SECTION 6 - POTENTIAL IMPACTS AND THEIR MANAGEMENT

6. Potential impacts and their management

This section outlines the assessment approach for the EIS, identifies and assesses the potential impacts of the proposal, and outlines the proposed mitigation, management and monitoring measures that would be implemented.

Identifying and assessing impacts

The impacts assessed for the proposal consider a suite of environmental and social aspects. The EPA Board identified these aspects in the EIS guidelines it published for the Heybridge Shore Crossing. A copy of the EIS guidelines for the proposal, and where the requirements have been addressed, is provided in full in Appendix A, with relevant EIS guidelines for each environmental and social aspect summarised within that section. Where there is cross-over between sections to address related issues (i.e., water quality is addressed in more than one section, as is contaminated materials), this is identified at the start of each section.

Whilst the steps required for the identification and assessment of issues is broadly the same across the technical disciplines, the approach to the impact assessment and the cumulative impact assessment is discussed in more detail below. A detailed assessment methodology for each technical assessment is explained in the relevant technical Appendix.

Methodology

The preparation of this EIS has involved technical specialists assessing aspects across various environmental and social disciplines. Four different impact assessment methods have been used to assess direct and indirect impacts, depending on the technical discipline, environmental, cultural and social context, and statutory requirements. These methods are:

- **Significance assessment.**
- **Risk assessment.**
- **Compliance assessment.**
- **Discipline specific methods.**

A *significance assessment* evaluates the sensitivity of a value to change and the magnitude of an impact on the value. This method assumes an impact would occur, with mitigation focussing on reducing the magnitude of an impact.

The benefit of using the *significance method* is that it requires an explicit assessment of the sensitivity of the value which is useful where there is uncertainty about the sensitivity of a value or how it would respond to a change.

A *risk assessment* considers the likelihood of environmental harm occurring (i.e., the likelihood of an event, mechanism or pathway existing and, when considered together with the hazard, resulting in harm to the

environment) and the consequences of this harm, considering the sensitivity of the value to change, to determine the risk of environmental harm.

A *risk assessment* is beneficial when there is more certainty about the sensitivity of values and how they would respond to change, and where there is an ability to manage the likelihood of environmental harm occurring, for example by avoiding the event or pathway.

The *compliance assessment method* is adopted where the study approach relies on compliance with a statutory guideline or policy, e.g., water and air quality guidelines.

Some studies adopt *discipline specific methods* where they are standards or technical guidelines. Examples are GHG estimates and bushfire assessments, which are done in accordance with national reporting standards and guidelines, emanating from inquiries and reviews into bushfire disasters.

The method used in each technical study was determined by the technical specialists considering the context, environmental values, proposed activities, statutory requirements and guidelines.

The key steps for the impact assessments are:

- Assessing existing conditions and identifying relevant values.
- Reviewing the project description and identifying credible impact pathways – where project activities could result in an impact on the value.
- Assessing the potential impacts of activities undertaken for the project on the values.
- Where a need is identified to reduce impacts, developing management measures that reduce the impacts.
- Assessing the residual impacts on values.

Further explanation of each method and when and how they are applied in the technical studies are provided below.

Identifying values

The basis of an impact assessment is identifying the values potentially affected by a project. Values encompass the qualities, characteristics and conditions of the physical, biological, social, cultural and economic environments. This forms the basis of the characterisation of the existing environment or ‘existing conditions’. A value is:

- A quality or physical characteristic of the environment that is important to ecological health; public benefit (or amenity), safety or health.
- A quality of the environment identified and declared to be a value under environmental legislation.

Changes due to the construction, operation or decommissioning of the project that affect these values are the impacts assessed in this EIS. Impacts can be both positive and negative, and the technical studies have considered if both could occur.

Impact pathways

For harm to values to occur, an impact pathway must exist between the proposal and the value. This considers the following:

- **Hazardous activity**: The proposal could cause harm or damage (an impact) to an identified value.
- **Mechanism**: The event that enables or triggers the hazard to cause harm or damage to an identified value.
- **Pathway**: The physical route from the hazard to the value such as through the ground, air or water.

Once the impact pathway has been identified, the impact would be assessed by a significance or risk assessment.

A risk is a hazardous event, situation or activity that poses a threat to a value. A risk assessment considers the likelihood and the consequence of the hazardous event occurring.

An impact is the effect of an action or hazardous event. An impact assessment considers the mitigation measures required to avoid, minimise, offset or manage an impact together with the sensitivity of the value and the magnitude of the impact.

Further explanation on the application of significance, risk, compliance assessments and discipline specific methods is discussed below.

Impact assessment methods

Table 6-1 sets out the impact assessment method applied for each technical study. Further details of how the method has been applied and why it is appropriate for the technical study is provided in the respective appendices to this EIS.

Table 6-1 Application of assessment method by technical study

Technical study	Assessment method
Terrestrial ecology	Significance
Contaminated land and acid sulfate soils	Risk
Marine ecology and resource use	Significance
Marine benthic ecology	Discipline specific
Surface water	Risk
Groundwater	Significance
Noise and vibration	Risk
Air quality	Risk
Greenhouse gas	Discipline specific
Social	Significance
Economic	Discipline specific
Traffic and transport	Significance and risk

Significance assessment

This method considers the significance of an impact on the value by evaluating the magnitude of an impact, and the sensitivity of the value to change. This approach assumes the impact would occur due to the actions taken for the proposal (i.e., a hazard, event or mechanism and pathway exist and are credible) and mitigation focuses on reducing the magnitude of an impact.

The sensitivity of a value is determined with respect to its protection status, intactness, uniqueness or rarity, resilience to change, replacement potential and community value. These contributing factors are described below:

- **Protection status** is assigned to a value by governments (including statutory and regulatory authorities) or recognised international organisations (e.g., United Nations Educational, Scientific and Cultural Organization) through legislation, regulations and international conventions.
- **Intactness** is an assessment of how intact a value is. It is a measure (with respect to its characteristics or properties) of its existing condition, particularly its representativeness.
- **Uniqueness** or rarity of a value is an assessment of its occurrence, abundance and distribution within and beyond its reference area (e.g., bioregion/biosphere).
- **Resilience** to change is determined by the extent to which a value can cope with change including that posed by threatening processes. This factor is an assessment of the ability of a value to adapt to change without adversely affecting its conservation status, intactness, uniqueness or rarity.
- **Replacement potential** is the potential for a representative or equivalent example of the environmental value to be found to replace any losses.
- **Community value** is the community infrastructure, assets, places and values of importance and concern to the community in which a project is proposed to be located. This factor also considers what is currently provided for the community (e.g., road capacity, community facilities, open space areas, etc.) and how it could be affected by a project.

The model criteria for determining sensitivity are set out in Table 6-2. These criteria were amended to be specific for each of the technical studies.

Table 6-2 Model sensitivity criteria

Sensitivity level	Criteria
Extremely sensitive	The value is listed on a recognised or statutory state, national or international register, or is protected under legislation, regulations or guidelines as being of very high significance (e.g., critically endangered). The value is intact and retains its intrinsic value.
	It is unique. It is isolated to the affected system/area which is poorly represented in the broader region, territory, country or the world.
	It is fragile and predominantly unaffected by existing threatening processes. Small changes would lead to substantial changes to the prescribed value.
	It is not widely distributed throughout the system/area and consequently would be difficult or impossible to replace.

Sensitivity level	Criteria
Very sensitive	The value is listed on a recognised or statutory state, national or international register, or is protected under legislation, regulations or guidelines as being of high significance (e.g., endangered).
	The value is relatively intact and retains most of its intrinsic value.
	It is locally unique to the environment or community in which it occurs, with few regionally available alternatives.
	It is predominantly unaffected by existing threatening processes. Small changes would lead to changes to the prescribed value.
	It is not widely distributed throughout the system/area and consequently recovery potential would be limited.
Sensitive	The value is listed on a recognised or statutory state, national or international register, or is protected under legislation, regulations or guidelines as being of moderate significance (e.g., vulnerable).
	The environmental value is in a moderate to good condition despite it being exposed to threatening processes. It retains many of its intrinsic characteristics and structural elements.
	It is relatively well represented in the systems/areas in which it occurs, but its abundance and distribution are limited by threatening processes.
	Threatening processes have reduced the environmental or social value's resilience to change. Consequently, changes resulting from project activities may lead to degradation of the prescribed value.
	Replacement of unavoidable losses is possible due to its abundance and distribution.
Not very sensitive	The value is not listed on a recognised or statutory state, national or international register, or is protected under legislation, regulations or guidelines as being of significance.
	It is in a poor to moderate condition as a result of existing threatening processes which have degraded its intrinsic value.
	It is not unique or rare and numerous representative examples exist throughout the system/area.
	It is less widely distributed throughout the host systems/areas.
	There is slight detectable response to change of the value but can quickly recover.
	The abundance and wide distribution of the value ensures replacement of unavoidable losses is assured.
Not sensitive	The value is not listed on any recognised or statutory register. It is not recognised locally by relevant suitably qualified experts or organisations e.g., historical societies.
	It is in a poor condition as a result of existing threatening processes which have degraded its intrinsic value.
	It is not unique or rare and representative examples exist abundantly throughout the system/area.
	It is abundant and widely distributed throughout the host systems/areas.
	There is no detectable response to change, or change does not result in further degradation of the value.

The magnitude of an impact on a value is assessed by considering:

- **Geographical extent**: Assessment of the spatial extent of the impact where the extent is defined as site, local, regional or widespread (meaning state-wide or national or international).
- **Duration of the impact**: The timescale of the effect i.e., if it is short, medium or long term.
- **Severity of the impact**: Assessment of the scale or degree of change from the existing condition, as a result of the impact. This could be positive or negative.

The magnitude of impact was assessed for all credible impact pathways i.e., where a project activity may lead to an impact on a value.

The model criteria for determining severe, high, moderate and low impacts are set out in Table 6-3. These criteria were amended to be specific for each of the technical studies.

Table 6-3 Model magnitude criteria

Magnitude level	Criteria
Severe	• An impact that causes permanent changes to the physical, ecological, or social environment and irreversible harm to values or consequences of the impact are unknown and management controls are untested. • Causes major public outrage, sustained widespread community complaints. Prosecution by regulatory authorities. Avoidance through appropriate design responses is required to address the impact.
Major	• An impact that is widespread, long lasting and results in substantial change to the value either temporary or permanent. • Can only be partially rehabilitated or uncertain if it can successfully be rehabilitated. • Causes major public outrage, possible prosecution by regulatory authorities. • Appropriate design responses are required to address the impact. • Receives widespread local community complaints and lasting effects on the social fabric of a community.
Moderate	• An impact that extends beyond the operational area to the surrounding area but is contained within the region where the project is being developed. • The impacts are short term and result in changes that can be ameliorated with specific management controls. • May receive local community complaint.
Minor	• A localised impact that is short term and could be effectively mitigated through standard management controls. • Remediation work and follow-up required.
Negligible	• A localised impact that is temporary and does not extend beyond operational area. Either unlikely to be detectable or could be effectively mitigated through standard management controls. • Full recovery expected.

The significance level of an impact is determined by the sensitivity of the value and the magnitude of the change it would experience. Table 6-4 shows how, using the criteria described above, the significance level of impacts is determined having regard to the sensitivity of the value and the magnitude of the expected change.

Table 6-4 Significance assessment matrix

Magnitude of impact	Sensitivity of value				
	Extremely sensitive	Very sensitive	Sensitive	Not very sensitive	Not sensitive
Severe	**Major**	**Major**	**Major**	**High**	**Moderate**
Major	**Major**	**Major**	**High**	**Moderate**	**Low**
Moderate	**High**	**High**	**Moderate**	**Low**	**Low**
Minor	**Moderate**	**Moderate**	**Low**	**Low**	**Very low**
Negligible	**Moderate**	**Low**	**Low**	**Very low**	**Very low**

Table 6-5 outlines the model significance criteria that are amended to be specific for each technical study.

Table 6-5 Model impact significance criteria

Significance of impact	Description
Major impact	Occurs when impacts would potentially cause irreversible or widespread harm to a value that is irreplaceable because of its uniqueness or rarity. Avoidance through appropriate design responses is the only effective mitigation.
High impact	Occurs when the proposed activities are likely to exacerbate threatening processes affecting the intrinsic characteristics and structural elements of the value. While replacement of unavoidable losses is possible, avoidance through appropriate design responses is preferred to preserve its intactness or conservation status.
Moderate impact	Occurs where, although reasonably resilient to change, the value would be further degraded due to the scale of the impacts or its susceptibility to further change. The abundance of the value ensures it is adequately represented in the region, and that replacement, if required, is achievable.
Low impact	Occurs where a value is of local importance and temporary and transient changes would not adversely affect its viability provided standard environmental controls and management measures are implemented.
Very low impact	A degraded (very low sensitivity) value exposed to minor changes (negligible magnitude impact) would not result in any noticeable change in its intrinsic value and hence the proposed activities would have negligible or no effects. This typically occurs where the activities occur in industrial or highly disturbed areas.

Risk assessment

A risk assessment considers the likelihood of environmental harm occurring from an event and the consequence of this harm considering the sensitivity of the value to change. The risk method involves assessing the likelihood of an event, mechanism or pathway existing and, when considered together with the hazard, resulting in harm to the environment. The relationship between likelihood and consequence provides the level of risk of harm to the value. The residual risk of harm is the level of remaining risk of harm to the environment following the implementation of industry standard measures or possible mitigation measures.

The principles of risk management described in *AS ISO 31000:2018 Risk management – guidelines* have been adopted for technical studies adopting a risk assessment method.

The assessment of risk of harm to identified values (prior to implementation of proposed standard mitigation measures to avoid, minimise, offset and manage impacts) was conducted by examining the likelihood of harm occurring and the potential consequences (i.e., a measure of severity of environmental impact) should the harm occur.

Qualitative risk assessment was used to assess the likelihood of harm to the relevant values from construction, operation and maintenance, and decommissioning activities.

Model qualitative criteria developed for the likelihood of potential risks are set in out in Table 6-6. These criteria are amended to be specific for each of the technical studies.

Table 6-6 Qualitative criteria for likelihood

Criteria	Likelihood description
Almost certain	A hazard, event and pathway exist, and harm has occurred in similar environments and circumstances elsewhere and is expected to occur more than once over the duration of the project activity, project phase or project life.
Likely	A hazard, event and pathway exist, and harm has occurred in similar environments and circumstances elsewhere and is likely to occur at least once over the duration of the project activity, project phase or project life.
Possible	A hazard, event and pathway exist, and harm has occurred in similar environments and circumstances elsewhere and may occur over the duration of the project activity, project phase or project life.
Unlikely	A hazard, event and pathway exist, and harm has occurred in similar environments and circumstances elsewhere but is unlikely to occur over the duration of the project activity, project phase or project life.
Rare	A hazard, event and pathway are theoretically possible on this project and has occurred once elsewhere, but not anticipated over the duration of the project activity, project phase or project life.

Source: Adapted from AS ISO 3100:2018.

Following the assessment of likelihood of harm occurring, the potential consequences (i.e., a measure of severity of impact), should the harm occur, were considered.

Qualitative risk assessment was used to assess the consequence of impacts on the environment deemed likely to occur from construction, operation and decommissioning activities.

Model qualitative criteria developed for the consequence of potential risks are set in out in Table 6-7. The consequence criteria are amended to be specific for each technical study. Statutory, nationally or internationally accepted guidelines have been incorporated into the consequence criteria where available.

Table 6-7 Qualitative criteria for consequence

Criteria	Consequence description
Severe	• An effect that causes permanent changes to the environment and irreversible harm to physical, ecological, or social environmental values, or consequences of the impact are unknown and management controls are untested. • Causes major public outrage, sustained widespread community complaints. • Prosecution by regulatory authorities. • Avoidance through appropriate design responses is required to address the impact.
Major	• An effect that is widespread, long lasting and results in substantial change to the value either temporary or permanent. • Can only be partially rehabilitated or uncertain if it can successfully be rehabilitated. • Appropriate design responses are required to address the impact. • Causes major public outrage, possible prosecution by regulatory authorities. • Receives widespread local community complaints.
Moderate	• An effect that extends beyond the operational area to the surrounding area but is contained within the region where the project is being developed. • The harm is short term and result in changes that can be ameliorated with specific management controls.
Minor	• A localised effect that is short term and could be effectively mitigated through standard management controls. • Remediation work and follow-up required.

