	1500	11	Three primary leaders with a fourth branch heading vertically. Overall health is good.
G143	London Plane	*Platanus x acerifolia*	16	1800	17	Mature and protected London plane trees lining the sides of Greys Ave will not be affected.
T144	?Thuja	*?Thuja sp.*	9	1000	6	Very poor condition with most of the canopy being dead. Could be a private tree.

G145	Pohutukawa x 2 Photinia x 3	*Metrosideros excelsa* *Photinia sp*	To 7	To 900	-	Group of vegetation within private property. The Pohutukawa trees have variegated branches within them. Understory planting consisting of *Coprosma* sp.
T146	Pohutukawa	*Metrosideros excelsa*	4	Cum. 800	4	Formed of two primary trunks with a seam running between. Some decay is present above the union in the inner surface. Surface roots visible around the open ground at the base. Fair specimen.
T147	Pohutukawa	*Metrosideros excelsa*	4	Cum. 600	4	Tree has been crown lifted quite high for age of tree. Multi-leader from knee height.
T148	London Plane	*Platanus x acerifolia*	8	1000	8	Tree grate at base is choking the tree. This probably is the cause of a thin canopy and lots of twiggy deadwood. Otherwise fair condition.
T149	London Plane	*Platanus x acerifolia*	10	1600	13	Overall condition of the tree is good.
T150	Evergreen Magnolia	*Magnolia grandiflora*	7	1000	5	Canopy and trunk is close to shop awning. Overall condition is good.
T151	Evergreen Magnolia	*Magnolia grandiflora*	7	1000	5	Same as above.
T152	Titoki	*Alectryon excelsus*	6	6000	4	Canopy is windswept from southerly winds. Lowest branch has a seam running from the union down the trunk. Some minor twiggy deadwood. Overall fair form and good health.
T153	Titoki	*Alectryon excelsus*	7	1000	7	Tree within car park and close to the adjacent dwelling. One low branch overhangs the entrance to the car park.
G154	Puka x 2 Flax	*Meryta sinclairii* *Phormium* sp.	2	300	2	Two individual trees with understory Flax (Purple leaved). Within private property.
G155	Flax	*Phormium* sp.	1	-	1	Purple leaved cultivar that is grouped within private property.
T156	?	*?*	4	Cum. 600	5	Unidentified species within a traffic island.
T157	?	*?*	2.5	Cum. 600	5	2 x trunks at base with crack and decay in between union. Structurally in poor condition.
G158	Privet Kohuhu Cotoneaster Whau	*Ligustrum lucidum* *Pittosporum tenuifolium* *Cotoneaster* sp. *Entelea arborescens*	To 4m	-	-	Trees were viewed from roadside and GPS waypoint manually plotted. This group is located within the motorway corridor.
G159	Flax Cabbage Tree Sedge	*Phormium* sp. *Cordyline australis* *Carex* sp.	1-2	-	-	Plants were viewed from roadside and GPS waypoint manually plotted. This group is within the motorway corridor.
G160	Wattle Kohuhu Flax Whau	*Acacia* sp. *Pittosporum tenuifolium* *Phormium* sp. *Entelea arborescens*	To 3m	-	-	Trees viewed from road adjacent to motorway as they are within the motorway corridor.
G161	Coprosma? Flax	*Coprosma* sp. *Phormium* sp.	To 1	-	-	Small corner planting. Ground cover species is a form of *Coprosma* sp.
T162	Pohutukawa	*Metrosideros excelsa*	6	800	4	Within small block surround. Girdling root present. Tree has a healthy canopy.

