Big G Pumped Hydropower Energy Storage

Application Number: **02456** Commencement Date: **13/06/2024** Status: **Locked**

1. About the project

1.1 Project details

1.1.1 Project title *

Big G Pumped Hydropower Energy Storage

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 *

15/09/2026

1.1.4 Estimated end date *

01/12/2080

1.2 Proposed Action details

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

The proposed action (**the Project**) is a closed-loop pumped hydropower energy storage scheme (hereafter referred to as '**Big-G PHES**') with a planned generating capacity of up to 800 megawatts (MW) and the ability to provide up to 12 hours of continuous energy generation.

The Big-G PHES has been designed on a modular basis with the ability to operate as a single 800 MW PHES or two 400 MW PHES projects with separate upper reservoirs and a single shared lower reservoir. It is located at Mount Alma on the Calliope Range, approximately 35 km northwest of Biloela and approximately 75 km from Gladstone, Queensland. The Project footprint straddles two local governments areas of Banana Shire Council (**BSC**) and Gladstone Regional Council (**GRC**). Principal road access to the Project site is via the Dawson Highway approximately 6 km to the north.

Water will be recirculated within the PHES between the upper and lower reservoirs via a new underground power station and associated infrastructure. Energy is generated when water is released from the upper reservoir. Electricity from the Project will be drawn from and supplied to the NEM via a new privately owned transmission line. Ongoing discussions with Powerlink have identified two possible options, which require further investigation. As such, both options are included in the proposed action for assessment. BE Power is also investigating including a Battery Energy Storage System ('**BESS**') on the site, likely 400MW for up to 4 hours.

The **Project area** or **area of the proposed action** is 859 ha, and spans over five properties: Voewood, Bell Creek, Rockfield, Wyalla, and Bocoolima. The Project is summarised below and is based on the current concept design:

- **Reservoir areas**, which include:
    - A bifurcated upper reservoir, formed by two valley dams (with lengths of ~270m and 340m, and heights of 54m and 78m respectively) and four saddle dams (totalling ~1200m long and of varying heights from 12-40m). This will provide total storage volume of 22.4 Mm3 and a live volume of approximately 14.5 Mm3 over an area of 121 ha;
    - A lower reservoir, formed by a single turkey's nest type embankment dam with a 4,200 m long crest and a maximum height of 40 m, over an area of 81 ha, with a total storage of 15.5 Mm3 and a live volume of 14.3 Mm3;
- Intake structures:
    - Two upper intake structures at the upper reservoir with W/H = 21.2/19.2 m, and minimum operating level (MOL) at El +470.00;
    - Two lower intake structures at the lower reservoir with W/H = 21.2/19.2 m, and MOL at El +155.00.
- Underground structures and waterways including:
    - Two vertical shafts connecting the upper reservoirs to the headrace tunnels of ~291 m in height and an internal diameter of 6.8 m;
    - Two headrace tunnels ~305 m long and an internal diameter of 6.8 m;
    - Penstocks ~ 207m in length, with diameter decreasing as they approach the power station complex;
    - Two tailrace tunnels of ~1,090 m long and an internal diameter of 6.8 m;
    - Underground power station complex, ~ 24 m wide, 135m long and 50 m high for the powerhouse cavern and a separate transformer cavern ~ 15m wide, 120 m long and 17 m high to accommodate the four 3-phase unit transformers surge chamber off the tailrace tunnels;
    - The power station complex will consist of four 200 MW Francis pump-turbine-generating units and their auxiliaries configured into two units connected by one of the two vertical shafts, thereby delivering a modular power plant of two x 400 MW capacity;
    - Main access tunnel (MAT) ~ 820 m long and 8 m high;
    - Two adits branching off the MAT to provide access to the surge chamber (~ 380m long) and one to provide access to the headrace tunnels (~ 240m long);
    - Emergency egress, cable and ventilation tunnel (ECVT) ~ 780m long and 7m high.
- **Supporting infrastructure**, which includes:
    - Surface switchyard:
    - Positioned between the ECVT and the lower reservoir, at a close distance to the portal. It has approximate size of 350 m in length and 200 m wide.

- Transmission Lines: Powerlink (the relevant transmission utility) has confirmed that there are two viable overhead grid connection options for the Project:
- Option 1 – tee-in to existing 275 kV 'northern transmission line' that is west of the Project area: ~ 6.8 km long, from the reservoir and associated electrical infrastructure, to the switching station (located on the Voewood property beside the Dawson Highway), contained within a 60 m wide easement;
- Option 2 – 'eastern transmission line' utilising an existing but unused 132 kV transmission line to the east of the Project area: ~ 6.1 km long, from the reservoir and associated electrical infrastructure, to a tee-in location (yet to be confirmed), contained within a 60 m easement.
- BE Power is yet to determine whether the grid connection to the existing Powerlink transmission infrastructure is to be overhead power lines or underground lines. This will be determined as the Project grid connection design advances and community feedback is received.
- Water supply is proposed to be accessed from the Sunwater Awoonga-Callide Water Supply Scheme Pipeline (**ACP**) connecting to the Awoonga Reservoir 15 km from the Project site; to access the water, the below is proposed:
- Surface water (and / or underground) pipeline of ~ 450-500 mm high-density polyethylene, totalling ~ 14 km, contained within the 60m easement of the Option 2 transmission line for the first 6km, and then in a 15m wide easement for ~ 7.6km and the final 0.6km in a GRC road reserve (unmade) for the remaining distance to the existing pipeline located in the Galloway Plains Road reserve.
- The Project has completed a 'Water Supply Inquiry and Application' to the Gladstone Area Water Board (**GAWB**) to access sufficient 'Initial-fill' and 'Ongoing-fill' water requirements for the Project. GAWB is the owner and operator of the Awoonga Reservoir.
- The Project (via Sunwater, owner and operator of the ACP) has completed a Water Transport Options Study to assess the viability of the ACP to facilitate the Project's water transportation requirements.
- Access Roads
- Upper access track of ~ 14.8 km, commencing at Dawson Highway and following the existing farm track (Thompsons Road) for 4 km before veering northward (partly referred to as Ogdens Road) for 2.2 km, and then east-southeasterly for the remaining 8.6 km to the upper reservoir;
- New lower access track of ~ 6 km through the Voewood property, commencing at Dawson Highway and traversing south to meet the lower reservoir;
- Construction camps and laydown areas
- Earthworks require borrow areas, spoil disposal areas, and temporary materials processing (aggregate crusher and concrete batching plant) and other construction-related laydown areas.
- Temporary construction areas, including stockpile and laydown areas, construction camps and site office, construction accommodation, utilities, and car parking.

- BESS located near the switchyard, on the same land used for laydown areas and construction camps. A preliminary layout is currently being developed, but the BESS would be expected to occupy around 5 ha.

The **impact area** refers to those areas with an aboveground disturbance, which are those infrastructure listed above except for the underground structures. The impact area is estimated to cover an area of 506.5 ha within the 859 ha Project area. It should be noted that the 506.5 ha contains both transmission line options, therefore the final impact area will be less than 506.5 ha.

Construction is expected to take up to six years including rehabilitation work, with up to 1,000 workers during the peak construction period. Construction activities include site establishment and preliminary works, import of turbines, transformers and other electrical infrastructure, as well as excavation of underground works. The construction of the two reservoirs forms the majority of the aboveground construction activities. Shafts will be excavated using raise boring method, while tunnels are proposed to be excavated using conventional drill and blast methods and lined with concrete or steel, with spoil reused on

site where possible (for example, for tunnel portals, reservoir construction, road base and shotcrete). Some explosives may also be required during tunnel excavation, for stripping the dam's foundation, and quarrying aggregate for concrete and road paving.

