

Appendix D – Arborist's Report

Attachment 2 - Arborist's Report



Trees and redevelopment at Civic Square, Launceston.

Impact of proposed improvements.

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25/10/2016

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1. Terms of reference

- Damien Fitzgerald, Project Manager with Launceston City Council, requested:
 - Comment on the condition of currently trees and vegetation growing at the Civic Square (see Appendix 1 – Site Plan_Overall)
 - Provide recommendations for management of trees within the scope of the project, including tree replacement species and strategies.
- The site and trees were inspected on 15/08/2016 and 29/08/2015. The trees were visually inspected from the ground. Although all trees on the site were inspected, this is not a complete tree survey and only those trees that are likely to be impacted by the proposed works and / or in need of maintenance to ensure longevity of service with a low risk of injury to nearby property and the public are included in this preliminary assessment.
- Further comments from an arborist about possible impact on individual trees and methods for tree protection may be useful as construction details become available.

2. The site and proposed improvements

Civic Square, in the heart of Launceston provides valuable public space as a major pedestrian corridor, a site for public events and recreation.

The proposed improvements include paving and garden edging renewal, new plantings and additional seating along garden edges, development of the LINC seating terrace, construction of a stage area and creation of a Civic Square Playspace near the St. John St (see Appendix 1 and 2).



3. Vegetation review

The site was divided into areas for ease of reference, starting from the north-western entrance point off Charles St, through to St. John St to the south-east:

- 3.1 Water Feature Car Park
- 3.2 Macquarie House
- 3.3 Henty House
- 3.4 Japanese Garden and Terraces
- 3.5 Large Cedar / stage area
- 3.6 Tasmania Police garden bed
- 3.7 Council Service Centre / Town Hall
- 3.8 Medical Centre / LINC
- 3.9 St Andrew's Church / Playspace

Please refer to the Tree Map below for the location of inspected trees.

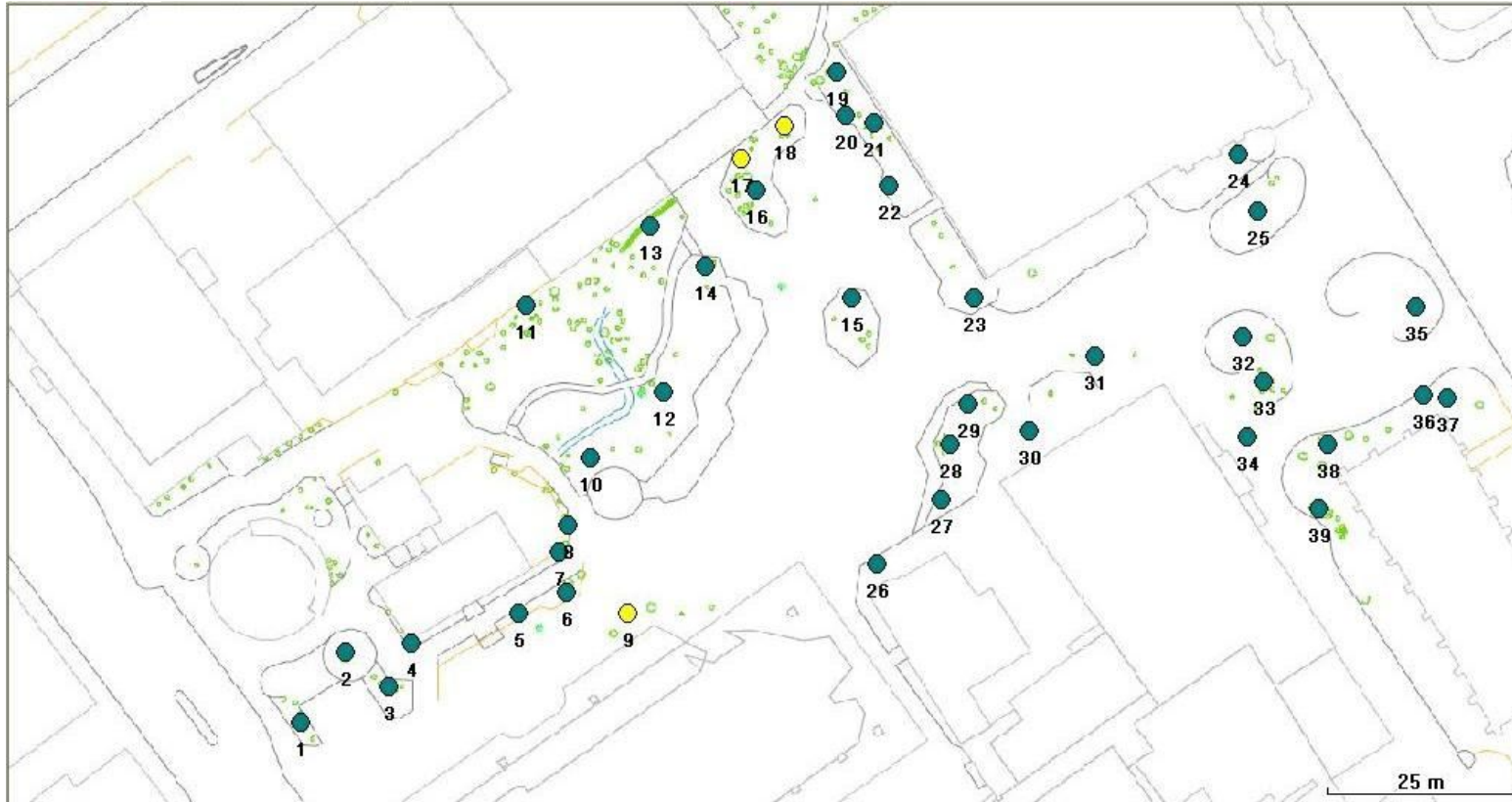
Data about individual trees in within the garden sections is presented as a table with the following headings:

ID – tree number on Tree Map and in tree data tables
SPECIES – Tree species
TREES - number of trees included in the record
HGT - approximate tree height (m)
DBH - trunk diameter (m), at 1.4m above the ground
H/S - assessment of tree health / structure (G- good, F- fair, P- poor, D- dead)
DEFECTS- key observations affecting the tree's potential for maintenance within the scope of the proposed development. Risk of injury was assessed using QTRA ¹
COMMENTS - additional observations and notes
LIFE - expected remaining landscape life in the current situation (years)
RET - tree to be retained (Y- yes, N – no)
WORKS – recommended maintenance works or reason for removal recommendation and may include prescriptions for:
SRZ - structural root zone radius (m) ²
TPZ - tree protection zone radius (m) ²

¹ – Quantified Tree Risk Assessment

² - SRZ and TPZ dimensions were guided by AS 4970-2009, Protection of trees on development sites.

Tree Map



Plan of the Civic Square (LCC) marked with approximate location of the inspected trees.

- - Trees with a broadly acceptable risk of serious injury (>1 in 1 million)
- - Trees with a tolerable risk of serious injury (1 in 10,000 – 1 million, see Defects column in tree data tables below for individual assessment).

3.1 Water Feature Car Park

Proposed improvements

- Decommissioning of the existing car parking
- Replacement of brick garden bed edging and installation of inbuilt seating along the northern edge of the current parking bay
- Possible future installation of disabled amenity facility over the existing parking bays



Fig. 1 The Callistemons (1) on the left and the mixed Melaleuca / Callistemon bed (3) on the right

Water feature car park

ID	SPECIES	TREES	HGT	DBH	H/S	DEFECTS	COMMENTS	LIFE	RET	WORKS
1	Callistemon sp.	4	4	25	G/G	Minor or none noticed		10-25	Y	Consider early replacement – life may be reduced to less than 10 years due to root disturbance during infrastructure replacement.
2	Platanus Xacerifolia	1	10-14	48	F/G	Moderate size dead branches, Broken branches hanging in crown, Roots lifting brick bed surround on NW side	The poor condition of the upper crown of the plane may be due to a combination of exposure to drying north-west winds, reflection from the water feature, limited root volume and impact of highly chlorinated water from a potentially leaking water feature.	10-25	Y	Deadwood, formative prune, reduce over-extended branches. Assess / improve irrigation over the raised garden bed.

ID	SPECIES	TREES	HGT	DBH	H/S	DEFECTS	COMMENTS	LIFE	RET	WORKS
3	Melaleuca linariifolia	3	4	25	G/G	Bifurcation of stem	Also 2 Callistemon pallidus at this site	10- 25	Y	Consider early replacement – life may be reduced to less than 10 years due to root disturbance during infrastructure replacement.

- **The Callistemon and Melaleucas** (trees 1 and 3) have reached the threshold between maturity and senescence. The trees are currently in a good condition and have the potential to provide additional 10-15 years of landscape service, with declining aesthetics. The proposed hard landscape improvements would include the removal and replacement of the garden bed edging and can be expected to disturb roots likely to be growing along the brickwork. The works are expected to have a moderate impact on these individuals reducing their landscape service to less than 10 years. The works provide an opportunity to renew both the hard edging and the landscape planting, avoiding the inevitable disruption to the landscape as the trees decline in the foreseeable future.
- **The London plane** (2) is generally structurally sound, but has not been performing well for some years. Tips of upper crown branches have died-back at times, with dry sections breaking out, but there are signs of periodic recovery as well. The tree has a broad spreading crown with considerable presence at this site and worthy of further maintenance (see Works above).

The circular brick edging is being lifted by large roots on the northern-western side, with another root poking out from below the brick retaining wall on the south eastern side (Fig. 2). Replacement of the brick edging will need to contend with large roots; some root pruning may be possible, but it is likely that the new installation will need to accommodate and provide for further expansion of the existing roots. Strategies for installation of the new edging in close proximity to large roots are best developed for individual situations, but may include bridging over roots, localised packing of roots with crushable material to enable hardscape installation and modification of edging alignment.



Fig 2. From left: the broad-spreading crown of the plane provides a strong landscape element and welcome shade over the summer; the garden edge and light are being displaced by large roots; a root squeezing below the south-eastern section of the low retaining wall.

3.2 Macquarie House

Proposed improvements

- Building conservation measures - extension of paving over the existing narrow garden bed immediately beside the wall in order to lower soil moisture levels near the wall
- Activation of the courtyard on the eastern side of the building – construction of steps leading into the courtyard.
- Paving replacement



Fig 3. The western and southern side of Macquarie House.

