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Arboricultural Impact Assessment and Tree Protection Plan

Site:

142 Dudley Rd 2 - 4 Kopa St Whitebridge

Prepared for:

SNL Constructions Pty Ltd

Prepared By

John Atkins

Ref No: C134
Date: 11th December 2014

Contents

1. Summary

The site at 142 Dudley Rd and 2 – 4 Kopa St, Whitebridge is proposed to be developed from the current “greenfield” site to a multi-residence housing type. Very few trees are present on the site, most being on the land adjacent to the proposed development.

The trees along the eastern boundary outside of the site will mostly be unaffected by the proposed development. The area in the north eastern corner of the site is to be developed for stormwater surface and underground flow, and the design has been mindful of tree preservation requirements. These are stated in the recommendations section of the report.

The access for cars is proposed to occur off Kopa Street. Creation of an exit and entrance driveway will not impact the trees along the current Kopa St side of the property. A driveway to access Lot No 23 will require the removal of 6 trees on the northern side of the development. In the initial phase of planning, these trees were assessed and generally found to have some structural faults, poor form or disease. Since that initial inspection Lake Macquarie City Council has pruned some trees heavily, mulched some about the base and relocated the cycleway entrance path from Kopa St. The construction of the path had been completed. These trees are proposed for removal in the development.

Along the western side of the property an easement to allow for stormwater from adjacent properties is proposed. The easement requires the excavation along some sections directly adjacent to the boundary fence and installation of underground pipes. The design of the stormwater system has considered the retention requirements of all trees in neighbouring properties. Although there may be some encroachment within the TPZ’s of some trees, the SRZ distances have been maintained for all trees. It is unlikely that any tree in adjacent properties will be adversely affected by the proposed development as due consideration of these distances has been made, even though minor encroachment of some TPZ areas is likely.

Trees 13 - 16 located along the eastern boundary are to be retained and the report identifies tree protection measures under the supervision of a project arborist. The recommendations accord with best practice as stated within Australian Standard 4970 – 2009.

2. Introduction

2.1. Disclaimer

This report has been prepared for the exclusive use of the client and Treeology Pty Ltd accepts no responsibility for its use by other persons. The client acknowledges that this report, and any opinions, advice or recommendations expressed or given in it, are based on the information supplied by the client and on the data obtained by inspections, measurements and analysis carried out or obtained by Treeology Pty Ltd. This report does not identify all structural defects of trees inspected and no responsibility is accepted for faults not identified or predicted.

It is not possible to accurately identify all structural defects at high levels in trees or internal structural faults that cannot be seen by the naked eye. Due to the nature of tree growth, the location of roots is unpredictable. The accurate detection of all structural defects in trees and their root systems is difficult to predict. Conditions such as extreme wind, storm activity, lightning and other events are unpredictable. Unforeseeable damage to trees may occur due to these unpredictable events.

The client should rely on the contents of this report, only to the extent that some structural faults have been observed, but not all. No responsibility for damage to persons or property is accepted for damage by trees referred to in this report due to unforeseen or extreme environmental events.

2.2. Brief

The purpose of this report is to provide clear data on the impact of the proposed development on existing trees. All trees referred to in this report have been previously assessed in a preliminary arborists report of 5th August 2013. The report is based on the recommended procedures as stated in Australian Standard 4970 – 2009 "*Protection of Trees on Development Sites".* The report will provide clear guidance of the impact on trees and the measures to protect trees during development of the site.

2.3. Methodology

Treeology has performed an on-site inspection on 5th December 2014 in conjunction with Wade Morris of SNL Constructions Pty Ltd. All trees identified off survey plans and the proposed development details about those trees were discussed with options considered. Details such as Visual Tree Assessment, recording tree data and in particular trunk diameter had been previously performed by Treeology in July 2013. The calculations for Structural Root Zone and Tree Protection Zones were previously determined.

To determine to an accurate level of detail the extent of the proposed development, review of the final plans provided by Forum Consulting Engineers, Mansfield Urban Landscape plans and discussion of details

occurred. Review of the engineering plans was the proposed stormwater easement impact and effects on trees in general.

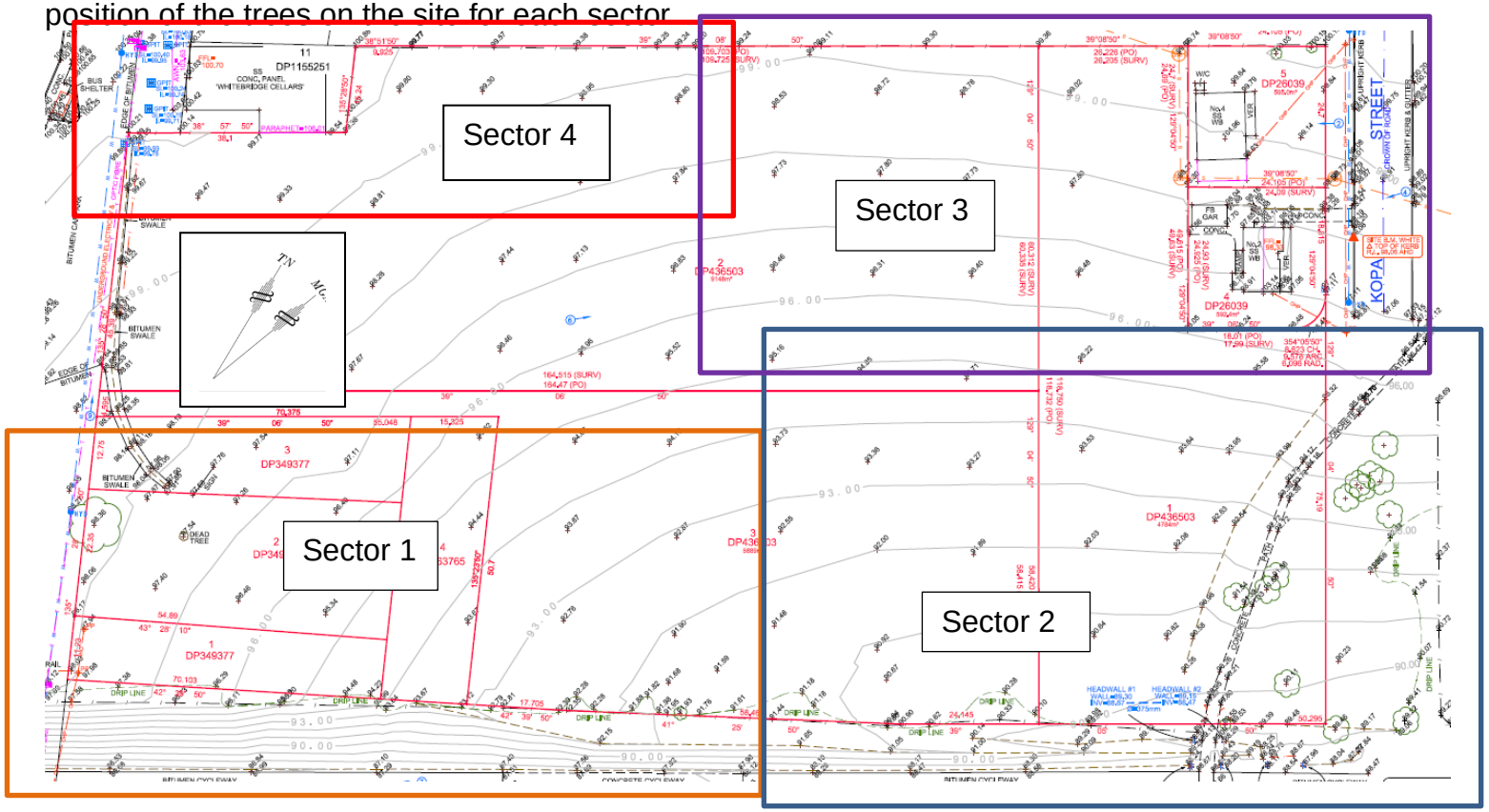
This report provides detail as accurately as possible with the understanding that some final details of construction requirements for the driveway along Kopa St may be subject to modification and are general.

