Borumba Pumped Hydro Energy Storage Project

Project Update

April 2022

Acknowledgement

Powerlink acknowledges the Traditional Owners and their custodianship of the lands and waters of Queensland and in particular, the lands on which we operate. We pay our respect to their Ancestors, Elders and knowledge holders and recognise their deep history and ongoing connection to Country.

Minister’s welcome

The Hon. Mick de Brenni MP

Minister for Energy, Renewables and Hydrogen
Minister for Public Works and Procurement

Overview

Presentation will provide an update to the Borumba Pumped Hydro Energy Storage (PHES) project since our last update to community and stakeholders on 01 and 02 December 2021

1. Stakeholder Reference Group Terms of Reference
2. Project Context
3. Borumba PHES reference project
4. Studies currently being performed or due to commence

Stakeholder engagement

Engagement activities to date include community information sessions, workshops, meetings, and stakeholder interactions through the project website.
Top three themes of stakeholder feedback have been:

1. Hydrological modelling for the dam
2. Flora and fauna
3. Water quality

Stakeholder engagement

How have we responded?

1. Hydrological modelling for the dam
    - Working closely with DRDMW during the review of the water plan
    - Using the new water plan hydrological model to determine the water needs of Borumba Pumped Hydro Project

2. Flora and fauna
    - Engaged with local environmental groups on environmental studies, scope, and timing
    - Working with community groups to help deliver the environmental studies

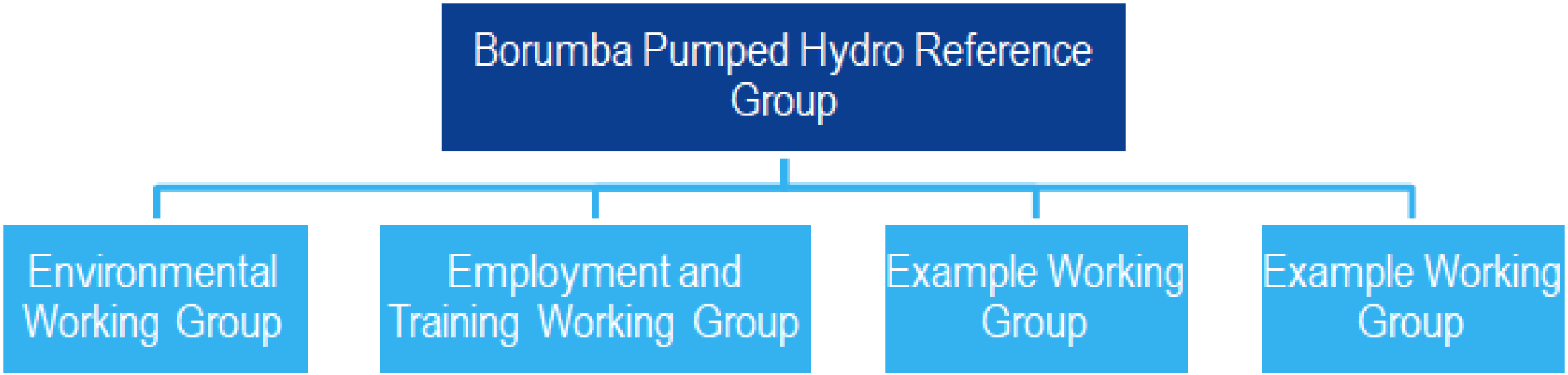
3. Water quality
    - Engaged with local environmental groups on surface water and sediment quality studies scope and timing

Stakeholder Reference Group Terms of Reference

Overview of the role of the Stakeholder Reference Group

- Borumba Project Stakeholder Reference Group is a consultative group to capture stakeholder feedback on the project
- Provides a forum for discussion of project specific issues to better inform the detailed analytical studies
- Provides an opportunity for stakeholders to better understand the project
- Provides a formal communication channel to disseminate and gather information
- Assists Powerlink and the Queensland Government to be aware of local issues and interests of broad range of stakeholders
- The group includes representatives from a mix of stakeholder groups:
    - Environmental groups
    - Business groups
    - Community & recreational groups
    - Traditional Owner groups

