Cethana Pumped Hydro Energy Storage Project

Application Number: **01909** Commencement Date: **03/07/2023** Status: **Locked**

1. About the project

1.1 Project details

1.1.1 Project title *

Cethana Pumped Hydro Energy Storage Project

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 *

01/01/2026

1.1.4 Estimated end date *

01/01/2110

1.2 Proposed Action details

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

As part of the Battery of the Nation (BotN) initiative, Hydro Tasmania is proposing Tasmania's first Pumped Hydro Energy Storage (PHES) facility to support the transitioning National Electricity Market (NEM). The Australian Energy Market Operator (AEMO) forecasts that all coal-fired generation will exit the NEM by 2043 and be replaced predominantly by variable renewable energy (VRE) generation, mainly wind and solar. This creates a need for additional firming capacity, such as storage, to be deployed in the NEM. Storage technologies such as PHES will play an important role in providing the necessary dispatchable generation to balance the energy system and ensure reliable electricity supply.

Hydro Tasmania proposes to construct the Cethana PHES Project in the vicinity of Lake Cethana in northwest Tasmania. Lake Cethana is part of Hydro Tasmania's Mersey Forth Hydropower Scheme and is operated by Hydro Tasmania in accordance with its Special Licence granted under Tasmania's Water Management Act (WM Act).

The Cethana PHES Project proposes to use the existing Lake Cethana as a lower storage connected, via underground tunnels and a new underground power station, to a new off river upper storage, located on a plateau above the western side of Lake Cethana, The proposed Cethana PHES will have an operating capacity of approximately 750 megawatts (MW), approximately 20 hours of storage (approximately 14,500 MW hours) and a design discharge of approximately 170 cubic meters per second (m3/s). An overview of the Cethana PHES is shown in Attachment 1 – Cethana PHES Project Scheme Overview.

The key components of the Cethana PHES are:

- A new partly lined off river upper storage formed by a ring shaped embankment dam. The storage will have an operating range of approximately 20 m (full supply level of approximately 755 m (AHD83) and a normal minimum operating level of approximately 735 m (AHD83), a reservoir capacity of approximately 12.4 million cubic meters (Mm3) (approximately 11.7 Mm3 active storage) and a footprint of approximately 100 ha.

- An approximately 630 m long approach channel (predominately located within the footprint of the upper storage) leading to the upper intake structure, which houses trash racks, stoplogs and sliding gates.
- An approximately 390 m deep, 9.6 m diameter, concrete lined high pressure shaft and an approximately 1450 m long, 9.2 m diameter, concrete lined high pressure tunnel.
- Four approximately 160 m long, 3.6 m diameter high pressure penstocks (steel and/or concrete lined).
- An underground powerhouse complex containing four reversible pump turbine sets and associated mechanical and electrical equipment including up to four 18 kilovolt (kV)/220 kV power transformers.
- Four approximately 46 m long, 4.9 m diameter, concrete lined low pressure draft tube tunnels connecting to an approximately 84 m long, 7.1 m diameter, concrete lined low pressure distributor.
- A low pressure surge facility comprised of an approximately 95 m long, 6.8 m diameter, concrete lined shaft and two 115 m long, 9.2 m diameter concrete lined surge chambers.
- An approximately 1060 m long, 9 m diameter, concrete lined and unlined low pressure tunnel including a rock trap near the upstream end.
- A lower intake structure on Lake Cethana housing trash racks, a maintenance gate and a bypass for filling of the low pressure tunnel. The lower intake will be cut into the shoreline and will extend approximately 30 m above the full supply level of Lake Cethana.
- Access tunnel(s) to the underground powerhouse complex including a Main Access Tunnel (MAT) (approximately 1100 m long, 7.5 m diameter), Ventilation Tunnel (approximately 900 m long, 5 m diameter) and an Emergency and Cable Tunnel (approximately 900 m long, 5.5 m diameter) and associated tunnel portals.
- A surface switchyard connected to the underground powerhouse complex and containing outdoor 220 kV air insulated switchgear.
- A new approximately 7.5 km, 220 kV transmission line connecting the switchyard to the proposed Staverton substation.
- Realignment of the existing Sheffield to Farrell 220 kV transmission line around the proposed upper storage.

Excavation of the shafts, tunnels and the powerhouse complex is anticipated to produce approximately 800,000 m3 of spoil, part of which will be used in construction (e.g. establishing tunnel portals), and the remainder stored permanently in an approximately 12 ha designated spoil storage area close to the lower intake and tunnel portals (Attachment 1 – Cethana PHES Project Scheme Overview).

Access to the Cethana PHES during construction and operation is proposed to be via a new intersection on Cradle Mountain Road and via Dolcoath Road, which will require minor upgrade. An alternative access has also been developed that avoids the use of all, or part, of Dolcoath Road if required (Attachment 1 – Cethana PHES Project Scheme Overview).

The activities during the construction and operation of the Cethana PHES that may have a direct or indirect impact on the environment are:

- Clearance of up to 220.7 ha of native vegetation to allow construction of above ground infrastructure including the upper storage, upper and lower intakes, tunnel portals, spoil stockpiles, switchyard, access tracks and transmission line.
- Noise and vibration generated by blasting for the upper storage, tunnels, shafts and the powerhouse complex as well as operation of construction plant and equipment, concrete batching plants and crushing and screening of spoil.
- Increase in light and heavy vehicle movements on nearby roads including Dolcoath Road, Cradle Mountain Road and Cethana Road, associated with the transport of materials, equipment and workforce during construction.
- The upper storage and the underground shafts, tunnels and powerhouse complex are likely to interact with groundwater. Impacts to local groundwater and management of groundwater during construction have potential direct and indirect environmental impacts.
- The operation of the Cethana PHES would alter the operational regime of Lake Cethana by increasing the frequency of daily lake level fluctuations (noting that Lake Cethana will continue to operate within its current operational range).
- The potential introduction of pathogens and weeds resulting from the movement of equipment, materials and people to and within the project site.

The Cethana PHES Project has a Project Area of 1,677.8 ha which includes a disturbance footprint (direct surface impact area) of up to 249.9 ha and an Avoidance Area of 5.2 ha.

Terrestrial and aquatic baseline and impact assessment reports are attached to this referral and provide further detail on the potential impacts of the proposed Cethana PHES on Matters of National Environmental Significance (MNES) (Attachment 2 - Cethana PHES Project Terrestrial Ecology Baseline Report and Impact Assessment - all pages and Attachment 3 - Cethana PHES Project Aquatic Ecology Baseline Report and Impact Assessment - all pages)

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? *

In parallel to referring the Cethana PHES Project to the Department of Climate Change, Energy, the Environment and Water (DCCEEW) under the *Environment Protection & Biodiversity Conservation Act 1999* (EPBC Act) (this document), Hydro Tasmania intends to submit the project to the Tasmanian Environmental Protection Authority (EPA) for assessment in accordance with the *Environmental Management and Pollution Control Act 1994* (EMPC Act). Should the project be deemed a controlled action under the EPBC Act, Hydro Tasmania will seek to have the project assessed under the bilateral assessment agreement pursuant to Part 5 of the EPBC Act.

The use and development of land in Tasmania is primarily regulated through the *Land Use Planning and Approvals Act 1993* (LUPA Act) and given effect through planning schemes administered by Local Government. The Cethana PHES is located within the Kentish Council local government area and therefore subject to the provisions of the *Kentish Interim Planning Scheme 2015*. A planning permit application for the project will be made to the Kentish Council under the LUPA Act.

Notwithstanding, some aspects of the redevelopment may be exempt from the need for a permit under the LUPA Act. This may include the construction or modification of power distribution or transmission infrastructure under Section 57 of the Tasmanian *Electricity Industry Supply Act 1995* (ESI Act).

The taking and management of water in Tasmania is principally regulated under the *Water Management Act 1999* (WM Act). In accordance with Schedule 4, Section 7 - Savings and transitional provisions of the WM Act Hydro Tasmania's rights under the previous Act continue, and Hydro Tasmania holds a Special Licence under section 115(2) of the WM Act.

7. Saving for certain rights of Corporation under repealed Act

(1) A right of the Corporation, as in force under the repealed Act immediately before the commencement day, continues in full force and effect, notwithstanding any other provision of this Act, on the same terms and conditions as were applicable at that time.

(2) The Corporation is taken to hold a special licence under section 115(2) with an endorsement that Division 6 of Part 6 applies to the licence, conferring on the Corporation the rights mentioned in subclause (1) with the conditions applicable to those rights under that subclause and also confers such other rights and is subject to such other conditions as the Minister may agree with the Corporation.

Lake Cethana is located within the Mersey Forth hydro-electric district appointed under statutory rule No. 37 of 1963, and forms part of the rights to take and manage water afforded by the Special Licence.

A Division 3 Dam Works Permit under the WM Act is also required for the construction of the upper storage.

An approximately 800 m span of the transmission line is located within the Mt Roland Regional Reserve and will be subject to assessment and approval by the Tasmanian Parks and Wildlife Service through the Reserve Activity Assessment process under the *National Parks and Reserve Management Act 2002*.

Hydro Tasmania will require approval from the Tasmanian Parliament under the *Hydro-Electric Corporation Act 1995* (HEC Act) to construct a major new power facility with a capacity exceeding 40 MW.

The Cethana PHES may also require additional approval under the following Tasmanian laws, and will be confirmed during detailed design:

- *Aboriginal Heritage Act 1975* (AH Act)
- *Threatened Species Protection Act 1995* (TSP Act)
- *Nature Conservation Act 2020* (NC Act)

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. *

Between 2019 and 2021 Hydro Tasmania undertook community engagement to support options assessment, pre-feasibility and feasibility studies for the project. Community information sessions were held in local community locations while smaller interest group and landowner meetings were held. An Aboriginal community liaison officer has been engaged to facilitate engagement with the Tasmanian aboriginal community and heritage surveys to date have been supported by an Aboriginal Heritage officer.

Community engagement in the next stage will include consultation on;

- Environmental and social impact assessment studies
- Land access
- Local benefit sharing
- Workforce accommodation planning
- Local content and social procurement planning.

Consultation and engagement activities will focus on the following key stakeholders:

- adjoining and near neighbours
- nearby communities (including the communities of Moina, Lorinna, Lake Gairdner, Staverton, Gowrie Park, Claude Road, Sheffield and Wilmot)
- community interest groups and organisations in nearby communities
- government and non-government service providers in nearby communities
- business owners and operators (including tourism operators) in nearby communities
- Aboriginal communities/groups
- Local and state government authorities
- environmental interest groups
- recreational user groups
- Sustainable Timber Tasmania
- TasNetworks.