The proposed action traverses 11 freehold parcels:

- 24/RN1599 – upper reservoir, access track to upper reservoir
- 349/FTY1050 – upper reservoir, access track to upper reservoir
- 5/RN1643 (Bell Creek) – upper reservoir, access track to upper reservoir
- 2/CTN1121 (Voewood) – lower reservoir, water conveyance (underground), temporary disturbance areas, access track to lower reservoir, northern transmission line corridor (part)
- 24/CL40287 (Voewood) – temporary disturbance areas, access track to lower reservoir, western transmission line corridor (part)
- 3/SP272391 – access track to lower reservoir, northern transmission line corridor, substation
- 3/CL40296 – eastern transmission line corridor, water pipeline
- 1/CL40361 – eastern transmission line corridor, water pipeline
- 31/SP291302 – eastern transmission line corridor, water pipeline
- 32/CTN1989 – water pipeline
- 3/CTN2088 – water pipeline.

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

No

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

The proposed action will be subject to a range of statutory approvals involving a number of Commonwealth and State departments. For assessment of matters of national environmental significance, we request the assessment to be undertaken via the bilateral assessment pathway.

The proposed action is being considered for declaration as a 'coordinated Project' under Queensland's *State Development and Public Works Organisation Act 1971* and, if declared, will be subject to assessment by the Coordinator-General.

Approval under a number of other legislation may be required, including but may not be limited to the below Commonwealth and Queensland state legislation:

- Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
- *Planning Act 2016* and *Planning Regulation 2017*
- *Vegetation Management Act 1999*
- *Water Act 2000*
- *Water Supply (Safety and Reliability) Act 2008*
- *Aboriginal Cultural Heritage Act 2003*
- *Electricity Act 1994*
- *Environmental Offsets Act 2014*
- *Environmental Protection Act 1994*
- *Nature Conservation Act 1992, and*
- *Transport Infrastructure Act 1994.*

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. *

Consultation has involved local landholders, the two local Councils and State Government bodies.

- Local government areas of Banana Shire, and Gladstone Regional Councils in July 2023
- Sunwater in December 2022
- Gladstone Area Water Board from January 2023
- Powerlink from 2021
- Calliope Station in June 2024
- Galloway Plains Station in June 2024
- Gladstone Regional Council Economic Development in May 2024
- Gladstone Engineering Alliance

Whilst the discussions so far have been relatively high level, no significant concerns have yet been raised by these stakeholders.

An initial Cultural Heritage Due Diligence Assessment has been completed and identified two indigenous groups:

- Gaangalu Nation People are the Aboriginal cultural heritage party for the area encompassing the proposed Upper Reservoir; and
- Bailai, Gurang, Gooreng Gooreng, Taribelang Bunda People are the Aboriginal cultural heritage party for the area encompassing the proposed Lower Reservoir.

Further engagement with these two groups will be undertaken throughout and after the EIS process.

1.3.1 Identity: Referring party

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1.3.1.1 Is Referring party an organisation or business? *

Yes

Referring party organisation details

ABN/ACN	48072377158
Organisation name	HYDRO-ELECTRIC CORPORATION T/A ENTURA
Organisation address	4 Elizabeth Street, Hobart TAS 7000

Referring party details

Name	Bunfu Yu
Job title	Senior Environmental Planner
Phone	+61 3 6245 4500
Email	bunfu.yu@entura.com.au
Address	4 Elizabeth Street, Hobart TAS 7000

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? *

No

1.3.2.2 Is Person proposing to take the action an organisation or business? *

Yes

Person proposing to take the action organisation details

ABN/ACN	659173592
Organisation name	BEP BIG G PTY LTD
Organisation address	Level 2, Tavistock House, 383-387 Flinders Lane, Melbourne VIC 3000

Person proposing to take the action details

Name	Scott Walkem
Job title	Managing Director
Phone	0449056060
Email	scottw@bepower.com.au
Address	Level 2, Tavistock House, 383-387 Flinders Lane, Melbourne VIC 3000

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? *

Yes

1.3.2.16 Describe the nature of the trust arrangement in relation to the proposed action. *

Unit trust, with the sole beneficiary being a “holding trust” (BEP Big G Hold Co Pty Ltd as trustee for Big G Hold Unit Trust. Big G Hold Unit Trust is the vehicle through which BE Power and a number of external investors hold their interest in the Project.

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. *

Yes, the proponent has a satisfactory record of responsible environment management.

The proponent is committed to maintaining a strong environmental management track record in line with the construction and operation of the company's other projects within its development portfolio. Specific environmental management frameworks and policies have been developed for the Project and will be revised as further environmental commitments are established during the approvals process.

For the design and approvals of this project, the proponent has engaged a number of consultants, including lead consultants which are ISO 14001 accredited and therefore ensuring that the project is designed, including designing of management measures, to best practice standards.

The majority project owner, BE Power, will shortly be submitting an EIS for approval for another PHES project in Queensland – the Big T project at Lake Cressbrook. This will provide further evidence of our environmental management approach.

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

BE Power is committed to developing the Project to meet or exceed current best practice environmental management.
A comprehensive environmental management and monitoring program will be developed and implemented for the Project. Management and monitoring measures will be documented in a Construction Environmental Management Plan (CEMP) and an Operational Environmental Management Plan (OEMP) or equivalent. It is anticipated that both plans will contain a range of sub-plans addressing specific requirements.

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	659173592
Organisation name	BEP BIG G PTY LTD
Organisation address	Level 2, Tavistock House, 383-387 Flinders Lane, Melbourne VIC 3000

Proposed designated proponent details

Name	Scott Walkem
Job title	Managing Director
Phone	0449056060
Email	scottw@bepower.com.au
Address	Level 2, Tavistock House, 383-387 Flinders Lane, Melbourne VIC 3000

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	48072377158
Organisation name	HYDRO-ELECTRIC CORPORATION T/A ENTURA
Organisation address	4 Elizabeth Street, Hobart TAS 7000
Representative's name	Bunfu Yu
Representative's job title	Senior Environmental Planner
Phone	+61 3 6245 4500
Email	bunfu.yu@entura.com.au
Address	4 Elizabeth Street, Hobart TAS 7000

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.

ABN/ACN	659173592
Organisation name	BEP BIG G PTY LTD
Organisation address	Level 2, Tavistock House, 383-387 Flinders Lane, Melbourne VIC 3000
Representative's name	Scott Walkem
Representative's job title	Managing Director
Phone	0449056060
Email	scottw@bepower.com.au
Address	Level 2, Tavistock House, 383-387 Flinders Lane, Melbourne VIC 3000