Criteria	Consequence description
Negligible	• A localised effect that is temporary and does not extend beyond operational area. Either unlikely to be detectable or could be effectively mitigated through standard management controls. • Full recovery expected.

The risk of harm was determined by combining likelihood and consequence using the matrix in Table 6-8. The initial risk was determined with consideration of controls and commitments inherent in the design and project description. The residual risk was then assessed considering the application of industry standard measures or possible mitigation measures that could be applied.

The risk assessment guides the identification and development of mitigation measures to avoid, minimise, offset and manage risks. Higher identified risks require specific controls or management, whereas lower risks can be managed using standard controls.

Table 6-8 Risk evaluation matrix

Consequence	Likelihood				
	Almost certain	Likely	Possible	Unlikely	Rare
Severe	Very high	Very high	Very high	High	Moderate
Major	Very high	Very high	High	Moderate	Low
Moderate	High	High	Moderate	Low	Low
Minor	Moderate	Moderate	Low	Low	Very low
Negligible	Moderate	Low	Very low	Very low	Very low

Compliance assessment

This approach considers whether impacts from the project would comply with the requirements of a statutory guideline or policy.

Where statutory guidelines are provided (e.g., within Tasmanian Planning Provisions), the assessment of significance and magnitude, or likelihood and consequence, is not required. In this instance, an assessment of compliance for the project against statutory guidelines has been undertaken. The results of modelling or other predictive techniques are also used to indicate whether published limits would or would not be exceeded (i.e., the assessment is binary and not subjective).

Statutory guidelines set out in regulatory documents are designed to protect the relevant values. The guidelines include an implicit assessment of the vulnerability of the value through the setting of limits or thresholds.

Discipline specific methods

There are some technical disciplines that adopt discipline specific methods to assess impacts, estimate emissions or conditions for the project. This includes technical disciplines such as marine benthic ecology, GHG emissions, climate change, and landscape and visual. In some instances, these methods may also be implemented and apply the significance assessment.

Management and mitigation measures

Following identification of the potential risk or potential impact, technical specialists have identified measures to avoid, mitigate and/or manage the potential impacts of the proposal.

Where technical studies have informed this Tasmanian EIS, as well as the Commonwealth/Victoria EIS/EES, the technical studies may refer to these mitigation approaches as 'environmental performance requirements' (EPRs). EPRs set the environmental outcomes that must be achieved during construction, operation and decommissioning of the project. This approach has been applied for the Commonwealth and Victorian components of the project. In applying this approach, technical specialists considered possible mitigation measures that would achieve the EPRs. For the Tasmanian assessment, these mitigation measures have been specified and would be implemented instead of the EPRs, to meet the requirements of the EIS guidelines.

This EIS refers to all mitigation and management measures proposed for the Heybridge Shore Crossing as 'mitigation measures' (or 'MM' where a cross-reference to a specific mitigation measure has been provided). These measures and the undertakings made by MLPL in this EIS represent the environmental management commitments for the proposal. Section 8 includes a consolidated list of all the mitigation measures to be implemented for the proposal.

The mitigation measures in Section 8 of this EIS apply for the whole proposal, but not always all components of the proposal. Table 6-9 identifies the components of the proposal subject to the environmental aspect class of mitigation measures.

Table 6-9 Mitigation measures relevant to proposal components

Mitigation measures by environmental aspect	Application to launch pad site	Application to underground crossings	Application to seabed alignments
General	Yes	Yes	Yes
Terrestrial natural values	Yes	No	No
Potentially contaminated materials and acid sulfate soils	Yes	Yes	No
Marine natural values	No	No	Yes
Water quality (surface and groundwater)	Yes	No	No
Noise and vibration emissions	Yes	Yes	Yes
Air quality	Yes	No	No
Waste management	Yes	Yes	No
Dangerous goods and environmentally hazardous materials	Yes	No	No
Greenhouse gases and ozone depleting substances	Yes	Yes	Yes
Socio-economic issues	Yes	Yes	Yes
Infrastructure and off-site ancillary facilities	Yes	No	No
Decommissioning and rehabilitation	Yes	No	No

Cumulative impact assessment

The EIS guidelines for this proposal require an assessment of cumulative impacts. Cumulative impacts result from incremental impacts caused by multiple projects occurring at similar times and within proximity to each other.

For this proposal, this includes the Heybridge Converter Station, which is subject to a separate EIS, but is a related component of the project. Many of the technical studies appended to this EIS combine the assessment of the impacts of the Heybridge Shore Crossing and the Heybridge Converter Station proposals, meaning that any cumulative impacts between these proposals are assessed together as the Tasmanian components of the project. Refer to Section 6.14 for an overview of how each technical specialist has approached the assessment of cumulative impacts of the proposal and the Heybridge Converter Station.

Additional projects have been identified for consideration in the cumulative impact assessment, due to the shared regional geography with the proposal, including the NWTD project, which would occur nearby, approximately at the same time, and have some similar impacts as the proposal particularly during construction.

The general assessment methodology, list of identified projects and a summary of potential cumulative impacts is discussed further in Section 6.14. The specific methodology for each technical assessment is described further in the relevant Appendix.

6.1 Terrestrial natural values

This section provides a summary of the findings of the Terrestrial Ecology Impact Assessment provided in Appendix B.

6.1.1 Assessment guidelines

The relevant sections of the EIS guidelines for the Heybridge Shore Crossing, and where these have been addressed in this EIS, are outlined in Table 6.1-1.

Table 6.1-1 Relevant EIS guidelines

Terrestrial natural values – EIS guidelines	Section
Existing environment	
Specify and map known records of species and their habitat, with particular reference to rare and threatened species, communities, and habitats, including those listed under the relevant Schedules of the Commonwealth EPBC Act and the *Tasmanian Threatened Species Protection Act 1995* (TSP Act) and *Tasmanian Nature Conservation Act 2002* (NC Act).	Section 6.1.3
Undertake and provide the results of a current natural values survey for the site.	Section 6.1.2, 6.1.3
Identify any known occurrences of species of conservation significance, threatened fauna species or flora species or potential habitat in the vicinity of the proposal footprint, or potentially impacted offsite, including aquatic species and shorebirds.	Section 6.1.3
White-bellied sea-eagle (*Haliaeetus leucogaster*) and Tasmanian Wedge-tailed Eagle (*Aquila audax* subsp. *Fleayi*) have been recorded in the area and an eagle nest has been recorded 1.8 km from the impact site. As eagle pairs often have several nests in their territory, an eagle nest search must be undertaken within 500 m direct distance and 1 km line-of-sight of the development to determine if any unknown nests are present. As eagles can be sensitive to disturbance during the eagle nesting/breeding season (July to January).	Section 6.1.3.4, 6.1.6
Identify areas or habitats of conservation significance, including designated conservation areas, areas relating to the requirements of international treaties (e.g., Japan-Australia and China-Australia Migratory Bird Agreements (JAMBA/CAMBA) and Ramsar (wetlands) Convention).	Section 6.1.3.6
Specify and map known sites of geoconservation significance or natural processes (such as fluvial or coastal features), including sites of geoconservation significance listed on the Tasmanian Geoconservation Database.	Section 6.1.3.6
Demonstrate that any surveys comply with requirements in Guidelines for Terrestrial Natural Values Surveys	Section 6.1.2
Identify any environmental weed species present on or near the site	Section 6.1.3.5
Describe natural processes of particular importance for the maintenance of the existing environment (e.g., fire, flooding, etc).	Section 6.1.3
Provide all results in a natural values assessment, undertaken by a suitably qualified person.	Section 6.1.3
Potential impacts	
Describe potential impacts of construction and operation of the proposal on flora, vegetation communities and habitat, with particular reference to rare and threatened species, communities, and habitats, including those listed under the relevant Schedules of the TSP Act and NC Act.	Section 6.1.5
Describe potential impacts of construction and operation of the proposal on fauna, including impacts on species, communities, and habitats. Provide details of impacts to	Section 6.1.5

Terrestrial natural values – EIS guidelines	Section
rare and threatened species, migratory species, communities, and habitats, including those listed under the relevant Schedules of the TSP Act and NC Act.	
In discussion of impacts on flora and fauna, including consideration of: • Habitat clearance and disturbance. • Activity causing potential disturbance (e.g., movement). • Noise and vibration emissions. • Lighting. • Vehicle movements (including roadkill). • Mobilised contaminated material or sediment. • The potential for the proposed works to result in subsidence and resultant impact onshore bird habitat above and adjacent to the drill holes.	Section 6.1.5
Discuss impacts on existing conservation reserves which may be affected by the proposal, with reference to the management objectives of the reserve(s) and the reserve management plan(s) (if any).	N/A (refer to Section 6.1.3.6)
Discuss impacts on other species, sites or areas of special conservation significance, including areas of wilderness or scientific value.	N/A (refer to Section 6.1.3.6)
Discuss the potential introduction or spread of pests, weeds and plant and animal diseases as a result of construction and operation of the proposal. Information about controlling the introduction and spread of weeds and the development of weed and disease management plans can be found in Section 4 of the NRE (2015) *Weed and Disease Planning and Hygiene Guidelines – Preventing the spread of weeds and diseases in Tasmania*.	Section 6.1.5, 6.1.6
Discuss impacts on sites of geoconservation significance or natural processes (such as fluvial or coastal features), including sites of geoconservation significance listed on the Tasmanian Geoconservation Database.	N/A (refer to Section 6.1.3.6)
In consideration of all issues, discuss any potential for cumulative impact with the proposed Heybridge Converter Station for Marinus Link.	Section 6.1.5.4
Avoidance and mitigation measures	
Describe management measures to mitigate adverse impacts to threatened fauna, flora and vegetation communities and other natural values where they cannot be avoided.	Section 6.1.6
It is noted that the shore crossings will be drilled continuously over 24 hours, seven days a week to ensure borehole stability. It is important that illumination of the site at night is minimised as this can disorient seabirds and shorebirds. If there is to be any form of additional night time lighting associated with the construction area for safety (or other) reasons, the illumination should be kept to a minimum and red light should be used. It is recommended that the guidance principles outlined in the *Commonwealth National Light Pollution Guidelines for Wildlife* be considered for incorporation into the lighting design, in particular those specified in Appendix A (Best Practice Lighting Design)	Section 6.1.6
Where impacts cannot be avoided, present proposed measures to mitigate and/or compensate adverse impacts on biodiversity and nature conservation values.	Section 6.1.6
Develop a plan to control the spread of weeds, pests and diseases and ensure that weeds present at the impact site are properly managed	Section 6.1.6
Discuss rehabilitation of disturbed areas following the completion of construction activities and cessation of the activity, including any proposed seed collection and progressive rehabilitation programme.	Section 6.1.6, Section 7
Provide a conclusion regarding the significance of likely impacts on natural values.	Section 6.1.7
Requirements for surveys	
Any flora and fauna surveys must, as a minimum, comply with the requirements of the document *Guidelines for Terrestrial Natural Values Surveys* published by the Department of Natural Resources and Environment (NRE). The methodology for surveys should be developed in consultation with the Department.	Section 6.1.2

Terrestrial natural values – EIS guidelines	Section
Legislative and policy requirements	
Tasmanian *Threatened Species Protection Act 1995* and associated regulations, Nature Conservation Act 2002 and associated regulations, including the *Nature Conservation (Wildlife) Regulations 2021, Forest Practices Act 1985* and associated regulations and codes (as relevant), *Commonwealth National Light Pollution Guidelines for Wildlife*.	Section 6.1.4

6.1.2 Methodology

In order to assess the existing terrestrial natural values present on the onshore components of the proposal site, a 'proposal survey area' has been established. The proposal survey area is presented in Figure 6.1-1 and comprises:

- **The Converter Station survey area**: An approximately 10 hectare (ha) area defined by the property boundary of the Heybridge Converter Station site (which includes the HDD launch pads for the proposal).
- **The Shore Crossing survey area**: A 6.5 ha area extending from the Heybridge Converter Station site, under Bass Highway and Western Line Railway, and across the shore to Bass Strait.

A broader 'study area' was also considered as follows:

- A 5 km radius around the survey areas used to identify which ecological values are likely to occur based on the Commonwealth Protected Matters Search Tool (PMST) and Tasmanian Natural Values Atlas (NVA).
- The aerial eagle nest survey completed for the NWTD considered a 2 km radius study area around the Heybridge Converter Station site.

Existing ecological values that may occur within the proposal survey area, or broader study area, were identified through a review of database and literature sources as well as and field surveys.

A desktop review was completed to identify ecological values that may occur within the study area and to gather associated supporting information. Database and literature sources reviewed as part of this work were:

- NVA.
- EPBC Act PMST.
- TASVEG 4 mapping.
- Threatened Native Vegetation Communities (TNVC 2020) mapping (Natural Resources and Environment Tasmania 2021) derived from TASVEG 3, TASVEG 4 and previous TNVC 2014 maps.
- Tasmanian Geoconservation database.
- Publicly available aerial imagery, including current and historical images from Google Earth™ and Environmental Systems Research Institute.

A field survey of the proposal survey area was undertaken on 17 and 18 January 2023 to identify vegetation communities, fauna habitats and flora species present. Previously, there had been a terrestrial ecology

survey undertaken of the Converter Station survey area on 12 February 2021 and two previous surveys of the Shore Crossing survey area targeting Little penguins between 21 and 23 November 2018, on 3 February 2022, and in January 2023.

The field surveys involved:

- The verification and mapping of the vegetation communities present on the proposal survey area.
- The identification of vegetation communities listed as threatened under the *Nature Conservation Act 1992* (NC Act) and ecological communities listed under the EPBC Act.
- Searching for flora species listed under the TSP Act and EPBC Act in potential habitat and in the vicinity of known locations that were identified in the desktop survey.
- The identification and assessment of potential habitat for fauna species listed as threatened under the TSP Act and EPBC Act.
- The identification of declared weeds listed under the *Weed Management Act 1999*, and now declared as pests under the *Biosecurity Act 2019*.
- The identification of potential eagle nest within a 2 km radius of the proposal site.

Flora surveys used a systematic method, which involves walking over the survey area in a random manner and recording all flora species encountered. This method was adequate to confirm absence of species and suitable habitat. The flora survey targeted habitats and vegetation communities that were likely to support threatened species. Mapped TASVEG communities within the proposal survey area were verified during the flora survey.

Important fauna habitat components were also recorded during the survey where encountered (e.g., important habitat trees, rock outcrops suitable for Tasmanian devil and Spotted-tailed quolls). Indirect evidence of the presence of threatened fauna was also recorded (e.g., scats, diggings, burrows, shelters). A targeted search for Tasmanian devil and Spotted-tailed quoll dens within the survey area was also undertaken, which included searching for scats.

An eagle nest survey was undertaken by North Barker in April 2022 for the NWTD project (North Barker, 2022) in accordance with the EPAs *Guide to Eagle Nest Searches and Activity Checks*. Raptor nest identification was based on a database search within a 1 km search radius and subsequent February 2023 aerial surveys (by helicopter) within a 1 km and 2 km radius of the NWTD route's operational area, which also included the proposal survey area. This information has been used to inform this assessment.

Previous surveys (21-23 November 2018 and 3 February 2022) were undertaken by Entura to target Little penguins (*Eudyptula minor*), as colonies are known to be scattered along the north coast. The 2018 surveys included a search for penguin burrows at the crossing point west of the Blythe River mouth, as well as evening surveys at the shore crossing area, to identify if any Little penguins returned to their burrows at dusk. Subsequent searches for burrows and evidence of penguins were also undertaken on 3 February 2022 and 18 January 2023.

The vegetation, flora and fauna surveys were undertaken in a manner that is consistent with the *Guidelines for Natural Values Surveys – Terrestrial Development Proposals* (DPIPWE 2015a).

A likelihood of occurrence assessment was carried out to determine which ecological values are considered likely to occur within 5 km of the study area. This was further refined with consideration of those species habitats requirements, and where these significantly different from those in the proposal survey area no further consideration was required.

The *Survey Guidelines and Management Advice for Development Proposals that may Impact on the* Tasmanian Devil (DPIPWE 2015c) propose that where there is increased night-time road use that a traffic impact assessment is undertaken and is used in conjunction with assessments of the local Tasmanian devil population information from both desktop and survey data to determine if there is a potential for a substantial impact (i.e., predicted >10% increase in deaths due to roadkill). The results of the assessment of potential impacts on fauna as a result of increased traffic movements is provided in Section 6.1.5.1.

