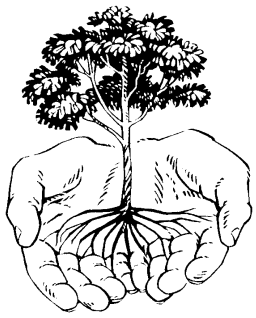
Appendix B

Arboriculture Assessment



Proposed Development

157-163 Cleveland St Redfern

Arboricultural Assessment

Prepared for

Urbanest

November 2011

Prepared by

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1.0 EXECUTIVE SUMMARY

1.1 The following report has been prepared for Urbanest to provide an assessment of the trees adjacent to the property at 157-163 Cleveland St Redfern. The report reviews the current condition and viability of the trees and provides an assessment of the potential impacts that development on the site may have on the trees. This report also examines the suitability of the specimens for retention in the context of the design proposal.

1.2 In all, eight trees were assessed. There are no trees within the proposed development site, although two trees are growing on the site boundary immediately adjacent to the council footpath. The six remaining trees are street trees and will need to be retained and protected.

1.3 Constraints to this report – At the time of writing, it was not possible to comment on any potential impacts that might arise from possible redirection of the existing sewer line. Information from Sydney Water is yet to be provided and until that time it is not known whether any of the street trees may be affected.

1.4 Generally, the two trees located on the boundary should be removed as they are not suitable for retention due to various defects, restricted growing spaces and ongoing conflicts with existing services. It would also not be possible to protect and retain these trees during demolition of the existing building. It should be possible to protect and retain the six existing street trees along the Hudson St frontage, although there may be some pruning required depending on the type of hoarding used during demolition and construction.

1.5 There are no other trees on adjoining properties that will be affected by the proposed development. Vegetation along the Cleveland St frontage comprises small clumps of Plumbago.

1.6 SUMMARY OF IMPACTS AND RECOMMENDATIONS

1.6.1 The following table lists trees on the site that will require tree protection or that are recommended to be removed. Brief rationales for tree removals are indicated in the table below.

It should be noted that the level of anticipated impacts described here is based on the current design proposals. No information is available at this time regarding installation of new underground services or associated works.

No.	*Botanical Name*	Common Name	Anticipated Impacts [A]	Remove / Retain [B]
1	*Tristaniopsis laurina*	Water Gum	Low	Retain
2	*Tristaniopsis laurina*	Water Gum	Low	Retain
3	*Celtis sinensis*	Chinese Nettle-tree	Moderate	Retain
4	*Tristaniopsis laurina*	Water Gum	Low	Retain
5	*Tristaniopsis laurina*	Water Gum	Low	Retain
6	*Tristaniopsis laurina*	Water Gum	Moderate	Retain
7	*Casuarina glauca*	Swamp She-oak	High	Remove [C]
8	*Jacaranda mimosifolia*	Jacaranda	High	Remove [C]
	([A] Refers to anticipated impacts of development on trees based on current design plans. Any substantial redesign may require reassessment of impacts.)			
	([B] For a more detailed explanation of impacts and rationale for recommendations, refer to the Tree Inventory and Assessment Schedule – page 10 of this report)			

	([C] Reason for removal: Impact of structure on rootzone and/or crown during demolition)

2.0 INTRODUCTION

2.1 The following report has been prepared for Urbanest regarding street trees adjacent to the property at 157-163 Cleveland St Redfern. The report reviews the current condition and viability of the trees and provides an assessment of the feasibility and suitability of the specimens for retention in the context of the design proposals for the site.

2.2 The proposed development site is bounded on four sides by Cleveland, Abercrombie, Hudson and Hart Streets. The principal trees discussed in this report are street trees.

2.3 Recommendations made in this report as to the likely impacts that the proposed development may have on trees adjacent to the site are based on a review of the current design proposals provided by Pure Projects (September 2011), together with know characteristics of the affected tree species and site conditions.

2.3.1 Relevant documents provided by Pure Projects and reviewed for this report include:

Site Survey	Prepared by Denny Linker & Co, Ref: 110505. 11/5/11
Floor Plans	Prepared by Bates Smart, Drawings SK-001 - SK-004. 15/9/11
Elevations and Sections	Prepared by Bates Smart, Drawing SK-201 - Drawing SK-205. 16/9/11
Perspectives	Prepared by Bates Smart, Drawing SK-302C. 16/9/11
Landscape Concept Plan	Prepared by Aspect Studios 6/9/11

2.4 This report does not represent an Arboricultural Method Statement (AMS) as some of the information necessary to prepare a concise AMS is not available at this stage. However, the report does provide broad recommendations regarding methods of tree protection that should be incorporated into the construction documentation for Construction Certificate stage.

3.0 FIELD SURVEYS

3.1 SITE ASSESSMENT

3.1.1 The trees on the site were assessed on 16/9/2011.

3.1.2 The levels and tree locations described in this report are derived from the Details and Levels Plan prepared by Denny Linker & Co. 20/05/2011. That plan was used as the basis for tree locations contained in the Tree Location Plan contained in this report. Exact tree locations should be confirmed by a surveyor.

