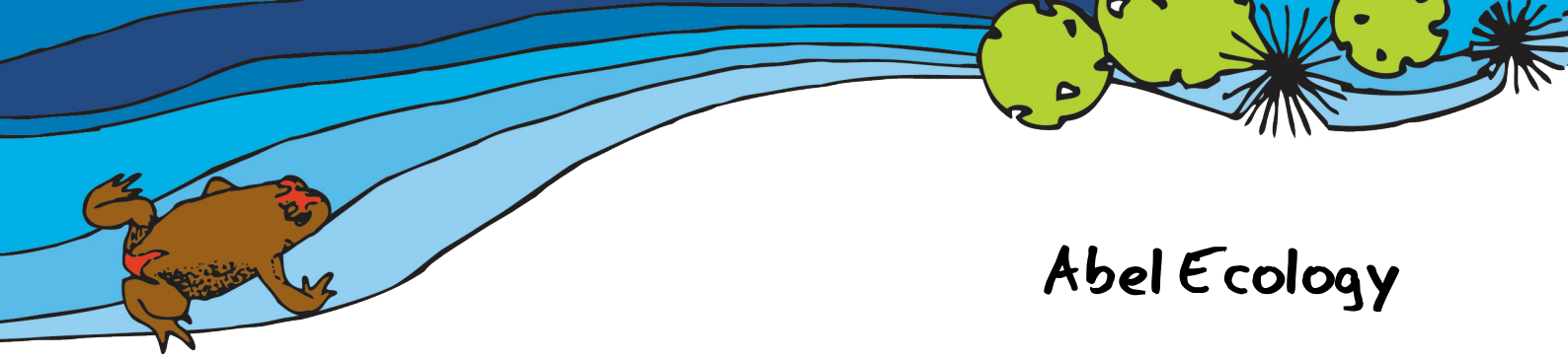

Abel Ecology

Biodiversity Management Plan

Eurobodalla Regional Hospital, Moruya NSW 2537

Lot 2, DP 1281576

Proposed Regional Hospital

Prepared for:	Tim MacLeod of Multiplex
Report No:	AE24-2471-BMP & VMP-ISS-2
Prepared by:	Abel Ecology
Date:	3 October 2024

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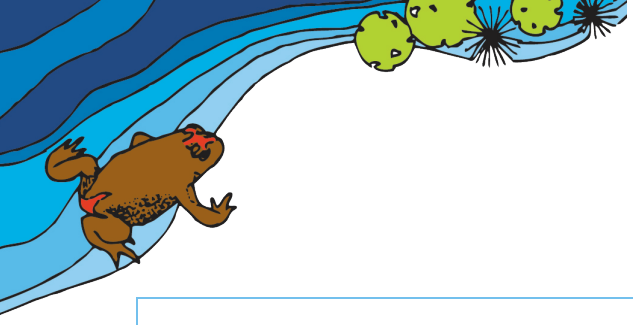

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Document History

Report	Version	Prepared by	Technical Review by	Proofread by	Submission	
					Method	Date
Report	Draft A	Callista Harris Nicholas Tong Erin Parker	Nicholas Tong	Corinna Campbell	ACONEX	05 September 2024
Report	Issue 1	Callista Harris Nicholas Tong Erin Parker	Nicholas Tong		ACONEX	06 September 2024
Report	Issue 2	Callista Harris Nicholas Tong Erin Parker	Nicholas Tong	Janelle Merry	ACONEX	03 October 2024

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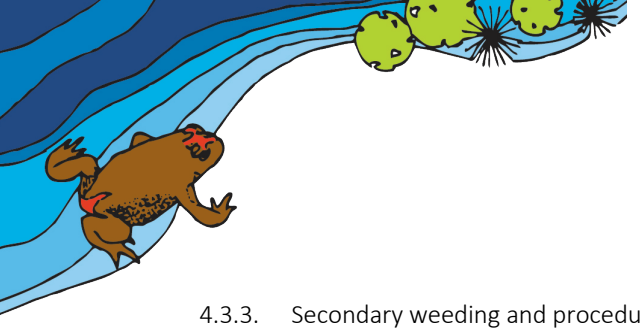

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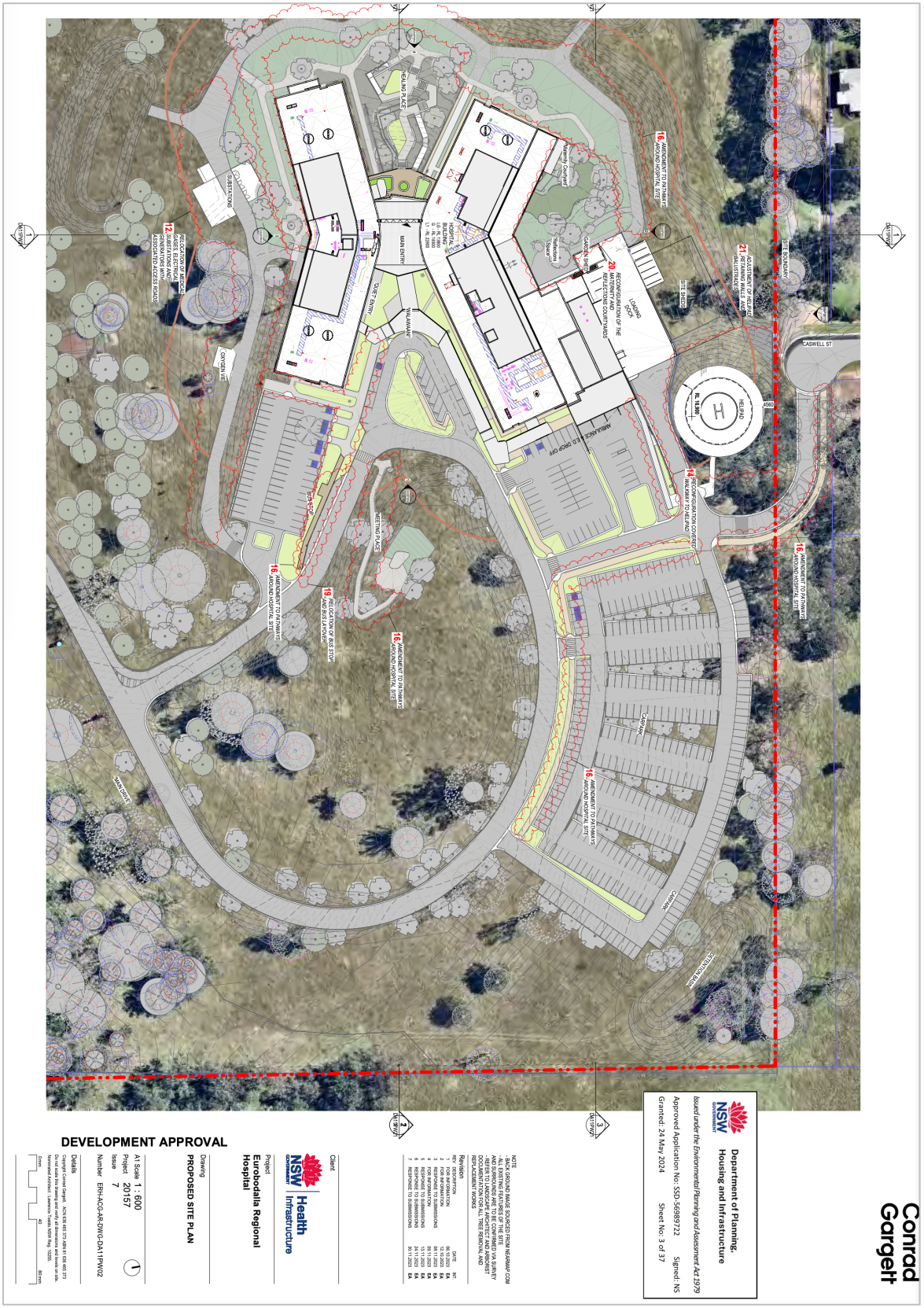


Figure 2. Site plan approved under SSD-56989722

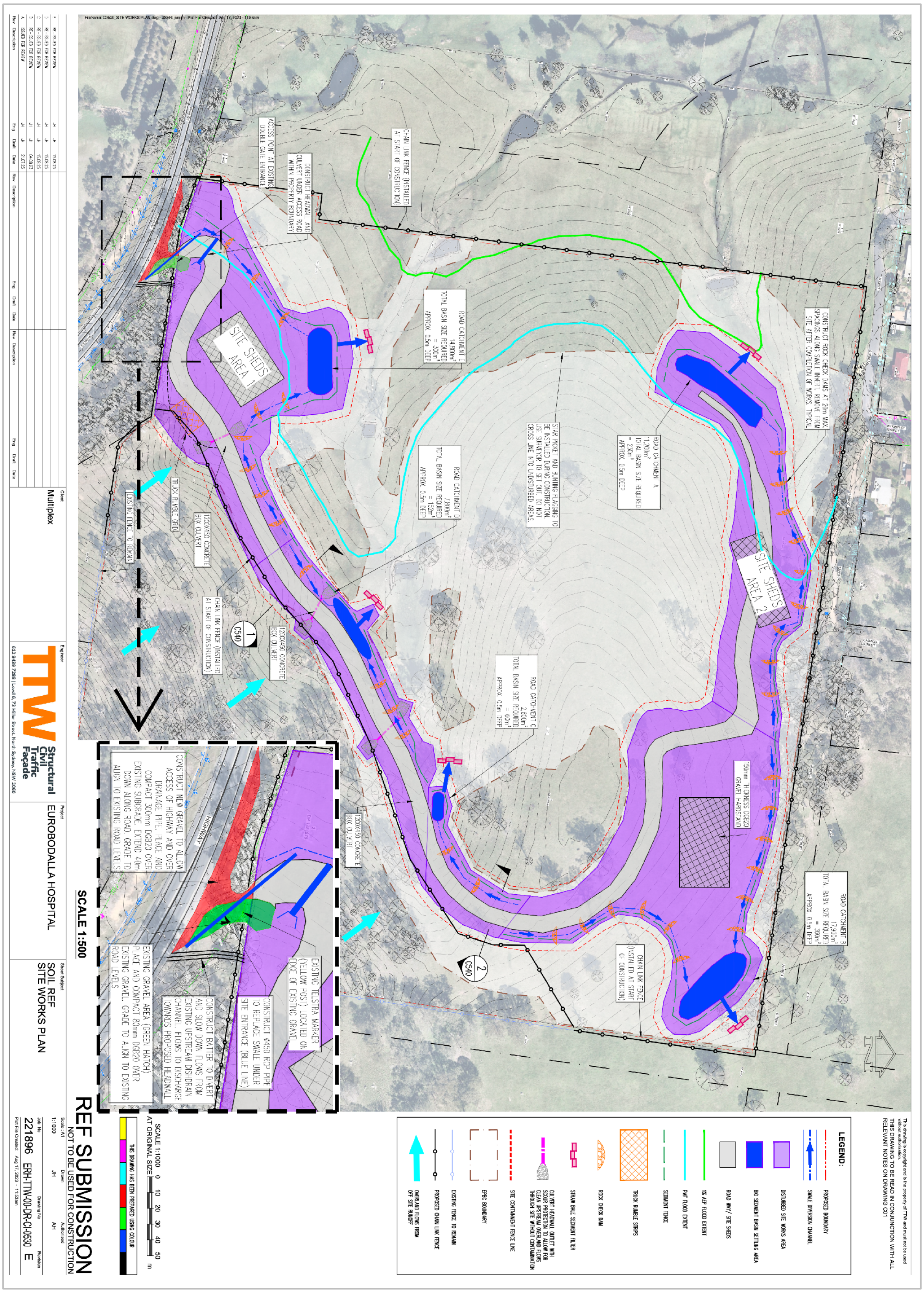


Figure 3. Soil Conservation REF Site Plan

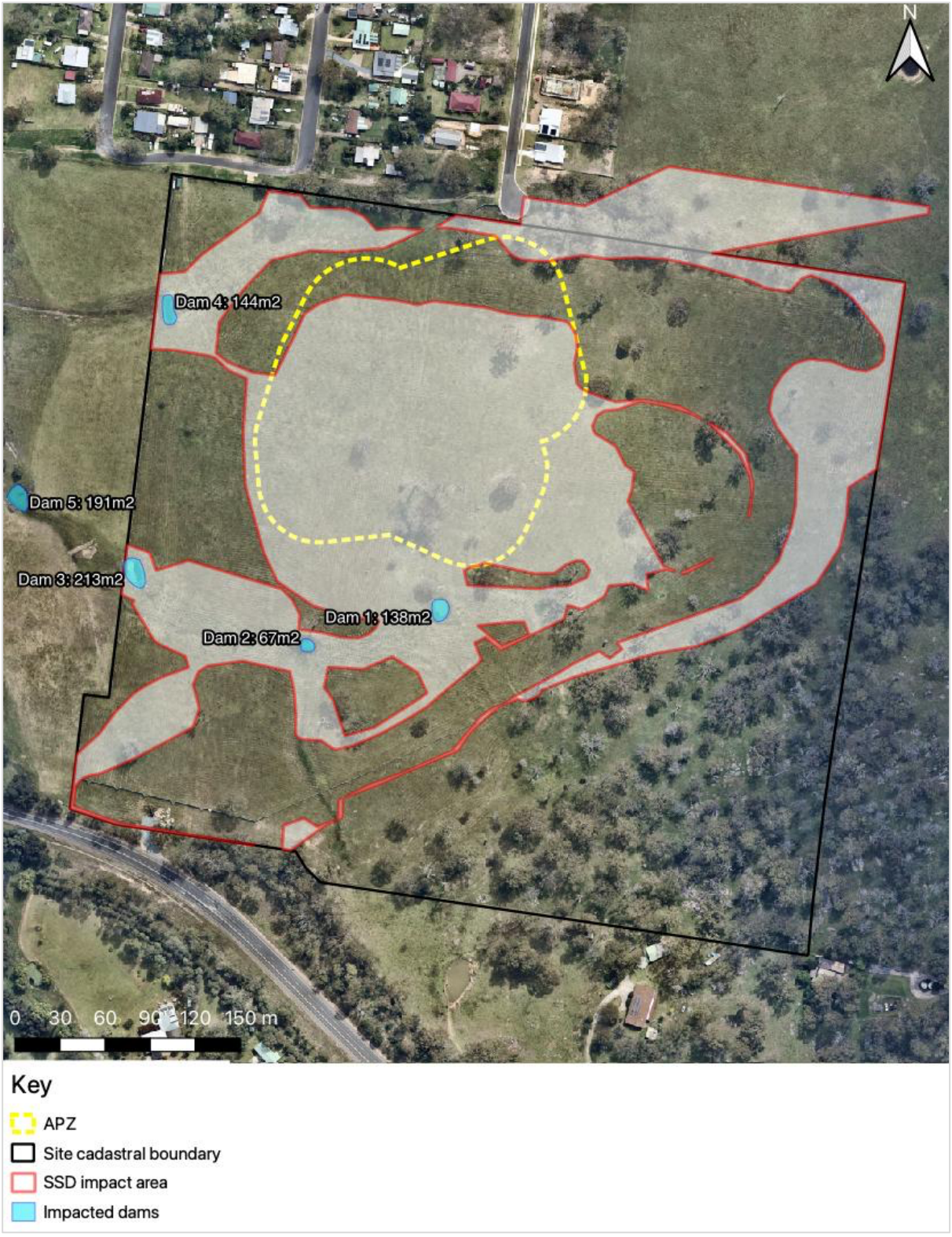


Figure 4. Farm dam locations on site

Source: (Abel Ecology, 8 January 2024, p. 138)

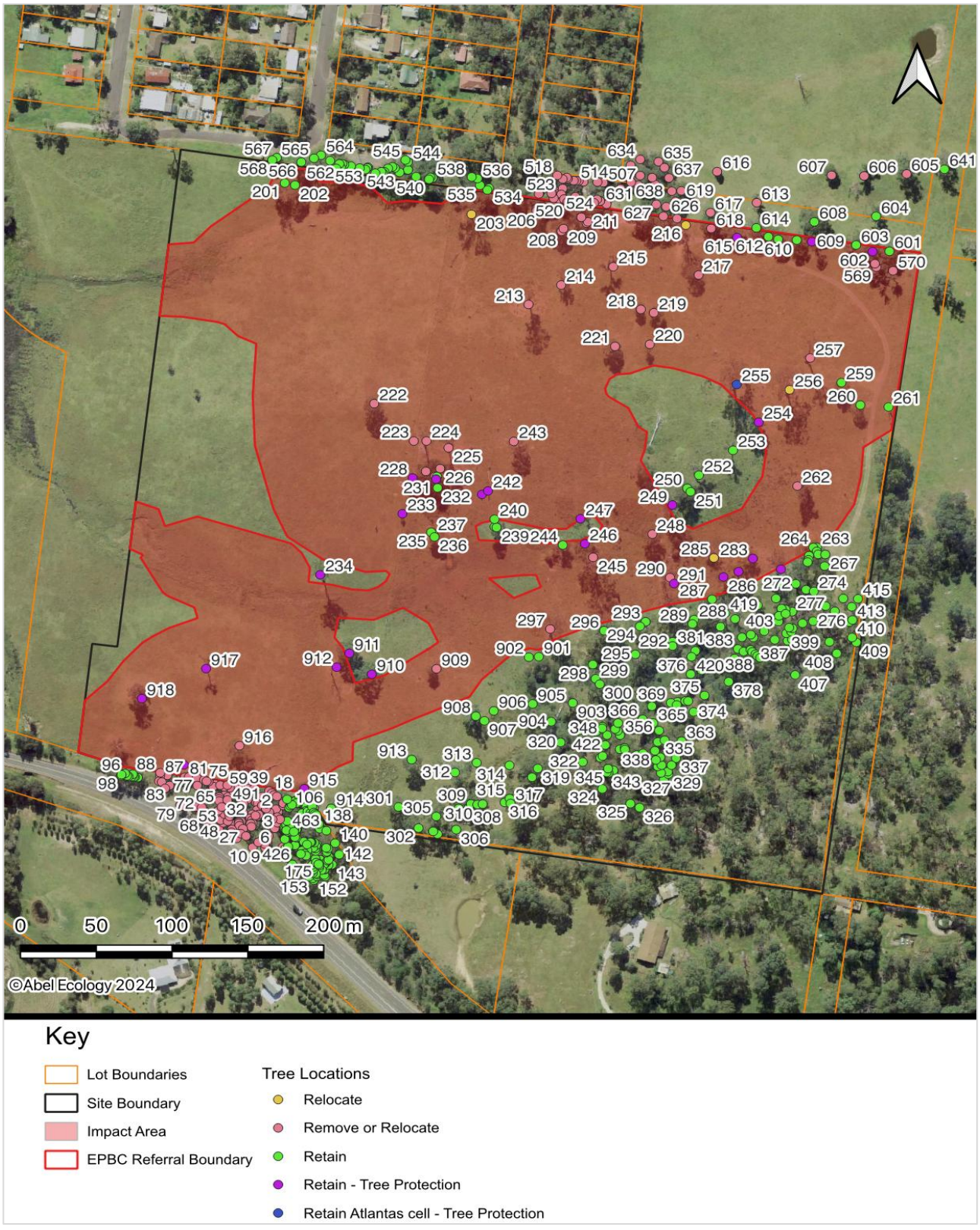


Figure 5. Tree locations

Source: (Abel Ecology, 27 November 2023, p. 45)

