



GRAHAM BROOKS ARBORICULTURAL TREE SERVICES PTY LTD

P.O. BOX 751 NEWPORT BEACH, NSW 2106

TEL: 02 9918 0418 MOBILE: 0412 281 580

EMAIL: gbrookstrecare@hotmail.com

A.B.N.NUMBER: 57 093 391 407

ARBORICULTURAL IMPACT ASSESSMENT

GOOD SAMARITAN CATHOLIC COLLEGE
401 HOXTON PARK ROAD, HINCHINBROOK, NSW 2168.

Prepared by:

Graham Brooks dip arb

Arboriculture Australia Consulting Arborist

Tree care and Consultancy

Prepared for:

Claudio Holzer

JDH Architects

P: (02) 9281 8697

E: Claudio@jdharchitects.com.au

19/01/2018

EXECUTIVE SUMMARY

Graham Brooks Arboricultural Tree Services Pty Ltd was commissioned by Claudio Holzer of JDH Architects to undertake an Arboricultural Impact Assessment (AIA) report in regards to the proposed development of Lot 11/DP1209742, 401 Hoxton Park Road Hinchinbrook, NSW 2168 – Good Samaritan Catholic College (The subject site).

Twenty-one (21) trees were assessed within the subject site.

Removal of trees 6 and 9-19 (6x *Acer* sp.-Low retention value, 3x *Lagerstroemia indica*- Low retention value, 1x *Eucalyptus crebra*- High retention value, 1x *Corymbia maculata*- High retention value and 1x *Eucalyptus moluccana*- High retention value) is recommended (Subject to approval from Liverpool City Council). Removal must be undertaken by a qualified Arborist (AQF 3), following the guidelines provided in the Amenity Tree Industry – Work Cover Code of Practice 1998.

A project Arborist (AQF 5) is to be engaged to establish tree protection measures (fenced tree protection zones) for all remaining trees. Section 10 of this report details the tree protection process to be followed and a specification for tree protection fencing can be found in section 10.5. The locations for tree protection fencing can be found in the attached Tree Protection Plan.

It is recommended that the replacement planting of 6 Locally indigenous trees reaching a minimum height of 12m at maturity (minimum 75L container size), is undertaken to maintain local amenity and bio-diversity. The replacement trees must be chosen in accordance with the guidelines provided in AS2303-2015 Tree stock for landscape use.

It is recommended that the replacement planting of 6 deciduous ornamental trees obtaining a minimum height of 5 metres at maturity (minimum 75L container size) is undertaken to maintain local amenity and bio-diversity. The replacement trees must be chosen in accordance with the guidelines provided in AS2303-2015 Tree stock for landscape use.

Yours faithfully,
Arboricultural Tree Services Pty Ltd



Graham Brooks dip arb

Managing director

Arboriculture Australia Approved Consulting Arborist No: 1983 Member International Society of Arboriculture
Mem No: 173140 ISA Tree Risk Assessment Qualified 2014-2019

CONTENTS

Executive Summary.....	i
1. Introduction	3
1.2 Legislation Requirements	3
2. Aim.....	3
3.The Site	4
4. Method.....	5
5. Observations.....	6
6. Tree Retention Values	12
7. Construction Impacts	14
8. Documents used in the Preparation of this report	16
9. Conclusion & Recommendations	17
10. Tree Protection Specification – As Per AS4970 – 2009.....	18
10.1 Pre - Development	18
10.2 Development Stage	18
10.3 Conclusion of Development.....	18
10.4 Tree Protection zone requirements	19
10.5 Tree Protection Fencing Requirements	20
10.6 Stem & Branch Protection Requirements	21
11. References	22
12. Glossary of Terms	23
13. Relevant Appendices.....	24
Appendix 1 - STARS© Rating System.....	24

1. INTRODUCTION

- 1.1.1 Graham Brooks Arboricultural Tree Services Pty Ltd has been commissioned by Claudio Holzer of JDH Architects to undertake an Arboricultural Impact Assessment (AIA) report in regards to the proposed development of Lot 11/DP1209742, 401 Hoxton Park Road Hinchinbrook, NSW 2168 – Good Samaritan Catholic College (The subject site).
- 1.1.2 This AIA report is to provide all relevant arboricultural information required for the development application to be lodged with Liverpool City Council.
- 1.1.3 This AIA report will include information relating to 21 trees located adjacent to the proposed development within the subject site.

1.2 LEGISLATION REQUIREMENTS

- 1.2.1 Lot 11/DP1209742, 401 Hoxton Park Road Hinchinbrook, NSW 2168 – Good Samaritan Catholic College, is zoned R2 – Low Density Residential (NSW Planning Portal, n.d.)
- 1.2.2 State Environmental Planning Policy (Vegetation in Non–Rural Areas) 2017 (NSW Government, 2017) has been considered in the preparation of this report. The aims of the policy are to;
- *“(a) to protect the biodiversity values of trees and other vegetation in non-rural areas of the State, and*
 - *(b) to preserve the amenity of non-rural areas of the State through the preservation of trees and other vegetation.”*
- 1.2.3 Liverpool City Council's Tree Management Policy (Liverpool City Council, 2016) has been considered in the preparation of this report. The Tree Management Policy defines a tree as;
- “Any perennial plant that has a height greater than 3.5 m or a canopy spread more than 4.0 m or a primary trunk diameter greater than 400 mm when measured 1.0 m above existing ground level of the tree”*
- 1.2.4 Part 1, Sections 2. Tree Preservation and 3. Landscaping and Incorporation of existing Trees of the Liverpool Development Control Plan 2008 (Liverpool City Council, 2008), have also been considered.