The assessment adopted a **significance assessment approach**. The significance assessment methodology was adopted in order to assess the significance of impacts on ecological values in the absence of statutory, nationally, internationally or industry accepted criteria for assessing significance.

A detailed methodology, including any relevant assumptions and limitations, is included in Appendix B.

6.1.3 Existing conditions

The ecological impact assessment first determined the proposal survey area and a study area (as explained in Section 6.1.2), both of which are larger and encompass the proposal site. The proposal survey area consists of an area of previously cleared industrial land with small patches of remnant vegetation, as well as beach and coastal vegetation between Bass Highway and Bass Strait.

Terrestrial natural values relevant to the proposal survey area include native vegetation communities, protected flora and protected fauna. The presence of native vegetation communities and the likelihood of protected flora and fauna were identified through available data resources and through field surveys. There are no known records of threatened species within the proposal survey area.

6.1.3.1 Vegetation communities

The 6.5 ha of Shore Crossing survey area present between Bass Highway and Bass Strait comprises 2 ha of native forest, 3 ha of native coastal scrub, and 1.5 ha of sandy beach. The Converter Station survey area (including the HDD launch pad site) is comprised of 1.5 ha of native vegetation and 9.3 ha of modified land (that includes 8.2 ha of cleared land, 0.6 ha of tree plantings, and 0.5 ha of weeds). Vegetation communities present at the proposal survey area are mapped in Figure 6.1-1. There are three native vegetation communities identified within the proposal survey area, as described in Table 6.1-2.

Figure 6.1-1: Vegetation mapped within the proposal survey area

Legend

Dry Eucalypt Forest and Woodland

- [DAC] Eucalyptus amygdalina coastal forest and woodland
- [DOB] Eucalyptus obliqua dry forest
- [DVC] Eucalyptus viminalis - Eucalyptus globulus coastal forest and woodland

Scrub, Heathland and Coastal Complexes

- [SSC] Coastal scrub

Agricultural, Urban and Exotic Vegetation

- [FUM] Extra-urban miscellaneous
- [FPU] Unverified plantations for silviculture
- [FWU] Weed infestation

Other Natural Environments

- [OSM] Sand, mud
- Watercourse
- Major Road
- Minor Road

Scale: 1:7,500 @ A4

Spatial Reference: GDA2020 MGA Zone 55

0 50 100 200 300 400

Metre

MARINUS LINK

Acknowledgements and Sources:

Data Source: Marinus Link GIS Data Repository and theLIST ©State of Tasmania.
Background Image: Esri Community Maps Contributors, DPIPWE, © OpenStreetMap, Microsoft, Esri, TomTom, Garmin, Foursquare, METI/ NASA, USGS, Maxar
Produced By: Marinus Link for the Tasmanian Heybridge Shore Crossing EIS.
Date Figure Exported: 22/11/2024

Table 6.1-2 Native vegetation communities identified within the proposal survey area

Native vegetation communities	Area (ha)	Location
Eucalyptus amygdalina coastal forest and woodland (DAC)	1.5	Present on the Heybridge Converter Station site
Coastal scrub (SSC)	3	Present on the proposal site (on land above the underground crossings)
Eucalyptus viminalis–Eucalyptus globulus coastal forest and woodland (DVC)	2	Present on the Shore Crossing survey area, on the northern side of Bass Highway (not within the proposal site)

The *Eucalyptus viminalis–Eucalyptus globulus* coastal forest and woodland (DVC) present on the Shore Crossing survey area (not within the proposal site) is listed under the NC Act.

The wet scrub (*Banksia marginata*) and silver tussock (*Poa labillardierei*) species, which are part of the non-threatened Coastal scrub (SSC) vegetation community present within the proposal survey area (on land above the underground crossings), are also listed under the NC Act.

6.1.3.2 Threatened ecological communities

Eucalyptus viminalis–Eucalyptus globulus coastal forest and woodland (DVC), listed under the NC Act is present at the south eastern end of the proposal survey area, but is not present on the proposal site.

The DVC community occurs as small remnants across eastern and northern Tasmania, and is considered important for the conservation of the community. The DVC community is considered to have variable or moderate susceptibility to the plant pathogen Phytophthora.

Two other EPBC Act listed threatened ecological communities' distributions were identified as potentially overlapping the proposal survey area, however no records of these ecological communities were present in the proposal survey area. These communities are:

- Tasmanian Forests and Woodlands dominated by black gum or Brookers gum (*Eucalyptus ovata / E. brookeriana*) (critically endangered).
- Tasmanian white gum (*Eucalyptus viminalis*) wet forest.

6.1.3.3 Flora

6.1.3.3.1 EPBC Act listed species

No threatened flora species listed under the EPBC Act were recorded within the proposal survey area.

Three EPBC Act listed flora species distributions were identified as potentially overlapping the proposal survey area, however a review of the range and habitat requirements of each species determined that they are either absent or unlikely to occur due to the absence of suitable habitat within the proposal survey area. These three flora species are listed in Table 6.1-3.

There are NVA historic records of Tiny fingers (*Caladenia pusilla*) and Paterson's spider orchid (*Caladenia patersonii*) within the surrounding Heybridge area, however there is no suitable habitat for either species within the proposal survey area and these two species are therefore unlikely to occur.

6.1.3.3.2 TSP Act listed species

No threatened flora species listed under the TSP Act were recorded within the proposal survey area.

Eight TSP Act listed flora species distributions were identified as potentially overlapping the proposal survey area, however a review of the range and habitat requirements of each species determined that they were either absent or unlikely to occur due to the absence of suitable habitat. Table 6.1-3 presents the likelihood of occurrence of all threatened flora species listed under the EPBC Act and TSP Act identified within a 5 km search radius of the proposal survey area on the Protected Matters Search Tool (PMST) and NVA databases.

Table 6.1-3 Likelihood of occurrence of EPBC Act and TSP Act listed flora within the proposal survey area

Scientific name	Common name	TSP Act	EPBC Act	Source	Likelihood of occurrence
Baumea gunnii	Slender twigsedge	r		NVA	Does not occur or absent
Caladenia caudata	Tailed spider-orchid	vu	VU	PMST	Does not occur or absent
Caladenia patersonii	Paterson's spider orchid	vu		NVA	Unlikely to occur
Caladenia pusilla	Tiny fingers	r		NVA	Unlikely to occur
Leucochrysum albicans var. tricolor	Hoary sunray	en	EN	PMST	Does not occur or absent
Persicaria decipiens	Slender waterpepper	vu		NVA	Does not occur or absent
Senecio psilocarpus	Swamp fireweed	en	VU	PMST	Does not occur or absent
Tetratheca ciliata	Northern pinkbells	r		NVA	Does not occur or absent

Unlikely to occur: the species/ecological community has not been recorded in the study area and/or suitable species habitat does not exist in or adjacent to the survey area.
Does not occur or absent: the species/community potential distribution includes the study area but has never been recorded in or adjacent to the study area.
r: listed as Rare under the TSP Act
vu: listed as Vulnerable under the TSP Act
en: listed as Endangered under the TSP Act
VU: listed as Vulnerable under the EPBC Act
EN: listed as Endangered under the EPBC Act

6.1.3.4 Fauna

6.1.3.4.1 EPBC Act listed species

The following EPBC Act listed species **may** potentially occur within the proposal survey area:

- Tasmanian devil (*Sarcophilus harrisii*) (endangered).
- Spotted-tailed quoll (*Dasyurus maculatus* subsp. *maculatus*) (endangered).
- Tasmanian wedge-tailed eagle (*Aquila audax* subsp. *fleayi*) (endangered).
- White-throated needletail (*Hirundapus caudacutus*) (migratory, vulnerable).
- Fork-tailed swift (*Apus pacificus*) (migratory).

The Tasmanian devil and the Spotted-tailed quoll have previously been recorded adjacent to the proposal survey area, as incidences of roadkill on Bass Highway and Minna Road. These incidences of roadkill are

presented in Figure 6.1-2. The existing population of devils and quolls in the vicinity of the proposal site is relatively small, this is based on the NVA database's records, landscape context and on-ground surveys. These species may forage over the proposal survey area, however there is no suitable denning habitat for either species, as there is limited habitat for prey species, and a lack of denning features such as rocky outcrops, large hollow logs and old wombat burrows.

The Tasmanian wedge-tailed eagle may occasionally overfly the proposal survey area given the species large home ranges. The nearest eagle nest of an indeterminate eagle species (either Tasmanian wedge-tailed eagle or White-bellied sea-eagle) was recorded 1.6 km (ID: 1323) from the proposal survey area but has not been verified as present since 2006. The location of this eagle nest in relation to the proposal site is presented in Figure 6.1-2.

The White-throated needletail visits the north Tasmanian region from its breeding grounds in Asia during the Australian summer, however it is almost exclusively aerial within its distribution and is not expected to land in the proposal survey area.

The Fork-tailed swift may potentially occur within the proposal survey area, however similar to the White-throated needletail, the Fork-tailed swift is a migratory species which visits Tasmania during the Australian summer months and is not expected to land within the proposal survey area.

The Little penguin (*Eudyptula minor*) is listed as a marine species under the EPBC Act. No penguin burrows nor individuals have been recorded as occurring within the proposal survey area despite targeted surveys.

6.1.3.4.2 TSP Act listed species

The TSP Act listed White-bellied sea-eagle **may** potentially occur within the proposal survey area. The nearest eagle nest of an indeterminate eagle species (either the Tasmanian wedge-tailed eagle or White-bellied sea-eagle) was recorded 1.6 km (ID: 1323) from the proposal survey area (refer to Figure 6.1-2) but has not been verified as being present since 2006.

Table 6.1-4 presents the threatened fauna that have been identified as being likely to occur listed under the EPBC Act and TSP Act within a 5 km search radius of the proposal survey area.

Table 6.1-4 Likelihood of occurrence of EPBC Act and TSP Act listed fauna within the proposal survey area

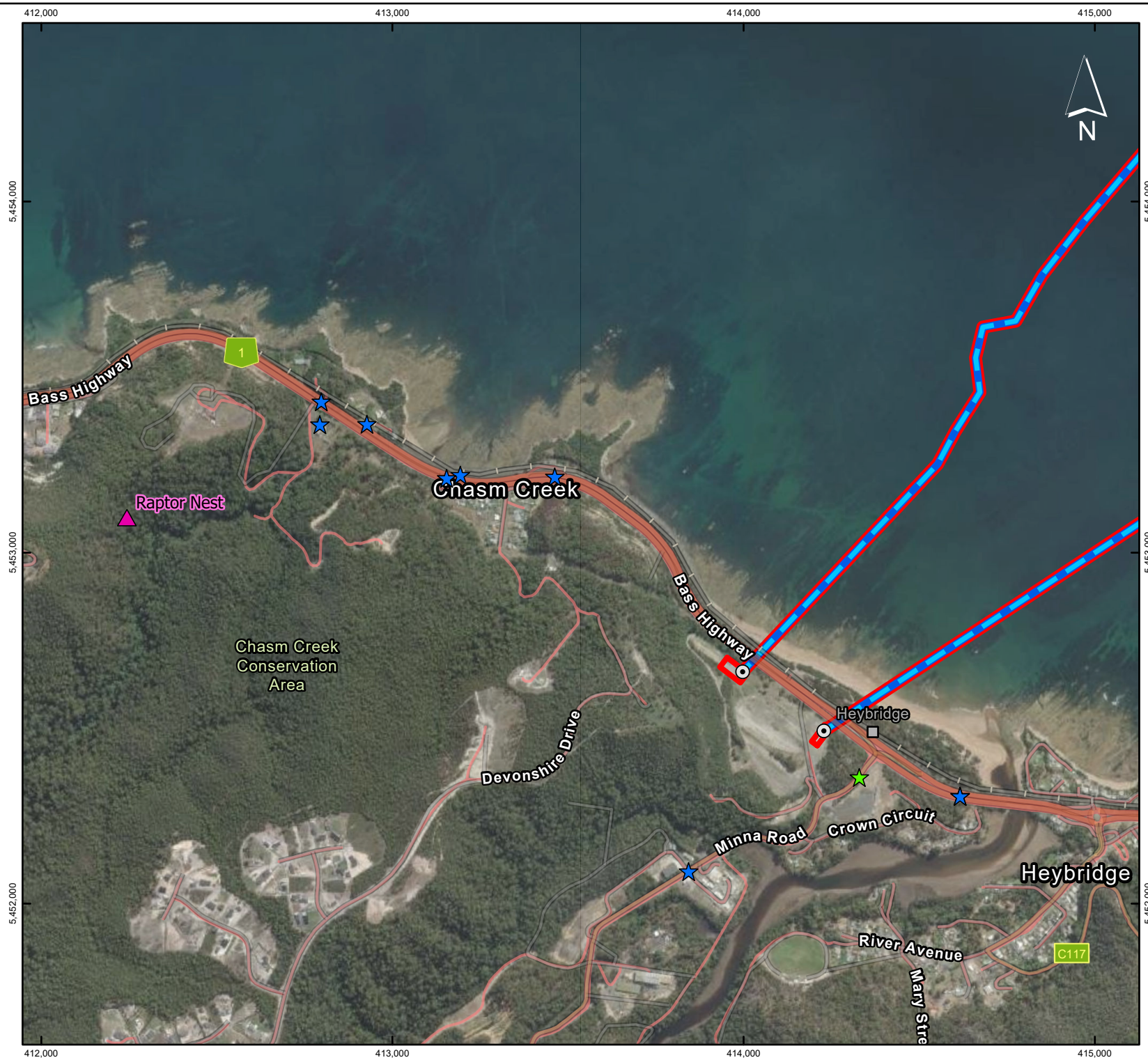
Listed fauna	TSP Act	EPBC Act	EPBC migratory /marine	Likelihood of occurrence	Rationale
Fork-tailed swift (*Apus pacificus*)			Migratory	May occur	No NVA records within 5 km of proposal survey area. Aerial species which could occur over the proposal survey area.
Tasmanian wedge-tailed eagle (*Aquila audax* subsp. *Fleayi*)	En	EN		May occur	There are no known nests within 1 km of the proposal survey area. The proposal survey area contains no suitable nesting habitat. Aerial species which could occur over the proposal survey area.

Listed fauna	TSP Act	EPBC Act	EPBC migratory /marine	Likelihood of occurrence	Rationale
Spotted-tailed quoll (*Dasyurus maculatus* subsp. *Maculatus*)	R	VU		May occur	No suitable habitat within the proposal survey area. There is a NVA record of a roadkill carcass on Minna Road near the intersection with Bass Highway dated 11 February 2020.
White-bellied sea-eagle (*Haliaeetus leucogaster*)	Vu		Marine	May occur	There are no known nests within 1 km of the proposal survey area. No suitable nesting habitat within the study area. Aerial species which could occur over the proposal survey area.
White-throated needletail (*Hirundapus caudacutus*)		VU	Migratory	May occur	There are no NVA records within 5 km of proposal survey area. Aerial species which could occur over the proposal survey area.
Tasmanian devil (*Sarcophilus harrisii*)	En	EN		May occur	There is no suitable habitat within the proposal survey area. There are NVA records of a roadkill carcass on Minna Road dated 17 February 2017 and a carcass on the Bass Highway dated 26 December 2018.

May occur: the species/ecological community has been recorded in the study area and suitable species habitat exists or could exist in the survey area following detailed ecological studies.

r: listed as Rare under the TSP Act
vu: listed as Vulnerable under the TSP Act
en: listed as Endangered under the TSP Act
VU: listed as Vulnerable under the EPBC Act
EN: listed as Endangered under the EPBC Act

Figure 6.1-2:
Fauna within the vicinity of the proposal site



Legend

- HVDC Landfall
- Proposed HVDC Subsea Cable
- Proposal Site
- Raptor Nest
- Spotted-tailed Quoll (Carcass NVA)
- Tasmanian Devil (Carcass NVA)
- Major Road
- Minor Road

Scale: 1:15,000 @ A4

Spatial Reference: GDA2020 MGA Zone 55

0 125 250 500 750

Metre

MARINUS LINK

Acknowledgements and Sources:

Data Source: Marinus Link GIS Data Repository and theLIST ©State of Tasmania .
Background Image: Esri Community Maps Contributors, DPIPWE, Esri, TomTom, Garmin, Foursquare, METI/NASA, USGS, Maxar
Produced By: Marinus Link for the Tasmanian Heybridge Converter Station EIS.
Date Figure Exported: 22/11/2024

6.1.3.5 Weeds

Seven declared weed species under the *Weed Management Act 1999*, and now declared as pests under the *Biosecurity Act 2019*, were identified within the proposal survey area:

- Californian thistle (*Cirsium arvense* var. *arvense*): a number of small patches were observed across the proposal survey area.
- Pampas grass (*Cortaderia species*): five plants were recorded along the southern boundary of the proposal survey area, however they were not flowering at the time of the survey so the species could not be confirmed.
- Spanish heath (*Erica lusitanica*): 10 plants identified.
- Boneseed (*Chrysanthemoides monilifera* subsp. *monilifera*): Two plants were recorded in the coastal scrub community.
- Blackberry (*Rubus fruticosus aggregate*): was recorded across the coastal scrub community.
- Ragwort (*Senecio jacobaea*): One plant recorded within the coastal scrub community.
- Gorse (*Ulex europaeus*): Three plants recorded within the coastal scrub community.

