PLANNING AND ENVIRONMENT ACT 1987

YARRA PLANNING SCHEME

CONDITION 4.2.14 OF THE ALPHINGTON LINK INCORPORATED DOCUMENT [DEPARTMENT OF TRANSPORT AND PLANNING, JULY 2025]

ENDORSED DOCUMENT

SHEET 1 to 23

SIGNED... .....FOR

MINISTER FOR PLANNING

DATE...14/01/2026.....

HOMEWOOD CONSULTING PTY LTD

Development Tree Management Report

for

Department of Transport

Management of trees at La Trobe Golf Club, Alphington

Prepared by

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Friday, 18 October 2024

Contents

Table 1: Table of Revisions

Rev No.	Report Date	Description	Author	Internal Review Date	Reviewed by
1	*09/09/22*	*Report for Submission to client*	*ELB*	*13/09/2022*	*CB*
2	*04/10/24*	*Updated Design*	*ELB*	*11/10/2024*	*JMB*

1. Introduction

Homewood Consulting Pty Ltd has been engaged to provide a Tree Management Plan for trees located at La Trobe Golf Course, Alphington. Works to construct a path connecting to the Darebin Creek Trail path will shortly be underway. The preparation of a Tree Management Plan is required to ensure viability of trees to be retained on site.

Three previous arborist reports (dated 6th December 2021, 3rd February 2022, 13th September 2022) were prepared by Homewood Consulting. These reports assessed the impact of a proposed bridge to connect to the Darebin Creek Trail path on trees near the works. Where works were within the Tree Protection Zones, non-destructive digging (NDD), using hydro-excavation was carried out and results and recommended design changes detailed in the report dated 3rd February 2022. Since this time, a new design (path instead of bridge) has been submitted.

A site visit was carried out on 23rd August 2024 to assess the differences the path would have on the trees, and it was decided that further NDD was required adjacent to Trees 6 and 7, as trenching would be required instead of bridge piers. Works are proposed 3.5m from Tree 6 and 4.2m from Tree 7. The results of the NDD can be seen in Section 5.

The new design has been supplied by Department of Transport dated 18/07/24. This plan has been used to show encroachment into the Tree Protection Zone from the new design and to determine tree protection requirements.

This report is written in accordance with AS 4970 - 2009, *Protection of Trees on Development Sites*. Providing the recommended arboricultural impact mitigation and tree protection measures specified in this report are employed, all trees are expected to remain viable in the landscape.

2. Engagement of Project Arborist

Prior to the commencement of works, a Project Arborist must be engaged.

The Project Arborist's role is to induct contractors into the Tree Management Plan, to ensure tree protection measures are in place and are adequate prior to demolition/construction, to ensure trees are protected throughout construction and that trees remain viable post construction. Any permitted works within a TPZ should be supervised by the Project Arborist. The Project Arborist will record observations and take photographs at each site visit.

The Project Arborist must be qualified and appropriately experienced with a minimum qualification of Certificate V (Diploma or equivalent) in Arboriculture.

Section 8 details the key monitoring and certification stages required for this project.

3. Overview of Proposed Works

It is proposed to construct a pedestrian/cycle path from Farm Road across golf club land and connecting into the Darebin Creek Trail path.

The western end of the path is to be constructed on fill with a 300mm excavation for drainage. The eastern end of the path is to be constructed in cut with a 2.5m retaining wall supporting the embankment.

An access track to the golf club is proposed to be constructed to the north and crossing the path.

