



Assessment of trees at Camp Reserve,  
Castlemaine

## **Arboricultural Impact Assessment**

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## 1. Introduction

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Upgrades are proposed to Camp Reserve in Forest Street Castlemaine that includes a new pavilion, change rooms, spectator areas and surrounding infrastructure. New parking and an access road are also proposed along with netball courts and associated facilities.

This report will provide:

- the findings of the assessment
- impacts from the proposed design
- recommendations.

## 2. Tree Assessment Method

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Cameron Ryder inspected the trees within proximity to the proposed Stage 1 works as requested on Thursday, 22 February 2024. The following data are presented in this report:

- Unique ID (maintained with Treelogic ID numbers)
- Image of tree
- Botanic and common name
- Tree dimensions (Height x Width)
- Diameter at breast height (DBH)
- Diameter at base (DAB)
- Health
- Structure
- Useful life expectancy (ULE)
- Retention value
- Comments

Trees have been aligned to match supplied drawings. Tree protection detail has been prepared and mapped in accordance with AS4970-2009 *Protection of Trees on Development Sites*.

The trees were visually assessed from ground level, heights and widths were estimated and trunks measured with a diameter tape. No invasive tests were conducted or samples taken and any assessments of decay are qualitative only.

For all tree assessment descriptors, see Appendix 1.



### 3. Site Map

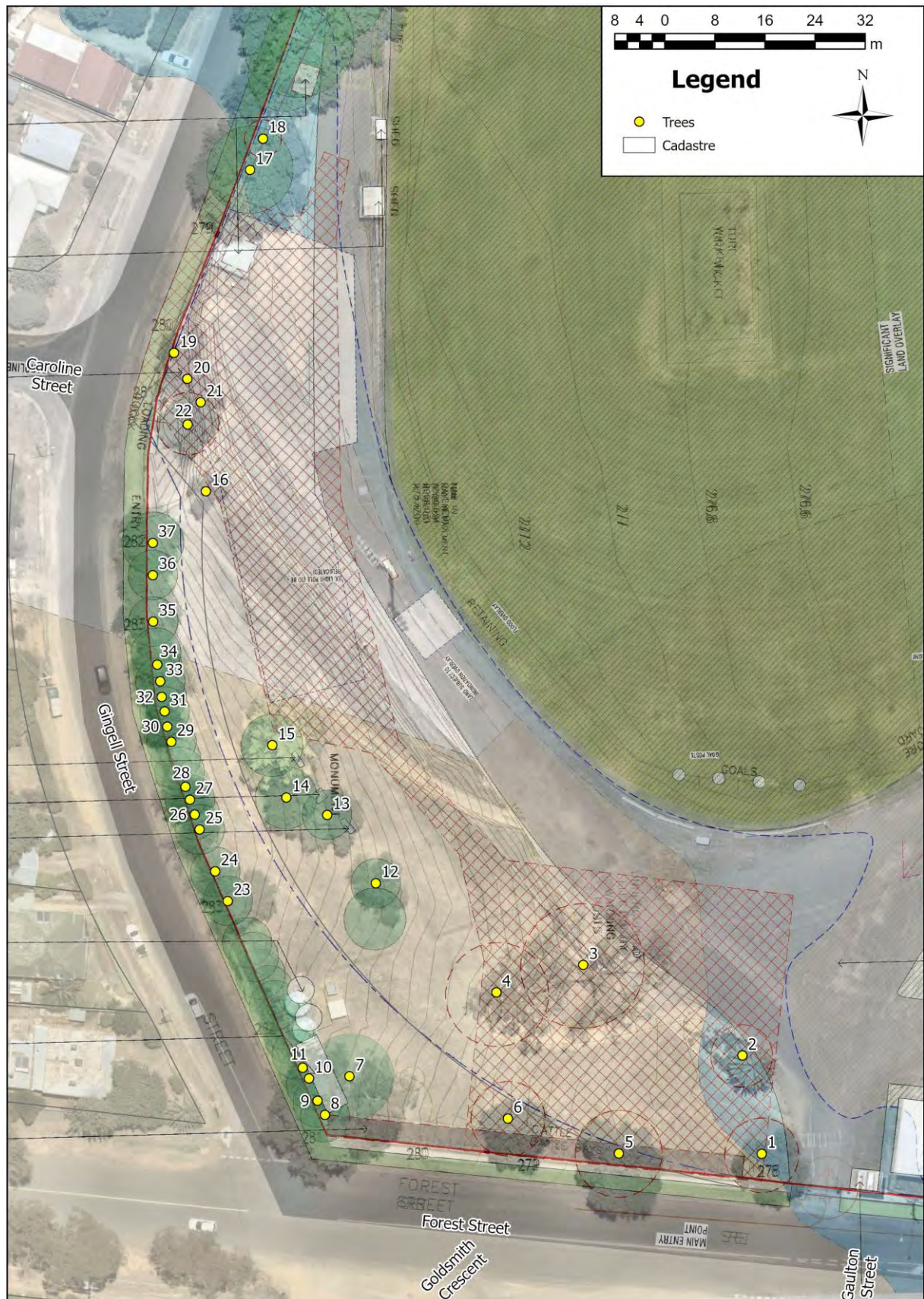


Figure 1: Aerial image of all trees (Nearmap image date December 2023).



## 4. Tree Details

Table 1: Tree assessment summary.

ID	Botanical Name	Common Name	Origin	Age	Height	Width	DBH	DAB	Health	Structure	ULE	Retention	TPZr (m)	SRZr (m)
1	<i>Schinus molle</i>	Peppercorn Tree	Exotic	Mature	8	10	85 71	200	Good	Fair	20+	High	13.32	4.43
2	<i>Phoenix canariensis</i>	Canary Island Date Palm	Exotic	Mature	10	5	73	-	Good	Good	20+	High	3.5	N/A
3	<i>Eucalyptus camaldulensis</i>	River Red Gum	Indigenous	Over mature	22	16	137	148	Poor	Fair	20+	High	15	3.9
4	<i>Eucalyptus camaldulensis</i>	River Red Gum	Indigenous	Mature	22	12	78	96	Fair	Fair	20+	High	9.36	3.25
5	<i>Ulmus ×hollandica</i>	Dutch Elm	Exotic	Mature	14	12	85	94	Good	Fair	20+	High	10.2	3.22
6	<i>Ulmus ×hollandica</i>	Dutch Elm	Exotic	Over mature	9	10	76	83	Fair	Poor	11-20	High	9.12	3.06
7	<i>Eucalyptus melliodora</i>	Yellow Box	Indigenous	Mature	18	12	82	104	Good	Fair	20+	High	9.84	3.36
8	<i>Hesperocyparis macrocarpa</i>	Monterey Cypress	Exotic	Over mature	8	8	52	65	Fair	Fair	6-10	Low	6.24	2.76
9	<i>Hesperocyparis macrocarpa</i>	Monterey Cypress	Exotic	Over mature	14	10	66	78	Fair	Fair	6-10	Moderate	7.92	2.98
10	<i>Hesperocyparis macrocarpa</i>	Monterey Cypress	Exotic	Over mature	14	8	51	61	Poor	Fair	6-10	Moderate	6.12	2.69
11	<i>Hesperocyparis macrocarpa</i>	Monterey Cypress	Exotic	Over mature	14	8	51	63	Poor	Fair	1-5	Low	6.12	2.73
12	<i>Schinus molle</i>	Peppercorn Tree	Exotic	Mature	9	8	51	65	Fair	Fair	20+	Moderate	6.12	2.76
13	<i>Ulmus ×hollandica</i>	Dutch Elm	Exotic	Mature	8	8	42	48	Fair	Fair	20+	Moderate	5.04	2.43
14	<i>Schinus molle</i>	Peppercorn Tree	Exotic	Mature	9	9	49	66	Fair	Fair	20+	Moderate	5.88	2.78
15	<i>Hesperocyparis macrocarpa</i>	Monterey Cypress	Exotic	Mature	10	11	64	72	Fair	Fair	11-20	Moderate	7.68	2.88
16	<i>Eucalyptus leucoxylon</i>	Yellow Gum	Indigenous	Mature	8	5	28	32	Good	Fair	11-20	Moderate	3.36	2.05
17	<i>Quercus robur</i>	English Oak	Exotic	Mature	18	18	84	99	Good	Good	20+	High	10.08	3.3
18	<i>Quercus robur</i>	English Oak	Exotic	Mature	16	6	34 23	37 27	Fair	Fair	20+	Moderate	4.92	2.39
19	<i>Eucalyptus leucoxylon</i>	Yellow Gum	Indigenous	Mature	8	6	27	32	Good	Fair	11-20	Moderate	3.24	2.05
20	<i>Eucalyptus leucoxylon</i>	Yellow Gum	Indigenous	Mature	6	4	17	23	Fair	Fair	11-20	Low	2.04	1.79
21	<i>Eucalyptus leucoxylon</i>	Yellow Gum	Indigenous	Mature	5	4	17	22	Fair	Fair	11-20	Low	2.04	1.75
22	<i>Ulmus ×hollandica</i>	Dutch Elm	Exotic	Mature	9	9	32 26 21	52	Fair	Fair	11-20	Low	5.52	2.51
23	<i>Hesperocyparis macrocarpa</i>	Monterey Cypress	Exotic	Mature	11	7	50	62	Poor	Fair	6-10	Low	6	2.71
24	<i>Hesperocyparis macrocarpa</i>	Monterey Cypress	Exotic	Severe decline	11	5	47	59	Very poor	Poor	1-5	Low	5.64	2.65

ID	Botanical Name	Common Name	Origin	Age	Height	Width	DBH	DAB	Health	Structure	ULE	Retention	TPZr (m)	SRZr (m)
25	<i>Hesperocyparis macrocarpa</i>	Monterey Cypress	Exotic	Severe decline	11	5	40	47	Poor	Poor	0	None	4.8	2.41
26	<i>Hesperocyparis macrocarpa</i>	Monterey Cypress	Exotic	Severe decline	11	4	23	30	Dead	Very Poor	0	None	2.76	2
27	<i>Hesperocyparis macrocarpa</i>	Monterey Cypress	Exotic	Over mature	11	6	39	48	Poor	Poor	1-5	None	4.68	2.43
28	<i>Hesperocyparis macrocarpa</i>	Monterey Cypress	Exotic	Over mature	5	6	33	40	Very poor	Poor	1-5	None	3.96	2.25
29	<i>Hesperocyparis macrocarpa</i>	Monterey Cypress	Exotic	Over mature	8	6	31	38	Poor	Poor	6-10	None	3.72	2.2
30	<i>Hesperocyparis macrocarpa</i>	Monterey Cypress	Exotic	Severe decline	7	5	23	30	Very poor	Poor	0	Low	2.76	2
31	<i>Hesperocyparis macrocarpa</i>	Monterey Cypress	Exotic	Over mature	9	5	27	34	Poor	Poor	6-10	None	3.24	2.1
32	<i>Hesperocyparis macrocarpa</i>	Monterey Cypress	Exotic	Mature	10	7	37	44	Fair	Fair	6-10	Low	4.44	2.34
33	<i>Hesperocyparis macrocarpa</i>	Monterey Cypress	Exotic	Mature	10	6	37	45	Fair	Fair	6-10	Low	4.44	2.37
34	<i>Hesperocyparis macrocarpa</i>	Monterey Cypress	Exotic	Mature	9	7	39	43	Fair	Fair	6-10	Low	4.68	2.32
35	<i>Hesperocyparis macrocarpa</i>	Monterey Cypress	Exotic	Mature	7	7	37	44	Fair	Fair	6-10	Low	4.44	2.34
36	<i>Hesperocyparis macrocarpa</i>	Monterey Cypress	Exotic	Mature	6	7	36	42	Fair	Poor	1-5	Low	4.32	2.3
37	<i>Hesperocyparis macrocarpa</i>	Monterey Cypress	Exotic	Mature	6	8	60	72	Fair	Poor	1-5	Low	7.2	2.88

## 5. Discussion

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### 5.1 The Site

Camp Reserve is an historic public space and premier sporting reserve located centrally in the Mount Alexander Shire's main population centre of Castlemaine. Situated a short distance west of the Castlemaine Town Centre, the Reserve occupies an area of approximately 3.8ha and is bounded by Barkers Creek, Forest Street and Gingell Street (Figure 2 and Figure 3).

The area of prime concern is a small section of the reserve in the south-west corner totalling approximately 1ha.

The assessment area is mostly comprised of planted specimens with coniferous species being prominent along the boundary with Gingell Street. Several other exotics are present including Dutch Elm *Ulmus xhollandica* and English Oak *Quercus robur*.

There are 3 species likely to be indigenous and remnant to the site. Trees 3 & 4 River Red Gum *Eucalyptus camaldulensis* and Tree 7 Yellow Box *Eucalyptus melliodora*. Trees 3 & 4 are centrally located within the reserve and have suffered decline in recent years (Figure 2).



Figure 2: Southern section of the assessment area with Trees 3 & 4 surrounded by the white picket fence.





Figure 3: Northern section of the assessment area.

The majority of the assessed area of Camp Reserve is within Public Park and Recreation Zone (PPRZ). A south-west sliver of the reserve is General Residential Zone (GRZ1) where it is adjacent with Gingell Street. Trees within PPRZ include 1-4 & 12-22 whereas trees within the GRZ1 include 5-11 & 23-37.

Heritage Overlay (HO668) applies to the site and tree controls apply. A permit is required to remove, destroy or lop a tree. There are no other planning overlays that restrict the removal, destruction or lopping of trees within the project area; however, Significant Landscape Overlay Schedule 2 (SLO2) exists along the Barkers Creek to the east.

Clause 52.17 Native Vegetation exists and is likely to be applicable to Trees 3, 4 & 7. A permit and offsets would be required if any of these trees were removed.

Much of the southern portion of the reserve is located within a Designated Bushfire Prone Area and as such exemptions listed under Clause 52.12 Bushfire Protection Exemptions would apply if relevant (Figure 4).



Figure 4: Planning mapping for the site showing zoning, overlays and bushfire prone areas.

## 5.2 The Trees

37 trees were assessed at the site, Monterey Cypress comprised the majority of trees with a long planting along the fence line (Table 2).

Table 2: Tree species summary.

Botanical Name	Common Name	Origin	Count
<i>Hesperocyparis macrocarpa</i>	Monterey Cypress	Exotic	20
<i>Ulmus ×hollandica</i>	Dutch Elm	Exotic	4
<i>Eucalyptus leucoxylon</i> *	Yellow Gum	Indigenous	4
<i>Schinus molle</i>	Peppercorn Tree	Exotic	3
<i>Quercus robur</i>	English Oak	Exotic	2
<i>Eucalyptus camaldulensis</i>	River Red Gum	Indigenous	2
<i>Phoenix canariensis</i>	Canary Island Date Palm	Exotic	1
<i>Eucalyptus melliodora</i>	Yellow Box	Indigenous	1
Total			37

\*Whilst Yellow Gum is listed as indigenous, the cultivar that is growing is a planted ornamental and not a locally occurring subspecies.

At the southern end of the assessment area, are a group of planted trees (ID 1, 2, 5, 6 & 12-15). Based on species type and maturity, it is estimated that they were planted in the early twentieth century. This included the Peppercorn *Schinus molle*, Dutch Elm, Canary Island Date Palm *Phoenix canariensis* and Golden Monterey Cypress *Hesperocyparis macrocarpa* 'Horizontalis Aurea'.

These trees generally had fair to good health with long ULEs of 11-20 or 20+ years. Tree 1 was a large Peppercorn with basal decay near the front entrance gate. It is commonplace for the species to suffer trunk decay at maturity. Following a review of tree structure, the decay was not assessed as likely to result in significant failure.

Trees 12-15 were located around an existing war memorial and associated seating (Figure 5). They all had fair health and structure with long ULEs. Trees 14 & 15 both had broken branches.



Figure 5: Trees 12-15 around the existing memorial.

Trees 16-22 were located at the northern end of the assessment area and comprised a mix of species and planting dates:

- Trees 16 & 19-21 were a cultivated form of Yellow Gum *Eucalyptus leucoxylon* 'Rosea'. The trees were planted at the site and are likely to be approximately 20-30 years of age (Figure 6). They all had fair to good health and structure with ULEs of 11-20 years. This cultivated form of Yellow Gum often suffers branch failures in maturity.
- Trees 17 & 18 were both English Oak and are the 2 southernmost specimens in a longer line of ~10 trees. Tree 17 was likely to be an original planting given its size with a DBH of 84cm and a height of 18m. It is estimated that the trees were probably planted in the first half of the twentieth century. Tree 18 was substantially smaller than the other trees. It is likely to have self-sown from an acorn from the surrounding trees.
- Tree 22 was a multistemmed Dutch Elm (Figure 6). It is unclear whether this tree was planted; however, given the multistemmed growth habit, it is possible that what exists today is just stump regrowth from a tree that was removed some time ago. Dutch Elm has a propensity to sucker and so the surrounding shoots are likely to be root suckers.





Figure 6: Trees 19-22.

Trees 8-11 & 23-37 were all Monterey Cypress growing along the fence line. Based off the alignment and aerial imagery, it appears that there was an entire row along the fence line; however, several have been removed over the years.

The trees were generally in a state of decline with deadwood and broken branches evident. They were all assessed with fair to poor health and structure with ULEs between 0 and 10 years. It is likely that the trees were suffering from Cypress Decline, a term given to a number of different fungal pathogens including Cypress Canker (*Seiridium* species), *Botryosphaeria*, *Phomopsis* and *Pestalotiopsis* species (DEDJTR 2017). These fungi can all cause dieback, particularly if the trees have been stressed.

The fungus kills the plant's vascular tissue, sometimes causing characteristic sunken, lens-shaped cankers and ringbarking. This interferes with the vascular system of the tree and eventually causes death above the wound. Generally, older trees are more susceptible but any tree is susceptible if in a stressed state (DEDJTR 2017, Sinclair & Lyon 2005).

These trees were in poor condition and should not be considered a constraint to the site.





Figure 7: Trees 23-28.



Figure 8: Trees 29-37.



Trees 3 & 4 were both large River Red Gum located within close proximity to each other, only a few metres from the asphalt at the southern end of the site (Figure 9). Tree 3 was the larger of the pair, Tree 4 had grown as a somewhat suppressed specimen with a phototropic lean.



Figure 9: Trees 3 (left) & 4 (right).

Aerial imagery from 1946 was reviewed to provide an estimate of the trees' age (Figure 10). 79 years ago, there was a significant patch of dark grey that is likely to have been the subject trees. Based on this, they would have been mature specimens when the photo was taken. An estimate of 150-200 years of age is provided for the trees.



Figure 10: 1946 aerial imagery of Camp Reserve shows a large canopy in the location of Trees 3 & 4 (<https://mapshare.vic.gov.au/webmap/historical-photomaps>)



### 5.3 Retention Value

The trees were assessed for their health, structure and ULE and placed in a retention category:

- 8 trees (ID 1-7 & 17) have a High retention value
- 9 trees (ID 9, 10, 12-16, 18 & 19) have a Moderate retention value
- 14 trees (ID 8, 11, 20-24, 30 & 32-37) have a Low retention value
- 6 trees (ID 25-29 & 31) have no retention value and should be removed.

### 5.4 Tree Protection

Trees have been assigned a retention value (section 4 Tree Details) which should be used as a guide to aid in decision-making regarding tree retention and removal at a site. Any trees retained as part of a project will require protection during construction. The easiest way of achieving this is with the installation of Tree Protection Zones.

#### 5.4.1 Tree Protection Zones

It is important when considering development or construction that assets to be retained are properly protected. In this case the trees are the assets and require protection if they are to be retained in the landscape long-term. Damage to the trees can come in 1 of 2 ways. The first is immediate damage directly to the tree in the form of root severance, breaking of branches and wounding of the trunk. The second is more insidious and can take some time to manifest. This is a more indirect form of damage and usually relates to modification of soil structure or grade, drainage patterns or hydrology (Coder 1995).

Trees can be easily protected from development by the installation of Tree Protection Zones (TPZ). TPZs have been calculated according to AS4970-2009 *Protection of Trees on Development Sites* for all trees to be retained. This calculates the TPZ radius by multiplying the trunk DBH by 12 to a maximum of 15m radius. These figures have been supplied in section 4 Tree Details and 5.6 TPZ & Proposed Design Map.

#### 5.4.2 Structural Root Zones (SRZs)

The structural root zone is a formula to define the theoretical volume of soil and tree roots required to keep a tree stable in the ground. It is in no way related to tree health and significant excavation at or near the SRZ for many trees will cause severe decline and/or death.

Excavation within SRZs can lead to whole tree failure often with devastating results. SRZs have been calculated in accordance with AS 4970-2009 *Protection of Trees on Development Sites* using the equation:

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

Where D=trunk diameter at base in metres.

These figures have been supplied in section 4 Tree Details and 5.6 TPZ & Proposed Design Map.

### 5.4.3 Encroachment

Encroachment of less than 10% of the TPZ and outside the SRZ is deemed to be minor encroachment according to AS 4970-2009. See Figure 11. Variations must be made by the project arborist considering other relevant factors including tree health, vigour, stability, species sensitivity and soil characteristics.

Encroachment of more than 10% of the TPZ or into the SRZ is major encroachment. The project arborist must demonstrate that the tree(s) would remain viable. This may require root investigation by non-destructive methods and consideration of relevant factors tree health, vigour, stability, species sensitivity and soil characteristics.

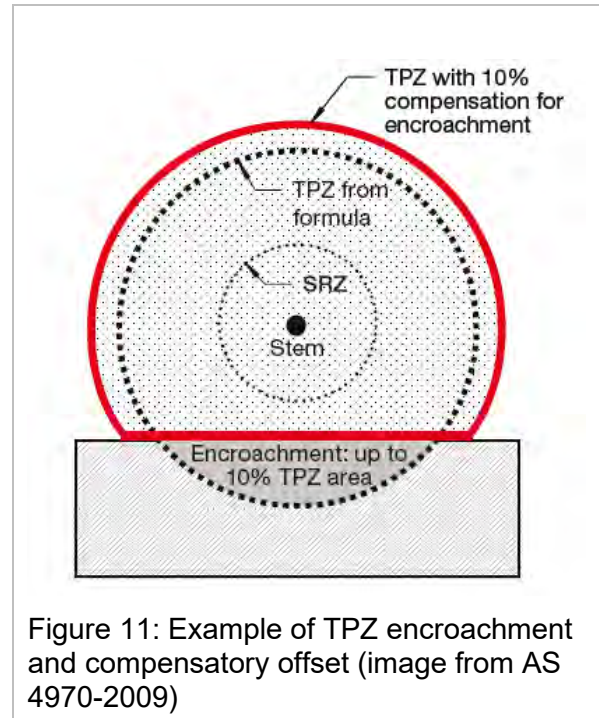
In any case, the lost TPZ should be compensated and be contiguous with the existing TPZ.

## 5.5 Design Proposal

The proposal will comprise the following elements:

- Demolition of existing structures
- Excavation and construction of new club rooms, viewing areas and function space
- New netball courts and surrounding infrastructure
- Formalisation of existing car park area.

See section 5.6 TPZ & Proposed Design Map and Appendix 2.









## 5.7 Arboricultural Impact Assessment

The impact of the proposal on the trees' TPZs and SRZs have been assessed (Table 3). Trees with an assessment of 100% encroachment include those where the trunk is located within the development. Trees not encroached are not shown.

The percentage encroachments were calculated and the levels of impact were determined in accordance with AS 4970-2009, *Protection of Trees on Development Sites* as follows:

- **Major** - Encroachment >10% and/or SRZ intrusion
- **Minor** - Encroachment <10% and no SRZ intrusion

Table 3: Construction Impact

ID	Retention	TPZr (m)	SRZr (m)	Encroachment %	SRZ Intrusion	Encroachment level	Outcome/ Comments
1	High	13.32	4.43	100	Yes	Major	Netball Courts, Tree is lost
2	High	3.5	-	100	Yes	Major	Netball Courts, Tree is to be transplanted
3	High	15	3.9	100	Yes	Major	Netball Courts, Tree is lost
4	High	9.36	3.25	100	Yes	Major	Netball Courts, Tree is lost
5	High	10.2	3.22	100	Yes	Major	Netball Courts, Tree is lost
6	High	9.12	3.06	100	Yes	Major	Netball Courts, Tree is lost
16	Moderate	3.36	2.05	100	Yes	Major	Club rooms and earth batter, Tree is lost
17	High	10.08	3.3	15	No	Major	New club rooms, timekeeper hut and path, retain
18	Moderate	4.92	2.39	7	No	Minor	New path, retain
19	Moderate	3.24	2.05	100	Yes	Major	Club rooms and earth batter, Tree is lost
20	Low	2.04	1.79	100	Yes	Major	Club rooms and earth batter, Tree is lost
21	Low	2.04	1.75	100	Yes	Major	Club rooms and earth batter, Tree is lost
22	Low	5.52	2.51	100	Yes	Major	Club rooms and earth batter, Tree is lost

It must be noted that any impacts associated with the car park being formalised have not been assessed. This was beyond the scope of the initial tree assessment proposal.

### 5.7.1 Netball Court Impacts

The proposed netball courts will result in the loss of Trees 1-6, all of which were assessed as high retention value (Figure 12). Tree 2 is a Canary Island Date Palm, and it is proposed to be transplanted into another area of the site. A significant redesign would be required if any of these trees required retention.

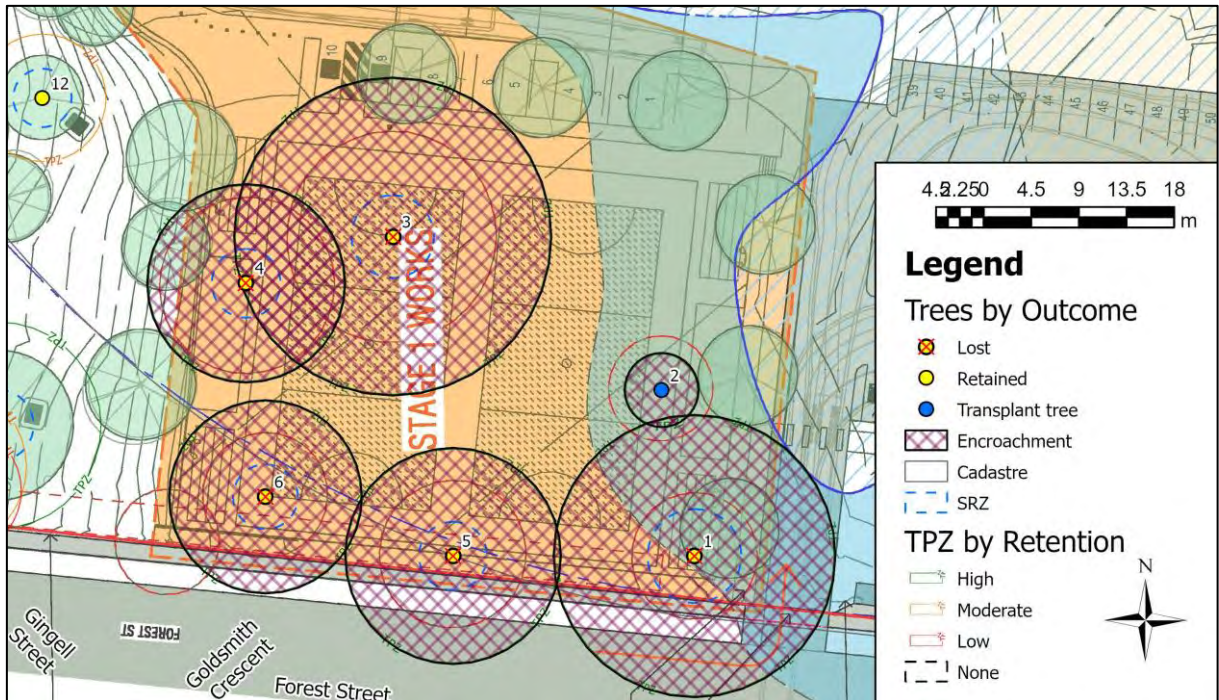


Figure 12: Tree impacts from proposed netball courts.

### 5.7.2 Club Rooms

Trees 16 & 19-22 will all be impacted by the proposed clubrooms and associated earthworks and require removal to facilitate the design (Figure 13). There are no simple design mitigation measures that could retain these trees, all of which were assessed with low or moderate retention values.

