

Borumba Pumped Hydro Energy Storage Project Voject Update

April 2022

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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.

Energy.

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





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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







Released under RTI Act by Energy **Stakeholder Reference Group Terms of Reference**

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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





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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 		



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





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Why Pumped Hydro Energy Storage (PHES)?



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

Queensland Region renewable generation – percentage of total energy generated



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Minimum demand and pumped hydro



Colora and in a



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Borumba Dam

- Owned by Seqwater
- Constructed 1964
- Rockfill embankment dam
- Raised by 2.5m (1998)
- 43 m high
- 343 m long
- 46.0 Mm³ 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 ARD 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



Powerhouse Location







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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



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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





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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
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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 minimise or enhance identified recreation impacts on stakeholders





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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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CONTACT

33 Harold Street Virginia Queensland 4014 Australia

PO Box 1193 Virginia Queensland 4014 Australia

1800 635 369

borumba@powerlink.com.au www.powerlink.com.au





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Purpose and Outcome

The purpose of the meeting was to initiate the stakeholder reference group for the Borumba Pumped Hydro Project (the project). The reference group helps to capture stakeholder feedback on the project to enable development of a well-informed business case.

The expected outcome is to meet the following objectives:

- provide a forum for discussions of project specific issues (e.g., environmental assessment or water modelling) to better inform the project's detailed analytical studies;
- enable Powerlink to be aware of local issues related to the project and ensure the interests of a broad range of stakeholders are considered during the detailed analytical studies;
- provide opportunities for the exchange of local information and knowledge to better inform the project;
- build on stakeholder understanding of the project and identify and leverage community knowledge to provide local benefits; and
- provide a formal communication channel between Powerlink and stakeholders to disseminate and gather information.

Attendees:

Project representatives: Mick de Brenni MP (Minister for Energy and Public Works), Gerard Reilly (chair, Powerlink), Chris Gwynne (Powerlink), Chris Evans (Powerlink), Nicole Maguire (Powerlink), Rosie Gilbert (Powerlink), Holly Mair (Powerlink), Catherine Cussen (Department of Energy and Public Works (DEPW)), Jane Carey (DEPW), Julius Frangos (DEPW), Callan Harker (DEPW), Megan Shea (Department of Regional Development, Manufacturing and Water (DRDMW)), Mark Wheeler (DRDMW), Lauren Timms (Office of the Minister for Energy and Public Works, Rebecca Powlett (SMEC)

Environment group members: Ian Mackay (Mary River Catchment Coordinating Committee), David Arthur (Wide Bay-Burnett Environment Council), Narelle McCarthy (Sunshine Coast Environmental Council), Dave Copeman (Queensland Conservation Council), Glenda Pickersgill (Save the Mary River Coordinating Group)

Business representative members: Graeme Elphinestone (Gympie District Liaison Group), Petra Van Beek (Gympie Chamber of Commerce), Sotera Trevaskis (Wide Bay-Burnett Regional Development Australia), Malcom Oakly (Mary Valley Chamber of Commerce), Janelle Parker (Mary Valley Chamber of Commerce) Luke Barden (Plumbing and Pipe Trades Employees Union)

Community representative members: Gary Rozynski (local irrigator), Bruce Horsfall (Lake Borumba Fish Stocking Association), Ian Stehbens (local community member), Don MacAulay (Lake Borumba Fishing Club), Carolyn Harris (adjoining landholder), Senior Constable Bill Greer (Imbil Rural Watch)

Apologies: Kabi representatives

Date & Time: 21 April 2022, 12:00 pm - 2:00 pm

Location: The Pavilion, Gympie Showgrounds 77 Exhibition Road

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Minutes

Agenda Item	Minutes and Actions	Action/ Assigned to	Due Date
1.0	Introduction and housekeeping		
1.1	Facility and emergency procedure information	No action	N/A
1.1	Round table introduction of all stakeholder reference group (SRG) members and project representatives.	No action	N/A
2.0	Minister's welcome		,
2.1	Minister's role in the meeting was an observer, listening rather than talking. SRG members were invited to speak freely and ask questions throughout.	No action	N/A
2.2	The Minister communicated that this is an exciting project and opportunity for Queensland. The project aim is to provide a source of clean and reliable energy that will support Queensland's renewable transformation and long-term economic growth.	No action	N/A
	The project is intended to lead diversification of the Queensland energy sector.		
3.0	Stakeholder reference group terms of reference		
3.1	SRG terms of reference were circulated with the invitation to join the group and provided in hard copy during meeting.	SRG terms of reference were	N/A
	Terms of reference outline:	members.	
	 the objectives for the SRG membership – both composition and process for appointment of members 	No action	
	 SRG structure, including ability to establish working groups to discuss specific project issues by including specialist knowledge. Balas and recompletibilities 		
	 Roles and responsibilities. SRG terms of reference were agreed by members. 		
4.0	General project overview and update		
4.1	In recognition that some stakeholders have had different levels of engagement to date, a general overview of the project was provided to bring all stakeholders to the same level of understanding of the project.	No action	N/A
4.2	The overview included the rationale for the development of pumped hydro in Queensland.	No action	N/A

