Borumba Pumped Hydro Energy Storage (PHES) Project - Exploratory Works

Application Number: **01638** Commencement Date: **01/02/2023** Status: **Locked**

1. About the project

1.1 Project details

1.1.1 Project title *

Borumba Pumped Hydro Energy Storage (PHES) Project - Exploratory Works

1.1.2 Project industry type *

Energy Generation and Supply (renewable)

1.1.3 Project industry sub-type

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1.1.4 Estimated start date *

1/09/2023

1.1.4 Estimated end date *

28/03/2025

1.2 Proposed Action details

1.2.1 Provide an overview of the proposed action, including all proposed activities. *

Proposed action details

Several supporting work elements for the Exploratory Works are within existing cleared areas. These activities would not contribute to the significant impact assessment spatially or temporally and are therefore excluded from the referral. A summary of the works and a self-assessment of those works is provided in **Att. 1 - Works outside of referral scope within Att.1 - Borumba PHES Project - Exploratory Works - EPBC referral report**.

The Project comprises the following components:

- *Exploratory tunnel drilling* – the construction of a portal pad and exploratory drilling of a tunnel to the powerhouse cavern from this pad following the proposed emergency, cable, and ventilation tunnel (ECVT) alignment. Only one exploratory tunnel will be drilled, however two options are currently being considered: the Orange option (which has a split portal pad across two locations that are connected by a track) and the Green option (described in detail in **Att.1 - Borumba PHES Project - Exploratory Works - EPBC referral report, Section 1.5.3, pp.14**).
- *Geotechnical investigations* – test pits, boreholes (deep and shallow, including some conversion to groundwater monitoring bores), seismic lines, and costeans (trenches) to obtain geotechnical information necessary to determine the suitability of the Borumba PHES Project location and support the detailed design.
- *Access tracks* on site – new gravel tracks and surface upgrades to existing gravel tracks in and around the Borumba dam and upper reservoir areas, including a waterway crossing downstream of Borumba dam, to enable access to geotechnical investigation and exploratory tunnel drilling sites, spoil disposal area, and supporting infrastructure.
- *Spoil disposal area* – location for disposal of spoil from exploratory tunnel drilling.

- *Other supporting infrastructure* – emergency helipads, temporary water infrastructure (pumps, pipes and tanks) to source and store water required for exploratory tunnel drilling and geotechnical drilling, a general staging area for works, and an explosive store for exploratory tunnel drilling materials.

The Project components listed above are described in more detail in **Att.1 - Borumba PHES Project - Exploratory Works - EPBC referral report, Section 1.5, pp.4**, and the anticipated footprint of the components is provided in **Att.1 - Borumba PHES Project - Exploratory Works - EPBC referral report, Section 1.5, Table 1-2**. The exploratory works are shown in **Att.1 - Borumba PHES Project - Exploratory Works - EPBC referral report, Section 1.5, Figure 1-2**.

A project area encompassing the disturbance footprint is an area of 1,222.95 ha.

For the purposes of this referral, the anticipated footprint provides a worst-case estimate of the disturbance footprint. While the footprint is described throughout this referral report, the final location of each individual work component will be determined in the field considering the ground conditions, access and avoiding the need to clear vegetation as far as possible. In addition, this footprint will be reduced as far as possible in accordance with the identified measures presented in this section and in **Att.1 - Borumba PHES Project - Exploratory Works - EPBC referral report, Section 7, pp.69**.

The total disturbance footprint of the Project would be[1]:

- 81.96 ha for the orange portal option, **or**
- 83.89 ha for the green portal option.

[1] There are two mutually exclusive options being considered for the exploratory tunnel. Exploratory tunnel drilling and associated works will only be undertaken for one of the options.

If not appropriately managed, the key potential direct and indirect environmental impacts associated with the Project may include:

- Direct and indirect impacts to flora and fauna habitat within the Project area due to vegetation clearing required for surface Project works, including portals, geotechnical investigations, access tracks.
- Risk of fauna injury or death due to vegetation clearing required for surface Project works, including portals, geotechnical investigations and access tracks, and due to increased vehicle/machinery movements onsite.
- Disturbance of the soil associated with vegetation clearing for surface Project works, including portals, geotechnical investigations and access tracks, concentrating runoff and causing soil erosion and resulting in changes to water quality (e.g. increased turbidity and sedimentation) within waterways near the Project.
- Loss and/or reduction in the populations of threatened flora and fauna, and displacement of fauna from the area, as a result of vegetation clearing for surface Project works, including portals, geotechnical investigations and access tracks, as well as potentially due to the associated increased noise and dust generation onsite
- Loss of habitat for aquatic fauna due to physical disturbance to the bed and banks of Yabba Creek and Kingaham Creek and the construction of waterway crossings.
- Aquatic fauna injury or death due to physical disturbance to the bed and banks of Yabba Creek and Kingaham Creek and the construction of waterway crossings.
- Temporary barriers to aquatic fauna movements due to the construction of waterway crossings.
- Changes to water quality, such as increases in turbidity, sediment loads, and concentrations of nutrients and metals, due to the construction of waterway crossings and runoff from Project works occurring near waterways or drainage lines that require vegetation removal and ground disturbance.
- Contamination of waterways through any discharge of surface/ground water collected during project work, and the accidental release of fuel, oil, waste or other chemicals.
- Direct groundwater take or groundwater drawdown associated with exploratory tunnel drilling, leading to a short-term reduction in water availability to potential groundwater dependent ecosystems (GDEs) in the vicinity of the exploratory tunnel drilling.
- Air quality (dust) impacts due to exploratory tunnel drilling, vegetation clearing, geotechnical investigations (particularly where large areas of the ground surface require preparation) and general vehicle and machinery movements onsite.
- Noise and vibration impacts, particularly due to earthworks and drilling and blasting activities and the general use of heavy machinery and vehicles onsite.
- Visual impacts, primarily as a result of vegetation clearance and ground disturbance/preparation for geotechnical investigations in an otherwise vegetated landscape.
- Increased occurrence of weeds and pests in the vicinity of Project works due to increased human activity and vehicle movements onsite, particularly in areas that were previously undisturbed.

Project Need

The purpose of the Project is to undertake and facilitate critical technical investigations required for the Borumba PHES Project. To confirm the suitability of the Project location and design, and then undertake the detailed design, sufficient technical information about the site is needed. Investigation is particularly crucial in areas where key project infrastructure will be constructed, as geological uncertainty is a significant risk for the Borumba PHES Project, particularly for the considerable subsurface infrastructure required.

The information obtained from investigations is crucial to the Borumba PHES Project, as it will determine whether the Project can proceed or if material changes to the reference design are necessary. The technical information needed primarily comprises investigations of geology at the proposed locations of the:

- Reservoir dam foundations – to be verified by geotechnical boreholes, test pits, costeans and seismic lines; and
- Underground tunnels and caverns – to be verified by geotechnical exploratory tunnel drilling and geotechnical boreholes.

It is especially critical that direct geological data is obtained for the caverns, as these are located approximately 450 m below ground and will house the power station components. Using an exploratory tunnel will provide full face exposure of underground material allowing confirmation (rather than extrapolation) of ground conditions. It will allow in-situ stresses to be measured directly, and will also allow time-dependent deformation to be observed and recorded.

The drilling of geotechnical boreholes will also enhance understanding of groundwater as some geotechnical boreholes will be used to undertake groundwater monitoring at key locations. There are currently no groundwater bores in the vicinity of the proposed underground infrastructure for the Borumba PHES Project, and it is essential to understand groundwater in these areas to inform the design and assess potential impacts of the Borumba PHES Project.

Some investigation areas are accessible using existing roads (i.e., from Imbil via Bella Creek and Borgan roads) and tracks, however proposed locations of the upper reservoir dam foundations and underground tunnels and cavern are remote and not accessible for investigations from existing roadways. Specialist large plant and equipment, which requires suitable access roads and tracks, is also needed to undertake the geotechnical exploratory tunnel drilling.

The exploratory works are largely temporary in nature and are not intended to remain in place for an extended duration. Should the Borumba PHES Project not proceed, the exploratory works infrastructure will be removed and impacted areas will be remediated where appropriate (i.e., revegetation of cleared areas, boreholes plugged).

The Borumba PHES Project timeframes require project detailed design to occur in parallel with the exploratory works and primary approvals processes for the Project. As the detailed design is developed for the Project, and assuming no fatal flaws are identified, the design team will seek to incorporate the temporary Exploratory Works infrastructure into the permanent work design, where possible.

A cover letter summarising the context of the project and the referral submission has also been provided (**Att.5 - Cover Letter**).

1.2.2 Is the project action part of a staged development or related to other actions or proposals in the region?

Yes

1.2.3 Is the proposed action the first stage of a staged development (or a larger project)?

No

1.2.4 Related referral(s)

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1.2.5 Provide information about the staged development (or relevant larger project).

Summary of related actions

The Borumba PHES Project – Exploratory Works (the Project), which is the subject of this referral, is one of three separate proposed actions required for the development and delivery of the Borumba PHES Project. The Borumba PHES Project is 2,000 megawatt (MW) hydroelectric scheme established to store, generate and supply energy through a pumped hydroelectric structure linked to the existing Lake Borumba reservoir.

The two other proposed actions that are planned to be referred separately under the EPBC Act are:

- The Borumba PHES Project, which includes the following:
  - a pumped storage project (2,000 MW power station, supplied by a circa 490 m Australian Height Datum (AHD) full supply level (FSL) upper reservoir), providing up to 24 hours of continuous generation
  - new Lower Borumba Dam and increased reservoir area (155 m AHD FSL).
- A transmission connection (up to 500 kilovolt (kV)) to existing Powerlink network substations at Tarong and/or Woolooga (delivered as a related project by Powerlink).

Further detail is provided in **Att.1 - Borumba PHES Project - Exploratory Works - EPBC referral report, Section 1.4, pp.1 and Section 1.6, pp.36**.

Borumba PHES Project description

The proposed Borumba PHES Project is located near to and incorporating the existing Borumba Dam Lake Borumba's catchment area covers 465 km2 of the Mary River basin and at full supply holds approximately 46,000 megalitres (ML) of water.

The proposed Borumba PHES Project will expand the existing footprint of Lake Borumba.

PHES schemes are comprised of an upper and lower reservoir at different heights which move water from the upper to the lower reservoir to generate electricity. Water is stored in an upper reservoir, then released through turbines to generate electricity when there is an energy generation deficit from other renewal energy sources, such as solar and wind. When energy demand is low, PHES uses excess renewable energy in the energy system to pump water from the lower to the upper reservoir to be stored for a future generation cycle. PHES helps ensure a secure energy system by providing a range of system security services, including system strength and inertia.

The proposed Borumba PHES Project will deliver:

- a pumped storage project (2,000 MW power station, supplied by a circa 490 m Australian Height Datum (AHD) full supply level (FSL) upper reservoir), providing up to 24 hours of continuous generation); and
- Lower Borumba Dam and reservoir (155m AHD FSL).

The Queensland Government identified Borumba Dam as a potential large-scale long duration PHES site in the 1980s, with land acquired and reserved for pumped hydro development (this land is now owned by Queensland Hydro, the state-owned hydropower development company).

The specific key components of the proposed Borumba PHES Project comprise:

- New Borumba Dam and (lower) reservoir (Lake Borumba):
  - Raising the full supply level of Lake Borumba through the construction of a new dam wall immediately downstream of the existing dam wall
  - Partial demolition of existing Borumba Dam
  - Installation of fish and turtle passage and transfer devices
- New upper dams and reservoir
  - Installation of a main dam wall, saddle dam and minor saddle dams to form an upper reservoir
- Underground works to support power generation
  - Water transfer (headrace and tailrace) tunnels (from 260 m to 2,400 m long) to transfer water between the upper and lower reservoirs (each comprising of 2 x 10.5 m internal diameter tunnels)
  - Underground power station and pump turbines
  - Access to the surface would be via a 1,520 m long, 10.4 m wide main access tunnel (MAT), and a 1,480 m long, 8.5 m wide ECVT. The portals would be located near the switchyard
  - Electrical switchyard (approximately 5 ha in area).
  - Ancillary infrastructure (both temporary and permanent) including quarry sites and other resource extraction areas, access roads and bridges, maintenance buildings, construction camps with associated water and wastewater treatment plants, spoil dumps and laydown areas.

The Borumba PHES Project design is still under development, and some features may be subject to change based on development of the Borumba PHES Project FEED and detailed design, which will also be informed by the information gathered during the Borumba PHES Project – Exploratory Works, which is the subject to this referral.

Subject to obtaining all required approvals, the Borumba PHES Project is expected to be operational by 2030.

The referral of the Borumba PHES Project action under the EPBC Act will be made as a separate and standalone project referral.

Borumba PHES Project – Transmission Connections

As the transmission network service provider (TNSP) in Queensland, Powerlink is investigating potential transmission line corridors to connect the proposed Borumba PHES Project to the existing electricity transmission network. Due to the potential generation and storage capacity of the Borumba PHES Project, new transmission infrastructure will be needed from the proposed pumped hydro facility at Lake Borumba to existing Powerlink substations at Tarong/Halys and Woolooga.

Powerlink is in the early planning phase and is currently assessing social, economic and environmental factors that might influence where proposed corridors could be located. Early and ongoing engagement with landholders, local communities and other stakeholders is an important part of this process.

The study corridor will eventually be refined and narrowed down to a final transmission line easement.

Any referral of the transmission connection action under the EPBC Act will be made as a separate and standalone project referral by Powerlink.

1.2.6 What Commonwealth or state legislation, planning frameworks or policy documents are relevant to the proposed action, and how are they relevant? *

Commonwealth legislation

- *Environment Protection and Biodiversity Conservation Act 1999* – MNES (listed Threatened Ecological Communities, threatened flora and fauna species) are known and predicted to occur in the Project area. Refer to **Att.1 - Borumba PHES Project - Exploratory Works - EPBC referral report, Section 5, pp.59** for further detail.
- *Native Title Act 1993* – One Native Title Claim (Kabi Kabi First Nation Traditional Owners Native Title Claim Group, QC2018/007) applies to the Project area.

Commonwealth planning frameworks

- 2021 Australian Infrastructure Plan - The 2021 Australian Infrastructure Plan is a practical and actionable roadmap for infrastructure reform . This plan acknowledges that energy technology is moving fast, and that Australia needs a high-tech, low-cost, low-emissions energy system to power the future, from efficient homes to clean exports. Consumers and businesses would benefit from a planned and proactive transition that prioritises value creating change.

State legislation

- *Planning Act 2016* – The Project will change land use in the project area and trigger approval requirements managed through the Planning Act.

