

Arboricultural Impact Assessment

Client: Bayview Golf Club.

Project: Stormwater harvesting and irrigation.

Address: 1825 Pittwater Road
Bayview. NSW
2104.

Lot/Section/Plan no: 5/-/DP45114.

BTC Ref No: BGC9221

Date: 19-03-21

Prepared by:



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1. Introduction.

1.1. Engagement.

Bellevue Tree Consultants (BTC) was engaged by Bayview Golf Club the owners of the subject site identified as Lot 5/-/DP4114; 1825 Pittwater Road, Bayview NSW. To provide an Arboricultural Impact Assessment (AIA) for a proposed development within the subject site. This AIA is to accompany a Development Application (DA) to Northern Beaches Council.

1.2. Aim

The aim of the report is to assess the health/vigour and structural condition of trees within the subject property that may be potentially impacted by the proposed development and make recommendations for appropriate set-backs from proposed works, pruning, retention and/or removal.

1.3. Proposed development.

Stormwater harvesting and reuse project to secure the future supply of water to irrigate the course.

1.4. Documents reviewed in the preparation of this report.

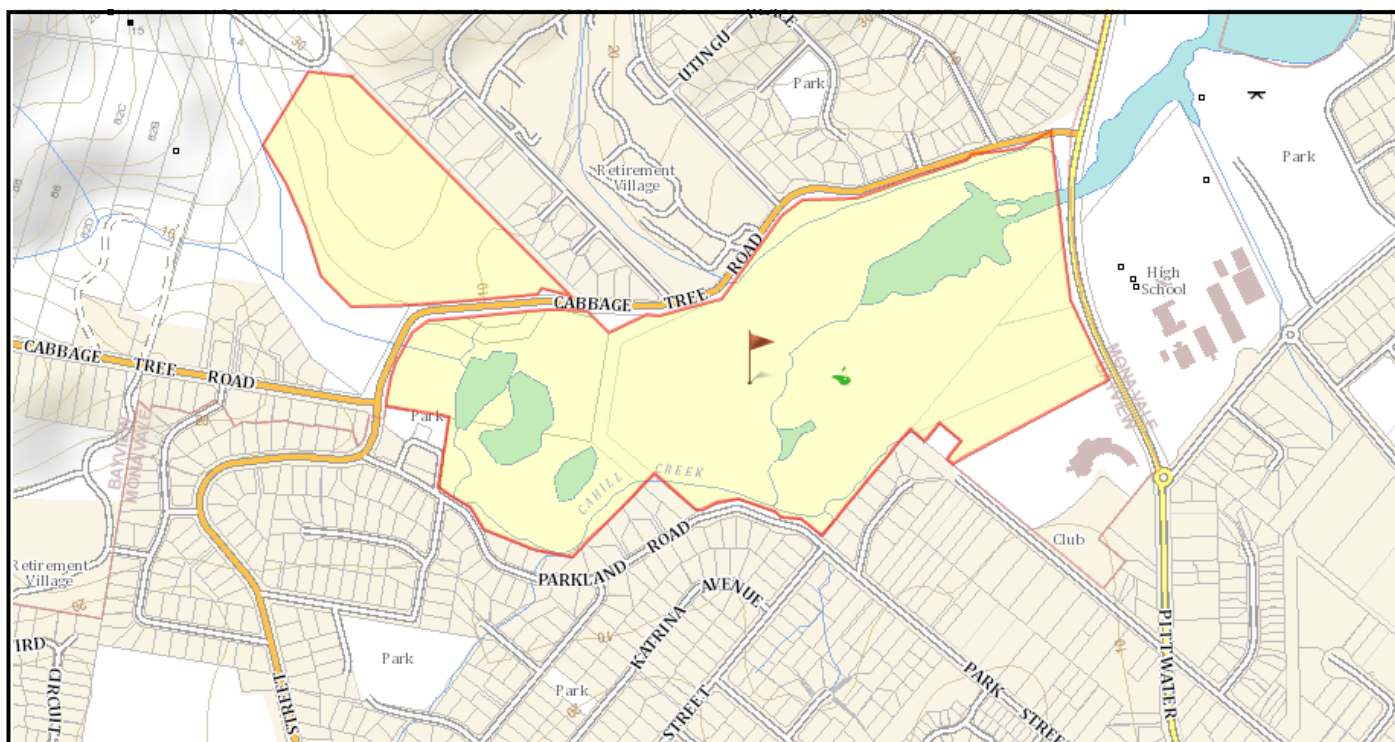
- Stormwater harvesting & irrigation civil works; Zone maps & general works. Chrisp Consulting; Job No-20056 Rev D- Dated 23-02-21.
- Northern beaches; Pittwater 21 Development Control Plan as amended 2019.
- Australian Standard AS 4970-2009 'Protection of trees on Development sites.
- Australian Standard AS 4373-2007 'Pruning of amenity trees'

2. Methodology.

- A site visit was conducted on the 09-02-21.
- Only trees within 5 metres of the proposed development have been assessed. Trees were counted (estimated) from Six maps overview and from ground level observation.
- Proposed service trenching and associated elements were measured & outlined at ground level during site visit.
- Subject site was entered into the Biodiversity Offsets Scheme (BOS) entry threshold map (Refer Appendix H)
- A Tree Evaluation was completed using the Visual Tree Assessment (VTA) method as described in The Body Language of Trees (Mattheck. & Breloer 1999).
- Canopy radius and tree height were estimated. Diameter at Breast Height (DBH) at 1.4m from ground level & Diameter at Base (DAB) were measured by diameter tape measure (MillionX10). Multi-trunks DBH each inserted into Tree-tec calculator to determine measurement in millimetres.
- A tree retention value has been calculated using. Couston.M and Howden.M (2001) Tree Retention Values Table Footprint Green Pty Ltd, Sydney Australia. (*Modified by Morton.A. Newcastle Urban Forest Technical Manual Feb 2018*) (Refer Appendix C)
- The Useful Life Expectancy (U.L.E.) was estimated using U.L.E. categories and sub groups (*Pre –planning Tree surveys; Barrell.J:1993*). Explanatory notes U.L.E. categories and terminology (Refer Appendix E).
- A site location map showing the position of the trees inspected with has been included.
- All trees inspected are numbered and are provided in the Tree Schedule
- Soil Landscapes of NSW (*e-spade*) was consulted, no soil samples or Ph tests were performed.
- No sonic tomograph, resistograph, or aerial inspections were performed.

3.Site Details

3.1. Figure 1. Site Location. (Six maps)



3.2 Site description.

1825 Pittwater road is a privately owned 18-hole golf club located on the Northern Beaches bordered by Pittwater road, Cabbage Tree road and Parkland road.

Table 1. Site information	
Local Government Area	Northern Beaches Council
Relevant Planning policies	Pittwater Local Environmental Plan 2014 Pittwater 21 Development Control Plan as amended 2019. State environmental planning policy (Coastal) 2018 Sepp (Vegetation in non-rural areas) 2017
Land zoning	RE2 - Private recreation
Acid sulphate soils	Class 2,3 5
Soil Type.	Low lying sand plain; fine sandy loam -Field PH 7
Bush fire prone land	Vegetation buffer category 1
Biodiversity Offset Scheme (BOS) Threshold Mapping	Stand of trees South-West end fairway 2
Threatened species/Endangered ecological community LEP 2011	Swamp Oak Forest; Swamp Sclerophyll Forest remnants within course.
Heritage Item LEP 2014	3 Concrete elephant statues within course.

4. Observations and discussion.

4.1. Construction elements.

The proposed development is to collect, divert, store, filter and distribute water into the golf course landscape and will require the installation of service trenching for power, drainage and pressured pipework, which will connect into existing in-ground services and storage ponds.

In order to clearly demonstrate the location of the proposed works the golf course has been divided into 10 zones (Appendix A) the impact from the development will be assessed for each zone individually.

4.2. Tree assessment.

4.2.1 Tree number. Of the estimated 975 trees on the course a total of 45 prescribed trees were assessed and were selected for their proximity to the proposed works ($\leq 5\text{m}$) or to demonstrate the proximity to existing construction elements and services.

Of the 45 trees assessed the species are listed below.

- 35 *Casuarina glauca* (Swamp She-oak)
 - 5 *Melaleuca quinquenervia* (Broad-Leaved Paperbark)
 - 1 *Melaleuca armillaris* (Bracelet Honey Myrtle)
 - 1 *Phoenix canariensis* (Canary Island Date Palm)
 - ❖ 2 *Lagunaria patersonii* (Norfolk Island Hibiscus)
 - ❖ 1 *Erythrina x sykesii* (Australian Coral Tree)
- ❖ Tree species are suitable for removal without consent unless identified as a heritage item or within a heritage area (Pittwater 21 DCP).

4.2.2. Impact appraisal

The Tree Protection Zone (TPZ) is the area that protects the above and below ground parts of a tree. Structural Root Zone (SRZ) is the area required for tree stability. As described in the Australian Standard *Protection of trees on development sites* (AS 4970), encroachments less than 10% are considered to be minor and acceptable. No specifications are provided within the AS4970 for encroachments greater than 10% and it is the consulting arborist that must investigate if the tree will remain stable and viable.

4.2.3. Prescribed trees proposed for removal.

Selection criteria for tree removal.

- Tree is dead or dying
- Trees are wholly or partially within the footprint of the proposed works.
- Where service trenches are required to intersect the tree line.
- Trees have wounds, cavities with decay, poor vigour and condition.
- Trees are suppressed and stunted; neighbouring trees will benefit from their removal.

Table .2. Trees proposed for removal.

Tree no	Species	Zone	TPZ (m)	TPZ Encroachment	Tree retention value	Useful Life Expectancy	Distance to works (m)	Comment	Action
1	<i>Casuarina glauca</i> (Swamp She-oak)	1	7.2	50%	Low	Dead	0.5	Partially within excavated area for proposed service trenching	Remove tree and provide offset replacement planting.

24	<i>Casuarina glauca</i> (Swamp She-oak)	8	4.8	43.38 %	Low	5-15 yrs	0.5	Suppressed tree, Poor vigour and condition. Partially within footprint of service trench	Remove tree and provide offset replacement planting.
25	<i>Casuarina glauca</i> (Swamp She-oak)	8	4.2	42.44 %	Low	5-15 yrs	0.5	Suppressed tree, Crown distortion (NE). Poor vigour and condition. Partially within footprint of service trench	Remove tree and provide offset replacement planting.
44	<i>Casuarina glauca</i> (Swamp She-oak)	10	4.8	34.99%	Low	< 5 yrs	1.0	Large wound from previous branch failure with decay(N). Poor vigour and condition. Partially within footprint of service trench	Remove tree and provide offset replacement planting.

4.2.4. Table 3. Prescribed trees proposed for retention.

Tree No	Zone	Minimum setback from works (m)	Comment
2,3,4,5	1	5.0	With the removal of tree 1, space will be made for the placement of primary holding tank and power control cabinet. Other construction elements will be > 5 m from remaining trees.
6	2	3.5	Trenching works will be outside TPZ.
Nil	3	Proposed works over 5m from nearest trees	Trenching works will be outside TPZ North & South 15 th fairway.
7,8	4	3.5	Trenching works will be outside TPZ. Pipe work will connect to existing inlet to dam within BOS identified area.
Nil	5	Proposed works over 5m from nearest trees	Trenching works will be outside TPZ 3 rd fairway. Open space to connect to dam (No trees within 10m)
9,10,11,12,13	6	4.0	Trenching works will be outside TPZ. Open space to connect to dam (No trees within 10m)
14,15,17,18,19,20	7	4.5	Trenching works will be outside TPZ. Open space to connect to dam (No trees within 5m)
21,22,23,26,27,28	8	4.0	Removal of T 24,25 will provide opening in tree line to facilitate trenching works between fairways 13 & 17. All remaining trees are sufficiently set-back.
West-29,30,31,32,33,34 East-	9	3.5	All trees are sufficiently set-back from proposed works and are marked on the plan to delineate fairway edges.

35,36,37			
South-38,39 North-40,41,42,43,43,45	10	4.5	Removal of T 44 will provide opening in tree line to facilitate trenching works from fairway 1 to existing pipework within tree line. All remaining trees are sufficiently set-back($\geq 5\text{m}$).