Macquarie House

ID	SPECIES	TREES	HGT	DBH	H/S	DEFECTS	COMMENTS	LIFE	RET	WORKS
4	Mixed exotics	4	2	8	G/G	Minor or none noticed	Plantings include 2 Camellia japonica, small Kunzea, Rhagodia sp. groundcover, 8 Correa shrubs	<10	N	Vegetation Removal - Building conservation, requirement for reduced watering beside historic building footings (Fig. 3)
5	Thuja orientalis	2	1	4	F/P	Main trunk has been broken	Replace both trees to maintain visual balance. Maintain low cypress and juniper shrubs nearby.	<10	N	Tree Removal - Defective structure
6	Populus simonii	3	15-19	38	G/G	Small dead branches over path	Low conifer shrubs below trees.	10-25	Y	Deadwood. Monitor for root presence below existing paving during paving replacement works. SRZ 2.3m; TPZ 4.6m
7	Cedrus atlantica "Glauca Pendula"	1	2	30	G/G	Minor or none noticed		10-25	N	Tree Removal - Re-development - step-down access to courtyard below



Fig. 4 From the left: three mature poplars (tree 6), two low arborvitae framing the doorway; the weeping atlas cedar over the courtyard.

- Building conservation measures necessitate the removal of the garden beds along the western and southern side of Macquarie House. The existing vegetation (4) consists predominantly of low growing shrubs and is not prominent in the immediate landscape (Fig. 3).
- The 2 low **arborvitae** (5) framing the steps and doorway to Macquarie House are in poor condition (Fig 4, centre) . The trunk of one has been broken – the tree is not likely to ever develop an aesthetically pleasing form. Replacement of both small trees is recommended.
- The mature **Chinese poplars** (6) are doing well and are unlikely to be adversely affected by the proposed works. Care needs to be exercised when lifting and replacing the paving below the tree crowns. Movement of heavy machinery and storage of materials should be avoided within the TPZ – an area with approximately 4.6m radius from each trunk. Presence of an arborist for on-site advice during lifting of the pavement in this area is recommended.

- Location of the **weeping atlas cedar** (7) is unfortunate. The tree remains healthy but its weeping crown clearly interferes with the utility of the courtyard (Fig 4, right). Maintenance of the low cedar crown is not compatible with public utility of the courtyard. Removal of the tree is essential to progress the vision for this space.

3.3 Henty House

Proposed Improvements

- Construction of an integrated ‘wave’ seat among the tree trunks (see Appendix 1)
- Pavement replacement

Henty House

ID	SPECIES	TREES	HGT	DBH	H/S	DEFECTS	COMMENTS	LIFE	RET	WORKS
9	Corymbia maculata	3	20-24	45	G/G	Poor root structure; QTRA 1/300,000	Trees have been planted in concrete pipes. A large proportion of the roots are confined within the pipes, increasing the potential for wind throw.	10-25	N	Tree removal and replacement with new specimens planted in a medium supported by structural cells.



It is unfortunate that a number of trees growing at Civic Square, including the 3 mature spotted gums in front of the Henty House, have been planted inside upturned concrete pipe sections. Tree roots soon begin to circle inside the pipes and rely on the pressure between the roots and the concrete surface rather than radial root extension for stability in the ground. There are local examples of failures by trees growing inside pipe surrounds (pers. comm. Tony Long, UTAS, Launceston, 2016).

A ground penetrating radar study completed over the gums’ root zone provides evidence of the poor root development. The executive summary of the ENSPEC Pty Ltd report includes:

“Roots are identified within some sections of test site 1 and 2 between 5 cm - 85 cm depth, and are mostly confined within the subsurface concrete pipes that the trees were originally planted in. It is interpreted that some roots from all 3 trees have breached or grown over the top of the subsurface concrete pipes.

Roots identified within the test areas are interpreted to vary from 5 cm - 10 cm in diameter. Most of the roots that have breached or grown over the top of the subsurface concrete pipes are interpreted to be less than 5 cm in diameter.”

Most of the gums’ roots do not radiate more than 2 m away from the trunks and those that do are of a small diameter. Despite their considerable height, the 3 gums are still quite young and their crowns are expected to grow higher and broader, elevating the potential for wind throw.

Using currently available information, the risk of harm associated with the trees is estimated at 1 in 300,000, in the tolerable range, but could be as high as 1 in 100,000 with multiple targets during events at Civic Square. The risk of injury is expected to increase with further crown development and may reach an unacceptable level (≤ 1 in 10,000) within 5 years. Tree failure is likely to occur in strong winds with little warning.

The proposed pavement renewal provides an opportunity for replacement of the inappropriately planted gums. A root space for in-ground trees could be created in this area using structural cells. The in-ground installation could be paved over to achieve a trafficable surface. Use of in-ground structural cells provides a non-compacted soil volume that encourages root growth and greatly reduces the potential for root damage to paved surfaces and infrastructure. An installation approximately 3m wide x 4.8m long x 1.1m deep would provide adequate volume for a medium sized tree. A contiguous installation could be used to create a shared root space large enough for 3 – 5 replacement trees. More information about structural cell systems can be found at:

<http://www.deeproot.com/products/silva-cell/landing-page/silva-cell-2/overview>

<http://www.enspec.com/StructuralCells.aspx>

<http://citygreen.com/products/stratacell/>

The gums could be replaced with new spotted gums (*Corymbia maculata*), dawn redwood (*Metasequoia glyptostroboides*) - a deciduous conifer - or beech trees (*Fagus sylvatica*) available in a range of cultivars with varying forms and leaf colours.



3.4 Japanese Garden

Proposed improvements

Although no changes are planned for the Japanese Garden, the trees were inspected to determine their condition and identify any maintenance works that would encourage their long-term serviceability.