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

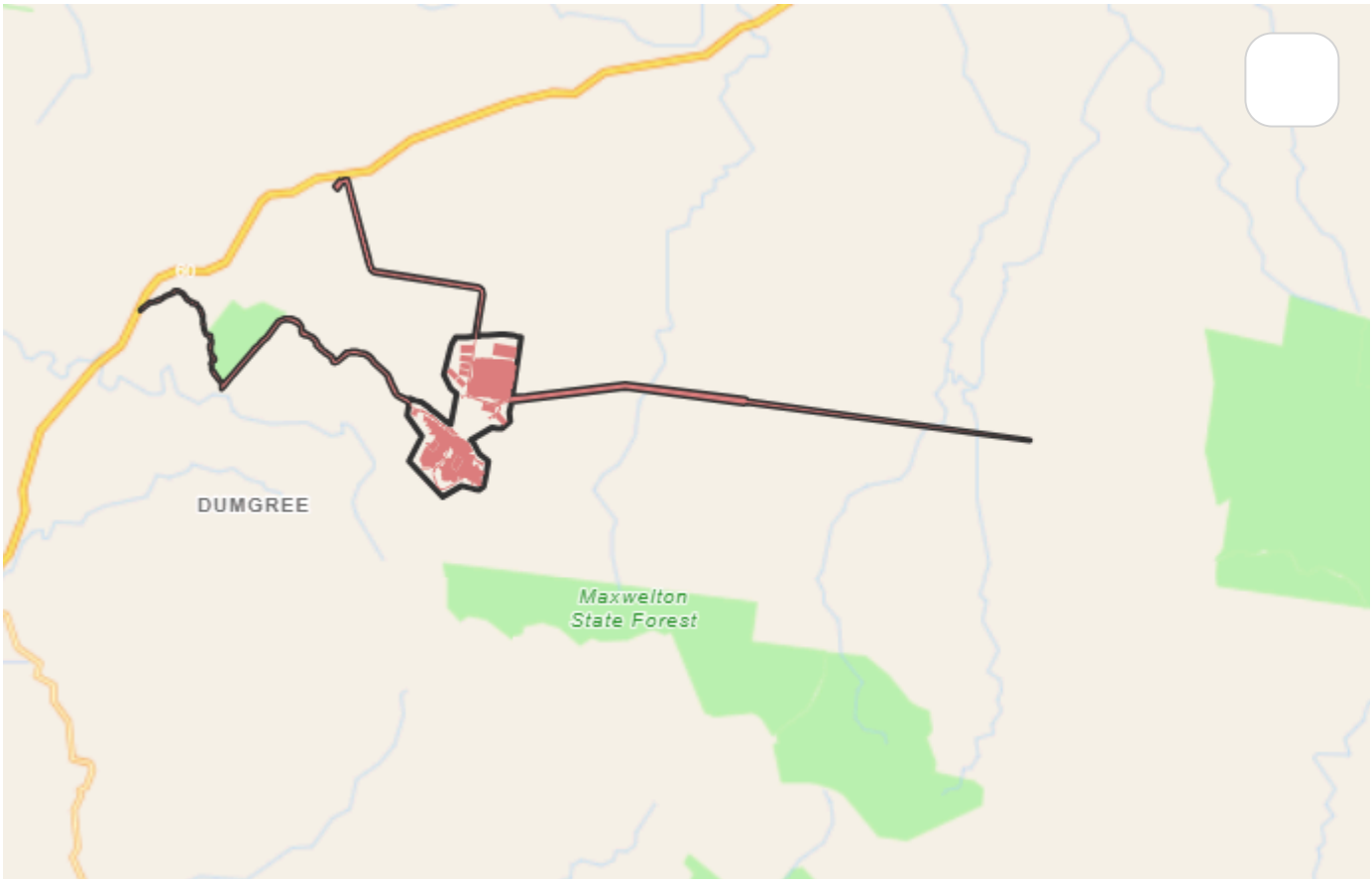
1.4 Payment details: Payment allocation

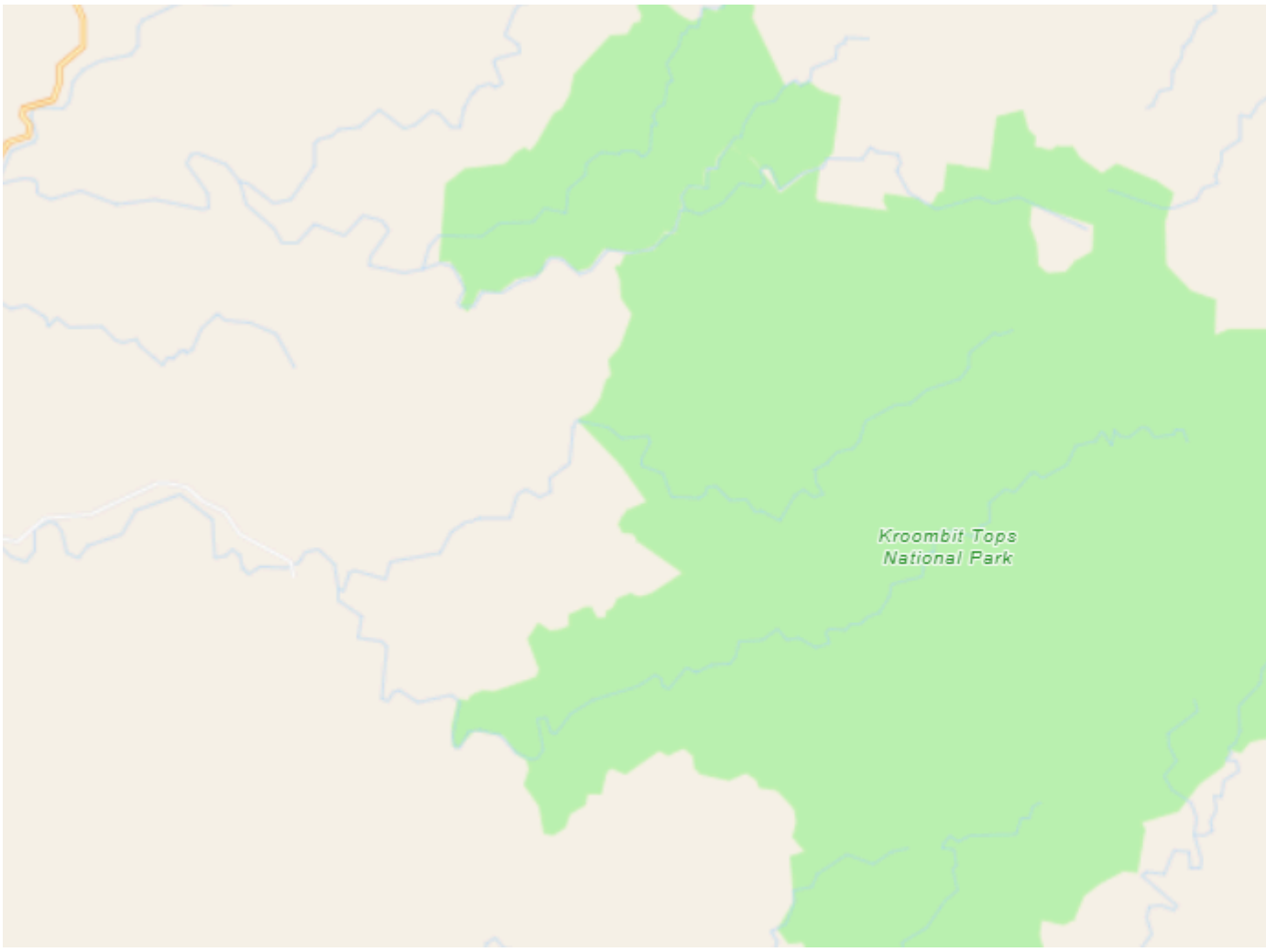
1.4.11 Who would you like to allocate as the entity responsible for payment? *

Person proposing to take the action

2. Location

2.1 Project footprint





Project area (860.68 Ha) Disturbance footprint (507.489 Ha)

Maptaskr © 2024 -24.246685, 150.876887

Powered By Esri - Sources: Esri, TomTom, Garmin, F…

2.2 Footprint details

2.2.1 What is the address of the proposed action? *

Dawson Highway, Biloela, Queensland

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 proposed action area is located across freehold land with the exception of a very small section of the upper access track with ‘State Forest’ tenure that is located within the Calliope Range State Forest.

3. Existing environment

3.1 Physical description

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

Much of the Project area was subject to a bushfire in mid-October 2023, three weeks prior to the spring flora surveys for the Project. Almost all parts of both reservoir areas, except for the moister, deeper gullies were burnt, with evidence of some areas experiencing particularly hot fires that reached the tree canopies. A description of the pre-fire and post-fire conditions is included in Attachment A – Big G Baseline Ecological Assessment – Section 4.5.1 – Pages 36-37.