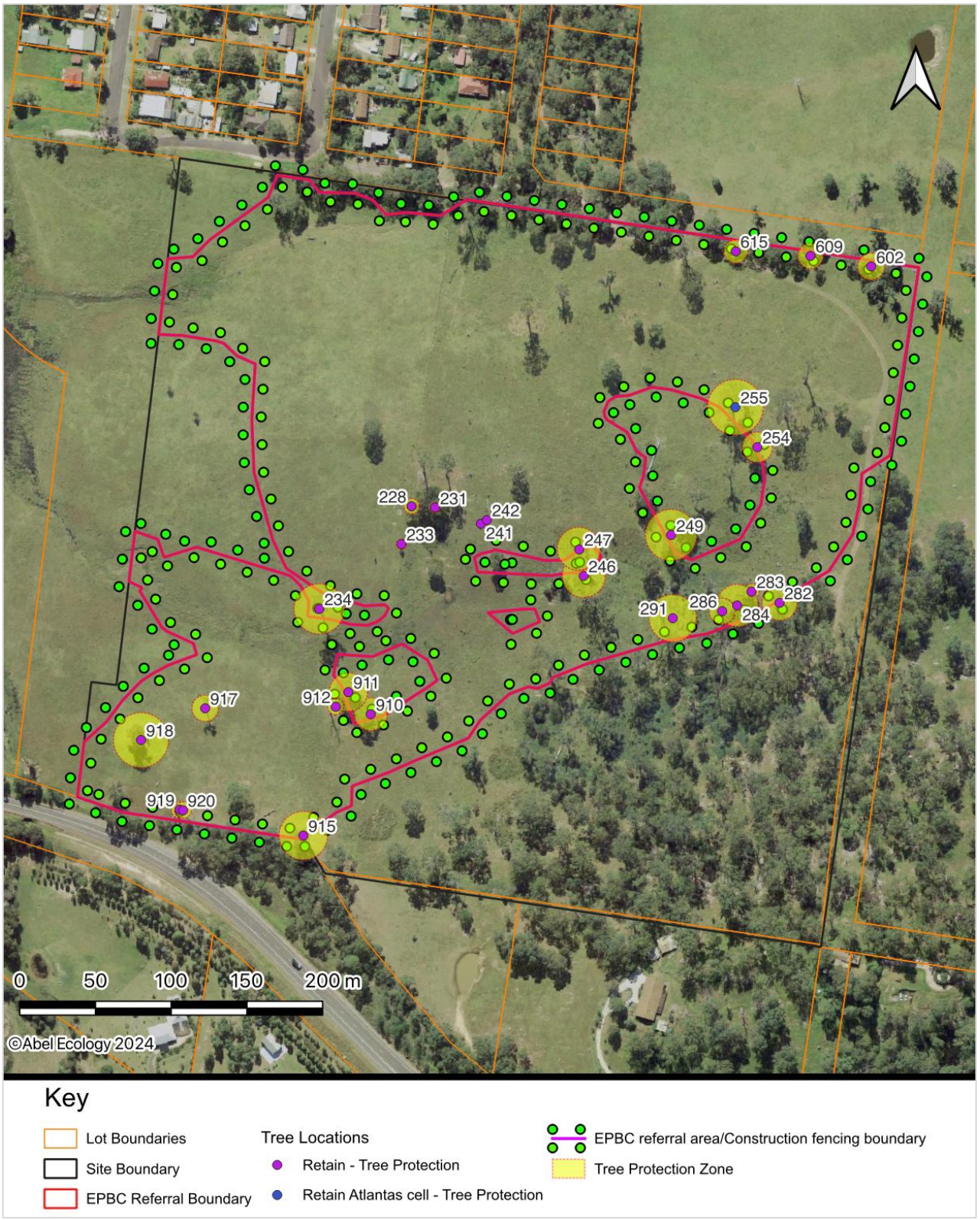


Figure 6. Tree protection fencing

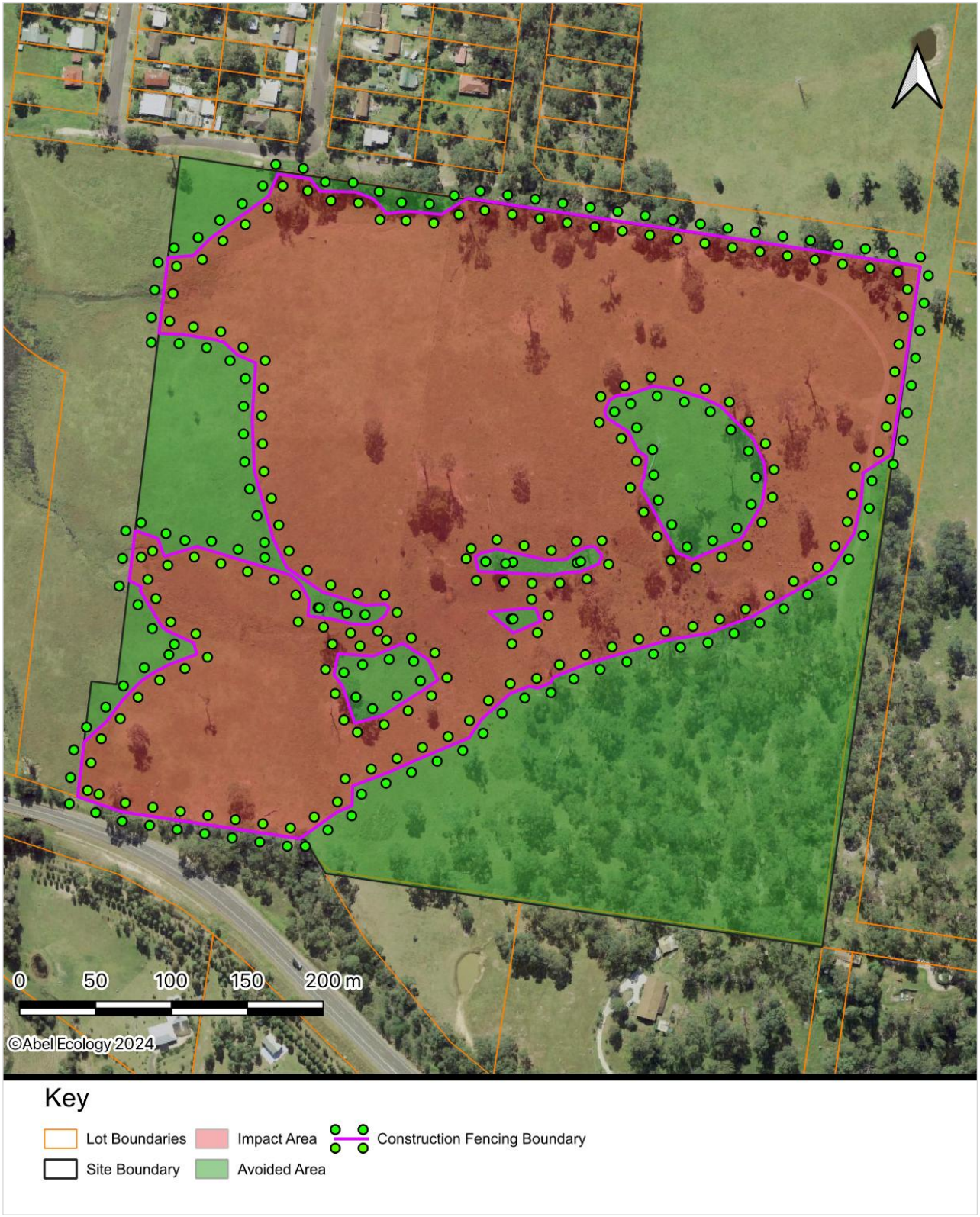


Figure 7. Areas of land where impacts on biodiversity are to be avoided

Figure 8. Installation area for nest boxes

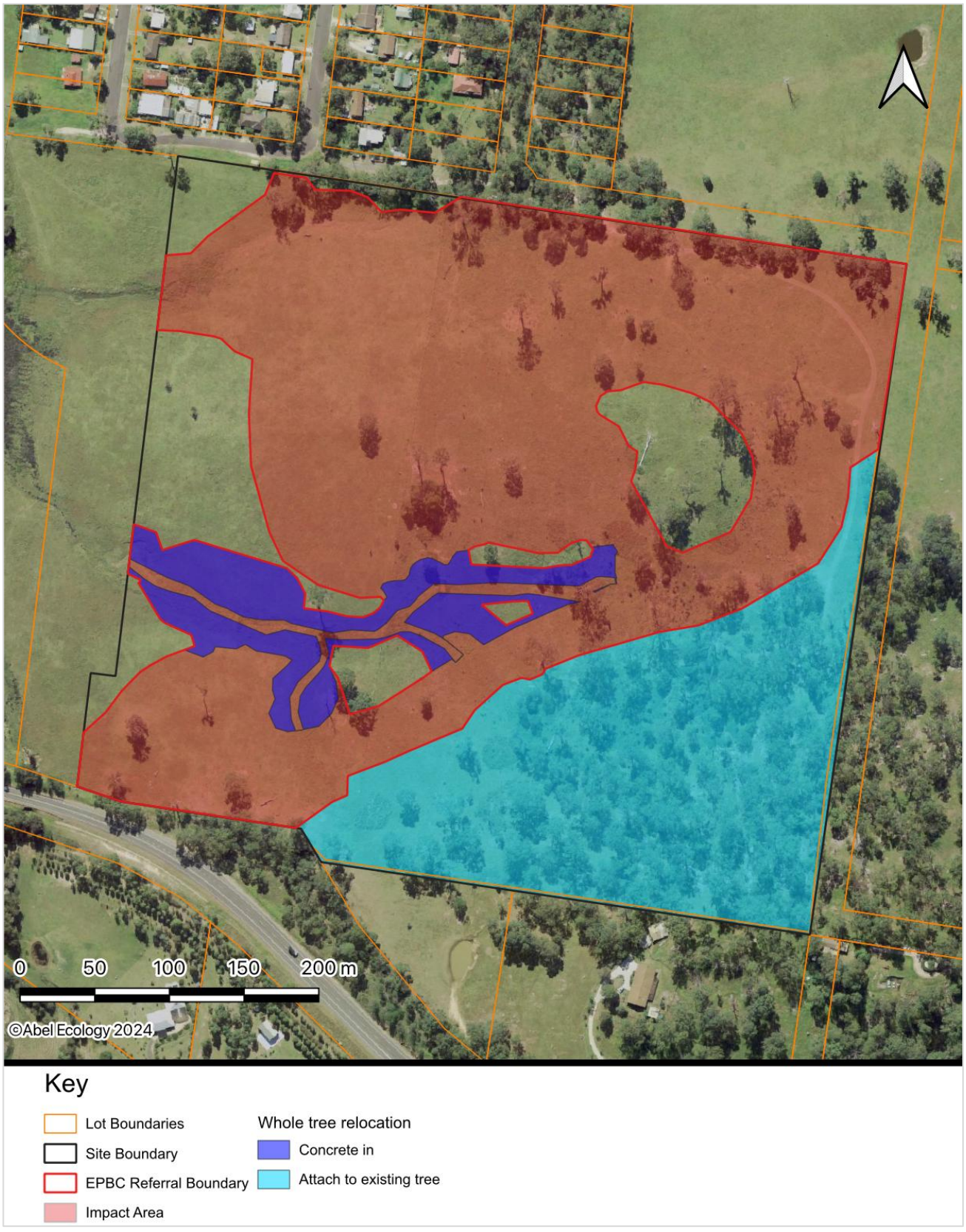


Figure 9. Whole tree relocation area

Figure 10. Terrestrial fauna relocation area

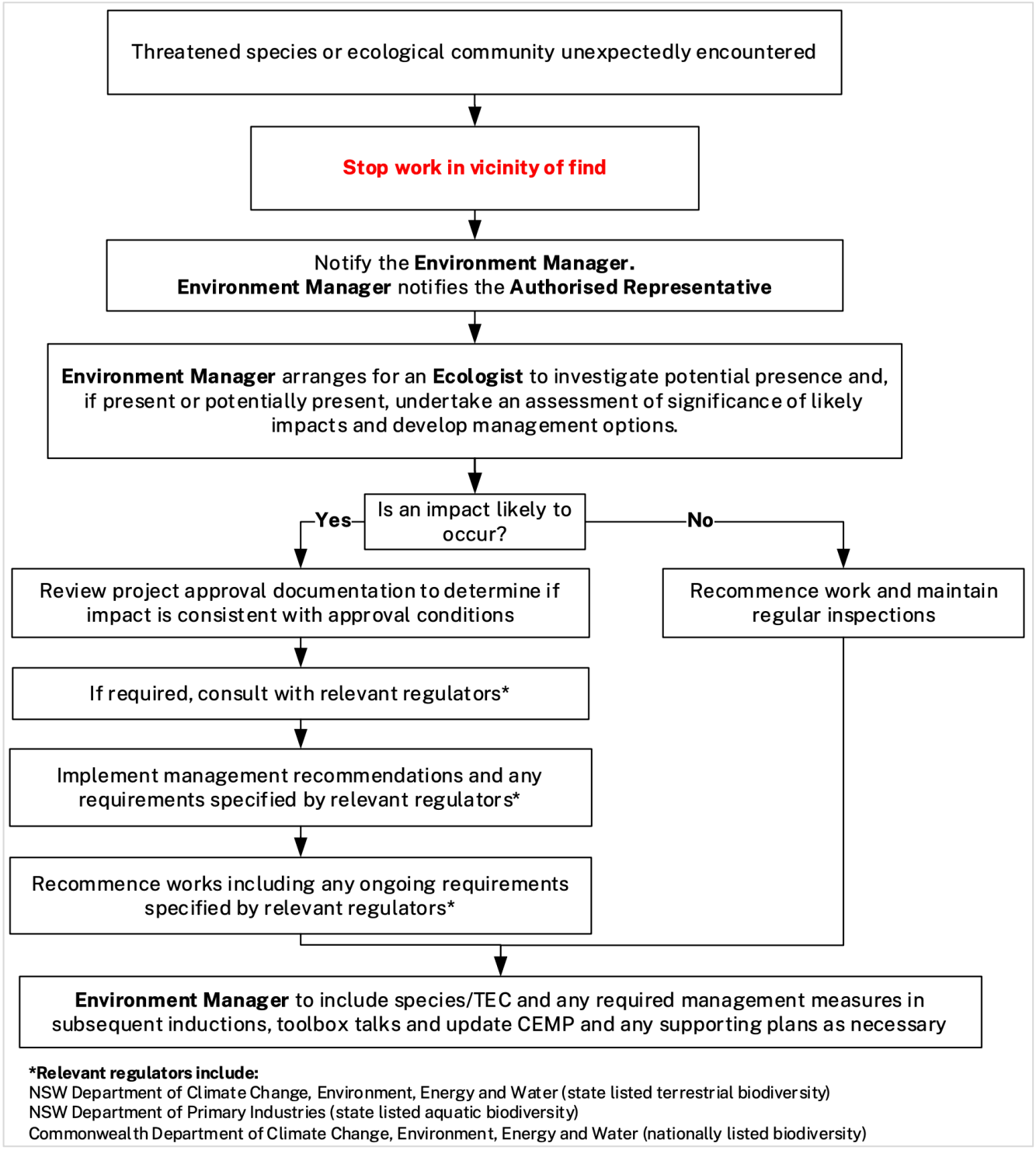


Figure 11. Unexpected threatened species finds procedure

Source: (TfNSW, 2024, p. 24)

Introduction

The site

The site is located between Albert Street and Princes Highway in Moruya, as shown in Figure 1. The site includes Lot 2 DP1281576 (the main site), Lot 69 DP752151 (site to the north) and Albert Street road reserve (to the east of Caswell Street and to the west of Lot 1 DP125563). The Albert Street road reserve does not have a Lot and DP number.

Existing approvals

The site has three existing approvals under the *Environmental Planning & Assessment Act 1979*, which are listed in Table 1.

Table 1. Existing approvals

Approval	For	Date approved	Approved by	Construction commenced?
Review of Environmental Factors - Princes Highway, Moruya - Roundabout Works - 12/7/2022	Roundabout Works	1/8/2022	Health Infrastructure NSW (approval no: 25/2022)	Construction commenced in July 2024
Amendment of Review of Environmental Factors 05/2023 – Soil Conservation Works Princes Highway, Moruya – 14/12/2023	Soil Conservation Works (change of footprint)	08/02/2024	Health Infrastructure NSW (approval no: 05/2023/A)	Construction commenced in July 2024
State Significant Development (SSD) application number SSD-56989722	Eurobodalla Regional Hospital	24/5/2024	NSW Minister for Planning and Public Spaces	Construction commenced in July 2024

Purpose of this report

This Biodiversity Management Plan (BMP) has been prepared to fulfil development consent condition B19 of SSD-56989722, which is detailed in Table 2.

Table 2. Consent condition B19 of SSD-56989722

Condition B19	How it is addressed
B19. The Biodiversity Management Sub-Plan (BMSP) must address, but not be limited to, the following: a) be prepared by a suitably qualified and experienced person/s;	Appendix 3 lists the qualifications and experience of the report authors.
b) identify areas of land where impacts on biodiversity are to be avoided as outlined in 'Biodiversity Development Assessment Report' (Final Report Issue 8), prepared by Abel Ecology and dated 8 January 2024, and set out how these areas will be protected from construction impacts; and	Areas to be avoided are identified in Figure 7. These areas will be protected through the installation of construction/exclusion fencing at the extent of the impact area.
c) set out the measures identified in the Biodiversity Development Assessment Report to minimise, mitigate and manage impacts on biodiversity, including timing and responsibility for delivery of the measures; and	Table 3 lists the recommendations detailed in the Executive Summary of the BDAR (Abel Ecology, 8 January 2024).
d) incorporate a Vegetation Management Plan, which must be prepared in consultation with BCD, and include documentary evidence on how feedback has been considered and whether any changes have been made in response to this feedback. The plan must: i. detail measures to be used for the relocation, installation and management of tree hollows; and ii. inform management of retained site vegetation, Bush Fire Asset Protection Zone maintenance, and regeneration of the 'Spring Forest' in the southeast corner of the site.	Appendix 1 of this report contains a Vegetation Management Plan (VMP). Relocation and installation areas for nest boxes and salvaged trees containing hollows are identified in Figure 8 and Figure 9.

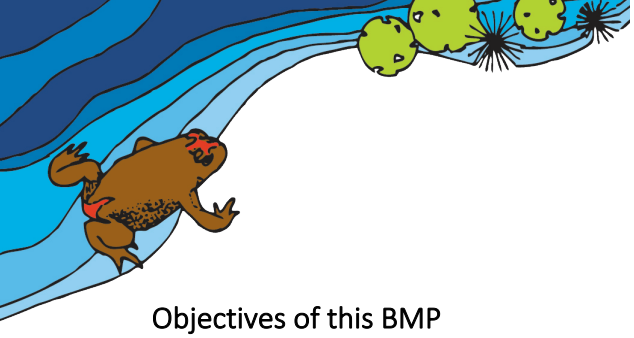
BDAR recommendations

Table 3 lists the recommendations of the Biodiversity Development Assessment Report (BDAR) (Abel Ecology, 8 January 2024) for the SSD.

Table 3. BDAR recommendations

BDAR recommendation	How it is addressed
The Biodiversity Offsets credits that will be generated when the proposal proceeds must be retired prior to any on-ground earthworks.	Condition B26 of the consent requires this.
It is recommended that sediment and erosion control measures are installed prior to earthworks and maintained until building works are complete.	Conditions B22, B23 and C23 of the consent require this. The Construction Environmental Management Plan (CEMP) for the development will describe the sediment and erosion control measures during construction, in accordance with condition B15.
Mitigation to address wildlife impacts is likely to be required if the dams are drained or modified. A fauna ecologist must be engaged to manage any impacts on dam fauna during any dam works.	The site contains four small dams (refer to Figure 4). Section 4.2.3 of this report contains a dam dewatering procedure.
Mitigation of impacts on biodiversity has been partially achieved by the relocation and reinstallation of salvaged hollows from all trees proposed for removal. Relocation and reinstallation of all hollows impacted by the proposal must be undertaken.	Section 0 of this report contains details of hollow salvage and relocation. Condition C19 of the consent states: *"The Applicant must engage a qualified ecologist to inspect hollow-bearing trees and potential habitat trees before they are removed and provide further advice where applicable as per the recommendations of 'Arboricultural Impact Assessment Report' (AE23-2386-REP-ISS-8), prepared by Abel Ecology and dated 27 November 2023."*
Tree protection fencing on retained trees in close proximity to the construction footprint is to be installed and maintained prior, and during construction works.	Conditions B35, C19 and C20 of the consent require the implementation of tree protection fencing. Trees must be protected in accordance with the Arboricultural Impact Assessment Report (Abel Ecology, 27 November 2023).
We recommend a temporary 1.8m chain-wire mesh exclusion fence be installed two (2) metres off the	A temporary 1.8 m chain-wire mesh exclusion fence has been erected around the construction site along

BDAR recommendation	How it is addressed
entire assessed development footprint to ensure no additional pasture will be disturbed or destroyed during the construction process. No human traffic, vehicle traffic, civil stockpiles or construction works are permitted outside the assessed development footprint.	the lot's north and western boundary, and the edge of the spring forest. Bunting (or similar) and sediment fencing (with access points for slashing) is to be used where the EPBC referral boundary does not coincide with the existing 1.8 m site boundary the fence. A stop work order is to be issued where human traffic, vehicle traffic, civil stockpiles or construction works breach this boundary, except where these incursions are necessary for cutting grass/bushfire maintenance, weed control and hollow salvage/installing nesting boxes and monitoring.
A suitably qualified ecologist is to supervise all vegetation removal and is to act in a catcher-spotter roles, particularly in relation to tree hollow removal. The project ecologist is to advise on vegetation removal procedures to protect impacted wildlife.	This report does not require the Project Ecologist to supervise the following vegetation removal: • Removal of non-habitat vegetation • Mulching and grubbing • Removal of the four "relocation trees", once the hollows have been inspected and closed. Section 4.2 of this report requires the Project Ecologist to: • Supervise removal of fauna habitat & dam dewatering • Act as a Fauna Spotter Catcher • Advise on vegetation removal procedures to protect impacted wildlife.
A Vegetation Management Plan is recommended to inform management of retained site vegetation, Bushfire Asset Protection Zone maintenance, and regeneration of the 'Spring Forest' in the southeast corner of the site.	Appendix 1 of this report contains a VMP.



Objectives of this BMP

The objectives of this BMP are provided in Table 4 below.

Table 4. Objectives, indicators and performance targets

Objective	Indicator	Performance target
No harm to terrestrial fauna before or during vegetation removal operation.	No fauna detected during pre-clearance survey. No detectable physical harm to fauna before or during vegetation removal operation.	All detected fauna is relocated un-harmed, by the Project Ecologist to the proposed relocation area (Figure 10) before or during vegetation removal operation. Pre-clearance survey of suitable fauna habitat undertaken by project Ecologist.
No harm to fauna pre-, during and post- dam dewatering.	No fauna detected during dam dewatering. No detectable physical harm to fauna before, during or after dam dewatering.	Minimised impact on fauna species. All detected fauna is relocated un-harmed, by the Project Ecologist to the proposed relocation area (to be determined following consultation with Eurobodalla Council/BCD) before or during dam dewatering. Dam dewatering protocol is followed.
Minimise fauna habitat removed from site	Reduce total number of hollows removed from the site Potential relocation/replanting of four (4) hollow bearing trees.	An estimate of thirty-one (31) natural hollows retained on site through the relocation of the four (4) hollow-bearing trees or salvage of the hollows (Section 1.1.4)
Replacement of fauna habitat.	A net-gain in suitable tree hollows, or similar, for a number of hollow-dependant fauna is observed.	An estimated 141 nest boxes are to be installed to offset ~47 hollows to be removed. Required nest box amount is calculated at a rate of three (3) nest boxes per hollow removed. Nest boxes are to be installed either on posts or retained trees in the areas identified in Figure 8 under the supervision of the Project Ecologist.
Success of replacement fauna habitat	Structure and integrity of nest boxes maintained. Native fauna and target	A management and monitoring plan (Section 1.1.6) is to be followed to detect the integrity of nest boxes and use by

Objective	Indicator	Performance target
	species observed utilising installed nest boxes.	fauna species. Annual inspection of nest boxes from ground is to be undertaken to ensure continued functionality. Motion detection cameras are to be installed to monitor nest box usage.
(Optional) A net-gain in large tree trunks ("fallen logs") at ground level within the relocation area.	A net-gain in strategically sited large tree trunks ("fallen logs") within the relocation area.	Salvage large tree sections (non-hollow-bearing) from vegetation removal operation and strategically place them within the relocation area (Figure 8) to improve fauna habitat.

