



# arboricultural impact assessment - proposed sewer pumping station - glenaeon, 207 forest way, belrose

18<sup>th</sup> November 2022 - prepared by Melanie Howden - Ass. Dip. Hort. (Haw. Ag. C.), SoA. Arb. MAIH, MIACA



## Executive Summary

This report has been prepared to assess the condition and significance of a number of trees on and adjacent the proposed sewer pumping station at Glenaeon Retirement Village 207 Forest Way, Belrose and assess the potential impact of the works on the identified trees.

The report has been commissioned by Lend Lease who have also provided site instructions and site inspections and field work were conducted on the 18<sup>th</sup> March 2022.

The tree assessments have been carried out using the Visual Tree Assessment (VTA) method (Mattheck & Breloer 2010) and development impact assessments are based upon the Australian Standard, Protection of Trees on Development Sites AS 4970-2009. The definition of a tree in this report is consistent with Warringah DCP (2011) being “a *palm or woody perennial plant with a single or multi stem greater than five (5) metres in height.*”

The existing sewer pumping station is located in the lower south eastern portion of the allotment and is accessed via a concrete service road. We are advised that the existing sewer pumping station is proposed to be replaced in a location adjacent to the existing pumping station (SCP. 2022). A number of trees are within the vicinity of the proposed works which have been considered in this report.

There are **9** trees that have been considered in this report all of which are to be retained and require tree protection measures to be implemented prior to and during works.

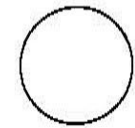
A qualitative breakdown of the trees to be retained is shown in the table below.

Details of the 9 Trees to be Retained (number of trees)							
Condition	Environmental / Landscape Significance						
	Declared Biosecurity Weed	Env. Pest (Exempt from DCP)	Low L/scape Sig.	Moderate L/scape Sig.	High L/scape Sig.	Very High L/scape Sig.	Threatened Species
SULE - 1			6				
SULE - 2			1		2		
SULE - 3							
SULE - 4							
Unstable							

Provided that the tree protection measures referred to in this report are implemented and works are undertaken in a sensitive manner, it is considered that the proposed development will not have a significant impact on the long-term health of the trees identified as being retained.

## Contents

sheet	1.....	this cover page
sheet	2.....	existing site - tree locations & reference numbers
sheets	3-4.....	arboricultural assessment - tree data sheets
sheet	5.....	proposed sewer pumping station – tree retention
sheets	6.....	impact of proposed development on individual trees
sheet	7.....	tree protection plan prior to & during demolition & construction
sheet	8 .....	tree protection measures & specifications



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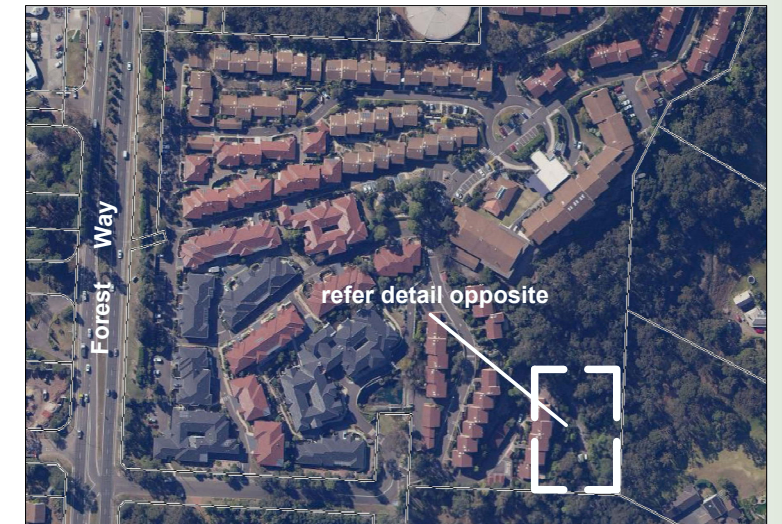
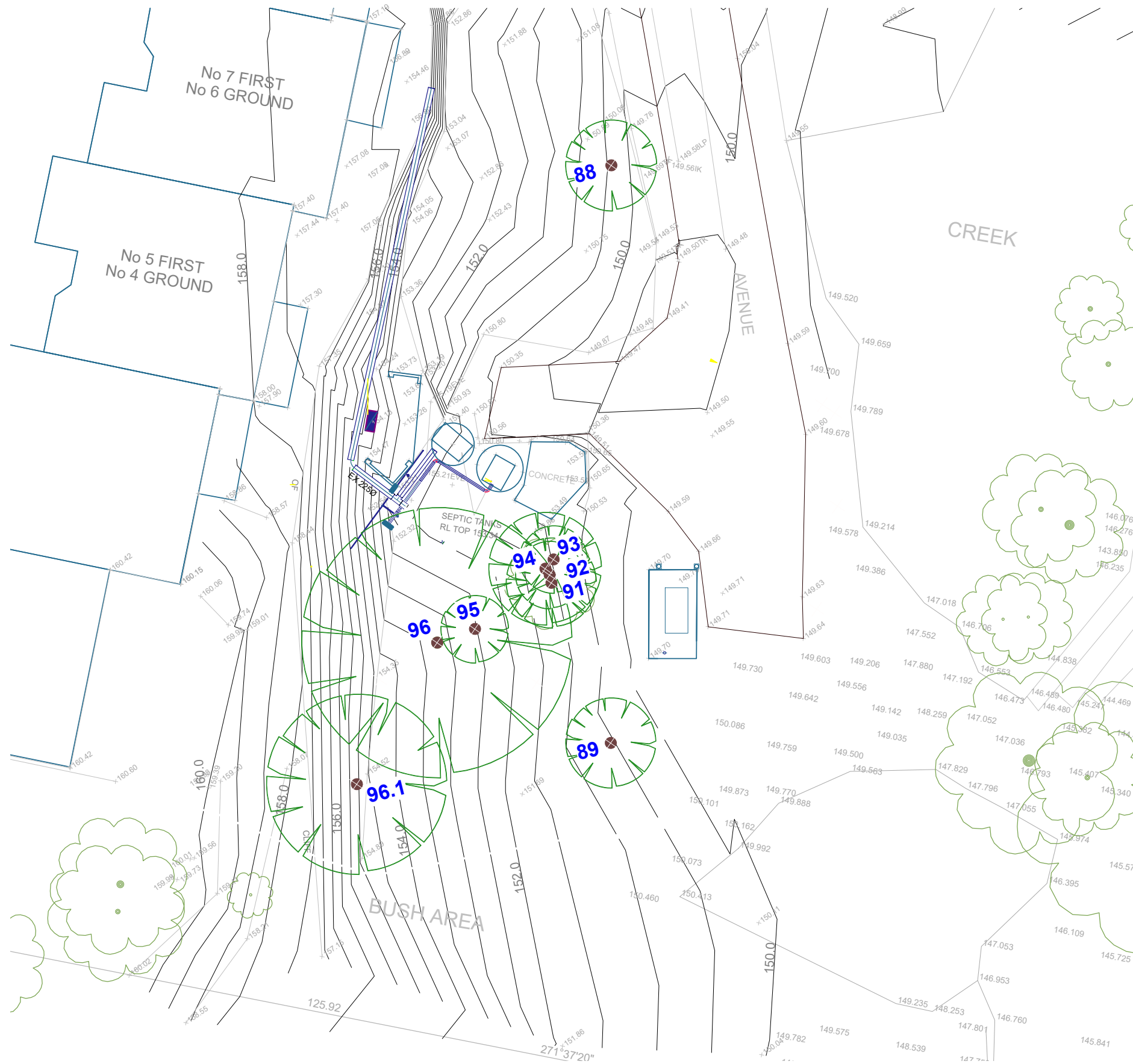
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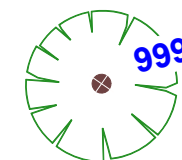
cover sheet