Overview of the role of the Stakeholder Reference Group



Roles and responsibilities of members

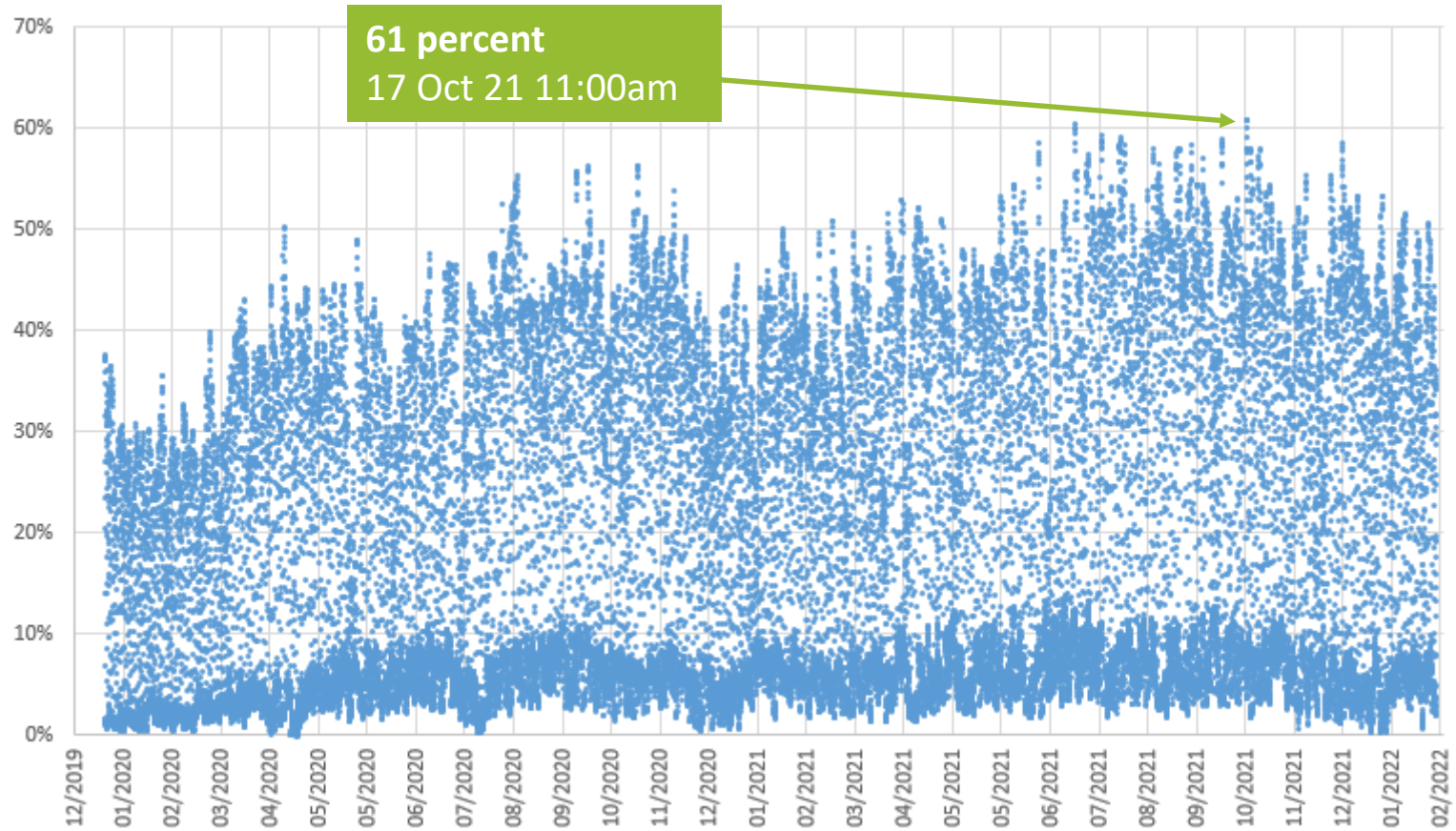
Role	Responsibilities
Powerlink/ Queensland Government	• Work in constructive, open, and transparent manner • Provide accurate, complete, easy to understand, and timely information • Communicate from Reference Group back to project team and Hydro Board • Provide feedback on how meeting actions/outcomes from Reference Group meetings are addressed/actioned
Reference Group members	• Attend and actively participate in meetings and discussions • Objectively present the interests, concerns, and views of their organisation/stakeholder group • Provide information back to their organisation/stakeholder group • Be respectful of the views, perspectives, and opinions of other members • Work towards collective solutions that best meet needs of all group members • Maintain all confidentiality requirements and declare any conflict of interest

Roles and responsibilities of members cont.

Role	Responsibilities
Working group members	• Attend and actively participate in meetings and discussions • Objectively present the interests, concerns, and views of their organisation/stakeholder group • Provide information back to their organisation/stakeholder group • Be respectful of the views, perspectives, and opinions of other members • Work towards collective solutions that best meet needs of all group members • Maintain all confidentiality requirements and declare any conflict of interest
Observers	• Observe meetings of the Reference Group • Provide information in relation to their area of expertise or knowledge • Answer questions as they relate to their area of expertise or knowledge • Provide objective advice/feedback on matters relating to their area of expertise or knowledge

Project Context

Why Pumped Hydro Energy Storage (PHES)?



