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27th September 2021

Hayball Architects,
Level 1, 250 Flinders Lane,
Melbourne,
VIC 3000

Tree Management Plan (TMP) and Tree Protection Plan (TPP) – Bill Street, Hawthorn East.

**PLANNING and ENVIRONMENT ACT
BAROONDARA PLANNING SCHEME**

CONSENT UNDER CLAUSE 52.20

VPP2101334

ENDORSED PLAN

Sheet 1 of 24

Signed:  for
Bill Street, Hawthorn East.
for
MINISTER FOR PLANNING, ENVIRONMENT
AND CLIMATE CHANGE
Date: 5 Nov 2021

Brief

I was contacted by you and asked to provide a Tree Management Plan (Report) and Tree Protection Plan (Drawing) as part of the redevelopment of the former Department of Housing Site at Bill St, Hawthorn East. The scope of works within this report considers all trees within and or neighbouring the site that maybe impacted by the proposal as per Australian Standard-4970 – Protection of Trees on a Development Site.

Additional Trees beyond this scope of works are included as a reference as they may be impacted by further development works.

Background

An Arborist Report was previously prepared by this company dated the 3rd of June 2021, outlining a schedule of works, and condition of trees present on and neighbouring the site.

The Trees

Trees Remove

Trees 01, 04, 05, 05a, 07, 08, 09, 10, 11, 12, 13, 14, 14a, 14b, 15, 17, 21, 22a, 26, 27, 28, 30, 31, 33, 34, 35, 36, 82 and 83 are proposed for removal for the proposal to proceed, with some requiring removal for the buildings, landscaping, and civil works.

Trees Retain.

Trees 03, 16a, 20, 23 and 24 within the site are proposed for retention within the site. Prior to any works proceeding they must be protected with Tree Protection Fencing and Ground Protection Measures, as per Definitions and as shown on the Tree Protection Plan.

Following are specific notes on construction within the TPZ of each tree. Doing so will mitigate encroachment to below the acceptable 10% as per AS-4970.



Tree 03 is a London Plane Tree to the south of the site. Given its low canopy some canopy lifting works maybe required for proposed works to occur. If required this must take place prior to any other works, as per AS-4737 and undertaken by a suitably qualified arborist. Under the proposal the proposed dwelling would encroach 7.6% into its Tree Protection Zone (TPZ), with the proposed paving would encroach 9.7% into its TPZ. Whilst the individual encroachment of each element is below the acceptable 10% as pre-AS-4970 they are collectively greater, and the proposed paving will need to be built above grade and of a permeable material to mitigate its encroachment. Refer to Appendix 1 for a suitable construction method. Alternatively, a Non-Destructive Root Investigation (NDR) can take place to establish what roots are present. If no major root (greater 40mm diameter or mass of fibrous roots) is present the proposed paving could be laid as required. If any footings are

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required for the proposed paving these must be dug by hand and lined with an impervious membrane, retaining any major roots, and shifting the proposed footing 100mm clear of the exposed major root.

The proposed Soft Fall Mulch as per the Landscape Plans will need to be laid above grade.

To mitigate encroachment of the proposed seating within the TPZ it must be construction by hand and during the soft landscape phase of construction when Tree Protection Measures can safely be removed. Any footings must be constructed as noted for paving within the TPZ.



Tree 16a is a Desert Ash to the southern nature strip of Bill Street, to the east of the site. it appears no canopy works will be required, for the proposal to proceed in its vicinity. The proposed decking will encroach 22.6%, above the acceptable 10% as per AS-4970. To mitigate its encroachment all decking must be built above grade, with all footings excavated and lined as noted for paving within the TPZ of Tree 03. This will mitigate encroachment to the proposed paving which will be 4.7% within the acceptable 10% as per AS-4970.

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Tree 20 is a Burr oak to the east of the site. It has an upright form and raised canopy, appearing to not require any pruning works prior to the proposal proceeding. Under the proposal the proposed building will encroach 4.2% into TPZ, proposed paving will encroach 0.3%, permeable gravel 7.1%, and the proposed seat 0.7%. The proposed permeable gravel will require modification to ensure encroachment from other elements is maintained below the acceptable 10% as per AS-4970, with it needing to be laid above grade. The proposed paving steppes and proposed fence will need to be built following all other hard landscaping to ensure the Tree Protection Measures can be safely removed to allow for these works. All footings for the proposed fence and proposed steppers will need to be excavated as noted for the paving within the TPZ of Tree 03 to mitigate their encroachment. Given major roots maybe present within the layout of steppers they may require modification during construction to accommodate major roots

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Tree 23 is a Pencil; Tree 24 is a Willow Bottlebrush. Both are located to the north-eastern corner of the site. Neither would require any canopy pruning prior to the proposal proceeding. Under the proposal the proposed permeable gravel would encroach below the 1% within the TPZ of each tree, well within the acceptable 10% as per AS-4970.

Trees Neighbouring

Neighbouring trees will require protection as noted on the Tree Protection Plan and as per Definitions. Given the distance from the proposal Trees 38 – 78 will not require any specific protection measures, under the current proposal.



Tree 02 is a Cut Leaf Plane Tree; Tree 06 is Weeping Lily Pili (not pictured). Both are neighbouring the site to the south. The proposed gravel paving will encroach 2.4% into the TPZ, of Tree 02, within the acceptable 10% as per AS-4970. Tree 06 will not be impacted by the proposal. As such the proposal will not require modification regarding either tree.

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Tree 15a is a Hedge Pittosporum, Tree 17a is a Privet, Tree 25 is a Desert Ash and Tree 29 is a Silky Oak. They are located to the south, east, and north of the site on private property. None would be impacted by the proposal and given their location and existing site features will not require specific tree protection measures to ensure their long-term viability.



Tree 32 is a Brush Box to the western side of the nature strip of Robinson St, adjacent the site. Its canopy may require some minor canopy works to ensure access for construction of the proposed building. If so, these must take place as per AS-4737, and undertaken by a suitably qualified arborist to the satisfaction of the relevant authority. The proposal would encroach 5.6% within the acceptable 10% as per AS-4970. As such no modifications will be required to the proposal, regarding Tree 32.

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Tree 37 is an English Elm to the south-western corner of the site, within the council reserve. Under the proposal it would encroach 3.6% into the TPZ, well within the acceptable 10% as per AS-4970. Under the proposal some minor canopy works maybe required. If so, these must take place as noted for Tree 32.

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Notes:

Pre-construction works and any root cutting must be inspected and approved by the project arborist. Removal of protection works, and cessation of the Tree Management Plan must be authorised by the relevant authority at completion of works.

All TPF mulching etc including signage as per AS 4970 – Protection of Trees on Development Sites and our Definitions following must be installed prior to any works commencing including demolition. All Tree Protection works must be supervised and signed off as being complete by the Project Arborist, as per the Tree Management Plan following.

Any root or other pruning required must be carried out by the Project Arborist as per AS 4373 Pruning of Amenity Trees and our Definitions following.

Watering through the project duration must be carried out as per our Definitions following.

Tree Management Plan: Timetable

The approved Tree Protection / Management Plan must be available on site prior to the commencement of works including demolition. It identifies key stages where monitoring and certification will be required. A Project Arborist must be appointed.

A pre-construction meeting must be attended by the site manager, the Project Arborist, and contractors to introduce the Tree Management Plan and its requirements.

Following, at all times the site manager must ensure all future workers or others involved with the project are introduced to and understand the Tree Management Plan or have the Project Arborist visit the site to brief them. Following is the supervision timetable. Each stage must have the tree management activities recorded and certified by the Project Arborist to the satisfaction of the responsible authority.