2. AIM

- 2.1 The aim of this report is to:
- Examine Councils policies in regards to application requirements needed for the preparation of an Arboricultural Impact Assessment.
 - Visually assess and identify the subject trees & the environment in which they grow.
 - Assess construction impacts for each subject tree through the revision of plans for the proposed development.

3. THE SITE

- 3.1 The subject site is Lot 11/DP1209742, 401 Hoxton Park Road Hinchinbrook, NSW 2168 – Good Samaritan Catholic College. The site can be seen below in Figure 1.



Figure 1: The subject site, outlined in red. (SIX Maps, n.d.)

4. METHOD

- 4.1 The trees and site were visually assessed from ground level on the 25th of October 2017. The genus and species of the tree was recorded as well as the dimensions for diameter at breast height (DBH), diameter at root crown and canopy width (Due to the location of the tree, these were estimated as accurately as possible). Height and age of the tree were estimated as well as the percentage of deadwood, the tree was given a Health / Vigour rating and signs and symptoms of pests and diseases were looked for.
- 4.2 Calculations have been made using guidelines supplied in AS4970-2009 Protection of Trees on Development Sites (Standards Australia, 2009) for the;
- Tree Protection Zone (TPZ),
 - Structural Root Zone (SRZ),
 - Live Crown Ratio (LCR),
 - Live Crown Size (LCS),
 - Height/Diameter ratio (H/D).
- 4.3 The subject trees have been allocated a landscape significance rating of Low, Medium or High using the *IACA Significance of a Tree, Assessment Rating System (STARS)*© (IACA, 2010). Stars assessment criteria includes:
- Condition and Vigour
 - Form, species specific
 - Provenance, age and botanical significance
 - Heritage and Ecological significance
 - Size, shape, and local amenity value
 - Restrictions to tree growth
- Appendix A contains the assessment criteria in full.
- 4.4 The subject trees have been allocated a Useful Life Expectancy (ULE) rating, categorised as either;
- Long – 40+ years
 - Medium – 15-40 years
 - Short – 5-15 years
 - Consider for removal - <5 years

5. OBSERVATIONS

5.1 Listed in Table 1 below are observations from the subject trees relating to;

- Health and vigour. Rated between 0 and 5. 0 = Dead, 5 = Excellent.
- Deadwood. An overall % has been estimated.
- Structural defects and comments.
- Any signs/symptoms of pest and disease attack.
- Previous pruning or wounds.
- A landscape significance rating determined using the *Significance of a Tree, Assessment Rating System STARS*© (IACA, 2010).
- A Useful Life Expectancy (ULE) rating of either long, medium, short or consider for removal.

Tree No.	Genus/Species & Common Names	Health Vigour	Dead wood %	Structural Defects/ Comments	Pests/ Disease	Pruning/ Wounds	Landscape Significance Rating	ULE Rating
1	<i>Corymbia maculata</i> Spotted Gum	3.5	<5%	None visible	None visible.	None visible	Medium	Long (>40)
2	<i>Corymbia maculata</i> Spotted Gum	3.5	<5%	None visible.	None visible	None visible	Medium	Long (>40)
3	<i>Corymbia maculata</i> Spotted Gum	3.5	<5%	Cabling attached to main stem at 4m agl.	None visible	Mechanical wound from attached cabling.	Medium	Long (>40)
4	<i>Corymbia maculata</i> Spotted Gum	3.5	<5%	None visible.	None visible	None visible	Medium	Long (>40)
5	<i>Corymbia maculata</i> Spotted Gum	3.5	<5%	None visible.	None visible	None visible	Medium	Long (>40)

Tree No.	Genus/Species & Common Names	Health Vigour	Dead wood %	Structural Defects/ Comments	Pests/ Disease	Pruning/ Wounds	Landscape Significance Rating	ULE Rating
6	<i>Eucalyptus crebra</i> Narrow-leaved Ironbark	3.5	<5%	Heavy compaction of soil within TPZ due to foot traffic.	None visible	None visible	Medium	Long (>40)
7	<i>Eucalyptus sideroxylon</i> Mugga Ironbark	3.5	<5%	Poor overall structure.	Cocky damage visible.	None visible	Medium	Long (>40)
8	<i>Corymbia maculata</i> Spotted Gum	3.5	<5%	Supressed.	None visible	None visible	Medium	Medium (15-40)
9	<i>Corymbia maculata</i> Spotted Gum	3.5	<5%	Heavy compaction of soil within TPZ due to foot traffic.	None visible	Branch stubs on southern face from previous 100mm and 75mm branch failures.	High	Long (>40)
10	<i>Acer</i> sp. Maple	3.5	<5%	Planted in raised bed. Crown comprised of epicormic shoots.	None visible	Form suggests multiple lopping events.	Low	Medium (15-40)
11	<i>Acer</i> sp. Maple	3.5	<5%	Planted in raised bed. Crown comprised of epicormic shoots.	None visible	Form suggests multiple lopping events.	Low	Medium (15-40)
12	<i>Acer</i> sp. Maple	3.5	<5%	Planted in raised bed. Crown comprised of epicormic shoots.	None visible	Form suggests multiple lopping events.	Low	Medium (15-40)
13	<i>Acer</i> sp. Maple	3.5	<5%	Planted in tree pit. Crown comprised of	None visible	Form suggests multiple lopping events.	Low	Medium (15-40)