3.2 APPROACH

3.2.1 Tree assessment was carried out to satisfy the requirements of the City of Sydney Council Tree Preservation Order and Guidelines for Arborist Reports.

3.2.2 Tree dimensions provided in the attached Assessment Schedule were accurately measured using a Leica Disto™ laser measuring device and diameter tape. Any further calculations for Protection Zones setbacks should use the measurements provided in this schedule.

3.3 HAZARD ASSESSMENT

Assessment of trees for this report was carried out by ground based visual inspection only. Where trees are to be retained, a more thorough hazard assessment may be required (including

aerial inspection of decay and branch attachment or examination of cavities) to determine any other possible defects. The Tree Assessment Survey Sheets indicate trees requiring more detailed assessment.

3.4 RECURRENT ASSESSMENT

3.4.1 Tree assessment and recommendations are based on the condition of the trees at the time of inspection. As the trees themselves continue to age and decline, further assessment, particularly from a hazard management perspective may be necessary.

3.4.2 It is recommended that a qualified Arborist should conduct a follow up assessment of the trees at least two years following completion of construction and redevelopment works on behalf of the tree owner, as part of a responsible tree management program and to fulfil risk management responsibilities on the part of the relevant Management Authority.

4.0 TREES ASSESSMENT SUMMARY

4.1 TREE SURVEY RESULTS

4.1.1 ***Trees Recorded on Site***: Only two trees are actually located partially along the site boundary (Tree nos. 7 & 8) but their trunks and roots overlap onto the public footpath. Both trees have been planted. There are no other trees within the site. The remaining six trees recorded during this survey are all street trees and therefore under the control of the City of Sydney Council.

It should be noted that two trees are shown on the survey but have been removed at some earlier stage. A review of Google Maps indicates they were both small Schefflera actinophylla and were therefore exempt from the City of Sydney Council Tree preservation Order 2004.

4.1.2 ***Trees Recommended for Retention***: All six street trees (Tree nos. 1 to 6) could be considered suitable for retention and can be adequately protected during the proposed demolition and construction phases. However, a recommendation is made in this report that consideration should be given to removal of Tree no. 3 as it is an inappropriate self sown species.

4.1.3 ***Trees Recommended for Removal***: The two trees located on the property boundary (Tree nos. 7 & 8) are recommended to be removed.

5.0 GENERAL COMMENTS

5.1 In broad terms, there are no significant tree issues that should hinder new construction on the site. There are only two specimens that are within or adjacent to the areas proposed for redevelopment and that would be directly affected by development. Both trees are unsuitable for retention due in part to their inappropriate planting locations that have resulted in poor root development and other defects.

5.2 The only trees of some significance are the five Watergums street trees located on the southern side of the site, adjacent to Hudson St. These trees are either young or mature – the later in the age range of 25 to 30 years (possibly older if the Watergums on the southern side of Hudson St are used as a guide).

This species typically has a fairly high tolerance to root disturbance during construction, although it is proposed that these trees be adequately protected during the demolition and construction stages.

5.3 The remaining street tree is a Chinese Nettle-tree. This species typically has a fairly high tolerance to root disturbance during construction.

This mature specimen has several defects, although not sufficient to warrant removal at this stage. Its age and location suggest that it was not planted and is more likely to be a self sown

weed tree. It also has poor form due to past lopping for powerlines and it will continue to grow back into lines and the proposed new building, requiring ongoing maintenance and creation of more structural defects. It will also be problematic in terms of being able to construct appropriate hoarding around the site.

It is recommended that this tree should be removed and replaced with a Watergum to maintain the uniformity of the street planting. However, replacement of this tree will require permission from the City of Sydney Council.

5.4 Shade cast by the proposed building is not considered to be a constraint to the growth of the existing trees for the following reasons:

- Watergums typically have a high tolerance of reduced light conditions in their native habitat.
- Two of the Watergums are only recently planted and will adapt to any altered light conditions.
- The other mature Watergums have been pruned low for powerlines resulting in them being in shade for most of the morning. All trees will continue to receive afternoon sun.

5.5 The two trees adjacent to the building are considered to be unsuitable for retention as they currently exhibit defects or are highly likely to be destabilised when the existing building is demolished. They are also in restricted growing spaces and will have ongoing conflicts with existing services. Neither tree has sufficient amenity value to warrant retention and could be replaced by more appropriate street trees.

In the case of Tree 7, its location will be in conflict with the proposed location for the Fire Booster Assembly and access to the water and gas meters.

5.6 The following images provide descriptions of the main issues with these two trees:

Figure 1: Tree 7 viewed from west showing its relatively small size and narrow form at this stage.

Figure 2: Tree 7 viewed from north showing its proximity to the existing building. Its proximity to the overhead lines will

also lead to repeated lopping in the near future.

Figure 3: Tree 8 viewed from west showing its relatively small size and few remaining branches following lopping for powerline clearance..

Figure 4: Tree 8 viewed from south west showing its proximity to the existing building and poor form.

Figure 5: Tree 8 showing how the trunk is compressed against the pier of the existing building.

