EMM

creating opportunities

APPENDIX B.1 – Environmental Impact Statement

Detailed project description

Prepared for Lake Lyell Project Pty Ltd

Lake Lyell Pumped Hydro Energy Storage Project

Detailed project description

Lake Lyell Pty Ltd

E221111 RP3

January 2026

Version	Date	Prepared by	Reviewed by	Comments
1	02/02/2024	Alex Frolich	Christopher Holloway	Draft
2	24/05/2024	Alex Frolich	Christopher Holloway	Final draft
3	26/06/2024	Alex Frolich	Christopher Holloway	Final for draft EIS
4	04/03/2025	Alex Frolich	Christopher Holloway	Revised project updates
5	30/06/2025	Alex Frolich	Christopher Holloway	Final draft for EIS
6	24/11/2025	Alex Frolich	Christopher Holloway	Final for EIS
7	20/01/2026	Alex Frolich	Christopher Holloway	Final

Approved by

Christopher Holloway
Director – Major Projects & Approvals
20 January 2026

Level 10 201 Pacific Highway
St Leonards NSW 2065
ABN: 28 141 736 558

TABLE OF CONTENTS

Tables

Figures

Preface

This document provides a detailed description of the Lake Lyell Pumped Hydro Energy Storage (PHES) project ('the project'), particularly how it is planned to be built and operated. All information included within this document is based on the current level of concept design prepared by the project design, engineering and construction team, including EnergyAustralia, EDF power solutions Australia, Acciona and McConnell Dowell Joint Venture (AMDJV) and Mott McDonald. The design is expected to be further refined as the project progresses.

The details outlined within this project description form the basis for the environmental impact assessment (EIS) undertaken and should be read with the supporting detailed maps and plans provided at Appendix B2 to the EIS.

The Secretary's environmental assessment requirements (SEARs) that are relevant to this chapter are:

> … the EIS must include:
>
> …
>
> - a full description of the project accompanied by suitable maps and plans, including the:
>   - disturbance area;
>   - physical layout of the project over time, including sections of key components;
>   - key uses and activities to be carried out on site;
>   - likely timing of the project including any stages, the key phases within each stage (site preparation, construction, commissioning, operation, decommissioning and rehabilitation) and the sequencing of these stages and phases

A summary of this document is provided in Chapter 3 of the EIS.

1 Project overview

1.1 Basis of the project

The Lake Lyell Pumped Hydro Energy Storage (PHES) project ('the project') is intended to act as an electrical energy storage system through the conversion of electrical to kinetic energy to gravitational energy and back via water as it is transferred from the elevated upper reservoir to a lower reservoir. The location of the project, on and adjacent to, the existing Lake Lyell will allow this to be achieved without the need to construct a lower reservoir. Water will be passed between the upper and lower reservoir through underground tunnels and an underground powerhouse, the latter of which will contain equipment that will act as a water pump or an electricity generator depending on the mode of operation.

The modes of operation are:

- **Pumping Mode** – When in pumping mode, electricity from the National Electricity Market (NEM) will be used to drive the pump-turbines in reverse direction – thereby pumping water up from the lower reservoir to the upper reservoir. The water will then be stored in the upper reservoir until electricity generation is needed.

- **Generating Mode** – When in electricity-generating mode, the water in the upper reservoir will be allowed to flow down to the lower reservoir via underground power waterways. The water will drive pump-turbine units, turning the generators and converting the waters kinetic energy into electricity.

- **Synchronous Condenser Mode** is when the pump-turbines are electrically connected to the transmission network but not pumping or generating but spinning to maintain inertia. This mode contributes to grid stability and dynamic voltage support.

A **standby mode** of operation is when the upper reservoir is empty (but not pumping) or when the upper reservoir is full (and not generating).

The project will provide services to the wholesale 'spot' market on the NEM, and support ancillary services used by the Australian Energy Market Operator (AEMO) to manage the power system reliably. The project will be able to raise or lower the output generation capacity depending on market needs.

The principles underpinning the operation of the project are depicted in Figure 1.1. This includes the operational philosophy of the PHES in relation to water levels within Lake Lyell.

The project will have the capacity to store up to 3,080 megawatt hours (MWh) of energy and generate at 385 megawatts (MW) for 8 hours or generate up to around 440 MW for a shorter period. The generation components of the project are referred to as the PHES 'Facility'. The Facility will comprise two synchronous fixed speed reversible Francis type pump-turbine generation units and related electrical and hydraulic infrastructure housed within a powerhouse located deep underground, midway between the upper and lower reservoirs.

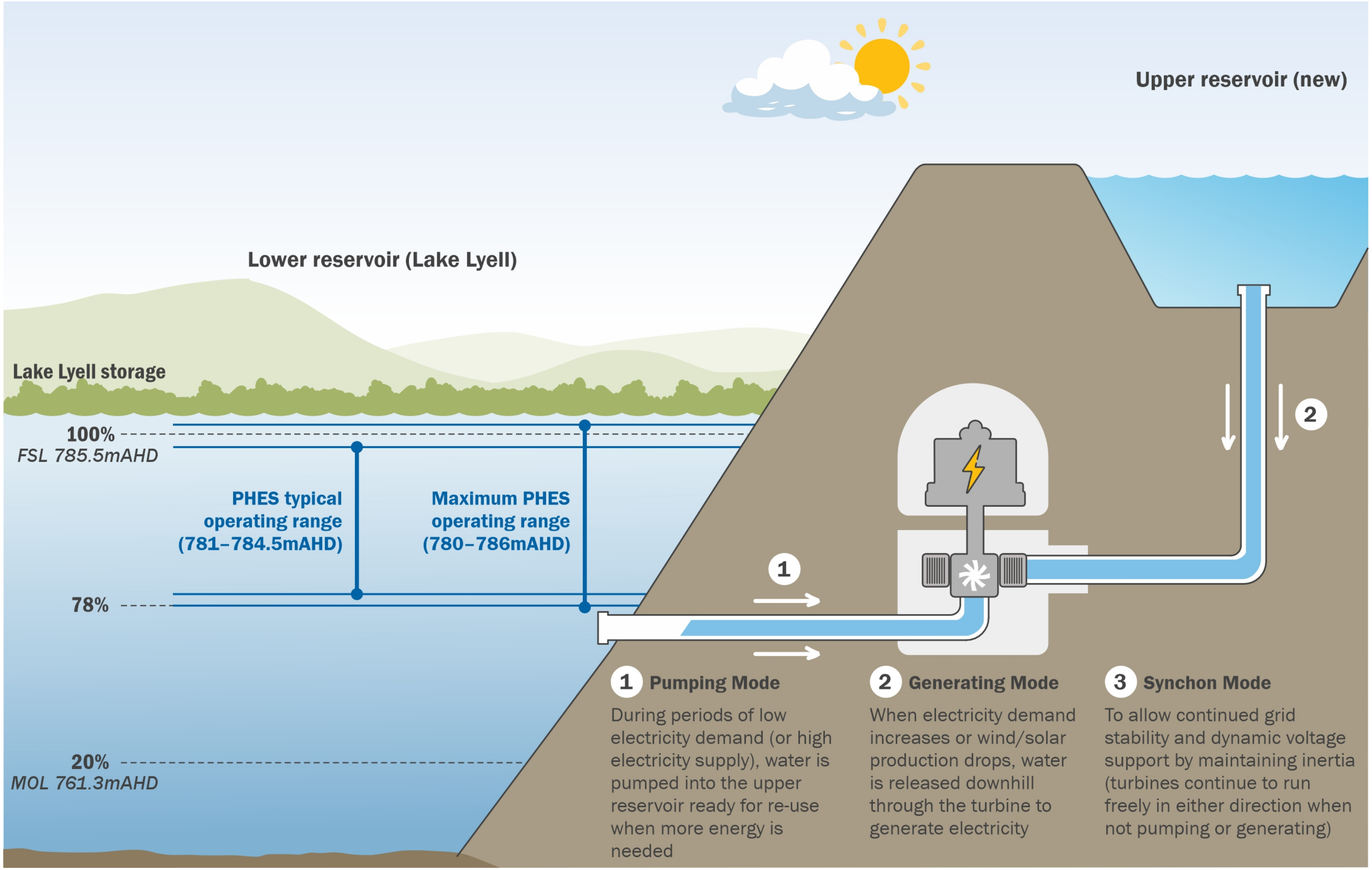


Figure 1.1 Basis of the project

1.2 Key project elements

The key components of the project are listed in Table 1.1 and described in more detail in Section 3. In addition to the reservoirs and underground waterways, the project will require the construction of a variety of components.

The construction duration is expected to be about four to five years and the operational life of the project approximately 80 to 100 years.

Construction will be completed in stages, including:

- pre-construction / enabling works (referred to as 'early works') – consisting of initial access works (internal and external roads), geotechnical investigations, site establishment and preparation of the worker's accommodation camp
- main works – consisting of all other construction activities needed to enable operation of the project.

Once operational, a limited number of project elements will continue to be visible at the surface as illustrated in Figure 1.2.

Key project components can be broadly categorised as:

- pumped hydro generation components (shown on Figure 1.3)
- transmission connection components (shown on Figure 1.4)
- site access and ancillary facilities (shown on Figure 1.5)
- other construction components or works (shown on Figure 1.6).

Table 1.1 Key project elements

Project element	Description
Pumped hydro generation components	
Upper reservoir and dam	The upper reservoir will be a rockfill "gully dam" constructed behind the southeastern ridge of Mount Walker, over 250 metres (m) above Lake Lyell. • Dam type: Rockfill embankment • Dam crest level ~1,052 metres Australian Height Datum (m AHD) • Storage volume: 5.30 gigalitres (GL) • Full supply level: 1,050 m AHD • Minimum operating level: 1,010 m AHD • Working water level range: 40 m • Maximum dam height (internal): 83 m • Maximum dam height (external): 150 m

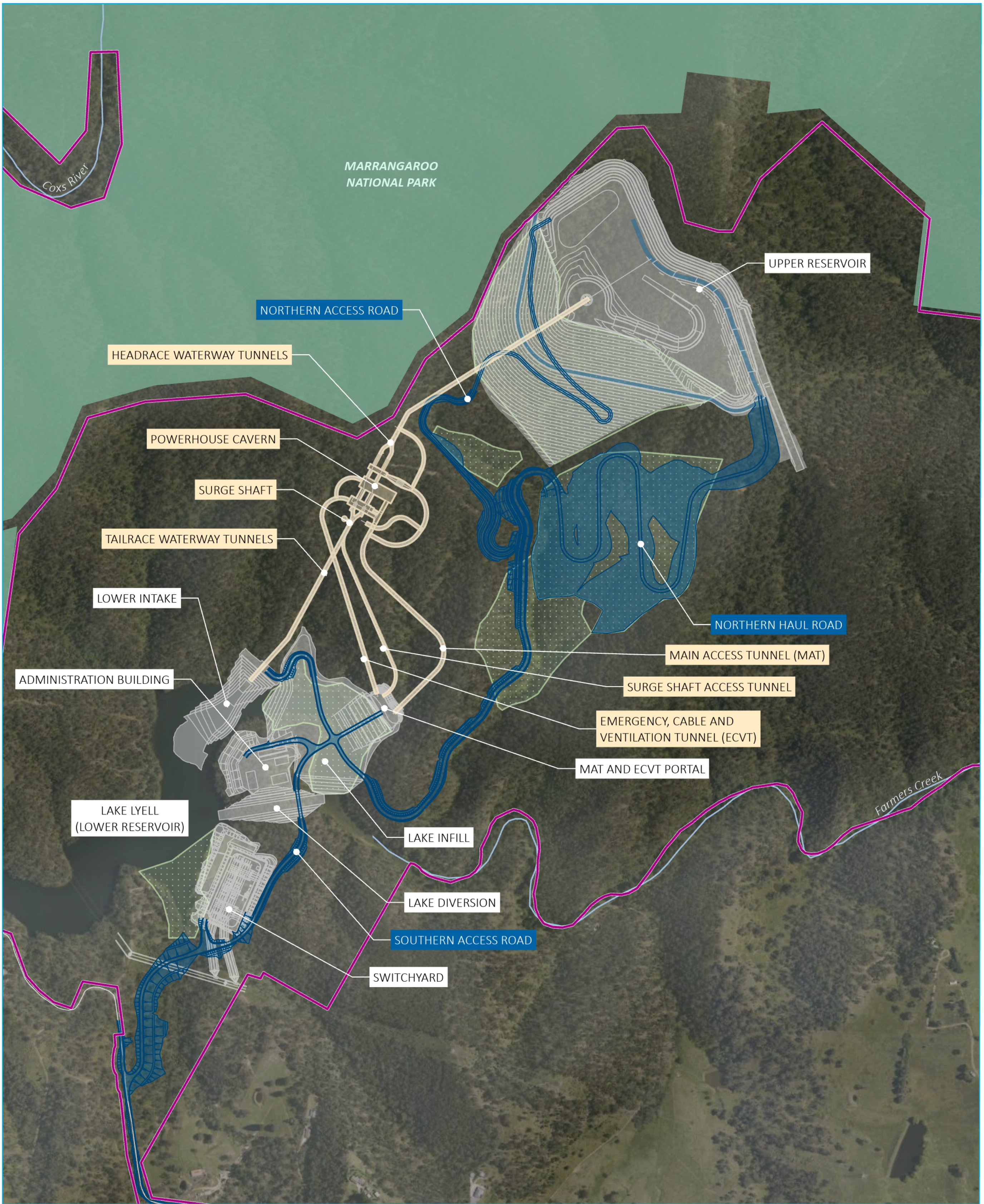
Project element	Description
Lower reservoir (Lake Lyell)	Lake Lyell will act as the project's lower reservoir; hence no new lower reservoir or dam will need to be constructed. The lake was dammed in 1982 (Lilyvale Dam) and is filled by natural flow from the Coxs River and Farmers Creek. • Storage volume: 34.2 GL (gross capacity) • Existing full supply level: 785.5 m AHD • Existing minimum operating level: RL 761.3 m • Maximum PHES operational level 786.0 m AHD (pump mode only) • Minimum PHES operating level: 780 m AHD (22.89 GL)[1] • Target PHES operating range: 781 m AHD to 784.5 m AHD.
Upper reservoir inlet / outlet structure	The upper inlet / outlet structure will be located within the lowest point of the upper reservoir to disperse water into the upper reservoir through the power waterways during pumping mode and allow the release of water to the power waterway during generation mode.
Lower inlet / outtake structure	The lower inlet / outlet structure will be located within the lower reservoir (Lake Lyell) to draw water up to the upper reservoir through the power waterways during pumping mode and disperse water from the power waterway during generation mode.
Power waterways	The power waterways will provide a connection between the reservoirs through which water will flow. They will comprise the following: • A single vertical shaft which will extend down from the upper inlet/outlet structure. The shaft is approx. 7 m in diameter (internal) and about 170 m deep. • An inclined single headrace tunnel that will extend downwards from the upper intake shaft. The tunnel is approximately 7 m in diameter (internal) and 550 m long, before it splits into two tunnels (each approximately 4.4 m in diameter) leading to each Francis turbine in the powerhouse. • The bifurcation section (upstream of the powerhouse) is just under 100 m long. • The bifurcation section (downstream of the powerhouse) is approximately 80 m long. Two tunnels (each approximately 5 m in diameter) will rejoin into a single tailrace tunnel. • A single tailrace tunnel will connect the lower inlet and the powerhouse. The lower waterway tunnel is approximately 7 m in diameter (internal) and approximately 500 m long. The power waterway structure will be predominately reinforced concrete lined with higher pressure sections using a combination of steel and concrete.
Underground powerhouse	Located in an underground cavern near the base of the headrace tunnel, the powerhouse will contain the two reversible pump-turbines and a variety of mechanical and electrical equipment.
Access tunnels and portals	Access to the power waterways and the powerhouse will be attained via access tunnels and portals, which will include: • the main access tunnel (MAT), approximately 7.5 m wide and 8.2 m tall, and approximately 600 m long • the emergency, cable, and ventilation tunnel (ECVT), approximately 7 m wide and 8.2 m tall, and approximately 500 m long. Each tunnel will have a portal/entrance at the surface, with a surface area of approximately 100 m x 50 m.
Surge shaft	An 11-m diameter single underground surge shaft will be located downstream of the powerhouse, connected to the single tailrace waterway and will vent to the surface.
Transmission connection components	
High voltage (HV) switchyard and transmission connection	A HV switchyard will contain the electrical equipment required to facilitate the connection between the project and the existing transmission network. A short transmission connection will be constructed to connect the HV switchyard to the nearby Wallerawang to Sydney South 330 kV transmission line. An underground cable in a trench will connect the main transformers and the switchyard.

1 Note that this is the proposed Lake Lyell PHES minimal operation level (MOL) for the project. The existing Lake Lyell has an additional storage volume of approximately 2.1 GL below the Existing Lake Lyell Minimum Operating level.

Project element	Description
Site access and ancillary facilities	
Site access roads	The project area will be accessed via Sir Thomas Mitchell Drive, which will undergo upgrades to allow project-related vehicles safe access. Upgrades to the intersection of Sir Thomas Mitchell Drive and Magpie Hollow Road is required. The intersection of the Great Western Highway and Magpie Hollow Road, subject to consultation with Transport for NSW, will require a temporary, signalised intersection modification to allow construction traffic. Only minor intersection adjustments will be required for the largest oversized equipment transport to site. Existing access roads within the project area will be upgraded as required and new ones will be constructed to allow access to key areas within the project area, including the following: • Pioneering access tracks will be utilised for vehicle access during early works and before main construction access is completed. The pioneering tracks will follow existing Lake Lyell access tracks on the project site, and in some areas these tracks will need to be maintained due to localised erosion. Some new pioneering access tracks will also need to be established. • The southern access roads. These will lie south of Farmers Creek and will connect Sir Thomas Mitchell Drive to the HV switchyard, the site access compound, and the temporary bridges across Farmers Creek. At completion of construction, some of the roads will be retained permanently for operation and others will be rehabilitated. • The northern access road, which will run between the Farmers Creek crossing, tunnel portals, reservoir laydown pad and upper reservoir. At completion of construction, the road will be retained permanently for operation. • The dam haul road. This road will connect the upper reservoir laydown pad and the upper reservoir and will be used predominantly by heavy vehicles. At completion of construction, the road will be permanently retained for operation. • Other temporary haul roads. Several additional haul roads will be needed to enable the movement of spoil within the site. These roads would be rehabilitated following construction and not required permanently for operation. • A jetty will be established to allow transport and access via barge during construction, following completion of a switchyard pad. The jetty will be retained permanently for ongoing maintenance and access.
Bridges	Four temporary bridges / crossing will be installed in total: • An existing causeway across Farmers Creek arm of Lake Lyell will be temporarily upgraded to provide critical access for early works, including geotechnical investigations. • A temporary causeway type crossing of Farmers Creek arm of Lake Lyell to provide critical access to the tunnel portals. • Two temporary crossing structures will be installed as part of the establishment of two temporary cofferdams built to allow the creek diversion. A permanent bridge will be established to cross the diverted path of Farmers Creek arm of Lake Lyell. This bridge will provide operational access to the upper reservoir and powerhouse.
Lake Lyell diversion	The Farmers Creek arm of Lake Lyell will be diverted near the lower inlet/outlet structure. This, combined with an adjacent infill area, will be undertaken to significantly reduce the risk of flood debris and sedimentation obstructing or damaging the pump facility infrastructure. It also allows the lower reservoir inlet / outlet to be constructed in a dry environment. The lake diversion will be an open channel and designed to allow continued upstream and downstream passage of fish and aquatic fauna. An infill area at the eastern end of the lower reservoir inlet / outlet structure will be constructed using spoil generated on-site, reducing offsite truck movements. An area at the western end of the lower reservoir inlet / outlet will be deepened to achieve the necessary inlet submergence to prevent air entrainment into the waterways. This deepened area also allows a transition from the waterways back to the existing lake where the water flow velocity is reduced and then rejoined with Lake Lyell.
Administration and utilities (operation)	The administration building will act as a control centre, staff centre and office. The building itself will be approximately 25 m x 15 m in size with a 500 m^2 sealed carpark with kerb and gutter. The approximately 28 m x 20 m maintenance workshop / store will be located adjacent to the administration building. Utilities for operation, such water, and LV power will be supplied to the site within the road access corridor.

Project element	Description
Other construction components or works	
Geotechnical investigation	To assist ongoing design refinement, geotechnical and geophysical surveys and investigations are proposed within the disturbance footprint.
Temporary workforce accommodation	A temporary workforce accommodation facility is proposed to house up to 500 workers (referred to as an accommodation camp). Two options for a temporary workforce accommodation facility are being considered: • a preferred accommodation camp on the land south of 340 Magpie Hollow Road, South Bowenfels (referred to as the Lakeside camp). The camp will require upgrades to the existing 11 kV overhead lines given the increased power demand and a communications link established • an alternative temporary workforce accommodation camp close to the Lithgow town centre on vacant land within the 'Pottery Estate' (referred to as the Town camp). The configuration of the accommodation camp will be confirmed during detailed design however is expected to include accommodation units / rooms, jetty (for Lakeside camp only), camp kitchen, first aid facility, gym and/or recreation room, laundry and carparking. Subject to feedback from the community, a single temporary workforce accommodation will be built on either the lakeside site or the town site, but not both.
Site works pads, laydown areas and facilities	**Site compound** A level pad will be constructed to the south of Farmers Creek to house the administration and main site compound. The main compound will include a workspace, kitchen, lunch, and ablution facilities for workers. It will also include office space, parking, and the water treatment facility to process water removed from the inlet / outlet and tunnel excavations.
	Laydown pads Spoil generated from excavations will be used to establish laydown pads for construction. Laydown pads will be oversized to allow for the further placement of spoil if necessary. The laydown areas are: • an upper reservoir laydown pad which may also be used for other facilities such as concrete or asphalt plants and material processing and storage • a smaller satellite compound and heavy vehicle workshop established below the upper reservoir to provide facilities to workers at the upper reservoir • a switchyard pad which will also provide transport staging and parking, a concrete batch plant, and fuel and other storage • a laydown area will also be established at Lilyvale Dam, for storage of plant, equipment and vehicles during works on the fusegate.
	Stormwater basin dam A stormwater basin will be constructed to the south of the upper reservoir to manage runoff and potential impacts from erosion and sedimentation. Pending the final detailed design, additional smaller basins may be constructed within the site.
	Batch plant A batch plant will be established within the HV switchyard pad. It will likely be a wet plant with a capacity of approximately 120 cubic metres per hour (m^3/hr). Dry batch plant options are also being investigated. All cement will be delivered directly to the batch plant. The approximate footprint including stockpiles will be 100 m x 100 m. As construction progresses, the batch plant will be relocated to the lake infill area. An additional batch plant may be established on the workshop pad if required.
	Cofferdams Two cofferdams will be utilised for the diversion of Lake Lyell. The downstream and upstream cofferdams will be established in water depths of 9 to 10 m and 3 to 4 m respectively. They will consist of sheet or tubular steel pile walls with rock infill or earth / rock embankments with secant piles. The downstream cofferdam will be temporary, while the upstream cofferdam will remain permanently.

Project element	Description
	Fire systems Fire water tanks and a fire system will be installed adjacent to the permanent roadways pending the final detailed design.
	Explosive storage Explosives for the drill and blast works will be stored at location(s) on site that complies with all relevant standards and guidelines. The primary storage location is proposed within an existing cleared area adjacent to the proposed spillway.
Spoil management and stockpile	Large volumes of spoil will be generated, primarily through: • excavation of the upper reservoir • excavation of inlet / outlet structures • the diversion of Lake Lyell • the construction of the northern haul road • tunnelling works. This spoil will predominantly be utilised for: • dam walls (for the upper reservoir, cofferdams and sediment basin) • the HV switchyard pad • the upper reservoir laydown pad • the main site compound pad • the infill of Farmers Creek arm of Lake Lyell after the diversion of Lake Lyell. Any remaining spoil that cannot be re-used for the construction of these elements will be placed in a temporary spoil stockpile to the south of Farmers Creek. Excess spoil will be transported offsite to a facility approved to accept the material.
Utilities during construction	**Construction water supply:** It is expected that potable water supply will be through water tanks or onsite potable water treatment plant supplied by bore water, unless a connection into the network can be achieved with Lithgow City Council. Construction water will be pumped from boreholes within the construction envelope, the lake itself, drawn from the sediment basin or recycled water from the water treatment plant.
	Construction power supply: Approximately 3 km of 11 kV electricity connection will need to be installed within the site from Sir Thomas Mitchell Drive to the batch plant, site compounds, tunnel entrances and HV workshop and satellite compound. Generators will be used to supply initial power until the external supply is completed.
	Wastewater connection: Wastewater from the accommodation camp and site ablution facilities will be either treated onsite and/or transported from the site by tanker truck and disposed of at a wastewater treatment plant.



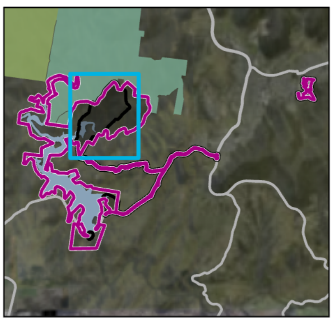
\\emm.local\xdrive\2022\E221111- Lake Lyell PHES EIS\GIS\02_Maps_EIS\EIS035_KeyProjElements\EIS035_KeyProjElements_20251103_02.aprx 12/12/2025

Source: EMM (2025); Lake Lyell Project Pty Ltd (2025); DCSSS (2024); GA (2009); MetroMap (2025)

0 250 500 m

GDA2020 MGA Zone 56

N



KEY

- Project area
- Permanent road
- Above ground design
- Underground design
- Permanent spoil emplacement

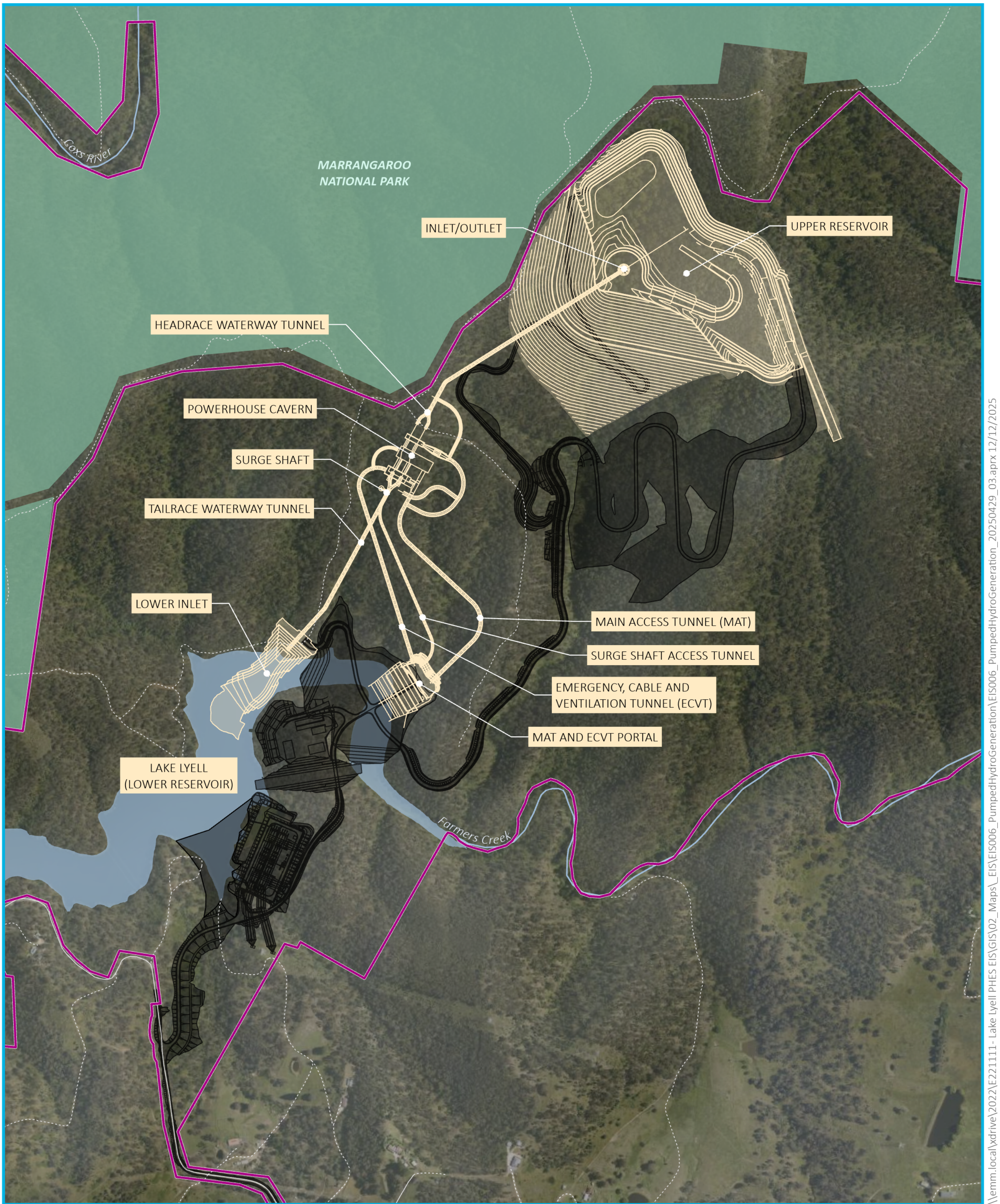
Existing environment

- Major road
- Minor road
- Named watercourse
- NPWS reserve
- State forest

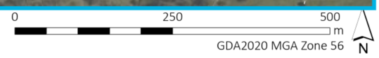
Overview of the project

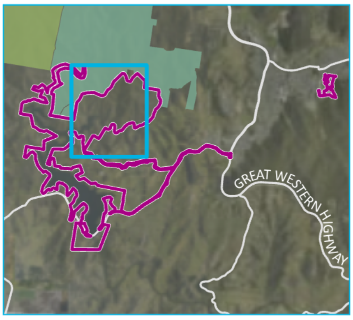
Lake Lyell PHES
Detailed Project Description
Figure 1.2

EMM
creating opportunities



Source: EMM (2025); Lake Lyell Project Pty Ltd (2025); DCSSS (2023); MetroMap (2025); GA (2009)





KEY
- Project area
- Project design
- Pumped hydro generation component

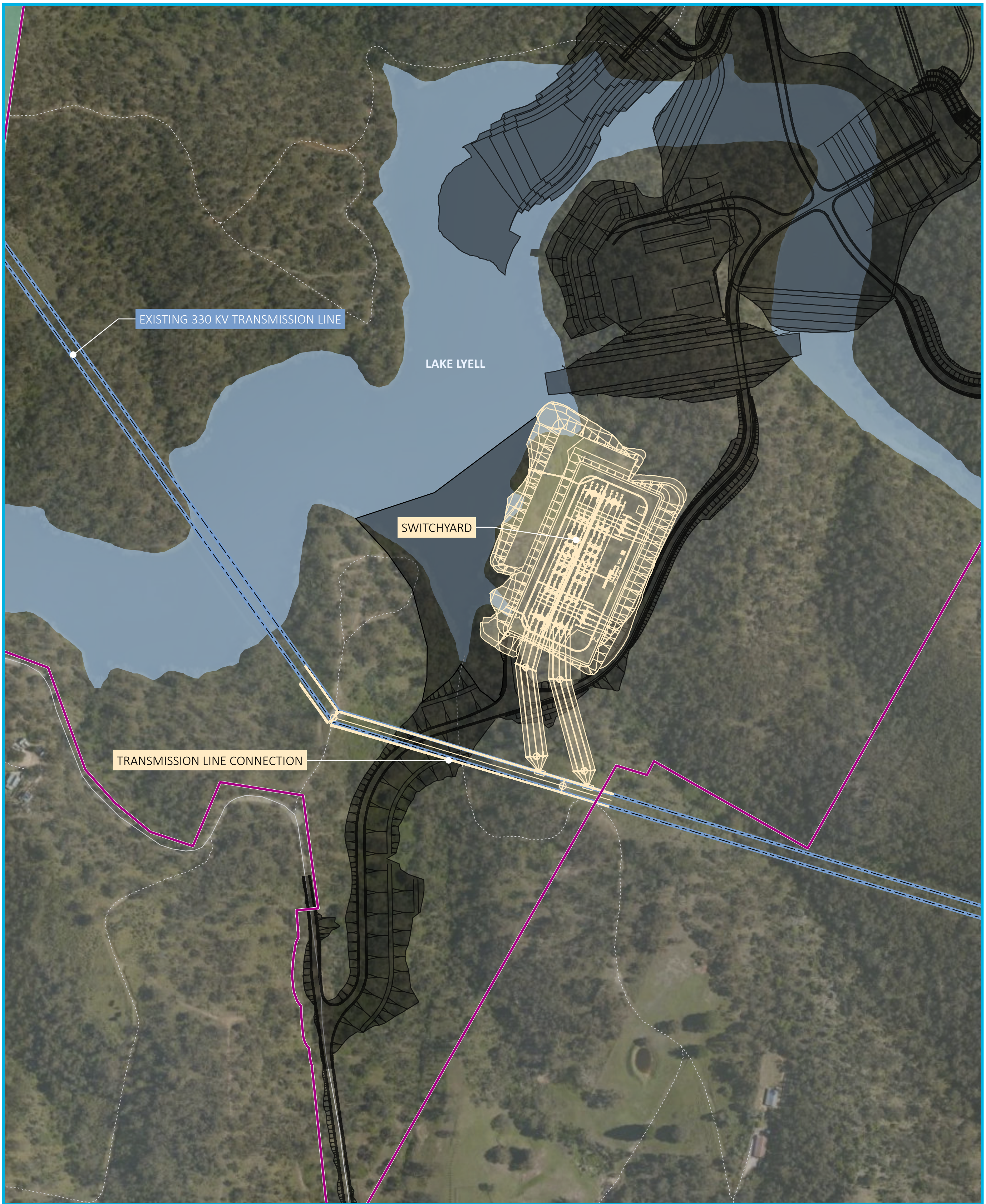
Existing environment
- Minor road
- Vehicular track
- Named watercourse
- Named waterbody
- NPWS reserve