4.2.5. Biodiversity. The majority of the trees within the subject site are remnant or planted species that are consistent with the Swamp Oak Forest and Swamp Sclerophyll Forest, identified as endangered ecological communities. The subject site was entered in to the biodiversity values map and threshold tool, which was triggered, exceeding the offsets scheme threshold. The area highlighted by the mapping represents < 3% of the subject site (refer figure 2). No construction or tree works are proposed within this stand of trees, the proposed trenching will connect drainage works to existing pipework to store in the adjacent dam and trenching works will be setback greater than 5 metres from the nearest trees (refer Zone 4). The removal of 4 trees and the proposed development works will not adversely effect, modify or put at risk the endangered ecological communities as outlined in the 7-part test for any NPWS listed species/populations/communities.

4.2.6. Potential Koala habitat. The on-site tree assessment has identified 48 *Eucalyptus robusta* (Swamp Mahogany) within the subject site. This species is listed within the State Environmental Planning Policy (Koala habitat protection) 2020 (NSW) Schedule 2 Feed tree species. The number of *Eucalyptus robusta* (Swamp Mahogany) constitutes < 5% of the total number of the tree population within the subject site.

5. Conclusion.

5.1. To implement the proposed stormwater harvesting & irrigation civil works 4 trees will require removal. 1 is dead (non-habitat) and the remaining 3 have been selected due to their low retention value, low useful life expectancy, poor vigour and structure. The removal of the 4 trees and the proposed development works will not adversely effect, modify or put at risk the endangered ecological communities.

5.2. The location of all the service trenching and construction elements is to be placed so as to minimise the impact by not encroaching the TPZ or where encroachment cannot be avoided that encroachment will be less than 10% of existing trees and by utilizing existing infrastructure.

6. Recommendations.

6.1. Implement tree protection measures for trees 2,3,4,5,18,19,26,27,43 & 45. (7.0 Arboricultural method statement)

6.2. Remove trees 1,24,25 & 44.

6.3. Under the supervision of the project arborist mark out and excavate for service trenching at the recommended minimum set-back distances identified in Table 3.

6.4. The Bayview Golf course a has an ageing tree population and it is important to note that the existing trees should be managed to enhance tree health and replace those that require removal for safety or other reasons. Compensatory tree replacement should be of a species indigenous to the area and placed so as to be able to sustain a long and healthy lifespan and have space to develop without damaging existing infrastructure and assets.

7. Arboricultural method statement.

7.1. Prior to works commencing. A project arborist is to be engaged prior to any demolition or constructions works commencing. The Project arborist to have a minimum AQF level 5 qualification in Arboriculture.

7.1.1. Project arborist, in consultation with the Project supervisor, is to review and augment the site contractor induction to ensure all tree protection measures and relevant guidelines are included.

7.1.2. Details of requirements relating to Project Arborists are set out in the 7.3 Key hold points.

7.1.3. Implement all tree protection measures in consultation with course management to minimise disruption to play.

7.2. Tree protection guidelines.

All tree protection measures must be maintained in good condition during the construction works and kept in place until the completion of works or as otherwise advised by the Project Arborist. All tree protection measures shall then be removed.

7.2.1. Each Tree Protection Zone shall:

- a. be enclosed by a 1.8m high fully supported chainmesh protective fencing. The fencing shall be secure and fastened to prevent movement. The fencing shall have a lockable opening for access. Roots greater than 50mm in diameter shall not be pruned, damaged or destroyed during the installation or maintenance of the fencing. The fencing shall not be moved, altered or removed without the approval of the Project Arborist;
- b. has a minimum of two signs that include the words "Tree Protection Zone – Keep Out". Each sign shall be a minimum size of 600mm x 500mm and the name and contact details of the Project Arborist. Signs shall be attached facing outwards in prominent positions at 10 metre intervals or closer where the fence changes direction. The signs shall be visible within the site;
- c. be kept free of weeds except where the existing surface is grass. Weeds shall be removed by hand; and
- d. unless the existing surface is grass, have mulch installed and maintained to a depth of 75mm. Mulch shall consist of mixed leaf and coarse woodchip in accordance with AS4454:2012 Composts, Soil Conditioners and Mulches.

7.2.2. Ground protection and trunk protection - trees 2,3,26,27,43 &45.

To be installed where the Project Arborist determines that tree protection fencing cannot be installed, or the tree protection fencing needs to be removed temporarily, access within or through the Tree Protection Zone is necessary or where work will be carried out within the Tree Protection Zone.

- a. the stem and branches of trees to be retained shall be protected, as follows:
 - install 65mm Drain coil Agg pipe around trunk at 1m intervals as shown in Figure 5. Examples of tree protection.
 - Install hardwood or treated pine timbers (100mm x 50mm) the same length as the stem or branch shall be positioned over the drain coil and next to each other around the stem or branch, secured together with galvanised wire or strapping. Boards shall not be nailed or screwed into the stem or branch. No part of the protection shall be secured to the tree.
- b. The ground surface within the Tree Protection Zone shall be protected by placing geotextile fabric on the ground surface, covering this with a layer of mulch or aggregate to a depth of 75mm and then placing boarding (Truck mats, scaffolding board or similar material) on top. The geotextile fabric and mulch shall be kept clear of tree stems by a least 50mm.

7.2.3. Activities prohibited within the Tree Protection Zone

1. a. disposal of chemicals and liquids (including concrete and mortar slurry, solvents, paint, fuel or oil);
- b. stockpiling, storage or mixing of materials;
- c. refuelling, parking, storing, washing and repairing tools, equipment, machinery and vehicles;
- d. disposal of building materials and waste;

The following activities shall not be carried out within any Tree Protection Zone unless under the supervision of the Project Arborist:

- 2.a. increasing or decreasing soil levels (cut and fill);
 - b. soil cultivation, excavation or trenching;
 - c. placing offices or sheds;
 - d. erection of scaffolding or hoardings; and/or
 - e. any other act that may adversely affect the vitality or structural condition of the tree.
3. All work undertaken within or above a Tree Protection Zone shall be supervised by the Project Arborist.

7.2.4. Excavation and Demolition within the Tree Protection Zone of trees 2,3,26,27,43 &45.

a. Is to be undertaken using non-destructive methods (e.g. manually by hand) to ensure no roots greater than 50mm in diameter are damaged, pruned or removed. All care shall be taken to preserve and avoid damaging roots; Where roots <50mm cannot be avoided, they are to be clean cut with saw or secateurs. All exposed roots are to be covered immediately with mulch or dampened hessian or similar material.

b. Excavation is not to occur within the Structural Root Zone.

c. Any additional stormwater drainage, detention pits, rainwater tanks and/or absorption trenches must accommodate the TPZ's set out in Appendix A Tree assessment schedule. All amended plans to be reviewed and impact assessed by the project arborist.

7.3. Key hold points.

Table 4.

Hold point	Stage	Task	Responsibility	Certification
1	Prior to all work commencing.	Clearly mark trees approved for removal.	Principle contractor	Project arborist
2	Prior to demotion and site establishment	Implement all approved tree protection measures	Principle contractor	Project arborist
3	Construction	Supervision of excavations within the TPZ	Principle contractor	Project arborist
4	Monthly inspections or as required	Inspection of trees and tree protection and/or any works within the TPZ.	Principle contractor	Project arborist
5	Prior to issue of compliance certificate.	Final inspection of trees	Principle contractor	Project arborist

8.Photos.



Photo 1
Zone 1.Trees 1,2,3.Tree 1 to be removed.
Line of works with set-backs



Photo 2.
Zone 1.Trees 4 & 5.
Line of works with set-backs



Photo 3.
Zone 2.Tree 6.
Line of works draining into existing catchment.
Minimum setback 3.5m



Photo 4.
Zone 3. Proposed works over 5m from nearest trees

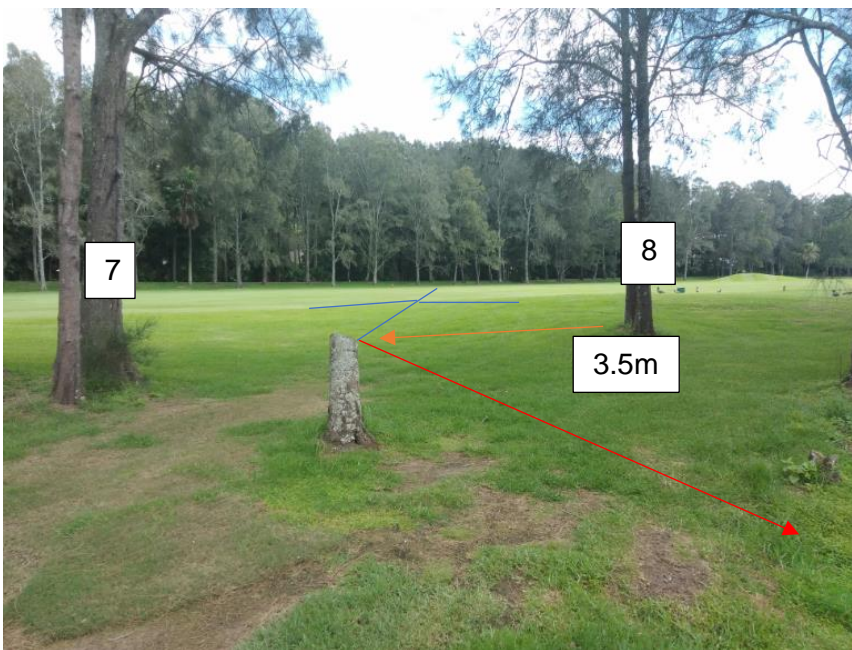


Photo 5.
Zone 4. Trees 7 & 8
Line of works to drain into existing catchment.
Minimum set-back 3.5m



Photo 6
Zone 5. Proposed works over 5m from nearest trees.
Line of works to drain into existing catchment.



Photo 7
Zone 6. Trees 9 & 11
Proposed works over 5m from nearest trees.



Photo 8.
Zone 7 South.
Proposed works over 5m from nearest trees.
Line of works to drain into existing catchment



Photo 9.
Zone 7 North. Trees 18 & 19
Proposed works over 5m from nearest trees.
Line of works to drain into existing catchment



Photo 10
Zone 8. Tree 21
Line of works to enter 17th fairway
Minimum set-back 4m

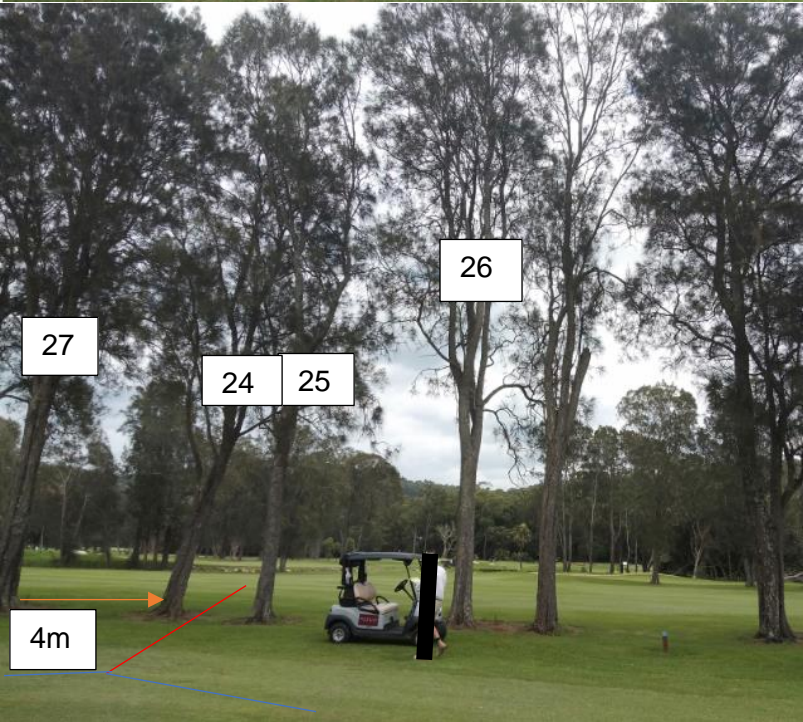


Photo 11.
Trees 24 & 25 to be removed to provide opening in tree line to facilitate trenching works between the 17th & 13th fairways.
Minimum set-back 4m