Project Arborist Name:

Contact Details:

Date Appointed:

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Site Establishment	Prior to works commencing through until all Tree Protection Methods are in place for
A Tree Management Plan must be viewed by those in control of or involved in site or building works as an Occupational Health and Safety Plan for Trees or a Tree. This means all involved in the project and all workers engaged on the site and within the project must be inducted, instructed, educated, and continually monitored to ensure the tree or trees are protected. The Project Arborist and site manager must work together, and the Project Arborist be engaged to ensure through stages of the project at all times the tree / trees are not negatively impacted upon and adequately protected at all times. Signed and certified by Project Arborist as complete and in compliance with TMP	
Signed by Project Arborist	Date
Pre-Construction	Following Site Establishment prior to construction
Prior to construction commencing Tree Protection Fencing and Ground Protection Measures must be installed as shown on the Tree Protection Plan. Following installation of the Tree Protection Fencing it must be inspected by the Project Arborist to ensure it is in place and protecting the trees adequately.	
Signed by Project Arborist	Date
Demolition	

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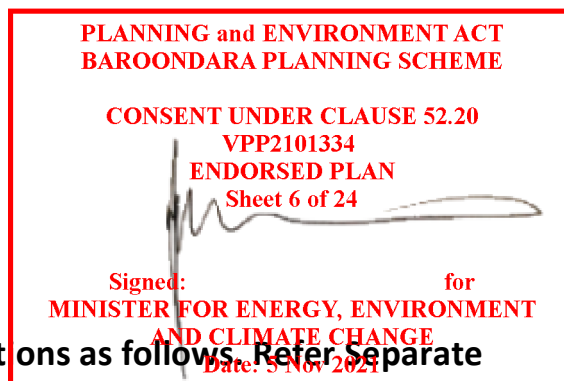
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Given the Tree Protection Fencing is in place demolition can be carried out. If machinery is used to carry out or help with the demolition, a "long armed" machine such as an excavator must be used that can stand outside any TPZ to carry out any works. Any works within a TPZ must be carried out by hand if possible and must be supervised by the Project Arborist in coordination with the site manager and any workers or others involved.			
Signed by Project Arborist		Date	
Construction		Building and Civil Works	
All workers must be briefed by the Project Arborist and / or site manager to be careful they do not spill or allow any deleterious substances into the root zone of any tree and to not enter into a TPZ without permission from the Project Arborist. When it is necessary to modify the position of Tree Protection Fencing to allow any works within a TPZ, such must be supervised by the Project Arborist. And comply with AS 4970 and our Definitions following.			
Signed by Project Arborist		Date	
Post Construction		Hard and Soft Landscaping	
Once construction is completed there may be other activities on the site such as landscaping. During Hard Landscaping all Tree Protection measures must remain in place. Following their completion or as noted tree protection measures can then be removed under the supervision of the Project Arborist to allow for the Soft Landscaping to commence. During soft landscaping Trees must be regularly monitored to ensure they are not being adversely affected, with all soft landscaping within a TPZ to occur above grade.			
Signed by Project Arborist		Date	
Final Certification			
The project arborist must assess the condition of trees and make recommendations for any necessary remedial actions. Following the project arborist must certify (as appropriate) that the completed works have been carried out in compliance with the approved plans and specifications for tree protection.			
Signed by Project Arborist		Date	

Statement and Project Arborist Notes to be provided by Project Arborist to include but not be limited to the condition of the retained trees, details of any deviations from the approved tree protection measures and their impacts on trees. Copies of all monitoring documentation must be provided.



Project Arborist Notes, Appendix 1, Tree Legend and Definitions as follows. Refer Separate A3 Tree Protection Plan.

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Project Arborist Notes		
Date	Stage	Note
		<div><p>PLANNING and ENVIRONMENT ACT BAROONDARA PLANNING SCHEME</p><p>CONSENT UNDER CLAUSE 52.20 VPP2101334 ENDORSED PLAN</p><p>Sheet 7 of 24</p><p>Signed: _____ for MINISTER FOR ENERGY, ENVIRONMENT AND CLIMATE CHANGE Date: 5 Nov 2021</p></div>

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Appendix 1: Footing Details

Preformed Concrete Strip Footing and
Piers to be confirmed with Engineer.

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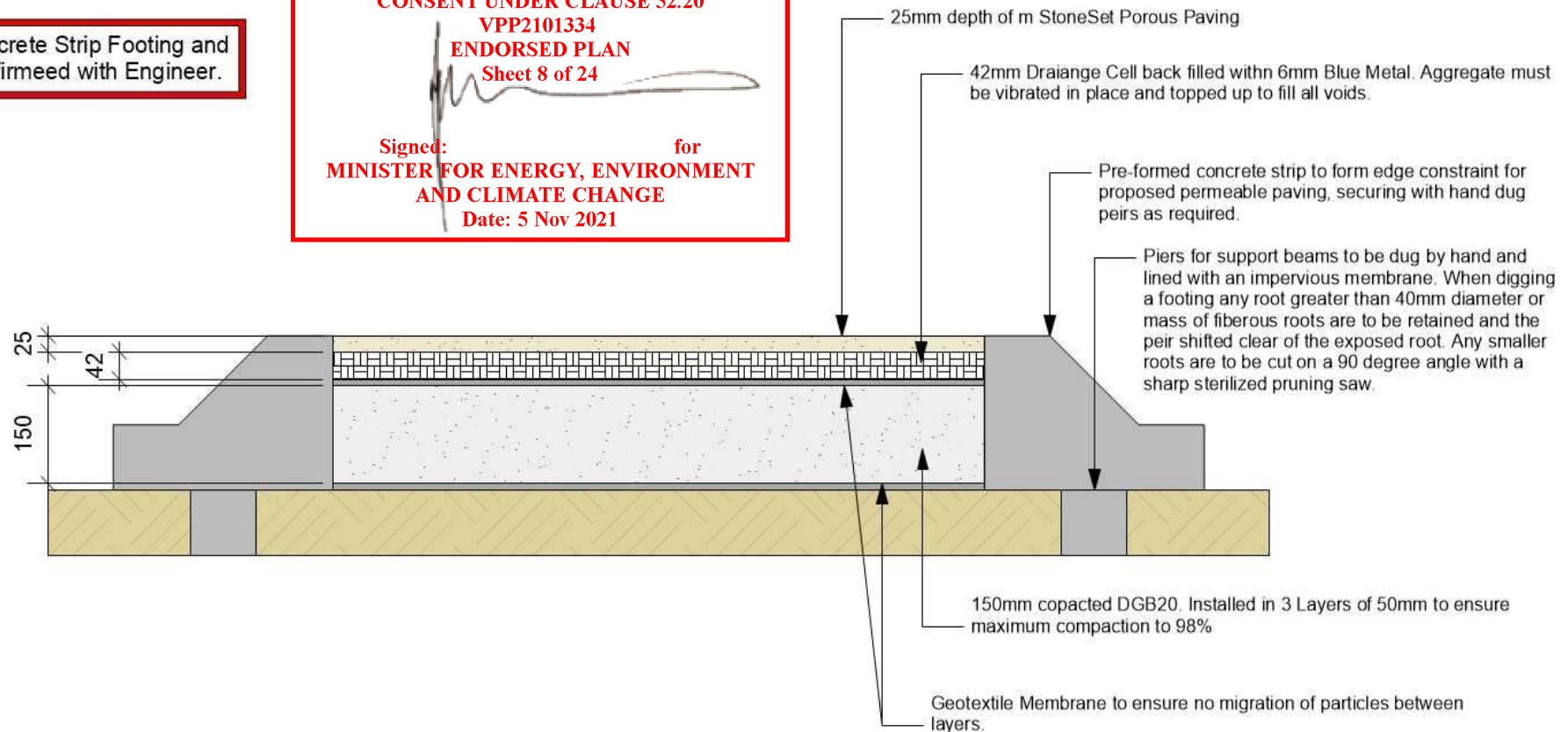
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1