site reference plan (not to scale)

tree legend



trees considered in this report

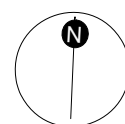
This plan is based upon:

Plan Showing Tree Survey & Levels Glenaeon Village, 199 Forest Way Belrose Dwg. No. T11828704001, Dated 23/05/2018 (Cardno, Rockdale, NSW).

In addition to the trees identified on the survey 2 trees have been added to this plan. The additional trees are Tree No's 92 & 93 and their locations, whilst based upon surveyed features, are approximate.

Several trees have failed and others have been removed and no longer exist. These trees have been removed from this plan.

The tree canopy spreads on this plan have been adjusted from those on the survey to better reflect the actual canopy spreads however they remain as indicative graphics.



tree significance

significance in the environment

Trees need to be considered in the overall environment and are subject to specific legislation and planning instruments such as:

- Biodiversity Conservation Act (NSW) 2016
- Biosecurity Act (NSW) 2015, and
- Development Control Codes.

Biodiversity Conservation Act (NSW) 2016

The Biodiversity Conservation Act lists in its schedules a number of species, populations or ecological communities that are either endangered or vulnerable. The Act requires biodiversity offsets to be made if an activity or development is going to have a significant effect on species, populations or endangered ecological communities listed in the schedules of the Act. Where identified on or adjacent the site, threatened tree species are considered in this report, however no attempt is made to identify trees as components of threatened ecological communities or populations.

Biosecurity Act (NSW) 2015

The purpose of the Biosecurity Act is to protect the NSW economy, environment, and community from the negative impact of pests, diseases and weeds. In NSW, all plants are regulated with a general biosecurity duty to prevent, eliminate, or minimise any biosecurity risk they may pose. In relation to weeds, the Act identifies weed species under 4 categories being:

- Weeds of National Significance;
- National Environmental Alert Weeds;
- Water Weeds;
- Native Plants Considered to be Weeds.

The Act makes provision of Regional Strategic Weed Management Plans which may include additional weed species to be dealt with weed control at a regional or local level.

Where tree is a species declared under the 4 main weed categories in the Act or where it is a species listed in a Regional Strategic Management Plan, the tree should be a priority for removal.

Development Control Codes

There are a number of environmental pest species that commonly cause problems in developed urban areas or readily spread into natural bushland areas. In urban areas, these species can have aggressive root systems and cause damage to built structures or services. Alternatively, some species can be problematic in natural bushland areas degrading habitats and reducing natural biodiversity.

Many of these are recognised by Councils as pest species and are exempt from protection under Council’s Development Control Plans (DCP).

significance in the landscape

Assessment of a tree’s significance in the landscape is generally categorised as either:

- Very High Landscape Significance- prominent from a broad landscape perspective;
- High Landscape Significance - prominent from a neighbourhood perspective;
- Moderate Landscape Significance - prominent from adjacent areas surrounding the site;
- Low Landscape Significance - prominent from a site perspective only.

tree condition & life expectancy

condition

The assessment of the trees condition is undertaken by visual inspection of the trees themselves, surrounding vegetation and the site conditions.

An assessment of each tree is undertaken taking into account the condition of the tree’s roots, trunk, branches, foliage, previous pruning works, pests and disease, nesting hollows, fauna scratchings and the surrounding environment that may influence the condition of the tree.

Safe Useful Life Expectancy (SULE)

The condition information is used to determine the Safe Useful Life Expectancy (SULE) of each tree and takes into account the age of the tree, the life span of the species, local environment conditions, estimated life expectancy, the location of the tree and safety aspects.

The SULE method takes into account whether a tree can be retained with an acceptable level of risk based on the information available at the time of inspection. A SULE assessment is not static as it relates to the tree’s health and the surrounding conditions. Whilst it is recognised that changes to the tree’s condition will affect the assessment, changes to the surrounding environment may result in changes to the SULE assessment.

Table 1 Safe Useful Life Expectancy (SULE), (Barrell, 2001)	
Category	Description
1	Long -Life span greater than 40 years
2	Medium - Life span from 15 to 40 years
3	Short - Life span from 5 to 15 years
4	Should be removed within 5 years
5	Small, Young or Regularly Pruned, Trees that can readily be moved or replaced.