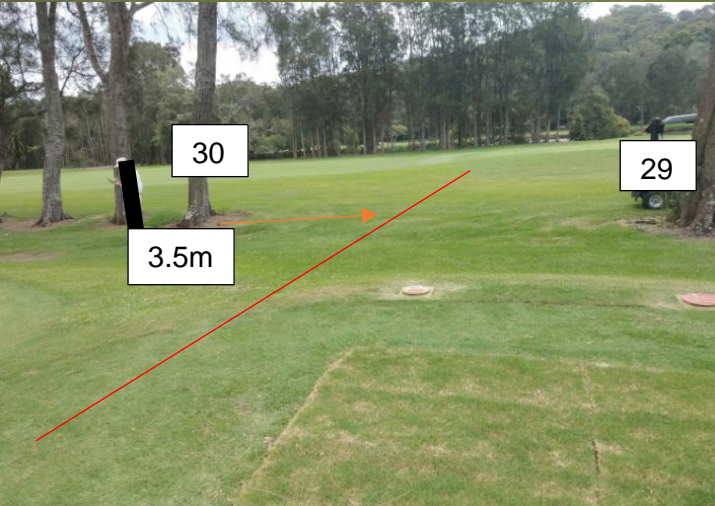


Photo 12. Zone 9 West.
Trees 29 & 30
Line of works transverse fairways adjacent to the 13th Tee.
Minimum set-back 3.5m

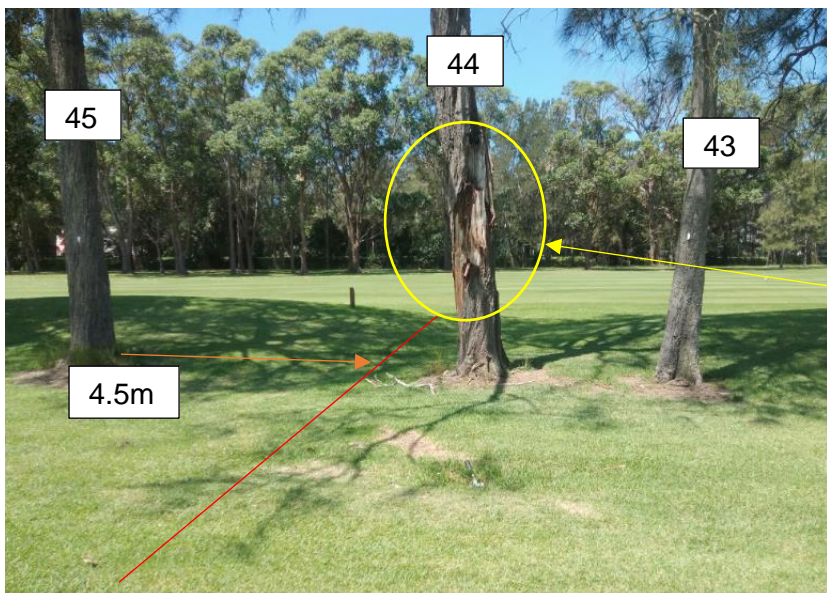


Photo 13

Zone 10. Trees 43,44,45.

The removal of T 44 will provide opening in tree line to facilitate trenching works from fairway 1 to existing pipework within tree line.

Large wound with decay.

Minimum set-back 4.5m



Photo 14.

Zone 9 East

11th & 12th fairways

All trees are sufficiently set-back from proposed works and are marked on the plan to delineate fairway edges.



Photo 15.

Zone 10. Tree 42

Line of works outside TPZ

Minimum setback 4.5m.



Photo 16.
Zone 10. Trees 38 & 39.
Line of works to connect into existing line.

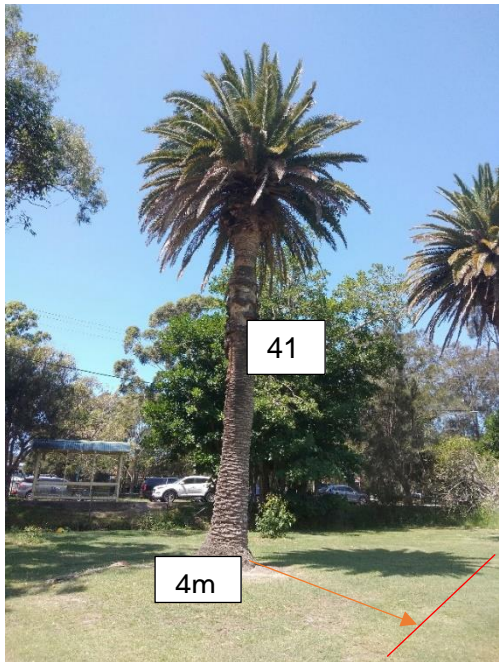
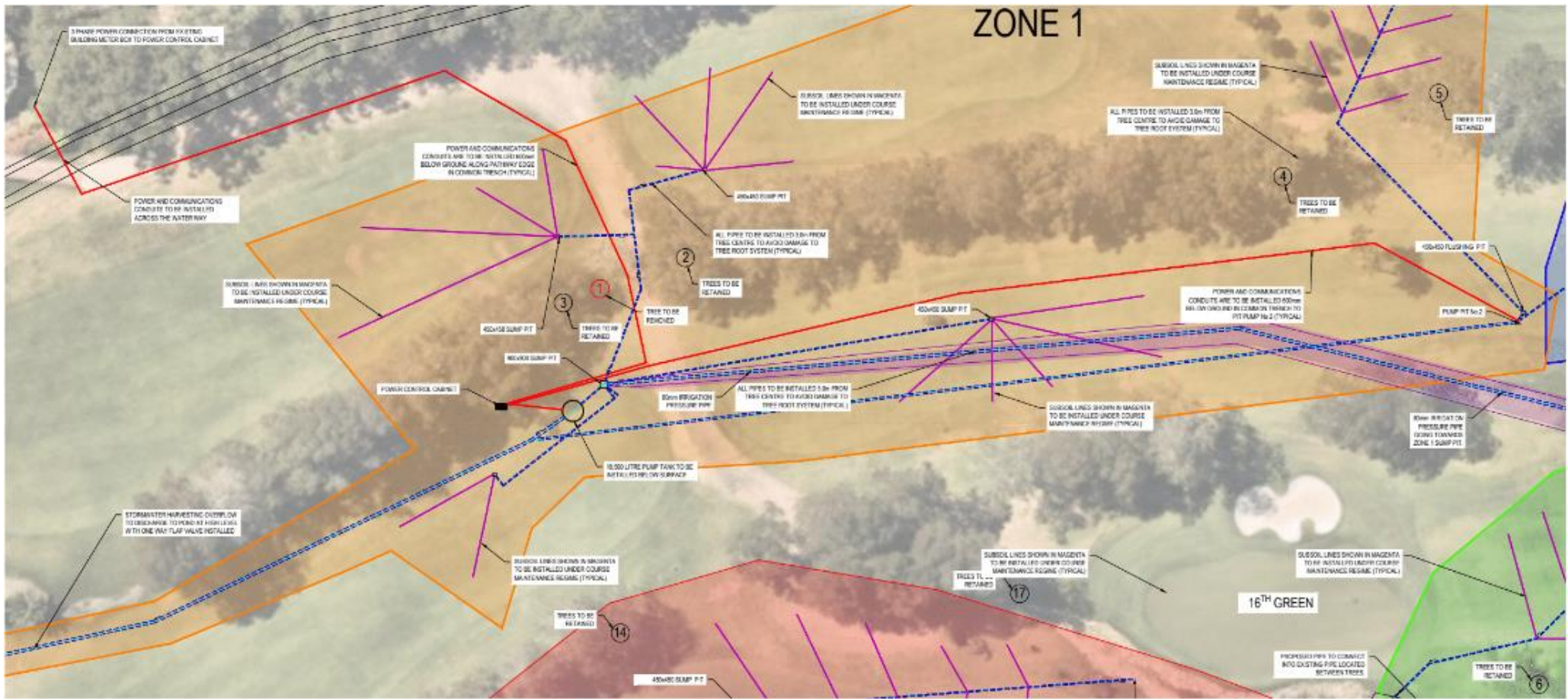


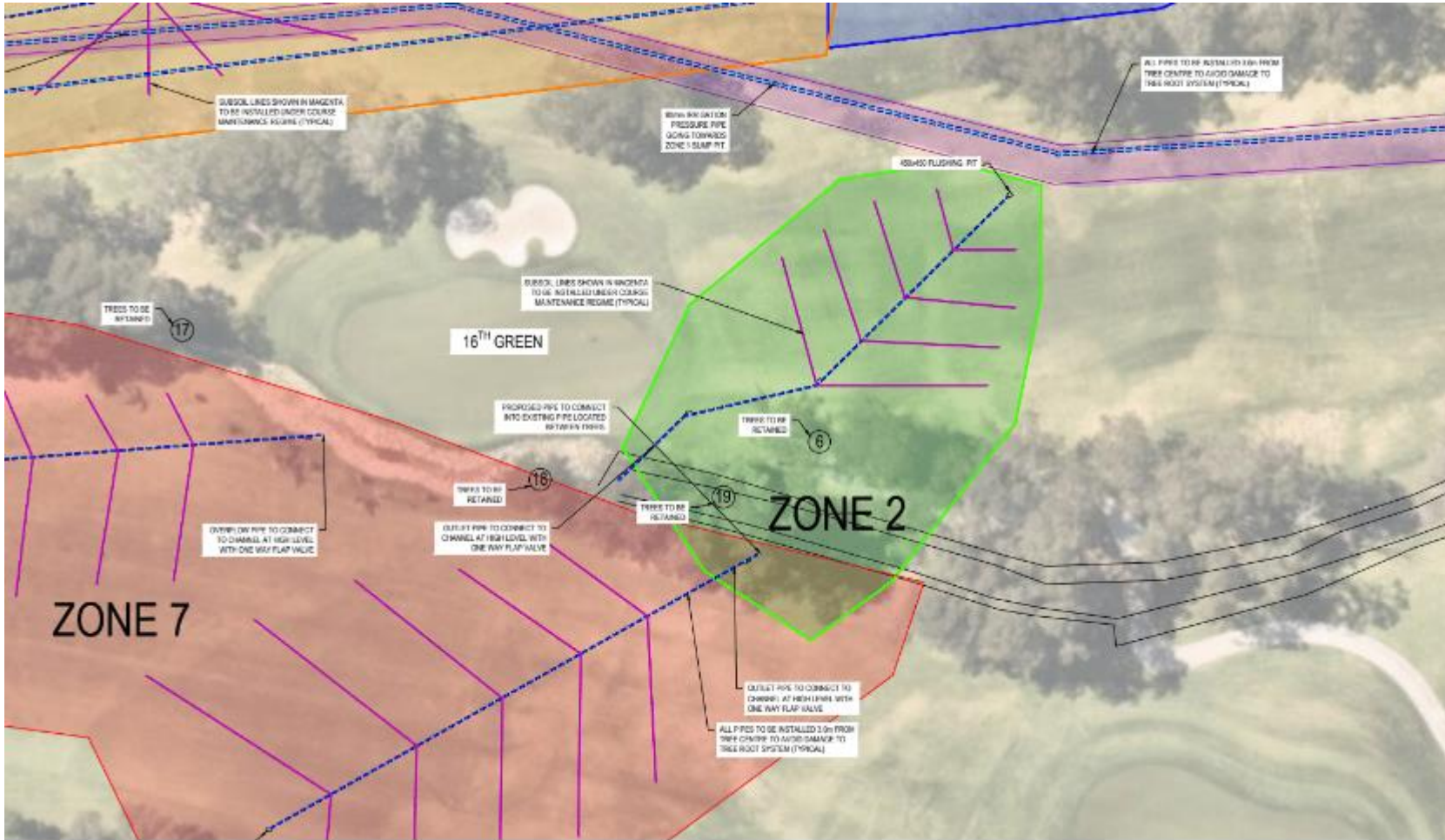
Photo 17.
Tree 41
Line of works outside TPZ.
Minimum setback 4m