Japanese Garden

ID	SPECIES	TREES	HGT	DBH	H/S	DEFECTS	COMMENTS	LIFE	RET	WORKS
10	Sequoiadendron gigantea	1	10-14	90	G/G	Minor or none noticed	This section also includes a mature Cedrus atlantica "Glauca Pendula" Pinus mugo and Fagus sylvatica - all in good condition	25-50	Y	Deadwood, prune away from sculpture
11	Cupressus arizonica	1	10-14	45	F/F	Heavy lean	Heavy lean	10-25	Y	Monitor tree lean – install lean monitoring markers
12	Cinnamomum camphora	1	8	42	G/G	Small dead branches over path	One of 3 mature camphor laurels here. All would benefit from some deadwooding and crown maintenance to improve aesthetics.	25-50	Y	Deadwood
13	Pinus patula	1	15-19	80	G/F	Heavy lean	Stability of the root plate has been assessed under dynamic loading and found to be satisfactory	25-50	Y	Monitor tree lean – install lean monitoring markers
14	Rhododendron sp.	1	4	33	G/G	Minor or none noticed		10-25	Y	Crown lifting for improved passive surveillance

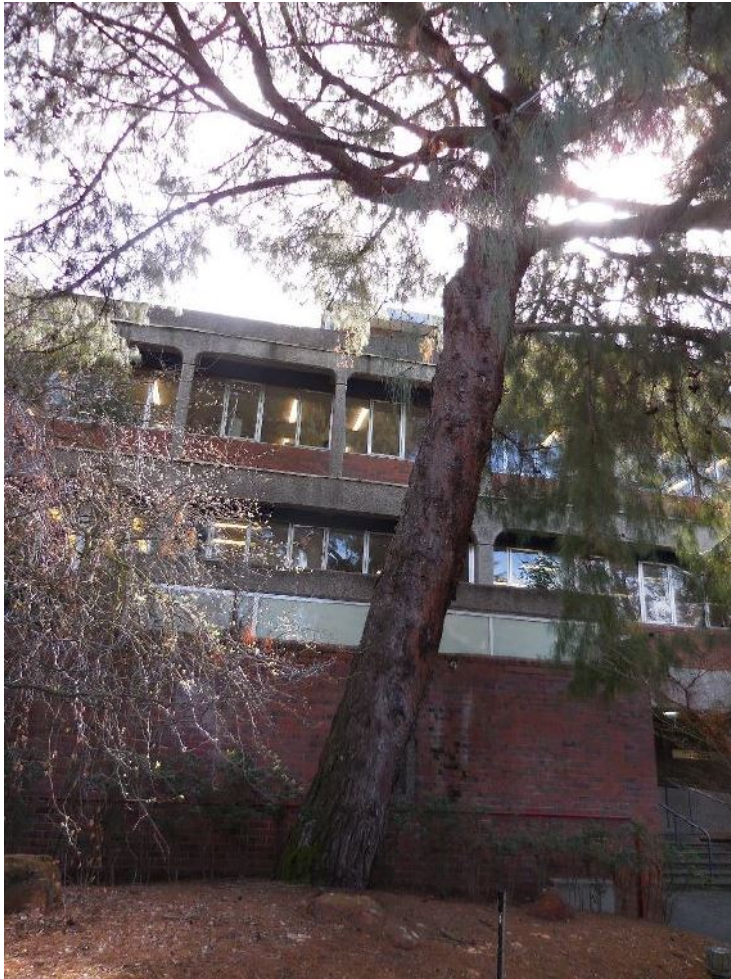


Fig. 4 The leaning pine.

- Trunks of a large **pine** (13) and **cypress** (11) growing along the northern periphery of the Japanese garden lean heavily (fig. 4). Installation of lean monitoring markers and periodic revision would provide valuable data about the trees' possible slow subsidence.

Root plate stability of the pine under dynamic loading was assessed using 2 logging accelerometers (see TreeSensor.com) installed on the lower trunk of the pine between 16 September and 12 October 2016. The loggers captured trunk and root plate movement induced by winds that included numerous gusts above 40km/h, with the highest gust of 76km/h recorded by the Launceston weather station on 9/10/2016.

Summary of findings:

Greatest tilt recorded for the pine - 0.25°
 Direction of tilt - West
 Range of tilt - low,

Tilt is within expected limits of stability at wind speeds of at least 40km/h

- Crown lifting of the mature **Rhododendron** (14) is recommended to facilitate improved passive surveillance of the stage and terraces area and the entrance to the Tasmania Police building.

3.5 Stage Area / Terraces

Proposed improvements

- Replacement of nearby paving and installation of new garden bed edging and seating
- Construction of a stage between the garden bed and the terraces at approximately 400mm above the exiting paving surface, incorporating a disabled ramp access.

Large Cedar / stage area

ID	SPECIES	TREES	HEIGHT	DBH	H/S	DEFECTS	COMMENTS	LIFE	RET	WORKS
15	Cedrus deodara	1	15-19	60	G/G	Minor or none noticed	Stage construction proposed over paved area to north-east (approximately 400mm above existing paved surface). Consider impact on existing roots and use of mulched bed space below the crown. A standard weeping cherry is growing below the cedar crown.	25-50	Y	Remove (prune off) low branches - clear stem to approximately 3m. Maintain both upward curving scaffold branches. SRZ 2.8m; TPZ 7.2m

The construction of a stage is proposed in the area to the north-west of the **cedar** (15), between the tree and the terraces (see Appendix 1). The stage finished surface would be approximately 400mm above the exiting paving in this area. It is likely that cedar roots are currently growing below the existing paving and capping of this area with fill and new infrastructure could dramatically reduce water availability to the exiting roots, leading to a decline in the tree's condition and longevity.