INSET KEY
- Major road
- NPWS reserve
- State forest

Pumped hydro generation components

Lake Lyell PHES
Detailed Project Description
Figure 1.3

EMM
creating opportunities



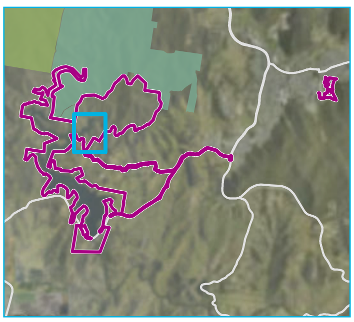
\\emm.local\xdrive\2022\E221111- Lake Lyell PHES EIS\GIS\02_Maps_EIS\EIS007_TransmissionConnectionComponents\EIS007_TransmissionConnectionComponents_20250925_04.aprx 20/11/2025

Source: EMM (2025); Lake Lyell Project Pty Ltd (2025); DCSSS (2023); MetroMap (2025); GA (2009)

0 100 200 m

GDA2020 MGA Zone 56

N



KEY

- Project area
- Project design
- Transmission connection component

Existing environment

- 330 kV transmission line
- Minor road
- Vehicular track
- Named waterbody
- NPWS reserve

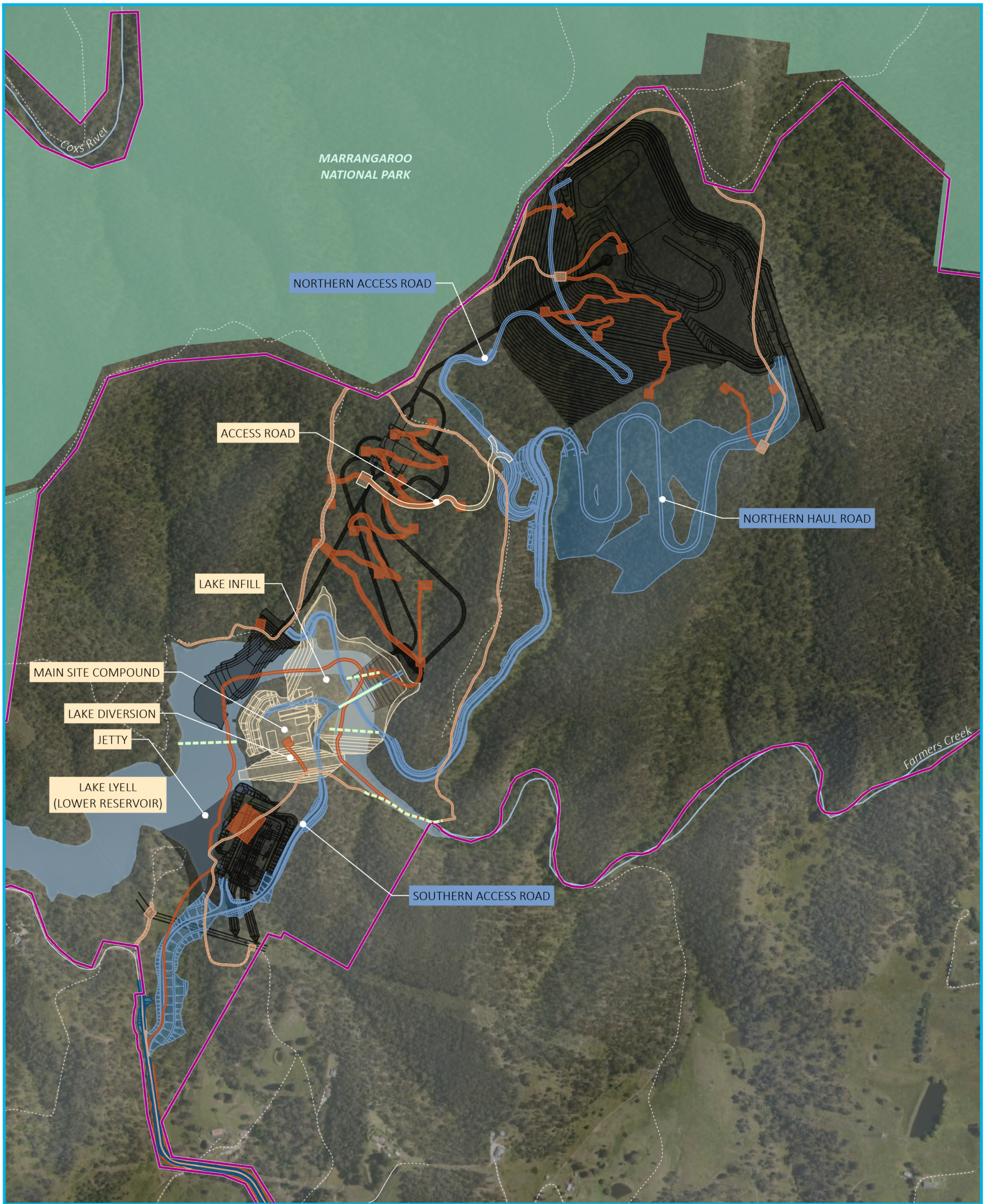
INSET KEY

- Major road
- NPWS reserve
- State forest

Transmission connection components

Lake Lyell PHES
Detailed Project Description
Figure 1.4

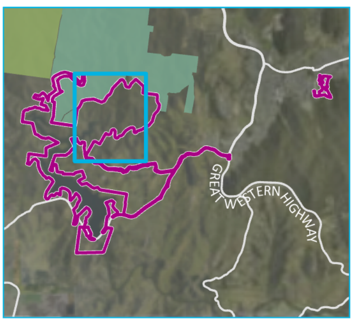
EMM
creating opportunities



Source: EMM (2025); Lake Lyell Project Pty Ltd (2025); DCSSS (2023); MetroMap (2025); GA (2009)

0 250 500
m
GDA2020 MGA Zone 56
N

\\emm.local\xdrive\2022\E221111- Lake Lyell PHES EIS\GIS\02_Maps_EIS\EIS008_PermanentAccessAncillary\EIS008_PermanentAccessAncillary_20250429_03.aprx 12/12/2025



KEY

- Project area
- Project design
- Site access
- Ancillary facilities
- Permanent crossing
- Temporary crossing
- Early works
- Existing track

Existing environment

- Minor road
- Vehicular track
- Named watercourse
- Named waterbody
- NPWS reserve

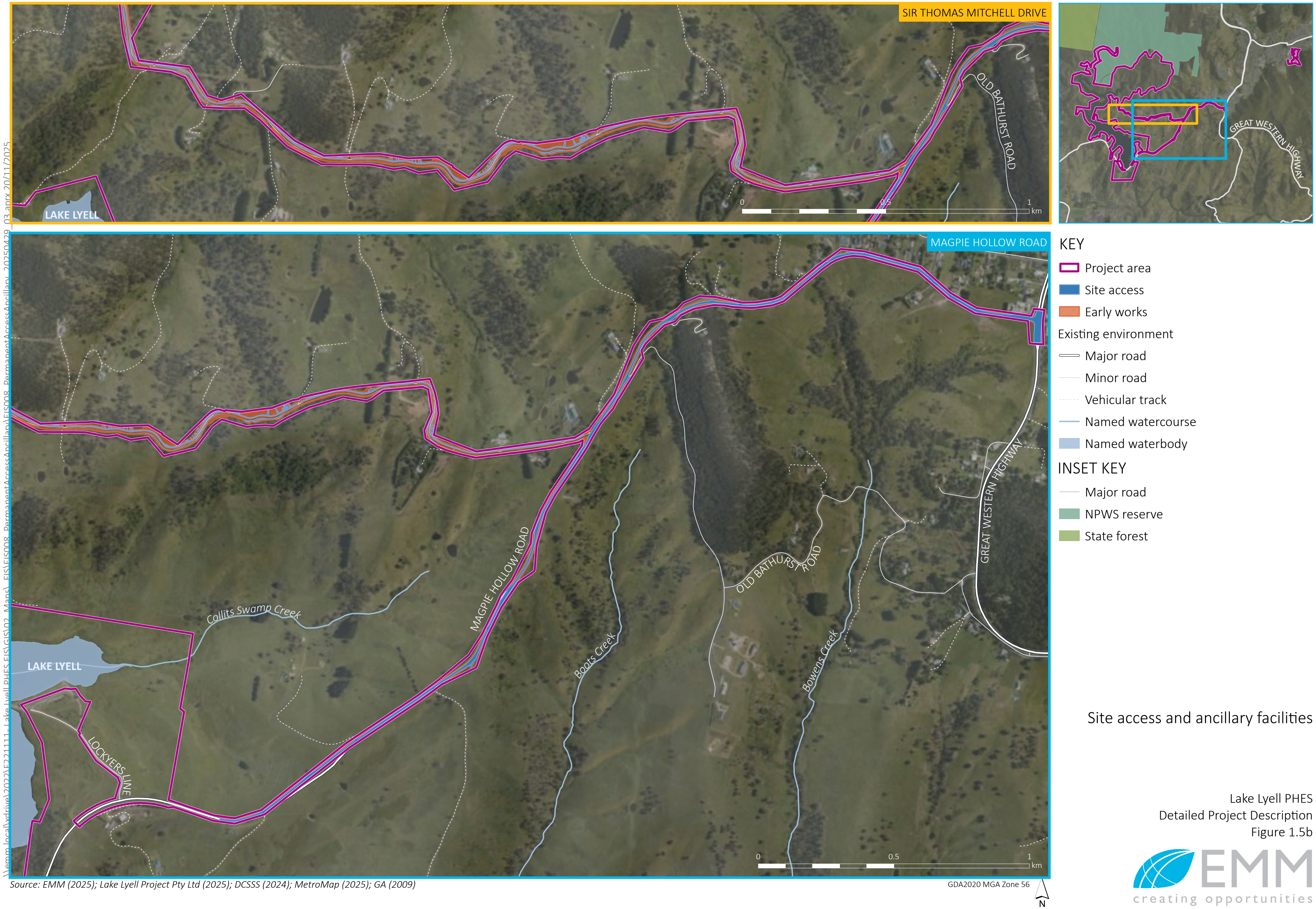
INSET KEY

- Major road
- State forest
- NPWS reserve

Site access and ancillary facilities

Lake Lyell PHES
Detailed Project Description
Figure 1.5a

EMM
creating opportunities



KEY

- Project area
- Site access
- Early works

Existing environment

- Major road
- Minor road
- Vehicular track
- Named watercourse
- Named waterbody

INSET KEY

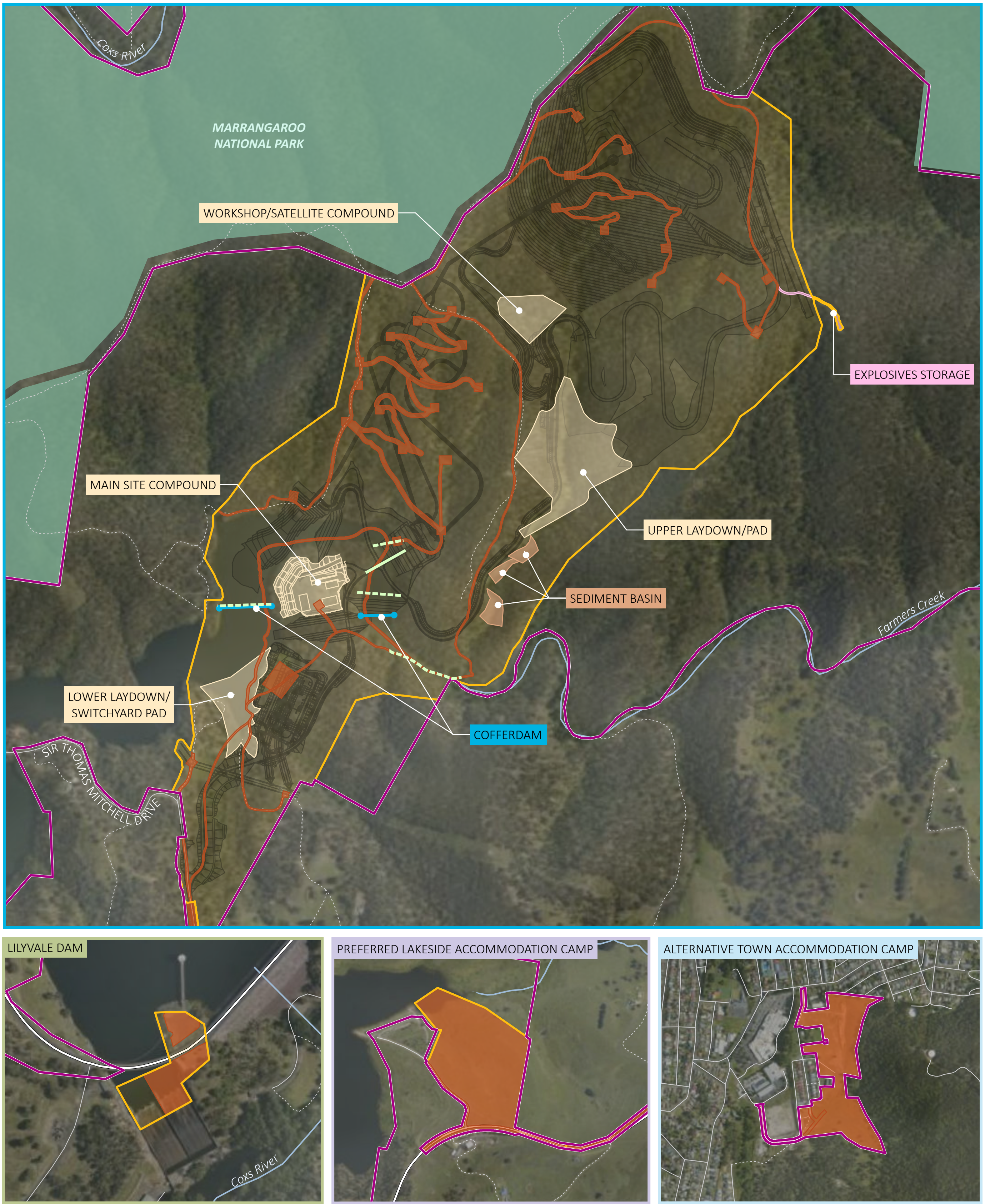
- Major road
- NPWS reserve
- State forest

Site access and ancillary facilities

Lake Lyell PHES
Detailed Project Description
Figure 1.5b

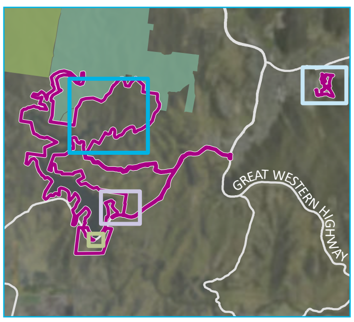
EMM creating opportunities

Source: EMM (2025); Lake Lyell Project Pty Ltd (2025); DCSSS (2024); MetroMap (2025); GA (2009)



Source: EMM (2025); Lake Lyell Project Pty Ltd (2025); DCSSS (2023); MetroMap (2025); GA (2009)

0 250 500 m
GDA2020 MGA Zone 56
N



KEY

- Project area
- Contruction envelope
- Construction component
- Indicative cofferdam
- Permanent bridge crossing
- Temporary bridge crossing
- Background project design
- Building pad
- Explosives storage
- Sediment basin
- Early works

Existing environment

- Minor road
- Vehicular track
- Named watercourse
- NPWS reserve

INSET KEY

- Major road
- NPWS reserve
- State forest

Other construction components or temporary works

Lake Lyell PHES
Detailed Project Description
Figure 1.6

EMM
creating opportunities

1.3 Design integration and assessment approach

A design integration and assessment (DIAA) process (refer to Figure 1.7) was undertaken to develop the design and construction methods presented in the EIS, with the guiding principles of avoiding and minimising environmental impacts where possible and engaging with key stakeholders throughout the process.

The DIAA involves identifying potential environmental impacts of an initial design, and then iterating aspects of that design to avoid and minimise the identified potential impacts where possible. This process is repeated to ensure a balanced assessment is completed, and that all reasonable and feasible changes to the design have been completed to ensure the preferred project demonstrates the best possible environmental and social outcome.

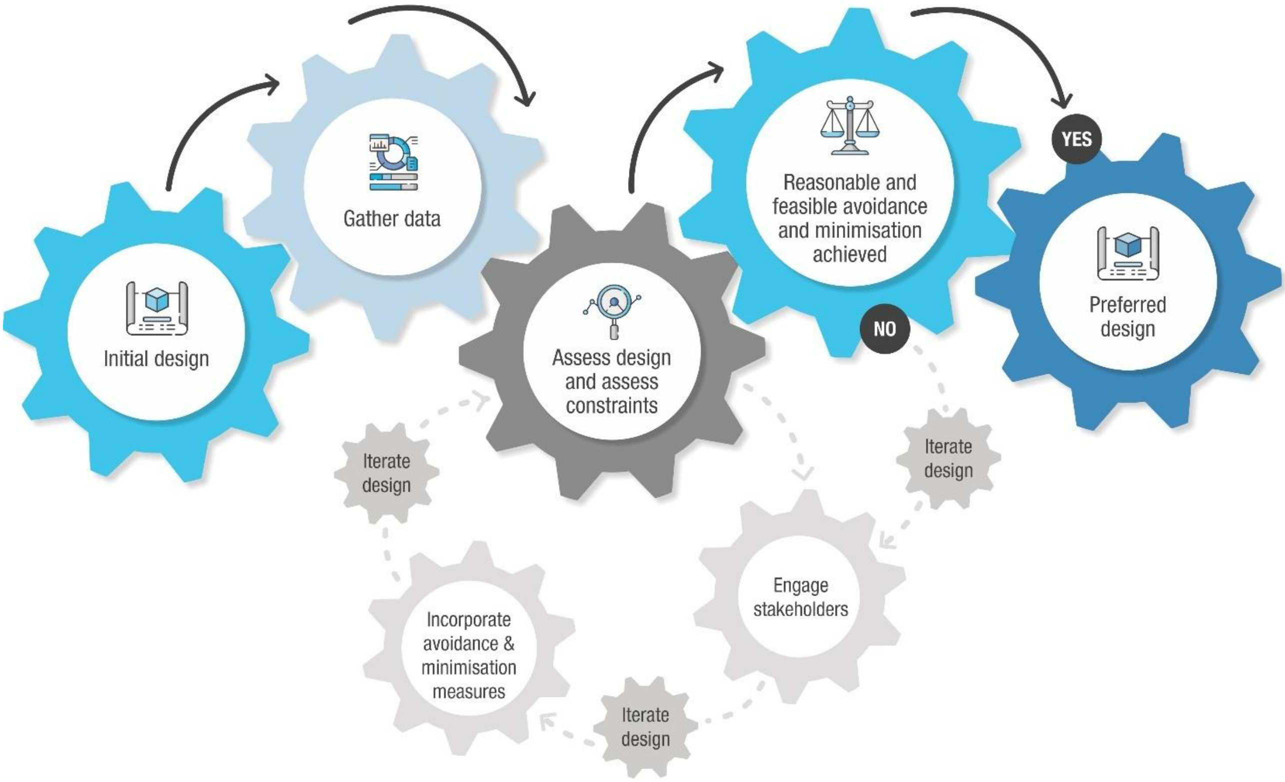


Figure 1.7 Design iteration and assessment approach

The DIAA was applied collaboratively by the project team, including engineers, environmental specialists and community and engagement consultants, and incorporated feedback from government agencies, Lithgow City Council (Council), and the community.

The project, while complex in design, has had the advantage of an early contractor involvement (ECI) process. The ECI process provides a means to incorporate and “test” various design iterations, constructability and environmental recommendations, to ensure they are feasible, as part of the EIS preparation. This has provided a level of confidence in the concept design and certainty of the projects ability to incorporate avoidance and mitigation measures.

1.3.1 Key constraints

Key environmental and social constraints identified early on in project design where no development will occur are:

- Marrangaroo National Park – project will avoid direct impacts and minimise indirect impacts
- Farmers Creek – project will avoid impacts to the natural system of Farmers Creek

- Lithgow – project will avoid or reduce visibility of operational infrastructure from Lithgow and surrounding residential areas.

As part of the EIS studies, further key constraints were identified such as breeding and foraging habitat for threatened bird species and native aquatic fauna (platypus). It was recommended that where possible, the development avoid and/or minimise impacts.

1.3.2 Avoidance and minimisation

Since the projects initial inception, engagement has been carried out with the local community, local and State government, and environmental and social studies have been progressed (as part of the EIS). These activities have informed the concept design developed for the project to ensure it has incorporated measures to avoid and minimise impacts as much as practical. Avoidance and minimisation measures adopted include the following:

- Relocation of the upper reservoir from the Mount Walker southern ridge to the west, within a gully and below the ridge. The relocation means that views of PHES infrastructure from Lithgow, Bowenfels and South Bowenfels are avoided.
- Selection of a rockfill embankment dam within the gully. This utilises a cut fill balance as far as possible to maximise reuse and minimise the need for disposal or transport of material off site. Reuse options considered throughout the design, including using won material for the protection of the inlet / outlet structure and excavated rocks for concrete aggregates.
- Using existing access roads where possible, such as for geotechnical investigations and early works.
- Wherever possible, aligning construction haul roads and permanent access roads within the same disturbance footprint to minimise overall clearing of native vegetation and habitat. Northern haul road and permanent roads kept outside of major visual impact areas.
- Switchyard area used for construction laydown area to minimise construction footprint.
- Powerhouse and waterways located underground to minimise impacts to flora and fauna as well as noise and visual impacts.
- Project northern area focused in gully area to reduce visual impacts.
- Switchyard located low in the least hilly site to reduce cut and fill and in doing so reducing the footprint of the pad.
- Construction methods for the intake and its protection (i.e. cofferdam, floating boom) developed to avoid and minimise impacts to an Aboriginal site on northern bank of the Farmers Creek arm of Lake Lyell.
- Temporary accommodation camp locations are located close to the project to minimise travel distances as well as minimise impacts and improve benefit opportunities to the community.
- Development of operational principles for the PHES that allow continued public recreation and access.

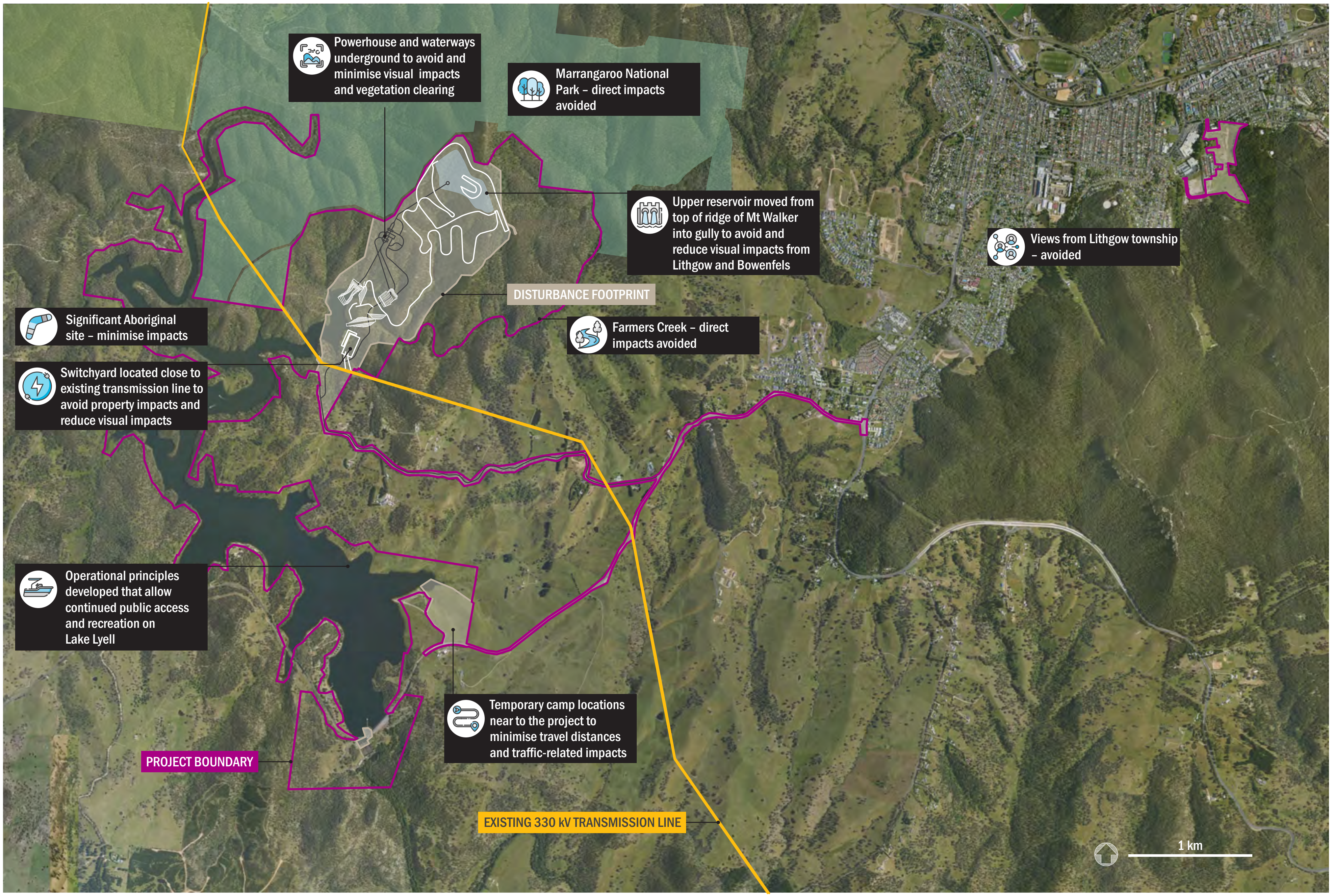


Figure 1.8 Constraints and avoidance

1.3.3 Ongoing design development

The principles to avoid and minimise impacts will continue to inform the refinement and optimisation of the project during detailed design and construction. This is aided by the construction envelope developed for the project (refer to Figure 1.9). The construction envelope has been defined in the EIS as the boundary limits of where direct disturbance can occur. The disturbance footprint, also defined in the EIS, sets the total clearing limit for the project with reference to the types of vegetation and habitat that can be impacted.

With reference to construction envelope, design flexibility is maintained for:

- geotechnical investigations
- alignment and design of internal roads
- powerhouse arrangement and fit-out
- construction methods
- installation of utilities.

With reference to outcomes-based assessment:

- water management
- spoil placement / landform
- progressive and final rehabilitation.

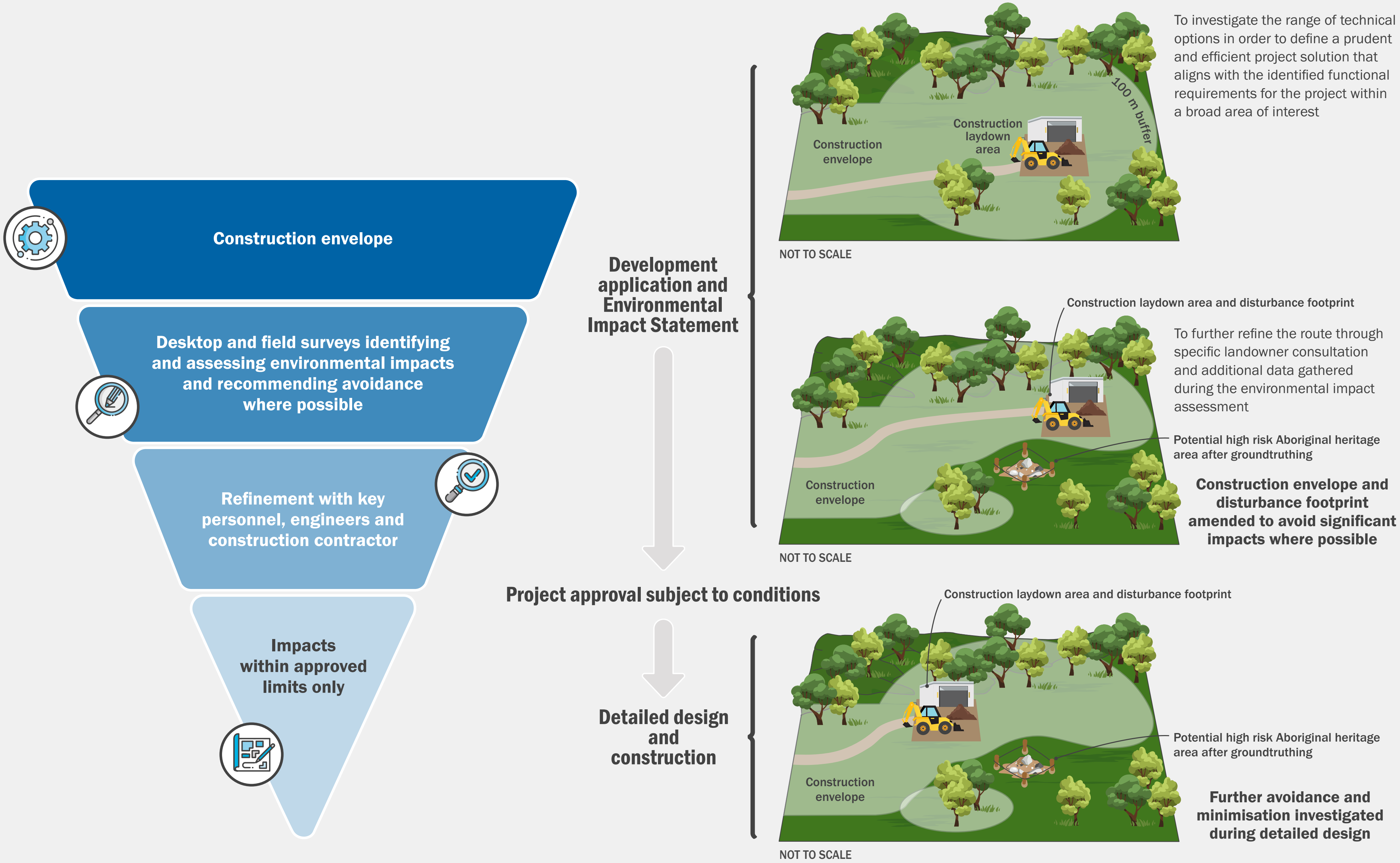


Figure 1.9 Construction envelope approach to project limits

2 Project areas

The project area is located about 5 km west of Lithgow, within the City of Lithgow local government area (LGA). The project area includes parts of Mount Walker, Lake Lyell, and adjacent land, and the road corridors needed for site access.

The project is based on a concept design and therefore it is anticipated that ongoing refinements will occur as part of the detailed design. The concept design demonstrates project feasibility and provides sufficient detail to inform the preparation of the EIS and seek approval. It is anticipated any optimisation or refinement of the design could occur within the design parameters and construction envelope provided by the concept and assessed in the EIS.