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Agenda Item	Minutes and Actions	Action/ Assigned to	Due Date
4.3	The reference project was presented, including changes to the design from the concept study to the reference project. There are three key changes from the concept study to the reference project:		
	 Refined height of the new Borumba Dam wall (lower reservoir). Lidar information indicates greater storage capacity is available. Increased storage volume of the upper reservoir which increases capacity to 1,500 MW to 2,000 MW with an operating duration of between 18 and 24 hours. Relocation of the power station from under the Conondale National Park to below Powerlink owned land. 		
5.0	Question and answer – project overview		
5.1	The Project Team responded to questions from SRG members including:	No action	N/A
	Q. Does it cost more to pump if the lower reservcir level is not full?		
	A. The cost of running the scheme does not change with the different water levels in the lower reservoir. The scheme can operate at quite low levels of water.		
	Q. What is the difference in the tidal change when the dam is full/not full?		
	A. The daily fluctuations will vary depending on the lower reservoir levels. The higher the water level, the smaller the fluctuation. Daily fluctuations vary based on a number of parameters. These parameters are being explored during the next phase of studies. The Project Team need to narrow the options to understand the specific potential daily fluctuations.		
	Q. How long does it take to fill or mover the 76 GL from the lower reservoir to the upper reservoir?		
	A. It takes 24 hours, plus some time for loss of efficiency.		
	Q. How much water is going to be caught directly in the upper catchment?		
	A. Very little. The catchment of the upper reservoir is very small, so there will be limited inflow from the catchment. The scheme relies on pumping of water and re-using that, rather than bringing in new water to the scheme.		
	Q. Are the pumps for pumping the water are single or multiple units?		
	A. There will be multiple units for pumping the water.		

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Agenda Item	Minutes and Actions	Action/ Assigned to	Due Date
	Q. What will the project cost?		
	A. We don't know the specific cost yet. Part of the detailed analytical studies is to understand the cost of the project.	4	
6.0	Progress update for detailed studies		
6.1	The Project Team provided an update on geotechnical drilling which is occurring at the new dam wall location (lower reservoir) and upper reservoir. The recent flood event suspended the geotechnical drilling program, but the program has recommenced.	Powerlink to provide geotechnical report to SRG, when available	Current scheduled has report available in August 2022
6.2	The Project Team provided an update on the environmental studies. The first round of environmental studies is underway and there will be several iterations of these studies as information and phases of the project are further defined.	No action	N/A
	Hydrology, surface water and sediment quality, equatic ecosystems, aquatic ecology, and terrestrial ecology studies have commenced.		
	Sequencing of studies is based on seasonal requirements for studies. Some information needed from engineering or other earlier studies to inform the environmental studies. All environmental studies are scheduled to be complete by November 2022.		
6.3	The Project Team provided an update on the transmission lines. Reference design has 2 × 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, which has the potential to provide significant network benefits across southern and central Queensland.	No action	N/A
	Powerlink is committed to stakeholder engagement. Initial engagement will be to understand constraints and stakeholder interests. Engagement will commence with local government and peak bodies in July, expanding to wider community in August/September. Community engagement to gain feedback on corridor options will be in November/December and engagement on draft corridor selection report in in early 2023.		