Tree No.	Genus/Species & Common Names	Health Vigour	Dead wood %	Structural Defects/ Comments	Pests/ Disease	Pruning/ Wounds	Landscape Significance Rating	ULE Rating
				epicormic shoots.				
14	<i>Acer</i> sp. Maple	3.5	<5%	Planted in tree pit. Crown comprised of epicormic shoots.	None visible	Form suggests multiple lopping events.	Low	Medium (15-40)
15	<i>Acer</i> sp. Maple	3.5	<5%	Planted in tree pit. Crown comprised of epicormic shoots.	None visible	Form suggests multiple lopping events. Trunk wound from mechanical damage.	Low	Medium (15-40)
16	<i>Lagerstroemia indica</i> Crepe Myrtle	3.5	<5%	Planted in raised bed.	None visible	None visible	Low	Medium (15-40)
17	<i>Lagerstroemia indica</i> Crepe Myrtle	3.5	<5%	Planted in raised bed.	None visible	None visible	Low	Medium (15-40)
18	<i>Lagerstroemia indica</i> Crepe Myrtle	3.5	<5%	Planted in raised bed.	None visible	None visible	Low	Medium (15-40)
19	<i>Eucalyptus moluccana</i> Grey Box	3.5	5-10%	None visible	None visible	None visible	Medium	Long (>40)
20	<i>Eucalyptus moluccana</i> Grey Box	2.5	5-10%	Supressed	None visible	None visible	Medium	Long (>40)

Tree No.	Genus/Species & Common Names	Health Vigour	Dead wood %	Structural Defects/ Comments	Pests/ Disease	Pruning/ Wounds	Landscape Significance Rating	ULE Rating
21	<i>Eucalyptus moluccana</i> Grey Box	3.5	5-10%	None visible	None visible	Canopy raised.	Medium	Long (>40)

Table 1: Tree Observations

5.2 Listed in Table 2 below are measurements from the subject trees relating to;

- Diameter at breast height (DBH).
- Diameter above buttress (DAB).
- Canopy spread – measured to the North, East, South and West (N, E, S, W).
- Tree height.
- Lowest scaffold branch.

Tree Number	Species	Maturity	Height (m)	Lowest Scaffold (m)	Spread (m)				DBH / Multi (cm)	DAB (cm)
					N	S	E	W		
1	<i>Corymbia maculata</i>	Mature	9	2.5	2.5	2.5	2.5	2.5	32	40
2	<i>Corymbia maculata</i>	Mature	9	2.5	2.5	2.5	2.5	2.5	20	27
3	<i>Corymbia maculata</i>	Mature	9	4	2.5	2.5	2.5	2.5	34	43
4	<i>Corymbia maculata</i>	Mature	9	3	2	2	2.5	2	27	39
5	<i>Corymbia maculata</i>	Mature	9	2.5	3	3	3	3	33	41
6	<i>Eucalyptus crebra</i>	Mature	9	2	3	1	1	3	29	35
7	<i>Eucalyptus sideroxylon</i>	Mature	7	2	2	2	2	2	26	32
8	<i>Corymbia maculata</i>	Mature	8	1.5	2	0	2	2	24	30
9	<i>Corymbia maculata</i>	Mature	12	4	4.5	4	4	4.5	47	57
10	<i>Acer</i> sp.	Mature	4.5	1.6	3	1.8	2.6	1.2	26	34
11	<i>Acer</i> sp.	Mature	4.5	1.6	1.8	1.8	2.6	1.2	21	22
12	<i>Acer</i> sp.	Mature	4.5	1.6	1.8	1.8	2.6	1.2	17	21
13	<i>Acer</i> sp.	Mature	4.5	1.6	1.7	3	3	1.5	19	22
14	<i>Acer</i> sp.	Mature	4.5	1.6	1.7	1.5	3	1.5	18	23
15	<i>Acer</i> sp.	Mature	4.5	1.6	3	1.5	3	1.5	23	29
16	<i>Lagerstroemia indica</i>	Semi Mature	3	1.6	2	2	2	2	9.5	10
17	<i>Lagerstroemia indica</i>	Semi Mature	2.5	1.6	1	1	1	1	9	10
18	<i>Lagerstroemia indica</i>	Semi Mature	2	1.6	1	1	1	1	8	9
19	<i>Eucalyptus moluccana</i>	Mature	8	3	3	5	6	2	33	41
20	<i>Eucalyptus moluccana</i>	Mature	8	4	1	2	1	3	20	27
21	<i>Eucalyptus moluccana</i>	Mature	8	4	2	2	2	3	21	30