Boneseed, Blackberry, and Gorse are listed on the *Weeds of National Significance* index. The *Weeds of National Significance* is a list of weeds identified as a threat to Australian environments based on their potential for spread, invasiveness and socioeconomic impacts.

The full list of introduced flora species is provided in Appendix B.

6.1.3.6 Sites of Geoconservation Significance

The Tasmanian Geoconservation Database is an inventory of geodiversity features, processes and systems of conservation significance. There are no geoconservation features within the proposal survey area. The closest geoconservation site identified in the Tasmanian Geoconservation Database, is Blythe Heads Folding. This site is located approximately 400 m to the north-west of the Heybridge Converter Station site. The significance statement notes that it is a ‘Notable example of type'.

6.1.4 Applicable legislation

6.1.4.1 Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act is Commonwealth legislation that protects MNES. The EPBC Act provides for Commonwealth involvement in the assessment and approval of proposed actions that could have an impact on an MNES.

The project is considered a ‘controlled action’ under the EPBC Act, as it has the potential to have a significant impact on the following MNES:

- Listed threatened species and communities (Sections 18 & 18A).
- Listed migratory species (Sections 20 & 20A).
- The environment of the Commonwealth marine area (Sections 23 & 24A).

While the project is considered a 'controlled action' under the EPBC Act, the controlled action decision relates to the whole project. The Commonwealth and Victorian components of the project are being assessed as part of the combined EIS/EES assessment process (refer to Section 1.3).

Where migratory species, threatened flora, fauna and ecological species and communities listed under the EPBC Act interact with listed species under the TSP Act, the potential for impacts in relation to the Terrestrial and onshore aspects are discussed in this section. Refer to Section 6.3 (Marine natural values) for interactions relevant to the marine environment in Tasmanian coastal waters.

6.1.4.2 Threatened Species Protection Act 1995

Under the TSP Act, a person must not knowingly kill, injure, or collect a listed species without a permit. Similarly, a person must not disturb a listed species on land subject to an interim protection order or subject to a land management agreement without a permit.

Threatened flora and fauna listed under the TSP Act present within the proposal survey area identified in Section 6.1.3. Mitigation measures have been developed to ensure compliance with the TSP Act.

6.1.4.3 Biosecurity Act 1999

The Tasmanian *Weed Management Act 1999* identified declared weeds for the state of Tasmania. In 2023, the Act was replaced by the *Biosecurity Act 2019* and supported by the *Biosecurity Regulations 2022*. Under previous and current regulations, 'declared weeds' and declared 'pests' are subject to management and compliance requirements. The *Biosecurity Regulations 2022* confirm that any declared weed within the meaning of the *Weed Management Act 1999* is a now declared pest under the *Biosecurity Act 2019*.

It is essential that weeds and pests within the proposal site are identified and measures are implemented to prevent their spread during construction of the proposal to comply with the general biosecurity duty under the *Biosecurity Act 2019*. This duty requires all people to take all reasonable and practicable measures to prevent, eliminate or minimise, biosecurity risk when dealing with biosecurity matter.

Declared weeds identified in the proposal survey area are presented in Section 6.1.3.5 and proposed mitigation measures to minimise potential impacts are outlined in Section 6.1.6.

6.1.4.4 Nature Conservation Act 2002

The NC Act and *Nature Conservation (Wildlife) Regulations 2021* provide for the conservation and protection of the fauna, flora and geological diversity in Tasmania and for the declaration of national parks and other reserved land. NC Act listed species relevant to the proposal have been identified and discussed in Section 6.1.3.

Schedule 3A of the NC Act lists the native vegetation communities in Tasmania that are threatened. Communities listed under the NC Act are protected from clearance and conversion under the *Forest Practices Act 1985* and are also afforded higher levels of protection under some local government planning schemes.

The clearing or conversion of listed threatened vegetation communities generally requires the preparation and certification of a Forest Practices Plan. However, Regulation 4(l) of the *Forest Practices Regulations 2017* describes the circumstances in which a Forest Practices Plan is not required and at 4(j) and 4(l) includes the following relevant circumstances:

Regulation 4(j)

> *The harvesting of timber or the clearing of trees on any land, or the clearance and conversation of a threatened native vegetation community, for the purpose of enabling –*
>
> *i. The construction of a building within the meaning of the Land Use Planning and Approvals Act 1993 or of a group of such buildings; or*
>
> *ii. The carrying out of any associated development –*
>
> *If the construction of the buildings or carrying out of the associated development is authorised by a permit issued under that Act.*

Regulation 4(l)

> *i. The harvesting of timber or the clearing of trees on any land, or the clearance and conversion of a threatened native vegetation community on any land, to enable the construction and maintenance of electricity infrastructure, if – '*
>
> *ii. there is an easement on the land that enables the electricity infrastructure to be constructed or used, or, if there is no such easement, if the owner of the land consents to the construction or maintenance of the electricity infrastructure on the land; and the clearance and conversion is undertaken in accordance with an environmental management system endorsed by the Forest Practices Authority.*

A Forest Practices Plan would not be required as threatened communities would not be impacted by the proposal.

6.1.4.5 Forest Practices Act 1985

The Forest Practices Authority (FPA) manages the Tasmanian forest practices system on both public and private land, based on the *Forest Practices Act 1985*. The FPA operates independently, alongside government and private businesses to regulate all the activities that are defined as 'forest practices'. The Fauna Technical Note Series (further detailed in Section 6.1.4.5.1) provides information for fauna management in production forests.

6.1.4.5.1 Fauna Technical Note No. 1: Eagle nest searching, activity checking and nest management

Fauna Technical Note 1 provides guidance for the management of eagle species under the Tasmanian forest practices system, focusing on managing the risk of disturbance to breeding birds and associated nest sites. As identified in Section 6.1.3.4, the Tasmanian wedge-tailed eagle and White-bellied sea-eagle may

potentially occur within the proposal survey area, and an eagle nest (ID: 1323) was recorded 1.6 km away from the proposal survey area in 2006.

Due to the potential presence of eagle species and nests within the vicinity of the study area, MLPL would undertake eagle nest searches and nest activity checks prior to and during construction in accordance with FPA Fauna Technical Note No. 1 (refer to MM EC03 for further details).

The *National Light Pollution Guidelines for Wildlife* (DCCEEW 2023a) provides a framework to assess and manage the light pollution impacts on protected wildlife. Construction of the proposal would involve HDD works to occur 24 hours a day, seven days a week for a duration of 6 months. Any required night-time lighting associated with these construction works must adhere to guidance principles outlined in the *National Light Pollution Guidelines for Wildlife* to minimise potential disorientation of seabirds and shorebirds.

6.1.4.5.2 Guide to Eagle Nest Searches and Activity Checks

The EPA *Guide to Eagle Nest Searches and Activity Checks* provides direction to proponents where there is a requirement to undertake eagle nest searches and nest activity checks for the TSP listed wedge-tailed eagle and the White-bellied sea-eagle as part of an environmental impact assessment (such as this EIS). The guidance note is based on the FPA Fauna Technical Note No. 1.

6.1.5 Potential impacts

6.1.5.1 Construction

There would be no direct impacts to protected vegetation communities, flora and fauna from the construction of the proposal. This is due to the small footprint of the launch pad site (within an already cleared area of the Heybridge Converter Station site) and because no construction works would occur on the land above the underground crossings.

However, the following construction activities have the potential to cause indirect impacts to natural terrestrial values identified in Section 6.1.3:

- Underground crossing component:
  - HDD from the proposal site to approximately 10 m water depth.
  - Increased traffic movements on the surrounding road network.
- HDD launch pad component (within the Heybridge Converter Station site):
  - Civil and infrastructure works.
  - Increased traffic movements on the surrounding road network.

Indirect impacts from the proposal could include the following:

- Potential spread of weeds, pests and diseases.
- Roadkill of protected fauna species (such as the Tasmanian Devil and Spotted-tailed quoll) as a result of proposal generated road traffic at night time associated with the HDD works.

- Potential injury or death of protected eagle species (Tasmanian wedge-tailed eagle or White-bellied sea-eagle) as a result of traffic movements and/or disorientation to light pollution.
- Disturbance of protected eagle species breeding seasons.

6.1.5.1.1 Vegetation communities

One native vegetation community, Coastal scrub (SSC) was identified on the proposal site (on land above the underground crossings). However, disturbance to this community would be avoided as there is no surface construction in this location. The impact to the native vegetation communities within the proposal survey area are outlined in Table 6.1-5.

Table 6.1-5 Disturbance to native vegetation communities relevant to the proposal

Native vegetation community	Area (ha)	Location	Disturbance
Eucalyptus amygdalina coastal forest and woodland (DAC)	1.5	Present on the Heybridge Converter Station site	No disturbance. DAC community is outside the construction footprint and would be avoided.
Coastal scrub (SSC)	3	Present on the proposal site (on land above the underground crossings)	No disturbance. SSC is not part of the construction footprint (due to the proposal being underground in this location) and would be avoided.
Eucalyptus viminalis–Eucalyptus globulus coastal forest and woodland (DVC)	2	Present on the Shore Crossing survey area, on the northern side of Bass Highway (not within the proposal site)	No disturbance. Construction footprint would be confined to the proposal site.

The potential introduction of weeds, pests and diseases may pose a risk to the native vegetation communities present on the proposal survey area and would require ongoing management. The impact significance is considered to be **low**. The low impact significance rating is due to the proposal site being cleared, construction vehicles would be confined internal access roads and any waste being collected or removed from the proposal site would be managed accordingly.

6.1.5.1.2 Threatened fauna

The TSP Act listed mammals Tasmanian devil and Spotted-tailed quoll **may** occasionally pass through the proposal survey area. Whilst there are no previous records or observations of the species or suitable habitat (dens) within the proposal survey area, there are records of roadkill of both species on Minna Road and Bass Highway. There is the possibility of increased mortality as a result of the proposal construction generated traffic between dusk and dawn.

Construction worker vehicles would arrive and depart the converter station site around shift start and finish times (7:00 am and 7:00 pm). Other construction vehicles movements would occur around these times, and permissible working hours (outlined in Section 2). Traffic movements occurring in periods one hour after sunrise or one hour before sunset would be considered as night-time movements.

The length of Minna Road from Bass Highway to the Heybridge Converter Station site access is less than 200 m. There would be an approximate 10.8% increase in night time traffic on Minna Road between Bass

Highway intersection and the entrance to the proposal site, whilst the busier Bass Highway would have an approximate increase night-time traffic of 0.2%. These increases in night-time traffic are based on the proposed traffic movement for the HDD works. Refer to Section 6.13 for further information on traffic generated by the proposal.

The impact significance to Tasmanian devils and Spotted-tailed quolls from construction generated traffic is considered to be **moderate**.

The risk of vehicle strikes to Tasmanian devils and Spotted-tailed quolls within the proposal site is negligible, as internal site traffic speeds at night would be less than 15 km per hour.

There is existing night-time anthropogenic lighting associated with the Bass Highway and with nearby residences. As such, additional night-time lighting to facilitate the 24-hour operation of the HDD works are not likely to result in increased risk of disorientation nor collisions by nocturnal fauna, however mitigation measures in adherence with *Commonwealth National Light Pollution Guidelines for Wildlife Appendix A (Best Practice Lighting Design)* would be implemented (refer to MM EC02 for further details).

The TSP listed Tasmanian Wedge-tailed eagle and the White-bellied sea-eagle have no known nest sites within 1 km of the proposal survey area. The nearest eagle nest has been recorded 1.6 km from the proposal survey area (ID: 1323) but has not been verified as being present since 2006. Both species may overfly the proposal survey area as they have large home ranges. If a nest is observed within 500 m or 1 km line-of-sight prior to construction, there is potential for the disturbance of eagle breeding cycles from construction activities. Overall, both species are unlikely to be impacted by the construction of the proposal and the pre-mitigation impact significance is considered to be **low**.

The TSP listed White-throated needletail may fly over the proposal survey area but would not use the proposal site as they do not come to land. This aerial bird species has low sensitivity to disturbance from the activities associated with the construction of the proposal, and such is unlikely to be impacted. Vegetation removal is not expected for the proposal. Therefore, the potential for the White-throated needletail roosting trees to be affected is unlikely. The impact significance is considered to be **low**.

The TSP Act listed shorebird species *Limosa lapponica baueri* (Nunivak bar-tailed godwit) and *Numenius madagascariensis* (Eastern curlew) were identified as potentially occurring near the proposal study area by the PMST. However, the likelihood of occurrence for both species are assessed as “Absent” based on there being no records on NVA database within 5 km of the proposal survey area. Due to the low likelihood of occurrence of shorebirds, there is no anticipated impact to shorebirds or shorebird habitat due to the construction of the proposal and required HDD works.

6.1.5.2 Operation

Operation of the proposal would involve periodic maintenance activities of the subsea cables which would be undertaken in the marine environment (refer to Section 2.4). As such, potential impacts to terrestrial natural values during operation is expected to be negligible.

6.1.5.3 Significance impact assessment

A significance impact assessment of potential impacts to terrestrial natural values during construction and prior to the implementation of mitigation measures is presented in Table 6.1-6.

Table 6.1-6 Terrestrial natural values – initial significant impact assessment

Impacted value	Proposal stage	Impact assessment		
		Sensitivity	Magnitude	Significance
Remnant patch E. *amygdalina* coastal forest and woodland 1.5 ha on converter station site	Construction	Low	Negligible	**Low**
Coastal scrub vegetation community 3 ha at proposal survey area	Construction	Low	Negligible	**Low**
E. viminalis - E.globulus coastal forest and woodland (NC Act listed) 2 ha at proposal survey area adjacent to Blythe River mouth	Construction	High	Negligible	**Low**
Tasmanian devil (*Sarcophilus harrisii*) and Spotted-tailed quoll (*Dasyurus maculatus* subsp. *maculatus*)	Construction	High	Minor	**Moderate**
Tasmanian wedge-tailed eagle (*Aquila audax* subsp. *fleayi*)	Construction	High	Negligible	**Low**
White bellied sea-eagle (*Haliaeetus leucogaster*)	Construction	High	Negligible	**Low**
Fork-tailed swift (*Apus pacificus*)	Construction	High	Negligible	**Low**
White-throated needletail (*Hirundapus caudacutus*)	Construction	High	Negligible	**Low**

6.1.5.4 Cumulative impacts

Out of the nearby proposed and foreseeable projects identified for consideration, construction activities for NWTD may occur in close proximity and in similar timeframes to the proposal. All other projects were considered unlikely to contribute to the potential impacts of the proposal, and are therefore not expected to have a cumulative impact to terrestrial natural values. This includes fauna species that have large home ranges and move extensively throughout the vicinity surrounding the proposal site.

Twilight and night traffic movements on Minna Road would increase by at least 10% at times due to construction activities associated with the proposal and the Heybridge Converter Station and the NWTD combined and may approach a 10% increase of traffic on Bass Highway. Therefore, there is a possibility for cumulative impacts to Tasmanian devils and Spotted-tailed quolls, related to roadkill from twilight and night-time traffic movements from construction of both the project and the NWTD corridor works. The application of the mitigation measures outlined in Table 6.1-7 would ensure that the additional 10% of traffic on a limited extant of road, is unlikely to result in a significant impact or decrease in population of Tasmanian devil and Spotted-tailed quoll.

The construction of the NWTD project corridor would involve the removal of potential impacts of native species. However, this is not an impact of Marinus Link. The proposal and the Heybridge Converter Station would not remove any potential habitat of any terrestrial native species.

The construction of the NWTD project corridor would also encounter Tasmanian wedge-tailed eagle nests at much greater number and at closer distance than works associated with the proposal. However, there are mitigation measures that would be adopted that require both inspection of nests and work stoppages (refer to Table 6.1-7) that are considered effective to avoid risks to raptors.