Figure 6: Tree 8 viewed from south showing one of the deep bark inclusions between trunks and roots restricted by the existing ramp.

6.0 TREE ASSESSMENT

6.1 EXPLANATION OF TERMS

6.1.1 The following Tree Assessment schedule categorises the trees by a number of *objective* measurements; height, spread and trunk diameter at breast height (DBH), and *subjective* assessment criterion. The following explains the terms used in the tree assessment schedule.

Health - Refers to the overall health and vigour of the specimen. Assessment of tree condition has taken into consideration both known specimens of the same species and age, which are growing under favourable conditions in Sydney, and a comparison with other specimens within this site growing in the same conditions. Health takes into consideration factors including: shoot extension growth, foliage surface area, and leaf size as well as the presence and extent of pests and diseases.

Horticultural Viability - This is an estimation of the likely viable useful life that can be expected for each tree. It is based on the known lifespan of the species, its present age, its present condition and indicators of vigour, site conditions, stress factors present, and any obvious factors that may compromise the health of the tree (such as the structural stability of the crown, or pests and diseases).

Rating	Description
Good	This rating indicates that the tree is in good health under current conditions and that its health and/or age would suggest that it would have a useful horticultural life over the medium to longer term, depending on the characteristic life span for the species.
Fair	This rating may indicate that a tree has a reasonable useful life at least over the medium. If conditions remain unchanged, the anticipated life, given the age of the specimen or its recent history, is likely to be less than could be expected if a more favourable growing environment were provided. This rating also suggests that the specimen may require more regular assessment of tree health and safety and may require more regular tree surgery or other arboricultural input.
Poor	This rating indicates that the tree exhibits low vigour, is under stress, and is in decline. In some cases structural defects, pathogenic infestation or insect activity might also be present. In most instances, these trees would have a useful life span of less than ten years. Remedial work on these trees is not considered to be warranted, and in many cases, they should be removed entirely within the next few years. In some cases, the poor condition of these trees could constitute a potential hazard, and they have been recommended for removal.

Generally, trees rated “Fair to Good” are likely to have their useful life extended if tree surgery is carried out or cultural conditions are improved; such as pruning of hazardous limbs, removal of grass from within the dripline, installation of mulch, regular fertilising, watering during extended dry periods, and alleviation of soil compaction (particularly compaction due to vehicle parking or traffic).

On this site, the viability of trees rated as "Fair to Poor" is unlikely to change. Removal of young trees with a "Fair to Poor" rating is justified as even with more favourable growing conditions these trees will still have a reduced life expectancy.

Age Class - Based on available information or assessment of the characteristics of the specimen, site conditions and experience with the species growing under similar conditions.

Y Young trees usually in their first 10 years of growth (apart from short lived species)
SM Semi Mature trees less than 1/3 life expectancy
M Mature tree, between 1/3 and 2/3 life expectancy
OM Over mature tree, annual growth is almost negligible, coming to end of life, usually applies to veteran trees.

Structural Condition - Comments about the structural characteristics of the tree, in particular the presence of any defects that may reduce the viability of the tree or pose a hazard to occupants of the site. Ratings range from "Poor" to "Good". In the case of young or semi-mature trees, it may be possible to carry out formative pruning to correct potential defects. If appropriate, recommendations will be made in the "Comments" section.

Ranked Class - A ranking system has been applied to identify, on a comparative basis, those trees that are most suitable or valued for retention based on individual tree's characteristics. The ranking system has been applied to all trees equally, and is irrespective of any specific or likely future development of the site. Values assigned to each tree range from 1 to 5 as follows.

Rating	Description
1	High - Assigned to trees most highly valued for retention on a comparative basis. Trees are of good condition and form, likely to be tolerant of the impacts of redevelopment if retained within an appropriate Tree Protection Zone, and generally are of mature size or otherwise prominent within the landscape. It is recommended that, where possible, future development impacts should be restricted for the benefit of these trees.
2	Medium - Assigned to trees less valued for retention on a comparative basis. Trees are generally observed to be in good condition and are of a suitable form. Trees are mainly of mature size or located in a position that allows room for future healthy growth to mature size and are likely to be tolerant of development impacts if retained within an appropriate Tree Protection Zone. Whilst of lower relative rank in comparison to those trees designated as Rank 1 it is recommended that, where possible, future development impacts are restricted for the benefit of these trees.
3	Low - These trees are considered worthy of retention if convenient within the context of the redevelopment and landscape design processes. They will add value in the short to medium-term, or until suitable replacement trees have been established, but are not considered of sufficient significance to warrant extensive efforts for their retention. If these trees are retained, normal protection measures including Tree Protection Zones should be applied in accordance with arboricultural guidelines.
4	Removal Recommended - The effort required to retain Rank 4 trees may not be considered justified in the context of likely development impacts or future site usage. More suitable, healthier, and longer lived trees, or trees conferring greater amenity can be retained or introduced as part of an integrated landscape plan. Despite poor form and structure, or terminal decline, Rank 4 trees may be retained at the preference of interested parties for features such as

	site screening or habitat. A management plan may need to be provided to allow for future safe retention.
5	Unsuitable for Retention - These trees are weed species, likely to be considered immediately hazardous, or otherwise unsuitable for retention. It is advised that these trees should be removed unless specific reasons are given for their retention.