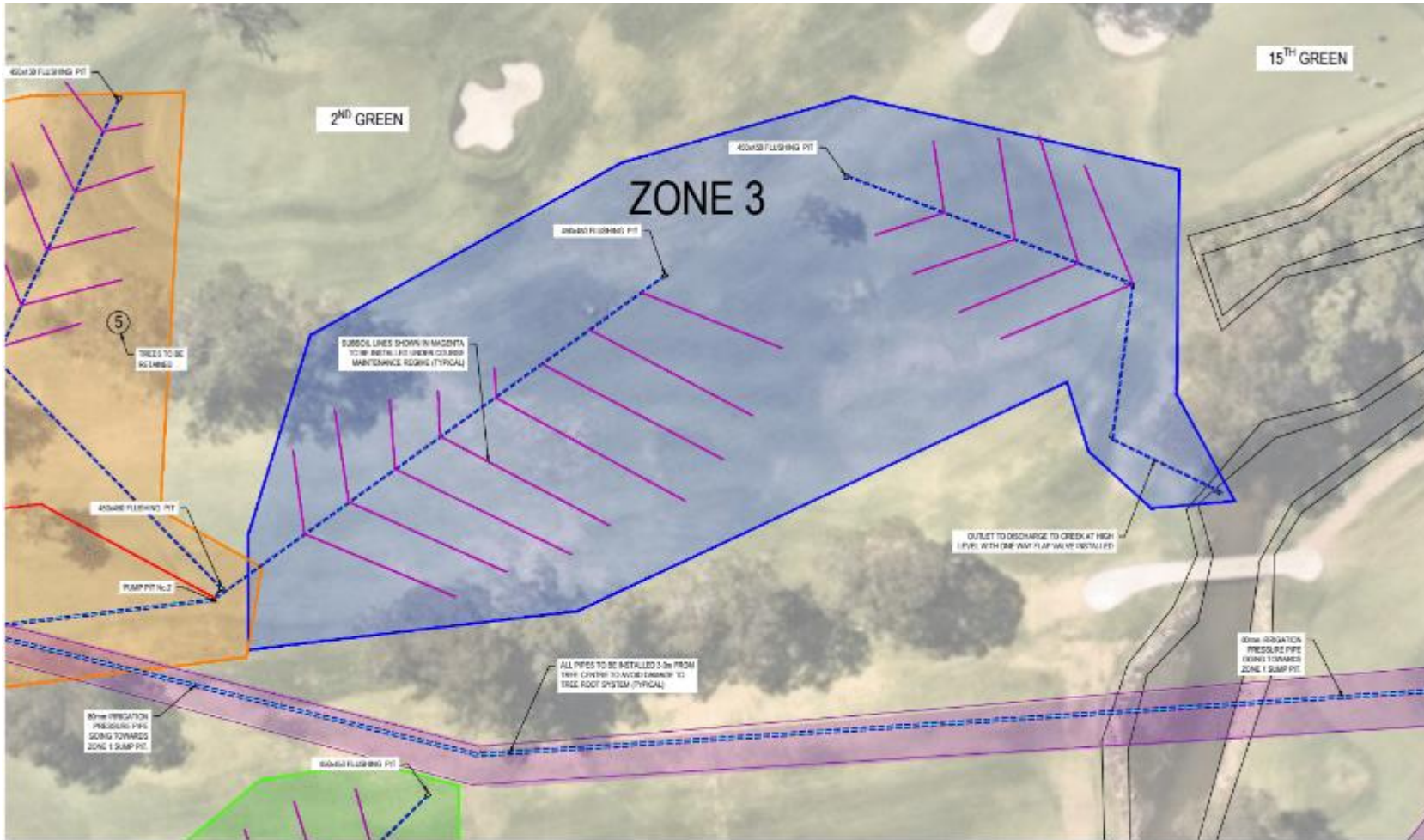


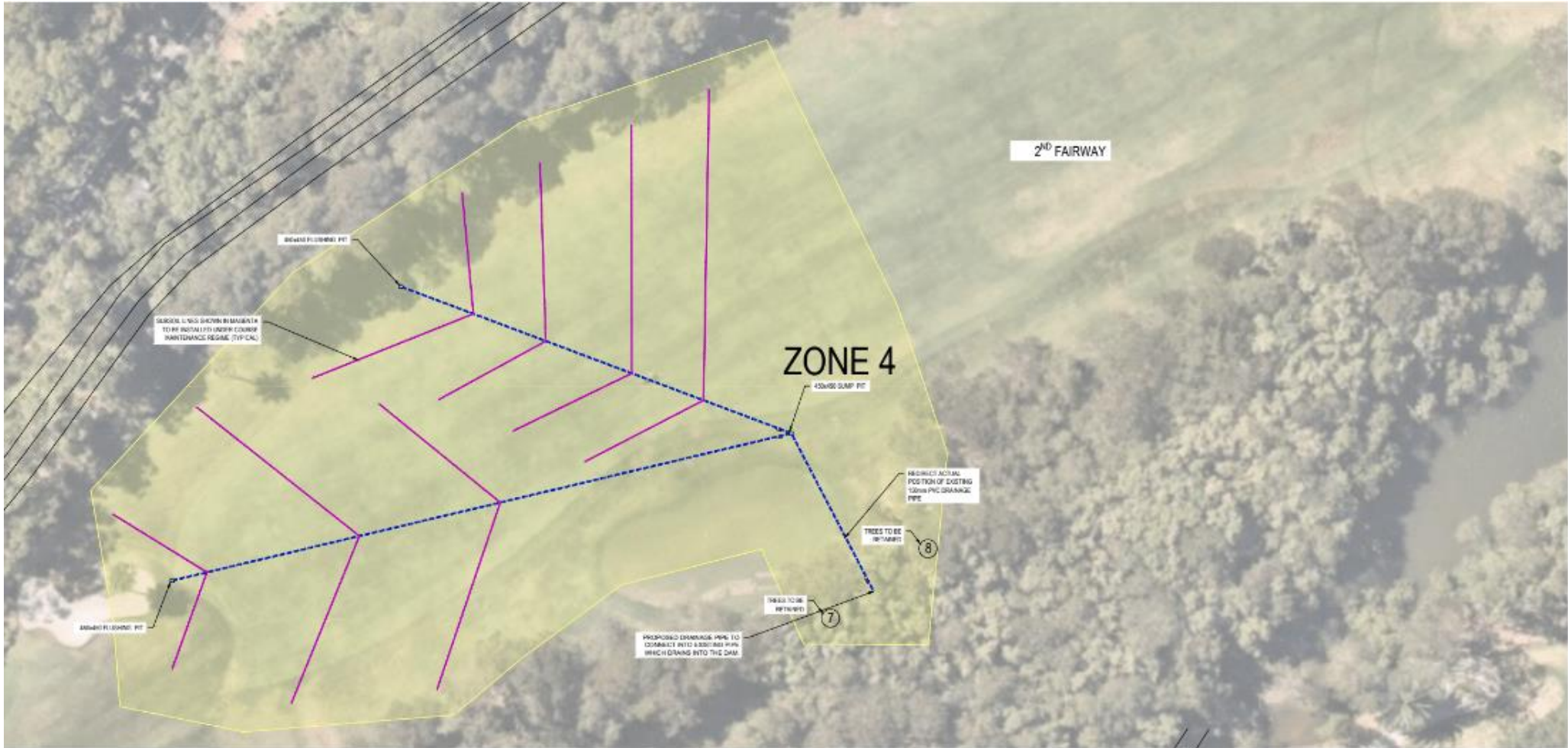
Figure 2. Area highlighted by biodiversity values map

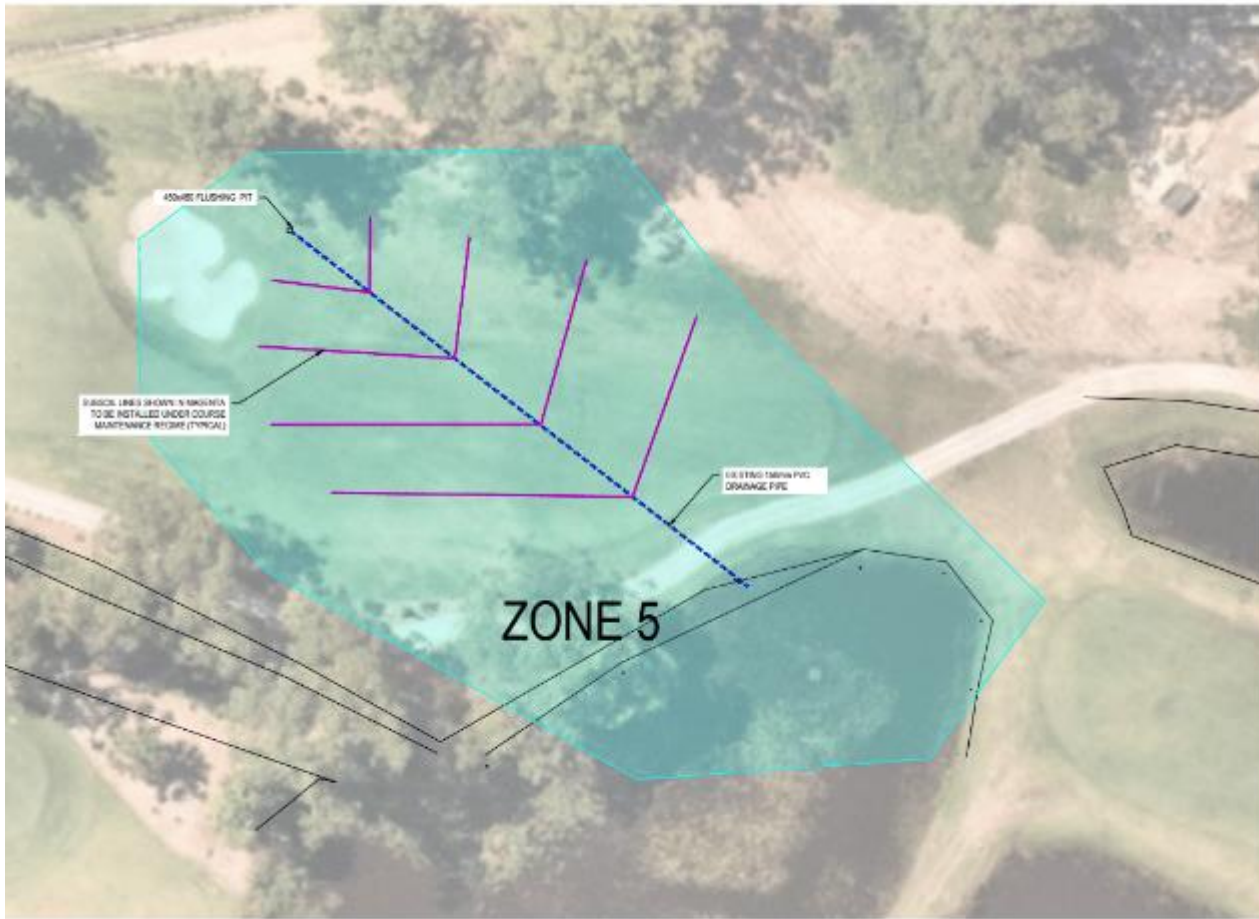
Appendix A. Work Zones. Trees numbered with proposed service lines and construction elements.