Table 2: Tree Measurements

5.3 Listed in Table 3 Below are calculations from the subject trees relating to;

- Tree Protection Zone (TPZ)
- Structural Root Zone (SRZ)
- Live Crown Ratio (LCR)
- Live Crown Size (LCS)
- Height/Diameter ratio (H/D)

Tree Number	Species	SRZ (m)	TPZ (m)	H/D Ratio	Live Crown Size (m ²)	Live Crown Ratio (%)
1	<i>Corymbia maculata</i>	2.25	3.84	28	33	72%
2	<i>Corymbia maculata</i>	1.91	2.4	45	33	72%
3	<i>Corymbia maculata</i>	2.32	4.08	26	25	56%
4	<i>Corymbia maculata</i>	2.23	3.24	33	26	67%
5	<i>Corymbia maculata</i>	2.28	3.96	27	39	72%
6	<i>Eucalyptus crebra</i>	2.13	3.48	31	28	78%
7	<i>Eucalyptus sideroxylon</i>	2.05	3.12	27	20	71%
8	<i>Corymbia maculata</i>	2.00	2.88	33	20	81%
9	<i>Corymbia maculata</i>	2.61	5.64	26	68	67%
10	<i>Acer sp.</i>	2.10	3.12	17	12	64%
11	<i>Acer sp.</i>	1.75	2.52	21	11	64%
12	<i>Acer sp.</i>	1.72	2.04	26	11	64%
13	<i>Acer sp.</i>	1.75	2.28	24	13	64%
14	<i>Acer sp.</i>	1.79	2.16	25	11	64%
15	<i>Acer sp.</i>	1.97	2.76	20	13	64%
16	<i>Lagerstroemia indica</i>	1.50	2	32	6	47%
17	<i>Lagerstroemia indica</i>	1.50	2	28	2	36%
18	<i>Lagerstroemia indica</i>	1.50	2	25	1	20%
19	<i>Eucalyptus moluccana</i>	2.28	3.96	24	40	63%
20	<i>Eucalyptus moluccana</i>	1.91	2.4	40	14	50%
21	<i>Eucalyptus moluccana</i>	2.00	2.52	38	18	50%

Table 3: Calculations from the subject trees

6. TREE RETENTION VALUES

6.1 The subject Trees have been allocated a retention value using the priority Matrix in the *IACA Significance of a Tree, Assessment Rating System (STARS)*© (IACA, 2010). The Matrix uses the Landscape Significance rating combined with the Useful Life Expectancy (ULE) to determine a retention value of either;

- Priority for Retention (High) – All measures must be taken to retain and protect these trees. If the guidelines set out in AS4970-2009 Protection of trees on development sites cannot be used to protect the trees, design modification or re-location of the proposed development should be considered.
- Consider for Retention (Medium) – Retention of these trees should remain a priority. If the trees are adversely affecting the proposed development and all protection measures have been considered but are not viable, removal can be considered.
- Consider for Removal (Low) – Retention of these trees is not important. No modification to design should be considered for their retention.
- Priority for Removal – Trees in an irreversible decline, weed species or hazardous trees. These trees should be removed.

Tree Number	Species	Landscape Significance Rating	Useful Life Expectancy	Retention Value
1	<i>Corymbia maculata</i>	Medium	Long (>40)	High
2	<i>Corymbia maculata</i>	Medium	Long (>40)	High
3	<i>Corymbia maculata</i>	Medium	Long (>40)	High
4	<i>Corymbia maculata</i>	Medium	Long (>40)	High
5	<i>Corymbia maculata</i>	Medium	Long (>40)	High
6	<i>Eucalyptus crebra</i>	Medium	Long (>40)	High
7	<i>Eucalyptus sideroxylon</i>	Medium	Long (>40)	High
8	<i>Corymbia maculata</i>	Medium	Medium (15-40)	Medium
9	<i>Corymbia maculata</i>	High	Long (>40)	High
10	<i>Acer</i> sp.	Low	Medium (15-40)	Low-Medium

Tree Number	Species	Landscape Significance Rating	Useful Life Expectancy	Retention Value
11	<i>Acer</i> sp.	Low	Medium (15-40)	Low-Medium
12	<i>Acer</i> sp.	Low	Medium (15-40)	Low-Medium
13	<i>Acer</i> sp.	Low	Medium (15-40)	Low-Medium
14	<i>Acer</i> sp.	Low	Medium (15-40)	Low-Medium
15	<i>Acer</i> sp.	Low	Medium (15-40)	Low-Medium
16	<i>Lagerstroemia indica</i>	Low	Medium (15-40)	Low-Medium
17	<i>Lagerstroemia indica</i>	Low	Medium (15-40)	Low-Medium
18	<i>Lagerstroemia indica</i>	Low	Medium (15-40)	Low-Medium
19	<i>Eucalyptus moluccana</i>	Medium	Long (>40)	High
20	<i>Eucalyptus moluccana</i>	Medium	Long (>40)	High
21	<i>Eucalyptus moluccana</i>	Medium	Long (>40)	High