Typical Permeable Paving Detail

Scale: 1:10



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Tree Legend

No	Botanical Name	Common Name	Origin	Height	Canopy	DBH @ 1.4 m	TPZ	DAB	SRZ	Condition	ULE	Significance	Vigor	Structure	Form	Ret Value	Age
01	Melaleuca nesophila	Showy honey myrtle	Native	7000	8000	363	4356	660	2779	Average	Short (5-15 yrs)	Less Significant	Average	Poor	Average	Council	Over Mature
02	Platanus orientalis	Cut Leaf Plane	Exotic	14000	10000	599	7188	900	3166	Good	Medium (16-39 yrs)	Highly Significant	Good	Average	Good	High	Mature
03	Platanus orientalis	Cut Leaf Plane	Exotic	16000	12000	730	8760	960	3253	Good	Medium (16-39 yrs)	Highly Significant	Good	Average	Good	High	Mature
04	Liquidambar styraciflua	Sweet Gum	Exotic	7000	5000	343.1	4117.2	355	2142	Poor	Removal	Less Significant	Poor	Poor	Poor	Low	Semi Mature
05	Lophostemon confertus	Brush Box	Native	10000	9000	455	5460	450	2366	Average	Medium (16-39 yrs)	Highly Significant	Good	Poor	Average	Moderate	Mature
05a	Citrus limon	Lemon tree	Exotic	4000	5000	214.8	2577.6	670	2797	Poor	Removal	Less Significant	Average	Poor	Poor	Low	Mature
06	Waterhousia floribunda	Weeping Lilly Pilly	Native	8000	7000	440	5280	700	2849	Average	Short (5-15 yrs)	Less Significant	Average	Poor	Average	Moderate	Mature
07	Casuarina cunninghamiana	River Sheoak	Native	13000	5000	440	5280	720	2883	Average	Removal	Less Significant	Average	Poor	Average	Low	Mature
08	Casuarina cunninghamiana	River Sheoak	Native	13000	5000	370	4440	690	2832	Average	Removal	Less Significant	Average	Poor	Average	Low	Mature
09	Casuarina cunninghamiana	River Sheoak	Native	14000	4000	320	3840	660	2779	Average	Removal	Less Significant	Average	Poor	Average	Low	Mature



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10	Casuarina cunninghamiana	River Sheoak	Native	15000	6000	350	4200	730	2900	Average	Removal	Less Significant	Average	Poor	Average	Low	Mature
11	Casuarina cunninghamiana	River Sheoak	Native	8000	4000	220	2640	350	2129	Poor	Removal	Least Significant	Poor	Poor	Poor	Low	Mature
12	Lophostemon confertus	Brush Box	Native	12000	10000	480	5760	520	2515	Poor	Removal	Less Significant	Poor	Poor	Average	Moderate	Mature
13	Lophostemon confertus	Brush Box	Native	12000	8000	400	4800	560	2594	Poor	Removal	Less Significant	Poor	Poor	Poor	Low	Mature
14	Lophostemon confertus	Brush Box	Native	14000	5000	375	4500	430	2322	Average	Removal	Less Significant	Average	Poor	Average	Low	Mature
14a	Fraxinus angustifolia subsp. angustifolia	Desert Ash	Exotic	4000	2000	110	2000	120	1500	Average	Removal	Less Significant	Average	Poor	Average	Weed	Mature
14b	Ligustrum lucidum	Shiny Privet	Exotic	4000	4000	160	2000	190	1647	Average	Removal	Less Significant	Average	Poor	Average	Weed	Mature
15	Salix humboldtiana	Chilean Willow	Exotic	4000	1000	149	2000	200	1683	Average	Removal	Less Significant	Good	Average	Average	Low	Semi Mature
15a	Pittosporum tenuifolium	Hedge Pittosporum	Exotic	6000	3000	120	2000	180	1611	Average	Short (5-15 yrs)	Less Significant	Average	Poor	Average	Neighbouring	Mature
16	Schefflera actinophylla	Umbrella Tree	Native	5000	3000	125.3	2000	250	1849	Average	Medium (16-39 yrs)	Less Significant	Average	Poor	Average	Low	Semi Mature
16a	Schefflera actinophylla	Umbrella Tree	Exotic	12000	16000	799.6	9595.2	850	3091	Average	Medium (16-39 yrs)	Highly Significant	Good	Poor	Average	Moderate	Mature
17	Agonis flexuosa	Willow myrtle	Native	8000	8500	904	10848	950	3239	Average	Removal	Hazardous	Average	Poor	Average	Low	Over Mature



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17a	Ligustrum lucidum	Shiny Privet	Exotic	5000	6000	161.2	2000	180	1611	Average	Short (5-15 yrs)	Less Significant	Good	Average	Average	Neighbouring	Mature
18	Eucalyptus viminalis	Manna gum	Native	18000	9000	1100	13200	1500	3924	Not Set	Removal	Not Set	Not Set	Not Set	Not Set	Removed	Not Set
19	Eucalyptus viminalis	Manna gum	Native	16000	6000	800	9600	700	2849	Not Set	Removal	Not Set	Not Set	Not Set	Not Set	Removed	Not Set
20	Quercus macrocarpa	Burr Oak	Exotic	18000	12000	760	9120	960	3253	Average	Long (40 + yrs)	Highly Significant	Good	Average	Average	High	Mature
21	Prunus cerasifera	Cherry Plum	Exotic	6500	7000	189	2268	200	1683	Not Set	Not Set	Not Set	Not Set	Not Set	Not Set	Removed	Mature
21	Ligustrum lucidum	Glossy Privet	Exotic	5000	3000	225.2	2702.4	250	1849	Poor	Removal	Least Significant	Average	Poor	Poor	Weed	Young
22a	Fraxinus angustifolia subsp. angustifolia	Desert Ash	Exotic	6000	3000	100	2000	129	1500	Average	Removal	Least Significant	Average	Average	Average	Weed	Young
23	Cupressus sempervirens	Green pencil pine	Exotic	6000	1000	150	2000	200	1683	Average	Medium (16-39 yrs)	Less Significant	Average	Average	Average	Low	Young
24	Callistemon salignus	Willow Bottle Brush	Native	7000	4000	250	3000	300	1996	Average	Short (5-15 yrs)	Less Significant	Good	Poor	Average	Low	Young
25	Fraxinus angustifolia	Desert Ash	Exotic	4000	2000	100	2000	150	1500	Poor	Short (5-15 yrs)	Least Significant	Average	Poor	Poor	Neighbouring	Young
26	Agonis flexuosa	Willow Myrtle	Native	5000	7000	482	5784	700	2849	Not Set	Not Set	Not Set	Not Set	Not Set	Not Set	Removed	Over Mature
27	Fraxinus excelsior aurea	Golden Ash	Exotic	7000	12000	492.4	5908.8	510	2494	Average	Medium (16-39 yrs)	Less Significant	Average	Poor	Average	Moderate	Mature