T163	Pohutukawa	*Metrosideros excelsa*	6	800	5	Single trunk form. One large root appears to be lifting pavement to the east. Healthy tree.
T164	Pohutukawa	*Metrosideros excelsa*	6	800	4	Also within a small block surround. Healthy tree is a small *Coprosma* sp. beneath.
T165	Pohutukawa	*Metrosideros excelsa*	6	800	4	Healthy tree. Surface root activity.
T166	Pohutukawa	*Metrosideros excelsa*	-	-	15-20	Noted from the road reserve. Appears to be a large specimen. GPS waypoint manually plotted.
T167	Puriri	*Vitex lucens*	?>6	-	-	Noted from road reserve. Difficult to tell how large tree is.
T168	Fig sp.	*Ficus* sp.	-	-	-	Noted from road reserve. Difficult to tell dimensions of tree as only the top can be seen from St Benedict's Road. GPS waypoint manually plotted.
G169	Karo Magnolia	*Pittosporum crassifolium* *Magnolia* sp.	5	600	3	Viewed from roadside. Magnolia is a deciduous species. Trees are on private land. GPS waypoints were manually plotted.
T170	Brazilian Pepper	*Schinus terebinthifolius*	6	Cum. 2000+	4	Pest plant species on private property.
T171	London Plane	*Platanus x acerifolia*	10	1100	10	Healthy tree that is semi-mature. Within traffic medium.
T172	London Plane	*Platanus x acerifolia*	10	1100	10	Same as above.
T173	London Plane	*Platanus x acerifolia*	10	1100	10	Same as above.
T174	London Plane	*Platanus x acerifolia*	10	1100	10	Same as above.
T175	London Plane	*Platanus x acerifolia*	10	1100	10	Same as above.
T176	London Plane	*Platanus x acerifolia*	9	1000	5	Very thin canopy. Smallest tree within this stretch inspected. Overall health is fair.
T177	Pohutukawa	*Metrosideros excelsa*	6	800	4	Single trunk to approx. 2.5m above ground level. Could be grafted stock from the appearance on the root plate. Overall health is good.
T178	Pohutukawa	*Metrosideros excelsa*	4	500	2	Young tree. A power plinth is located some 2-3m from the base of the tree.
T179	Cabbage tree Flax	*Cordyline australis* *Phormium texax*	To 3m	-	-	Group in raised bed
T180	Crepe Myrtle	*Lagerstroemia indica*	4	600	4	Overall in good condition.
T181	Pohutukawa	*Metrosideros excelsa*	6	1000	5	A limb on the NE canopy edge has torn out affecting the shapeliness. Wound wood development surrounds the tear. Healthy foliage.
T182	Silver Birch	*Betula pendula*	6	600	4	Central leader of the tree has previously been removed – a cavity now runs down the trunk from the wound. Overall in poor condition
T183	Crepe Myrtle	*Lagerstroemia indica*	4	600	4	Overall in good condition.
T184	Pohutukawa	*Metrosideros excelsa*	7	Cum. 1000	5	A lamp post is adjacent to the canopy. Tree has three trunks.
T185	Crepe Myrtle	*Lagerstroemia indica*	4	600	4	Overall in good condition.
T186	Silver Birch	*Betula pendula*	6	700	4	Overall in good condition.
T187	Pohutukawa	*Metrosideros excelsa*	6	900	5	Overall in good condition.
T188	Silver Birch	*Betula pendula*	6	700	4	Overall in good condition. The roots are affecting the footpath.
T189	Pohutukawa	*Metrosideros excelsa*	6	900	5	Overall in good condition.
T190	Cabbage tree	*Cordyline australis*	3	-	-	Overall in good condition. Flax bushes present at the trees base
T191	Cabbage tree	*Cordyline australis*	2.5	-	-	Overall in good condition.