Life of this BMP

At the completion of:

1. The installation of fauna habitat replacement in the form of one-hundred and forty-one (141) nest boxes, attached to posts or trees to be retained in the areas shown in (Figure 8).
2. The relocation of four identified habitat trees 203, 285, 256 and 216.
3. The management and monitoring of nest boxes for at least five years (Section 1.1.6).
4. The life of the VMP (Appendix 1) is at the end of construction or after 5 years, where it should be re-assessed and reimplemented.
5. The life of the VMP (Appendix 1) includes the completion of the offset plantings along the central swale.

The requirements of this Biodiversity Management Plan are satisfied, and the life of this document will end.

Site description

History

The site has previously been cleared for agriculture and is currently vacant.

Geology and soils

The site is mapped as "Smt" and is described as "Silurian Moruya "Granite" Granodiorite, tonalite" (NSW DPIE, 2024).

The Great Soil Group "Brown Podzolic Soils" is present on the site primarily near the south-east corner of the subject land. Large parts of the subject land is mapped as "Yellow Podzolic Soils – more fertile". There is also a mapped area of "Humic Gleys" near the western boundary of the subject land (NSW DPIE, 2024).

The soil is shallow over massive granite bedrock.

The ecological value of existing bushland and bushland impacted upon by the development

The remnant vegetation on the site was identified as PCT834 Forest Red Gum – Rough-barked Apple – White Stringybark grassy woodlands in dry valleys, southern South East Corner Bioregion. The vegetation consisted of remnant woodland and pasture derived from the woodland.

Woodland and pasture on the site meet the definition of the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) listed Critically Endangered Ecological Community (CEEC) Lowland Grassy Woodland in the South East Corner Bioregion.

Common tree species recorded within the site include *Eucalyptus tereticornis* (Forest Red Gum) and *Angophora floribunda* (Rough-barked Apple). *Eucalyptus bosistoana* (Coastal Grey Box) also occurs less commonly. Canopy trees are common within the forest / woodland area in the south-east corner of the site.

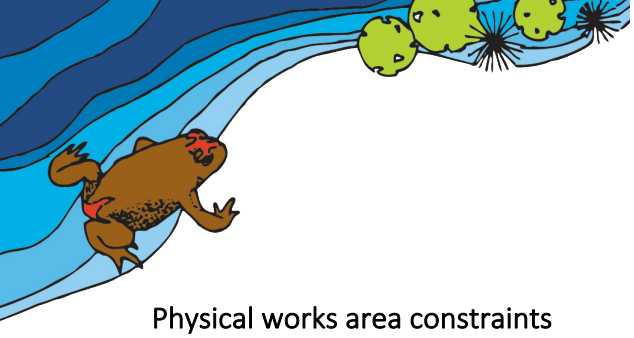
The woodland vegetation was relatively homogenous. However, the woodland within the Albert Street road reserve to the north of the site contained a greater abundance of shrubs and taller groundcovers. It is assumed more abundant shrub layer is due to the lack of grazing or other management.

The species composition and dominance individual species within the grassland vegetation appeared to vary across the site.

The site contains habitat for the following threatened fauna species (Table 5):

Table 5. Threatened species for which habitat occurs on the site

Scientific Name	Common Name	NSW status	Comm. status
Brown Treecreeper (eastern subspecies)	Climacteris picumnus victoriae	Vul	Vul
Diamond Firetail	Stagonopleura guttata	Vul	Vul
Dusky Woodswallow	Artamus cyanopterus cyanopterus	Vul	-
Eastern Coastal Free-tailed Bat	Micronomus norfolkensis	Vul	-
Flame Robin	Petroica phoenicea	Vul	-
Glossy Black-Cockatoo	Calyptorhynchus lathami	Vul	Vul
Grey-headed Flying-fox	Pteropus poliocephalus	Vul	Vul
Large Bent-winged Bat	Miniopterus orianae oceanensis	Vul	-
Little Lorikeet	Glossopsitta pusilla	Vul	-
Regent Honeyeater	Anthochaera phrygia	Crit End	Crit End
Scarlet Robin	Petroica boodang	Vul	-
Speckled Warbler	Chthonicola sagittata	Vul	-
Spotted-tailed Quoll	Dasyurus maculatus	Vul	End
Swift Parrot	Lathamus discolor	End	Crit End
White-bellied Sea-Eagle	Haliaeetus leucogaster	Vul	-
White-throated Needletail	Hirundapus caudacutus	Vul	Vul
Austral Toadflax	Thesium australe	Vul	Vul
Southern Myotis	Myotis macropus	Vul	-
Powerful Owl	Ninox strenua	Vul	-
Greater Glider population in the Eurobodalla local government area	Petauroides volans - endangered population	End	End
Squirrel Glider	Petaurus norfolcensis	Vul	-
Brush-tailed Phascogale	Phascogale tapoatafa	Vul	-
Koala	Phascolarctos cinereus	End	End



Physical works area constraints

The physical works area contains a range of constraints and environmental features including:

- The *EPBC Act* listed CEEC *Lowland Grassy Woodland in the South East Corner Bioregion* is present on the site. This area is to have nest boxes/ hollows installed into suitable trees, maintenance of plantings and relocated trees, as well as the maintenance of the asset protection zone specifications. Access to this area is to be limited to these activities, as outlined in this report.
- The site contains four small farm dams that potentially provide Southern Myotis foraging habitat. The dams may also provide habitat and a water resource for aquatic species and other fauna.
- *Thesium austral* (Austral Toadflax) is assumed present at the site. It is listed as vulnerable under the EPBC Act and *Biodiversity Conservation Act 2016* (BC Act).
- *Myotis Macropus* (Southern Myotis) has been confirmed as present at the site. It is listed as vulnerable under the BC Act.
- *Phascogale tapoatafa* (Brush-tailed Phascogale) is assumed present at the site.
- The development footprint contains twenty (20) hollow-bearing trees which are to be directly impacted by the development.
- Rock outcrops are present and relatively common in the southeast corner of the site, varying in size and complexity.
- Fallen logs and dead wood/coarse woody debris are present, which may provide shelter and breeding habitat.
- The woodland in the south-east of the site has some connectivity to the large areas of remnant native vegetation to the east of the site.

Identification of potential impacts to biodiversity

The nature and extent of any proposed construction activities

The development footprint covers approximately 13.65 ha.

The development will require the clearing of a total of 225 trees. This includes trees removed as part of all three existing approvals outlined in Table 1. An estimated total of hollows that are to be removed is seventy-eight (78).

The four (4) small farm dams on the site will be dewatered, filled and levelled.

Fauna habitat within the development footprint is expected to remain post-construction.

Impact mitigation

Pre-clearing

1.1.1. Requirements for environmental physical works area inductions for all personnel (including contractors) working in the physical works area.

The project manager must be advised of this BMP. The project manager must ensure that the construction crew, including contractors, are advised of this BMP.

The project manager must also consider the following:

- Trees that are scheduled to be retained will be identified and suitable tree protection fencing be installed around these trees, in accordance with the Arboricultural Impact Assessment Report (Abel Ecology, 27 November 2023)
- Measures to reduce environmental impacts associated with construction including installation of protective fencing at the extent of the impact area as shown in Figure 7.

1.1.2. Requirements for the environmental physical works area to prevent the pollution and degradation of sensitive and threatened ecological communities.

The vegetation community at the site is sensitive to disturbance, weed invasion, soil run off and other environmental pollutants associated with construction sites. This project is required to implement environmental protection measures to reduce the impact of construction on the areas to be retained. Such measures include:

- Avoiding soil disturbance where any activity can be timed or staged to minimise time and extent to which soil is exposed to wind and water,
- Sediment barriers or fences,
- No dumping of soil 'waste',
- A single stabilised entry and exit to the site for the duration of the construction,
- Stabilisation of all disturbed areas as quickly as possible,
- Washing of vehicles prior to entry onto the site to prevent/slow the spread of invasive weeds (a key threatening process under the *Biodiversity Conservation Act 2016*),
- Installation of truck rumble grid with wheel wash facilities for vehicles exiting the site to prevent weed distribution into surrounding lots and control sediment,
- Regular inspections and maintenance of all controls to ensure controls maintain their functional design.

Where these measures conflict with the CEMP, the CEMP should be followed.

1.1.3. Tree protection fencing

Trees that are scheduled to be retained will be identified and suitable tree protection fencing be installed around these trees, in accordance with the Arboricultural Impact Assessment Reports see Figure 6 (Abel Ecology, 27 November 2023).

1.1.4. Hollow/tree relocation

Tree hollows are cavities formed in the trunk or branches of a live or dead tree. Such hollows are usually more characteristic of older, mature to over- mature trees but may form in earlier growth stages depending on tree species. The target for this project is a minimum of 25% hollow salvage relocation. The estimated total number of hollows to be removed is seventy-eight (78). If possible, the following four (4) habitat trees containing a total of thirty-one (31) hollows (~40% of removed hollows) are to be replanted to the suitable relocation area (Figure 9). If whole tree transplantation is not viable, the hollows are to be salvaged/replaced at a 1:1 ratio with reclaimed natural hollows, or with nest boxes as outlined below.

- Tree – 203 (10 hollows)
- Tree – 285 (10 hollows)
- Tree – 256 (5 hollows)
- Tree – 216 (6 hollows)

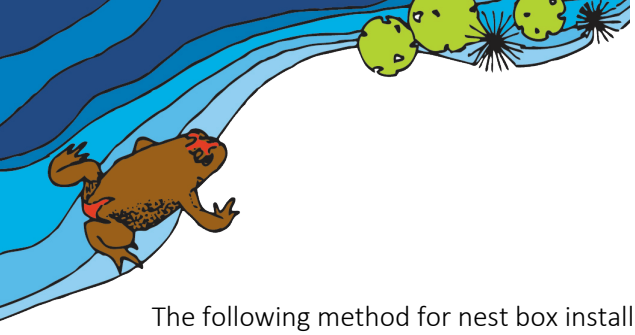
The trees are to be relocated, including the trunk, and erected within the relocation area with suitable structural support.

Directions for trunk relocation are provided in the *Guideline for the Relocation of Large Tree Hollows* (Central Coast Council, 2016), however, another method may be used.

The project manager, engineers and project ecologist must decide on a method to relocate the trees. This will depend on the available machinery and engineering constraints.

1.1.5. Nest box installation

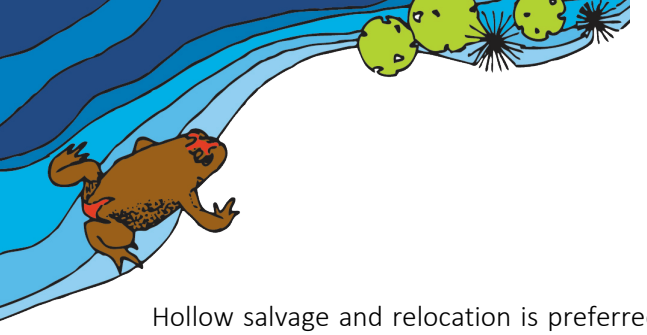
Due to the replanting of the four (4) trees mentioned above, the total hollows expected to be removed is minimised from seventy-eight (78) to forty-seven (47). The required replacement rate is three (3) nest boxes per one (1) hollow removed. The total number of nest boxes required to be installed is 141. However, the final number of hollows to be removed may differ given the chance that additional hollows are identified during pre-clearance surveys. In such instance, the required number of nest boxes may be altered.



The following method for nest box installation is recommended:

- A portion of the required nest boxes are to be installed prior to any vegetation clearing or construction works.
    - Twenty-five (25) nest boxes (or 9 reclaimed natural hollows) installed prior to works in the fauna relocation area (Figure 10) to provide added shelter during construction works and opportunity for safer relocation.
- The remaining nest boxes are to be installed in suitable trees within the property boundaries. Potential installation sites may include, but are not limited to the purple areas in Figure 8.
    - Where an attachment tree is not available, especially within the predominately clear area at the western part of the site, nest boxes may be mounted to constructed poles.
    - Otherwise, in the forest area to the south-east, nest boxes are to be installed in the retained trees.
    - Consultation with on-site qualified ecologist is required to determine which trees to install nest boxes/natural hollows (tree species, height, aspect and box type/size). Once installation is complete, an ecologist is to sign off on the installed nest boxes/hollows to confirm.
- Nest Boxes should target the following species:
    - 40x Small Bird
        - Brown Treecreeper
        - Dusky Woodswallow
    - 20x Microbat
        - Eastern Coastal Free-tailed Bat
        - Southern Myotis
    - 50x Small Parrot
        - Little Lorikeet
        - Swift Parrot
    - 15x Large Parrot/Forest Owl
        - Glossy Black-Cockatoo
        - Powerful Owl
    - 16x Mammal
        - Greater Glider
        - Squirrel Glider
        - Brush-tailed Phascogale

Further detailed guidelines are provided in Guide 8: Artificial hollows of *Biodiversity Management Guideline: Protecting and managing biodiversity on Transport for NSW projects* (TfNSW, 2024, p. 96)



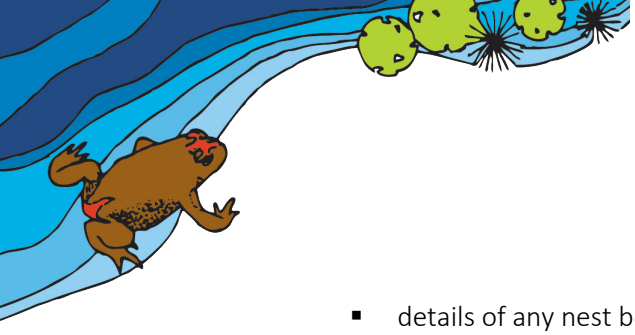
Hollow salvage and relocation is preferred to nest boxes, as nest boxes require more maintenance, can break down and require replacing. If a sufficient number of natural hollows cannot be saved, suitable salvaged hollows from the local area may be employed. All hollows are to be installed into a suitable host tree. Hollows placed on the ground do not satisfy the requirements for installation of habitat and nesting for this report.

Detailed directions for hollow relocation are provided in *Guideline for the Relocation of Large Tree Hollows* (Central Coast Council, 2016)

1.1.6. Nest box monitoring program

To review the success and ensure maintenance of the installed nestboxes, the following steps are to be undertaken:

- Annual inspections from the ground for at least five years to determine the structural integrity of the nest boxes and if they remain functional.
    - The following questions should be addressed during inspection:
        - Are the joints of the nestbox intact and structurally sound?
        - Is the entrance to the nest box obstructed in any way?
        - Is the position of the nest box consistent with its installation position?
        - Is there any evidence of rot that will impact the nest boxes longevity?
        - Is there any evidence of pest occupancy e.g., feral bees, ants, common mynas?
        - Signs of use may also be noted during these inspections including any direct observations of fauna, scratchings or chew marks at nest box entrances, and presence of droppings/scat.
    - Any nestboxes identified to be damaged or unusable are to be repaired and reinstalled.
- Install six (6) motion detection cameras to monitor the use of the nest boxes.
    - The recommended camera that will provide the most efficiency in this case is the KEEN Ranger PT Trail 4G Wireless Cellular Outdoor Camera with solar panel.
    - Cameras are to target the Mammal and Large Parrot/Forest Owl nest boxes to monitor offset species Brush-tailed Phascogale and Powerful Owl.
    - Within larger nest boxes cameras may be installed on the inside roof looking down into the space of the nest box.
    - Smaller nest boxes can be monitored by installing the camera outside looking towards the entrance of the nest box.
- Data is to be recorded and reported annually for at least five (5) years from the installation of all nest boxes. Reports are to include:
    - Integrity inspections
        - Dates of completion
        - Any observations made during inspection



- details of any nest boxes that have required replacement
- date of repair/placement
- reasoning for repair/replacement

- All fauna activity detected on cameras
  - species identification
  - count of individuals
  - evidence of nesting/breeding
  - evidence of predation
  - any clear evidence of animal injury
  - evidence of reuse by an individual
  - dates of use
  - condition of nest box

1.1.7. Weeding

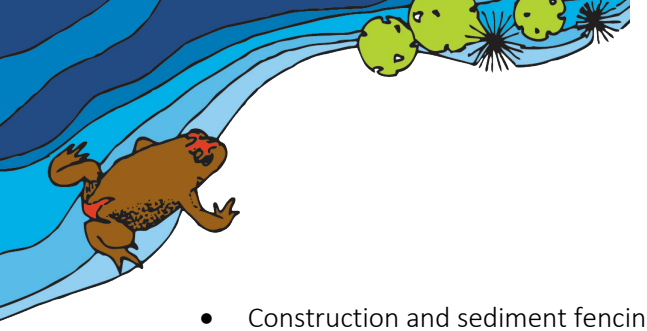
During construction, any exotic, noxious and non-local vegetation, should be removed using appropriate methods. Refer to the VMP attached in Appendix 1.

1.1.8. Provision for the supervision of pre-clearing works by a licensed wildlife carer or ecologist

- A licensed wildlife carer or fauna ecologist must undertake a pre-clearance survey of the development footprint.
- The licensed wildlife carer or fauna ecologist is to climb trees or use an elevated work platform to inspect any nest or hollows.
- If actively breeding fauna is located, then protection fencing must be installed around the tree and the tree is not to be cleared until the young have vacated the nest/hollow (all non-active hollows in the tree can be sealed).
- If non-actively breeding fauna is found, and able to be captured, it must be relocated to the 'Spring Forest' Figure 10.
- The pre-clearance survey must be undertaken no more than two (2) days prior to clearing works.

The following protection measures for wildlife and retained vegetation must occur or be in place before vegetation clearance operations begin, which includes the stripping of topsoil from grassed areas:

- Pre-clearance survey as described in section 1.1.8.
- Tree protection fencing in accordance with the Arboricultural Impact Assessment Reports and shown in Figure 6.



- Construction and sediment fencing installed along extent of impact area (Figure 7).
- Installation of a portion of the required nest boxes (approximately twenty-five (25) boxes or nine (9) natural hollows) in the suggested 'Spring Forest' (Figure 8) to provide added shelter during construction works and opportunity for relocation.

During clearing

Management of fauna habitat during the clearing process will be achieved by the process detailed in Table 6.

Table 6. Clearing procedure

Task	When	Is the activity optional or mandatory?	Activity
Inspecting and unmarking habitat features	On the day of stage 1 clearing, before toolbox talk	Optional	• The Project Ecologist may choose to check habitat features such as hollow logs, thick weeds, rock piles, and low-to the ground hollows. This can be done using a torch, pole camera, drone and/or endoscope. If no fauna are found, the marking can be removed from these features, and they can be cleared that day during Stage 1. • If they cannot be cleared that day, they will need to be re-marked. • If fauna are found, they are to be captured then released in the relocation area (refer to Figure 10) • If the habitat features cannot be checked properly (such as hollows high in trees) then they must remain marked, as they may contain fauna.
Nest box installation	Prior to any clearing or construction	Mandatory	Install twenty-five (25) nest boxes or nine (9) natural hollows into trees determined by the ecologist.
Toolbox talk	Each day, before clearing commences	Mandatory	A toolbox talk and/or walkthrough of the site will be conducted. The Project Ecologist will show the machine operators where the habitat features are. The Project Ecologist and machine operators will establish the communication methods to be used (UHF radio, hand signals etc).
Stage 1 clearing	After toolbox talk	Mandatory	Stage 1 clearing can begin. Stage 1 clearing involves clearing of non-habitat features. This stage does not require supervision by the Project Ecologist.

Task	When	Is the activity optional or mandatory?	Activity
Mulching & grubbing	Can occur after stage 1 clearing, stage 2 clearing, or tree relocation	Optional	Mulching & grubbing can occur after stage 1 clearing, stage 2 clearing, or after tree relocation. It does not require supervision by the Project Ecologist.
Hollow log salvage	After stage 1 clearing	Optional	• After Stage 1 clearing, the Project Ecologist may choose to identify any hollow logs in the development footprint that are in good condition. The logs can either be immediately placed in the relocation area, or stockpiled and placed there later.
Stage 2 clearing	At least 24 hours after stage 1 clearing	Mandatory	• A minimum of 24 hours must pass between the end of stage 1 clearing and the start of stage 2 clearing. This is so that fauna can leave the area overnight. • Stage 2 clearing involves clearing of hollow-bearing trees and any marked habitat features, except for the four "relocation trees". • After each hollow-bearing tree is felled, the Project Ecologist must check the hollows for fauna. If fauna are found, they should be captured and inspected for injuries. If healthy, must be released in the relocation area (refer to Figure 10). If injured, they must be taken to a vet or licenced wildlife carer.
Hollow branch salvage	After stage 2 clearing	Optional	• After Stage 1 clearing, the Project Ecologist may choose to spray paint the location of hollow branches on felled trees. Before the tree is mulched, a suitably qualified person can remove the branches using a chainsaw. • The branches can either be refurbished and used as nest boxes, or placed on the ground in the relocation area.

Task	When	Is the activity optional or mandatory?	Activity
Tree relocation	Can occur at the same time as stage 1 or stage 2 clearing. It can also occur after stage 2 clearing.	Mandatory	• Tree relocation can occur at the same time as stage 1 or stage 2 clearing. It can also occur after stage 2 clearing. • The project manager, engineers and project ecologist must decide on a method to relocate the four "relocation trees". This will depend on the available machinery and engineering constraints. The following is a suggested method. • **Hollow inspection and closure**: The Project Ecologist must supervise this activity: a) Before the trees are relocated, the hollows should be inspected and closed off. This can be done by the Project Ecologist via Elevated Work Platform, or by an arborist via tree-climbing. Each hollow should be inspected. If fauna are found, they should captured, then released in the relocation area (refer to Figure 10). After inspection, each hollow should be closed off using fabric or other materials so that fauna cannot enter the hollow. • **Tree relocation**: The following activities do not require Project Ecologist supervision: b) An arborist should cut off any leafy vegetation on the tree, to make the tree easier to relocate. c) An excavator should dig around the root ball of the tree. d) An excavator should dig a hole in a suitable location in the relocation area. e) A crane should be used to lift the tree and place it into the hole in the relocation area. f) Concrete or other measures should be used to secure the tree in the ground. g) Once the concrete has set, soil should be placed on top of the concrete to give a natural appearance. Ideally the soil should be 1 metre or more in thickness, to allow space for vegetation to grow.

1.1.9. Requirements for unexpected threatened species, communities and non-threatened fauna on site during the construction process

If a threatened species is encountered during clearing activities, a stop work procedure will be implemented in accordance with the Unexpected Threatened Species Finds Procedure detailed in Figure 11.