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No	Botanical Name	Common Name	Origin	Height	Canopy	DBH @ 1.4 m	TPZ	DAB	SRZ	Condition	ULE	Significance	Vigor	Structure	Form	Ret Value	Age
28	Eriobotrya japonica	Loquat tree	Exotic	5000	4000	170	2040	210	1718	Average	Medium (16-39 yrs)	Less Significant	Average	Average	Average	Low	Young
29	Grevillea robusta	Silky Oak	Native	8000	7000	300	3600	400	2252	Average	Short (5-15 yrs)	Hazardous	Good	Average	Average	Low	Semi Mature
30	Eucalyptus botryoides	Southern Mahogany	Native	5000	3000	250	3000	300	1996	Average	Removal	Hazardous	Good	Average	Average	Low	Young
31	Acer campestre	Hedge Maple	Exotic	7000	8000	436	5232	410	2276	Average	Medium (16-39 yrs)	Highly Significant	Average	Poor	Average	Moderate	Mature
32	Lophostemon confertus	Brush Box	Native	8000	7000	300	3600	700	2849	Average	Medium (16-39 yrs)	Highly Significant	Average	Poor	Average	High	Mature
33	Lophostemon confertus	Brush Box	Native	12000	8000	430	5160	700	2849	Average	Removal	Highly Significant	Good	Poor	Average	Council-Moderate	Mature
34	Lophostemon confertus	Brush Box	Native	9000	7000	559	6708	670	2797	Average	Removal	Highly Significant	Good	Poor	Average	Council-Moderate	Mature
35	Prunus armeniaca	Apricot	Exotic	6000	5000	223	2676	300	1996	Not Set	Not Set	Not Set	Not Set	Not Set	Not Set	Removed	Over Mature
36	Agonis flexuosa	Willow myrtle	Native	8000	10000	694.6	8335.2	700	2849	Poor	Removal	Hazardous	Average	Poor	Average	Low	Over Mature
37	Ulmus procera	English Elm	Exotic	12000	13000	660	7920	880	3136	Average	Removal	Highly Significant	Poor	Poor	Average	Low	Over Mature
38	Eucalyptus fibrosa	Broad Leaf Ironbark	Native	14000	10000	460	5520	480	2431	Average	Medium (16-39 yrs)	Highly Significant	Average	Average	Average	High	Mature



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No	Botanical Name	Common Name	Origin	Height	Canopy	DBH @ 1.4 m	TPZ	DAB	SRZ	Condition	ULE	Significance	Vigor	Structure	Form	Ret Value	Age
39	Corymbia citriodora	Lemon Scented Gum	Native	11000	11000	490	5880	650	2762	Average	Medium (16-39 yrs)	Highly Significant	Average	Average	Average	High	Mature
40	Eucalyptus leucoxylon	Yellow Gum	Native	8000	9000	490	5880	650	2762	Average	Medium (16-39 yrs)	Highly Significant	Good	Average	Average	High	Mature
41	Eucalyptus leucoxylon	Yellow Gum	Native	8500	8000	520	6240	490	2453	Good	Long (40 + yrs)	Most Significant	Good	Average	Good	Highest	Mature
42	Corymbia citriodora	Lemon Scented Gum	Native	16000	11000	560	6720	680	2814	Average	Medium (16-39 yrs)	Highly Significant	Average	Average	Average	High	Mature
43	Corymbia citriodora	Lemon Scented Gum	Native	6500	4000	160	2000	190	1647	Good	Long (40 + yrs)	Less Significant	Good	Average	Good	Low	Young
44	Corymbia citriodora	Lemon Scented Gum	Native	9000	6500	361	4332	430	2322	Average	Short (5-15 yrs)	Hazardous	Average	Poor	Average	Low	Semi-Mature
45	Eucalyptus camaldulensis	River Red Gum	Indigenous	6000	4500	184.9	2218.8	350	2129	Poor	Short (5-15 yrs)	Less Significant	Average	Poor	Poor	Low	Young
46	Eucalyptus camaldulensis	River Red Gum	Indigenous	6000	4500	155	2000	180	1611	Good	Long (40 + yrs)	Less Significant	Good	Average	Good	Moderate	Young
47	Schinus molle	Peppercorn Tree	Exotic	4500	4000	205.4	2464.8	350	2129	Poor	Long (40 + yrs)	Less Significant	Average	Poor	Poor	Low	Young
48	Grevillea robusta	Silky Oak	Native	4000	2000	80	2000	130	1500	Good	Long (40 + yrs)	Less Significant	Good	Average	Good	Low	Young
49	Grevillea robusta	Silky Oak	Native	5000	3000	140	2000	190	1647	Good	Long (40 + yrs)	Less Significant	Good	Average	Good	Low	Young
50	Corymbia citriodora	Lemon Scented Gum	Native	14000	16000	700	8400	900	3166	Good	Long (40 + yrs)	Most Significant	Good	Average	Good	Highest	Mature



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51	Ulmus procera	English Elm	Exotic	10000	12000	630	7560	615	2698	Average	Short (5-15 yrs)	Highly Significant	Average	Poor	Average	Moderate	Mature
52	Eucalyptus leucoxylon subsp. megalocarpa	Large Fruited Yellow Gum	Native	6000	3000	248.4	2980.8	260	1879	Poor	Short (5-15 yrs)	Less Significant	Poor	Poor	Average	Low	Semi-Mature
53	Eucalyptus leucoxylon subsp. megalocarpa	Large Fruited Yellow Gum	Native	5000	5000	240	2880	260	1879	Average	Medium (16-39 yrs)	Less Significant	Good	Average	Average	Low	Semi-Mature
54	Eucalyptus leucoxylon subsp. conata	Melbourne Yellow Gum	Native	9000	6000	417.7	5012.4	530	2535	Poor	Short (5-15 yrs)	Hazardous	Average	Poor	Poor	Low	Mature
55	Eucalyptus leucoxylon subsp. megalocarpa	Large Fruited Yellow Gum	Native	3000	3000	177.2	2126.4	250	1849	Average	Medium (16-39 yrs)	Less Significant	Average	Average	Average	Low	Semi-Mature
56	Eucalyptus leucoxylon	Yellow Gum	Native	4500	6000	210	2520	220	1752	Good	Long (40 + yrs)	Less Significant	Good	Good	Good	Low	Semi-Mature
57	Acacia mearnsii	Black Wattle	Indigenous	6000	4000	180	2160	210	1718	Good	Short (5-15 yrs)	Less Significant	Good	Average	Good	Low	Semi-Mature
58	Acacia mearnsii	Black Wattle	Indigenous	2000	1000	20	2000	50	1500	Good	Short (5-15 yrs)	Less Significant	Good	Average	Good	Low	Young
59	Eucalyptus leucoxylon subsp. megalocarpa	Large Fruited Yellow Gum	Native	4000	2000	110	2000	120	1500	Average	Long (40 + yrs)	Less Significant	Good	Average	Average	Low	Young
60	Eucalyptus leucoxylon subsp. megalocarpa	Large Fruited Yellow Gum	Native	4000	2000	90	2000	110	1500	Average	Long (40 + yrs)	Less Significant	Good	Average	Average	Low	Young



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61	Melaleuca styphilooides	Prickly Tea Tree	Native	9000	8000	840	10080	830	3060	Good	Medium (16-39 yrs)	Highly Significant	Good	Average	Good	High	Mature
62	Fraxinus excelsior	European Ash	Exotic	10000	12000	931.5	11178	640	2744	Average	Short (5-15 yrs)	Less Significant	Average	Poor	Average	Moderate	Over Mature
63	Eucalyptus fibrosa	Broad Leaf Ironbark	Native	9000	6000	400	4800	470	2410	Poor	Short (5-15 yrs)	Less Significant	Average	Poor	Poor	Low	Mature
64	Acacia mearnsii	Black Wattle	Indigenous	6000	3000	130	2000	150	1500	Average	Short (5-15 yrs)	Less Significant	Average	Poor	Average	Low	Semi-Mature
65	Acacia mearnsii	Black Wattle	Indigenous	7000	3000	160	2000	190	1647	Average	Short (5-15 yrs)	Less Significant	Average	Poor	Average	Low	Semi-Mature
66	Acacia mearnsii	Black Wattle	Indigenous	10000	5000	290	3480	350	2129	Poor	Short (5-15 yrs)	Hazardous	Average	Poor	Poor	Low	Mature
67	Eucalyptus saligna	Sydney Blue Gum	Native	8000	5000	400	4800	450	2366	Average	Short (5-15 yrs)	Hazardous	Average	Poor	Average	Low	Mature
68	Acacia mearnsii	Black Wattle	Indigenous	6000	3000	110	2000	130	1500	Average	Short (5-15 yrs)	Less Significant	Good	Average	Average	Low	Young
69	Callistemon salignus	Willow Bottlebrush	Indigenous	6000	5000	204.9	2458.8	230	1785	Average	Short (5-15 yrs)	Less Significant	Average	Poor	Average	Low	Mature
70	Acacia mearnsii	Black Wattle	Indigenous	8000	4000	180	2160	250	1849	Average	Short (5-15 yrs)	Less Significant	Average	Average	Average	Low	Semi-Mature
71	Acacia mearnsii	Black Wattle	Indigenous	7000	4000	250	3000	310	2024	Average	Short (5-15 yrs)	Less Significant	Average	Average	Average	Low	Semi-Mature



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Definitions

As per Australian Standard 4970 – 2009 – Protection of Trees on Development Sites (AS 4970):

Tree

AS 4970 Defines a Trees as ...