Queensland Region renewable generation – percentage of total energy generated

We're doing well, but more is needed

Significant investment in Queensland in new renewable generation projects

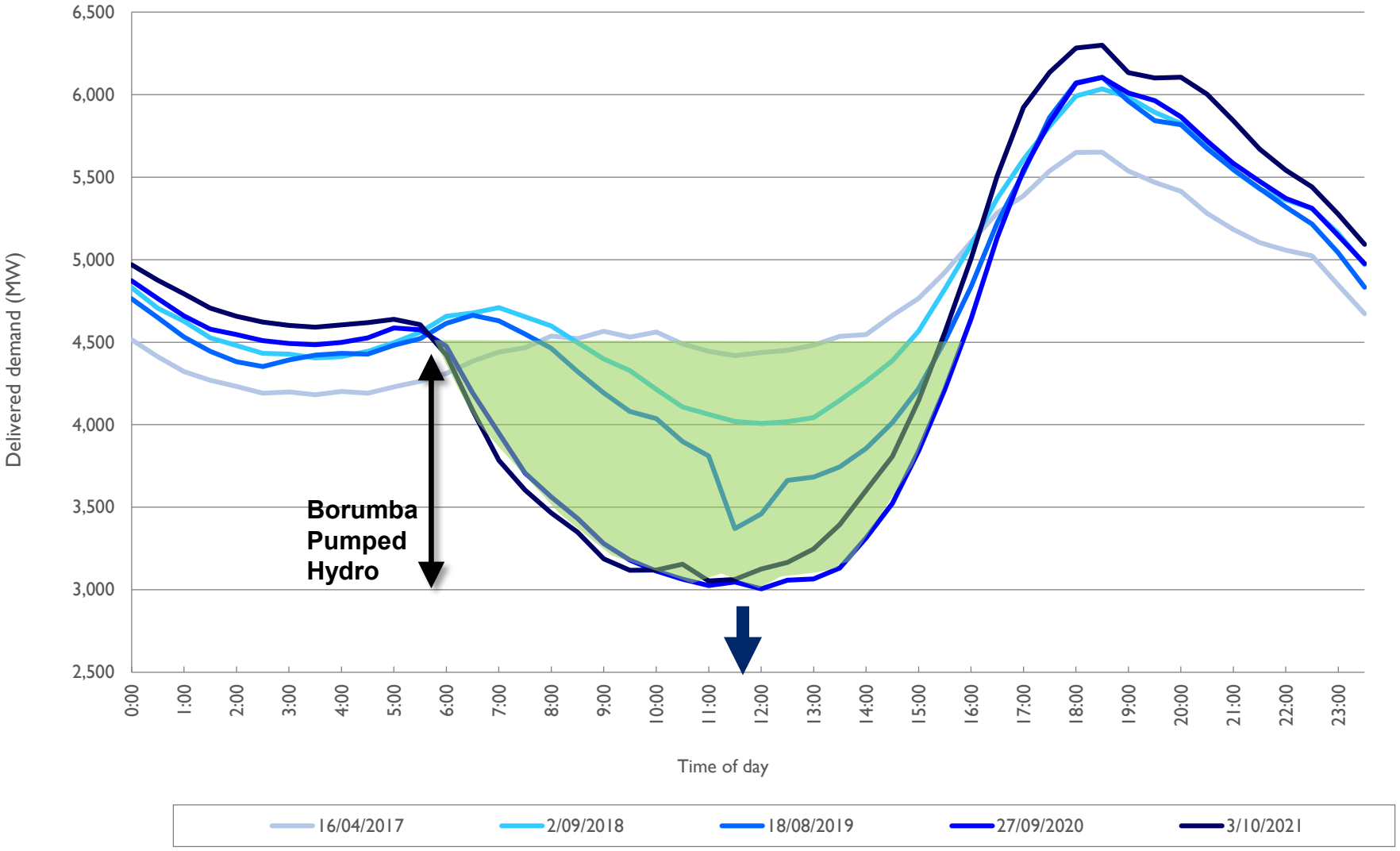
- Strong solar resource
- Complimentary wind resource

>60% renewable generation observed in Qld market

Significant periods when renewable generation <10% (predominantly when solar not generating)

Intermittent renewable generation requires firm dispatchable generation

Minimum demand and pumped hydro



Reference Project

Borumba Dam

- Owned by Seqwater
- Constructed 1964
- Rockfill embankment dam
- Raised by 2.5m (1998)
- 43 m high
- 343 m long
- 46.0 Mm^3 storage
- Full supply level = 135.0m Australian Height Datum (AHD) (spillway height)
- Dam crest = 144.4m AHD
- Parapet wall = 147.2m AHD
- Recreation uses include boating (including power vessels), water-skiing, fishing (stocked), camping

Reference Project

Borumba Concept Study completed in May 2020, set minimum design requirement for project:

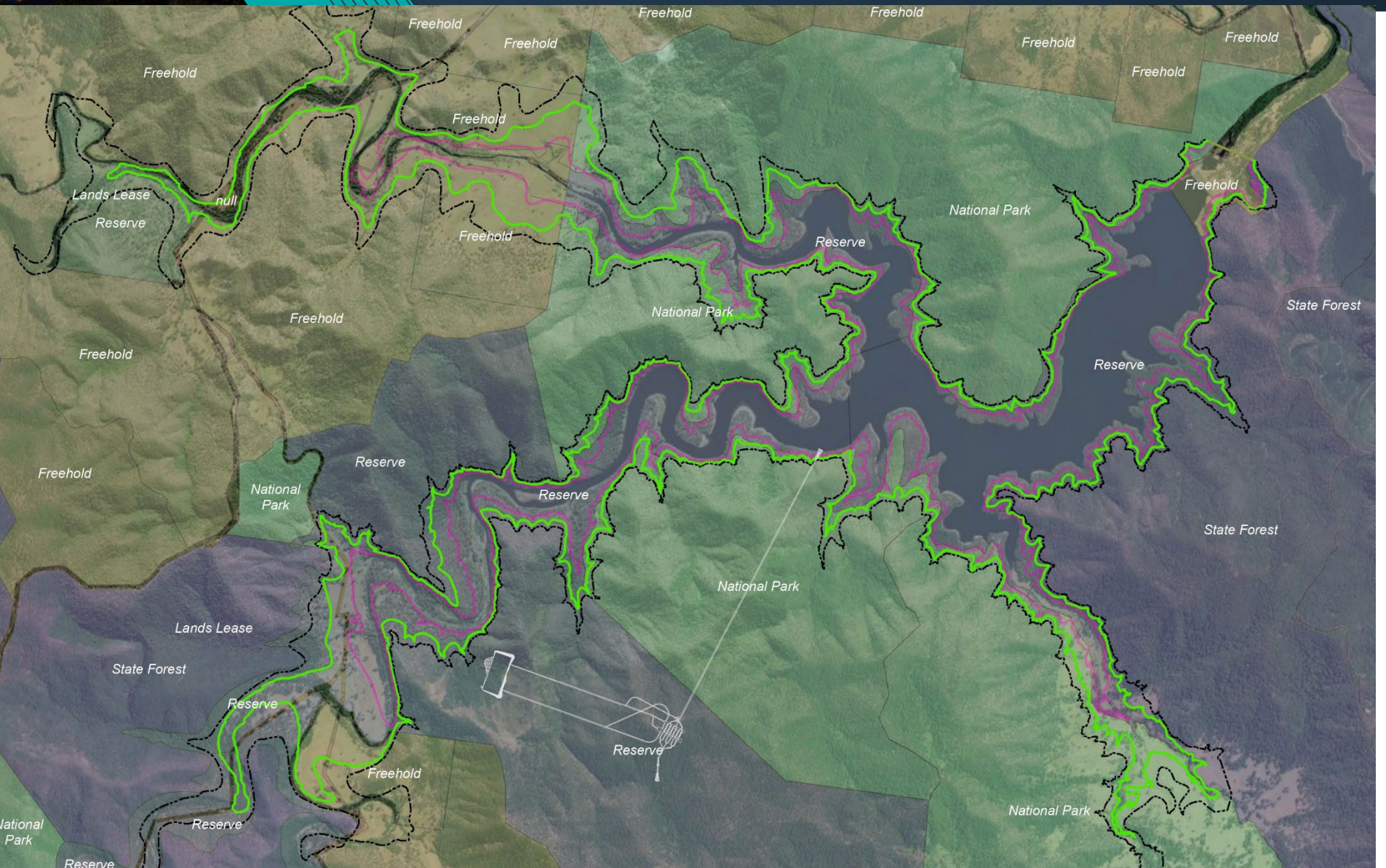
- 1000 MW generation capacity
- 24 hours storage (24,000 MWh)