Table 4: Tree Retention Values

7. CONSTRUCTION IMPACTS

7.1 Listed in table 5 below are likely impacts from the proposed construction upon the trees.

Tree No.	Proposed encroachments into TPZ and/or canopy	Likely Impacts from proposed construction (Discussion)	Conclusion
1-5	There are no proposed encroachments to T1 – T5.	Scaffolding and site access may encroach on the TPZ's of T1-T5.	T1-T5 are to be retained and protected. Tree protection fencing will be required.
6	T6 is located within the development footprint.	The removal of T6 would be necessary to facilitate the proposed development.	Remove and replace T6 subject to approval from Liverpool City Council.
7-8	There are no proposed encroachments to T7 – T8.	Site access may encroach on the TPZ's of T7-T8.	T7-T8 are to be retained and protected. Tree protection fencing will be required.
9	T9 will have a canopy encroachment of approximately 40% from the proposed development and associated scaffolding required for construction. Footings for the first floor deck and roof will be located within the SRZ.	The removal of 3 x 1 st order branches (South and West), and 1 first order structural stem, including a portion of the crown (South) would be necessary to facilitate the proposed. This will leave an asymmetrical crown and insufficient foliage for photosynthesis, further dieback and epicormic growth would be expected. Wind damping will also be altered.	Remove and replace T9 subject to approval from Liverpool City Council.
10-15	T10-T15 are located within the proposed development footprint.	The removal of T10-T15 would be necessary to facilitate the proposed development.	Remove and replace T10-T15 subject to approval from Liverpool City Council.
16-18	T16-T18 are located within the footprint of proposed landscaping.	The removal of T16-T18 would be necessary to facilitate the proposed development.	Remove and replace T16-T18 subject to approval from Liverpool City Council.
19	T19 will have a canopy encroachment of approximately 55% from the proposed development and associated scaffolding required for construction.	The removal of 2 x 1 st order structural branches (East and South) would be necessary to facilitate the proposed development due to the lack of suitable reduction points closer to the proposed development. This will leave an asymmetrical crown and insufficient foliage for	Remove and replace T19 subject to approval from Liverpool City Council.

Tree No.	Proposed encroachments into TPZ and/or canopy	Likely Impacts from proposed construction (Discussion)	Conclusion
		photosynthesis, further dieback and epicormic growth would be expected. Wind damping will also be altered.	
20-21	There are no proposed encroachments to T20 – T21.	Site access may encroach on the TPZ's of T20-T21.	T20-T21 are to be retained and protected. Tree protection fencing will be required.

Table 5: Construction Impacts

8. DOCUMENTS USED IN THE PREPARATION OF THIS REPORT

8.1 Listed in table 6 below are documents used in the preparation of this report. Any plans referenced in table 6 below are available as attachments at the end of this report.

Document type	Source/ Author	Title	Date	Summary
Plan	CMS Surveyors.	Survey Plan showing detail & levels over part Lot 11 in D.P.1209742 401 Hoxton Park Road Hinchinbrook NSW 2168	28/09/2017	Plan showing detail & levels over part Lot 11 in D.P.1209742 401 Hoxton Park Road Hinchinbrook NSW 2168
Plan	JDH architects	Proposed Site Plan. DD-001_2	07/12/2017	Plan showing details of the proposed site at 401 Hoxton Park Road Hinchinbrook NSW 2168
Plan	JDH architects	Demolition Ground Floor Plan. DD-002_2	07/12/2017	Plan showing details of proposed demolition of the ground floor at 401 Hoxton Park Road Hinchinbrook NSW 2168
Plan	JDH architects	Proposed ground floor plan. DD-003_2	07/12/2017	Plan showing details of the proposed ground floor at 401 Hoxton Park Road Hinchinbrook NSW 2168
Plan	JDH architects	Proposed Elevation. DD-003_2	07/12/2017	Plan showing details of the proposed elevations at 401 Hoxton Park Road Hinchinbrook NSW 2168
Plan Overlay	Graham Brooks Arboricultural Tree Services	TPZ & SRZ Plan	18/01/2017	Plan overlay showing Tree Protection Zones and Structural Root Zones to Scale.
Australian Standard	Standards Australia Limited	AS 4970-2009 Protection of trees on development sites.	2009	Guidelines for the protection of trees on development sites.

9. CONCLUSION & RECOMMENDATIONS

- 9.1 Removal of trees 6 and 9-19 (6x *Acer* sp.-Low retention value, 3x *Lagerstroemia indica*- Low retention value, 1x *Eucalyptus crebra*- High retention value, 1x *Corymbia maculata*- High retention value and 1x *Eucalyptus moluccana*- High retention value) is recommended (Subject to approval from Liverpool City Council). Removal must be undertaken by a qualified Arborist (AQF 3), following the guidelines provided in the Amenity Tree Industry – Work Cover Code of Practice 1998.
- 9.2 A project Arborist (AQF 5) is to be engaged to establish tree protection measures (fenced tree protection zones) for all remaining trees. Section 10 of this report details the tree protection process to be followed and a specification for tree protection fencing can be found in section 10.5. The locations for tree protection fencing can be found in the attached Tree Protection Plan.
- 9.4 It is recommended that the replacement planting of 6 Locally indigenous trees reaching a minimum height of 12m at maturity (minimum 75L container size), is undertaken to maintain local amenity and bio-diversity. The replacement trees must be chosen in accordance with the guidelines provided in AS2303-2015 Tree stock for landscape use.
- 9.5 It is recommended that the replacement planting of 6 deciduous ornamental trees obtaining a minimum height of 5 metres at maturity (minimum 75L container size) is undertaken to maintain local amenity and bio-diversity. The replacement trees must be chosen in accordance with the guidelines provided in AS2303-2015 Tree stock for landscape use.