Given the limited extent of roads where the proposal may contribute to roadkill (Bass Highway and Minna Road), and with the application of mitigation measures (refer to Table 6.1-7), the proposal is unlikely to contribute to a significant decrease in the population of Tasmanian devil and Spotted-tailed quoll when combined with the impacts from the NWTD project.

6.1.6 Management, mitigation and monitoring

Proposed mitigation measures to minimise potential impacts on terrestrial natural values are presented in Table 6.1-7. Mitigation measures in other sections that are relevant to the management of terrestrial natural values include:

- Section 6.3 (Marine natural values), specifically measures related to the protection of seabirds and migratory shorebirds.
- Section 6.5 (Water quality), specifically measures which address impacts to surface and groundwater quality or groundwater drawdown.
- Section 6.7 (Air quality), specifically measures managing dust impacts reducing potential impacts on ecological receptors.
- Section 6.13 (Infrastructure and off-site ancillary facilities), specifically measures for site inductions and driver awareness to minimise instances of roadkill.

Together, these measures will minimise potential impacts to terrestrial natural values.

Table 6.1-7 Terrestrial natural values – mitigation measures

Ref	Mitigation measure	Proposal stage
EC01	Develop and implement measures to protect the area of *Eucalyptus amygdalina*, coastal forest and woodland, present on the converter station site, primarily by implementing a no-go zone.	Construction
EC02	To minimise potential ecological impacts of the proposal: • Adopt measures detailing the identification and management of weeds in accordance with the *Weed and Disease Planning and Hygiene Guidelines* (DPIPWE 2015b), the relevant Statutory Weed Management plans associated with the declared weeds on site, and the Tasmanian *Biosecurity Act 2019*. • Adopt measures to minimise roadkill in MM T01, as appropriate. • Any night-time lighting associated with construction works must adhere to the guidance principles outlined in the *National Light Pollution Guidelines for Wildlife*. These measures would include, but are not limited to:	Construction

Ref	Mitigation measure	Proposal stage
	- Night-time lighting required for the 24-hour operation of the HDD works will be minimised to the greatest extent practicable. - Red light will be used at night where possible.	
EC03	Prior to construction commencing and every year during construction, confirm that there are no active Tasmanian wedge-tailed eagle or White-bellied sea-eagle nests within a distance of 500 m of the site boundary, or within 1 km line-of-sight of the site boundary using eagle nest search data collected within one year of construction commencing. At any time prior to or during construction, if an eagle nest is observed within 500 m, or within 1 km line-of-sight, works will cease until activity checks and other measures have been implemented in accordance with Tasmania Forest Practices Authority's *Fauna Technical Note No. 1 Eagle nest searching, activity checking and nest management* (FPA 2023), the *Threatened Tasmanian Eagles Recovery Plan 2006-2010*, and the EPA *Guide to Eagle Nest Searches and Activity Checks*. If activity checks are to be required, the following measures will be implemented: • Activity checks are to be conducted between mid-October and the end of December by a suitably qualified, FPA/NRE accredited assessor. • Activity checks are considered likely to disturb a breeding pair, potentially leading to breeding failure and would only be conducted under exceptional circumstances following consultation with NRE Tasmania and EPA Tasmania. Construction will be deferred until outside of the eagle nest management constraint period if a nest within 500 m, or within 1 km line-of-sight is determined to be active as per FPA Fauna Technical Note No. 1.	Construction
EC04	Prepare and implement an eagle nest management strategy if a new eagle nest is identified within 500 m or 1 km line-of-sight of the site boundary during construction, in accordance with FPA *Fauna Technical Note No. 1*, the *Threatened Tasmanian Eagles Recovery Plan 2006-2010,* and the EPA *Guide to Eagle Nest Searches and Activity Checks*. This strategy will be prepared in consultation with NRE Tasmania and EPA Tasmania.	Construction

6.1.7 Residual impacts

A significance impact assessment on the residual impacts to terrestrial natural values following the implementation of mitigation measures, is presented in Table 6.1-8.

Following the implementation of the mitigation measures outlined in Section 6.1.6, the impact significance of potential impacts to terrestrial natural values have been reduced to **low**.

Table 6.1-8 Terrestrial natural values – residual impact significance assessment summary

Impacted value	Proposal stage	Initial impact significance	Mitigation measure	Residual impact significance
Remnant patch *E. amygdalina* coastal forest and woodland 1.5 ha on converter station site	Construction	Low	EC01 and EC02	**Low**
Coastal scrub vegetation community 3 ha at proposal study area	Construction	Low	EC02	**Low**
E. viminalis - E.globulus coastal forest and woodland (NC Act listed)	Construction	Low	EC02	**Low**

Impacted value	Proposal stage	Initial impact significance	Mitigation measure	Residual impact significance
2 ha at proposal study area adjacent to Blythe River mouth				
Tasmanian devil (*Sarcophilus harrisii*) and Spotted-tailed quoll (*Dasyurus maculatus* subsp. *maculatus*)	Construction	Moderate	T01	**Low**
Tasmanian wedge-tailed eagle (*Aquila audax* subsp. *fleayi*)	Construction	Low	EC03	**Low**
White-bellied sea-eagle (*Haliaeetus leucogaster*)	Construction	Low	EC03	**Low**
Fork-tailed swift (*Apus pacificus*)	Construction	Low	None required	**Low**
White-throated needletail (*Hirundapus caudacutus*)	Construction	Low	None required	**Low**

6.2 Potentially contaminated materials and acid sulfate soils

This section provides a summary of Contaminated Land and Acid Sulfate Soils Impact Assessment provided in Appendix C.

This technical assessment informs other technical studies concerning surface and groundwater, which are summarised in Section 6.5. The purpose of this section is to explain the current state of contamination and the pathways for contamination to present risks to the local environment. The mitigation measures in this section are directed towards avoiding or minimising the risk of contamination. The mitigation measures in Section 6.5 are about protecting aspects of water environment from contamination. Note that this section addresses potential contaminated material at the launch pad site and land-based areas only, and Section 6.4 later addresses potential contamination in Tasmanian coastal waters.

6.2.1 Assessment guidelines

The relevant sections of the EIS guidelines for the Heybridge Shore Crossing, and where these have been addressed in this EIS, are outlined in Table 6.2-1.

Table 6.2-1 Relevant EIS guidelines

Potentially contaminated materials and acid sulfate soils – EIS guidelines	Section
From sampling, provide an analysis as to whether Potential Acid Sulfate Soils (PASS) may be present and potentially disturbed as a result of construction of the proposal.	Section 6.2.3.5, 6.2.5.1.3
For the terrestrial component of the proposal, an assessment of site contamination, which must be conducted in accordance with the *National Environment Protection (Assessment of Site Contamination) Measure 1999* by a consultant who holds Site Contamination Specialist certification under the Certified Environmental Practitioner Scheme (CEnvP(SC)).	Section 6.2.2, 6.2.3
For the marine component of the proposal, an assessment of site contamination undertaken by a suitably qualified person, based on sampling and site history, applying the principles of the *National Environment Protection (Assessment of Site Contamination) Measure 1999* as relevant.	Section 6.2.2, 6.2.3, 6.2.4.1
Detail of proposed construction methodology, footprint, extent of disturbance and how this may interact with contaminated material and PASS.	Section 6.2.5.1, 6.2.3.6
Analysis of receptors and risk to receptors due to disturbing potentially contaminated material, during and after construction (e.g., from scouring of sediment due to altered flow patterns).	Section 6.2.3.7, 6.2.5.1, 6.2.5.2,6.2.5.3
Potential consequences of disturbance (i.e., potential impact/risks), and evaluation of their significance.	Section 6.2.5, 6.2.5.3
Potential cumulative impact with works being undertaken for the Heybridge convertor station.	Section 6.2.5.4
Describe proposed management and mitigation measures for minimising impacts of contaminated material during construction and long-term use/operation, including storage, monitoring and disposal as relevant.	Section 6.2.6
In regard to potential acid sulfate soils, the risk should be managed and monitored in accordance with Australian Government ASS Guidelines and *Tasmanian ASS Management Guidelines*. The national guidelines indicate that a management plan is required for an activity if >100m³ ASS materials is likely to be disturbed during the construction phase. This management plan should clearly describe and detail construction techniques, include a risk assessment and describe management and monitoring activities.	Section 6.2.6

Potentially contaminated materials and acid sulfate soils – EIS guidelines	Section
Legislative and policy requirements	
National Environment Protection (Assessment of Site Contamination) Measure 1999 (the Assessment of Site Contamination NEPM), *Environmental Management and Pollution Control (Waste Management) Regulations 2020*, Australian Government ASS guideline documents, *Tasmanian Acid Sulfate Soils Management Guidelines 2009*.	Section 6.2.4

6.2.2 Methodology

National Environment Protection Measures (NEPMs) are statutory instruments that establish national standards various environmental issues. The Contaminated Land and Acid Sulfate Soils Impact Assessment (Appendix C) was carried out in accordance with the Assessment of Site Contamination NEPM by a suitably qualified site contamination specialist who holds certification under Certified Environmental Practitioner Scheme (CEnvP-SC).

The impact assessment adopted a **risk assessment** approach and identifies the potential source of existing contamination of concern which has the potential to impact on soil, surface water and groundwater at the proposal site.

The initial desktop assessment included review of publicly available information (including aerial photographs, maps, plans, registers and other information) to establish the potential sources (including nature and extent) of contamination within the study area and identify areas where additional sampling and analysis was required.

Following this, a targeted assessment of specific sources of contamination within the Heybridge Converter Station site was undertaken. This included:

- A site walkover of the targeted areas to confirm the presence or absence of contamination or contaminating activities.
- Targeted soil assessment of areas that had not previously been investigated and had a potential to contain contamination or ASS, including the collection and analysis of soil samples.
- Targeted surface water sampling from onsite stormwater detention ponds and drains.

Soil sampling was completed at eight test-pit locations along the northern boundary of the Heybridge Converter Station site to assess for the presence of ASS. These test-pit locations were considered more likely to contain undisturbed soil profiles. Test-pits were limited to an excavation depth of 1.5 m below the ground surface (to avoid soil instability and risk of test-pit collapse).

Several stockpiles of soils are present on the site (refer to Figure 6.2-1) and samples from the six larger stockpiles were collected to provide a preliminary indication of the contamination status of the soils in them. Some smaller mounds of soils (generally less than 1 m^3) were present in areas to assist with water drainage, or from onsite road forming, and were not sampled.

The contamination status of surface water at the proposal site has not previously been assessed. It was considered that sampling the current surface water drainage system would provide an indication of the current baseline condition of surface water on the site. Surface water sampling was completed at two surface

water locations; from the stormwater drain within the proposal site, and at the stormwater drain outlet on Tioxide Beach. The effluent tunnel that emerges on the eastern end of Tioxide Beach was blocked and did not appear to be flowing.

Outcomes of the desktop and field data were used to develop a conceptual site model to identify the nature and extent of contamination and ASS within the study area (the sources of contamination), the potential receptors that may be exposed to or impacted by disturbance of the contamination/ASS, and the pathways by which receptors may be exposed. The full detailed methodology, including any relevant assumptions and limitations, is included in Appendix C.

6.2.3 Existing conditions

6.2.3.1 Soils

Soil contamination associated with the previous land use of the Heybridge Converter Station site, where the HDD launch pads would be located (refer to Section 0), has largely been remediated and validated as being below the adopted industrial land-use screening criteria. However, there are isolated locations of contamination remaining including metals in fill with concentrations of copper (location SP2_02), nickel (locations SP2_01-03, SP8-02 and SP10_03), and zinc (location SP10-03) above adopted NEPM-EILs, and one location with lead above the adopted NEPM-HIL-D.

Key findings of reports into previous land use identified that the Heybridge Converter Station site contains various thickness of fill soils ranging from 0.3 m to >1.5 m, with an average thickness is 0.7 m based on geotechnical testing since demolition of the tioxide plant. The extent of fill has not been well characterised within the site. The demolition of factory buildings on site was undertaken in the mid-1990s, however remnants of footings (such as concrete blocks and bricks) are present in some areas, which have limited the sampling of soils in some isolated locations. Given this uncertainty, there is potential that areas of contamination that are present in soils at depth, including hydrocarbon contamination, metal contamination, acidic soils and asbestos containing material, and all at concentrations that could pose a potential impact to human health and environment.

There is potential for hydrocarbons contamination to still be present at levels above NEPM management limits or health screening levels, however recent testing has not identified any locations with concentrations above the adopted screening criteria. Soil stockpiles, presented in Figure 6.2-1, are unlikely to present a risk to health, unless they contain residual asbestos.

ACM debris had been identified on the ground surface at the Heybridge Converter Station site. The ACM, where identified, were then removed, however no further sampling of the residual soils on the site has been undertaken. There is potential for residual fragments of ACM to be present within fill soils on the site. The location of the asbestos contamination is shown in Figure 6.2-2. Low pH soils are present where acid leakages from former plant and machinery have resulted in reduced pH in the central section of the Heybridge Converter Station site, away from the HDD launch pad sites. Radioactivity testing indicates that the measured radioactivity was within background levels, and poly-fluoroalkyl substances (PFAS) testing did not report any concentrations above adopted screening criteria.

Figure 6.2-1:
Soil stockpiles on the proposal site

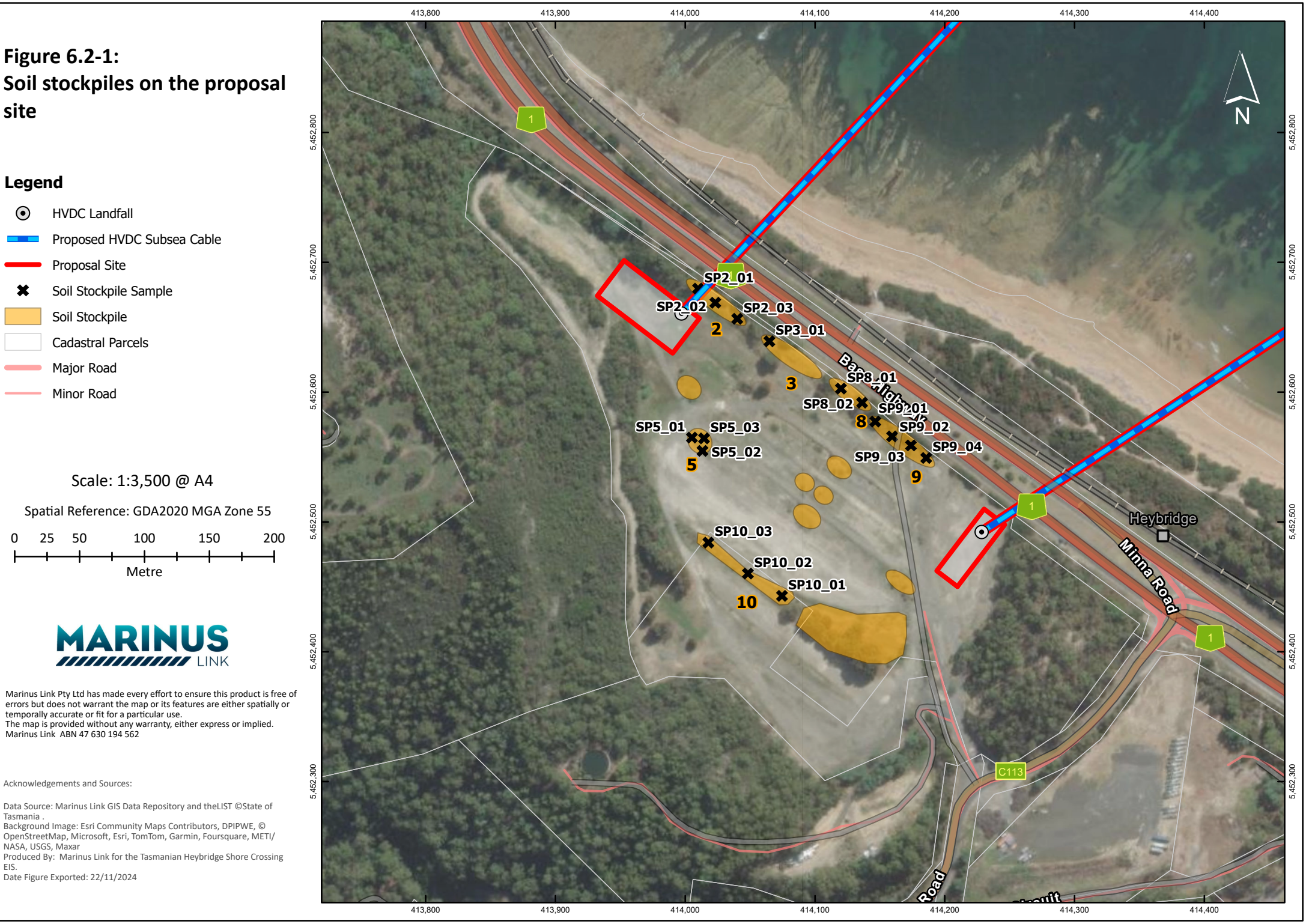


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Figure 6.2-2:
Areas of known asbestos contamination

Legend

- HVDC Landfall
- Proposed HVDC Subsea Cable
- Proposal Site
- Areas where ACM Debris was Identified and Removed from Site (Approximate Locations Only)
- Cadastral Parcels
- Major Road
- Minor Road

Scale: 1:3,500 @ A4

Spatial Reference: GDA2020 MGA Zone 55

0 25 50 100 150 200

Metre

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Acknowledgements and Sources:

Data Source: Marinus Link GIS Data Repository and theLIST ©State of Tasmania .
Background Image: Esri Community Maps Contributors, DPIPWE, © OpenStreetMap, Microsoft, Esri, TomTom, Garmin, Foursquare, METI/ NASA, USGS, Maxar
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Date Figure Exported: 22/11/2024

6.2.3.2 Surface water

Surface water at the Heybridge Converter Station site and land above the underground crossings is managed through a built drain and detention basin which discharges directly into the marine environment. Testing of the surface water has shown:

- Concentrations of copper and zinc exceeded the adopted screening criteria for protection of fresh and marine water (ANZG 2018 – Default Guideline Values (DGVs) for 95% species protection).
- Concentrations of potential contaminants at the proposal site are below the screening criteria for protection of human health (primary contact recreation and potable water supply).