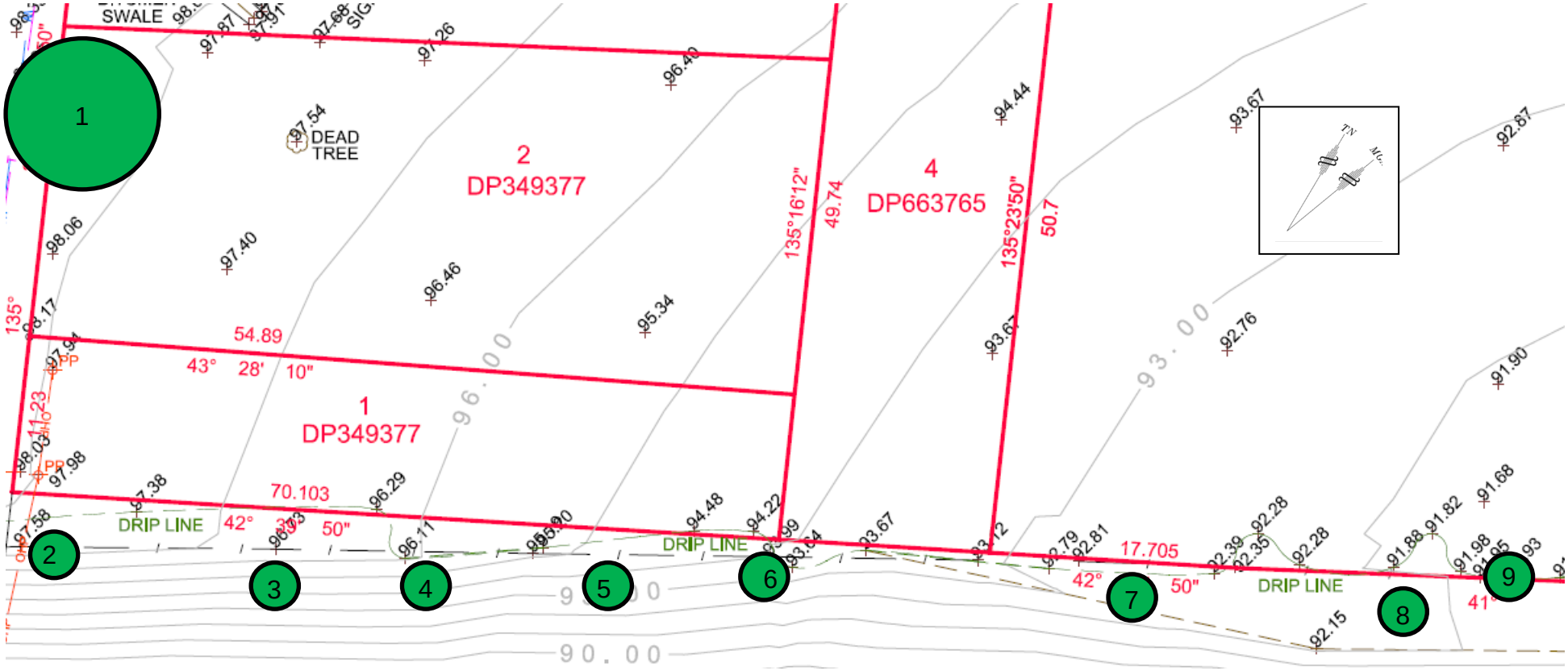
3. Tree Retention details

3.1. Tree location plans

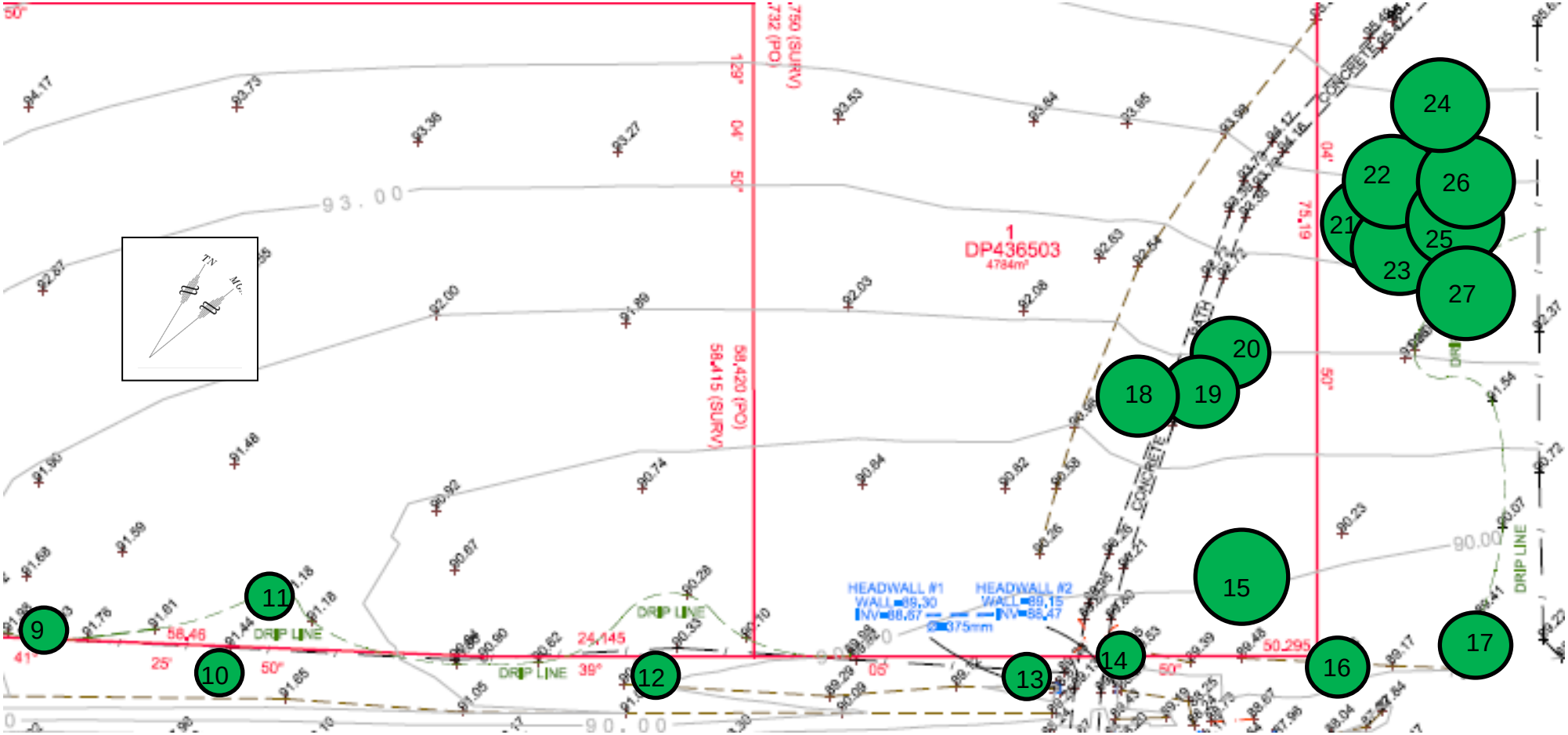
The size of the site makes the presentation in report format difficult to present.