1.4.6 Tree Long lived woody perennial plant greater than (or usually greater than) 3 m in height with one or relatively few main stems or trunks (or as defined by the determining authority).

Therefore, unless otherwise required by the determining authority or if it is neighbouring and could be impacted upon, we do not include any plants under this size.

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TPZ and SRZ Methodology

Determining the Tree Protection Zone (TPZ)

The radius of the TPZ is calculated for each tree by multiplying its DBH x 12. TPZ = DBH x 12

Where - DBH = trunk diameter measured at 1.4 metres above ground; radius is measured from the centre of the stem at ground level.

A TPZ should not be less than 2 metres and no greater than 15 metres except where crown protection is required. Some instances may require variations to the TPZ.

The TPZ of palms, other monocots, cycads and tree ferns should not be less than 1 metre outside the crown projection.

This area is an estimate of the space required to maintain the health of a tree long term. It is entirely possible to work inside this Zone providing due care is exercised according to AS 4970.

Determining the Structural Root Zone (SRZ)

The SRZ is the area required for tree stability. A larger area is required to maintain a viable tree. The SRZ only needs to be calculated when major encroachment into a TPZ is proposed.

There are many factors that affect the size of the SRZ; e.g. tree height, crown area, soil type, soil moisture etc. The SRZ may also be influenced by natural or built structures, such as rocks and footings. An indicative SRZ radius can be determined from the trunk diameter measured immediately above the root buttress using the following formula:

SRZ radius = $(D \times 50) 0.42 \times 0.64$

Where - D = trunk diameter, in m, measured above the root buttress.

The SRZ for trees with trunk diameters less than 0.15m will be 1.5m.

It needs to be emphasised that this is an indicative calculation which generalizes all the conditions influencing the estimate. SRZ is often less than the indicated calculation. An Exploratory Root Excavation (ERE) or root investigation according to AS 4970 may provide more information on the extent of these roots.

TPZ and SRZ Encroachment

Any encroachment into TPZ should be advised and supervised by a qualified Arborist

AS 4970 says:

3.3.2 Minor encroachment

If the proposed encroachment is less than 10% of the area of the TPZ and is outside the SRZ detailed root investigations should not be required. The area lost to this encroachment should be compensated for elsewhere and contiguous with the TPZ.

AS 4970 also says:

3.3.4 TPZ encroachment considerations

When determining the potential impacts of encroachment into the TPZ, the project arborist should consider the following:

(a) Location and distribution of the roots to be determined through non-destructive investigation methods (pneumatic, hydraulic, hand digging or ground penetrating radar). Photographs should be taken and a root zone map prepared.

NOTE: Regardless of the method, roots must not be cut, bruised or frayed during the process.

It is imperative that exposed roots are kept moist and the excavation back filled as soon as possible.

(b) The potential loss of root mass resulting from the encroachment: number and size of roots.

(c) Tree species and tolerance to root disturbance.

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(d) Age, vigour and size of the tree.

(e) Lean and stability of the tree.

NOTE: Roots on the tension side are likely to be most important for supporting the tree and are likely to extend for a greater distance.

(f) Soil characteristics and volume, topography and drainage.

(g) The presence of existing or past structures or obstacles affecting root growth.

(h) Design factors.

Tree sensitive construction measures such as pier and beam, suspended slabs, cantilevered building sections, screw pile foundations and contiguous piling can minimize the impact of encroachment.

When siting a structure near to a tree, the future growth of the tree, both above and below ground should be taken into account.

Precautions should be taken at the planning and design stage to minimize potential conflict between trees and new structures

When the root zone is reactive clay, techniques such as localized pier and beam (bridged), screw pile footings or root and soil moisture control barriers may be appropriate to minimize effects on structures.

NOTE: Collaboration may be required between the project arborist and the geotechnical or structural engineer.

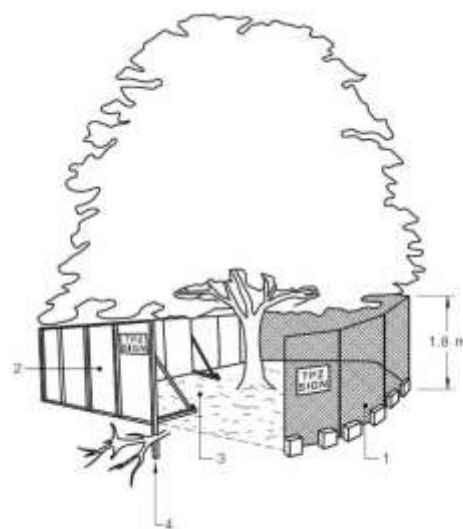
Landscapes by Design believes it is vital to ensure that construction is strong enough to withstand any encroachment by the tree as it grows. Pro-active measure like root control barriers and moisture barriers before trees grow to maximum size may be considered.

Tree Protection Fencing

The image to the right provides an example of suitable protective fencing:

Legend:

1. Chain wire mesh panels with shade cloth (if required) attached, held in place with concrete feet.
2. Alternative plywood or wooden paling fence panels. This fencing material also prevents building materials or soil entering the TPZ.
3. Mulch installation across surface of TPZ (at the discretion of the project arborist). No excavation, construction activity, grade changes, surface treatment or storage of materials of any kind is permitted within the TPZ. Bracing is permissible within the TPZ. Installation of supports should avoid damaging roots.



Tree Protection Fencing must be erected prior to any works of any nature commencing and before any machinery or materials are brought onto the site. Once erected this protective fencing must not be removed or altered until such time as all works associated with the construction are complete, unless approved and supervised by an Arborist. It must have signs attached to it saying "Tree Protection Zone – Stay Out" at maximum 2.4 metres centres or on each panel

Immediately following erection of the Tree Protection Fencing, the Tree Protection Zones are to be weeded and then mulched with 75 mm depth leaf mulch or similar, that has been aged for at least 12 weeks.

No trenching or excavation is to occur within this Tree Protection Zones. If underground services must be routed within the TPZ, they should be installed by directional drilling or in manually excavated trenches. The directional drilling bore should be at least 600 mm deep. The project arborist should assess the likely impacts of boring and bore pits on retained trees. A NDRI may assist in this case. See Later section.

The Tree Protection Fencing Zone should be secured to restrict access.

AS 4687 – Temporary Fencing and Hoardings specifies applicable fencing requirements. Shade cloth or similar should be attached to reduce the transport of dust, other particulate matter and liquids into the protected area.

Fence posts and supports should have a diameter greater than 20 mm and be located clear of roots.

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Existing perimeter fencing and other structures may be suitable as part of the protective fencing.

If it is necessary to remove the Tree Protection Fencing to allow works to be carried out it must be reinstated daily immediately following completion of works. If works are carried out within the Tree Protection Zones this work must be supervised by an Arborist. During required work suitable planking should be laid within the Tree Protection Zone to protect against compaction to the roots of the tree / trees from workers and others. It is recommended that machinery does not enter the Tree Protection Zone (see 4.2 from AS 4970 below: "Activities generally excluded"), however rumble boards, plates, or sheets of heavy duty materials over mulch and an impervious membrane can be used if vehicles need to move through the zone. Excavation can be carried out by machine using skilled operators briefed by and observed by an Arborist. Mini-excavators should be used and if possible, the vehicle located outside the zone with its tool arms moving within the site. In the case of a NDRI being conducted the workmen and their equipment are only in the area for a short time however extreme care must be taken to protect the trunk, canopy and roots of the tree/s.