There will be 15% TPZ encroachment to Tree 17 from the proposed structures. The following comments are made regarding the likely impact to the tree:

1. Works for the timekeepers building will take place in an area that is highly compacted and likely to have few roots.
2. The encroachment on the south side of the tree will take place where there is an existing building proposed to be demolished.
3. The encroachment for the path should require minimal excavation.
4. English Oak tend to have a moderate level of tolerance to root disturbance.
5. A Tree Protection Management Plan must be developed for the site as part of the development works.
6. There must be no excavation within the TPZ for landscaping or other purposes.
7. Tree 17 can be retained.

There will be a 7% TPZ encroachment to Tree 18. This is considered minor encroachment, is beyond the SRZ and the tree will remain viable.

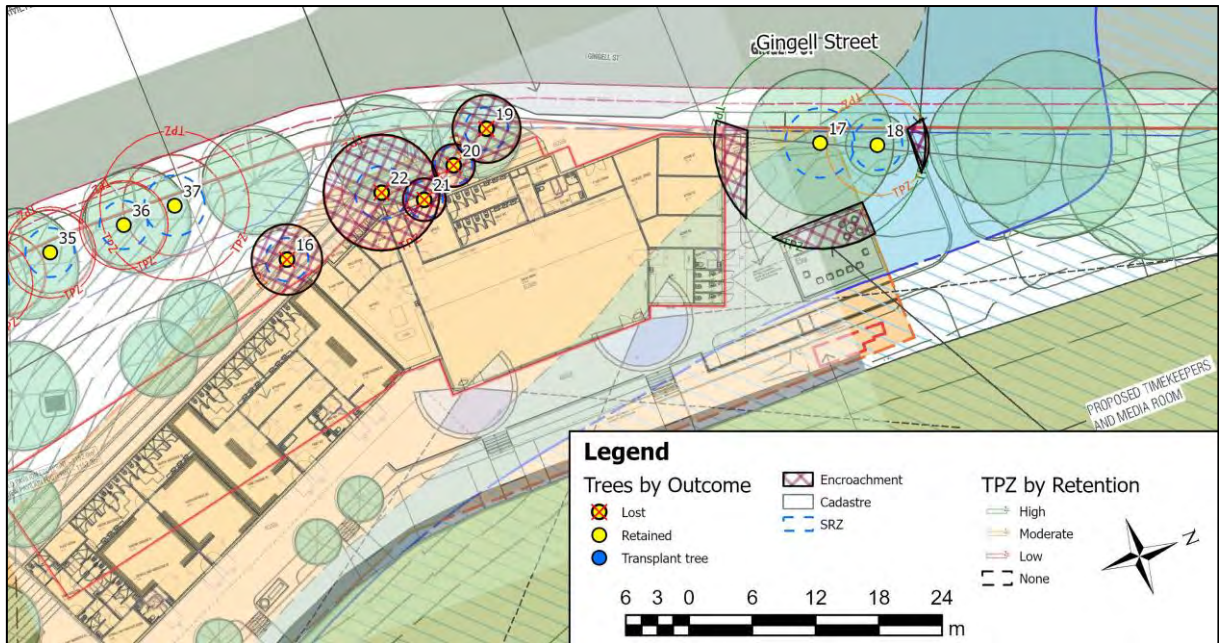


Figure 13: Tree impacts from the club rooms and surrounds.

### 5.7.3 TPZ Impact Summary

Following a review of the proposed design:

- 10 trees will have 100% TPZ encroachment and will require removal to facilitate the design including:
  - 5 high retention trees (ID 1, 3, 4, 5, 6)
  - 2 moderate retention trees (ID 16 & 19)
  - 3 low retention trees (ID 20, 21 & 22).
- Tree 2 has 100% TPZ encroachment; however, it is a Canary Island Date Palm and is proposed for transplant.
- Tree 17 will have major encroachment of 15% and can be retained
- Tree 18 will have minor TPZ encroachment and can be retained
- 24 trees will not be encroached by the proposal.

## 5.8 Tree Protection Management Plan

Following completion of a design and approval of trees to be retained and removed, a Tree Protection Management Plan (TPMP) is to be developed. It is to contain:

- The engagement of a project arborist with a minimum qualification of Diploma in Arboriculture (AQF level 5 or equivalent)
- Detail regarding how the trees will be retained:
  - During demolition
  - Prior to and during construction
  - Post construction
- A tree protection plan to scale that is to show:
  - all tree protection zones and structural root zones,
  - all tree protection fenced off areas and areas where ground protection systems will be used



- The type of footings within the tree protection zone
- All services to be located within the tree protection zone and a notation to state that all services will either be located outside of the tree protection zone or bored under the tree protection zone
- A notation to refer to the tree management plan for specific detail on what actions are required within the tree protection zone.
- Location of tree protection measures and ground protection
- Certification, milestones, inspection times and hold points.

The TPMP is to be developed in accordance with AS4970-2009 *Protection of Trees on Development Sites*.

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## 6. Conclusion

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C&R Ryder Consulting was engaged to assess trees in the vicinity of the proposed Stage 1 works at Camp Reserve, Castlemaine.

37 trees were assessed in the southern part of the reserve and comprised a mix of planted and naturally occurring specimens. Of particular prominence are Trees 3, 4 & 7 being of indigenous origin and Tree 17 being a large English Oak.

The trees were assessed for their health, structure and ULE and placed in a retention category:

- 8 trees (ID 1-7 & 17) have a High retention value
- 9 trees (ID 9, 10, 12-16, 18 & 19) have a Moderate retention value
- 14 trees (ID 8, 11, 20-24, 30 & 32-37) have a Low retention value
- 6 trees (ID 25-29 & 31) have no retention value and should be removed.

An arboricultural impact assessment was completed for the Stage 1 proposal. Following a review of the proposed design:

- 10 trees will have 100% TPZ encroachment and will require removal to facilitate the design including:
  - 5 high retention trees (ID 1, 3, 4, 5, 6)
  - 2 moderate retention trees (ID 16 & 19)
  - 3 low retention trees (ID 20, 21 & 22).
- Tree 2 has 100% TPZ encroachment; however, it is a Canary Island Date Palm and is proposed for transplant.
- Tree 17 will have major encroachment of 15% and can be retained
- Tree 18 will have minor TPZ encroachment and can be retained
- 24 trees will not be encroached by the proposal.

Impacts associated with the car park being formalised have not been assessed. This was beyond the scope of the initial tree assessment proposal.

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## 7. Recommendations

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It is recommended that:

1. TPZs and SRZs are incorporated and shown on plans for the site to help identify any further opportunities for tree retention.
2. The design team maintains contact with the project arborist as the plans are refined.
3. If there are any further changes to the design, the impacts are reassessed.
4. A Tree Protection Management Plan is prepared by the project arborist following approval of a design and associated permits.

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## 8. References

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

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## Appendix 1. Tree Assessment Descriptors

### 1.1 Image of tree

Digital image captured on the day of assessments.

### 1.2 Botanic Name/Common Name

The tree identified to genus and species level as well as the generally accepted common name for the tree.

### 1.3 Tree Dimensions

The height and width of the tree as estimated by the arborist in whole metres.

### 1.4 Diameter at Breast Height

The trunk diameter of the tree measured with a diameter tape at 1.4m above ground level.

### 1.5 Diameter at Base

The trunk diameter of the tree measured with a diameter tape above the root flare.

### 1.6 Health

<b>Very Good</b>	The tree is demonstrating exceptional growth for the species, has a full, dense canopy and there is no sign of any pest or disease.
<b>Good</b>	The tree is demonstrating good growth for the species with respect to its location and broader context. The canopy is full and complete and there are no signs of pest or disease.
<b>Fair</b>	The tree may have shown a reduction in optimal growth and/or there may be some twiggy deadwood within the canopy. There may be the presence of some pests or diseases that are not causing a significant decline in the tree
<b>Poor</b>	The tree is in decline with little growth. There may be sections of the canopy missing and pests or diseases may be prevalent
<b>Very Poor</b>	The tree is in significant decline, with large sections of the canopy dead. This tree is very unlikely to recover.
<b>Dead</b>	The tree is dead

### 1.7 Structure

<b>Good</b>	The tree's structure is typical of the species with no significant hazards such as included bark, trunk decay, splits or tears. In general, there will be a single trunk with scaffold and/or subordinate branches that display good attachments
<b>Fair</b>	There may be minor defects in the canopy, but the overall tree is still relatively free of significant issues. The tree may need minor pruning to fix minor defects. The canopy will be mostly symmetrical and typical of the species.
<b>Poor</b>	The tree will have 1 or more significant defect that may be able to be remedied with pruning. This tree is likely to have an atypical canopy and may contain defects such as included bark or codominant stems.
<b>Very Poor</b>	The tree has substantial defects associated with its primary trunk and scaffold structure that cannot be remedied with pruning or other measures. It is likely that this tree will require removal in the short term.
<b>Hazardous</b>	The tree has major defects and is likely to fail. It should be removed as soon as possible.

## 1.8 Useful Life Expectancy

<b>20+</b>	The tree is a healthy specimen in good condition. It is expected to provide a contribution to the landscape for at least another 20 years with an appropriate level of management.
<b>10-20 years</b>	The tree is a reasonably healthy specimen in good or fair condition. It is expected to provide a contribution to the landscape for 10-20 years with an appropriate level of management.
<b>5-10 years</b>	The tree is in fair condition or a short lived species. It is likely to provide contribution to the landscape for 5-10 years with an appropriate level of management at which point removal may need to be considered.
<b>1-5 years</b>	The tree is a poor specimen in decline and is likely to require removal within 1-5 years.
<b>0 years</b>	The tree is either dead or has substantial defects requiring its removal in the short term.



## 1.9 Tree Retention

<b>Very High</b>	The tree is an outstanding example of the species and it should be retained at all costs.
<b>High</b>	The tree is a mature specimen in fair to good condition with a ULE of at least 10 years, is suitable to the site and should be retained in a new development.
<b>Moderate</b>	The tree is a semi-mature or mature specimen, in fair to good condition that is suitable for retention; however, is located such that its loss would not have a significant impact on the landscape.
<b>Low</b>	The tree is likely to be juvenile or in decline and could be retained; however, design changes are not considered worthwhile to retain a tree in this category.
<b>None</b>	The tree should be removed irrespective of a design as it is in severe decline, hazardous or dead.
<b>Third Party Tree</b>	This tree is located off the subject property and is owned by a third party. The assessment of health and structure is considered irrelevant as the tree must be retained.

## Appendix 2. Enlarged TPZ Map





 <p><b>RYDER</b> ARBORICULTURE &amp; ENVIRONMENT</p> <p>C&amp;R Ryder Consulting Pty. Ltd 12/8 Sigma Drive, Croydon South VIC 3136 E: cameron@crryder.com.au P: 0434 351 567</p>	<p>MAP DETAILS</p> <p>ARBORICULTURAL IMPACT ASSESSMENT AS PART OF PROPOSED STAGE 1 WORKS AT CAMP RESERVE, CASTLEMAINE</p>	<p><b>Legend</b></p> <div> <p><b>Trees by Outcome</b></p> <ul style="list-style-type: none"> <li>Lost</li> <li>Retained</li> <li>Transplant tree</li> <li>Encroachment</li> <li>Cadastre</li> </ul> </div> <div> <p><b>TPZ by Retention</b></p> <ul style="list-style-type: none"> <li>High</li> <li>Moderate</li> <li>Low</li> <li>None</li> <li>SRZ</li> </ul> </div>	<p>CLIENT</p> <p>MOUNT ALEXANDER SHIRE COUNCIL Corner Lyttleton and Lloyd Streets Castlemaine VIC 3450</p>	<p>SCALE BAR</p> <p>6.53.25 0 6.5 13 19.5 26 m</p> <p>Scale: 1:550 SHEET SIZE A3</p> <table border="1"> <tr> <td>AUTHOR</td> <td>C. RYDER</td> </tr> <tr> <td>DATE</td> <td>11.03.2025</td> </tr> <tr> <td>MAP DATUM</td> <td>GDA 2020 MGA Zone 55</td> </tr> </table>	AUTHOR	C. RYDER	DATE	11.03.2025	MAP DATUM	GDA 2020 MGA Zone 55	
	AUTHOR	C. RYDER									
	DATE	11.03.2025									
	MAP DATUM	GDA 2020 MGA Zone 55									
						Page 26 of 40					



## Appendix 3. Photographic Tree Reports

### Tree ID 1

**Botanical Name:** *Schinus molle*

**Common Name** Peppercorn Tree **Origin:** Exotic  
**Height (m):** 8 **Health:** Good  
**Width (m):** 10 **Structure:** Fair  
**DBH (cm):** 85 71 **ULE:** 20+  
**Dia. @ base (cm):** 200  
**Age Class:** Mature  
**Retention Value:** High  
**TPZ Radius (m):** 13.32 **TPZ encroachment %:** 100  
**SRZ Radius (m):** 4.4 **SRZ intrusion:** Yes  
**Encroachment Level:** Major **Outcome:** Lost  
**Comments:**



### Tree ID 2

**Botanical Name:** *Phoenix canariensis*

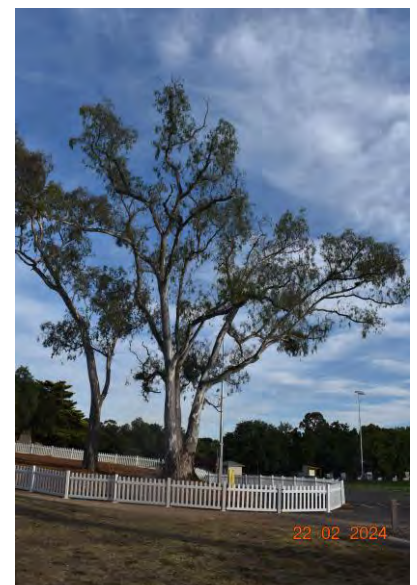
**Common Name** Canary Island Date Palm **Origin:** Exotic  
**Height (m):** 10 **Health:** Good  
**Width (m):** 5 **Structure:** Good  
**DBH (cm):** 73 **ULE:** 20+  
**Dia. @ base (cm):** -  
**Age Class:** Mature  
**Retention Value:** High  
**TPZ Radius (m):** 3.5 **TPZ encroachment %:** 100  
**SRZ Radius (m):** 0.0 **SRZ intrusion:** Yes  
**Encroachment Level:** Major **Outcome:** Transplant tree  
**Comments:**



### Tree ID 3

**Botanical Name:** *Eucalyptus camaldulensis*

**Common Name** River Red Gum **Origin:** Indigenous  
**Height (m):** 22 **Health:** Poor  
**Width (m):** 16 **Structure:** Fair  
**DBH (cm):** 137 **ULE:** 20+  
**Dia. @ base (cm):** 148  
**Age Class:** Over mature  
**Retention Value:** High  
**TPZ Radius (m):** 15 **TPZ encroachment %:** 100  
**SRZ Radius (m):** 3.9 **SRZ intrusion:** Yes  
**Encroachment Level:** Major **Outcome:** Lost  
**Comments:** tree has shown some response with new growth





### Tree ID 4

**Botanical Name:** *Eucalyptus camaldulensis*

**Common Name** River Red Gum **Origin:** Indigenous

**Height (m):** 22 **Health:** Fair

**Width (m):** 12 **Structure:** Fair

**DBH (cm):** 78 **ULE:** 20+

**Dia. @ base (cm):** 96

**Age Class:** Mature

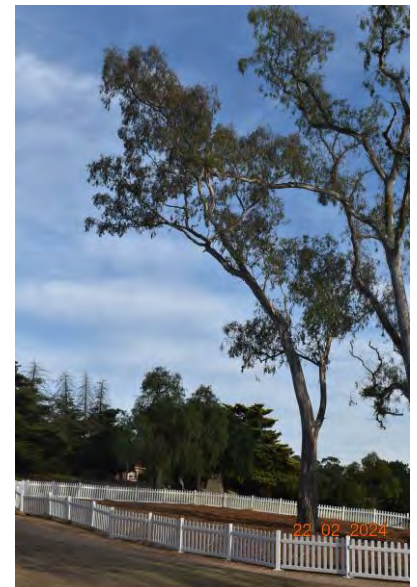
**Retention Value:** High

**TPZ Radius (m):** 9.36 **TPZ encroachment %:** 100

**SRZ Radius (m):** 3.3 **SRZ intrusion:** Yes

**Encroachment Level:** Major **Outcome:** Lost

**Comments:** tree has shown some response with new growth



### Tree ID 5

**Botanical Name:** *Ulmus xhollandica*

**Common Name** Dutch Elm **Origin:** Exotic

**Height (m):** 14 **Health:** Good

**Width (m):** 12 **Structure:** Fair

**DBH (cm):** 85 **ULE:** 20+

**Dia. @ base (cm):** 94

**Age Class:** Mature

**Retention Value:** High

**TPZ Radius (m):** 10.2 **TPZ encroachment %:** 100

**SRZ Radius (m):** 3.2 **SRZ intrusion:** Yes

**Encroachment Level:** Major **Outcome:** Lost

**Comments:**



### Tree ID 6

**Botanical Name:** *Ulmus xhollandica*

**Common Name** Dutch Elm **Origin:** Exotic

**Height (m):** 9 **Health:** Fair

**Width (m):** 10 **Structure:** Poor

**DBH (cm):** 76 **ULE:** 11-20

**Dia. @ base (cm):** 83

**Age Class:** Over mature

**Retention Value:** High

**TPZ Radius (m):** 9.12 **TPZ encroachment %:** 100

**SRZ Radius (m):** 3.1 **SRZ intrusion:** Yes

**Encroachment Level:** Major **Outcome:** Lost

**Comments:**



### Tree ID 7

**Botanical Name:** *Eucalyptus melliodora*

**Common Name** Yellow Box

**Origin:** Indigenous

**Height (m):** 18 **Health:** Good

**Width (m):** 12 **Structure:** Fair

**DBH (cm):** 82 **ULE:** 20+

**Dia. @ base (cm):** 104

**Age Class:** Mature

**Retention Value:** High

**TPZ Radius (m):** 9.84 **TPZ encroachment %:**

**SRZ Radius (m):** 3.4 **SRZ intrusion:** No

**Encroachment Level:** None **Outcome:** Retained

**Comments:** stables under western canopy



### Tree ID 8

**Botanical Name:** *Hesperocyparis macrocarpa*

**Common Name** Monterey Cypress

**Origin:** Exotic

**Height (m):** 8 **Health:** Fair

**Width (m):** 8 **Structure:** Fair

**DBH (cm):** 52 **ULE:** 6-10

**Dia. @ base (cm):** 65

**Age Class:** Over mature

**Retention Value:** Low

**TPZ Radius (m):** 6.24 **TPZ encroachment %:**

**SRZ Radius (m):** 2.8 **SRZ intrusion:** No

**Encroachment Level:** None **Outcome:** Retained

**Comments:** suppressed tree



### Tree ID 9

**Botanical Name:** *Hesperocyparis macrocarpa*

**Common Name** Monterey Cypress

**Origin:** Exotic

**Height (m):** 14 **Health:** Fair

**Width (m):** 10 **Structure:** Fair

**DBH (cm):** 66 **ULE:** 6-10

**Dia. @ base (cm):** 78

**Age Class:** Over mature

**Retention Value:** Moderate

**TPZ Radius (m):** 7.92 **TPZ encroachment %:**

**SRZ Radius (m):** 3.0 **SRZ intrusion:** No

**Encroachment Level:** None **Outcome:** Retained

**Comments:** at rear of stable, restricted location





### Tree ID 10

**Botanical Name:** *Hesperocyparis macrocarpa*

**Common Name** Monterey Cypress **Origin:** Exotic

**Height (m):** 14 **Health:** Poor

**Width (m):** 8 **Structure:** Fair

**DBH (cm):** 51 **ULE:** 6-10

**Dia. @ base (cm):** 61

**Age Class:** Over mature

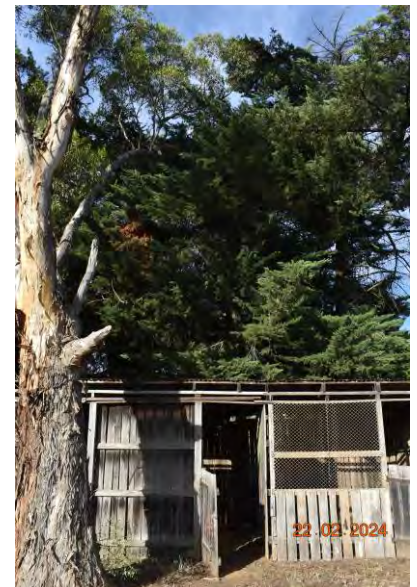
**Retention Value:** Moderate

**TPZ Radius (m):** 6.12 **TPZ encroachment %:**

**SRZ Radius (m):** 2.7 **SRZ intrusion:** No

**Encroachment Level:** None **Outcome:** Retained

**Comments:** at rear of stable, restricted location



### Tree ID 11

**Botanical Name:** *Hesperocyparis macrocarpa*

**Common Name** Monterey Cypress **Origin:** Exotic

**Height (m):** 14 **Health:** Poor

**Width (m):** 8 **Structure:** Fair

**DBH (cm):** 51 **ULE:** 1-5

**Dia. @ base (cm):** 63

**Age Class:** Over mature

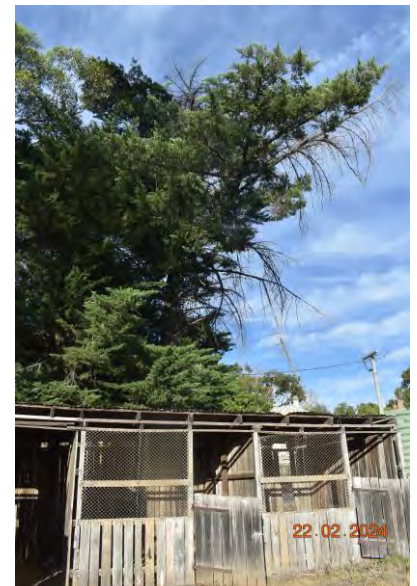
**Retention Value:** Low

**TPZ Radius (m):** 6.12 **TPZ encroachment %:**

**SRZ Radius (m):** 2.7 **SRZ intrusion:** No

**Encroachment Level:** None **Outcome:** Retained

**Comments:** at rear of stable, restricted location



### Tree ID 12

**Botanical Name:** *Schinus molle*

**Common Name** Peppercorn Tree **Origin:** Exotic

**Height (m):** 9 **Health:** Fair

**Width (m):** 8 **Structure:** Fair

**DBH (cm):** 51 **ULE:** 20+

**Dia. @ base (cm):** 65

**Age Class:** Mature

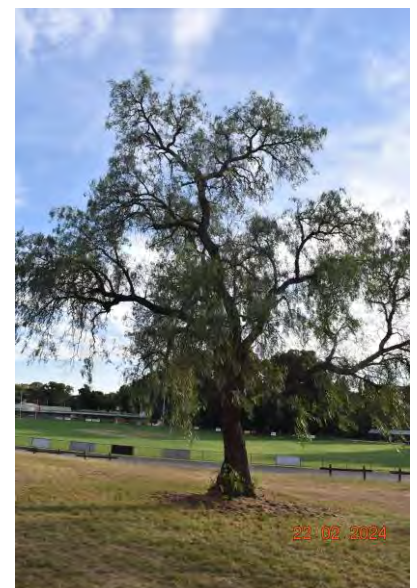
**Retention Value:** Moderate

**TPZ Radius (m):** 6.12 **TPZ encroachment %:**

**SRZ Radius (m):** 2.8 **SRZ intrusion:** No

**Encroachment Level:** None **Outcome:** Retained

**Comments:**





### Tree ID 13

**Botanical Name:** *Ulmus xhollandica*

**Common Name** Dutch Elm

**Origin:** Exotic

**Height (m):** 8 **Health:** Fair

**Width (m):** 8 **Structure:** Fair

**DBH (cm):** 42 **ULE:** 20+

**Dia. @ base (cm):** 48

**Age Class:** Mature

**Retention Value:** Moderate

**TPZ Radius (m):** 5.04 **TPZ encroachment %:**

**SRZ Radius (m):** 2.4 **SRZ intrusion:** No

**Encroachment Level:** None **Outcome:** Retained

**Comments:**



### Tree ID 14

**Botanical Name:** *Schinus molle*

**Common Name** Peppercorn Tree

**Origin:** Exotic

**Height (m):** 9 **Health:** Fair

**Width (m):** 9 **Structure:** Fair

**DBH (cm):** 49 **ULE:** 20+

**Dia. @ base (cm):** 66

**Age Class:** Mature

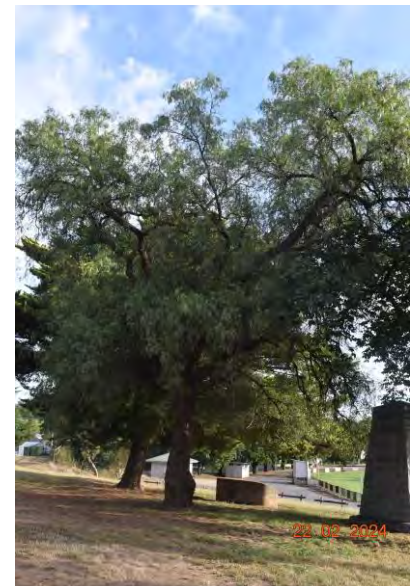
**Retention Value:** Moderate

**TPZ Radius (m):** 5.88 **TPZ encroachment %:**

**SRZ Radius (m):** 2.8 **SRZ intrusion:** No

**Encroachment Level:** None **Outcome:** Retained

**Comments:**



### Tree ID 15

**Botanical Name:** *Hesperocyparis macrocarpa*

**Common Name** Monterey Cypress

**Origin:** Exotic

**Height (m):** 10 **Health:** Fair

**Width (m):** 11 **Structure:** Fair

**DBH (cm):** 64 **ULE:** 11-20

**Dia. @ base (cm):** 72

**Age Class:** Mature

**Retention Value:** Moderate

**TPZ Radius (m):** 7.68 **TPZ encroachment %:**

**SRZ Radius (m):** 2.9 **SRZ intrusion:** No

**Encroachment Level:** None **Outcome:** Retained

**Comments:** tap is embedded in trunk, cultivar is 'Horizontalis Aurea'



### Tree ID 16

**Botanical Name:** *Hesperocyparis macrocarpa*

**Common Name** Monterey Cypress **Origin:** Exotic

**Height (m):** 11 **Health:** Poor

**Width (m):** 7 **Structure:** Fair

**DBH (cm):** 50 **ULE:** 6-10

**Dia. @ base (cm):** 62

**Age Class:** Mature

**Retention Value:** Low

**TPZ Radius (m):** 6 **TPZ encroachment %:**

**SRZ Radius (m):** 2.7 **SRZ intrusion:** No

**Encroachment Level:** None **Outcome:** Retained

**Comments:**



### Tree ID 17

**Botanical Name:** *Hesperocyparis macrocarpa*

**Common Name** Monterey Cypress **Origin:** Exotic

**Height (m):** 11 **Health:** Very poor

**Width (m):** 5 **Structure:** Poor

**DBH (cm):** 47 **ULE:** 1-5

**Dia. @ base (cm):** 59

**Age Class:** Severe decline

**Retention Value:** Low

**TPZ Radius (m):** 5.64 **TPZ encroachment %:**

**SRZ Radius (m):** 2.7 **SRZ intrusion:** No

**Encroachment Level:** None **Outcome:** Retained

**Comments:**



### Tree ID 18

**Botanical Name:** *Hesperocyparis macrocarpa*

**Common Name** Monterey Cypress **Origin:** Exotic

**Height (m):** 11 **Health:** Poor

**Width (m):** 5 **Structure:** Poor

**DBH (cm):** 40 **ULE:** 0

**Dia. @ base (cm):** 47

**Age Class:** Severe decline

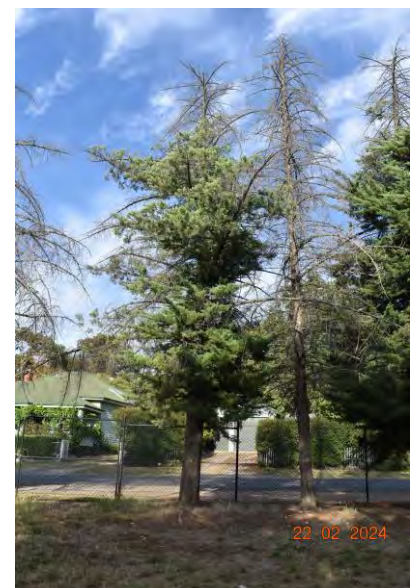
**Retention Value:** None

**TPZ Radius (m):** 4.8 **TPZ encroachment %:**

**SRZ Radius (m):** 2.4 **SRZ intrusion:** No

**Encroachment Level:** None **Outcome:** Retained

**Comments:**





### Tree ID 19

**Botanical Name:** *Hesperocyparis macrocarpa*

**Common Name** Monterey Cypress **Origin:** Exotic

**Height (m):** 11 **Health:** Dead  
**Width (m):** 4 **Structure:** Very Poor  
**DBH (cm):** 23 **ULE:** 0  
**Dia. @ base (cm):** 30