Tree Surgery - This category identifies specimens requiring tree surgery or improved management. Where tree surgery is indicated, a more detailed assessment or explanation may be necessary. Tree work involving pruning does not include branch removal required for construction activity. Pruning in this category will be restricted to essential work required to maintain the health and safety of the trees.

Where work relates to the risk management of a specimen, tree surgery should be given greater priority than say, improving cultural conditions, particularly if the area around the tree is subject to greater pedestrian usage or the tree may impact a structure.

Only the readily apparent problems were recorded for each tree. Re-assessment of all trees should be carried out as part of the ongoing management of the tree population. Where trees are retained, further tree surgery should be carried out as individual trees or site conditions change over time.

Some of the recommendations for tree surgery are self explanatory. In the case of actions described as; “1” - deadwood, “2” - reshape crown, and “3” – wound repair, the extent of work required will need to be reassessed at the time when quotations from Arborists are sought. Generally, the need for deadwood removal is only indicated where there are dead branches 0.25 mm or greater in diameter. The priority for this work tends to be low while the trees are in areas not used by the public. As the area around an individual specimen is developed further, the priority for tree surgery work to be carried out will be given higher priority. All pruning work should be in accordance with the Australian Standard for Pruning Amenity Trees AS 4373 – 1996.

On this site “4” - insect control, no trees where identified as having significant infestations of pests or diseases present, other than unidentified decay organisms in some trees.

Where the action is described as “5” - Improve cultural conditions, the basic work required will include; removal of weeds, fill and debris from within the drip zone, soil chemistry analysis, fertilising (in accordance with soil analysis recommendations), mulch. Additional cultural methods such as irrigation may also be necessary. Most of the trees on this site would benefit from this action however; only trees considered to be of higher significance value and with apparent health problems were identified for this action.

A recommended action of “6” - Investigate cavities - refers to the need to further assess the extent of cavities observed in the tree and the role that this structural fault may affect the safety of the tree. An assessment of the hazard potential should be made in each case in the context of the level of use of the area around the tree and feasibility of moving potential targets (for example, relocating seats, car parking and paths).

“7” - Thin canopy or consider installation of cabling / bracing. This category of required work was applied to large and significant specimens to be retained but which may have had structural faults that may represent a potential hazard. Again, implementation of this technique will depend on the feasibility of retaining an individual tree and the extent that the area around the tree is occupied by new structures and/or the rates of pedestrian occupancy.

Where the action is described as “8” – Line clearance – this generally describes a tree that requires pruning to provide regulatory authority clearances for power lines or other aerial cables.

Under current legislation, only tree contractors approved by the relevant regulatory authority can undertake powerline clearance work. Line clearance can also describe a tree that, due to its location, will require recurrent pruning to provide clearance.

A recommended action of "9" – Remove climbers – indicates that climbing vines of one or more species are growing on either the trunk or branches of the tree. Removal is recommended to avoid the problems of girdling/ringbarking, suppression of photosynthesis by the tree crown or the risk of branch failure because of vines weighing down branches.

"10" – Root girdling. This describes the presence of a defect created where roots grow around the main stem of the tree and cut off or restrict the movement of water, plant nutrients and stored food reserves. Certain tree species are more prone to this problem than others are and trees can slowly weaken and die over a period of years or decades because of root girdling. The primary purpose of identifying root girdling is to determine whether the tree can maintain structural stability or maintain viability over the longer term. Severe root girdling may initially require further investigation by excavating around the root crown. For younger trees, pruning girdling roots may be an option. For larger specimens the impact of wounding resulting from pruning may outweigh the potential benefits.

No trees on this site were found to require tree surgery in the categories "3", "4" "5" "6" "7" "9" or "10" at this stage.

Where a definite recommendation of removal -"11" - is given, the trees are generally in poor health or exhibit significant structural instability or decay or the tree is an inappropriate species for this location or for the eventual use of the site.

"12" – No tree surgery required indicates trees that, at the time of inspection, had no significant defects that required action. However, where a tree is retained, as the specimen continues to age and decline, further assessment, particularly from a hazard management perspective, may be necessary.

7.0 TREE INVENTORY AND ASSESSMENT SCHEDULE

7.1.1 The following Assessment Schedule provides comparative information on trees within the site using a series of brief descriptions and ratings. Detailed features of individual specimens and recommendations are provided in the “Comments” column.