On the following pages the initial survey plan has been divided into 4 sectors. On following pages, more detailed plans show the position of the trees on the site for each sector.

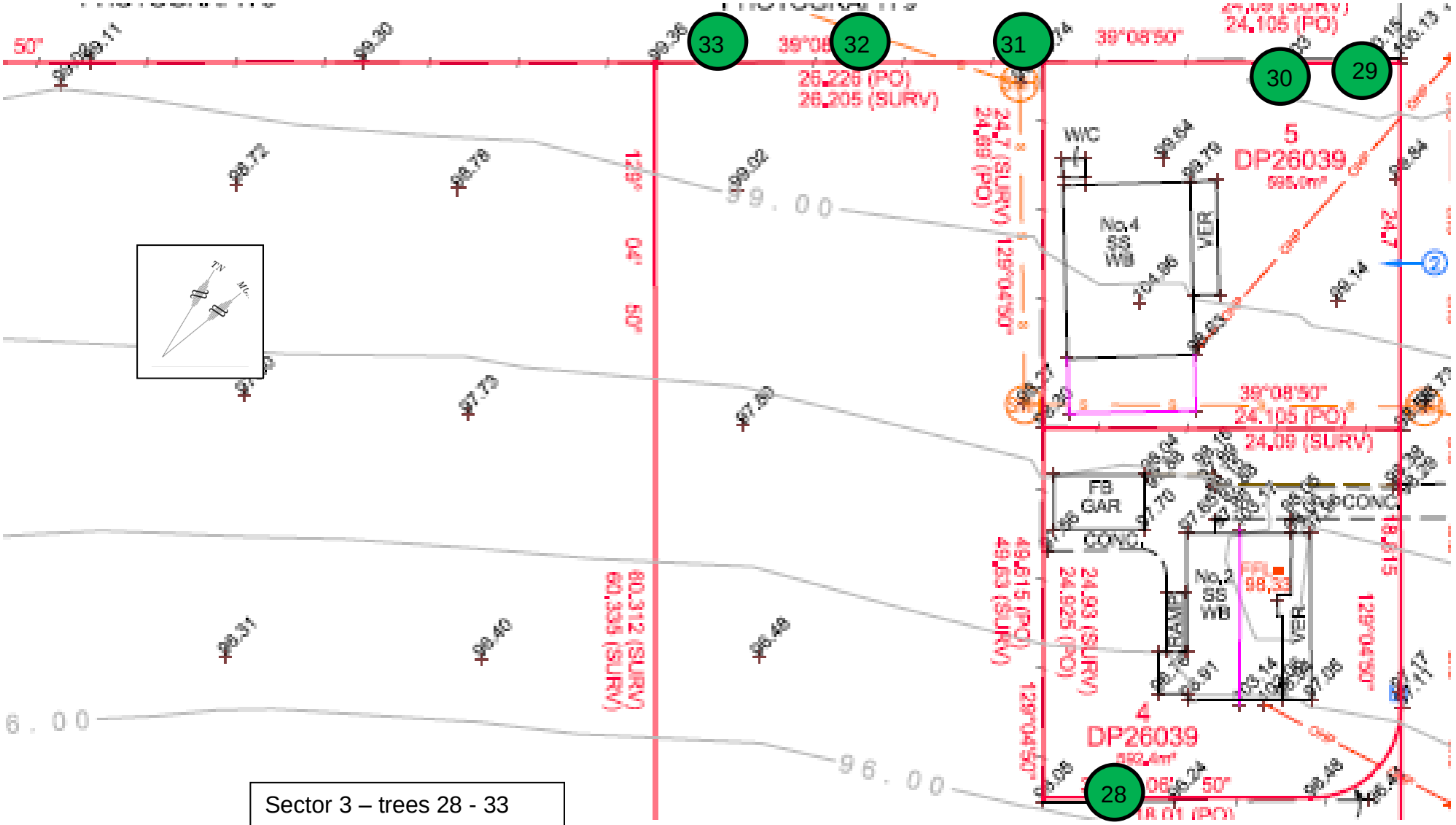




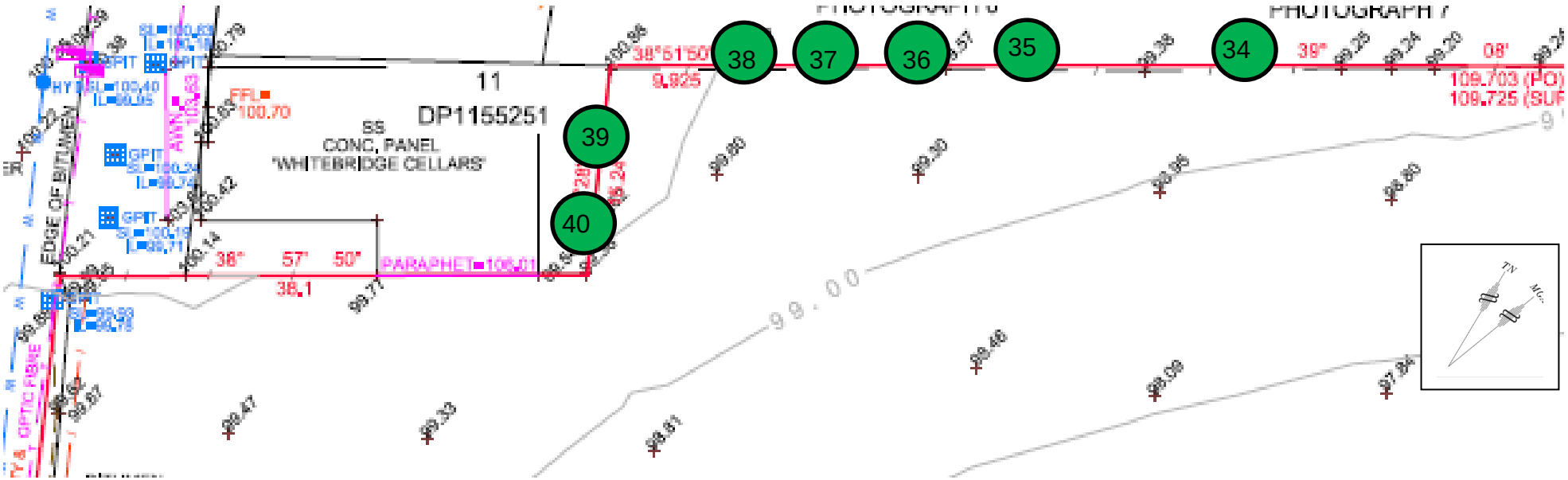
Sector 1 – trees 1 - 9



Sector 2 – trees 9 - 27



Sector 3 – trees 28 - 33



Sector 4 – trees 34 - 40

3.2. Retention Value Assessment, Structural Root Zone, Tree Protection Zone and Canopy area dimensions

See Appendix 2 for details of SRZ and TPZ formulas.