In addition to the categories listed above, trees that show signs of imminent structural failure are listed as ‘Unstable’.

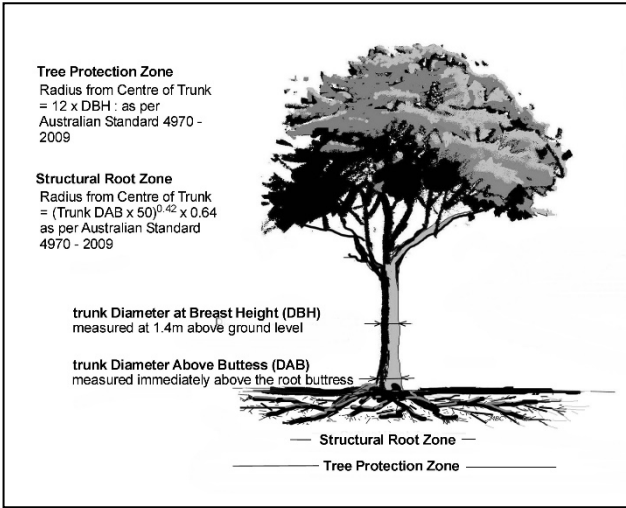
Unstable	Unstable in the ground or have significant trunk damage rendering them structurally hazardous.
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development planning & general impacts on trees

tree protection zones

Where trees are intended to be retained, development footprints should be located away from trees so as to provide adequate clearances for a tree protection zone. Disturbance within Tree Protection Zones can be detrimental to the tree’s root system and in turn affect the stability, health and condition of the tree. In many cases damage to the root systems is the major cause of tree decline in urban areas.

Figure 3.1 Typical diagram of a Tree Protection Zone & Structural Root Zone of a tree based upon AS 4970 – 2009.



Where trees are multi-trunk specimens assessment needs to be made based upon the number of trunks and the diameter of each trunk. Based upon the Australian Standard for Protection of Trees on Development Sites, AS 4970 – 2009, the DBH of multi-trunk trees is calculated by:

$$DBH = \sqrt{(DBH_1)^2 + (DBH_2)^2 + (DBH_3)^2}$$

development design & Tree Protection Zones

Where trees are intended to be retained, proposed developments must provide an adequate Tree Protection Zone around trees. This Tree Protection Zone is set aside for the tree’s root zone and it is essential for the stability and longevity of the tree. Existing soil levels should be retained within the Tree Protection Zone.

Based upon the Australian Standard for Protection of Trees on Development Sites, AS 4970 – 2009, the radius of the Tree Protection Zone (TPZ) is calculated as: TPZ = 12 x DBH with a minimum 2.0m radius and a maximum 15m radius.

developments within the Tree Protection Zone

Minor encroachments into Tree Protection Zones  
Based upon AS 4970 – 2009 some development activity can occur within the vicinity of trees and minor encroachments can occur within the calculated Tree Protection Zone provided that:

- no more that 10% of the area (m2) of the Tree Protection Zone is removed (0.7 x TPZ radius on 1 side only);
- the encroachment does not extend into the Structural Root Zone, and
- the area (m2) to be removed is compensated for by increasing the distance of the Tree Protection Zone in other directions so that there is no net loss in area (m2) of the Tree Protection Zone

Major encroachments into Tree Protection Zones  
Where the proposed development activity is greater than that described as a minor encroachment (refer above); the activity is considered to be a major encroachment into the Tree Protection Zone.

Where major encroachments are to occur within the Tree Protection Zone of trees intended to be retained, it must be demonstrated that the works or activities will not have a significant impact on the health and condition of the tree. To demonstrate this detailed root mapping investigation by non-invasive methods may be necessary; and other factors such as the age class, health & vigour, trunk lean, disturbance tolerance of the species, and building design may need to be taken into account in the arboricultural assessment.

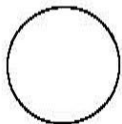
Where major encroachments are proposed to occur into the Tree Protection Zone the tree’s Structural Root Zone should also be taken into account.

developments within the tree’s Structural Root Zone

The Structural Root Zone is the area surrounding the tree where the severance of roots and excavation is likely to affect the structural stability of the tree and is likely to have a significant detrimental impact on the health & condition of the tree. Based upon AS 4970 – 2009 the radius of a tree’s Structural Root Zone (SRZ) is determined by measuring the diameter of the trunk immediately above the root buttress (DAB) and calculated by: SRZ = (DAB x 50) 0.42 x 0.64.

Developments should not encroach into the tree’s Structural Root Zone and existing soil levels must remain unchanged. Excavation should not occur within this area unless a detailed arboricultural assessment is undertaken and Specific Tree Protection measures will be required.