Current phase of detailed analytical studies commenced in late July 2021, with SMEC joining Powerlink as owners engineer in Sept 2021

Optioneering occurred from Oct to Dec 2021, with a Reference Project defined. Key changes from the Concept Study include:

1. Refined height of the new lower Borumba Dam wall (at least 3m lower than identified the Concept Study – and presented in December)
2. Increased storage volume of the upper reservoir
   - Increased capacity to 1,500 MW to 2,000 MW
   - Duration 18-24 hours (36,000 MWh to 48,000 MWh)
3. Moved location of Powerhouse from under National Park to below Powerlink owned land

Optioneering: Borumba Pumped Energy Storage Project



Variety of heights for new dam wall considered, from 10m above current height (pink) to 35m above current height (dark blue).

Green line is approximately 20m above current height

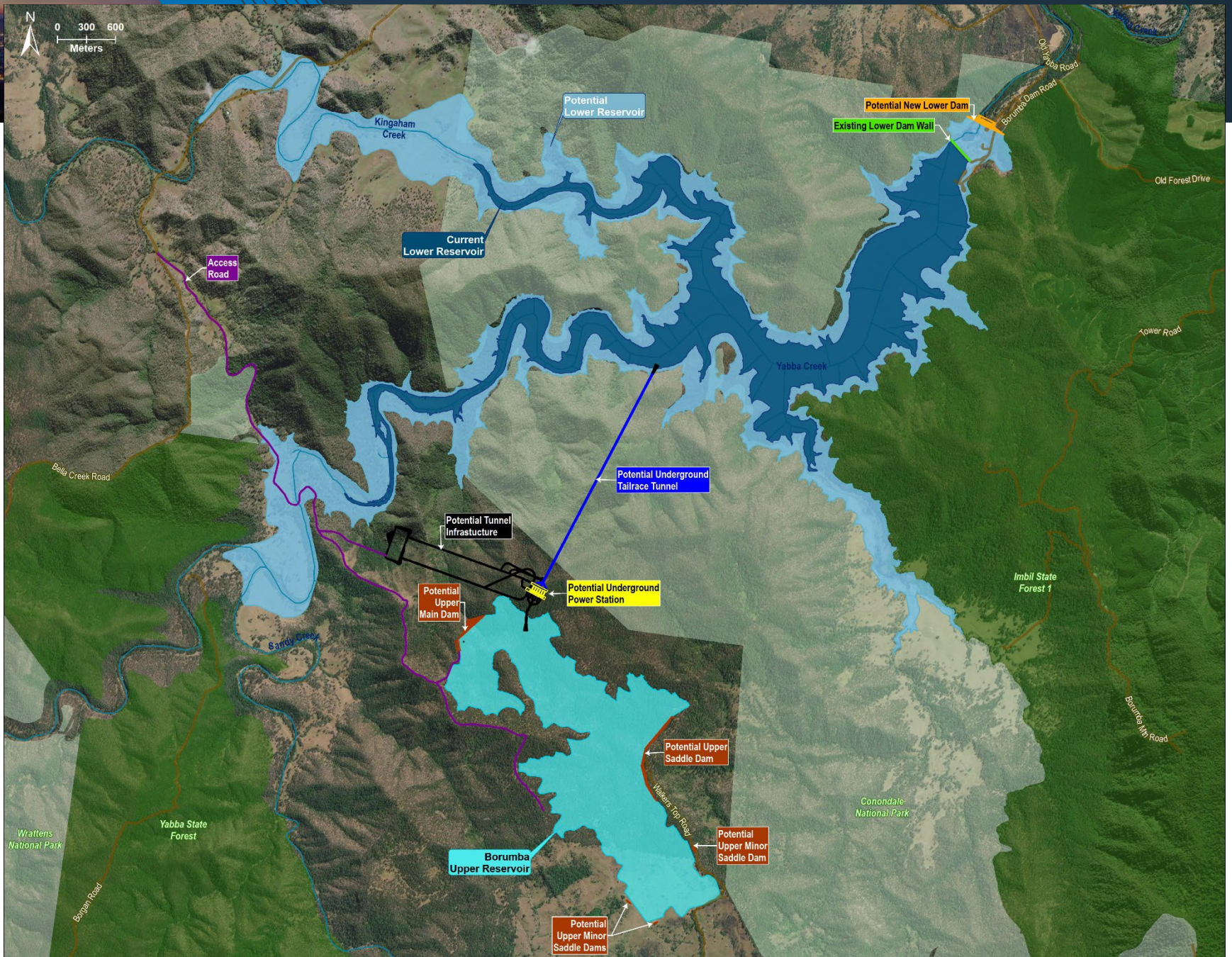