Tree No.	Botanical Name	Common Name	HEIGHT[1] SPREAD[2] DBH[3] (mm)			Health	Hort. Viability	Structural Condition	Rank for Retention	Age Class	Tree Surgery[4]	Notes
			H	S	D							
1	*Tristaniopsis laurina*	Water Gum	2.5	1.5	65	Good	Good	Good	1	Young	2	This is a recently planted, small specimen that can be easily protected during the demolition and construction phases by the use of appropriate hoarding. Some formative, directional is recommended for this tree to provide pedestrian clearance – although that will be the responsibility of Council.
2	*Tristaniopsis laurina*	Water Gum	2.5	1	45	Good	Good	Good	1	Young	2	This is a recently planted, small specimen that can be easily protected during the demolition and construction phases by the use of appropriate hoarding.
3	*Celtis sinensis*	Chinese Nettle-tree	9	8.0 12.5		Good	Good	Fair	3	Mature	11	Generally reasonable specimen although it has been repeatedly lopped for powerline clearance. Tree has numerous wounds to branches from truck damage. Its age appears to be 15-20 years and is growing at the base of a stump of a former street tree. Given its age and location it is likely that this is a self sown If retained, it will require further line clearance pruning and some directional pruning to remove poorly attached branches. Lopping has resulted in a spreading crown that will conflict with the installation of hoarding, requiring extensive pruning. The potential size of the tree also means that it will increasingly be in conflict with the adjacent building, requiring ongoing maintenance. Removal is recommended.
4	*Tristaniopsis laurina*	Water Gum	4.5	5.0 7.0	230 160	Good	Good	Good	1	Mature	12	Generally reasonable specimen. Age appears to be 20-30 years although it is smaller than the Watergums on the southern side of Hudson St due to repeated lopping. The lopping has resulted in a low, flat-topped form with dense branching in the upper crown. No significant defects other than minor deay at the lopped branch tips. Its short and wide crown size means that it may conflict with the installation of hoarding. Some pruning may required at that stage.
5	*Tristaniopsis laurina*	Water Gum	4.5	3.0 5.0	210	Fair to good	Fair to good	Good	1	Mature	12	Generally reasonable specimen. Age appears to be 20-30 years although it is smaller than the Watergums on the southern side of Hudson St due to repeated lopping. The lopping has resulted in a low, flat-topped form with dense branching in the upper crown. No significant defects other than minor deay at the lopped branch tips. Its short and wide crown size means that it may conflict with the installation of hoarding. Some pruning may required at that stage.
6	*Tristaniopsis laurina*	Water Gum	7.5	6.0 7.0	240 170	Fair to good	Fair to good	Good	1	Mature	2	Generally reasonable specimen. Age appears to be 20-30 years although it is smaller than the Watergums on the southern side of Hudson St due to past lopping. The form of this tree has been allowed to develop since the installation of Aerial Bundle Conductors (ABCs). The tree has tended to grow out and away from the existing building. Therefore it is less likely to be in conflict with the installation of hoarding. However, some pruning may required at that stage.
7	*Casuarina glauca*	Swamp She-oak	9	4.0 3.0	175	Fair to good	Fair to good	Fair to good	4	Semi-mature	11	This is a relatively young specimen inappropriately planted hard against the footings of the existing building. Although the tree currently exhibits good health and its narrow form has avoided lopping for power lines, the main issue is that all of the root system is directed parallel to the footings within the narrow garden bed and to the west under the footpath. Demolition of the existing building and its footings would leave the tree vulnerable to windthrow and therefore pose an unacceptable risk. For this reason, its removal is recommended.
8	*Jacaranda mimosifolia*	Jacaranda	9	3.0 4.5	222 220 180	Fair	Poor	Poor	4	Mature	11	This is a mature multi-trunked specimen with deep bark inclusions between the three trunks and distorted form. It has been severely lopped for power line clearance and was also inappropriately planted hard against the footings of the existing building resulting in a restricted root plate. Demolition of the existing building and its footings would be very difficult to complete without damaging the lower trunks. It is possible that the tree might be vulnerable to windthrow, however this is less of a risk, compared to #7, as this tree has a much reduced crown spread. Given its poor form, defects and the limitations that its retention would place on demolition and construction of the proposed building, there appears to be no justification for its retention. Removal is recommended.

[1] **Height and Spread** - Approximates measured using a hand held laser distometer.

[2] **Spread** – Where two measurements are given, the first is measured north-south and the second measured east-west.

[3] **DBH** = Diameter at Breast Height. Measurement of trunk diameter measured at 1.4m above ground level or as close as branch arrangement permits. For trees located on adjacent properties, an estimate of DBH may be provided.

[4] **Tree Surgery Categories** - 1-Deadwood. 2-Reshape crown. 3-Wound repair. 4-Insect control. 5-Improve cultural conditions. 6-Investigate cavities. 7-Thin canopy or consider installation of cabling / bracing. 8-Line clearance. 9-Remove climbers. 10-Root Girdling. 11-Removal recommended. 12-No tree surgery required.

LEGEND:

Trees of high quality and value.

Trees of moderate quality and value.

Trees removed since survey.

Trees of low quality and value.

Trees that will be removed as part of the development.