The tree's structural root (SRZ) is calculated to have a radius of 2.8m and a recommended tree protection zone (TPZ) should extend to 7.2m radius from the trunk. Pavement replacement and construction of the stage are likely to encroach over the SRZ and TPZ. Design of the stage and edge seating and methods of paving renewal need to be sensitive to the expected presence of large and fine roots below the footprint of

the proposed works. Key considerations are: i) physical damage to large roots (greater than 75mm in diameter), ii) capping of the root zone reducing infiltration of water and air essential to root function.

While I believe that the proposed development is possible, despite the close proximity of the works to the large cedar (Fig. 5). Appropriate design that minimises root damage and maintains a viable root zone providing air and water infiltration is essential to the long-term viability of the cedar. The stage could be built entirely on pier footings with infill wall edging, or over rock fill supplemented with irrigation below the finished surface. Similarly, the edge seating could be constructed between pier footings, with the footings hand dug or hydro-excavated to avoid damage to large roots. Pedestrian access over the garden bed itself could be facilitated by a deck constructed over piers, with supplementary irrigation ensuring adequate soil moisture over this important section of the root zone.

Input of an arborist during the construction design stage for improvements in this area and on-site advice during early stages of construction is recommended.



Fig. 5 The cedar (left) and paving between the tree and terraces (right), currently used by the mobile café van. The tree's roots are expected to extend below the existing paving – design and construction methodology for the proposed improvements will need to be sensitive to the long-term viability of this space as a root zone.

3.6 Tasmania Police bed

Proposed improvements

- Replacement of brick garden edging and construction of integrated seating along the bed edge.
- Possible simplification of the garden bed shape –removal of the protruding south-western section.

Tasmania Police garden bed

ID	SPECIES	TREES	HGT	DBH	H/S	DEFECTS	COMMENTS	LIFE	RET	WORKS
16	Liquidambar styraciflua	1	15-19	35	G/G	Minor or none noticed	Trunk diam at ground - 45cm. Modification of the raised bed (south-western end) will impact on the tree's roots.		N	Tree Removal – Modification of the garden shape and replanting
17	Nothofagus cunninghamii	1	15-19	35	G/P	Heavy lean; QTRA 300,000	Strong lean, 10° to north-west toward the building. Root plate lifting on tension side	<10	N	Tree Removal - Defective root structure
18	Nothofagus cunninghamii	1	10-14	28	G/P	Heavy lean; QTRA 1 million	Heavy lean - 16° to SE, root plate lifting on tension side.	<10	N	Tree Removal - Defective root structure



○ The Liquidambar (16) is healthy and typically for this species displays a robust root system. A large root is readily visible extending along the bed surface and beside the brick retaining wall (Fig. 6 and 7). Replacement of the brick edging and reduction of the south-westerly extension of the garden bed will substantially impact on structural roots of this tree. Works in this area, including the necessary removal of 2 myrtle beech trees (see comments below) provide an opportunity for succession planting of a young Liquidambar beside the existing mature specimen.

Fig. 6 Large Liquidambar root along the brick garden retaining wall.

- The 2 myrtle **beech trees** (17 and 18) provide a tall evergreen element within the raised garden bed. Both display a strong lean (Fig. 7) and sounding of the bed surface suggests a considerable lifting of the tension section of the root plate away from the underlying substrate. Slow subsidence of the trees is expected, but more importantly, the trees now have an increased potential for failure at ground level. Early removal of the trees is recommended.



Fig. 7 Left – Liquidambar (16); Centre – myrtle beech (17) leaning toward the building; Right – myrtle beech (18) leaning over the path.

3.7 Town Hall / Council Service Centre

Proposed improvements

- Replacement of garden edging and some soft landscape components
- Construction of raised seating along garden edges
- Removal of garden bed beside south-eastern wall of Town Hall

Council Service Centre / Town Hall

ID	SPECIES	TREES	HGT	DBH	H/S	DEFECTS	COMMENTS	LIFE	RET	WORKS
19	Allocasuarina cunninghamiana	1	15-19	80	G/F	Bifurcations of stem		10-25	Y	Clearance prune - building
20	Acmena smithii	1	15-19	42	G/F	Bifurcation of stem	A young Ginkgo below.	10-25	Y	Clearance prune - building
21	Alnus glutinosa 'Laciniata'	1	10-14	20	G/F	Large dead branches			N	Tree Removal - Dead tree, no replacement necessary
22	Alnus glutinosa 'Laciniata'	1	10-14	40	G/G	Minor or none noticed		25-50	Y	No works required
23	Mixed natives	3	4	15	G/F	Bifurcation of stem	2 x Allocasuarina sp. and 1 x Banksia serrata	10-25	N	Tree Removal - Planting renewal
24	Rhododendron sp.	1	3	24	G/G	Minor or none noticed	Low cypress shrubs below Rhododendron.	10-25	N	Tree Removal - Building conservation, requirement for reduced watering beside the building footings.
25	Ulmus parvifolia	1	6	40	G/G	Minor or none noticed		25-50	Y	No works required; be aware of possible roots below paving when replacing existing pavers

- Tree 21, **common alder** (21) has died (Fig. 8). Replacement of this tree is not essential due to close proximity of already established large trees.
- As part of landscape renewal, the **natives** (23) growing near the south-western corner of Town Hall are proposed to be replaced with species more complementary to the predominantly exotic planting theme of Civic Square.
- The bed (24) extending along the south-eastern wall of Town Hall is proposed to be replaced with paving to reduce soil moisture levels near and over the building footings.



Fig. 8 From the left: dead alder (21); mixed natives (23); Rhododendron (24) and low conifers along the south-eastern wall of Town Hall.