Balance between a higher dam wall

- PHES reliability
- reduced daily fluctuations
- potential to support additional water supply

With a lower dam wall:

- smaller inundation area
- lower cost

Reference Project



Height of 158m AHD identified in the Concept Study

Reference project proposes new dam height up to 20m above current dam height: 155m AHD

Area of National Park impacted reduces from approximately 145ha (at 158m AHD) to approximately 96ha (at 155m AHD)

Reference Project

- Concept level design was 1,000MW and 24 hours storage (24,000MWh)
- Aerial survey has identified greater storage available increasing MW (capacity) and MWh (storage)

For the upper reservoir full supply level (FSL) two options will be assessed

36,000 MWh storage (485m AHD full supply level)

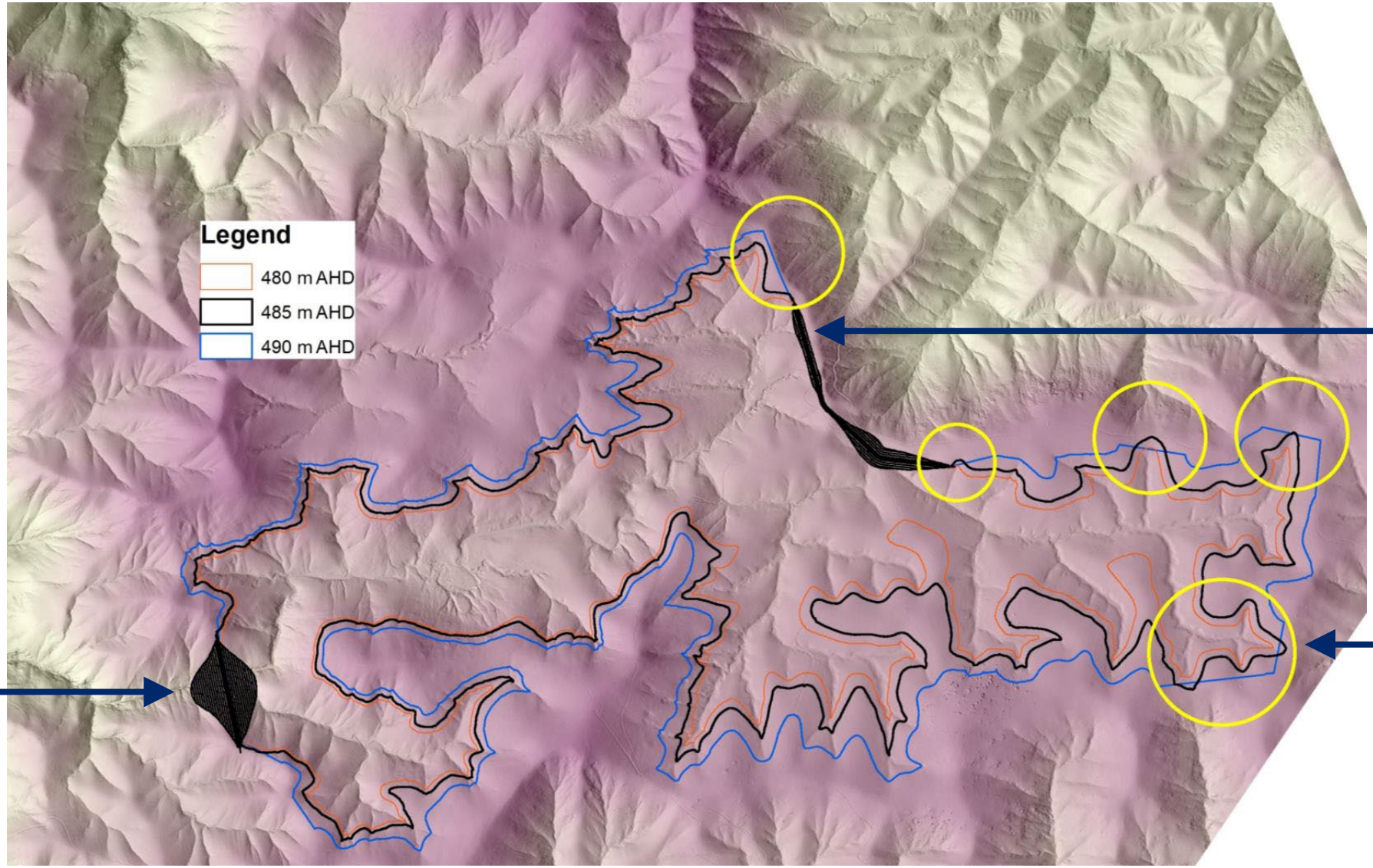
- ~100 m high main dam + 2 saddle dams (800m in total length)
- 1,500 MW x 24 hours
- 2,000 MW x 18 hours