Recent community engagement in 2023 has been focussed on upcoming lodgement of the EPBC Act referral. Engagement activities have included:

- Briefing of representatives from the Kentish Council
- Hard copy distribution of the Cethana Project Update to all households in nearby communities and email distribution to businesses, services providers and interest groups operating in the local area
- Telephone and written contact with adjoining and near neighbours
- Social media posts
- Preliminary information sharing and meetings with Aboriginal organisations.

These engagement activities were complemented by a new project webpage. The project webpage includes frequently asked questions, capacity to ask a question and a 'subscribe' facility to enable interested parties to receive updates, notifications and general information through direct mail-outs. In addition, there is a specific section on the EPBC referral process provided.

Future engagement activities will include (in addition to the above activities) a series of community information sessions in nearby communities. The first round of sessions are planned for September 2023 aligned with the preparation of technical studies and the development application. A further round will be facilitated in subsequent project stages. Additional engagement tools include interest group briefings, key participant interviews for the social impact assessment, focus groups with stakeholder groups, local print media and a community survey.

Exhibition of the development application will be supported through extensive community engagement including a series of community information sessions attended by technical representatives of the project.

Hydro Tasmania's website also provides project information for the Cethana project and a direct link to the engagement site. The website also shares broader information around *Battery of the Nation* and the changing market.

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.

The Department of Climate Change, Energy, the Environment and Water (the department) collects your personal information (as defined by the Privacy Act 1988) through this platform for the purposes of enabling the department to consider your submission and contact you in relation to your submission. If you fail to provide some or all of the personal information requested on this platform (name and email address), the department will be unable to contact you to seek further information (if required) and subsequently may impact the consideration given to your submission.

Personal information may be disclosed to other Australian government agencies, persons or organisations where necessary for the above purposes, provided the disclosure is consistent with relevant laws, in particular the Privacy Act 1988 (Privacy Act). Your personal information will be used and stored in accordance with the Australian Privacy Principles.

See our Privacy Policy to learn more about accessing or correcting personal information or making a complaint. Alternatively, email us at privacy@awe.gov.au.

☑ **Confirm that you have read and understand this Privacy Notice ***

1.3.1.1 Is Referring party an organisation or business? *

Yes

Referring party organisation details

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

Referring party details

Name	David Procter
Job title	Senior Environmental Consultant
Phone	+61 3 6245 4500
Email	david.procter@entura.com.au
Address	4 Elizabeth Street, Hobart TAS 7000, Australia

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	48072377158
Organisation name	HYDRO-ELECTRIC CORPORATION
Organisation address	4 Elizabeth Street, Hobart, TAS 7000

Person proposing to take the action details

Name	Paul Molnar
Job title	Project Director BotN Projects– Hydro Tasmania
Phone	03 6240 2270
Email	paul.molnar@hydro.com.au
Address	GPO Box 355 Hobart Tasmania 7001

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. *

Hydro Tasmania has a satisfactory record of responsible environmental management.

As custodians of 60% of Tasmania's freshwater resources and significant hydropower infrastructure, Hydro Tasmania is committed to reducing its environmental and social impacts. Hydro Tasmania has been operating the Tasmanian hydropower system for over 100 years and has a mature environment program and strong scientific understanding of the waterbodies and land that are managed by Hydro Tasmania and their multiple use demands. Hydro Tasmania manages waterbodies that provide essential habitat for various threatened species listed at the Commonwealth and State level and works to minimise its impacts on these threatened species and to effectively manage the environment for future generations.

Environmental protection and management is a core part of Hydro Tasmania's business and Hydro Tasmania employs and works with environmental experts to monitor, manage and research threatened species, environmental flows, fish migration, and the general health of its waterways. Hydro Tasmania's water licence gives the right to take and use water in six Tasmanian water catchments, making Hydro Tasmania the largest freshwater manager in Australia. Hydro Tasmania monitors river and lake levels, water quality, and biological condition to support its sustainable management and to help keep Tasmanians informed.

Hydro Tasmania will undertake the proposed Cethana Pumped Hydro Project in accordance with its Environmental Policy and Sustainability Principles.

Hydro Tasmania has not been and is not currently subject of proceedings under Commonwealth or State law for actions against the protection of 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

Hydro Tasmania has environmental governance in place that ensures environmental considerations are integrated into decision making at all levels. Hydro Tasmania's Environmental Policy and Sustainability Principles guide catchment management practices so that future generations can enjoy Tasmania's wealth of natural attractions. The Executive General Manager Assets and Infrastructure is responsible for overall management of the Environmental Management System (EMS) for the business.

Hydro Tasmania operates under an EMS that is accredited to ISO 14001 which allows management and identification of environmental risk and opportunities while encouraging continual improvement. Hydro Tasmania's EMS includes procedures and programs to ensure compliance with legal and regulatory obligations, for environmental monitoring, and to manage and improve environmental outcomes. This includes defining accountabilities and responsibilities, effectively outlining business and operational risks, developing procedures and protocols to effectively control and manage these risks. In addition, the EMS includes methods to check and review system performance and implementation and ensure a systematic continuous improvement cycle is established and implemented.

Through the Environmental Policy Hydro Tasmania aims to *go beyond compliance and conservation by leading changes in our business and behaviours that will protect and restore the environment.* Our policy seeks to achieve this by:

- **Maintaining a strong system** - we seek opportunities to innovate and be leaders in environmental management through continual improvement of our Environmental Management System to enhance our environmental performance, products, services and activities.
- **Being proactive and accountable** - we proactively review our performance in meeting environmental and social objectives and targets, and openly communicate our progress to stakeholders.
- **Managing risks** - we understand and manage our social and environmental risks with the goal of eliminating or minimising those risks.
- **Empowering people** - we empower our employees, stakeholders and contractors to speak up if something could be improved and support our people to fulfill their environmental responsibilities.
- **Going beyond compliance** - we fulfill our environmental legislative and regulatory obligations and place great value in meeting a range of voluntary environmental and social commitments.
- **Ensuring healthy catchments** - we have a collaborative and holistic approach to how we manage aquatic, land and heritage aspects across our catchments and adapt to the impacts caused by climate change.
- **Avoiding waste** - we prevent pollution and reduce waste by embedding a circular economy, committing to waste reduction targets and introducing sustainable procurement guidelines.
- **Investing sustainably** - we ensure our communities and the environment are considered in our investment and corporate strategies, new projects, procurement and the products and services we offer.

Hydro Tasmania's Sustainability Principles guide how we operate sustainably by:

- **Governance** - we're guided by our ethics and we acknowledge failure, welcoming the opportunity to improve.
- **Finance** - our investment decisions deliver long-term benefits for the environment, our communities, customers and owners.
- **Communities** - we seek to understand the needs of our local communities, and our actions are for their benefit.
- **Wellbeing** - our employee experience leaves our people feeling safe, connected, empowered and recognised.
- **Environment** - we go beyond compliance and conservation by leading changes in our business and behaviours that will protect and restore the environment.
- **Customers** - we put our customers' needs at the heart of our business, balancing environmental expectations with value for money.
- **Assets** - our whole-of-system, whole-of-life approach lets us manage our assets and resources in a way that enhances our communities.

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? *

No

1.3.3.2 Is Proposed designated proponent an organisation or business? *

Yes

Proposed designated proponent organisation details

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

Proposed designated proponent details

Name	Donna Brown
Job title	Manager Stakeholder Relations, Environment and Planning – Battery of the Nation
Phone	03 6240 2270
Email	donna.brown@hydro.com.au
Address	GPO Box 355 Hobart Tasmania 7001

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
Organisation address	4 Elizabeth Street, Hobart, TAS 7000
Representative's name	David Procter
Representative's job title	Senior Environmental Consultant
Phone	+61 3 6245 4500
Email	david.procter@entura.com.au

Address	4 Elizabeth Street, Hobart TAS 7000, Australia

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	48072377158
Organisation name	HYDRO-ELECTRIC CORPORATION
Organisation address	4 Elizabeth Street, Hobart, TAS 7000
Representative's name	Paul Molnar
Representative's job title	Project Director BotN Projects– Hydro Tasmania
Phone	03 6240 2270
Email	paul.molnar@hydro.com.au
Address	GPO Box 355 Hobart Tasmania 7001

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.

ABN/ACN	48072377158
Organisation name	HYDRO-ELECTRIC CORPORATION
Organisation address	4 Elizabeth Street, Hobart, TAS 7000
Representative's name	Donna Brown
Representative's job title	Manager Stakeholder Relations, Environment and Planning – Battery of the Nation
Phone	03 6240 2270
Email	donna.brown@hydro.com.au
Address	GPO Box 355 Hobart Tasmania 7001