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Agenda Item	Minutes and Actions	Action/ Assigned to	Due Date
7.0	Question and answer – detailed studies		
7.1	The Project Team responded to questions from SRG members including:		
	Q. Does the increase in the scheme size mean that Powerlink will increase the transmission lines?	e S	
	A. The minimum requirement for the project is for 2 × 275 kV but Powerlink is investigating the potential for development of a 500 kV network, which has the potential to provide significant network benefits across southern and central Queensland.		
	Q. Can the geotechnical report be made available to the SRG?	Powerlink to	Current
	A. Yes, when available we can share the geotechnical report with the SRG.	provide geotechnical	scheduled has report
	Q. Are you expecting any variability in geology?	when available	August
	A. This is what the geotechnical investigation is aiming to identify – if there is variability in the geology, the Project Team needs to identify what and where this occurs and the implications for the engineering design.		2022
	Q. If the powerhouse is at 300 m, how far are you drilling?		
	A. At some locations we will be drilling down to approximately 400 m.		
	Q. Where are you getting the sand from?		
	A. The geotechnical investigations will identify potential construction materials that may be available or present in the area of the upper reservoir. We need to confirm this information before we consider alternative options as this has implications for costs, design, and access.		
	Q. Are you looking at site access through Western Creek/Dirk Creek instead of through imbil? What about impacts to roads? There is an opportunity to upgrade roads and bridges – there are varying views as some people see that as an opportunity, some like the infrastructure the way it is now.		
	A. We need to undertake further studies to confirm the options for transport routes and potential impacts. We will also need to consider the impacts of flooding on the access conditions.		
	Q. Do we know Seqwater's aspirations? Seqwater's water security plan hasn't been released yet – was supposed to be March, but that has been delayed – unsure of the date for release.		
	A. We understand that Seqwater's water security plan will be released sometime this year.		

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Agenda Item	Minutes and Actions	Action/ Assigned to	Due Date
	Q. What about future irrigation growth? Can't expect to take water out of the system to give to power and South East Queensland.		
	A. The letter of invitation to SRG members outlined the issues that are fundamental to building the social licence to operate for the project. These are: that there are no impacts to environmental low flows, there is no off-river storage infrastructure on the Mary River. These commitments form part of our project design principles. We are also working closely with DRDMW during their review of the Water Plan (Mary Basin) 2006.		
	Q. Assume the climate change study will look at increased evaporative loss and increased loss with increased surface area?		
	A. Yes, the climate change study will consider evaporative losses and the potential impact due to the larger surface area of the lower reservoir.		
	Q. Fish passage – what system will be used? There is no fish passage on the Borumba Dam now, why add one in for the new dam wall? Will this mean pest species that are not currently in the dam can enter the dam? We don't want to introduce a problem to the dam that isn't there now.		
	A. We are working with the Department of Agriculture and Fisheries to understand the requirements for fish passage. Generally, fish passage needs to provide both upstream and downstream movement of aquatic species.		
	Q. Power boats and paddle boats are currently allowed on Lake Borumba, how will the rise and fall of water levels influence boat ramps and access?		
	A. There would be movement at day and night depending on the scheme demand. As part of the design we are looking to try to keep these fluctuations similar to typical tidal fluctuations. The boat ramp and other recreational infrastructure will need to cater for these fluctuations in water level.		
	Q. Borumba Dam was built in 1964, how often has drought meant that irrigators can't use water from Borumba Dam?		
	A. Examining the historical climate data is part of the hydrology study.		
	Q. The project will inundate 96 ha of national park – recognise that this is a reduction in inundation from the design in the concept study but what studies are being done or have been done?		
	A. The ecology studies will investigate the ecological value, species composition. of the proposed inundation area. The engineering studies will continue to refine the potential impact area of the project and will feed into identifying how much of the Conondale National Park will be inundated. Both these studies are ongoing.		

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Agenda Item	Minutes and Actions	Action/ Assigned to	Due Date
	Q. Acknowledge early stage, but what is the easement width for 275 kV and 500 kV?		
	A. About 60 m easement for 275 kV and about 100 m wide for 500 kV.		
	Q. What is the length of the transmission line from Borumba to Tarong and Woolooga?	, S	
	A. The distance is about 70 km in both directions.		
	Q. Has any Queensland system had any wildfire ignition issues?		
	A. Powerlink has not had any wildfire ignition issues from transmission infrastructure.		
8.0	Next steps		
8.1	Wivenhoe site visit. Members of the stakeholder reference group are invited to a site visit to the Wivenhoe Pumped Storage Hydroelectric Power Station. Site visit is scheduled for May 2022. A formal invitation and more information will be emailed to members following this meeting	Powerlink to send invitation for site visit	May 2022
8.2	Discussion relating to the proposed meeting schedule, agenda for meetings. Intention is to meet quarterly with the location for the meetings moving to different localities within the region to ensure equity in terms of travel times for members. Representatives asked to send email to <u>borumba@powerlink.com.au</u> if there are preferred times and days for future meetings and for agenda items. The aim is to shape the meetings and agenda to best meet the information needs and interests of members.	SRG members to email any preferences for meeting times, days, and agenda items.	Ongoing
	Meeting Closed		

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