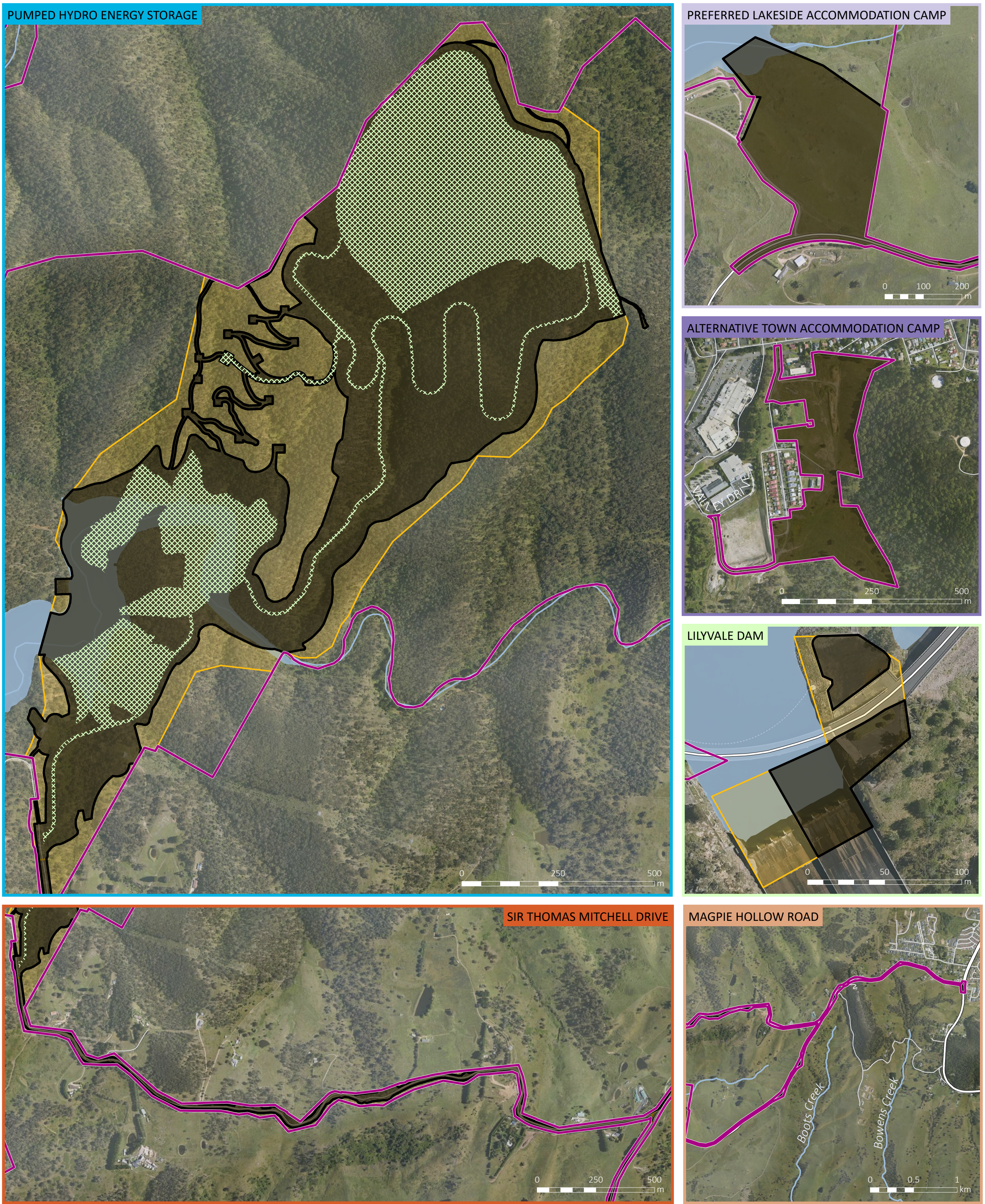
Aligned with the DIAA approach (previously described in Section 1.3), and to accommodate future optimisation and refinement to the design as it progresses, a 'project area', 'construction envelope', 'disturbance footprint' and 'operational footprint' approach have been defined for the project (refer to Table 2.1) and are shown in Figure 2.1. Land properties within the project areas are provided in Table 2.2.

All physical disturbance generated by the project will be primarily contained on land owned by EnergyAustralia. The construction of the project will require a variety of significant construction activities to be undertaken to establish project infrastructure as well as supporting infrastructure, some of which are temporary. Consequently, the operational footprint and the area needed for construction will differ.

Table 2.1 Project areas

Term	Definition / Description
Project area	The project area is a broader buffer around the project and represents the area that was investigated during the environmental assessments. The project area is largely confined to land owned by EnergyAustralia except for the primary access route on Council owned land and the alternative temporary accommodation camp site in Lithgow. The project area includes both the land that will be physically disturbed for the project (directly and indirectly) as well as land where no disturbance or impact will occur.
Construction envelope	The construction envelope represents the maximum extent of where disturbance may occur during the construction of the project. To derive the construction envelope, buffers have been applied around project infrastructure and work areas to provide a level of flexibility where required. Some areas have reduced buffers to indicate reduced flexibility due to environmental or design constraints to be avoided. The construction envelope for the project covers an area of around 197 hectares (ha).
Disturbance footprint	The disturbance footprint represents the physical disturbance that can be expected as part of the construction works, a total disturbance not exceeding 137 ha. As the design is refined, the final siting of the disturbance footprint can move within the construction envelope, subject to the recommended environmental management measures, and provided it does not exceed any limits defined by the construction envelope or vegetation clearing thresholds. Noting that two options are presented for a temporary accommodation camp and ultimately only one will be selected and built, the disturbance footprint considering each option is: • approximately 132 ha for the project with a Town camp (of 12.5 ha), or • approximately 137 ha for the project with a Lakeside camp (of 17.9 ha). Pre-construction and enabling work activities will form part of an early works package, and are a subset of the total disturbance needed to construct the project. The early works disturbance footprint consists of up to~37 ha of the total disturbance footprint. Refer to Section 4.3. Note: The disturbance footprint includes up to 9.4 existing disturbed areas, such as road pavement.
Progressive rehabilitation	Progressively, and at the end of construction, temporary components that are required to support the construction of the project will be rehabilitated and returned to a state representing its previous use. The exceptions to this are the areas required for permanent operation of the project, which would be retained (see below operational footprint). Approximately 74 ha of the disturbance footprint would be progressively rehabilitated.

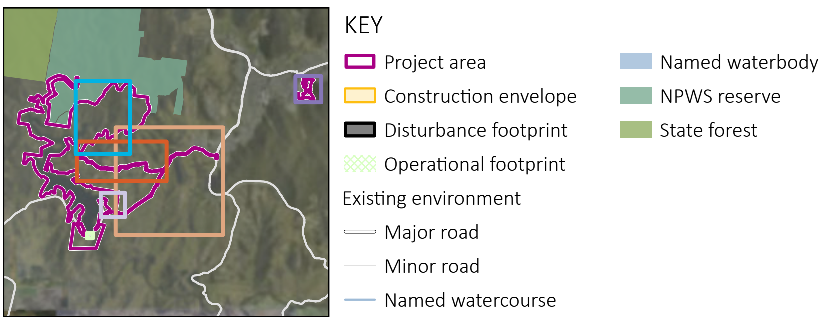
Term	Definition / Description
Operational footprint	The operational footprint represents the permanent disturbance of the land following progressive rehabilitation. The operational footprint covers an area of around 47 ha. A further 16 ha of the disturbance footprint comprises external road upgrades that would be passed back to Council and does not form part of the operational footprint. This includes Magpie Hollow Road and Sir Thomas Mitchell Drive and associated intersections.



Source: EMM (2025); Lake Lyell Project Pty Ltd (2025); DCSSS (2024); GA (2009); MetroMap (2025)

GDA2020 MGA Zone 56

N



Project areas

Lake Lyell PHES
Detailed Project Description
Figure 2.1

EMM
creating opportunities

\\emm.local\xdrive\2022\E221111 - Lake Lyell PHES EIS\GIS\02_Maps_EIS\EIS012_ProjectAreas\EIS012_ProjectAreas_20250430_02.aprx 20/11/2025

Table 2.2 Land within the project area

Lot	DP	Project elements
103	751651	Upper reservoir, etc
2	792415	Accommodation camp option (Lakeside site- Lake Lyell)
26	1244557	Accommodation camp option (Town site- Pottery Estate)[2]
4	1005128	Accommodation camp option (Town site- Pottery Estate)[2]
3	246233	Ancillary works area
4	246233	Ancillary works area
2	246233	Ancillary works area
4	634322	Lake Lyell (existing reservoir footprint)
1	260856	Lake Lyell (existing reservoir footprint)
2	260856	Lake Lyell (existing reservoir footprint)
12	616071	Lake Lyell (existing reservoir footprint)
382	618960	Lake Lyell (existing reservoir footprint)
3	260856	Lake Lyell (existing reservoir footprint)
1	261232	Lake Lyell (existing reservoir footprint)
1	246233	Lake Lyell (existing reservoir footprint)
11	751651	Lake Lyell (existing reservoir footprint)
15	626299	Lake Lyell (existing reservoir footprint)
34	751651	Lake Lyell (existing reservoir footprint)
20	619350	Lake Lyell (existing reservoir footprint)
27	751651	Lake Lyell (existing reservoir footprint)
57	791928	Lake Lyell (existing reservoir footprint)
61	791927	Lake Lyell (existing reservoir footprint)
3	263511	Lake Lyell (existing reservoir footprint)
1	634323	Lake Lyell (existing reservoir footprint)
21	619350	Lake Lyell (existing reservoir footprint)
253	751651	Lake Lyell (existing reservoir footprint)
2	1181411	Lake Lyell (existing reservoir footprint)
6	1181411	Lake Lyell (existing reservoir footprint)
3	1181411	Lake Lyell (existing reservoir footprint)
5	1181411	Lake Lyell (existing reservoir footprint)

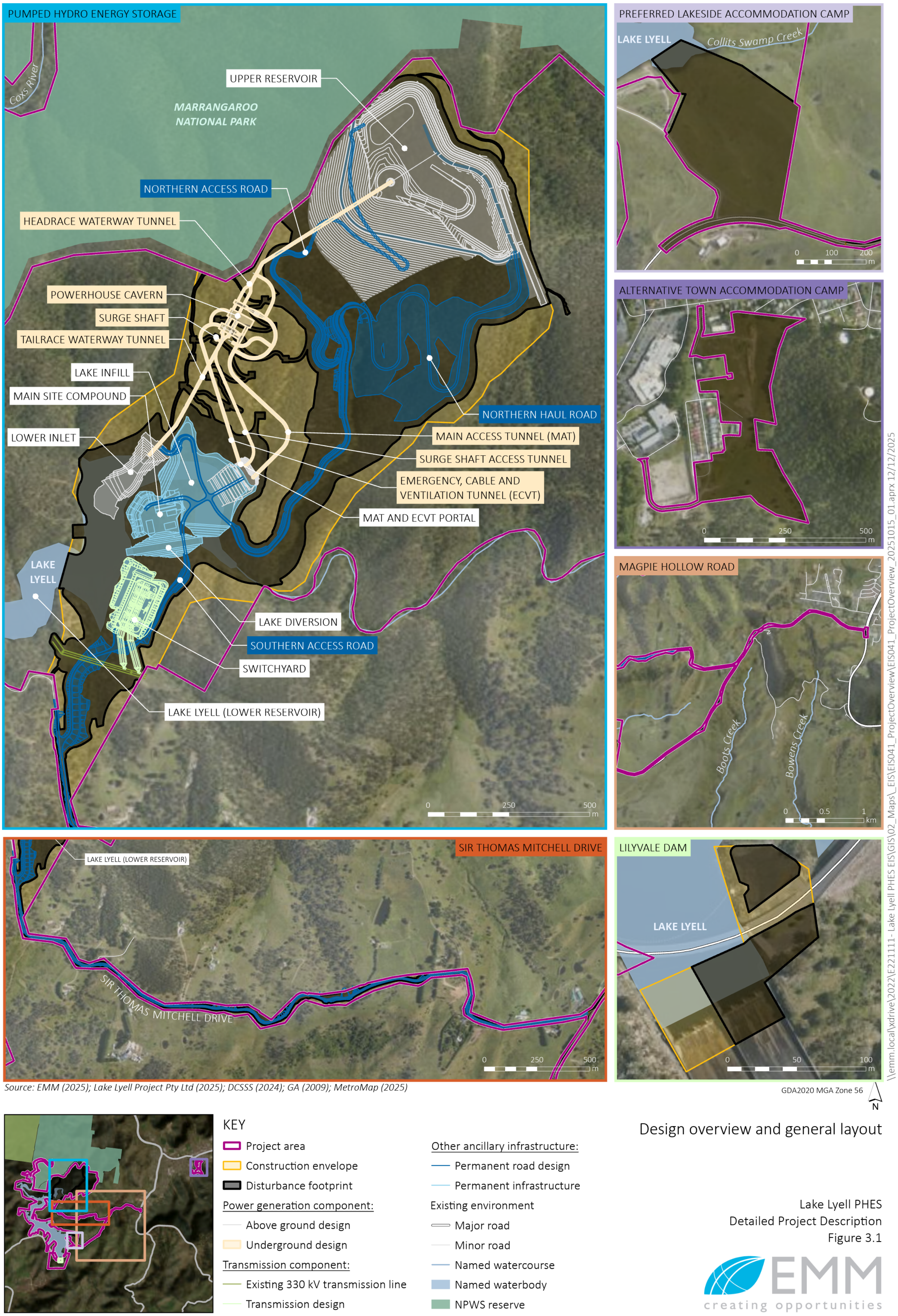
2 As an alternative to the lakeside construction camp LLP would enter into a lease for exclusive use of the identified Lot in Table 2.2 for the duration of construction and commissioning work

Lot	DP	Project elements
7	1181411	Lake Lyell (existing reservoir footprint)
1	1181411	Lake Lyell (existing reservoir footprint)
8	1181411	Lake Lyell (existing reservoir footprint)
9	1181411	Lake Lyell (existing reservoir footprint)
1	1304125	Lake Lyell (existing reservoir footprint)
2	1304125	Lake Lyell (existing reservoir footprint)
3	1304125	Lake Lyell (existing reservoir footprint)
4	1304125	Lake Lyell (existing reservoir footprint)

3 Design and layout

The overall general arrangement and layout of the project is shown in Figure 3.1. All detailed drawings and plans for the concept design are provided separately in Appendix B2 of the EIS. To assist readability, illustrations of designs have been included in this chapter.

This chapter describes the design parameters for the key project elements.



Design overview and general layout

Lake Lyell PHES
Detailed Project Description
Figure 3.1

3.1 Upper reservoir

Purpose: to hold and store water for energy generation.

Construction method summary: excavation via cut and fill, with excavated rock being re-used to build the rockfill dam.

Final land use: permanent infrastructure.

3.1.1 Design

The proposed design and layout for the upper reservoir is shown in Figure 3.2.

The upper reservoir includes a rockfill embankment, channel spillway and other supporting infrastructure and instrumentation (such as monitoring equipment and lightning protection rods). A PVC geomembrane liner will be installed across the upstream face of the dam, to provide a waterproof barrier and maintain the storage volume. The upper inlet/outlet structures will be installed within the deepest part of the reservoir which is the dead storage volume (refer to Section 3.4.1).

The total storage capacity of the upper reservoir will be 5.3 GL, with the reservoir surface area covering approximately 165,000 m^2 at full supply level (FSL). The FSL of the reservoir is 1,050 m AHD, with a minimum operational level (MOL) of 1,010 m AHD. As such, the working water level range is 40 m.

The rockfill embankment will have an upstream slope of 1.4 H:1.0 V, with an internal height of 80 m and external height of ~150 m extending down from crest to the deepest toe of the dam.

The channel spillway provides protection from over-pump risk and is located at the eastern end of the reservoir. It will only be used in the extreme malfunction event of over-pumping should the FSL of the upper reservoir be exceeded by 0.8 m between FSL level and top of parapet wall, in which case the water discharges to the south of the reservoir and ultimately into the Farmers Creek arm of Lake Lyell.

3.1.2 Construction

The construction strategy for the upper reservoir has been developed to respond to challenges within the steep terrain while still aiming to minimise environmental impacts and disturbance.

The upper reservoir will be built via excavation techniques using various plant such as scrapers, dump trucks and dozers. Due to the hardness of the rock, controlled blasting techniques will also be needed (see Section 4.6 for a description of this technique). The excavated material will be transported to the toe of the reservoir to build up (fill) and compact the embankment dam. The sequencing of cut and fill activities to build the reservoir is shown in Figure 3.3. The upper reservoir will be cut from one main area which forms the back wall of the reservoir, and placed within one main fill area which forms the front wall of the reservoir (i.e. the dam). Placement will be in layers of placement and compaction until the dam height is reached.

Preliminary geotechnical investigations indicate the extracted rock from the cut will be of sufficient volume and material suitability to complete the rockfill embankment. Excess excavated material will be transported to the upper reservoir laydown pad in line with the proposed spoil management strategy for the project (see Section 4.7).

The geomembrane liner will be “keyed” to bedrock on the inner surface of the dam wall. This method will ensure stability and durability of the liner.

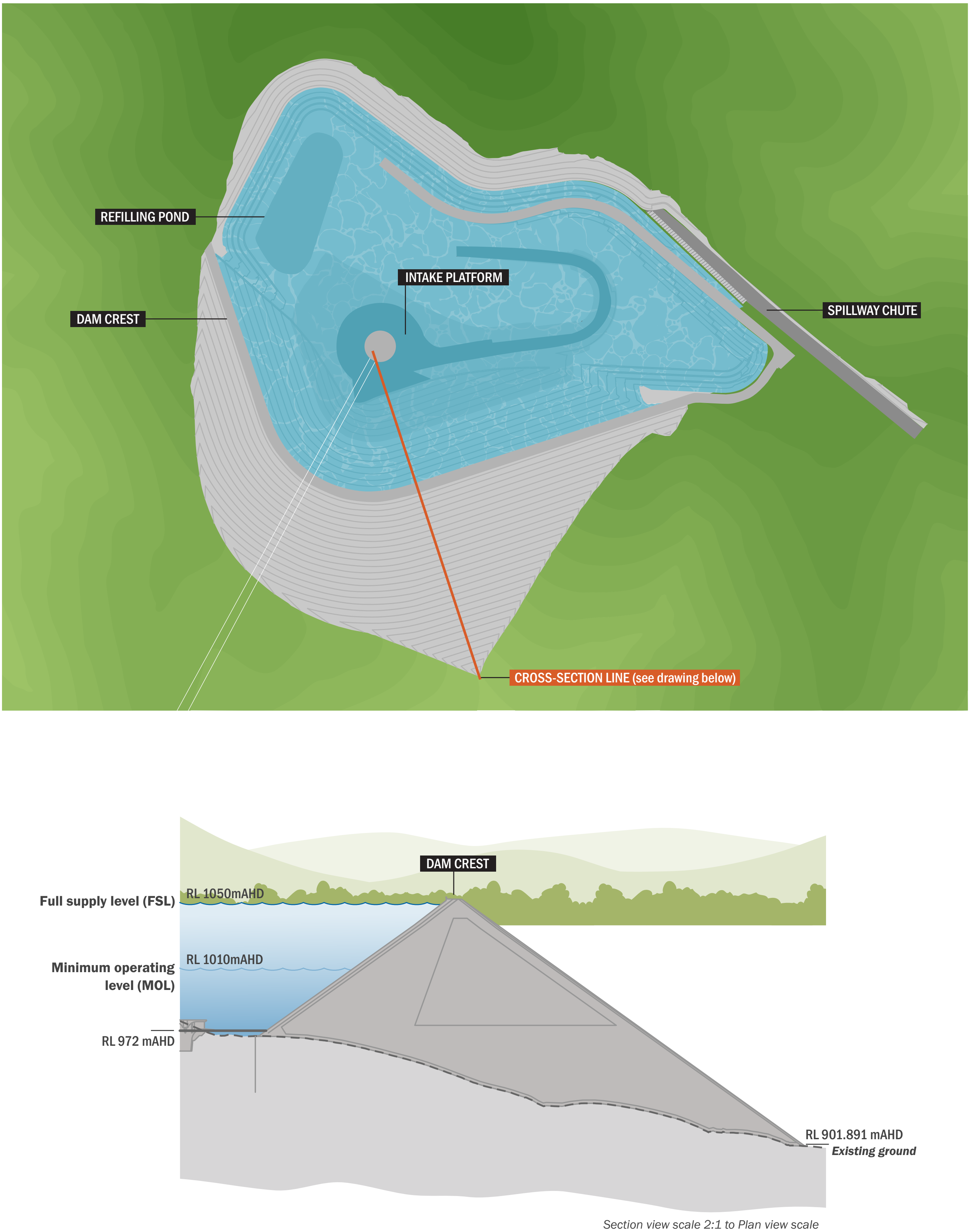


Figure 3.2 Upper reservoir design – plan view and section

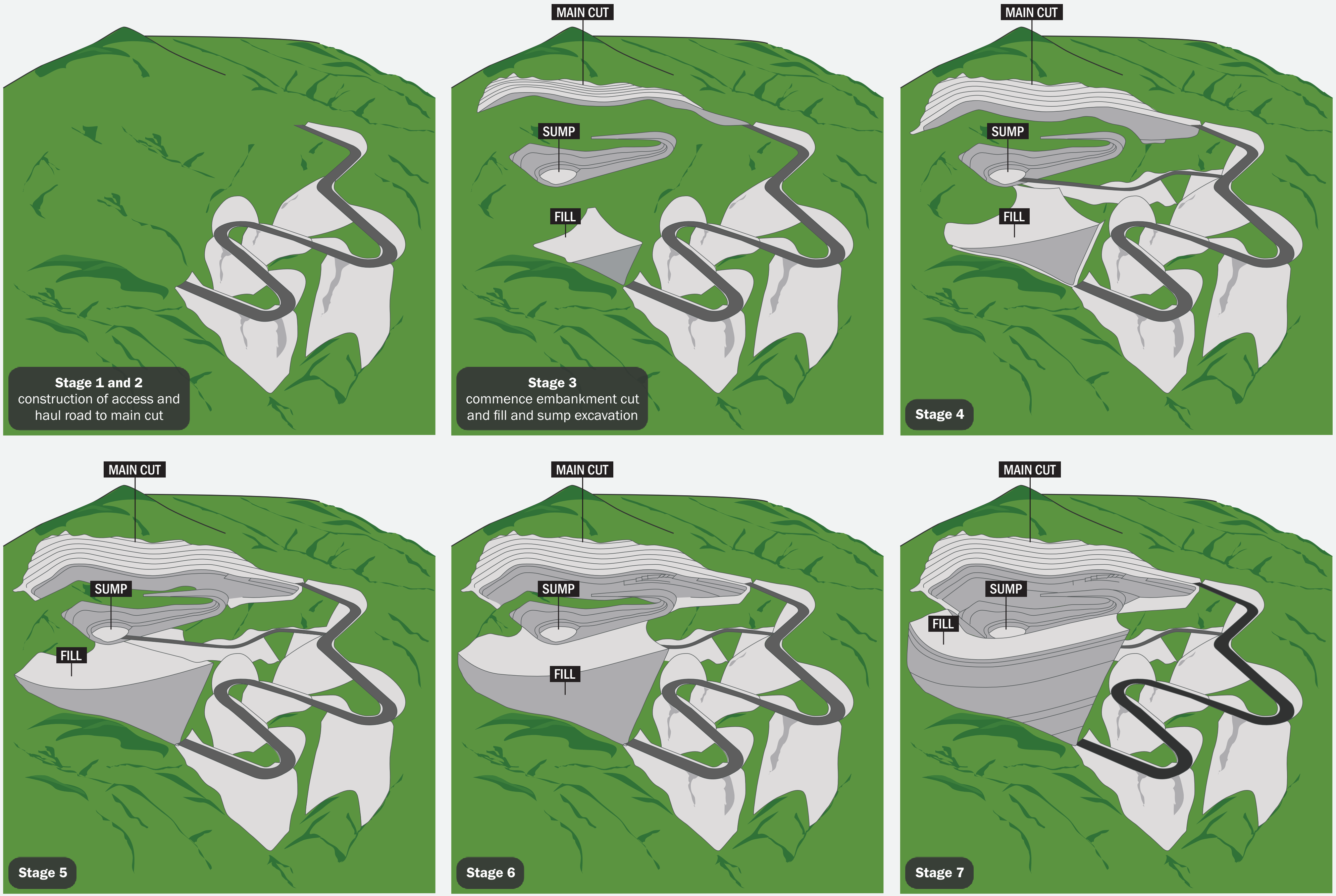


Figure 3.3 Upper reservoir – earthworks sequencing

3.2 Lower reservoir (Lake Lyell)

Purpose: to hold and store water for energy generation.

Construction method summary: none, reservoir is existing infrastructure.

Final land use: existing permanent infrastructure.

Lake Lyell will act as the project's lower reservoir; hence, no new lower reservoir or dam will need to be constructed. The lake was established in 1982 with the construction of Lilyvale Dam and is filled by natural flow from the Coxs River and Farmers Creek. The total storage capacity of the reservoir is 34.2 GL, with the reservoir catchment of some 380 km^2 and a surface area covering 2.34 km^2 at FSL. The existing reservoir has an operating range of 24.2 m from 785.5 m AHD (FSL) to 761.3 m AHD (MOL). The operation of the PHES will only occur within the top 5.5 m of this range (PHES MOL of 780 m AHD to existing reservoir FSL of 785.5 m AHD). Each operational full cycle (9.6-hour pump and 6.2-to-8-hour generation) of the project would result in a maximum water level change of between 2.5 and 2.85 m, depending on the existing water level of Lake Lyell. The project cannot operate when the lake is below 780 m AHD, at which time the lake still has 22.9 GL of storage (78% of total storage (see Section 6 for details on the proposed operating regime).

3.3 Powerhouse and tunnels

Purpose: power generation and conveyance of water between upper and lower reservoir.

Construction method summary: drill and blast excavation, raised bore excavation, shaft/blind sinking.

Final land use: permanent infrastructure.

3.3.1 Design

The powerhouse for the project is located approximately 170 m below the existing surface. The upper and lower reservoirs will be connected to the powerhouse by a single waterway arrangement, which will pass water through turbines located within the machine hall. The waterway arrangement splitting to two with separate Main Inlet Valves on approach to the powerhouse will allow for improved reliability and maintenance, as one turbine will be able to continue to run independently of the other if required.

The power waterway tunnel arrangement is shown in Figure 3.4 and includes:

- a single vertical inlet/outlet shaft approximately 7 m in diameter which will extend down from the upper inlet / outlet structure
- a single inclined headrace tunnel that will extend downwards from the upper intake shaft, before it bifurcates into two tunnels leading to each pump-turbine unit in the powerhouse
- a single underground surge shaft will be located downstream of the powerhouse, connected to the single tailrace waterway and will run to a cavern accessible from an adit tunnel from the portal pad. The bottom of the surge shaft will be submerged, as pressure waves pass, typically during operational mode changes, the water level will rise and fall, this water column will absorb hydraulic transient water pressures and will also then see air either release of enter the top of the shaft to make up for the changing water level in the shaft
- the bifurcation section (downstream of the powerhouse) including isolating gates combines the two draft tube outlets into a single tailrace tunnel
- a single tailrace tunnel of approximately 7 m diameter will connect the lower intake structure and the powerhouse.

To protect the structure of the tunnels under pressure and limit groundwater inflows during operation, the waterways will typically be reinforced concrete lined with a combination of steel and concrete at higher pressure areas.

The orientation and arrangement of the powerhouse is subject to further refinement following additional geotechnical investigations and design, which may also result in refinement of waterway arrangements. However, a consistent approach to the caverns is anticipated. The powerhouse concept arrangement includes:

- powerhouse cavern, which houses the two pump-turbine and generation units
- transformer cavern, which houses the two transformers
- main inlet valves (MIV) located upstream of the powerhouse with the functionality to restrict hydraulic flow to turbines when required or for emergency isolation
- tailrace gate valves located downstream of the powerhouse housing hydraulic gates allowing to isolate hydraulic flows for maintenance or for emergency flood prevention.

The powerhouse cavern will be connected directly via access tunnels to the MIV cavern, emergency, cable and ventilation tunnel (ECVT) and transformer cavern. The precise location and orientation of powerhouse including caverns and tunnels alignment will be finalised after further site investigations.

The indicative dimensions of each of the caverns are included in Table 3.1; and the key equipment contained within the caverns is listed in Table 3.2. The layout of the project's caverns are shown in Figure 3.5.

Table 3.1 Approximate cavern dimensions

Cavern	Width (m)	Height (m)
Powerhouse cavern	26.5	62
Transformer cavern	20	18
MIV cavern	14	23
Tailrace gate cavern	10	32

Table 3.2 Key equipment to be housed in caverns

Equipment	Location
Reversible pump-turbine (x2)	Powerhouse cavern
Generator (x2)	Powerhouse cavern
Electric overhead crane	Powerhouse cavern
Transformer (x2)	Transformer cavern
Auxiliary transformers	Transformer cavern
De-watering system	Powerhouse cavern
Oil handling system	Powerhouse cavern
Pump turbine cooling system	Powerhouse cavern
Air cooling and venting system	Powerhouse cavern
High pressure air system	Powerhouse cavern
Fire detection system	Powerhouse and transformer cavern

Separate to the power waterways, the underground caverns will be connected to the surface by access tunnels. The access tunnels are:

- main access tunnel (MAT), approximately 7.5 m wide, provides the primary underground access and supply airflow to the powerhouse from a portal at the surface
- ECVT, approximately 5.5 m wide, provides a secondary underground access and supply airflow to the powerhouse from a separate portal at the surface.

Each tunnel will have a portal / entrance at the surface. It is anticipated that the portals would share an access pad, with a surface area of approximately 100 m x 50 m. The MAT and ECVT portals are shown on Figure 3.6.

3.3.2 Construction

To provide a suitable working platform for excavation of the tunnels, a flat pad (referred to as the portal pad) will be constructed at the portal entrance for the MAT, ECVT and the surge shaft access tunnel. The portal pad will be cut from the hillside. It will likely be constructed at the same time as the main haul road as it will be built through a cut and fill balancing approach, reusing excavated material to level the portal pad.

Once the portal pad has been established, excavation of the MAT and ECVT will follow. The excavation of the tunnels will predominantly be using the drill and blast method (refer to Section 4.4); however, some mechanical rock breaking is also anticipated. An acoustic wall or similar (i.e. blast doors) will be placed at the portal to reduce noise impacts. Excavated material from the tunnel will be brought back to the surface by trucks and stockpiled primarily for re-use in construction of the lake infill (refer to Section 3.5).

From the MAT, construction adits will be excavated into the tailrace tunnel, the powerhouse and into the MIV Cavern. The headrace tunnels will then be excavated towards the vertical shafts, and tailrace tunnels towards the inlet / outlet.

The vertical shafts will be constructed by either raised bore or shaft sinking method or possibly in combination. from the surge shaft cavern.

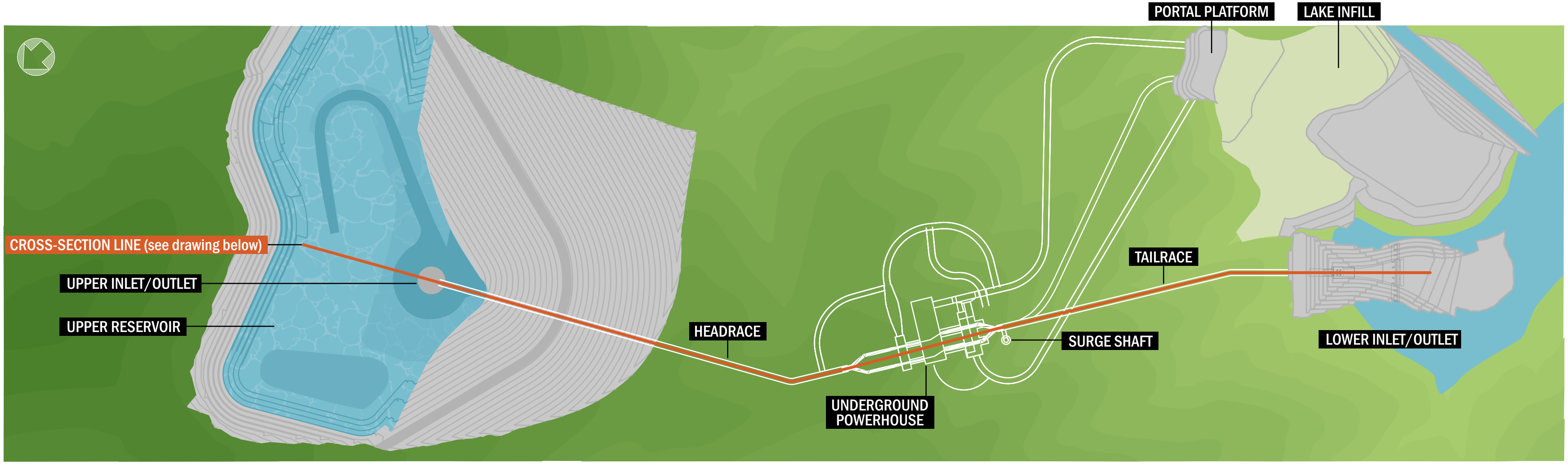
The raised bore machine will be established at the top of the required shaft. A pilot hole is drilled down. A cutter is attached to the bore at the bottom of the pilot hole via an access tunnel. The cutter is then pulled upwards as it spins creating a shaft. Spoil material drops down and is removed via the access tunnel. The cutter is pulled upward to the cavern and removed.

A shaft sinking method will commence with excavation from the top whereby excavated material is removed either through a winder that lifts the excavated material to the top or using a pilot hole (excavated using a raised bore methodology) through which material will be dropped to the bottom and removed via the access tunnel.

Lining of the vertical shafts and power waterways will be done in two stages:

1. rock supports will be placed to improve safe access for workers and then shotcrete applied

2. permanent concrete or steel lining will be installed.