Tree No	Genus Species	Common Name	Height (m)	Canopy Spread (m)	DBH (mm)	DAB (mm)	Description	Environmental / Landscape Significance	Condition	Foliage Condition	% Canopy Dead Wood	Evidence of Pests, Disease, Cavity, Bracket Fungi	SULE	On / off site	TPZ Radius (m)	Area of TPZ (m2)
88	<i>Angophora costata</i>	Sydney Red Gum	7	4	140	190	Semi-mature single trunk tree with an upright forest form; an upright trunk/s and balanced canopy and branch development . No evidence of significant branch pruning.	Low L/scape Sig.	The tree appears stable and its branch attachment appears sound. The tree is considered to be in good health and displays good vigour.	Good	5%	None evident	1	On site	2.00	12.60
89	<i>Callistemon viminalis</i>	Weeping Bottlebrush	5	4	1*80, 1*110, 1*50, 2*40	230	Mature multi trunk tree with a broad spreading form; an upright trunk/s and balanced canopy and branch development . No evidence of significant branch pruning.	Low L/scape Sig.	The tree appears stable and its branch attachment appears sound. The tree is considered to be in moderate health and displays good vigour.	Good	5%	None evident	2	On site	2.00	12.60
91	<i>Angophora costata</i>	Sydney Red Gum	10	4	220	260	Semi-mature single trunk tree with an upright forest form; a slight trunk lean to the south and majority of canopy and branch development is towards the north. No evidence of significant branch pruning.	Low L/scape Sig.	The tree appears stable and its branch attachment appears sound. The tree is considered to be in good health and displays good vigour.	Good	5%	None evident	1	On site	2.60	21.20
92	<i>Ceratopetalum gummiferum</i>	Christmas Bush	8	3	120	140	Mature single trunk tree with an upright elliptical form; an upright trunk/s and majority of canopy and branch development is towards the north. No evidence of significant branch pruning.	Low L/scape Sig.	The tree appears stable and its branch attachment appears sound. The tree is considered to be in good health and displays good vigour.	Good	10%	None evident	1	On site	2.00	12.60
93	<i>Ceratopetalum gummiferum</i>	Christmas Bush	8	3	90	110	Mature single trunk tree with an upright elliptical form; an upright trunk/s and majority of canopy and branch development is towards the north. No evidence of significant branch pruning.	Low L/scape Sig.	The tree appears stable and its branch attachment appears sound. The tree is considered to be in good health and displays good vigour.	Fair	10%	None evident	1	On site	2.00	12.60
94	<i>Angophora costata</i>	Sydney Red Gum	8	5	100	130	Mature single trunk tree with an upright forest form; a slight trunk lean to the north and majority of canopy and branch development is towards the north. No evidence of significant branch pruning.	Low L/scape Sig.	The tree appears stable and its branch attachment appears sound. The tree is considered to be in good health and displays good vigour.	Fair	10%	None evident	1	On site	2.00	12.60
95	<i>Ceratopetalum gummiferum</i>	Christmas Bush	10	3	120	140	Mature single trunk tree with an upright forest form; an upright trunk/s and balanced canopy and branch development . No evidence of significant branch pruning.	Low L/scape Sig.	The tree appears stable and its branch attachment appears sound. The tree is considered to be in moderate health and displays good vigour.	Good	10%	None evident	1	On site	4.00	49.30





Tree No	Genus Species	Common Name	Height (m)	Canopy Spread (m)	DBH (mm)	DAB (mm)	Description	Environmental / Landscape Significance	Condition	Foliage Condition	% Canopy Dead Wood	Evidence of Pests, Disease, Cavity, Bracket Fungi	SULE	On / off site	TPZ Radius (m)	Area of TPZ (m2)
96	<i>Angophora costata</i>	Sydney Red Gum	15	8	420	450	Mature single trunk tree with an upright forest form; a slight trunk lean to the north and balanced canopy and branch development . No evidence of significant branch pruning.	High L/scape Sig.	The tree appears stable and its branch attachment appears sound. The tree is considered to be in good health and displays good vigour.	Good	10%	None evident	2	On site	5.00	78.5
96.1	<i>Angophora costata</i>	Sydney Red Gum	12	12	340	420	Mature single trunk tree with an upright forest form; an upright trunk/s and balanced canopy and branch development. No evidence of significant branch pruning.	High L/scape Sig.	The tree appears stable and its branch attachment appears sound. The tree is considered to be in moderate health and displays good vigour.	Fair	15%	The tree is growing on a rock shelf with some epicormic growth evident..	2	On site	4.10	52.8



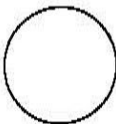
Figure 4.1 - The existing sewer pumping station looking south from the access road.



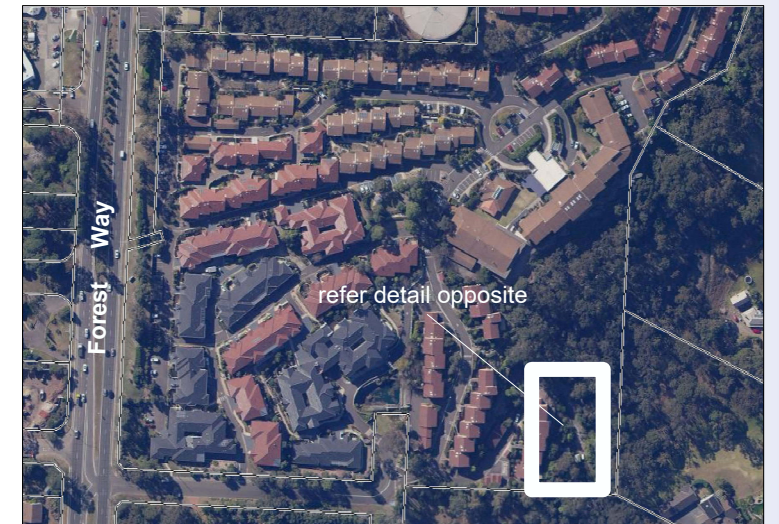
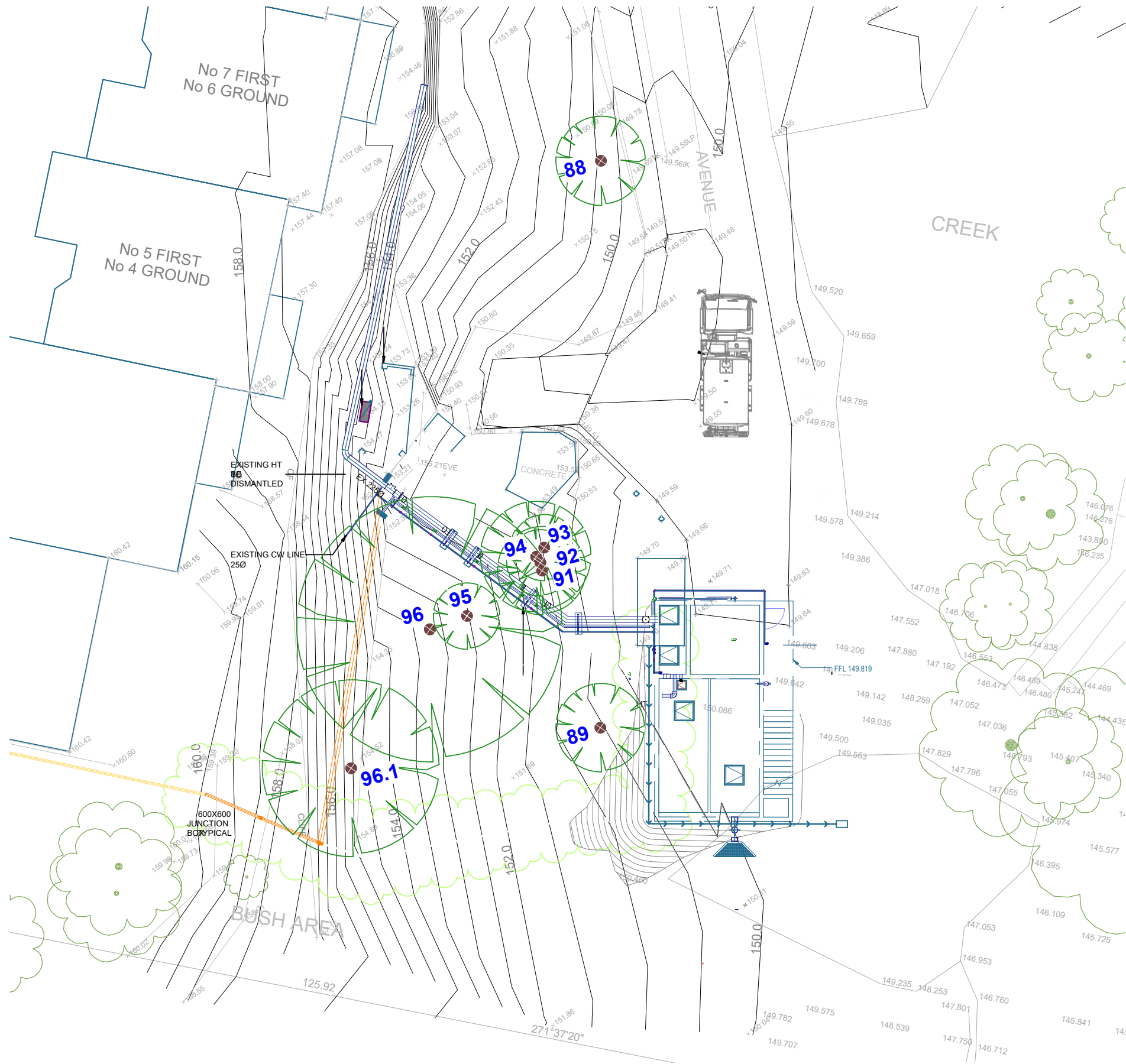
Figure 4.2 - View of the rocky terrain and the alignment of the proposed pipes which are to be elevated above ground and supported on piers.