Tree No	Botanic Name Common Name	Sustainability	Canopy Area	Landscape significance	Retention Value	DBH (mm)	SRZ (m)	TPZ (m)
1	Cinnamomum camphora Camphor Laurel	Greater than 40 years	95	Very Low	Very Low	675	2.81	8.1
2	Eucalyptus racemosa Scribbly Gum	Greater than 40 years	57	Moderate	Moderate	450	1.23	5.4
3	Angophora costata Smooth barked Apple Gum	15 - 40 years	44	Moderate	Moderate	300	2.00	3.6
4	Eucalyptus piperita Sydney peppermint	15 - 40 years	57	Low	Moderate	500	2.47	6
5	Allocasuarina torulosa Forest Oak	5 - 15 years	13	Low	Low	170	1.57	2.04
6	Allocasuarina torulosa Forest Oak	5 - 15 years	38	Low	Low	280	1.94	3.36

Tree No	Botanic Name Common Name	Sustainability	Canopy Area	Landscape significance	Retention Value	DBH (mm)	SRZ (m)	TPZ (m)
7	Allocasuarina torulosa Forest Oak	5 - 15 years	16	Low	Low	300	2.00	3.6
8	Angophora costata Smooth barked Apple Gum	Greater than 40 years	13	Moderate	High	280	1.94	3.36
9	Allocasuarina torulosa Forest Oak	5 - 15 years	16	Low	Low	270	0.53	3.24
10	Allocasuarina torulosa Forest Oak	less than 5 years	44	Low	Low	400	2.25	4.8
11	Melaleuca styphelioides Prickly Paperbark	15 - 40 years	7	Low	Low	200	1.68	2.4
12	Angophora costata Smooth barked Apple Gum	15 - 40 years	57	Moderate	High	520	2.51	6.24
13	Eucalyptus racemosa Scribbly Gum	Greater than 40 years	10	Moderate	Moderate	210	1.72	2.52
14	Eucalyptus racemosa Scribbly Gum	less than 5 years	16	Low	Low	310	2.02	3.72

Tree No	Botanic Name Common Name	Sustainability	Canopy Area	Landscape significance	Retention Value	DBH (mm)	SRZ (m)	TPZ (m)
15	Eucalyptus racemosa Scribbly Gum	15 - 40 years	87	High	High	770	2.97	9.24
16	Eucalyptus racemosa Scribbly Gum	Greater than 40 years	38	Moderate	Moderate	300	1.18	3.6
17	Eucalyptus globoidea White stringybark	Greater than 40 years	38	High	High	280	1.94	3.36
18	Eucalyptus globoidea White stringybark	15 - 40 years	104	Moderate	Moderate	720	2.88	8.64
19	Eucalyptus globoidea White stringybark	Greater than 40 years	16	High	High	420	2.30	5.04
20	Eucalyptus racemosa Scribbly Gum	15 - 40 years	79	Moderate	High	590	2.65	7.08
21	Eucalyptus racemosa Scribbly Gum	5 - 15 years	64	Moderate	Low	560	2.59	6.72
22	Eucalyptus globoidea White stringybark	Greater than 40 years	16	Moderate	Moderate	320	2.05	3.84

Tree No	Botanic Name Common Name	Sustainability	Canopy Area	Landscape significance	Retention Value	DBH (mm)	SRZ (m)	TPZ (m)
23	Eucalyptus racemosa Scribbly Gum	5 - 15 years	16	Low	Low	330	0.58	3.96
24	Eucalyptus racemosa Scribbly Gum	15 - 40 years	38	Moderate	Moderate	480	2.43	5.76
25	Eucalyptus globoidea White stringybark	less than 5 years	44	Low	Low	450	2.37	5.4
26	Pittosporum undulatum Native Daphne	15 - 40 years	20	Moderate	Moderate	250	1.85	3
27	Eucalyptus globoidea White stringybark	Greater than 40 years	13	High	High	360	2.15	4.32
28	Lagerstroemia indica Crepe Myrtle	Greater than 40 years	7	Low	Low	300	2.00	3.6
29	Syzygium paniculatum Brush Cherry	Greater than 40 years	50	High	High	430	2.32	5.16
30	Syzygium paniculatum Brush Cherry	Greater than 40 years	38	High	High	400	0.94	4.8

Tree No	Botanic Name Common Name	Sustainability	Canopy Area	Landscape significance	Retention Value	DBH (mm)	SRZ (m)	TPZ (m)
31	Morus nigra Mulberry	15 - 40 years	38	Low	Low	500	2.47	6
32	Cupressocyparis x leylandii Leyland Cypress	Greater than 40 years	3	Low	Moderate	150	1.49	1.8
33	Callistemon viminalis Bottlebrush	15 - 40 years	3	Low	Low	300	2.00	3.6
34	Eucalyptus racemosa Scribbly Gum	15 - 40 years	44	Low	Low	450	2.37	5.4
35	Angophora costata Smooth barked Apple Gum	Greater than 40 years	50	High	High	450	2.37	5.4
36	Callistemon viminalis Bottlebrush	15 - 40 years	7	Low	Low	300	2.00	3.6
37	Callistemon viminalis Bottlebrush	15 - 40 years	13	Low	Low	300	0.41	3.6
38	Cinnamomum camphora Camphor Laurel	15 - 40 years	64	Low	Very Low	500	2.47	6

Tree No	Botanic Name Common Name	Sustainability	Canopy Area	Landscape significance	Retention Value	DBH (mm)	SRZ (m)	TPZ (m)
39	Liquidambar styraciflua Liquidamber	15 - 40 years	16	Low	Low	350	2.13	4.2
40	Eucalyptus nicholii Black Peppermint	15 - 40 years	44	Low	Low	700	2.85	8.4

4. Impact of the proposed development

4.1. Tree 1 is a Camphor laurel tree (*Cinnamomum camphora)* and is considered a weed species in Lake Macquarie City council. It is to be removed.

4.2. Trees 2 – 14 are situated about the common boundary of the site adjoining the Fernleigh track. Tree 11 is a small Melaleuca of low retention value. Earthworks to construct stormwater retention ponds are likely to require the removal of all vegetation. Trees 13 and 14 are small trees located near drainage works however the design allows for the retention of these trees. The trees will provide a sentry like form at the pedestrian and cycleway entrance from the Fernleigh track.

4.3. Tree 15 is to be retained. This tree requires a structural root zone of 2.97 metres and this will not be encroached. The recommended Tree Protection Zone is 9.6 metres. Recent work by Lake Macquarie City Council was observed on site on 4th December. The previous path access to the Fernleigh track cycleway had been dismantled and a new entrance path was under construction. The location of the path was beyond the recommended TPZ distance however construction practices didn't protect the tree's roots from compaction.

4.3.1. It is proposed to install underground stormwater storm water pipes within the TPZ but beyond the SRZ distance. The proposed installation will involve excavation by trenching to install pipes and a junction point. The actual distances from the tree of the proposed trenching could not exactly be determined from plans. On site there is ample space to locate pipes with an estimated encroachment of between 20 - 30% of the TPZ area. The impact can be considered low. To retain this tree, the key is to minimise disturbance as much as possible and to erect the TPZ fence as early as possible. The area within the TPZ for tree 15 shall be mulched using the woodchip from trees to be removed. The likely impact of trenching and stormwater installation will be low. Excavation in close proximity to the tree should be supervised by the project arborist and where necessary, root pruning or hand excavation about large surface roots may be necessary.

4.3.2. 