Irrigation –

During warmer periods the Tree Protection Zones should be irrigated with 1 litre of clean water for every 1 cm of trunk girth measured at the soil / trunk interface on a weekly basis.

No persons, vehicles or machinery are to enter the Tree Protection Zones unless authorised to do so, preferably with permission from the Determining Authority.

No fuel, oil dumps or chemicals are allowed to be used or stored within the Tree Protection Zones; the servicing and refuelling of equipment and vehicles must be carried out away from the TPZ; no storage of material or equipment is to take place within them; nothing whatsoever, including temporary services wires, nails, screws or any other fixing device, is to be attached to any tree.

4.2 ACTIVITIES RESTRICTED WITHIN THE TPZ

Activities generally 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, and
- (n) physical damage to the tree.

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Trunk and Branch Protection

Trees impacted upon by construction works should be protected as per the Sketch 1 below. It is suggested that suitable rubberised padding material be used under 75 by 50 hardwood timber which is strapped with galvanised tin strapping approximately 30 mm wide at 900 mm spacing from bottom of trunk upwards and nailed or screwed to the hardwood timber with 25 mm long galvanised fasteners. The rubberised padding material should be perforated to allow air to the trunk, and not soak water into itself. No nails or screws are to enter the tree trunk or branches and care must be taken to ensure that no materials bite into the tree surface and scar or damage its surface in any way.

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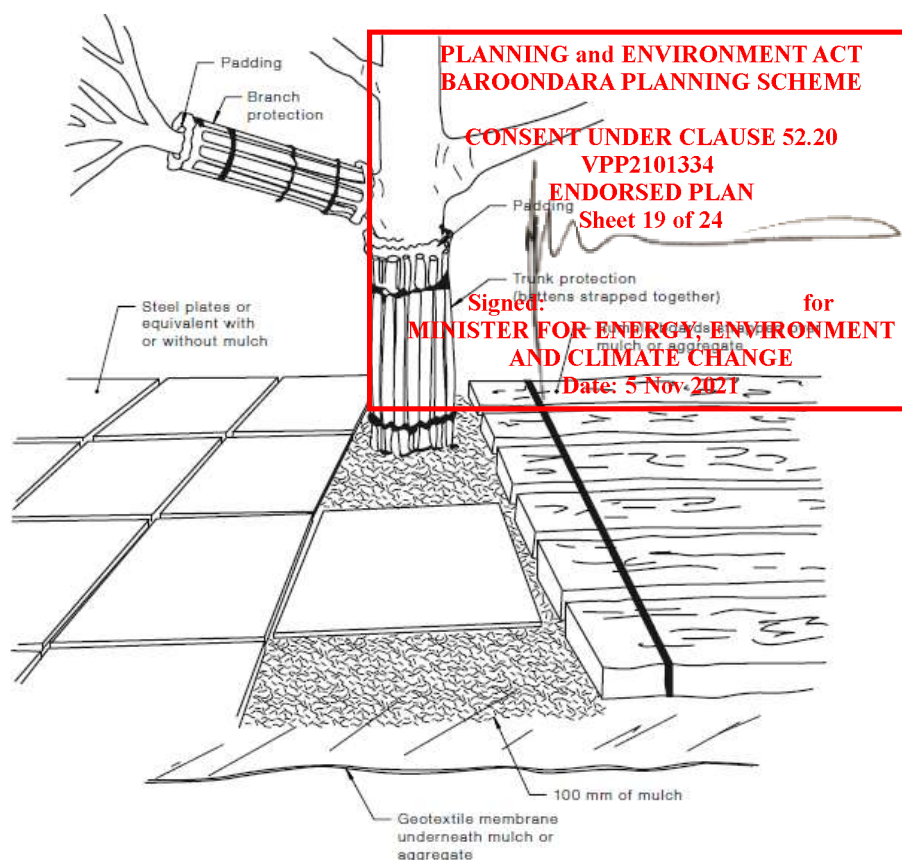
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Ground Protection

The planking to the right in the sketch following is an example of the planking that could be used. If temporary access for machinery is required within the TPZ, ground protection measures will be required. The purpose of ground protection is to prevent root damage and soil compaction within the TPZ. Measures should include a permeable membrane such as Geo-textile fabric beneath a layer of mulch or crushed rock, below rumble boards as per sketch 1. Rubber matting and packing plywood may also be used. Under this planking or sheeting within the TPZ, a 75 mm layer of leaf mulch or similar, aged for at least 12 weeks and proven to contain no toxic substances must be installed. These measures may also be applied to root zones beyond the TPZ. Rumble boards should be of a suitable thickness to prevent soil compaction and root damage.



Non-Destructive Root Investigation (NDRI)

A (NDRI) according to AS 4970 may be conducted to provide more information on the extent of a tree's SRZ or encroachment over 10% into TPZ. The SRZ is an indicative measure and the actual positions and extent of the roots can only be determined by an investigation. A trench is carefully excavated along a pre-determined line (for example, the edge of a proposed slab or decking posts) to a depth of at least 650 mm and no more than 300mm wide. If roots are located, they must be carefully exposed without any damage to the root. The position and size of any roots found can be photographed, recorded and mapped. If there are too many large roots or root mats found the Arborist may decide to move the trench further out from centre of trunk. A NDRI may indicate that a building can or cannot be placed in the proposed location, or that piers/stumps can be placed between roots, or that roots are not extending far enough to directly damage a building/path/pipe. The NDRI map may lead to design and engineering changes to enable a building, extensions, or earthworks that encroach into the TPZ, to proceed or be moved. Where possible the trenching is done by hand but there are times when machinery or water pressure excavation can be used under the supervision of an Arborist.

Root Protection during Works within the TPZ

Some approved works within the TPZ, such as regrading, installation of piers or landscaping may have the potential to damage roots.

If the grade is to be raised the material should be coarser or more porous than the underlying material. Depth and compaction should be minimized.

Manual excavation is the preferred method and should be carried out under the supervision of an arborist to identify roots critical to tree stability and determine the actual extent of the SRZ. A NDRI may be used with photographs and maps to serve as a guide for designers and workers. Relocation or redesign of construction works may be required. (See preceding section)

Where the project arborist identifies roots to be pruned within or at the outer edge of the TPZ, they should be pruned with a final cut back to undamaged wood. Pruning cuts should be made with sharp tools such as secateurs, pruners, handsaws or chainsaws. Pruning wounds should not be treated with dressings or paints. It is not acceptable for roots within the TPZ to be 'pruned' with machinery such as backhoes or excavators.

Where roots within the TPZ are exposed by excavation, temporary root protection should be installed to prevent them drying out. This may include jute mesh or hessian sheeting as multiple layers over exposed roots and excavated soil profile, extending to the full depth of the root zone. Root protection sheeting should be pegged in place and kept moist during the period that the root zone is exposed.

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Other excavation works in proximity to trees, including landscape works such as paving, irrigation and planting can adversely affect root systems. The project arborist should be consulted and supervise any works.

TPZ Encroachment Over 10%

If the proposed building footprint encroaches into the TPZ more than 10%; either the building footprint will have to change to reduce the encroachment to 10% or a NDRI could be carried out by an Arborist to determine the exact location of any roots present. Prior to a NDRI make certain to contact the Determining Authority to see if permission is required. If roots are discovered belonging to the tree that are under 40 mm diameter, they could be cut by an arborist to allow either the entire building footprint to be accommodated, or if that is not possible, a smaller redesigned building footprint to be accommodated. If the TPZ is varied following a NDRI (as per AS 4970) room must be allowed for the lost area to be compensated for elsewhere. Roots greater than 40 mm diameter and fibrous root mats or clumps greater than 50mm diameter should not be cut but need to be worked around. A well-qualified arborist may cut a root greater than 40 mm diameter, but not greater than 50 mm diameter unless given permission to cut from the Determining Authority.