**Age Class:** Severe decline

**Retention Value:** None

**TPZ Radius (m):** 2.76 **TPZ encroachment %:**

**SRZ Radius (m):** 2.0 **SRZ intrusion:** No

**Encroachment Level:** None **Outcome:** Retained

**Comments:**



### Tree ID 20

**Botanical Name:** *Hesperocyparis macrocarpa*

**Common Name** Monterey Cypress **Origin:** Exotic

**Height (m):** 11 **Health:** Poor  
**Width (m):** 6 **Structure:** Poor  
**DBH (cm):** 39 **ULE:** 1-5  
**Dia. @ base (cm):** 48

**Age Class:** Over mature

**Retention Value:** None

**TPZ Radius (m):** 4.68 **TPZ encroachment %:**

**SRZ Radius (m):** 2.4 **SRZ intrusion:** No

**Encroachment Level:** None **Outcome:** Retained

**Comments:**



### Tree ID 21

**Botanical Name:** *Hesperocyparis macrocarpa*

**Common Name** Monterey Cypress **Origin:** Exotic

**Height (m):** 5 **Health:** Very poor  
**Width (m):** 6 **Structure:** Poor  
**DBH (cm):** 33 **ULE:** 1-5  
**Dia. @ base (cm):** 40

**Age Class:** Over mature

**Retention Value:** None

**TPZ Radius (m):** 3.96 **TPZ encroachment %:**

**SRZ Radius (m):** 2.3 **SRZ intrusion:** No

**Encroachment Level:** None **Outcome:** Retained

**Comments:**





### Tree ID 22

**Botanical Name:** *Hesperocyparis macrocarpa*

**Common Name** Monterey Cypress **Origin:** Exotic

**Height (m):** 8 **Health:** Poor

**Width (m):** 6 **Structure:** Poor

**DBH (cm):** 31 **ULE:** 6-10

**Dia. @ base (cm):** 38

**Age Class:** Over mature

**Retention Value:** None

**TPZ Radius (m):** 3.72 **TPZ encroachment %:**

**SRZ Radius (m):** 2.2 **SRZ intrusion:** No

**Encroachment Level:** None **Outcome:** Retained

**Comments:**



### Tree ID 23

**Botanical Name:** *Hesperocyparis macrocarpa*

**Common Name** Monterey Cypress **Origin:** Exotic

**Height (m):** 7 **Health:** Very poor

**Width (m):** 5 **Structure:** Poor

**DBH (cm):** 23 **ULE:** 0

**Dia. @ base (cm):** 30

**Age Class:** Severe decline

**Retention Value:** Low

**TPZ Radius (m):** 2.76 **TPZ encroachment %:**

**SRZ Radius (m):** 2.0 **SRZ intrusion:** No

**Encroachment Level:** None **Outcome:** Retained

**Comments:**



### Tree ID 24

**Botanical Name:** *Hesperocyparis macrocarpa*

**Common Name** Monterey Cypress **Origin:** Exotic

**Height (m):** 9 **Health:** Poor

**Width (m):** 5 **Structure:** Poor

**DBH (cm):** 27 **ULE:** 6-10

**Dia. @ base (cm):** 34

**Age Class:** Over mature

**Retention Value:** None

**TPZ Radius (m):** 3.24 **TPZ encroachment %:**

**SRZ Radius (m):** 2.1 **SRZ intrusion:** No

**Encroachment Level:** None **Outcome:** Retained

**Comments:**



### Tree ID 25

**Botanical Name:** *Hesperocyparis macrocarpa*

**Common Name** Monterey Cypress **Origin:** Exotic

**Height (m):** 10 **Health:** Fair

**Width (m):** 7 **Structure:** Fair

**DBH (cm):** 37 **ULE:** 6-10

**Dia. @ base (cm):** 44

**Age Class:** Mature

**Retention Value:** Low

**TPZ Radius (m):** 4.44 **TPZ encroachment %:**

**SRZ Radius (m):** 2.3 **SRZ intrusion:** No

**Encroachment Level:** None **Outcome:** Retained

**Comments:**



### Tree ID 26

**Botanical Name:** *Hesperocyparis macrocarpa*

**Common Name** Monterey Cypress **Origin:** Exotic

**Height (m):** 10 **Health:** Fair

**Width (m):** 6 **Structure:** Fair

**DBH (cm):** 37 **ULE:** 6-10

**Dia. @ base (cm):** 45

**Age Class:** Mature

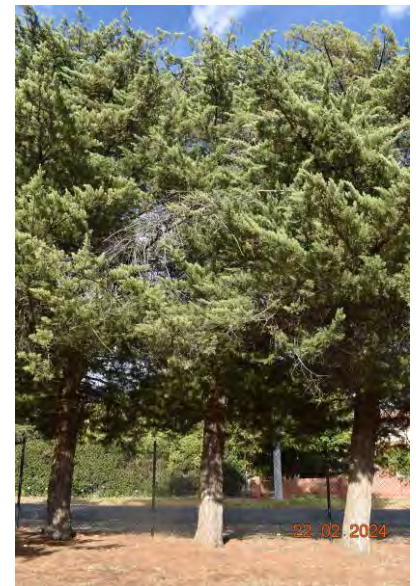
**Retention Value:** Low

**TPZ Radius (m):** 4.44 **TPZ encroachment %:**

**SRZ Radius (m):** 2.4 **SRZ intrusion:** No

**Encroachment Level:** None **Outcome:** Retained

**Comments:**



### Tree ID 27

**Botanical Name:** *Hesperocyparis macrocarpa*

**Common Name** Monterey Cypress **Origin:** Exotic

**Height (m):** 9 **Health:** Fair

**Width (m):** 7 **Structure:** Fair

**DBH (cm):** 39 **ULE:** 6-10

**Dia. @ base (cm):** 43

**Age Class:** Mature

**Retention Value:** Low

**TPZ Radius (m):** 4.68 **TPZ encroachment %:**

**SRZ Radius (m):** 2.3 **SRZ intrusion:** No

**Encroachment Level:** None **Outcome:** Retained

**Comments:**





### Tree ID 28

**Botanical Name:** *Hesperocyparis macrocarpa*

**Common Name** Monterey Cypress **Origin:** Exotic

**Height (m):** 7 **Health:** Fair

**Width (m):** 7 **Structure:** Fair

**DBH (cm):** 37 **ULE:** 6-10

**Dia. @ base (cm):** 44

**Age Class:** Mature

**Retention Value:** Low

**TPZ Radius (m):** 4.44 **TPZ encroachment %:**

**SRZ Radius (m):** 2.3 **SRZ intrusion:** No

**Encroachment Level:** None **Outcome:** Retained

**Comments:**



### Tree ID 29

**Botanical Name:** *Hesperocyparis macrocarpa*

**Common Name** Monterey Cypress **Origin:** Exotic

**Height (m):** 6 **Health:** Fair

**Width (m):** 7 **Structure:** Poor

**DBH (cm):** 36 **ULE:** 1-5

**Dia. @ base (cm):** 42

**Age Class:** Mature

**Retention Value:** Low

**TPZ Radius (m):** 4.32 **TPZ encroachment %:**

**SRZ Radius (m):** 2.3 **SRZ intrusion:** No

**Encroachment Level:** None **Outcome:** Retained

**Comments:**



### Tree ID 30

**Botanical Name:** *Hesperocyparis macrocarpa*

**Common Name** Monterey Cypress **Origin:** Exotic

**Height (m):** 6 **Health:** Fair

**Width (m):** 8 **Structure:** Poor

**DBH (cm):** 60 **ULE:** 1-5

**Dia. @ base (cm):** 72

**Age Class:** Mature

**Retention Value:** Low

**TPZ Radius (m):** 7.2 **TPZ encroachment %:**

**SRZ Radius (m):** 2.9 **SRZ intrusion:** No

**Encroachment Level:** None **Outcome:** Retained

**Comments:**





### Tree ID 31

**Botanical Name:** *Eucalyptus leucoxylon*

**Common Name** Yellow Gum **Origin:** Indigenous

**Height (m):** 8 **Health:** Good

**Width (m):** 5 **Structure:** Fair

**DBH (cm):** 28 **ULE:** 11-20

**Dia. @ base (cm):** 32

**Age Class:** Mature

**Retention Value:** Moderate

**TPZ Radius (m):** 3.36 **TPZ encroachment %:** 100

**SRZ Radius (m):** 2.1 **SRZ intrusion:** Yes

**Encroachment Level:** Major **Outcome:** Lost

**Comments:**



### Tree ID 32

**Botanical Name:** *Eucalyptus leucoxylon*

**Common Name** Yellow Gum **Origin:** Indigenous

**Height (m):** 5 **Health:** Fair

**Width (m):** 4 **Structure:** Fair

**DBH (cm):** 17 **ULE:** 11-20

**Dia. @ base (cm):** 22

**Age Class:** Mature

**Retention Value:** Low

**TPZ Radius (m):** 2.04 **TPZ encroachment %:** 100

**SRZ Radius (m):** 1.8 **SRZ intrusion:** Yes

**Encroachment Level:** Major **Outcome:** Lost

**Comments:**



### Tree ID 33

**Botanical Name:** *Eucalyptus leucoxylon*

**Common Name** Yellow Gum **Origin:** Indigenous

**Height (m):** 6 **Health:** Fair

**Width (m):** 4 **Structure:** Fair

**DBH (cm):** 17 **ULE:** 11-20

**Dia. @ base (cm):** 23

**Age Class:** Mature

**Retention Value:** Low

**TPZ Radius (m):** 2.04 **TPZ encroachment %:** 100

**SRZ Radius (m):** 1.8 **SRZ intrusion:** Yes

**Encroachment Level:** Major **Outcome:** Lost

**Comments:**



### Tree ID 34

**Botanical Name:** *Eucalyptus leucoxylon*

**Common Name** Yellow Gum **Origin:** Indigenous

**Height (m):** 8 **Health:** Good

**Width (m):** 6 **Structure:** Fair

**DBH (cm):** 27 **ULE:** 11-20

**Dia. @ base (cm):** 32

**Age Class:** Mature

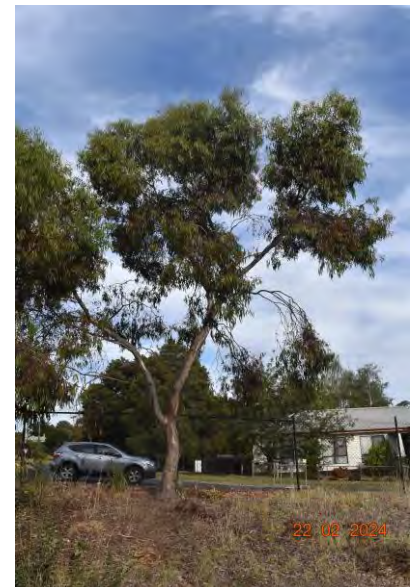
**Retention Value:** Moderate

**TPZ Radius (m):** 3.24 **TPZ encroachment %:** 100

**SRZ Radius (m):** 2.1 **SRZ intrusion:** Yes

**Encroachment Level:** Major **Outcome:** Lost

**Comments:**



### Tree ID 35

**Botanical Name:** *Ulmus xhollandica*

**Common Name** Dutch Elm **Origin:** Exotic

**Height (m):** 9 **Health:** Fair

**Width (m):** 9 **Structure:** Fair

**DBH (cm):** 32 26 **ULE:** 11-20

**Dia. @ base (cm):** 52

**Age Class:** Mature

**Retention Value:** Low

**TPZ Radius (m):** 5.52 **TPZ encroachment %:** 100

**SRZ Radius (m):** 2.5 **SRZ intrusion:** Yes

**Encroachment Level:** Major **Outcome:** Lost

**Comments:** masses of suckers beneath



### Tree ID 36

**Botanical Name:** *Quercus robur*

**Common Name** English Oak **Origin:** Exotic

**Height (m):** 18 **Health:** Good

**Width (m):** 18 **Structure:** Good

**DBH (cm):** 84 **ULE:** 20+

**Dia. @ base (cm):** 99

**Age Class:** Mature

**Retention Value:** High

**TPZ Radius (m):** 10.08 **TPZ encroachment %:** 15

**SRZ Radius (m):** 3.3 **SRZ intrusion:** No

**Encroachment Level:** Major **Outcome:** Retained

**Comments:**





**Tree ID 37**

**Botanical Name:** *Quercus robur*

**Common Name** English Oak

**Origin:** Exotic

**Height (m):** 16 **Health:** Fair

**Width (m):** 6 **Structure:** Fair

**DBH (cm):** 34 23 **ULE:** 20+

**Dia. @ base (cm):** 37 27

**Age Class:** Mature

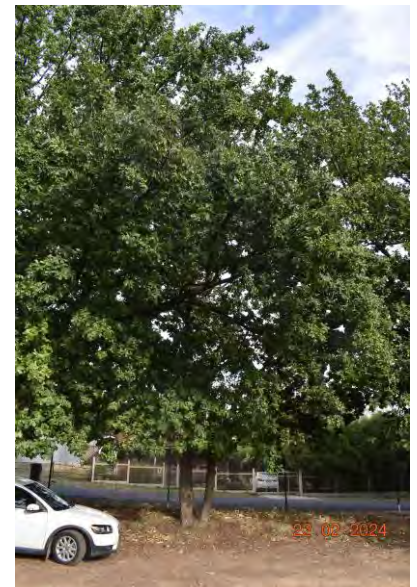
**Retention Value:** Moderate

**TPZ Radius (m):** 4.92 **TPZ encroachment %:** 7

**SRZ Radius (m):** 2.4 **SRZ intrusion:** No

**Encroachment Level:** Minor **Outcome:** Retained

**Comments:**







# Flood Impact Assessment & Stormwater Management Strategy

## Camp Reserve Development, Castlemaine

Mount Alexander Shire Council

20 February 2025



## Document Status

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## 1 INTRODUCTION

### 1.1 Overview

Water Technology was engaged by Mount Alexander Shire Council to undertake a Flood Impact Assessment (FIA) and Stormwater Management Strategy (SWMS) for the proposed development of Camp Reserve. The two assessments will be used to support a planning permit application associated with the development of Camp Reserve and prepared in based on the advice of the North Central Catchment Management Authority (NCCMA), Mount Alexander SC.

The FIA address the following aspects:

- Ensure the proposed development see all habitable areas are elevated at least 0.3 m above the 1% Annual Exceedance Probability (AEP) flood level and proposed access roads are not impact by flooding that exceeds safety design criteria, as per Australian Rainfall and Runoff 2019.
- Ensure the proposed development does not adversely impact neighbouring properties.
- Determine the extent, depth, velocity and hazard of the 1% AEP flood event under existing and developed conditions.
- Consider the impacts of Climate Change on the proposed development and make allowances were required.

The SWMS address the following aspects:

- Identify on-site stormwater management treatment devices necessary to meet State Environment Protection Policy (SEPP) and Best Practice Environmental Management Guidelines for Urban Stormwater (BPEMG)
- Prepare a response to Clause 53.18 (Stormwater Management in Urban Development) of the Mount Alexander Planning Scheme, including a response to the Objectives and Standards of Clause 53.18-5 and Clause 53.18-6
- Identify the requirements of on-site detention.

### 1.2 Site & Background

The site is located in a low-lying area and is encumbered by both a Flood Overlay (FO) and a Land Subject to Inundation Overlay (LSIO). The site is bordered by Barkers Creek to the east and residential living to the north, west and south. The site is approximately 3.9 hectares and features an existing club pavilion on the north east side of the oval, attached changerooms, and several detached sheds. In the southeast corner of the site, the Table Tennis and Agricultural Pavilion is located adjacent to Forest Street road reserve and Barkers Creek. The location of the Subject Site is shown in Figure 1-1 below.

An existing hydraulic TUFLOW model was made available to Water Technology for the use of this assessment which was constructed by SWM Consulting for the NCCMA to update the Castlemaine, Campbells Creek and Chewton Flood Management Plan<sup>1</sup> and was finalised in May 2020. Mapping of the 1% AEP flood extent from this study is shown in Figure 1-2 below.

The current masterplan for the Camp Reserve development indicates a new pavilion along the western boundary and new netball courts along the southern boundary, as shown in Figure 1-3.

---

<sup>1</sup> A, Simmons (2020), 'Castlemaine, Campbells Creek and Chewton Flood Management Plan Update', North Central Catchment Management Authority





**Figure 1-1 Site Location**





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## 2 FLOOD IMPACT ASSESSMENT

### 2.1 Available Information

This section of the report documents the data collated by Water Technology for this assessment. Data was sourced from a number of agencies/authorities, including:

- Mount Alexander Shire Council
- Department of Energy, Environment and Climate Action (DEECA formerly DELWP)

### 2.2 Model Overview

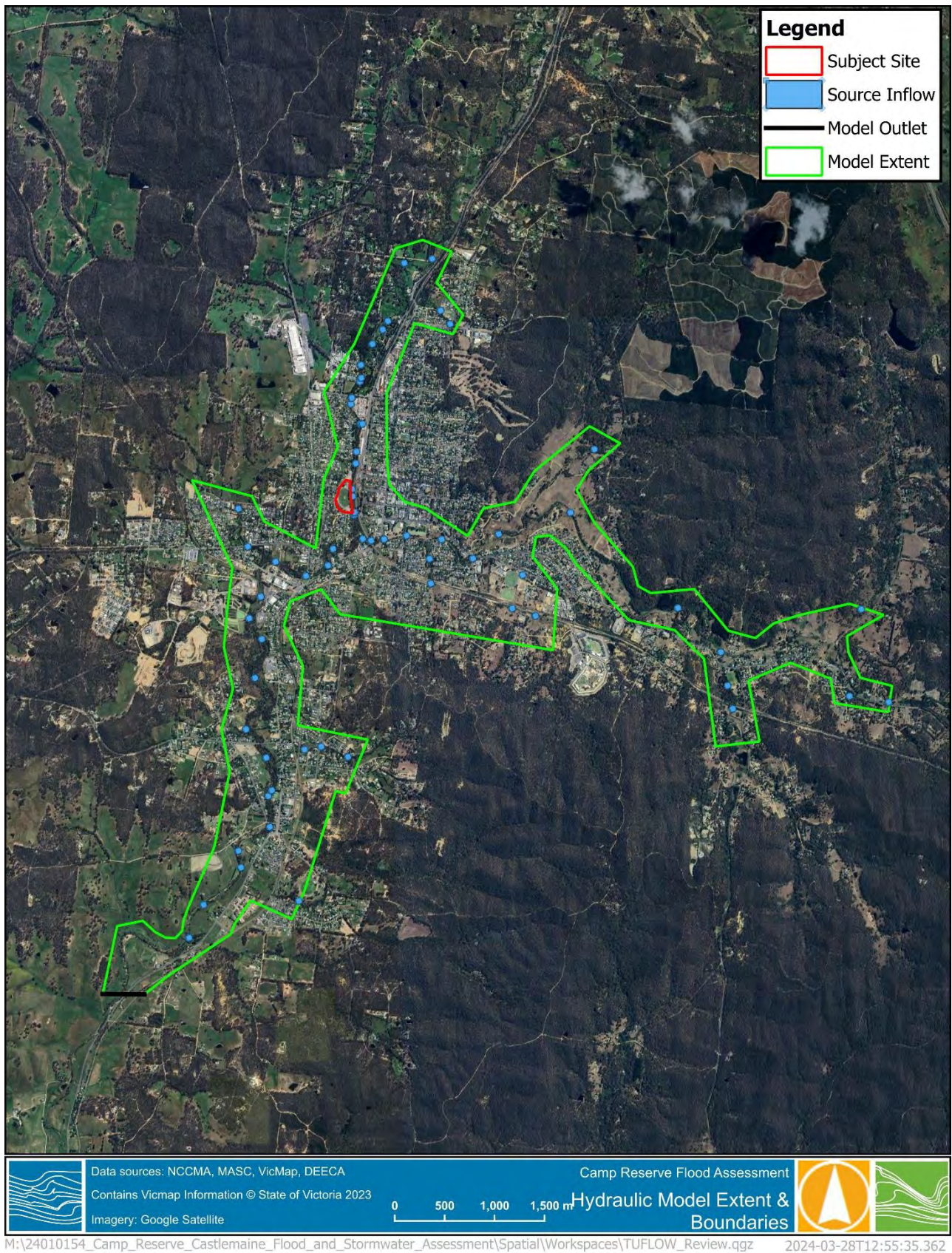
Hydrologic and hydraulic modelling was adopted from the 2020 *Flood Management Plan Update*<sup>1</sup> using RORB and TUFLOW. This assessment has adopted the same hydrology and hydraulic inflow conditions as the 2020 *Flood Management Plan Update*<sup>1</sup>, which should be referred to in conjunction to this assessment.

The hydraulic modelling component of this assessment adopted the same TUFLOW build that was used in the 2020 *Flood Management Plan Update*<sup>1</sup>, 2018-03-AE-iDP, as well as the same critical duration which was 12-hours for both the 1% and 10% AEP events. Adjustments were made to the original model to re-establish the existing conditions of the Subject Site that better reflected its characteristics for a site-specific scale assessment.

#### 2.2.1 Hydraulic Model Extent & Boundaries

The hydraulic model extent was not altered from the 2020 study<sup>1</sup> as it covers the study site and can be modelled efficiently. An overview of the hydraulic model extent and boundaries are shown below in Figure 2-1. The 1% AEP flood depth results at the site are shown in Figure 2-2.





**Figure 2-1 Hydraulic Model Extent and Boundaries**



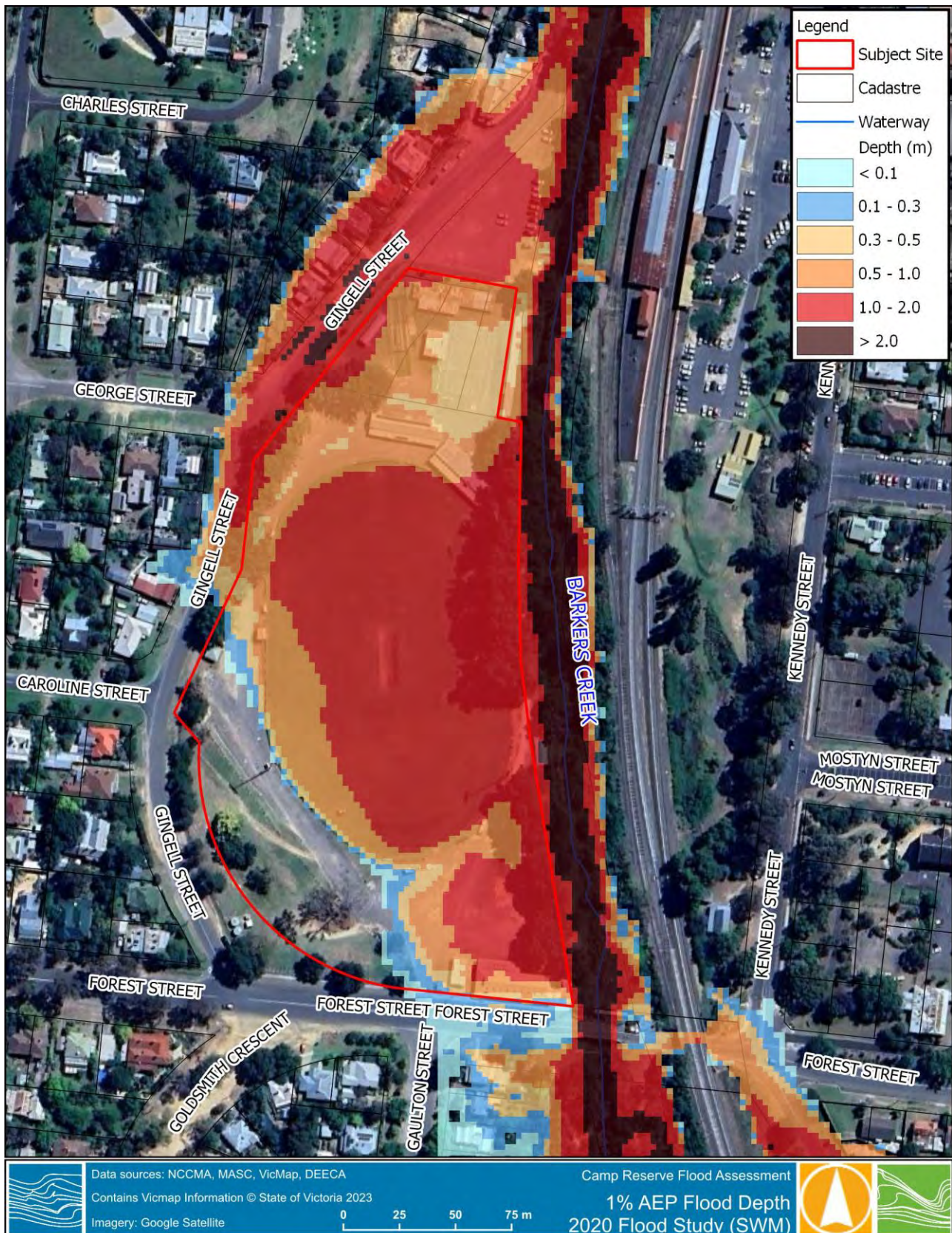


Figure 2-2 2020 Flood Study – 1% AEP Depth





## 2.2.2 Topography

Terrain data used in the 2020 hydraulic model was based on 1 metre LiDAR data captured on an unknown date. The resolution of the model DEM in the existing hydraulic model is suitable for this assessment, and was compared to LiDAR captured in September 2019 to determine if there were any major differences in terrain that could impact floodplain behaviour. The comparison revealed levels between the model DEM and the 2019 LiDAR Dataset are within tolerances ( $\pm 5$  cm) for most of the Subject Site. A large difference in the model DEM and 2019 LiDAR is the decrease in elevation along the Barkers Creek in the modelled DEM, but this is due to the changes applied within the TUFLOW model (2d\_zsh). Based on this comparison, the model DEM was adopted to represent the topography of the study site.

An overview of the comparison between hydraulic model terrain and the 2016 LiDAR dataset is shown in Figure 2-3 below, and the modelled topography of the Subject Site is shown in Figure 2-4 below.