Figure 1 shows the view looking west at Tree 15 prior to commencement of new cycleway access path. The dimensions for the SRZ and TPZ distances are not to scale

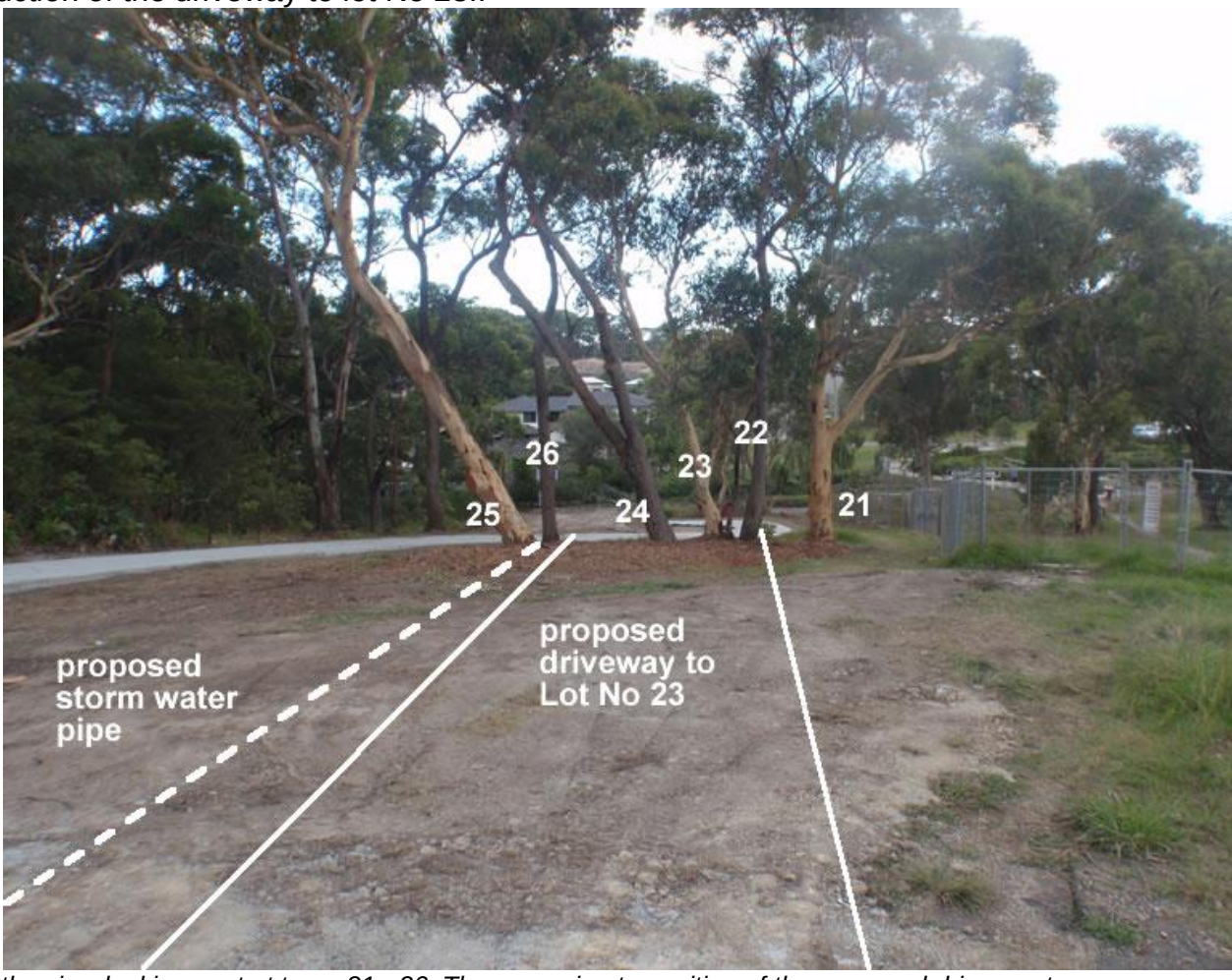
4.4. Tree 16 is to be retained and unlikely to be affected by the proposed development.

4.5. Tree 17 was not observed and may have been removed to accommodate the new cycleway entrance.

4.6. Trees 18 – 20 are to be removed as the proposed development indicates Lot No 23 is to be constructed in that position.

4.7. Trees 21 – 27 have been pruned since the first inspection, and they have been mulched. During the site inspection it was observed that Tree 21 was subjected to severe compaction less than 1 metre from the trunk by Council's staff and earthmoving machinery. Soil levels about tree 27 have been raised and excavation equipment was observed causing damage to tree roots. The installation of the cycleway directly adjacent to trees 26 and 27 within the SRZ distances has occurred.

The proposed development will require the removal of trees 21 - 26 for the construction of the driveway to lot No 23..



4.8. *Figure 2 shows the view looking east at trees 21 - 26. The approximate position of the proposed driveway to Lot No 23 and the stormwater pipe are indicated.*

4.9. Tree 27 will not be affected by the proposed development but has been affected by Council's actions. There is unlikely to be any requirement to erect protective fencing specifically for Tree 27 as it is already likely to be erected for the construction of a driveway to Lot No 23.

4.10. Tree 28 will require removal for the construction of the main entrance and exit and underground car park.

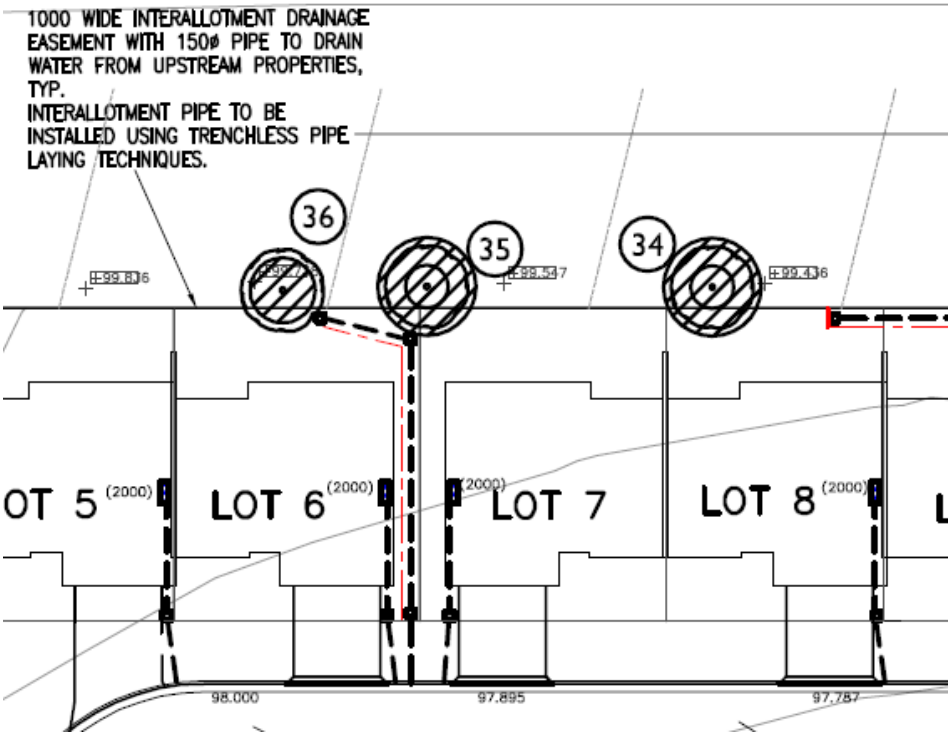
4.11. Trees 29 and 30 will require removal. The excavation for basement parking and the construction of units 1 and 18 of L4 will encroach well within the SRZ distance of both trees.