(Colour coding based on BS5837 2005)

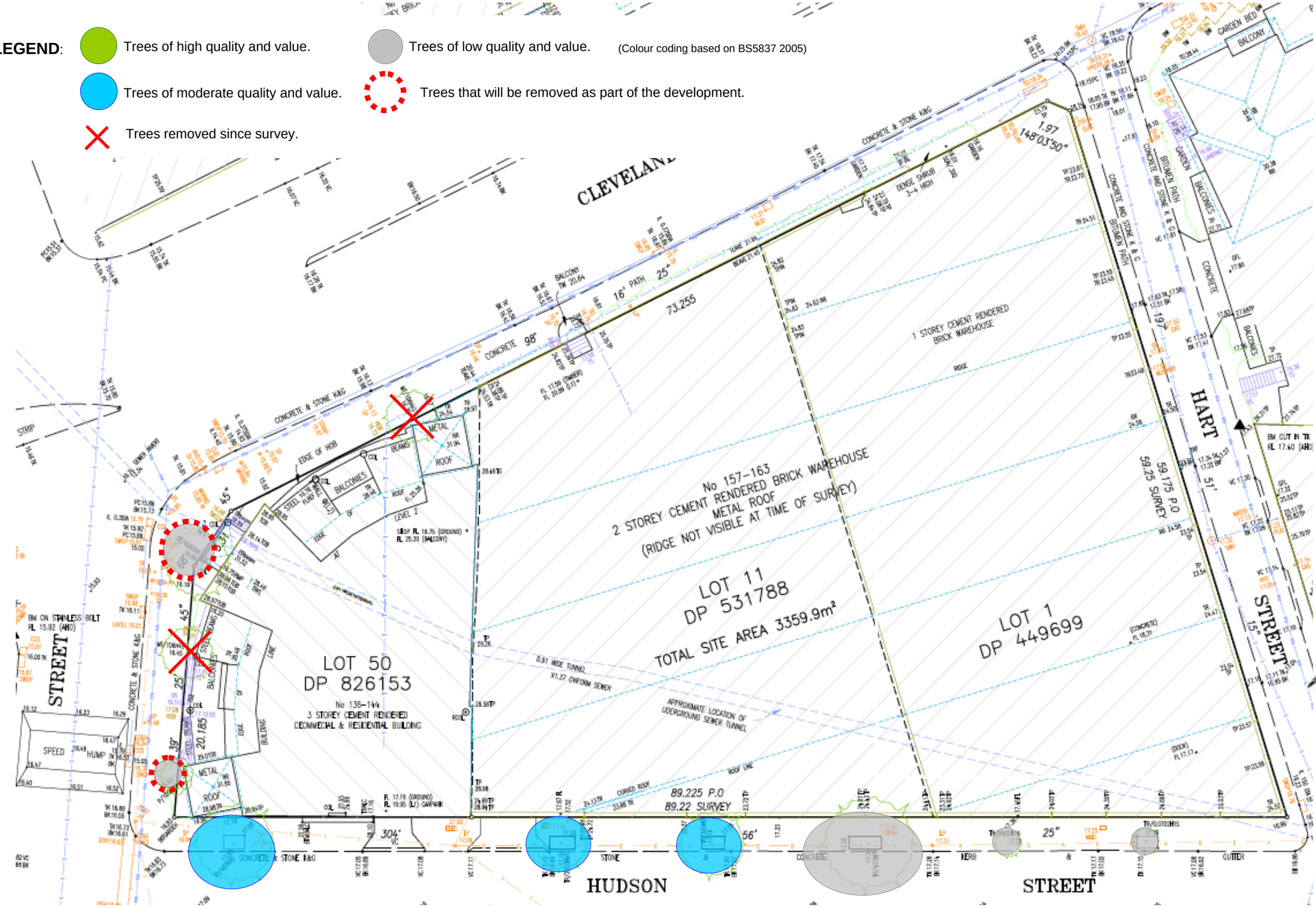


Diagram 1 – Tree Location Plan (n.t.s.) Note: refer to schedule for tree numbers.
(Source: Adapted from Details and Levels Plan prepared by Denny Linker & Co. 20/05/2011)

8.0 GENERAL TREE IMPACT STATEMENT

8.1 In summary, it is feasible to construct the proposed development to the extent indicated in the current design proposal without impacting on the retained adjacent trees in a way that would affect their current condition or reduce its longer-term viability. This recommendation is contingent on all tree protection measures being in place and maintained during construction and that growing conditions around the trees are not significantly altered. The details for tree management should be included in the Construction Management Plan.

8.2 Aspects of the design will need further review and refinement during the documentation stage to ensure that adequate tree protective measures can be put place. At the time of writing it is understood that further information has yet to be made available from various authorities, such as Sydney Water, regarding the location of stormwater lines, and the undergrounding of power cables. The design of these services has the potential to impact on the crowns and roots of the retained trees and should be reviewed to determine what if any impacts may occur and what approaches are available to minimise impacts. The proposed type of hoarding around the site (understood to be Type B hoarding) also as the potential to impact on the crowns of the trees. Again, this should be reviewed as design information becomes available.

In general terms, it is considered that as the street trees are relatively small, suitable measures could be taken to minimise impacts on the retained street trees and that appropriate measures can be put in place during construction provided there is adherence to the specifications and that there is supervision of the tree protection measures by a qualified and experienced Arborist during construction.

8.3 In the event that the design of the structures changes, more detailed site investigations may be needed to determine more accurately the extent of roots systems, the feasibility of construction close to the tree(s) or the locations of footings, so as to avoid roots.