Given the direct discharge to the marine environment, the 95% marine criteria have been used to assess the potential for impact to marine water quality (refer to Section 6.4). The concentrations of copper and zinc are marginally above the adopted screening criteria and could present a potential risk to marine receptors. However, since the surface water flowing from the Heybridge Converter Station site and land above the underground crossings is ephemeral (in that it only flows during rainfall events), the impacts to marine receptors are likely to be minimal. This is because the exposure duration for assessing impacts to aquatic biota is based on continual exposure, and not period exposure. Therefore, the surface water quality within the study area is not considered to impact on ecological receptors within the marine environment.

6.2.3.3 Groundwater

Groundwater beneath the Heybridge Converter Station site and land above the underground crossings is present at depths ranging between approximately 0.5 m to 3 m below the ground surface.

Previous soil and groundwater assessments (refer to Section 6.5.3 and Appendix F) across the Heybridge Converter Station site indicate that:

- Analytes for the five groundwater samples collected by Jacobs (2022) were reported to be below adopted criteria with the exception of cobalt (all samples), copper (three samples) and zinc (all samples).
- PFAS concentrations were reported in three wells but were below the adopted screening criteria for marine ecosystems (95% species protection) and also for other water uses.
- Field parameters recorded by Jacobs (2022) indicated that the groundwater was mildly acidic with an oxidising potential.
- WCC (2007) reported that shallow groundwater encountered during test pit excavation was locally contaminated with TPH (>C10) and traces of volatiles at two locations (and not widespread across Heybridge Converter Station site).

Groundwater contaminant testing has shown that groundwater is generally not impacted by contamination originating from the Heybridge Converter Station site. Groundwater discharges to the ocean at Tioxide Beach and there is a potential that the concentrations of metals in groundwater may impact on marine receivers under existing conditions.

6.2.3.4 Sediment

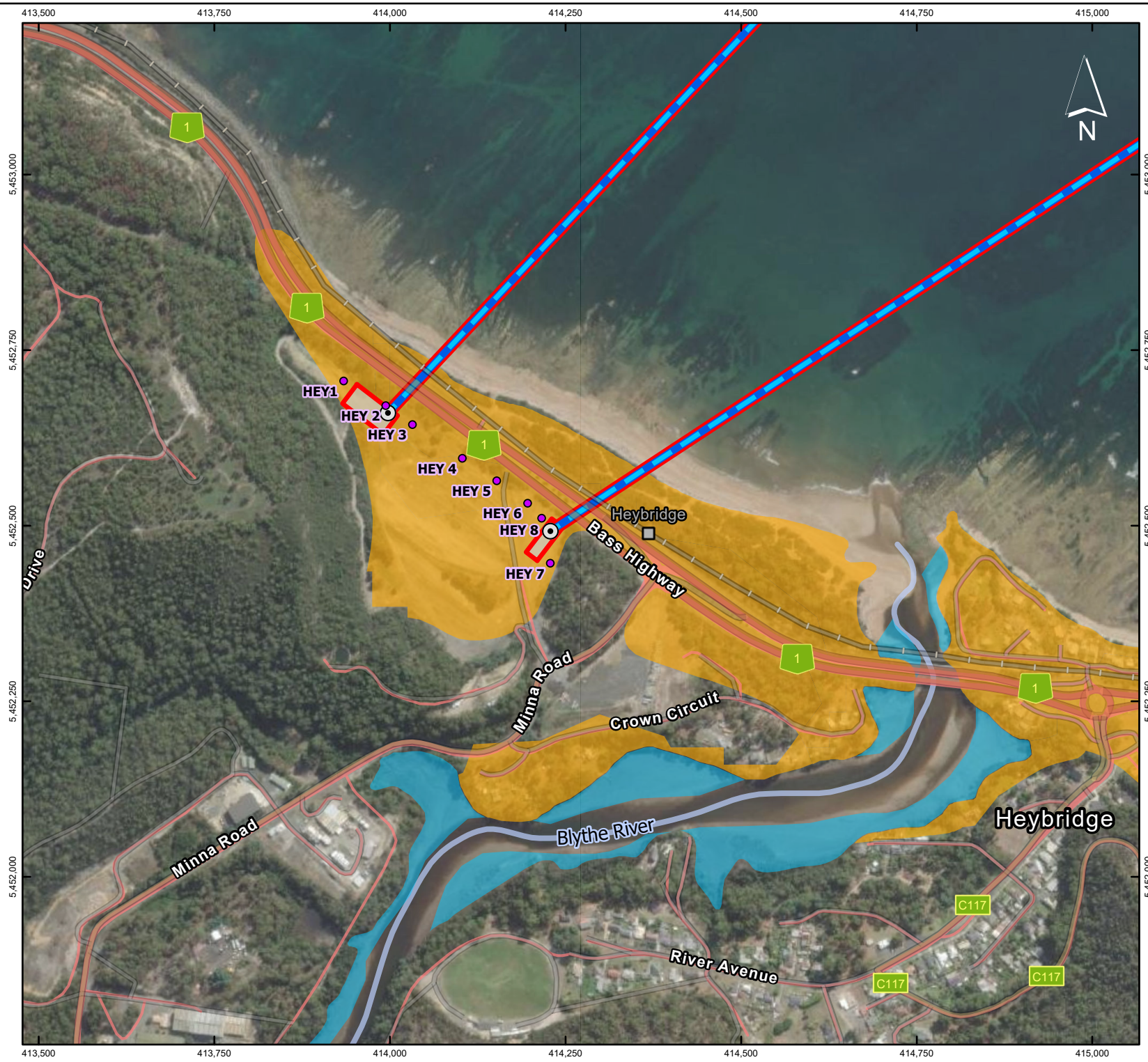
The western seabed alignment is partly traversed by the disused outfall pipelines of the former tioxide plant. The outfall pipelines are not considered to be a potential source of contamination, as sediments in and around the pipeline containing concentrations of potential contaminants are below the sediment DGVs.

For the majority of the pipeline length, the sediments surrounding the pipeline are not considered to be contaminated. However, based on sediment sampling near the outlet of the effluent pipe, it is likely that sediments in the vicinity of the pipe outlets are contaminated with metals. Potential impacts of the disused outfall pipelines are further discussed in Section 6.3 and 6.4.

6.2.3.5 Potential acid sulfate soils

ASS testing undertaken across the Heybridge Converter Station site, including at sampling locations that overlapped the HDD launch pad, indicates that potential ASS is present at depths from approximately 0.5 m below the ground surface, although the presence is not continuous across the site. The probability of occurrence of ASS is shown in Figure 6.2-3.

Figure 6.2-3:
Acid sulfate soils probability of occurrence



Legend

- HVDC Landfall
- Proposed HVDC Subsea Cable
- Proposal Site
- ASS Sample Location

Coastal Acid Sulphate Soils (0-20m AHD)

- Low Probability

Marine Acid Sulphate Soils

- High (Intertidal)
- Watercourse
- Major Road
- Minor Road

Scale: 1:7,500 @ A4

Spatial Reference: GDA2020 MGA Zone 55

0 50 100 200 300 400

Metre

MARINUS LINK

Acknowledgements and Sources:

Data Source: Marinus Link GIS Data Repository and theLIST ©State of Tasmania .
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6.2.3.6 Summary of conceptual site model

Potential sources of contamination that may impact receptors were identified through a review of previous environmental site investigations and publicly available environmental and historical information. The key contamination issues associated with the proposal are:

- **Diversely distributed contamination**: This includes metals (lead, copper, nickel, chromium and zinc), petroleum hydrocarbons and ACM within fill soils on the Heybridge Converter Station site. These contaminates have the potential to impact upon human health or ecological receptors if disturbed or if surplus soils are not managed appropriately.
- **Historical contamination**: Due to the long history of mineral processing, the demolition undertaken and the highly diverse distribution of contamination in soils at the Heybridge Converter Station site, contamination may be encountered outside of areas previously identified or remediated.
- **Contaminated groundwater**: Discharging to surface water (onsite and to the marine environment) may result in impacts to sensitive ecological receptors.
- **Potential ASS**: If disturbed, or dewatered, these soils may result in generation of acid that has the potential to impact upon on human health, built structures, terrestrial and aquatic biota, and buried cultural heritage artefacts.

These key contamination issues in the context of the proposal are discussed further in Section 6.2.5. A plan of the conceptual site model is presented in Figure 6.2-4.

6.2.3.7 Exposure pathways and receptors

Human health and ecological receptors specific to the Heybridge Converter Station site have been identified to assess the potential risk from existing contamination. The identification of receptors was carried out through a preliminary conceptual site model, which characterises the potential for contamination or ASS to impact receptors by identifying the present exposure pathways. This model also guides the development of potential management and mitigation measures.

Based on review of previous environmental site investigations, publicly available information, site inspection and targeted sampling, the contaminants of potential concern that may have impacted the soil, surface water and groundwater on the Heybridge Converter Station site are summarised in Table 6.2-2.

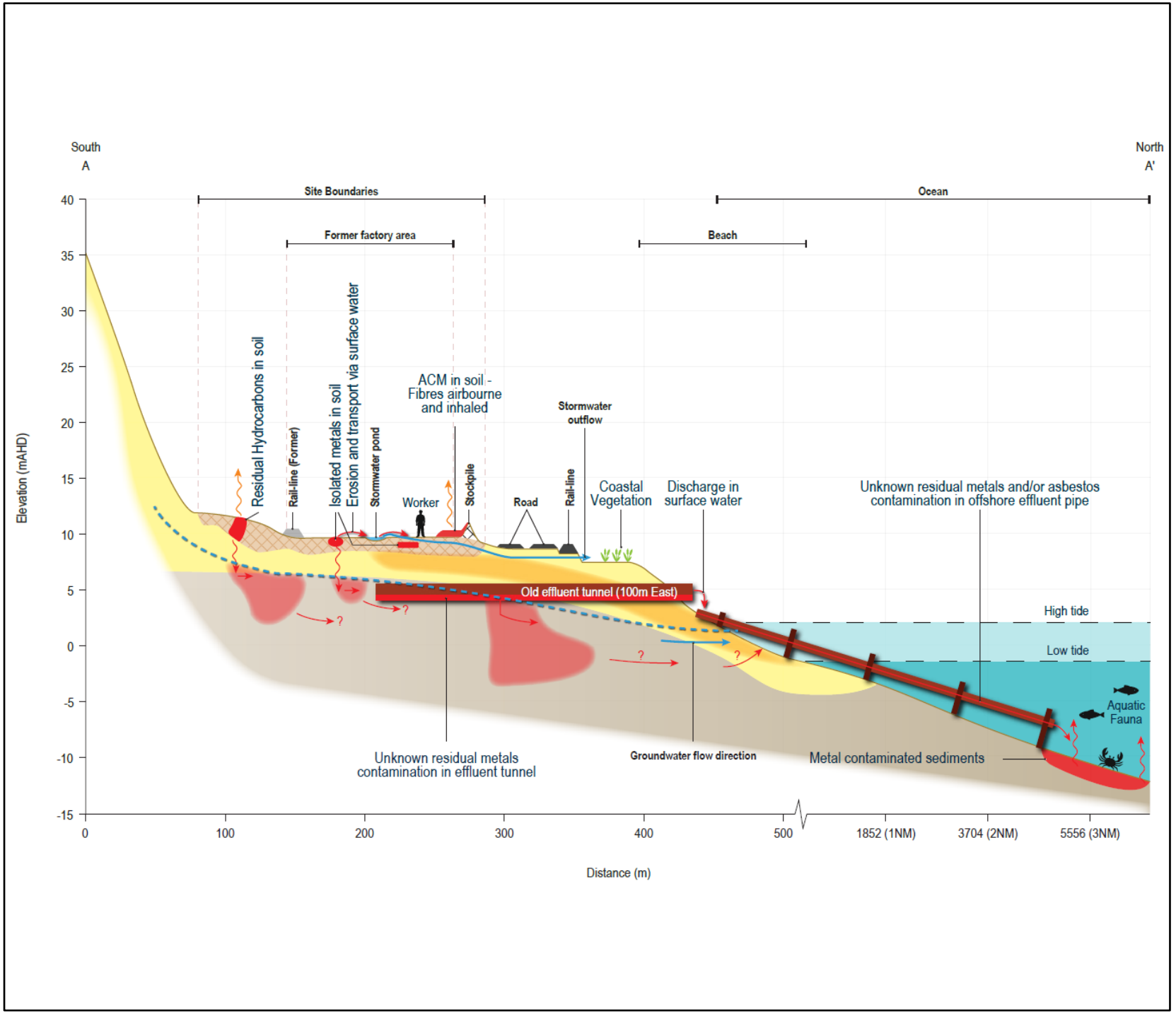
Table 6.2-2 Potential sources of contamination

Source of contamination	Associated contaminants of potential concern
Former tioxide plant	Metals, petroleum hydrocarbons, asbestos, low pH, NORM
Lumber yard	Petroleum hydrocarbons
Potential ASS	Acid generation (low pH), metals

Figure 6.2-4:
Conceptual site model

Legend

- Fill
- Sand
- Potential acid sulfate soils
- Quartz-wacke
- Effluent piping
- Leaching/groundwater transport plume
- Volatilisation
- Leaching
- Potential Migration
- Groundwater



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Acknowledgements and Sources:

Produced for the Tasmanian Heybridge Shore Crossing EIS.
Date Figure Exported: 22/11/2024

6.2.4 Applicable legislation

6.2.4.1 Environmental Management and Pollution Control (Waste Management) Regulations 2020

The Waste Management Regulations are administered under the EMPC Act. The Waste Management Regulations are used to regulate and manage controlled waste and some aspects of the general waste disposal within Tasmania. As per the Waste Management Regulations, the proposal site cannot pose a known or potential unacceptable risk to human health and/or the environment, and any controlled waste potentially generated by the proposal would be managed in accordance with the regulations.

6.2.4.2 National Environment Protection (Assessment of Site Contamination) Measure 1999

NEPMs are statutory instruments that establish national standards various environmental issues. In Tasmania, the *National Environment Protection Council (Tasmania) Act 1995* references the National Environment Protection (Assessment of Site Contamination) Measure 1999. NEPMs are considered State Policies in accordance with section 12A of the *State Policies and Projects Act 1993*. The adopted screening criteria levels are detailed in the Contaminated Land and Acid Sulfate Soil Impact Assessment (Appendix C). All analytical results have been compared to the NEPM to determine potential for reuse in a commercial/industrial land use.