4.12. Trees 31 is a mulberry tree located in close proximity to the proposed development. Encroachment within the SRZ distance is unlikely but encroachment within the TPZ distance is estimated at 40 – 45%. The tree will likely be stressed by the proposed development and minor pruning at the boundary fence is likely to be required. The stability of the tree is unlikely to be compromised as the tree has a low broad domed growth habit. The stormwater design does not impact on the trees health.

4.13. Tree 32 consists of three small conifers and although excavation for a stormwater pipe and construction of a retaining wall is proposed as part of an easement for future development in the adjacent property, the trees are unlikely to be severely affected. They will likely provide good visual screening.

4.14. Tree 33 is a small Bottlebrush tree that has been lopped previously. The excavation for the stormwater pipe and easement is just within the SRZ distance of the tree (2.0 m) but is unlikely to affect tree stability. Encroachment of approximately 20 – 30% of the TPZ area is likely to occur and some stress may occur to the tree but is unlikely to cause severe impact.

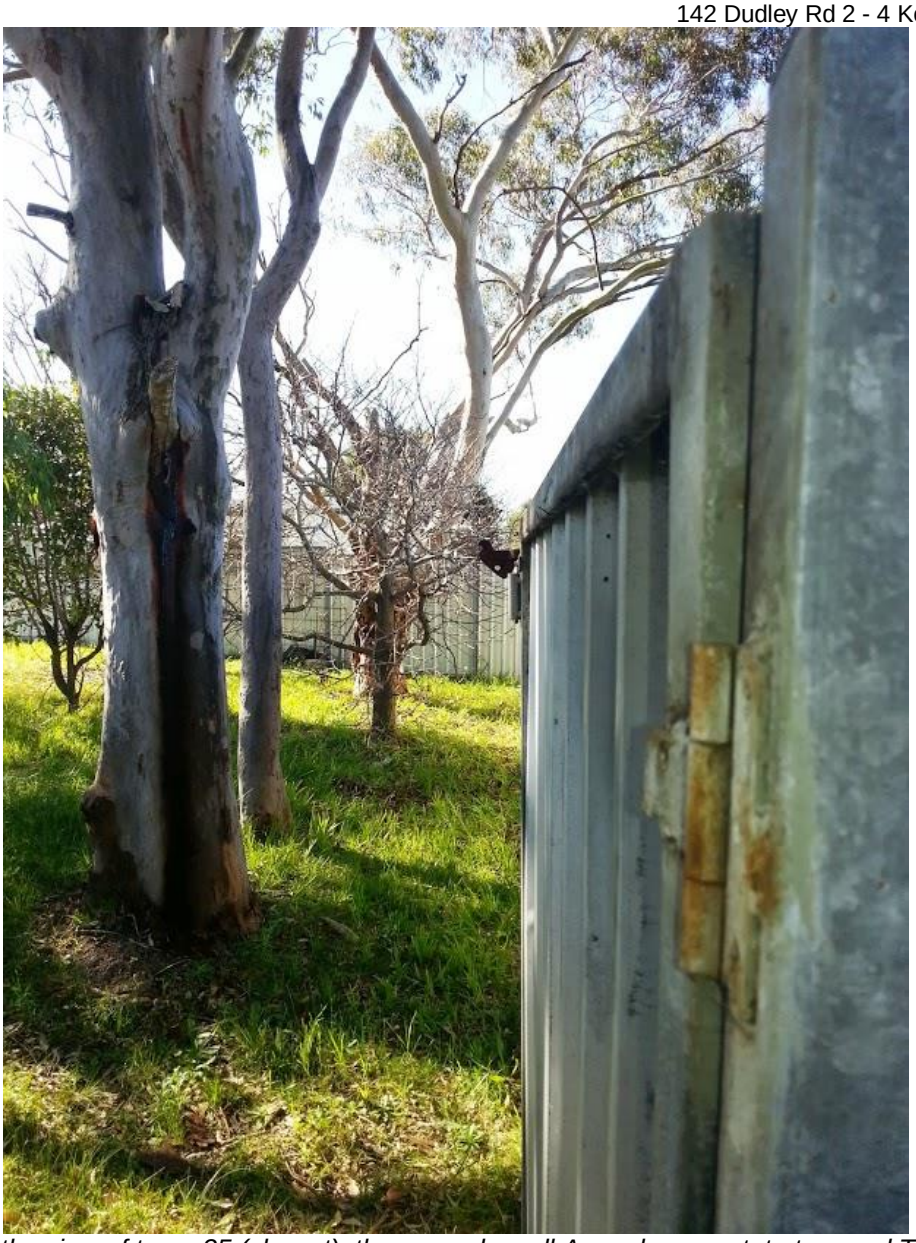
4.15. Tree 34 is an old Scribbly Gum with poor health already and a basal crack in the fork. It is proposed that an easement is created for future development in adjoining properties. The original designs showed an underground pipe was to be installed in the easement. To minimise the impact of the proposed current development on those trees, the underground pipe layout has been designed so as to not slice off a large portion of the root zone of the neighbouring trees.



4.16.

4.17. The above design provides for connecting points strategically placed so as to minimise the impact on the existing trees. The Structural root zone of tree 35 in particular has been preserved. There is moderate intrusion within the tree protection zone of Tree 35 but this is not considered to have serious impact on the tree's health.

4.18. Tree 35 was surveyed as 1 tree however on second observation an additional smaller tree is present. The smaller tree and Tree 35 are unlikely to be impacted severely by the proposed development. The easement and stormwater pipe excavation and installation is proposed to be beyond the SRZ distance and encroaches by approximately 20% of the TPZ distance. As this species is noted for its poor tolerance to development, the plan for the stormwater is considered satisfactory for both trees.



4.19. *Figure 3 shows the view of trees 35 (closest), the second small Angophora costata tree and Tree 34 in the background. Tree 35 was measured as being 1.5 metres from the boundary.*

4.20. Trees 36 and 37 are small Bottlebrush trees located in the rear of the adjacent property. The stormwater pipe excavation and installation will be at the edge of the SRZ distance and minor encroachment of the TPZ distance is likely. The proposed development will have minimal effect on both small trees.

4.21. Tree 38 is a small Camphor laurel. This tree is considered a weed species and as part of the proposed development, its removal is being negotiated with the tree owner. It is unlikely to be retained so no impact assessment is relevant in that case. In the event that it is not removed, the proposed development is unlikely to adversely affect this tree. Excavation within the TPZ rarely impacts this species as they are extremely robust.