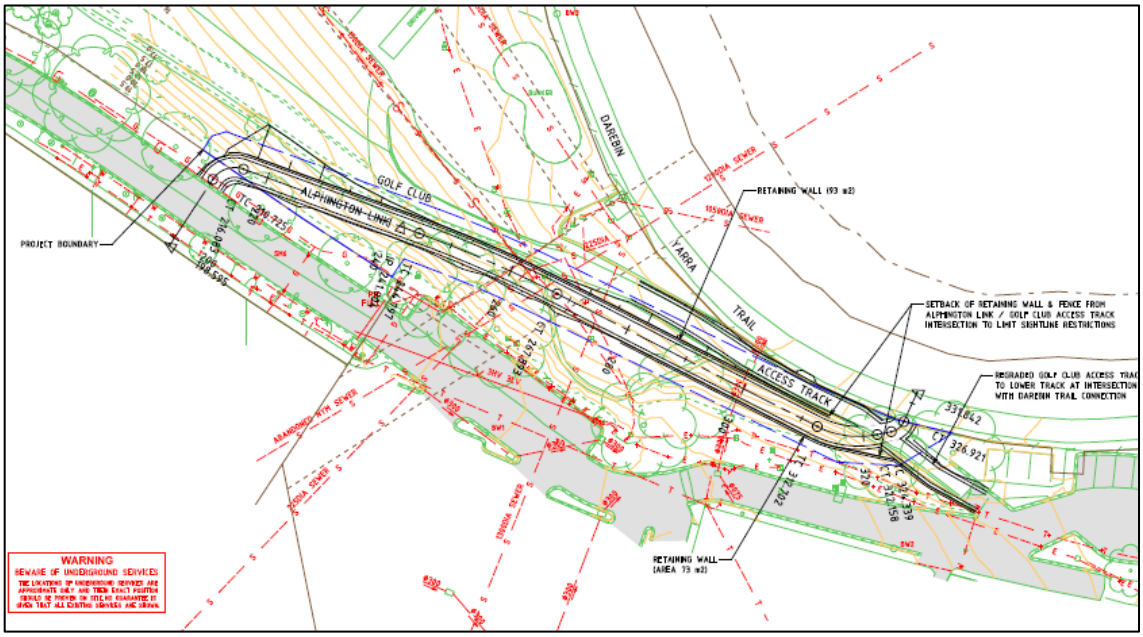


Figure 1: Proposed path

4. Protection of Trees on Development Sites

Trees 1-3, 5-8, 10 and 13 are to be retained and will require protection throughout all stages of works.

The Tree Protection Zone (TPZ) is the principal means of protecting trees on development sites. It is a combination of the root area and crown area, which is isolated from construction disturbance, so that the tree remains viable. The TPZ incorporates the Structural Root Zone (SRZ), the area around the base of a tree required for the tree's stability in the ground; with the woody root growth and soil cohesion in this area necessary to hold the tree upright. Further description of the TPZ and SRZ, and methods used for their calculation can be seen in Appendix 3.

Appendix 1 shows the Tree Protection Plan with trees marked for retention and removal, TPZs and SRZs for the assessed trees depicted to scale and the construction footprint of the proposed works.

5. Non-Destructive Digging (NDD)

Due to the change of plan from a bridge to a path, an NDD investigation was required adjacent to Trees 6 and 7 as trenching down to a depth of 300mm will now be required within their TPZs. NDD was undertaken using Hydro excavation and a small narrow trench was excavated and all roots greater than 20mm in diameter were left intact. Figure 2 show the approximate location of the NDD trench.

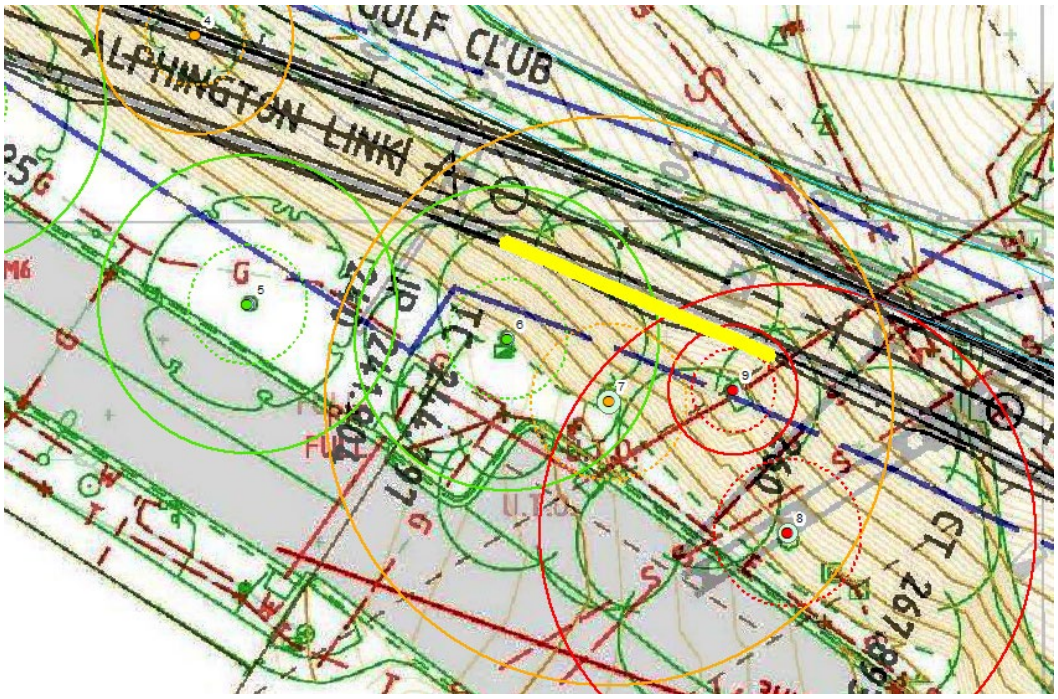


Figure 2: NDD trench (yellow)

Hydro excavation was carried out along the footprint of the path which was 3m from the trunk of Tree 6 and 3.5m from the trunk of Tree 7; excavation extended 3m either side of the trunks. The trench depth went to 600mm.

Fourteen roots in total greater than 20mm were seen in the trench, left intact and recorded. Five of these measured 20mm in diameter, six measured 30mm in diameter, one measured 40cm in diameter, another measured 50cm in diameter and the largest measured 60cm in diameter. Roots over 40mm in size can be classed as structural roots, however, the ones found are small structural roots for the size of the trees and it is likely that the roots supporting these trees are further down the soil profile or on other sides of the tree. Providing excavation does not exceed 600mm in depth and follows the NDD excavation line (no closer to the trees), then the trees are expected to remain viable with the construction of the path.