T192	Pohutukawa	*Metrosideros excelsa*	7	1000	5	Blocks surround the tree and girdling roots within the open planting pit. Overall health is good.
T193	Pohutukawa	*Metrosideros excelsa*	4	400	3	Extensive surface root activity within planting pit. Overall health is good.
T194	Chinese Windmill Palm	*Trachycarpus fortunei*	7	500	1	Tall palm with areas of the furry bark dislodging. Potentially some structural problems with the trunk.
T195	Evergreen Magnolia	*Magnolia grandiflora*	7	1500	8	Tree within private property. Healthy canopy.
G196	?Foxtail Palm x 2	*?Wodyetia bifurcata*	5	1500	3	Viewed from road. Palms are located on top of a retaining wall within private property.
T197	Pohutukawa	*Metrosideros excelsa*	10	-	-	Tree viewed from road reserve. Appears healthy. GPS waypoints manually plotted.
G198	Cabbage Tree x 3 Grass x 2 Coprosma x 1 Pseudopanax x 1	*Cordyline australis* *Carex?* sp. *Coprosma* sp. *Pseudopanax* sp.	2	-	-	Garden bed has little plants for the size of it. *Coprosma* is a ground cover form.
T199	Pohutukawa	*Metrosideros excelsa*	8	-	5	Viewed from railway over bridge. Tree has been cut back from the railway line and adjacent building. Base of tree is close to the building foundations.
G208	Honey Locust x 2	*Gleditsia triacanthos*	To 6m	600	4	Young trees within the same carpark as G207. The trees are in good condition. Adjoins T48
G209	Honey Locust x 8	*Gleditsia triacanthos*	To 7m	800	5	Mixed row of young to semi-mature trees within a carpark. The condition of the trees is good. Parallel row in same carpark as 208
G210	Magnolia x 6	*Magnolia* sp.	To 6m	-	-	Row of evergreen magnolias within a carpark.
G211	Magnolia x 9	*Magnolia* sp.	To 7m	-	-	Continuation of the G210 row of evergreen magnolias in the carpark.
G215	Tree privet Brush wattle	*Ligustrum lucidum* *Paraserianthes lophantha*	To 4m	-	-	Infestation of weed trees. Not accessed but viewed from Ngahura St.
G216	Japanese spindle tree	*Euonymus japonicus*	4	-	-	Small grove of an invasive tree species mixed with other weeds around the bases
G218	Silver birch x 3	*Betula pendula*	To 4m	to 400mm	To 5m	Two smaller specimens in poor condition, the larger specimen is in good overall condition.

Appendix B

Tree Survey Plan

File Ref: A12053_Tree_List_Overview_Map_RevH.mxd

Map 1

Map 2

Map 3

Map 4

- Tree List
- Existing Rail
- Rail Link Alignment
- Britomart and Portal Cut and Cover Structure
- Mined Caverns
- Portal
- TBM Tunnel
- Top Down Structure
- Train stations
- Britomart and Portal Cut and Cover Structure
- TBM Tunnel
- Top Down Structure
- Train stations
- Construction Worksites
- Map Frames

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Sources: Auckland Council (2011 Aerials, District Plan), Treesafe, Aurecon, Boffa Miskell

A12053 City Rail Link Ecology

Tree List Overview Map

Date: 17 December 2012 | Revision: H

Plan Prepared for Auckland Council by Boffa Miskell Limited

Author: matt.daniels@boffamiskell.co.nz | *Checked:* SCh

File Ref: A12053_Tree_List_RevH.mxd

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Sources: Auckland Council (2011 Aerials, District Plan), Treesafe, Aurecon, Boffa Miskell

A12053 City Rail Link Ecology

Tree List - Map 1

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Sources: Auckland Council (2011 Aerials, District Plan), Treesafe, Aurecon, Boffa Miskell

A12053 City Rail Link Ecology

Tree List - Map 2

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T146
T149
T147
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G154
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T156
T157
G158
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G160
G161
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G169
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T171
T172
T173

Tree List
Existing Rail
Rail Link Alignment
Britomart and Portal Cut and Cover Structure
Mined Caverns
Portal
TBM Tunnel
Top Down Structure
Train stations
Britomart and Portal Cut and Cover Structure
TBM Tunnel
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Sources: Auckland Council (2011 Aerials, District Plan), Treesafe, Aurecon, Boffa Miskell