1.1.10. Dry dam procedure

If the dam does not hold water, the dam wall can be broken to allow for water to continue down the slope in rain events. Prior to any works on dams, an ecologist is to survey the dry dam to capture and relocate any fauna found. No works are to be carried out on the dam floor until after one rain event to flush out any unseen fauna. After this, the dam is to be filled in, as per the proposal.

1.1.11. Dam dewatering protocol

The proposal includes the dewatering and infilling of four (4) dams ("constructed wetlands") within the site. The locations of these dams are shown in Figure 4. The combined area of the dams is approximately 562 m^2 with the largest dam measuring approximately 250 m^2. Within and upslope from the dams some vegetation typical of wetter areas was recorded (refer to Biodiversity Development Assessment Report (BDAR) (Abel Ecology, 8 January 2024) for further detail). The following strategies are relevant to minimise the impact on fauna species that may be present due to the dam dewatering procedure.

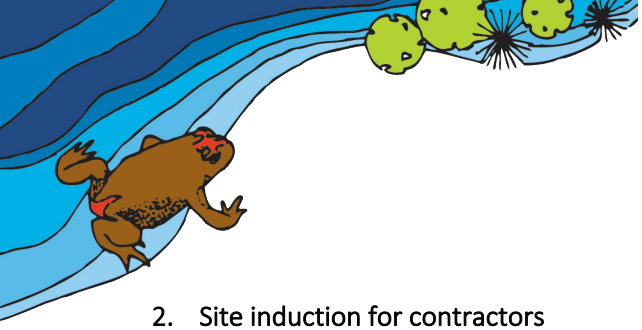
Purpose

Construction works, or disturbance, may adversely affect fauna species and their habitat. A Protocol for Fauna Management during construction works aims to provide a framework for the pre-, during and post-construction stages that will minimise impact on fauna species present within the construction site. This protocol is applicable to sites that contain potential fauna habitat which may be impacted by construction. In this case, a Fauna Ecologist will be appointed for the project and be required to supervise and undertake the dam dewatering procedures.

Prior to Dam Dewatering

1. Preparation of working arrangement between Fauna Ecologist and Site Manager

The presence of an on-site Fauna Ecologist is necessary to control any animals that may be displaced through the dewatering process. The role of the ecologist is to capture and relocate these individuals to the appropriate sites, as well as implement exclusion, escape and re-entrance structures. A working arrangement will need to be reached for the duration of the construction works outlining when the Fauna Ecologist would need to be on site or how he/she can be contacted/consulted. The Site Manager or Ranger may be responsible for constructing some of the exclusion, escape and re-entrance structures after consulting with the Fauna Ecologist.



2. Site induction for contractors

A contractor induction program will be drawn up for all site workers prior to any works. Contractors will need to be aware of the specific area under construction. They will be informed about the local fauna that may be encountered and will be introduced to the on-site Fauna Ecologist. Open dialogue will be encouraged between these two parties, so that any displaced animals during construction, can be identified and dealt with appropriately.

3. Consents/ Identify relocation site and strategy

The Project Manager would need to refer to the local Council's planning and environmental staff to ensure that consents are obtained, including:

- Suitable aquatic fauna relocation sites.

Based upon the species encountered, a relocation site, containing suitable habitat, will need to be identified. Relocation strategies will be specific to the site and species present.

4. Site survey for fauna species and habitat

The Fauna Ecologist engaged will need to conduct a preliminary fauna species and habitat survey/site inspection. In general, this will involve "point and identify" searches, to record species present. Significant habitat to be protected from works will also be identified.

In addition to the site survey a species list is to be compiled from the following sources:

a) Cross reference to the Atlas of NSW Wildlife fauna database.

b) Previously recorded species (reports, local observations of fauna).

c) Threatened species likely to occur given appropriate available habitat.

During Dam Dewatering

5. Water removal procedure

Recommendation: To avoid injury to tadpoles, dam dewatering should be initially conducted by siphon, and not pump or mechanically driven water removal. Fauna that is siphoned out will be caught in a holding tank in an adjacent low area (not within the downstream water channel). The siphon holding tank will be fitted with a fine micron mesh to allow filtered water to pass through but not allow fish or juvenile fish pest species or eggs to pass through. The rate of water flow through the holding tank will not permit over-land flow to reach remaining waterbodies. Appropriate animal handling equipment will be prepared prior to dam dewatering. The Fauna Ecologist will capture and relocate fauna as required, as the dam water level drops as per this plan.

Once satisfied all reasonable efforts have been made to capture fauna prior to the use of a suction pump or by mechanical water removal, the Fauna Ecologist will advise the site manager to remove any remaining water and silt as they see fit. If a significant amount of water remains when this decision is made (e.g. if the dam refills with

spring water overnight), the suction hose used to dewater the dam is to have a sponge or another suitable filter cage on the end within the water column to prevent fauna inadvertently being sucked into the pump. The pump operator is to assist the ecologist in the capture of fauna by managing the uptake of water (pump impeller speed) as the ecologist undertakes fauna capture measures. If available, a 20-tonne excavator with a wide bucket would be useful in concentrating the remaining water into the low point of the dam.

Site water removal is recommended to be by overland flow irrigation and to be undertaken while grass/ground cover vegetation remains at the dispersal area. Excessive pooling of removed site water must be avoided, and site water runoff must be managed appropriately. Site water runoff must not be permitted to directly enter adjacent watercourses or stormwater drainage systems. Overland flow through adjacent grassland is an appropriate filter for dam water dispersal if an adequate area is available. If required, a shallow absorption trench is recommended for disposal of site water.

6. Fauna management – removal/relocation from site

Fauna will be caught by hand-net or by hand and transported in insulated containers. Water used during transportation will be water collected from the site. The bins will be placed in a secured and protected position in vehicles for transportation. At the relocation site, fauna will be scooped out of the bins by hand-net and placed into the watercourse while final welfare checks are made before release. Animal handling/holding procedures and equipment will need to be available prior to construction. Resources need to be obtained for rescue or euthanasia of injured fauna and euthanasia of feral fauna. All fauna handling is to be carried out by the appointed Fauna Ecologist. Fauna relocation methods will be dependent upon the species present and the area under construction. Special consideration will need to be paid to any threatened or vulnerable species. Contractors are to be made aware of the threatened species that will be potentially found on site and advised to report any unexpected finds to the appointed Fauna Ecologist.

Any injured or feral fauna are to be managed according to the *Australian code of practice for the care and use of animals for scientific purposes* (NHMRC, 2021), either for rescue or euthanasia. Correctly identified pest species (e.g., *Gambusia holbrooki*, Carp, etc), if captured, are not to be relocated or returned to the site: they are to be euthanised.

Fauna is to be captured as required during the staged dam dewatering. The following general practices should be adhered to.

In general fauna will fall into the following groups:

1. Mobile aquatic fauna, e.g. turtles, eels
2. Mobile terrestrial fauna, e.g. Native Water Rat, possums, water birds

The following methods are best practice for handling captured fauna:

i. All vertebrate fauna captured should be stored in separate bags/containers.
ii. *Hygiene protocols for the control of diseases in Australian frogs* (Murray, et al., 2011).

iii. Nocturnally active species if captured during the day should not be released until the evening/nightfall.

iv. *Australian code of practice for the care and use of animals for scientific purposes* (NHMRC, 2021).

v. Aquatic animals will be caught using nets, put into 32 micron polythene plastic bags and transported, in insulated containers, to the appropriate relocation site.

vi. Terrestrial animals will be trapped as deemed appropriate to the species.

vii. Feral species will not be relocated or released. Appropriate procedures for euthanasia will be followed as per *Guidelines for the Euthanasia of Animals* (AVMA, 2020).

Items below may, or may not, be applicable depending on which fauna groups are likely to be present.

a. Mobile aquatic/semi-aquatic species

Frogs

Hygiene protocols for the control of diseases in Australian frogs (Murray, et al., 2011) is to be followed. Capture and handling of frogs holds the danger of aiding the transmission and spread of disease between individuals. It must be recognised that this poses very serious consequences for species survival for vulnerable populations. Guidelines and measures to reduce this risk must be taken.

Key measures to be taken include but are not limited to

- Caught individuals are to be held in separate holding tanks, and water should not be shared between tanks.
- Tadpoles from the same water body may be housed for short periods in a common container, although overcrowding should be avoided.
- Holding tanks and equipment are to be appropriately sterilised prior to any capture or handling and between each individual.
- Disinfecting solutions must not come into contact with frogs or be permitted to contaminate any water bodies
- Footwear and clothing that has significant contact with frogs and the environment should be cleaned/disinfected between collection sites.
- Direct transfer of pathogens during capture and handling of successive adult amphibians can be reduced by using:
    - single-use gloves (latex, nitrile or vinyl), and/or
    - single-use lightweight plastic bags
    - adequate cleaning of hands and handling equipment between individuals
- In the instance where a sick frog is identified, the individual should be collected and sent for disease diagnosis as per Section 6.7 - Sick and dead animals of (Murray, et al., 2011) Disposable gloves should be used when handling a suspected sick frog and replaced between individuals.

- Thorough review of Murray, et al., 2011 and appropriate planning (e.g., a pre-work checklist) should be undertaken prior to works.

Fish

The dam dewatering staging in Table 7, is constructed to allow sufficient time for the Ecologist to capture all fish. Fish will be hand netted during the final stages of the dam dewatering with larger fish being targeted first.

Introduced species, such as Plague Minnow *Gambusia holbrooki* or Carp, are not to be reintroduced. Feral species are to be euthanased as per *Guidelines for the Euthanasia of Animals* (AVMA, 2020).

Eels are to be captured when water levels are very low and preferably be kept in separate holding tubs. Eels may be released a few metres back from the bank of the relocation site, directed towards the water.

Holding tanks are to not be:

- Overstocked or,
- Left in direct sunlight

Native fish are to be relocated to a nearby identified site that is suitable. The determined relocation site must be sufficient to accommodate the additional fish and eels. Water from the relocation site should be gradually mixed into the holding tank water for fish to acclimatise. Individuals should be released via hand nets.

At least two ecologists are to be on site for the dam dewatering to reduce any risk of injury from carrying heavy tubs up the bank of the dam. It is recommended that a slight ramp be excavated for ease of access and exit.

Turtles

Turtles will be netted or captured by hand while water level is very low. Captured individuals may be held and transported in a tub kept cool and moist with a wet fabric bag inside.

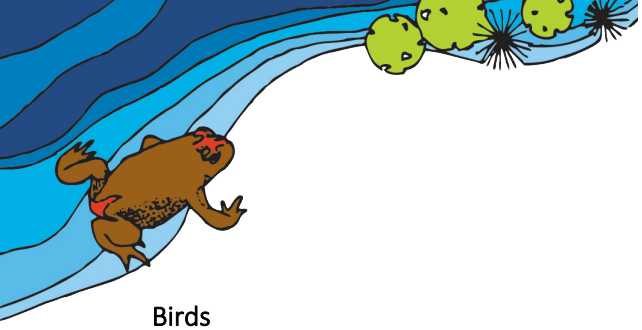
Feral species are to be euthanised as per *Guidelines for the Euthanasia of Animals* (AVMA, 2020). Fauna injured in the construction phase are to be managed according to (NHMRC, 2021), either for rescue or euthanasia.

If encountered, the exotic *Trachemys scripta* (Red-eared Slider Turtle) are to be contained humanly and OEH immediately notified (Environment Line -131 555). They will collect the live turtle from the ecologist.

b. Mobile Terrestrial Species

Reptiles

Any reptiles encountered should be captured opportunistically either via hand capture or with appropriate handling jigs or tongs for venomous species.



Birds

If birds are not deterred by machinery and construction works, bird scare strategies may be used to scare them out of harm's way, e.g., gas guns. If wetland birds are actively nesting or young birds present, the ecologist will closely monitor their response. Depending on the species and age of the young birds they may be able to relocate by themselves. In the case that eggs or young require rescue, they will be captured, and a vet or wildlife carer will be immediately contacted and an arrangement made.

Mammals

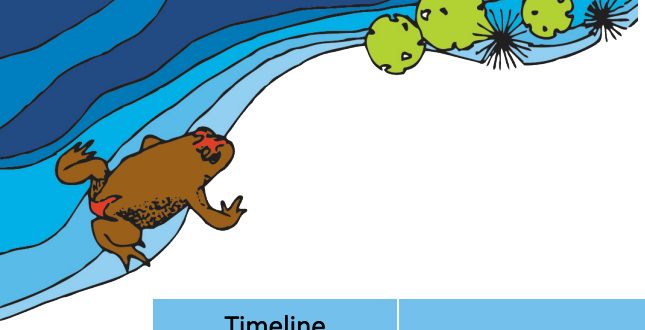
Any mammals encountered should be captured opportunistically with hand nets, with minimal handling and kept until release in a quiet, dark location.

Post Dam Dewatering

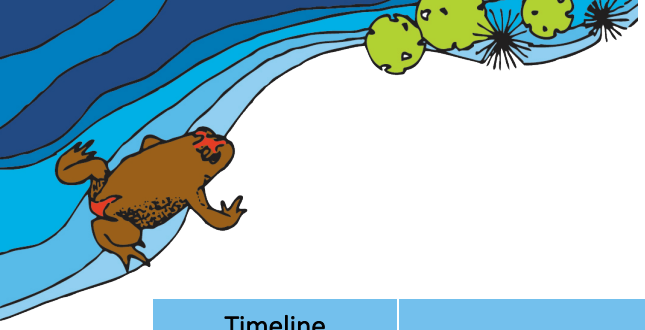
Post dam de-watering procedures should follow details in Table 7. A site-specific fauna management summary report may be submitted if required.

Table 7. Dam De-watering schedule

Timeline	Activity	Objective
Day 1	• Install bunds to divert overland flow. Install erosion controls (e.g. Silt fence, haybales and/or geotextile fabric) and prepare pump pad. • The pump in take head is best positioned on a floating device above the deepest part of dam and held in position with ropes spanning the dam. It is difficult to move the pipe when the water is low, so it's easiest to install when dam is full. Test discharge and diversion to ensure no erosion/sedimentation occurs downstream. Avoid disturbing vegetation(grass) in areas where water will travel. Drain the maximum amount of volume by syphon. • **Notify Aquatic Ecologist** The Aquatic Ecologist is to notify DPI Fisheries of the activity 48 hours prior to fish relocation (unless an agreements in place), including locations of dewatered and relocation sites (see regional office contacts www.dpi.nsw.gov.au/aboutus/about/office). Fisheries require permits to be carried by the licensed ecologist, who should also display a sign clearly	To lower water level slowly allowing fauna to move into the deeper parts of the Dam



Timeline	Activity	Objective
	showing licence number (if working in public areas, especially when releasing fauna to local creek).	
Day 2-4 (or longer)	• Check syphon, if syphon has ceased, pump water and irrigate overland (or use to suppress dust) at a rate that allows infiltration to the soil. • Check sediment controls if soil becomes saturated by irrigation and generates surface runoff. Adjust pumping rate to slow runoff. • Stop once Water level is approximately 1 m deep • **Update Aquatic Ecologist.**	To lower water level slowly allowing fauna to move into the deeper parts of the Dam
Day 5	• During final 0.3-0.5 m of dewatering allow Aquatic Ecologist to rescue fauna in one day. • Water will become turbid as levels fall and when ecologists wade over muddy bottom. This water should be discharged away from drainage lines. • To allow rapid fauna rescue, pump inlet needs to be large enough to suck sediment (e.g. 100-150 mm). • Partially remove wall to prevent re-filling. Stabilise if needed. Grade a ramp for overnight escape of fauna hidden in bottom sediment. • **Aquatic Ecologist on-site.**	Collection and relocation of native fauna.
Day 6-7	• Clear surrounding vegetation. • Leave escape ramp for fauna trapped for two night from the evening of day 5. • **Aquatic Ecologist on-site (if required).**	Allow residual fauna to escape or be captured and relocated.
Day 8	• Remove wall and fill dam.	
Dry Dam Method		
Day 1	• Use and excavator to break the dam wall down to the existing downstream ground level. • Do not compact or drive over the body of the dry dam.	Open the dam to allow fauna to escape when it next rains
Wait for the next rain event (>5 mm)	• Allow species to emerge from the soil and vegetation and make their way down stream.	Fauna is able to naturally escape the dry dam.



Timeline	Activity	Objective
After rain event	• Fill and level the dam.	

Post-clearing

1.1.12. Maintenance of tree protection fencing

a) Where access is required within a TPZ, temporary ground protection measures will be required (e.g. metal plates, rumble boards or exterior-grade ply over aggregate) capable of supporting the required load without deflection. Trunk protection may be required, e.g. battens wrapped around the trunk to a height of 2 m.

b) Material stockpiles or dumps, parking, excavation, site sheds, preparation of chemicals, fires, wash down areas or similar are to be located clear of TPZs. Areas designated for such requirements are not to divert drainage water into tree protection areas.

c) Machine trenching is to be excluded from the TPZ of retained trees. Any required root excavation inside a TPZ is to be done by hand and intact roots >40 mm in diameter are to be retained. Services are to be installed 100 mm clear of such roots. Damaged roots must be cut cleanly with sharp implements (backhoe blades and similar are excluded), with no root dressings or paints. Trenches are to be backfilled promptly to minimise soil desiccation. Underbore, if no suitable alternative location, is possible. All works within the TPZ are to be supervised by the Project Arborist.

1.1.13. Requirements for the relocation of on-site habitat features

All protected habitat features within the physical works area will be scheduled for relocation:

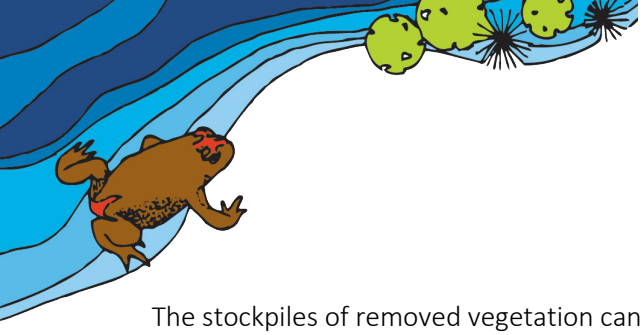
a) Any unexpected hollow-bearing tree sections that are encountered are to be salvaged. Identified hollow-bearing tree sections are to be lifted and gently lowered to ground with the use of a climbing arborist and crane team.

b) Any Identified hollow-bearing tree sections are generally weak / fragile section of trees. Identified hollow-bearing tree sections are to be 'gently' transported to the retained natural vegetation within the possible relocation area (Figure 8).

c) Any hollow unable to be safely salvaged is to be replaced with an artificial nest box in the ratio of three (3) nest boxes for every hollow (3:1). These nest boxes are to be installed within the possible relocation area. The unsalvageable hollows are to be relocated to the proposed relocation area and used as hollow log habitat.

d) All main stems of trees scheduled for removal to be reused as fauna habitat. Post-clearing, these sections of tree stems are to be relocated to the possible relocation area (Figure 8).

e) Any bush rock collected during the removal of vegetation or excavation is to be relocated to the possible relocation area (Figure 8).



The stockpiles of removed vegetation can be reused and are recommended to be so in the following methods:

f) The larger logs are to be split and used to form shelter sites for fauna within the possible relocation area (Figure 8).

g) 'Excess' tree trunks and large branches can be chipped to create relatively large wood chips. These wood chips can be used to mulch tree protection zones of the retained trees (Figure 6), under the instruction of an arborist.

h) Finer branches with leaves and fruit (when available) from indigenous species as well as shrubby material from indigenous species can be used for brush-matting.

i) Seeds of native vegetation may be collected for use in future bush regeneration and ecological restoration works to offset the impacts of the development. Collected seeds can be used to preserve genetic diversity when carrying out restoration works for areas of the Critically Endangered Ecological Community (CEEC) Lowland Grassy Woodland in the South East Corner Bioregion.

1.1.14. Secondary weeding and procedures for controlling the spread and introduction of invasive weeds and pathogens into the site and throughout the locality.

The introduction of invasive weeds are key threatening processes listed under the Schedule 4 of the Biodiversity Conservation Act 2016. A key threatening process is listed as a key threatening process if, in the opinion of the Scientific Committee –

a) *It adversely affects threatened species or ecological communities, or*

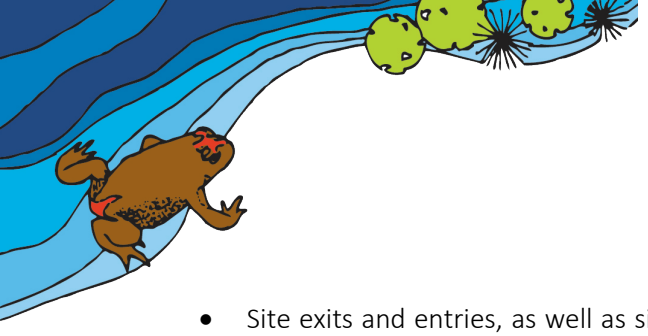
b) *It could cause species or ecological communities that are not threatened to become threatened.*

Existing Key Threatening Processes on site relating to invasive weeds include the sparse presence of:

- Blackberry - *Rubus anglocandicans*
- Fireweed - *Senecio madagascariensis*
- African Olive - *Olea europaea* subsp. *cuspidata*
- Purple top - *Verbena bonariensis*
- Plantain - *Plantago lanceolata*
- Sweet Briar – *Rosa rubiginosa*
- Mickey Mouse Plant – *Ochna serrulata*

While these weeds are already present on site, steps can be taken to reduce the spread of these species throughout the locality and into other remnant woodland patches. The following methods and procedures are recommended to reduce the spread of invasive weeds into the site and throughout the locality:

- Following the *NSW Department of Primary Industries Vehicle and Machinery Decontamination Checklist* (see Appendix 2)
- In line with the *NSW Department of Primary Industries Guide – Decontamination of vehicles and equipment v2.,* vehicles and equipment are required to have been cleaned and decontaminated prior to arrive onsite.