6.2.4.3 Tasmanian Acid Sulfate Soil Management Guidelines

Assessment criteria for the investigation of ASS have been adopted from the *Tasmanian Acid Sulfate Soil Management Guidelines*, which presents the recommended approach to assessment and management of ASS in Tasmania. Should the proposal exceed the threshold for preparation of an ASS Management Plan, MM CL02 will be implemented in accordance with the Tasmanian Acid Sulfate Soil Management Guidelines.

6.2.4.4 EPA Tasmania (2018) Information Bulletin No. 105, Classification and Management of Contaminated Soil for Disposal

EPA Tasmania (2018) *Information Bulletin No. 105, Classification and Management of Contaminated Soil for Disposal* (Information Bulletin 105) defines the criteria for the classification of contaminated soil that requires treatment and/or off-site disposal and provides guidelines for managing each classification. Analytical results have been compared to the Information Bulletin 105 to determine potential for reuse in a commercial or industrial land use.

Soils present on the proposal site have preliminary classification of Low Level Contaminated Soil (Level 2) for the top 0.5 m of soils, and a preliminary classification Fill Material (Level 1) for the deeper soils (below 0.5 m) with isolated locations containing deeper contamination (up to 1 m below ground level) that would classify these isolated locations as Low Level Contaminated Soil (Level 2).

Estimates of approximate volumes of soils to be disturbed as part of the bulk earthworks for the Heybridge Converter Station site (of which a portion includes the HDD launch pad/s) have been provided in Table 6.2-3. Surplus soils generated during construction of the proposal that require offsite disposal would be classified and managed in accordance with Information Bulletin 105.

Table 6.2-3 Estimates of waste soil categories for disposal

Soil category	Estimated volume (m^3)
Level 1 (fill material)	37,200
Level 2 (low level contaminated soil)	34,300
Level 3 (contaminated soil)	0
Level 4 (contaminated soil for remediation)	0
Total	**62,200**

6.2.5 Potential impacts

Based on the outcomes of the conceptual site model and the existing conditions, potential hazards have been identified as having a risk of causing unmitigated impacts to the environment. They include:

- Management of excavated soils.
- Disturbance of ASS.
- ACM debris.
- Management of routine construction impacts.

The results of the conceptual site model and contamination assessment collectively shape the overall risk assessment. This includes a detailed evaluation of potential risks to environmental values (both human and ecological receptors) from existing contamination (whether natural or anthropogenic) identified at the proposal site. It also covers potential risks that may arise during the construction and decommissioning phases of the proposal, as detailed in the sections below.

6.2.5.1 Construction

The following sections detail the potential impacts of contamination on human health and ecological receptors during the construction phase of the proposal.

6.2.5.1.1 Impacts associated with existing contamination

The construction of the HDD launch pads involves earthworks which may disturb existing contaminated soil or interaction with contaminated groundwater or surface water. This could potentially result in harm to human health and ecological receptors through exposure pathways, including:

- Disturbance of existing contamination/wastes (natural or anthropogenic).
- Stockpiling and handling of contaminated material.
- Removal of contaminated in-situ infrastructure.

During construction of the HDD launch pads and HDD, there is a potential to encounter contaminants such as metals and hydrocarbons at concentrations could impact human health or the environment if not appropriately managed. However, the extent of contaminated soil exceeding the adopted criteria at the onshore components of the proposal site is limited, so the potential impact to human health and ecological receptors is considered **low**.

Based on the risk assessment (refer to Table 6.2-4), without the implementation of mitigation measures, these potential impacts have a risk rating of **moderate**.

6.2.5.1.2 Potentially contaminating construction activities

The construction of the proposal on the Heybridge Converter Station site has the potential to cause contamination to soil, surface water and groundwater if unmitigated. This could occur due to:

- Localised leaks of oils, fuels and chemicals, including drilling fluids, from plant and equipment.
- Improper handling of potentially contaminated material (exposure to workers, human and ecological receptors).

Improper handling and stockpiling of excavated contaminated soils can impact air quality through dust emissions or surface water quality via stormwater run-off and sedimentation. Contaminated material stockpiles would be contained using standard procedures to limit the potential for contamination migration. through dust dispersion, leaching, or stormwater run-off.

All other parts of the construction footprint were assessed as low risk. Given the proposed land use, they are considered to pose a low risk to human health and potential environmental impacts can be managed by standard erosion and sediment control procedures.

Prior to mitigation, the risk rating of these construction impacts are **low**. Refer to the risk assessment in Table 6.2-4.

6.2.5.1.3 Potential acid sulfate soils

ASS are naturally occurring soils, sediments or organic substrates that contain iron sulfides. When left undisturbed, ASS do not present any environmental risk. However when exposed to air, the iron sulfides ASS contain react with oxygen to create sulfuric acid. The disturbance of ASS has the potential to result in oxidation of sulfidic minerals within the soils and create acid, which can then leach metals. The disturbance of ASS can lead to the degradation of constructed proposal elements and can cause degradation to ecological receptors at the proposal site including flora and fauna. The disturbance of ASS may also result in generation of sulfidic odours. Refer to Section 6.6 for further discussion on potential odour impacts.

Prior to mitigation, the potential disturbance of ASS during construction, and their potential impact on ecological receptors (degradation to flora and/or fauna if disturbed), has a risk rating of **moderate**. Refer to the risk assessment in Table 6.2-4.

6.2.5.1.4 Asbestos

ACM debris had been identified on the ground surface at the Heybridge Converter Station site. The ACM, where identified, has since been removed. There is potential for fragments of ACM to be present within fill soils on the site. ACM is susceptible to degradation and fibre release and has the potential to cause impact on human health (construction workers) and ecological receptors if the asbestos fibres become airborne and respirable. To manage potential exposure to asbestos fibres by human health receptors, an unexpected finds protocol will be developed and implemented. This protocol is detailed further in Table 6.2-5.

Prior to the implementation of mitigation measures, the potential exposure of ACM during construction of the HDD launch pads has a risk rating of **moderate**.

6.2.5.2 Operation

Operation of the proposal would involve periodic maintenance activities of the subsea cables which would be undertaken in the marine environment (refer to Section 2.4). As such, potential impacts to terrestrial natural values during operation is expected to be negligible.

6.2.5.3 Risk assessment

A risk assessment evaluation undertaken for the proposal is presented in Table 6.2-4. The evaluation assesses the potential risk to human health and/or ecological receptors prior to the implementation of mitigation measures. Further details on the methodology for the assessment is provided in the Contaminated Land and Acid Sulfate Soils Impact Assessment (Appendix C).

Table 6.2-4 Risk assessment of potentially contaminated material and acid sulfate soils

Impacted value	Potential risk of harm	Risk rating
Human health/ecological receptors	Excavated soils (including contaminated soils) may present a risk to human or ecological receptors if not contained causing degradation of environment or hazards to health.	**Moderate**
Human health/ecological receptors	Construction activities lead to generation of contaminated wastes, spills or leaks that may cause a risk to human or ecological receptors if not contained causing degradation of environment or hazards to health.	**Low**
Ecological receptors	ASS may cause degradation to flora and/or fauna if disturbed.	**Moderate**
Human health receptors	Exposure of asbestos fibres from ACM in soil to human receptors during construction or decommissioning.	**Moderate**

6.2.5.4 Cumulative impacts

The study area for the assessment of contaminated land impacts included the area for the Heybridge Converter Station, making the assessment of impacts a combined assessment for the proposal and the Heybridge Converter Station.

Beyond the Heybridge Converter Station, cumulative impacts from contamination or ASS associated with nearby projects would be highly localised to the areas where the individual projects disturb potential contamination. It is unlikely that contamination that may be disturbed associated with the nearby projects would result in impacts that may overlap with the potential impacts from this proposal, with the exception of parts of the NWTD project that interfaces with the proposal site.

Cumulative impacts relevant to the proposal site that may occur include local residential or commercial redevelopments, or upgrades to Bass Highway or the rail line in the vicinity of the site. However, the magnitude of impacts from these potential projects would be minor due to their limited footprints and the low potential for contamination being present being disturbed. This is because the risks of contamination from the proposal are temporary and localised.

6.2.6 Management, mitigation and monitoring

Proposed measures to minimise potential impacts associated with potentially contaminated materials and ASS are presented in Table 6.2-5. Mitigation measures in other sections that are relevant to the management of potentially contaminated material include:

- Section 6.3 (Marine natural values), specifically measures which address the management of contaminated sediment and marine water quality.
- Section 6.5 (Water quality), specifically measures which address the management of surface and groundwater quality.
- Section 6.7 (Air quality), specifically measures which address the management of odours associated with contaminated soils.
- Section 6.8 (Waste management), specifically measures which address appropriate classification, handling and disposal of waste materials, including contaminated waste.
- Section 6.9 (Dangerous goods and environmentally hazardous materials), specifically measures which address appropriate handling and management of hazardous materials.
- Section 8.2 (Mitigation measures), specifically measures which address emergency response and incident management (MM Gen05).

Together, these measures will minimise the potential contamination impacts.

Table 6.2-5 Potentially contaminated materials and acid sulfate soils – mitigation measures

Ref	Mitigation measure	Proposal stage
CL01	Manage excavated soil, contaminated soils and potential risks to the environment due to contamination during construction.	Construction
CL01-1	Undertake a detailed site investigation for the site (in accordance with guidance from the Assessment of Site Contamination NEPM – including as a minimum schedules B1 and B2) to define the nature and extent of potential contamination in soils (including asbestos and ASS).	
CL01-2	Identify options to manage surplus soils in accordance with the waste hierarchy.	
CL01-3	Sample and classify all soils surplus to project requirements in accordance with *EPA Tasmania's Information Bulletin 105 – Classification and Management of Contaminated Soil for Disposal, Australian Standards AS4482.*1 (2005) and *AS4482.*2 (1999), and *Tasmanian Acid Sulfate Soil Management Guidelines* (DPIPWE 2009) to identify the waste classification of the soils.	
CL01-4	Any waste soils that are classified as Level 1 (fill material), must be responsibly managed and disposed to a site where the soils do not result in impacts to the environment, or result in pollution (as defined in the EMPC Act), which may include disposal to a Solid Inert (Category A) Landfill. Level 1 soils may be reused on the site.	
CL01-5	Any waste soils that are classified as Level 2 (low level contaminated soil) and surplus to project requirements are likely to be Controlled Wastes (depending on contaminants) and require disposal to a Category B (Putrescible Landfill). There are opportunities for Level 2 soils to be reused on the site, depending on the nature of the contamination and how they are proposed to be used. The	

Ref	Mitigation measure	Proposal stage
	reuse of Level 2 soils on the site will be assessed on a case-by-case basis in consultation with EPA.	
CL01-6	All transport of contaminated soils must be undertaken by a licensed waste transporter.	
CL01-7	Any temporary storage of soils must: • Be stored in appropriately sited stockpiles away from surface drainage lines with bunding. • Depending on the nature of the contamination in the material to be stockpiled, on a lined or impermeable surface. • Have surface covering if odorous. • Be sprayed during periods of dry weather with water or suitable dust suppressant.	
CL01-8	Any asbestos containing materials to be disturbed must be removed from the site by an appropriately qualified and licensed removalist.	
CL01-9	Develop an unexpected finds protocol for contamination, asbestos and odour management of excavated soils.	
CL01-10	Develop and implement contingency and emergency response procedures to manage fuel, chemical or contamination spills	
CL01-11	Manage all contaminated materials, chemicals, fuels and hazardous materials to mitigate potential environmental harm via: • All dangerous goods or environmentally hazardous materials will be stored in appropriately bunded containers within the Heybridge Converter Station site, in accordance with relevant Australian Standards and state regulations. • Fuel storage on site during construction will be via tankers (between 20,000 L and 50,000 L in size) that will be parked in bunded hardstands within the Heybridge Converter Station site, or temporary containerised, self-bunded, above-ground fuel storage systems. Machinery and equipment will then either be refuelled within the site or in-situ via a refuelling truck, which will have on board spill kits and temporary bunding equipment. • Hydrocarbon and chemical spill kits will be stored within the Heybridge Converter Station site and wherever dangerous goods and environmentally hazardous materials are used throughout the site.	
CL01-12	The construction contractor will maintain records of waste soil volumes generated, disposal locations, and disposal facility receipts.	
CL02	Develop and implement ASS management controls during construction.	Construction
CL02-1	Design excavation and soil disturbance works to avoid ASS where practicable.	
CL02-2	ASS risk and management will be addressed through the development of an ASS Management Plan in accordance with the *Tasmanian Acid Sulfate Soil Management Guidelines* (DPIPWE 2009). The ASS Management Plan will be developed in consultation with EPA Tasmania.	
CL02-3	Where disturbance of ASS cannot be avoided, develop management measures to reduce the potential impact from ASS in accordance with the *Tasmanian Acid Sulfate Soil Management Guidelines* (DPIPWE 2009) and the *National Acid Sulfate Soils Guidance* (DAWR 2018) as follows: • Design HDD cutting and drilling fluid retention systems to allow testing for potential acidic or ASS conditions in HDD returns and allow diversion for treatment. • Design and appropriately locate ASS stockpile areas to avoid and otherwise minimise impacts from acid generation including lining, covering and runoff collection to prevent release of acid.	

Ref	Mitigation measure	Proposal stage
	• Where ASS is identified and disturbed, it must be treated to ensure neutralisation of potential acid generation. Treatment (via liming) is to be at the rates identified during the further ASS assessment to be undertaken in the proposed detailed site investigations for MM CL01. • Any treatment must be designed with consideration of Tasmanian regulations and guidance and include sufficient neutralising capacity to mitigate acid generation. • Manage any odours that may be generated during handling of potential ASS. • Prevent oxidation of disturbed ASS so far as reasonably practicable via: - Scheduling works to limit exposure of ASS to oxidising conditions. - Ensuring ASS or acid sulfate rock is not retained in on-site stockpiles for long periods (i.e. greater than 48 hours) without treatment. - Designing and implementing ASS treatment to neutralise ASS prior to other management measures applied. • Identify suitable sites for re-use, management or disposal of ASS and acid sulfate rock that may be generated by the proposal.	
CL03	*Not relevant for this proposal*	

6.2.7 Residual impacts

With the implementation of the mitigation measures outlined in Section 6.2.6, the risk of impacts to human health and ecological receptors as a result of the proposal are reduced to **low** and **very low** (refer to Table 6.2-6). Further details on the methodology for the assessment is provided in Appendix C.

Table 6.2-6 Potentially contaminated material and acid sulfate soils – residual risk assessment summary

Impacted value	Potential risk of harm	Proposal stage	Mitigation measure	Residual risk
Human/ ecological receptors	Excavated soils (including contaminated soils) may present a risk to human health or ecological receptors if not contained causing degradation of environment or hazards to health.	Construction	CL01, CL02	**Low**
Human / ecological receptors	Construction activities lead to generation of contaminated wastes, spills or leaks that may cause a risk to human health or ecological receptors if not contained causing degradation of environment or hazards to health.	Construction	CL01, CL02	**Very Low**
Ecological receptors	ASS may cause degradation to flora and/or fauna if disturbed.	Construction	CL02	**Low**
Human health	Exposure of asbestos fibres from ACM in soil to human receptors during construction	Construction	CL01	**Low**

6.3 Marine natural values

This section provides a summary of the findings of the Marine Ecology and Resource Use Impact Assessment and the Marine Benthic Habitat Characterisation. The reports are provided in Appendix D and Appendix E of this EIS respectively.

This section summarises the assessment outcome for marine natural values within the Tasmanian jurisdiction for the proposal, denoted by Tasmanian coastal waters within 3 NM from the shore. The Commonwealth marine waters beyond the 3 NM are outside the scope of this EIS and have been considered in the Commonwealth and Victorian combined EIS/EES for the project (refer to Section 1.3).

6.3.1 Assessment guidelines

The relevant sections of the EIS guidelines for the Heybridge Shore Crossing, and where these have been addressed in this EIS, are outlined in Table 6.3-1.