Figure 4.3 - The base of Tree No. 96.1 showing the existing cast iron rising sewer main (right).

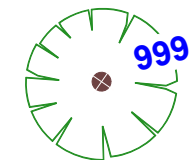






site reference plan (not to scale)

#### tree legend



trees to be retained

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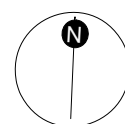
SPS Demolition and Staging Plan, Dwg.No. GLN-H-D-20001, Rev E, Dated 08/11/2022 (SCP)

SPS Electrical Demolition and Staging Plan Plan Dwg.No. GLN-E-D-20001, Rev D Dated 06/11/22 (SCP)

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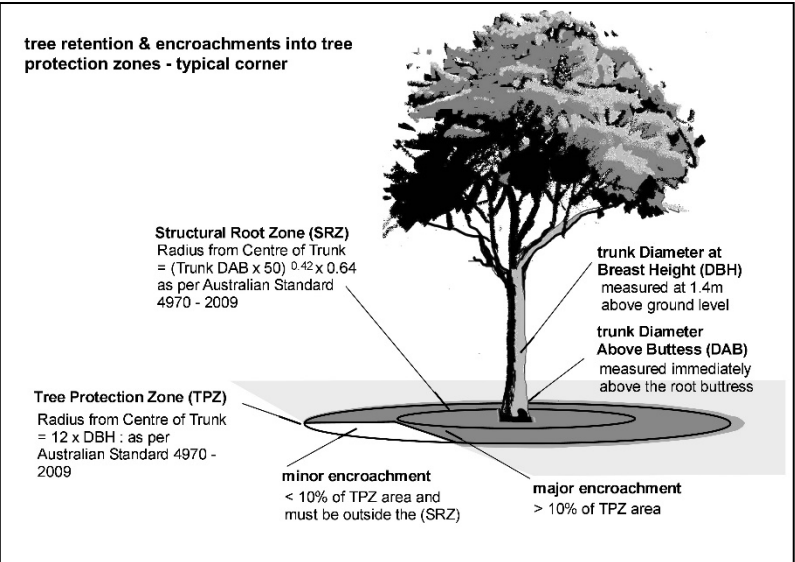
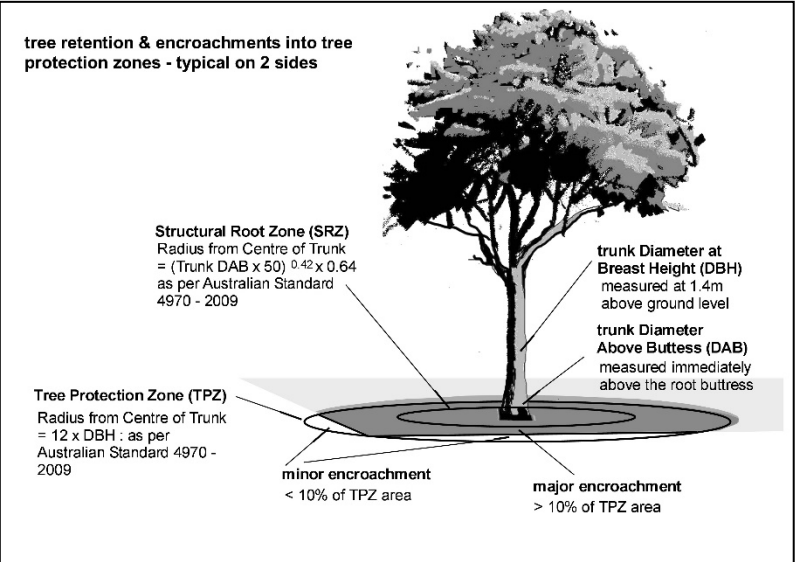
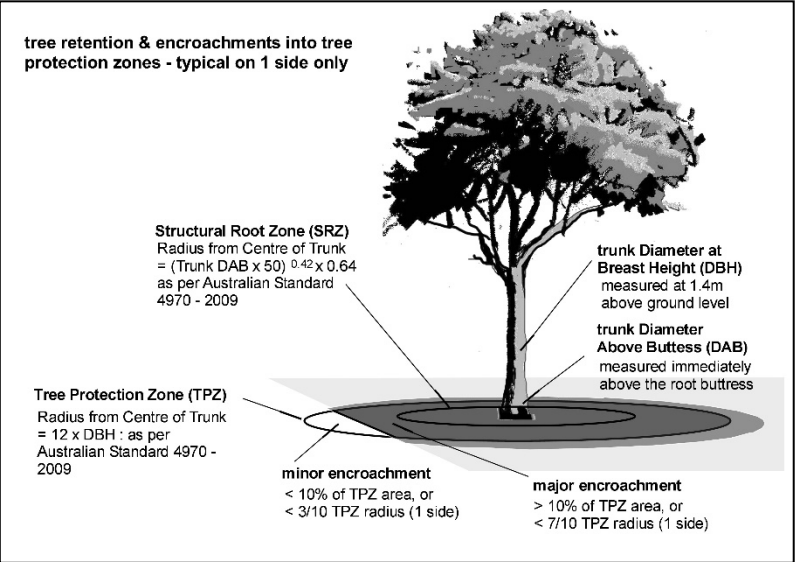
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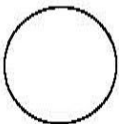