Yours faithfully,
Arboricultural Tree Services Pty Ltd



Graham Brooks dip arb

Managing director

Arboriculture Australia Approved Consulting Arborist No: 1983 Member International Society of Arboriculture Mem No: 173140 ISA Tree Risk Assessment Qualified 2014-2019

10. TREE PROTECTION SPECIFICATION – AS PER AS4970 – 2009

Tree Protection will be undertaken in the three stages listed below.

10.1 PRE - DEVELOPMENT

10.1.1 Prior to any tree removal an AQF level 5 arborist must be engaged as site arborist to oversee all arboricultural aspects of the project including identifying trees for removal.

10.1.2 Tree protection should be installed by a minimum AQF level 3 arborist and be supervised by an AQF level 5 arborist in accordance with the guidelines from AS4970-2009 Protection of trees on development sites (Standards Australia, 2009), and the information provided in sections 10.4, 10.5 and 10.6 of this report.

10.1.3 All trees on site should be visually assessed and their current health and condition recorded. Tree protection measures should be inspected.

10.1.4 Certifying of Pre-Construction Tree Protection by the site arborist will conclude the pre-construction phase of development. It is recommended that Construction does not commence until Pre-Construction tree protection has been certified by the site arborist.

10.2 DEVELOPMENT STAGE

10.2.1 Tree protection measures must remain in place during this stage. They cannot be removed intermittently for access and any modifications to Tree Protection Fencing Location must be authorised, recorded and carried out by the site arborist.

10.2.2 The site arborist will conduct regular visits in accordance to visually assess and record the health and condition of the trees being retained for the duration of the development.

10.2.3 Tree protection measures will also be assessed regularly to ensure they are functioning correctly. Any maintenance required for Tree Protection measures will also be performed.

10.2.4 A stop work notice will be issued to the compliance officer if any Tree Protection Measures are not found to be complying with the Tree Protection Plan.

10.2.5 Any incidents relating to retained trees must be reported immediately to the site arborist to be documented and a plan for remediation put in place.

10.3 CONCLUSION OF DEVELOPMENT

10.3.1 Final visit from the site arborist to report on the health and condition of the trees that have been retained and the removal of tree protection. Incidents documented during the development stage will be included in this report.

10.3.2 Any remedial work necessary upon the completion of development will be recommended in the final report.

10.4 TREE PROTECTION ZONE REQUIREMENTS

Tree Protection Zones (TPZs), will be set out before the commencement of construction works.

According to AS 4970-2009, activities excluded from the TPZ include but are not limited to-:

- (a) machine excavation including trenching
- (b) excavation for silt fencing
- (c) cultivation
- (d) storage
- (e) preparation of chemicals, including preparation of cement products
- (f) parking of vehicles and plant
- (g) refuelling
- (h) dumping of waste
- (i) wash down and cleaning of equipment
- (j) placement of fill
- (k) lighting of fires
- (l) soil level changes
- (m) temporary or permanent installation of utilities and signs
- (n) physical damage to the tree.

Source Australian Standard *AS 4970-2009 Protection of trees on development sites*.

A TPZ sign with contact details of the site arborist must be fixed to the TPZ fencing, see example below.



An Example of a TPZ sign.

Source, *Australian Standard AS 4970-2009 Protection of trees on development sites*

10.5 TREE PROTECTION FENCING REQUIREMENTS

10.5.1 Tree protection Fencing must be a minimum of 1.8 metres in height and be held in place with locking clamps and concrete feet between each panel, see Figure 2 below. All temporary fencing should also comply with AS 4687-2007 Temporary fencing and hoardings.



Tree protection fencing must be secured with locking clamps in between each panel and concrete feet.

An Example of Temporary Fencing

10.6 STEM & BRANCH PROTECTION REQUIREMENTS

10.6.1 Wherever stems and branches are to be protected. Timber boards are to be used with padding underneath that will protect damage to the trees bark. All stem and branch protection timbers are to be strapped to the subject tree. Examples of stem protection are shown below.



Boards held in Place by steel strapping.

Hessian is used as padding to prevent damage to the trees bark.



Foam used as padding between timber boards used for stem protection and the trees bark.

11. REFERENCES

Claus Mattheck, H. B., 2006. *The Body Language of Trees: A handbook for failure analysis*. London: The Stationary office.

IACA, 2010. *IACA Significance of a Tree, Assessment Rating System (STARS)*, Institute of Australian Consulting Arboriculturists, Australia. [Online]

Available at: www.iaca.org.au

[Accessed 19 June 2015].

Liverpool City Council, 2008. *Liverpool Development Control Plan 2008*. [Online]

Available at: <http://www.liverpool.nsw.gov.au/planningdevelopment/liverpools-planning-control/Liverpool-Development-Control-Plan-2008>

[Accessed 14th November 2017].

Liverpool City Council, 2016. *Tree Management Policy*. [Online]

Available at: <http://www.liverpool.nsw.gov.au/environment/trees>

[Accessed 14th November 2017].