48,000 MWh storage (490m AHD full supply level)

- ~105 m high main dam + multiple saddle dams needed (2.3km in total length)
- 1,500 MW x 32 hours
- 2,000 MW x 24 hours

- The cost of additional storage will be considered against the value and network benefits of additional MWh

Optioneering: Borumba Pumped Storage Project



2nd saddle dam
(550m long)

485m+ AHD

Yellow circles are multiple saddle dams – extra 1.5 km needed on 490m AHD reservoir size

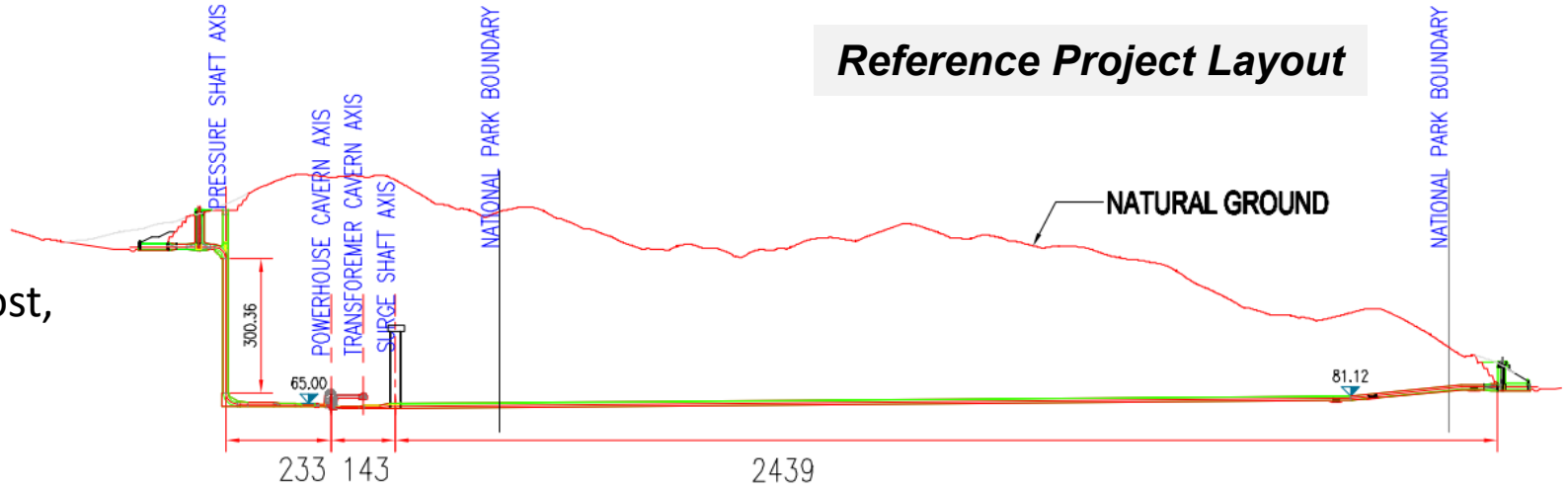
Main dam:
circa 100m high

Powerhouse Location

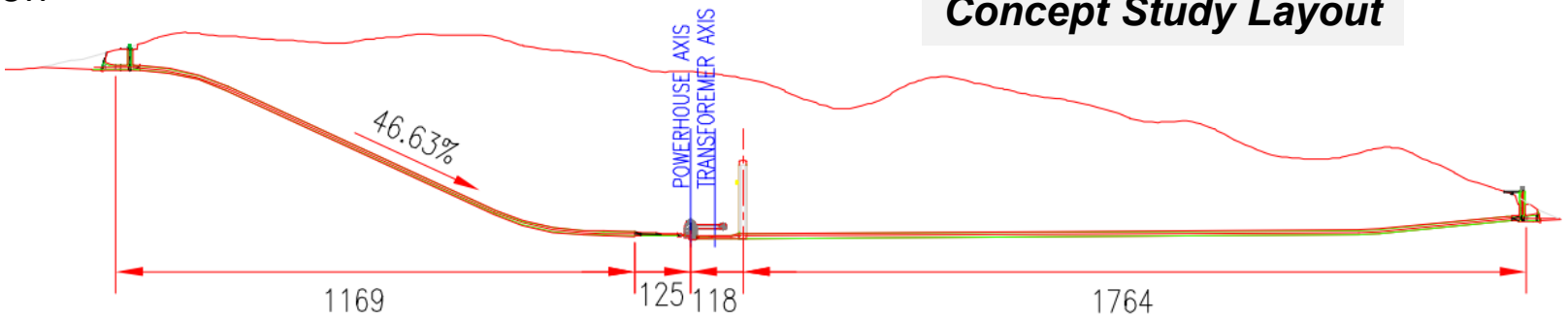
Waterway, powerhouse arrangement:

- Main structures now outside National Park boundaries
- Vertical shaft – simpler construction, less cost, faster
- Excavated tunnel construction, not tunnel boring machine
- Better hydraulics for fast efficient operation