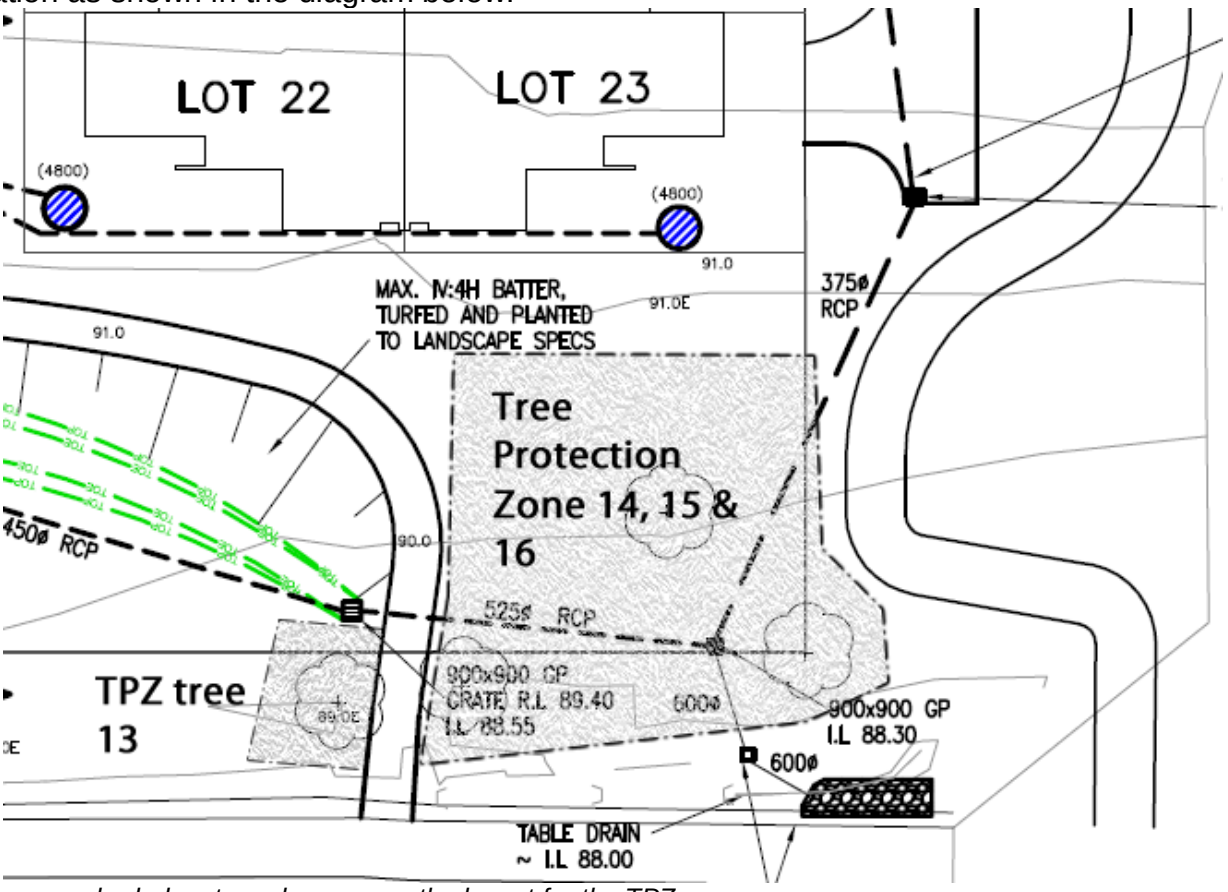
4.22. Trees 39 and 40 will not be impacted adversely by development. The design of the residences accommodates future growth, is beyond the SRZ distances and allows for access for removal of the trees when this is necessary.

5. Recommendations for tree protection measures

5.1. The commencement of the project shall include the appointment of a project arborist (PA) as stated in Australian Standard 4970.

5.2. The PA shall supervise the tree protection measures about trees 2 – 13 along the eastern boundary, trees 14, 15 and 16 and trees in adjacent properties. Inspection of the tree protection measures and certification of compliance is recommended as a condition of consent.

5.3. Trees 13, 14, 15 and 16 shall have a temporary fence erected prior to commencement of earth works for drainage and stormwater pipe installation. The fence shall be constructed so as to permit minimal access for machinery and pipe installation as shown in the diagram below.



5.4. *Figure 4 shows a grey shaded rectangular zone as the layout for the TPZ areas.*

5.5.

5.6. The excavation for the underground services will occur within the TPZ area. In this location, the excavation will be under the direct supervision of the project arborist and where required, excavation will be undertaken by hand and machine.

5.7. The use of machinery will require direction as to the position of the machine when working and limit the amount of tyre compaction. As the soil appears to have a high sand content, compaction is not likely to be severe.

5.8. The placement of spoil from excavation within the TPZ shall be directed by the project arborist so as not to be placed about or near trees. Machinery can cause damage to trunks when moving piles of soil in and out of trenches.

5.9. The TPZ for Tree 15 shall be mulched during construction to a depth of 100 mm using wood chip obtained from tree removal on site.

5.10. The following practices shall not be permitted within the TPZ after set out of fencing and prior to excavation occurring.

(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;

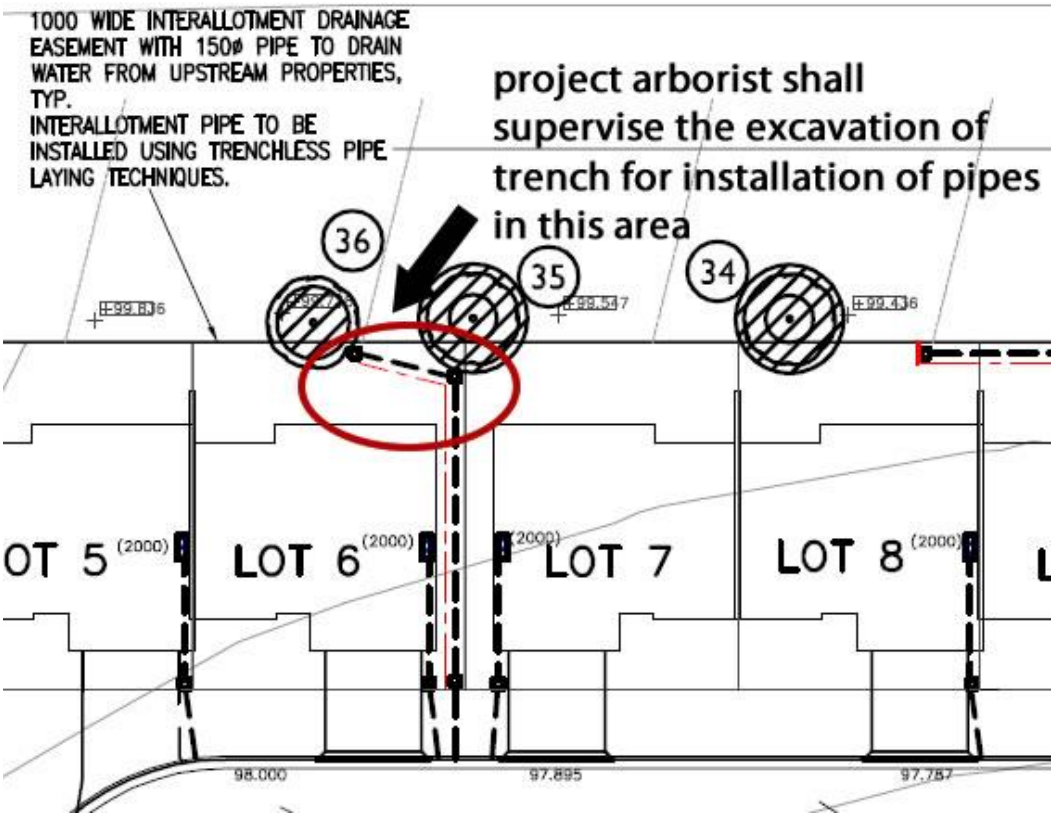
(j) placement of fill;

(k) soil level changes;

(l) Temporary or permanent installation of utilities and signs, and (n) physical damage to the tree.

5.11. The TPZ fence shall remain in position during construction and only removed where landscaping work requires access or maintenance of the grass through mowing. The fence shall be removed when the project is deemed at practical completion about Tree 15.

5.12.



5.13. The above image shows the zone where critical excavation about the roots of tree 35 is to occur. The current boundary fence will constitute the main tree protection measure. When excavation about tree 35 is to occur for the purpose of trenching, the project arborist will supervise machinery use and placement and direct hand excavation if necessary.

