Ashburton
DISTRICT COUNCIL

14 February 2014

E.G. Drewitt
C/- Olivia Fitzgerald
Cooney Silva Evatt Ltd
PO Box 324
Ashburton 7740

Dear Sir

Listed Status of Lime Tree at 28 Queens Drive, Ashburton

Further to our discussions last year and request via your solicitors for the Council to engage a survey of the tree on your property, I attach the results of this survey to this correspondence.

As you will see from the survey, aside from concerns regarding the leaning of the stems (I understand from Council Open Spaces Staff that these are to be re-cabled in the very near future), the report concludes that the tree is in good condition and is unlikely to result in danger for adjoining occupiers.

It is therefore my opinion that the investigations undertaken in relation to the tree have not identified any fundamental issue which would justify its removal on technical grounds. Having said this however, I would note that the onus is always on the applicant to demonstrate that the benefits of the loss of the tree would outweigh the merits of its protection and that the process to have such matters considered would be through the formal resource consent process.

I trust this is of use to you in your decisions as to how you wish to proceed.

Yours sincerely

Ian Hyde
Senior District Planner

Cc: David Askin, ADC Open Spaces Manager

Ashburton District Council
Tree Safety and Health Report
Protected Silver Lime Tree – Tilia tomentosa
28 Queens Drive - Ashburton

Purpose of report
The purpose of this report is to inform Ashburton District Council as to the safety, health and suitability for protection of the protected silver lime tree at 28 Queens Drive.

Background
Mr Drewett, the owner of the lime tree, has requested that the council remove the tree from the list of protected trees in the Ashburton District Plan.

From a discussion directly with Mr. Drewett, his reasons for wanting the protection removed from the tree are:

(i) High risk of the lime being wind - thrown or one of the three (3) stems breaking and falling either on his own or his neighbours house or grounds.

(ii) The large volume of leaves that fall in the autumn littering his own and the neighbouring properties.

(iii) The shading effects of the lime.

(iv) The effect the presence of the tree has had on the value of his property (both titles).

(v) The difficulty/practicality of constructing a dwelling on the (adjacent) section on which the lime is situated.

(vi) Concern that roots from the lime were the cause of cracking in the tar-sealed pathway around his house.

Scope of report
Notwithstanding the above range of reasons given by Mr. Drewitt, in accordance with my instructions from ADC planner, Mr. Ian Hyde, this report deals principally with the safety and health of the lime tree.

I have included a section dealing with the property damage reported by Mr. Drewett.

Method of hazard evaluation
The method of evaluation I have used is the Tree Hazard Evaluation Guide as developed by the International Society of Arboriculture (ISA).

Procedure
The evaluation procedure I have used is the Visual Tree Assessment (VTA) method. This is carried out from ground level, recording the range of hazard and condition factors contained in the ISA tree hazard evaluation form (see attached).

The size of the tree has been determined by Abney level and measuring tape.

The angles of lean of each of the three stems have been determined by using a hand held spirit level and protractor device.

General characteristics of lime
Species: Tilia tomentosa – Silver lime

Overall size: Height: 23.0 metres. Mean crown diameter: 20.0 metres.

Diameter breast height: (1.4 m from ground level):
Stem 1 = 610 millimetres. Stem 2 = 850millimetres. Stem 3 = 790 millimetres
Stem 1 is nearest to Mr. Drewitt's house, the other stems are numbered clockwise.

Estimated age of tree: 100 years plus.

Form: The form of the lime is generally symmetrical with a live crown (to total height) ratio of 60% due to pruning to raise the level of the crown.

Landscape importance: The lime is by far the most dominant tree in the landscape of the area, standing out as something of a landmark and being noticeable as soon as one enters the street.

Health/vigour: The density and colour of the foliage is good, as is the size of the leaves. As well, there is no sign of twig or branch or bark die-back that would indicate the health and vigour of the tree is in decline. There were also no symptoms indicating that the tree was infected by disease organisms.

Longevity:
Lime trees per se (Tilia genera) are long lived trees, capable of withstanding a wide range of climatic conditions, atmospheric pollution and injurious human activities, yet still being able to maintain attractive, entire crown forms.

In my opinion, of all the broad leaved, northern hemisphere trees, introduced to New Zealand, the limes have the potential to live (in a safe, healthy and attractive condition) to the greatest age.

Provided the three individual stems are cabled together as prescribed in this report, I believe the ***Future Safe Useful Life Expectancy (FSULE)*** of the lime to be forty (40) years.