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

The existing uses of the properties associated with the Project area and proposed action is farming and grazing. Specifically, both the Voewood and Bell Creek properties are established cattle grazing properties.

The proposed use of the Project area is for hydroelectricity and renewable energy. However, areas not used for the proposed use will remain as farming and grazing land.

The proposed Specimen Hill wind farm also traverses the ridges above the upper storage location.

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

There are no outstanding natural features or other important/unique features relevant to the Project area.

There are however natural features within close proximity to the Project area, including Maxwelton State Forest which lies approximately 1.7 km south of the Project area and Kroombit Tops National Park, which lies approximately 10-12 km south-east of the Project area, both of which are connected to the Project area through a mostly continuous tract of native vegetation.

The Upper Access Track runs alongside the Calliope Range State Forest. Connectivity to Protected Areas to the north-east (Don River State Forest) and east (Dan Dan State Forest) from the Project area is subject to greater fragmentation.

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 area of the proposed action is characterised by a mix of steep hills and lower lying, flatter areas.

The southern portion of the Reservoir area is characterised by steep hills and boulder strewn gullies. On the Voewood property, the lower lying, flatter areas lie at an elevation of approximately 160 – 190 metres Australian Height Datum (m AHD) and rise steeply to a continuous ridge at approximately 490 m AHD over an approximate 800 m run. Generally, the slopes on the Voewood property face a north-easterly aspect.

On the property hosting the upper reservoir, the topography is hillier, with several peaks connected by saddles and separated by steep gullies. The gullies, which represent the lowest elevation, lie at approximately 427 – 450 m AHD and rise to peaks of 500 – 560 m AHD. Rises on the Bell Creek property are steep, particularly in the south-west where slopes reach more than 30%.

The Lower Access Track, Transmission Lines and Water Pipeline have generally been positioned in lower-lying areas situated at an elevation between 100 – 160 m AHD. The Upper Access Track lies at a higher elevation, traversing the landscape at an elevation between 340 – 520 m AHD.

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.

Flora and fauna surveys for the Project were completed in spring and autumn 2023 and 2024. The below sections summarise the flora and fauna characteristics of the Project area.

Flora

A total of 204 Least Concern and Special Least Concern flora species, from 49 plant families, were recorded during the 2023 and 2024 surveys. A total of 60 Endangered, Vulnerable or Near Threatened (EVNT) flora species were identified from desktop searches, 21 of which were initially considered to have potential to occur in the Project area based on habitat suitability and species records in proximity to the Project area. No EVNT flora species, other than cycads, *Cycas megacarpa* (Endangered under the EPBC Act and *Nature Conservation Act 1992* [NC Act]), were recorded from the Project area.

The Project area is estimated to support approximately 41,288 *C. megacarpa* based on average density estimates for various Regional Ecosystem (RE) polygons recorded during the field surveys. A total of 468 ha of potential habitat is mapped for this species in the Project area. Of this, up to 223 ha, supporting 9,530 individuals will be required to be removed or translocated.

Based on flora surveys and field-verified vegetation mapping, one remaining EVNT flora species remains potentially likely to occur within the Project area, being the *Thismia rodwayi* (listed as Near Threatened under the NC Act). It is a small, inconspicuous herb to 5 cm, and remains hard to detect even when in flower.

A High Risk Area (HRA) for Protected Plants is mapped for the Project area. Formal protected plant surveys have not yet been undertaken, but would form part of subsequent surveys in later stages of the Project when feasibility has been confirmed.

Further details of the flora species within the Project area is included in Attachment A – Big G Baseline Ecological Assessment – Section 5.8 – Pages 137-142.

Fauna

A total of 139 terrestrial fauna species were recorded from the Project area during 2023 and 2024 surveys. This includes 74 birds, 39 mammals, 6 amphibians and 20 reptiles. A total of 65 EVNT fauna species were identified from desktop searches, of which 28 were initially considered to have potential to occur in the Project area based on desktop assessment of habitat suitability and species records in proximity to the Project area.

Based on desktop assessment, 2023 fauna surveys and 2024 fauna habitat assessments, eight of these 28 species are either known or considered likely to occur within the Project area (six of which are listed under the EPBC Act), including:

- koala (*Phascolarctos cinereus*) – Endangered (EPBC Act and NC Act);
- greater glider (*Petauroides volans*) – Endangered (EPBC Act and NC Act);
- northern quoll (*Dasyurus hallucatus*) – Endangered (EPBC Act);
- yellow-bellied glider – south-eastern subspecies (*Petaurus australis australis*) – Vulnerable (EPBC Act and NC Act);
- squatter pigeon – southern subspecies (*Geophaps scripta scripta*) – Vulnerable (EPBC Act and NC Act);
- white-throated needletail (*Hirundapus caudacutus*) – Vulnerable (EPBC Act and NC Act)
- glossy black-cockatoo – northern subspecies (*Calyptorhynchus lathami erebus*) – Vulnerable (NC Act); and
- powerful owl (*Ninox strenua*) – Vulnerable (NC Act).

Four of the above six EPBC-Act listed species are expected to be significantly impacted by the Project, being the koala, greater glider, northern quoll, and the yellow-bellied glider.

The migratory rufous fantail (*Rhipidura rufifrons*) was recorded during the spring 2023 survey. The migratory white-throated needletail, which is also listed as Vulnerable under the EPBC Act and NC Act, was recorded in airspace above the Project area during surveys completed for the Specimen Hill Wind Farm (EMM 2020). There is potential for a further 18 migratory species listed under the EPBC Act to utilise the Project area on occasion.

Further details of the fauna species within the Project area is included in Attachment A – Big G Baseline Ecological Assessment – Section 5.9 – Pages 143-173.

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

Field surveys and aerial imagery of the Project area have been used to characterise the vegetation communities present. Field verification identified 501.6 ha of remnant vegetation, and 131.4 ha of regrowth/high value regrowth vegetation (including 2.0 ha of vegetation that is native plantation). Of this, there is 0.04 ha of remnant Endangered Regional Ecosystem (RE) and 15.8 ha of remnant Of Concern RE. The remaining 226.1 ha of the Project area has been cleared and comprises of agricultural grassland and unsealed tracks.

Vegetation within the Project area, particularly the reservoir area which will include the largest clearing, forms part of the large, somewhat continuous tract of vegetation spanning the Calliope Range. Most of the vegetation in the Project area comprises spotted gum (*Blakella citriodora*) grassy woodland, representing RE 11.12.6. This community is also mapped along the Upper Access Track and in the Northern Transmission Line and amounts to approximately 39% of the vegetation in the Project area. RE 11.12.3 (mixed eucalypt woodland community) occurs throughout the Project area, constituting approximately 34% of the vegetation, while RE 11.12.2 (a silver-leaved ironbark [*E. melanophloia*] dominated community) and RE 11.12.1 (narrow-leaved ironbark [*Eucalyptus crebra*] community) contribute about 15% and 6% respectively. Other vegetation communities field-verified within the Project area (contributing a combined 6% to the vegetation of the Project area) include:

- narrow patches of silver-leaved ironbark with an understorey of semi-evergreen vine thicket species, recorded from the boulder-strewn gullies on lower reservoir property, most closely representing RE 11.12.7;
- riparian/floodplain communities characterised by Queensland blue gum (*E. tereticornis*, RE 11.3.25), Moreton Bay ash (C*. tessellaris*, RE 11.3.4), poplar box (*E. populnea*, RE 11.3.2), silver-leaved ironbark (RE 11.3.6) or grey box (E*. moluccana*, RE 11.3.26), located mostly along the waterways intersected by the Eastern Transmission Line and Water Pipeline;
- narrow-leaved ironbark and red bloodwood (*Corymbia erythrophloria*) (RE 11.11.15), silver-leaved ironbark (RE 11.11.10) or poplar box (*E. populnea*) (RE 11.11.9) dominated communities on undulating rises and low hills, intersected by the Eastern Transmission Line; and
- a small portion of a brigalow (*Acacia harpophylla*) dominated community (RE 11.11.14) extending into the Water Pipeline (0.04 ha).