- Site exits and entries, as well as site sediment boundaries and site fence lines, are to be monitored for the emergence and presence of invasive weeds. Weed establishment within these areas are indicators of inadequate weed control and vehicle hygiene protocols. If weeds are detected and beginning to establish within these areas, hygiene protocols and procedures are to be upgraded and incorporate increased vehicle and equipment hygiene standards.
- Set up a boot and footwear cleaning station at the exit of the site to remove weed seeds and prevent the spread of weeds into local woodlands.

Note: These protocols may be included into the toolbox talk and site inductions, as well as briefing drivers on all vehicle hygiene and decontamination requirements.

Secondary weeding as outlined in Appendix 1 is to be undertaken within Area 1-6 that have undergone primary weeding. These areas are to be inspected and any exotic, noxious and non-local vegetation that has re-emerged be removed using appropriate methods. Refer to Appendix 1 for further recommendations on continued weed maintenance.

Schedule of work (Fauna Management)

Time frame	Task	Responsibility	Indicators	Performance target
Year 1 **Week 1**	Tree protection fencing is to be installed at the boundary of disturbance and at the extent of TPZ of trees to be protected. Install fauna nest boxes as appropriate.	Certified contractor	Fence installed and signs attached. Fauna nest boxes installed.	Trees protected. Alternate habitat available for fauna
Week 2-4	Pre-clearance fauna survey to relocate fauna. Relocate habitat trees last	Certified contractor	Fauna relocation as per best practice.	No fauna harmed during clearing works.
Weeks 4 - 5	Dam Dewatering Fill and level farm dam.	Certified contractor	Fauna relocation as per best practice.	No fauna harmed during dewatering works.
Weeks 6+	Install remaining nest boxes.	Certified contractor	Mitigation of loss of habitat features	No net loss of hollows. Hollows replaced at a ratio of 3 nest boxes to 1 natural hollow.
End Year 1	Inspections of nest box integrity Final Report – Y1: Preparation of report	Ecologist/ Certified contractor	Assessment of integrity of nest boxes. Any damaged nest boxes replaced. Reporting of nest box conditions and fauna activity data.	Presentation of report to stakeholders
End Year 2	Inspections of nest box integrity Final Report – Y2: Preparation of report	Ecologist/ Certified contractor	Assessment of integrity of nest boxes. Any damaged nest boxes replaced. Reporting of nest box conditions and fauna activity data.	Presentation of report to stakeholders
End Year 3	Inspections of nest box integrity Final Report – Y3: Preparation of report	Ecologist/ Certified contractor	Assessment of integrity of nest boxes. Any damaged nest boxes replaced. Reporting of nest box conditions and fauna activity data.	Presentation of report to stakeholders

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Appendix 1. Vegetation Management Plan

Vegetation Management Plan

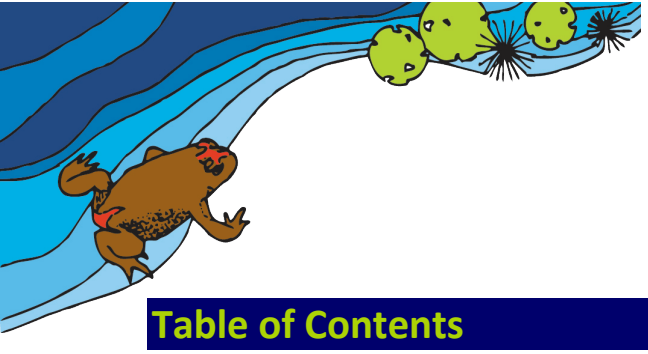
For

Eurobodalla Regional Hospital, Moruya NSW 2537

Lot 2, DP 1281576

Proposed Regional Hospital

Date	03 October 2024
Report No:	AE24-Moruya VMP-ISS-2
Prepared for:	Tim MacLeod of Multiplex
Prepared by:	Abel Ecology



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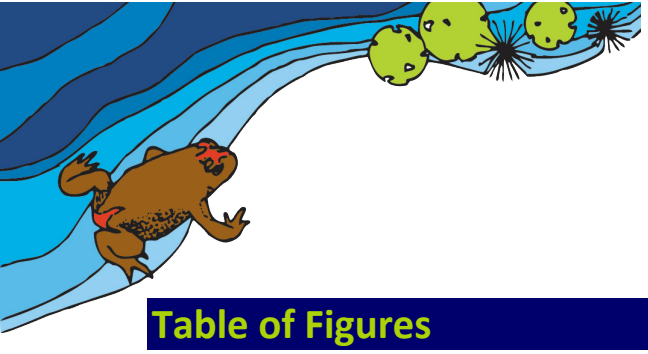

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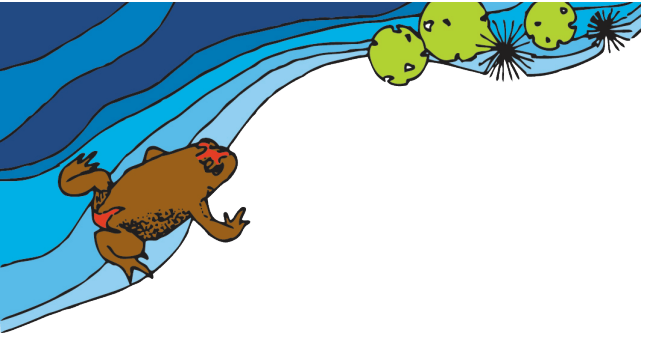
List of Abbreviations

APZ	Asset Protection Zone
d.b.h.	Diameter at breast height (~1.4 metres)
EEC	Endangered Ecological Community
EPZ	Environmental Protection Zone
ESD	Ecologically Sustainable Development
HTW	High Threat Weed
IPA	Inner Protection Area
LEP	Local Environmental Plan
LGA	Local Government Area
LGW	Lowlands Grassy Woodland in the South East Corner Bioregion
NP	National Park
NR	Nature Reserve
OPA	Outer Protection Area
PDA	Principal Development Area

Note regarding maps in this report

The diagrams/site maps used in this report have been supplied by and are used with the permission of the client.

With regard to maps provided by the Land Information Centre, Topographic maps used with the permission of © Land and Property Information, NSW.



Disclaimer

This report has been prepared in accordance with the scope of services described in agreement between Abel Ecology and the Client.

In preparing this report, Abel Ecology has relied upon data, surveys and site inspection results taken at or under the particular time and or conditions specified herein. Abel Ecology has also relied on certain verbal information and documentation provided by the Client and/or third parties, but did not attempt to independently verify the accuracy or completeness of that information. To the extent that the conclusions and recommendations in this report are based in whole or in part on such information, they are contingent on its validity. Abel Ecology assumes no responsibility for any consequences arising from any information or condition that was concealed, withheld, misrepresented, or otherwise not fully disclosed or available to Abel Ecology.

The findings contained in this report are the result of discrete/specific methods used in accordance with normal practices and standards. To the best of our knowledge, they represent a reasonable interpretation of the general condition of the site in question. Under no circumstances, however, can it be considered that these findings represent the actual state of the site/sites at all points.

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Furthermore, this report has been prepared solely for use by the Client. Abel Ecology accepts no responsibility for its use by other parties.

I confirm that I have read the NSW Land and Environment Court Practice Note commencing on 14 May 2007, Division 2, Part 31 of the Uniform Civil Procedure Rules 2005 and the Expert Witness Code of Conduct in Schedule 7 to the Uniform Civil Procedure Rules 2005. I have prepared this advice in accordance with the requirements of the Practice Note and Code of Conduct and believe this report is consistent with the requirements of the Practice Note and the Code of Conduct. I agree to be bound by the Practice Note and Code of Conduct.

Document History

Report	Version	Prepared by	Technical Review by	Proofread by	Submission	
					Method	Date
Report	Draft A	Mark Sherring Nicholas Tong Andy Araya			Aconex	14 June 2024
Report	Issue 1	Mark Sherring Nicholas Tong			Aconex	18 June 2024
Report	Issue 2	Nicholas Tong Andy Araya		Corinna Campbell	Aconex	05 September 2024
Report	Issue 3	Nicholas Tong Andy Araya		Janelle Merry	Aconex	03 October 2024

VMP Figures

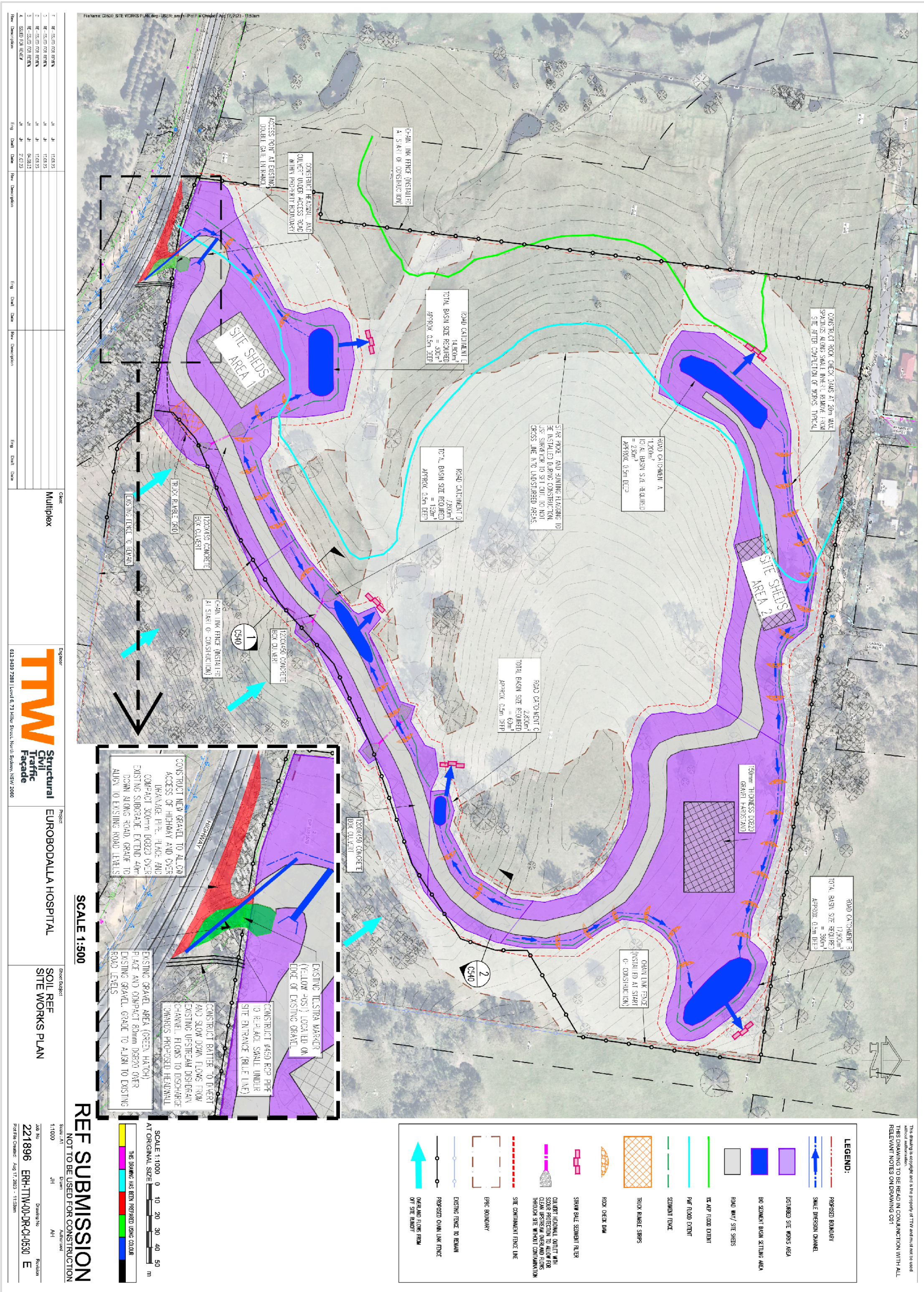


Figure 12. Soil Conservation Proposal Diagram

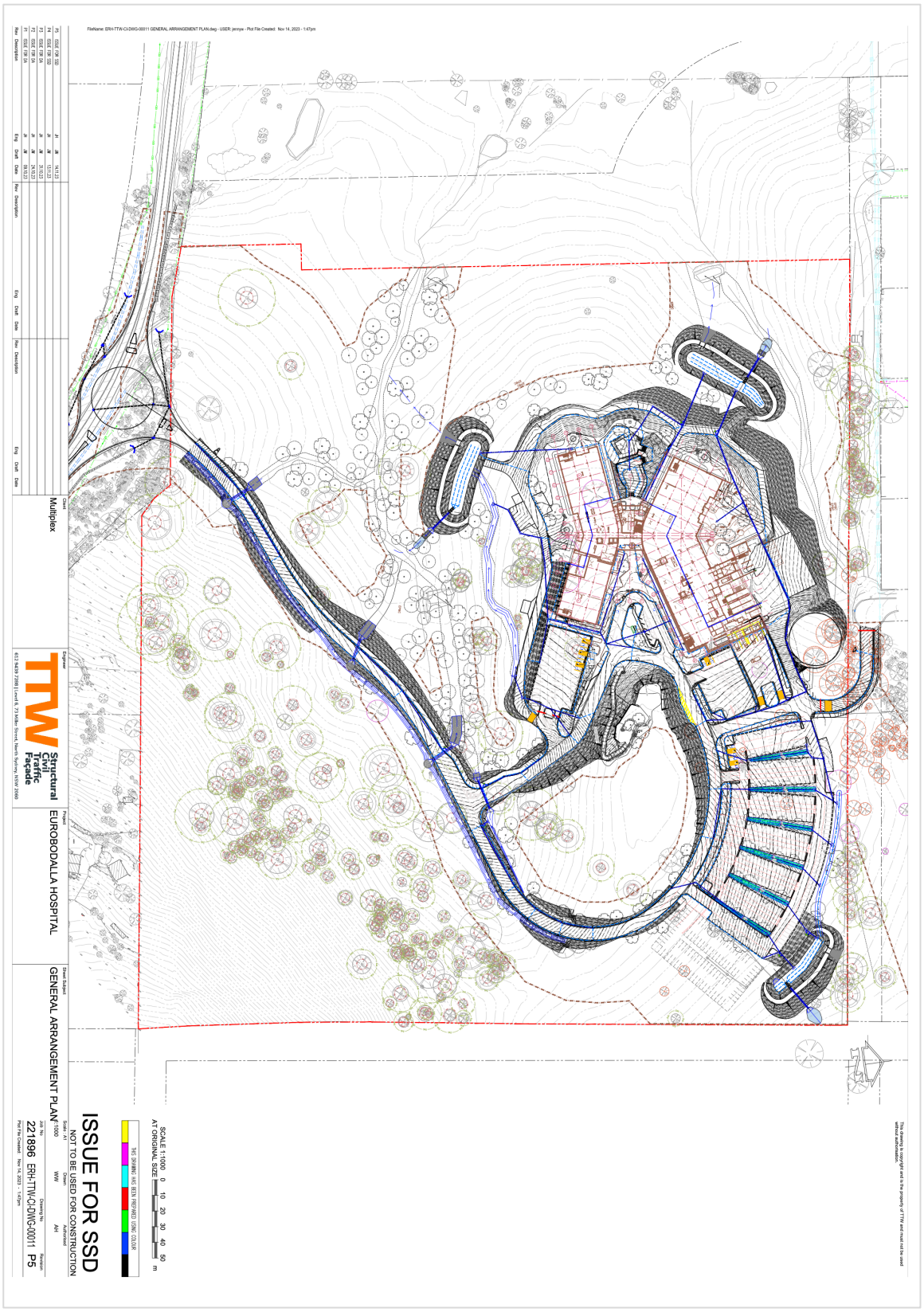


Figure 13. Main Works Proposal Diagram

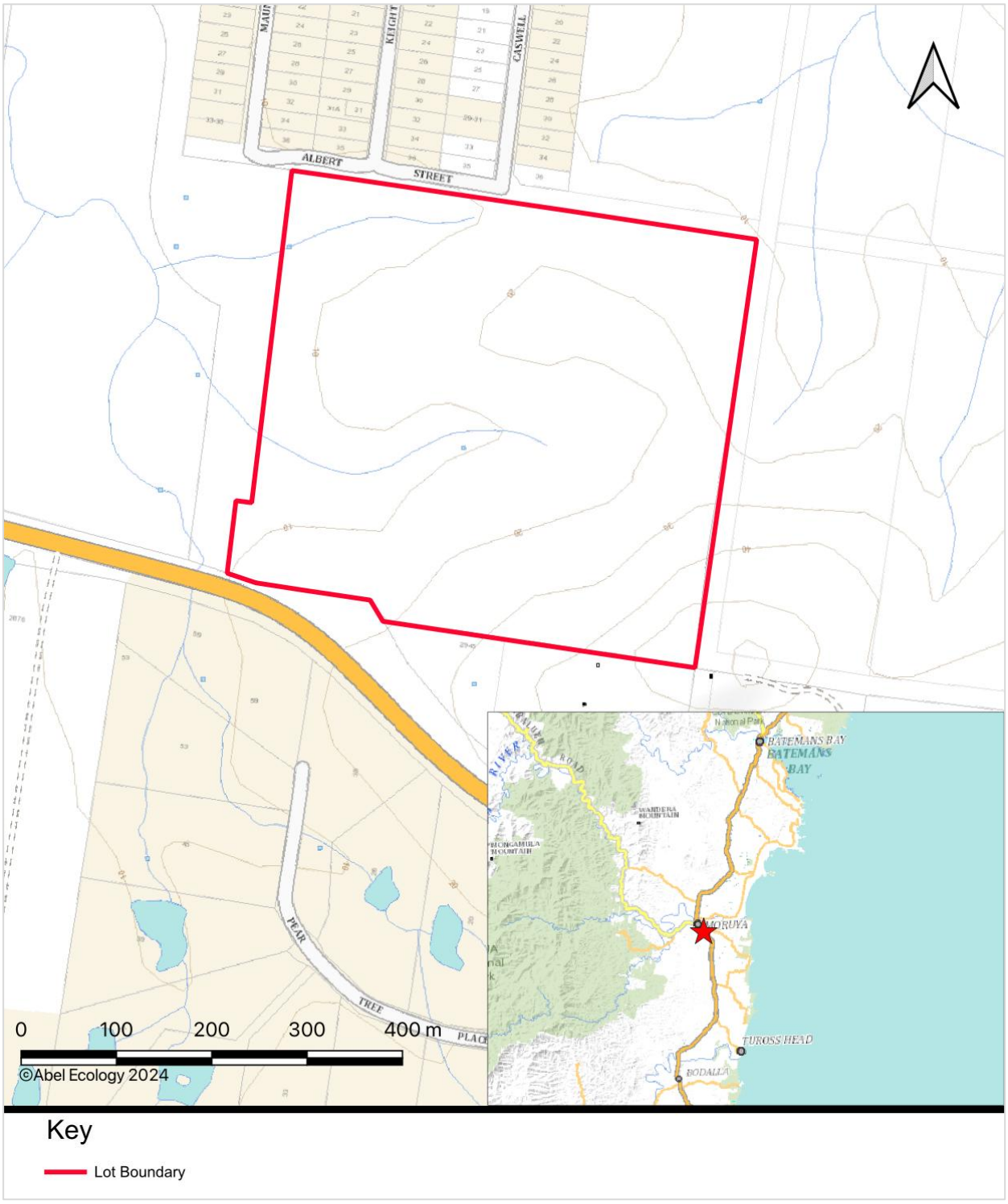


Figure 14. Locality map for Eurobodalla Regional Hospital

Source: Land and property Information NSW. Spatial Information eXchange (SIX) website 2016.