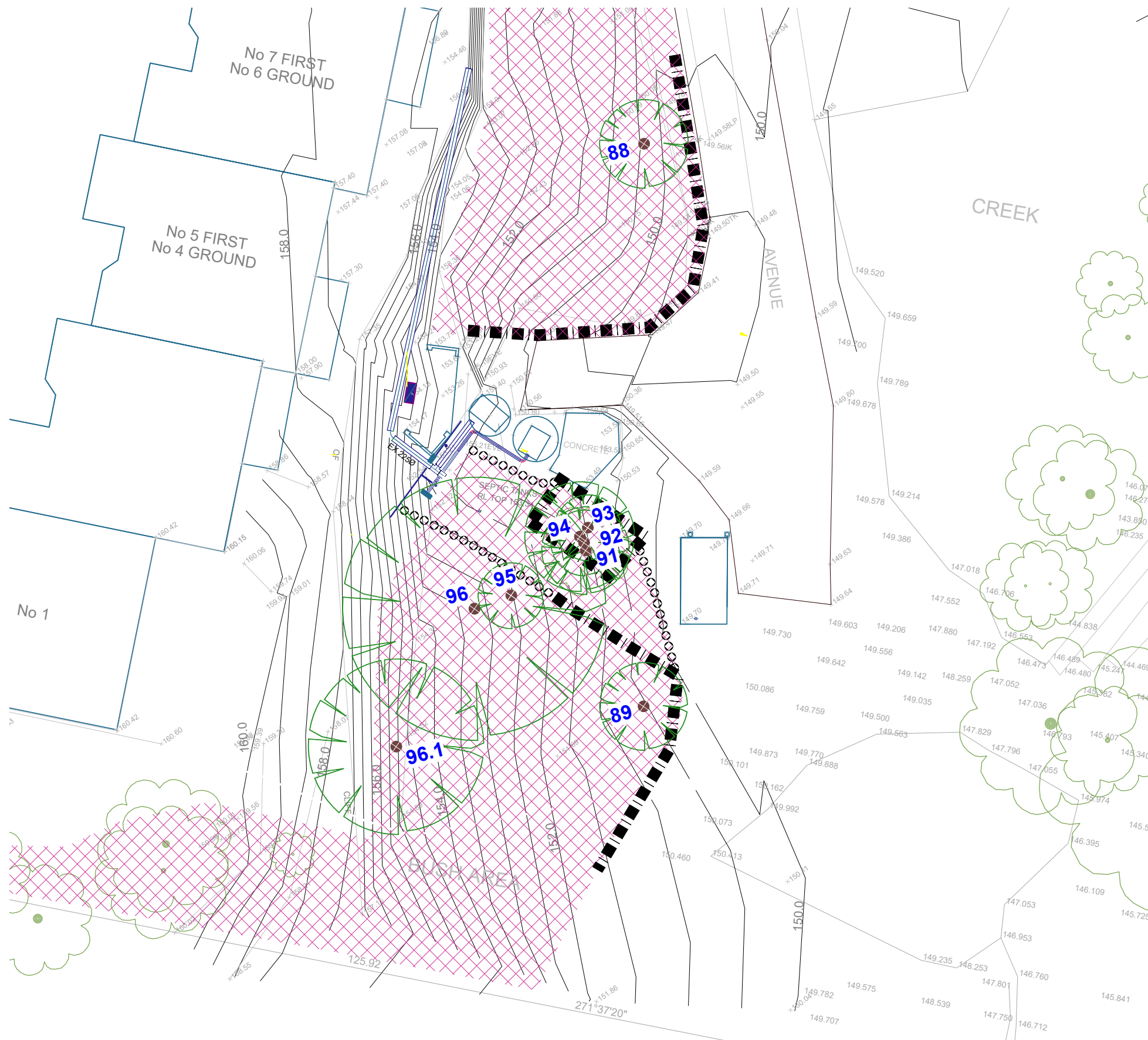
typical application of Australian Standard 4970-2009 - Protection of Trees on Development Sites