Although small, isolated and subject to disturbance by cattle, the brigalow-dominated community (RE 11.11.14) meets the size threshold and condition criteria of the Brigalow (*Acacia harpophylla*) dominant and co-dominant Threatened Ecological Community (TEC), listed as Endangered under the EPBC Act.

Specifically, most of the vegetation on the hilly rises and slopes of the upper reservoir property within the reservoir area is dominated by spotted gum with an understorey of black-spear grass. The vegetation is in good to average condition, with reduced condition due to lantana infested gillies and prevalence of praxelis in the groundcover. In the lower areas of the Bell Creek property, spotted gum grades into Queensland blue gum, often with narrow-leaved ironbark, pink bloodwood, Moreton Bay ash and rough-barked apple. This vegetation community also occurs on the flatter parts of the lower reservoir property to the north, but is in poorer condition due to disturbance.

Narrow-leaved ironbark and red bloodwood woodland to forest occurs close to the top of the ridge, near the property divide of the upper and lower reservoirs, and the understorey includes cycads. The vegetation community is sparse and generally lacks very large trees.

The slopes of the lower reservoir property are dominated by silver-leaved ironbark with a groundcover of black-spear grass. The vegetation is in generally good to average condition, with few large trees and a low occurrence of weeds, except in gullies where there is infestation by lantana (*Lantana camara*). In some of the boulder-strewn gullies in the upper slopes of the lower reservoir property, the grassy understorey is replaced by a mix of vine thicket species. The patches were mostly narrow and too small to map out, except in one location where the extent of vine thicket was sufficient size and diversity to be mapped as a separate community. It was surrounded by silver-leaved ironbark.

Further details of the vegetation characteristics of the Project area is included in Attachment A – Big G Baseline Ecological Assessment – Section 5-2-5.4 – Pages 98-117.

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.

There are no Commonwealth heritage values that apply to the project area.

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

A desktop cultural heritage due diligence assessment was undertaken, and confirmed that no previously recorded Aboriginal cultural heritage sites or registered places intersects with the area of the proposed action.

Two different Aboriginal cultural heritage parties are relevant for the proposed action; the Gaangalu Nation People encompass the upper reservoir, and the Bailai, Gurang, Gooreng Gooreng, Taribelang Bunda People for the lower reservoir.

There is limited significant ground and surface disturbance, owing to vegetation clearance, and access road and fence construction. The proximity to significant landscape features such as rocky outcrops, remnant vegetation and waterways, indicates some residual intangible cultural heritage may still exist within the area of the proposed action.

A full heritage assessment as well as the preparation of a cultural heritage management plan will be prepared as part of the environmental approvals.

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 proposed action is located within the Fitzroy Natural Resource Management region in the upper reaches of the Calliope and Fitzroy River catchments. The upper reservoirs are located on the boundary of the Fitzroy River and Calliope Catchments whilst the lower reservoir is located wholly within the Calliope Catchment.

Both the upper and lower reservoirs are formed by off stream dams. Water for the initial fill of the reservoirs and to replace water lost through evaporation will be sourced from a bulk water supply agreement with Gladstone Area Water Board for the initial fill. This water will be sourced from the 26,000 ML of unutilised GAWB allocation from Awoonga Dam. A water transport agreement with Sunwater allows access to the Awoonga-Callide Pipeline. The initial fill volume is approximated at 28,000 ML and will occur over three years. The estimated annual operational loss from evaporation and seepage is 2,450 ML.

The establishment of the upper reservoirs is estimated to result in a reduction of approximately 0.0015% of the current catchment area of the existing Fitzroy River catchment (reservoir catchment area, including reservoir surface, of 2.1km2 of total Fitzroy River catchment area of 140 656 km2). The establishment of the lower reservoir is estimated to result in a reduction in catchment area of 0.12% of the existing Calliope River catchment (2.3 km2 reservoir catchment area, including reservoir surface, of total Calliope River catchment area of 1,950 km 2).

No substantial waterways are located within either the upper or lower reservoir areas and none will be impacted by associated infrastructure. Drainage of the site that is located within the Fitzroy River Catchment is via the upper reaches of Bell Creek, Callide Creek, the Don River, the Dawson River and finally the Fitzroy River. Drainage of the site that is located within the Calliope River Catchment is via the upper reaches of Lost Spring, Maxwelton, Toms, Oaky, Jack and Doubtful creeks (and their tributaries), which ultimately meet the Calliope River.

Groundwater

A groundwater data review and gap analysis was undertaken by AGE Consultants. The dominant rock type in the area of the proposed action is the Late Permian to Early Triassic Bocoolima Granodiorite (PRgab), a deeply weathered, grey medium-grained biotite-hornblend granodiorite. These geological units can be grouped into two ‘hydrostratigraphic units’ based on their ability to store and transmit groundwater; these are quaternary sediments and bocoolima granodiorite.

The quaternary colluvium/alluvium forms a porous aquifer system of varying permeability depending on the depositional environment. The lower reservoir is underlain by quaternary colluvium, however the extend and thickness are unknown as no registered bores appear to be screened in the quaternary sediments.

The bocoolima granodiorite can be divided into the weathered zone, which generally has enhanced permeability compared to underlying unweathered bedrock, and the fresh zone, where the water bearing resides in the fractured system, and groundwater occurrence will be controlled by fracture location and

density and therefore is likely to be highly variable in fresh bedrock zones.

Based on the available regolith information, granodiorite in the highly weathered zone may be less than 5 m in the upper reservoir area and may increase to 10 m in the lower reservoir area. Site observations as part of the concept design development noted that the weathered granodiorite is composed of coarse sands.

The ephemeral creeks in the upper reservoir area follows a square grid pattern, likely related to joints in the fresh granodiorite. It is likely that the main storage of water will be long those joints and follows the same flow patterns of northwest-southeast, and northeast-southwest.

Within the area of the proposed action, significant groundwater in the granodiorite is likely to be limited to the weathered zone and areas where secondary porosity and permeability has developed. However, there are no registered bores to confirm the geology and weathering depth at the proposed reservoir locations. Subsequently, regional groundwater level contours in the bocoolima granodiorite were estimated based on the static water level records from the registered bores. Based on the topography of the Calliope Range, it is suspected that groundwater flow direction may follow the surface water catchment, and therefore groundwater beneath the upper reservoir may flow to the northwest and groundwater beneath the lower reservoir may flow to the northwest, and/or groundwater may flow from upper reservoir to the lower reservoir following the range slope. Further studies will be undertaken during the EIS process to confirm the flow direction.

Based on available geology and hydrogeological data, AGE Consultants developed a conceptual hydrogeological model to inform design of a groundwater monitoring program which will be implemented in parallel with the geotechnical study (Refer Attachment C – Big G Groundwater data review and gap analysis – Section 8 – Pages 31 to 33). This shows that groundwater within the quaternary colluvium is held predominantly in the pore space as storage, resulting from infiltration of rainwater from the surface. Groundwater in the weathered granodiorite forms preferential flow paths for the rainfall infiltration or seepage via interconnective flow from the colluvium units. The upper reservoirs are located within two symmetrical valleys following joints, and as such the preferential recharge will likely occur through the joints in the valley bed. The groundwater in granodiorite beneath the lower reservoir is likely shallow.