NSW Government, 2017. *State Environmental Planning Policy (Vegetation in Non-Rural Areas)*.

[Online]

Available at: <https://www.legislation.nsw.gov.au/#/view/EPI/2017/454/part1/cl3>

[Accessed 26th October 2017].

NSW Planning Portal, n.d. *Find a Property*. [Online]

Available at: [https://www.planningportal.nsw.gov.au/find-a-property/property/3862025_401-435_Hoxton_Park_Road_11_Hinchinbrook_DP1209742/401-](https://www.planningportal.nsw.gov.au/find-a-property/property/3862025_401-435_Hoxton_Park_Road_11_Hinchinbrook_DP1209742/401-435_hoxton_park_road_hinchinbrook_2168)

[435_hoxton_park_road_hinchinbrook_2168](https://www.planningportal.nsw.gov.au/find-a-property/property/3862025_401-435_hoxton_park_road_hinchinbrook_2168)

[Accessed 14th November 2017].

SIX Maps, n.d. [Online]

Available at: <https://maps.six.nsw.gov.au/>

[Accessed 14th November 2017].

Standards Australia, 2009. *AS 4970-2009 Protection of trees on development sites*. Sydney: Standards Australia.

12. GLOSSARY OF TERMS

Common name/genus - the common name and genus/ species of the tree.

Age Class- assessment of the trees current age.

Immature (IM) - refers to a tree at growth stages between immaturity and full size.

Semi-mature (SM) - refers to a full sized tree with some capacity for further growth.

Mature (M)-refers to a full sized tree with some capacity for further growth.

Over-mature (OM) - a mature tree has reached a near stable size (biomass) above and below the ground .Trees can have a Mature Age Class for > 90% of their life span. Over-mature (**OM**) trees show symptoms of irreversible decline and decreasing biomass.

Height -estimated overall height of the tree.

Tree Protection Zone (TPZ) - is a “No Go Zone” surrounding a tree to aid in its ability to cope with disturbances associated with construction works. Tree protection involves minimising root damage that is caused by activities such as construction. Tree protection also reduces the chance of a tree’s decline in health or death & the possibly damage to structural stability of the tree from root damage.

Diameter at Breast Height (DBH) - the trunk diameter at breast height (in metres) of the tree, 1.4 meters above ground level.

Diameter above the Buttress (DAB) - refers to the tree trunk diameter measured above the root buttress and is used to calculate the radius of the SRZ.

Structural root zone (SRZ) – the structural root zone is the area required for the trees stability. A larger area is required to maintain a viable tree. The SRZ is only needed to be calculated when a major encroachment into the TPZ is proposed. There are many factors that affect the size of the SRZ (e.g. tree height, crown area, soil type, soil moisture).The SRZ may also be influenced by natural or built structures, such as rock and footings.

Vigour - Good (G), Fair (F) or Poor (P) - the general appearance of the canopy of the tree at the time of inspection. Vigour can vary with the season and rainfall frequency

Health – Excellent (E), Very Good (VG), Good (G), Fair (F), Declining (D), Poor (P),Very Poor (VP).this refers to the tree’s form & growth habit, as modified by its environment (aspect suppression by other tree/s, soils,) & the state of the scaffold (i.e. trunk & major branches),including structural defects such as cavities, crooked trunks or weak trunk/branch junctions. These are not directly connected with health & it is possible for a tree to be healthy but in poor condition/vigour.

Deadwood – this refers to any whole limb that no longer contains living issues (i.e. living leaves & /or bark).Some dead wood is common in a number of species.

Crown Spread - the greatest width from drip line to drip line of a branch across the trees crown.

Crown Form -the density of foliage (expressed as a percentage), that would be expected to be displayed in a tree of its genus/species. Many factors such as the presence of pests and/or diseases, drought and other associated environmental conditions contribute to crown form.

Epicormic Growth - these are advantageous shoots that grow from secondary bud development. They are an indicator that the tree has/or is under stress.

Live Crown Ratio (LCR) -the height of a trees crown, relative to the total height of the tree. Often used as an indicator of overall stability.

Live Crown Size (LCS) - the area of the crown as viewed from one aspect.

Australian Height Datum (AHD) – A Geodetic measurement for altitude in Australia.

AGL – Above Ground level.

13. RELEVANT APPENDICES

APPENDIX 1 - STARS© RATING SYSTEM

Significance of a Tree, Assessment Rating System* (IACA 2010) – S.T.A.R.S. ©

The landscape significance of a tree is an essential criterion to establish the importance that a particular tree may have on a site. However, rating the significance of a tree becomes subjective and difficult to ascertain in a consistent and repetitive fashion due to assessor bias. It is therefore necessary to have a rating system utilising structured qualitative criteria to assist in determining the retention value for a tree. To assist this process all definitions for terms used in the *Tree Significance - Assessment Criteria* and *Tree Retention Value - Priority Matrix*, are taken from the IACA Dictionary for Managing Trees in Urban Environments 2009.

This rating system will assist in the planning processes for proposed works, above and below ground where trees are to be retained on or adjacent a development site. The system uses a scale of *High*, *Medium* and *Low* significance in the landscape. Once the landscape significance of an individual tree has been defined, the retention value can be determined. An example of its use in an Arboricultural report is shown as Appendix A.