Figure 3: Trench adjacent Trees 6 and 7

Figure 4: 30mm root

Figure 5: 40mm rot

Figure 6: 60mm flat root

Figure 7: Smaller 10-20mm roots

6. Impact Summary

Following NDD, Trees 6 and 7 are expected to remain viable, and there is minimal change to the encroachment of the other trees from the new design. Works are 6m from Tree 8 on the edge of the TPZ and this is deemed far enough away to not have a detrimental effect on the tree. Trees 1, 2, 3, 5, 10 and 13 have the same footprint as the previous design and all are expected to remain viable providing tree protection measures are in place.

It is still proposed to remove Trees 4, 9, 11 and 12.

The current design can proceed as planned with retained trees remaining viable. Nine trees are to be retained (Trees 1-3, 5-8, 10 and 13) and will require protection throughout all stages of works.

Any requirements for works/management within the TPZ of these trees is outlined in Section 7.

7. Tree Protection Measures Required

1. A Project Arborist is engaged to oversee all works within the Tree Protection Zone (TPZ) of retained trees, verify TPZ fencing locations, attend monthly site visits and supervision of works to ensure TPZ guidelines, specifications and recommendations are adhered to.
   1.1 The name and address of the Project Arborist must be supplied to the relevant authority and approved prior to the commencement of works.
2. **All workers must be familiar with the Tree Protection Plan** and an induction on tree protection must be carried out by the Project Arborist for all workers on site prior to works commencing.
3. All trees to be removed (Trees 4, 9, 11 and 12) are clearly marked on site and removed prior to the commencement of construction.
4. In accordance with the Tree Protection Plan (TPP) a Tree Protection Zone (TPZ) must be established for all retained trees that conforms with the following:
   4.1 **Fencing** must be a minimum height of 1.8m high and consist of chain wire mesh panels held in place with concrete feet. Fencing must comply with Australian Standard AS 4687-2007 Temporary fencing and hoarding.
   4.2 **Fixed signs** are to be provided on all visible sides of the TPZ fencing stating 'Tree Protection Zone – Keep Out'.
   4.3 There must be **no storage of materials or vehicles** within the TPZ, no fill or lighting of fires.
5. Following TPZ setup, a site meeting is carried out with the Project Manager and Project Arborist to ensure TPZ protection is set up adequately, including any ground protection required and to detail order of works.
6. **Ground protection** within the TPZ of Trees 1, 2, 5, 6, 7, 8, 10, and 13 must be installed if large vehicles are proposed within the TPZs. The purpose of ground protection is to prevent root damage and soil compaction within the root zones. Measures require a permeable membrane such as geotextile fabric beneath a layer of mulch or crushed rock below rumble boards (Figure 8).
7. No vehicles are permitted on sloped ground adjacent to Trees 6, 7, 8 and 10 unless authorised by the Project Arborist.
8. All large vehicles must work from the dedicated access track (flat ground) and on the northern side of the trees.
9. **Trunk and branch protection** must be used around Trees 6, 7, 8 and 13 if large vehicles/cranes are working near overhanging branches. This must consist of padding surrounding the trunk held in place with batons strapped together, or similar (Figure 8). Boards are to be strapped to trees, not nailed or screwed.

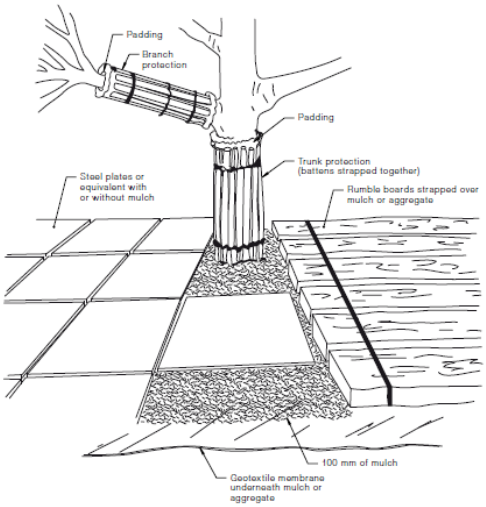


Figure 8: Example of trunk, branch and ground protection (Source: AS 4970-2009).

10. If clearance pruning is required over the path or for vehicle access, this must be assessed by the Project Arborist prior to being undertaken. No more than 10% canopy volume should be removed, and all works must be undertaken by qualified arborists familiar with the design plan and as per the specifications of AS 4373-2007 *Pruning of Amenity Trees.*
11. **Tree 2 - (High Retention Value)** - All works within the TPZ of Tree 2 can proceed as planned. **These works must be undertaken under the direct supervision of the Project Arborist.**