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	No	Yes
S18	Threatened Species and Ecological Communities	Yes	Yes

EPBC Act section	Controlling provision	Impacted	Reviewed
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. *

There are no World Heritage Areas within, or in close proximity to, the Project.

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. *

There are no national heritage areas within, or in close proximity to, the Project.

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.

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

No

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

There are no Ramsar wetlands within, or in close proximity to, the Project.

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	Common name
No	No	Arthraxon hispidus	Hairy-joint Grass
No	No	Bosistoa transversa	Three-leaved Bosistoa, Yellow Satinheart
No	No	Bulbophyllum globuliforme	Miniature Moss-orchid, Hoop Pine Orchid
No	No	Cadellia pentastylis	Ooline
No	No	Calidris acuminata	Sharp-tailed Sandpiper
No	No	Calidris ferruginea	Curlew Sandpiper
No	No	Chalinolobus dwyeri	Large-eared Pied Bat, Large Pied Bat
No	No	Cossinia australiana	Cossinia
No	No	Cupaniopsis shirleyana	Wedge-leaf Tuckeroo
Yes	No	Cycas megacarpa	
Yes	No	Dasyurus hallucatus	Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji

Direct impact	Indirect impact	Species	Common name
			[Martu]
No	No	Delma torquata	Adorned Delma, Collared Delma
No	No	Denisonia maculata	Ornamental Snake
No	No	Dichanthium setosum	bluegrass
No	No	Egernia rugosa	Yakka Skink
No	No	Elseya albagula	Southern Snapping Turtle, White-throated Snapping Turtle
No	No	Erythrotriorchis radiatus	Red Goshawk
No	No	Eucalyptus raveretiana	Black Ironbox
No	No	Falco hypoleucos	Grey Falcon
No	No	Furina dunmalli	Dunmall's Snake
No	No	Gallinago hardwickii	Latham's Snipe, Japanese Snipe
Yes	No	Geophaps scripta scripta	Squatter Pigeon (southern)
No	No	Grantiella picta	Painted Honeyeater
No	No	Hemiaspis damelii	Grey Snake
No	No	Hipposideros semoni	Semon's Leaf-nosed Bat, Greater Wart-nosed Horseshoe-bat
Yes	No	Hirundapus caudacutus	White-throated Needletail
No	No	Leuzea australis	Austral Cornflower, Native Thistle
No	No	Macroderma gigas	Ghost Bat
No	No	Neochmia ruficauda ruficauda	Star Finch (eastern), Star Finch (southern)
No	No	Numenius madagascariensis	Eastern Curlew, Far Eastern Curlew
No	No	Nyctophilus corbeni	Corben's Long-eared Bat, South-eastern Long-eared Bat
Yes	No	Petauroides volans	Greater Glider (southern and central)
Yes	No	Petaurus australis australis	Yellow-bellied Glider (south-eastern)
Yes	No	Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)	Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory)

Direct impact	Indirect impact	Species	Common name
No	No	Poephila cincta cincta	Southern Black-throated Finch
No	No	Polianthion minutiflorum	
No	No	Pteropus poliocephalus	Grey-headed Flying-fox
No	No	Rhaponticum australe	Austral Cornflower, Native Thistle
No	No	Rheodytes leukops	Fitzroy River Turtle, Fitzroy Tortoise, Fitzroy Turtle, White-eyed River Diver
No	No	Rostratula australis	Australian Painted Snipe
No	No	Samadera bidwillii	Quassia
No	No	Stagonopleura guttata	Diamond Firetail
No	No	Turnix melanogaster	Black-breasted Button-quail

Ecological communities

Direct impact	Indirect impact	Ecological community
No	No	Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions
No	No	Poplar Box Grassy Woodland on Alluvial Plains
No	No	Weeping Myall Woodlands

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 impact area of the proposed action is up to 506.5 ha, and protected matters will be directly impacted through the removal of habitat. The following matters (species) is likely to be directly impacted.

- ***C. megacarpa (Cycas megacarpa)* –** There is approximately 468 ha of potential habitat for the C. megacarpa within the Project area. Of this, 223 ha, supporting an estimated 9,530 individuals will be directly impacted by clearing for the above ground infrastructure as part of the Project.
- **Northern quoll *(Dasyurus hallucatus)* –** The proposed action will have a direct impact on 264 ha of northern quoll habitat; of this, 140 ha could be considered to be habitat critical to the survival of the local population of northern quoll.

- **Yellow-bellied glider *(Petaurus australis australis)* –** The proposed action is likely to have a direct impact on the yellow-bellied glider through the removal of approximately 230 ha of potential habitat within the impact area (162 ha of denning and/or foraging habitat, and 68 ha of foraging and/or dispersal habitat). This is in large due to the construction of the upper access track around the Calliope Range State Forest.
- **Greater glider *(Ptauroides volans)* –** The proposed action is likely to have a direct impact on 341 ha of denning, foraging and/or dispersal habitat for the greater glider.
- **Koala *(Phascolarctos cinereus)* –** The proposed action is likely to have a direct impact on 345 ha of potential woodland habitat for the koala.
- **Squatter pigeon *(Geophaps scripta scripta)* –** The proposed action is likely to have a direct impact on 17 ha of potential breeding and foraging habitat, mostly along the eastern transmission line and water pipeline where much of the vegetation has been subject to past clearing, disturbance and fragmentation.
- **White-throated needletail (*Hirundapus caudacutus*)** – As an aerial insectivore, this species spends most of its time aloft and could occur anywhere within the area of the proposed action. All remnant and regrowth vegetation within the impact area is considered as potential habitat for this species, totalling 341 ha, however there is limited potential the species could roost in an areas of woodland across project area.

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 area of the proposed action, or have a potential likelihood of occurrence.

A summary of the species likely to be significant impacted are summarised below.

Cycas megacarpa

The Project will remove 223 ha of habitat critical to the survival of the cycads and require the removal and/or translocation of an estimated 9,530 individuals. Despite the proposed action intending to secure a suitable recipient offset site, undertaking translocation of impacted individuals and propagating from collected seed, the residual impact to this species is considered significant.

There are several Projects in the vicinity of the Project area that will or already have resulted in direct impacts to the local cycad population. Projects include Specimen Hill Wind Farm (EPBC 2020/8864, yet to be constructed), Callide Wind Farm (EPBC 2021/9057, yet to be constructed), the Santos GLNG (constructed, EPBC 2012/6615), Australia Pacific LNG (constructed, and under various EPBC references) and Surat Gladstone Pipeline (constructed, EPBC 2009/5029).

Northern quoll (*Dasyurus hallucatus*)

The northern quoll occurs in a variety of habitats across their range. Habitat critical to their survival include rocky areas and offshore islands. Suitable habitat for the species occurs throughout much of the reservoir area which has the greatest surface disturbance. Rocky outcrops, boulders, saves and rocky crevices were observed on both properties that are proposed for reservoir construction, but tended to occur more substantially in gullies and higher up in the slopes. These areas are particularly important to the local northern quoll population by providing critical sheltering resources.

The Project is also likely to displace individuals into other rocky habitats extending to the northwest and south. Camera trapping undertaken as part of targeted surveys for this species suggest that the local population of northern quoll may be of low density. Thorough surveys undertaken as part of this proposed action suggest revisitation of the same quoll, while the northern quoll was not detected during surveys for the neighbouring Specimen Hill wind farm. Notwithstanding the low encounter of quoll individuals, the removal of 264 ha of northern quoll habitat is likely to have a significant impact on the northern quoll, including a reduction of habitat available for the local population to occupy. Of the 264 ha that is likely to be removed, 140 ha is considered to be habitat that is likely to be critical to the survival of the local population.