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

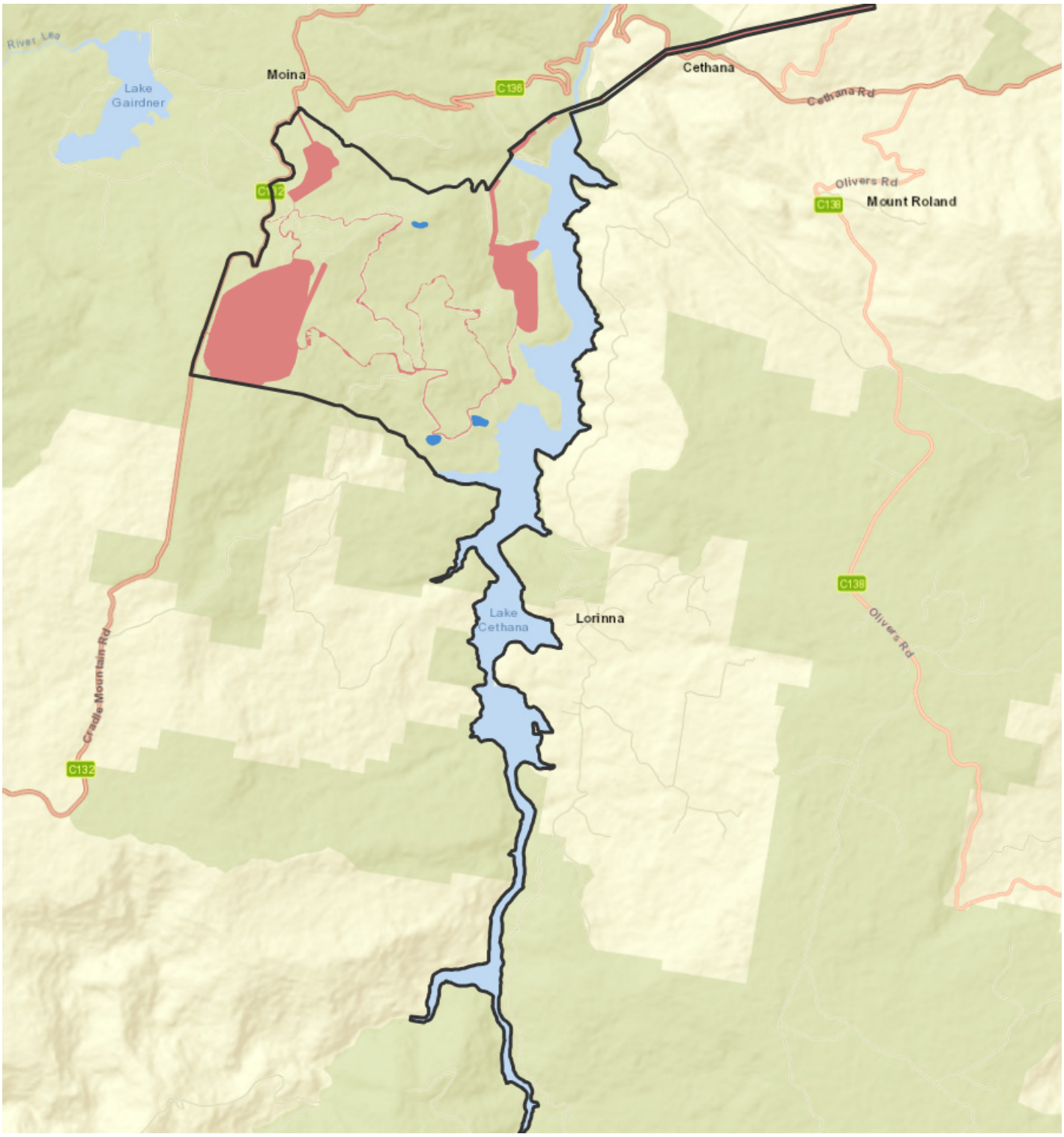
1.4 Payment details: Payment allocation

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


River Lea
Lake Gairdner
Moina
C136
Cethana
Cethana Rd
Olivers Rd
C138
Mount Roland
C132
Lake Cethana
Lorinna
Cradle Mountain Rd
C132
C138
Olivers Rd

2.2 Footprint details

2.2.1 What is the address of the proposed action? *

Lake Cethana, Tasmania, 7310

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

Tasmania

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 Cethana PHES Project is located on land owned or managed by the Hydro Electric Corporation (Hydro Tasmania), land managed by Sustainable Timber Tasmania (STT) and land managed by the Tasmanian Parks and Wildlife Service (PWS). There are four private parcels of land that are within the transmission line alignment near Staverton.

Land managed by STT is classed as Permanent Timber Production Zone Land under the *Forest Management Act 2013*.

3. Existing environment

3.1 Physical description

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

The Cethana PHES Project is located in the vicinity of Lake Cethana in Northwest Tasmania approximately 58 km to the southwest of Devonport, Tasmania (Attachment 1 – Cethana PHES Project Scheme Overview). Access to the project is by Cradle Mountain Road and Dolcoath Road, an unsealed road that connects Lake Cethana to Cradle Mountain Road.

The environment of the project area has been influenced by past disturbance from hydropower development, timber harvesting and plantation development for production forestry and by historical grazing in areas of the plateau above Lake Cethana. Hydropower infrastructure including dams and transmission lines are prominent features of the landscape.

Vegetation within the project area is predominately eucalypt forest. Ecological surveys of the disturbance footprint recorded 220.7 ha of native vegetation of which 153.1 ha was made up of wet and dry eucalypt forest. A further 29.2 ha of modified vegetation was recorded. One vegetation community, highland *Poa* grassland, which is listed as threatened under the Tasmanian *Nature Conservation Act 2002* (NC Act), was recorded in the disturbance footprint (Attachment 2 - Cethana PHES Project Terrestrial Ecology Baseline Report and Impact Assessment – Section 3.1 – Pages 22 to 25).

The project area contains a range of habitats which support species that are characteristic of highland forests and grasslands in Tasmania including several endemic mammals and birds. Three species of mammal and six species of birds that are listed under the EPBC Act are likely to occur within the disturbance footprint. No terrestrial flora species listed under the EPBC Act are likely to occur within the disturbance footprint (Attachment 2 - Cethana PHES Project Terrestrial Ecology Baseline Report and Impact Assessment – Section 5 – Pages 66 to 68). However, one riparian flora species, *Barbarea australis* (native wintercress) listed under the EPBC Act was recorded during surveys (Attachment 3 - Cethana PHES Project Aquatic Ecology Baseline Report and Impact Assessment – Section 3.4.3 – Pages 83 to 91).

Lake Cethana is regulated through Hydro Tasmania's operation of the Mersey Forth Hydropower Scheme. The baseline health of aquatic ecosystems in Lake Cethana is generally poor. The range of fish species present in Lake Cethana is limited by the presence of downstream dams to those able to maintain self-sustaining landlocked populations or those that are stocked. Three native fish species were recorded during surveys and only one other native fish species has potential to occur. The introduced brown trout (*Salmo trutta*) and rainbow trout (*Oncorhynchus mykiss*) both occur in Lake Cethana. Platypus (*Ornithorhynchus anatinus*) were observed during surveys and water rats (*Hydromys chrysogaster*) are considered likely to be present. The abundance and diversity of invertebrate taxa recorded during surveys was varied but generally low. (Attachment 3 - Cethana PHES Project Aquatic Ecology Baseline Report and Impact Assessment – Section 3.4.5.3 – Pages 105 to 112). There are no aquatic species listed under the EPBC Act recorded in Lake Cethana. Based on known distributions, the only EPBC Act listed aquatic species that could potentially be present is the giant freshwater crayfish (*Astacopsis gouldi*), however, targeted surveys did not record this species (Attachment 3 - Cethana PHES Project Aquatic Ecology Baseline Report and Impact Assessment – Section 3.4.4 – Pages 92 to 97).

Under the *Kentish Interim Planning Scheme 2013*, land within the disturbance footprint is zoned Rural Resource with the exception of the shoreline of Lake Cethana and sections of the transmission line alignment which are zoned Environmental Management.

Under the *Forest Management Act 2013*, much of the land within the disturbance area is classed as Permanent Timber Production Zone Land. Should the Cethana PHES Project proceed, the revocation of the classification of land within the disturbance area as Permanent Timber Production Zone Land would be required.

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

Land use in the vicinity of the Cethana PHES Project is dominated by hydroelectric generation and forestry. Wilmot Power Station, Cethana Power Station and Cethana Dam are all located within 2 km of the Cethana PHES, the Sheffield to Farrell 220kV transmission line bisects the location of the upper storage and the Sheffield to Wilmot 220kV transmission line originates at Wilmot Power Station and runs to the northeast. The project area is predominately located on land managed by Sustainable Timber Tasmania and is actively managed for forestry operations. Forest operations include hardwood plantations dominated by *Eucalyptus obliqua* and *Eucalyptus delegatensis*.

Cradle Mountain Road is located adjacent to the western side of the project area and provides access to Cradle Mountain - Lake St Clair National Park from Devonport and Launceston. Several accommodation businesses operate in the area including Lemonthyme Lodge located immediately to the south of the project area.

There are several recreational walks in the vicinity of the project area including Champagne Falls and Bridal Veil Falls.

With the exception of the conversion of land from forestry operations to use for hydroelectric generation, no change in land use is proposed.

In addition to its primary use for hydroelectric generation, Lake Cethana is used for recreation, angling and limited commercial activities. A commercial dive training facility is operated on Lake Cethana by Commercial Dive Academy.

Lake Cethana is also used recreationally, primarily for fishing, and has relatively low utilisation from the most recent Angler Postal Survey.

Lake Barrington is located immediately downstream of Lake Cethana (and the project area) and is the location of the Lake Barrington International Rowing Centre.

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

The Tasmanian Wilderness World Heritage Area (TWWHA) is located to the south of the Cethana PHES Project and abuts the shoreline of Lake Cethana approximately 6 km from the project area. The TWWHA encompasses Dove River Regional Reserve located approximately 4.5 km from the project area and Cradle Mountain – Lake St Clair National Park located approximately 12 km from the project area (Attachment 1 – Cethana PHES Project Scheme Overview).

The TWWHA was first inscribed on the World Heritage List in 1982 in recognition of its natural and cultural values and now covers an area of more than 1.5 million hectares in Tasmania. The TWWHA is also listed as a National Heritage Place. Hydro Tasmania currently manages approximately 14,000 ha of land within the TWWHA for hydropower generation. The Cethana PHES will not have a direct or indirect impact on the TWWHA or the Cradle Mountain - Lake St Clair National Park (Cethana PHES Project Aquatic Ecology Baseline Report and Impact Assessment - Section 3.3.5. – Pages 69 to 70).

The disturbance footprint overlaps the north western tip of the Mount Roland Regional Reserve associated with a single approximately 800 m span of the transmission alignment (noting that clearance within the reserve is limited to approximately 2.1 ha around a transmission tower) (Attachment 1 – Cethana PHES Project Scheme Overview). The Mount Roland Regional Reserve is an approximately 7000 ha reserve established under the *Nature Conservation Act 2002*. The disturbance footprint will have a direct impact on the Mount Roland Regional Reserve but the impact is not expected to be significant and will be assessed as part of the Reserve Activity Assessment process by the Tasmanian Parks and Wildlife Service.

There are no other outstanding natural features or important or unique values applicable to the Project area.

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 Cethana PHES Project is located in a region characterised by large changes in elevation. The upper storage is located on a relatively flat approximately 1 km wide plateau to the west of Lake Cethana. The plateau drops steeply to the east toward Lake Cethana and to the west toward Lake Gairdner. The upper storage is located at an elevation of approximately 750 m (AHD83) while the lower intake lies at an elevation of approximately 230 m (AHD83), a 520 m fall in elevation.