    11.1 Material for the fill used within the TPZ of Tree 2 must consist of non-compacted structural soils with no fines used. This will enable rainwater to penetrate to the root zone below.
12. **Trees 6 (High Retention Value) and Tree 7 (Medium Retention Value)** – Following NDD 3m from Tree 6 and 3.5m from Tree 7 minimal large roots were encountered (detailed in this report Section 5). Works for installation of the path can be carried out providing it does not extend within 3m of Tree 6 and within 3.5m of Tree 7. **These works must be supervised by the Project Arborist.**
13. **Tree 10 – (Very High Retention Value)** - Following NDD (4.5m from the trunk down to 1m) within the TPZ only minimal small roots were encountered (detailed in arborist report dated 3/3/22). Works can proceed as planned provided the excavation works are no closer than 4.5m from the trunk. **These works must be supervised by the Project Arborist.**
14. **Tree 13 – (Very High Retention Value)** - Following NDD within the TPZ of this tree, works can proceed as planned as minimal roots were encountered (detailed in arborist report dated 3/3/22). Further excavation works are required down to 300mm within the TPZ (discussed at site visit 24/8/22). **This is an area of approximately 3m that NDD did not cover, and this must be supervised by the Project Arborist.**

    14.1 If large roots are encountered (greater than 50mm), the paving and sub-base must be raised to keep the root intact. This was discussed on site and is achievable (site meeting 24/8/22).
15. The Project Arborist must be given at least 48 hours' notice to attend supervision of works and preferably one to two weeks to ensure needs can be met. If this does not occur, then the works may have to be postponed.

16. All pruning of small roots during these works is undertaken by the Project Arborist using clean, sharp secateurs or pruning saw.
17. The Project Arborist must be notified of any pruning that is required, other than discussed in this report, to allow access for large vehicles, scaffold clearance or building clearance. This should be assessed by the Project Arborist and carried out by qualified arborists and conform to the Australian Standard Pruning on Amenity Trees (AS 4373 2007).
18. During site visits by the Project Arborist for supervision of works, the Project Arborist will assess the trees and TPZ fencing and determine irrigation requirements for trees.
19. Any further construction proposed within TPZs of assessed trees and not discussed within this report **must** be assessed by the Project Arborist prior to commencement of works and approved by the relevant authority.

Further description of the Tree Protection Measures listed can be seen in Appendix 4.

8. Key Monitoring and Certification Stages

There are many stages in the development process where the Project Arborist is required to monitor or certify, provide a written statement of compliance, for tree protection.
Table 2below details the stages and activities where the Project Arborist must be involved.

Table 2: Project Arborist Involvement

Stage	Activities	Required	Date Completed	Certification Compliance
Pre-Construction	Name and contact details of the Project Arborist submitted to the Council	Yes		Yes/No
	Site induction meeting with Project Manager & contractor in charge to discuss order of works, designated storage areas, site entry and exit	Yes		Yes/No
	Arborist verification of TPZ protection measures for construction - All tree protection fences, warning signs, ground protection, trunk/branch protection established to be checked on site	Yes		Yes/No
	Confirm that all trees for removal correspond with those shown on the approved plan	Yes		Yes/No
	Verify tree pruning work required has been completed	Yes		Yes/No
	Carry out site inspection to ascertain all listed activities have been completed	Yes		Yes/No
	Confirmation report of compliance provided by the Project Arborist	Yes		Yes/No
Construction Stage	Monthly meetings with the contractor on site to inspect any adverse impact on the trees and ensure TPZ measures are maintained	Yes		Yes/No
	To undertake direct supervision of works within the TPZ of Trees 2, 6, 7, 10 and 13	Yes		Yes/No
	To advise on tree protection measures where changes to approved plans are required	Yes		Yes/No
Landscaping	To advise on and monitor staged removal of Tree Protection fencing	Yes		Yes/No
	To undertake direct supervision of works within TPZs	Yes		Yes/No
End of Construction Stage	Tree inspection to confirm all tree protection activities have been satisfactorily completed	Yes		Yes/No
	Any remedial works to be undertaken have been satisfactorily completed - Project Arborist to certify completion	Yes		Yes/No

Stage	Activities	Required	Date Completed	Certification Compliance
	A confirmation report of compliance shall be provided by the Project Arborist	Yes		Yes/No

Certification will include a statement on the condition of retained trees, details of any deviations from the approved tree protection measures and their impacts on trees.

If there is non-compliance with tree protection measures or if trees have been damaged, a timeframe for compliance and remedial works will be specified by the Project Arborist.

9. References

AS 4970 - 2009, *Australian Standard, Protection of Trees on Development Sites*, Standards Australia.

AS 4373 - 2007, *Australian Standard, Pruning of Amenity Trees*, Standards Australia.

Biddle, P.G., 1998, *Tree root damage to buildings, Causes, Diagnosis and Remedy,* Willowmead Publishing Ltd., Wantage,UK.

Mattheck, C. and Breloer, H. 1994, *The body language of trees: a handbook for failure analysis*, London: HMSO.