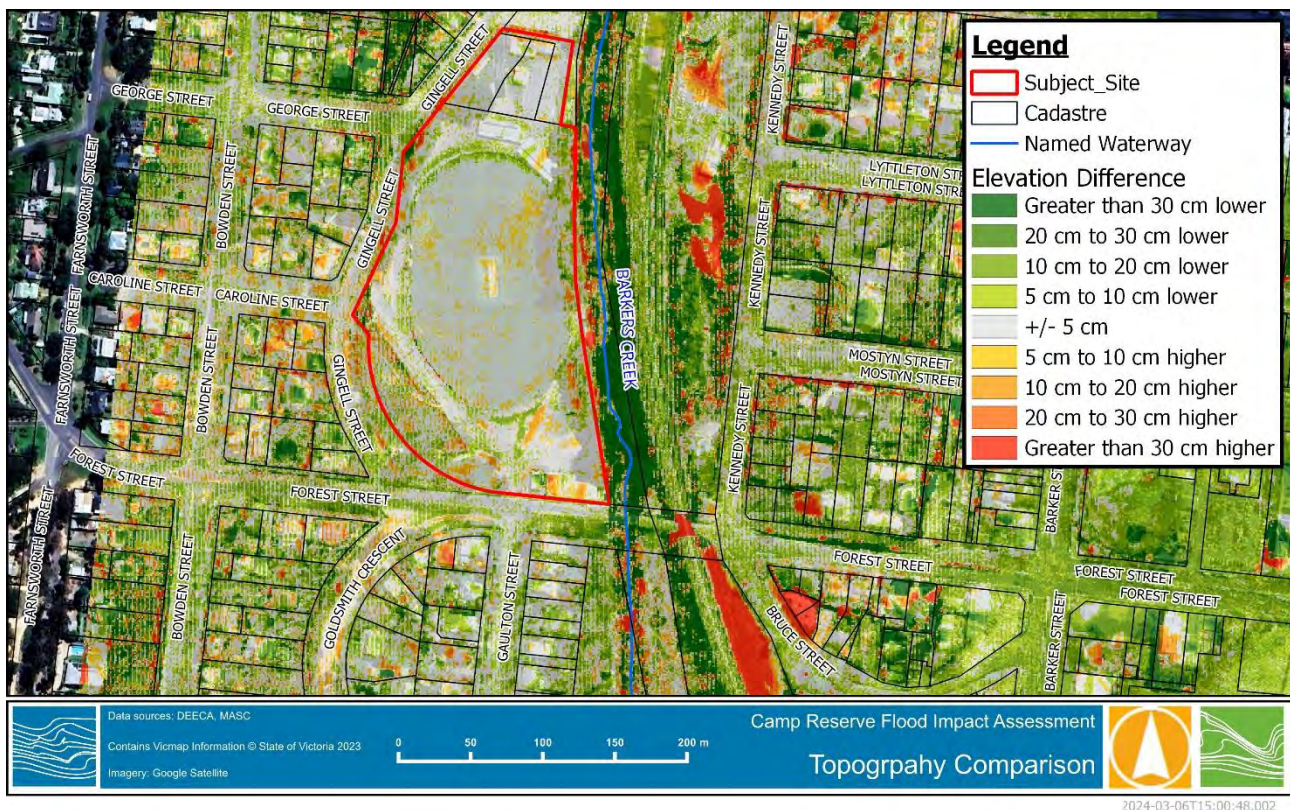


Figure 2-3 Topography Comparison – 2019 LiDAR vs Modelled Terrain (2020 Study)





**Figure 2-4 Subject Site Topography – Existing Conditions**





### 2.2.3 Hydraulic Structures

The hydraulic model featured hydraulic structures including pits, pipes, culverts, and bridges. Pits and pipes were modelled in the 1D domain (1d\_nwk) while bridges were modelled in the 2D domain as layered flow constrictions (2d\_lfcsh).

The Subject Site features a small stormwater network, consisting of pits and pipes, that convey flows from the west into Barkers Creek. Immediately downstream of the Subject Site, at Forest Street, the road and pedestrian bridge are both modelled as layered flow constrictions. Details of each of the assets were reviewed and compared against current asset information to ensure they are still relevant. No changes were made to the modelled 1D network and layered flow constrictions.

An overview of the stormwater network and layered flow constrictions relative to the Subject Site are shown in Figure 2-5 below.



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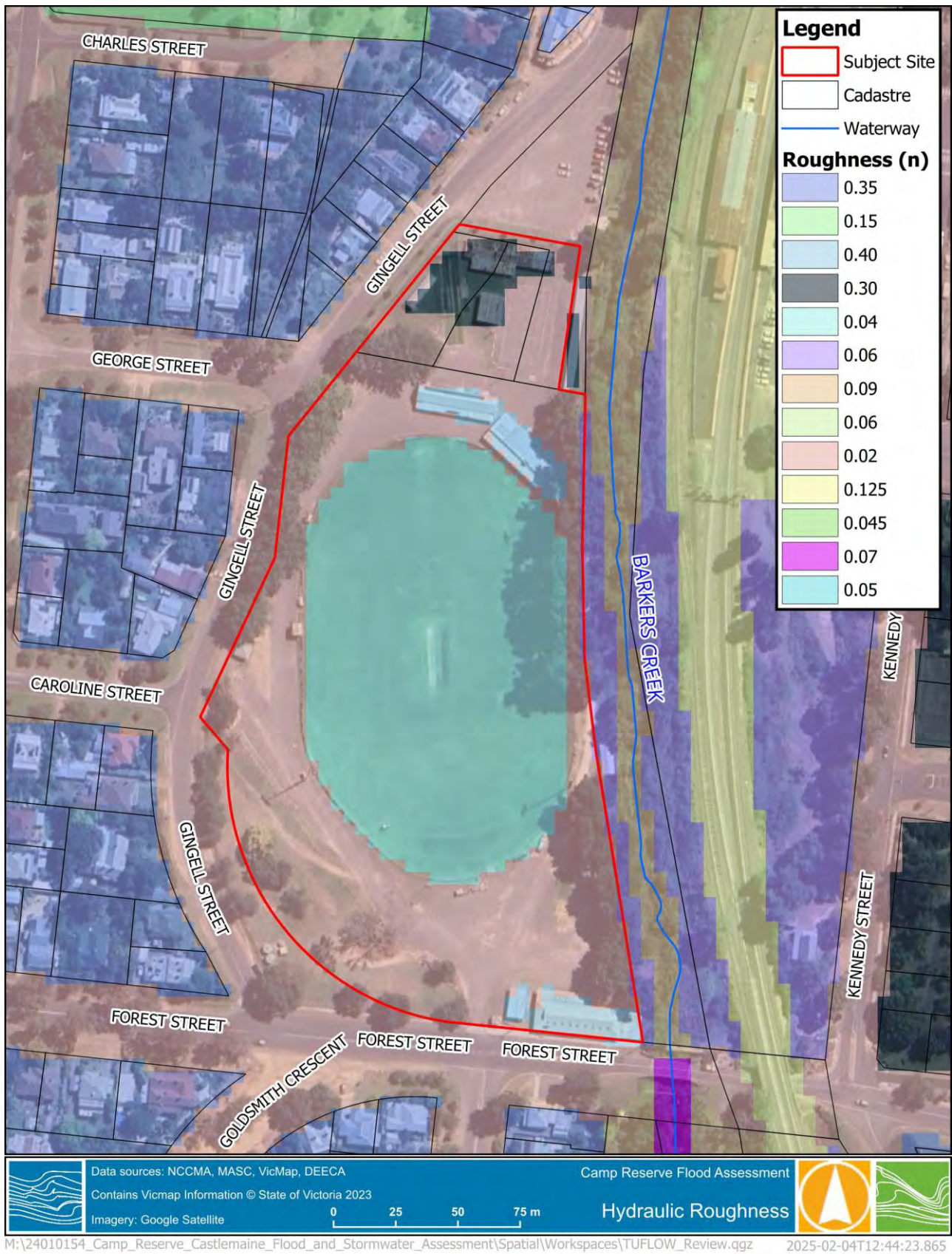


## 2.3 Surface Roughness

Hydraulic model surface roughness was based on planning layers and verified using aerial imagery. The Manning's 'n' roughness values adopted for each land use in the hydraulic model are presented in Table 2-1 and Figure 2-6 below. The adopted roughness values were based on the 2020 Management Plan Update, with changes made to the Subject Site to represent the surface roughness more accurately. Delineation between the oval and road/parking area was completed, as well as the representation of the existing buildings on the site. Previously, the Subject Site was modelled as Open Space with Minimal Vegetation.

**Table 2-1 Manning's Roughness Used in Hydraulic Model**

Land Type	Manning's Value (n)
Residential - Urban (higher density) - when building footprints and remainder of parcel are modelled together (with one roughness value)	0.35
Residential - Rural (lower density) - when building footprints and remainder of parcel are modelled together (with one roughness value)	0.15
Residential Footprint - when building footprints are modelled separately to remainder of parcel	0.4
Industrial/Commercial or large buildings on site	0.3
Open Space or Waterway - minimal vegetation	0.04
Open Space or Waterway - moderate vegetation	0.06
Open Space or Waterway - heavy vegetation	0.09
Open water (with reedy vegetation)	0.06
Car park/pavement/wide driveways/roads	0.02
Railway line	0.125
Forest Ck - Previous 10	0.045
Campbells Creek Channel from Forest St to Elizabeth St - Previous 18	0.07
Barkers Ck	0.05



**Figure 2-6 Detailed Hydraulic Roughness – Site Specific Existing Conditions**





## 2.4 Model Summary

A summary of the model inputs is shown in Table 2-2.

**Table 2-2 TUFLOW Model Summary**

<b>Terrain</b>	The base terrain for the hydraulic model comprised of topographical data with a resolution of 1 metre. A description of the adopted base terrain dataset is listed below: <ul style="list-style-type: none"> <li>■ Barkers_lidar_R2_extended</li> </ul>
<b>Inflow Boundary Regime</b>	Direct inflow represented by source areas (2d_sa).
<b>Tailwater Boundary Conditions</b>	2d_bc – Type HQ (water level-flow) <ul style="list-style-type: none"> <li>■ Downstream Outlet: 0.01 m/m</li> <li>■ Remaining Extents: 0.027 m/m</li> </ul>
<b>Model Type</b>	TUFLOW HPC
<b>Model Build</b>	2023-03-AB-iSP
<b>Hydraulic Roughness</b>	Manning's 'n' values were attributed to different land use or surface types. The adopted manning's 'n' values adopted are shown in Table 2-1 and Figure 2-6.
<b>Model Cell Size</b>	2-metres
<b>Peak Cumulative Mass Error</b>	0.01% - 12-hr TP03
<b>RoG Filtering Parameters</b>	Depth: $\leq 0.03$ m Puddles: 200 m <sup>2</sup>



### 3 FLOOD MODELLING RESULTS

The representative design storm (12-hr) was used for the mapping and flood impact assessment analysis of the Subject Site and proposed development for the 1% AEP event. Changes to the existing conditions hydraulic model provided by the North Central CMA have resulted in altered flood levels in the immediate area of the Subject Site. These changes and their cause are discussed below, as well as the outcome the proposed development has on the floodplain.

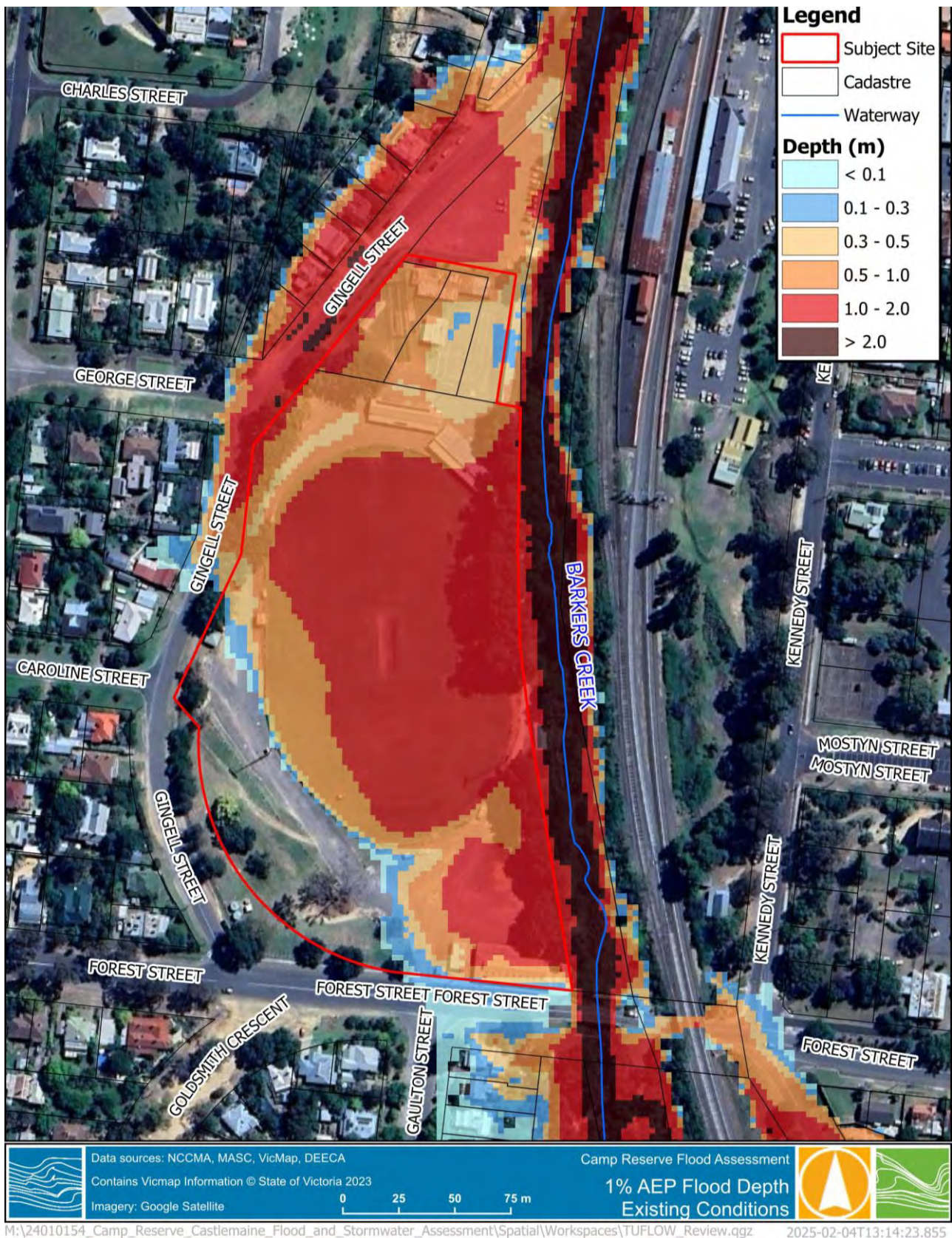
#### 3.1 Existing Conditions

In general, a decrease in the design flood level of between 1 cm to 2.5 cm within the central area of the site. To the north of the site and around Gingell Street, the flood levels decrease up to 5cm. These changes are due to the revised roughness values and delineation of internal roads, the oval and buildings within the site. Towards the southern end of the Subject Site, levels have increased by 1 cm to 2.5 cm where the roughness value was increased to represent the Table Tennis and Agricultural Pavilion in the southeast corner. With the pavilion now present, flows are backing up to the north of the structure which causing levels downstream to drop slightly, this is visible in Forest Street road reserve at the bridge, where levels are approximately 2 cm to 6 cm lower.

Mapping of the revised existing conditions afflux (compared with the 2020 flood study results), depth, water level and velocity are shown below in Figure 3-2 to Figure 3-4. The 10% AEP flood depth is shown in Figure 3-5.

The 1% AEP depth plot from the 2020 Flood Study are shown earlier in Figure 2-2. These show a consistent alignment to the revised modelling at the site.





**Figure 3-1 1% AEP Flood Depth – Existing Conditions**





**Figure 3-2 1% AEP 2020 Study Flood Levels vs Revised Flood Levels (Existing Conditions)**



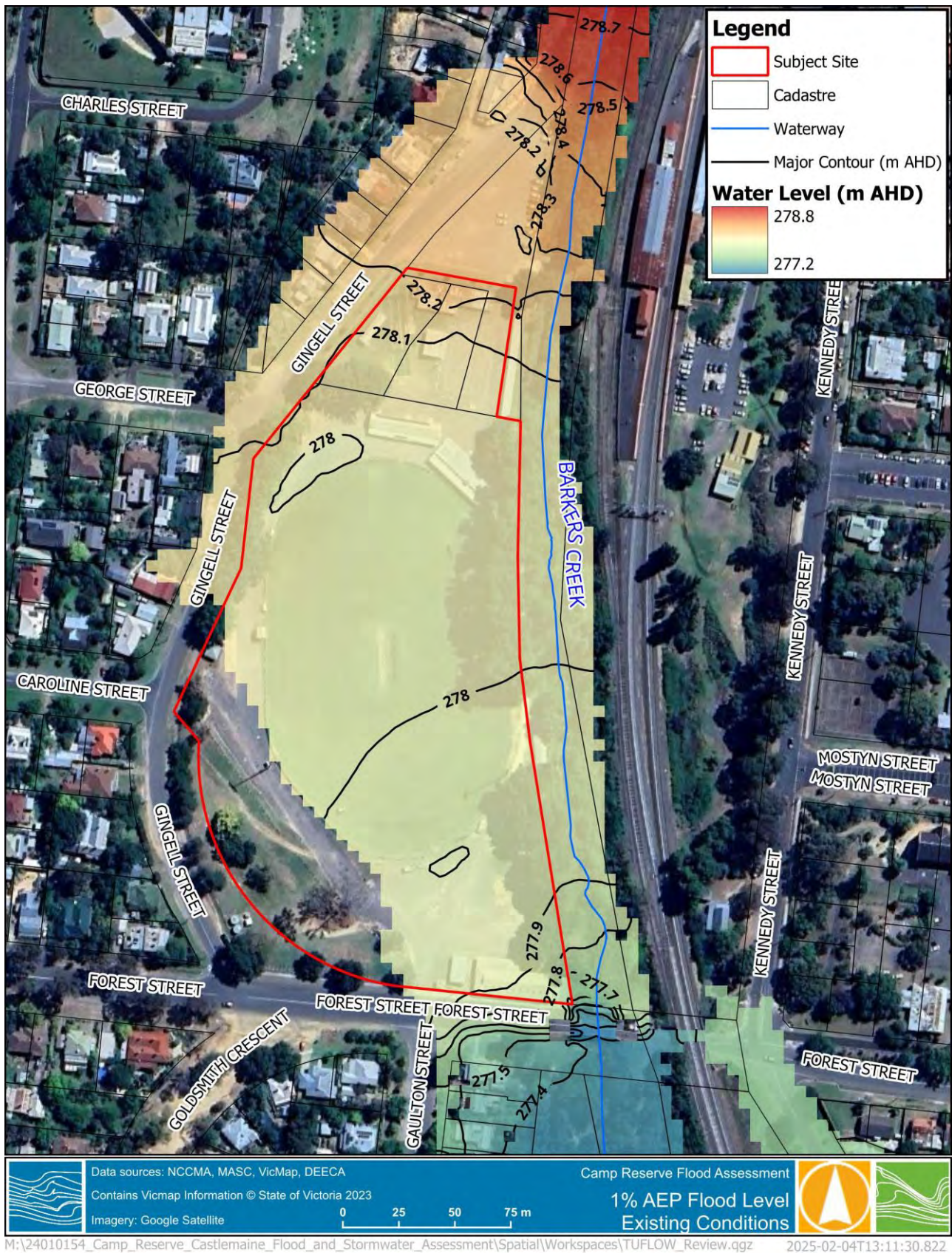


Figure 3-3 1% AEP Flood Level – Existing Conditions





**Figure 3-4 1% AEP Flood Velocity – Existing Conditions**





**Figure 3-5 10% AEP Flood Depth – Existing Conditions**



### 3.2 Developed Conditions

Developed conditions scenario modelling included changes to the model terrain and altering surface roughness values. To ensure the proposed development sees all habitable areas are elevated at least 0.3 m above the 1% AEP flood level and proposed access roads are not impacted by flooding that exceeds safety design criteria, the following elevations were adopted.

- Pavilion Building Footprint – 279 m AHD.
- Netball Courts – 277.95 m AHD.
- Access Road – 277.82 m AHD.

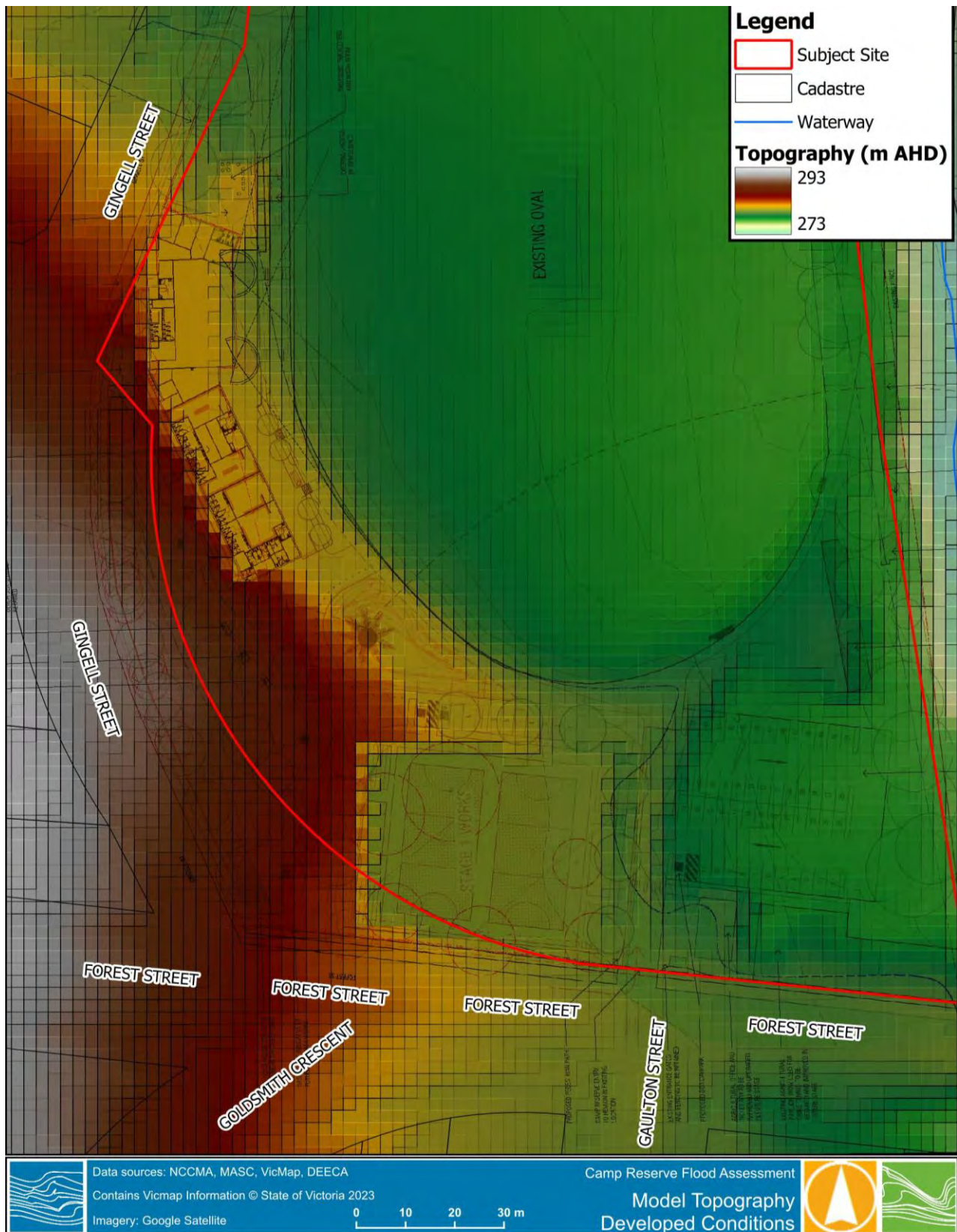
Modelling the proposed pavilion at approximately 1 metre higher than the 1% AEP flood level provided a clearer understanding on afflux and levels for recommended finished floor heights and allows for assessing rarer storm events knowing the modelled flood will likely be above the flood level.

To minimise the loss of floodplain storage within the Subject Site, the proposed netball courts were elevated slightly above the existing conditions 1% AEP flood level. The internal road along the east and north sides of the netball court was elevated to a height to allow for inundation during the 1% AEP event while maintaining safety design criteria for access/egress to the site during emergencies.

The Mannings (n) value (0.40) for the proposed pavilion was adjusted to reflect the impediment of flow in the hydraulic model. The netball courts, internal road and the removed buildings, at the north end of the oval, were assigned a Mannings (n) value of 0.02 (based on concrete or a sealed road surface).

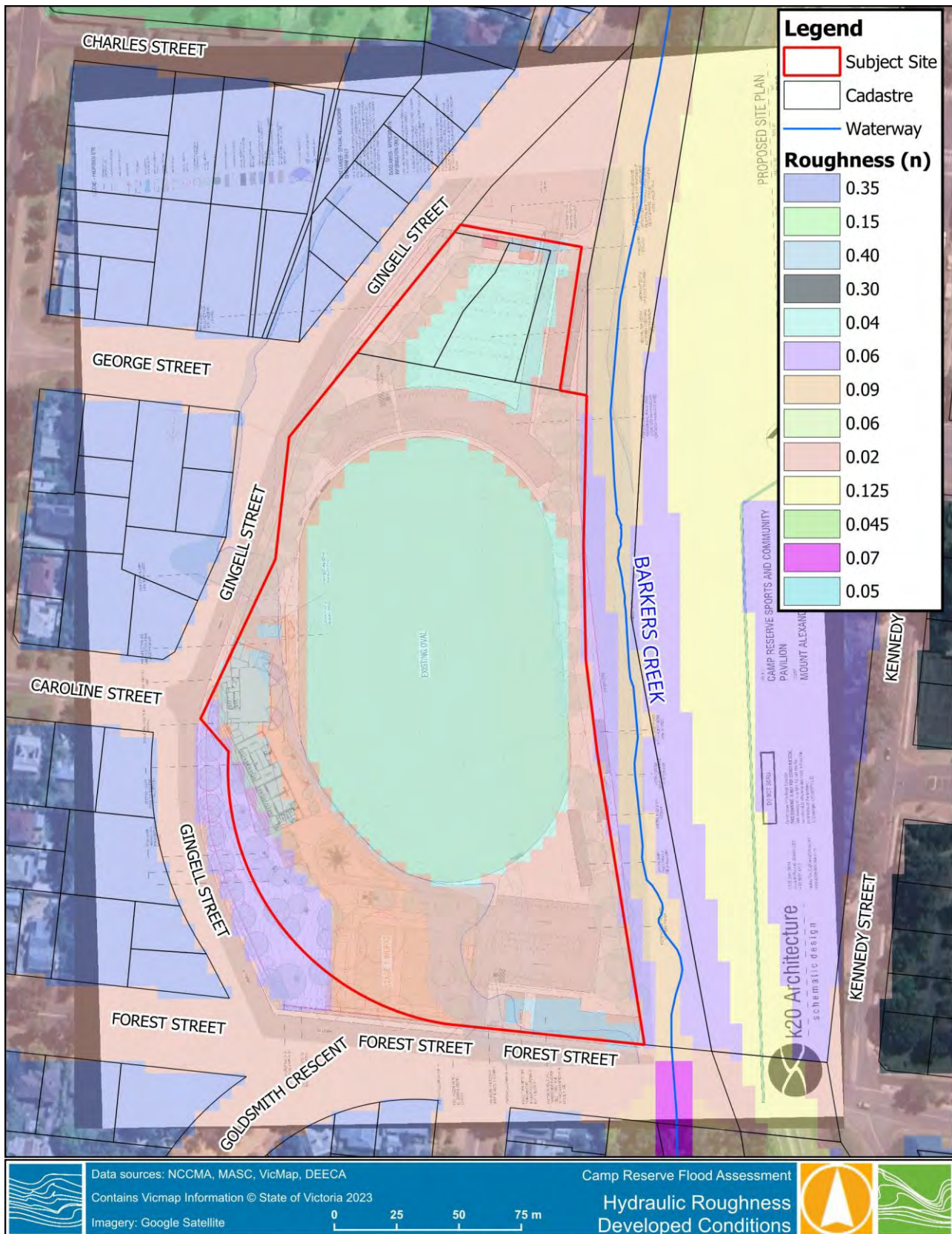
An overview of the proposed development layout is shown in Figure 1-3, and mapping of the developed topography and surface roughness's are shown in Figure 3-6 and Figure 3-7 below.





**Figure 3-6 Proposed Development Modelled Surface Elevations**





**Figure 3-7 Detailed Hydraulic Roughness – Site Specific Developed Conditions**





### 3.2.1 Results

Mapping of the developed conditions scenario show that the extents of the 1% and 10% AEP design events no longer impact the proposed pavilion. The developed flood extents reach the base of the stairs/seating area attached to the eastern side of the pavilion. The proposed netball court area experiences partial inundation during the 1% AEP flood event on its eastern side. Depths of inundation along the frontage of the pavilion are generally less than 0.3 metres in depths, with the timekeepers box area to the north, sited above the 1% AEP flood level. The netball courts are inundated by depths less than 0.2 metres which is isolated to the boundary of the east court. Depths in the internal road are slightly greater with a range of 0.1 to 0.2 metres, the deepest being where the road forks around the oval.

The north area of the proposed pavilion is the closest to the 1% AEP flood extent, with a flood level of 278.02 m AHD along its frontage of the oval. Flood levels near the proposed timekeeper's box are slightly higher to the north at 278.00 m AHD.

Velocities through the Subject Site during the 1% AEP event range between less than 0.5 m/s and 3 m/s, with higher velocities located north of the pavilion along the boundary of the oval. Adjacent to the proposed pavilion, velocities are less than 0.5 m/s.

Flood depth, velocity and water level mapping for the 1% AEP design event are shown in Figure 3-8 to Figure 3-11 below.

Mapping of the 10% AEP flood event shows that the proposed pavilion, netball courts and internal road are not subject to inundation, with flood levels reaching 277.14m AHD within the Subject Site. Mapping of the 10% AEP flood depth is shown in Figure 3-12 below.