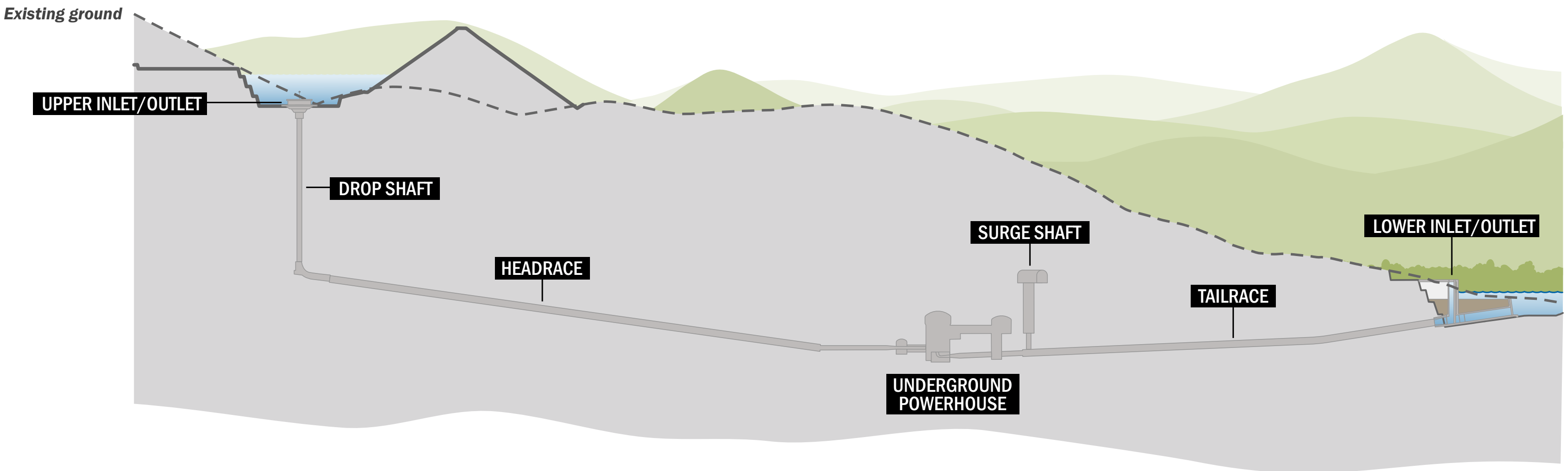


Figure 3.4 Powerhouse and waterway arrangement – plan view and section

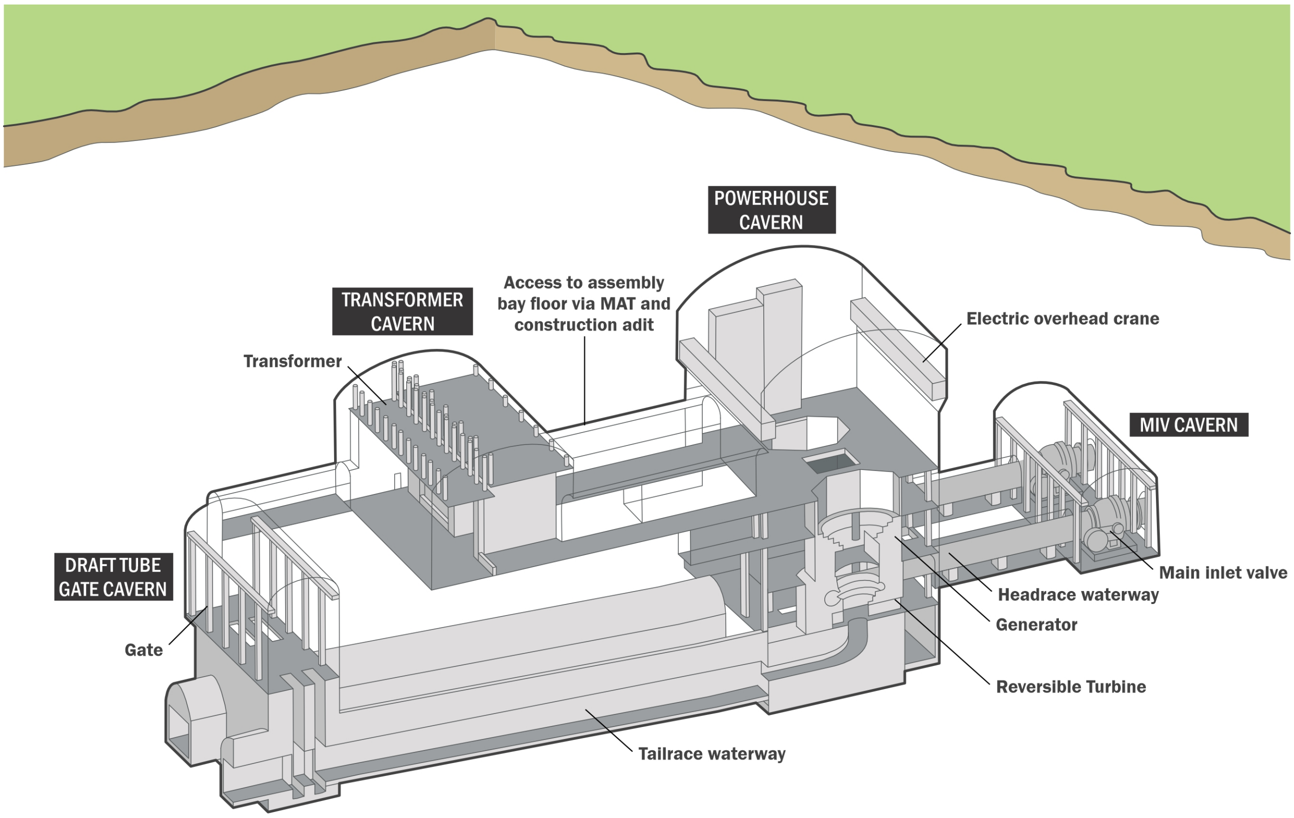


Figure 3.5 Powerhouse layout

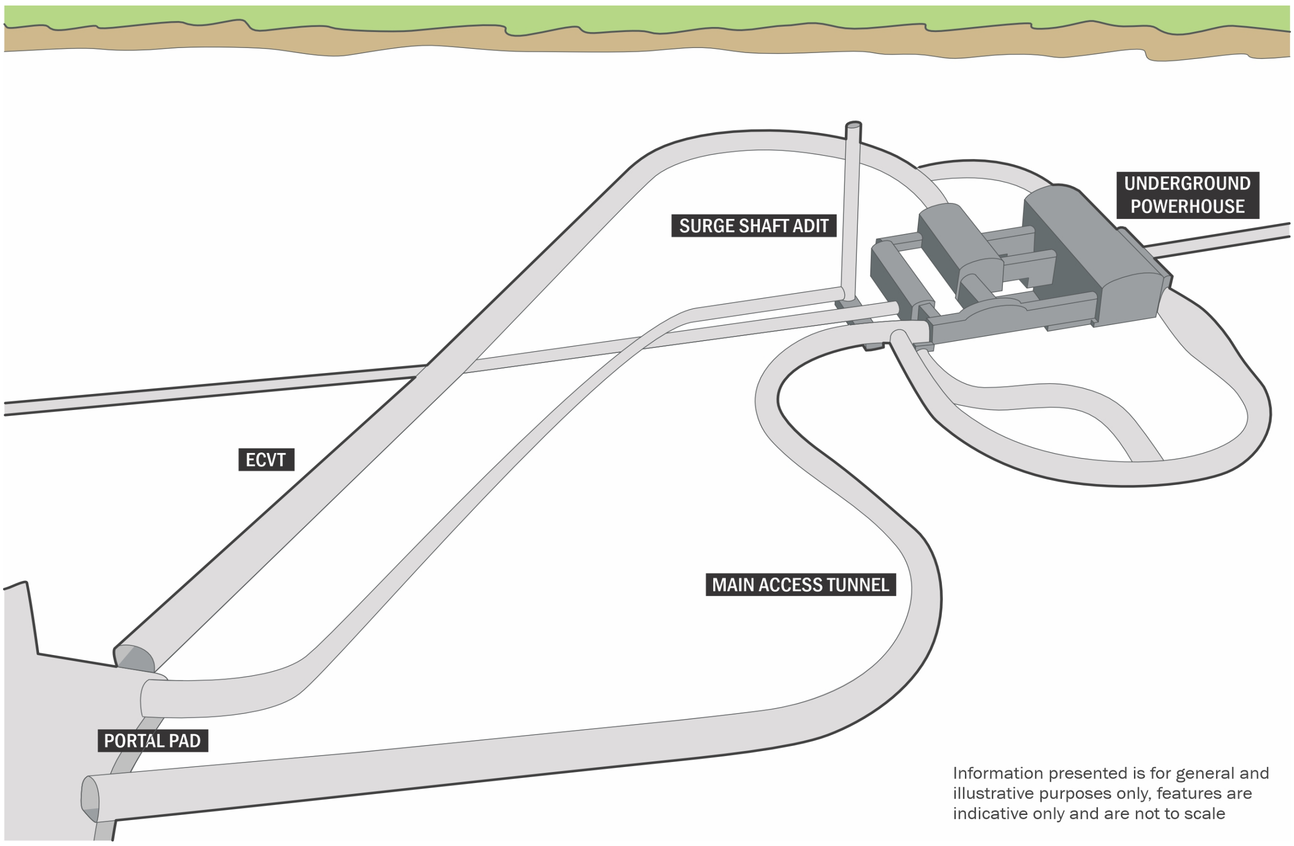


Figure 3.6 MAT and ECVT portals

3.4 Inlet/outlet structures

Purpose: to draw water in to, and release from, the power waterways.

Construction method summary: Upper inlet / outlet structure - raised bore with cast in-situ concrete structure at top of shaft (upper reservoir intake). Lower inlet / outlet structure - drill and blast excavation within cofferdams with cast in-situ concrete structure at outlet of tailrace tunnels.

Final land use: permanent infrastructure.

3.4.1 Upper reservoir inlet/outlet

i Design

The proposed design and layout for the upper reservoir inlet/outlet is shown conceptually in Figure 3.7.

The structure will be directly founded on rock. It includes a removable steel hatch to provide access to the shaft for maintenance operation. The layout allows placing and removal of trash racks which are designed to ensure debris isn't transferred into the power waterways.

ii Construction

The upper reservoir inlet/outlet would be built following completion of the raised bore excavation (refer to Section 4.4) of the vertical inlet/outlet tunnels. Its construction involves installation of formwork for cast-in-situ concrete pours, pre-cast structures and screens above the shaft.

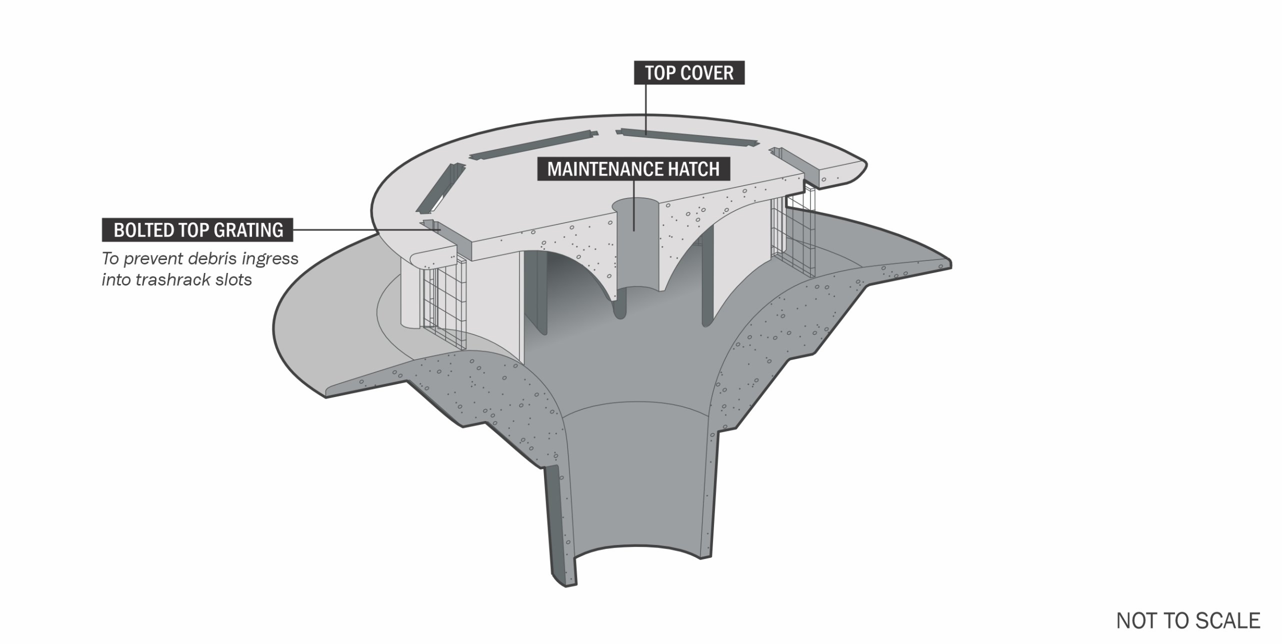


Figure 3.7 Upper reservoir inlet / outlet structure

3.4.2 Lower reservoir inlet/outlet

i Design

The proposed design and layout for the lower reservoir inlet / outlet is shown conceptually in Figure 3.8.

The inlet / outlet screens must be deep enough to prevent air entrainment into the waterway; this means deepening and make smooth flow paths for water in and out of the inlet/outlet screens. The steel screens are set out at 150-millimetre (mm) spacings, this prevents large logs and debris from entering the waterways. Isolation valves are behind the screens to allow waterways maintenance.

The max velocity at the inlet / outlet screen is between 1.0 and 2.5 metres per second (m/s) depending on facility generation / pumping operation.

At the Farmers Creek arm interface point (floating boom), the velocity varies with lower reservoir operating depth. During the last few minutes of pumping at minimum operating level the maximum average velocity going into the Facility is 1.3 m/s. During maximum generation for the first hours the outgoing maximum average velocity from the Facility is 1.5 m/s.

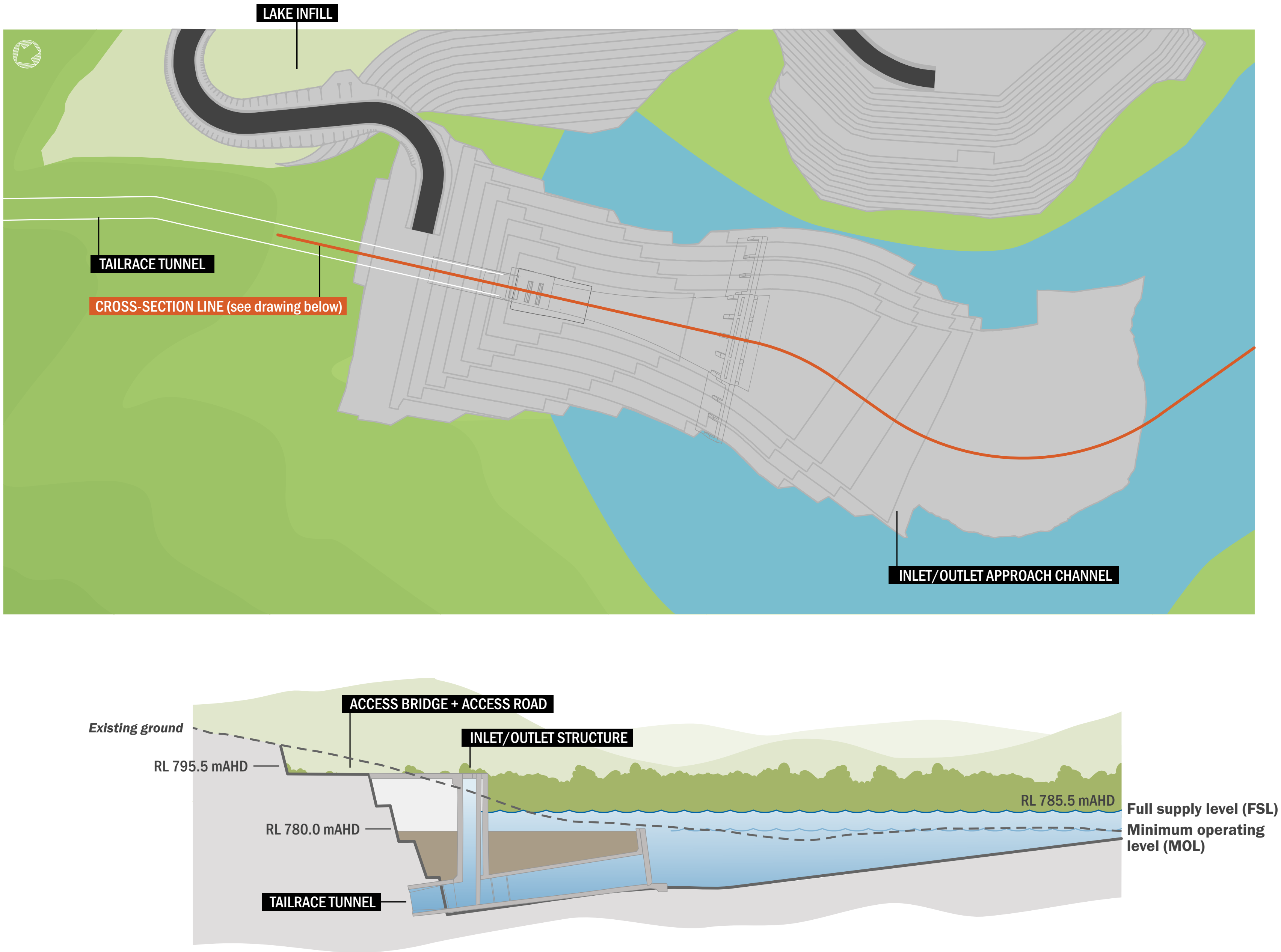


Figure 3.8 Lower reservoir inlet/outlet structure – plan view and section

To further guide floating material, surface active aquatic species, platypus and keep floating logs out of the inlet / outlet area a floating boom will be designed and implemented. The design of the log boom will be developed in consultation with an appropriately qualified aquatic ecologist however an initial conceptualisation has been proposed as shown in Figure 3.9.

This boom concept is intended to create a physical barrier for platypus and discourages general public entry into the inlet / outlet area. The hanging steel mesh allows water flows but is resilient to blockage. It means that any platypus would need to dive deeper to get past this barrier.

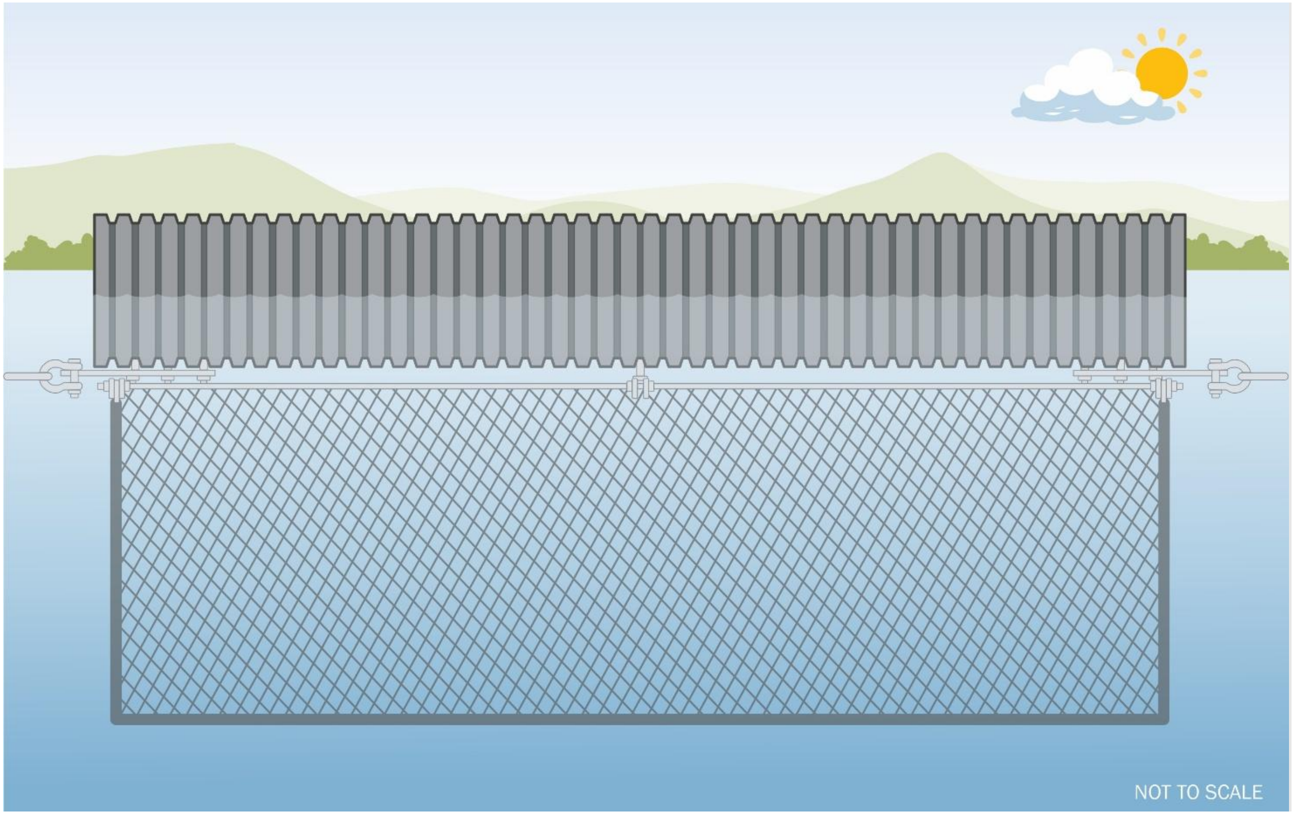


Figure 3.9 Floating boom concept

ii Construction

The area between the inlet / outlet boundary (established with a floating boom) at Farmers Creek and the inlet screen will see two cofferdams built and a combination of bulldozer, excavator and drill and blast excavation to create a deepened pocket for the inlet / outlet screen, in dry conditions only (i.e. no dredging is required). The cofferdams (an eastern cofferdam and a western cofferdam) are needed to enable dry construction of the lower inlet/outlet and protect the works from flood events. Cofferdams would also be built in dry conditions where possible, with water within the reservoir managed to align with the approved regional water regime (refer to Section 6), or otherwise minimal in-water works will be required until the area between cofferdams has been de-watered.

Cofferdams will be built via sheet piling with rock fill backing (and if necessary upstream contiguous bulkhead walls) to protect the inlet / outlet construction area from inflows and floods upstream. Both cofferdams would be removed on completion of construction of the lower inlet / outlet works.

Spoil generated from construction of the inlet / outlet will be relocated to the lake infill area to create a stable area and ultimately accommodate a permanent crossing to the generation facility.

3.5 Lake diversion

Purpose: to protect the inlet / outlet from flood events and provide aquatic fauna passage around the Lower Inlet/Outlet infrastructure.

Construction method summary: minor cofferdams (temporary), drill and blast and excavation.

Final land use: permanent infrastructure.

3.5.1 Design

To protect the permanent lower inlet / outlet infrastructure from floods and water borne debris and sedimentation, the Farmers Creek arm of Lake Lyell will be diverted before its junction with the natural extent of Farmers Creek. The diverted path of the Farmers Creek arm will comprise a waterway with a width of around 20 to 60 m with sides with benched batters. An open waterway between the Lake Lyell and Farmers Creek intends to allow aquatic passage with the location / orientation of the channel providing a pathway for any flood debris to enter the lake downstream of the inlet / outlet structures. It also allows distance separation between the lower inlet/outlet structures and Farmers Creek.

To provide road access to the project, a permanent bridge will be constructed over the lake diversion. The diversion is sized to take a probable maximum frequency (PMF) event flood flow without the water contacting the base of the new bridge.

3.5.2 Construction

The lake diversion will involve excavation to a depth of approximately RL 783 to 780 m AHD with a gentle grade to ensure river flow is maintained during periods of low water. The diversion base will be shaped to have a stream bed and rock pools to encourage aquatic passage similar to existing conditions. A channel will be excavated, using traditional excavation methods including drill and blast with scrapers, excavators and trucks, leaving both ends in place until two cofferdams are established within the current section of the lake (as described in Section 1.3 and shown in Figure 3.11).

The excavated material from the diversion channel will be placed in the adjacent creek infill area or within the base of the platform fill including into the edge of the lake to create a laydown area for the switchyard. The minor cofferdams at each end will allow the diversion to be constructed dry. The minor cofferdams will then be removed, allowing water to pass through. The sequencing of the diversion is shown in Figure 3.11, ensuring that connectivity between Farmers Creek and Lake Lyell is always maintained.

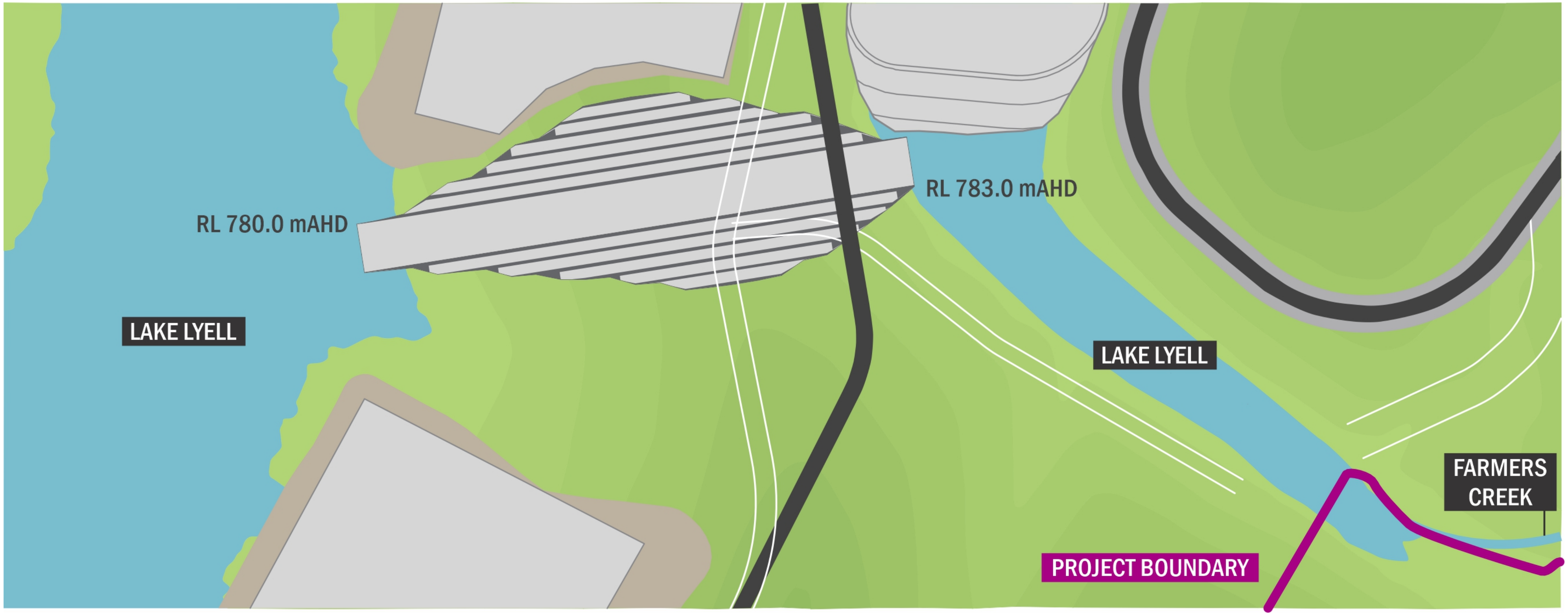


Figure 3.10 Lake diversion – plan view and section

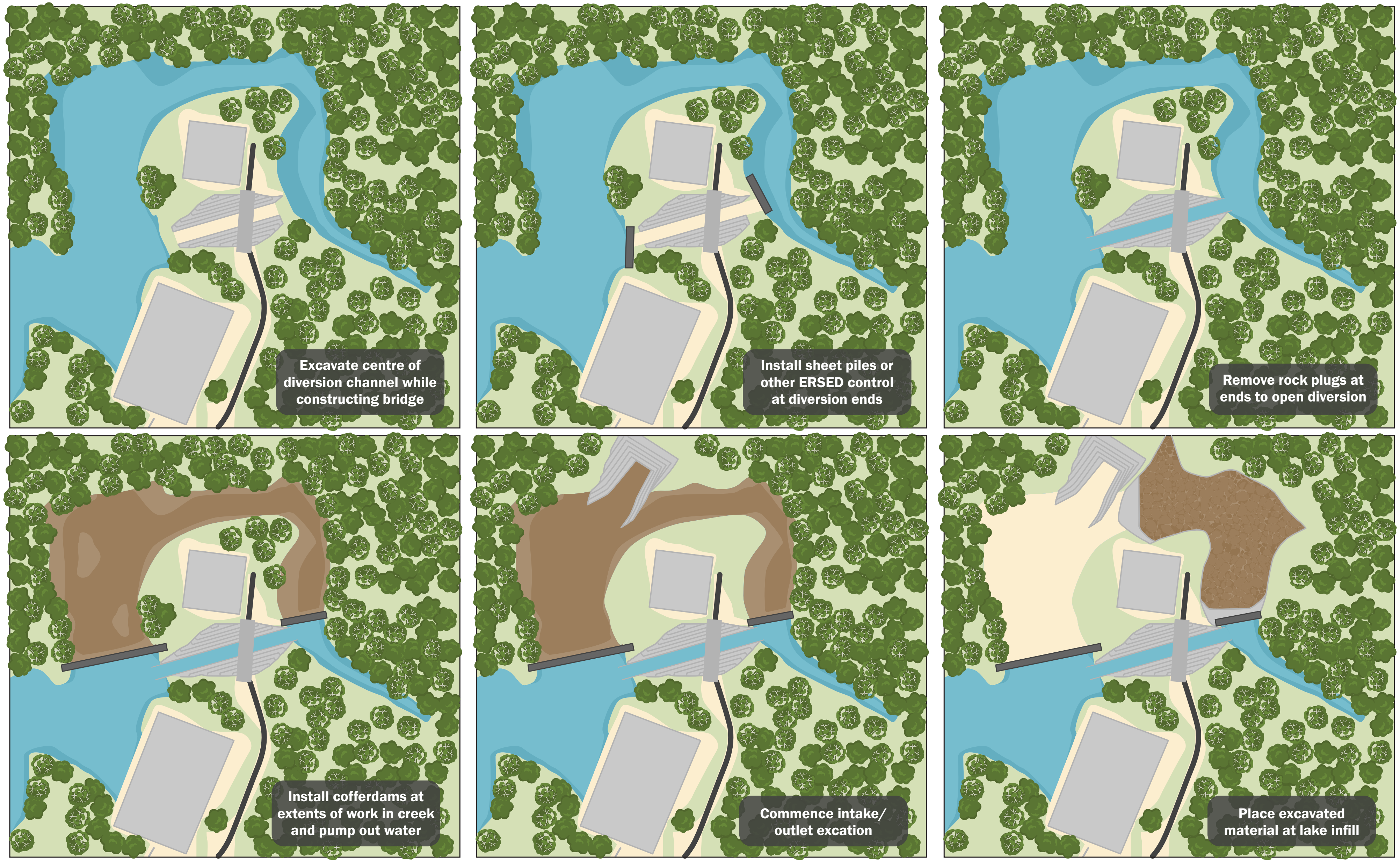


Figure 3.11 Planned sequencing of Lake Lyell diversion, Farmers Creek infill and inlet / outlet structure

3.6 High voltage switchyard

Purpose: to connect the generated electricity with the transmission network.

Construction method summary: civil and concrete, steelworks, LV and HV electrical buildings and mechanical installation.

Final land use: permanent infrastructure.

3.6.1 Design

The 330 kV switchyard pad will be built over a 130 m x 200 m area located in the west of the project site. Its primary purpose will be to house the electrical equipment necessary to connect the project to the transmission network and consequently it will be designed in accordance with Transgrid's specifications. Key infrastructure within the site is shown in Figure 3.12 and will include:

- overhead 330 kV towers and conductors from existing transmission lines to switchyard
- switchyard including cable bays, busbars, overhead gantries and HV overhead lines, voltage and current transformers, circuit breakers & grid metering point
- auxiliary transformer
- drainage, access road and earth grid
- site buildings, fire systems and balance of plant systems
- SCADA and communication systems
- control building, auxiliary services building and storage shed
- firefighting equipment
- security equipment.

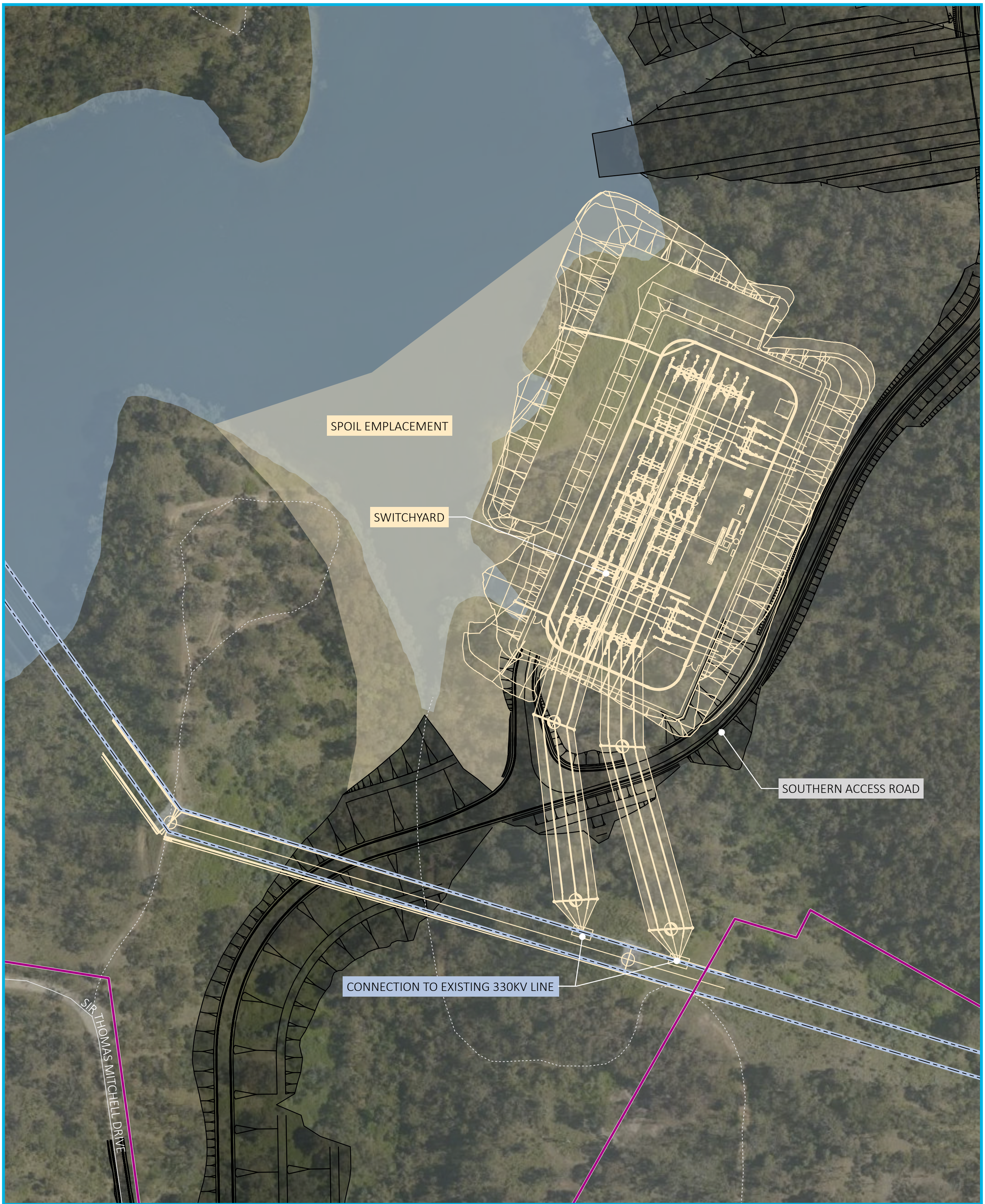
From the switchyard, an approximate 220 m long single circuit transmission line with turn in and turn out spans will be constructed to connect with the existing 330 kV lines that pass through the project area. Due to the relatively short length of the transmission connection, up to six monopole towers are anticipated. The connection will utilise a single circuit turn-in to the 330 kV network.