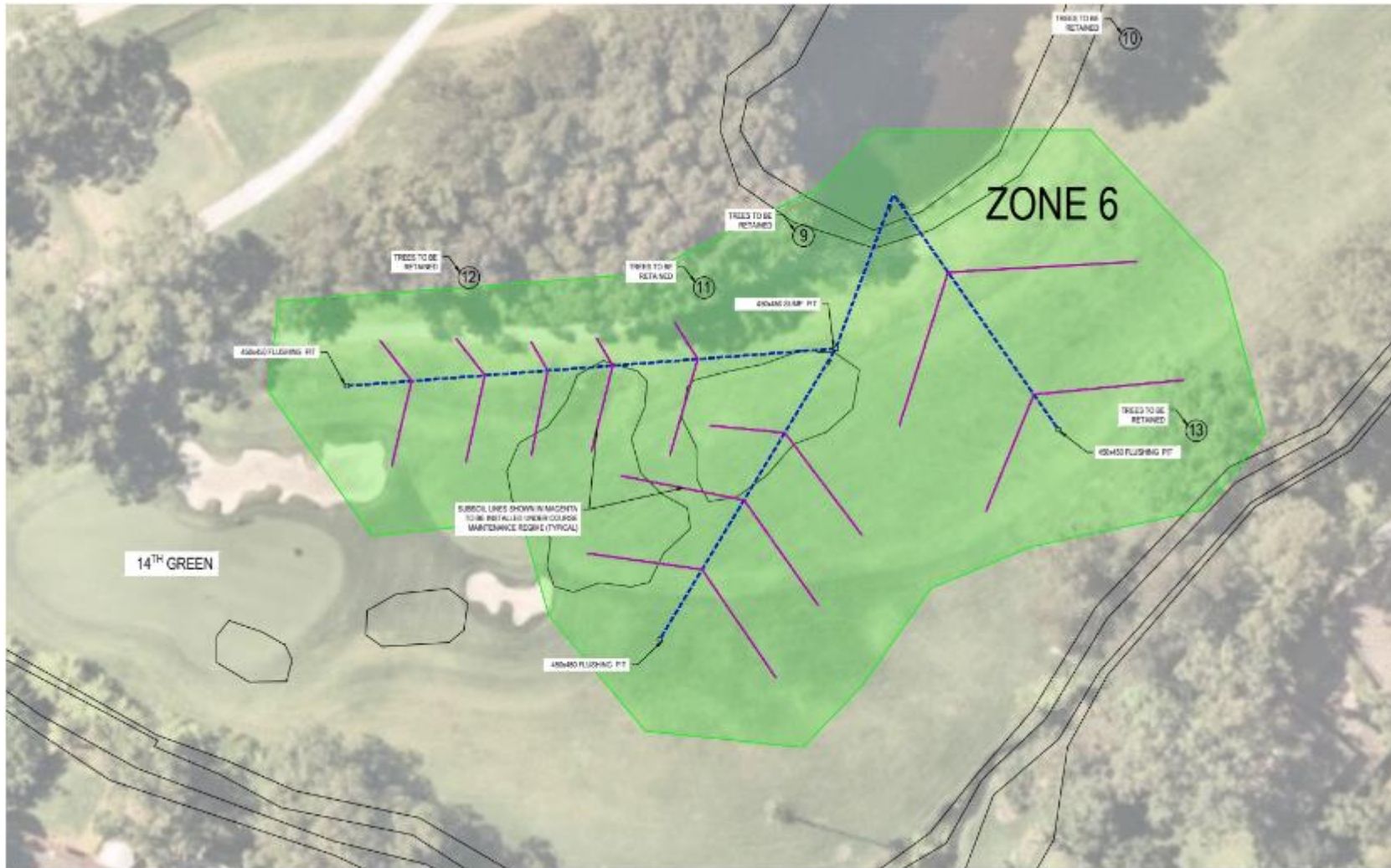


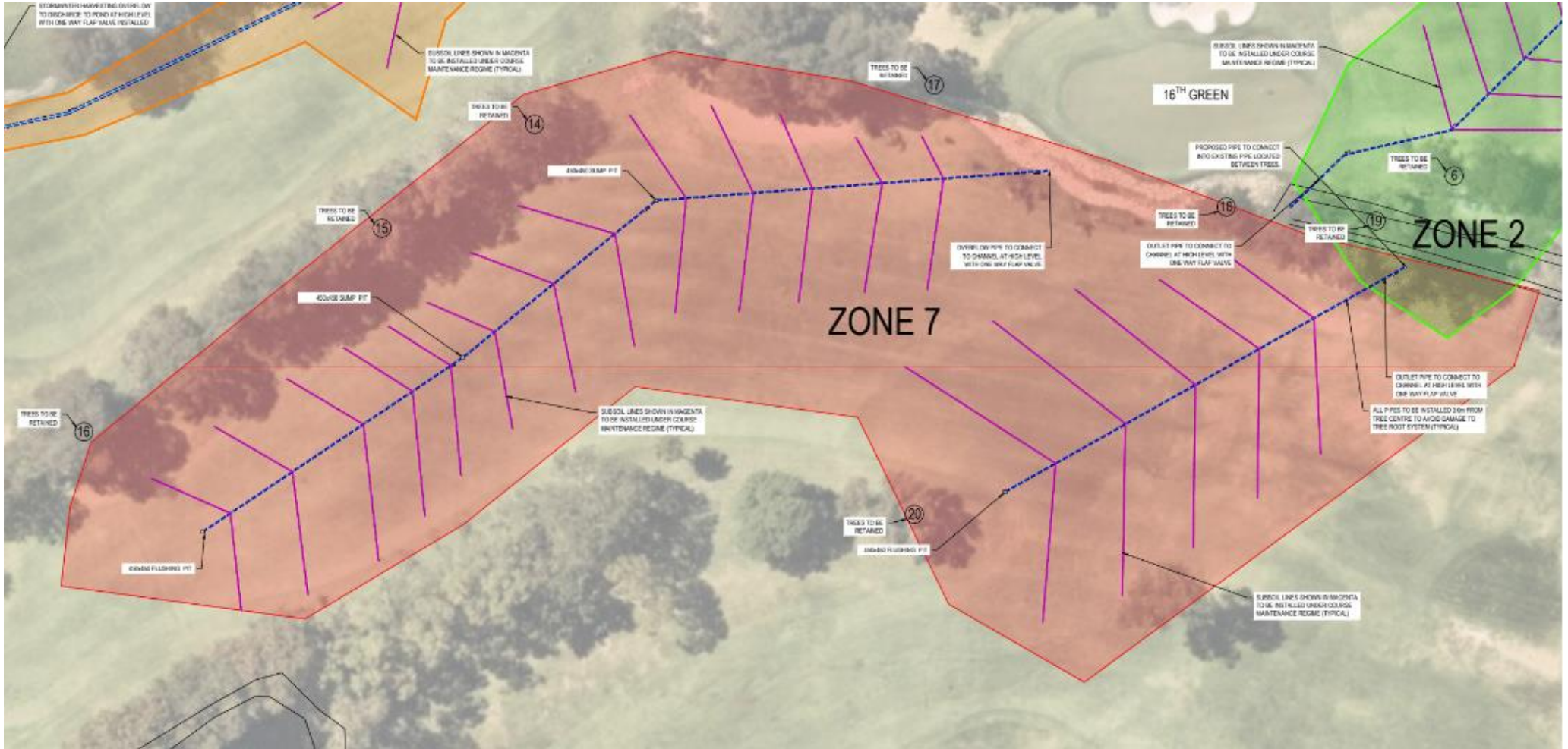


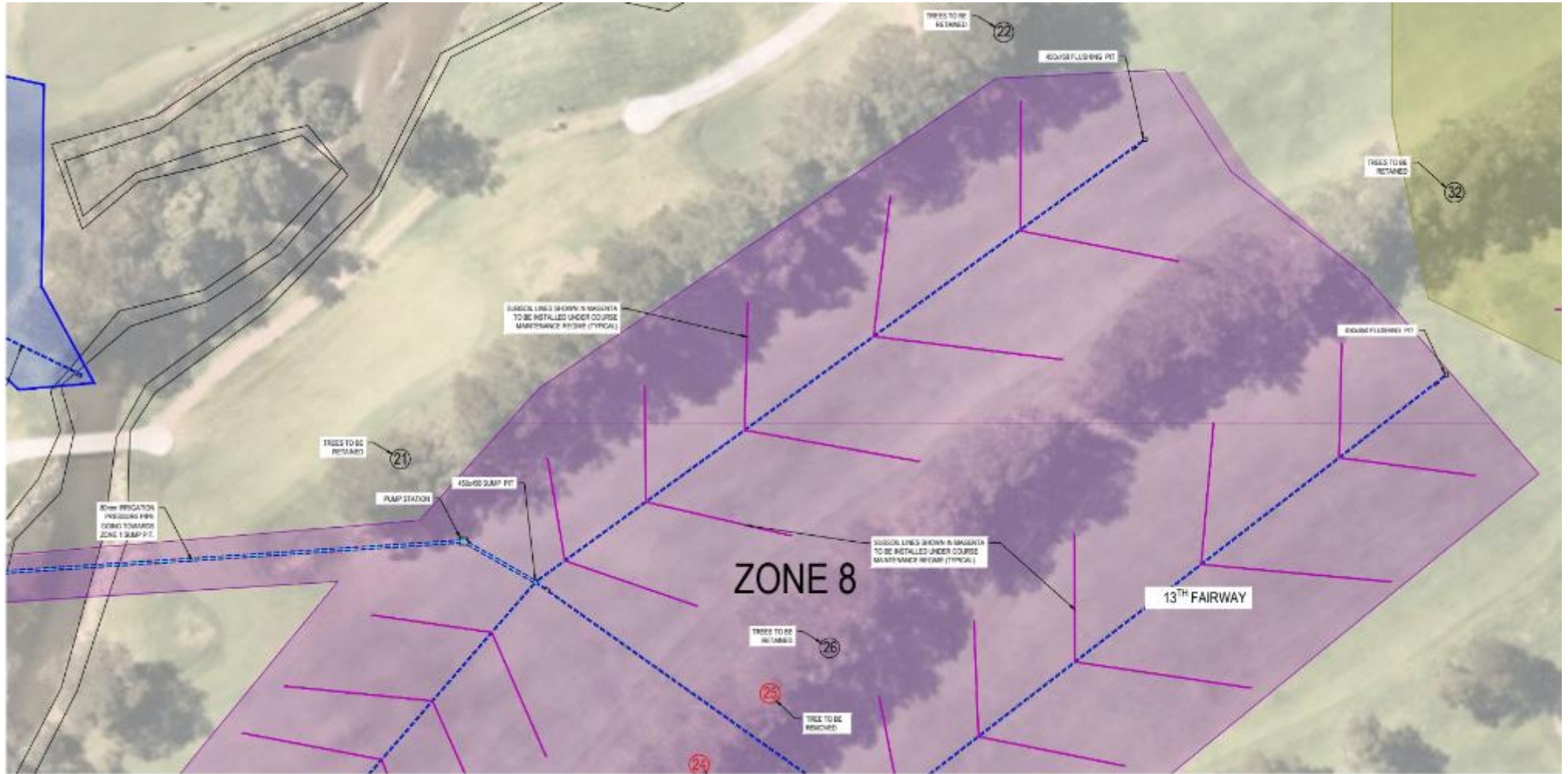




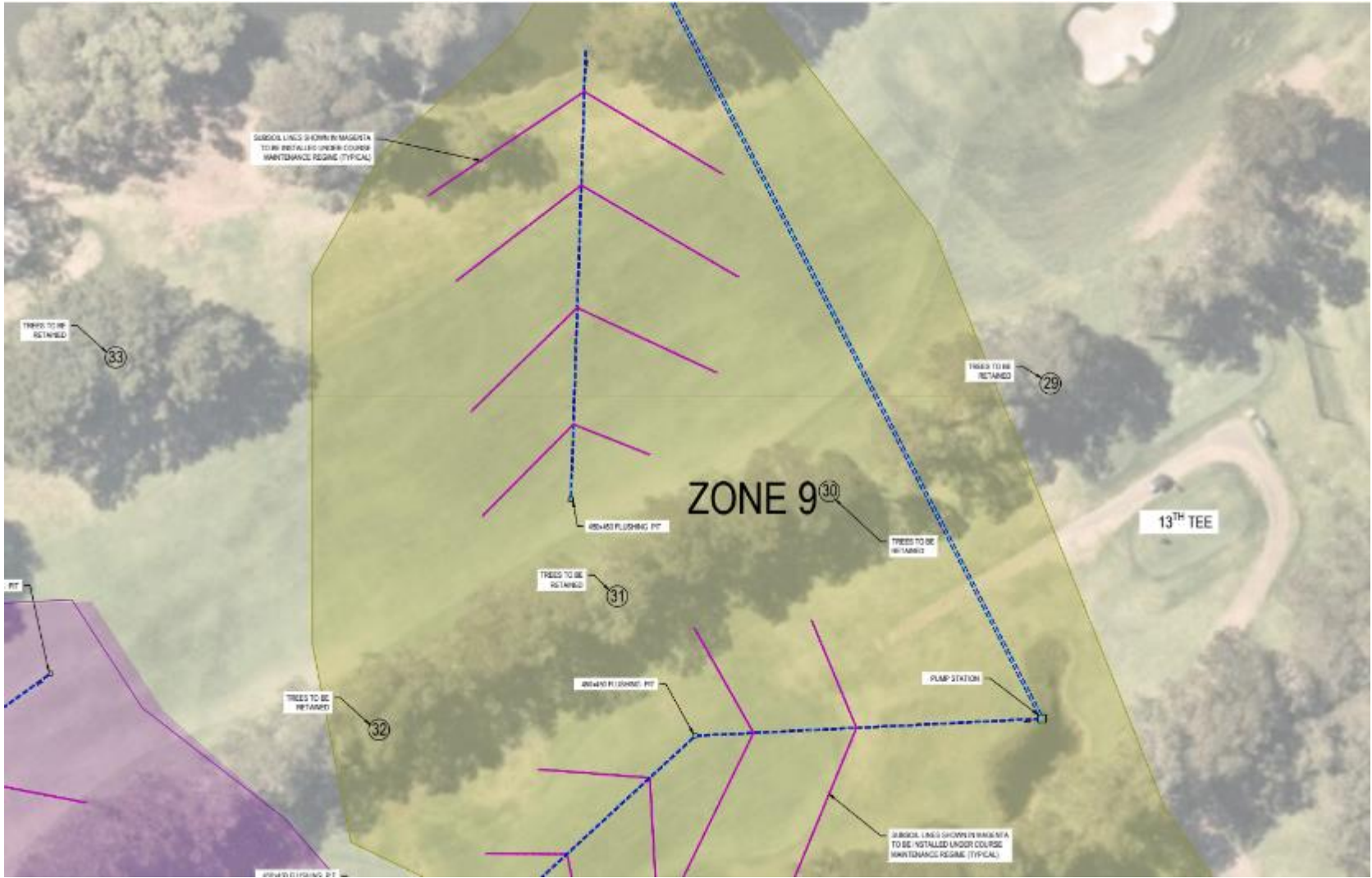




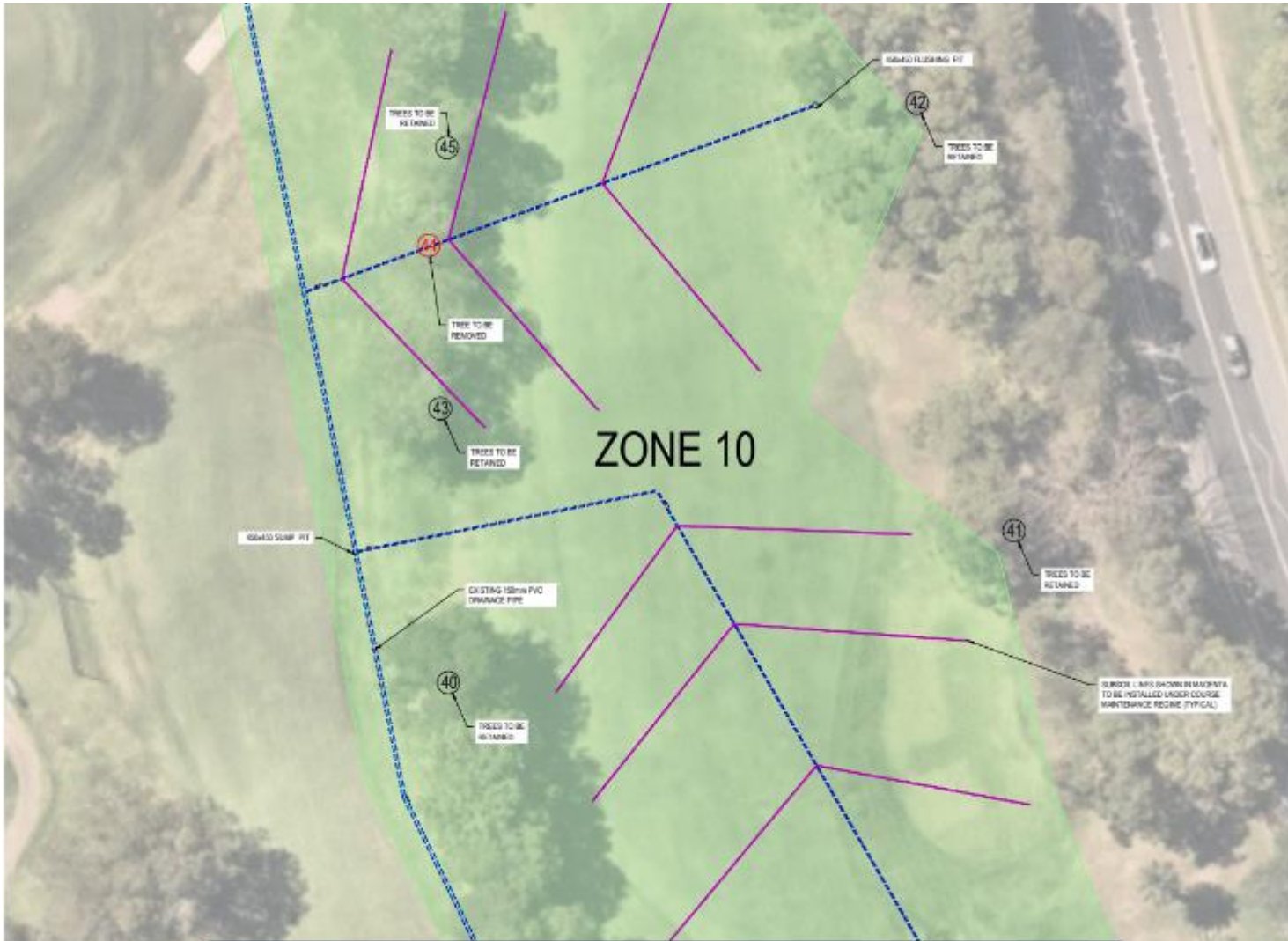


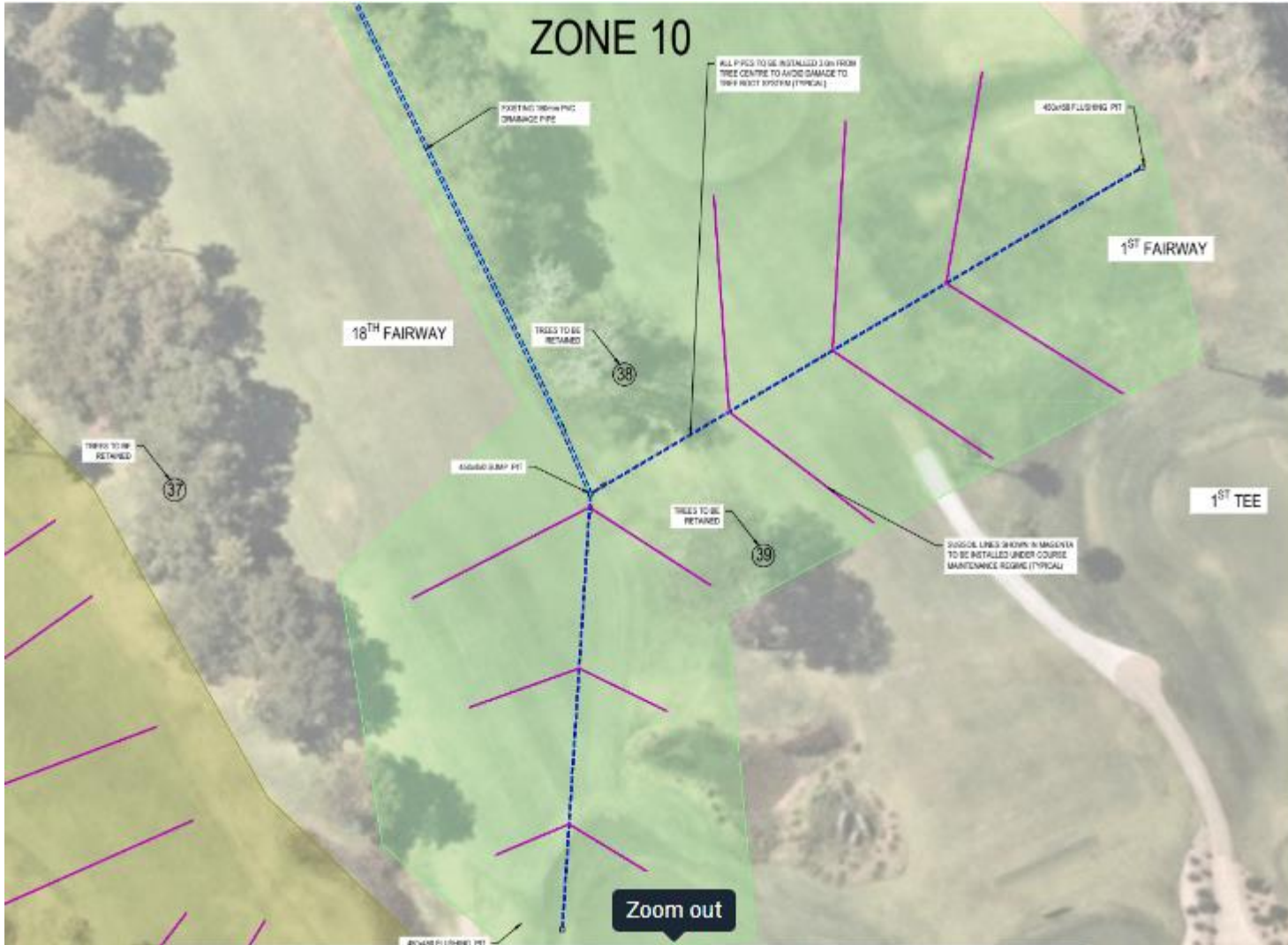












Appendix B. Tree assessment schedule.

Tree No	Genus Species	Age	Height (m)	DBH & DAB (mm)	TPZ & SRZ (m)	Canopy Radius (m)	ULE (Yrs)	Structural Condition	Vigour	Retention Value	Crown Class	Live crown Ratio (%)	Landscape significance	Comment
1	<i>Casuarina glauca</i> (Swamp She-oak)	OM	15	600 650	7.2 2.76	N- 3 S- 3 E- 3 W-3	Dead	N/a	N/a	V.Low	N/a	N/a	5	Dead tree, based on a large amount of delaminated bark and no vascular activity was detected. Adjacent to service road. Non habitat
2	<i>Melaleuca quinquenervia</i> (Broad-leaved Paperbark)	M	15	700 800	8.4. 3.01	N- 3 S- 4 E- 3 W-3	>40	Fair	Average	Mod	D	60	4	Crown bias to South. Multi -trunked at 1.8 m Sound unions. Fair representation of the species.
3	<i>Melaleuca quinquenervia</i> (Broad-leaved Paperbark)	M	10	MT 560 600	6.72 2.67	N- 2 S- 4 E- 2.5 W-2.5	15-40	Poor	Fair	Low	Co	40	5	Previous split at base, fork with fair union; Trunk distortion to North with epicormic shoots. 2 nd trunk slight lean to South. Poor representation of the species.
4	<i>Casuarina glauca</i> (Swamp She-oak)	M	18	600 650	7.2 2.76	N- 2 S- 3 E- 2.5 W-2.5	5-15	Fair	Fair	Low	Co	60	4	Transverse wound with decay (North) probable lightning strike. Crown bias to North. Fair representation of the species.