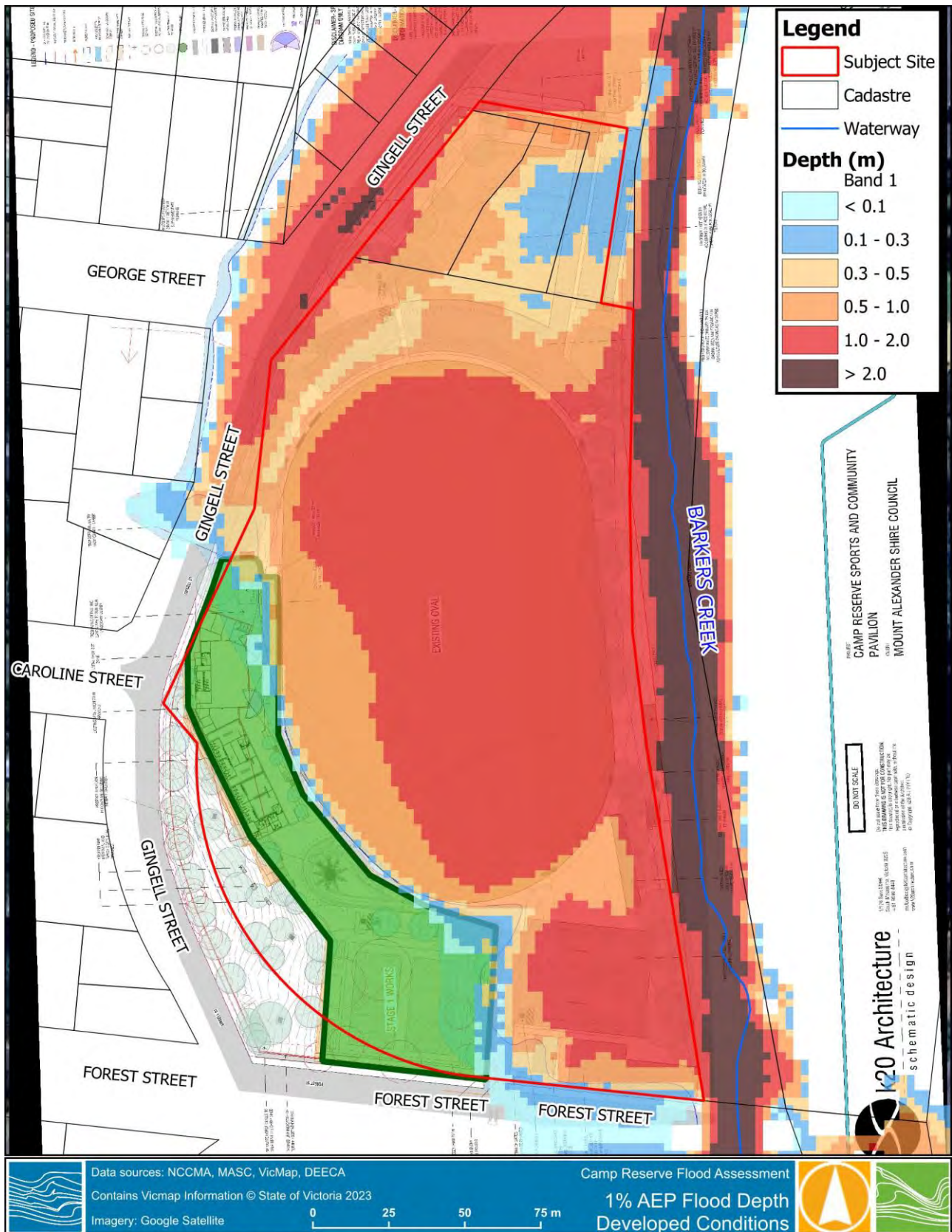
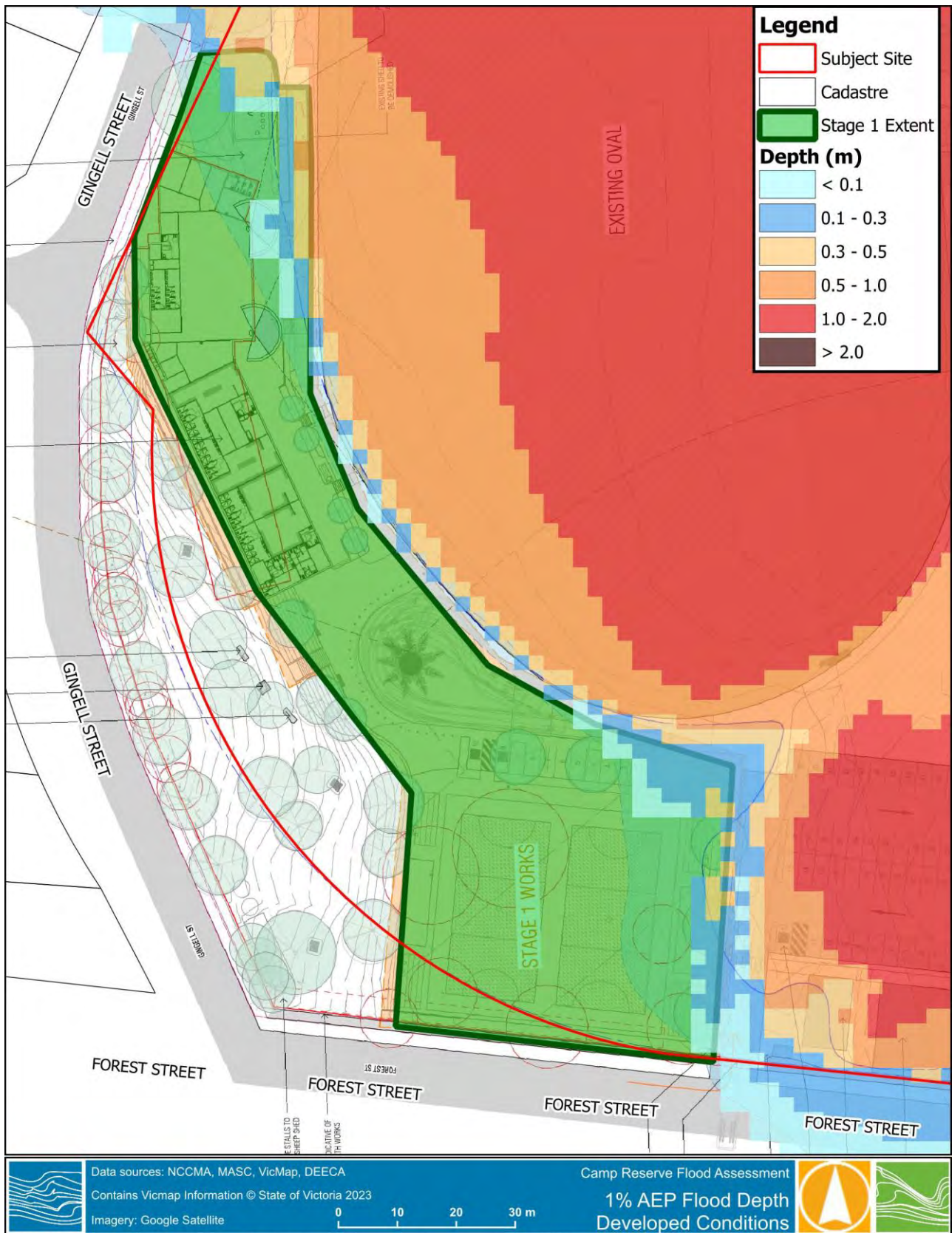


Figure 3-8 1% AEP Flood Depth – Developed Conditions Site Overview





**Figure 3-9 1% AEP Flood Depth – Developed Conditions – Proposed Building Locations**





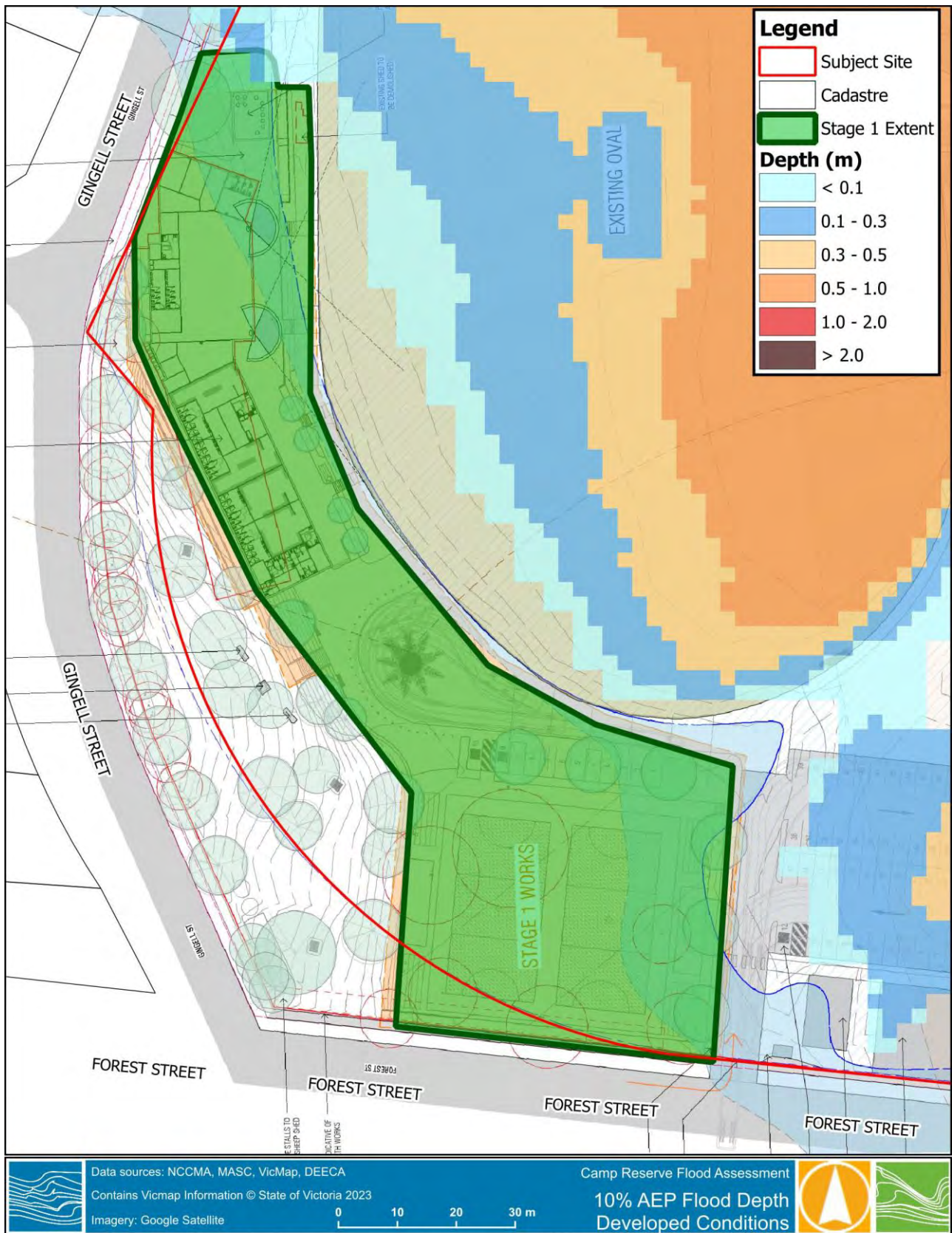
**Figure 3-10 1% AEP Flood Level – Developed Conditions**





**Figure 3-11 1% AEP Flood Velocity – Developed Conditions**





**Figure 3-12 10% AEP Flood Depth – Developed Conditions**





### 3.3 Afflux Assessment

Existing and developed flood levels were compared for the 1% AEP critical duration (12-hour) event to highlight any impact the proposed development may have on neighbouring properties. This comparison was determined by subtracting the existing conditions flood depths from the developed conditions, as shown in the equation below.

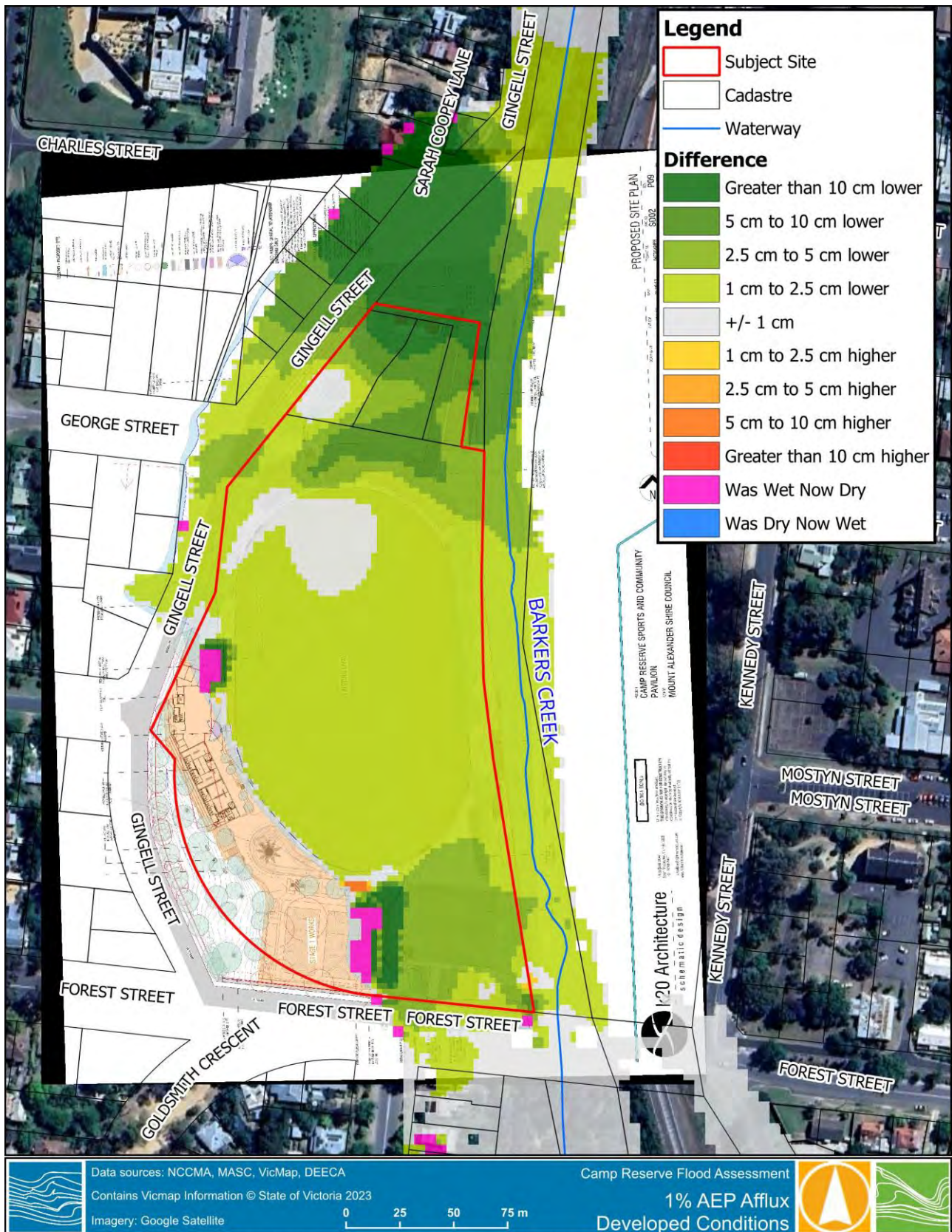
$$\text{Change in Flood Depths} = \text{Developed Conditions Flood Depths} - \text{Existing Conditions Flood Depths}$$

Comparison of the flood depths between developed and existing conditions have changed across the site. Depths north of the Subject Site, in Gingell Street road reserve, reduce by approximately 10cm. Throughout the Subject Site, peak depths generally decrease between 1 to 2.5cm. These reductions in flood depths are attributed to the removal of several buildings in the northern area of the Subject Site which previously obstructed flows. This results in a change in flow distribution and peak velocities across the oval which slightly alters flow behaviour and generally lowers the peak depths across the site.

Where the proposed pavilion is to be constructed, the elevated building footprint which slightly encroaches into the flood extent shows minimal changes in flood depth at the north end of the pavilion.

Flood depths over the internal road (at Forest Street) have decreased by more than 10cm as a result of elevating the access road. Increasing of the road height and reducing depths over the internal road have not negatively impacted the floodplain in the Forest Street road reserve either, as depths in Forest Street have reduced by approximately 2.5cm. The proposed netball courts now remain dry.

No negative impacts on peak flood depths outside of the site (neighbouring properties and road reserve) is evident as shown in Figure 3-13.



**Figure 3-13 1% AEP Flood Depth Difference**





### 3.4 Hazard Assessment

Flood hazard is used to determine if access is considered safe for people and vehicles during a flood event. The recommended criteria for assessing flood hazard are outlined in ARR19 and the Australian Emergency Management Handbook<sup>2</sup>. The flood hazard curve, shown in Figure 3-14, and vulnerability thresholds, shown in Table 3-1, specifies safety/risk levels for floodplain management or emergency management.

Elevating the internal road is key to reducing the hazard classification of the primary access to the Subject Site. The assessed road height, discussed in Section 3.2 above, will still experience inundation during the 1% AEP storm event, however the modelled depths, velocities and VxD products are given the classification of H1. Mapping of the 1% AEP flood hazard classification extents is shown in Figure 3-15 below.

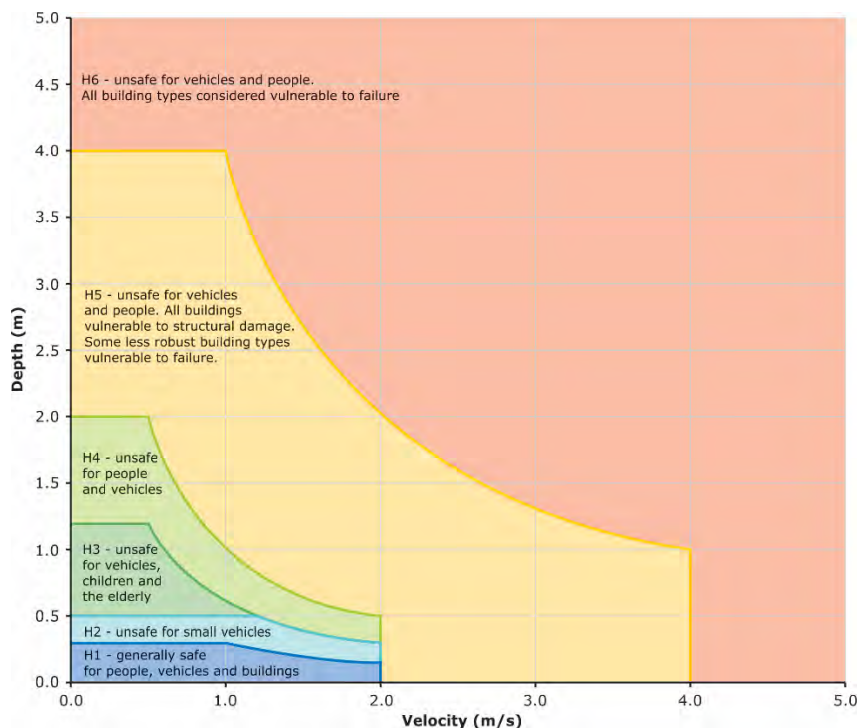
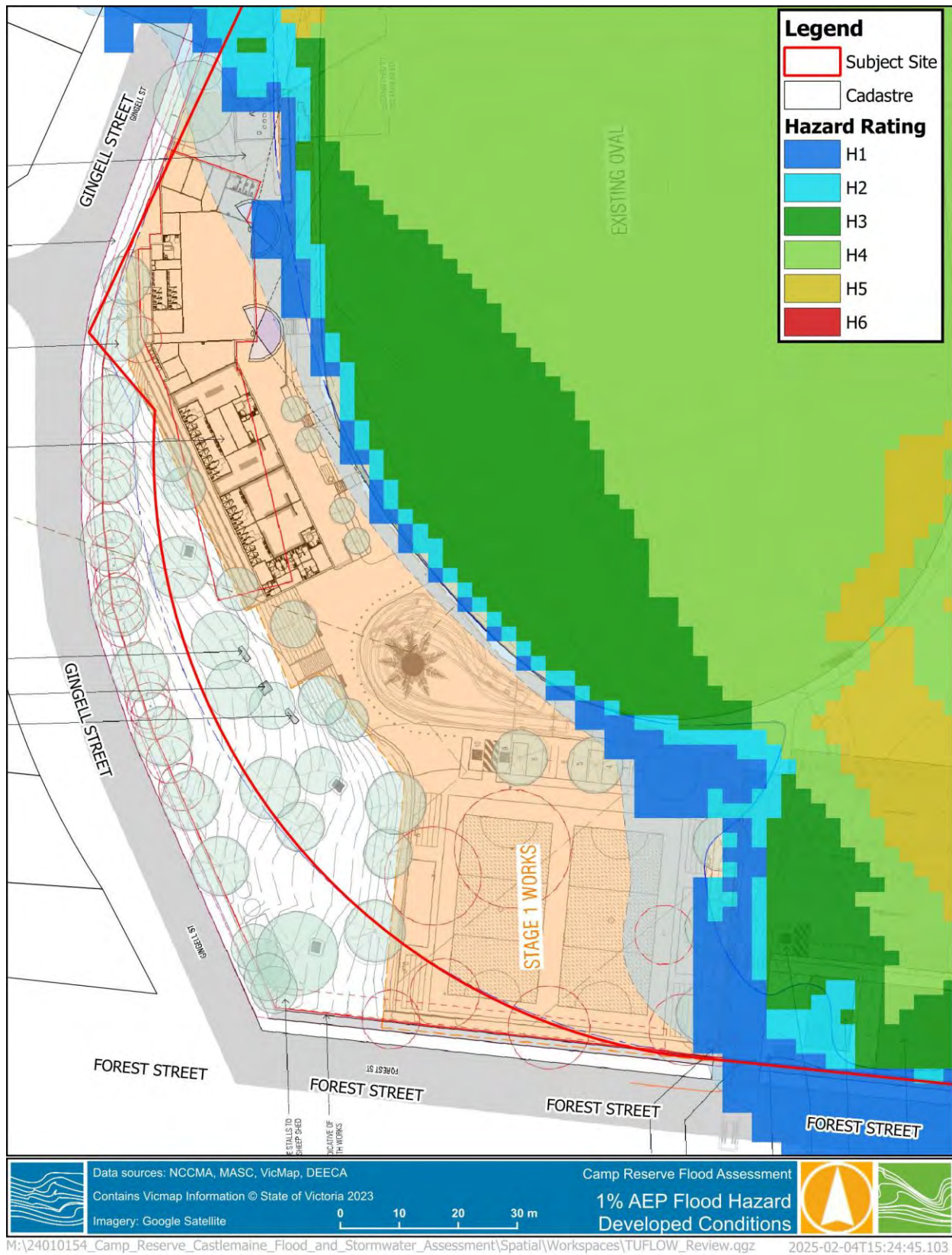


Figure 3-14 ARR19 Combined Flood hazard Curves (Smith et al., 2014)

Table 3-1 Combined Hazard Curves – Vulnerability Thresholds Classification Limits (Smith et al., 2014)

Classification	Classification Limit (Dand V in combination)	Limiting Still Water Depth (m)	Limiting Velocity (m/s)
H1	$D*V \leq 0.3$	0.3	2.0
H2	$D*V \leq 0.6$	0.5	2.0
H3	$D*V \leq 0.6$	1.2	2.0
H4	$D*V \leq 1.0$	2.0	2.0
H5	$D*V \leq 4.0$	4.0	4.0
H6	$D*V > 4.0$	-	-

<sup>2</sup> Technical flood risk management guideline: Flood hazard – Supporting document for the implementation of Australian Emergency Management Handbook 7, Managing the floodplain: Best practice in flood risk management in Australia, by Australian Emergency Management Institute



**Figure 3-15 1% AEP Flood Hazard Classification – Developed Conditions**





### 3.5 Climate Change

Consideration to the climate change levels was completed by assessing the proposed development against the 0.5% AEP and 0.2% AEP flood events. Modelling of the 2090 RCP8.5 climate change scenarios was not undertaken as part of the 2020 Management Plan Update<sup>1</sup>, however, determination of the rainfall intensities changes was undertaken. An increase in rainfall intensity of 16.0% was required to project future climate conditions in the Loddon Campaspe catchment.

Rainfall intensity increases for the 0.5% AEP and 0.2% AEP events were compared to the existing conditions 1% AEP event.

**Table 3-2 Climate Change Intensity Comparison**

Scenario	0.5% AEP	0.2% AEP
Existing Conditions	9.50%	23.1%
2090 RCP8.5	16.0%	

Flood modelling for the climate change scenario was completed by assessing the 0.2% AEP event for the proposed development. This event adopts a conservative assumption with an increase in intensity larger than the 2090 RCP8.5 climate change scenario (23.1% compares to 16.0%).

Mapping of the 0.2% AEP event indicates a flood level of 278.4m AHD (around 40mm higher than the 1% AEP flood level). The pavilion would require a finished flood level of 278.7 m AHD to provide 0.3m freeboard above the 0.2% AEP flood level. Access via the internal road from Forest Street is now inundated by depths ranging between 0.5 to 1.0 m.

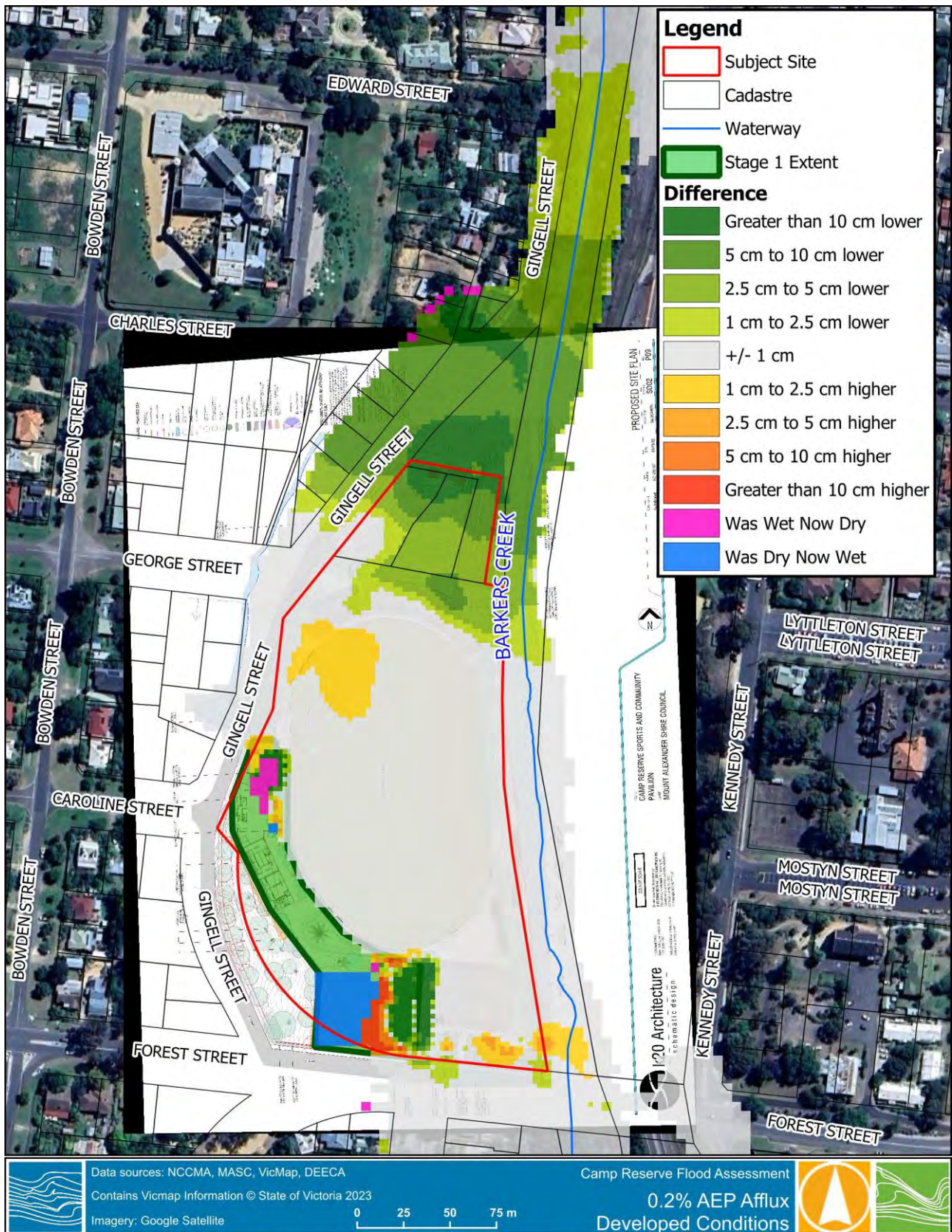
A comparison in flood levels was also completed for the proposed development conditions under the 0.2% AEP event to assess the impacts on the floodplain. The changes made to the northern area of the Subject Site have reduced flood levels by 10cm, similar to the 1% AEP event but to a smaller extent. Levels within the site remain constant over the oval. Where the timekeeper's box was previously inundated, it is now indicating it is above the 0.2% AEP flood level, with localised increases/decreases in levels where the terrain has changed slightly.