A cleared easement of about 60 m will be maintained along the transmission connection (i.e. ongoing vegetation maintenance). Access to the new towers will be via the main entrance road and access to the grid connection tie-in points will be via existing easements

3.6.2 Construction

Construction of the switchyard pad will involve clearing and earthworks (cut and fill) to create a level pad. The HV switchyard construction is significantly shorter than the duration of the main project works, and for this reason, the HV switchyard pad will be utilised for a variety of other purposes before the HV switchyard itself is ultimately constructed. These purposes include worker bus and transport staging, laydown area, concrete batch plant, fuel storage, heavy vehicle parking, and overflow parking for light vehicles if required. Once these temporary uses are no longer required, construction of the pad and switchyard will involve:

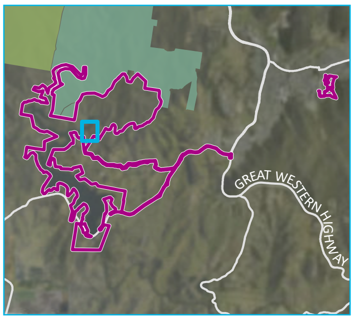
- land reclamation using material excavated from the lake diversion and intake
- grading and pavement works, creating the permanent, platform for the switchyard and infrastructure
- local construction temporary buildings, comms and LV local power
- installation of foundation and civil works including earthing, switchyard pad drainage, foundations, etc.
- installation of electrical infrastructure including overhead support structures, HV electrical plant, cable bays, etc.
- constructing operational buildings (switchyard control building)
- installation of Switchyard building equipment, amenities, balance of plant infrastructure, etc.
- construction of fencing, buffer zones, and local drainage, etc.
- HV connections from existing transmission lines to new switchyard.



Source: EMM (2025); Lake Lyell Project Pty Ltd (2025); DCSSS (2023); MetroMap (2025); GA (2009)

0 50 100 m
GDA2020 MGA Zone 56 N

\\emm.local\xdrive\2022\E221111- Lake Lyell PHES EIS\GIS\02_Maps_EIS\EIS005_HVSwitchyard\EIS005_HVSwitchyard_20250430_03.aprx 24/11/2025



KEY
- Project area
- Switchyard
- Project design

Existing environment
- 330 kV transmission line
- Minor road
- Vehicular track
- Named waterbody

INSET KEY
- Major road
- NPWS reserve
- State forest

Indicative switchyard layout

Lake Lyell PHES
Detailed Project Description
Figure 3.12

EMM
creating opportunities

3.7 Site access and security

Purpose: to provide access to and from power generation infrastructure for operation and maintenance.

Construction method summary: excavation, cut and fill.

Final land use: permanent infrastructure.

3.7.1 Internal roads

i Permanent roads

Access to the project site will be attained via Sir Thomas Mitchell Drive, and the roads within the site will be constructed as part of the project. The roads have been designed with consideration of both construction and operational requirements, to minimise overall ground disturbance. It is intended that where possible construction haul roads will become permanent roads for operation or otherwise rehabilitated.

The site access and internal roads needed permanently for operation of the project are shown in Figure 3.13, and include:

- Southern access road – joins directly with Sir Thomas Mitchell Drive and provides direct access to the MAT platform with intersections to the switchyard, surface building platform, inlet / outlet platform and the intersection to the road to the upper reservoir and includes a permanent bridge over the Farmers Creek Diversion at the lake
- Inlet / outlet access road – connects the southern access road with the inlet / outlet platform area
- Switchyard access road – connects the southern access road with the switchyard platform area
- Surface building access road – connects the southern access road to the surface building platform area
- MAT and ECVT access roads – located within the MAT and ECVT tunnels, the road connects the underground powerhouse with the surface access from the portals
- Upper reservoir access road – the main two-way access road from the southern access road to the upper reservoir.

All permanent roads would initially be established as construction access roads and used to build project infrastructure. During construction, it is anticipated roads would be unsealed road base and designed with sufficient berms, edge protection and water management (such as culverts, cut drains or basins) to minimise risks to vehicles, plant and the downstream environment. All permanent roads would be unsealed apart from the Upper reservoir access road which would ultimately be completed as a combination of sealed and unsealed sections based on the vertical grades.

The permanent access roads would be two lane roads that would include curve widening were necessary, to accommodate heavy vehicles (i.e. B-Double (25 m)), apart from the Upper reservoir access road that would be designed to accommodate a Single unit Truck (12.5 m).

The two-lane access roads have a total width of 9 m (i.e. 2 x 3 m lanes, 2 x 0.5 m wide shoulders and 2 x 1 m verge). The section of the upper reservoir access road on the dam wall is a single lane section which would be 7 m wide (i.e. 1 x 4 m lane, 2 x 0.5 m shoulders and 2 x 1.0 m verges. The switchback on the dam wall if included will also provide sufficient area for a layby.

ii Temporary haul roads

Temporary haul roads outside the footprint of permanent works will be required, in particular to support haulage of excavated material from the lake diversion and tunnel portals to stockpile and infill areas in addition to the upper reservoir construction. Construction haul roads will be two-way, 15 to 20 m in width and only used by large earthmoving equipment such as scrapers or dump trucks. The maximum grade of haul roads is designed based on the upper limits to safely operate heavy vehicles on the roads. Temporary haul roads are shown in Figure 3.12.

3.7.2 Bridge crossings

i Temporary bridges

Installation of two temporary bridges across Farmers Creek is critical to allow plant to access the project area north of Farmers Creek for the commencement of clearing, pioneering, tunnelling works and upper reservoir construction which is critical to the program. As such, temporary bridges are proposed as shown in Figure 3.13.

The northern temporary bridge will comprise prefabricated structures installed and lifted in place by a crane. This bridge will require piles within the lake and construction of abutments on crushed rock, pushed out into the existing lake. Indicative length of this bridge is 60 to 80 m.

The southern bridge will be constructed as a causeway on large diameter culverts semi submerged within the water. This will allow safe passage and open channel flow for fauna passage. Indicative length of the causeway is 30 to 40 m. This bridge will be established as part of the enabling works phase of the project, as it provides access for geotechnical and other critical works.

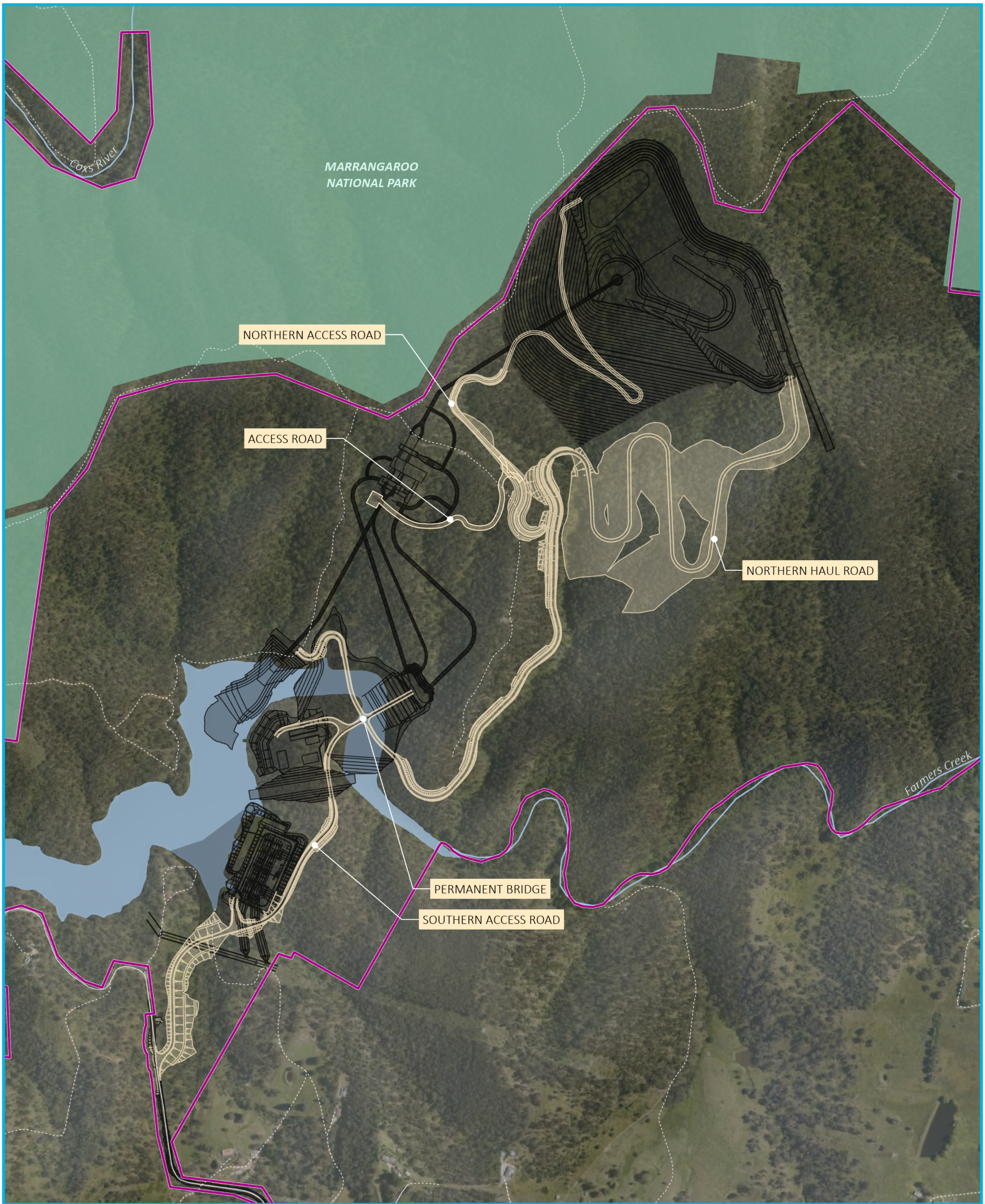
Two other temporary crossings will be established as part of the construction of the two cofferdams needed to facilitate the construction of the lake diversion. These crossings will be atop each cofferdam to allow access for construction vehicles.

ii Permanent crossing

A permanent bridge will be required to cross the Farmer Creek diversion. This bridge will provide access across the diversion to the site compounds and the northern section of the project site where the tunnel portals, inlet/outlet structure and upper reservoir are located. The bridge would be about 9 m wide and approximately 80 to 100 m long with an estimated depth of 2.5 m to 3.0 m deep.

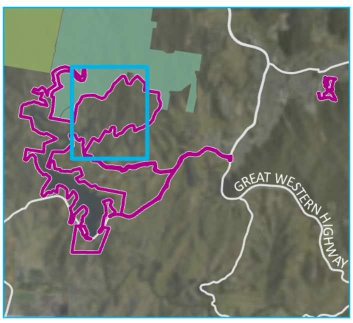
The construction of the bridge will be undertaken concurrently with the lake diversion works (refer to Section 3.5) and involve:

- establishment and stabilisation of abutments
- installing pre-cast structures
- construction of deck, parapets installation, etc.



Source: EMM (2025); Lake Lyell Project Pty Ltd (2025); DCSSS (2023); MetroMap (2025); GA (2009)

0 250 500 m
GDA2020 MGA Zone 56
N



KEY
- Project area
- Project design
- Permanent road infrastructure

Existing environment
- Minor road
- Vehicular track
- Named watercourse
- Named waterbody
- NPWS reserve

INSET KEY
- Major road
- NPWS reserve
- State forest

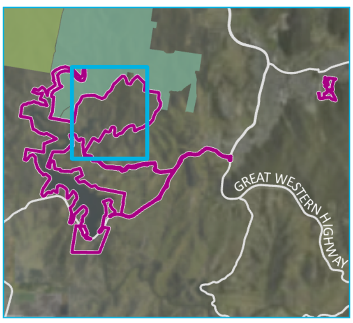
Permanent roads during operation

Lake Lyell PHES
Detailed Project Description
Figure 3.13

EMM
creating opportunities

Source: EMM (2025); Lake Lyell Project Pty Ltd (2025); DCSSS (2023); MetroMap (2025); GA (2009)

0 250 500
m
GDA2020 MGA Zone 56
N



KEY

- Project area
- Project design
- Road infrastructure
- Temporary bridge crossing
- Early works road

Existing environment

- Minor road
- Vehicular track
- Named watercourse
- Named waterbody
- NPWS reserve

INSET KEY

- Major road
- NPWS reserve
- State forest

Roads during construction

Lake Lyell PHES
Detailed Project Description
Figure 3.14

EMM
creating opportunities

\\emm.local\xdrive\2022\E221111- Lake Lyell PHES EIS\GIS\02_Maps_EIS\EIS014_RoadsConstruction\EIS014_RoadsConstruction_20250501_01.aprx 12/12/2025

3.7.3 Boat access

i Switchyard service jetty

A service jetty will be installed at the switchyard location to allow marine access to Farmers Creek and provide access to deeper water.

A boat launch ramp will provide further access for the required marine works including but not limited to sheet piling and piling works, cofferdam installation, installation of erosion and sediment controls and installation of temporary bridges and potentially for water transport of workers to and from the lakeside camp location. It may also be used for delivery of plant/materials if required. The jetty will either be of a tiered rock type or driven piles and a floating pontoon construction. The jetty and boat launch ramp will remain permanently for operations and maintenance use however it will be gated and not open for public access.

ii Workboat launch facility

A temporary workboat launch facility will be established at the lake side accommodation camp and will allow for launching and loading of barges. The location of the barge launch facility will not restrict the foreshore currently used for recreational purposes and access by the public. It is currently intended the boat launch facility will be temporary and used for the duration of construction of the project. However, consultation with Lithgow City Council and the community will determine potential long-term uses and benefit of the boat launch facility, and whether it could be retained following completion of the project's construction.

3.7.4 Public access

i Water access

During construction, access to Farmers Creek arm of Lake Lyell (east of existing powerlines) will be restricted. Appropriate signage and safety buoys will be installed in consultation with Transport for NSW (NSW Maritime). Access to the foreshore near the accommodation camp will be maintained for public recreation access however access to the boat launch facility will be restricted.

Farmers Creek arm is not included in the Council lease for recreational access and signs prohibiting entry to the pumped hydro area will be installed at the junction with Coxs River to provide notice to the public. However, it is considered inevitable that public incursions will occur. During operation, access to the inlet / outlet structure will be further restricted by a floating boom placed across the waterway. No access will be allowed beyond this boom. Further, the service jetty for the project will have restricted access for authorised personnel only.

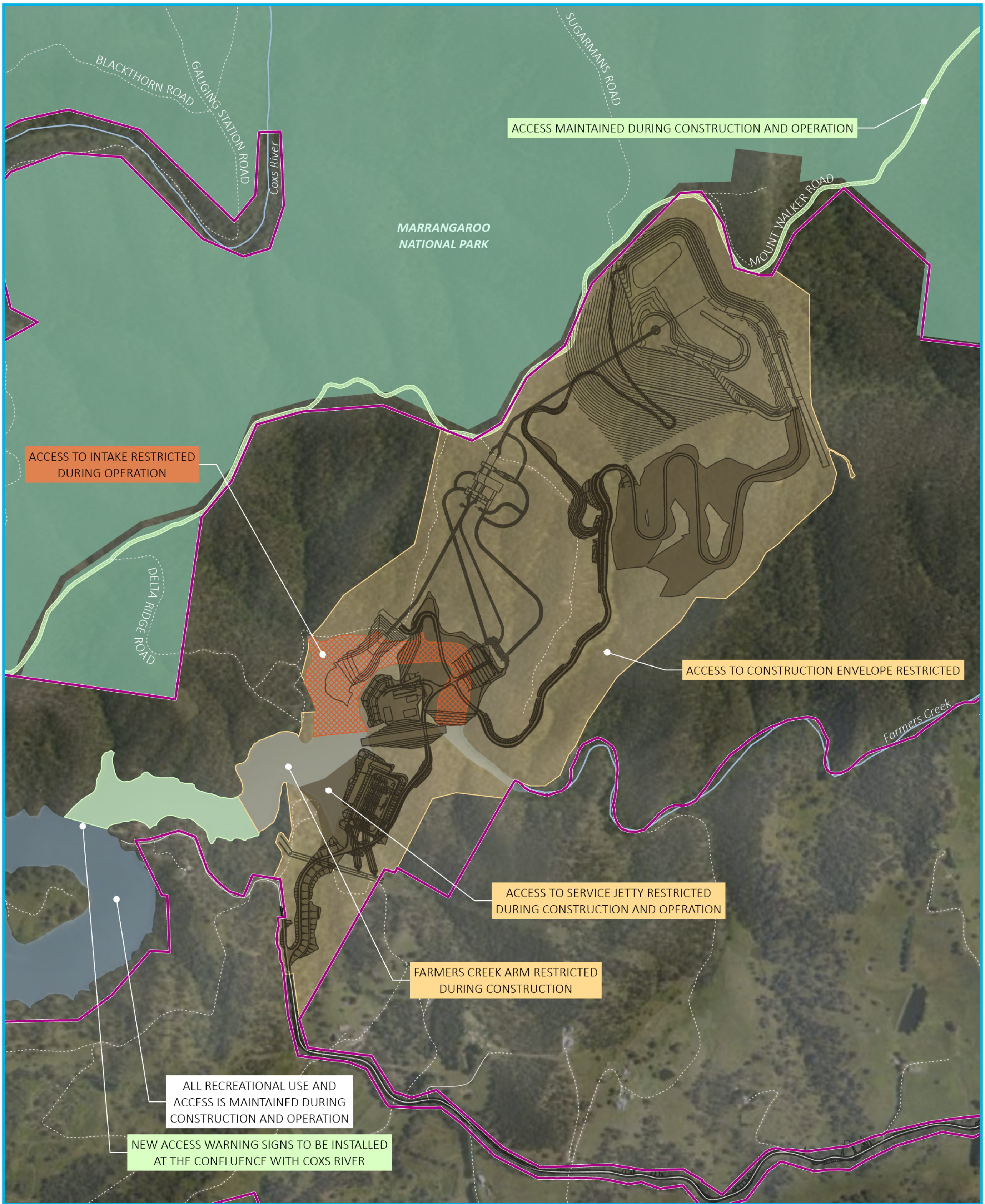
The remaining areas of Lake Lyell and Farmers Creek will remain open to the public, and existing laws and regulations for public waterways will continue to be implemented by NSW Maritime. New signage will be established in consultation with NSW Maritime, including hazard signs (strong currents and changing water levels).

ii Land access

During construction, the entire construction envelope will be an active construction site and no public access will be permitted. Appropriate barrier fencing and signage will be established.

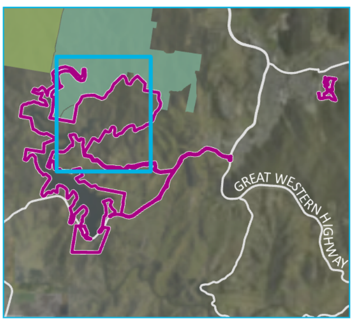
Access along Mount Walker Road will not be restricted and will remain open during construction for existing permitted uses, including by NSW National Parks and Wildlife Service (NPWS), NSW Rural Fire Service (NSW RFS). General 4WD and public recreation access on Mt Walker Road east of the junction with Sugarmans Road across the project lands will not be permitted.

Once rehabilitation of temporary construction elements has been completed, access to the remaining operational infrastructure will be restricted via gates and fences at key site entry points and areas of high safety risk (refer to Section 3.7.5).



\\emm.local\xdrive\2022\E221111 - Lake Lyell PHES EIS\GIS\02_Maps_EIS\EIS015_PublicAccess\EIS015_PublicAccess_20250501_01.aprx 12/12/2025

Source: EMM (2025); Lake Lyell Project Pty Ltd (2025); DCSSS (2023); MetroMap (2025); GA (2009)



KEY

- Project area
- Site layout

Restriction

- Minimal restriction
- Restriction during operation
- Access restriction

Existing environment

- Minor road
- Vehicular track
- Named watercourse
- Named waterbody
- NPWS reserve

INSET KEY

- Major road
- NPWS reserve
- State forest

Public access restrictions during construction and operation

Lake Lyell PHES
Detailed Project Description
Figure 3.15

EMM
creating opportunities

3.7.5 Security fencing

Fencing is required for the safety of workers and the public, to restrict access to key operational facilities of the project such as the upper reservoir, administration building and the HV switchyard. Temporary security fencing is required for the duration of construction to ensure separation between the public and active works areas. Security fencing and gates will be installed throughout the project area during construction and operation as indicated in Table 3.3.

Table 3.3 Indicative security fencing

Area	Fence type
Upper reservoir	Permanent
Portal pad	Temporary
Main site compound	Temporary
Switchyard	Permanent[1]
Sir Thomas Mitchell Drive	Temporary

Notes:

1. Temporary fencing during construction to be replaced with permanent fencing prior to operation

3.8 Administration and utilities

3.8.1 Administration building

An administration building will be located near the switchyard and site entry opposite the diversion and will act as the control centre, visitor centre, and provide office space and parking. It will be used during construction and operation.

The final design for the administration building is yet to be completed however general design objectives have been developed based on EnergyAustralia's corporate principles and in response to community feedback. As such, the design objectives are to ensure permanent buildings:

- blend into the local environment where possible
- have a sustainable focus, while maintaining efficiency in construction and operational costs
- habitatable spaces provide visual connection to the surrounding landscape.

It is anticipated that the administration building would be similar in arrangement and extent as the existing Mt Piper power station expo centre (refer to Figure 3.16).

Figure 3.16 Indicative layout of the administration building (Mt Piper)

3.8.2 Utility connections

i Power

Operation of the generating infrastructure will be powered via the transmission network which it will be directly connected to Line 76 on the existing 330 kV transmission network.

Construction power will initially be sourced from diesel generators until a connection to the 11 kV distribution network is established. A new feeder will be installed within the site from Sir Thomas Mitchell Drive to the tunnel entrances and site compounds. A connection request will be made with Endeavour Energy to facilitate the connection from Lithgow.

ii Communications

Communications connections are required to the administration building and accommodation camp, and will be buried.

iii Water

Potable water will be provided to services within the powerhouse and the administration building. It is anticipated potable water supply will be from eventual connection to the existing Council water supply network or from the onsite treatment of bore water supply.

During construction, potable water will be transported to site by tanker trucks and stored onsite in water tanks or produced on site by a treatment plant supplied by bore water rather than a connection into the water supply network.

3.9 External road and intersection upgrades

External road upgrades are required between Great Western Highway and the site entry point at Sir Thomas Mitchell Drive to ensure the roads will be able to carry the increase in traffic during construction, as well accommodate delivery of large equipment (such as the turbines and transformers).

Magpie Hollow Road is approximately 2 km from the Great Western Highway to the intersection with Sir Thomas Mitchell Drive. The existing road is a two-lane road with an operating speed of 80 kilometres per hour (km/hr). The existing road is between 7 and 8 m wide. Upgrade will be required from the junction with Sir Thomas Mitchell Drive to the Lakeside camp location and to the intersection with the Great Western Highway. The Magpie Hollow Road and Great Western Highway will also require modification.

Sir Thomas Mitchell Drive is a winding, mostly sealed road, with the project entrance located about 3.4 km from the intersection with Magpie Hollow Road, of which 2.8 km is currently sealed and the remainder unsealed. The existing road is a two-lane road with an operating speed of 50 km/hr. The existing road is between 4.8 to 5.5 m wide and has several residential accesses. A combination of widening and resurfacing will be required as well as an upgrade and a change in priority to the intersection of Sir Thomas Mitchell Drive with Magpie Hollow Drive.

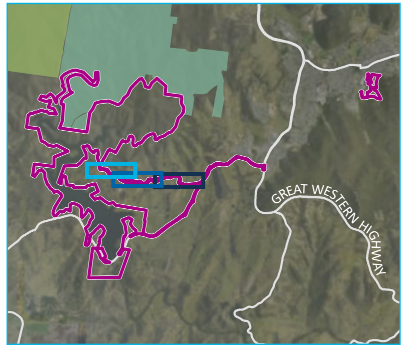
Should the alternative Town camp be selected for the project, some modifications to the roads and intersections along the transport route may be required. However, this would need to be determined in consultation with Council and Transport for NSW.

3.9.1 Sir Thomas Mitchell Drive

To allow for the required traffic numbers and allow safe passing distances Sir Thomas Mitchell Drive will need the pavement widened by approximately 1 to 2 m in each direction and the non-sealed sections to be sealed. In addition, two corners will require widening by placement of road base material to accommodate oversize loads as shown Figure 3.17.

Additionally, a right turn in road and intersection upgrade will be required at the Sir Thomas Mitchell Drive and main entrance road junction.

Barges and other watercraft may be launched from the camp accommodation location or the end of Sir Thomas Mitchell Drive.



KEY

Project area

Site access

Existing environment

Minor road

Vehicular track

Source: EMM (2025); Lake Lyell Project Pty Ltd (2025); DCSSS (2024); MetroMap (2025); GA (2009)

0 100 200 m

GDA2020 MGA Zone 56

N

\\emm.local\xdrive\2022\E221111- Lake Lyell PHES EIS\GIS\02_Maps\EIS\EIS016_STMDUpgrade\EIS016_STMDUpgrade_20250925_01.aprx 24/11/2025

Proposed upgrade of
Sir Thomas Mitchell Drive

Lake Lyell PHES
Detailed Project Description
Figure 3.17

EMM
creating opportunities

3.9.2 Magpie Hollow Road

The junction of Sir Thomas Mitchell Drive and Magpie Hollow Road will likely require upgrade to improve safety for heavy vehicles (see Figure 3.18). The extent of these upgrades will be determined during detailed design however are anticipated to include improved sight lines and improved turning lanes.

To accommodate oversized loads, temporary signage removal is required to allow turning of the over size over mass (OSOM) vehicles into Magpie Hollow Road from the Great Western Highway.

3.9.3 Intersection modifications

Preliminary designs have been prepared for the following intersections determined to require upgrade or modification:

- Magpie Hollow Road / Sir Thomas Mitchell Drive
- Magpie Hollow Road / Lockyers Line.

The designs are provided in Appendix B2 of the EIS and demonstrate feasible traffic solutions that can be achieved, noting that the detailed design will need to perform additional assessment and consultation with the relevant roads authority.

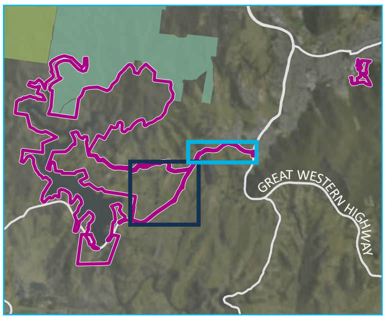
Given the projected construction traffic volumes, it is proposed to switch the intersection priorities at Magpie Hollow Road / Sir Thomas Mitchell Drive intersection. Vehicles approaching from and departing to the south would be required to give way to vehicles on Sir Thomas Mitchell Drive. Following the completion of the construction phase, the priorities can be reversed, if needed.

The Magpie Hollow Road / Lockyers Line intersection would only require upgrade if the Lakeside camp is chosen.

The Magpie Hollow Road / Great Western Highway intersection requires modification to reduce queue length from increased traffic from the project. A preferred design solution will be determined in consultation with Transport for NSW.

Source: EMM (2025); Lake Lyell Project Pty Ltd (2025); DCSSS (2024); MetroMap (2025); GA (2009)

0 100 200 m
GDA2020 MGA Zone 56
N



KEY

- Project area
- Site access

Existing environment

- Major road
- Minor road
- Vehicular track
- NPWS reserve
- State forest

Proposed upgrade of Magpie Hollow Road and Sir Thomas Mitchell Drive

Lake Lyell PHES
Detailed Project Description
Figure 3.18

EMM
creating opportunities

\\emm.local\xdrive\2022\E221111 - Lake Lyell PHES EIS\GIS\02_Maps_EIS\EIS018_MHRUpgrade\EIS018_MHRUpgrade_20250925_02.aprx 24/11/2025

4 Construction methods and activities

4.1 Project timing and staging

An overview of the key project development stages and the sequencing of construction activities is shown in Table 4.1.

Table 4.1 Project timing and staging

Activity	Start	Finish
Detailed design • Geotechnical • Detailed design • Management plans • Procurement • Early works / service relocations (external road upgrades)	Q2-26	Q4-26
Permits and Approvals	Q4-25	Q4-26
Pioneering works – preliminary establishment • Pioneering works-temporary access roads • Switchyard site preparation • Upper reservoir laydown pad construction • Accommodation camp construction	Q4-26	Q3-27
Geotechnical investigations • Temporary access establishment • Pad preparation • Geotechnical drilling	Q4-26	Q2-27
Access Roads • Construct access roads	Q1-27	Q3-27
Lower inlet / outlet • Construction lower inlet/outlet	Q1-27	Q3--29
MAT and construction adits • Construction tunnelling- ECVT tunnelling • Construction tunnelling- MAT tunnelling • Construction- tunnelling- adits to powerhouse, tailrace	Q4-27	Q4-28
Upper Reservoir • Construction Upper Reservoir	Q2-27	Q1 -31
Headrace • Construction pressure tunnel- tunnelling • Construction pressure tunnel- lining tunnel (concrete, steel) • Construction pressure shafts-raise bore • Construction pressure shafts-lining (concrete)	mid-27	Q3-29
Surge shaft • Surge shaft excavation	Mid-27	Q3-29

Activity	Start	Finish
Powerhouse • Cavern excavation (powerhouse, transformer and MIV caverns) • Fitout	Q1-28	21-31
Tailrace • Construction tailrace- tunnelling • Construction tailrace-- lining tunnel (concrete, steel)	Q3-27	Mid-29
Rehabilitation • Rehabilitation will be undertaken progressively as work in areas are completed. The temporary bridge will be decommissioned		
Testing and commissioning	Q3 2031	Q3 2031
Energised commissioning and performance testing	Q4 2031	Q4 2031
Operation	2031	2110

Demobilisation will be performed individually for each project component as they are completed. The first component to be decommissioned will be the temporary bridge, followed by the stockpile area in the switchyard, and the site compound before the administration building is constructed.