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 of the disturbance footprint were completed between 2019 and 2023. The results of the surveys are described in detail in Attachment 2 - Cethana PHES Project Terrestrial Ecology Baseline Report and Impact Assessment – Section 3.2 – Pages 41 to 42 and Section 3.4 Pages 42 to 57 and Attachment 3 - Cethana PHES Project Aquatic Ecology Baseline Report and Impact Assessment - Section 3.4 - Pages 70 to 116.

Flora

Surveys recorded 217 flora species within the disturbance footprint, of which 192 were native species and 25 were introduced. Two flora species listed under the EPBC Act and a further seven species listed under the Tasmanian *Threatened Species Protection Act 1995* (TSP Act) have previously been recorded within 5 km of the disturbance footprint. The EPBC Act Protected Matters Search Tool (PMST) identified a further five species as potentially occurring in the disturbance footprint.

Despite targeted surveys, the only flora species listed under the either the EPBC Act or TSP Act recorded during surveys was *Barbarea australis* (native wintercress). Native wintercress was recorded from the lower reaches of Bull Creek, an unregulated creek that flows into Lake Cethana. Native wintercress is a riparian species that is listed under both the EPBC Act and TSP Act. There are no previous records of this species in the Forth River catchment.

Fauna

Surveys recorded five terrestrial fauna habitat types within the disturbance footprint including shrubby dry forest, wet forest, rainforest, wet scrub and tussock grassland. Wet and dry forest as well as tussock grassland provide habitat suitable for the Tasmanian devil (*Sarcophilus harrisii*), spotted-tailed quoll (*Dasyurus maculatus subsp. maculatus*) and eastern quoll (*Dasyurus viverrinus*) listed under both the EPBC Act and TSP Act. There are records of all three species within 5 km of the disturbance footprint and Tasmanian devil and eastern quoll scats were recorded during surveys. All three species are considered likely to occur within the disturbance footprint.

There are two eagle nests within 1 km of the proposed transmission line alignment. The nests are of indeterminate species and could be either Tasmanian wedge tailed eagle (*Aquila audax fleayi*) or white-bellied sea-eagle (*Haliaeetus leucogaster*). The Tasmanian wedge tailed eagle is listed under the EPBC Act and TSP Act and the white-bellied sea eagle is a listed marine species under the EPBC Act.

There is one record of the swift parrot (*Lathamus discolor*) within 600 m of the project area and there is suitable *Eucalyptus delegatensis* habitat within the disturbance footprint which may be used for post breeding foraging.

There are no records of blue-winged parrot (*Neophema chrysostoma*) within 5 km of the disturbance footprint, however, the highland *Poa* grassland vegetation community located within the footprint of the upper storage may provide foraging habitat.

The Tasmanian masked owl (*Tyto novaehollandiae subsp. castanops*) is considered to potentially occur in the project area but outside the disturbance footprint. Bio-acoustic recorders have been deployed in two areas of potential masked owl breeding habitat to determine if masked owls are present.

Three bird species listed as migratory under the EPBC Act are considered likely to occur in the disturbance footprint; fork-tailed swift (*Apus pacificus*), white-throated needletail (*Hirundapus caudacutus*; also listed as vulnerable on EPBC Act), and satin flycatcher (*Myiagra cyanoleuca*).

There are no aquatic fauna species listed under the EPBC Act or TSP Act that are considered likely to occur in the disturbance footprint and none were recorded during surveys.

The PMST identified a further nine species listed under the EPBC Act and five listed migratory species, however, these species are considered unlikely to occur due to a lack of suitable habitat and/or they were not recorded during targeted surveys.

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

VVegetation surveys of the disturbance footprint were completed between 2019 and 2023. The results of the surveys are described in detail in Attachment 2 - Cethana PHES Project Terrestrial Ecology Baseline Report and Impact Assessment – Section 3.1 – Pages 22 to 41.

The vegetation types within the project area are influenced by soil type as well as fire history and past disturbance including clearing for agriculture and production forestry. Vegetation types range from *Eucalyptus nitida* forest communities to the north of the upper storage and *E. amygdalina* dry forest on the transmission line on nutrient poor siliceous soils to various *E. delegatensis* dominated wet and dry forests on more nutrient rich soils in the south. The understorey of the various forest types is heavily influenced by drainage as well as past fire history. A large area of the upper storage is located in native grassland (highland *Poa* grassland) which appears to have been impacted by past clearing activities as evidenced by the presence of cut stumps and partially burnt tree trunks and limbs and the presence of weed species associated with grazing (e.g. sheep sorrel *Acetosella vulgaris*).

Eighteen Tasmanian Vegetation Map (TASVEG 4) mapping units were identified within the disturbance area including twelve native vegetation communities (combined 200.7 ha) and six modified vegetation communities (combined 29.2 ha). One of these communities, highland *Poa* grassland, is listed as threatened under the *Tasmanian Nature Conservation Act 2002* (NC Act).

Four ecological communities listed under the EPBC Act were identified by the PMST as potentially occurring within 5 km the disturbance footprint;

- Alpine Sphagnum Bogs and Associated Fens
- Lowland Native Grasslands of Tasmania
- Tasmanian Forests and Woodlands dominated by black gum or Brookers gum (*Eucalyptus ovata* / *E. brookeriana*)
- Tasmanian white gum (*Eucalyptus viminalis*) wet forest.

None of these vegetation communities were recorded in the disturbance footprint during surveys. A small patch of Tasmanian white gum (*Eucalyptus viminalis*) wet forest was recorded adjacent to the transmission line alignment but outside the project area.

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 Cethana PHES Project will not impact any places entered on heritage lists maintained by the Commonwealth Government, including the World Heritage List, National Heritage List or Register of the National Estate (RNE). Cethana Dam, 1.3km downstream of the proposed lower intake, is listed as an Indicative Place on the RNE but will not be affected by the development.

The disturbance footprint and associated infrastructure intersects several late 19th early 20th century alluvial mine workings that are listed on Tasmanian government agency management lists, including the All Nations Mine listed on the Tasmanian Historic Places Inventory maintained by the Parks & Wildlife Service, and Iris and Lawkemlaw workings listed on Mineral Resources Tasmania’s Mineral Deposits database. There are no places listed on the municipal Local Heritage Code or Tasmanian Heritage Register intersected by the project area.

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

A review of previous heritage studies carried out in the region indicates that most documented sites are situated on the elevated basalt plateaux east and west of the Forth River. A cluster of sites to the west of the river lie on a north-east trending basalt upland between the Iris River and Bull Creek (outside the project area). Robinson’s journal refers to a ‘native road’ running along a tier between the Black Bluff Range and the Forth River. Plomley (2008) identifies this as the ridge between the Lea and Iris rivers via Stormont Hill, leading to a lagoon (most likely where Lake Gairdner now is) described by Robinson as a ‘favourite resort of the natives’ where spears were made (Plomley, 2008). However, the Van Diemen's Land Company Track through Middlesex Plains, which is also widely considered to follow the main native road, crosses the Forth River at Lorinna some 9km further east. The basalt ridge between the Iris River and Bull Creek, currently followed by Cradle Mountain Road, provides easier access to Lake Gairdner than Plomley’s suggested route, and may have been a secondary road between the main road crossing the Forth and Lake Gairdner. This would potentially explain the concentration of sites on

that alignment that include tools and scrapers (used in spear and waddy manufacture). Documented sites east of Lake Cethana appear to demonstrate an even stronger affinity with the high basalt plateaux. The sites, which extend from Addison Creek in the south to Machinery Creek, follow the watershed separating the Forth and Mersey River catchments through Olivers Plains along a line bisected by the current Lemonthyme Road. Once again, Robinson refers to the main native road passing through this area, most likely on the same or a similar alignment to the subsequent VDL Co track, which appears to have skirted around the south side of Gadds Hill before turning east to pass through Liena en route to Deloraine. This could account for a southern cluster of sites at Gads Hill being on the road skirting the foot of the Western Tiers with the northern cluster at Olivers Plains possibly being on a separate road to the Mt Vandyke ochre mines via Mt Claude.

Relatively few Aboriginal sites have been recorded in the Forth River Valley itself, the most noticeable cluster of small open sites occurring on the south-east flanks of Dalcoath Hill trending towards a cobble reduction site at the edge of the present Lake Cethana, approximately 150m south of the proposed lower intake and outside the disturbance footprint.

The environmental affiliations of Aboriginal sites in the Forth River valley / Lake Cethana are difficult to discern owing to the small sample size, but they appear to be associated with small, benched ridgelines that provide a gradual descent to the river or are at near the valley floor on the northern tips of small prominences overlooking the main river channel. The general patterning of known Aboriginal heritage sites, which likely reflect lake Holocene activities, suggests structured movement through country along maintained roads with targeted use of strategic resources away from these corridors. As a result, large and complex sites are not anticipated in the project area which appears to be situated between two major traditional roads. Small open sites are likely to be present, however, reflecting lower intensity activities such as hunting, plant and stone resource gathering between these thoroughfares.

The disturbance footprint intersects several Aboriginal heritage sites (all single artefacts) that are managed in accordance with the Tasmanian *Aboriginal Heritage Act 1975*. This includes four single artefact sites within the proposed storage footprint and one at the north end of the proposed switchyard pad.

Hydro Tasmania is in the early stages of engaging with the Tasmanian Aboriginal community to develop an understanding of the significance of the identified heritage sites and intangible cultural heritage values that may pertain to the project area.

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. *

The Mersey and Forth rivers rise on Tasmania's central plateau and flow northwards to the coast near Devonport and Forth respectively. Cethana Dam lies on the Forth River and is part of the Mersey Forth Scheme. The most upstream impoundment on the Mersey River is Lake Rowallan with Rowallan Power Station at the toe of Rowallan Dam discharging into the Mersey River which flows for approximately 8 km before entering Lake Parangana. Lake Parangana is also supplied from central plateau waters of Lake Mackenzie that are diverted to the Fisher Power Station before entering the lake via the Fisher River. From Lake Parangana, water is transferred west to the Forth River catchment via a tunnel that releases at Lemonthyme Power Station at the southern end of Lake Cethana. Water is also transferred east to Lake Cethana from Lake Gairdner via a tunnel and penstock which discharges at Wilmot Power Station at the northwest end of Lake Cethana.