- *Environmental Protection Act 1994* – Development of the project will require environmentally relevant activities (ERAs). Construction of the project may also include disturbance of land that may be contaminated or listed on the Environmental Management Register (EMR), or Contaminated Land Register (CLR).
- *Fisheries Act 1994* – Mapped waterways will be affected by Project related infrastructure (waterway crossings).
- *Queensland Heritage Act 1992* – Development on or adjoining a Queensland heritage place is considered assessable development and requires development approval under State code 14, unless the activity meets relevant accepted development criteria, or an exemption applies under the Planning Regulation 2017.
- *Vegetation Management Act 1999* – The Project will require vegetation clearing.
- *Water Act 2000* – Access roads will cross watercourses. Materials will be extracted from the Yabba Creek bed and vegetation removed.
- *Nature Conservation Act 1992* - Threatened flora and fauna listed under the NC Act may occur in the Project area. Revocation will be required for those areas of Conondale National Park within which geotechnical investigations are proposed
- *Aboriginal Cultural Heritage Act 2003* – Aboriginal places and artefacts have been registered within and near the Project area, and there is a high potential for more to occur.
- *Native Title (Queensland) Act 1993* – The *Native Title (Queensland) Act 1993* validates certain historic acts undertaken in Queensland that were invalidated because of the existence of native title and confirms that some previously undertaken acts have resulted in the extinguishment of native title. Developed to be consistent with standards set by the Native Title Act 1993 (Cth). This Act is applicable to develop on State-owned land, including national park.
- *Biosecurity Act 2014* - The Project has the potential to result in the spread of restricted biosecurity matters.
- *Building Act 1975* – The Project will require the construction of offices and accommodation, and other infrastructure associated with the construction phase.
- *Forestry Act 1959* - Geotechnical investigation is necessary on state forest land.
- *Land Act 1994* – Changes to arrangements for land lease properties may be required.
- *Regional Planning Interests Act 2014* – Strategic cropping areas are mapped on Kingaham Creek and Yabba Creek within the Project area.

State planning frameworks and policy documents

- State Infrastructure Strategy 2002 - The Queensland Government's State Infrastructure Strategy 2022 presents a vision for the Queensland Government's infrastructure requirements over the next two decades. It sets out objectives for infrastructure and the priority actions that will drive the future for Queensland and clarifies challenges and opportunities. This strategy highlights the Borumba Dam Pumped Hydro Study as a current key energy initiative and recognises the need for longer duration storage, such as pumped hydro, to ensure that the future energy supply remains secure and reliable.
- Queensland Energy and Jobs Plan - The Queensland Energy and Jobs Plan outlines how Queensland's 'SuperGrid' will deliver clean, reliable, and affordable power. Queensland's generation mix will transform over time to include more wind, solar and storage to ensure the State always has enough energy to meet energy demand including at peak times. The Queensland Government is setting two new renewable energy targets of 70 per cent renewable energy by 2032 and 80 per cent by 2035. The SuperGrid is all the elements in the electricity system, including the poles, wires, solar, wind and storage that will provide Queenslanders with clean, reliable, and affordable power for generations. The building of Queensland's SuperGrid includes 'Borumba Pumped Hydro delivered by 2030 and greater connection with southern and central Queensland.'
- Pathways to a Clean Growth Economy: Queensland Climate Transition Strategy - This Queensland Climate Transition Strategy outlines how Queensland proposes to prepare for this transition and set itself on the pathway to meet this target. The world is heading toward zero net emissions and the technologies enabling this transition are now competitive. Australia's ratification of the Paris Agreement means the nation will need to reach zero net emissions by 2050.
- Queensland Bulk Water Opportunities Statement - The Queensland Bulk Water Opportunities Statement guides Queensland's investment in bulk water supply infrastructure. It provides a framework to achieve a balance between the use of existing infrastructure and investment in new projects and identifies four key objectives:
    - Safety and reliability of dams and urban water supplies
    - Use existing water resources more efficiently
    - Support commercial infrastructure that provides a commercial return to bulk water providers
    - Consider projects that will provide regional economic benefits. The Borumba PHES Project has the potential to contribute to the safety and reliability of dams and urban water supplies given the raising of the dam wall and increased storage in Lake Borumba.

Local legislation and planning frameworks

- *Local Government Act 2009* - The project may require works that affect local roads.
- Gympie Regional Council Planning Scheme - Aspects of the project may require assessment against the planning scheme.

Further information is provided in **Att.1 - Borumba PHES Project - Exploratory Works - EPBC referral report, Section 1.7, pp.39.**

1.2.7 Describe any public consultation that has been, is being or will be undertaken regarding the project area, including with Indigenous stakeholders. Attach any completed consultation documentations, if relevant. *

Community engagement strategy

Support from stakeholders is essential for the successful delivery of the Project. Accordingly, throughout the Project, Queensland Hydro has committed to:

- Building trust
- Engaging early and often
- Delivering tangible benefits to local communities
- Partnering with key stakeholders in our communities
- Enabling open and transparent dialogue.

Project engagement objectives aim to deliver mutually beneficial outcomes, minimise social and environmental impact, and maximise benefits and positive co-existence. These include:

- Proactively involving stakeholders in the Project development process
- Providing accurate and clear information that is easy for all audiences to understand
- Closing the feedback loop by relaying issues raised to the project team in a timely manner, and demonstrating to stakeholders how feedback has been incorporated into the Project
- Building and maintaining positive stakeholder relationships based on trust through transparent and responsive engagement
- Actively identifying, mitigating, and managing risks as they arise to minimise project impacts
- Clearly outlining negotiables and non-negotiables to manage stakeholder expectations and allow meaningful input.

To evaluate engagement effectiveness and success during the project, Queensland Hydro will:

- Measure, monitor, and report on stakeholder views/perceptions after activity completion
- Monitor for increased Project web page visits, social media hits and information downloads
- Analyse engagement actions and indicators and assess delivery against engagement objectives
- Collect feedback from stakeholders, ministers, government, and general community
- Measure the level of stakeholder participation in the consultation process
- Evaluate the engagement strategy through media and social media monitoring.

Project specific consultation

Queensland Hydro, and previously Powerlink Queensland, has been engaging with the local and Regional communities and stakeholders on the Borumba PHES Project since the project was announced by the Queensland Government in 2021. The concept of the Project was first introduced to stakeholders at the July 2022 community information sessions and Stakeholder Reference Group. At this time, it was shared that Queensland Hydro (then Powerlink) were looking at undertaking exploratory works that would include drilling a tunnel.

Consultation regarding the Project was undertaken at the following events:

- Stakeholder traffic and transport workshop on in Kandanga (11 October 2022)
- Briefing with Gympie Regional Council (15 November 2022)
- Stakeholder information sessions in Imbil (23 November 2022) and Gympie (24 November 2022)
- Stakeholder Reference Group meetings in Gympie (24 November 2022)
- Briefing with Hon. Tony Perrott briefing (30 November 2022).

Key messages during this consultation included:

- The Project will increase our understanding of the area's geology and will improve the Borumba PHES Project engineering design
- This work will involve excavating soil and rock in a D-shaped shaft at the likely location of the potential power station's ECVT tunnel
- The exploratory tunnel drilling works are proposed to supply information on the geotechnical conditions along the tunnel route, which will provide a comprehensive understanding of the ground conditions
- Information from exploratory tunnel drilling will complement surface borehole investigations to increase our understanding of ground conditions
- Blast and drilling methods will be used to remove the spoil (or excavated materials), and are a more efficient method than using a tunnel boring machine due to the short length of the tunnel, and the schedule for works
- The Project is likely to be undertaken from October-2023 and throughout 2024, concurrently with the Borumba PHES Project's environmental studies and approvals processes
- Undertaking the Project does not imply that an investment decision has been made to progress the Borumba PHES Project; the Project is designed to increase our understanding of ground conditions and reduce costs
- Other works associated with the exploratory tunnel drilling works will include:
    - minor road works on Bella Creek Road and Borgan Road – road works to allow safe access to site
    - construction of an on-site access road, and support infrastructure including a temporary construction camp, and site support infrastructure such as site office, workshop, and material and equipment storage
    - on-site spoil movement and stockpile.

Engagement between Queensland Hydro and Kabi Kabi First Nation Traditional Owners

Following the above discussions, the proposed minor road works on Bella Creek Road and Borgan Road, as well as the temporary construction camp were determined to quality for self-assessment, due to the nature of the works proposed and likely low levels of potential environmental impact. Further detail of the Project components that do not form part of this referral due to qualifying for self-assessment are provided in **Att. 1 - Works outside of referral scope within Att.1 - Borumba PHES Project - Exploratory Works - EPBC referral report**.

The stakeholder engagement activities have allowed for overall engagement outcomes to be identified, including public interest issues. Landholders, community and other stakeholders generally support the Borumba PHES Project and engagement process. This is evidenced by recorded values for project sentiment (a value given to the Borumba PHES Project as a whole by stakeholders involved with an event) based on information declared unprompted by stakeholders.

Qualitative evidence can be found in public statements made by key community and political stakeholders. This includes Gympie Mayor Glen Hartwig's statements to ABC Sunshine Coast that "*Borumba is the blueprint for public consultation … I can only commend the team for their engagement*". This statement was made on air on 12 October 2022 at 16:17.

Conversely, negative qualitative feedback has also been reported in the media, with one stakeholder reporting to the Gympie Times, "*They are revoking National Park status to allow geotechnical testing*". The Gympie Times reported that the stakeholder mentioned that the area was home to threatened species relevant to the EPBC Act, and that lack of transparency was a concern.

Thirty-six engagement themes have been identified through issues and concerns raised by stakeholders. The themes with the most mentions were general project overview, traffic and transport, ecology and biodiversity, hydrology, and transmission lines. Community information sessions and stakeholder reference group meetings content have been tailored to these themes.

Queensland Hydro and the Kabi Kabi First Nation Traditional Owners Native Title Claim Group (Kabi Kabi; the registered Native Title Claimant for the Project footprint) have worked cooperatively in regard to early geotechnical cultural heritage inspections, and Kabi Kabi have provided cultural heritage monitors for geotech and access track physical works. Furthermore, Queensland Hydro commissioned Kabi Kabi and their technical advisors to undertake a detailed Cultural Heritage assessment of the Project area which comprised over 8 weeks of survey activity, often with two teams of Kabi Kabi people with advisors. The resultant survey report will assist Kabi Kabi and Queensland Hydro in the development of a formal Cultural Heritage Management Plan, which is expected to be concluded in late 2023. Queensland Hydro has also committed funding for a Kabi Kabi led Regional Cultural Values Assessment which will review historical records and facilitate engagement with Kabi Kabi cultural knowledge holders so as to identify, record and collate intangible cultural heritage knowledge within the broader project area. The Regional Cultural Values Assessment was commenced at a Kabi Kabi Community meeting in November 2022 in Gympie, where the Kabi Kabi selected anthropologist provided an overview of the proposed study methodology and commenced collecting the names of people who wanted to share cultural knowledge.

For the Project, Kabi Kabi and Queensland Hydro have agreed to negotiate and execute an Early Works Agreement (EWA) which will outline the cultural heritage assessment process for the Project and will constitute 'another agreement' for the purposes of section 23(3)(a)(iii) of the ACH Act. The EWA will require Queensland Hydro to request a physical cultural heritage survey by Kabi Kabi people of any areas proposed to be subjected to ground disturbance as part of the Project, and to agree management and protection measures where cultural heritage materials exist, or where there is a reasonable risk of sub surface materials being encountered during Project works.

In addition to the cultural heritage management and protection measures outlined above, Queensland Hydro and Kabi Kabi have agreed to negotiate an Indigenous Land Use Agreement (ILUA) which, if agreed by the wider Kabi Kabi group, will provide the necessary Native Title Consent to those elements of the project development which require a consent in accordance with the NT Act. Throughout the negotiation of the ILUA, EWA and CHMP, Queensland Hydro will continue to regularly brief Kabi Kabi on the progress of the Project and provide notification of the general details of applications and approvals required for the Project.

1.3.1 Identity: Referring party

Privacy Notice:

Personal information means information or an opinion about an identified individual, or an individual who is reasonably identifiable.

By completing and submitting this form, you consent to the collection of all personal information contained in this form. If you are providing the personal information of other individuals in this form, please ensure you have their consent before doing so.

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1.3.1.1 Is Referring party an organisation or business? *

Yes

Referring party organisation details

ABN/ACN	81661444515
Organisation name	QUEENSLAND HYDRO PTY LTD
Organisation address	4000 QLD

Referring party details

Name	Nirvana Searle
Job title	Environment Lead - Borumba
Phone	0733247832
Email	approvals@qldhydro.com.au
Address	239 George St, Brisbane City, Qld, 4000

1.3.2 Identity: Person proposing to take the action

1.3.2.1 Are the Person proposing to take the action details the same as the Referring party details? *

Yes

Person proposing to take the action organisation details

ABN/ACN	81661444515
Organisation name	QUEENSLAND HYDRO PTY LTD
Organisation address	4000 QLD

Person proposing to take the action details

Name	Nirvana Searle
Job title	Environment Lead - Borumba
Phone	0733247832
Email	approvals@qldhydro.com.au
Address	239 George St, Brisbane City, Qld, 4000

1.3.2.14 Are you proposing the action as part of a Joint Venture? *

No

1.3.2.15 Are you proposing the action as part of a Trust? *

No

1.3.2.17 Describe the Person proposing the action's history of responsible environmental management including details of any proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources against the Person proposing to take the action. *

The Project proponent is Queensland Hydro. Queensland Hydro is a special purpose vehicle established under the *Government Owned Corporations Act 1993* in September 2022 to design, deliver, operate, and maintain long duration PHES assets in Queensland.

Environmental management measures to avoid and minimise impacts on environmental, social and cultural heritage values will be implemented for all phases of the Project. The Project's design, construction, and operational processes will follow the environmental mitigation hierarchy (i.e. avoid, minimise, mitigate, offset) and align with all relevant Australian standards and environmental legislation and policies, including, but not limited to:

- ISO14001:2015 – Environmental management systems
- ISO45001:2018 – Occupational health and safety management systems
- EP Act.

There are no past or present proceedings under a Commonwealth, State or Territory law for the protection of the environment, or the conservation and sustainable use of natural resources against Queensland Hydro.

The person making and proposing the action has not had any known past or present proceedings in relation to compliance with a Commonwealth, State or Territory law in relation to the protection of the environment or the conservation and sustainable use of natural resources.

1.3.2.18 If the person proposing to take the action is a corporation, provide details of the corporation's environmental policy and planning framework

Environmental management measures to avoid and minimise impacts on environmental, social, and cultural heritage values will be implemented for all phases of the Project, including design/planning, construction, and operation. The Project's construction will align with all relevant Australian standards and environmental legislation and policies, including, but not limited to:

- ISO14001:2015 – Environmental management systems
- ISO45001:2018 – Occupational health and safety management systems
- EP Act.

A construction environmental management plan (CEMP) will be developed for the Project. The CEMP will incorporate environmental and social mitigation measures and environmental approvals as a framework for ongoing management, monitoring, reporting and improvement during construction. Its primary purpose will be to identify the environmental values potentially affected by Project works, and describe measures to manage the risk of potential adverse impacts to these values. The CEMP will outline potential impacts, target criteria for environmental protection, control measures to be implemented, and monitoring programs to evaluate the efficacy of control measures.

Monitoring of compliance with environmental management requirements would be undertaken by a team of suitably qualified practitioners.

1.3.3 Identity: Proposed designated proponent

1.3.3.1 Are the Proposed designated proponent details the same as the Person proposing to take the action? *

Yes

Proposed designated proponent organisation details

ABN/ACN	81661444515
Organisation name	QUEENSLAND HYDRO PTY LTD
Organisation address	4000 QLD

Proposed designated proponent details

Name	Nirvana Searle
Job title	Environment Lead - Borumba
Phone	0733247832
Email	approvals@qldhydro.com.au
Address	239 George St, Brisbane City, Qld, 4000

1.3.4 Identity: Summary of allocation

Confirmed Referring party's identity

The Referring party is the person preparing the information in this referral.