Appendix 1 - Tree Protection Plan

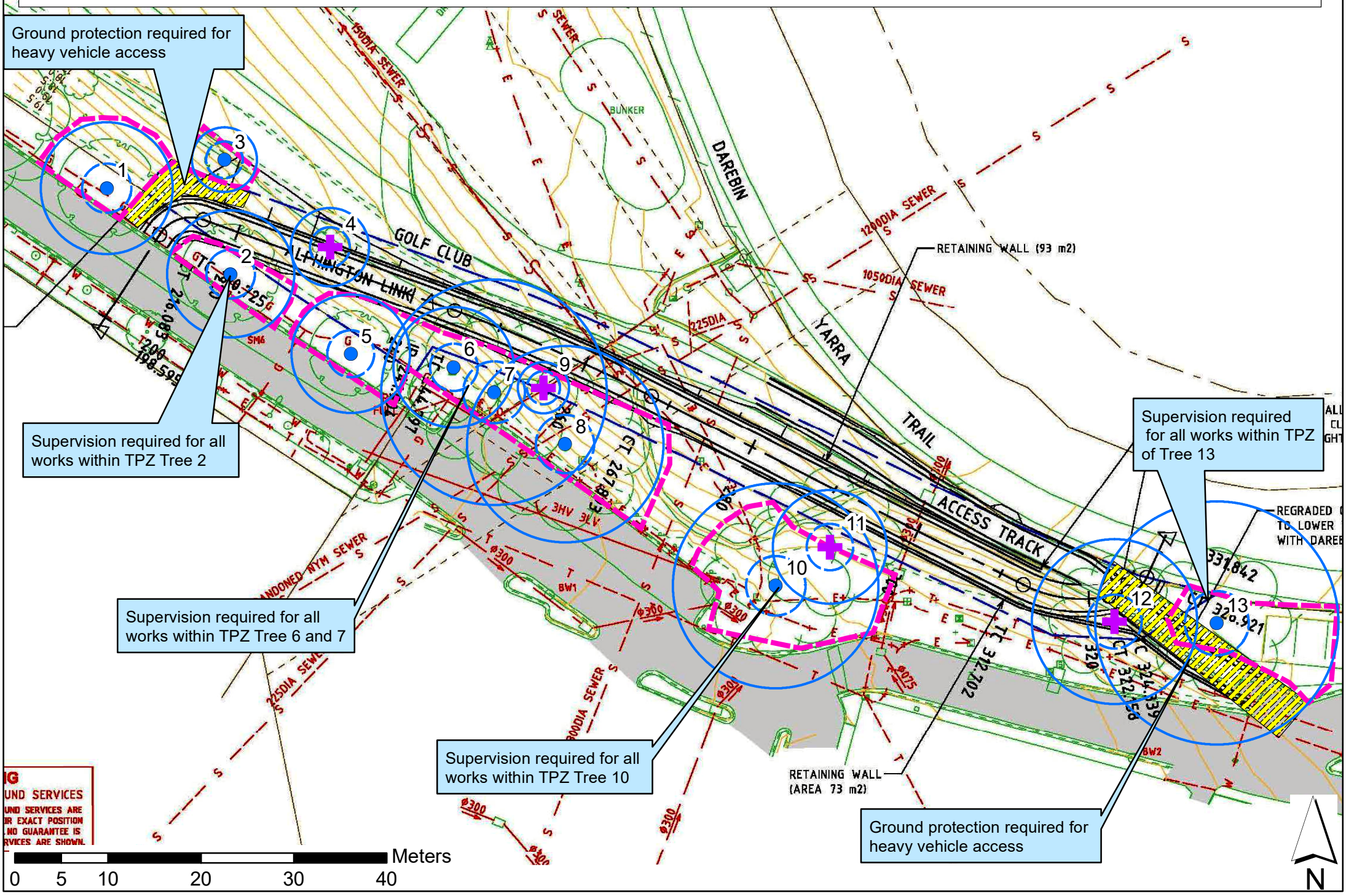
1. A Project Arborist must be engaged to oversee all works within the Tree Protection Zone (TPZ) of retained trees.
2. All workers must be familiar with the Tree Protection Plan and an induction on tree protection must be carried out by the Project Arborist for all workers on site prior to works commencing.
3. All trees to be removed (Trees 4, 9, 11 and 12) are clearly marked on site and removed prior to the commencement of construction.
4. In accordance with the Tree Protection Plan (TPP) a Tree Protection Zone (TPZ) must be established for all retained trees that conforms with the following:

4.1 Fencing must be a minimum height of 1.8m high and consist of chain wire mesh panels held in place with concrete feet. Fencing must comply with Australian Standard AS 4687-2007 Temporary fencing and hoarding.

4.2 Fixed signs are to be provided on all visible sides of the TPZ fencing stating 'Tree Protection Zone – Keep Out'.

4.3 There must be no storage of materials or vehicles within the TPZ, or lighting of fires.

5. Following TPZ setup, a site meeting is carried out with the Project Manager and Project Arborist to ensure TPZ protection is set up adequately, including any ground protection required and to detail order of works.
6. Ground protection within the TPZ of Trees 1, 2, 5, 6, 7, 8, 10, and 13 must be installed if large vehicles are proposed within the TPZs. The purpose of ground protection is to prevent root damage and soil compaction within the root zones. Measures require a permeable membrane such as geotextile fabric beneath a layer of mulch or crushed rock below rumble boards.
7. No vehicles are permitted on sloped ground adjacent to Trees 6, 7, 8 and 10 unless authorised by the Project Arborist.
8. All large vehicles must work from the dedicated access track (flat ground) and on the northern side of the trees.
9. Trunk and branch protection must be used around Trees 6, 7, 8 and 13 if large vehicles/cranes are working near overhanging branches. This must consist of padding surrounding the trunk held in place with batons strapped together, or similar. Boards are to be strapped to trees, not nailed or screwed.
10. Arborist supervision must be carried out for all works within the TPZ of Trees 2, 6, 7, 10 and 13.
11. The Project Arborist must be notified of any pruning that is required, other than discussed in this report, to allow access for large vehicles, scaffold clearance or building clearance. This should be assessed by the Project Arborist and carried out by qualified arborists and conform to the Australian Standard Pruning on Amenity Trees (AS 4373 2007).