The main natural inflows to Lake Cethana are the Forth and Dove rivers. Several small named and unnamed creeks also enter along the steep sided valley along the west and east of the lake. Dolcoath and Bull creeks enter the northwest region of Lake Cethana and their headwaters are directly downslope from the proposed new upper reservoir.

Cethana Dam is a 113 m high concrete face rockfill dam with a crest length of 213 m. The lake is over 90 m deep near the dam wall and has an operating range of approximately 4.58 m with the full supply level (FSL) at 220.98 m and normal minimum operating level (NMOL) at 216.41 m. The total storage capacity of Lake Cethana is 112,210 megalitres and the effective storage capacity is 19,989 megalitres.

Cethana Power Station is situated at the toe of Cethana Dam discharging into the southern end of Lake Barrington formed by the Devils Gate Dam on the Forth River before passing through Devils Gate Power Station and finally Paloona Power station at the toe of their respective dams. The Forth River flows for another 17 km before entering Bass Strait on the central north coast.

Historically and under current operation, the median water level fluctuation in Lake Cethana is approximately 0.35 m over 24 hours and for 10% of the time, it is approximately 0.7 – 0.8 m over 24 hours. Cethana Dam spills for approximately 11% of the time. Hydro Tasmania has modelled the predicted future operations of the Cethana PHES using Plexos software (Attachment 4 - Cethana PHES Project Plexos Environmental Modelling Report – all pages). The lake will continue to operate within the same range with the PHES, however, lake level fluctuations are modelled to increase. The frequency of spill from Cethana Dam is modelled to remain similar to current operation (Attachment 3 - Cethana PHES Project Aquatic Ecology Baseline Report and Impact Assessment – Section – 3.1.3 – Pages 31 to 33). Modelling also predicts that there would be no material hydrological changes elsewhere in the Mersey-Forth Hydro Scheme or in any of Hydro Tasmania's other hydro schemes (Attachment 3 - Cethana PHES Project Aquatic Ecology Baseline Report and Impact Assessment – Section 3.1.2 – Pages 30 to 31).

Water quality monitoring of Lake Cethana was undertaken from 2018 to 2021 and was supplemented by Hydro Tasmania's historical water quality data from 2001-2002 and 2010-2011. Water quality monitoring included bi-monthly and continuous surface water monitoring and depth profiles. The results of historical monitoring and monitoring undertaken for the Cethana PHES Project demonstrate that Lake Cethana is oligotrophic with low nutrients and turbidity, and low primary productivity due to the low nutrient concentrations. Heavy metal

concentrations were generally low and within the ANZECC guideline levels (ANZECC 2000). Depth profile sampling shows a thermocline at 10-30 m during the warmer months but no thermal stratifications occurred between June and September. Profile sampling also showed consistently low turbidity other than when sampling coincided with significant inflow events. The results of water quality monitoring are summarised in Attachment 3 – Cethana PHES Project Aquatic Ecology Baseline Report and Impact Assessment – Section 3.2 – Pages 34 to 46.

An initial hydrogeological assessment and conceptual hydrogeological model has been completed for the Cethana PHES Project. The geology of the Cethana PHES site is dominated by consolidated bedrock comprised of near surface unconsolidated soils, tertiary basalt and Palaeozoic bedrock. The water table in both the basalt aquifer and bedrock aquifer is generally shallow (less than 5m from ground surface). Groundwater levels in the basalt aquifer are highly responsive to rainfall recharge as evidenced by observed fluctuations in groundwater levels at on-site observation bores following rain and low salinity of the groundwater. Groundwater levels in the bedrock aquifer are less responsive to rainfall.

The site is located on a ridge with the topography sloping away from the upper reservoir in all directions and it is likely that the groundwater table mimics the topography. Groundwater is expected to migrate radially from the highpoint at a rate governed by both the hydraulic gradient and the hydraulic conductivity of the aquifer materials. The hydraulic gradient is expected to be steep below the western and eastern slopes of the ridge. It is expected that groundwater discharge would provide base flow to creeks along the lower slopes of the ridge beneath the upper reservoir and would be also expressed as seeps/wetlands beneath the ridge.

To manage movement of water between the upper storage and groundwater table, it is expected that the upper storage will be partly lined with an impermeable liner (e.g. HDPE liner) and will include a drainage layer beneath the liner. If the liner remains impermeable as expected, there is not anticipated to be any change in natural groundwater conditions and no change in the rate of groundwater discharge to creeks and seeps. If there is seepage through the liner that cannot be diverted by the drainage layer, the water table may rise, however, it would not be expected to significantly increase the hydraulic gradient of the water table as it is likely to be naturally steep and thus not increase the rate of groundwater discharge.

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
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.

Direct impact	Indirect impact	World heritage
No	No	Tasmanian Wilderness

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 Tasmanian Wilderness World Heritage Area (TWWHA) abuts land vested to Hydro Tasmania at the southern end of Lake Cethana (Attachment 1 – Cethana PHES Scheme Overview). The boundary between the Hydro Tasmania land and the TWWHA follows the 231 m Sea Level (SL) contour. Lake Cethana has Full Supply Level (FSL) of 220.98 m (SL) contour (Title Reference P135769). The FSL is the maximum level at which water can be stored indefinitely and is equal to the spill way crest level on Cethana Dam. The Cethana PHES Project will operate within the existing FSL of Lake Cethana. The Cethana PHES Project will not have a direct impact on the TWWHA as there is a greater than 10 m vertical separation between the FSL of Lake Cethana and the TWWHA boundary.

Model outputs indicate that the water level in Lake Cethana would fluctuate more frequently. For example, the median lake level change in 24 hours is predicted to increase from 0.35 m to 0.7 m for 50% of the time and from 0.7 m to 1.1 m 10% of the time (Attachment 3 - Cethana PHES Project Aquatic Ecology Baseline Report and Impact Assessment – Section – 3.1.3 – Pages 31 to 33).

Increasing the frequency and magnitude of water level fluctuations is likely to increase the rate of erosional processes in susceptible locations. The valley at the southern end of Lake Cethana in the vicinity of the TWWHA is steep sided with thin soils overlaying bedrock. Most of the areas prone to slips are likely to have already been affected by historic operation of Lake Cethana and while future localised landslides are possible, the prevalence of bedrock suggest that large slides are unlikely. Therefore, the geomorphic and vegetation character of the valley within the TWWHA, which borders 10 m above the FSL of the lake, is likely to remain in its current condition during operation of the PHES. (Attachment 3 – Aquatic Ecology Baseline Report and Impact Assessment – Section 3.3.5 – Pages 69 to 70).

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 Tasmanian Wilderness World Heritage Area (TWWHA) abuts land vested to Hydro Tasmania at the southern end of Lake Cethana (Attachment 1 – Cethana PHES Scheme Overview). The TWWHA is also a National Heritage Place. The boundary between Hydro Tasmania land and the TWWHA follows the 231 m Sea Level (SL) contour (Title Reference P135769). Lake Cethana has Full Supply Level (FSL) of 220.98 m (SL). The FSL is the maximum level at which water can be stored indefinitely and is equal to the spill way crest level on Cethana Dam. The Cethana PHES Project will operate within the existing FSL of Lake Cethana. The Cethana PHES Project will not have a direct impact on the TWWHA as there is a greater than 10 m vertical separation between the FSL of Lake Cethana and the TWWHA boundary.

Model outputs indicate that the water level in Lake Cethana would fluctuate more frequently. For example, the median lake level change in 24 hours is predicted to increase from 0.35 m to 0.7 m for 50% of the time and from 0.7 m to 1.1 m 10% of the time (Attachment 3 - Cethana PHES Project Aquatic Ecology Baseline Report and Impact Assessment – Section – 3.1.3 – Pages 31 to 33).

Increasing the frequency and magnitude of water level fluctuations is likely to increase the rate of erosional processes in susceptible locations. The valley at the southern end of Lake Cethana in the vicinity of the TWWHA is steep sided with thin soils overlaying bedrock. Most of the areas prone to slips are likely to have already been affected by historic operation of Lake Cethana and while future localised landslides are possible, the prevalence of bedrock suggest that large slides are unlikely. Therefore, the geomorphic and vegetation character of the valley within the TWWHA, which borders 10 m above the FSL of the lake, is likely to remain in its current condition during operation of the PHES. (Attachment 3 – Aquatic Ecology Baseline Report and Impact Assessment – Section 3.3.5 – Pages 69 to 70).

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. *

The closest Ramsar Wetland, the Interlaken Ramsar Site, is located more than 100 km to the southeast in the upper Clyde Catchment. The Interlaken Ramsar Site will not be impacted by the Cethana PHES Project and the proposed action will not have a direct or indirect impact to a Ramsar wetland.

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	Aquila audax fleayi
No	No	Astacopsis gouldi
No	Yes	Barbarea australis
No	No	Calidris ferruginea
No	No	Ceyx azureus diemenensis
No	No	Colobanthus curtisiae
Yes	No	Dasyurus maculatus maculatus (Tasmanian population)
Yes	Yes	Dasyurus viverrinus
No	No	Hirundapus caudacutus
No	Yes	Lathamus discolor
No	No	Leucochrysum albicans subsp. tricolor
No	No	Litoria raniformis
No	Yes	Neophema chrysostoma
No	No	Numenius madagascariensis
No	No	Oreixenica ptunarra

Direct impact	Indirect impact	Species
No	No	Perameles gunnii gunnii
No	No	Prototroctes maraena
No	No	Pseudocephalozia paludicola
No	No	Pterodroma leucoptera leucoptera
No	No	Pterostylis ziegeleri
Yes	Yes	Sarcophilus harrisii
No	No	Tyto novaehollandiae castanops (Tasmanian population)

Ecological communities

Direct impact	Indirect impact	Ecological community
No	No	Alpine Sphagnum Bogs and Associated Fens
No	No	Lowland Native Grasslands of Tasmania
No	No	Tasmanian Forests and Woodlands dominated by black gum or Brookers gum (Eucalyptus ovata / E. brookeriana)
No	No	Tasmanian white gum (Eucalyptus viminalis) wet forest

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. *

Barbarea australis **(native wintercress**)

Native wintercress was recorded from an approximately 3 km long reach of Bull Creek upstream from its entry to Lake Cethana. There are no previous records of this species in the Forth River catchment. Native wintercress is an opportunistic riparian coloniser, relying on disturbance, particularly flow disturbance, to turn over bank sediments and create suitable ground for its establishment. Bull Creek is an unregulated creek that contains small areas suitable native wintercress habitat. The shoreline of Lake Cethana does not appear to provide habitat for native wintercress and it has not been recorded from the shorelines of other lakes in Tasmania.