ABN/ACN	81661444515
Organisation name	QUEENSLAND HYDRO PTY LTD
Organisation address	4000 QLD
Representative's name	Nirvana Searle
Representative's job title	Environment Lead - Borumba
Phone	0733247832
Email	approvals@qldhydro.com.au
Address	239 George St, Brisbane City, Qld, 4000

Confirmed Person proposing to take the action's identity

The Person proposing to take the action is the individual, business, government agency or trustee that will be responsible for the proposed action.

Same as Referring party information.

Confirmed Proposed designated proponent's identity

The Person proposing to take the action is the individual or organisation proposed to be responsible for meeting the requirements of the EPBC Act during the assessment process, if the Minister decides that this project is a controlled action.

Same as Person proposing to take the action information.

1.4 Payment details: Payment exemption and fee waiver

1.4.1 Do you qualify for an exemption from fees under EPBC Regulation 5.23 (1) (a)? *

No

1.4.3 Have you applied for or been granted a waiver for full or partial fees under Regulation 5.21A? *

No

1.4.5 Are you going to apply for a waiver of full or partial fees under EPBC Regulation 5.21A?

No

1.4.7 Has the department issued you with a credit note? *

No

1.4.9 Would you like to add a purchase order number to your invoice? *

No

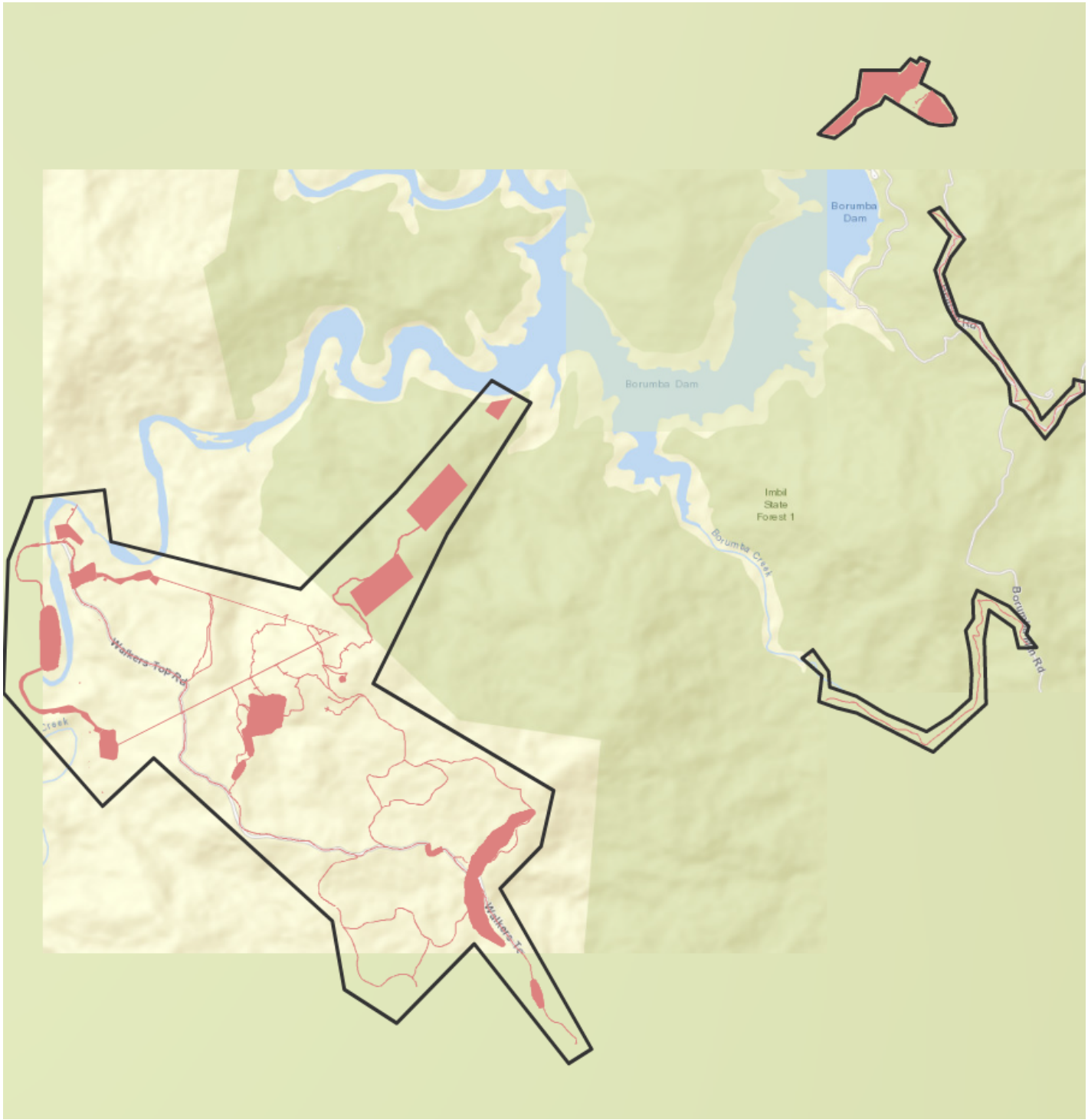
1.4 Payment details: Payment allocation

1.4.11 Who would you like to allocate as the entity responsible for payment? *

Proposed designated proponent

2. Location

2.1 Project footprint



2.2 Footprint details

2.2.1 What is the address of the proposed action? *

Bella Creek Road & Borgan Road, Lake Borumba

2.2.2 Where is the primary jurisdiction of the proposed action? *

Queensland

2.2.3 Is there a secondary jurisdiction for this proposed action? *

No

2.2.5 What is the tenure of the action area relevant to the project area? *

The Project is located across 15 properties and several road reserves. The Project footprint is contained within the following land tenure:

- Six reserves
- Four freehold parcels
- Two national park parcels
- Two state forest parcels.

There will be no changes to existing tenure or land zoning as a result of the Project.

Att.1 - Borumba PHES Project - Exploratory Works - EPBC referral report, Section 2.1.1, Table 2-1 identifies the landholder/trustees, tenure and existing land use of the impacted properties.

Key land tenures within and surrounding the Project area include national park, resources reserve, reserve, State Forest, freehold and Profit à Prendre. Other tenures surrounding the Project include small areas of lands lease.

No homes or significant private infrastructure are currently identified as being impacted by the Project. No significant public infrastructure is currently identified as being directly impacted by the Project. Upgrades to local services (power, telecommunications, water supply and sewerage) may be needed to support the Project.

Queensland Hydro owns approximately 2,360 ha of land southwest of Lake Borumba that is reserved for pumped storage hydro development (here after referred to as 'Project land'). The Project land includes lots 1LX2754, 2LX2754, 3LX2754, 16LX1925, 20LX2359, KCP845218 (strata parcel of 986FTY1720), and 1723L37994. Queensland Hydro properties are currently leased to a single leaseholder for cattle grazing.

Except for lot 1RP194600, all properties impacted by the Project are either held by Queensland Government departments or Queensland Government owned corporations.

Strategic cropping areas under the *Regional Planning Interests Act 2014* are mapped on Kingaham Creek and Yabba Creek within the Project area.

There are no current mining leases, mining lease applications, key resource areas, or petroleum or gas pipelines within the exploratory works footprint. However, there are four historical mining leases within the footprint: ML212846 on lot 7AP23628, ML231555 on lot 3LX2754, ML231568 on lot 3LX2754 and ML3717 on 3LX2754.

There are no lots listed on the CLR and four lots listed on the EMR that intersect with the Exploratory Works footprint:

- 3LX2754 – mineral processing
- 135FTY1911 – petroleum product or oil storage and waste storage, treatment or disposal
- 7AP23628 – petroleum product or oil storage and waste storage, treatment or disposal
- 1723L37994 – livestock dip or spray race.

Lots 135FTY1911 (Imbil State Forest) and 7AP23628 (Conondale National Park and Conondale Resources Reserve) were sub-divided from Lot 135FTY1638, which had been listed on the EMR prior to the subdivision. The lots therefore automatically acquire the same EMR listing as their parent and may retain the EMR listing despite not having been subject to the notifiable activity or hazardous contaminant listed.

3. Existing environment

3.1 Physical description

3.1.1 Describe the current condition of the project area's environment.

The Borumba PHES Project and associated Exploratory Works are within the Somerset and Gympie Regional Council local government areas, approximately 13 km southwest of Imbil, 48 km southwest of Gympie, and 180 km northwest of Brisbane. The existing Lake Borumba reservoir is in the Yabba Creek sub catchment of the Mary River Basin water plan area.

The Project is located across 15 properties and several road reserves. The Project footprint is contained within the following land tenure:

- Six reserves
- Four freehold parcels
- Two national park parcels

- Two state forest parcels.

There will be no changes to existing tenure or land zoning as a result of the Project.

Att.1 - Borumba PHES Project - Exploratory Works - EPBC referral report, Section 2.1.1, Table 2-1 identifies the landholder/trustees, tenure and existing land use of the impacted properties.

Access to the Project site, which is approximately a 2.5 hour drive from Brisbane, will be primarily from Imbil via Bella Creek/Borgan Road. Bella Creek Road is accessed from Yabba Creek Road and traverses the northern part of Borumba Dam. The road is a Gympie Regional Council controlled gravel road. Borgan Road diverges from Bella Creek road, and the internal Project road network will start at the gate on Borgan Road located approximately 1300 m from Bella Creek Road.

Access to the main Project areas will be facilitated through use of existing roads and access tracks (some to be upgraded) as well as the construction of dedicated access tracks for the project (further detail is provided below).

The Borumba PHES Project is located on Yabba Creek in the upper Mary River Basin, approximately 258 km from the tidal barrage and 318 km from the river mouth. The Mary River basin discharges into the Great Sandy Strait, identified as a Ramsar wetland, and the UNESCO Great Sandy Biosphere Reserve. The nearshore coastal environment also comprises the Great Sandy Marine Park, Fraser Island and sensitive estuarine and freshwater ecosystems.

The study area is located within the Southeast Queensland bioregion, which is characterised by moderate to high rainfall (between 800-1500 mm per year) with warm to hot summers and cool winters **(Att.2-Appx.2 - Terrestrial Ecology Technical Report (Umwelt 2022), Section 3.1.1.1, pp.30)**. This bioregion comprises coastal plains, adjacent hills and ranges and the major drainage basins of Brisbane River, Mary River, Barambah Creek and Lower Burnett River. It also includes coastal mainland and island sand masses **(Att.2-Appx.2 - Terrestrial Ecology Technical Report (Umwelt 2022), Section 3.1.1.1, pp.30)**.

The study area is also located within two subregions: Burringbar-Conondale Ranges and Gympie Block **(Att.2-Appx.2 - Terrestrial Ecology Technical Report (Umwelt 2022), Section 3.1.1.1, pp.30)**. Burringbar-Conondale Ranges subregion, also known as the Southeast Hills and Ranges subregion is moist and hilly to mountainous **(Att.2-Appx.2 - Terrestrial Ecology Technical Report (Umwelt 2022), Section 3.1.1.1, pp.30).** It is comprised of metamorphic geology with some acid volcanic intrusions **(Att.2-Appx.2 - Terrestrial Ecology Technical Report (Umwelt 2022), Section 3.1.1.1, pp.30)**. The vegetation is characterized by eucalypt tall open forests, complex notophyll rainforest and Araucarian notophyll rainforest **(Att.2-Appx.2 - Terrestrial Ecology Technical Report (Umwelt 2022), Section 3.1.1.1, pp.30)**. The Gympie Block subregion comprises low hilly landscapes on old sedimentary rocks, metamorphics and intermediate and basic volcanoes **(Att.2-Appx.2 - Terrestrial Ecology Technical Report (Umwelt 2022), Section 3.1.1.1, pp.30)**. The relatively fertile soils support extensive patches of Araucarian/notophyll and microphyll rainforest and mixed eucalypt forests **(Att.2-Appx.2 - Terrestrial Ecology Technical Report (Umwelt 2022), Section 3.1.1.1, pp.30).**

The region surrounding the Project is characterised by rural agricultural holdings, small towns, native vegetation, and nature conservation areas. The current landscape surrounding the project comprises:

- Agricultural land, predominately grazing operations
- Native vegetation
- Watercourses
- Scattered residential dwellings/outbuildings
- Minor roads that connect smaller townships and residential areas to regional centres
- Lake Borumba and recreational facilities on the foreshores
- The peaks of Mount Kandanga (557 m) to the north, Mount Borumba (624 m) to the south and Yabba Range to the west.

The sensitive environmental values present within and surrounding the study area include:

- Several State-wide riparian and terrestrial biodiversity corridors
- Remnant vegetation, including endangered and of concern regional ecosystems (REs)
- Mapped essential habitat
- Conondale National Park within the footprint of the lower reservoir
- Imbil State Forest within the footprint of the lower reservoir
- A number of reserves owned by Gympie Regional Council.

Due to the steep topography within and surrounding the study area, vegetation communities on the upper hill crests and slopes remain relatively intact, having not been previously cleared **(Att.2-Appx.2 - Terrestrial Ecology Technical Report (Umwelt 2022), Section 3.2.1, pp.46)**. They typically consist of woodlands over native grasses. This trends to wet sclerophyll with vine thicket and dense shrub understorey along creek lines and gullies **(Att.2-Appx.2 - Terrestrial Ecology Technical Report (Umwelt 2022), Section 3.2.1, pp.46).**

The proposed upper reservoir location consists primarily of remnant vegetation on the steep hills and gullies, particularly in the northern section, while the southern extent of the upper reservoir study area boundary consists of cleared land and is used for cattle grazing **(Att.2-Appx.2 - Terrestrial Ecology Technical Report (Umwelt 2022), Section 3.2.1, pp.46)**. Previous logging activity at the upper reservoir is evident by the presence of cut stumps **(Att.2-Appx.2 - Terrestrial Ecology Technical Report (Umwelt 2022), Section 3.2.1, pp.46).** Vegetation communities associated with the upper reservoir are comprised of woodland to open forest, dominated by *Eucalyptus propinqua*, *E. siderophloia, E. acmenoides* and *E. microcorys*, with smaller intersecting patches of rainforest vegetation dominated by *Araucaria bidwillii* and *A. cunninghamii* (**Att.2-Appx.2 - Terrestrial Ecology Technical Report (Umwelt 2022), Section 3.2.1, pp.46).**

Lake Borumba is primarily bordered by Conondale National Park and Imbil State Forest as protected areas and timber production **(Att.2-Appx.2 - Terrestrial Ecology Technical Report (Umwelt 2022), Section 3.2.1, pp.46).**

The major waterways in the vicinity of the Project include:

- Yabba Creek
- Kingaham Creek
- Borumba Creek
- Sandy Creek.