Tree Significance - Assessment Criteria

High Significance in landscape

- The tree is in *Good condition* and *Good vigor*;
- The tree has a form typical for the species;
- The tree is a remnant or is a planted locally indigenous specimen and/or is rare or uncommon in the local area or of botanical interest or of substantial age;
- The tree is listed as a Heritage Item, Threatened Species or part of an Endangered ecological community or listed on Councils significant Tree Register;
- The tree is visually prominent and visible from a considerable distance when viewed from most directions within the landscape due to its size and scale and makes a positive contribution to the local amenity;
- The tree supports social and cultural sentiments or spiritual associations, reflected by the broader population or community group or has commemorative values;
- The tree's growth is unrestricted by above and below ground influences, supporting its ability to reach dimensions typical for the taxa *in situ* - tree is appropriate to the site conditions.

Medium Significance in landscape

- The tree is in *Fair-Good condition* and *Good or Low vigor*;
- The tree has form typical or atypical of the species;
- The tree is a planted locally indigenous or a common species with its taxa commonly planted in the local area
- The tree is visible from surrounding properties, although not visually prominent as partially obstructed by other vegetation or buildings when viewed from the street,
- The tree provides a fair contribution to the visual character and amenity of the local area,
- The tree's growth is moderately restricted by above or below ground influences, reducing its ability to reach dimensions typical for the taxa *in situ*.

Low Significance in landscape

- The tree is in fair-poor condition and good or low vigor;
- The tree has form atypical of the species;
- The tree is not visible or is partly visible from surrounding properties as obstructed by other vegetation or buildings,
- The tree provides a minor contribution or has a negative impact on the visual character and amenity of the local area,
- The tree is a young specimen which may or may not have reached dimension to be protected by local Tree Preservation orders or similar protection mechanisms and can easily be replaced with a suitable specimen,
- The tree's growth is severely restricted by above or below ground influences, unlikely to reach dimensions typical for the taxa *in situ* - tree is inappropriate to the site conditions,
- The tree is listed as exempt under the provisions of the local Council Tree Preservation Order or similar protection mechanisms,
- The tree has a wound or defect that has potential to become structurally unsound.

Environmental Pest / Noxious Weed Species

- The tree is an Environmental Pest Species due to its invasiveness or poisonous/ allergenic properties,
- The tree is a declared noxious weed by legislation.

Hazardous/Irreversible Decline

- The tree is structurally unsound and/or unstable and is considered potentially dangerous,
- The tree is dead, or is in irreversible decline, or has the potential to fail or collapse in full or part in the immediate to short term.

The tree is to have a minimum of three (3) criteria in a category to be classified in that group.

Note: The assessment criteria are for individual trees only, however, can be applied to a monocultural stand in its entirety e.g. hedge.

Institute of Australian Consulting Arboriculturists (IACA 2010), *IACA Significance of a Tree, Assessment Rating System (STARS)*, www.iaca.org.au



Table 1.0 Tree Retention Value - Priority Matrix.

		Significance				
		1. High	2. Medium	3. Low		
		Significance in Landscape	Significance in Landscape	Significance in Landscape	Environmental Pest / Noxious Weed Species	Hazardous / Irreversible Decline
Estimated Life Expectancy	1. Long >40 years					
	2. Medium 15-40 Years					
	3. Short <1-15 Years					
	Dead					

Legend for Matrix Assessment	
	Priority for Retention (High) - These trees are considered important for retention and should be retained and protected. Design modification or re-location of building/s should be considered to accommodate the setbacks as prescribed by the Australian Standard AS4970 <i>Protection of trees on development sites</i> . Tree sensitive construction measures must be implemented e.g. pier and beam etc if works are to proceed within the Tree Protection Zone.
	Consider for Retention (Medium) - These trees may be retained and protected. These are considered less critical; however their retention should remain priority with removal considered only if adversely affecting the proposed building/works and all other alternatives have been considered and exhausted.
	Consider for Removal (Low) - These trees are not considered important for retention, nor require special works or design modification to be implemented for their retention.
	Priority for Removal - These trees are considered hazardous, or in irreversible decline, or weeds and should be removed irrespective of development.



USE OF THIS DOCUMENT AND REFERENCING The IACA Significance of a Tree, Assessment Rating System (STARS) is free to use, but only in its entirety and must be cited as follows:

IACA, 2010, *IACA Significance of a Tree, Assessment Rating System (STARS)*, Institute of Australian Consulting Arboriculturists, Australia, www.iaca.org.au

REFERENCES Australia ICOMOS Inc. 1999, *The Burra Charter – The Australian ICOMOS Charter for Places of Cultural Significance*, International Council of Monuments and Sites, www.icomos.org/australia Draper BD and Richards PA 2009, *Dictionary for Managing Trees in Urban Environments*, Institute of Australian Consulting Arboriculturists (IACA), CSIRO Publishing, Collingwood, Victoria, Australia. Footprint Green Pty Ltd 2001, *Footprint Green Tree Significance & Retention Value Matrix*, Avalon, NSW Australia, www.footprintgreen.com.au

IACA 2010, *IACA Significance of a Tree, Assessment Rating System (STARS)*, Institute of Australian Consulting Arboriculturists, www.iaca.org.au