Reference Project Layout

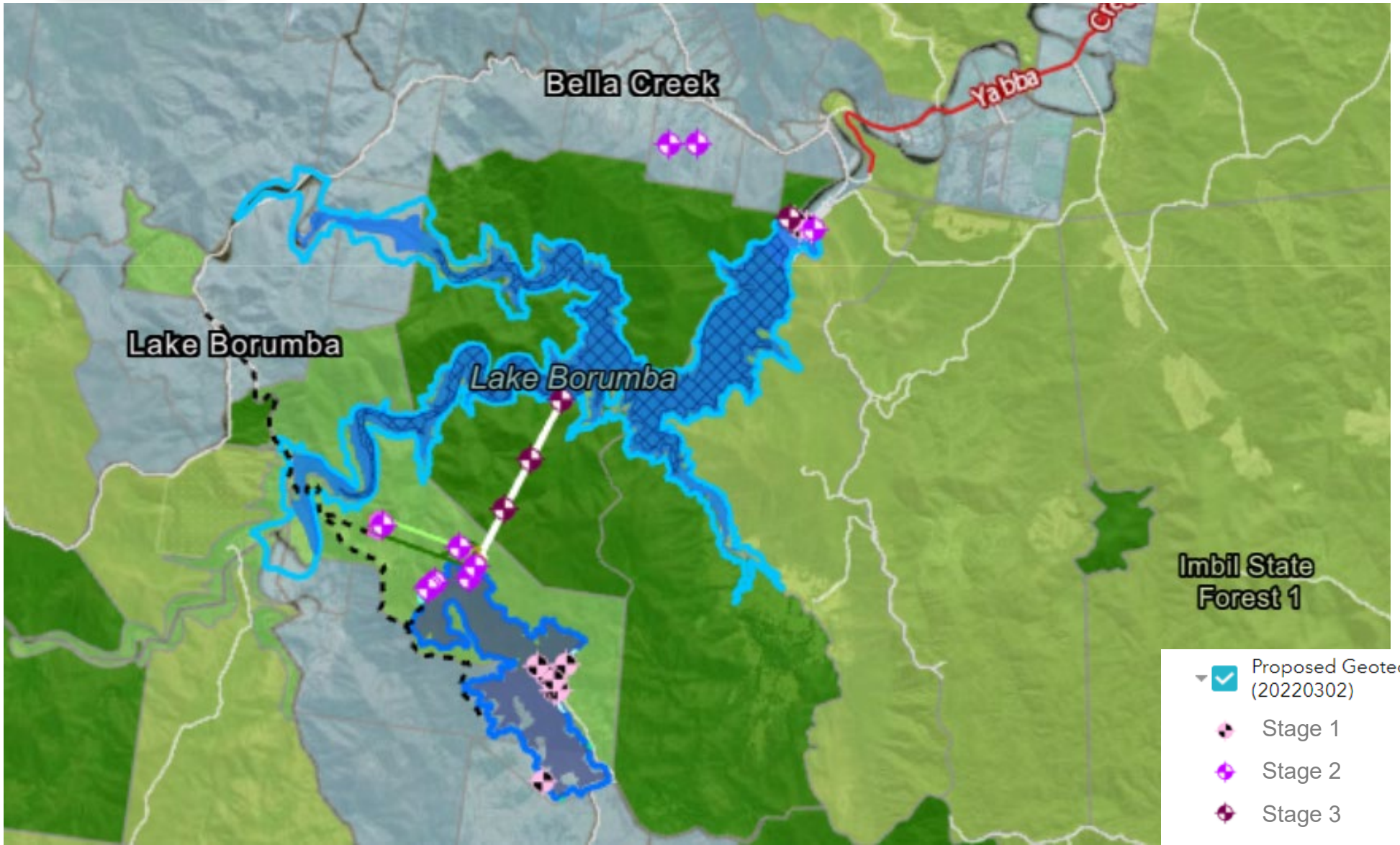


Concept Study Layout



Studies Update

Geotechnical Studies – Stages 1,2,3



Geotechnical Studies

- 25 geotechnical bore hole locations to be drilled – January to August 2022
- Key project input to understand ground conditions for the dams and tunnels

Recent activity

- Package 1 commenced drilling at the ‘New Borumba’ dam site
- Completed road improvements for access into the upper reservoir site on Somerset Regional Council’s Yielo Road and into the Powerlink land at Walkers Top Road
- Recent flooding rain has disrupted work and shut down the sites. Track improvements that had been made have been damaged by runoff and work to reinstate improvements and recommence drilling has started. Hoping to make them more ‘all weather’, with work having commenced at Yielo Road (to the south of the upper reservoir).

Next Steps

- Geotechnical packages 2 and 3 to be contracted
- Some sites will require helicopter access to avoid development of tracks and to reduce vegetation clearance

Geotechnical Studies

Geotechnical Studies

Hydrology

The aim of the preliminary yield hydrological modelling is to:

1. Establish a ‘base case’ for the Borumba Pumped Hydro Project scenarios to be compared against
2. Test the sensitivity of changing the storage capacity of Borumba Dam on assessing Project performance (historical level of service)
3. Test the sensitivity of Project performance to supplying additional high priority water allocations from the Mary Valley water supply scheme (will also need to be considered under, and comply with new Water Plan, once available)

Next steps

Testing for any impact/s of the Borumba Pumped Hydro Project on the new draft water plan outcomes and objectives using the updated hydrologic model

Powerlink, Department of Energy and Public Works, and Department of Regional Development, Manufacturing and Water’s (DRDMW) Mary Basin Water Plan team are working closely together as additional project hydrological modelling takes place and the draft Mary Basin Plan is prepared