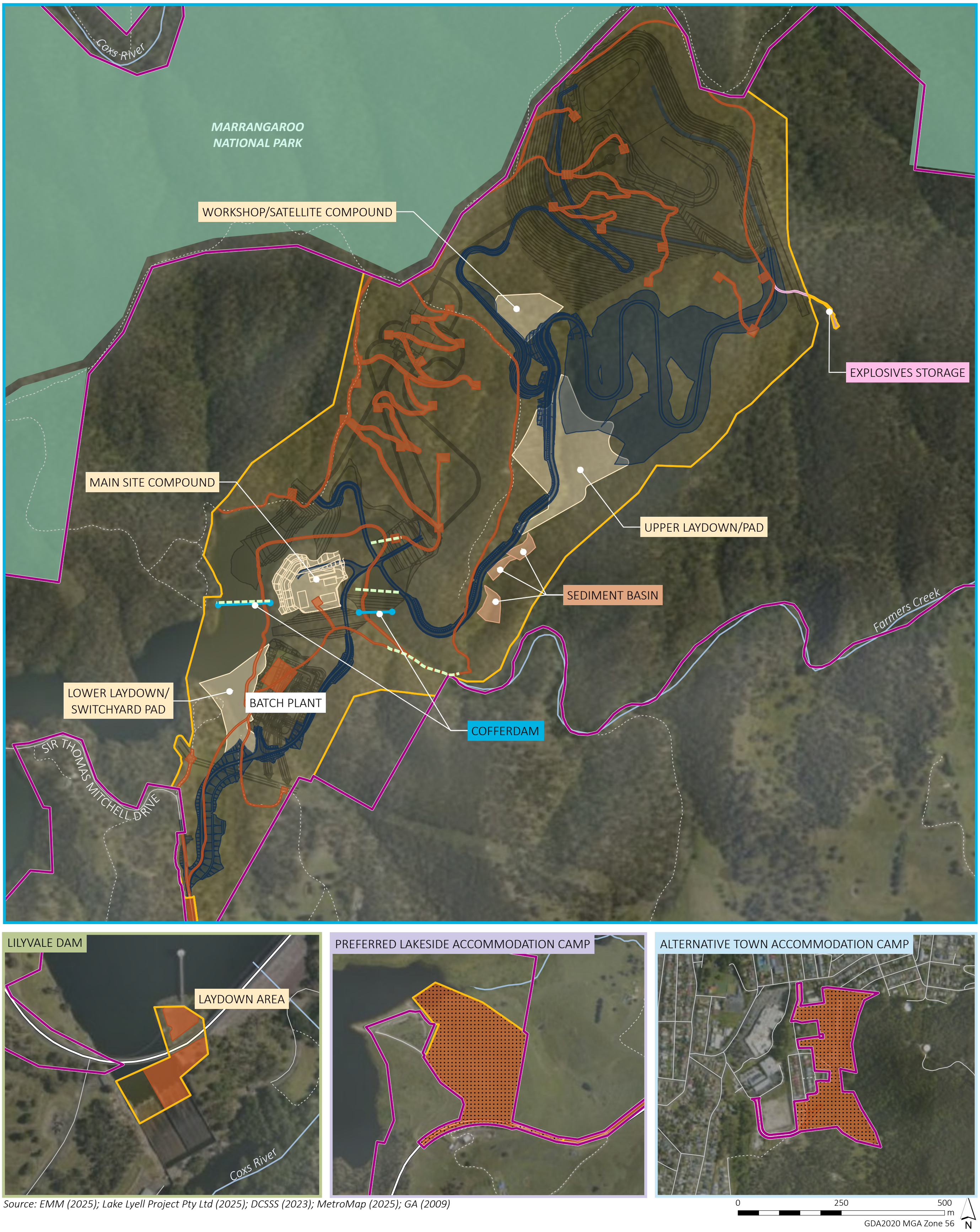
Once civil works for the upper reservoir are completed, the upper reservoir laydown pad office will be decommissioned as well as any other facilities remaining on it (batch plants, maintenance facility, etc.).

The main site compound will only be decommissioned once the project is fully completed, including the administration building, though it may be partially decommissioned. The workforce accommodation may also be progressively decommissioned as the size of the workforce decreases as the project construction nears completion.

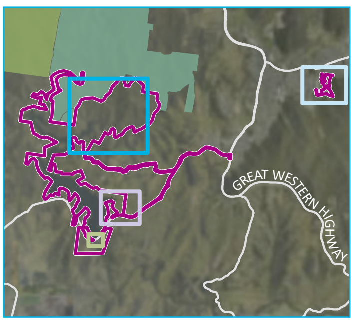
4.2 Construction overview and general layout

The key operational infrastructure to be built has been discussed previously in Section 3. The project will require supporting ancillary facilities and activities to enable the construction of this infrastructure, including haul roads, site compounds, batch plant, laydown and stockpile areas, which are discussed in the following sections in this chapter. Key construction activities will involve vegetation clearing, grubbing, excavation, tunnelling, boring, lining, and the installation of plant and machinery.

An overview of the layout of the site during construction of the project is shown in Figure 4.1.



Source: EMM (2025); Lake Lyell Project Pty Ltd (2025); DCSSS (2023); MetroMap (2025); GA (2009)



KEY

- Project area
- Contruction envelope
- Indicative cofferdam
- Temporary bridge crossing
- Construction road
- Background project design
- Building pad
- Explosives storage
- Sediment basin
- Accommodation camp
- Early works

Existing environment

- Minor road
- Vehicular track
- Named watercourse
- NPWS reserve

INSET KEY

- Major road
- NPWS reserve
- State forest

Indicative site layout during construction

Lake Lyell PHES
Detailed Project Description
Figure 4.1

EMM creating opportunities

4.3 Pre-construction / enabling works

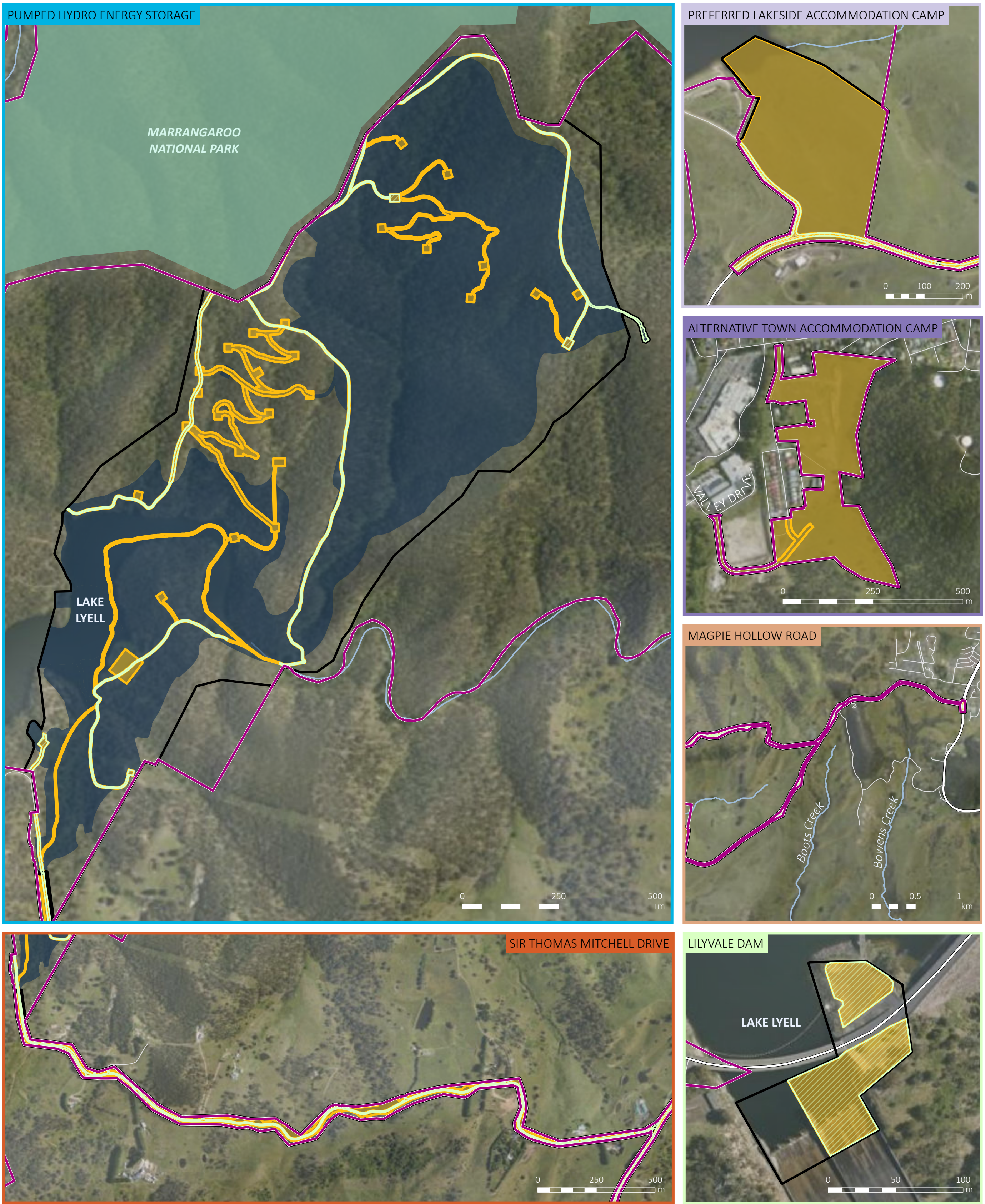
Before construction can start, there are key activities needed to be completed to inform finalisation of the design and construction methodologies, as well as enabling work to facilitate construction, such as access improvements, establishment of worker accommodation, and preparation of work sites. These activities occur before the main construction work and are critical to the overall construction timeframe.

The following activities would be carried out as early works, before the start of the main construction work:

- Design and procurement, including preparation of management plans and dam safety arrangements.
- Phase II geotechnical drilling programme, involving:
  - utilisation and maintenance of existing EnergyAustralia access tracks (no clearing required)
  - clearing of new access tracks and drill pads
  - upgrading an existing causeway (including culvert installation) across Farmers Creek arm of Lake Lyell to facilitate access
  - barge access, either from the site of the lakeside accommodation camp, or from a launch site adjacent to Sir Thomas Mitchell Drive, to allow lakeside drilling.
- Power connection to main site, involving application for Endeavour Energy 11 kV connection and establishing temporary power supply to an early works staging area.
- External road upgrades (Magpie Hollow Road and Sir Thomas Mitchell Drive) to facilitate heavy vehicle access, involving:
  - services investigation and relocation works
  - drainage works
  - localised vegetation clearing where required
  - road widening and surface works.
- Establish early works compounds, including:
  - a storage area off Sir Thomas Mitchell Drive within existing cleared areas
  - a compound at the proposed switchyard location, requiring clearing and earthworks.
- Establishment of the workers accommodation camp, involving:
  - civil work – earthworks and drainage
  - access and carparking
  - services installation and connections – power, communications, water, wastewater.
- Securing the site using fencing and gates, as required.

- Temporarily lowering existing Lake Lyell reservoir by up to 3.2 m by temporary relocation of one or more fusegates at Lilyvale Dam. Maintenance works required on the fuse gates as part of existing operations will be scheduled to be carried out at this time.

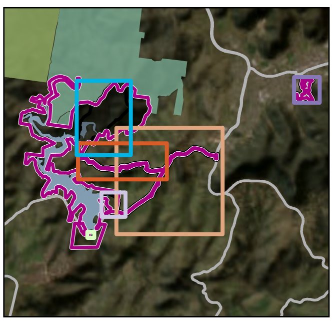
The pre-construction and enabling work activities were selected and developed based on those critical activities needed but also have considered works that would result in only minor environmental and community impacts. In some instances, clearing of vegetation is unable to be avoided and appropriate offsets will be secured prior to any clearing. All disturbance activities occur within the overall disturbance footprint for the project, as shown in Figure 4.2. The management of these activities will be detailed in an early works environmental management plan.



Source: EMM (2025); Lake Lyell Project Pty Ltd (2025); DCSSS (2024); GA (2009); MetroMap (2025)

GDA2020 MGA Zone 56

N



KEY

- Project area
- Construction envelope (offset for clarity)
- Existing disturbance
- Early works disturbance footprint
- Main works disturbance footprint

Existing environment

- Major road
- Minor road
- Named watercourse
- NPWS reserve

Early works

Lake Lyell PHES
Detailed Project Description
Figure 4.2

EMM
creating opportunities

\\emm.local\xdrive\2022\E221111- Lake Lyell PHES EIS\GIS\02_Maps_20250320_EarlyMainWorks\CW001_CombinedWorks_20250403_04.aprx 12/11/2025

4.4 Clearing works

Clearing works involve the felling of canopy and removal of vegetation across the disturbance footprint using dozers, excavators and similar plant. Where possible, vegetation would be stockpiled and reused in rehabilitation however due to the volume of biomass expected as a result of clearing works other disposal methods are needed, including removal from site.

The project intends to use predominately pyrolysis units to process biomass. The production of biochar through the use of specialised biochar equipment (Pyrolysis) supports carbon reduction and assists with soil amelioration on site. The intention is to store cleared material on site until the upper reservoir laydown pad is large enough to bring in two units and commence processing. Carrying out the processing on a large, cleared pad will mitigate fire risk. The production of biochar produces carbon credits which can be sold to offset the cost of clearing. Some material will be mulched for ERSED controls.

4.5 Site works pads, laydown areas and facilities

4.5.1 Main site compound

The main site compound will be a general-purpose facility located on a 90 m x 90 m pad. It will provide parking for 85 light vehicles, workspace, kitchen, lunch, and ablution facilities for 50 engineers and staff, as well as crib and ablution facilities for 350 workers.

The compound will also include a water treatment facility to process water removed during the excavation of tunnels and inlet/outlet structures.

The main site compound will also eventually include the administration building (refer to Section 3.8.1).

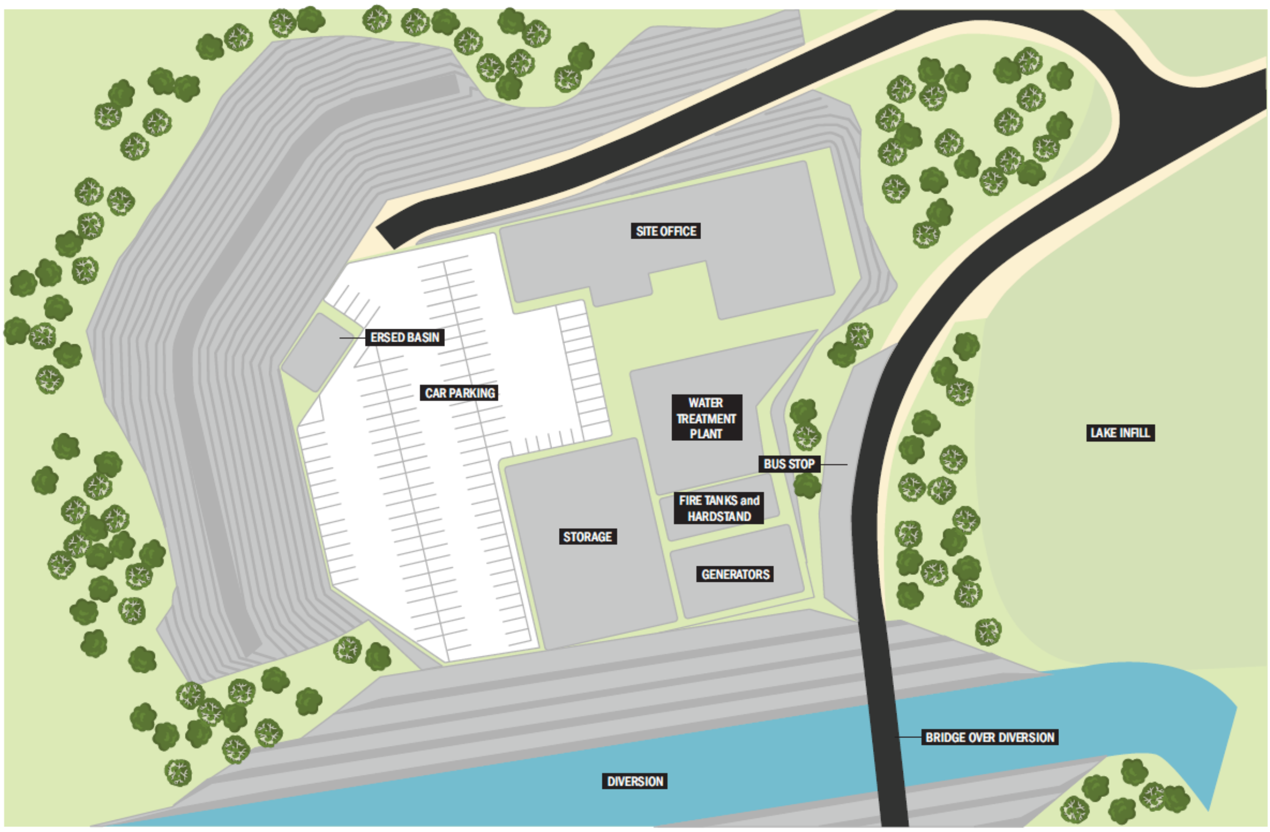


Figure 4.3 Main site compound – indicative layout

4.5.2 Laydown area and batch plant

The HV switchyard pad will house the project's batch plant during construction. The batch plant will occupy an area of approximately 100 m x 100 m within the HV switchyard pad. Included within this area will be:

- designated stockpiles for associated materials
- a small site shed
- a portable ablution facility for use by batch plant operators
- worker bus and transport staging area.

The batch plant will be a wet plant supplied with construction water from on-site supply. All cement will be delivered directly to the batch plant, and its maximum capacity will be approximately 120 m^3 per hour. The batch plant will produce the annual concrete and cement in the volumes listed in Table 4.2, which will be transported directly to its ultimate use destination within the project area.

Table 4.2 Batch plant production volumes

Year	Concrete (tonnes per year)	Cement (tonnes per year)
2026	4,200	1,300
2027	33,300	10,000
2028	99,600	30,000
2029	70,200	21,600
2030	6,000	2,000

Extending from the HV switchyard will be a laydown area constructed within the existing lake footprint using rock from the diversion excavation and some in-water works will be required to stabilise the area.

If the construction of the HV switchyard is required to commence prior to the decommissioning of the batch plant then the batch plant will be shifted to either the upper reservoir laydown pad or the infilled section of Farmers Creek, near the tunnel portal.

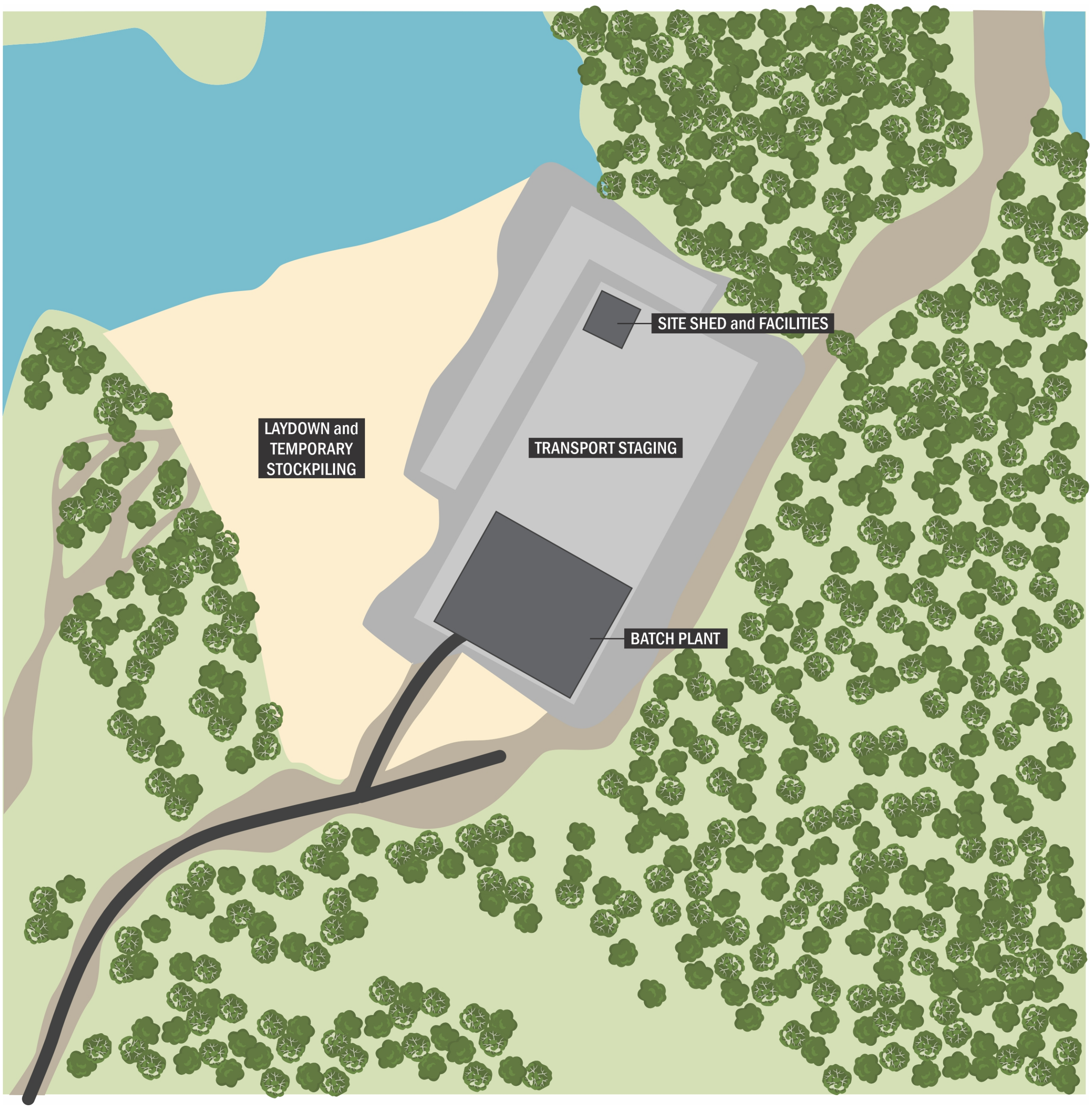


Figure 4.4 Switchyard site compound – indicative layout (construction)

4.5.3 Upper reservoir laydown pad

Located within the gully to the south of the upper reservoir in the north of the project site, the upper reservoir laydown pad will be a multi-purpose level pad (and likely multi levelled through terraced placement) which will serve as one of the four main sites (along with the upper reservoir dam, the lake infill and the switchyard/laydown area) which will receive spoil generated by the project. The pad itself will comprise a large volume of spoil that will result in it being elevated by up to 40 m. It is anticipated that the upper reservoir laydown pad will be required to store approximately 1.2 million cubic metres (Mm^3) of spoil, and it has been conservatively designed so that it can take up 1.8 Mm^3.

In addition to acting as a spoil disposal site, the upper reservoir laydown pad is essential to provide flat work areas that will support:

- a satellite site compound
- a heavy vehicle workshop
- a laydown area
- a stockpiling area
- an office.

To minimise the impacts of erosion and sedimentation, water flowing over the upper reservoir laydown pad will drain directly into the nearby stormwater basin dam. The location of these project components are shown in Figure 4.5.

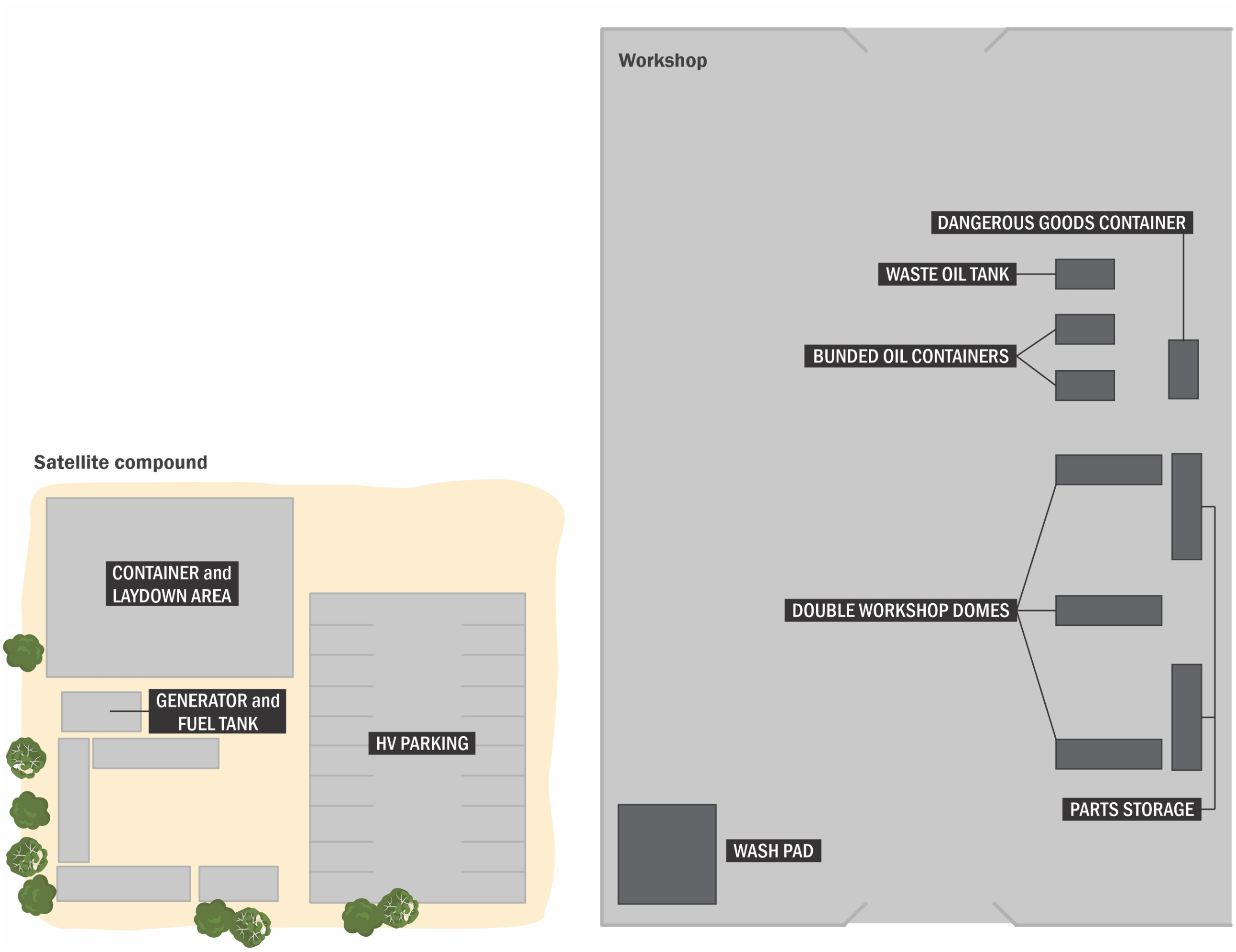


Figure 4.5 Satellite compound – indicative layout

4.5.4 Stormwater basin dam

Located downhill from the upper reservoir laydown pad the stormwater basin dam will be utilised as a key measure to reduce the erosion and sedimentation impacts of the project. It will be situated in a natural valley and will have walls up to 14 m high. At completion of construction, the stormwater basin will be rehabilitated into the surrounding landscape.

4.5.5 Cofferdams

Cofferdams are required to allow the construction of the inlet / outlet structures, removal of sediment and providing a channel in Lake Lyell towards the inlet / outlet structure. While the cofferdam downstream of the inlet/outlet structure will be temporary, the cofferdam upstream will be of a permanent nature. During construction, water within the reservoir will be managed to align with the approved regional water regime which may allow cofferdams to be constructed in dry conditions. This is further described in Section 4.7.

Some clean rockfill will be placed on the downstream (i.e. lake side) of the cofferdams to provide support and appropriate controls will be implemented.

4.5.6 Road works

Internal roads needed for the project were described in Section 3.7.1. Road works will involve clearing, excavation (cut and fill) and grading. Haul roads will be compacted and will be unsealed during construction. Some roads will be retained permanently and sealed, and as such pavement works may be completed earlier in the construction schedule.

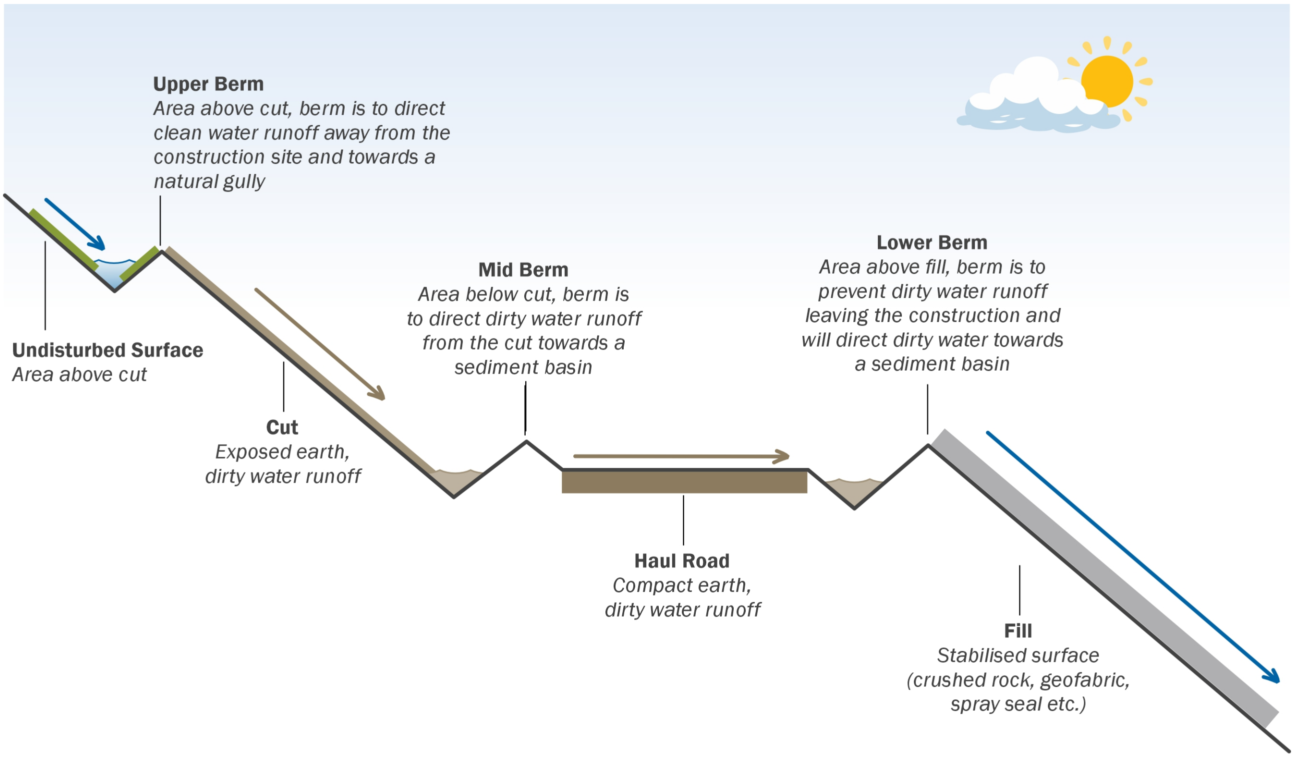


Figure 4.6 Haul road concept

4.6 Excavation methods and activities

Excavation will be one of the most significant activities and will involve drilling and blasting in several areas, as well as other mechanical excavation methods.

4.6.1 Drill and blast tunnelling

Drill and blast involves the drilling of holes into a rock face (or ground) by a mechanical rock drill and inserting explosives to break up and excavate rock. This method is suitable for all tunnelling works given the length of tunnels, and depths below ground and rock strength. Drill and blast will also be the primary method for excavation of the underground caverns for the powerhouse.