Kingaham Creek and Yabba Creek are mostly cleared on the alluvial flats, except for riparian vegetation, and used for cattle grazing **(Att.2-Appx.2 - Terrestrial Ecology Technical Report (Umwelt 2022), Section 3.2.1, pp.46)**. The upper slopes surrounding these creeks are mostly vegetated outside of protected areas **(Att.2-Appx.2 - Terrestrial Ecology Technical Report (Umwelt 2022), Section 3.2.1, pp.46).**

Small pockets of residential land occur to the north and northwest of Borumba Dam with the town of Imbil occurring within 10 km of the dam wall **(Att.2-Appx.2 - Terrestrial Ecology Technical Report (Umwelt 2022), Section 3.2.1, pp.46)**. Vegetation types associated with the lower reservoir are similar those of the upper reservoir **(Att.2-Appx.2 - Terrestrial Ecology Technical Report (Umwelt 2022), Section 3.2.1, pp.46)**. Additionally, narrow patches of riparian vegetation exist shouldering creeks and rivers feeding into the lower reservoir, dominated by *Eucalyptus tereticornis* subsp. *tereticornis* and *Casuarina cunninghamiana* subsp. *cunninghamiana* **(Att.2-Appx.2 - Terrestrial Ecology Technical Report (Umwelt 2022), Section 3.2.1, pp.46).**

3.1.2 Describe any existing or proposed uses for the project area.

The Project is located across 15 properties and several road reserves. The Project footprint is contained within the following land tenure:

- Six reserves
- Four freehold parcels
- Two national park parcels
- Two state forest parcels.

There will be no changes to existing tenure or land zoning as a result of the Project.

Att.1 - Borumba PHES Project - Exploratory Works - EPBC referral report, Section 2.1.1, Table 2-1 identifies the landholder/trustees, tenure and existing land use of the impacted properties.

This previous land use of the site is the same as the existing land use.

Key land tenures within and surrounding the Project area include national park, reserve, State forest, freehold and Profit à Prendre. Other tenures surrounding the Project include small areas of lands lease.

No homes or significant private infrastructure are currently identified as being impacted by the Project. No significant public infrastructure is currently identified as being directly impacted by the Project. Upgrades to local services (power, telecommunications, water supply and sewerage) may be needed to support the Project.

Queensland Hydro owns approximately 2,360 ha of land southwest of Lake Borumba that is reserved for pumped storage hydro development (here after referred to as ‘Project land’). The Project land includes lots 1LX2754, 2LX2754, 3LX2754, 16LX1925, 20LX2359, KCP845218 (strata parcel of 986FTY1720), and 1723L37994. Queensland Hydro properties are currently leased to a single leaseholder for cattle grazing.

Except for lot 1RP194600, all properties impacted by the Project are either held by Queensland Government departments or Queensland Government owned corporations.

Built across Yabba Creek, the existing Borumba dam was constructed in 1963 and was upgraded to increase flood storage in 1997. It forms Lake Borumba and is owned and operated by Seqwater. Stored water is currently used within the Mary Valley Water Supply Scheme for drinking water and for irrigation purposes. Lake Borumba is a popular recreation area including for camping, fishing and water sports (including power boating).

The region currently surrounding the Project is characterised by rural agricultural holdings, small towns, native vegetation, and nature conservation areas. The current landscape surrounding the Project comprises:

- Agricultural land, predominately grazing operations
- Native vegetation
- Watercourses
- Scattered residential dwellings/outbuildings
- Minor roads that connect smaller townships and residential areas to regional centres
- Lake Borumba and recreational facilities on the foreshores
- The peaks of Mount Kandanga (557 m) to the north, Mount Borumba (624 m) to the south and Yabba Range to the west.

The sensitive environmental values present within and surrounding the study area include:

- Several State-wide riparian and terrestrial biodiversity corridors
- Remnant vegetation, including endangered and of concern regional ecosystems (REs)
- Mapped essential habitat
- Conondale National Park within the footprint of the lower reservoir
- Imbil State Forest within the footprint of the lower reservoir
- A number of reserves owned by Gympie Regional Council.

The proposed use of the Project area is pumped storage hydro development, as detailed in this referral and **Att.1- Borumba PHES Project - Exploratory Works - EPBC referral report, Section 1.5, pp.4 and Section 1.6, pp.36.**

3.1.3 Describe any outstanding natural features and/or any other important or unique values that applies to the project area.

Protected areas

The Project would require work to be undertaken within and immediately adjacent to several protected areas and State forests, including:

- Conondale National Park (borders Lake Borumba, with some elements of the Project to occur within its boundary in resource revocation areas). The National Park contains the popular Booloumba Creek camping and day-use area, walking tracks, lookouts, scenic drives and grassy camp sites.
- Imbil State Forest (borders Lake Borumba, with some elements of the proposed action to occur within its boundary), which contains camping and day-use areas and several recreation trails.
- Yabba State Forest (located approximately 10 km to the west of the proposed action).

Conondale National Park covers an area of approximately 35,700 ha and is characterised by large areas of remnant vegetation, rugged mountain ranges and boulder lined creeks **(Att.2-Appx.2 - Terrestrial Ecology Technical Report (Umwelt 2022), Section 3.1.7, pp.46)**. The aim of the national park is to provide mountainous protection areas for flora and fauna including threatened species that are at the limit of their range **(Att.2-Appx.2 - Terrestrial Ecology Technical Report (Umwelt 2022), Section 3.1.7, pp.46)**. Conondale National Park provides refuge, including elevation, for a number of threatened flora and fauna species and vegetation communities **(Att.2-Appx.2 - Terrestrial Ecology Technical Report (Umwelt 2022), Section 3.1.7, pp.46).**

Connectivity

The study area occurs at the northern extent of the Conondale Range extending into Conondale National Park and bordered by Imbil State Forest, and Yabba State Forest **(Att.2-Appx.2 - Terrestrial Ecology Technical Report (Umwelt 2022), Section 3.1.2, pp.30)**. The surrounding state forest areas are production and plantation forests **(Att.2-Appx.2 - Terrestrial Ecology Technical Report (Umwelt 2022), Section 3.1.2, pp.30).** The study area is the intersection of several mapped biodiversity significant terrestrial and riparian corridors, with contiguous vegetation acting as a corridor between Conondale National Park and Wrattens National Park within a mosaic of vegetated freehold land and state forest reserves **(Att.2-Appx.2 - Terrestrial Ecology Technical Report (Umwelt 2022), Section 3.1.2, pp.30).**

The study area also intersects a state significant terrestrial corridor that runs east-west from the Elgin Vale State Forest to the coast at Peregian via Mapleton National Park, Imbil State Forest, Conondale National Park and Yabba State Forest **(Att.2-Appx.2 - Terrestrial Ecology Technical Report (Umwelt 2022), Section 3.1.2, pp.30).** The justification for this corridor is due to the linking of four state and two regional terrestrial corridors, intersection with riparian corridors, incorporation of latitudinal and climatic gradients, connectivity of remnant vegetation, connectivity between coast and inland, linking of protected areas and estates and that it falls partially within the Great Eastern Ranges corridor **(Att.2-Appx.2 - Terrestrial Ecology Technical Report (Umwelt 2022), Section 3.1.2, pp.30).** The current extent of the Borumba Dam reservoir acts as a connectivity barrier from north to south **(Att.2-Appx.2 - Terrestrial Ecology Technical Report (Umwelt 2022), Section 3.1.2, pp.30).**

The eastern extent of the study area associated with the lower reservoir occurs partially within a regionally significant terrestrial corridor that runs south-north from Imbil State Forest to Curra State Forest via Marys Creek State Forest and Brooyar State Forest **(Att.2-Appx.2 - Terrestrial Ecology Technical Report (Umwelt 2022), Section 3.1.2, pp.33).**

3.1.4 Describe the gradient (or depth range if action is to be taken in a marine area) relevant to the project area.

The topography, geology and soils across the project area vary greatly. The terrain is rugged and relatively inaccessible. The study area ranges greatly in elevation between the upper and lower reservoir. The upper reservoir ranges between 400 and 500 m AHD, while the lower reservoir ranges between 100 and 170 m AHD **(Att.2-Appx.2 - Terrestrial Ecology Technical Report (Umwelt 2022), Section 3.2.1, pp.46).** The surface geology of the study area is mapped mostly as volcanic and metamorphic geologies with intrusive granitoids and ultramafic rock **(Att.2-Appx.2 - Terrestrial Ecology Technical Report (Umwelt 2022), Section 3.2.1, pp.46).** The open valleys of Lake Borumba contain more gently sloping land.

Much of the project area is surrounded by the steep slopes of the Yabba Range, Conondale Range and Kandanga Range to the south, southeast and north respectively. These ranges rise to more than 370 m above the current Lake Borumba full supply surface level.

3.2 Flora and fauna

3.2.1 Describe the flora and fauna within the affected area and attach any investigations of surveys if applicable.

Survey effort

Att.1 - Borumba PHES Project - Exploratory Works - EPBC referral report, Section 4, pp.57 provides a summary of the ecological assessments completed as part of the Borumba PHES Project.

Fauna habitat types

Fauna habitat types present in the study area have been mapped based on ground-truthed RE mapping, in combination with habitat values assessed within the Project footprint **(Att.2-Appx.2 - Terrestrial Ecology Technical Report (Umwelt 2022), Section 3.2.3.6, pp.65 & Att.2-Appx.3 - Exploratory Works - Ecological Surveys Briefing Note - Umwelt 2022, Section 3.3.1, pp.7)**. The various habitat types have the potential to support multiple threatened and migratory fauna species which are known to occur or have a moderate or high likelihood of occurrence. Fauna habitat types include:

- Notophyll vine forests on foothills and ranges (RE 12.11.10, 12.12.16), potentially supports ground dwelling fauna, birds (especially frugivorous) and amphibian species
- Moist to dry open woodlands on metamorphic and volcanic rocks (RE 12.11.3, 12.12.15, 12.12.15b), potentially supports woodland and migratory bird species, arboreal mammals, hollow nesting bird species, ground dwelling fauna and amphibian species
- Dry to moist eucalypt woodlands and open forests on undulating to hilly terrain of metamorphic and volcanic rocks (RE 12.11.14), potentially supports arboreal mammals, hollow nesting bird species and ground dwelling fauna
- Eucalyptus open forest and woodlands on drainage lines and alluvial plains (RE 12.3.7), provides refuge habitat and dispersal opportunities, particularly in more modified areas where surrounding cover is low.
- Non-remnant pasture, where habitat features were largely absent or of low value due to the level of disturbance.

Further detail is provided in **Att.1-Att.2 - Matters of National Environmental Significance, Section 2.1, Table 2-2.**

MNES occurrence

A Likelihood of Occurrence assessment for threatened species and communities was completed for terrestrial species by Umwelt (2022) and for aquatic species by Hydrobiology (2022) **(Att.1-Att.2 - Matters of National Environmental Significance, Section 2.2, pp.13)**. These reports identified species and communities with potential to occur within the study area.

Species that have been determined ‘unlikely to occur’ or having ‘low likelihood of occurrence’ based on the results of field surveys have been excluded from further consideration. The complete list of species occurrence is provided in **Att.1-Att.2 - Matters of National Environmental Significance, Section 2.2.2, Table 2-3**.

Listed threatened ecological communities

Based on field surveys, the listed threatened ecological communities that are known to occur within the Project footprint, include:

- Lowland Rainforest of Subtropical Australia - Critically endangered, Vegetation Management Act status - Least concern (RE 12.11.10)
- Subtropical eucalypt floodplain forest and woodland of the New South Wales North Coast and South East Queensland bioregions - Endangered, Vegetation Management Act status - Least concern (RE 12.3.7)

Listed threatened species

Based on field surveys, the listed threatened flora species that are known to occur, or have a high or moderate likelihood of occurrence within the Project footprint, include:

Known to Occur:

- Nightcap Plectranthus (*Coleus torrenticola*) - Endangered
- Scrub Turpentine (*Rhodamnia rubescens*) - Critically Endangered
- Brush Sophora (*Sophora fraseri*) - Vulnerable

High Likelihood of Occurring:

- Austral Toadflax (*Thesium australe*) - Vulnerable

Moderate Likelihood of Occurring:

- Three-Leaved Bosistoa (*Bosistoa transversa*) - Vulnerable
- Ball Nut (*Floydia praealta*) - Vulnerable
- Small-Fruited Queensland Nut (*Macadamia ternifolia*) - Vulnerable
- Macadamia Nut (*Macadamia integrifolia*) - Vulnerable
- Wedge-Leaf Tuckeroo (*Cupaniopsis shirleyana*) - Vulnerable
- Rough-Shelled Bush Nut (*Macadamia tetraphylla*) - Vulnerable
- Hairy-Joint Grass (*Arthraxon hispidus)* - Vulnerable

Based on field surveys, the listed threatened fauna species that are known to occur, or have a high or moderate likelihood of occurrence within the Project footprint, include:

Known to Occur:

- Glossy Black-cockatoo (South-Eastern) (*Calyptorhynchus lathami lathami*) - Vulnerable
- Greater Glider (*Petauroides volans*) - Endangered
- Grey-headed Flying-fox (*Pteropus poliocephalus*) - Vulnerable
- Koala (Combined pop. of QLD, NSW, ACT) (*Phascolarctos cinereus*) - Endangered
- Long-nosed Potoroo (Northern) (*Potorous tridactylus tridactylus*) - Vulnerable
- White-throated Needletail (*Hirundapus caudacutus*) - Vulnerable
- Yellow-bellied Glider (Southern Subsp.) (*Petaurus australis australis*) - Vulnerable

High Likelihood of Occurring:

- Black-breasted Button-quail (recorded in Study Area but not in Exploratory Works footprint) (*Turnix melanogaster*) - Vulnerable
- Australian Lungfish, Queensland Lungfish (*Neoceratodus forsteri*) - Vulnerable
- Mary River Cod (*Maccullochella mariensis*) - Endangered
- Mary River Turtle, Mary River Tortoise (*Elusor macrurus*) - Endangered
- Southern Snapping Turtle, White- throated Snapping Turtle (*Elseya albagula*) - Critically Endangered

Moderate Likelihood of Occurring:

- Coxen's Fig-parrot (*Cyclopsitta diophthalma coxeni*) - Endangered
- Regent Honeyeater (*Anthochaera phrygia*) - Critically Endangered
- Spotted-Tail Quoll (*Dasyurus maculatus maculatus*) - Endangered

Listed migratory species

Based on field surveys, the listed migratory species that are known to occur, or have a high or moderate likelihood of occurrence within the Project footprint, include:

Known to Occur:

- Spectacled Monarch (*Monarcha trivirgatus*) - Migratory

High Likelihood of Occurring:

- Black-faced Monarch (*Monarcha melanopsis*) - Migratory
- Rufous Fantail (*Rhipidura rufifrons*) - Migratory
- Satin Flycatcher (*Myiagra cyanoleuca*) - Migratory

Moderate Likelihood of Occurring:

- Fork-Tailed Swift (*Apus pacificus*) - Migratory
- Latham's Snipe (*Gallinago hardwickii*) - Migratory
- Oriental Cuckoo (*Cuculus optatus*) - Migratory

3.2.2 Describe the vegetation (including the status of native vegetation and soil) within the project area.

Regulated vegetation

Field surveys have confirmed that the study area (including the Project area) currently consists mostly of remnant vegetation **(Att.2-Appx.2 - Terrestrial Ecology Technical Report (Umwelt 2022), Section 3.2.2.4, pp.51 and Att.2-Appx.3 - Exploratory Works - Ecological Surveys Briefing Note - Umwelt 2022, Section 3.1.1, pp.A-3)**. The field verified regional ecosystems (REs) within the project footprint include:

- RE 12.3.7 - *Eucalyptus tereticornis, Casuarina cunninghamiana subsp. cunninghamiana +/- Melaleuca* spp. fringing woodland.
  - Some areas qualify as Subtropical eucalypt floodplain forest and woodland of the New South Wales North Coast and South East Queensland bioregions TEC.
  - Vegetation Management Act (VM Act) class = Least concern, remnant status = regrowth
- RE 12.11.3 - *Eucalyptus siderophloia, E. propinqua +/- E. microcorys, Lophostemon confertus, Corymbia intermedia, E. acmenoides* open forest on metamorphics +/- interbedded volcanics.
  - VM Act class = Least concern, remnant status = remnant
- RE 12.11.9 - *Eucalyptus tereticornis subsp. tereticornis or E. tereticornis subsp. basaltica* open forest on metamorphics +/- interbedded volcanics.
  - VM Act class = Of concern, remnant status = remnant
- RE 12.11.10 - Notophyll vine forest +/- *Araucaria cunninghamii* on metamorphics +/- interbedded volcanics
  - Some areas qualify as Lowland Rainforest of Subtropical Australia TEC
  - VM Act class = Least concern, remnant status = remnant
- RE 12.11.14 - *Eucalyptus crebra, E. tereticornis, Corymbia intermedia* woodland on metamorphics +/- interbedded volcanics
  - VM Act class = Of concern, remnant status = remnant

- RE 12.12.12 - *Eucalyptus tereticornis, Corymbia intermedia, E. crebra* +/- *Lophostemon suaveolens* woodland on Mesozoic to Proterozoic igneous rocks
  - VM Act class = Of concern, remnant status = remnant
- RE 12.12.15 - *Corymbia intermedia* +/- *Eucalyptus propinqua, E. siderophloia, E. microcorys, Lophostemon confertus* open forest on Mesozoic to Proterozoic igneous rocks
  - VM Act class = Least concern, remnant status = remnant
- RE12.12.15b *Lophostemon confertus* open forest +/- *Eucalyptus microcorys, E. siderophloia, E. carnea, E. propinqua* and vine forest species often present in understorey. Occurs in gullies and exposed ridges on Mesozoic to Proterozoic igneous rocks often amongst vine forest
  - VM Act class = Least concern, remnant status = remnant
- RE 12.12.16 - Notophyll vine forest on Mesozoic to Proterozoic igneous rocks
  - Some areas qualify as Lowland Rainforest of Subtropical Australia TEC
  - VM Act class = Least concern, remnant status = remnant
- RE 12.12.23 - *Eucalyptus tereticornis subsp. tereticornis or E. tereticornis subsp. basaltica* +/- *E. eugenioides* woodland to open forest on crests, upper slopes and elevated valleys and plains on Mesozoic to Proterozoic igneous rocks
  - VM Act class = Least concern, remnant status = remnant
- Non-remnant - Predominantly comprises cleared pasture, not representative remnant or regrowth vegetation.

Soils

Soils vary from sandy loams to light to medium clays. The soil structure in the Project area ranges from moderately stable surface soils over dispersive subsoils to cohesive surface soils over dispersive subsoils.

Acid sulphate soils (ASS) are not mapped within the project area and have a low probability to extremely low probability to occur, with very low to low confidence respectively. Despite this, the study area is mapped within the State Planning Policy ASS trigger area: Gympie Region.

There has been no recorded evidence of salinisation of the lands around the Yabba, Conondale and Kandanga ranges.

Soil disturbance from construction presents a risk of soil erosion, particularly where fragile non-cohesive surface soils are disturbed, and dispersive subsoils are exposed to storm events. This could in turn lead to increased sediment load within the Mary River and its tributaries if not managed correctly.

3.3 Heritage

3.3.1 Describe any Commonwealth heritage places overseas or other places recognised as having heritage values that apply to the project area.

The Project footprint does not directly or indirectly interfere with any Commonwealth heritage places overseas.

A search of the Australian Heritage Database returned no results for within the Project footprint.

3.3.2 Describe any Indigenous heritage values that apply to the project area.

The Project area are within the traditional homelands the Kabi Kabi people. This area is subject to a claim by the Kabi Kabi First Nation Traditional Owners Native Title Claim Group (QUD20/2019).

There are no registered Indigenous Land Use Agreements within the Project area.

The Aboriginal and Torres Strait Islander Cultural Heritage Database and Register, managed by the Queensland Government, lists several sites of cultural heritage significance in the vicinity of the Project. These sites are located well outside any proposed Project activities and will not be impacted by construction. There are a significant number of artefact finds located to the east of Borumba dam suggesting historical indigenous use of the areas. Detailed investigations will confirm the presence of other artefacts and areas of cultural heritage interest in the Project area will need to be undertaken prior to commencement of works.

A search of the Australian Heritage Database returned no results for within the Project footprint.

The Project also needs to consider the water-related cultural values of Aboriginal and Torres Strait Islander communities within the area.

The Queensland Heritage Register identified no State listed places within the Project area.

The Gympie Regional Council heritage database lists several heritage places for the Gympie Regional Council LGA, although none of these are within the Project area.

Engagement between Queensland Hydro and Kabi Kabi First Nation Traditional Owners

Queensland Hydro and the Kabi Kabi First Nation Traditional Owners Native Title Claim Group (Kabi Kabi; the registered Native Title Claimant for the Project footprint) have worked cooperatively in regard to early geotechnical cultural heritage inspections, and Kabi Kabi have provided cultural heritage monitors for geotech and access track physical works.

For the Project, Kabi Kabi First Nation Traditional Owners Native Title Claim Group (Kabi Kabi) and Queensland Hydro have agreed to negotiate and execute an Early Works Agreement (EWA) which will outline the cultural heritage assessment process for the Project and will constitute 'another agreement' for the purposes of section 23(3)(a)(iii) of the ACH Act. The EWA will require Queensland Hydro to request a physical cultural heritage survey by Kabi Kabi people of any areas proposed to be subjected to ground disturbance as part of the Project, and to agree management and protection measures where cultural heritage materials exist, or where there is a reasonable risk of sub surface materials being encountered during Project works.

3.4 Hydrology

3.4.1 Describe the hydrology characteristics that apply to the project area and attach any hydrological investigations or surveys if applicable. *

Surface water

The study area is in the Mary River catchment and the Upper Mary River drainage sub-basin **(Att.2-Appx.2 - Terrestrial Ecology Technical Report (Umwelt 2022), Section 3.1.6, pp.44)**. The terrain associated with the study area is typically steep adjacent to Lake Borumba, with watercourses generally flowing into the lake via three main tributaries including Kingaham, Yabba and Borumba creeks **(Att.2-Appx.2 - Terrestrial Ecology Technical Report (Umwelt 2022), Section 3.1.6, pp.44)**. Kingaham and Yabba creeks flow from west to east and Borumba Creek flows from south to north **(Att.2-Appx.2 - Terrestrial Ecology Technical Report (Umwelt 2022), Section 3.1.6, pp.44).** Several smaller unnamed watercourses flow into Lake Borumba from the surrounding steep terrain **(Att.2-Appx.2 - Terrestrial Ecology Technical Report (Umwelt 2022), Section 3.1.6, pp.44).**

Most drainage lines associated with the upper slopes of the study area are stream order 1 or 2 and are typically defined by rocky vegetated banks in moderately steep to steep gullies **(Att.2-Appx.2 - Terrestrial Ecology Technical Report (Umwelt 2022), Section 3.1.6, pp.44).** Borumba Creek is mapped as stream order 4, Kingaham and Yabba creeks are mapped as stream order 5, and Lake Borumba and Yabba Creek downstream of the existing dam wall are mapped as stream order 6 **(Att.2-Appx.2 - Terrestrial Ecology Technical Report (Umwelt 2022), Section 3.1.6, pp.44)**.

Built across Yabba Creek, the existing Borumba dam was constructed in 1963 and was upgraded to increase flood storage in 1997. It forms Lake Borumba and is owned and operated by Seqwater. Stored water is currently used within the Mary Valley Water Supply Scheme for drinking water and for irrigation purposes. Lake Borumba is a popular recreation area including for camping, fishing and water sports (including power boating). Lake Borumba is mapped as an artificial lacustrine waterbody (dam) **(Att.2-Appx.2 - Terrestrial Ecology Technical Report (Umwelt 2022), Section 3.1.6, pp.44)**. Areas downstream of the existing dam wall are mapped as high ecological significant (HES) wetlands **(Att.2-Appx.2 - Terrestrial Ecology Technical Report (Umwelt 2022), Section 3.1.6, pp.44).**

The land surface within the study area primarily drains towards Yabba Creek, with Kingaham Creek and Sandy Creek being the main tributaries draining into Lake Borumba. Stream flow at Yabba Creek is highly seasonal and varies considerably from year to year. Streamflow generally corresponds to rainfall but is also affected by storage within and spillage from Borumba Dam.

Water quality in the Mary Basin is generally affected by nutrient and sediment loading and pesticide and herbicide application, having negative impacts on the ecosystem function of the coastal ecosystems. These environmental stressors are not unexpected as the catchment is home to the primary industries of grazing, horticulture, forestry, commercial fishing and mining.

Groundwater and groundwater dependent ecosystems

Information on groundwater in the Upper Mary River sub-basin is limited. The primary groundwater receptors are registered bores, groundwater dependent ecosystems (GDEs) and Yabba Creek downstream of the new Borumba dam wall. Most registered groundwater users are downstream close to Imbil, with only three registered groundwater users within 5 km of the proposed action.

The yields from registered bores within 5 km of the Project are relatively low, so groundwater is expected to be used only for small scale domestic use such as gardening or limited stock.

A high concentration of potential GDEs is mapped within the Project area and surrounds, due to its location within parks and reserve areas. According to the Bureau of Meteorology National Atlas of Groundwater Dependent Ecosystems, there are areas mapped as having varying potential for aquatic and terrestrial GDEs within and surrounding the Project as follows:

- High potential aquatic GDEs associated with Lake Borumba, Yabba Creek, Kingaham Creek, Bella Creek and Sandy Creek
- Moderate potential aquatic GDEs approximately 2 km downstream of Lake Borumba
- Low potential aquatic GDEs directly downstream of Lake Borumba
- High potential terrestrial GDEs are largely associated with the upstream sections of Yabba Creek
- Moderate to low potential terrestrial GDEs throughout the Project area.

The Bureau of Meteorology's GDE Atlas does not identify any subterranean GDEs in the Project area.

4. Impacts and mitigation

4.1 Impact details

Potential Matters of National Environmental Significance (MNES) relevant to your proposed action area.

EPBC Act section	Controlling provision	Impacted	Reviewed
S12	World Heritage	No	Yes
S15B	National Heritage	No	Yes
S16	Ramsar Wetland	Yes	Yes
S18	Threatened Species and Ecological Communities	Yes	Yes
S20	Migratory Species	Yes	Yes
S21	Nuclear	No	Yes
S23	Commonwealth Marine Area	No	Yes
S24B	Great Barrier Reef	No	Yes
S24D	Water resource in relation to large coal mining development or coal seam gas	No	Yes
S26	Commonwealth Land	No	Yes
S27B	Commonwealth heritage places overseas	No	Yes
S28	Commonwealth or Commonwealth Agency	No	Yes

4.1.1 World Heritage

You have identified your proposed action will likely directly and/or indirectly impact the following protected matters.

A direct impact is a direct consequence of an action taken – for example, clearing of habitat for a threatened species or permanent shading on an ecological community as the result of installing solar panels.

An indirect impact is an 'indirect consequence' such as a downstream impact or a facilitated third-party action.

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4.1.1.1 Is the proposed action likely to have any direct and/or indirect impact on any of these protected matters? *

No

4.1.1.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact. *

The Project will not interfere directly or indirectly with any World Heritage Properties.

4.1.2 National Heritage

You have identified your proposed action will likely directly and/or indirectly impact the following protected matters.

A direct impact is a direct consequence of an action taken – for example, clearing of habitat for a threatened species or permanent shading on an ecological community as the result of installing solar panels.

An indirect impact is an 'indirect consequence' such as a downstream impact or a facilitated third-party action.

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4.1.2.1 Is the proposed action likely to have any direct and/or indirect impact on any of these protected matters? *

No

4.1.2.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact. *

The Project will not interfere directly or indirectly with any National Heritage Places.

4.1.3 Ramsar Wetland

You have identified your proposed action will likely directly and/or indirectly impact the following protected matters.

A direct impact is a direct consequence of an action taken – for example, clearing of habitat for a threatened species or permanent shading on an ecological community as the result of installing solar panels.

An indirect impact is an 'indirect consequence' such as a downstream impact or a facilitated third-party action.

Direct impact	Indirect impact	Ramsar wetland
No	Yes	Great Sandy Strait (including Great Sandy Strait, Tin Can Bay and Tin Can Inlet).

4.1.3.1 Is the proposed action likely to have any direct and/or indirect impact on any of these protected matters? *

Yes

4.1.3.2 Briefly describe why your action has a direct and/or indirect impact on these protected matters. *

The Great Sandy Strait Ramsar listed wetland was identified on the PMST. The Great Sandy Strait Ramsar wetland is located approximately 300 km downstream from the project site. The primary source of potential impact to the Great Sandy Strait Ramsar Wetland as a result of the Project is altered water quality and flow volumes. All proposed components of the Project would be undertaken in areas that drain directly into Yabba Creek and/or Lake Borumba, which form part of the catchment draining to the coast and the Great Sandy Strait Ramsar wetland.

Without mitigation, the Project has some small potential to impact the quality of the water that enters the catchment that drains into the Great Sandy Strait, via increasing nutrient, sediment and/or contaminant loads. There is also the potential for altered flow volumes, if the Project was to influence the amount of water draining to the waterways in the upper catchment (primarily via reducing the volumes of water

that would otherwise enter the catchment and flow downstream, through capture across the Project footprint).

The Project includes geotechnical investigations, construction of new access tracks and exploratory tunnel drilling, which requires the disturbance of soil and earthworks. These works will be discrete in nature, with the exploratory drilling to be the longest duration works at approximately 18 months (including mobilisation and demobilisation). Once the entrance to the exploratory tunnel has been established (after 2.5 months), the works will proceed underground, therefore limiting the potential for sediment movement offsite. In addition, the geotechnical investigation works will also be predominantly spatially and temporally separate from one another, meaning that the Project will not result in large areas of cleared and/or disturbed land occurring across a small area; rather small patches of disturbance where investigation is undertaken, and rehabilitated as soon as practicable after the necessary information is gathered. New access tracks will also be limited in their spatial extent, with appropriate sealing and treatment applied as part of their construction.