Tree No	Genus Species	Age	Height (m)	DBH & DAB (mm)	TPZ & SRZ (m)	Canopy Radius (m)	ULE (Yrs)	Structural Condition	Vigour	Retention Value	Crown Class	Live crown Ratio (%)	Landscape significance	Comment
5	<i>Casuarina glauca</i> (Swamp She-oak)	M	17	600 650	7.2 2.76	N- 2 S- 3 E- 2 W-2	15-40	Fair	Average	Mod	Co	60	4	Crown bias to South. Fair representation of the species.
6	<i>Casuarina glauca</i> (Swamp She-oak)	M	17	350 400	4.2 2.25	N- 1.5 S- 4 E- 1.5 W-1.5	>40	Fair	Average	Mod	Co	60	4	Trunk distortion and crown bias to South. Adjacent to creek. Fair representation of the species.
7	<i>Casuarina glauca</i> (Swamp She-oak)	M	15	350 400	4.2 2.25	N- 3 S- 2 E- 1.5 W-1.5	>40	Fair	Average	Mod	Co	40	5	Crown bias to North. Fair representation of the species.
8	<i>Casuarina glauca</i> (Swamp She-oak)	M	12	250 300	3.0 2.0	N- 2 S- 2 E- 1.5 W-1.5	5-15	Poor	Poor	V.Low	S	30	7	Crown partially removed (storm damage).20% deadwood with stubs. Poor representation of the species.
9	<i>Casuarina glauca</i> (Swamp She-oak)	M	15	400 450	4.8 2.37	N-3 S-3	>40	Average	Average	Mod	D	60	4	Crown bias to North. Fair representation of the species. Adjacent to dam

Tree No	Genus Species	Age	Height (m)	DBH & DAB (mm)	TPZ & SRZ (m)	Canopy Radius (m)	ULE (Yrs)	Structural Condition	Vigour	Retention Value	Crown Class	Live crown Ratio (%)	Landscape significance	Comment
10	<i>Casuarina glauca</i> (Swamp She-oak)	M	17	600 650	7.2 2.76	N- 2 S- 2 E- 2 W-2	>40	Fair	Average	Mod	Co	60	4	Crown bias to North. Fair representation of the species. Adjacent to dam
11	<i>Melaleuca armillaris</i> (Bracelet Honey Myrtle)	M	10	MT 390 450	4.68 2.37	N- 2 S- 2 E- 2 W-1.5	15-40	Fair	Average	Low	Co	50	5	Crown bias to North. Fair representation of the species. Slight lean to NE>
12	<i>Melaleuca quinquenervia</i> (Broad-leaved Paperbark)	M	12	250 350	3.0 2.13	N- 3.5 S- 2 E- 2 W-1.5	>40	Average	Average	Low	Co	50	5	Crown bias to North. Fair representation of the species.
13	<i>Eucalyptus robusta</i> (Swamp Mahogany)	M	15	500 600	6.0 2.67	N- 3.5 S- 2 E- 2 W-3	>40	Fair	Average	Mod	Int	60	4	Crown bias to North-West. Fair representation of the species.
14	<i>Casuarina glauca</i> (Swamp She-oak)	M	12	500 600	6.0 2.67	N- 2.5 S-	>40	Average	Average	Mod	Int	60	4	Fair representation of the species.

Tree No	Genus Species	Age	Height (m)	DBH & DAB (mm)	TPZ & SRZ (m)	Canopy Radius (m)	ULE (Yrs)	Structural Condition	Vigour	Retention Value	Crown Class	Live crown Ratio (%)	Landscape significance	Comment
15	<i>Melaleuca quinquenervia</i> (Broad-leaved Paperbark)	M	15	600 650	7.2 2.76	N- 3 S- 3 E- 3.5 W-3	>40	Fair	Average	Mod	Co	60	4	Multiple forks @ 2m; Sound unions. Fair representation of the species.
16	<i>Casuarina glauca</i> (Swamp She-oak)	M	12	500 550	6.0 2.57	N- 2 S- 1.5 E- 1.5 W-1.5	15-40	Poor	Average	Low	Co	60	6	Crown bias to North. Poor representation of the species.
17	<i>Casuarina glauca</i> (Swamp She-oak)	M	12	500 550	6.0 2.57	N- 2 S- 2 E- 2 W-1.5	15-40	Poor	Fair	Low	Int	40	6	Crown bias to North. Poor representation of the species
18	<i>Casuarina glauca</i> (Swamp She-oak)	M	12	400 450	4.8 2.37	N- 2 S- 2 E- 2 W-2	>40	Fair	Average	Low	Co	50	6	Fair representation of the species
19	<i>Casuarina glauca</i> (Swamp She-oak)	M	12	250 300	3.0 2.0	N- 2 S- 2 E-2	>40	Fair	Average	Low	Co	60	6	Fair representation of the species

Tree No	Genus Species	Age	Height (m)	DBH & DAB (mm)	TPZ & SRZ (m)	Canopy Radius (m)	ULE (Yrs)	Structural Condition	Vigour	Retention Value	Crown Class	Live crown Ratio (%)	Landscape significance	Comment
20	<i>Melaleuca quinquenervia</i> (Broad-leaved Paperbark)	M	14	600 650	7.2 2.76	N- 3 S- 2 E- 3.5 W-3	15-40	Poor	Fair	Low	D	60	5	Multiple forks @ 1m; Bifurcated unions with transverse cracks high probability of failure. Poor representation of the species.
21	<i>Casuarina glauca</i> (Swamp She-oak)	M	15	400 450	4.8 2.37	N- 3 S- 1.5 E- 2 W-1.5	>40	Fair	Average	Low	Co	60	5	Crown bias to the north. Fair representation of the species
22	<i>Casuarina glauca</i> (Swamp She-oak)	M	12	400 450	4.8 2.37	N- 1.5 S- 0.5 E- 2 W-1.5	15-40	Poor	Fair	Low	Co	50	6	Co-dom fork with inclusions at 3m. Poor representation of the species.
23	<i>Casuarina glauca</i> (Swamp She-oak)	M	15	600 650	7.2 2.76	N-2.5 S-2.5 E-2.0	>40	Fair	Average	Low	Co	60	5	Fair representation of the species
24	<i>Casuarina glauca</i> (Swamp She-oak)	M	12	300 350	3.6 2.13	N- 1.5 S- 0.5 E- 1.5 W-1.5	5-15	Poor	Fair	V.Low	Int	50	6	Slight lean to North. Transverse crack in trunk.20% Deadwood wood with stubs. Poor representation of the species.

Tree No	Genus Species	Age	Height (m)	DBH & DAB (mm)	TPZ & SRZ (m)	Canopy Radius (m)	ULE (Yrs)	Structural Condition	Vigour	Retention Value	Crown Class	Live crown Ratio (%)	Landscape significance	Comment
25	<i>Casuarina glauca</i> (Swamp She-oak)	M	13	300 350	3.6 2.13	N- 1.5 S- .05 E- 1.5 W-1.5	5-15	Poor	Fair	Low	Int/Supp	60	7	Suppressed by neighbouring trees. 30%deadwood and stubs. Poor representation of the species.
26	<i>Casuarina glauca</i> (Swamp She-oak)	M	15	400 450	4.8 2.37	N-2 S- 2 E- 1.5 W-1.5	15-40	Fair	Average	Low	Co	60	5	Co-dom fork at 4m with sound union. Minor deadwood. Fair representation of the species.
27	<i>Casuarina glauca</i> (Swamp She-oak)	M	15	600 650	7.2 2.76	N-2.5 S- 2 E- 1.5 W-1.5	>40	Fair	Average	Mod	D	60	4	Slight lean to North. Transverse crack in trunk. 10% Deadwood wood with stubs. Fair representation of the species.
28	<i>Casuarina glauca</i> (Swamp She-oak)	M	15	500 550	6.0 2.57	N-2.5 S- 2 E- 2 W-2	>40	Average	Average	Mod	D	60	4	Habit typical for the species.
29	<i>Casuarina glauca</i> (Swamp She-oak)	M	15	400 450	4.8 2.37	N- 1.5 S- 1.5 E- 1.5	15-40	Poor	Fair	Low	Co	60	6	Co-dom fork with inclusions at 3m. Poor representation of the species.

Tree No	Genus Species	Age	Height (m)	DBH & DAB (mm)	TPZ & SRZ (m)	Canopy Radius (m)	ULE (Yrs)	Structural Condition	Vigour	Retention Value	Crown Class	Live crown Ratio (%)	Landscape significance	Comment
30	<i>Casuarina glauca</i> (Swamp She-oak)	M	15	400 450	4.8 2.37	N- 1.5 S- 1.5 E- 1.5 W-1.5	5-15	Poor	Fair	Low	Co	60	6	20%deadwood and stubs. Poor representation of the species.
31	<i>Casuarina glauca</i> (Swamp She-oak)	M	15	300 350	3.6 2.13	N- 2.5 S- 1.5 E- 2.5 W-1.5	>40	Fair	Average	Low	Co	60	5	10%deadwood and stubs. Fair representation of the species.
32	<i>Casuarina glauca</i> (Swamp She-oak)	M	15	350 400	4.2 2.25	N- 2. S- 1.5 E- 2. W-1.5	>40	Fair	Average	Low	Co	60	5	10%deadwood and stubs. Fair representation of the species.
33	<i>Casuarina glauca</i> (Swamp She-oak)	M	15	300 350	3.6 2.13	N- 2.5 S- 1.5 E- 2.5 W-1.5	>40	Fair	Average	Low	Co	60	5	10%deadwood and stubs. Fair representation of the species.
34	<i>Lagunaria patersonia</i> (Norfolk Island Hibiscus)	M	10	MT 270 300	3.24 2.0	N- 2.5 S- 1.5 E- 2.5	>40	Fair	Average	Low	D	60	5	Poor pruning history. Fair representation of the species. Exempt species list (Pittwater 21 DCP)

Tree No	Genus Species	Age	Height (m)	DBH & DAB (mm)	TPZ & SRZ (m)	Canopy Radius (m)	ULE (Yrs)	Structural Condition	Vigour	Retention Value	Crown Class	Live crown Ratio (%)	Landscape significance	Comment
35	<i>Erythrina x sykesii</i> (Australian Coral Tree)	M	14	600 650	7.2 2.76	N- 4 S- 4 E- 4 W-4.	15-40	Poor	Fair	Low	Co	60	6	Multiple wounds from previous branch failure with decay. Exempt species list (Pittwater 21 DCP).
36	<i>Casuarina glauca</i> (Swamp She-oak)	M	15	500 550	6.0 2.57	N- 2.5 S- 1.5 E- 2.5 W-2.5	15-40	Poor	Fair	Low	D	50	5	Co-dom fork @ 2.2m; Bifurcated union with transverse crack high probability of failure. Poor representation of the species.
37	<i>Lagunaria patersonia</i> (Norfolk Island Hibiscus)	M	8	250 300	3.0 2.0	N- 1.5 S- 2.5 E- 2.5 W-2.5	15-40	Average	Average	Low	Co	60	5	Fair representation of the species. Exempt species list (Pittwater 21 DCP)
38	<i>Casuarina glauca</i> (Swamp She-oak)	M	12	350 400	4.2 2.25	N- 2. S- 1.5 E- 2. W-1.5	>40	Average	Average	Low	Co	60	5	10%deadwood and stubs. Fair representation of the species.
39	<i>Casuarina glauca</i> (Swamp She-oak)	M	15	400 450	4.8 2.37	N- 1.5 S- 2.5 E- 2.5	15-40	Fair	Fair	Low	Co	60	5	10%deadwood and stubs. Fair representation of the species.