Yellow-bellied glider (*Petaurus australis australis*)

The yellow-bellied glider (south-eastern subspecies) occurs in eucalypt-dominated woodlands and forests. Feeding marks of the yellow-bellied glider were detected during field surveys of the Upper Access Track (and also recorded during surveys of the Specimen Hill wind farm) on the margins of the Calliope Range State Forest, which runs alongside the Upper Access Track.

The Project would remove approximately 230 ha of potential yellow-bellied glider habitat (162 ha of denning and/or foraging habitat, and 68 ha of foraging and/or dispersal habitat). This habitat forms a small part of the contiguous tract of vegetation providing connectivity across the landscape. The clearing of this habitat may remove large trees with hollows and foraging resources used by the local population, although its use appears to be low.

Greater glider (*Petauroides volans*)

The area of the proposed action contains approximately 341 ha of denning, foraging and/or dispersal habitat for the greater glider. This habitat forms a small part of the contiguous tract of vegetation considered critical to the survival of the local population. The clearing of this habitat will remove large trees that may contain hollows, and reduce the availability of foraging resources for this species.

Greater glider scats were identified under a large hollow-bearing Queensland blue gum on the Bell Creek property, and individuals were also sighted during spotlighting surveys in the vicinity of Bell Creek.

The proposed action may also adversely affect species movements due to the construction of the Upper Access Track around Calliope Range State Forest, due to the volume of disturbance within habitat critical for the survival of the species. The cumulative impacts from this proposed action, as well as two nearby actions (Specimen Hill and Callide wind farms) will remove a combined 510.7 ha of species habitat and construct a network of access tracks as well as other infrastructure, which may reduce the availability and quality of the habitat used by the population.

Koala (*Phascolarctos cinereus*)

The koala occurs in forests or woodlands, especially with a higher proportion of feed tree species, and may include remnant or non-remnant vegetation. Locally important koala tree species include the Queensland blue gum, narrow-leaved ironbark, and silver-leaved ironbark, and occur over the area of the proposed action. The proposed action is likely to remove 345 ha of potential koala habitat; this habitat forms a small part of the contiguous tract of vegetation connecting the Project area to the protected areas to the northwest and southeast.

Despite the Project area providing suitable habitat for the koala, its utilisation of the area appears to be low. Evidence of koala utilisation, in the form of scratches, was recorded on a large Queensland blue gum on the Bell Creek property. All areas of remnant, regrowth and suspected regrowth eucalypt habitat has been identified as koala habitat.

When considering the cumulative impact for this species from nearby proposed Projects, the quantity of koala habitat required to be cleared is high and spatially extensive (estimated at 3,872 ha), and may contribute to a decrease in population.

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. *

The proposed action has been considered against the *EPBC Act Significant Impact Guidelines*, recovery plans and conservation advice where available. Based on the assessment, it is considered that there is a likely significant impact four fauna species due to removal of habitat, and one flora species, also impacted by the clearance associated with the proposed action.

The proponent therefore considers that it is likely the Commonwealth Minister for the Environment will determine the Project as a controlled action for provisions listed under sections 18 and 18A of the Act. It is likely that the proposed further assessment will be undertaken as a bilateral assessment through the preparation of an environmental impact statement.

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. *

The Project has considered various avenues of avoidance and mitigation through design. Specifically, the Project has sought to:

- Avoid and minimise surface disturbance in areas of rocky outcrops and slopes which is suitable quoll habitat, by undergrounding of the water conveyance infrastructure.
- Avoid and minimise surface disturbance on the northern slopes of the Voewood property which contain areas of higher densities of *C. megacarpa*, by undergrounding the water conveyance infrastructure. Underground infrastructure avoids approximately 6.9 ha of potential habitat that supports an estimated 2,419 cycad individuals.
- Avoid additional clearance for access tracks in the Voewood property by using existing approved access track corridors to minimise impact on the koala, yellow-bellied glider, and greater glider. The Upper Access Track is shared with Specimen Hill wind farm, an approved Project.

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

A specific cycad management plan will be prepared as part of the Project. The proposed action will require the removal or translocation of up to 9,530 cycad individuals. Translocation and propagation of *C. megacarpa* has been required for several projects in the vicinity of the proposed action to mitigate impacts to this species.

Translocation monitoring programs suggest a high success rate of 80 % or more. Assuming an 80 % success rate, to offset the impacts arising from the proposed action and ensure the size of the population does not decrease over the long term, a minimum of 10,755 cycad individuals will need to be translocated

and/or propagated. Genetic studies indicate that the recipient sites should be within 36 km of the proposed action and within surrounding populations, that is, Calliope Range, Callide Range, and Kroombit populations.

Suitable offset habitat for the northern quoll habitat, yellow-bellied glider, greater glider and the koala will be identified as part of studies undertaken during the EIS process.

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	Common name
No	No	Actitis hypoleucos	Common Sandpiper
Yes	No	Apus pacificus	Fork-tailed Swift
No	No	Calidris acuminata	Sharp-tailed Sandpiper
No	No	Calidris ferruginea	Curlew Sandpiper
No	No	Calidris melanotos	Pectoral Sandpiper
No	No	Crocodylus porosus	Salt-water Crocodile, Estuarine Crocodile
Yes	No	Cuculus optatus	Oriental Cuckoo, Horsfield's Cuckoo
No	No	Gallinago hardwickii	Latham's Snipe, Japanese Snipe
Yes	No	Hirundapus caudacutus	White-throated Needletail
Yes	No	Monarcha melanopsis	Black-faced Monarch
Yes	No	Myiagra cyanoleuca	Satin Flycatcher
No	No	Numenius madagascariensis	Eastern Curlew, Far Eastern Curlew
Yes	No	Rhipidura rufifrons	Rufous Fantail
Yes	No	Symposiachrus trivirgatus	Spectacled Monarch

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. *

The total impact area of the proposed action is up to 506.5 ha. The removal of potential habitat, as well as construction of reservoirs by the Project may directly impact the following species:

- A farm dam (state-mapped modified lacustrine wetland) intersected by the eastern transmission line that is heavily impacted by cattle provides 1.4 ha of marginal habitat for the red-necked stint, Caspian tern, and glossy ibis.
- Construction of reservoirs may provide marginal foraging habitat, roosting habitat, and potential breeding habitat for the eastern osprey.
- Impact on 341 ha of remnant and regrowth eucalypt woodland, which provides general habitat for the black-faced monarch, satin flycatcher, rufous fantail, fork-tailed swift, and oriental cuckoo.
- Removal of up to 6 ha of riparian habitat in areas of the supporting infrastructure which may intersect with waterways may impact the spectacled monarch.

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. *

Based on the assessment of the EPBC Act Significant Impact Guidelines, none of the impacts on migratory species is considered to be a significant impact.

The farm dam intersected by the eastern transmission line, and which is a State-mapped modified lacustrine wetland, is heavily impacted by cattle and with little fringing and emerging vegetation is unlikely to provide habitat for the red-necked stint, Caspian tern, and glossy ibis. For these species, the farm dam is marginal habitat. Additionally, there are more substantial intact wetland habitats within the broader area that offer suitable habitat for these species.

The construction of the reservoirs has the potential to create only small areas of new marginal habitat which are considered unlikely to be utilised by the eastern osprey. The upper reservoirs are in close proximity the proposed Specimen Hill Wind Farm and, were wind farm to be constructed and the eastern osprey to utilise the upper reservoirs, there may be a turbine collision risk. Given the low likelihood of utilisation by the eastern osprey it is considered unlikely that the proposed action will impact an ecologically significant proportion (24 individuals) of the population to be considered a significant impact.

The clearance of up to 341 ha of remnant and regrowth eucalypt woodland or 6 ha of riparian habitat is not considered to result in a significant impact to the black-faced monarch, satin flycatcher, rufous fantail, fork-tailed swift, oriental cuckoo or the spectacled monarch, as the clearing does not exceed the upper thresholds for individuals or habitat areas.