Locations and types of tree protection measures for proposed works at La Trobe Golf Club, Alphington

Base information supplied by: Design East
Plotted: ELB, Coordinate System: GDA 1994 MGA Zone 55

Legend

- Trees - Retain
- Trees - Remove
- TPZ
- SRZ
- Ground Protection
- TPZ Fencing

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Appendix 2. Tree Details for Retained Trees

Table 3: Tree Details

ID	Botanical Name	Origin	Height & Width (m)	DBH (cm)	Age Class	Health	Structure	ULE (years)	Retention Value	Comments	TPZ Radius (m)	SRZ Radius (m)	TPZ Encroachment (%)	TPZ Impact
1	*Corymbia citriodora*	Native	14 x 10	59	Mature	Good	Good	20 - 40	High	Council owned tree	7.08	2.65	8	Impact Minor
2	*Corymbia maculata*	Native	14 x 10	57	Mature	Fair	Good	20 - 40	High	Council owned tree	6.84	2.61	28	Impact Major - viable
3	*Eucalyptus camaldulensis*	Indigenous	7 x 4	29	Semi mature	Good	Fair	40+	Medium	Golf club owned tree	3.48	1.97	0	No impact
5	*Corymbia citriodora*	Native	13 x 10	53	Mature	Fair	Fair	20 - 40	High	Council owned tree	6.36	2.53	0	No impact
6	*Eucalyptus globulus*	Native	13 x 7	54	Mature	Good	Fair	20 - 40	High	Golf club owned tree	6.48	2.55	15	Impact Major - viable
7	*Eucalyptus globulus*	Native	17 x 14	101	Mature	Good	Fair	10 - 20	Medium	Small bracket fungi on trunk, multi stemmed, trunk decay, co-dominant trunks. Golf club owned tree	12.12	3.32	26	Impact Major - viable
8	*Eucalyptus globulus*	Native	16 x 13	88	Mature	Fair	Poor	5 - 10	Low	Large fungi on main stem, main stem declining, epicormic shoots on lower tree indicating stress, major failure. Golf club owned tree	10.56	3.14	12	Impact Major - viable

ID	Botanical Name	Origin	Height & Width (m)	DBH (cm)	Age Class	Health	Structure	ULE (years)	Retention Value	Comments	TPZ Radius (m)	SRZ Radius (m)	TPZ Encroachment (%)	TPZ Impact
10	*Eucalyptus camaldulensis*	Indigenous	17 x 13	92	Mature	Good	Good	40+	Very High	Golf club owned tree.	11.04	3.2	18	Impact Major - viable
13	*Eucalyptus camaldulensis*	Indigenous	17 x 13	109	Mature	Good	Good	40+	Very High	Possibly remnant. Golf club owned tree	13.08	3.43	26	Impact Major - viable

Appendix 3. Tree Protection Zones & Structural Root Zones

All parts of the tree may be damaged by development and damage to any one part of the tree may affect its functioning as a whole.

Root damage is the most common cause of damage to trees on development sites. Roots may be directly damaged when removed, wounded, crushed or torn during grading, excavation or trenching. Soil compaction from foot traffic and vehicle traffic indirectly damages tree roots, resulting in loss of pore space within the soil which is essential for the exchange of gases between the soil and atmosphere and for soil drainage.

Trunks of trees may be wounded mechanically during demolition and construction work. This not only predisposes a tree to potential decay, but it also interferes with the transport of water, nutrients and sugars throughout the tree. Serious impacts may structurally weaken the tree.

The canopy of trees can be damaged through incorrect pruning techniques or mechanical injury by trucks, cranes, excavators etc. The removal of leaves reduces the level of photosynthesis and reduces the tree's capacity to function normally and to withstand stresses. Incorrect pruning and mechanical damage can produce wounds that are susceptible to infection by wood decay organisms.

For trees to be retained and their requirements met, procedures must be in place to protect trees at every stage of the development process. This needs to be taken into account at the earliest planning stage of any outdoor event or design of a development project where trees are involved.

3.1 Tree Protection Zones

The most common method of protecting trees during construction is by establishing a Tree Protection Zone (TPZ). The TPZ is an area isolated from construction disturbance area, so that the tree remains viable. The TPZ radius has been calculated according to the Australian Standard (AS 4970-2009) for the subject trees. This method calculates the TPZ as 12 times the trunk diameter at 1.4m above ground level (DBH).

A TPZ should not be less than 2m nor greater than 15m, except where additional crown protection is required. The TPZ of palms, other monocots, cycads and tree ferns should not be less than 1m outside of the crown projection.