4.1.3.4 Do you consider this likely direct and/or indirect impact to be a Significant Impact? *

No

4.1.3.6 Describe why you do not consider this to be a Significant Impact. *

Despite the potential for the Project to alter the quality and volumes of environmental flows of waters that flow to the Great Sandy Strait Ramsar wetland (as discussed in section 4.1.3.2 of this referral above), a significant impact is not anticipated. This is due to:

- The distance of the project from the Great Sandy Strait Ramsar Wetland. Given the distance of the Project from the Ramsar wetland, it is unlikely that any Project affected water that either drains to or is released into the catchment will result in impacts that can be directly attributable to the Project, with respect to the background levels of sediment/nutrients/contaminants that would be contributed from existing sources from within the lower catchment.
- Most Project work being undertaken in areas that will initially drain directly into the existing Borumba Dam. Outside of high flow events (i.e. flooding or significant rainfall events), any water released from Project work areas or overland flow that passes over disturbed Project work areas would initially flow into Lake Borumba, where it is possible that suspended particles would have an opportunity to settle out of the water column, therefore potentially limiting the movement of suspended sediments/nutrients beyond the dam. An exception to this would be for the Project work proposed to occur below the existing Borumba Dam wall, which would include a temporary waterway crossing to facilitate geotechnical investigations on the western bank of Yabba Creek, within the Conondale Resource Reserve area. Further detail of this work is provided in **Att.1 - Borumba PHES Project - Exploratory Works - EPBC referral report, Section 1.5, pp.4.**
- The Project will implement a construction environment management plan (CEMP), including erosion and sediment control plan (ESCP), which will ensure that all Project work and worksites are managed in accordance with best practice erosion and sediment control principles. This would reduce the potential for the Project to generate any water quality affects. The CEMP is provided at **Att.1-Att.3 - Construction Environment Management Plan.**

4.1.3.7 Do you think your proposed action is a controlled action? *

No

4.1.3.9 Please elaborate why you do not think your proposed action is a controlled action. *

With respect to the above points raised in Section 4.1.3.5 of this referral, and subject to the implementation of the Project's CEMP from the commencement of all Project work, a significant impact is not likely given the expectation there will be limited potential for Project works to contribute additional sediment/nutrients/contaminants into waterways that drain to the downstream Great Sandy Strait Ramsar Wetland.

4.1.3.10 Please describe any avoidance or mitigation measures proposed for this action and attach any supporting documentation for these avoidance and mitigation measures. *

The Project will implement a CEMP, including ESCP, which will ensure that all Project work and worksites are managed in accordance with best practice erosion and sediment control principles. This would reduce the potential for the Project to generate any water quality affects, and there will be limited potential for Project works to contribute additional sediment/nutrients/contaminants into waterways that drain to the downstream Great Sandy Strait Ramsar Wetland. The CEMP is provided at **Att.1-Att.3 - Construction Environment Management Plan**.

4.1.3.11 Please describe any proposed offsets and attach any supporting documentation relevant to these measures. *

It has been determined that a significant impact to the Great Sandy Strait Ramsar Wetland is not likely, as there will be limited potential for Project works to contribute additional sediment/nutrients/contaminants into waterways that drain to the downstream Great Sandy Strait Ramsar Wetland. Further, the Project will implement a CEMP, including ESCP, which will ensure that all Project work and worksites are managed in accordance with best practice erosion and sediment control principles. This would reduce the potential for the Project to generate any water quality affects.

As a significant impact is not likely, offsets are not required for this MNES.

4.1.4 Threatened Species and Ecological Communities

You have identified your proposed action will likely directly and/or indirectly impact the following protected matters.

A direct impact is a direct consequence of an action taken – for example, clearing of habitat for a threatened species or permanent shading on an ecological community as the result of installing solar panels.

An indirect impact is an 'indirect consequence' such as a downstream impact or a facilitated third-party action.

Threatened species

Direct impact	Indirect impact	Species
Yes	Yes	Anthochaera phrygia
Yes	Yes	Arthraxon hispidus
No	No	Bosistoa transversa
No	No	Botaurus poiciloptilus
No	No	Calidris ferruginea
Yes	Yes	Calyptorhynchus lathami lathami
No	No	Chalinolobus dwyeri
No	No	Coeranoscincus reticulatus
No	No	Cossinia australiana
No	No	Cupaniopsis shirleyana
Yes	Yes	Cyclopsitta diophthalma coxeni
No	No	Dasyurus hallucatus

Direct impact	Indirect impact	Species
Yes	Yes	Dasyurus maculatus maculatus (SE mainland population)
No	No	Delma torquata
No	No	Dichanthium setosum
No	No	Egernia rugosa
No	No	Elseya albagula
No	No	Elusor macrurus
No	No	Erythrotriorchis radiatus
No	No	Falco hypoleucos
Yes	Yes	Floydia praealta
No	No	Fontainea venosa
No	No	Furina dunmalli
No	No	Geophaps scripta scripta
No	No	Grantiella picta
No	No	Haloragis exalata subsp. velutina
No	No	Hemiaspis damelii
No	No	Hirundapus caudacutus
No	No	Lathamus discolor
No	No	Lepidium peregrinum
No	No	Macadamia integrifolia
No	No	Macadamia ternifolia
No	No	Macroderma gigas
No	No	Mixophyes fleayi
No	No	Mixophyes iteratus
No	No	Neoceratodus forsteri
No	No	Numenius madagascariensis
No	No	Persicaria elatior
Yes	Yes	Petauroides volans
Yes	Yes	Petaurus australis australis
No	No	Petrogale penicillata
Yes	Yes	Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)
No	No	Phyllodes imperialis smithersi
No	No	Plectranthus nitidus
No	No	Plectranthus omissus
Yes	Yes	Potorous tridactylus tridactylus
Yes	Yes	Pteropus poliocephalus

Direct impact	Indirect impact	Species
Yes	Yes	Rhodamnia rubescens
No	No	Rhodomyrtus psidioides
No	No	Rostratula australis
No	No	Samadera bidwillii
No	No	Sarcochilus weinthalii
Yes	Yes	Sophora fraseri
Yes	Yes	Thesium australe
Yes	Yes	Turnix melanogaster

Ecological communities

Direct impact	Indirect impact	Ecological community
No	No	Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland
Yes	Yes	Lowland Rainforest of Subtropical Australia
No	Yes	Subtropical eucalypt floodplain forest and woodland of the New South Wales North Coast and South East Queensland bioregions
No	No	White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland

4.1.4.1 Is the proposed action likely to have any direct and/or indirect impact on any of these protected matters? *

Yes

4.1.4.2 Briefly describe why your action has a direct and/or indirect impact on these protected matters. *

The total disturbance footprint of the Project would be up to 83.89 hectares (ha). This is for either exploratory tunnel drilling portal option as discussed in **Att.1 - Borumba PHES Project - Exploratory Works - EPBC referral report, Section 1.5.3, pp.14**. The total disturbance footprint is made up of many discrete and spatially separate elements across the site.

Of the total Project footprint, the following areas overlap with threatened species habitat or ecological communities:

- Clearance of up to 79.81 ha (subject to the chosen portal option) of listed threatened species habitat
- Clearance of 2.91 ha of vegetation within a listed threatened ecological community.

Further breakdown of the project's impacts to listed threatened species and ecological communities as a result of vegetation clearing is as follows (note that species determined to have a ‘low likelihood’ of occurrence or ‘unlikely’ to occur within the Project footprint have not been further considered as part of this assessment, as discussed in **Att.1-Att.2 - Matters of National Environmental Significance, Section 2.2.1, pp.13**):

Listed threatened ecological communities (refer to **Att.1-Att.2 - Matters of National Environmental Significance, Section 3.3, pp.102** for more detail):

- Lowland Rainforest of Subtropical Australia - The combined maximum possible extent of impact is 2.914ha. However, this number will almost certainly be substantially reduced after further refinement of the proposed geotechnical program is undertaken
- Subtropical eucalypt floodplain forest and woodland of the New South Wales North Coast and South East Queensland bioregions - There will be no direct impact on this Threatened Ecological community as a result of the Project; potential indirect impacts may occur downstream of Borumba Dam and access track near Borumba Creek
- Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland - There will be no impact on this Threatened Ecological community as a result of the Project
- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland - There will be no impact on this Threatened Ecological community as a result of the Project

Listed threatened species (refer to **Att.1-Att.2 - Matters of National Environmental Significance, Section 3, pp.16** for more detail, including discussion of the types of species' habitat that would be impacted):

Flora (refer to Att.1-Att.2 - Matters of National Environmental Significance, Section 3, pp.16-50 for more detail):

- Nightcap Plectranthus (*Coleus torrenticola)* - It is unlikely that individuals or habitat for *Coleustorrenticola* will be impacted by the exploratory works. No impacts anticipated
- Scrub Turpentine (*Rhodamnia rubescens)* - 47.02 hectares of potential habitat will be potentially impacted to allow development of tracks and geotechnical work sites
- Brush Sophora (*Sophora fraseri)* - Approximately 37.85 ha of potential habitat for the species is present in the exploratory works footprint of which only a small proportion may be impacted
- Austral Toadflax (*Thesium australe)* - Potential habitat (64.81) is present in the footprint for the Exploratory Works. This species has not been identified during targeted surveys but the possibility of a significant impact cannot be entirely dismissed.
- Three-leaved Bosistoa (*Bosistoa transversa)* - The species is closely aligned with lowland subtropical rainforest and has been found in this community type but well to the south of the nearest component of the exploratory works footprint. No impacts anticipated
- Ball Nut *(Floydia praealta)* - Approximately 1.05 ha of potential habitat for *Floydia praealta* will be impacted by the Exploratory Works
- Small-Fruited Queensland Nut (*Macadamia ternifolia)* - Suitable habitat is generally outside the impact footprint for the Exploratory Works. No impacts anticipated
- Macadamia Nut (*Macadamia integrifolia)* - Suitable habitat is primarily outside the impact footprint for the Exploratory Works. No specimens of this species were located during flora surveys. No impacts anticipated
- Rough-Shelled Bush Nut *(Macadamia tetraphylla)* - 0.76 ha of potential habitat is within the exploratory works footprint. No specimens of this species were located during flora surveys
- Hairy-Joint Grass (*Arthraxon hispidus)* - Potential suitable habitat (2.71 ha) is within the impact footprint for the Exploratory Works. No specimens of this species were located during targeted flora surveys of the exploratory works footprint
- Cossinia (*Cossinia australiana)* - Suitable habitat for the species is not present in the impact footprint for the Exploratory Works. No impacts anticipated
- Wedge-Leaf Tuckeroo *(Cupaniopsis shirleyana)* - Suitable habitat is outside the impact footprint for the Exploratory Works. No impacts anticipated.

Fauna (refer to Att.1-Att.2 - Matters of National Environmental Significance, Section 3, pp.50-98 for more detail):

- Glossy Black-cockatoo (South-Eastern) (*Calyptorhynchus lathami lathami)* - Approximately 66.76 ha of potential habitat for Glossy Black-Cockatoo (South-Eastern) will be impacted by the Exploratory Works
- Greater Glider (*Petauroides volans)* - Approximately 63.36 ha of potential habitat for Greater Glider may will be impacted by the Exploratory Works
- Grey-headed Flying-fox (*Pteropus poliocephalus)* - Approximately 67.05 ha of potential habitat for Grey-Headed Flying-Fox will be impacted by the Exploratory Works
- Koala (*Phascolarctos cinereus)* - Approximately 86.68 ha of potential habitat for Koala will be is within the area which could be impacted by the Exploratory Works
- Long-Nosed Potoroo (Northern) (*Potorous tridactylus tridactylus)* - Approximately 49.96 ha of potential habitat for Long-Nosed Potoroo (Northern) will be impacted by the Exploratory Works
- White-Throated Needletail (*Hirundapus caudacutus)* - The Exploratory Works will result in the removal of wooded areas above which White-throated Needletail is likely to forage for insects. However, given the almost exclusively aerial nature of the species and the availability and extent of forest habitat in the region the species is unlikely to be impacted
- Yellow-Bellied Glider (Southern Subsp.) (*Petaurus australis australis)* - Approximately 49.41 ha of potential habitat for Yellow-Bellied Glider will be impacted by the Exploratory Works
- Black-Breasted Button-Quail (*Turnix melanogaster)* - Approximately 38.12 ha of potential habitat for Black-Breasted Button-Quail will be impacted by the Exploratory Works
- Australian Lungfish (aka Queensland Lungfish) (*Neoceratodus forsteril)* - no habitat for Lungfish will be directly impacted by the proposed action
- Mary River Cod (*Maccullochella mariensis)* - no habitat for Mary River Cod will be directly impacted by the proposed action
- Mary River Turtle, Mary River Tortoise (*Elusor macrurus)* - the exploratory works would not involve activities which would have significant impact on the species, its movement or its habitat
- Southern Snapping Turtle (aka White-throated Snapping Turtle) (*Elseya albagula)* - the exploratory works will not have any direct impact on the species or its preferred habitat
- Coxen's Fig-Parrot (*Cyclopsitta diophthalma coxeni)* - Approximately 0.76 ha of potential habitat for Coxen's Fig-Parrot will potentially be impacted by the Exploratory Works.
- Regent Honeyeater (*Anthochaera phrygia)* - Approximately 63.36 ha of potential habitat for Regent Honeyeater is within the area which may be impacted by the Exploratory Works
- Spotted-tail Quoll *Dasyurus maculatus maculatus* - Approximately 63.36 ha of potential habitat for Spotted-Tail Quoll may be impacted by the Exploratory Works
- Australian Painted Snipe (*Rostratula australis)* - Australian Painted Snipe was not detected within the Exploratory Works footprint during targeted surveys. No impacts anticipated
- Fleay's Frog (*Mixophyes fleayi)* - Fleay's Frog was not detected within the Exploratory Works footprint during targeted surveys. No impacts anticipated
- Giant Barred Frog (*Mixophyes iteratus)* - Giant Barred Frog was not detected within the Exploratory Works footprint during targeted surveys. No impacts anticipated
- Grey Snake (*Hemiaspis dameliiis)* - Grey Snake is unlikely to be present in the Study Area. No impacts anticipated.

4.1.4.4 Do you consider this likely direct and/or indirect impact to be a Significant Impact? *

Yes

4.1.4.5 Describe why you consider this to be a Significant Impact. *

Significant impact assessments have been undertaken in accordance with the EPBC Significant Impact Assessment Guidelines for all listed threatened species and ecological communities that are either known to occur within the Project footprint, or have a high/moderate or low likelihood of occurrence within the Project footprint (refer to **Att.1-Att.2 - Matters of National Environmental Significance, Section 3, pp16-105** for the complete significant impact assessment for listed threatened species and ecological communities).

Despite temporary nature of the Exploratory Works, of all the species considered as part of this assessment, a potential significant impact has been determined to be likely **only** for the following threatened species and ecological communities:

- Koala (*Phascolarctos cinereus*)
- Lowland Rainforest of Subtropical Australia

In addition, a potential significant impact is also possible for the following threatened species:

- Austral Toadflax (*Thesium australe*)
- Glossy Black-Cockatoo (South-Eastern) (*Calyptorhynchus lathami lathami*)
- Greater Glider (*Petauroides volans*)
- Grey-Headed Flying-Fox (*Pteropus poliocephalus*)
- Long-Nosed Potoroo (Northern) (*Potorous tridactylus tridactylus*)
- Spotted-Tail Quoll (*Dasyurus maculatus maculatus*).