3.8 Medical Centre / LINC

Proposed improvements

- Replacement of existing brick garden bed edges and construction of raised seating
- Construction of a new raised seating area in front of LINC

Medical Centre / LINC

ID	SPECIES	TREES	HGT	DBH	H/S	DEFECTS	COMMENTS	LIFE	RET	WORKS
26	Ulmus glabra 'Lutescens'	1	10- 14	50	G/F	Minor or none noticed	Be aware of possible root presence below existing paving during paving renewal	25- 50	Y	No works required. Use pier footings if constructing raised garden bed edging near trunk.
27	Ulmus parvifolia	1	10- 14	40	G/G	Minor or none noticed		10- 25	Y	Clearance prune - building; , Formative prune crossing limbs; deadwood
28	Platanus Xacerifolia	1	10- 14	55	G/F	Heavy lean	Tree growing in a raised bed - roots bearing heavily on brick bed edging. Care required when renewing bed edging.	10- 25	Y	Lift branches over paving; remove small dead branches
29	Ulmus parvifolia	1	7	25	G/G	Minor or none noticed	Care required when renewing bed edging.	10- 25	Y	Deadwood
30	Cedrus atlantica 'Glauca'	1	10- 14	30	F/G	Minor or none noticed	Tree has been planted in 1.2m diameter concrete pipe - poor rooting space and water availability reflected by low crown vigour. Roots have grown over the upper edge pipe - consider installation of drop-in tree wells to provide shade within seating area.	10- 25	N	Tree Removal - Poor root structure; Re-development - seating and tables

ID	SPECIES	TREES	HGT	DBH	H/S	DEFECTS	COMMENTS	LIFE	RET	WORKS
31	Betula pendula 'Fastigiata'	4	10- 14	20	P/G	Minor or none noticed	Trees have been planted in 1.2m diameter concrete pipes - poor rooting space and water availability. Crowns are in poor condition. Consider installation of drop-in tree wells to provide shade within seating area.	<10	N	Tree Removal - Poor root structure; Re-development - seating and tables

- The mature **atlas cedar** (30) and 4 **birches** (31) currently growing in the ground in front of LINC have been planted in upturned concrete pipes. This practice creates inherent root defects, as discussed for the spotted gums growing in front of the Henty House. Trees planted this way can be expected to have a much reduced landscape life. In fact, the birches are already in poor condition. The currently proposed infrastructure improvements at Civic Square include the development of a raised seating area in front of LINC that could be complemented with sunken tree wells housing moderate size trees growing in crates or a more extensive structural cell installation with in-ground trees. Maples (*Acer* sp.) would be suitable for either in ground or planter cultivation in this space, providing welcome shade over the summer and plenty of light during the winter.

Fig. 9 The poor performing birches and cedar growing in concrete pipes in front of LINC.



- Roots of the Chinese elms and plane (27, 28 and 29) growing in the raised bed beside LINC can be expected to have large roots in close proximity to the bed edging. Take care when replacing the edging. (Fig. 10).



Fig. 10 Roots near the surface and garden edging.

3.9 Playspace / St Andrews Church

Proposed improvements

- Replacement of existing brick garden bed edges and construction of raised seating
- Replacement of paving
- Construction of new Civic Square Playspace

St Andrew's Church / Playspace

ID	SPECIES	TREES	HGT	DBH	H/S	DEFECTS	COMMENTS	LIFE	RET	WORKS
32	Pistacia chinensis	1	2	4	G/G	Minor or none noticed		10-25	N	Tree Removal - Within footprint of proposed Playspace. This tree could be transplanted to another location.
33	Camelia sasanqua	4	5	12	G/G	Minor or none noticed	Azalea shrubs below	10-25	N	Tree Removal - Within footprint of proposed Playspace. Consider transplanting these specimens.
34	Ulmus parvifolia	2	9	20	F/F	Minor or none noticed	Trees were planted in 1.2m diameter concrete drainage pipes - slow crown development and poor condition of the northern crown in particular result from inadequate root space, poor water availability and exposure.	<10	N	Tree Removal - Poor root structure; Likely to be adversely impacted by proposed construction of family gathering space to east

ID	SPECIES	TREES	HGT	DBH	H/S	DEFECTS	COMMENTS	LIFE	RET	WORKS
35	Ulmus parvifolia	1	10-14	55	G/F	Bifurcation of stem	Proposed works will cap existing paved area to the north-west, potentially reducing water availability to roots below this section of paving. Monitor tree health post works. Consider installation of a watering system as part of the re-development.	25-50	Y	Check cable & replace cable clamps (use 3 per termination) , Treat for ELB as required
36	Thuja occidentalis	1	10-14	39	G/F	Bifurcation of stem	Tree is growing in mounded bed, within 2.4m of the church wall and footings. The crown leaders are currently held together by a loop of bracing rope.	10-25	N	Tree Removal -Improvement of passive surveillance for proposed Playspace
37	Thuja plicata 'Zebrina'	1	10-14	41	G/F	Bifurcation of stem	Tree is growing in a mounded bed, 1.6m from the church wall and footings. Foliage is rubbing on the church wall.	10-25	N	Tree Removal - Improvement of passive surveillance for proposed Playspace
38	Betula pendula	3	10-14	35	G/G	Minor or none noticed		25-50	Y	No works required
39	Liquidambar styraciflua	2	10-14	35	G/G	Minor or none noticed	Roots by bed edging - take care when renewing edging. Sooty mould on branches - treat for sap suckers over summer, if desired (Fig. 13).	25-50	Y	No works required

- This area will be dominated by the new the Playspace – a space for families and friends to gather, relax and play. Construction of the Playspace will require the removal of an existing garden bed to the south-east of LINC and 5 small trees there (32 and 33) (Fig. 11).
- Two **Chinese elms** (34) growing between the garden bed and LINC have been planted in upturned pipes. The trees are not performing well. The northern of the 2 trees in particular is in poor condition. Both elms would need to be removed to create space for the Playspace (Fig. 11).