The netball courts are now inundated due to the proposed excavation/cut back into the slope to the west. lowering and levels in the proposed access from Forest Street have reduced by 0.2 to 0.5 m. Isolated increases in flood level in the southeast corner of the Subject Site are evident with levels approximately 2.5cm higher compared to existing conditions.



**Figure 3-16 0.2% AEP Flood Level – Developed Conditions**





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**Figure 3-17 0.2% AEP Flood Depth Difference – Developed Conditions**



## 4 RECOMMENDED FLOOR HEIGHTS

Design flood levels for 1% AEP and the Climate Change consideration (based on 0.2% AEP – current conditions) at the proposed pavilion, netball courts and internal road are shown in Table 4-1 below along with recommended and freeboard and minimum floor levels.

**Table 4-1 Recommended Finished Floor Levels**

<b>Building</b>	<b>Freeboard (above Design Level) (m)</b>	<b>1% AEP Flood Level (m AHD)</b>	<b>Minimum Floor/Building Level (m AHD)</b>	<b>0.2% AEP Flood Level (m AHD)</b>	<b>Minimum Floor/Building Level (m AHD)</b>
Pavilion	0.3	278.00	278.30	278.40	278.70
Timekeeper's Box	0.15	278.00	278.15	278.40	278.55
Netball Courts	-	277.90	277.95	278.30	-





## 5 STORMWATER MANAGEMENT STRATEGY

### 5.1 Planning Clause 53.18

The purpose of the Mount Alexander planning scheme Clause 53.18 is to ensure that stormwater in urban development, including retention and reuse, is managed to mitigate the impacts of stormwater on the environment, property and public safety, and to provide cooling, local habitat and amenity benefits. Clause 53.18-5 and 53.18-6 are of particular relevance for the current project and stipulate the stormwater management conditions that applied during the normal operation and construction phases of the project. A summary of key objectives and standards to be met for each clause is summarised in Table 5-1.

**Table 5-1 Clause 53.18-5 and Clause 53.18-6 Objectives and Standards**

Clause	Objectives	Standards
53.18-5	<ul style="list-style-type: none"> <li>■ To encourage stormwater management that maximises the retention and reuse of stormwater.</li> <li>■ To encourage development that reduces the impact of stormwater on the drainage system and filters sediment and waste from stormwater prior to discharge from the site.</li> <li>■ To encourage stormwater management that contributes to cooling, local habitat improvements and provision of attractive and enjoyable spaces.</li> <li>■ To ensure that industrial and commercial chemical pollutants and other toxicants do not enter the stormwater system.</li> </ul>	<p>The stormwater management system should be designed to:</p> <ul style="list-style-type: none"> <li>■ Meet the current best practice performance objectives for stormwater quality as contained in the Urban Stormwater - Best Practice Environmental Management Guidelines (Victorian Stormwater Committee, 1999).</li> <li>■ Minimise the impact of chemical pollutants and other toxicants including by, but not limited to, bunding and covering or roofing of storage, loading and work areas.</li> <li>■ Contribute to cooling, improving local habitat and providing attractive and enjoyable spaces.</li> </ul>
53.18-6	<ul style="list-style-type: none"> <li>■ To protect drainage infrastructure and receiving waters from sedimentation and contamination.</li> <li>■ To protect the site and surrounding area from environmental degradation prior to and during construction of subdivision works.</li> </ul>	<p>An application should describe how the site will be managed prior to and during the construction period and may set out requirements for managing:</p> <ul style="list-style-type: none"> <li>■ Erosion and sediment.</li> <li>■ Stormwater.</li> <li>■ Litter, concrete and other construction wastes.</li> <li>■ Chemical contamination.</li> </ul>

### 5.2 Available Data and relevant Guidelines

- Indicative proposed development
- Shire of Mount Alexander MUSIC modelling guidelines (2019)



### 5.3 Method

Since the proposed development consists of modification to the existing layout of the reserve, unlike the typical stormwater management strategy associated with development of existing rural/undeveloped land, the main approach was to understand what the net difference in impervious area under current and proposed conditions. The basis of this approach is the creation of new impervious areas leads to an increase in peak runoff rate, volume and pollutant loading. Therefore, the proposed stormwater management strategy aims to minimise the impact of additional impervious areas created through this project. It is noted that some areas identified for upgrading from gravel paths to concrete may in some instances reduce pollutant loading (gross pollutants).

Details relating to the stormwater treatment assessment are listed below.

- Impervious surfaces such as, roof, paved (asphalt roads, netball courts), synthetic turf and gravel were calculated from aerial imagery (existing conditions) and the development layout (proposed conditions). For the purpose of the SWMS development, these estimates are suitable for the assessment.
- Overall site impervious area under current and proposed conditions were estimated by assuming the following impervious fraction values:
  - Roof – 100%
  - Paved areas – 100%
  - Gravel – 80%
  - Synthetic turf – 95%
- A STORM report was developed to assess suitable WSUD treatment asset(s).
  - As summarised in Section 6.1 the nature of the development largely consists of the relocation of existing asset, resulting in a marginal net decrease in impervious area (~0.02ha). As such the proposed pavilion (~0.11 ha) was conservatively adopted as the additional development which is required to meet BPEM targets.
- Much of the site is not part of a formal drainage system. Runoff generated from roads and paths within the site flows either towards the oval or away from the site in a distributed manner. This is important as the flow paths travel over grassed areas where runoff is likely infiltrated except in severe storm events.
- Relevant strategies and guidelines applicable for construction phase stormwater management were also discussed.
- An additional assessment of the requirement of on-site detention was conducted.
- Minor modifications to the development layout will not impact the findings of the SWMS. However, if major changes to the proposed development are occurred in future, the SWMS needs to be revisited.





## 6 TREATMENT MODELLING RESULTS

### 6.1 Comparison of Current and Future Impervious Areas

Impervious areas under existing and proposed conditions are shown in Figure 6-1 and Figure 6-2 respectively. A summary of impervious area estimates is presented Table 6-1. It is evident that the proposed development will result in a decrease of the equivalent impervious area by 0.03 ha. The reserve area encompasses 3.9 ha, resulting in the site being estimated to be 34% impervious (currently) and expected to be comparable in proposed development scenario (33%). Based on the overall size of the site, the proposed development can be considered to have an insignificant change in impervious area.

**Table 6-1 Impervious area summary**

Impervious Area Type	Existing Total Area (ha)	Proposed Total Area (ha)	Adopted FI	Resultant Existing Impervious Area (ha)	Resultant Proposed Impervious Area (ha)
Roof	0.301	0.249	1	0.30	0.25
Paved	0.681	1.042	1	0.68	1.04
Gravel	0.411	0.000	0.8	0.33	0.00
Synthetic Turf	0.011	0.000	0.95	0.01	0.00
<b>Total</b>	<b>1.404</b>	<b>1.291</b>		<b>1.32</b>	<b>1.29</b>



**Figure 6-1 Current Impervious Areas**





**Figure 6-2 Proposed Impervious Areas (based on layout dated 15/03/2022)**





## 6.2 Stormwater Management during Operation

A typical SWMS of a developed site consists of two main components: runoff quantity management (peak flow attenuation target) and quality management (pollutant load reduction targets). The proposed approach for Camp Reserve is summarised below.

### 6.2.1 Water Quality Management

Two treatment strategies were explored within the Camp Reserve for the treatment of stormwater:

#### ■ Harvesting and reuse

- There are opportunities to harvest rainwater and stormwater within the site, including harvesting rainwater from the new Pavilion roof for toilet flushing. Based on preliminary modelling of rainwater harvesting, (a 50% pavilion roof area is the maximum allowable area under the Council's MUSIC guidelines) will produce a yield of 0.2 ML/year. A summary of the potential maximum reduction in runoff volume and pollutant loading feasible through rainwater harvesting of the pavilion roof and all roof areas within the site<sup>3</sup> is provided in
- Table 6-2 based on a MUSIC assessment.

**Table 6-2 Mean Annual Loading generated from 50% of Pavilion Roof and 50% of all Roof areas**

Parameter	Pavilion Roof only	All Roof Area
Flow (ML/yr)	0.224	0.598
Total Suspended Solids (kg/yr)	5.81	15.9
Total Phosphorus (kg/yr)	0.034	0.091
Total Nitrogen (kg/yr)	0.492	1.33
Gross Pollutants (kg/yr)	7.82	20.9

- The proposed rainwater harvesting from the pavilion roof for toilet flushing would keep runoff volumes to below the current conditions. However, the reduction in pollutant loading, will not be sufficient to maintain pollutant loading to existing loads or meet BPEM targets.
- Another opportunity is to consider stormwater harvesting for oval irrigation. With an approximate oval area of 1.5 ha, it is assumed the mean annual irrigation demand could be around 4.8 to 6.8 ML/year<sup>4</sup>.
- The estimated total runoff volume generated from the entire site is 5.5 ML/year, not all of this would be harvested (roof only volumes are less than 0.6ML/Year). Additional plumbing infrastructure and stormwater treatment (advanced treatment for disinfection) and storage tanks will be needed to implement a stormwater harvesting scheme on site for irrigation of the oval. These aspects will be considerably expensive compared to rainwater harvesting for toilet flushing.
- An advantage of rainwater harvesting for toilet flushing is that, unlike stormwater harvesting, no additional treatment and disinfection are needed. They are also a relatively cost-effective option.

<sup>3</sup> It is not feasible to harvest rainwater from all roof areas. This scenario is provided as a comparison. Runoff can be harvested from pavilion roof and possibly other buildings where tanks can be readily connected to indoor toilets.

<sup>4</sup> Based on a typical reuse demand of 3.2 and 4.5 ML/ha/year for warm season turf and cool season turf. Source: City of Greater Geelong MUSIC modelling Guidelines

<https://www.geelongaustralia.com.au/idm/article/item/8d782dbec363563.aspx#shr>





- Considering the proposed changes to the site layout, rainwater harvesting is recommended for the new pavilion at the Camp Reserve development. The rainwater harvesting complemented with some additional WSUD treatment is likely sufficient to meet stormwater management requirements.

#### ■ Treatment Only

Given the nature of works raingardens fed from the proposed pavilion roof are considered a suitable option:

- This option treats runoff generated from the pavilion roof via raingardens.
- A preliminary concept of this option approximately 8 m<sup>2</sup> total of raingarden area split across two halves of the pavilion roof (550m<sup>2</sup> each).
- A STORM Rating Assessment is shown in Figure 6-3

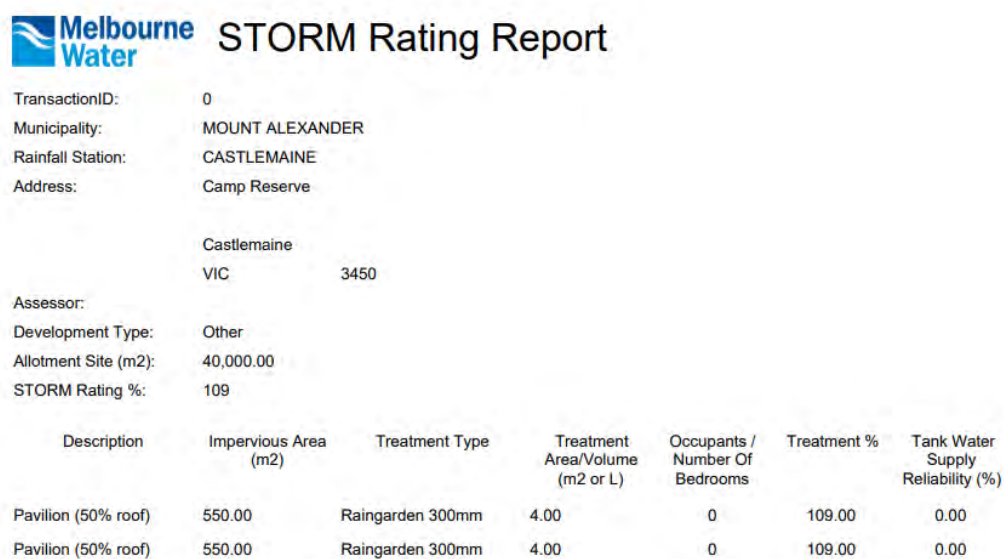


Figure 6-3 Storm Rating Report

As shown in Figure 6-1 the proposed development hardstand area(s) is comparable to the existing reserve impervious area(s), Figure 6-2. The impervious areas are summarised in Table 6-1. Considering the negligible change in impervious areas additional stormwater treatment assets are considered not to be required to cater for these areas.

### 6.2.2 Additional Treatment Opportunities

When assessing the impact on stormwater quality from proposed changes to the site, consideration must be given to the type of development. Typical stormwater management strategies and WSUD assets implemented in residential and commercial developments consist of sites typically with fraction impervious values higher than the recreation reserve being assessed here. Currently, a large portion of the site is not part of the formal drainage system and runoff generated from hard impervious surfaces will flow either towards the oval or away from the site crossing large swathes of grassed areas. These areas act as buffer strips which have not been incorporated into the treatment modelling for this assessment.

Opportunities to implement further treatment within the formalised pit and pipe drainage network are limited within the site. The flood modelling assessment has shown there is a single drainage outfall from the site to Barkers Creek which collects external stormwater runoff from Gingell Street and further west including Geroke



Street and the surrounding catchment. The use of a proprietary type pit insert at either the existing connection pits adjacent to the site (on Gingell Street) or where any runoff from the proposed building will connect into this network would further increase the treatment of stormwater quality entering Barkers Creek. The drainage outfall to Barkers Creek adjacent to the site also lends itself to opportunities to implement an end of line type treatment measure in place of the treatment options proposed above.

Combining any additional WSUD treatment with rainwater harvesting for toilet flushing for the new pavilion will maximise the water quality benefits for any stormwater leaving the site.

### **6.2.3 Onsite detention**

Considering the minimal change in the impervious area across the site, current drainage conditions and limitations of the current drainage network, on-site detention is deemed unnecessary for the proposed changes to the site.

## **6.3 Stormwater Management During Construction**

Erosion, sediment, and litter are the main stormwater-related concerns to be managed during the construction phase. A construction management plan is to be developed by the contractor as the planning process advances. This should follow best practice guidelines such as:

- Erosion and Sediment control guide for building sites 2007
  - [clearwatervic.com.au/resource-library/guidelines-and-strategy/erosion-and-sediment-control-guidelines-for-building-sites.php](http://clearwatervic.com.au/resource-library/guidelines-and-strategy/erosion-and-sediment-control-guidelines-for-building-sites.php)
- Melbourne Water and EPA Victoria – Keeping Our Stormwater Clean: A builder Guide (2007)
  - <https://www.clearwatervic.com.au/resource-library/guidelines-and-strategy/keeping-our-stormwater-clean-a-builders-guide.php>
- EPA Victoria – Construction Techniques for Sediment and Pollutant Control
  - <https://www.epa.vic.gov.au/-/media/epa/files/publications/275.pdf>

## **6.4 Response to Stormwater Management Objectives**

The main objective of the proposed SWMS is to meet the requirements of the planning clause 53.18. Table 6-3 provides how the proposed SWMS addresses the planning requirements.





**Table 6-3 Clause 53.18-5 and Clause 53.18-6 Objectives and Standards**

Clause	Objectives	Standards	SWMS Response
53.18-5	<ul style="list-style-type: none"> <li>■ To encourage stormwater management that maximises the retention and reuse of stormwater.</li> <li>■ To encourage development that reduces the impact of stormwater on the drainage system and filters sediment and waste from stormwater prior to discharge from the site.</li> <li>■ To encourage stormwater management that contributes to cooling, local habitat improvements and provision of attractive and enjoyable spaces.</li> <li>■ To ensure that industrial and commercial chemical pollutants and other toxicants do not enter the stormwater system.</li> </ul>	<p>The stormwater management system should be designed to:</p> <ul style="list-style-type: none"> <li>■ Meet the current best practice performance objectives for stormwater quality as contained in the Urban Stormwater - Best Practice Environmental Management Guidelines (Victorian Stormwater Committee, 1999).</li> <li>■ Minimise the impact of chemical pollutants and other toxicants including by, but not limited to, bunding and covering or roofing of storage, loading and work areas.</li> <li>■ Contribute to cooling, improving local habitat and providing attractive and enjoyable spaces.</li> </ul>	<ul style="list-style-type: none"> <li>■ The proposed SWMS has demonstrated achieving BPEM targets by treating new pavilion runoff through raingardens</li> <li>■ The site does not store or use chemical pollutants and other toxicants in its normal operation.</li> <li>■ The proposed development does not change the existing characteristics of the site in terms of cooling and local habitat. The site itself is used as an active open space.</li> </ul>
53.18-6	<ul style="list-style-type: none"> <li>■ To protect drainage infrastructure and receiving waters from sedimentation and contamination.</li> <li>■ To protect the site and surrounding area from environmental degradation prior to and during construction of subdivision works.</li> </ul>	<p>An application should describe how the site will be managed prior to and during the construction period and may set out requirements for managing:</p> <ul style="list-style-type: none"> <li>■ Erosion and sediment.</li> <li>■ Stormwater.</li> <li>■ Litter, concrete and other construction wastes.</li> <li>■ Chemical contamination.</li> </ul>	<ul style="list-style-type: none"> <li>■ It is expected the contractor will develop A construction management plan as the planning process advances.</li> </ul>



## 7 SUMMARY

The current masterplan for the Camp Reserve development indicates a new pavilion along the western boundary and new netball courts along the southern boundary. Stage 1 of the works also includes a new pavilion, timekeeper's box and redeveloped internal road. A summary of the flood impact assessment and stormwater management strategy are provided below.

### 7.1 Flood Impact Assessment

Hydraulic modelling of the proposed development of Camp Reserve demonstrates that Stage 1 of the works can be completed without negatively impacting neighbouring properties for a 1% AEP flood events. 1% AEP flood mapping of Stage 1 shows that safe access/egress can be achieved when the road is elevated to the recommended level of 277.82 m AHD. It also demonstrates that the changes to the sites topography, within the 1% AEP flood extent, will not increase levels on neighbouring properties or road reserves.

In lieu of climate change modelling outputs, assessing the proposed development against the 0.2% AEP design event was considered appropriate. This can be considered a conservative assessment given the 0.2% AEP event is considered more severe than the increase in rainfall intensity associated with the 2090 RCP8.5 climate change scenario. During a 0.2% AEP event, the proposed works will result in a similar decrease in flood levels north of the site (due to the removal of existing buildings), however there is a minor isolated increase in flood levels north and north west of the pavilion in Gingell Street road reserve. However, this increase is limited to 2.5 cm and to the boundary of the road reserve.

Overall, the proposed works for Stage 1 is suitable from a floodplain management perspective but minimum design levels are recommended to achieve the modelled outcomes. Consideration to a flood risk plan to ensure the cancellation of events during an inundation event should also be discussed with the NCCMA.

### 7.2 Stormwater Management Strategy

The proposed development is estimated to have negligible impact on the site overall impervious areas. Resulting in negligible changes from the existing site stormwater conditions (runoff volume and water quality).

No-onsite detention is proposed for the site because of negligible changes to existing overall imperviousness.

The proposed SWMS strategy aims mitigate any adverse impacts of altered stormwater quality on receiving waters.

Rainwater harvesting for toilet flushing within the new pavilion could reduce the volume of runoff leaving the site from the new pavilion. Raingardens are proposed downstream of the pavilion roof to meet stormwater treatment requirements.

For stormwater management during construction, it is proposed to develop a construction management plan following best practice guidelines to manage erosion, sediment and litter within the site.



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# CAMP RESERVE SPORTS AND COMMUNITY PAVILION

11 FOREST STREET CASTLEMAINE 3450  
MOUNT ALEXANDER SHIRE COUNCIL

SD00	P06	CONTENTS- SCHEMATIC DESIGN
SD01	P010	EXISTING/ DEMOLITION SITE PLAN
SD02	P015	PROPOSED SITE PLAN FOR THIS PERMIT APPLICATION
SD02A	P03	PROPOSED FULL SITE PLAN
SD03	P015	PROPOSED PAVILION GROUND FLOOR PLAN
SD04	P08	PROPOSED PAVILION ROOF PLAN
SD05	P07	PROPOSED NETBALL COURTS FLOOR PLAN
SD06	P06	PROPOSED PAVILION ELEVATIONS
SD07	P02	PROPOSED PAVILION & TIMEKEEPERS ROOM ELEVATIONS
SD08	P06	PROPOSED PAVILION SECTIONS
SD09	P04	PROPOSED NETBALL COURTS SECTIONS



Design Story “The Spirit”

This design proposal seeks to maximise the potential of the site by developing an integrated design response that improves and expands on the amenities that support the adjacent sports fields and renowned agricultural show.

Form

The form of the proposed building draws from the rich heritage of the site ‘the spirit of place’. The form of the north block comprising of social room and associated amenities is a contemporary response to ‘the grandstand’, with a central gable, wide balcony and terraced seating extending across the front of the building.

The south block comprising of sporting change rooms and amenities, references the agricultural shed typology with gable pitch roof and lean-to canopy providing shelter over adjacent walkways. The use of gable roofs in the design response complements existing buildings at Camp Reserve including the existing Agricultural Pavilion and Poultry Shed.

Materiality

A Colorbond roof has been proposed, a materiality that is reflected in the surrounding neighbourhood character. Expressed jointed light weight cladding has been proposed, offering durability and complimentary to the materials of adjacent existing building. Polycarbonate wall cladding at high level has been proposed to allow natural light into the building. Locally sourced stone and brick materials are proposed for the retaining walls in addition to decking with recycled content, linking back to the grandstand typology. Overall building materiality is intended to compliment the materials of the agricultural buildings and shelters on the site.

Care has been taken to minimise impacts of the proposed building on the neighbouring residences. Window openings along the western building facades have been minimised to provide acoustic and visual privacy to the neighbouring residences. The building positioning has been placed to maintain visible access, reduce site excavation and removal of existing trees.

ESD INITIATIVES

USE OF RECYCLED AND RECYCLABLE MATERIALS

NATURAL DAYLIGHT

SOLAR PANELS

INTERNAL PLANTING

REDUCED WATER USE

THERMAL MASS

REDUCED CAR PARKING

DRYING LINES CLEAR OF OVERSHADOWING

CO/TRIGENERATION

USE OF LOCAL MATERIALS

USE OF NATURAL LIGHT

LOW VOC

NATURAL VENTILATION

AIR LEAKAGE/BUILDING SEALING

PASSIVE SHADING

TRANSPORT PLANNING

FIRE SYSTEMS WATER

SUSTAINABLY SOURCED/ RECYCLED TIMBER

LIGHTING ZONING

CARBON DIOXIDE/ LOW VOC MONITORING

BLACK/GREY WATER USE

GEOTHERMAL HEATING AND COOLING

PUBLIC TRANSPORT

CYCLIST FACILITIES

SUB-METERING

GREEN ENERGY/ ENERGY EFFICIENT LIGHTING

SOLAR HOT WATER

EXTERNAL VIEWS

RAIN WATER HARVESTING

GEOTHERMAL ENERGY

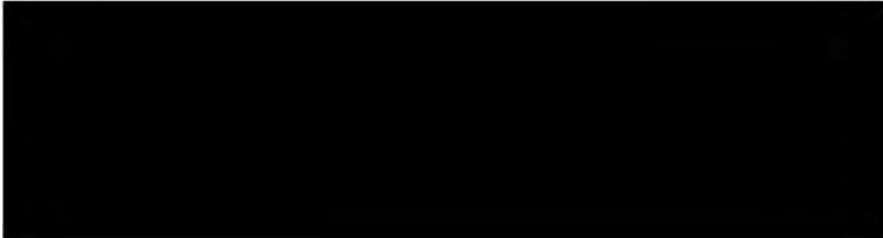
CAR SHARING

WIND TURBINE

ENERGY SHARING SYSTEMS



SUBJECT SITE





DISCLAIMER- APPROXIMATE INFORMATION ONLY

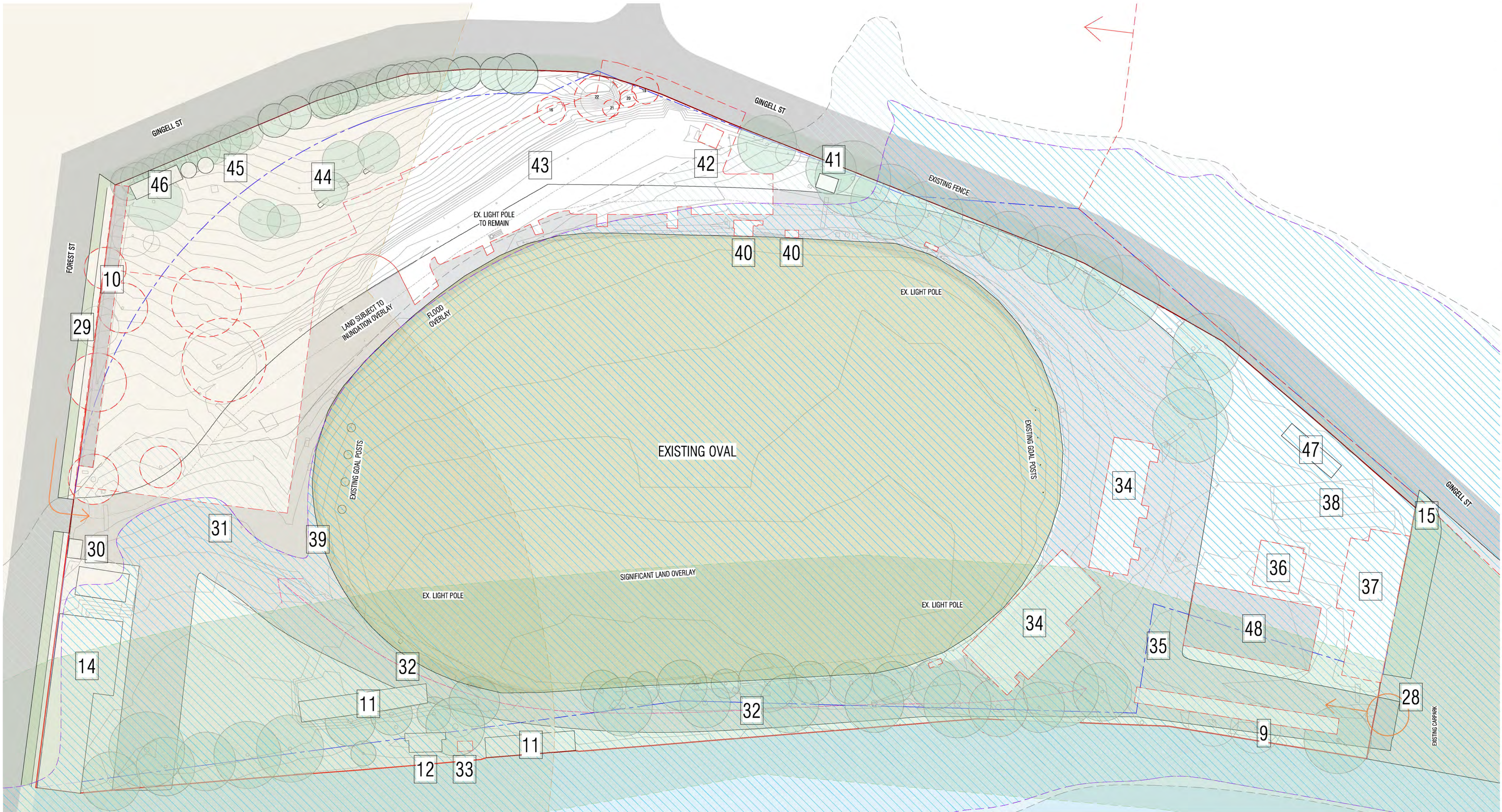
NOTE: THIS DRAWING CONTAINS BASIC AND APPROXIMATE ONLY INFORMATION TAKEN FROM THE FOLLOWING SOURCES:

- FEATURE SURVEY, CAMP RESERVE, 08/01/21, MODEL, PDF, DATED OCT '22 BY LBS ENGINEERING SURVEYORS
- NORTH CENTRAL CATCHMENT MANAGEMENT AUTHORITY DATED 22 OCT 2018 REGARDING FLOOD INFORMATION
- GOOGLE MAPS OF THE SITE
- PLANNING REPORT DATED 23 FEB 2022

THE INFORMATION CONTAINED IN THIS DOCUMENT IS APPROXIMATE ONLY AND NEEDS TO BE VERIFIED FOR ACCURACY. A LICENSED SURVEYOR SHALL BE REQUIRED TO DETERMINE ACCURATE INFORMATION RELATING TO FEATURES, LEVELS AND LOCATIONS OF SERVICES, BOUNDARIES, EXISTING BUILDINGS AND THE LIKE.