Alternatively, if a NDRI shows it is impossible to vary the TPZ, alternative "tree friendly" construction methods could be employed, such as installing a building slab above grade, pier and beam methods, or building on stumps. Piers and stumps can be relocated to avoid damage to any significant roots discovered by the NDRI. These alternative building methods should be specified by a suitably qualified person.

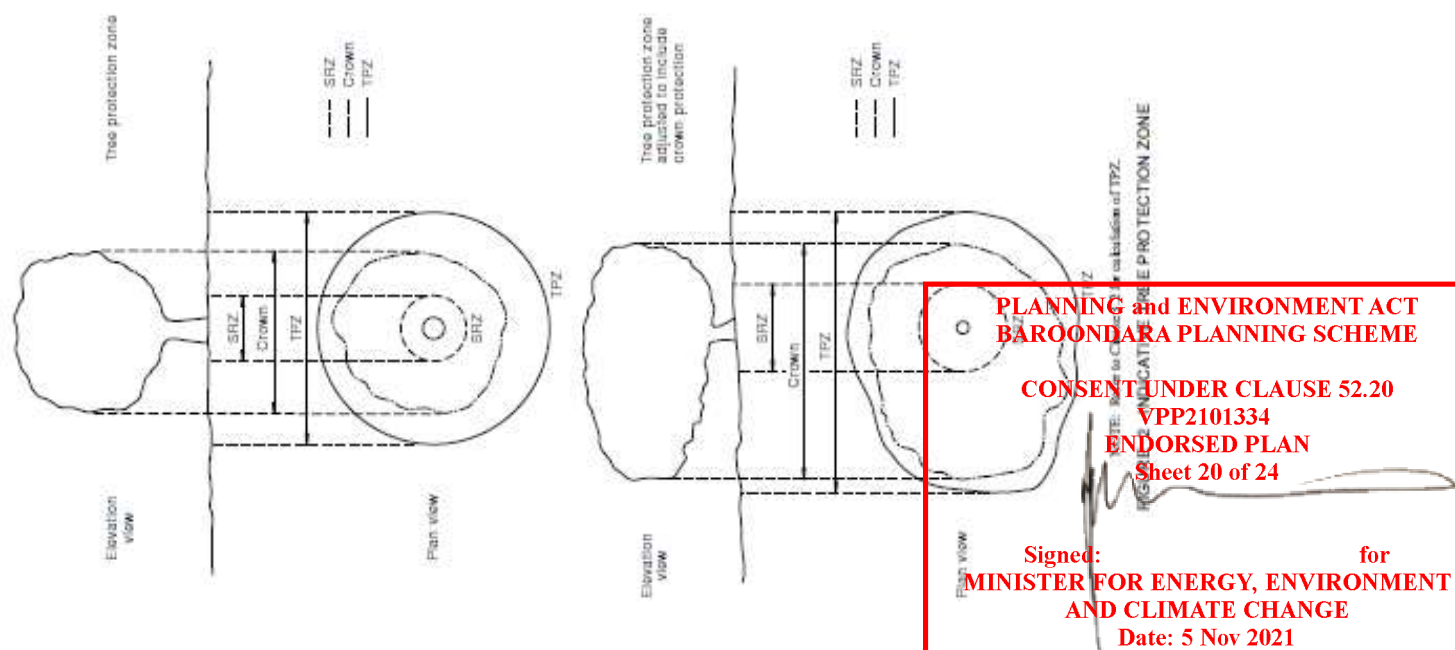
Installing Underground Services within TPZ

All services should be routed outside the TPZ. If underground services must be routed within the TPZ, they should be installed by directional drilling or in manually excavated trenches. The directional drilling bore should be at least 600 mm deep. The project arborist should assess the likely impacts of boring and bore pits on retained trees.

For manual excavation of trenches, the project arborist should advise on roots to be retained and should monitor the works. Manual excavation may include the use of pneumatic and hydraulic tools.

Crown protection

Tree crowns may be injured by machinery such as excavators, drilling rigs, cranes, trucks, hoarding installation and scaffolding. The TPZ may need to include additional protection of above ground parts of the tree. Where crown protection is required, it will usually be located at least one metre outside the perimeter of the crown (see Figure 2). The erection of scaffolding may require an additional setback from the edge of the crown. Crown protection may include pruning, tying-back of branches or other measures. If pruning is required, requirements are specified in AS 4373 and should be undertaken before the establishment of the TPF. NOTE: Pruning may require approval from the Determining Authority. See following section on Pruning and Removal of Trees



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Pruning and Removal of Trees

If pruning is required, it should be carried out in accordance with Australian Standard 4373 - Pruning of Amenity Trees (AS4373) and any root pruning also as per AS 4973 – Specialist advice from a person with a minimum AQF Level 4 in Arboriculture should be sought before any root pruning occurs.

Prior to the pruning of or removal of any tree the Determining Authority, usually the local council must be consulted to be certain the pruning or removal is allowed by them and is lawful.

In any development seek approval for tree removal and encroachment into the TPZ of trees from the Determining Authority; before planning or building preparation and drawings are completed. This is to ensure that building or other drawings are not prepared based on this report, when a relevant Determining Authority does not allow the trees nominated in our report to be removed, or their TPZ's encroached into.

Scaffolding

Where scaffolding is required, it should be erected outside the TPZ. Where it is essential for scaffolding to be erected within the TPZ, branch removal should be minimized. This can be achieved by designing scaffolding to avoid branches or tying back branches. Where pruning is unavoidable it must be specified by the project arborist in accordance with AS 4970 and 4373.

NOTE: Pruning works may require approval by the determining authority.

Ground below the scaffolding should be protected by boarding (e.g., scaffold board or plywood sheeting) as shown in Trunk and Branch Protection earlier. Where access is required, a board walk, or other surface material should be installed to minimize soil compaction. Boarding should be placed over a layer of mulch and impervious sheeting to prevent soil contamination. The boarding should be left in place until the scaffolding is removed.

There is a risk of materials falling off the scaffold decking and into the TPZ, damaging the tree. Care must be exercised, and solid walls or mesh barriers be installed on any scaffolding over the TPZ.

Impervious membrane, mulch, boards or plywood must be used under the scaffold soleplates and no excavation is to be performed for the soleplates. It may be possible to erect secondary fencing inside the general TPZ fencing to further protect the tree from damage.

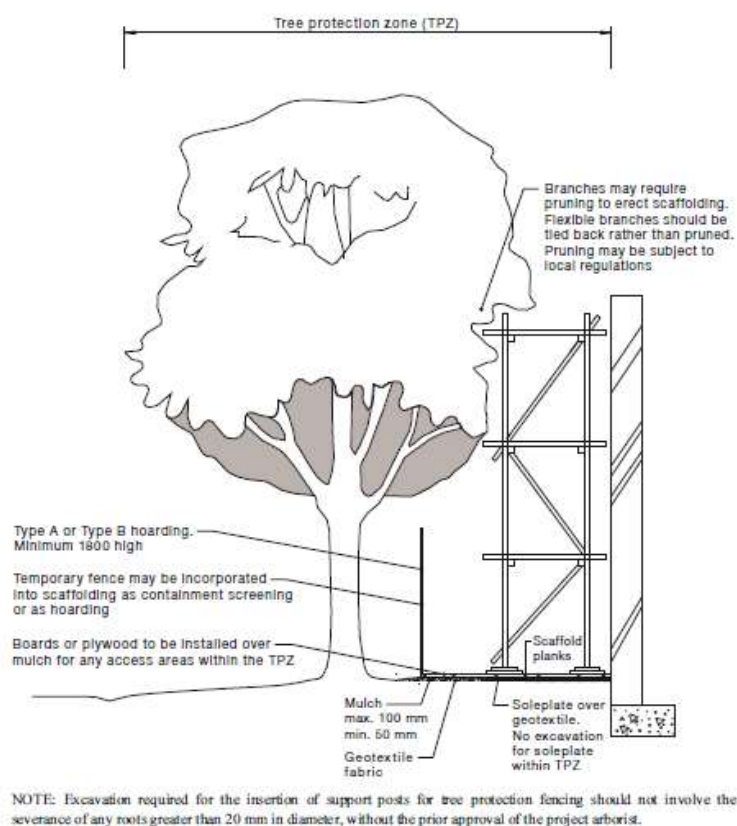


FIGURE 5 INDICATIVE SCAFFOLDING WITHIN A TPZ

Parameters – Used as required:

Condition, Vigour, Structure and Form - Each has four parameters: Excellent, Good, Average and Poor.