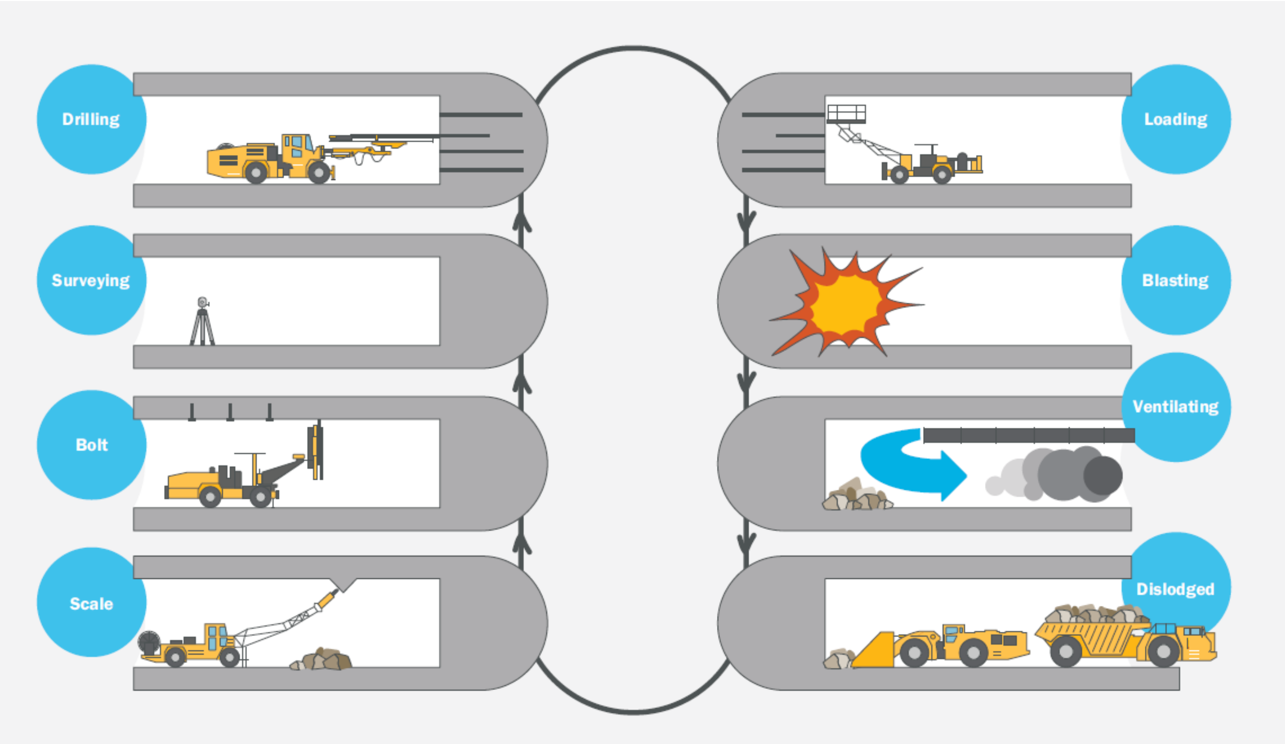


Figure 4.7 Drill and blast method

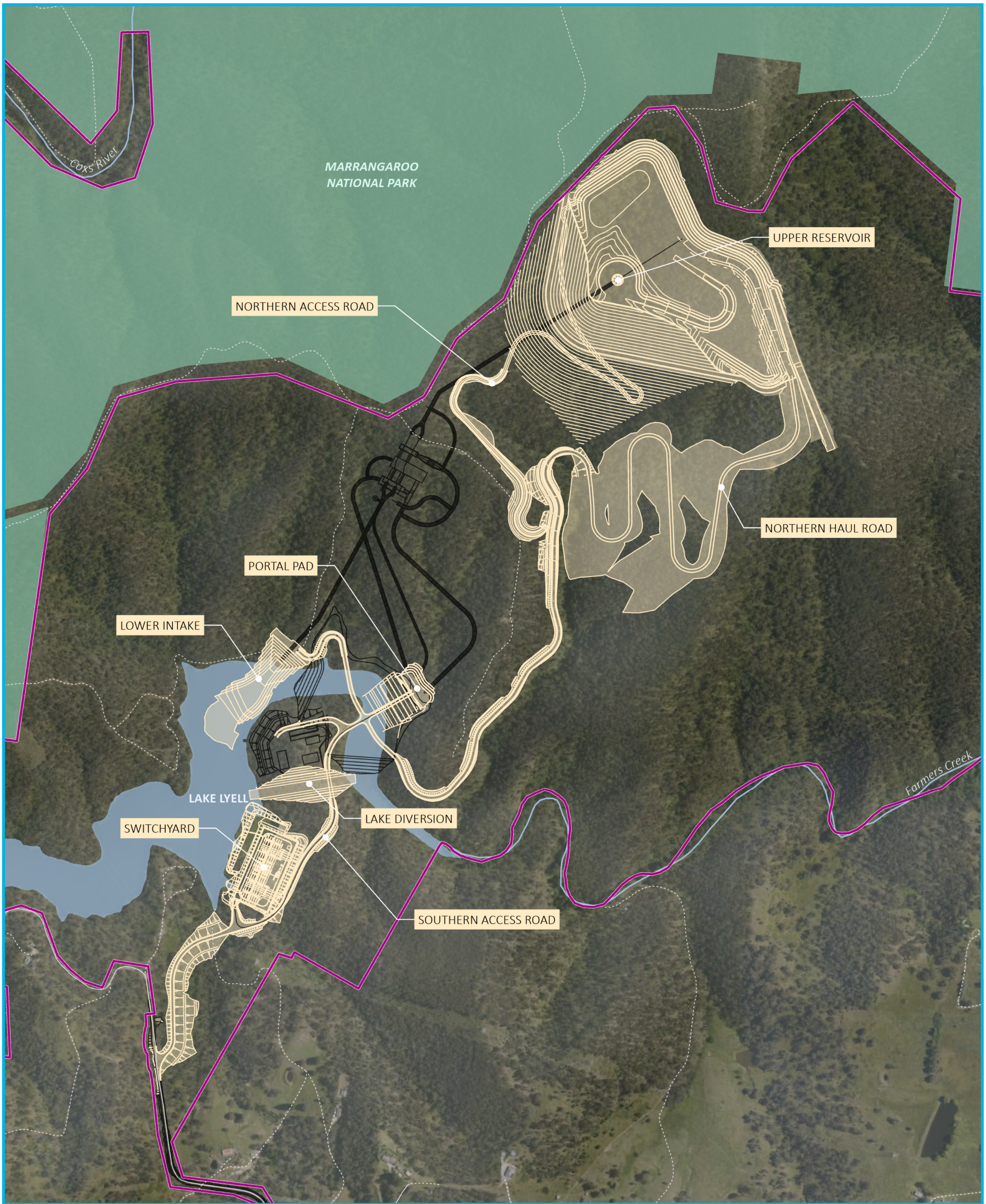
4.6.2 Open cut excavation and blasting

Open cut excavation is needed to remove soil and hard material from surface construction areas and involves the scraping and ripping of material from the surface. In areas of hard rock, blasting techniques will be adopted.

Blasting will likely be employed during the construction of the following site components:

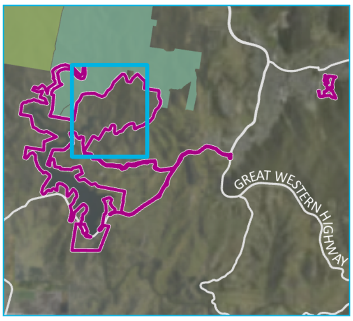
- access roads where required, in particular the upper reservoir access road
- main access tunnel portal pad
- switchyard
- upper reservoir
- lower inlet / outlet structure
- lake diversion.

Blasting may also be required at the main site compound. The distribution of the areas requiring blasting are shown in Figure 4.8. The construction of the upper reservoir will be the most intensive step for blasting requirements due to the large excavation required at the surface. Blasting will be undertaken either weekly or twice weekly at the upper reservoir, with each blast producing 50,000 m^3 to 100,000 m^3 of material. Maximum instantaneous charges (MICs) will be designed to meet the peak particle velocity (PPV) requirements at the nearest sensitive receptors.



Source: EMM (2025); Lake Lyell Project Pty Ltd (2025); DCSSS (2023); MetroMap (2025); GA (2009)

0 250 500 m
GDA2020 MGA Zone 56
N



KEY
- Project area
- Construction blasting
- Project design

Existing environment
- Minor road
- Vehicular track
- Named watercourse
- Named waterbody
- NPWS reserve

INSET KEY
- Major road
- NPWS reserve
- State forest

Indicative blasting locations

Lake Lyell PHES
Detailed Project Description
Figure 4.8

EMM
creating opportunities

\\emm.local\xdrive\2022\E221111- Lake Lyell PHES EIS\GIS\02_Maps_EIS\EIS017_BlastingLocations\EIS017_BlastingLocations_20250428_01.aprx 12/12/2025

4.6.3 Raise bore vertical excavation

Considering the diameter of the waterway shaft and surge shaft, the vertical shafts will be constructed using a shaft sinking method possibly combined with a raised bored pilot hole.

A shaft sinking method will commence with excavation from the top of the shaft whereby excavated (i.e. material removed using drill and blast methodology) is removed either through a winder that lifts the excavated material to the top or using a pilot hole (formed using a raised bore methodology) through which material will be dropped to the bottom from which it will be removed in a similar fashion as the tunnel spoil material.

If a raised bore is used to form a pilot hole, the raised bore machine will be established at the top of the required shaft. A pilot hole is drilled down. A cutter is attached to the bore at the bottom of the pilot hole via an access tunnel. The cutter is then pulled upwards as it spins creating a shaft. Spoil material drops down and is removed via the access tunnel. The cutter is pulled upward to the surface and removed.

Raise boring is a drilling method used to create a pilot hole between an underground cavern or tunnel and the surface, without the need for explosives.

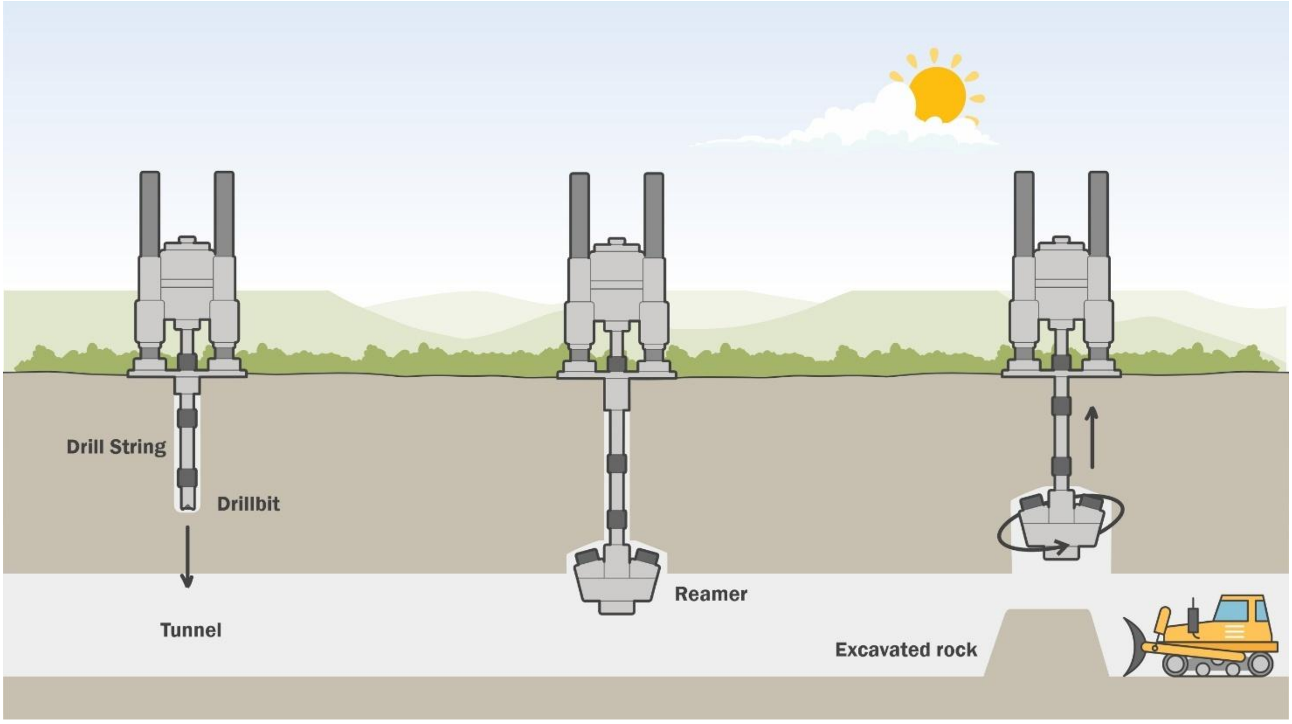


Figure 4.9 Raise boring method

4.7 Temporary opening of Lilyvale Dam fusegates

The project construction requires multiple waterway crossings and cofferdams to facilitate the inlet / outlet construction. The inlet / outlet areas temporary cofferdams must be designed to be higher than the flood level that the inlet / outlet area may see during the construction period. The original Lake Lyell Dam, designed in 1983, had an ogee crest level at RL 782.6 m AHD. In 1997, a rubber dam raised the crest height by 3.2 m, but after multiple failures, it was replaced in 2001 by six fusegates, each 3.2 m high and 9.7 m long, with the fusegate crest level raised to RL 785.5 m AHD. The fusegates are constructed of reinforced concrete with stainless steel inlet wells and are single-use, requiring reconstruction if ever triggered.

To mitigate the flood risk to inlet / outlet works behind the cofferdams, one or more fusegates will be repositioned open to temporarily lower Lilyvale Dam spill level back to RL 782.6 m reducing the coffer dam water levels by 3.2 m. This reduction significantly improves constructability and significantly mitigates flood risk in the inlet/outlet works area.

The reservoir of Lake Lyell would still be used within the Mt Piper / Coxs Supply Scheme works approval level ranges, and under the care and control of the dam operator.

On completion of construction of the inlet / outlet structures on Farmers Creek Arm the Lilyvale Dam fusegates will be returned to their positions and Lake Lyell water levels managed to support commissioning of the pumped hydro facility until Lake Lyell is returned to full operation and with FSL at RL 785.5 m.

Figure 4.10 Lake Lyell hydroplus fusegates - view from downstream

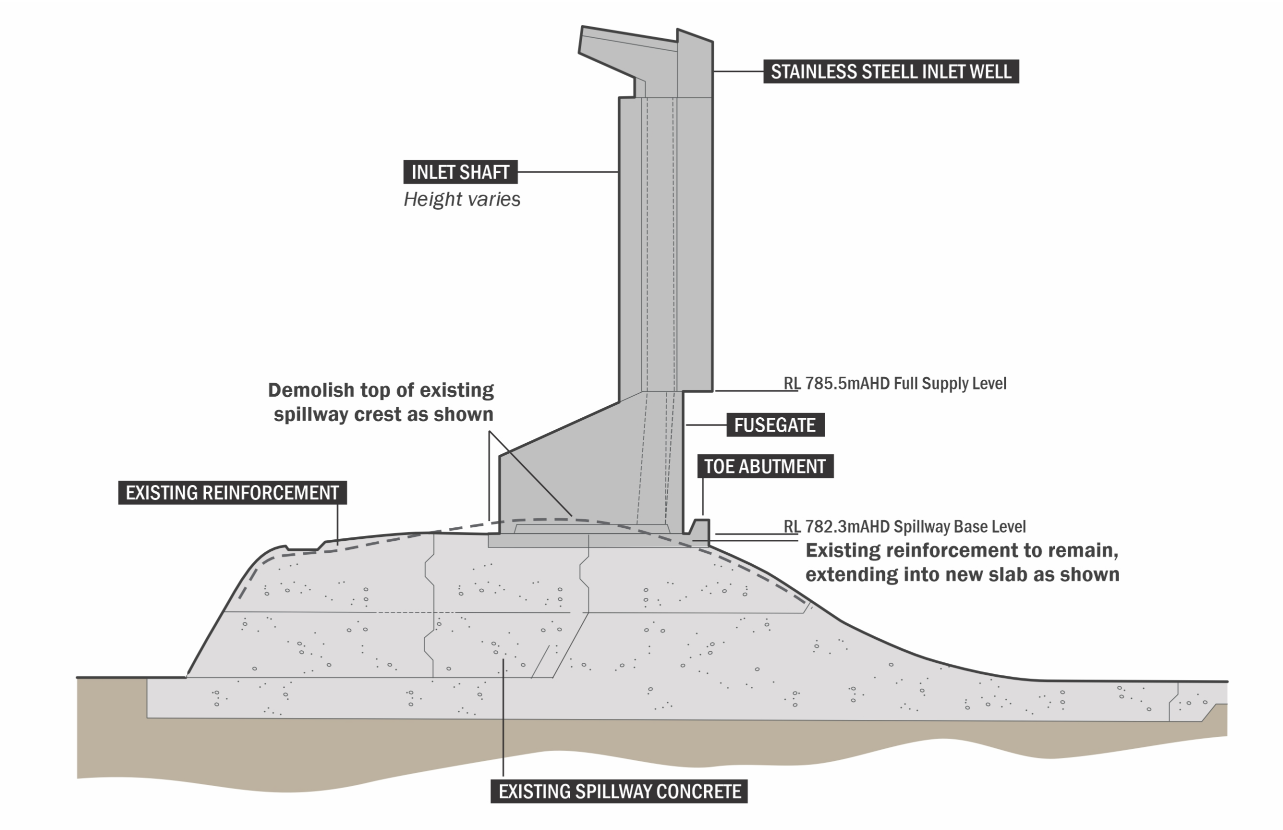


Figure 4.11 Lake Lyell hydroplus fusegates - cross section

4.8 Spoil and materials management

4.8.1 Sources and quantities

Spoil generated by the project will primarily be utilised on site for other construction activities or as part of permanent infrastructure and landforms. The construction of the upper reservoir rockfill dam, the upper reservoir laydown pad, and the infilled section of Farmers Creek arm of the lake (to protect the inlet / outlet structure) and the lower laydown pad and switchyard will be the primary project components that will utilise spoil.

An excavated rock management strategy has been prepared to guide the processing, handling and placement of spoil on site in a manner that reduces environmental risks, and is provided at Appendix I of the EIS. The management strategy categorises excavated rock into the following categories:

- Type 1 – refers to material excavated using drill and blast methods
- Type 2 – refers to material excavated using non-drill and blast methods such as raised bore and heavy rip.

Estimated quantities by category type are summarised in Table 4.3.

Table 4.3 Spoil generated by the project

Excavated rock types	Rock volume (million BCM)
Beneficially used in construction (in PSEs)	
Type 1	6.92
Type 2	0.19
Total	**7.11**
Exported offsite to an appropriate facility	
Type 1	0.24
Type 2	0.00
Total	**0.24**
Overall total	**7.35**

The project anticipates the ability to re-use at least 95% of all excavated material within the project's construction. The remaining 5% of material will need to be transported offsite to a facility approved to accept the material. Spoil quantities are conservative estimates based on geotechnical information obtained to date and will be revised as further geotechnical information is obtained during the project. Opportunities to additionally increase reuse of material onsite and reduce offsite transport will be further investigated during detailed design.

4.8.2 Management approach

Typically, all material will be transported on site using unsealed access roads. The following types of spoil will be stockpiled in the site temporary when necessary:

- mulch
- topsoil
- excavated rock stockpiled for processing
- excavated spoil stockpiled for future use.

Spoil will be reused on site for construction of the project and its permanent elements, including the diversion infill, road works and landform rehabilitation.

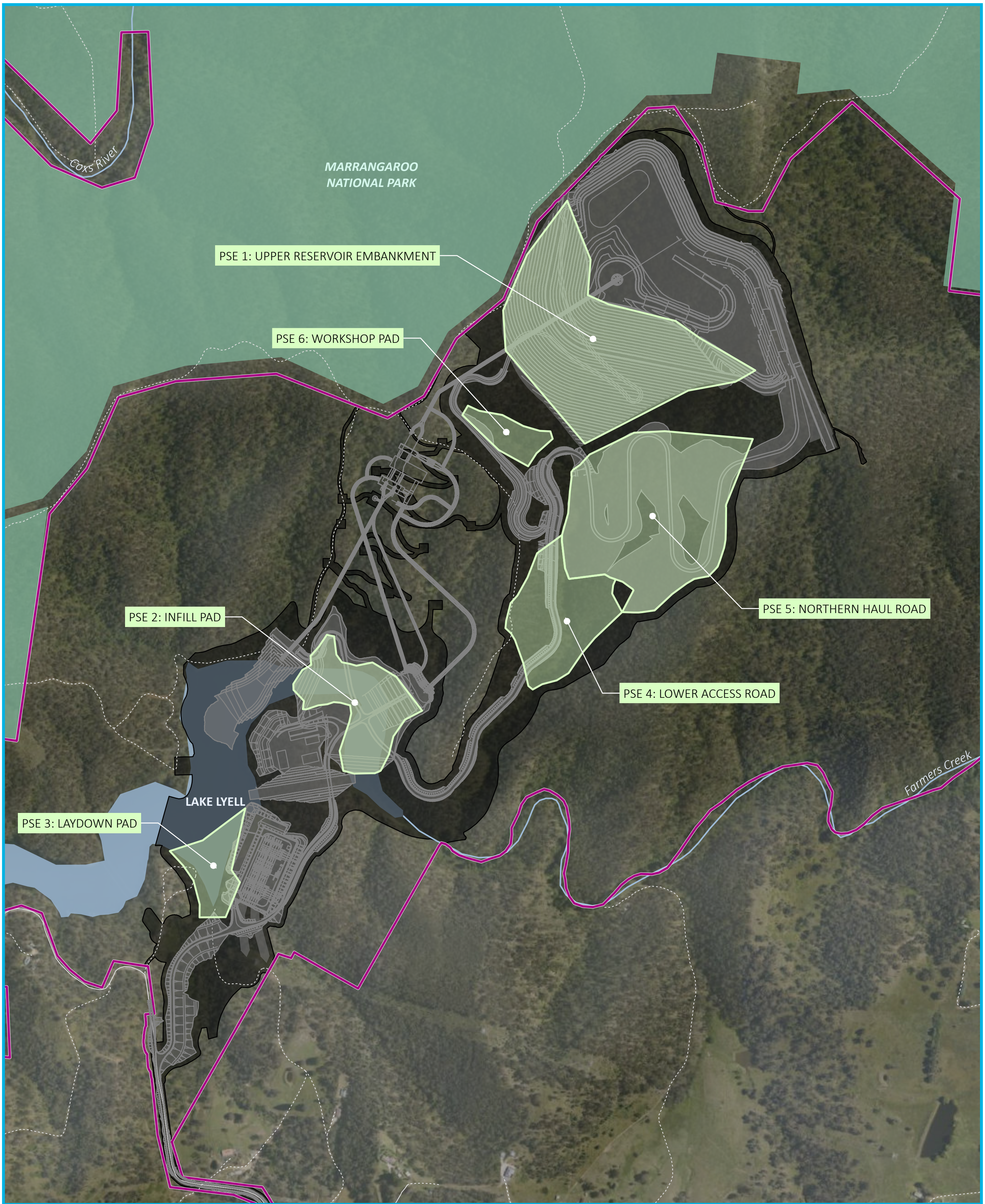
As noted in Section 4.8, most excavated rock will be beneficially used to construct the upper reservoir embankment, construction pads and roads. The excavated rock management strategy (Appendix I of the EIS) describes the reuse of spoil in terms of permanent rock emplacements (PSEs), which are identified in Figure 4.13 and are:

- Upper reservoir embankment (PSE1)
- Infill pad (PSE2)
- Laydown pad (PSE3)
- Lower access road (PSE4)
- Northern haul road (PSE5)
- Workshop pad (PSE6).

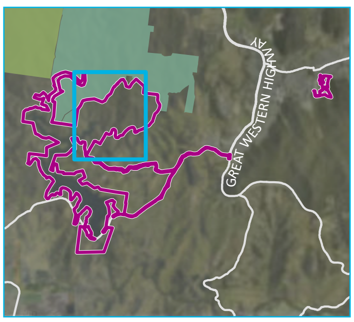
Due to the potential water quality risks associated with excavated rock emplacements, the upper reservoir and construction pads are described as being PSE. The PSEs include in-reservoir PSEs (i.e. will be partially below the FSL during operation) and land-based PSEs. Design principles and management concepts have been developed for these PSEs, aimed at managing water quality risks during construction and operation. These concepts are described in detail in Appendix I and have been developed to consider:

- geochemical properties of the excavated rock
- construction related risks such as residual nitrogen from blasting of rock (Type 1 material) and management of fines that could be mobilised by water movement.

Nitrogen leaching from Type 1 material will be managed by collecting and treating seepage from PSEs. However, as nitrogen in Type 1 rock is highly soluble and bound to rock fragments, the nitrogen risk can also be managed by washing rock prior to placement. LLP propose to selectively use pre-placement washing to manage nitrogen risks for some rock emplacements. The washing process would also remove most fines. The washing method will be established at detailed design and its efficacy in removing nitrogen from excavated rock will be validated before and during its use. Water used for washing would likely have high nitrogen concentrations and would be managed in the contaminated water system, which is described in the surface water assessment (Appendix H of the EIS).



Source: EMM (2025); Lake Lyell Project Pty Ltd (2025); DCSSS (2023); MetroMap (2025); GA (2009)



KEY

- Project area
- Disturbance footprint
- Site layout
- Permanent spoil emplacement

Existing environment

- Minor road
- Vehicular track
- Named watercourse
- Named waterbody
- NPWS reserve

INSET KEY

- Major road
- NPWS reserve
- State forest

Permanent spoil emplacements

Lake Lyell PHES
Detailed Project Description
Figure 4.12

EMM
creating opportunities

4.8.3 Construction waste

During construction of the project, waste expected to be generated includes general liquid waste, general solid waste (non-putrescible), general solid waste (putrescible), hazardous waste and spoil. It is expected that there would be minimal waste generated during the operational phase of the project.

The type and sources of waste that would be produced during construction are summarised in Table 4.4 and are based on the project's concept design.

Table 4.4 Construction waste types and source

Type of waste	Main sources of waste
General solid waste (non-putrescible) primarily concrete and metal, and other general materials such as glass, plastics, cardboard, packaging, virgin excavated natural material and cleared vegetation	• Spoil generated during excavations. • Concrete and other solid waste from concrete batch plant at the construction compound. • Vegetation clearance within the reservoir area and during site establishment for permanent and ancillary infrastructure. • Packaging materials for large OEM equipment. • General waste produced during construction activities and demobilisation at all locations including construction compounds.
General liquid waste, such as process water, grey water and sewage	• Process water for concrete and grouting works at construction compounds, embankment and spillway. • Grey water and sewage at construction compounds and accommodation camp.
General solid waste (putrescible), such as food waste	• Food waste from the accommodation camp and construction compounds.
Special waste	• Spoil containing any contaminated material.
Green waste	• Felled timber, mulch and other green waste to be removed from site. Pyrolysis will be used to manage green waste prior to disposal.

The volumes of waste to be managed through project construction and further details of the project's waste management are provided in the waste management assessment appended to the EIS.

4.9 Geotechnical investigation

Further survey of ground conditions is required to inform detailed design. Geotechnical investigations including geophysical survey, construction of test pits, borehole drilling and blasting vibration assessments will be completed within the disturbance footprint as part of the pre-construction and enabling works phase of construction (refer to Figure 4.2).

Borehole drilling is required to facilitate the detailed design and optimisation of the upper reservoir, under ground structures, road cuttings, bridge foundations, and drainage structures. Borehole drilling will be carried out using a variety of truck and track mounted drilling rigs and will involve drill pad establishment (including vegetation clearing and installation of erosion and sediment controls), borehole drilling, and in-situ testing and sampling. Establishment of temporary access tracks is required to complete the works.

Additionally a small number of shallow boreholes will be drilled and used for blasting vibration assessment. This will include the use of vibration monitoring equipment at the site and the detonation of small charges.

4.10 Construction hours

Construction works would generally be conducted within the hours outlined in Table 4.5. As some activities would be undertaken 24 hours a day, seven days a week, the project construction environmental management plan (CEMP) would include out-of-hours mitigation measures to reduce potential impacts of these construction activities at nearby receptors during these periods.

Table 4.5 Construction hours

Work type	Hours of work
Normal construction	Monday to Saturday 6.00 am to 6.00 pm
	Sundays or public holidays 9:00 am to 5:00 pm (low noise work only)
Deliveries	Monday to Saturday 6.00 am to 10.00 pm
	No work on Sundays or public holidays
Blasting (at surface)	Monday to Saturday 9.00 am to 6.00 pm
	No work on Sundays or public holidays
Underground excavation and tunnelling (including blasting)	Monday to Saturday 24 hours
	Sundays or public holidays 24 hours
Camp operation	Monday to Saturday 24 hours
	Sundays or public holidays 24 hours

4.11 Workforce and accommodation

The project's peak workforce is expected to be approximately 600 full-time equivalent workers, 80% of which are expected to require temporary accommodation. For this reason, temporary accommodation for approximately 500 workers will be provided near the site. The primary camp location is at the lakeside off Magpie Hollow Road, an alternate location is also proposed in Lithgow close to the town centre. Only one of the camp locations will proceed determined by the outcome of EIS consultation. The workforce accommodation camp will require a footprint of approximately 200 m x 200 m including a carpark. Buses will be provided to transport workers to and from the project area.

Barges and other watercraft may be launched from the Lakeside camp location or the end of Sir Thomas Mitchell Drive.

The indicative layout of the Lakeside camp is shown in Figure 4.13. The indicative layout of the Town camp alternative is shown in Figure 4.14.

Figure 4.13 Workforce accommodation camp – preferred Lakeside camp

Figure 4.14 Workforce accommodation camp – alternative Town camp

4.12 Traffic generation and management

4.12.1 Transport route

The primary transport route for construction vehicles is shown on Figure 4.15. The Great Western Highway is an approved B-Double route and is near the site. From The Great Western Highway, vehicles will turn on to Magpie Hollow Road and continue to Sir Thomas Mitchell Drive and the main site entrance.

Roads within Marrangaroo National Park will not be used by project construction vehicles as part of normal construction operations. An egress route maybe required in the event of an emergency.

The transport route for OSOM vehicles has also been identified and shown on Figure 4.16. OSOM are needed to transport the larger components of the project's construction, such as transformers and pumps.

A preliminary logistics assessment of indivisible OSOM components transport to site has been undertaken. This preliminary assessment determined Port Kembla as the best OSOM import dock but this may change once material orders are placed and logistics details are confirmed. Exiting the port to the construction location off Sir Thomas Mitchell Drive in South Bowenfels. The study was based on 5 m wide OSOM loads.

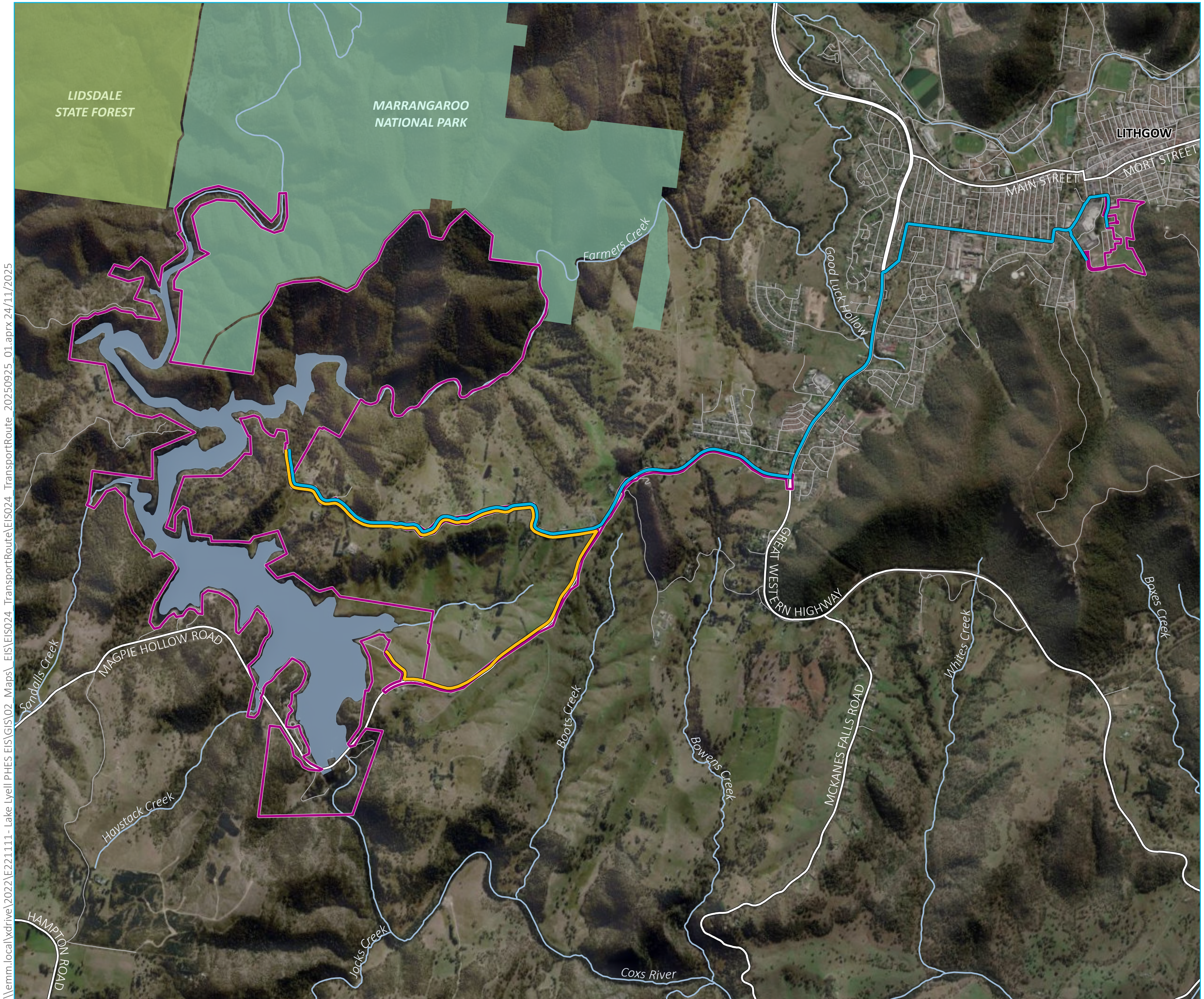
Two routes were identified:

- Route 1 – Blue Mountains via Hume Highway and Great Western Highway
- Route 2 – around the Blue Mountains via Cowra.

Route 1 is the most direct route, taking the Hume Highway up to Sydney and then turning onto the Great Western Highway and going through the Blue Mountains before arriving at Lake Lyell. This route traverses the densely populated area of the Blue Mountains and will likely require close consultation and planning with Transport for NSW, as well as potentially extra pilot vehicles and police escorts. The gradients and sharp bends of the Great Western Highway will also be more challenging for transport equipment and require additional block trucks. Travel through metropolitan Sydney and the Blue Mountains will be restricted to night time only to reduce the impact to fellow road users.

Route 2 takes a more circuitous route, using the Hume Highway westbound to Yass and then turning up Lachlan Valley Way through Boorowa and Cowra. The route then takes the Mid-Western Highway to Bathurst, and then the Great Western Highway to site. Whilst considerably lengthier than the first route option, this route stays clear of the sensitive populated areas of Sydney and the Blue Mountains. The loads will have to pass through the regional towns of Cowra and Bathurst.

Further studies that allow the turbine stay ring to be transport as complete units (not two halves) requiring an approximately 6.5 m OSOM study is still to be completed.