This report has been prepared by John Atkins on 11th December, 2014.

Contact details	Qualifications
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Appendix 1 Structural Root Zone and Tree Protection Zone Dimensions and details

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.

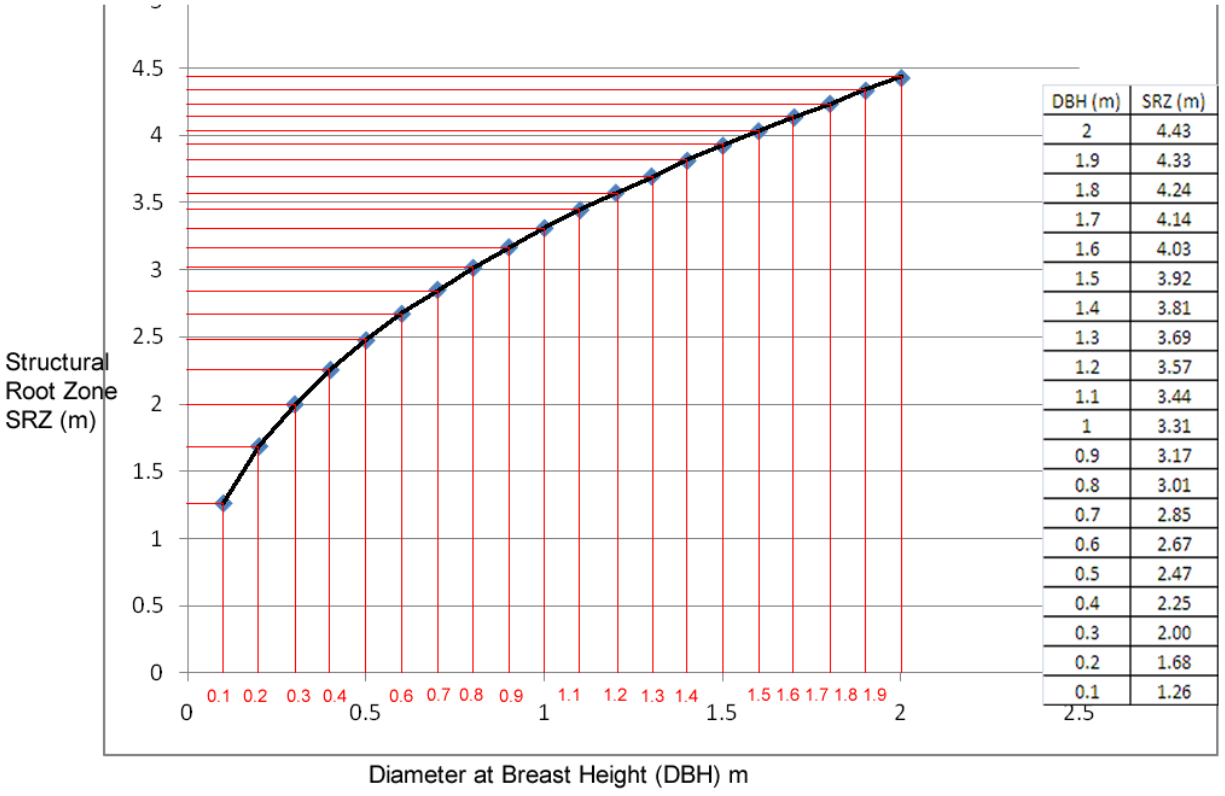
There are many factors that affect the size of the SRZ (e.g. tree height, crown area, soil type, soil moisture). The SRZ may also be influenced by natural or built structures, such as rocks and footings. An indicative SRZ radius can be determined from the trunk diameter measured immediately above the root buttress using the following formula or Figure 1. Root investigation may provide more information on the extent of these roots.

$$\text{SRZ radius} = (\text{DBH} \times 50)^{0.42} \times 0.64$$

where

DBH = trunk diameter at breast height in m, measured above the root buttress

NOTE: The SRZ for trees with trunk diameters less than 0.15 m will be 1.5 m (see graph below).



DBH (m)	SRZ (m)
2	4.43
1.9	4.33
1.8	4.24
1.7	4.14
1.6	4.03
1.5	3.92
1.4	3.81
1.3	3.69
1.2	3.57
1.1	3.44
1	3.31
0.9	3.17
0.8	3.01
0.7	2.85
0.6	2.67
0.5	2.47
0.4	2.25
0.3	2.00
0.2	1.68
0.1	1.26

Tree Protection Zone (TPZ) Calculations

Australian Standard 4970 – 2009 Protection of Trees During Construction states that the method of calculating the ideal TPZ is as follows:

TPZ radial distance (m) = DBH (m) x 12

It is also noted that the TPZ can be encroached by 10 – 20% where the remainder of the TPZ remains undisturbed due to site restrictions. This formula has been applied as a guideline.

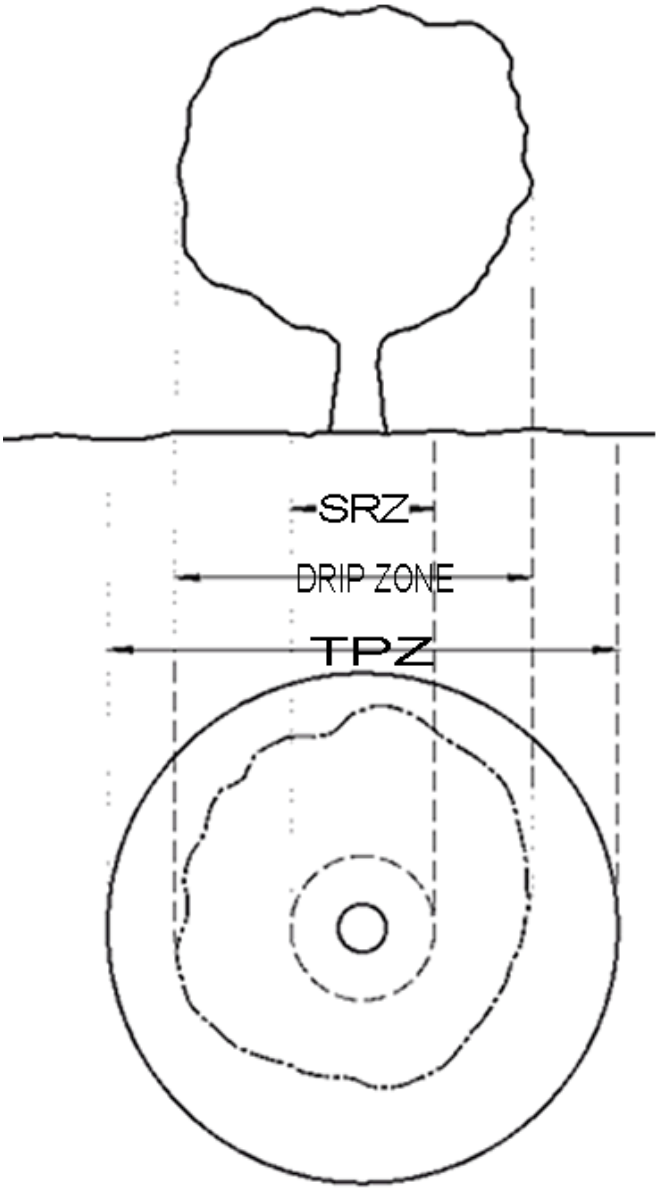


Figure 5 shows a sketch of the different dimensions related to tree preservation, SRZ, TPZ and Drip zone (the area directly under the canopy).