Structural condition of lime

Notwithstanding the general good health of the lime, it does have a major structural defect that presents a potential hazard to persons and property within falling distance of the tree.

Instead of a single main trunk, it has grown three large trunks that arise from the base, close to ground level (possibly due to the loss of a central leader early in the life of the tree).

Where the trunks/stems have grown together at the base, they are separated by a condition known as "included bark". This condition is considered a major structural defect because where the trunks meet and continue to grow, the living bark tissue becomes trapped between the individual stems. Because of this, the stem at the point of contact is unable to form annual rings that form a proper fusing of the wood tissues. Instead, the stems continue to grow as individual stems, becoming larger in size and weight above the point where they touch compared with size and strength of the stem where they arise. As well, the bark continuing to grow between the stems acts like wedge, driving the stems apart.

In this case, the condition is exacerbated by the significant leans of the stems away from each other (see hazard evaluation form) and the imbalance of branch growth/weight where they grown out towards the light.

This condition can lead to a stem or stems splitting or breaking away completely at the point of contact, which given the large size of all the stems, is likely to have serious consequences for persons or property in the 23 0 metre radius falling zone. At the time of my inspection of the lime on 11/1/2014 there was no sign of splitting or breakage.

This defect was noticed by City Care arborists in 1997 who subsequently supported the three stems by installing synthetic rope bracing to hold the stems together, thus avoiding likely failure.

The trunk of stem No.2 shows signs that it was wounded many years ago as there is a seam running up the trunk where the wound-wood and bark from opposite sides have formed met and closed over the damaged area. Due to the thickness of the stem, I do not believe that this poses a significant threat to its strength however.

Apart from the trunk faults described with the three main stems, in common with all limes, the wood characteristics and branch structure of this tree have the right combination of strength and pliability to resist failure in the long term.

Ground conditions/root stability
From information received from Mr. Drewett, the soil of the site consists predominantly of heavy clay. Apparently, in the past, clay was extracted from a pit on the adjacent property for the commercial manufacture of ceramic objects.

Mr. Drewett also recalls the adjacent land being swampy although his own property has not suffered from surface water retention. Drainage work required for the subsequent site development work in the area should have cured this problem.

Clay soils, which are plastic in nature, usually have lower shear strength and are more susceptible to load bearing failure when saturated.

This can affect a tree in the following ways and is applicable to the tree in question:

When wet, clay soils are saturated, slippery and plastic, tree roots in tension (e.g. as in high winds) are pulled more easily through the soil due to greatly reduced friction.

On the opposite side of the tree to the wind direction, the soft ground under the root plate subjected to increased compression and the high load bearing forces, may fail.

In saturated soil conditions the combined effect will make the tree more prone to wind-throw.

In dry soil conditions, clay soil is strongly cohesive and provides good root plate support. Clay is also dense and heavy and its weight over the root plate will help prevent it lifting.

Root development in stiff clay soils tends to be in the upper soil levels due to the poor porosity and low aeration of stiff clays. "Sinker roots" that in more porous soils would provide anchorage at lower levels are unlikely to be present in the case of this lime.

However, the trunk buttresses and basal root flares at ground level are well developed and sound indicating that the lime has an extensive and strongly supportive root plate.

With regard to tree stability, contrary to popular opinion, compared to small trees large trees with large trunks are more resistant to wind-throw. This is due to the greater weight pressing down on the ground which increases the degree of friction between the root plate and the soil.

Nb The construction of buildings in the root zone of trees growing on clay soils can cause foundation problems, details of which are beyond the scope of this report.

Extreme wind events/comparisons
The severe North West gale of September 10th 2013 caused major tree damage and wind-throw throughout Canterbury.

According to the National Institute of Water and Atmospheric Research (NIWA) the wind speed reached in this gale was the highest since the destructive North West gale of August 1st 1975, 38 years ago.

At Winchmore, Ashburton, the September gale reached speeds of 129.6 kph compared with the wind speed of 151.2 for the August 1975 gale.

Despite this, the lime suffered no crown damage from these winds and there is no sign of ground failure or root lifting/breakage.

The average return event of the September gale is estimated by NIWA as thirty (30) years.

Hazard abatement/remedial tree work

The structural defects described in the section dealing with the structure and condition of the lime, require urgent abatement/remedial work.

The tree was fitted with a synthetic rope cable support system (Cobra) in 1997/8 to prevent the stems breaking away at the base.

In December 2013 one of the cables supporting the three stems was found to be broken.