Only a short (approximately 30 m) reach of the mouth of Bull Creek is within the operational zone of Lake Cethana. This reach is under the influence of current operation and would continue to be affected during operation of the Cethana PHES project. The upper storage has an emergency spillway that drains into a headwater tributary of Bull Creek. Failure of the Cethana PHES could result in the activation of new storage spillway and would subject an 800 m reach of Bull Creek to scouring flows up to 126 m3/s. Large spill events could impact the population of native wintercress in Bull Creek. However, the probability of the emergency spillway being engaged has been calculated as less than a 1 in 10,000 chance annually and is therefore considered a very remote possibility.

A detailed description of potential impacts to native wintercress is provided in Attachment 3 - Cethana PHES Project Aquatic Ecology Baseline Report and Impact Assessment – Section 3.4.3 – Pages 83 to 91.

Tasmanian devil (*Sarcophilus harrisii*)

Tasmanian devils preferred habitat is open forests and woodland and they are less commonly found in tall or dense wet forests. There is 85 ha of dry forest and native grassland within the disturbance footprint which is likely to be used as preferred foraging habitat by the Tasmanian devil and a further 104.3 ha of less preferred wet forest habitat. Fourteen wombat borrows were recorded in the disturbance footprint in the highland *Poa* grassland vegetation community which could potentially be used as den sites. The clearance of vegetation in the disturbance footprint may directly and indirectly impact the Tasmanian devil by the permanent loss of foraging habitat and existing and potential den sites. Noise and vibration during construction may also disturb breeding in maternal dens. Due to the scavenging behaviour of devils, an increase in traffic on local roads during construction also has potential to directly impact devils through an increase in roadkill.

A detailed description of potential impacts to the Tasmanian devil is provided in Attachment 2 - Cethana PHES Project Terrestrial Ecology Baseline Report and Impact Assessment – Section 4.1.2.1 – Pages 62 to 63.

Eastern quoll (*Dasyurus viverrinus*)

Eastern quolls inhabit grasslands, dry forest and agricultural land but do not generally inhabit wet forest or rain forest. There is 85 ha of dry forest and native grassland within the disturbance footprint which is likely to be used as preferred foraging and denning habitat by the eastern quoll. The clearance of vegetation in the disturbance footprint may directly and indirectly impact the eastern quoll by the permanent loss of foraging and denning habitat. Noise and vibration during construction may also disturb breeding in maternal dens. Due to the scavenging behaviour of quolls, an increase in traffic on local during construction also has potential to directly impact quolls through an increase in roadkill.

A detailed description of potential impacts to the eastern quoll is provided in Attachment 2 - Cethana PHES Project Terrestrial Ecology Baseline Report and Impact Assessment – Section 4.1.2.1 – Pages 62 to 63.

Spotted tailed quoll (***Dasyurus maculatus subsp. Maculatus***)

The spotted-tailed quoll inhabits wet forest and rainforest. There is 104.3 ha of wet eucalypt forest and 2.6 ha of rainforest within the disturbance footprint which is likely to be used as foraging and denning habitat by the spotted tailed quoll (note that 38 ha of the wet forest habitat is comprised of regrowth from forestry operations and would be suboptimal habitat for the spotted tailed quoll). The clearance of vegetation in the disturbance footprint may directly and indirectly impact the spotted tail quoll by the permanent loss of foraging and denning habitat. Noise and vibration during construction may also disturb breeding in maternal dens. Due to the scavenging behaviour of quolls, an increase in traffic on local roads during construction also has potential to directly impact quolls through an increase in roadkill.

A detailed description of potential impacts to the spotted tailed quoll is provided in Attachment 2 - Cethana PHES Project Terrestrial Ecology Baseline Report and Impact Assessment – Section 4.1.2.1 – Pages 62 to 63.

Tasmanian wedge-tailed eagle (*Aquila audax fleayi*)

Wedge-tailed eagle nest surveys recorded two eagle nests within 1 km of the disturbance footprint, both associated with the proposed transmission line alignment. The nests are either wedge-tailed eagle or white-bellied sea-eagle (*Haliaeetus leucogaster*) nests. Wedge-tailed eagles are sensitive to disturbance during the breeding season and disturbance may result in nest desertion. There is the potential for construction activities associated with the transmission line to indirectly affect breeding by wedge-tailed eagles. Wedge-tailed eagles are also susceptible to electrocution and collision with powerlines, and there is potential for the new 220 kV transmission line to increase the direct impact risk of electrocution and collision events.

A detailed description of potential impacts to the wedge-tailed eagle is provided in Attachment 2 - Cethana PHES Project Terrestrial Ecology Baseline Report and Impact Assessment – Section 4.1.2.1 – Pages 63 to 64.

Swift parrot (*Lathamus discolor*)

The Cethana PHES Project is located outside the breeding range of the swift parrot which is within 10 km of the coast. There is one record of the swift parrot approximately 600 m west of the upper storage. This record is most likely a bird foraging on flowering *E. delegatensis* post breeding as the birds move across the Central Plateau in search of flowering eucalypts. The Cethana PHES Project has the potential to indirectly impact swift parrots due to the clearing of potential foraging habitat.

A detailed description of potential impacts to the swift parrot is provided in Attachment 2 - Cethana PHES Project Terrestrial Ecology Baseline Report and Impact Assessment – Section 4.1.2.1 – Page 64.

Blue winged parrot (*Neophema chrysostoma*)

The blue winged parrot occurs in coastal, sub-coastal and inland areas in north-western, central and eastern parts of Tasmania. In Tasmania, blue winged parrots favour dry eucalypt forests and woodlands for breeding where they nest in hollows in eucalypts. The closest records of blue winged parrots are located 11 km from the disturbance footprint. The highland *Poa* grassland vegetation community within the upper impoundment area may be visited on occasions by blue winged parrots, however, it is unlikely to be suitable breeding habitat as it is surrounded by dense wet forest. The Cethana PHES Project has the potential to indirectly impact blue winged parrots through the clearing of foraging habitat.

A detailed description of potential impacts to the blue winged parrot is provided in Attachment 2 - Cethana PHES Project Terrestrial Ecology Baseline Report and Impact Assessment – Section 4.1.2.1 – Page 65.

Other MNES

A patch of Tasmanian white gum (*Eucalyptus viminalis*) wet forest vegetation community occurs outside the project area and will not be directly or indirectly impacted by the Cethana PHES Project - Attachment 2 - Cethana PHES Project Terrestrial Ecology Baseline Report and Impact Assessment – Section 4.1.1.2 – Pages 60 to 61.

There are three areas of suitable Tasmanian masked owl breeding habitat within the project area and bio-acoustics recorders have been deployed to determine if masked owls are present. The areas of identified masked owl habitat are located outside the disturbance footprint and have been included in avoidance areas. Masked owls will not be directly or indirectly impacted by the Cethana PHES Project - Attachment 2 - Cethana PHES Project Terrestrial Ecology Baseline Report and Impact Assessment –4.1.2.1 – page 64.

Giant freshwater crayfish (*Astacopsis gouldi*) are known to occur in the catchment of Lake Barrington but have not been recorded upstream of Lake Barrington in Lake Cethana or its tributaries. Extensive targeted surveys, including physical searches and eDNA surveys, found no evidence for giant freshwater crayfish in Lake Cethana or its tributaries (Attachment 3 - Cethana PHES Project Aquatic Ecology Baseline Report and Impact Assessment – Section 3.4.4 - Pages 92 to 101). The alignment for the new transmission line crosses a section of the southern end of Lake Barrington and two of its tributaries, however, the lake and creeks will be spanned and there will be no works in or adjacent to these watercourses. The Cethana PHES Project will not directly or indirectly impact giant freshwater crayfish.

Targeted surveys concluded that the following MNES were unlikely to occur:

- Tussock skink (*Pseudemoia pagenstecheri*) (Attachment 2 - Cethana PHES Project Terrestrial Ecology Baseline Report and Impact Assessment – Section 3.4.7 – Pages 53 to 54)
- Ptunarra brown butterfly (*Oreixenica ptunarra*) (Attachment 2 - Cethana PHES Project Terrestrial Ecology Baseline Report and Impact Assessment – Section 3.4.8 – Pages 54 to 57).

Other MNES are considered unlikely to occur (Attachment 2 - Cethana PHES Project Terrestrial Ecology Baseline Report and Impact Assessment – Appendix B).

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. *

Tasmanian devil (*Sarcophilus harrisii*)

The clearance of vegetation within the disturbance footprint that is suitable foraging and denning habitat may impact Tasmanian devils by:

- Adversely affecting preferred dry forest and grassland habitat, particularly the destruction of existing and potential den sites, as well as less preferred wet forest habitat that is critical to survival of the Tasmanian devil.
- Disrupting the breeding cycle of a population of Tasmanian devils by destroying existing and potential den sites and disturbing breeding in maternal dens by increased noise and vibration during construction.

In accordance with the EPBC Act Matters of National Environmental Significance Significant impact guidelines 1.1, an action which has *a real chance or possibility that it will* result in the potential impacts listed above is likely to have a significant impact on an endangered species.

A detailed assessment of the potential impacts to Tasmanian devils against the Matters of National Environmental Significance Significant impact guidelines 1.1 is provided in Attachment 2 - Cethana PHES Project Terrestrial Ecology Baseline Report and Impact Assessment– Appendix D.1.

Eastern quoll (*Dasyurus viverrinus*)

The clearance of vegetation within the disturbance footprint that is suitable foraging and denning habitat may impact the eastern quoll by:

- Adversely affecting preferred dry forest and grassland habitat, particularly the destruction of potential den sites that is critical to survival of the eastern quoll.
- Disrupting the breeding cycle of a population of eastern quolls by destroying existing and potential den sites and disturbing breeding in maternal dens by increased noise and vibration during construction.

In accordance with the EPBC Act Matters of National Environmental Significance Significant impact guidelines 1.1, an action which has *a real chance or possibility that it will* result in the potential impacts listed above is likely to have a significant impact on an endangered species.

A detailed assessment of the potential impacts to eastern quolls against the Matters of National Environmental Significance Significant impact guidelines 1.1 is provided in Attachment 2 - Cethana PHES Project Terrestrial Ecology Baseline Report and Impact Assessment– Appendix D.2.