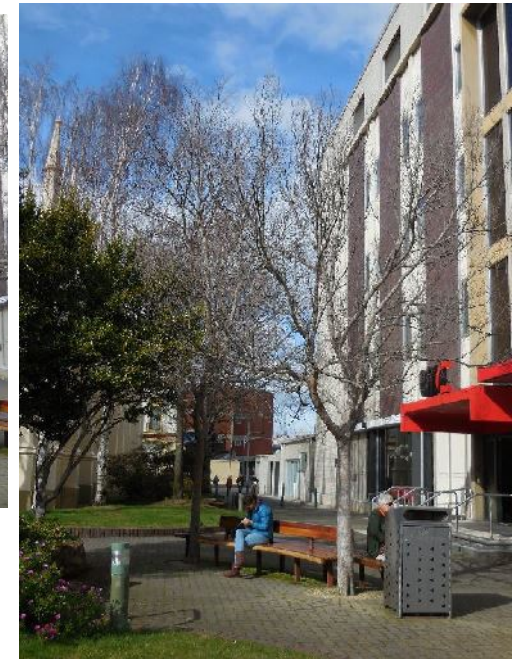


Fig. 11 The Chinese elms (34) (left) and trees 32 and 33 (right) will need to be removed for the new Playspace.



Elm (35) (Fig. 12) is growing in a raised bed that will be refurbished with new edging and seating. The elm crown has been braced in the past. The bracing cable needs to be inspected and the termination clamps replaced (see Works in table above). The proposed Playspace will cap a section of the tree's potential root zone. Ensure that adequate irrigation is supplied to the garden bed to offset the potential loss of this root zone section.

Fig. 12 Elm 35 is to be retained.



Fig. 13 Conifers 36 and 37 by the church corner.

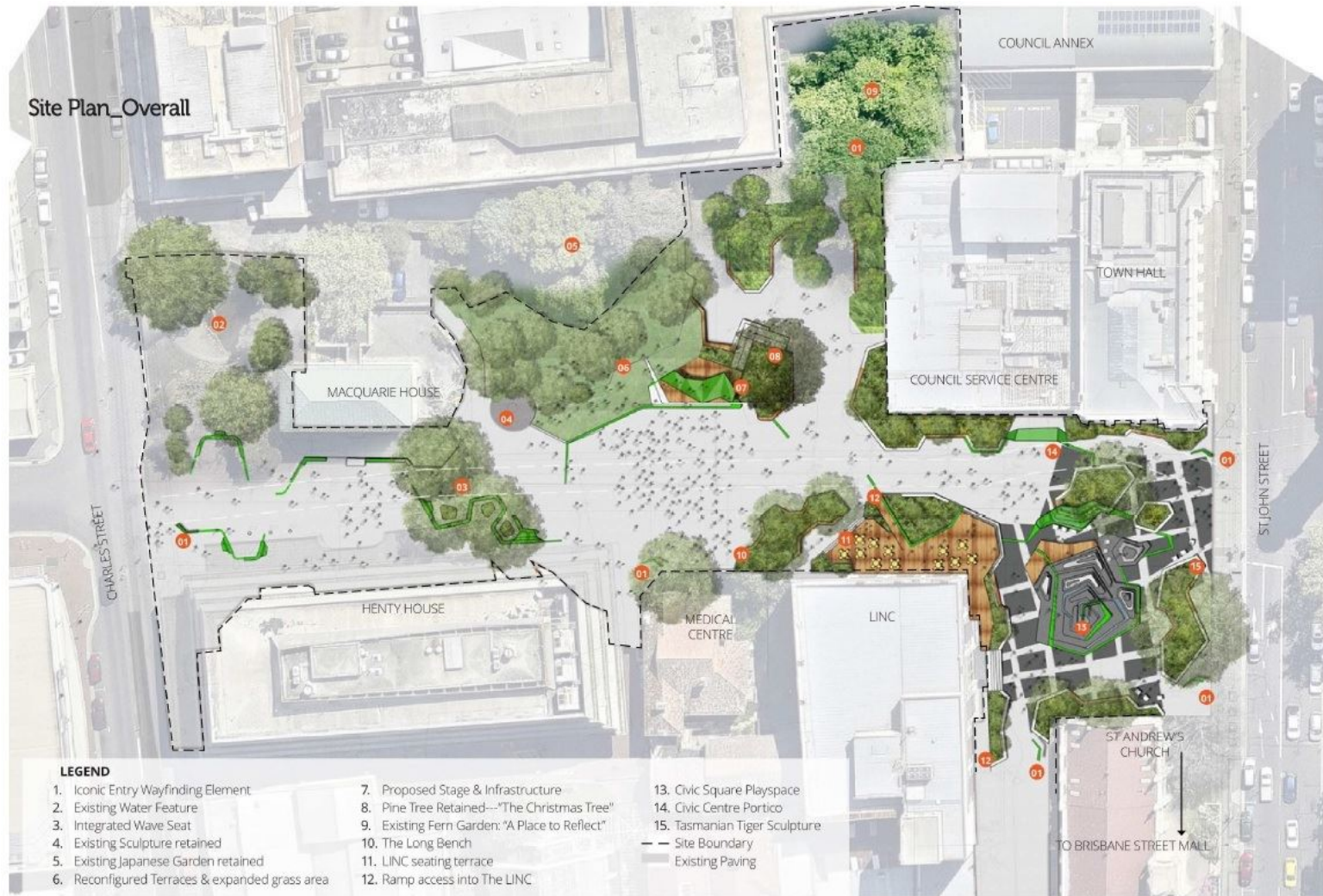
The 2 **Thuya** (36 and 37) growing beside the north-eastern corner of the church are poorly located for long-term maintenance in the landscape (Fig. 13). The trees are growing within 1m of the church footings. Branches of the southern tree are rubbing on the church wall. Attachments of the numerous leaders that make up the crown of the northern tree include bark at their attachment and are being held together by a loop of rope.