A12053 City Rail Link Ecology

Tree List - Map 3

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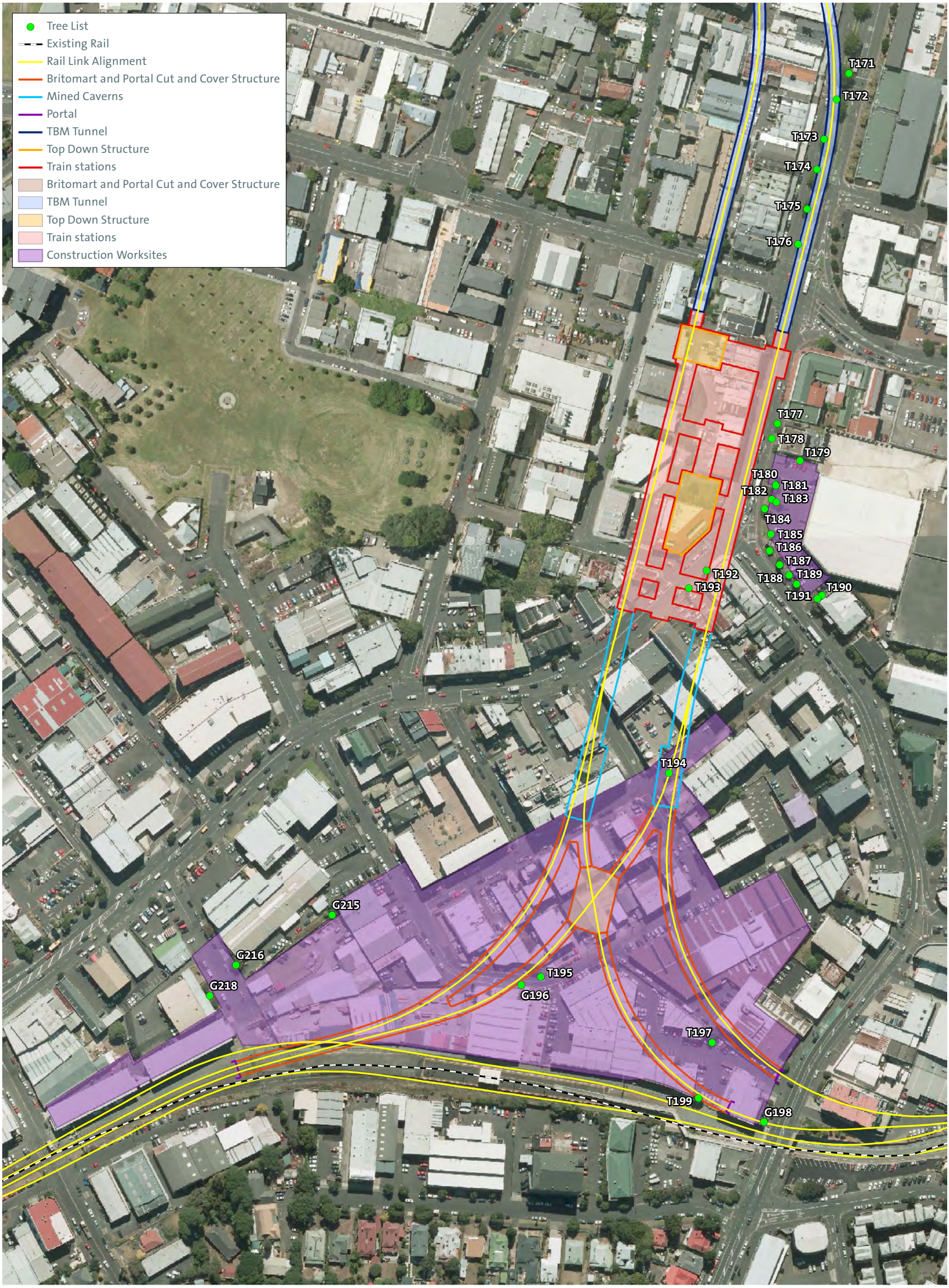

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Sources: Auckland Council (2011 Aerials, District Plan), Treesafe, Aurecon, Boffa Miskell

A12053 City Rail Link Ecology

Tree List - Map 4

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