Further detail of the significant impact assessments undertaken for all species, including those for which the project is unlikely to result in a significant impact, can be found in **Att.1-Att.2 - Matters of National Environmental Significance, Section 3, pp16-105 & Att.1 - Borumba PHES Project - Exploratory Works - EPBC referral report, Section 8, pp.73.**

4.1.4.7 Do you think your proposed action is a controlled action? *

Yes

4.1.4.8 Please elaborate why you think your proposed action is a controlled action. *

Despite temporary nature of the Exploratory Works, of all the species considered as part of this assessment, a potential significant impact has been determined to be likely for the following threatened species and ecological communities:

- Koala (*Phascolarctos cinereus*)
- Lowland Rainforest of Subtropical Australia

In addition, a potential significant impact is also possible for the following threatened species:

- Austral Toadflax (*Thesium australe*)
- Glossy Black-Cockatoo (South-Eastern) (*Calyptorhynchus lathami lathami*)
- Greater Glider (*Petauroides volans*)
- Grey-Headed Flying-Fox (*Pteropus poliocephalus*)
- Long-Nosed Potoroo (Northern) (*Potorous tridactylus tridactylus*)
- Spotted-Tail Quoll (*Dasyurus maculatus maculatus*)

As a result, Queensland Hydro considers there is a high likelihood the Commonwealth Minister for the Environment determines that the Project is a controlled action.

Further detail is provided in **Att.1 - Borumba PHES Project - Exploratory Works - EPBC referral report, Section 8, pp.73.**

4.1.4.10 Please describe any avoidance or mitigation measures proposed for this action and attach any supporting documentation for these avoidance and mitigation measures. *

Utilisation of previously disturbed areas

While developing the Project, satellite imagery and Queensland government environmental mapping was incorporated into the Project's GIS portal used to locate works. As part of this review, areas with significant existing disturbance (e.g. cleared paddocks used for cattle grazing, existing roads and tracks) were identified and their suitability for components of the Project assessed. Subsequent field work has been undertaken to confirm suitability of cleared areas identified through spatial analysis and to identify further opportunities to avoid sensitive environmental values.

Due to the nature of the Borumba PHES Project design and the objectives of the Project (i.e. to assess the suitability of the site, including the proposed locations for Borumba PHES Project key infrastructure), it was not possible to locate all works in disturbed areas. However, wherever possible, activities and infrastructure that are not directly associated with assessing the Borumba PHES Project design were situated in areas subject to past clearing. This includes the spoil disposal area, temporary water infrastructure, and some access tracks as

shown in **Att.1 - Borumba PHES Project - Exploratory Works - EPBC referral report, Section 1.5, Figure 1-3**. For the access tracks, use of existing tracks was prioritised (with upgrades where necessary to meet the required standards) and the installation of new tracks was restricted to locations required to provide access to investigation sites or ensure safe and suitable access for vehicles and plant.

Co-location of Borumba PHES Project – Exploratory Works and Borumba PHES Project work components

In addition to preferencing previously disturbed areas, Project work components were also co-located with the Borumba PHES Project design wherever possible, to reduce the overall impact of the Project. This includes locating the:

- Exploratory tunnel portal pad within the proposed permanent portal pad – this approach will apply to either portal pad location (orange portal option or green portal option) and tunnel alignment chosen.
- Spoil disposal area and general staging area within the proposed dam inundation areas.
- Tracks (new and upgrades) with access routes that can be used during construction of the Borumba PHES Project components.
- Anticipated geotechnical investigation sites with tracks where possible when not located in proposed permanent infrastructure locations and drilling multiple bore holes from a single pad.

Relocation of works

During the development of the Project, the proposed footprint was also compared with environmental field survey results as they became available. This was done by incorporating the field results in the GIS portal and overlaying them with the proposed Project footprint to determine if any environmental constraints had been identified at the same location as the proposed works. Where environmental constraints were identified, the Project team (including the design engineers and the Exploratory Works Manager) was consulted and a process initiated to determine if the works in that location could be moved without affecting the objective of the exploratory works. This process was ongoing and iterative, with checks occurring as design refinements were proposed and additional field data became available. Overall, the process resulted in several key changes to the Project to avoid environmental impacts. These were:

- The location of the exploratory tunnel portal pad, noting that two options are under consideration in less sensitive environmental areas.
- Spoil disposal location.
- Upgrades to Bella Creek Road and to Borgan Road. The changes implemented have allowed for these proposed works to quality for self-assessment, and therefore have not been included as part of this referral for assessment – further detail is provided in **Att.1 - Works outside of referral scope within Att.1 - Borumba PHES Project - Exploratory Works - EPBC referral report.**
- Investigation of a potential quarry location.

The exploratory tunnel portal pad was initially located at the site shown in **Att.1 - Borumba PHES Project - Exploratory Works - EPBC referral report, Section 1.5.1.3, Figure 1-4** to align with the proposed permanent portal pad. However, a field survey determined that this coincided with an EPBC Act listed threatened ecological community (TEC) – the critically endangered Lowland Rainforest of Subtropical Australia. Consequently, it was decided to relocate the permanent portal pad to a different location, with no TEC. This is represented by the Orange option in the exploratory works footprint.

After this adjustment to the portal pad, the design was considered further, resulting in a change to the size of the portal pad. The initial Project design included a portal pad with the same dimensions as the permanent portal pad. However, it was identified that the works associated with drilling the exploratory tunnel do not require a staging area equivalent to the Borumba PHES Project design, and as a result the size of the portal pad was reduced.

The review of the portal pad also led to the review of alternative locations with improved construction and environmental conditions. Three additional locations were assessed using a simplified, high-level multi-criteria analysis (MCA) that considered geotechnical, stakeholder, environmental, cultural heritage, hydrology and civil works constraints. Engineering design, cost and time constraints were not included as the engineering input was not available. The MCA resulted in two options being excluded from consideration and one option (Green option) being retained for future engineering input. The Green option is largely located in a previously disturbed area currently used for cattle grazing; this location will be reviewed by the Queensland Hydro engineering team in February and March 2023.

Consideration was also given to the off-site disposal of spoil from the exploratory tunnel drilling. However, based on the volume of spoil and the transport vehicles required, it was determined that significant upgrades to Bella Creek Road would be required to allow for off-site disposal. These upgrades would have included road widening and associated clearing of remnant vegetation that includes regional ecosystems that meet the criteria for an EPBC Act listed TEC (the endangered Subtropical Eucalypt Floodplain Forest and Woodland) as well as additional waterway crossing upgrades. Based on the extent of the works that would be required to Bella Creek Road to support off-site spoil disposal, on-site spoil disposal was identified as the preferred option, and a suitable cleared area within the proposed Borumba PHES Project Lake Borumba inundation area identified as the spoil disposal area (**refer to Att.1 - Borumba PHES Project - Exploratory Works - EPBC referral report, Section 1.5, Figure 1-3**).

It is necessary to travel along Borgan Road to access the Project site. Sections of this road are narrow, winding and steep, and as such it was determined that upgrades would be required to allow vehicles and plant to access the site. This initially included a realignment to straighten one section of Borgan Road, but field surveys identified the presence of the critically endangered Lowland Rainforest of Subtropical Australia TEC on either side of the road at that location **(refer to Att.1 - Borumba PHES Project - Exploratory Works - EPBC referral report, Section 1.5.1.3, Figure 1-5**). Consequently, multiple design options within the existing road corridor were tested, while consultation was undertaken with contractors and operators to better understand vehicle capabilities. The outcome of this analysis and consultation process was that the vehicles that will be used for the Project can navigate the existing gradient and alignment, with some upgrades to the surface (from gravel to asphalt) outside the section adjacent to the TEC. This resulted in no proposed disturbance to the TEC. Given the reduced level of disturbance associated with the Borgan Road upgrades, the upgrades were considered suitable for self-assessment and therefore are excluded from this referral. Further information is provided in **Att.1 - Works outside of referral scope within Att.1 - Borumba PHES Project - Exploratory Works - EPBC referral report.**

During the selection of the anticipated geotechnical investigation sites for the Project, it was identified that the Borumba PHES Project design had selected a potential quarry site in an area of likely high environmental value within the state forest boundary. An ecology survey of the area was undertaken in response. This survey found the Lowland Rainforest of Subtropical Australia TEC, threatened plants species and habitat for threatened fauna species were located in the proposed quarry area, including within the associated quarry access tracks and investigation sites. Following review by the Project team and through consultation with the design engineers, it was agreed that this quarry location would not be progressed at this stage of the Project, and alternative locations would be investigated. This avoided potential impacts to sensitive environmental values.

Avoidance measures will also be taken during the implementation of the geotechnical investigations for the Project. The geotechnical engineers and drilling contractors will operate in accordance with a protocol that requires the anticipated investigation sites to be adjusted if vegetation clearing can be avoided, by relocating the investigation site to a suitable nearby location that does not require clearing, or where clearing can be reduced.

Att.1 - Borumba PHES Project - Exploratory Works - EPBC referral report, Section 7, pp. 69 provides a detailed description of the mitigation measures to be applied for the Project. **Att.1-Att.3 - Construction Environment Management Plan** contains the Project's Construction Environment Management Plan.

4.1.4.11 Please describe any proposed offsets and attach any supporting documentation relevant to these measures. *

A Preliminary Environmental Offsets Strategy has been prepared for the Project which investigates the feasibility of securing an environmental offset which meets the requirements of the offsets framework established under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the related EPBC Act *Environmental Offsets Policy, October 2021*.

Offsets are likely to be required to compensate for SRIs to a range of MNES for both the Project and the Borumba PHES Project main works.

To understand the scale of the offsets that may be required for the Project and to provide context around the offset available, analysis of both the largest potential offset obligation for the proposed works and the most constrained values were considered. Key considerations surrounding the size and availability of potential offset for the Exploratory Works were:

- Largest area
    - Koala is listed as Endangered under the EPBC Act and the Project is likely to impact approximately 81.33 ha of habitat (assuming rainforest and other dense vegetation is not habitat). Using an 8 times multiplier results in an offset area requirement of 651 ha.
    - MNES value that is mutually exclusive to Koala habitat include areas of Lowland Rainforest of Subtropical Australia TEC, which will add to total area of land required for offset delivery.
- Constrained availability
    - Suitable offset sites of Lowland Rainforest of Subtropical Australia TEC are likely to be the most constrained in terms of availability. This TEC is listed as Critically Endangered therefore will likely require an area of 58.2 ha assuming an impact area of 2.91 ha (up to 20:1 offset to impact area ratio)

Based on the above assumptions the total offset area for the Exploratory Works could be as large as 710 ha, assuming that all impacts on potential koala habitat are found to be significant, and require offsets.

It is anticipated that the size of direct land-based offsets required for the Borumba PHES Project works will be much larger than for the Project. Therefore, it is proposed that a single offset package for the combined Project and Borumba PHES Project impacts is used. In this way, a large strategically located land-based offset can be provided that incorporates offset requirements for all components of the Borumba PHES Project.

It is proposed to further develop the offsets strategy for the wider Borumba PHES Project and incorporate offset requirements for the Project into a single Borumba PHES Project offset strategy. Should the Borumba PHES Project not proceed (or be approved under the EPBC Act) within five years of approval of the Project, a stand-alone offset will be delivered for the Project that meets the requirements of the EPBC Act and Environmental Offsets Policy.

QLD Hydro owns properties as part of the Borumba PHES Project that provide potential for offset sites outside of the Project’s operational footprint. As potential offset sites they are more likely to have ecological values and function similar to the proposed impact areas compared to offset sites further away. It appears feasible that the Queensland Hydro owned land will be able to acquit the MNES offset requirements for the Project based on a rapid ecological assessment of habitat values.

Should additional offset areas be required for the Borumba PHES Project there is State owned land nearby that appear to contain land suitable as offset sites.

Att.1 - Borumba PHES Project - Exploratory Works - EPBC referral report, Section 9, pp. 95 provides an overview of the environmental offsets requirements for the Project, including detail of the Project's Preliminary Environmental Offsets Strategy. **Att.1-Att.4 - Preliminary Environmental Offsets Strategy** contains the Project's Preliminary Environmental Offsets Strategy.

4.1.5 Migratory Species

You have identified your proposed action will likely directly and/or indirectly impact the following protected matters.

A direct impact is a direct consequence of an action taken – for example, clearing of habitat for a threatened species or permanent shading on an ecological community as the result of installing solar panels.

An indirect impact is an 'indirect consequence' such as a downstream impact or a facilitated third-party action.

Direct impact	Indirect impact	Species
No	No	Actitis hypoleucos
No	No	Apus pacificus
No	No	Calidris acuminata
No	No	Calidris ferruginea
No	No	Calidris melanotos
No	No	Crocodylus porosus
Yes	Yes	Cuculus optatus
Yes	Yes	Gallinago hardwickii
No	No	Hirundapus caudacutus
Yes	Yes	Monarcha melanopsis
Yes	Yes	Myiagra cyanoleuca
No	No	Numenius madagascariensis
No	No	Pandion haliaetus
Yes	Yes	Rhipidura rufifrons
Yes	Yes	Symposiachrus trivirgatus
No	No	Tringa nebularia

4.1.5.1 Is the proposed action likely to have any direct and/or indirect impact on any of these protected matters? *

Yes

4.1.5.2 Briefly describe why your action has a direct and/or indirect impact on these protected matters. *

Suitable habitat was recorded within the Study Area for eight migratory species.

An assessment of potential impacts to migratory species as a result of the Project was undertaken, and found the following (note that species determined to have a ‘low likelihood’ of occurrence or ‘unlikely’ to occur within the Project footprint have not been further considered as part of this assessment, as discussed in **Att.1-Att.2 - Matters of National Environmental Significance, Section 2.2.1, pp.13**):

- Black-Faced Monarch (*Monarcha melanopsis)* **-** Approximately 37.83 ha of potential habitat for Black-Faced Monarch is within the work area of the Exploratory Works
- Fork-tailed Swift (*Apus pacificus)* **-** The Exploratory Works will result in the removal of wooded areas above which Fork-tailed Swift is likely to forage for insects. However, given the almost exclusively aerial nature of the species and the availability and extent of forest habitat in the region the species is unlikely to be impacted. No impacts anticipated
- Latham's Snipe (*Gallinago hardwickii)* **-** Approximately 21.61 ha of potential habitat for Latham's Snipe is within the work area of the Exploratory Works
- Oriental Cuckoo (*Cuculus optatus)* **-** Approximately 0.76 ha of potential habitat for Oriental Cuckoo is within the work area of the Exploratory Works.
- Osprey (*Pandion haliaetus)* **-** Osprey was not detected within the Exploratory Works footprint; however, it was detected as a fly-over in the lower reservoir immediately adjacent. No impacts anticipated
- Rufous Fantail (*Rhipidura rufifrons)* **-** Approximately 65.58 ha of potential habitat for Rufous Fantail is within the work area of the Exploratory Works
- Satin Flycatcher (*Myiagra cyanoleuca)* **-** Approximately 65.58 ha of potential habitat for Satin Flycatcher is within the work area of the Exploratory Works.
- Spectacled Monarch (*Monarcha trivirgatus/Symposiachrus trivirgatus)* **-** Approximately 51.62 ha of potential habitat for Spectacled Monarch is within the work area of the Exploratory Works.

Refer to **Att.1-Att.2 - Matters of National Environmental Significance, Section 3.2.20, pp.98-102** for further detail, including a discussion of the migratory species habitat present within the Project footprint.

4.1.5.4 Do you consider this likely direct and/or indirect impact to be a Significant Impact? *

No

4.1.5.6 Describe why you do not consider this to be a Significant Impact. *

Significant impact assessments have been undertaken in accordance with the EPBC Significant Impact Assessment Guidelines for the eight migratory species with suitable habitat in the Project's study area (refer to **Att.1-Att.2 - Matters of National Environmental Significance, Section 3.2.20, pp.98-102**) for the complete significant impact assessment for migratory species).