Tree No	Genus Species	DBH (mm)	DAB (mm)	SULE	Env./ L/scape Sig.	TPZ Radius (m)	Radius of 90% of TPZ area (7/10)	SRZ Radius (m)	Adjacent Works	Influence on Tree	Plan Status	On / off site
88	Angophora costata	190	210	1	Low L/scape Sig.	2.30	16.60	1.7	Construction access is to occur on the existing concrete driveway within 2.4m (east) of the tree.	No significant impact	Retained with Tree Protection Measures	On site
89	Callistemon viminalis	180	210	2	Low L/scape Sig.	2.20	15.20	1.7	The proposed sewer tank is within 2.4m (east) of the tree with minor earthworks associated with the spoon drain within 2.0m (east) of the tree..	No significant impact	Retained with Tree Protection Measures	On site
91	Angophora costata	140	200	1	Low L/scape Sig.	2.00	12.60	1.7	The proposed pipe support column is within 0.8m (south) of the tree.	No significant impact	Retained with Tree Protection Measures	On site
92	Ceratopetalum gummiferum	240	270	1	Low L/scape Sig.	2.90	26.40	1.9	The proposed pipe support column is within 1.2m (south) of the tree.	No significant impact	Retained with Tree Protection Measures	On site
93	Ceratopetalum gummiferum	260	330	1	Low L/scape Sig.	4.40	60.80	2.1	The proposed pipe support column is within 1.9m (south) of the tree.	No significant impact	Retained with Tree Protection Measures	On site
94	Angophora costata	100	130	1	Low L/scape Sig.	2.0	12.60	1.4	The proposed pipe support column is within 2.4 (east) and 2.1m (north) of the tree.	No significant impact	Retained with Tree Protection Measures	On site
95	Ceratopetalum gummiferum	160, 170, 220	380	1	Low L/scape Sig.	3.80	45.40	2.2	The proposed pipe support column is within 2.5 (east) and 2.3m (north) of the tree.	No significant impact	Retained with Tree Protection Measures	On site
96	Angophora costata	420	450	2	High L/scape Sig.	5.0	78.50	2.4	The proposed pipe support column is within 4.2 (east) and 3.2m (north) of the tree. The proposed electrical conduit is within 3.0m (west) of the tree and is proposed to be installed between existing boulders adjacent the cast iron rising sewer main.	No significant impact	Retained with Tree Protection Measures	On site
96.1	Angophora costata	560	590	2	High L/scape Sig.	6.70	141.00	2.7	The proposed electrical conduit is within 3.0m (west) of the tree and is proposed to be installed between existing boulders adjacent the cast iron rising sewer main	No significant impact	Retained with Tree Protection Measures	On site

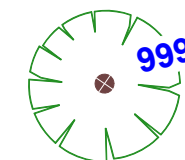






site reference plan (not to scale)

#### legend



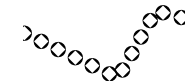
trees to be retained



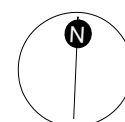
tree protection zone  
(refer specifications sheet 8)



tree protection fencing  
(refer specifications sheet 8)



tree protection webbing  
(refer specifications sheet 8)





tree protection fencing

Prior to demolition or construction, tree protection fencing and tree protection webbing shall be erected as shown on the Tree Protection Plan (refer sheet 7) in accordance with the specifications below.

**distance away from tree**  
as shown on tree protection plan, or  
as specified radius from trees

**organic mulch**  
the area within the tree  
protection fencing shall be  
mulched to a depth of 50mm

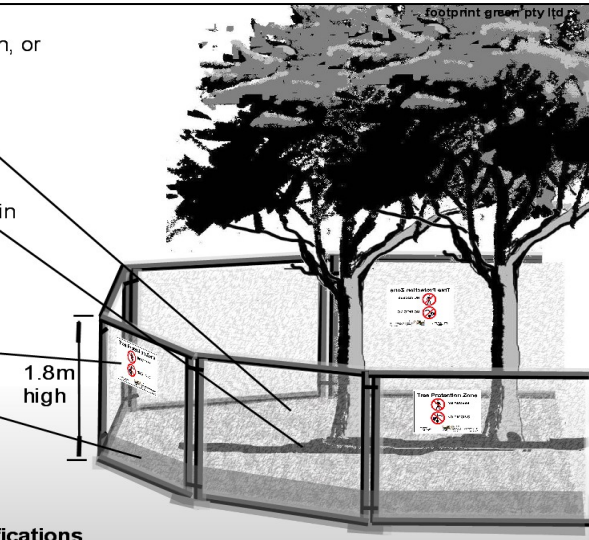
**drip irrigation**  
drip irrigation installed to maintain  
soil moisture

**fencing material**  
chainmesh, weldmesh, plywood  
or paling fence

**signage**  
tree protection signage fixed  
to fence

**sediment control fencing**  
sediment control fencing  
required where building works  
are upslope or within 200mm  
of tree protection fencing

**tree protection fencing - specifications**



1.8m  
high

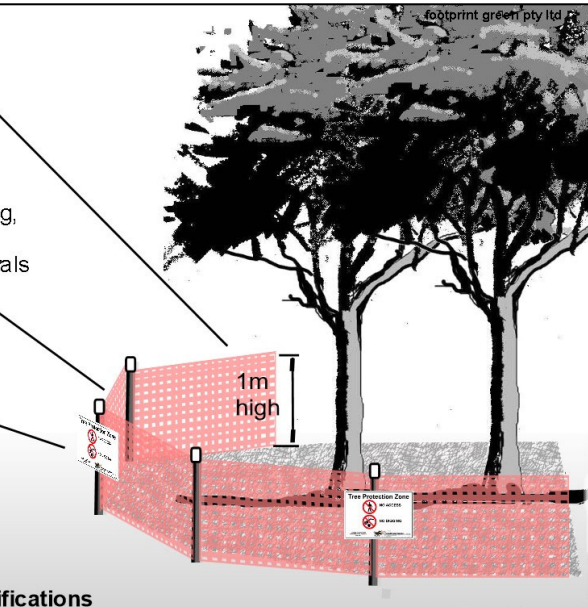
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**distance away from tree**  
- as shown on plan, or  
- as specified radius from trees

**fencing material**  
orange plastic construction fencing,  
safety netting 1m high  
fixed to star pickets at 1.5m intervals

**signage**  
tree protection signage  
fixed to star pickets

**tree protection webbing - specifications**



1m  
high

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tree protection signage

Tree Protection Signage is to be installed on fencing and webbing shall be installed at maximum 15m intervals and at changes in the fencing direction (refer specification below).