Figure 7: Tree 3 showing its distorted form and conflict with the existing building.

Figure 8: The low broad crown of Tree 5 may create some difficulties for the erection of appropriate hoarding.

9.0 OVERVIEW OF TREE MANAGEMENT PROCEDURES

9.1 REFERENCES

Generally, tree protection and management during the construction phase should conform with AS 4870 – 2009, Protection of trees on development sites.

9.2 SUMMARY

9.2.1 Witness & Hold Points - in order to monitor and manage activities near trees, a number witness & hold points shall be incorporated in the Contract Documentation. More specific Hold points may be required, however among these should be included:

- ❖ Protection enclosures installed and Tree Protection Zones established to trees prior to commencement of works.
- ❖ Root pruning works to any trees, prior to backfilling.

9.3 DOCUMENTATION

9.3.1 The location of all Tree Protection Zones and Tree Protection Fencing should be identified on all construction drawings.

9.4 SITE MANAGEMENT

9.4.1 Implementation - All tree protective measures should be implemented before the commencement of demolition, excavation and building works.

9.4.2 Duration - Protect the trees and maintain the protective measures in place and in good order for the duration of the demolition, bulk earthworks and construction phases.

9.4.3 Tree Protection Zones - Establish Tree Protection Zones (TPZ) around all individual trees or groups of trees to be retained at the distances indicated on the Tree Protection Zone (see attached schedule) unless more specific recommendations are provided by the Project Arborist regarding appropriate setbacks.

9.4.4 Trees To Be Retained - these will be protected and managed within Tree Protection Zones enclosed by Tree Protection Fences (TPF) in accordance with industry best practise. This will include; a minimum 1800mm high galvanised chain wire fence with lockable gates to AS 1725 and clad with shade cloth to prevent wind blown debris Fences to be located and installed to avoid damage to tree roots. TPF to be maintained during the construction phase.

9.4.5 Enclosure Signs - Signage will be attached to each tree enclosure, defining limitations. Install tree protection signage to all sides of each tree enclosure.

9.4.6 Hoarding – An acceptable alternative to tree protection fencing will be the use of hoardings to protect the crowns of street trees and delineate areas around the trees that will be protected. Hoarding should be installed so as to minimise the need for pruning or damage to trunks. Hoarding should be installed after appropriate trunk and branch protection has been installed (as described in item 9.4.14 below)

9.4.7 Site Sheds – Generally locate site sheds outside of the dripzones of trees.

9.4.8 Harmful Materials - All materials will be stored outside of fenced TPZs. There will be no temporary storage or stockpiling of bulk materials and harmful materials within TPZ. Do not place spoil from excavations against tree trunks. Prevent wind-blown materials such as cement or other chemicals from harming trees and plants. Do not permit waste from washing of

concreting tools or painter's waste to be disposed of anywhere within the TPZ or other disturbed areas to be incorporated into the final landscape works.

9.4.9 Excavation - Excavation for new works should avoid damage, disturbance or rocking the remaining root system. Roots should not be torn by backhoe or excavator buckets. Where roots greater than 50 mm diameter are encountered during excavation, roots shall be exposed by hand and cut by the Project Arborist. Roots will be cut cleanly using hand tools to avoid disturbance to surrounding roots. Wounds will not be treated with dressings or paint in accordance with current best practice.

9.4.10 Extent - Excavation for new work should extend no further than necessary for the construction.

9.4.11 Soil Moisture - Where roots are to be exposed for extended periods, soil within the rootzones of the trees will be assessed and adequate moisture levels maintained through temporary irrigation. Where required, a soil wetting agent such as Wettasoil will be applied conjunction with watering to ensure good moisture retention in the exposed soils.

9.4.12 Root Protection - Where excavation is to occur at the edge of the TPZ and is likely to exposes roots for extended periods, sheeting or a root curtain will be installed to prevent further damage or drying out of the roots. Sheeting shall extend the length of the cut face exposing roots. Adequate soil moisture levels will be maintained around the area of cut roots to promote adventitious root growth.

9.4.13 Backfilling - Backfill to trenches and around exposed roots will be with site soil or a loamy sand soil mix approved by the Superintendent.

9.4.14 Damage to Limbs and Bark - Damage from temporary powerlines, stays, guys and the like to trees will be avoid by ensuring these are not attached to trees.

9.4.15 Work Within Tree Protection Zones - Generally, excavation or construction equipment will not be permitted to operate from within the TPZs of trees to be retained. Where it is considered necessary to operate machinery within the TPZ, steel plates or timber planking will be installed within TPZ to avoid soil compaction and root damage.

Where operation of machinery with TPZs and close to tree trunks becomes necessary, trunk protection will be installed of affected trees, as shown below.