For assessments against Matters of National Environmental Significance Significant impact guidelines 1.1 for MNES where potential impacts are not considered to be significant, refer to the following:

- *Barbarea australis* (native wintercress) (Attachment 3 - Cethana PHES Project Aquatic Ecology Baseline Report and Impact Assessment – Table 3.10 – Pages 88 to 90)
- Spotted-tailed quoll (*Dasyurus maculatus subsp. maculatus*) (Attachment 2 - Cethana PHES Project Terrestrial Ecology Baseline Report and Impact Assessment – Appendix D.3)
- Tasmanian wedge-tailed eagle (*Aquila audax subsp. fleayi*) (Attachment 2 - Cethana PHES Project Terrestrial Ecology Baseline Report and Impact Assessment – Appendix D.4)
- Swift parrot (*Lathamus discolor*) (Attachment 2 - Cethana PHES Project Terrestrial Ecology Baseline Report and Impact Assessment – Appendix D.5)
- Blue winged parrot (*Neophema chrysostoma*) (Attachment 2 - Cethana PHES Project Terrestrial Ecology Baseline Report and Impact Assessment – Appendix D.6)

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 EPBC Act Public Portal glossary defines a controlled action as *an action that is likely to have a significant impact on a Part 3 protected matter*. Part 3, Division 1, Subdivision C of the EPBC Act includes listed threatened species and communities as a protected matter.

As described above, the Cethana PHES Project is likely to have a significant impact on the listed threatened species the Tasmanian devil (*Sarcophilus harrisii*) and the eastern quoll (*Dasyurus viverrinus*); it is therefore considered to be a controlled action.

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. *

To avoid direct impacts to Tasmanian devils and eastern quolls, a pre-construction survey will be completed to locate possible Tasmanian devil or eastern quoll den sites, including wombat burrows. If any dens are found, a determination on whether they are active will be made in accordance with the *Survey Guidelines and Management Advice for Development Proposals that may impact on the Tasmanian Devil* (Natural and Cultural Heritage Division 2015). If an active den/s is found, it will be closed in accordance with the procedure for the closure and destruction of den sites as described in *Survey Guidelines and Management Advice for Development Proposals that may impact on the Tasmanian Devil* (Natural and Cultural Heritage Division 2015).

To minimise Tasmanian devil and eastern quoll roadkill, a roadkill management plan will be prepared and contractually enforced. The plan will include:

- Minimise vehicle movements between dusk and dawn.
- Roadkill and threatened species awareness in induction programs for any personnel travelling to the construction site.
- Monitor and record any roadkill carcasses of threatened mammals (i.e. Tasmanian devil, eastern quoll and spotted-tailed quoll). This will include removal (when/where safe), recording location, condition and collecting any Tasmanian devil carcasses for provision to the Tasmanian devil program if requested.

Where roadkill of a threatened species has been reported (including roadkill not related to the Cethana PHES Project), a review of the incident will occur to assess whether additional roadkill minimisation measures are required.

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

An offset plan for the Tasmanian devil and the eastern quoll will be prepared which will include:

- the feasibility of constructing artificial den sites and denning habitat within the project area.
- options to protect known foraging habitat, den sites/s and or denning habitat elsewhere within the project area or at other locations.
- funding of research programs.

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

Direct impact	Indirect impact	Species
No	No	Calidris acuminata
No	No	Calidris ferruginea
No	No	Calidris melanotos
No	No	Gallinago hardwickii
No	No	Hirundapus caudacutus
No	Yes	Myiagra cyanoleuca
No	No	Numenius madagascariensis
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. *

Satin flycatcher (*Myiagra cyanoleuca*)

The satin flycatcher is a summer breeding migrant to Tasmania where its preferred habitat is wet and damp tall eucalypt forests. It was recorded during surveys and there is approximately 104.3 ha of wet eucalypt forest habitat within the disturbance footprint. The clearance of approximately 117.9 ha of suitable habitat may have an indirect impact on the satin flycatcher - Attachment 2 - Cethana PHES Project Terrestrial Ecology Baseline Report and Impact Assessment – Section 4.1.2.2 – Page 65.

Other Migratory Species

Both the white-throated needletail (*Hirundapus caudacutus*) and fork-tailed swift (*Apus pacificus*) are almost exclusively aerial when in Tasmania. Given that the species are not dependent on terrestrial habitats, it is unlikely that the removal of native vegetation will result in an impact to either the white-throated needletail or the fork-tailed swift - Attachment 2 - Cethana PHES Project Terrestrial Ecology Baseline Report and Impact Assessment – Section 4.1.2.2 – Page 65 and Appendices D8 and D9.

Other MNES are considered unlikely to occur (Attachment 2 - Cethana PHES Project Terrestrial Ecology Baseline Report and Impact Assessment – Appendix B).

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. *

The clearance of vegetation within the disturbance footprint that is suitable habitat for the satin flycatcher will not have a significant impact as it will not:

- modify, destroy or isolate an area of important habitat for a migratory species because the area of native vegetation to be disturbed is below 4,000 ha which is the 1% threshold for an area of important habitat which is likely to result in a significant impact as defined in the Referral guideline for 14 birds listed as migratory species under the EPBC Act
- seriously disrupt the lifecycle of an ecologically significant proportion of the population of a migratory species because the population disturbed will be below 1700 which is the national ecologically significant portion of the population for the satin flycatcher as defined in the Referral guideline for 14 birds listed as migratory species under the EPBC Act.
- Result in an invasive species that is harmful to the satin flycatcher.

Refer to Attachment 2 – Cethana PHES Project Terrestrial Ecology Baseline Report and Impact Assessment – Appendix D10 for assessment of the impact to the satin flycatcher against the Matters of National Environmental Significance Significant impact guidelines 1.1.

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 EPBC Act Public Portal glossary defines a controlled action as *an action that is likely to have a significant impact on a Part 3 protected matter*. Part 3, Division 1, Subdivision D of the EPBC Act includes listed migratory species as a protected matter.

The Cethana PHES Project will not have a significant impact on migratory species and is therefore not considered to be a controlled action.

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. *

No avoidance or mitigation measures are proposed as the action is unlikely to have a significant impact on any migratory species.

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

No offsets are proposed, as the action is unlikely to have a significant impact on any migratory species.

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 proposed action 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 within, adjacent to or nearby the Cethana Pumped Hydro Project area. The proposed action is unlikely to directly or indirectly cause a significant impact to Commonwealth Marine Areas.

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 is not within, adjacent to or nearby the Cethana Pumped Hydro Project area. The proposed action is unlikely to directly or indirectly cause a significant impact to the Great Barrier Reef.

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 proposed action is not a large coal mining or coal seam gas action.

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. *

There is no Commonwealth land within, adjacent to or nearby the Cethana Pumped Hydro Project area. The proposed action is unlikely to directly or indirectly cause a significant impact to 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. *

There are no Commonwealth heritage places overseas within, adjacent to or nearby the Cethana Pumped Hydro Project area. The proposed action is unlikely to directly or indirectly cause a significant impact to any 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 Cethana PHES Project objectives are to:

- Provide new firming capacity to meet the needs of a future electricity market that will have substantially higher proportion of variable renewable energy generation.
- Design for rapid response to market needs for clean, deep storage that can fill supply gaps over extended periods as well as provide ancillary services to the market, which are becoming increasingly critical in a VRE dominated system.
- Provide increased capacity and flexibility within the hydropower system to create additional revenue opportunities.
- Improve the flexibility of Hydro Tasmania's portfolio to enable revenue streams to be more resilient to a range of future market conditions.

The following sections outline how the proposed action meets these objectives and that following extensive options assessments, there were no alternatives that met the objectives.

Project location

Tasmania's geography is well suited for PHES developments due to its hilly and mountainous terrain located in close proximity to abundant water storages, including lakes and rivers. Such topography enables the construction of large reservoirs at relatively high elevations, facilitating high heads and short connection distance (via tunnels or conveyances).

Tasmania already has an established hydroelectric power generation system in place, with a large network of dams and hydropower stations in operation. This infrastructure can be utilised to support new pumped hydro, as existing infrastructure can potentially be used as the lower/upper reservoirs for the pumped hydro system.

Tasmania's natural advantages result in a lower relative cost for PHES development on a dollar per kWh basis, when compared to mainland Australian PHES locations.

Various studies were conducted over a four-year period from 2017 - 2021 to determine Cethana as the preferred site for a pumped hydro project in Tasmania.

A longlist of 2,000 sites was developed using a state-wide screening process undertaken in 2017. Topographic information was then analysed to identify 28 sites with high potential suitability for constructing pumped hydro projects. Hydro Tasmania conducted a concept options study in 2018 that identified 14 projects to undergo prefeasibility studies.

In 2018-19, prefeasibility studies were done on the 14 potential sites identified. These studies confirmed that six sites were suitable to progress to feasibility studies. Of these six sites, the three most promising sites were progressed to the feasibility study stage in 2019. These were Cethana, Rowallan and Tribute.

An assessment of the three sites was undertaken in 2020, based on a range of mandatory and selection criteria. This process initially selected two preferred sites to consider further (Cethana and Tribute) and further analysis was done to select a preferred site. Our "multi-criteria analysis" used technical, environmental, social and economic factors to make the assessment including:

- Capacity and storage duration (and flexibility of design options for both size and duration)
- Effective management of identified risks across social, environmental, culture and heritage, technical and project delivery
- Financial (costs and benefits in a future market)
- Constructability and project schedule.

As a result, Cethana was selected as the preferred pumped hydro site.

Deep storage capacity, greater cost and technical certainty, environmental and social sustainability and flexibility in sizing and capacity made Cethana the preferred site and technical feasibility was finalised in 2021.

The study considered two alternative options for location of infrastructure (southern and northern options) and concluded that the northern most design option with a downstream power station cavern (Option D) should be progressed.

The size of the upper reservoir was maximised during the feasibility study to a level that is technically feasible and cost-effective.

Project capacity and storage duration

The proposed action considers utilisation of the existing Lake Cethana as the lower storage, with construction of a new approximately 750 MW underground power station, linking underground tunnels and a new upper storage with approximately 20 hours' duration.