Tree No	Genus Species	Age	Height (m)	DBH & DAB (mm)	TPZ & SRZ (m)	Canopy Radius (m)	ULE (Yrs)	Structural Condition	Vigour	Retention Value	Crown Class	Live crown Ratio (%)	Landscape significance	Comment
40	<i>Casuarina glauca</i> (Swamp She-oak)	M	15	600 650	7.2 2.76	N- 3 S- 3 E- 2.5	15-40	Poor	Fair	Low	Co	60	6	Multiple wounds from previous branch failure with decay. Exempt species list (Pittwater 21 DCP).
41	<i>Phoenix canariensis</i> (Canary Island Date Palm)	M	12	500 550	6.0 2.57	N- 3 S- 3 E- 3	>40	Average	Average	Mod	D	30	4	Habit typical of the species.
42	<i>Eucalyptus robusta</i> (Swamp Mahogany)	M	18	400 450	4.8 2.37	N- 4 S- 3 E- 2	>40	Average	Average	Mod	D	50	4	Minor deadwood <10%. Minor crown bias to North.
43	<i>Casuarina glauca</i> (Swamp She-oak)	M	12	300 350	3.6 2.13	N- 2 S- 3 E- 2	15-40	Fair	Average	Low	Co	60	6	Slight lean-to South. Fair representation of the species.
44	<i>Casuarina glauca</i> (Swamp She-oak)	M	12	400 450	4.8 2.37	N- 2 S- 2 E- 2	5-15	Poor	Fair	Low	Co	40	6	Major wound (West) from branch tear-out with decay, Poor wound-wood development. High probability of failure.
45	<i>Casuarina glauca</i>	M	12	400 450	4.8 2.37	N-2.S-2 W-2.E-2	15-40	Fair	Average	Low	Co	60	6	10%deadwood and stubs. Fair representation of the species.

Appendix C. Tree Retention Matrix

	Landscape Significance Reading						
Tree Sustainability	1	2	3	4	5	6	7
Greater than 40 years	High Retention Value						
15 to 40 years			Moderate				
5 to 15 years				Low			
Less than 5 years					Very Low Retention Value		
Dead or hazardous							

Modified by Morton.A. Technical Manual Newcastle Urban Forest; Part A 4.1 Determining tree retention value from Couston,M and Howden.M (2001) Tree Retention Values Table Footprint Green Pty Ltd, Sydney Australia.

Appendix D. Explanation of terms.

Height – Provided in Tree Schedule as metres

U.L.E. - Useful Life Expectancy.

D.B.H - Diameter at Breast Height (*measured at 1.4 meters from base*)

D.A.B - Diameter at base.

Age Class - **J** juvenile **SM** semi mature **M** mature **OM** over mature

Crown Class – **D** Dominant **CO** Co-dominant **I** Intermediate **S** Suppressed

Live Crown Ratio – Is the ratio of the foliage canopy to the total height of the tree.

Canopy Spread - **N** north **S** south **E** east **W** west

T.P.Z. Tree Protection Zone means an area above and below ground calculated in accordance with AS 4970 -2009 Protection of trees on development sites. It is a radial distance from the stem set aside for the protection of a tree's roots and crown to provide for the viability and stability of the tree. The extent of potential impacts to the trees is summarised as.

0% of root zone impacted – no impact of significance

0 to 10% of TPZ impacted – low level of impact

10 to 15% of TPZ impacted – low to marginal level of impact

15 to 20% of TPZ impacted – marginal level of impact

20 to 25% of TPZ impacted – marginal to high level of impact

25 to 35% of TPZ impacted – high level of impact

>35% of TPZ impacted – significant level of impact

S.R.Z. Structural Root Zone means an area around the base of a tree required for the tree to be stable. The tree's woody roots and soil cohesion in this area are necessary to hold the tree upright. It is a radial distance from the stem calculated in accordance with AS 4970 -2009 Protection of trees on development sites.

Vigour -The general appearance of the canopy/foliage of the tree at the time of inspection. Vigour can vary with the season and rainfall frequency. A tree can have 'Good' vigour but be hazardous due to 'Poor' condition. A tree in Good vigour has the ability to sustain its life processes. Vigour is synonymous with health **E** excellent **A** average **F** fair **P** poor

Wound wood Development - **E** excellent **A** average **F** fair **P** poor

Structural Condition- The general form and structure of the trunk/s and branching. Trunk lean, trunk/branch structural defects, canopy skewness or other hazards are considered. - **E** excellent **A** average **F** fair **P** poor

Appendix E. U.L.E

Useful Life Expectancy (U.L.E) Categories and Subgroups (J.Barrell 1996)

1. Long ULE > 40 Years

- a) Structurally sound trees located in positions that can accommodate future growth
- b) Trees which could be made suitable for long term retention by remedial care
- c) Trees of special significance which would warrant extraordinary efforts to secure their long-term retention

2. Medium ULE of 15 – 40 Years

- a) Trees which may only live from 15 to 40 years
- b) Trees which may live for more than 40 years but would be removed for safety or nuisance reasons
- c) Trees which may live for more than 15 years but would be removed to prevent interference with more suitable individuals or to provide space for new planting
- d) Trees which could be made suitable for retention in the medium term by remedial care

3. Short ULE of 5 – 15 Years

- a) Trees which may only live from 5 to 15 years
- b) Trees which may live for more than 15 years but would be removed for safety or nuisance reasons
- c) Trees which may live for more than 15 years but would be removed to prevent interference with more suitable individuals or to provide space for new planting
- d) Trees which require substantial remediation and are only suitable for retention in the short term.

4. Remove tree within 5 years.

- a) Dead, dying, suppressed or declining trees because of disease or inhospitable conditions
- b) dangerous trees through instability or recent loss of adjacent trees
- c) Dangerous trees because of structural defects including cavities, decay, included bark, wounds or poor form
- d) Damaged trees that are clearly not safe to retain
- e) Trees which may live for more than 5 years but would be removed to prevent interference with more suitable individuals or to provide space for new planting
- f) Trees which are damaging or may cause damage to existing structures within the next 5 years

5. Trees suitable for transplant.

- a) small trees less than 5m in height
- b) young trees less than 15 years old but over 5m in height
- c) formal hedges and trees intended for regular pruning to control growth.
- d) palms, monocots, cycads and tree ferns.

Appendix F. References.

- <https://www.northernbeaches.nsw.gov.au/environment/trees>. Visited 12-03-21.
- <https://www.lmbc.nsw.gov.au/Maps/index.html?viewer=BOSETMap>. Visited 06-03-21
- <https://www.environment.nsw.gov.au/eSpade2Webapp> > Visited 12-03-21
- <https://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?ID=1920200>. Visited 12-03-21
- <https://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10094> . Visited 12-03-12-21
- Useful life expectancy (*Pre planning tree surveys;Barrell.J:1993*).
- Technical Manual Newcastle Urban Forest; Part A 4.1 Determining tree retention value.
<http://www.newcastle.nsw.gov.au/getmedia/b358fcff-8e6a-4ca6-b1ad-dd0f7ba38dd9/1-Part-A-Private-Trees-Newcastle-Urban-Forest-Technical-Manual.aspx> > Visited 14-03-21
- http://www.treetec.net.au/TPZ_SRZ_DBH_calculator.php > Visited 14-03-21
- <https://maps.six.nsw.gov.au> . Visited 11-03-21
- Mattheck .C. Breloer.H. (1999) *The Body Language of Trees – a handbook for failure analysis* 5th ed., London: The Stationery Office, U.K
- Harris, Clark and Matheny (2004) *Arboriculture, Integrated Management of Landscape Trees, Shrubs and vines*.4th edition. Pearson Education Inc. New Jersey, USA
- Australian Standard AS 4970-2009 'Protection of trees on Development sites.
- Australian Standard AS 4373-2007 'Pruning of Amenity Trees'.
- Draper. D. Richards P (2009). *Dictionary for managing trees in urban environments*. CSIRO publishing

Appendix G. Qualifications

Michael. V. Marley

Dip Hort / Dip Arb

AQF level 5 (TAFE-2006-2911234)

Registered QTRA and Advanced registered licensee; Ref No- 4431

Associate member- Institute of Australian Consulting Arboriculturists. (IACA)

Bellevue Tree Consultants

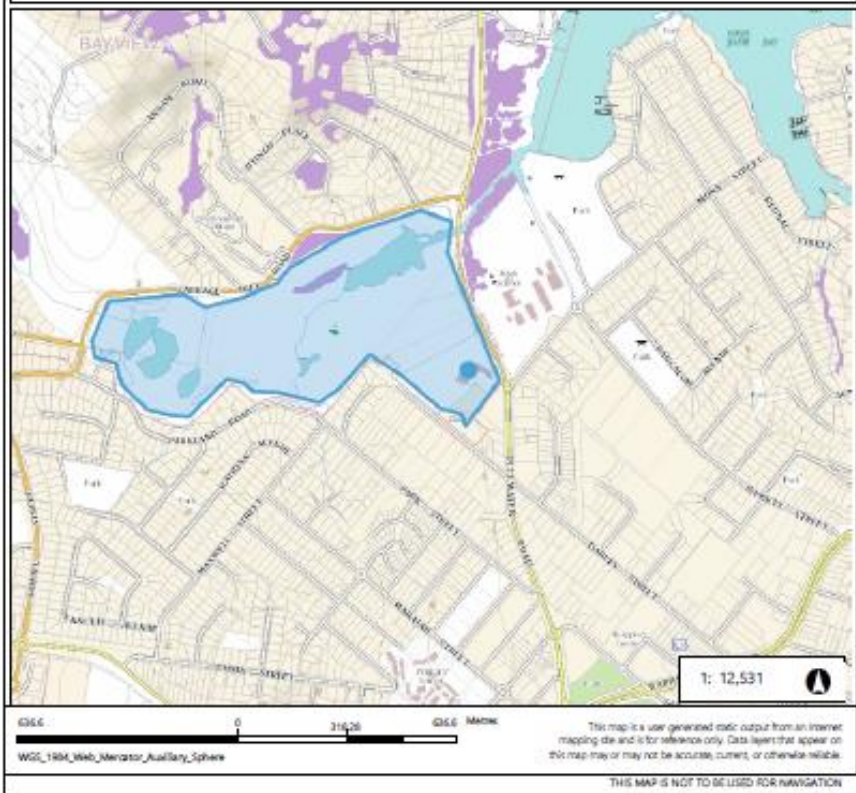
ABN- 34117508643

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Appendix H. Biodiversity Offset Threshold Map



Biodiversity Offset Scheme (BOS) Entry Threshold Map



Legend

- Biodiversity Values that have been mapped for more than 90 days
- Biodiversity Values added within last 90 days

Notes
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Biodiversity Values Map and Threshold Report

Results Summary

Date of Calculation	06/03/2021 4:06 PM	BDAR Required*	
Total Digitised Area	27.41 ha		
Minimum Lot Size Method	Lot size		
Minimum Lot Size	0.01 ha		
Area Clearing Threshold	0.25 ha		
Area clearing trigger Area of native vegetation cleared	Unknown #	Unknown #	
Biodiversity values map trigger Impact on biodiversity values map(not including values added within the last 90 days)?	yes	yes	
Date of the 90 day Expiry	N/A		

*If BDAR required has:

• at least one "Yes": you have exceeded the BOS threshold. You are now required to submit a Biodiversity Development Assessment Report with your development application. Go to <https://customer.lmhc.nsw.gov.au/assessment/AccreditedAssessor> to access a list of assessors who are accredited to apply the Biodiversity Assessment Method and write a Biodiversity Development Assessment Report

• "No": you have not exceeded the BOS threshold. You may still require a permit from local council. Review the development control plan and consult with council. You may still be required to assess whether the development is "likely to significantly affect threatened species" as determined under the test in s. 7.3 of the Biodiversity Conservation Act 2016. You may still be required to review the area where no vegetation mapping is available.

Where the area of impact occurs on land with no vegetation mapping available, the tool cannot determine the area of native vegetation cleared and if this exceeds the Area Threshold. You will need to work out the area of native vegetation cleared - refer to the BOSET user guide for how to do this.

On and after the 90 day expiry date a BDAR will be required.

Disclaimer

This results summary and map can be used as guidance material only. This results summary and map is not guaranteed to be free from error or omission. The State of NSW and Office of Environment and Heritage and its employees disclaim liability for any act done on the information in the results summary or map and any consequences of such acts or omissions. It remains the responsibility of the proponent to ensure that their development application complies with all aspects of the Biodiversity Conservation Act 2016.

The mapping provided in this tool has been done with the best available mapping and knowledge of species habitat requirements. This map is valid for a period of 30 days from the date of calculation (above).

Acknowledgement

I as the applicant for this development, submit that I have correctly depicted the area that will be impacted or likely to be impacted as a result of the proposed development.

Signature _____ Date: 06/03/2021 04:06 PM