3.2 Structural Root Zones

The Structural Root Zone (SRZ) is the minimum volume of roots required by the tree to remain stable in the ground. If the SRZ is breached the chances of windthrow are significantly increased. Windthrow is an event where the entire tree fails/falls over.

It is important to note that the SRZ is not related to tree health. It refers to the physical volume of roots required for the tree to remain stable in the ground (Figure 9). It is in no way related to the physiological requirements of the tree but is the minimum volume of roots required for the tree to remain standing (Mattheck and Breloer 1994).

According to AS 4970-2009 the SRZ radius of the trees has been calculated using the equation:

$$R_{srz} = (D \times 50)^{0.42} \times 0.64$$

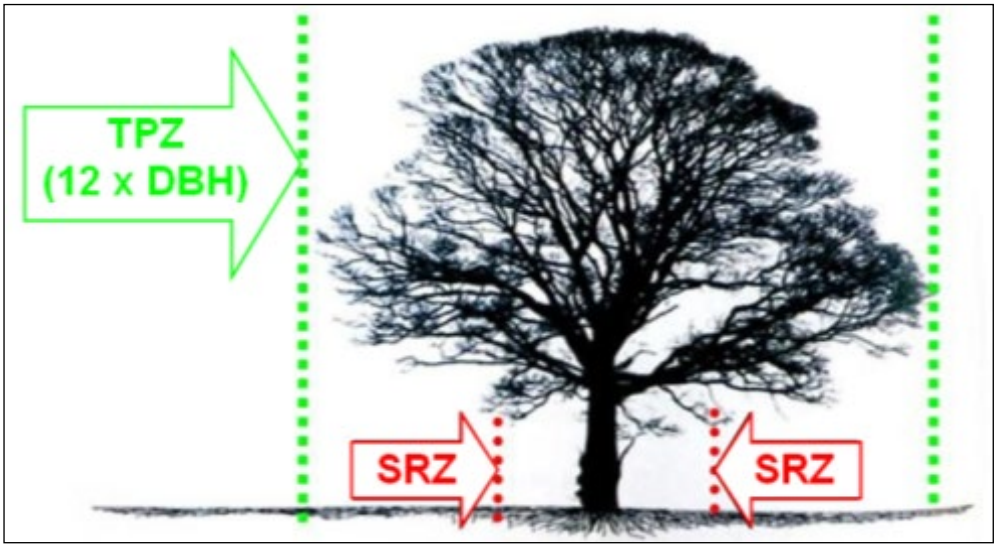

Figure 9: The SRZ = minimum volume of roots required to maintain tree stability (Biddle 1998).

3.3 TPZ and SRZ encroachment

It may be possible to encroach into or make variations to the standard TPZ. Encroachment includes (but is not limited to) excavation, compacted fill and machine trenching.

Table 4: Levels of TPZ encroachment as defined by AS 4970-2009

Level of Encroachment	Description / Definition	Requirements
Minor	Encroachment of less than 10% of the TPZ and outside the SRZ is deemed to be minor encroachment.	Detailed root investigations should not be required but the encroachment must be compensated with an extension to the TPZ elsewhere (Figure 10). Variations must be made by the Project Arborist considering other relevant factors including tree health, vigour, stability, species sensitivity and soil characteristics.
Major	Encroachment of more than 10% of the TPZ or into the Structural Root Zone (SRZ) is deemed to be major encroachment.	The Project Arborist must demonstrate that the trees would remain viable. This may require root investigation by non-destructive methods and/or consideration of relevant factors of tree health, vigour, stability, species sensitivity and soil characteristics. The area lost to this encroachment should be compensated for elsewhere and contiguous with the TPZ.

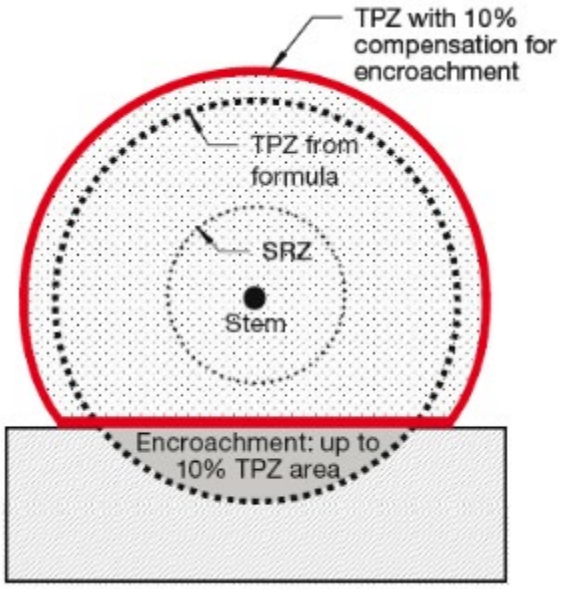

Figure 10: Example of minor TPZ encroachment and compensatory offset (image from AS 4970-2009).

Appendix 4. Tree Protection Measures

4.1 Tree Protection Fencing

The Tree Protection Zone is delineated on site by a physical barrier of protective fencing that is a minimum of 1.8m high. It is installed around retained trees prior to site establishment and retained intact until completion of the works (Figure 11). Once erected, protective fencing must not be removed or altered without approval by the Project Arborist. The TPZ fence should be secured to restrict access.