Alternative capacity and storage durations (higher and lower) were considered but not favoured as:

- a materially larger facility is only possible in market scenarios where there is very low VRE output and/or significantly greater Tasmanian load growth. Additionally, while estimated revenues may be higher for a larger-sized facility, the market opportunity is lower, increasing the risk of an underutilised asset.
- a materially smaller facility would not fully maximise the opportunity of available export interconnector capacity and would result in foregone revenue opportunities.
- changing from the preferred 750 MW sizing would increase the risk of not aligning the project to the Marinus Link timeline for the second 750 MW cable.

The feasibility study (2020) and the subsequent project development and business case analysis (2023) has confirmed that approximately 750 MW and 20 hours' storage duration is the optimal sizing to meet the objectives.

5. Lodgement

5.1 Attachments

1.2.1 Overview of the proposed action

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Attachment 1 - Cethana PHES Project Scheme Overview.pdf Schematic overview map of the Cethana PHES Project	31/07/2023	No	High
#2.	Document	Attachment 2 - Cethana PHES Project Terrestrial Ecology Baseline and Impact Assessment.pdf Report describing the existing terrestrial ecology and potential impacts of the Cethana PHES, including to MNES	31/07/2023	No	High
#3.	Document	Attachment 3 - Cethana PHES Project Aquatic Baseline and Impact Assessment Report.pdf Report describing the existing aquatic ecology and potential impacts of the Cethana PHES, including to MNES	31/07/2023	No	High

1.2.7 Public consultation regarding the project area

	Type	Name	Date	Sensitivity	Confidence
#1.	Link	Cethana pumped hydro project https://connect.hydro.com.au/cethana-pumpedhydro			High
#2.	Link	Hydro Tasmania http://www.hydro.com.au			High

1.3.2.17 (Person proposing to take the action) Proposer's history of responsible environmental management

	Type	Name	Date	Sensitivity	Confidence
#1.	Link	Hydro Tasmania - Environmental Policy https://www.hydro.com.au/docs/default-source/abo..			High
#2.	Link	Hydro Tasmania - Sustainability Principles https://www.hydro.com.au/docs/default-source/abo..			High

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

	Type	Name	Date	Sensitivity	Confidence
#1.	Link	Hydro Tasmania - Environmental Policy https://www.hydro.com.au/docs/default-source/abo..			High
#2.	Link	Hydro Tasmania - Sustainability Principles https://www.hydro.com.au/docs/default-source/abo..			High

3.1.1 Current condition of the project area's environment

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Attachment 1 - Cethana PHES Project Scheme Overview.pdf Schematic overview map of the Cethana PHES Project	30/07/2023		High
#2.	Document	Attachment 2 - Cethana PHES Project Terrestrial Ecology Baseline and Impact Assessment.pdf Report describing the existing terrestrial ecology and potential impacts of the Cethana PHES, including to MNES	30/07/2023		High

#3.	Document	Attachment 3 - Cethana PHES Project Aquatic Baseline and Impact Assessment Report.pdf Report describing the existing aquatic ecology and potential impacts of the Cethana PHES, including to MNES	30/07/2023	High

3.1.2 Existing or proposed uses for the project area

	Type	Name	Date	Sensitivity	Confidence
#1.	Link	Inland Fisheries Service - Angler Postal Survey (APS) Results 2017 https://www.ifs.tas.gov.au/media/publications/IF..			High

3.1.3 Natural features, important or unique values that applies to the project area

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Attachment 1 - Cethana PHES Project Scheme Overview.pdf Schematic overview map of the Cethana PHES Project	30/07/2023		High
#2.	Document	Attachment 3 - Cethana PHES Project Aquatic Baseline and Impact Assessment Report.pdf Report describing the existing aquatic ecology and potential impacts of the Cethana PHES, including to MNES	30/07/2023		High

3.2.1 Flora and fauna within the affected area

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Attachment 2 - Cethana PHES Project Terrestrial Ecology Baseline and Impact Assessment.pdf Report describing the existing terrestrial ecology and potential impacts of the Cethana PHES, including to MNES	30/07/2023		High
#2.	Document	Attachment 3 - Cethana PHES Project Aquatic Baseline and Impact Assessment Report.pdf Report describing the existing aquatic ecology and potential impacts of the Cethana PHES, including to MNES	30/07/2023		High

3.2.2 Vegetation within the project area

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Attachment 2 - Cethana PHES Project Terrestrial Ecology Baseline and Impact Assessment.pdf Report describing the existing terrestrial ecology and potential impacts of the Cethana PHES, including to MNES	30/07/2023		High

3.3.2 Indigenous heritage values that apply to the project area

	Type	Name	Date	Sensitivity	Confidence
#1.	Link	Friendly mission : the Tasmanian journals and papers of George Augustus Robinson, 1829-1834 / edited https://catalogue.nla.gov.au/catalog/4268838			High

3.4.1 Hydrology characteristics that apply to the project area

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Attachment 3 - Cethana PHES Project Aquatic Baseline and Impact Assessment Report.pdf Report describing the existing aquatic ecology and potential impacts of the Cethana PHES, including to MNES	30/07/2023		High
#2.	Document	Attachment 4 - Cethana PHES Project PLEXOS Environmental Modelling.pdf Report describing the results of PLEXOS modelling completed for the Cethana PHES Project	31/07/2023	No	High

4.1.1.3 (World Heritage) Why your action is unlikely to have a direct and/or indirect impact

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Attachment 1 - Cethana PHES Project Scheme Overview.pdf Schematic overview map of the Cethana PHES Project	30/07/2023		High
#2.	Document	Attachment 3 - Cethana PHES Project Aquatic Baseline and Impact Assessment Report.pdf Report describing the existing aquatic ecology and potential impacts of the Cethana PHES, including to MNES	30/07/2023		High

4.1.2.3 (National Heritage) Why your action is unlikely to have a direct and/or indirect impact

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Attachment 1 - Cethana PHES Project Scheme Overview.pdf Schematic overview map of the Cethana PHES Project	30/07/2023		High
#2.	Document	Attachment 3 - Cethana PHES Project Aquatic Baseline and Impact Assessment Report.pdf Report describing the existing aquatic ecology and potential impacts of the Cethana PHES, including to MNES	30/07/2023		High

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 2 - Cethana PHES Project Terrestrial Ecology Baseline and Impact Assessment.pdf Report describing the existing terrestrial ecology and potential impacts of the Cethana PHES, including to MNES	30/07/2023		High
#2.	Document	Attachment 3 - Cethana PHES Project Aquatic Baseline and Impact Assessment Report.pdf Report describing the existing aquatic ecology and potential impacts of the Cethana PHES, including to MNES	30/07/2023		High

4.1.4.5 (Threatened Species and Ecological Communities) Why you consider the direct and/or indirect impact to be a Significant Impact

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Attachment 2 - Cethana PHES Project Terrestrial Ecology Baseline and Impact Assessment.pdf Report describing the existing terrestrial ecology and potential impacts of the Cethana PHES, including to MNES	30/07/2023		High
#2.	Document	Attachment 3 - Cethana PHES Project Aquatic Baseline and Impact Assessment Report.pdf Report describing the existing aquatic ecology and potential impacts of the Cethana PHES, including to MNES	30/07/2023		High
#3.	Link	Matters of National Environmental Significance Significant impact guidelines 1.1 https://www.dcceew.gov.au/sites/default/files/do..			High

4.1.4.8 (Threatened Species and Ecological Communities) Why you think your proposed action is a controlled action

	Type	Name	Date	Sensitivity	Confidence
#1.	Link	Glossary - EPBC Act Public Portal https://epbcpublicportal.awe.gov.au/guides-resou..			High

4.1.4.10 (Threatened Species and Ecological Communities) Avoidance or mitigation measures proposed for this action

	Type	Name	Date	Sensitivity	Confidence

#1.	Link	Survey Guidelines and Management Advice for Development Proposals that may impact on the Tasmanian D https://nre.tas.gov.au/Documents/Devil%20Survey%..		High

4.1.5.2 (Migratory Species) Why your action has a direct and/or indirect impact on the identified protected matters

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Attachment 2 - Cethana PHES Project Terrestrial Ecology Baseline and Impact Assessment.pdf Report describing the existing terrestrial ecology and potential impacts of the Cethana PHES, including to MNES	30/07/2023		High

4.1.5.6 (Migratory Species) Why you do not consider the direct and/or indirect impact to be a Significant Impact

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Attachment 2 - Cethana PHES Project Terrestrial Ecology Baseline and Impact Assessment.pdf Report describing the existing terrestrial ecology and potential impacts of the Cethana PHES, including to MNES	30/07/2023		High
#2.	Link	Matters of National Environmental Significance Significant impact guidelines 1.1 https://www.dcceew.gov.au/sites/default/files/do..			High
#3.	Link	Referral guideline for 14 birds listed as migratory species under the EPBC Act. https://www.dcceew.gov.au/sites/default/files/do..			High

4.1.5.9 (Migratory Species) Why you do not think your proposed action is a controlled action

	Type	Name	Date	Sensitivity	Confidence
#1.	Link	Glossary - EPBC Act Public Portal https://epbcpublicportal.awe.gov.au/guides-resou..			High

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
Organisation address	4 Elizabeth Street, Hobart, TAS 7000
Representative's name	David Procter
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☑ 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, **David Procter of HYDRO-ELECTRIC CORPORATION**, 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	48072377158
Organisation name	HYDRO-ELECTRIC CORPORATION
Organisation address	4 Elizabeth Street, Hobart, TAS 7000
Representative's name	Paul Molnar
Representative's job title	Project Director BotN Projects– Hydro Tasmania
Phone	03 6240 2270
Email	paul.molnar@hydro.com.au
Address	GPO Box 355 Hobart Tasmania 7001

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, **Paul Molnar of HYDRO-ELECTRIC CORPORATION**, 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, **Paul Molnar of HYDRO-ELECTRIC CORPORATION**, the Person proposing the action, consent to the designation of **Donna Brown of HYDRO-ELECTRIC CORPORATION** 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. *

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.

ABN/ACN	48072377158
Organisation name	HYDRO-ELECTRIC CORPORATION
Organisation address	4 Elizabeth Street, Hobart, TAS 7000
Representative's name	Donna Brown
Representative's job title	Manager Stakeholder Relations, Environment and Planning – Battery of the Nation

Phone	03 6240 2270
Email	donna.brown@hydro.com.au
Address	GPO Box 355 Hobart Tasmania 7001

- [x] Check this box to indicate you have read the referral form. *

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

- [x] I, **Donna Brown of HYDRO-ELECTRIC CORPORATION**, 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. *

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