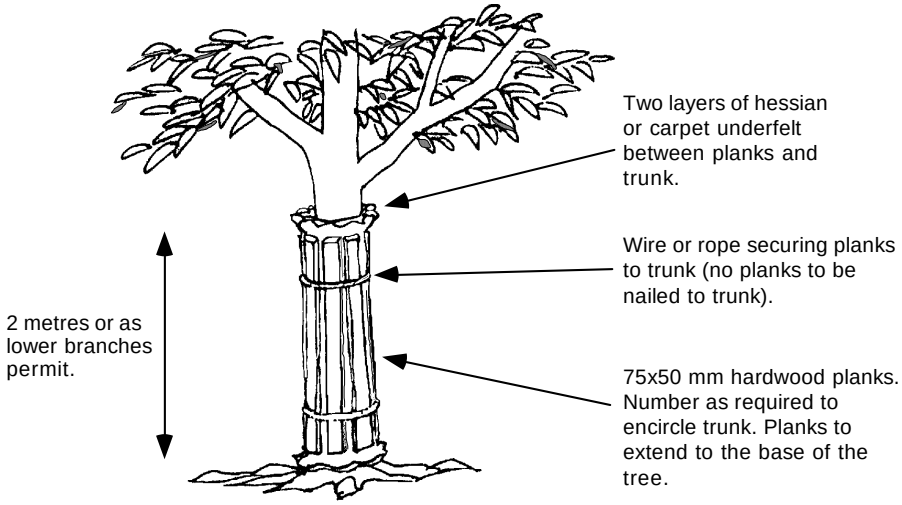


Diagram 2: Method of installing trunk protection.

9.4.16 TPF Removal - Temporary removal of tree protection enclosures during construction will only be permitted when work is required specifically within the enclosure, and only following written

approval. The TPFs will be re-installed as soon as work is completed or if the area is to remain idle for more than 24 hours.

9.4.17 Machinery Damage to Limbs - Operators of backhoes, excavators, cranes or similar equipment are to avoid damage to tree limbs and trunks. Where alternative access is not readily available, branches will be tied back by the Project Arborist.

9.4.18 Trenches - Trenches for temporary or permanent underground utilities are to be located outside of the fenced off tree protection zones. In the event that underground services are to be located within a TPZ, the option of tunnelling or boring under trees will be investigated and implemented where feasible.

9.4.19 Compaction - Where compaction of the rootzone has occurred to an extent that will restrict root growth, assessed by penetrometer testing, soil decompaction techniques such as vertical mulching or hydraulic coring will be carried out.

10.0 TREE SURGERY RECOMMENDATIONS

The attached tree assessment sheets identify some trees requiring remedial tree surgery. As a guide, the following information is included to provide a standard that should be required of the tree workers.

10.1 All pruning work should be in accordance with the Australian Standard for Pruning Amenity Trees AS 4373 - 1996 and as described below.

10.2 A minimum amount of foliage should be removed to achieve the required pruning objective.

10.3 All tree surgery work should be carried out by a qualified Arborist. The following should serve as a guide for the standard of pruning work:

10.3.1 The extent of pruning should be in accordance with the extent permitted by the City of Sydney Consent Conditions.

10.3.2 When removing a live branch, at all times cuts must be made just outside of the branch collar or at approximately the same angle where no collar exists. Do not damage the collar or branch bark ridge or leave a protruding stub (refer to Diagram 3 below).

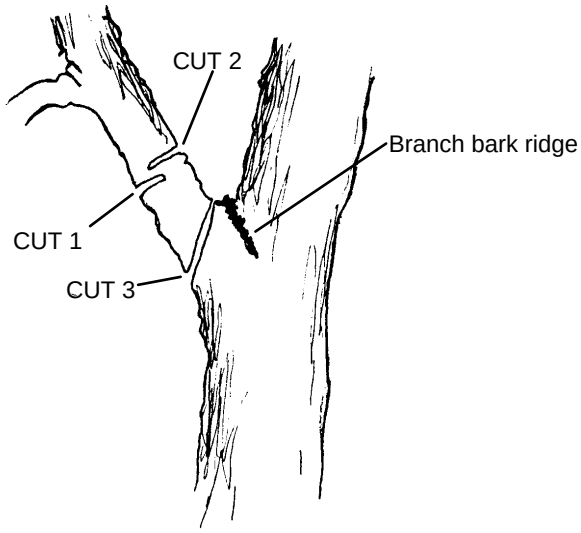


Diagram 3: Removal of branches will involve cutting the branch back to but just outside of the collar. For larger branches, the step cuts shown here will be followed to avoid tearing bark away from the collar.

10.3.3 Wounds to live tissue will be minimised. During deadwood removal, cuts will be made outside of the collar, consistent with "target pruning techniques", avoiding damage to the live cambium tissue.

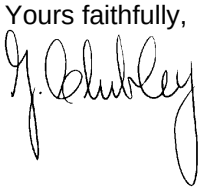
10.3.4 Cuts close to the sites of existing decayed tissue will be avoided where possible to reduce the risk of spreading decay pathogens.

10.3.5 All pruning will be carried out without the use of climbing spurs or other tools that might injure the bark or conductive tissue of the trees.

Dressings or paints will not be applied to wounds in accordance with current industry best practise.

I trust that this report adequately addresses the main arboricultural issues arising from the assessment of trees within the proposed development site at 157-163 Cleveland St Redfern. If you require further explanation of the issues or tree protection methods described here, please to contact me.

Yours faithfully,



Garry Clubley