Where TPZ fencing is impractical - e.g. if site access is required through the TPZ, other tree protection measures should be used, including ground protection and/or trunk and branch protection (see 4.8 and 4.9).

Figure 11: TPZ fencing is erected around retained trees prior to site works.

4.2 Signs

Signs identifying the TPZ should be placed around the edge of the TPZ and be clearly visible from within the development site (Figure 12).

Figure 12: Example of a TPZ warning sign clearly displayed on TPZ fencing.

4.3 Activities restricted within the TPZ

Activities restricted within the TPZ include but are not limited to:

- machine excavation including trenching
- excavation for silt fencing
- cultivation and landscaping
- storage of materials
- preparation of chemicals, including preparation of cement products
- parking of vehicles and plant
- refuelling
- dumping of waste
- wash down and cleaning of equipment
- lighting of fires
- temporary or permanent installation of utilities and signs
- physical damage to the tree.

4.4 TPZ Maintenance

The fenced TPZ area should be mulched to retain soil moisture throughout the period of works. The mulch must be maintained to a depth of 50-100mm. Where the existing landscape within the TPZ is to remain unaltered (e.g. garden beds or turf) mulch may not be required.

Soil moisture levels should be regularly monitored by the Project Arborist. Temporary irrigation or watering may be required within the TPZ. An above-ground irrigation system should be installed and maintained by a competent individual.

All weeds should be removed by hand without soil disturbance or should be controlled with appropriate use of herbicide.

4.5 Working within the TPZ

Some works and activities within the TPZ may be permitted by the determining authority. These must be directly supervised on site by the Project Arborist. Any additional encroachment that becomes necessary as the site works progress must be reviewed by the Project Arborist and be acceptable to the determining authority before being carried out.

4.6 Landscaping

Soft and hard landscaping within Tree Protection Zones should be assessed by the Project Arborist at the design stage, and prior to the commencement of works. In general:

- There should be no grade changes within the TPZ of trees to be retained. If a level surface is required, no more than 100mm of fill (e.g. topsoil or crushed rock) should be used.
- There should be no soil preparation for landscaping (cultivation, replacement of existing substrate or compaction) within the TPZ of trees to be retained.

- Excavation for planting holes, fence posts, garden edging, etc. should be undertaken manually within the TPZ of trees to be retained. If significant roots (greater than 30mm diameter) are encountered these are to be retained unscathed and the location of the landscape component shifted. Any small roots are to be cleanly pruned by the Project Arborist, at right angles, using sharp, clean tools.

4.7 Underground services

Underground services within Tree Protection Zones should be assessed by the Project Arborist at the design stage, and prior to the commencement of works.

- All underground services (including water, sewage, electricity, gas and communications) should be located outside of the TPZ of trees to be retained.
- If underground services are to be routed within an established TPZ, they should be installed by directional boring with the top of the bore to be a minimum depth of 800mm below the existing grade.
- Bore pits should be located outside of the TPZ or manually excavated under the direct supervision of the Project Arborist.

4.8 Ground Protection

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. Examples of ground protection include track mats (Figure 13) and rumble boards strapped over mulch or crushed rock (Figure 14). Depending on weather conditions, geotextile fabric may be required to prevent mulch and crushed rock mixing into the site soils.

Figure 13: Track mats.

Figure 14: Rumble boards over crushed rock.

4.9 Trunk and Branch Protection

Where trees cannot be isolated from vehicles or machinery by TPZ fencing, trunk and branch protection may be required to prevent mechanical damage. Protection may consist of

padding surrounding the trunk or branch, held in place with batons strapped together, or similar (Figure 15). Boards are to be strapped to trees, not nailed or screwed.

Crown protection may also include pruning, tying-back of branches or other measures. If pruning is required, it must be undertaken by a qualified arborist and as per the specifications of AS 4373-2007 *Pruning of Amenity Trees* and should be undertaken before the establishment of the TPZ.

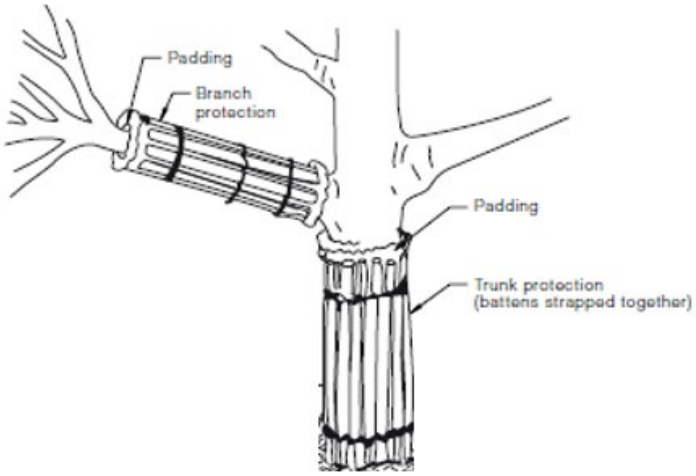

Figure 15: Example of trunk and branch protection (Source: AS 4970-2009).