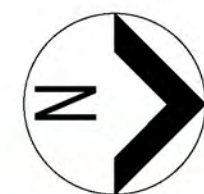
LEGEND - EXISTING SITE

- SITE BOUNDARY - AS INDICATED ON TITLE
- INDICATIVE EXISTING FENCE LINE
- ENTRY TO SITE
- FLOOD OVERLAY
- LAND SUBJECT TO INUNDATION OVERLAY
- SIGNIFICANT LANDSCAPE OVERLAY
- BUSHFIRE PRONE AREA OVERLAY
- HERITAGE OVERLAY
- EXISTING BUILDINGS AND STRUCTURES TO REMAIN
- EXISTING SITE FEATURES
- EXISTING TREES TO BE RETAINED
- EXISTING TREES TO BE REMOVED
- EXISTING SITE TO BE DEMOLISHED AND/OR BE PREPARED TO SUIT PROPOSED SCOPE OF WORKS



1 | EXISTING/DEMOLITION SITE PLAN  
1:300

- COW SHELTER TO BE REUSED AND RELOCATED – PUSHED BACK AGAINST EAST SITE BOUNDARY. HEIGHT INCREASED TO 3.2m FOR USE AS HORSE BAYS FOR LARGE ANIMALS
- TWO ROWS OF HORSE STALLS ARE TO BE REUSED IN THE NORTHERN AREA OF THE SITE, IN ASSOCIATION WITH THE RE-PURPOSED COW SHELTER.
- SHEEP PENS TO BE RETAINED.
- EXISTING PUBLIC TOILET TO BE RETAINED.
- EXISTING AGRICULTURAL PAVILION/TABLE TENNIS PAVILION TO BE RETAINED.
- EXISTING HORSE LOADING RAMP WITH PATH CONNECTION TO BE RETAINED.
- EXISTING TICKET BOX TO BE RETAINED.
- EXISTING CHAINWIRE MESH FENCE TO BE DEMOLISHED ALONG FOREST STEET WHERE NETBALL COURTS ARE TO BE BUILT.
- EXISTING TICKET BOX, FENCING AND GATES TO BE RETAINED.
- EXISTING ACCESS ROAD TO BE RECONFIGURED TO SUIT NEW DESIGN.
- EXISTING PATH TO BE RETAINED.
- EXISTING CRICKET MAINTENANCE STORAGE SHED TO BE DEMOLISHED.
- EXISTING SOCIAL AND CHANGE ROOMS TO BE DEMOLISHED.
- EXISTING ACCESS ROAD TO BE RECONFIGURED TO SUIT NEW DESIGN.
- EXISTING NETBALL CHANGE ROOMS TO BE DEMOLISHED
- EXISTING POULTRY PAVILION TO BE DEMOLISHED.
- EXISTING CRICKET NETS TO BE RETAINED.
- DEMOLISH EXISTING SCOREBOARD.
- EXISTING COACHES BOXES TO BE DEMOLISHED.
- EXISTING TOILET BLOCK (NOW CRICKET MAINTENANCE SHED) TO BE RETAINED.
- EXISTING TOILET BLOCK TO BE DEMOLISHED.
- SITE TO BE PREPARED FOR NEW PAVILION.
- MONUMENT AND SEATING TO BE RETAINED.
- EXISTING RAINWATER TANKS TO BE RETAINED.
- HISTORIC TIMBER STALLION STABLES TO BE CONSERVED AND RETAINED AND INTERPRETED IN FUTURE STAGE.
- GOAT SHED TO BE DEMOLISHED IN FUTURE STAGE.
- EXISTING NETBALL COURTS TO BE DEMOLISHED.





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INFORMATION ONLY

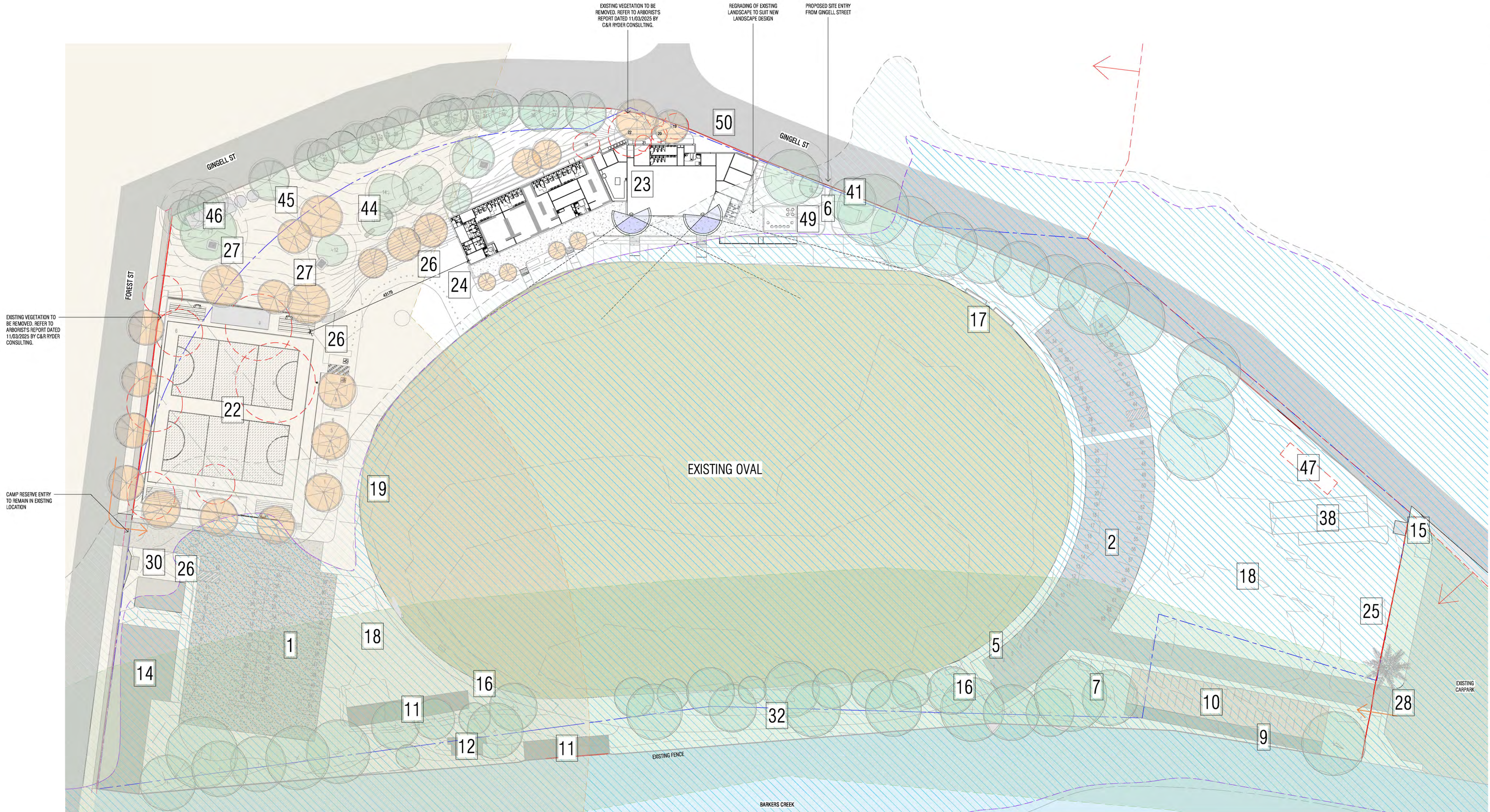
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- NORTH CENTRAL CATCHMENT MANAGEMENT AUTHORITY DATED 22 OCT 2018 REGARDING FLOOD INFORMATION  
- GOOGLE MAPS OF THE SITE  
- PLANNING REPORT DATED 23 FEB 2022

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LEGEND - PROPOSED SITE

- SITE BOUNDARY - AS INDICATED ON TITLE
- INDICATIVE EXISTING FENCE LINE
- ENTRY TO SITE
- FLOOD OVERLAY
- LAND SUBJECT TO INUNDATION OVERLAY
- SIGNIFICANT LANDSCAPE OVERLAY
- BUSHFIRE PRONE AREA OVERLAY
- HERITAGE OVERLAY
- EXISTING TREES TO BE REMOVED
- EXISTING TREES IN POOR HEALTH - FUTURE REMOVAL EXPECTED TBC
- EXISTING TREES TO BE RETAINED
- PROPOSED TREES
- PROPOSED INTERNAL ROADS
- PROPOSED GRAVEL FOOTPATHS
- EXISTING STRUCTURES TO BE RETAINED - RELOCATED AS NOTED
- PROPOSED AGRICULTURAL BUILDING AND OTHER AMENITIES AS NOTED - LOCATION AND SIZE INDICATIVE ONLY
- TRUE HUMAN FIELD OF VIEW
  - BINOCLAR VISION (120°)
  - PERIPHERAL VISION
  - BOTH EYES (200 - 220°)
  - HUMAN EYE

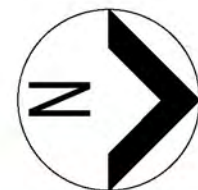


1 | PROPOSED SITE PLAN  
1:300

- SOUTHERN CARPARK – PROVISION OF 51 BAYS WITH A CHIP SEAL TREATMENT.
- NORTHERN CARPARK – PROVISION OF 63 BAYS WITH A CHIP SEAL TREATMENT
- 1.5m WIDE PEDESTRIAN PATH. BROOM FINISH CONCRETE.
- NEW PEDESTRIAN SITE ENTRY AND 1.5m WIDE PROPOSED FOOTPATH TO GINGELL STREET.
- PROVISION OF TWO NEW HORSE WASH BAYS.
- COW SHELTER TO BE REUSED AND RELOCATED – PUSHED BACK AGAINST EAST SITE BOUNDARY. HEIGHT INCREASED TO 3.2m FOR USE AS HORSE BAYS FOR LARGE ANIMALS .
- TWO ROWS OF HORSE STALLS ARE TO BE REUSED IN THE NORTHERN AREA OF THE SITE, IN ASSOCIATION WITH THE RE-PURPOSED COW SHELTER.
- SHEEP PENS TO BE RETAINED.
- EXISTING PUBLIC TOILET TO BE RETAINED.
- EXISTING AGRICULTURAL PAVILION/TABLE TENNIS PAVILION TO BE RETAINED.
- EXISTING HORSE LOADING RAMP WITH PATH CONNECTION TO BE RETAINED.
- COMBINATION OF REMOVABLE AND FIXED BOLLARDS TO PREVENT UNAUTHORISED VEHICLE ACCESS.
- TWO NEW PLAYER COACHES BOXES (INDICATIVE LOCATION).

- OVERFLOW CAR PARKING.
- NEW GOAL SAFETY NETTING.
- TWO NEW NETBALL COURTS AND ASSOCIATED INFRASTRUCTURE. LIGHTING, SHELTERS, SEATING AND PATHWAYS.
- NEW CENTRALISED SPORTS AND COMMUNITY PAVILION.
- RELOCATE AND INSTALL 2 EXISTING CAST IRON POSTS/BOLLARDS.
- RELOCATED DATE PALM (PHOENIX CANARIENSIS) TO NORTHERN AREA OF RESERVE.
- BICYCLE HOOPS TO BE INSTALLED AT THE PAVILION, THE NETBALL COURTS AND THE AGRICULTURAL PAVILION.
- NEW PICNIC TABLES TO BE INSTALLED ON GRANITIC SAND PAVEMENT.
- RETAIN TICKET BOX.
- EXISTING TICKET BOX, FENCING AND GATES TO BE RETAINED.
- EXISTING PATH TO BE RETAINED.
- EXISTING CRICKET NETS TO BE RETAINED.
- EXISTING TOILET BLOCK (NOW CRICKET MAINTENANCE SHED) TO BE RETAINED.
- MONUMENT AND SEATING TO BE RETAINED.
- EXISTING RAINWATER TANKS TO BE RETAINED.

- HISTORIC TIMBER STALLION STABLES TO BE CONSERVED AND RETAINED AND INTERPRETED IN FUTURE STAGE.
- GOAT SHED TO BE DEMOLISHED IN FUTURE STAGE.
- PROPOSED TIMEKEEPERS AND MEDIA ROOM.
- VEHICLE DROP OFF ZONE.





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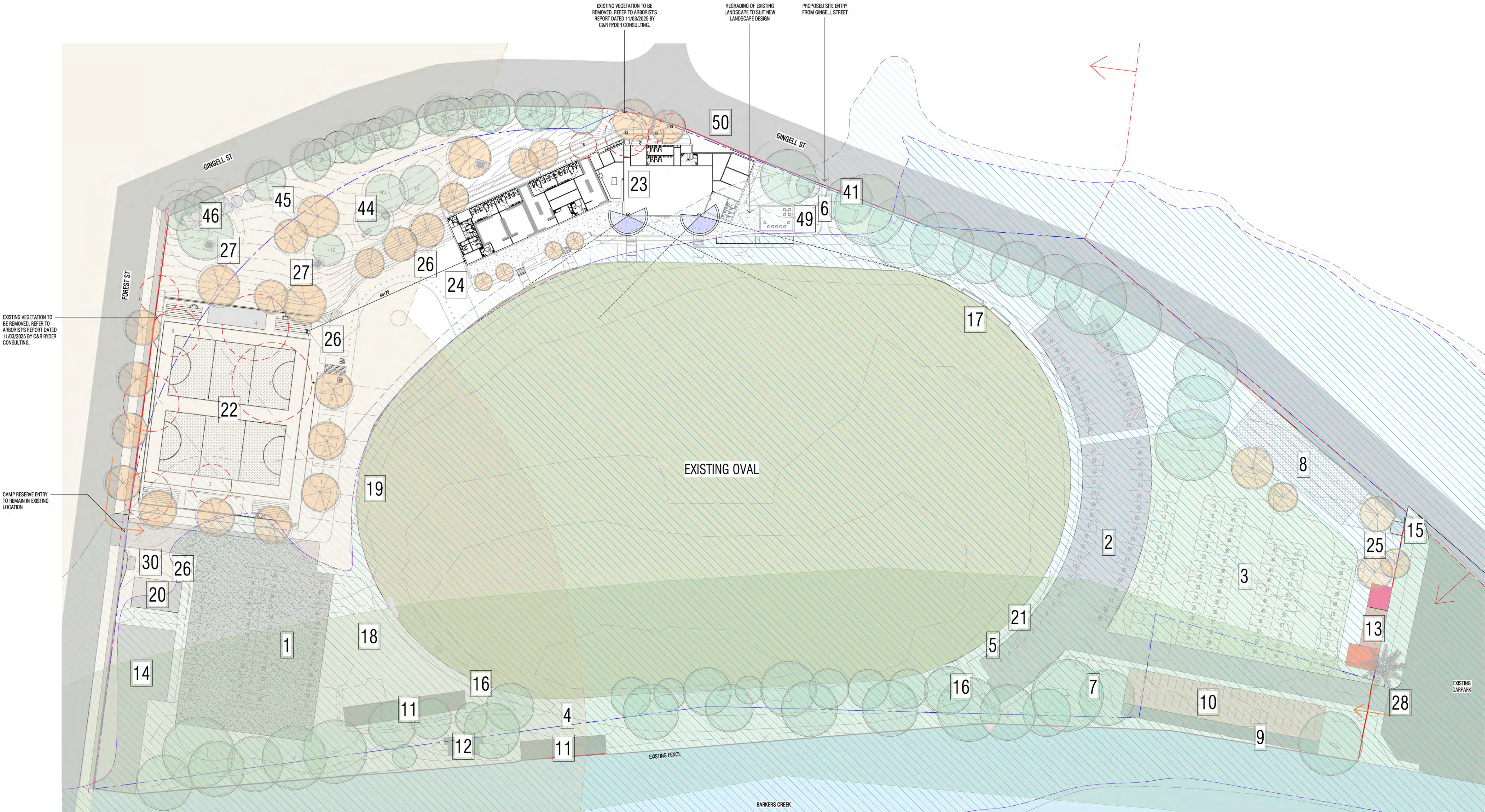
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LEGEND - PROPOSED SITE

- SITE BOUNDARY - AS INDICATED ON TITLE
- INDICATIVE EXISTING FENCE LINE
- ENTRY TO SITE
- FLOOD OVERLAY
- LAND SUBJECT TO INUNDATION OVERLAY
- SIGNIFICANT LANDSCAPE OVERLAY
- BUSHFIRE PRONE AREA OVERLAY
- HERITAGE OVERLAY
- EXISTING TREES TO BE REMOVED
- EXISTING TREES IN POOR HEALTH - FUTURE REMOVAL EXPECTED
- EXISTING TREES TO BE RETAINED
- PROPOSED TREES
- PROPOSED INTERNAL ROADS
- PROPOSED GRAVEL FOOTPATHS
- EXISTING STRUCTURES TO BE RETAINED - RELOCATED AS NOTED
- PROPOSED AGRICULTURAL BUILDING AND OTHER AMENITIES AS NOTED - LOCATION AND SIZE INDICATIVE ONLY
- TRUE HUMAN FIELD OF VIEW
  - BINOCLAR VISION (120°)
  - PERIPHERAL VISION
  - BOTH EYES (200 - 220°)
  - HUMAN EYE



1 | PROPOSED SITE PLAN  
1:300

- SOUTHERN CARPARK - PROVISION OF 51 BAYS WITH A CHIP SEAL TREATMENT.
- NORTHERN CARPARK - PROVISION OF 63 BAYS WITH A CHIP SEAL TREATMENT
- OPEN SPACE AREA FOR OVERFLOW CAR PARKING. CAPACITY ESTIMATED AT 75 SPACES.
- 2m WIDE PEDESTRIAN PATH WITH COMPACTED GRANITIC SAND TREATMENT.
- 1.5m WIDE PEDESTRIAN PATH. BROOM FINISH CONCRETE.
- NEW PEDESTRIAN SITE ENTRY AND 1.5m WIDE PROPOSED FOOTPATH TO GINGELL STREET.
- PROVISION OF TWO NEW HORSE WASH BAYS.
- NEW CRICKET NETS.
- COW SHELTER TO BE REUSED AND RELOCATED - PUSHED BACK AGAINST EAST SITE BOUNDARY. HEIGHT INCREASED TO 3.2m FOR USE AS HORSE BAYS FOR LARGE ANIMALS.
- TWO ROWS OF HORSE STALLS ARE TO BE REUSED IN THE NORTHERN AREA OF THE SITE, IN ASSOCIATION WITH THE RE-PURPOSED COW SHELTER.
- SHEEP PENS TO BE RETAINED.
- EXISTING PUBLIC TOILET TO BE RETAINED.
- PROPOSED PUBLIC AMENITY AND STORAGE.

- EXISTING AGRICULTURAL PAVILION/TABLE TENNIS PAVILION TO BE RETAINED.
- EXISTING HORSE LOADING RAMP WITH PATH CONNECTION TO BE RETAINED.
- COMBINATION OF REMOVABLE AND FIXED BOLLARDS TO PREVENT UNAUTHORISED VEHICLE ACCESS.
- TWO NEW PLAYER COACHES BOXES (INDICATIVE LOCATION).
- OVERFLOW CAR PARKING.
- NEW GOAL SAFETY NETTING.
- FUTURE EXPANSION OF AGRICULTURAL PAVILION FOR SHOW OFFICE AND TICKET BOX.
- POSSIBLE NEW SCOREBOARD LOCATION.
- TWO NEW NETBALL COURTS AND ASSOCIATED INFRASTRUCTURE. LIGHTING, SHELTERS, SEATING AND PATHWAYS.
- NEW CENTRALISED SPORTS AND COMMUNITY PAVILION.
- RELOCATE AND INSTALL 2 EXISTING CAST IRON POSTS/BOLLARDS.
- RELOCATED DATE PALM (PHOENIX CANARIENSIS) TO NORTHERN AREA OF RESERVE.
- BICYCLE HOOPS TO BE INSTALLED AT THE PAVILION, THE NETBALL COURTS AND THE AGRICULTURAL PAVILION.
- NEW PICNIC TABLES TO BE INSTALLED ON GRANITIC SAND PAVEMENT.
- RETAIN TICKET BOX.

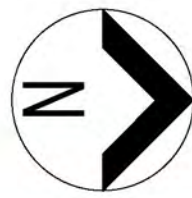
- EXISTING TICKET BOX, FENCING AND GATES TO BE RETAINED.
- EXISTING TOILET BLOCK (NOW CRICKET MAINTENANCE SHED) TO BE RETAINED.
- MONUMENT AND SEATING TO BE RETAINED.
- EXISTING RAINWATER TANKS TO BE RETAINED.
- HISTORIC TIMBER STALLION STABLES TO BE CONSERVED AND RETAINED AND INTERPRETED IN FUTURE STAGE.
- PROPOSED TIMEKEEPERS AND MEDIA ROOM.
- VEHICLE DROP OFF ZONE.



k20 Architecture  
schematic design

DO NOT SCALE

PROJECT  
CAMP RESERVE SPORTS AND COMMUNITY  
PAVILION  
CLIENT  
MOUNT ALEXANDER SHIRE COUNCIL

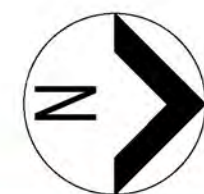


PROPOSED FULL SITE PLAN

SCALE @ A1 As indicated	AUTHOR JAQ	DATE 11/21/25	PROJECT NO 0473CAMP	DWG NO SD02A	REV P03
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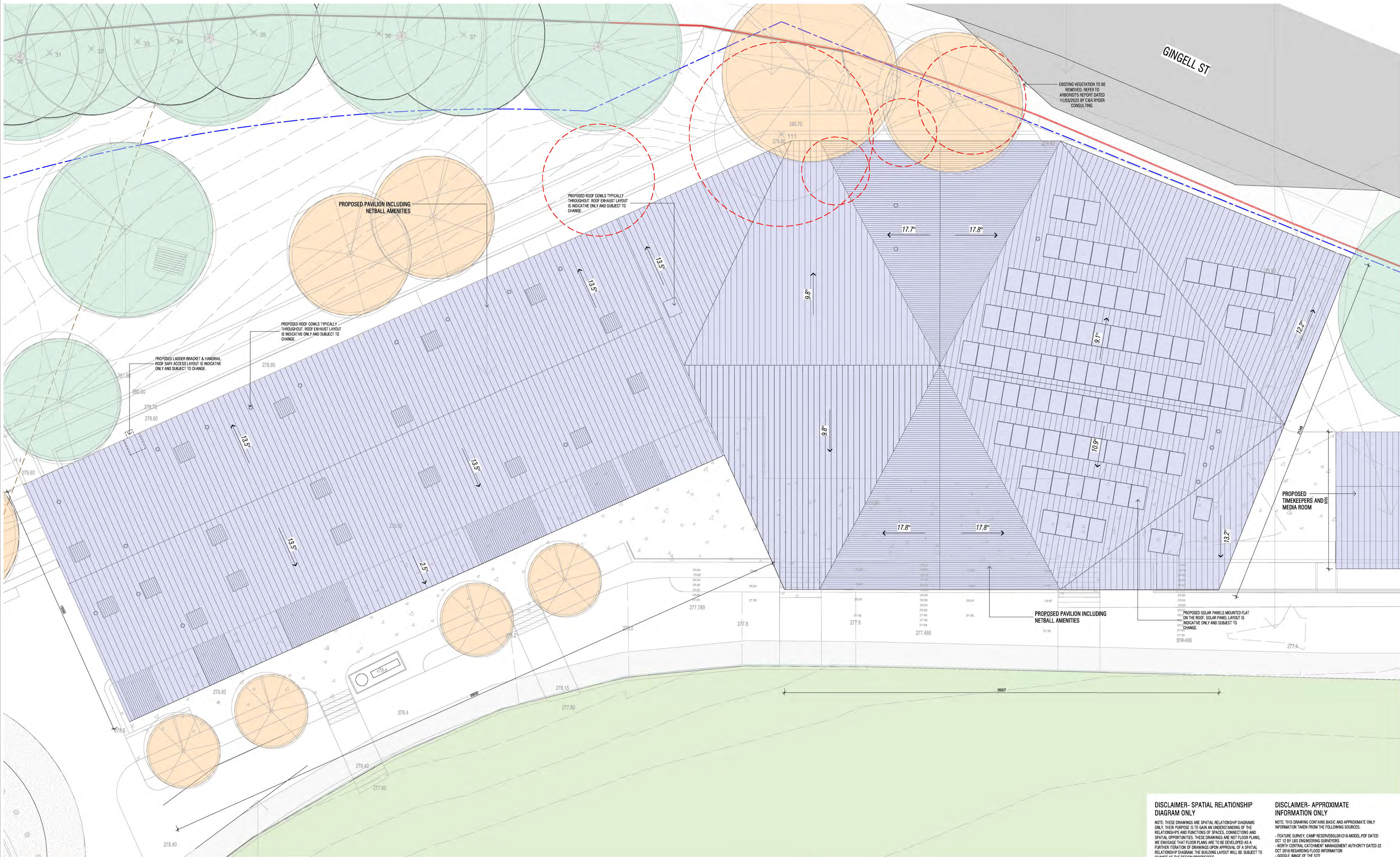




LEGEND - PROPOSED SITE			
	SITE BOUNDARY - AS INDICATED ON TITLE		EXISTING STRUCTURES TO BE DEMOLISHED
	INDICATIVE EXISTING FENCE LINE		EXISTING TREES TO BE REMOVED
	INDICATIVE FUTURE FOOTPATH		EXISTING TREES IN POOR HEALTH - FUTURE REMOVAL EXPECTED
	ENTRY TO SITE		EXISTING TREES TO BE RETAINED
	FLOOD OVERLAY		PROPOSED TREES
	LAND SUBJECT TO MINOR OVERLAY		PROPOSED INTERNAL ROADS
	SEMI-MAJOR LANDSCAPE OVERLAY		PROPOSED GRAVEL FOOTPATHS
	BUSHFIRE PRONE AREA OVERLAY		