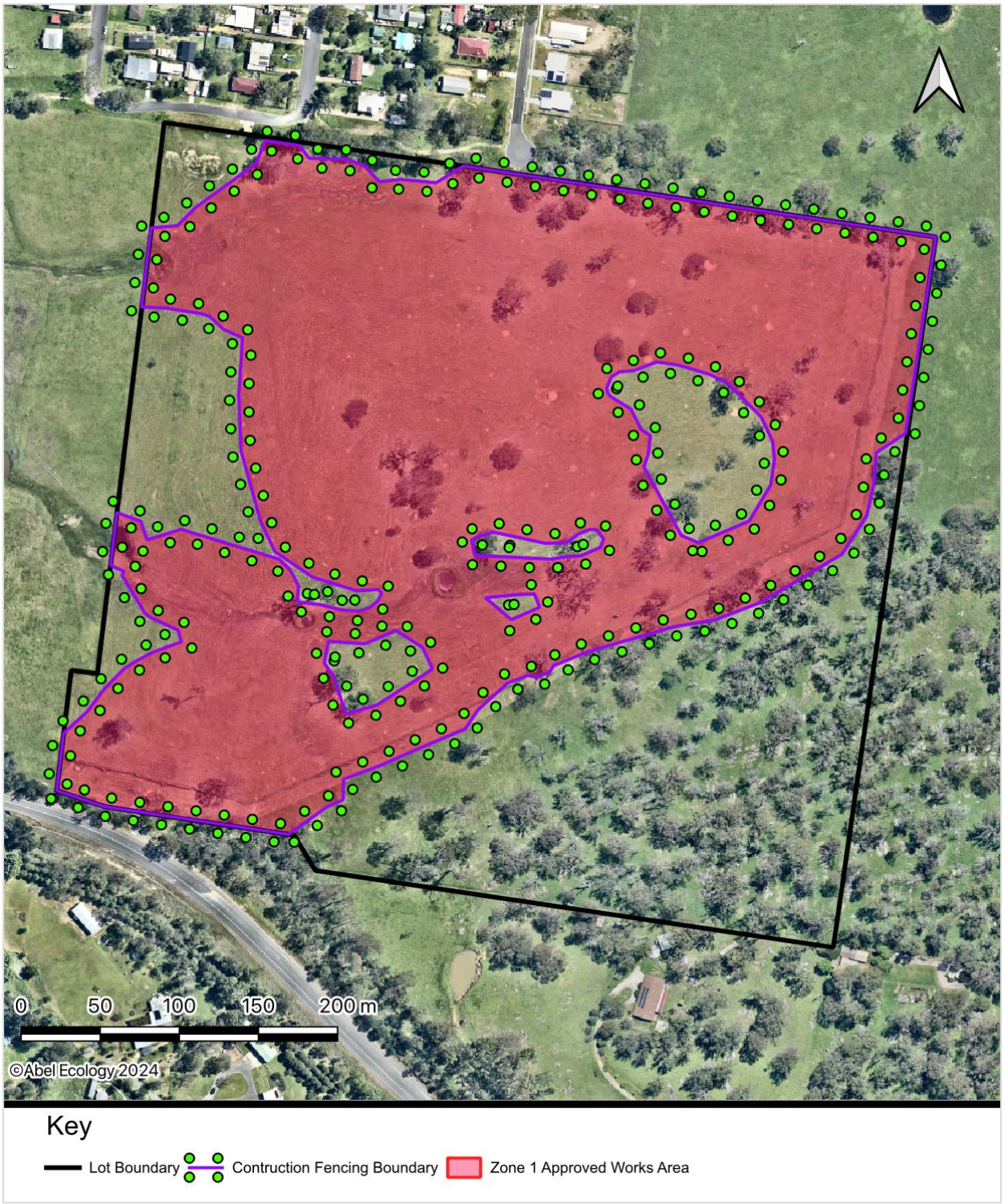


Figure 15. Impacts of the Whole Proposal

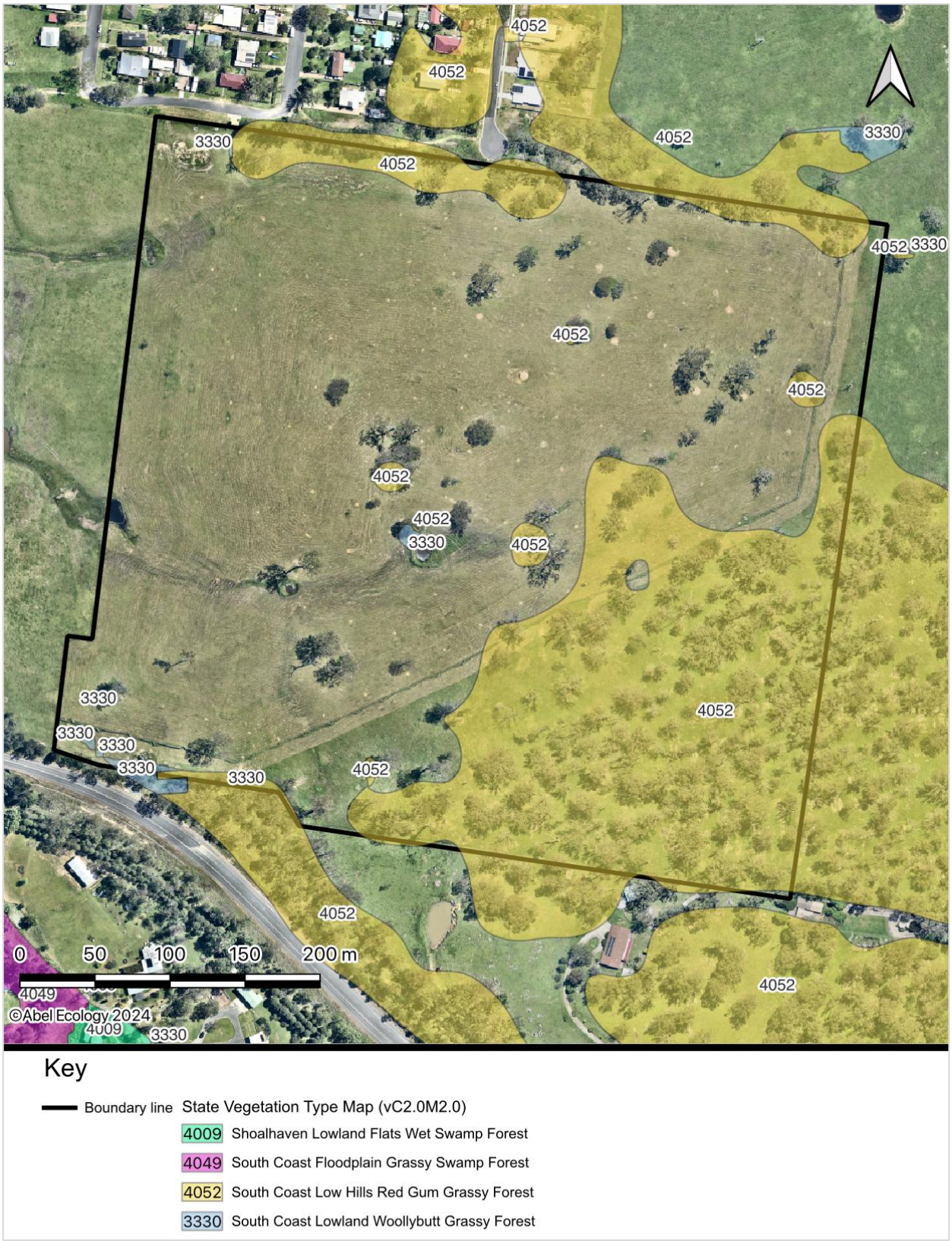


Figure 16. Site vegetation map

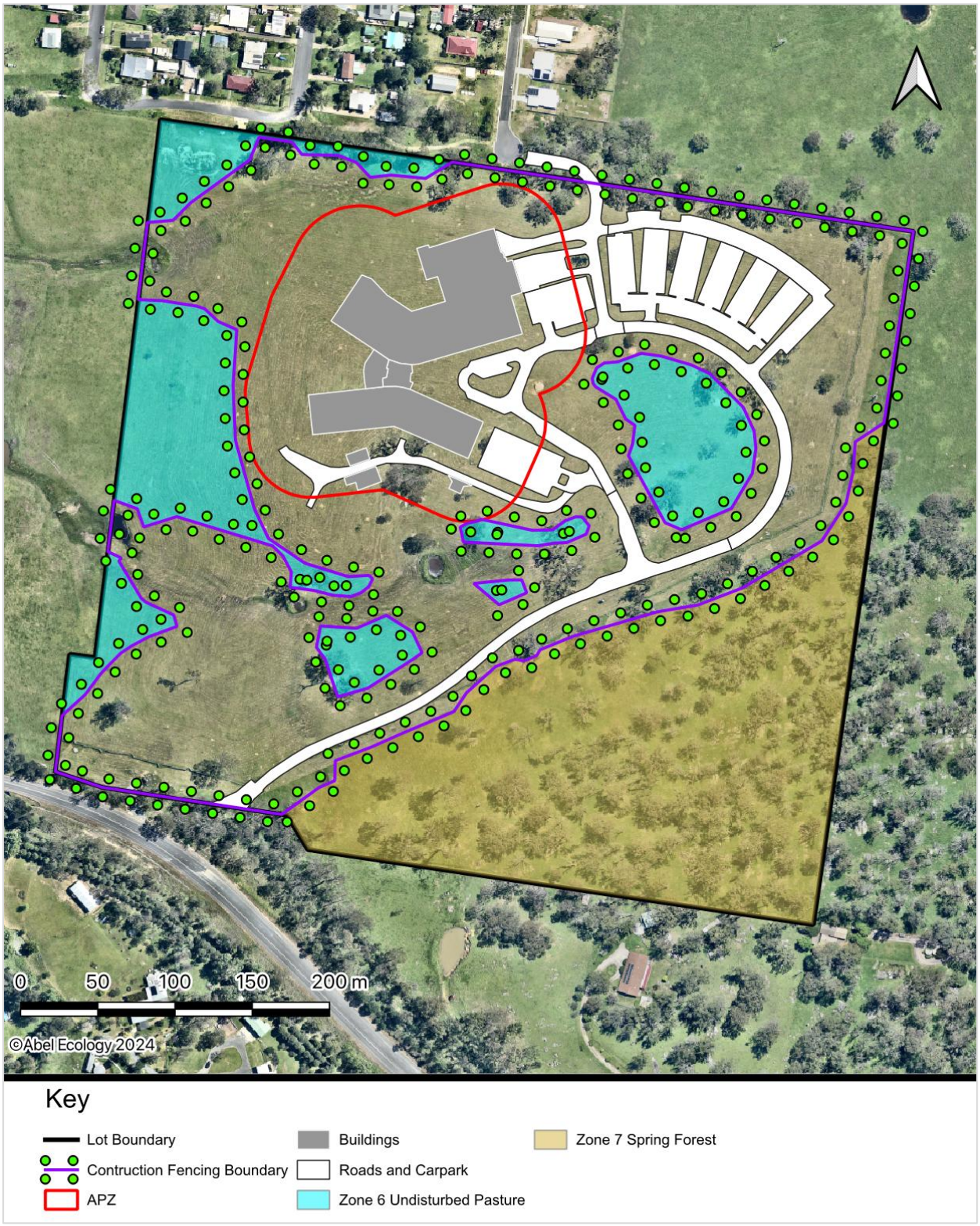


Figure 17. Undisturbed Vegetation Zone map

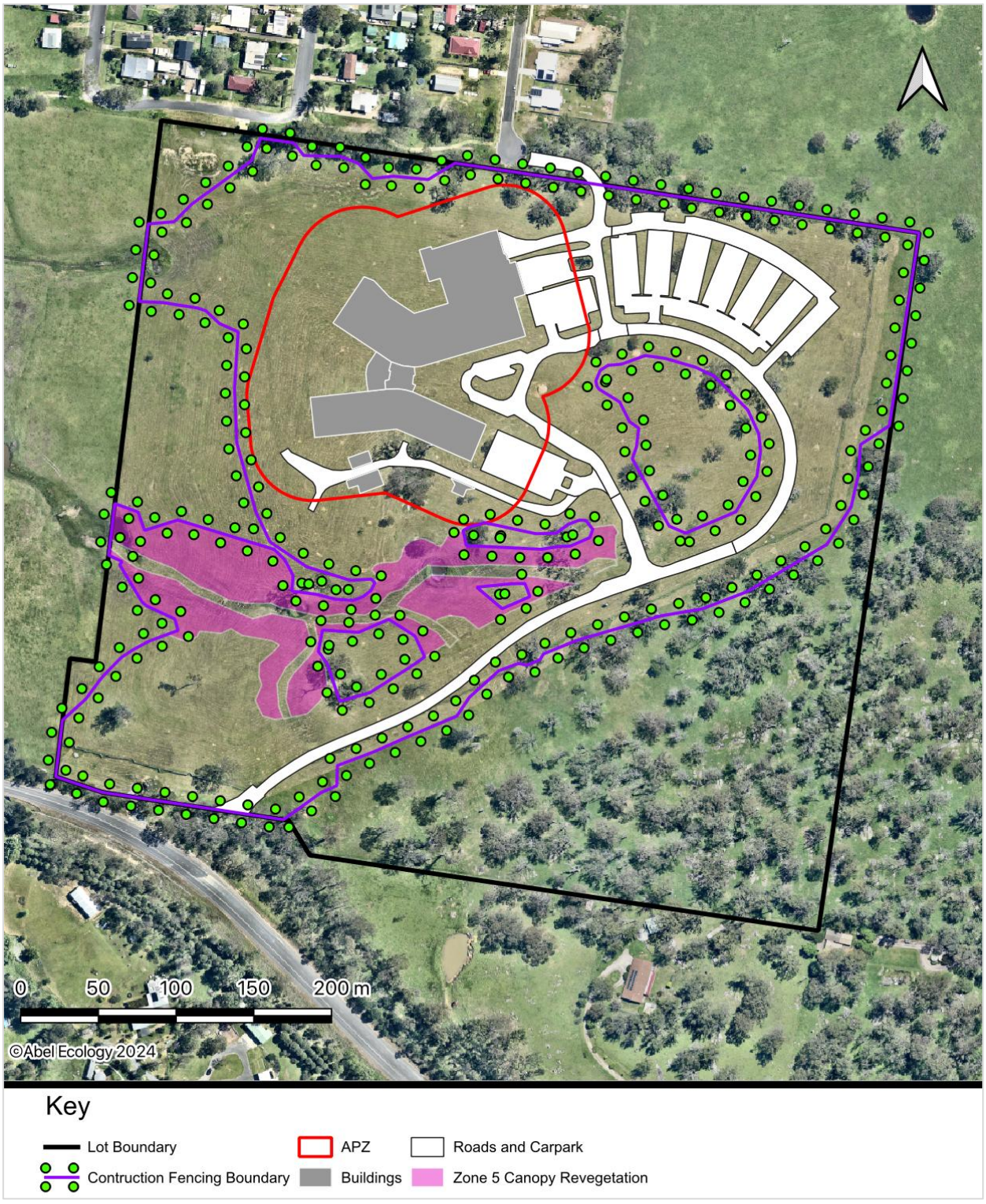
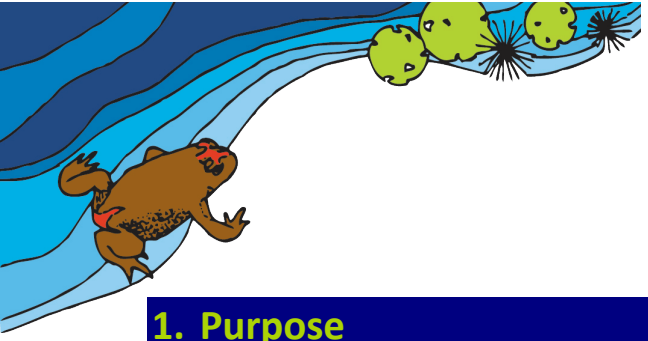


Figure 18. Canopy Revegetation Zone map

Figure 19. Post Construction Zone map



1. Purpose

1.1. Purpose and objectives

The purpose of the VMP is to manage vegetation across the site, in compliance with DCP 2015 (LEP 2015), and with Planning for Bushfire Protection 2019 (PBP 2019) guidelines. This will include management of retained bushland, weeds during construction, landscaping, and the Asset Protection Zone (APZ).

[The S88E instrument currently applied to the land will be extinguished and replaced by this Plan upon occupancy].

Conditions of Consent Soil Conservation:

6.3 Prior to Commencement of works, a Vegetation and Fauna Management Plan must be prepared by a suitably qualified ecologist and implemented throughout the course of the project.

6.9 All landscaping or gardening must use species that are native to the Grassy Woodland in the Southeast Corner Bioregion vegetation community.

Conditions of Consent Main Works:

B19 (d) incorporate a Vegetation Management Plan, which must be prepared in consultation with BCD, and include documentary evidence on how feedback has been considered and whether any changes have been made in response to this feedback. The plan must:

(i) detail measures to be used for the relocation, installation and management of tree hollows; and

(ii) inform management of retained site vegetation, Bush Fire Asset Protection Zone maintenance, and regeneration of the 'Spring Forest' in the southeast corner of the site.

The objectives of the VMP are to:

a) Conserve and restore natural vegetation and habitat features,

b) Minimise impacts to retained vegetation,

c) Maintain erosion control measures as required,

d) Implement weed control, including for 'edge effects',

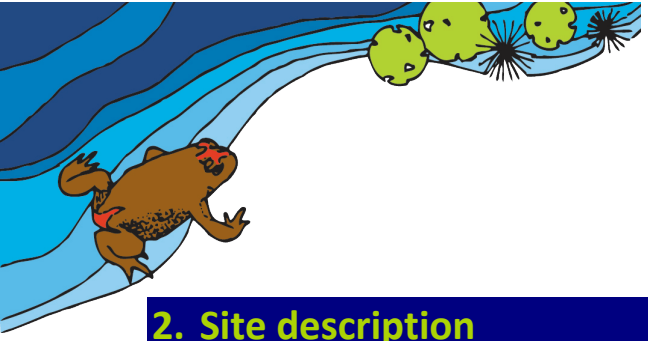
e) Install and maintain APZ and landscape requirements,

f) Maintain monitoring for effective implementation of the Plan.

Particular strategies for the site include:

- recommendations for ongoing management (VMP Section 6)
- weed removal (VMP Section 8)
- landscape plantings (including Asset Protection Zone) (VMP Sections 9 & 10),
- erosion control.

This VMP may also be used to determine priorities for resource use and funding, to guide the planning of works, and for supervision of vegetation clearance.



2. Site description

1.1. .Land to which the Plan applies

This Plan applies to Lot 2 DP 1281576, addressed Princes Highway Moruya, NSW (Figure 1).

The site is irregularly shaped, Zoned R2, Low Density Residential and consists of approximately 22 ha.

To the west of the site is Moruya TAFE, and to the north is a small residential subdivision called Mynora Estate.

The site is bordered by the Princess Highway and RU1: Primary Production to the south.

1.2. Management authority, tenure and ownership

For the purposes of this Plan, the management authority is the owner.

1.3. Site description

For the purpose of this Plan, the site (Figure 2) is defined by the property boundaries of Lot 2. The site has access to the Princess Highway to the southwest via an existing gravel access track.

The site is at an elevation of approximately 5-24 m above sea level and is gently sloping to the east. Stormwater management is by overland flow.

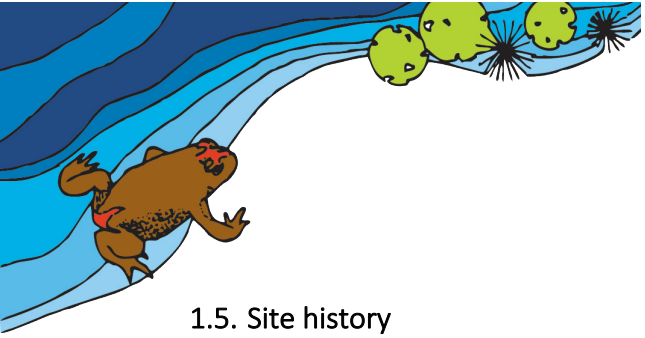
The site is currently undeveloped pasture with some remnant bushland. At site inspection, a number of dams were present within the approved works area.

1.4. Natural resource information

The vegetation has been assessed for 140 m in all directions from the proposal, according to PBP 2019 Appendix 1 section A1.2 and the classification system of Keith (2004).

The vegetation in all directions surrounding the proposed development is pasture with scattered paddock trees, consisting predominantly of *Eucalyptus tereticornis*. The majority of the lot as a whole contains similar vegetation. Remnant forest is present in the south east corner of the lot, consistent with Lowland Grassy Woodland in the South East Corner Bioregion.

The predominant vegetation has therefore been classified as Forest to the north, east, south and west of the proposed development for the purposes of this assessment.



1.5. Site history

The site was naturally occurring native vegetation in 1943 and remained undisturbed until 2006. Several structures were erected on site between 2006 and 2021 but have since been demolished and removed.

1.6. Proposed development

The proposal is for a New Eurobodalla Regional Hospital, including:

a) Site establishment and preparation, including bulk earthworks, tree removal, environmental clearing and cut and fill.

b) Construction and operation of a three-storey hospital with four wings, which includes the following departments:

   a. - Emergency Department (including flexible mental health beds).
   b. - Medical Imaging.
   c. - Operating Theatres.
   d. - Intensive Care Unit.
   e. - Pathology.
   f. - Pharmacy.
   g. - Medical and surgical in-patient units.
   h. - Rehabilitation and Palliative Care in-patient units.
   i. - Women's Health and Paediatrics.
   j. - Ambulatory Care for community outpatient services.
   k. - Administration including Education and Training.
   l. - Back of House including Mortuary.

c) Internal road network and access from Princes Highway.

d) Secondary road access (controlled access for Emergency vehicles only) from Caswell Street.

e) Car parking.

f) Loading dock.

g) Helipad.

h) Ancillary landscaping including the Walawanni, Meeting Place and Healing Place.

The proposal will require clearing native and exotic plant species.

3. Management zones

Seven management zones have been identified across the 2 stages of development (construction and operation) for the management of the land (see Figure 1).

Asset Protection Zone (Figures 3, 5, 6, 7)

An asset protection zone for Eurobodalla Regional Hospital is 40-45 m consistent with BAL – 12.5 (AE23 2381 REP ISS 9 27NOV23). The Asset protection Zone is not included as a separate Zone, but where other Zones are included within the APZ they are to be maintained to Inner Protection Area (IPA) condition as per Appendix 4 of PBP 2019 and the RFS document *Standards for Asset Protection Zones* (VMP Section 9 and see www.rfs.nsw.gov.au). Individual tree canopies must have at least two (2) metre gaps between them, but close standing trees are allowed to form clumps as long as the tree canopy cover threshold is not exceeded for IPA condition.

3.1. Zone 1 Approved Disturbance Footprint (Construction)

Approved disturbance footprint includes the footprint of building development, storage and drainage of effluent on site, and proposed construction of driveway (Figure 14).

3.2. Zone 2 Hard Landscaping (Operation)

The hard landscaping includes formal lawns, formal gardens and informal gardens around the buildings and carparks (Figure 19).

3.3. Zone 3 Soft Landscaping (Operation)

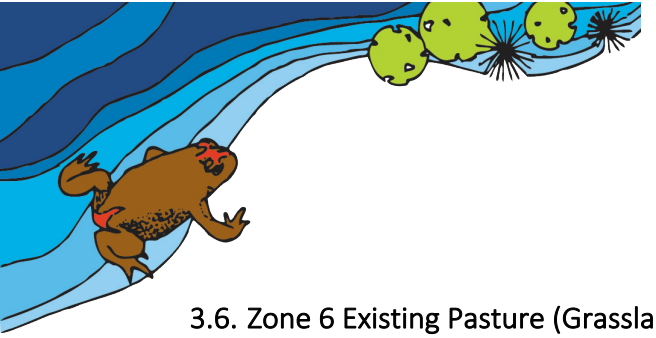
Zone 3 includes the remainder of the construction footprint which is not included in Zones 1, 2 or 5. Zone 3 is predominantly pasture that will be disturbed during construction activity and are to be reconstructed as Derived Native Grassland consistent with and Lowland Grassy Woodland in the South East Corner Bioregion (Figure 19).

3.4. Zone 4 Stormwater Basins and Swales (Operation)

Zone 4 includes the semi-aquatic parts of the site which will undergo infrequent inundation with stormwater during rain events. Management requirements for Basins and swales are outlined in the 'Stormwater Management Plan' (Figure 19).

3.5. Zone 5 Canopy Revegetation (Operation)

Zone 5 comprises an area of land around the southern stormwater swale that will undergo a canopy replenishment planting regime to offset the removal of remnant trees in the rest of the development (Figure 18).