SULE – Safe Useful Life Expectancy - Has four parameters – Long (40 + years), Medium (16 to 39 years), Short (5 to 15 years) and Removal

Significance - Has six parameters – Most, Highly, Less, Least, and Hazardous

Age – Has four parameters:

Young – Less than one third of expected life span

Semi Mature – Into second third of expected life span

Mature – Into last third of expected life span

Over Mature – Beyond normal life span or age-related state of decline

**PLANNING and ENVIRONMENT ACT
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for

**MINISTER FOR ENERGY, ENVIRONMENT
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Retention Value – has nine parameters High, Moderate, Low, Weed, Neighbouring, Owners Choice, Damaging, Council and Hazardous when required following another parameter. Generally Neighbouring Trees must be retained and protected unless suitable arrangements can be made for their removal with the owner, and that removal is legal. Council trees to streets or neighbouring parks are that Council's responsibility. After a tree report is submitted that includes Council trees, it is suggested that council should inspect their trees to ensure they are safe and worthy of retention.

Definitions - Terms:

Acute Branch Crotch – Angle on the inner side of the branch crotch is less than 90 degrees.

Definitions - Terms:

Acute Branch Crotch – Angle on the inner side of the branch crotch is less than 90 degrees.

Apical Dominance - the main central stem of the plant is dominant over the other branches.

Bacterial Wet Wood - is a bacterial disease of certain trees, primarily elm, cottonwood, poplar, horse chestnut, sycamore, mulberry and oak.

Branch Union – point where a branch originates from the trunk or another branch; may be referred to as a crotch

Bracket Fungi or Shelf Fungi - are the fruiting structures of many different fungi that cause heartwood decay in standing trees.

Co-dominant Stems – 'Co-dominant stems are two stems or trunks of equal size that develop from 2 apical buds at the tip of the same stem. Each co-dominant stem is a direct extension of the stem below its origin. There are no branch collars or trunk collars at the base of co-dominant stems' (Dr Alex Shigo) – Similar to **Bi-furcated** meaning two, **Tri-furcated** meaning three and **Quadrifurcated** meaning four.

Compartmentalise – (CODIT: Compartmentalization of Decay in Trees. Dr Alex Shigo) natural process of defence in trees by which they wall off decay in wood and heal wounds.

Crown Gall - plant disease probably caused by the bacteria or invasion of some sort into the tree

Dead Wooding Removal of dead, dying and diseased branches throughout the crown.

De-current – growth habit developing a more rounded form with multiple scaffold branches

Determining Authority – Usually refers to the Council responsible for the property being assessed but includes any government or semi-governmental authority that has control or liability under common law, and the role to encourage and enforce the developmental process including legislation relating to trees and plants.

Epicormic Shoots - An epicormic shoot is a shoot growing from an epicormic bud which lies underneath the bark of a trunk, stem, or branch of a plant. In older wood, epicormic shoots can result from severe defoliation or radical pruning.

Etoliation is a process in plants grown in partial or complete absence of light. It is characterized by long, weak stems; smaller, sparser leaves due to longer internodes; and a pale-yellow colour (chlorosis).

Ex-current - growth habit with pyramidal crown and a central leader

Fall Zone – area under a tree or adjacent to it where if it failed it could impact upon.

Frass – Granular wood particles produced by borer insects that can be fine, medium or coarse depending on the type of insect.

Flush Cut - Pruning technique in which both branch and stem tissue are removed; generally considered poor practice. Flush cuts can allow decay to enter back into the main trunk or branch.

Gall - abnormal outgrowth of tissues and can be caused by various parasites, from fungi and bacteria, to insects and mites. Sometimes called a burl.

Ground Heaving – ground lifting or heaving as the root plate of a trees moves.

Hedges – Are not assessed as trees; therefore, a canopy dimension is represented in drawings not the TPZ.

Included Bark - bark that becomes embedded in a crotch between branch and trunk or **Co-Dominant Stems** and causes a weak structure.

Indigenous – a plant occurring naturally in the area or region of the subject site.

Kino Sap oozing from a tree caused by structural damage and / or disease or pests.

Later Growth – growth formed later in a tree's life cycle with perhaps poor attachment.

Obtuse Branch Crotch – where the angle on the inner side of the union is greater than 90 degrees.

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Phototropism or Phototropic Lean - is the phenomenon in which plants follow or grow towards a light source, most commonly the sun.

Picus Tomograph - used for tree risk assessments in order to measure the thickness of the residual wall of trees with internal defects such as cavities or decay non-invasively with sound waves sent through the tree.

Reaction Wood - tree wood formed as a result of mechanical stress helping to provide strength to affected areas as in leaning trees, wind exposure, over weighting, compartmentalisation of decay etc. A sign a tree could fail.

Scaffold Branch - the permanent or structural branches of a tree

Senescence - the condition or process of growing old especially the condition resulting from the transitions and accumulations of the deleterious aging process. Senescent

Torsional Loading - When a tree generally by the wind has had part of its structure twisted as it grows.

?? - After a tree's name means identity of species may not be exact.

Tree - As defined by AS 4970: A long lived woody perennial plant greater than (or usually greater than) 3 m in height with one or relatively few main stems or trunks (or as defined by the determining authority). Landscapes by Design believes that the definition is too loose and too general to include all the plants that we would include in the definition of a tree, however it serves to encompass most plants that we assess. We also assess where required, neighbouring plants other than trees.

Disclaimer etc

No examination of any sort has been carried out to the root systems of these trees. Given factors like environmental, vegetative and other overlays and local or other planning controls it is difficult to accommodate or satisfy all parties when assessing trees and other vegetation. It is very difficult to establish clear outcomes and impossible to determine that a tree can be deemed safe under all circumstances. No guarantee can be given that a tree is totally safe or will remain healthy given short-term adverse weather conditions or long term climatic conditions or other environmental and physical factors. No guarantees can be given for any part of a trees current or future stability. The writer and Landscapes by Design Pty Ltd does not accept any responsibility for any tree or part of it assessed, with regard to its ongoing stability and safety, or its capacity to damage property, other assets or people.

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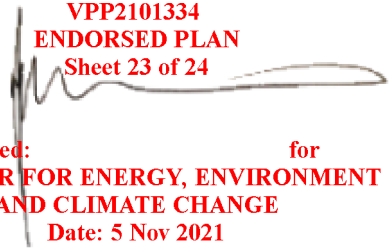
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Tree Protection Plan:
Bills Street, Hawthorn

Legend

Existing Building	Existing Hard Surfaces
Existing Retaining Wall	Proposed Building
Proposed Hard Surface	Proposed Permeable Surface
Proposed Retaining Wall and Structures	Proposed Drainage
Proposed Deck	Site Boundary
Proposed Fence	Proposed Tree Protection Fencing
Proposed Ground Protection Measures	Trees Neighbouring
Trees For Removal	Trees Retain
Structural Root Zone	Tree Protection Zone

N

Scale: 1:500 @ A3