This may have been due to one of the following causes:

(a) The initial strength of the rope was not sufficient for the loads imposed.

(b) The rope had been progressively weakened by the effects of ultra violet light on the synthetic (plastic) tissue forming the rope.

The safe working life of synthetic (uncovered) ropes is about seven (7) to ten (10) years. In New Zealand, which experiences high level ultra violet sunlight, these time frames can be considerably reduced. In my opinion, synthetic ropes should be replaced within any seven (7) year period with yearly safety inspections within this time. This is particularly the case in the situation of the lime in question where failure of any of the stems could result in the loss of life and/or major damage to property.

Specially designed synthetic rope systems have been approved and used to support trees for some years, However, in the situation described above, I believe the safest method is to install (on all three stems) galvanized multi-strand wire steel ropes attached to galvanized eyebolts drilled through the centre of the stems.

The ropes and the fittings should be of sufficient (safe working load) strength to support the stems in the most severe climatic conditions.

Damage to property
Slight damage has been caused, not to the house itself, but pathways and a garden feature.

There is a narrow crack about 1.5 metres long and few millimeters wide, in the tar-sealed pathway running round the house, 10.5 metres from the base of the lime. I also noted some disruption to the tar-seal where it abutted the house wall nearby. The only way to determine whether roots were the cause this damage would be to break open and lift the seal and check for the presence of roots beneath. This would have been beyond the scope of this exercise. Repairs would also need to be made to the damaged seal.

There is a raised, brick walled, garden bed 6.5 metres from the trunk of the lime. The corner nearest the lime shows signs of repaired brickwork and some slumping. The damage may have been due to tree roots directly contacting the wall's foundations or indirect damage due (clay) soil shrinkage. The wall may have had insufficient or defective foundations to begin with. Again it would require some excavation work determine this.

A concrete paver/slab pathway, laid directly on the soil, runs close to the lime about 1.5 metres from the buttress roots. The individual pathway slabs are uneven which can be expected being so close to the tree. The slabs could be re-laid without too much difficulty.

Tree roots can extend to distances 1 to 1.5 times the height of the tree (23 metres).

Fallen leaves collect in the house gutters, the clearing of which Mr. Drewett can no longer undertake due to the physical limitations of a man of his age.

Suitability of lime tree for protection
To assess the worthiness of the lime for protection, I carried out an independent evaluation of the tree using the Heritage Tree Criteria/Evaluation System contained in the ADC District Plan.

My inspection of the tree found that it had been incorrectly identified as a Tilia x europaea - common lime. The tree is in fact a Tilia tomentosa, known as a silver lime.

Mature specimens of this species are quite rare. The Christchurch City Council protected tree list for example, records only two trees of this particular species, both situated on the same property.

The evaluation system form showing the factors and my point scores is attached to this report.

Under the score sheet factor *Form and Condition* I gave the lime a two (2) point score relating to the criteria, *"poor condition or form, no bad defects.* ***Any hazardous and other conditions can be rectified".*** The latter I believe is absolutely essential if the tree is to be protected.

Had the tree not been a multi-stemmed specimen with the dangerous condition of included bark, the tree would have rated at least an eight (8) point score under the *"Good form, healthy condition* factor.

Under the score factor ***Suitability in relation to setting*** I gave the lime only two (2) points on the grounds the tree may be causing slight damage to the property.

I scored the lime a total of 40 points.

Summary

The silver lime is undoubtedly an impressive specimen visually. The tree makes a major contribution to the landscape of the locality where large trees are scarce.

Mature trees of this species are rare in Canterbury therefore it also is of scientific and botanical value/interest.

There are serious safety considerations that relate to the safety of the lime which I have dealt with in this report.

Despite its structural defects, the tree is generally in a healthy condition and is likely to remain so for many more years.

The lime is situated in close proximity to residential buildings and grounds. This will undoubtedly cause nearby residents to experience some degree of shading, leaf litter and nuisance problems normally associated with trees.

I understand the vacant section where the lime stands is proposed to be developed. This will need careful consideration in terms of how this may affect the tree and how the tree may affect a future building and its occupants.

Whatever may happen in the future, any retention or council protection of the lime in the meantime should be conditional upon the three main stems being cabled together.

Attached to this report are:

A completed and signed copy of the ISA Tree Hazard Evaluation Form.

A completed and signed copy of the ADC – District Plan, Heritage Tree Criteria/Evaluation System form.

An explanation of the ISA hazard evaluation system

Report by arborist: Date: 21 January 2014

Walter Fielding - Cotterell