Removal of these trees would greatly improve passive surveillance of the Playspace.

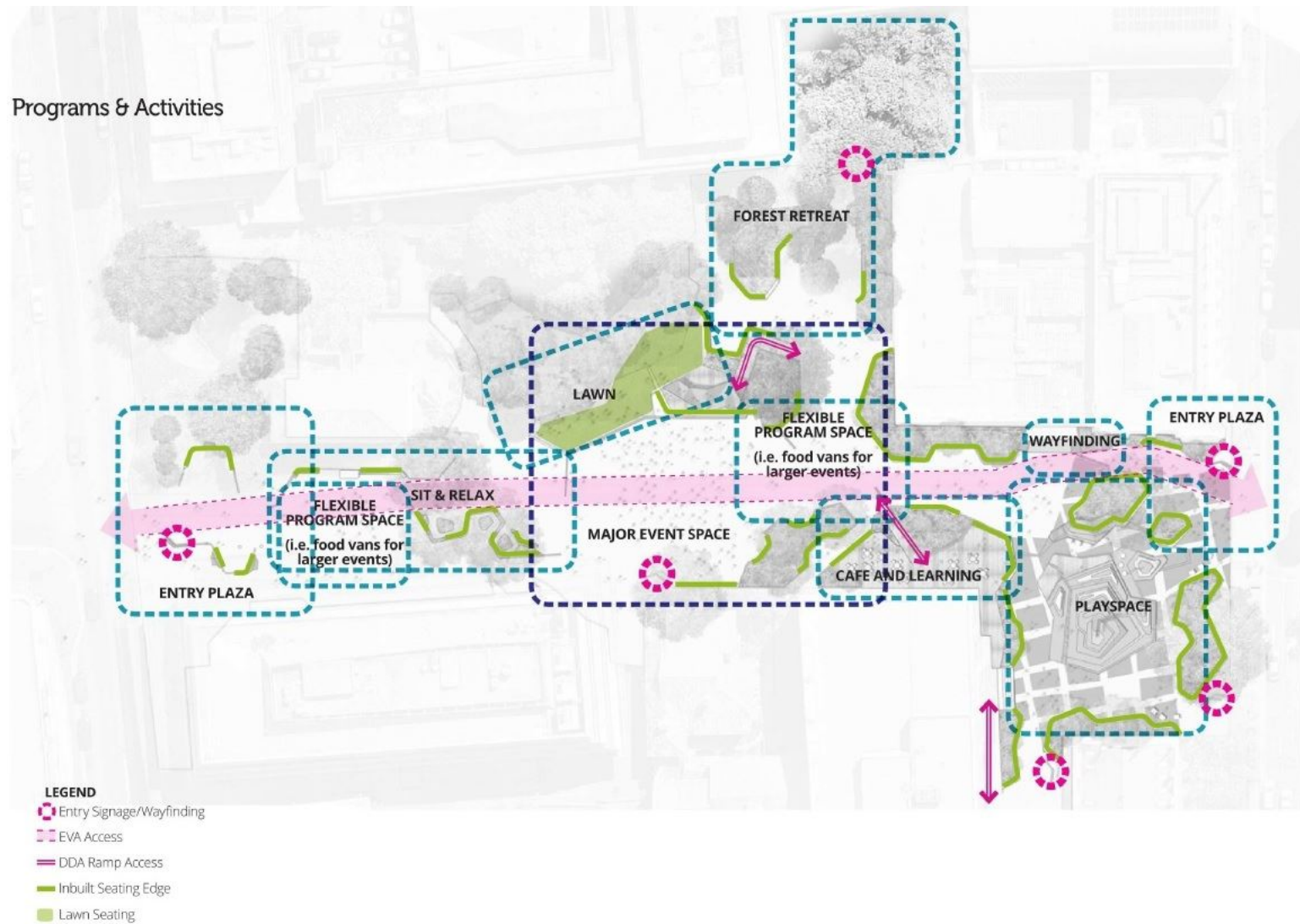
Fig. 13 Roots of **Liquidambars** (39) are pushing on the existing bed edging. Take not to damage the roots when replacing the edging.



Appendix1 Site Plan_Overall



Appendix 2 Programs and activities plan



Appendix 3 Spotted gums – ground penetrating radar scan of root zone

Ground Penetrating Radar Report

Prepared for: Launceston City Council

Site Location: Civic Square Launceston

Test Area Location: Adjacent to Henty House

Site Description: Paved courtyard

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SWAN HILL

TASMANIA
BRISBANE STREET
LAUNCESTON

Appendix 4 Mexican pine root plate stability report



PREPARED FOR	Launceston City Council
LOCATION	Civic Square
DATE PROCESSED	17-Jul-2016
TREE ID	
TREESENSOR COM ID	1301
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