Further details relating the assessment of significance of migratory species is included in Attachment B – Big G Assessment of Significance – Section 4 – Pages 81-98, and Section 5 – Pages 99-110.

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

Yes

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

The proposed action has been considered against the *EPBC Act Significant Impact Guidelines*, recovery plans and conservation advice where available. Based on the assessment, it is considered that there is a likely significant impact four fauna species due to removal of habitat, and one flora species, also impacted by the clearance associated with the proposed action.

The proponent therefore considers that it is likely the Commonwealth Minister for the Environment will determine the Project as a controlled action for provisions listed under sections 18 and 18A of the Act. It is likely that the proposed further assessment will be undertaken as a bilateral assessment through the preparation of an environmental impact statement.

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. *

The Project has considered various avenues of avoidance and mitigation through design. Specifically, the Project has sought to:

- Avoid and minimise surface disturbance in areas of rocky outcrops and slopes which is suitable quoll habitat, by undergrounding of the water conveyance infrastructure.
- Avoid and minimise surface disturbance on the northern slopes of the Voewood property which is areas of higher densities of C. megacarpa, by undergrounding the water conveyance infrastructure.
- Avoid additional clearance for access tracks in the Voewood property by using existing approved access track corridors to minimise impact on the koala, yellow-bellied glider, and greater glider. The Upper Access Track is shared with Specimen Hill wind farm, an approved Project.

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

A specific cycad management plan will be prepared as part of further work during the Project. The proposed action will require the removal or translocation of up to 9,530 cycad individuals. Translocation and propagation of C. megacarpa has been conditioned for several Projects in the vicinity of the proposed action to mitigate impacts to this species.

Translocation monitoring programs suggest a high success rate of 80 % or more. Assuming a 80 % success rate, to offset the impacts arising from the proposed action and ensure the size of the population does not decrease over the long term, a minimum of 10,755 cycad individuals will need to be translocated

and/or propagated. Genetic studies indicate that the recipient sites should be within 36 km of the proposed action and within surrounding populations, that is, Calliope Range, Callide Range, and Kroombit populations.

Suitable offset habitat for the northern quoll habitat, yellow-bellied glider, greater glider and the koala will be identified as part of studies undertaken during the EIS process.

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 a nuclear action.

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.

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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. *

There are no Commonwealth marine areas that will be impacted by the Project.

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 Great Barrier Reef Marine Park lies more than 50 km to the east of the Project area.

The proposed action is located in the upper reaches of the Calliope and Fitzroy River catchments. Both the Calliope and Fitzroy Rivers meet the Pacific Ocean is in vicinity of the Great Barrier Reef Marine Park. The estimated breach discharge drainage distance between the upper reservoir and Calliope River confluence with the Pacific Ocean is estimated to be approximately 82 km whilst the estimated breach discharge drainage distance between the upper reservoir and the Fitzroy River confluence with the Pacific Ocean is estimated to be 472 km.

A preliminary hydrology and dam break assessment was completed to understand the potential for the Project to impact the Great Barrier Reef Marine Park via the following three scenarios; (a) the reduction in catchment area arising from the construction of the Project, (b) over topping of the reservoirs either via flooding or over pumping, (c) dam failure of any of the reservoirs.

The loss of catchment area resulting from the project is insignificant and will not impact the Great Barrier Reef Marine Park. The establishment of the upper reservoirs is estimated to result in a reduction of approximately 0.0015% of the current catchment area of the existing Fitzroy River catchment (reservoir catchment area, including reservoir surface, of 2.1km2 of total Fitzroy River catchment area of 140 656 km2). The establishment of the lower reservoir is estimated to result in a reduction in catchment area of 0.12% of the existing Calliope River catchment (2.3 km2 reservoir catchment area, including reservoir surface, of total Calliope River catchment area of 1,950 km2).

High intensity rainfall events of up to 1 in 2000 AEP are not expected to result in spill from reservoirs. The reservoir catchment areas are small resulting in little runoff entering the reservoirs and water in the reservoirs can be managed to provide capacity for run-off for forecast high rainfall events. In the event of over-pumping (i.e. a failure where pumps do not turn off) spill from the upper reservoirs would be via spill

ways that drain into the Fitzroy River. The preliminary hydrology assessment found that even without attenuation the estimated peak flows from pump failure would not be a significant proportion of typical daily flows within the Fitzroy River.

The preliminary hydrology assessment found that a significant volume of sediment laden high velocity breach flows would reach the Calliope River mouth in Gladstone in the event of the failure of either dam 2 or 4 on the upper reservoir. These failures represent the worst case given the shorter breach distance of the Calliope River and larger storage volume of the upper reservoirs. However, the likelihood of occurrence of this event is extremely low on the basis that the dam design, construction and operation must be in accordance with national and international standards. Pursuant to the definition of 'likely' under the Commonwealth's Significant Impact Guidelines where a likely significant impact is one that is a real or not remote chance or possibility, it is considered that there is not a real possibility that a dam failure will occur.

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 is not a water resources project related to a coal mining or coal seam gas.

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.

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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 does not occur on 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.

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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 does not occur in Commonwealth heritage places.

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. *

Alternatives have been considered as part of the concept design stage of the Project. The project site is considered to be the most optimal due to proximity to existing infrastructure (Powerlink high voltage transmission line, disused 132 kV transmission line easement as another option), proximity to water connection (via the Awoonga-Callide water pipeline), and ideal topography for a pumped hydropower project.

Various reservoir designs have been considered as part of the concept design study, particularly with regard to the upper reservoir location. However, various upper storage sites without reasonable distance that could be coupled with the lower reservoir on the adjacent valley plain were not identified along the escarpment in the vicinity of the Project site.

5. Lodgement

5.1 Attachments

1.3.2.16 (Person proposing to take the action) Nature of the trust arrangement in relation to the proposed action

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Attachment D - Big G Unit Trust (executed) [CONFIDENTIAL].pdf		Yes	

3.2.1 Flora and fauna within the affected area

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Attachment A – Big G Baseline Ecology Assessment (compressed).pdf Baseline ecology report		No	Medium

3.4.1 Hydrology characteristics that apply to the project area

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Attachment C – Big G Groundwater data review and gap analysis.pdf Preliminary Groundwater data review		No	Medium

4.1.4.2 (Threatened Species and Ecological Communities) Why your action has a direct and/or indirect impact on the identified protected matters

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Attachment B – Big G Assessment of Significance (compressed).pdf Assessment of Significance		No	Medium

5.2 Declarations

Completed Referring party's declaration

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

ABN/ACN	48072377158
Organisation name	HYDRO-ELECTRIC CORPORATION T/A ENTURA
Organisation address	4 Elizabeth Street, Hobart TAS 7000
Representative's name	Bunfu Yu
Representative's job title	Senior Environmental Planner
Phone	+61 3 6245 4500
Email	bunfu.yu@entura.com.au
Address	4 Elizabeth Street, Hobart TAS 7000

☑ 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, **Bunfu Yu of HYDRO-ELECTRIC CORPORATION T/A ENTURA**, 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.

ABN/ACN	659173592
Organisation name	BEP BIG G PTY LTD
Organisation address	Level 2, Tavistock House, 383-387 Flinders Lane, Melbourne VIC 3000
Representative's name	Scott Walkem
Representative's job title	Managing Director
Phone	0449056060
Email	scottw@bepower.com.au
Address	Level 2, Tavistock House, 383-387 Flinders Lane, Melbourne VIC 3000

☑ 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, **Scott Walkem of BEP BIG G 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, **Scott Walkem of BEP BIG G 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. *