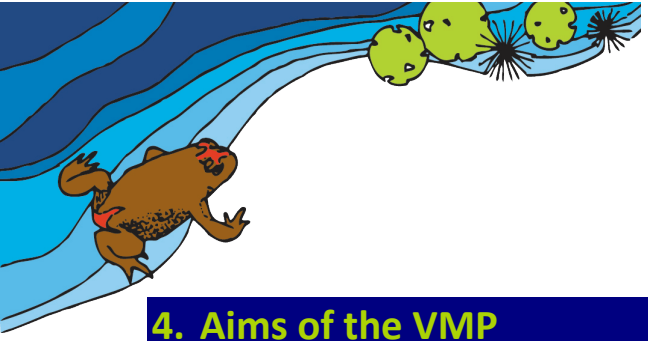


3.6. Zone 6 Existing Pasture (Grassland) (Construction and Operation)

This zone is the remaining pasture that is outside of the development footprint and not included within the 'Spring Forest'. This zone is a mixture of native and exotic ground covers (Figure 17).

3.7. Zone 7 Spring Forest (Construction and Operation)

Spring Forest is the name given to the remnant Lowland Grassy Woodland in the South East Corner Bioregion which occurs in the south east corner of the property (Figure 17).



4. Aims of the VMP

Conditions of Consent Soil Conservation:

6.3 Prior to Commencement of works, a Vegetation and Fauna Management Plan must be prepared by a suitably qualified ecologist and implemented throughout the course of the project.

6.9 All landscaping or gardening must use species that are native to the Grassy Woodland in the Southeast Corner Bioregion vegetation community.

Conditions of Consent Main Works:

B19 (d) incorporate a Vegetation Management Plan, which must be prepared in consultation with BCD, and include documentary evidence on how feedback has been considered and whether any changes have been made in response to this feedback. The plan must:

(i) detail measures to be used for the relocation, installation and management of tree hollows; and

(ii) inform management of retained site vegetation, Bush Fire Asset Protection Zone maintenance, and regeneration of the 'Spring Forest' in the southeast corner of the site.

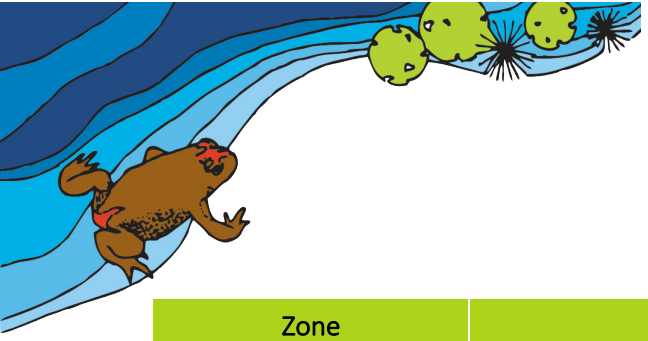
Requirements under any of the above policies or plans made under the *Environmental Planning and Assessment Act 1979,* the *Biodiversity Species Conservation Act 1995* are independent of, and apply in addition to, the requirements specified by this Management Plan.

The current and target condition of management zones is identified in

Table 8 below.

Table 8. Current and target condition

Zone	Current condition	Target condition
Asset Protection Zone	Existing Pasture with Scattered Paddock Trees	Formal and informal landscaping consistent with Grassy Woodland in the Southeast Corner Bioregion vegetation community and maintained to Inner Protection Area condition as per Appendix 4 of PBP 2019 and the RFS document Standards for Asset Protection Zones (Appendix 3 and see www.rfs.nsw.gov.au).
Approved Disturbance Footprint	Existing Pasture with Scattered Paddock Trees	Weed controlled to 5% coverage



Zone	Current condition	Target condition
Hard Landscaping	Existing Pasture with Scattered Paddock Trees	Weeds controlled to 5% coverage, maintain planting against natural attrition.
Soft Landscaping	Existing Pasture with Scattered Paddock Trees	Control HTW, maintain plantings against natural attrition. Maintained to Standards for Asset Protection Zones (Appendix 3 and see www.rfs.nsw.gov.au).
Stormwater Basins and Swales	Existing Pasture with Scattered Paddock Trees	Targeted ongoing control of weeds, maintain planting against natural attrition.
Canopy Revegetation	Existing Pasture with Scattered Paddock Trees	Revegetated with native plantings consistent with species included in Lowlands Grassy Woodland and in compliance with Site Landscape Plan. Weeds control to 5% coverage, maintain planting against natural attrition.
Existing Pasture (Grassland)	Existing Pasture with Scattered Paddock Trees	Control HTW, Maintenance mowing not required. Weeds control to 5% coverage
'Spring Forest'	Existing Lowlands Grassy Woodland	Weeds control to 5% coverage

5. Management objectives and performance criteria

The primary objective of the Plan is to manage the land in a way that protects its natural values. The main purpose of management is therefore to protect and maintain the natural ecosystems present on the land. In addition, landscaping is to be managed according to IPA (APZ) requirements for the development (per RFS stipulation).

The Tree Schedule indicates trees to be retained, removed or relocated (refer overarching BMP).

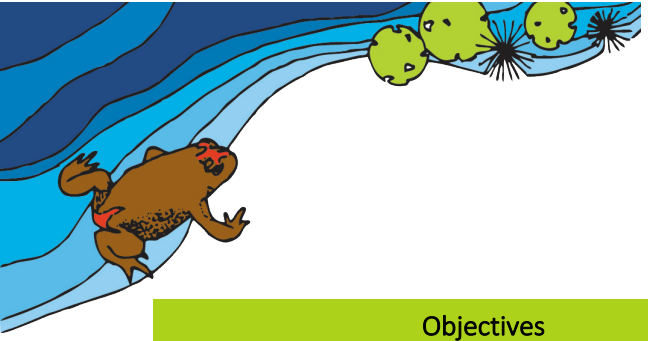
The current and target conditions of Management Zones are identified in

Table 8.

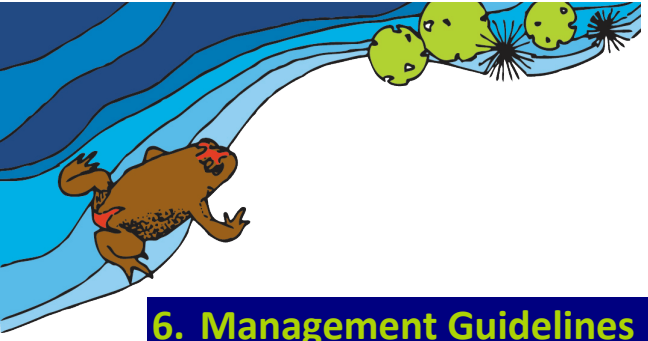
Management objectives and performance criteria are identified in Table 9.

Table 9. Objectives and performance criteria

Objectives	Performance Criteria
To establish an environmentally sensitive IPA (APZ) by the selective removal of vegetation components in a manner that is acceptable to the consent authority (consistent with the Consent and the principles of Planning for Bushfire Protection 2019);	Per RFS stipulation, IPA conditions will apply to SGTF. For the onsite forest, this will also mean the retention of natural vegetation in preference against weeds – vegetation can then be maintained to IPA conditions. Trees retained will form part of 'island' vegetation, consistent with IPA principles.
To conserve or select appropriate landscape species and on-site tree management;	Suitable species are to be installed and maintained for landscaping, per Conditions of Consent and RFS guidelines. A list of local plant species is contained in Appendix 3 - Recommended planting list.
To limit impacts on threatened, endangered, vulnerable or a locally significant flora and fauna species or ecological communities by their conservation, provide adequate native vegetation buffers and ameliorative measures;	The development footprint has been designed to minimise impacts to onsite Lowlands Grassy Woodland. Vegetation of the depression on the north end of the swale is to be retained and monitored for weeds
To retain and restore vegetation and trees within mapped or otherwise identified protected areas;	Retained Lowlands Grassy Woodland stands in the south east and trees on the northern boundary are protected as part of the Consent. As far as possible, landscaping within/adjacent to the PDA is to incorporate species consistent with Lowlands Grassy Woodland.



Objectives	Performance Criteria
To select and maintain vegetation that stabilises soils or that absorbs run-off from accumulation points on the site, or that contributes to the optimum and effective functioning of Water Sensitive Urban Design (WSUD) stormwater management devices;	The reformed swales across the property will continue to function as an accumulation/direction feature on the site. Stormwater management is otherwise integrated to the development.
To retain or reinstate vegetation and trees that contribute to wildlife corridors or provide habitat for native fauna;	Retained 'Spring Forest' Lowlands Grassy Woodland in the south east corner will continue to provide native fauna habitat and (fragmented) wildlife corridor connectivity with adjacent offsite canopy. Remnant Trees on the northern boundary will continue to provide habitat and connectivity. Revegetation of the canopy along the southern drainage swale will increase the connectivity through the site.
To restore degraded areas resulting from unauthorised clearing, stormwater erosion, sediment deposition or other degrading factors;	All restoration of degraded areas in to be consistent with Lowlands Grassy Woodland.
To remove noxious and environmental weeds in a manner that is environmentally sustainable.	All weeds are to be targeted for ongoing removal in Lowlands Grassy Woodland and throughout the site. Priority Weeds and Weeds of National Significance are to be prioritised.



6. Management Guidelines

Grazing - the grazing of non-native animals (such as horses, sheep or goats) must not be carried out on the land.

Protection of trees - measures are to be taken to prevent damage and disturbance to tree roots by cutting of roots, loss of water, soil compaction or build up of soil.

Tree planting - new tree plantings are to be locally indigenous species to link, enhance and complement local native vegetation.

Clearing - further clearing of bushland on the land must not be carried out.

Restoration - following construction, all areas immediately adjoining natural areas are to be restored, by reinstating the plant species, structure and dynamics of the pre-existing indigenous plant communities. Strategies are to be adopted which maximise the natural recovery of those plant communities. Restoration is to be carried out in a manner that minimises weed invasion of nearby native vegetation.

Earthworks - are to be undertaken in a manner that minimises the need for rehabilitation.

Filling - fill material obtained from other sites shall not be brought onto the land. Off-site soil material may only be used where it has no weed content.

Stockpiling of materials - works are to be completed in stages (clearing, topsoil stripping, relocation of topsoil, mulching, planting, etc.) so as to follow the principle of isolating stockpiles of different materials to prevent contamination.

Pollution - pollution of estuaries is to be minimised by use of alternative disposal methods or high-level treatment of wastes.

Nutrients leached from building materials - materials (including concrete, gravel, topsoil, etc.) must be stockpiled in such a way as to prevent nutrients from leaching into watercourses or into groundwater systems.

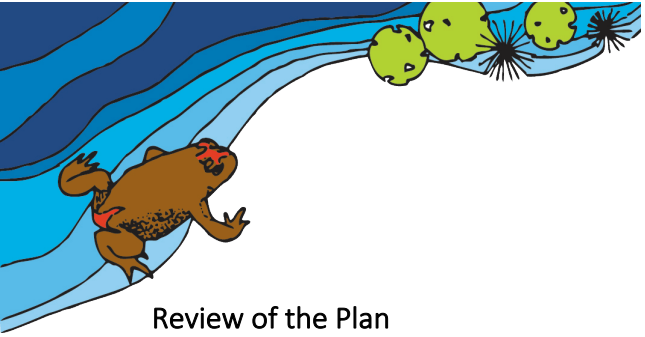
Irrigation - irrigation is to be minimised on any lawns or mowed areas to avoid runoff.

Rubbish dumping (including garden waste) - is not permitted within natural areas. Any lawn clippings are to be disposed of off-site or in a manner that does not affect natural vegetation, or encourage the spread of weeds.

Emergencies - this Plan authorises any necessary activities to be carried out during declared bushfire emergencies. Following the carrying out of any works, periodic monitoring is to be undertaken, and rehabilitation works undertaken if necessary.

Primary planting list - contains the native species consistent with '*Lowland Grassy Woodland in the South East Corner Bioregion'* that were present on-site when surveyed (BAM plots).

Secondary planting list - the remaining plants listed for the '*Lowland Grassy Woodland in the South East Corner Bioregion'* community, not present at survey.



Review of the Plan

This Plan applies for a period of five(5) years from the commencement of site works, after which period the Plan shall lapse.

The management authority is to commence a review of the Plan at least one(1) year prior to the date on which it lapses. The review is to include all relevant background information, including updated ecological information and details of additional proposed works.

Following the review, the management authority is to arrange for an updated Plan to be approved of by the State government prior to the date on which the Plan lapses.

7. Schedule of work

Works are divided into 3 main categories logistically:

1 – Construction

Initial establishment phase, construction. Vegetation removal/management; weed control; erosion control.

2 – Post-construction (Operation)

Asset Protection Zone (APZ); Landscaping of the PDA (building footprint); 'Replacement' plantings (e.g. south-west quarter, drainage lines)

3 – Independent (Construction and Operation)

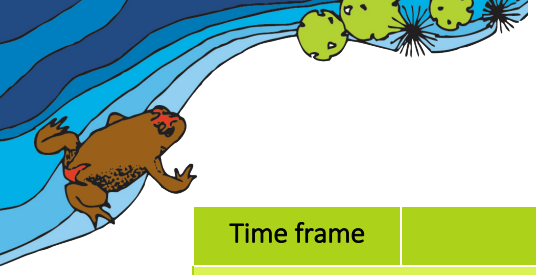
'Spring Forest' – South-east hillside; weeding can be commenced from the project inception.

Remnant trees on north boundary (west of Caswell Street); designate as a 'no-go' zone for vehicle traffic.

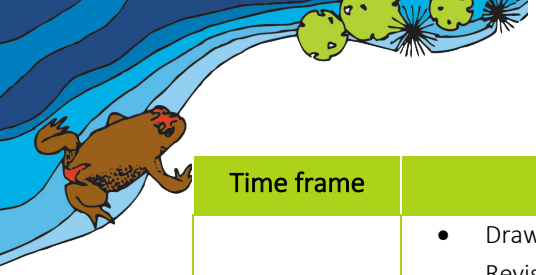
Zones

Several Zones apply across the site. Various Zones will be relevant at different stages of the project. Refer to relevant Figures for the site.

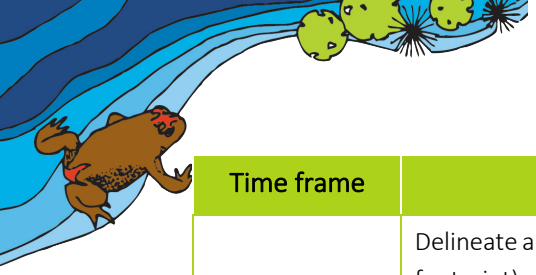
Zone 1 – Approved Works Area	Area of disturbance (Figure 15)
Zone 2 – Hard landscape	Associated with the PDA (buildings/infrastructure) (Figure 19)
Zone 3 – Soft landscape	Lowland Grassy Woodland (Figure 19)
Zone 4 – Basins & Swales	Stormwater retention basins (Stormwater Management Plan) (Figure 19)
Zone 5 – Canopy revegetation	Southern drainage lines (dam, associated slopes) (Figure 18)
Zone 6 – Pasture (grassland)	Existing pasture (grassland) external to the development (Figure 17)
Zone 7 – 'Spring Forest'	Hillside on south-east quarter of the site (Figure 17)



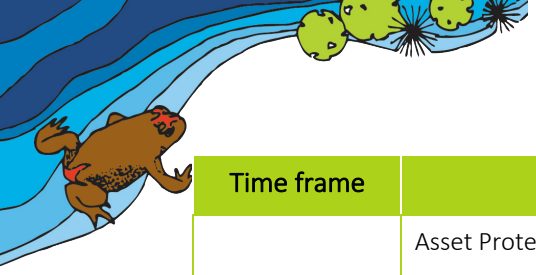
Time frame	Task	Responsibility	Indicators	Performance target
CONSTRUCTION PHASE + INDEPENDENT				
Year 1 Weeks 1 - 4	Zone 1 – Approved Works Area Delineate work site boundary, with particular attention to: • Works compound/Staging area on south-west corner • 'Spring Forest' on south-east hillside • Remnant trees on north boundary (W of Caswell Street) • Retained trees (inc. Habitat trees) adjacent to the PDA (footprint margins)	Management Authority	Site works boundary to be delineated per works plan. (Refer to Landscape Plan - Drawing ERH-BB-LA-DA-DWG-007, Revision 01; Date 09.11.23)	Appropriate works site fencing insta (addressed in following sections)
	Delineate works compound / staging area on south-west corner	Management Authority	Delineate works compound on south-west quarter of site (by site entrance)	Compound area established to defir boundary per site map.
	Delineate 'Spring Forest' on south-east hillside (Zone 7) Regeneration of 'Spring Forest' can be commenced at any time (independent of the project construction) Refer to Landscape Plan (Black Beetle Landscape Architecture and Design): • Drawing ERH-BB-LA-DWG-DA-102, Revision 02. 013.11.23; • Drawing ERH-BB-LA-DWG-DA-105, Revision 02. 013.11.23;	Management Authority	Retained forest on SE hillside, referred to as 'Spring Forest', delineated by Landscape Plan; Extending from (near) the site entrance to the east boundary.	Established fence line. Suitable fencing to be used – flagging is suitable for short term only. (Important to separate this forest from any access roads used for the project – roads are to be part of the construction zone only. Regeneration of 'Spring Forest' can be (preferably) contemporaneous with the



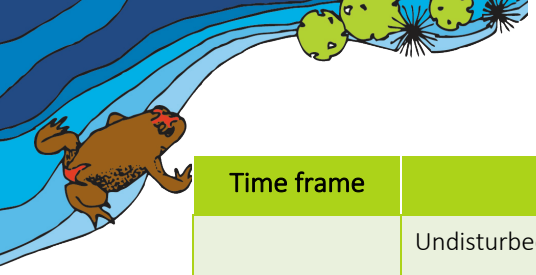
Time frame	Task	Responsibility	Indicators	Performance target
	• Drawing ERH-BB-LA-DWG-DA-106, Revision 02. 013.11.23; • Drawing ERH-BB-LA-DWG-DA-110, Revision 02. 013.11.23.			project construction – weeding only.
	Delineate remnant trees on the north boundary (west of Caswell St), near northern drainage line Refer to Landscape Plan (black beetle Landscape Architecture and Design): • Drawing ERH-BB-LA-DWG-DA-115, Revision 02. 013.11.23; • Drawing ERH-BB-LA-DWG-DA-116, Revision 02. 013.11.23.	Management Authority	Retained on north boundary; most are Habitat trees. Moist soils, potential vehicle hazard.	Works site boundary fencing installed and maintained. Signage to indicate this area as a 'no-go' zone for vehicles. Minimise (exclude) vehicle movements.
	Retained trees (inc. Habitat trees) adjacent to the PDA (footprint margin) - protect	Management Authority	All retained trees on PDA margins (identified by relevant site plans).	Tree protection fencing installed prior to any adjacent/relevant works.
Weeks 1 - 52	Vegetation removal within the Approved Principal Development Area (PDA) Zone 1	Management Authority	Presence of native vegetation, including remnant and habitat trees, and exotic pasture.	Controlled/supervised removal of vegetation: • Native trees removed and retained as logs; • All fauna habitat (hollows) from removed trees retained; • Exotic pasture removed and treated appropriately (removed from site/stockpiled for later treatment/other methods).



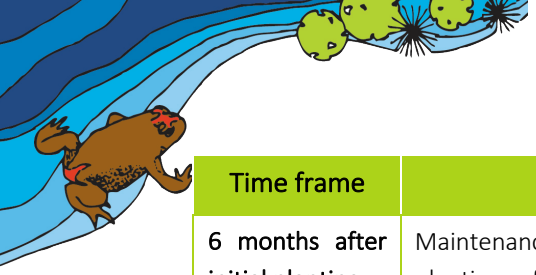
Time frame	Task	Responsibility	Indicators	Performance target
	Delineate areas external to PDA (construction footprint) - those areas are to remain in their existing state (comprise mainly exotic pasture (grassland)) Zone 6.	Management Authority	Exotic pasture (Drawing ERH-BB-LA-DA-DWG-007, Revision 01; Date 09.11.23.)	Retained; excluded from vehicle traffic and other disturbance.
Indeterminate	Planting of sediment basins as/when completed. Maintenance of basin plantings Zone 4	Certified contractor	Sediment basin(s) completed & ready for planting.	Basins planted out. Basins subject to regular maintenance for replacement plantings and weeding.
	INDEPENDENT OF CONSTRUCTION 'Spring Forest' – Regeneration by weed removal (Refer to the 4 Drawings above ('Weeks 1-4))	Certified contractor	Indicator weeds present throughout, including Priority Weeds and Weeds of National Significance (WONS).	Primary weeding; targeting of all WONS & Priority Weeds. Environmental weeds removed as part of standard weeding.
POST-CONSTRUCTION PHASE				
DATE(S) TO BE DETERMINED (Completion of construction)	Site remediation/site preparation Asset protection Zone (APZ) 'Replacement' plantings on southern drainage line (Zone 5 – Canopy Revegetation').	Management Authority and Certified contractor(s)	Construction-phase works areas external to the finished construction footprint. To be remediated/prepared for remediation - e.g. south-west works compound and associated southern drainage line.	As addressed in following sections.
	Site remediation/site preparation	Management Authority	Disturbed works areas (external to construction footprint).	Works-associated machinery & resources removed from work site. South-west works compound clear and ready for 'replacement' plantings as required.