Environmental Studies

Recent Activities

- Surface water and sediment quality, aquatic ecosystems, aquatic ecology, and terrestrial ecology studies have commenced
- Will include both wet and dry season flora and fauna surveys - terrestrial and aquatic ecology
- Window for the wet season survey is between March to May 2022, depending on rainfall

Next Steps

- Awarding several other environmental studies packages to specialist ecologists and scientists
- Ongoing work on the hydrological modelling

Study timeline 2022

Study	Scheduled to be completed
Historical heritage study	July
Water transfer study	July
Soils and erosion study	July
Contaminated land study	July
Indigenous cultural heritage	September
Air, noise, vibration and greenhouse gas study	September
Pollutant export study	September
Fluvial geomorphology and sediment transport study	September
Groundwater study	September
Fish passage study	September
Flood hydrology study	October
Other studies (including social impact assessment, recreation, and sustainability, etc.)	November

Recreation study

Recreation impact study will:

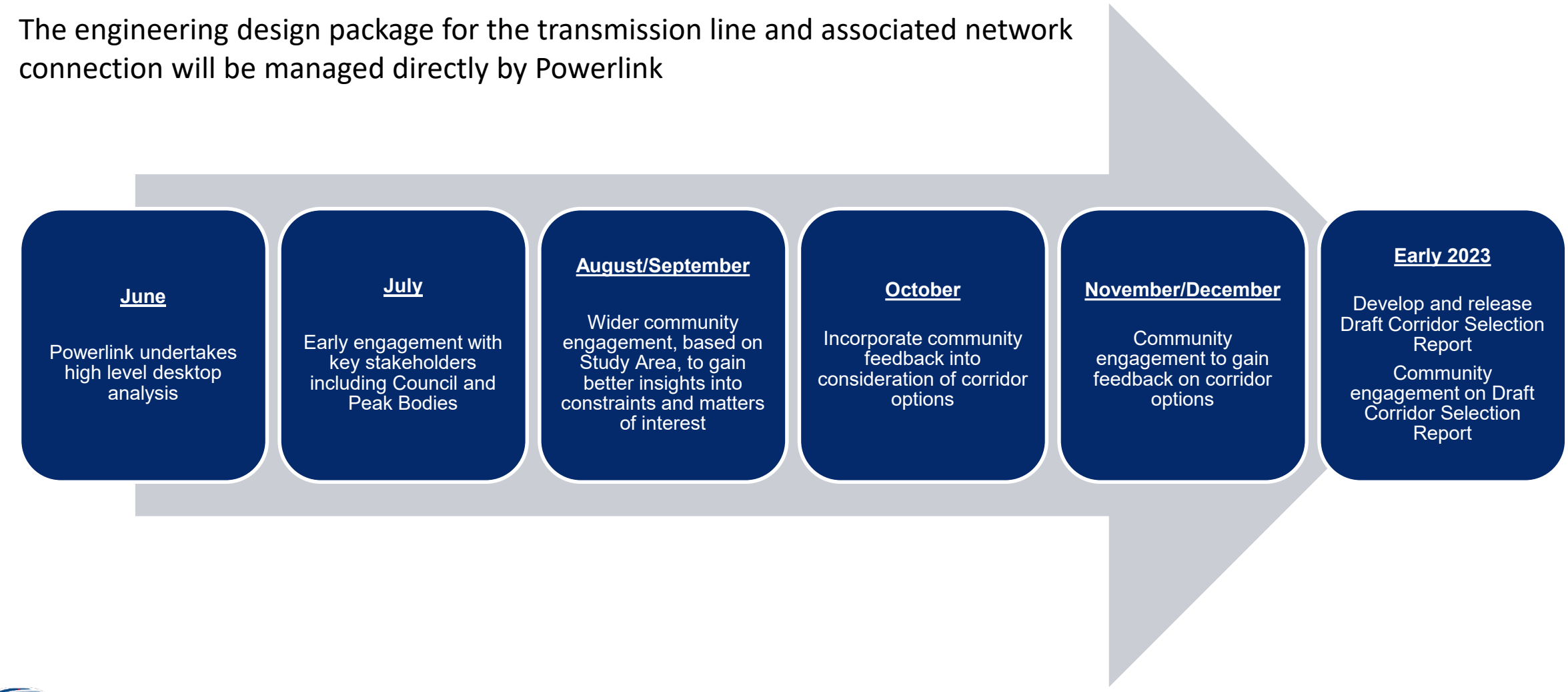
- Map recreation uses and their locations, sites of recreation facilities
- Identify existing social and recreational characteristics of the study area and key recreation values
- Targeted stakeholder engagement and survey to understand how and where people recreate and how stakeholders are likely to be impacted by the project
- Identify potential recreation impacts (both positive and negative)
- Identify opportunities to avoid, or where avoidance is not possible, develop measures to minimsie or enhance identified recreation impacts on stakeholders

Transmission Network Connection

- While the reference design is 2 x 275 kV transmission lines joining into the network at existing substations at Tarong and Woolooga, Powerlink is investigating the potential for development of a 500 kV network. Utilising 500 kV connections has the potential to provide significant network benefits across southern and central Queensland. Allowance will be made for slightly taller structures in corridor identification and selection to support a broader transmission network strategy
- This configuration is expected to be able manage the likely power station configurations (1,500 MW to 2,000 MW)

Transmission Engagement Timeline to early 2023

- The engineering design package for the transmission line and associated network connection will be managed directly by Powerlink



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