Source: EMM (2025); Lake Lyell Project Pty Ltd (2025); DCSSS (2024); ESRI (2025); GA (2009

0 0.5 1 km
GDA2020 MGA Zone 56
N

\\emm.local\xdrive\2022\E221111 - Lake Lyell PHES EIS\GIS\02_Maps_EIS\EIS024_TransportRoute\EIS024_TransportRoute_20250925_01.aprx 24/11/2025

KEY

- Project area

Transport route

- From Great Western Highway and Magpie Hollow Road to Town camp
- From Great Western Highway to site and Lakeside camp

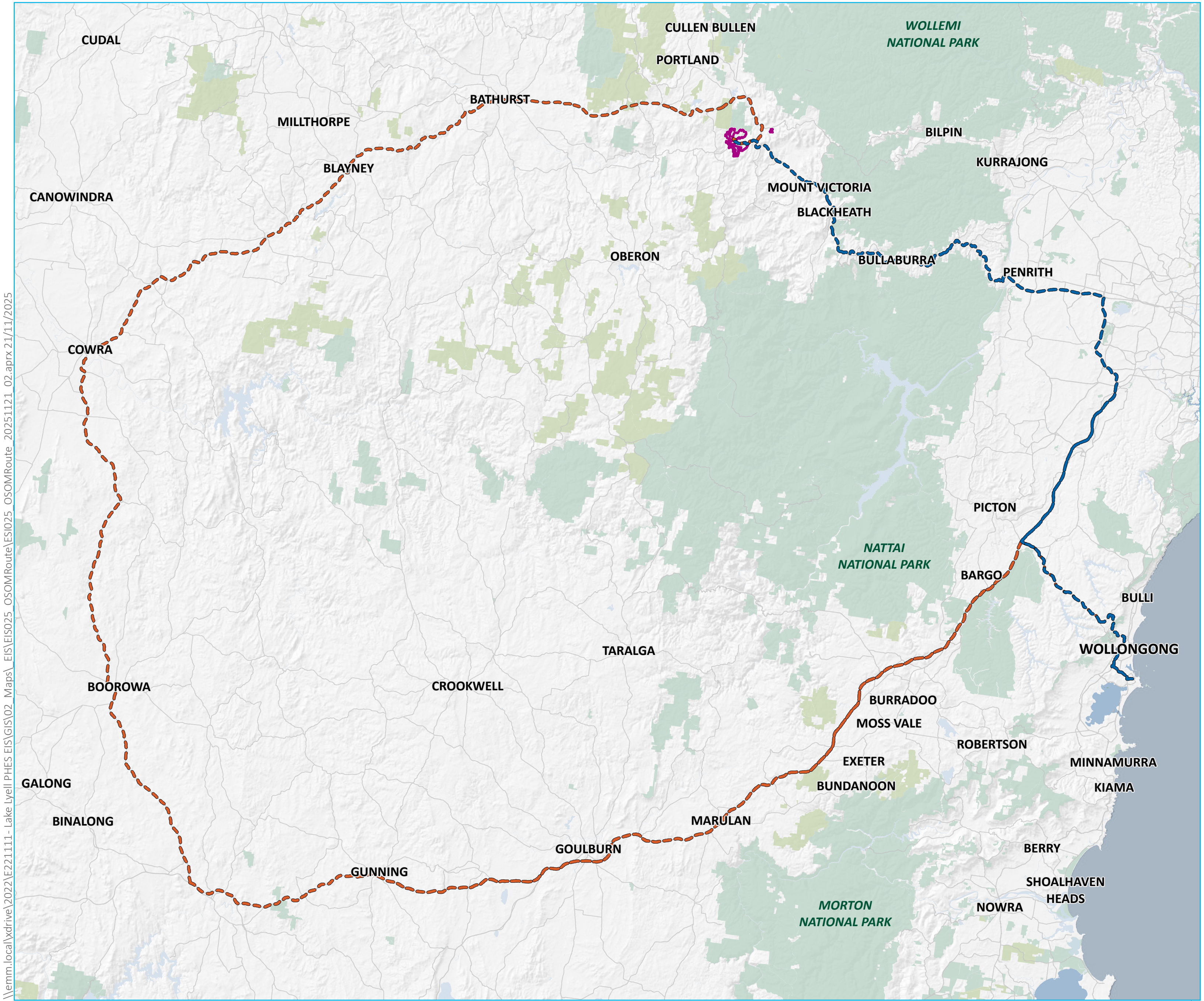
Existing environment

- Major road
- Minor road
- Named watercourse
- Named waterbody
- NPWS reserve
- State forest

Transport route

Lake Lyell PHES
Detailed Project Description
Figure 4.15

EMM
creating opportunities



KEY

Project area

OSOM route

Preferred OSOM route

Alternative OSOM route

Existing environment

Major road

Named waterbody

NPWS reserve

State forest

Source: EMM (2025); Lake Lyell Project Pty Ltd (2025); DCSSS (2024); GA (2009)

\\emm.local\xdrive\2022\E221111 - Lake Lyell PHES EIS\GIS\02_Maps_EIS\EIS025_OSOMRoute\EIS025_OSOMRoute_20251121_02.aprx 21/11/2025

OSOM route options

Lake Lyell PHES
Detailed Project Description
Figure 4.16

EMM
creating opportunities

4.12.2 Construction traffic volumes

Light and heavy vehicles needed for construction will access the project site via the main site entrance. This includes delivery of construction machinery, equipment and materials, transport of spoil offsite, and transport of personnel. The majority of project traffic generation is expected to be light vehicles associated with local workers driving to site. Non-local workers staying at the accommodation camp will primarily be transported via bus to and from site (with buses considered in heavy vehicle estimates). The estimated average daily traffic movements during construction are shown in Figure 4.17.

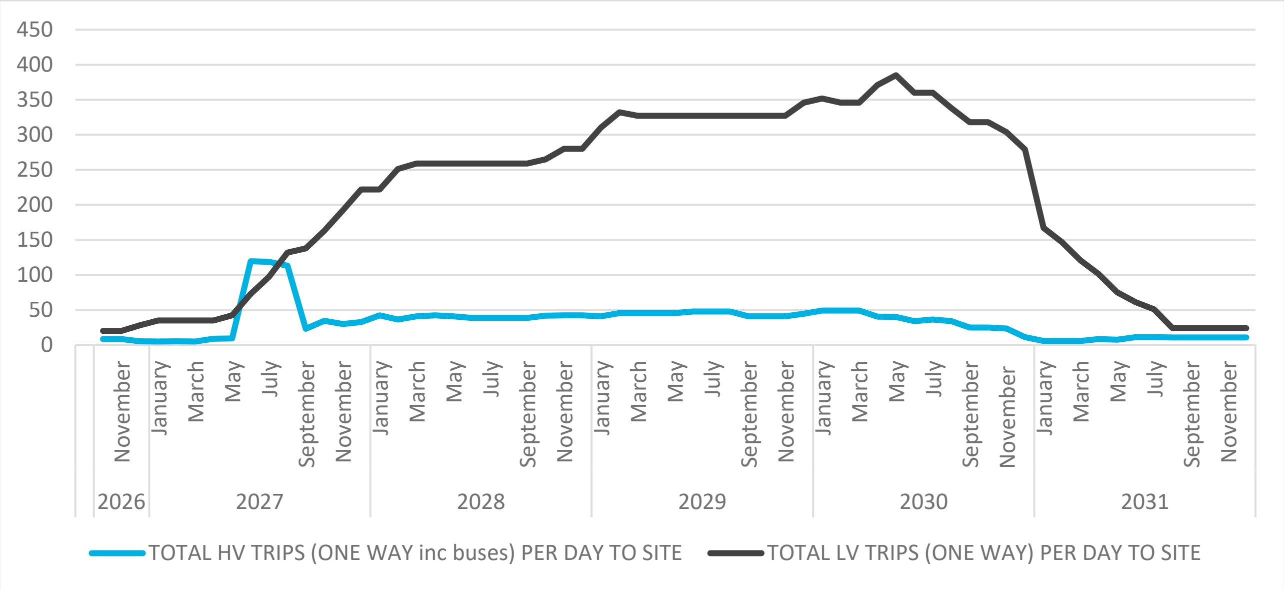


Figure 4.17 Estimated project traffic movements

4.13 Construction utilities and supply

4.13.1 Water

Non-potable construction water will be used on site for concrete batching, dust suppression, etc. will be treated water from the underground construction and the area within the cofferdams, treated by the onsite water treatment plant (WTP), or supplied directly from Lake Lyell. Additionally, one or more ground water bores will be installed to provide additional construction water.

Potable water shall be trucked into site and stored in water tanks or supplied by the onsite WTP.

Estimated maximum daily water usage for each activity during construction is shown in Table 4.6.

Table 4.6 Estimated daily water usage

Activity	Estimated maximum daily water usage (litre/day)	Water source
Concrete batching	150,000	Bore
Tunnelling and underground works	30,000	Primary: recycled from WTP where possible Secondary: bore
Earthworks	300,000	Primary: sediment basin Secondary: Recycled from WTP Bore water if necessary

Activity	Estimated maximum daily water usage (litre/day)	Water source
Dust suppression	800	Primary: sediment basin Secondary: Recycled from WTP
Site offices non-potable	3,000	Recycled from WTP
Site offices potable	500	Bore or imported
Camp accommodation	230,000	Bore

4.13.2 Wastewater

Wastewater for the main construction site will either be pumped out and removed offsite or treated onsite and used for dust suppression. All sewage from the accommodation camp will be treated at an onsite wastewater plant and/or trucked offsite unless a connection to an existing nearby sewerage main is available.

4.13.3 Electricity

A connection request will be made to Endeavour Energy for electricity supply for both construction and operation of the project.

A connection to the mains power will ultimately be established however diesel generators will be used prior to the mains power connection.

Utilities for the accommodation camp include connection to the electricity network via an extension of poles and wires from the existing distribution network along Magpie Hollow Road for Lakeside camp location (within the disturbance footprint). Power to the Town camp location would be through connection to the existing town electricity network.

5 Rehabilitation and final landform

5.1 Objectives

The overall strategy of rehabilitation works undertaken will be to enable the project to co-exist within its existing setting and maintain values of its setting as far as practicable. Rehabilitation will occur progressively over the four to five-year construction period. A total of approximately 74 ha of the disturbance footprint would be progressively rehabilitated following construction.

Rehabilitation objectives for the project are as follows:

- Preserve the construction envelopes natural assets and values and ecological connectivity to Marrangaroo National Park.
- Agreement on future land use and consider long-term site management.
- Establish processes prior to construction works to source seeds, tubestock, topsoils, organic matter and landscape items such as rock and logs to be used in revegetation and progressive, ongoing rehabilitation during the construction works phase.
- Establish appropriate treatments for minimisation of runoff into waterways.
- Protect existing native fauna and their habitats including (e.g. trunks, logs, large rocks, etc.) in construction adjacent areas.
- Where practicable, rehabilitate disturbed areas to a pre-existing or improved state at completion of construction activity.
- Minimise the visual impact of construction works from significant public viewpoints and sensitive receptors.

A rehabilitation strategy has been prepared to as a high-level concept to outline the framework and proposed approach to decommissioning and rehabilitation activities associated with the project and is provided in Appendix T of the EIS. Should the project be approved, a rehabilitation management plan will be prepared for the project in accordance with relevant approval conditions, guidelines and in consultation with relevant authorities and stakeholders.

5.2 Progressive rehabilitation

Temporary infrastructure and disturbance areas required during construction, and no longer needed for operation, will need to be decommissioned and progressively rehabilitated. These areas are shown in Figure 5.1 and the proposed rehabilitation in Table 5.1.

Due to the steep terrain the design often uses 1:1 batters to significantly reduce the footprint and therefore the clearing area. However, this results in batters that require scour protection rather than revegetation with grass and trees. As such, a combination of armour rock and scour protection, native tree vegetation, and grass revegetation will be employed throughout the project area based on suitability due to terrain. The most suitable rehabilitation method for project components are listed in Table 5.1.

Table 5.1 Landscape rehabilitation treatments

Project component	Rehabilitation treatment	Final land use
Northern access road	Scour rock	Permanent design
Northern haul road	Topsoil, seed and scour rock	Permanent design
Southern access road	Scour rock, grass revegetation	Permanent design
HV switchyard / Lower laydown pad	Scour rock	Permanent design
Site compound	Scour rock	Permanent design
Upper reservoir laydown pad	Native tree revegetation	Permanent design
Sediment basin	Native tree revegetation	Revegetation
Temporary crossings over lake	Riparian	Revegetation
Southern temporary haul roads	Native tree revegetation	Revegetation
Site compound	Grass revegetation	Permanent design
Lake infill	Grass revegetation	Permanent design
Cofferdams	Riparian	Temporary design
Tunnel adits	Scour rock	Permanent design

5.3 Operational footprint

The operational footprint of the project will have a significantly smaller area than the overall construction footprint. Similarly, ongoing personnel activities within the project site will be significantly lower than during construction.

Permanent infrastructure which will remain in use during the operating phase of the project's life are listed in Table 5.2.

Table 5.2 Permanent project infrastructure

Infrastructure	Description of purpose
Upper reservoir and dam	The upper reservoir, dam, spillway will continue to be used for water storage throughout the project's life.
Inlet/Outlet structures	Both the upper and lower inlet / outlet structures are essential for the functioning of the project and will remain in operation for the duration of the project's life.
Southern access road	The southern access road will continue to be the primary road used for site access (via Sir Thomas Mitchell Drive).
Northern access road	The northern access road will continue to be used for operational, repair, and maintenance purposes.
Northern haul road	The northern haul road will continue to be used for operational, repair, and maintenance purposes.
Farmers Creek diversion bridge	The permanent bridge spanning the diverted Farmers Creek will remain in use, as access to the northern part of the project area will continue to be attained via Sir Thomas Mitchell Drive and the southern access road.
Administration building	The administration building will continue to act as a control centre, staff centre, and office.

Infrastructure	Description of purpose
HV switchyard	The HV switchyard is needed to allow the project to connect to the Transmission network, and as such will remain in use for the duration of the project's operational life.
Transmission connection	The transmission connection will continue to link the project to the electricity grid via the nearby 330 kV transmission lines that pass through the project site.
MAT and portal	The MAT will continue to act as the primary route for accessing the powerhouse, and the portal at the entrance to the MAT and ECVT will remain in use.
ECVT and portal	The ECVT will remain in use for operational and emergency purposes throughout the project's operational life.
Powerhouse	The powerhouse contains a variety of essential equipment and machinery that will continue to be used throughout the operational life of the project.
Surge shaft	The (single) surge shaft with a varying (internal) diameter from 5 to 11 m will be connected to the waterway and located downstream of the powerhouse and bifurcation..
Power waterways	The power waterways are essential for the functioning of the project and will remain in operation for the duration of the project's life.

5.4 Final landform

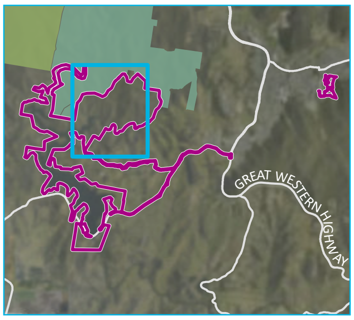
Significant landform modification will occur within the operational footprint, including the excavation of the upper reservoir constructed behind the southeastern ridge of Mount Walker. Several pads will also be established during construction of the project, re-using excavated material to reduce the need to transport spoil offsite. These pads primarily include a flat surface and stabilised batters. It is intended that these pads are revegetated at the end of construction, and opportunities to ensure the final landform integrates with the surrounding environment are considered during detailed design.

It is proposed that the final landform will be constructed from excavated material to create a safe and stable landform, commensurate with the surrounding topography of the area.

\\emm.local\xdrive\2022\E221111 - Lake Lyell PHES EIS\GIS\02_Maps_EIS\EIS003_OperationalFootprint\EIS003_OperationalFootprint_20250424_02.aprx 21/11/2025

Source: EMM (2025); Lake Lyell Project Pty Ltd (2025); DCSSS (2023); MetroMap (2025); GA (2009)

0 250 500 m
GDA2020 MGA Zone 56 N



KEY

- Project area
- Contruction envelope
- Operational footprint
- Progressive rehabilitation

Existing environment

- Minor road
- Vehicular track
- Named watercourse
- Named waterbody
- NPWS reserve

INSET KEY

- Major road
- NPWS reserve
- State forest

Operational footprint of the project

Lake Lyell PHES
Detailed Project Description
Figure 5.1

EMM creating opportunities

6 Operating principles and activities

6.1 Water regime

6.1.1 Existing Lake Lyell and Lilyvale Dam

i Regional Water Scheme

Lake Lyell operates under a regional water scheme including Thompsons Creek Reservoir and Lake Wallace. This scheme is shown graphically in Figure 6.1.

The existing Lake Lyell environmental release protocol follows an 85/25 release protocol and operates under the following rules (DPI Water, 2014):

- Translucent flows – When the daily volume of natural inflows into Lake Lyell is greater than 13.6 megalitres per day (ML/d), the volume of water that is released from Lake Lyell is 13.6 ML/d plus 25% of the natural inflow volume above 13.6 ML/d.

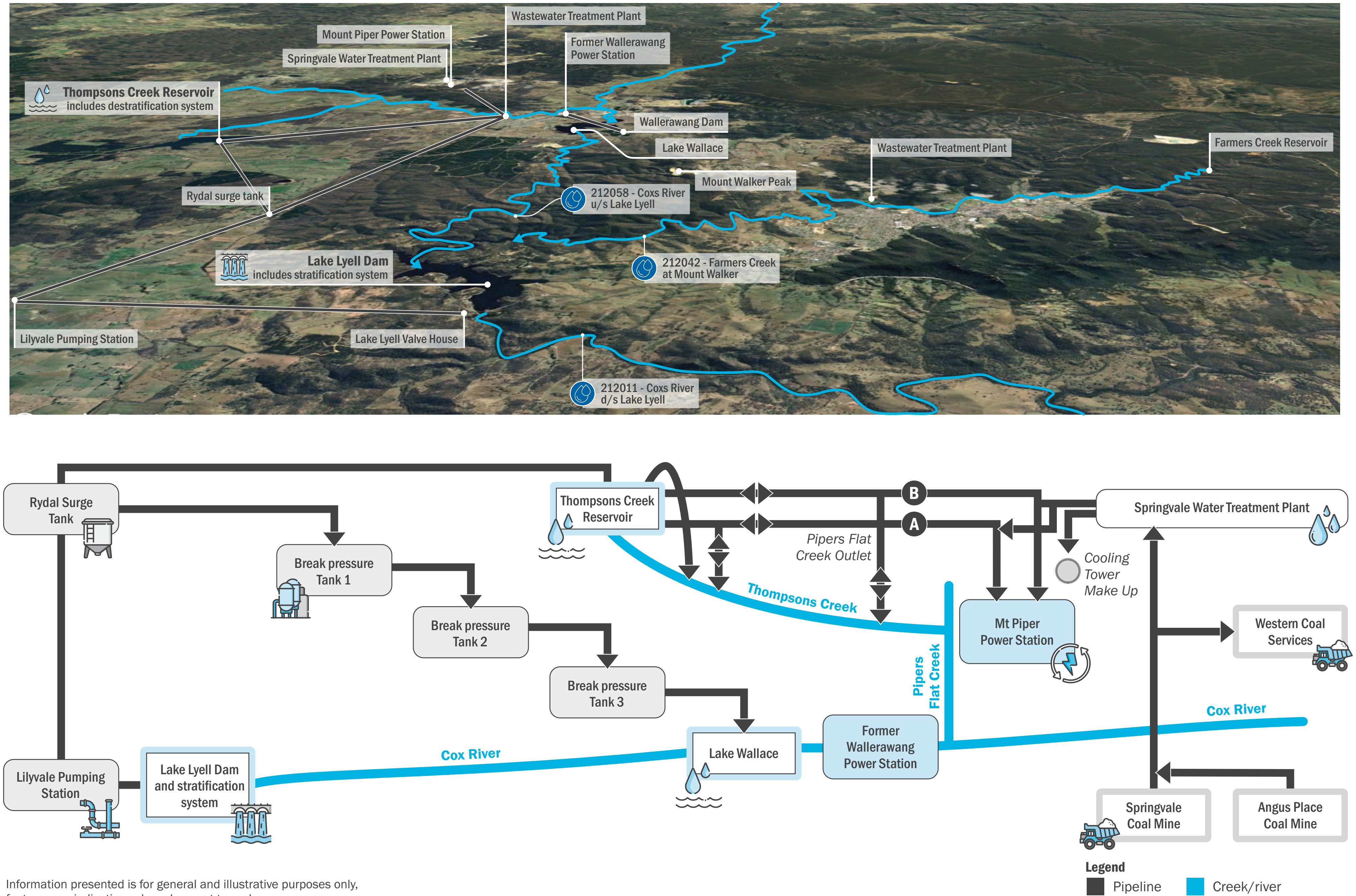
- Transparent flows – When the daily volume of natural inflows into Lake Lyell is less than or equal to 13.6 ML/d, the volume of water released from Lake Lyell is equivalent to the natural inflow volume.

- Drought triggers – When the total active storage in Lake Lyell, Lake Wallace and Thompsons Creek Reservoir is less than 50,000 ML, the volume of water released from Lake Lyell is equivalent to the natural inflow volume up to a maximum of 9.0 ML/d. If this situation has existed for a continuous six-month period, the volume of water released from Lake Lyell is equivalent to the natural inflow volume up to a maximum of 5.0 ML/d.

- Annual channel maintenance flow – Ensures that within any continuous 12-month period there is at least one flow event of at least 800 ML/d (for a minimum period of one hour) at the Lithgow Gauge when not in drought trigger.

ii Existing Lake Lyell Recreational Use

Lake Lyell also serves as a recreational reservoir for fishing, boating, water-skiing, kayaking, camping, and swimming on land lots that are leased to the Lithgow City Council. This lease does not include the Farmers Creek branch of Lake Lyell. EnergyAustralia intend to maintain water levels in the Lake, subject to drought, existing dam operations and maintenance needs, and water existing licencing requirements, to allow Lake recreational activities to continue during construction and operations.



Information presented is for general and illustrative purposes only, features are indicative only and are not to scale

Figure 6.1 Coxs River Water Supply Scheme

6.1.2 Lake Lyell PHES

The LLPHES operational requirements needs the existing Lake Lyell water levels to be maintained within a tighter bandwidth than the current max (FSL) and MOL. Due to technical limits no pumping operation from the lower reservoir is permitted below MOL. The operation of the PHES within the existing Lake Lyell system is shown diagrammatically in Figure 6.2, assuming a full generation and/or pumping cycle and several part cycle examples.

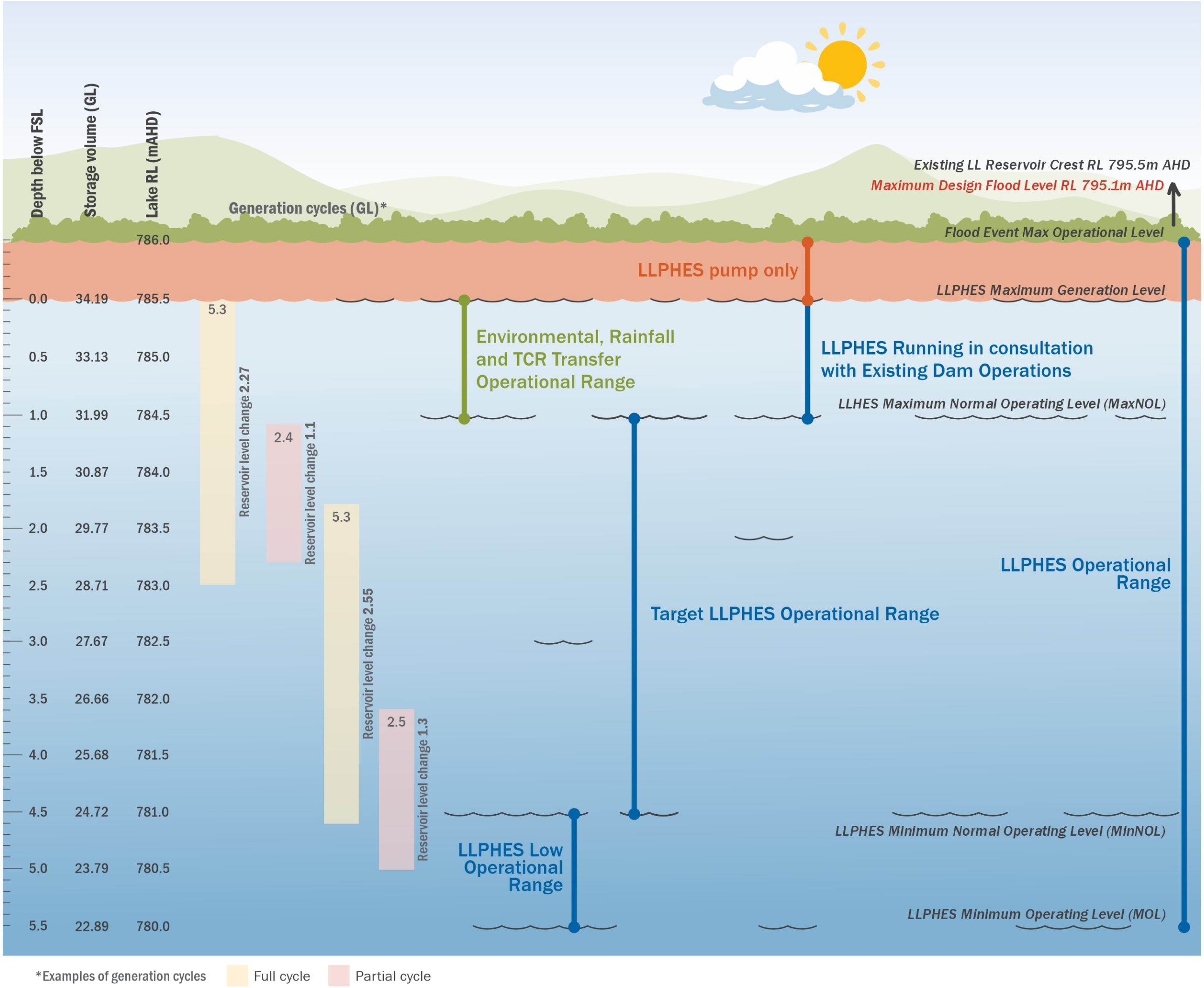


Figure 6.2 Lake Lyell PHES operational philosophy

The EA LLPHES operational level philosophy is as follows:

- LL Reservoir Crest Level RL 795.5 m AHD - Existing setting
- Maximum Design Flood Level RL 795.1 m AHD - Existing setting
- LLPHES allowance for high level and still able to pump: FSL + 0.5m 786.0 m AHD
- LL Reservoir FSL 785.5 m AHD - Existing setting
- LLPHES Maximum Normal Operating Level MaxNOL 784.5 m AHD
- LLPHES Minimum Normal Operating Level MinNOL 781.0 m AHD

- LLPHES Minimum Operating Level MOL 780.0 m AHD.

The max levels assumes the LLPHES has completed a full generation cycle. The min levels assumes the LLPHES has completed a full pump cycle.

The LLPHES project requires Lake Lyell PHES to operate up to a maximum of FSL RL 785.5 m AHD. When the existing spillway is overtopping / spilling up to 0.5 m above FSL the LLPHES facility can still run in pump mode but would not add to the spill by running in generation mode.

The LLPHES MOL is driven by bathymetry considerations in the Farmers Creek branch and as such the minimum level is RL 780 m when a pump cycle is complete. See Figure 6.3 showing the Lake Lyell filling curve.

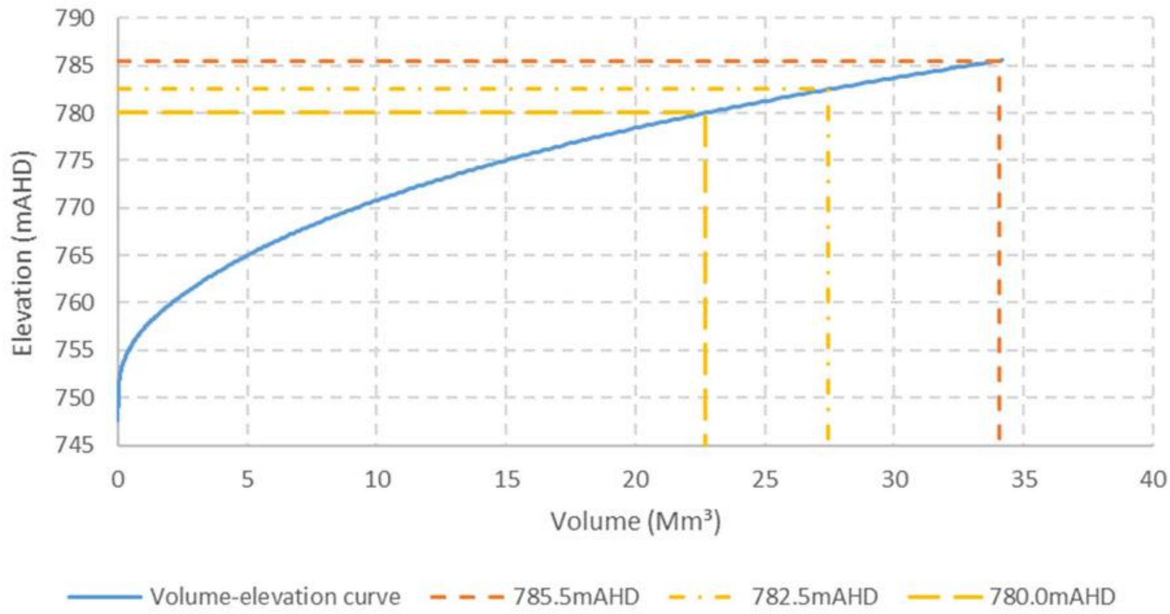


Figure 6.3 Lake Lyell filling curve

A full pump cycle will draw the existing lake water level down between 2.5 and 2.85 m between 9 to 10 hours.

Depending on the generation setting this water can be replenished in approximately 7 to 8 hours at maximum generation or just over 11 hours at minimum generation for both units, or 22 hours for a single unit.

To allow the management of the existing assets a ~2.2 GL allowance for operation water level management is nominated at a range between FSL 785.5 m to RL 784.5 m. This is for outflow requirements and provides buffer capacity for inflow events. The LLPHES project can operate when the water is in this range but the EA existing asset team can limit LLPHES operations based on inflow and outflow requirements if needed.

When the water level in the lower reservoir is closer to the LLPHES operational low level the system efficiency is increased. This advantage of running the Lake Lyell lower is countered by the risk of debris and sediment being drawn in during pumping at these lower levels.

Based on these above considerations, and factoring in recreational use, dam safety needs, existing asset inflow and outflow needs, typically, the level will fluctuate 1.4 to 2.7 m over a typical cycle and within the Lake Lyell operational target bandwidth between RL 784.5 and 781.0 m.

During drought conditions the lake level may fall to low levels. The lowest level that full cycle volume can be drawn is in the lower reservoir level range RL 782.65 m (before pumping) to RL 780.0 m (after pumping). Should drought water levels be lower than RL 782.65 m (before pumping) then the proportion of cycle volume available is reduced. The lowest operational range using only one pump-turbine unit is operation between lower reservoir level range RL 781 m (before pumping) to RL 780.0 m (after pumping) which enables 33% of full cycle capacity.

It should be noted that energy market needs may require generating and pumping cycles around the morning and evening peak periods, resulting in two four-hour cycles rather than one eight-hour cycle in the day. In which case the full energy storage capacity of the Facility could be delivered over a day with lake level only varying by 1 to 1.3 m over the shorter pumping and generating cycles. Examples of water level change for part cycles are also shown in the diagram in Figure 6.2.

6.2 Operation, management and maintenance activities

6.2.1 Operational water management

i Releases (upper reservoir)

Note that the upper reservoir does have a spillway, this is intended to never be used under business-as-usual management of excess water. In the case of an extreme emergency event (such as multiple interlock failure event over-pumping or highly localised highly improbable flooding) then the spillway has the capacity to protect the upper reservoir from overtopping.

ii Waterway maintenance

Once the scheme is in service, periodic inspections and maintenance of the upper reservoir and waterways will be required. Periodic inspections can be undertaken with a remote operating vehicle (ROV); some scuba diver access may be required on rare events at the upper or lower intakes.

If waterway issues are detected that require repair, then the waterway will need to be dewatered, repaired, then subsequently refilled. The intakes, and the stoplogs and gate arrangements, allow for these events without needing to lower the existing Lake Lyell level.

Periodic removal of any sediments that have collected in the inlet/outlet deep pit area may be required via a barge or lowering the reservoir to ~RL 779 m AHD for major maintenance (i.e. approximately every 20 years).

6.2.2 Operational infrastructure management

i Generating facility

Operation and maintenance of the generating facility would include regular maintenance, yearly minor shut maintenance, yearly major shut maintenance, five yearly major inspections (including dams), ~20 yearly major facility wide maintenance. A maintenance shut would typically see 20 to 50 personnel on site, these personal would typically be housed in local accommodation.

ii Switchyard

Operation and maintenance of the HV switchyard will be undertaken by Transgrid as the Transmission Network Service Provider in NSW.

6.3 End of life and decommissioning

After the 80 to 100-year design life the asset may remain viable for a plant refurbishment and extension of life as has been seen for other older assets globally.

Following the plants final refurbishment or once it has reached the end of its serviceable life then the project would look to return the site to a more natural state and encourage community beneficial use.

Decommissioning and repurposing may include:

- removing segments of the upper reservoir dam wall such that it does not hold water or holds significantly less water and is no longer a “declared dam”
- removal of upper reservoir liners
- removing the some of the sealed roads, particularly north of Farmers Creek
- removal of plant and equipment for refurbishment, recycling or reuse
- plugging the waterways and tunnels to remove access and seal off waterways
- rehabilitating and revegetating much of the site
- reviewing the options for recreational and community beneficial use of the site for activities such as camping, fishing, boating, sightseeing and hiking
- repurposing for other water storage needs.

Any decommissioning plans and final rehabilitation of the assets, and the site generally, will need to consider and align with the local and regional strategic context of the Lithgow region into the future.