This assessment found that a significant impact for all migratory species is unlikely, therefore it has been determined that the Project will not have a significant impact on migratory species.

4.1.5.7 Do you think your proposed action is a controlled action? *

No

4.1.5.9 Please elaborate why you do not think your proposed action is a controlled action. *

The assessment (refer to **Att.1-Att.2 - Matters of National Environmental Significance, Section 3.2.20, pp.98-102**) determined that the Project will not have a significant impact on any migratory species.

As a result, Queensland Hydro considers there is a low likelihood the Commonwealth Minister for the Environment determines that the Project is a controlled action due to potential impacts on migratory species.

4.1.5.10 Please describe any avoidance or mitigation measures proposed for this action and attach any supporting documentation for these avoidance and mitigation measures. *

Utilisation of previously disturbed areas

While developing the Project, satellite imagery and Queensland government environmental mapping was incorporated into the Project's GIS portal used to locate works. As part of this review, areas with significant existing disturbance (e.g. cleared paddocks used for cattle grazing, existing roads and tracks) were identified and their suitability for components of the Project assessed. Subsequent field work has been undertaken to confirm suitability of cleared areas identified through spatial analysis and to identify further opportunities to avoid sensitive environmental values.

Due to the nature of the Borumba PHES Project design and the objectives of the Project (i.e. to assess the suitability of the site, including the proposed locations for Borumba PHES Project key infrastructure), it was not possible to locate all works in disturbed areas. However, wherever possible, activities and infrastructure that are not directly associated with assessing the Borumba PHES Project design were situated in areas subject to past clearing. This includes the spoil disposal area, temporary water infrastructure, and some access tracks as shown in **Att.1 - Borumba PHES Project - Exploratory Works - EPBC referral report, Section 1.5, Figure 1-3**. For the access tracks, use of existing tracks was prioritised (with upgrades where necessary to meet the required standards) and the installation of new tracks was restricted to locations required to provide access to investigation sites or ensure safe and suitable access for vehicles and plant.

Co-location of Borumba PHES Project – Exploratory Works and Borumba PHES Project work components

In addition to preferencing previously disturbed areas, Project work components were also co-located with the Borumba PHES Project design wherever possible, to reduce the overall impact of the Project. This includes locating the:

- Exploratory tunnel portal pad within the proposed permanent portal pad – this approach will apply to either portal pad location (orange portal option or green portal option) and tunnel alignment chosen.
- Spoil disposal area and general staging area within the proposed dam inundation areas.
- Tracks (new and upgrades) with access routes that can be used during construction of the Borumba PHES Project components.
- Anticipated geotechnical investigation sites with tracks where possible when not located in proposed permanent infrastructure locations and drilling multiple bore holes from a single pad.

Relocation of works

During the development of the Project, the proposed footprint was also compared with environmental field survey results as they became available. This was done by incorporating the field results in the GIS portal and overlaying them with the proposed Project footprint to determine if any environmental constraints had been identified at the same location as the proposed works. Where environmental constraints were identified, the Project team (including the design engineers and the Exploratory Works Manager) was consulted and a process initiated to determine if the works in that location could be moved without affecting the objective of the exploratory works. This process was ongoing and iterative, with checks occurring as design refinements were proposed and additional field data became available. Overall, the process resulted in several key changes to the Project to avoid environmental impacts. These were:

- The location of the exploratory tunnel portal pad, noting that two options are under consideration in less sensitive environmental areas.
- Spoil disposal location.
- Upgrades to Bella Creek Road and to Borgan Road. The changes implemented have allowed for these proposed works to quality for self-assessment, and therefore have not been included as part of this referral for assessment – further detail is provided in **Att.1 - Works outside of referral scope of Att.1 - Borumba PHES Project - Exploratory Works - EPBC referral report.**
- Investigation of a potential quarry location.

The exploratory tunnel portal pad was initially located at the site shown in **Att.1 - Borumba PHES Project - Exploratory Works - EPBC referral report, Section 1.5.1.3, Figure 1-4** to align with the proposed permanent portal pad. However, a field survey determined that this coincided with an EPBC Act listed threatened ecological community (TEC) – the critically endangered Lowland Rainforest of Subtropical Australia. Consequently, it was decided to relocate the permanent portal pad to a different location, with no TEC. This is represented by the Orange option in the exploratory works footprint.

After this adjustment to the portal pad, the design was considered further, resulting in a change to the size of the portal pad. The initial Project design included a portal pad with the same dimensions as the permanent portal pad. However, it was identified that the works associated with drilling the exploratory tunnel do not require a staging area equivalent to the Borumba PHES Project design, and as a result the size of the portal pad was reduced.

The review of the portal pad also led to the review of alternative locations with improved construction and environmental conditions. Three additional locations were assessed using a simplified, high-level multi-criteria analysis (MCA) that considered geotechnical, stakeholder, environmental, cultural heritage, hydrology and civil works constraints. Engineering design, cost and time constraints were not included as the engineering input was not available. The MCA resulted in two options being excluded from consideration and one option (Green option) being retained for future engineering input. The Green option is largely located in a previously disturbed area currently used for cattle grazing; this location will be reviewed by the Queensland Hydro engineering team in February and March 2023.

Consideration was also given to the off-site disposal of spoil from the exploratory tunnel drilling. However, based on the volume of spoil and the transport vehicles required, it was determined that significant upgrades to Bella Creek Road would be required to allow for off-site disposal. These upgrades would have included road widening and associated clearing of remnant vegetation that includes regional ecosystems that meet the criteria for an EPBC Act listed TEC (the endangered Subtropical Eucalypt Floodplain Forest and Woodland) as well as additional waterway crossing upgrades. Based on the extent of the works that would be required to Bella Creek Road to support off-site spoil disposal, on-site spoil disposal was identified as the preferred option, and a suitable cleared area within the proposed Borumba PHES Project Lake Borumba inundation area identified as the spoil disposal area (**refer to Att.1 - Borumba PHES Project - Exploratory Works - EPBC referral report, Section 1.5, Figure 1-3**).

It is necessary to travel along Borgan Road to access the Project site. Sections of this road are narrow, winding and steep, and as such it was determined that upgrades would be required to allow vehicles and plant to access the site. This initially included a realignment to straighten one section of Borgan Road, but field surveys identified the presence of the critically endangered Lowland Rainforest of Subtropical Australia TEC on either side of the road at that location **(refer to Att.1 - Borumba PHES Project - Exploratory Works - EPBC referral report, Section 1.5.1.3, Figure 1-5**). Consequently, multiple design options within the existing road corridor were tested, while consultation was undertaken with contractors and operators to better understand vehicle capabilities. The outcome of this analysis and consultation process was that the vehicles that will be used for the Project can navigate the existing gradient and alignment, with some upgrades to the surface (from gravel to asphalt) outside the section adjacent to the TEC. This resulted in no proposed disturbance to the TEC. Given the reduced level of disturbance associated with the Borgan Road upgrades, the upgrades were considered suitable for self-assessment and therefore are excluded from this referral. Further information is provided in **Att.1 - Works outside of referral scope of Att.1 - Borumba PHES Project - Exploratory Works - EPBC referral report.**

During the selection of the anticipated geotechnical investigation sites for the Project, it was identified that the Borumba PHES Project design had selected a potential quarry site in an area of likely high environmental value within the state forest boundary. An ecology survey of the area was undertaken in response. This survey found the Lowland Rainforest of Subtropical Australia TEC, threatened plants species and habitat for threatened fauna species were located in the proposed quarry area, including within the associated quarry access tracks

and investigation sites. Following review by the Project team and through consultation with the design engineers, it was agreed that this quarry location would not be progressed at this stage of the Project, and alternative locations would be investigated. This avoided potential impacts to sensitive environmental values.

Avoidance measures will also be taken during the implementation of the geotechnical investigations for the Project. The geotechnical engineers and drilling contractors will operate in accordance with a protocol that requires the anticipated investigation sites to be adjusted if vegetation clearing can be avoided, by relocating the investigation site to a suitable nearby location that does not require clearing, or where clearing can be reduced.

Att.1 - Borumba PHES Project - Exploratory Works - EPBC referral report, Section 7, pp. 69 provides a detailed description of the mitigation measures to be applied for the Project. **Att.1-Att.3 - Construction Environment Management Plan** contains the Project's Construction Environment Management Plan.

4.1.5.11 Please describe any proposed offsets and attach any supporting documentation relevant to these measures. *

The assessment has determined that the Project will not result in a significant impact to any migratory species, therefore offsets for this MNES are not required.

4.1.6 Nuclear

4.1.6.1 Is the proposed action likely to have any direct and/or indirect impact on this protected matter? *

No

4.1.6.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact. *

The Project is not and does not involve nuclear actions.

4.1.7 Commonwealth Marine Area

You have identified your proposed action will likely directly and/or indirectly impact the following protected matters.

A direct impact is a direct consequence of an action taken – for example, clearing of habitat for a threatened species or permanent shading on an ecological community as the result of installing solar panels.

An indirect impact is an 'indirect consequence' such as a downstream impact or a facilitated third-party action.

—

4.1.7.1 Is the proposed action likely to have any direct and/or indirect impact on any of these protected matters? *

No

4.1.7.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact. *

The Project will not interfere directly or indirectly with the Commonwealth Marine Environment.

4.1.8 Great Barrier Reef

4.1.8.1 Is the proposed action likely to have any direct and/or indirect impact on this protected matter? *

No

4.1.8.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact. *

The Project is not located within or immediately adjacent to the Great Barrier Reef Marine Park (GBRMP), and therefore will not directly or indirectly interfere with the GBRMP.

4.1.9 Water resource in relation to large coal mining development or coal seam gas

4.1.9.1 Is the proposed action likely to have any direct and/or indirect impact on this protected matter? *

No

4.1.9.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact. *

The Project does not involve coal seam gas or large coal mining development.

4.1.10 Commonwealth Land

You have identified your proposed action will likely directly and/or indirectly impact the following protected matters.

A direct impact is a direct consequence of an action taken – for example, clearing of habitat for a threatened species or permanent shading on an ecological community as the result of installing solar panels.

An indirect impact is an 'indirect consequence' such as a downstream impact or a facilitated third-party action.

—

4.1.10.1 Is the proposed action likely to have any direct and/or indirect impact on any of these protected matters? *

No

4.1.10.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact. *

The Project will not interfere directly or indirectly with Commonwealth Land.

4.1.11 Commonwealth heritage places overseas

You have identified your proposed action will likely directly and/or indirectly impact the following protected matters.

A direct impact is a direct consequence of an action taken – for example, clearing of habitat for a threatened species or permanent shading on an ecological community as the result of installing solar panels.

An indirect impact is an 'indirect consequence' such as a downstream impact or a facilitated third-party action.

—

4.1.11.1 Is the proposed action likely to have any direct and/or indirect impact on any of these protected matters? *

No

4.1.11.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact. *

The Project will not interfere directly or indirectly with the Commonwealth heritage places overseas.

4.1.12 Commonwealth or Commonwealth Agency

4.1.12.1 Is the proposed action to be taken by the Commonwealth or a Commonwealth Agency? *

No

4.2 Impact summary

Conclusion on the likelihood of significant impacts

You have indicated that the proposed action will likely have a significant impact on the following Matters of National Environmental Significance:

- Threatened Species and Ecological Communities (S18)

Conclusion on the likelihood of unlikely significant impacts

You have indicated that the proposed action will unlikely have a significant impact on the following Matters of National Environmental Significance:

- World Heritage (S12)
- National Heritage (S15B)
- Ramsar Wetland (S16)
- Migratory Species (S20)
- Nuclear (S21)
- Commonwealth Marine Area (S23)
- Great Barrier Reef (S24B)
- Water resource in relation to large coal mining development or coal seam gas (S24D)
- Commonwealth Land (S26)
- Commonwealth heritage places overseas (S27B)
- Commonwealth or Commonwealth Agency (S28)

4.3 Alternatives

4.3.1 Do you have any possible alternatives for your proposed action to be considered as part of your referral? *

No

4.3.8 Describe why alternatives for your proposed action were not possible. *

The purpose of the Project is to undertake and facilitate the critical technical investigations required to confirm the suitability of the Borumba PHES Project location and design. Investigation is particularly required in areas where key infrastructure will be constructed, as geological uncertainty is a significant risk for the Borumba PHES Project. Accordingly, the Exploratory Works are largely temporary in nature and are not intended to remain in place for an extended duration. Should the Borumba PHES Project not proceed, the Exploratory Works infrastructure will be removed, and impacted areas will be remediated where appropriate.

Given that the Borumba Dam site has been subject to thorough investigation and determined as the most suitable site for a PHES (further discussed in **Att.1 - Borumba PHES Project - Exploratory Works - EPBC referral report, Section 1.6.1, pp.36**), the only possible alternative to the Project is to not take the action, wherein which the feasibility of the Borumba PHES Project cannot be fully investigated, potentially preventing the associated benefits of the Borumba PHES Project from being realised.

The alternatives considered for specific Project elements have been further discussed in **Att.1 - Borumba PHES Project - Exploratory Works - EPBC referral report, Section 1.5.1, pp.9.**

5. Lodgement

5.1 Attachments

5.2 Declarations

Completed Referring party's declaration

The Referring party is the person preparing the information in this referral.

ABN/ACN	81661444515
Organisation name	QUEENSLAND HYDRO PTY LTD
Organisation address	4000 QLD
Representative's name	Nirvana Searle
Representative's job title	Environment Lead - Borumba
Phone	0733247832
Email	approvals@qldhydro.com.au
Address	239 George St, Brisbane City, Qld, 4000

☑ Check this box to indicate you have read the referral form. *

☑ I would like to receive notifications and track the referral progress through the EPBC portal. *

☑ By checking this box, I, **Nirvana Searle of QUEENSLAND HYDRO PTY LTD**, declare that to the best of my knowledge the information I have given on, or attached to this EPBC Act Referral is complete, current and correct. I understand that giving false or misleading information is a serious offence. *

☑ I would like to receive notifications and track the referral progress through the EPBC portal. *

Completed Person proposing to take the action's declaration

The Person proposing to take the action is the individual, business, government agency or trustee that will be responsible for the proposed action.

Same as Referring party information.

☑ Check this box to indicate you have read the referral form. *

☑ I would like to receive notifications and track the referral progress through the EPBC portal. *

☑ I, **Nirvana Searle of QUEENSLAND HYDRO PTY LTD**, declare that to the best of my knowledge the information I have given on, or attached to the EPBC Act Referral is complete, current and correct. I understand that giving false or misleading information is a serious offence. I declare that I am not taking the action on behalf or for the benefit of any other person or entity. *

I would like to receive notifications and track the referral progress through the EPBC portal. *

Completed Proposed designated proponent's declaration

The Proposed designated proponent is the individual or organisation proposed to be responsible for meeting the requirements of the EPBC Act during the assessment process, if the Minister decides that this project is a controlled action.

Same as Person proposing to take the action information.

Check this box to indicate you have read the referral form. *

I would like to receive notifications and track the referral progress through the EPBC portal. *

I, **Nirvana Searle of QUEENSLAND HYDRO PTY LTD**, the Proposed designated proponent, consent to the designation of myself as the Proposed designated proponent for the purposes of the action described in this EPBC Act Referral. *

I would like to receive notifications and track the referral progress through the EPBC portal. *