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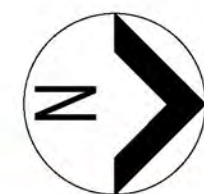
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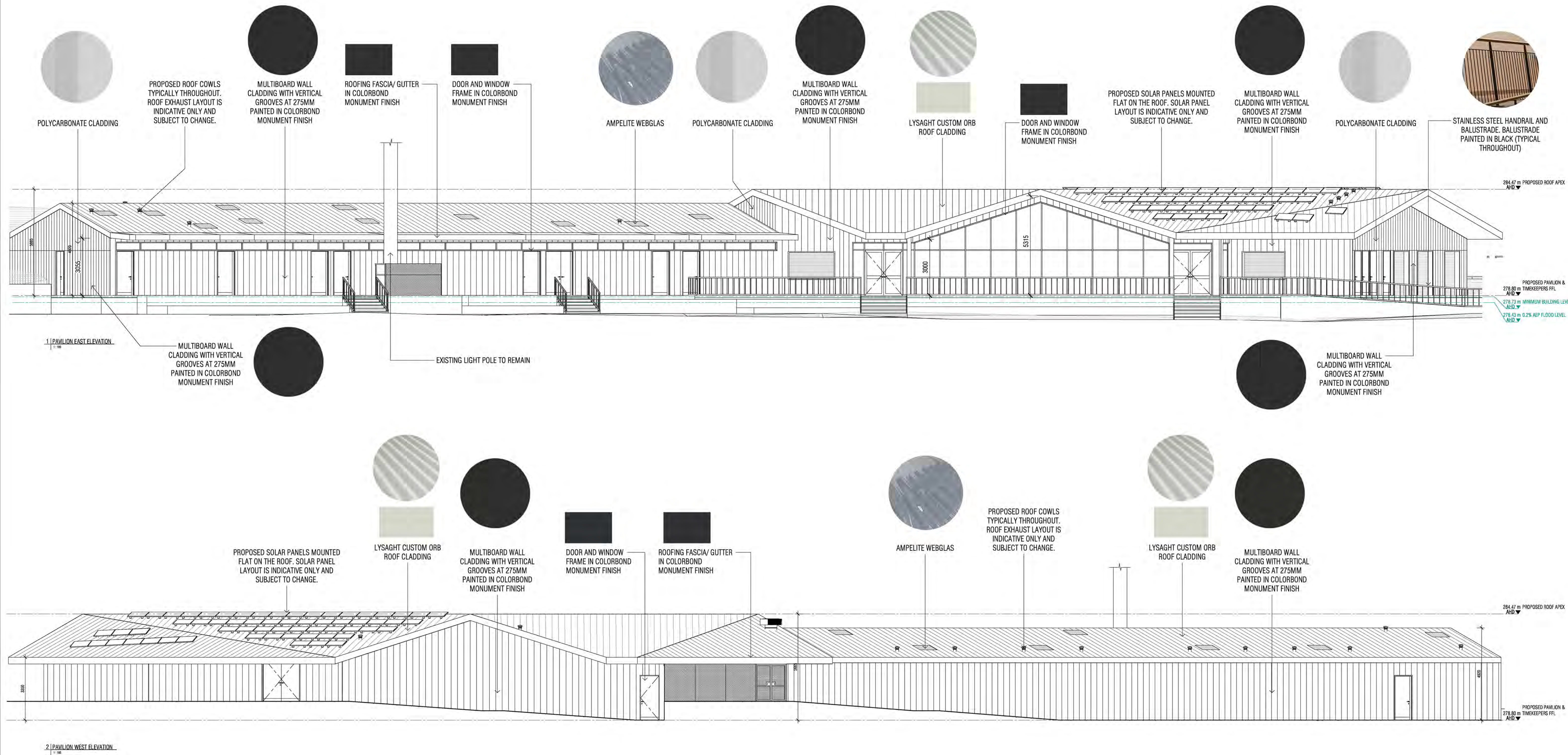
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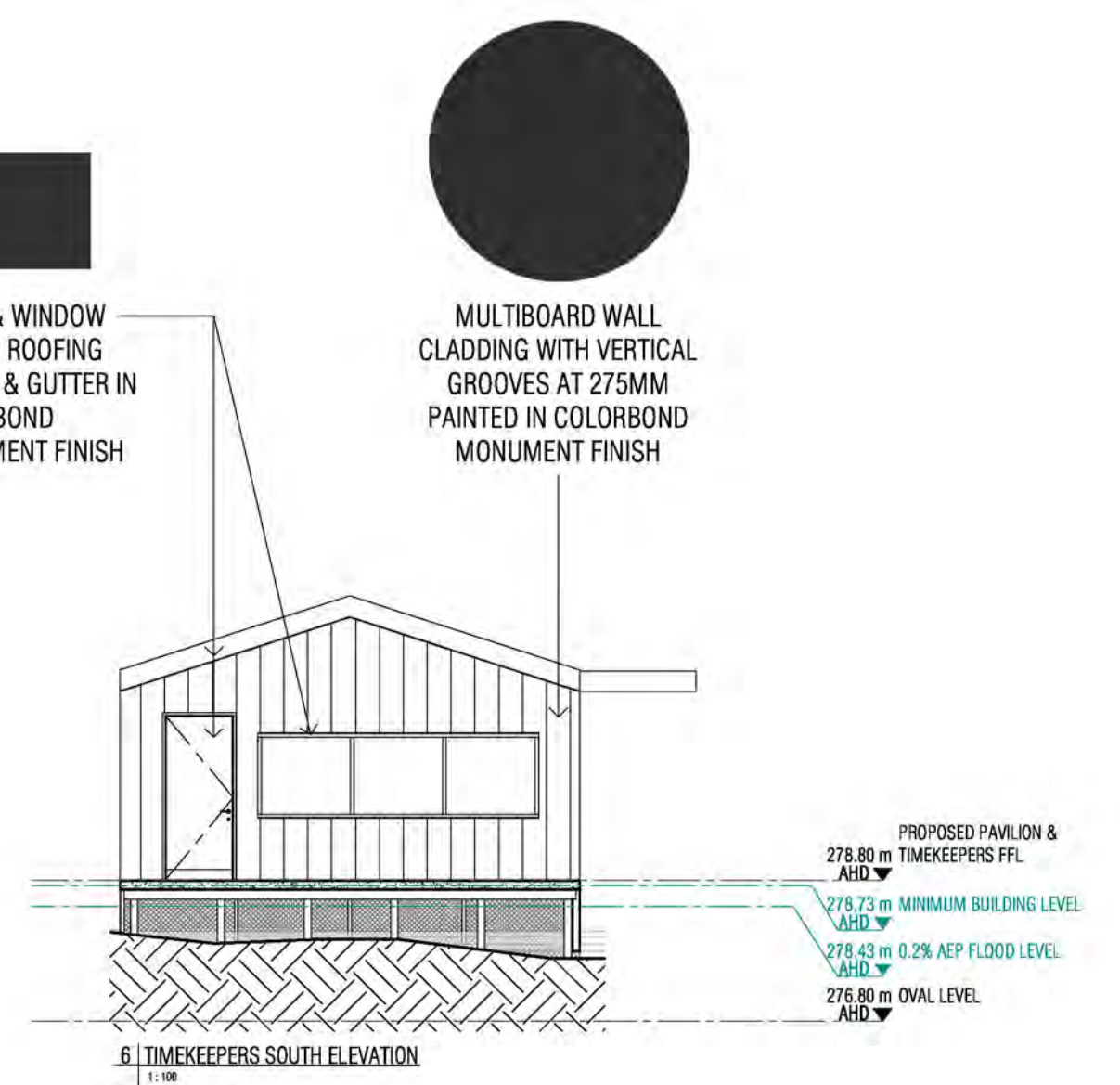
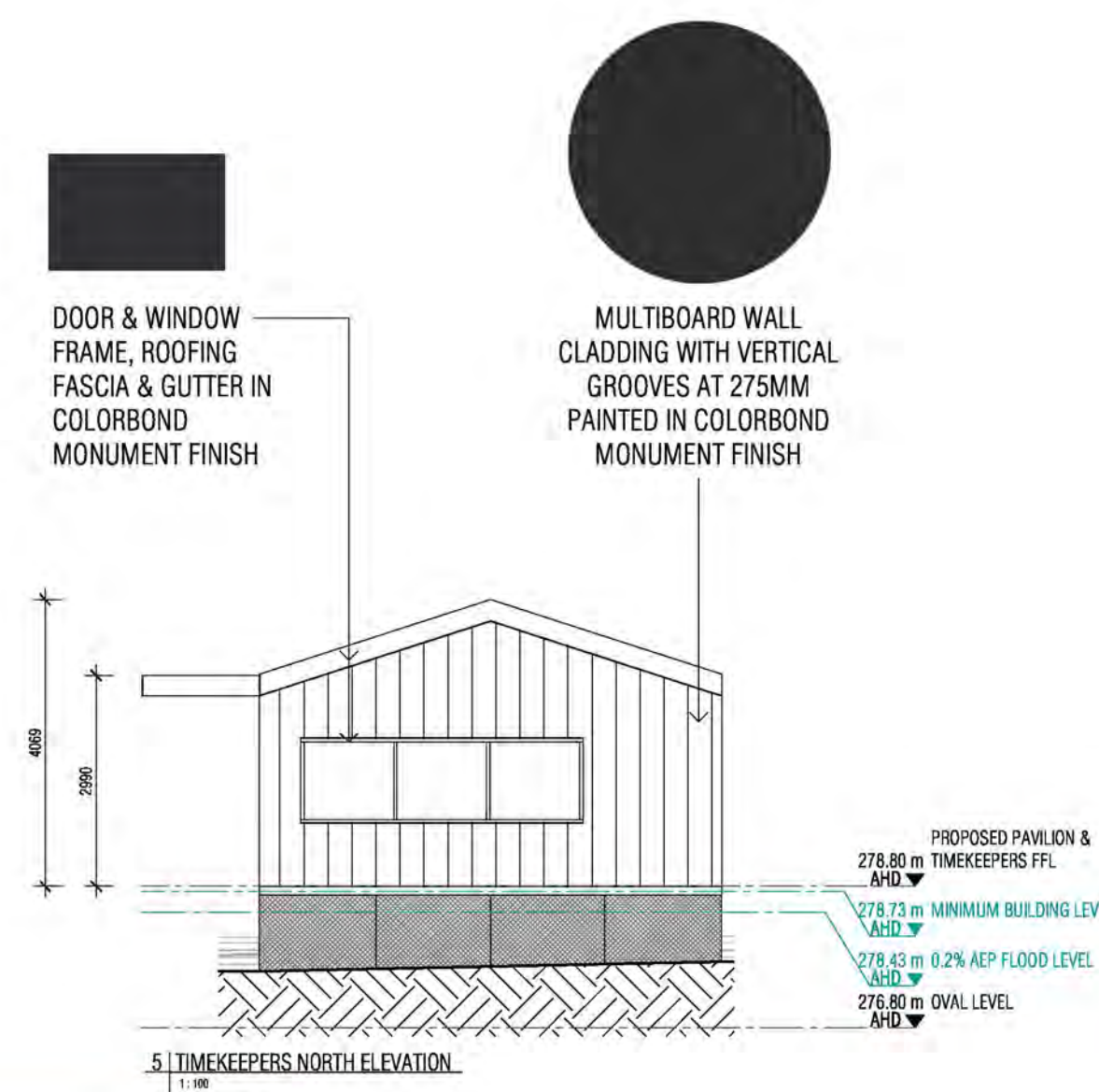
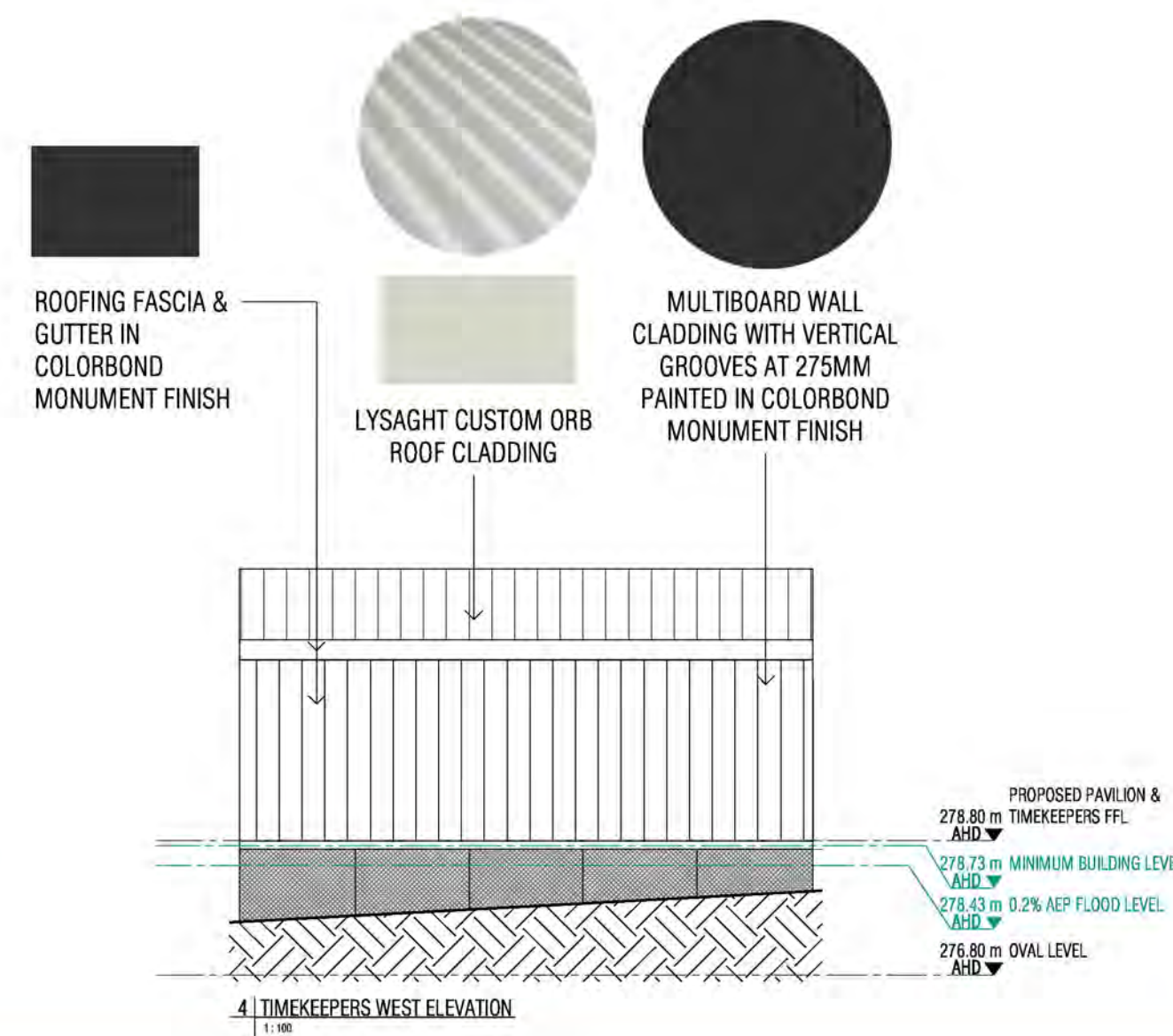
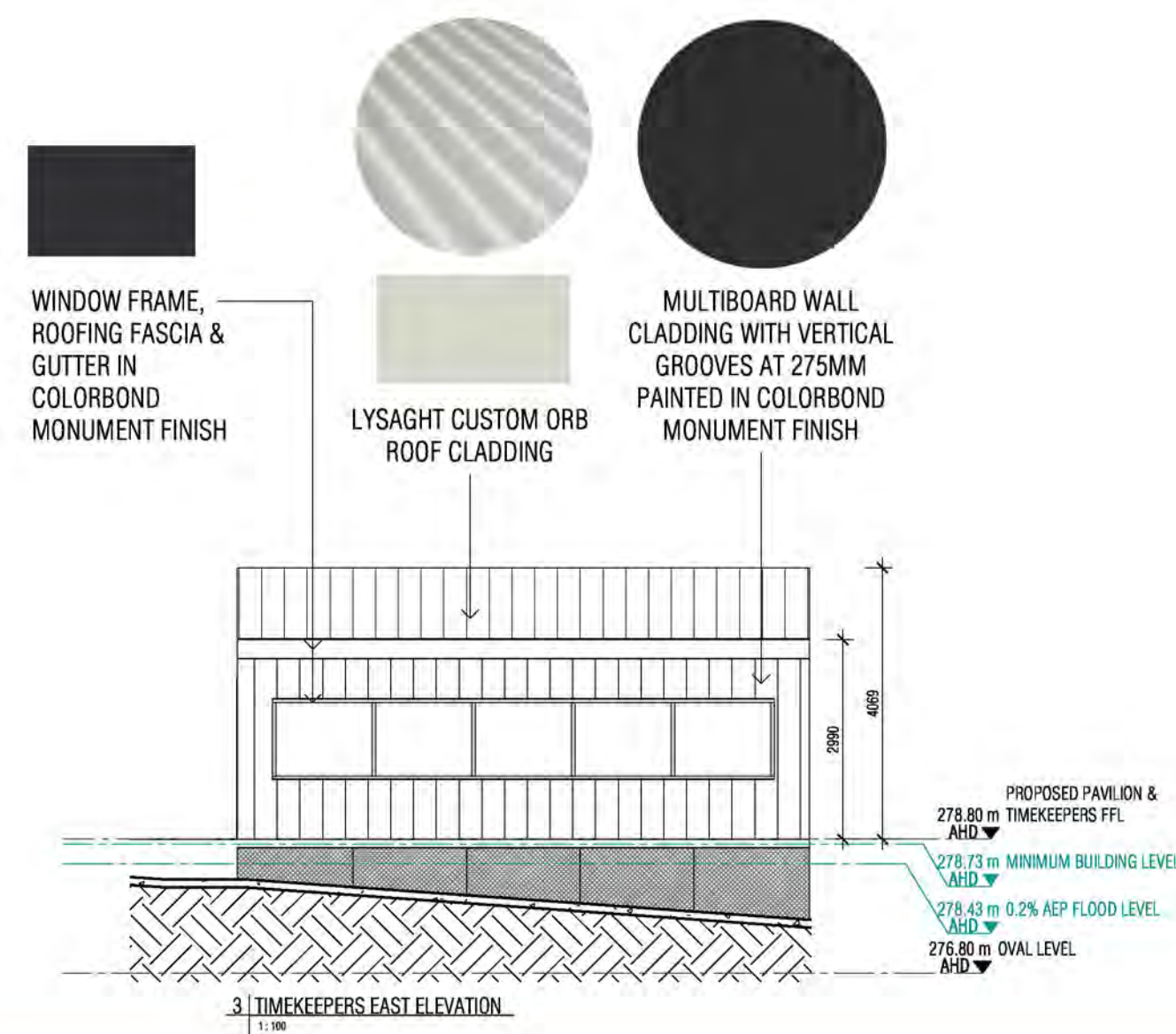
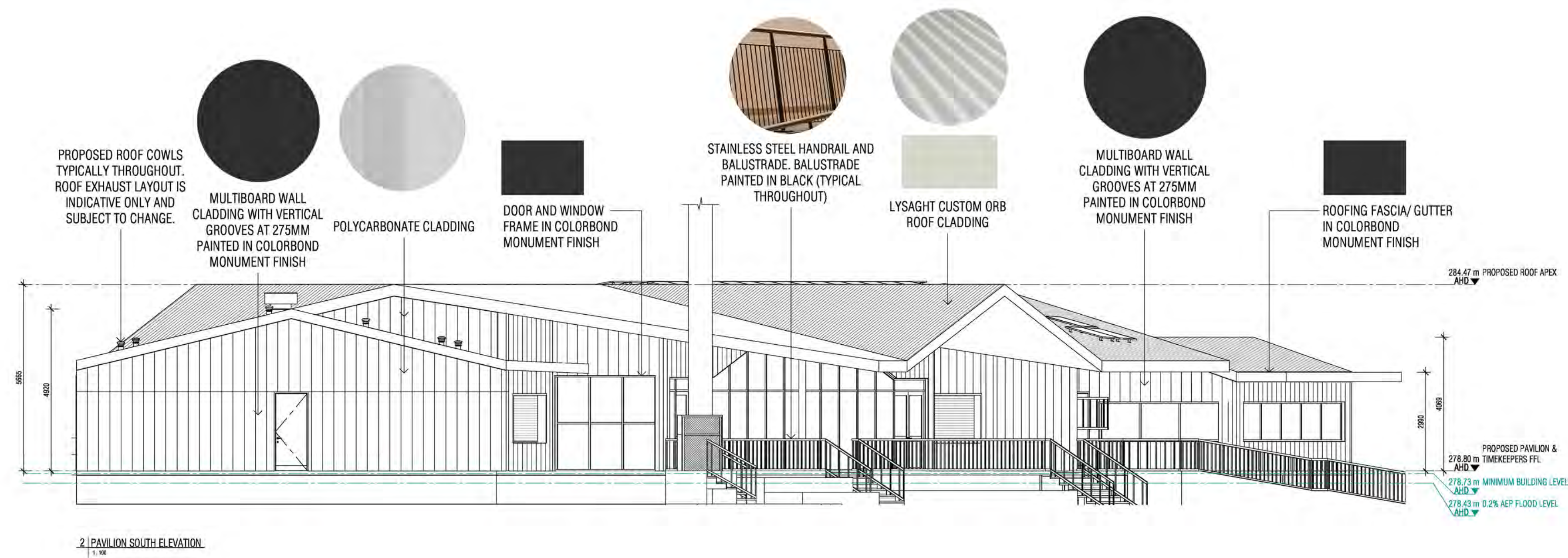
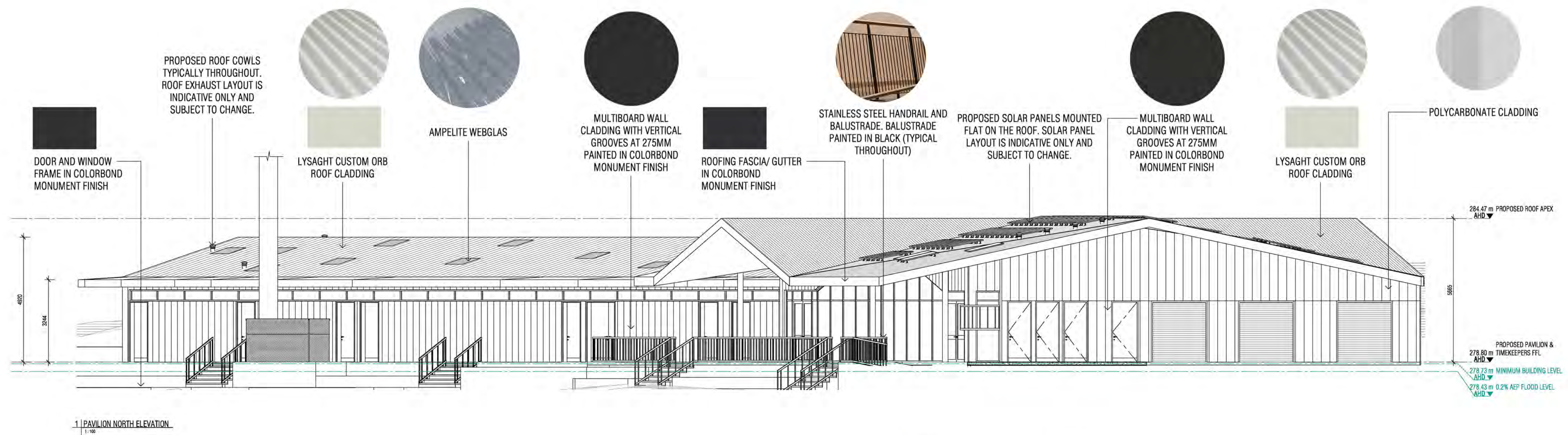




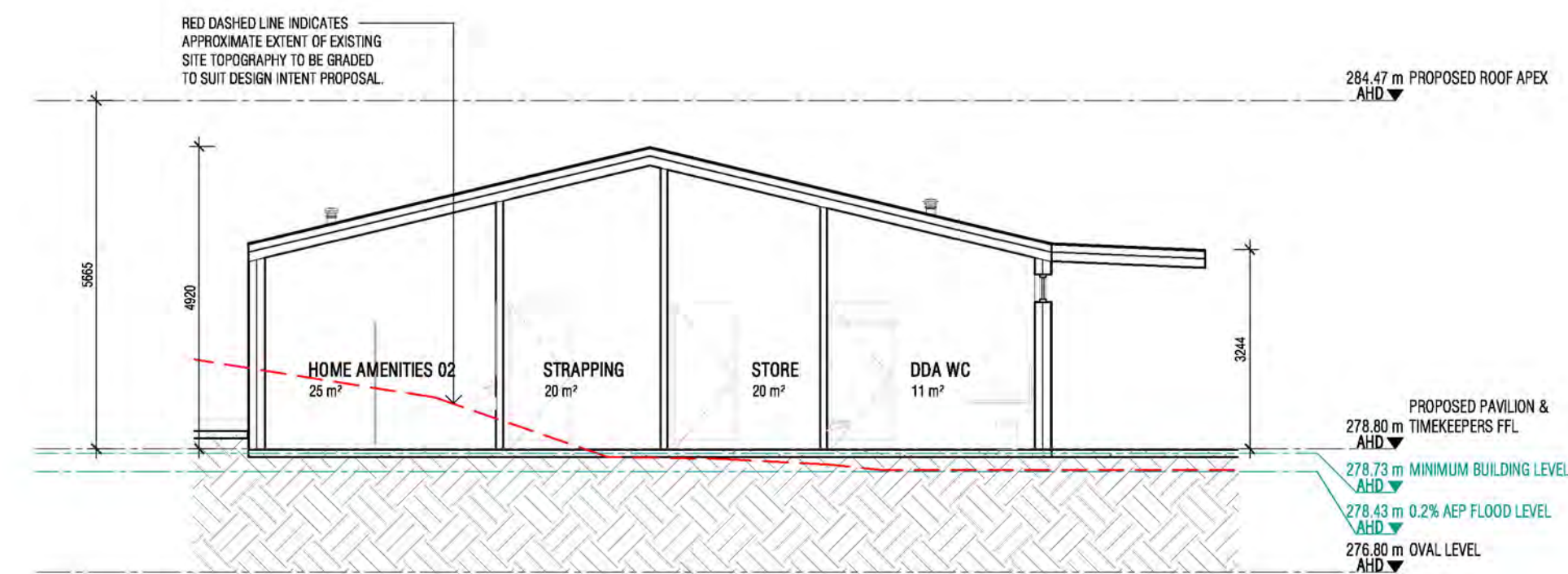




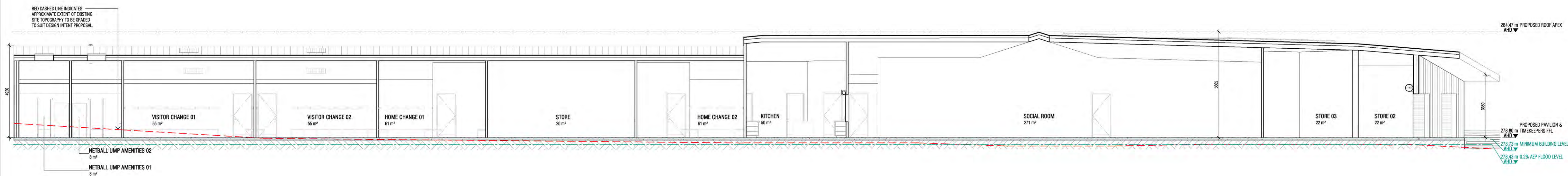




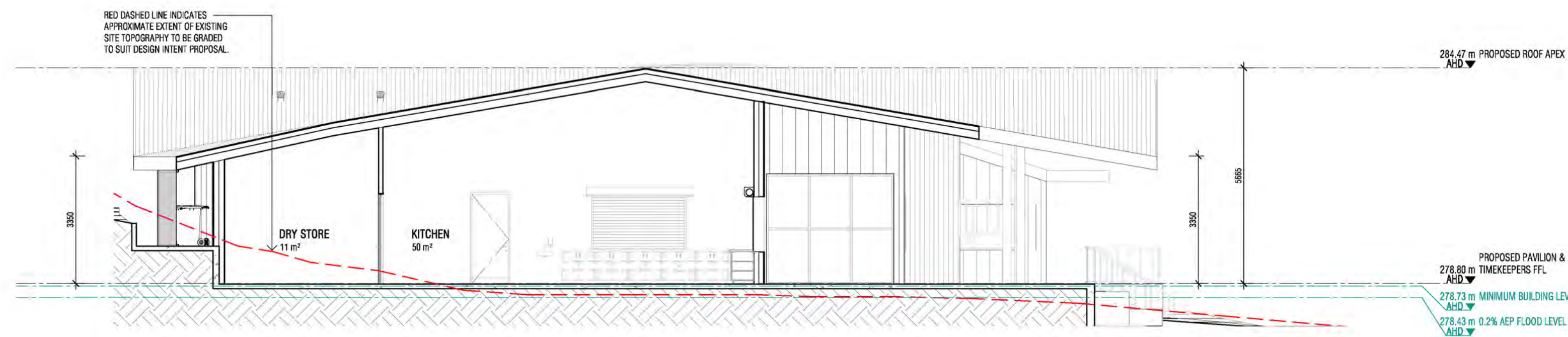




1 | PAVILION CROSS SECTION A  
1:100



2 | PAVILION LONGITUDINAL SECTION A  
1:100



3 | PAVILION CROSS SECTION B  
1:100



4 | PAVILION CROSS SECTION C  
1:100



LEGEND - PROPOSED NETBALL COURTS

- SITE BOUNDARY - AS INDICATED ON TITLE
- SITE TOPOGRAPHY TO BE GRADED TO SUIT DESIGN INTENT
- PROPOSED RETAINING WALLS / FLOOR
- EARTHWORKS

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