**signage size**  
min size 420 x 290mm  
in colour

**fixing**  
signs shall be fixed at a  
height of 1500mm above  
ground and a number of  
signs shall be fixed on the  
tree protection fencing so that  
a sign is visible from all  
directions

**format of signage**  
format based upon  
Australia Standard - Safety  
Signs for the Occupational  
Environment AS 1319 -  
1994

**tree protection signage - specifications**



contact:  
**Footprint Green** PTY LTD  
ARBOCULTURAL, ENVIRONMENTAL & HORTICULTURAL CONSULTANTS  
5 WATKINS ROAD, AVELON BEACH, NSW 2107  
Ph: (02) 99188877  
Fax: (02) 99188876  
AEN 34 097 138 817

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works within tree protection zones

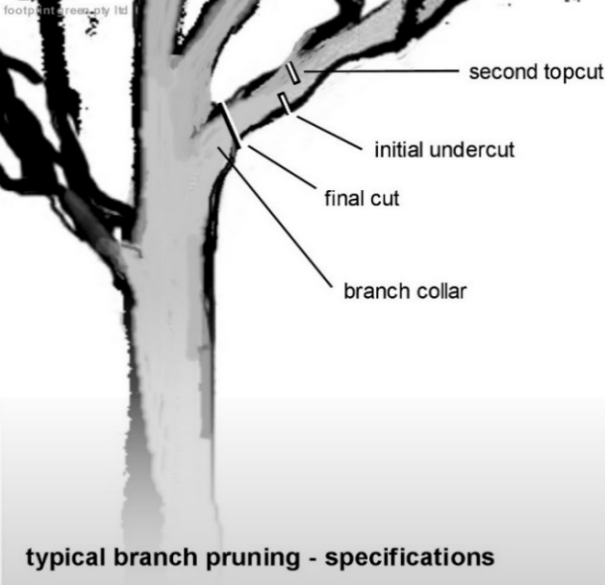
All works associated with excavation within the designated Tree Protection Zones must be undertaken under the direct supervision of the Project Arborist.

The project manager shall ensure that at all times during site works no stockpiles, storage or disposal of materials shall take place within the Tree Protection Zones fenced off and that all Protective Fences remain secure throughout the development work period.

branch pruning if required

Should branch pruning be required to provide access for vehicles/ pedestrians or overhead crane operations pruning must be carried out in accordance with Australian Standard AS 4373-2007 Pruning of Amenity.

If necessary branch pruning will be restricted so that no more than 10% of the canopy foliage being removed and branch pruning is to be carried out by an experienced and qualified arborist and in accordance with the specification below.



second topcut  
initial undercut  
final cut  
branch collar

**standard**  
branch pruning shall be  
undertaken in accordance  
with Australian Standard  
Pruning of Amenity Trees  
AS 4373 - 2007

**application**  
crown reduction, crown  
thinning, deadwood  
removal etc. involving other  
branch pruning shall follow  
the same pruning principals  
at branch unions or branch  
collars

**typical branch pruning - specifications**

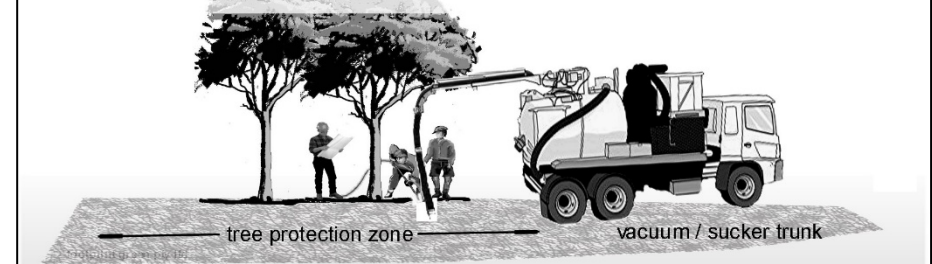
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excavation of pipe support footings

The location and dimensions of the pipe support footings are to be marked out on the ground and are to be inspected by the Project Arborist and the Project Manager prior to works commencing.

Option 1 - Excavation for the footings of the pipe supports are to be carried out using a water jet and suction truck in accordance with the specification below.

- hydro & vacuum excavation involves softening the soil with water and then sucking the slurry into tanker trucks for fast, efficient removal. This process enables precise trenching routes while doing the least amount of damage to the soil and tree roots,
- hydro & vacuum excavation within tree protection zones must be undertaken under the supervision of the project arborist;
- vacuum /sucker trucks must be located outside tree protection zones or operated in conjunction with ground and root protection measures within tree protection zones
- debris, soil, slurry or other waste material must not be discharged onto soil within the tree protection zone.



hydro and vacuum excavation for services within Tree Protection Zones - specifications

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Option 2 - Excavation shall be carried out using hand tools under the supervision of the Project Arborist to a depth of 200mm or to a shallower depth where rock suitable for the pipe support is encountered in accordance with the specification below.

hand tools

Include the use of shovels, crowbars.  
(mattocks & axes shall not be used).

retention of tree roots

Excavation is to be conducted under the supervision of the project arborist.  
Tree root >30mm dia. shall exposed,  
left intact and not severed or damaged

inspection of tree roots

Where exposed tree roots spatially conflict with construction design levels, depending upon the number and size of the tree roots, the project arborist shall either:  
- cleanly prune the tree roots and treat them root hormone compound, or  
- provide instructions to leave the tree roots intact and investigate alternate locations, construction methods or design.

preliminary excavation using hand tools within Tree Protection Zones - specifications

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Should deeper excavation be required, excavation can be carried out by machines under the supervision of the Project Arborist provided that the Tree Protection Fencing or Webbing remains in place during excavation.