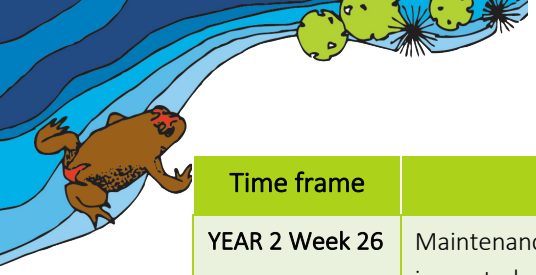
Time frame	Task	Responsibility	Indicators	Performance target
	Asset Protection Zone (APZ) NOTE: several grassland areas are not part of the APZ. Refer to: • Drawing ERH-BB-LA-DA-DWG-007, Revision 01; 09.11.23. APZ plantings are permissible – Refer to Landscape Plan.	Certified contractor	APZ – primarily comprising exotic grassland.	Vegetation within the designated APZ to be removed/managed to the required APZ conditions.
	'Replacement' plantings on southern drainage line, consistent with the local vegetation community Zone 5	Management Authority/ Certified contractor	Drainage line and adjacent south west works compound area ready for planting	Systematic tree planting with appropriate canopy species (refer Landscape Plan, ERH-BB-LA-DWG-DA-004 Revision 2), consistent with the local vegetation community and maintained to Bush fire standards, refer Bushfire Report (AE23 2381 REP ISS 9 27NOV23 - Abel Bushfire).
	Sediment basins Zone 4	Certified contractor	Presence of weeds; attrition of native plantings	Basins maintained to specification; replacement plantings as required; weeds controlled to <5%.
INDEPENDENT (of Construction)				
(Repeated from 'Construction phase' section above)	INDEPENDENT OF CONSTRUCTION 'Spring Forest' – Regeneration by weed removal (Refer to the 4 Drawings above ('Weeks 1-4)). Zone 7	Certified contractor	Indicator weeds present throughout, including Weeds of National Significance (WONS) and Priority Weeds (PWs).	Primary weeding; targeting of all WONS & Priority Weeds. Environmental weeds removed as part of standard weeding. Weed coverage <5%..



Time frame	Task	Responsibility	Indicators	Performance target
	Undisturbed Pasture Zone 6	Management Authority/ Certified Contractor	Indicator weeds present throughout, including Weeds of National Significance (WONS) and Priority Weeds (PWs)	Primary weeding; targeting of all WONS & Priority Weeds. Environmental weeds removed as part of standard weeding. Weed coverage <5%..
PLANTING GUIDE – INDICATIVE ONLY				
	Install new plantings (as prescribed in Landscape Design Report ERH-BB-LA-DA-DWG-108 Revision 2) Planting species guide (Landscape Plan ERH-BB-LA-DWG-DA-004 Revision 2) Sediment basins (Stormwater Management Plan) Replacement plantings (Zones 1-6 southern drainage line)	Management Authority/ Certified contractor	Planting as per stipulated species composition/Tree schedule	New plantings successfully installed in sediment basins 'Replacement' plantings on southern drainage line (SW quarter of site) according to suitable species composition.
	Watering. As a 'rule-of-thumb', water plants daily for the first week, and weekly for the first month after planting. Thereafter, as required.	Management Authority or Certified contractor	Plants in re-vegetated areas in a healthy state. The intent is to provide adequate water for successful plant establishment, water only as required.	Successful plant establishment in planted areas (healthy growing plants after 10 weeks).
	Mulch around new plantings. Mulch if/as required, to a minimum 50 mm depth.	Management Authority or Certified contractor	No bare soil exposed around new plantings.	Soils in planted areas erosion free. Minimal weed growth 95% weed free.
	APZ plantings are permissible – Refer to Landscape Plan	Certified contractor	Vegetation established at IPA standards as required by PBP 2019 and RFS requirements.	Asset Protection Zone requirements established



Time frame	Task	Responsibility	Indicators	Performance target
6 months after initial planting	Maintenance of new plantings; Inspect plantings for health; Remove any dead plants; Replace with new stock; Exotic, noxious and non-local vegetation (weeds) removed by appropriate methods; Replenish mulch – as required; Watering of plantings as necessary for plant health	Management Authority or Certified contractor	No dead plants present Weeding as per best practice No bare soil exposed around new plantings.	Maintenance of plant densities at recommended levels. Re-vegetated areas clear of weeds. Successful plant establishment
To be commenced 3 - 6 months after primary weeding	Secondary weeding; Inspect areas already subject to primary weeding. Remove any exotic, noxious and non-local vegetation that has re-emerged, particularly in the riparian zone, using appropriate methods.	Management Authority or Certified contractor	Weeding as per best practice.	Riparian zone and IPA 95% cleared of weeds. Maintain IPA requirements.
1 year after initial planting	Maintenance of Asset Protection Zone: Removal of excess litter, fine fuel and thinning as required of standing vegetation; Replenish mulch as required.	Certified contractor	Vegetation and litter maintained at Inner Protection Area standards as required by Vegetation Plan of Management	Asset Protection Zone maintained to PBP 2019 Standards.
	Maintenance of Plantings: Plantings inspected for health; Remove any dead plants; Replace with new stock; Spot weeding; Watering of plantings as necessary for plant health.	Management Authority or Certified contractor	Weeds removed as they re-sprout or germinate. Vegetation and litter maintained.	Plantings maintained. 95% survival rate of plantings. Replace plantings when required. 95% weed free.
	Final Report – Y1: Preparation of report.	Ecologist/ Certified contractor	Assessment and reporting of site condition.	Presentation of report to stakeholders



Time frame	Task	Responsibility	Indicators	Performance target
YEAR 2 Week 26	Maintenance - six monthly basis: Plantings inspected for health; Remove any dead plants; Replace with new stock; Spot weeding; Watering of plantings as necessary for plant health	Management Authority or Certified contractor	Weeds removed as they re-sprout or germinate. Vegetation and litter maintained. Attrition of plants.	Planting requirements maintained (95% survival rate). Replacement planting with alternative planting list if initial species fail.
Week 52	Maintenance of Plantings: Plantings inspected for health; Remove any dead plants; Replace with new stock; Spot weeding; Watering of plantings as necessary for plant health	Management Authority or Certified contractor	Weeds removed as they re-sprout or germinate. Vegetation and litter maintained. Attrition of plants.	Planting requirements maintained (95% survival rate). Replacement planting with alternative planting list if initial species fail.
	Maintenance of IPA: Removal of excess litter, fine fuel and thinning as required of standing vegetation; Replenish mulch as required	Certified contractor	Vegetation and litter maintained at IPA standards as required by Vegetation Plan of Management	Asset Protection Zone maintained to PBP 2019 Standards.
	Final Report - Y2: Preparation of report	Ecologist/ Certified contractor	Assessment and reporting of site condition	Presentation of report to stakeholders

8. Guidelines for weed control

General

a) Comprehensive treatment of all weeds in an area is to be carried out prior to planting.

b) Maintenance weeding of all areas is to be carried out prior to seed set.

c) All weed propagules are to be bagged and removed from site.

Herbicide use

The manufacturers' safety and application directions must be followed. Contractors are required to obtain all necessary approvals and complete necessary notifications before using herbicides, particularly near waterways.

Hand Removal

The removal of weeds by hand is the preferred method and is most suitable for the removal of seedlings, herbaceous weeds, and many grasses. Always place seeds and or fruit into a plastic bag before pulling out the rest of the plant. Dispose of the contents of the bag and the plant off-site to avoid the further spread of the weed. Wherever possible take advantage of favourable seasonal conditions, e.g. work after good rain when soil moisture conditions allow for easier removal.

Treatment of weeds with underground reproductive parts

The most effective treatment for weeds with underground reproductive parts is to carefully dig up the entire plant with all tubers, bulbs and corms intact. The reproductive parts must then be bagged and removed from site.

Spraying with herbicide can be employed where no native species are present. This will control above ground vegetative growth and some underground reproductive parts but subsequent hand removal of the remaining underground parts is often necessary.

Spraying with herbicide is most effective between flowering and seed set.

Treatment of exotic vines

Most exotic vines can either be dug up by hand or sprayed with herbicide to remove vegetative growth above the ground and then followed up with hand removal of re-shooting nodes.

Treatment of exotic grasses and herbs

Most exotic grasses and herbs can be hand removed or 'crowned' with a knife. They can be sprayed with diluted herbicide where no native species are present.

The slashing of tall herbaceous weeds and the spraying of regrowth can also be used to reduce the amount of herbicide used. Debris from slashing will contain weed propagules and must be removed from site.

Some exotic grasses and herbs can be extremely difficult to eradicate by hand removal. It is important that these species are controlled prior to planting, as the ability to spray herbicide after planting will be greatly reduced.

Cut and paint treatment for woody weeds

The following cut and paint treatment is appropriate for most woody weeds:

a) Woody weeds are to be cut as close to the ground as possible and at an angle horizontal to the ground to prevent herbicide running off the stump.

b) Undiluted herbicide must be applied to the stumps immediately.

c) On large stumps only the outer (sapwood) rim of the stump requires poisoning.

Debris from woody weeds that is capable of re-shooting (e.g., Small Leaf Privet) must never be left in contact with the ground. Such debris is either to be removed from site or piled on temporary 'rafts' until dead.

Scrape and poison treatment for woody weeds

Scrape and poison treatment is required for weeds where relatively small stem diameters do not permit enough herbicide to penetrate large rootstock for cut and poison treatment to be effective.

a) Long scrapes are to be made with a knife along either side of each stem to expose the sapwood.

b) Care must be taken not to scrape around the entire stem.

c) Undiluted herbicide is to be applied to scrapes immediately.

d) Plants must then be left in situ until dead.

Herbicide injection of large trees

Herbicide injection of large trees must, ideally, occur during periods of active growth (Spring). For deciduous trees treatment must occur between late Summer and early Autumn to ensure an effective 'take-down' of herbicide.

Trained and experienced personnel may carry out this procedure to ensure safe and effective treatment.

a) Holes are to be drilled into the base of the tree trunk at ~10 cm intervals, evenly spaced around the entire trunk and at a downwards angle to hold the herbicide.

b) Holes must be drilled to penetrate the phloem (sapwood) of the tree and no further.

c) Herbicide must be applied to the holes immediately after drilling.

Leave injected trees undisturbed for six months to ensure effective treatment (follow up may be required).

9. Asset Protection Zone Construction

For this site, the Asset Protection Zone (APZ) consists of:

- an Inner Protection Area (IPA) of 40-45m

The designated APZ is to be maintained in the following manner *(from s3.1, p.10 of Planning for Bushfire Protection 2006, and Standards for Asset Protection Zones)*. At least 75% of the ground cover must be retained after maintenance to prevent soil erosion:

Inner Protection Area

Specification

- Trees
- Canopy - average cover of whole IPA less than 15%; not continuous from hazard to asset with 2-5 m separation between tree crowns; not overhanging within 2-5 m of building; islands of canopy permitted.
- All lower limbs under 2 m removed
- Trees and shrubs - retained as clumps or islands, cover less than 20% of whole area
- Garden beds of flammable shrubs
- Not to be located under trees
- Over 10 m from an exposed window or door

Maintenance

The IPA is to be maintained as follows:

- Minimal fine fuel at ground level which could be set alight by a bushfire,
- Vegetation does not provide a path for the transfer of fire to the development - that is, fuels are discontinuous
- No trees to overhang the building
- Trees must be well spread out and not form a canopy
- Trees or shrubs that retain dead material or deposit excessive quantities of fuel in a short period of time must not be within the IPA
- Trees and shrubs must be located far enough from the house that the radiant heat they produce or direct flame contact will not ignite the house.
- Wooden sheds, combustible material, large areas/quantities of garden mulch, stacked flammable building materials etc., must not be within the IPA

An Outer Protection Area (OPA)

Is not specified for the development. Instead, a variable IPA has been specified (as above).

The site it to be maintained with open grassland/pasture effectively performing the function of an OPA.

Maintenance

The OPA is to be managed as follows:

a) Any trees and shrubs are to be maintained in such a manner that the vegetation is not continuous

b) Fine fuel loadings must be kept at a level where the fire intensity expected will not impact on adjacent developments.

10. Recommended planting list

The following list includes suitable species for planting into re-vegetation areas on the site. This expanded list allows for alternative choices where particular species are not available.

Trees

PRIMARY

Angophora floribunda
Brachychiton populneus subsp. populneus
Eucalyptus eugenioides
Eucalyptus tereticornis
Eucalyptus bosistoana

SECONDARY

Eucalyptus baueriana
Eucalyptus globoidea
Eucalyptus longifolia
Eucalyptus maidenii
Eucalyptus melliodora

Shrubs and taller groundcovers

PRIMARY

Acacia mearnsii
Bursaria spinosa
Glycine clandestina
Glycine tabacina
Leucopogon juniperinus

SECONDARY

Allocasuarina littoralis
Bossiaea buxifolia
Bursaria spinosa
Cassinia aculeata
Cassinia longifolia
Cassinia trinerva
Clematis glycinoides var. glycinoides
Convolvulus erubescens
Einadia trigonos
Geitonoplesium cymosum
Hardenbergia violacea
Hymenanthera dentata
Jacksonia scoparia
Ozothamnus argophyllus
Ozothamnus diosmifolius
Pimelea curviflora

Ferns

PRIMARY

Cheilanthes sieberi

SECONDARY

Cheilanthes distans
Pellaea falcata

Groundcovers/Herb layer

PRIMARY

Acaena echinata
Asperula conferta
Bothriochloa macra
Carex inversa
Cymbopogon refractus
Cyperus gracilis
Desmodium varians
Dichondra repens
Eragrostis leptostachya
Geranium solanderi var. solanderi
Hypericum gramineum
Lomandra longifolia
Microlaena stipoides
Panicum effusum
Poa labillardierei var. labillardierei
Rubus parvifolius
Rumex brownii
Solanum prinophyllum
Sporobolus creber
Themeda australis
Wahlenbergia communis
Wahlenbergia gracilis

SECONDARY

Acaena agnipila
Ajuga australis
Aristida vagans
Arthropodium milleflorum
Arthropodium species B
Austrodanthonia pilosa
Austrodanthonia racemosa var. racemosa
Austrostipa rudis
Calotis lappulacea
Carex breviculmis
Carex longebrachiata
Chenopodium carinatum
Chenopodium pumilio
Chloris truncata
Chrysocephalum semipapposum
Chyrsocephlum apiculatum
Chloris ventricosa
Cynoglossum australe
Cynoglossum suaveolens
Desmodium brachypodum
Dianella longifolia var. longifolia
Dianella revoluta var. revoluta
Dichelachne micrantha
Digitaria parviflora
Digitaria ramularis
Echinopogon caespitosus var. caespitosus
Echinopogon ovatus
Elymus scaber var. scaber
Epilobium billardierianum
Euchiton gymnocephalus
Galium propinquum
Hydrocotyle laxiflora
Imperata cylindrica var. major
Juncus subsecundus
Lagenifiera stipitata
Lepidosperma laterale
Lomandra multiflora subsp. multiflora
Notodanthonia longifolia
Opercularia aspera
Opercularia varia
Oplismenus imbecillis
Oxalis perennans
Oxalis radicosa
Pimelea curviflora
Polygala japonica
Pratia purpurascens
Scleranthus biflorus
Senecio hispidulus var. hispidulus
Sigesbeckia orientalis subsp. orientalis
Solanum pungetium
Sorghum leiocladum
Sporobolus elongatus

Vernonia cinerea var. cinerea
Veronica calycina
Veronica plebeia
Wahlenbergia stricta subsp. stricta
Zornia dyctiocarpa var. dyctiocarpa

Appendix 2. Vehicle and Machinery Decontamination Checklist

NSW GOVERNMENT Department of Primary Industries

Guide

Emergency Management Unit
Biosecurity and Food Safety
Email: emergency.preparedness@dpi.nsw.gov.au

Appendix 1: Vehicle and machinery decontamination checklist

Instructions: Checklist can be used as a guide or completed as evidence of decontamination.

Site:

Vehicle/Equipment:

Date:

Decon team:

SAFETY – ☐ Flat ground ☐ Engine off & keys removed ☐ Wheels chocked ☐ Moving/raised parts secured

	Contamination point	Decon		Contamination point	Decon
Body	Step treads		Wheels & arches	Wheel arches	
	Bumper/s			Wheel caps & rims	
	Around fuel tank caps			Tyre tread/tracks	
	Around tray body			Mudflaps	
Under carriage	Axles & differentials			Brakes	
	Struts & stabilisers		Interior / Cabin	*Remove items for disposal/cleaning*	
	Steering components			Foot wells	
	Chassis rails, inc recesses & holes			Seats	
	Spare tyre & mounts			Air vents	
	Fuel tank			Glove box, centre console	
Engine bay	Front grill			Tool boxes	
	Radiator, oil coolers			Boot or recesses, inc spare tyre well	
	Top of gearbox		Attachments	Bull bar	
	Battery recess & tray			Tow ball	
	Air filters			Winch	
	Engine mounts			Bucket, blade, boom, ripper etc	
	Engine recesses or manifold			Hydraulic arms	

Appendix 3. Company Profile

Abel Ecology has been in the biodiversity consulting business since 1991, starting in the Sydney Region, and progressively more state wide in New South Wales since 1998, and now also in Victoria. During this time extensive expertise has been gained with regard to Master Planning, Environmental Impact assessments including flora and fauna, bushfire reports, Vegetation Management Plans, Management of threatened species, Review of Environmental Factors, Species Impact Statements, Biodiversity Development Assessment Reports and as Expert Witness in the Land and Environment Court. We have done consultancy work for industrial and commercial developments, golf courses, civil engineering projects, tourist developments as well as residential and rural projects. This process has also generated many connections with relevant government departments and city councils in NSW. Our team consists of four scientists and two administrative staff, plus casual assistants as required.

Licences

NPWS s132C Scientific licence number is SL100780
NPWS GIS data licence number is CON95034
NSW Dept of Primary Industries Secretary's Animal Care and Ethics Committee Approval: 18/575
NSW Dept of Primary Industries Animal Research Authority. Accreditation No: 84207

The Consultancy Team

Dr Danny Wotherspoon

BSc, DipEd, MA, PhD, Grad Dip Bushfire Protection,

MECA NSW, MEPLA, MNELA, MESA, MEIANZ, White card.

Danny has practiced as an ecological and bushfire consultant since 1991. He is a consulting ecologist to private developers, State Government agencies and various City Councils on a regular basis, for development applications, government projects, and as expert witness in the NSW Land and Environment Court.

Danny's PhD researched fragmented vegetation and fauna habitat use. He has special expertise in fauna habitat use. Danny has presented invited papers at international conferences since 2001 in Australia, China, South Africa, Sri Lanka and Israel on his PhD and other research, including golf course habitat management. Danny's scientific papers have been published in both international and Australian academic journals.

Mark Mackinnon

B Env. Sci. (Hons), Grad Dip Bushfire Protection
MEIANZ, White Card,
Accredited Practitioner Level 3 - Bushfire Planning & Design (BPAD), Accreditation number 36395.

Mark is a passionate and enthusiastic scientist who thrives in the field of natural resource management. He has experience in threatened species, fire ecology, bushfire management, pest plant and animals, and landscape restoration. In particular he specializes in ornithology and bushfire management. Mark has a number of specialized field-based skills including: nest box installation, simple and complex tree climbing, working at heights, general firefighter departmental fire accreditation, venomous snake and reptile handling, immunization to handle bat species, and an A - class bird banding licence with mist-net endorsement. Mark is also skilled in ArcGIS mapping, first-aid, four -wheel-driving.

Mark Sherring

BM, MAABR, Cert. Hort., Cert. Bush Regen, Cert. Rural Ops, White Card.
Member of the Australian Association of Bush Regenerators

Mark has extensive knowledge and experience of plant species in New South Wales. He has built up his expert knowledge on NSW native plant species over the many years that he has practised as a Botanist. He is regularly asked to contribute to the extensive (ongoing) flora surveys of the Sydney Basin and Blue Mountains carried out by the Royal Botanic Gardens, Sydney. Mark has extensive field survey experience, having worked for over ten years in various plant-related roles. His role in Abel Ecology is to provide expert advice on flora and on the full range of flora management issues encountered and in the design and management of environmental monitoring projects.

Nick Tong

BSc (Biology), MPhil (Ecology), Cert. III CLM
BAM Accredited Assessor (BAAS22012),
MECA NSW, Snr First Aid, White card.

Nicholas is an experienced ecologist with expertise in fauna, plant species identification, vegetation assessment and ecological restoration. In the last six years, he has been a consulting ecologist to private developers and large corporations, for a variety of projecting including State Significant Developments. Nick has extensive field work experience in Sydney, the Blue Mountains and Central West NSW. His Master's project investigated the impacts of exotic predators on herpetofauna in the arid zone. His role at Abel Ecology is to provide expert advice on fauna and the application of the Biodiversity Offset Scheme.

Andy Araya

Botanist / Ecologist

B Env. Sci. MTeach (Env., Marine, Agr., Bio., Chem.), Dip. Marine Operations

First Aid Cert. White Card. ACDC Chemical Licence, NSW Boating Licence, Marine Radio Licence, Security Licence, Chainsaw Licence.

Andy has over 15 year's experience as a bush regeneration supervisor working across a number of environments throughout NSW and QLD from EEC of the Cumberland Plain, riparian and wetland areas, sand dunes and rainforests, to the higher elevations of the Blue Mountains National Park. Managing teams of up to 10 staff in remote areas as well as urban environments has allowed Andy to hone his skills of communication and native species identification. Andy's additional experience as a builder in the building and construction industry gives him a solid understanding of the considerations and legal requirements clients face in mitigating environmental and personal harm.

Erin Parker

B Biodiversity and Conservation, Macquarie University.

Junior Ecologist and Administration Assistant

Erin has completed a Bachelor of Biodiversity and Conservation at Macquarie University. Erin has previously worked as a bush regeneration team member while completing her degree. There she was able to develop plant ID skills and understanding of the procedures of weed management and restoration. Erin has also taken part in a casual position assisting with threatened species surveys in the Central West of NSW. This involved various tasks including tree hollow surveys for Glossy Black Cockatoos, preparation for reptile surveys, spotlighting, harp trapping surveys of microbats, and Koala SAT plot surveys. Erin is passionate about furthering her knowledge on native Australian flora and fauna, their ecology and impacts.

Callista Harris

BPlan (Hons), White Card, Apply First Aid, Work Safely at Heights, Maintain and Operate Chainsaws, Operate Elevating Work Platform (scissor lift), High Risk Work Licence - Boom-Type Elevating Work Platform (WP) (over 11 metres), Venomous snake handling certificate, Damage Mitigation Permit for Removal and relocation of protected animals, Operate and maintain 4WD.

Callista has 9 years' experience as an urban planner. She has a strong knowledge of NSW environmental legislation and has secured approvals for a wide range of developments, including housing developments, industrial developments, solar farms, and infrastructure. She has recently changed careers and has gained valuable on the ground experience working as a fauna spotter catcher, ecologist, and botanist on various projects.