Table 6.3-1 Relevant EIS guidelines

Marine natural values – EIS guidelines	Section
Existing environment	
Specify and map known records of species and their habitat in the vicinity of the proposed works, including shorebirds and aquatic species, with particular reference to rare and threatened species, communities, and habitats, including those listed under the relevant Schedules of the Commonwealth EPBC Act and the *Tasmanian Threatened Species Protection Act 1995* (TSP Act) and *Tasmanian Nature Conservation Act 2002* (NC Act).	Section 6.3.4
Undertake and provide the results of a marine natural values survey of the proposed cable routes, including benthic ecology, habitat and observed species.	Section 6.3.2 and 6.3.4
Demonstrate that any surveys comply with requirements in *Guidelines for Marine and Estuarine Natural Values Surveys* related to Development Proposals	Section 6.3.2
Identify areas or habitats of conservation significance, including designated conservation areas or areas relating to the requirements of international treaties.	Section 6.3.4
Describe natural processes of particular importance for the maintenance of the existing environment.	Section 6.3.4
Provide all results in a natural values assessment, undertaken by a suitably qualified person.	Section 6.3.2 and 6.3.4
Potential impacts	
Describe potential short-term and long-term impacts of construction and operation of the proposal on flora and fauna, with particular reference to rare and threatened species, migratory species, communities, and habitats, including those listed under the relevant Schedules of the TSP Act and NC Act.	Section 6.3.5
In discussion of impacts on flora and fauna, including consideration of: • Habitat clearance and disturbance. • Activity causing potential disturbance (e.g., movement). • Noise and vibration emissions. • Lighting. • Vehicle/vessel movements. • Potential for marine mammal entanglement or collision with vessels or infrastructure. • Mobilised contaminated material or sediment.	Section 6.3.5

Marine natural values – EIS guidelines	Section
• Heat and electromagnetic radiation, including whether it will have any potential impacts on benthic ecosystems, fish or mammals, and their migratory behaviours, e.g., through impact on movement of seawater, magnetic characteristics of marine sediments or other potential impacts.	
Discuss the potential introduction or spread of pests or plant and animal diseases as a result of construction and operation of the proposal.	Section 6.3.5
In consideration of all issues, discuss any potential for cumulative impact with the proposed Heybridge converter station and the remainder of cabling works for Marinus Link.	Section 6.3.5.3
Avoidance and mitigation measures	
Describe management measures to mitigate adverse impacts to threatened fauna, flora, and other natural values where they cannot be avoided.	Section 6.1.6, 6.3.6
It is noted that the shore crossings will be drilled continuously over 24 hours, seven days a week to ensure borehole stability. It is important that illumination of the site at night is minimised as this can disorient seabirds and shorebirds. If there is to be any form of additional night-time lighting associated with the construction area for safety (or other) reasons, the illumination should be kept to a minimum and red light should be used. It is recommended that the guidance principles outlined in the *Commonwealth National Light Pollution Guidelines for Wildlife* be considered for incorporation into the lighting design, in particular those specified in Appendix A (Best Practice Lighting Design).	Section 6.1.6, 6.3.6, and 6.3.3.3
Where impacts cannot be avoided, present proposed measures to mitigate and/or compensate adverse impacts on biodiversity and nature conservation values.	Section 6.3.6
Develop a plan to control the spread of weeds, pests and diseases and ensure that weeds present at the impact site are properly managed.	Section 6.1.6
Discuss rehabilitation of disturbed areas following the completion of construction activities and cessation of the activity, including any proposed seed collection and progressive rehabilitation program.	Section 6.3.6
Provide a conclusion regarding the significance of likely impacts on natural values.	Section 6.1.6, 6.3.6
Requirements for surveys	
Any flora and fauna surveys must, as a minimum, comply with the requirements of the document *Guidelines for Natural Values Assessments* or with the *Guidelines for Natural Values Surveys – Estuarine and Marine Development Proposals* (as relevant) published by the Department of Natural Resources and Environment (NRE). The methodology for surveys should be developed in consultation with the Department.	Section 6.3.2
Legislative and policy requirements	
Tasmanian Threatened Species Protection Act 1995 and associated regulations, *Nature Conservation Act 2002* and associated regulations, *Forest Practices Act 1985* and associated regulations and codes (as relevant). *Commonwealth National Light Pollution Guidelines for Wildlife*.	Section 6.3.3

6.3.2 Methodology

The marine impact assessment approach identified the sources of positive (beneficial) and negative (potentially adverse) environmental impacts of the proposal and then predicted their effects on environmental values (e.g., a site, receptor or marine resource use).

In this assessment, a receiver is any environmental component that is sensitive to or has the potential to be impacted by the proposal, whereas a resource is any environmental component that only has the potential to be impacted by the proposal.

A likelihood of occurrence rating has been used to categorise both EPBC Act listed and TSP Act listed species potentially occurring within Bass Strait and Tasmanian coastal waters. The likelihood of occurrence rating assessment was based on a literature review of selected marine fauna species and their preferred habitats and foraging areas. Table 6.3-2 presents the likelihood of occurrence ratings used in the marine impact assessment.

Table 6.3-2 Likelihood of occurrence ratings

Likelihood rating	Description
Remote	No prior known occurrence and/or is not anticipated to occur.
Rare	Occurs rarely and/or is unlikely to occur
Possible	Possible but does not commonly occur and/or may occur at some time
Likely	Has occurred before and would again and/or is likely to occur
Very likely	Occurs frequently and/or is expected to occur

For the purpose of the marine impact assessment, the following methods have been used to assess impacts to marine natural values:

- Significance assessment method.
- Discipline specific assessment method.
- Risk assessment.

For further details about the methodology adopted and subsequent assumptions and limitations, refer to Appendix D.

6.3.2.1 Information sources

Desktop reviews were undertaken of the following sources to determine the existing environment of Bass Strait and relevant marine natural values surrounding the proposal site:

- Online public access databases, including:
  - EPBC Act PMST (DCCEEW 2023b).
  - Species Profile and Threats Database (DCCEEW 2022c).
  - Atlas of Living Australia (CSIRO 2022).
  - Victorian Biodiversity Atlas (DELWP 2022b).
  - National Conservation Values Atlas (DCCEEW 2022a).
  - Tasmanian NVA (NRE 2022).
  - Victorian State Wide Integrated Flora and Fauna Teams (SWIFFT 2022).
  - Southern Australian Sea Turtles Project (Deakin University 2022).
- Peer reviewed scientific papers and studies, including key reports relevant to Bass Strait:
  - Basslink Integrated Impact Assessment Study (NSR 2002).
  - BassGas Project Environment Effects Statement (Origin Energy 2002).

  - Basslink. Marine biological Monitoring. (Chidgey et al. 2006).
  - Basslink. Supplementary Marine Biological Monitoring (CEE 2009).
  - Installation and operational effects of a submarine cable in a continental shelf setting (Sherwood et al. 2016).
- Publications from relevant organisations, including but not limited to:
  - Australian Maritime and Safety Organisation (AMSA).
  - Australian Fisheries Management Authority (AFMA).
  - Southern and Eastern Scalefish and Shark Fishery (SESSF) – Commonwealth Trawl sector.
  - SESSF – Shark Gillnet and Shark Hook sectors.
  - South East Trawl Fishing Industry Association (SETFIA 2022).
  - Bass Strait Central Zone Scallop Fishery (BSCZSF).
  - Tasmanian Seafood Industry Council (TSIC 2022).
  - Seafood Industry Australia.

6.3.2.2 Field surveys

Seabed surveys were undertaken in Tasmanian coastal waters in 2019 and 2021 (CEE 2024) and geophysical data was collected in 2019, 2020 and 2023 (Fugro 2020). The assessment is based on the observations of the physical environment and biological communities observed in the 2019 and 2021 seabed surveys (Appendix E). Species not observed in the seabed surveys, but listed as present according to regional data, were assumed to be present and included in the assessment.

- CEE (2019, 2021) seabed habitat surveys as part of the benthic surveys (provided in Appendix E).
- Fugro (2019, 2020, 2023) undertook various geophysical surveys and geotechnical investigations and seabed sampling, which then provided information and data to provide confidence in the selected project alignment across offshore Bass Strait (Fugro 2020).

6.3.2.3 Significance assessment method

The **significance assessment** method has been implemented where a qualitative assessment is required. This approach assumes that the identified impacts would occur and focuses attention on the mitigation and management of potential impacts through the identification and development of effective design responses and environmental controls.

The significance assessment method was used for the assessment of impacts on marine natural values from HDD and cable installation, artificial lighting, and generated magnetic, electrical and thermal fields. The significance of impacts matrix utilised for the assessment of residual impacts is presented in Table 6.3-3.

Table 6.3-3 Significance of impacts matrix

Magnitude of impact	Sensitivity of receiver				
	Very high	High	Moderate	Low	Very low
Severe	Major	Major	Major	High	Moderate
Major	Major	Major	High	Moderate	Low
Moderate	High	High	Moderate	Low	Low
Minor	Moderate	Moderate	Low	Low	Very low
Negligible	Low	Low	Low	Very low	Very low

6.3.2.4 Discipline specific assessment method

The **discipline specific** assessment method used for the underwater noise impact assessment is a modification of the significance assessment method described above, developed specifically for assessing impacts of underwater noise.

The discipline specific assessment method focuses on underwater noise as the sensitivity criterion of greatest importance to sound-sensitive fauna (receivers) and also applies acoustic threshold criteria (where known) for species groups (common hearing groups) or individual species (if available). This method ignores conservation status as a 'sensitivity' as conservation status does not confer an increased or decreased sensitivity to underwater noise. For example, the great white shark (*Carcharodon carcharias*) has a sensitivity rating of moderate, due to its listing as vulnerable under the EPBC Act. However, in the assessment of underwater noise impacts, the great white shark has a sensitivity rating of very low as sharks are generally not sensitive to underwater sound pressure, and only respond to particle motion and vibrations.

The underwater noise impact assessment is based on typical noise source levels that are likely to be involved in the proposal. The specific types and exact number of construction vessels required for construction is not yet known, as such for the purpose of the underwater noise assessment, assumptions have been made on the generated underwater noise levels for the proposal based on literature reviews of similar interconnector projects involving cable installation and burial.

The magnitude of impacts of underwater noise on marine species are divided into three main categories being: pathological, physiological and behavioural. The magnitude of impacts has been based on criteria that consider these categories. Table 6.3-4 summarises the residual impact significance rating matrix used for assessing underwater noise impact to a receiver. The significance rating is determined by combining the sensitivity of the receiver and the magnitude of the impact.

Table 6.3-4 Significance of impacts matrix for the assessment of underwater noise

Magnitude of impact	Sensitivity of receiver				
	Very high	High	Moderate	Low	Negligible
Very high	Major	Major	Major	High	Moderate
High	Major	Major	High	Moderate	Low
Moderate	High	High	Moderate	Low	Low
Low	Moderate	Moderate	Low	Low	Very low
Negligible	Low	Low	Low	Very low	Very low

All underwater sound pressure levels (SPL) referenced in this report are expressed in units of decibels referenced to a pressure of 1 micropascal (dB re 1 μPa_{rms}) for non-impulsive noise source levels and dB re 1 μP_{arms} for received non-impulsive levels (i.e., noise level experienced by a receptor such as a whale or what a hydrophone would receive).

6.3.2.5 Risk assessment method

The **risk assessment** method was adopted for the assessment of invasive marine species (IMS) and proposal vessel collisions with marine megafauna. The risk of harm to a receiver was determined by combining the likelihood and consequence using the risk assessment matrix presented in Table 6.3-5.

Table 6.3-5 Risk assessment matrix

Consequence	Likelihood				
	Almost certain	**Likely**	**Possible**	**Unlikely**	**Rare**
Severe	**Major**	**Major**	**Major**	**High**	**Moderate**
Major	**Major**	**Major**	**High**	**Moderate**	**Low**
Moderate	**High**	**High**	**Moderate**	**Low**	**Low**
Minor	**Moderate**	**Moderate**	**Low**	**Low**	**Very low**
Negligible	**Low**	**Low**	**Low**	**Very low**	**Very low**

A detailed methodology, including any relevant assumptions and limitations, is included in the Marine Ecology and Resource Use Impact Assessment (Appendix D).

6.3.2.6 Study area

While the study area in the Marine Ecology and Resource Use Impact Assessment (Appendix D) includes the entire project alignment and extends across Bass Strait, this EIS assesses the impacts of shore crossing and subsea cabling in Tasmanian coastal waters (out to 3 NM from the mean high-water mark). The 3 NM limit generally corresponds with a water depth of 40 m (refer to Figure 6.3-1).

The existing conditions in Tasmanian coastal waters was established following a review of publicly available data sources, including database searches, peer reviewed scientific papers and studies, and publications from relevant industry organisations (refer to Marine Ecology and Resource Use Impact Assessment (Appendix D)).

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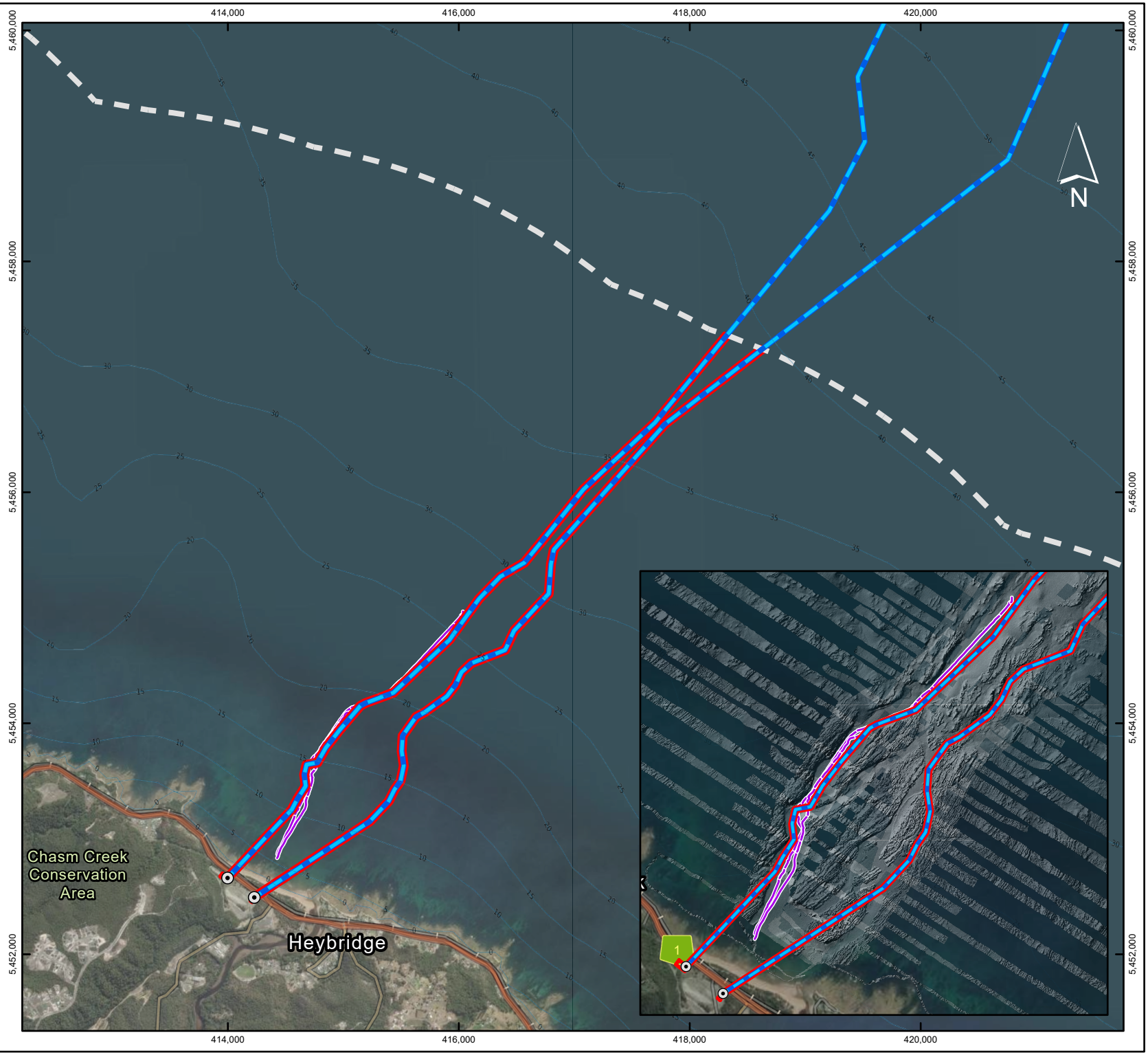
Figure 6.3-1: Bathymetry and nautical miles limit for the proposal study area



Legend

- HVDC Landfall
- Proposed HVDC Subsea Cable
- Proposal Site
- Former Tioxide Plant Outfall Pipeline
- Limit of State Coastal Waters (3NM)

Scale: 1:45,000 @ A4

Spatial Reference: GDA2020 MGA Zone 55

0 500 1,000 2,000

Metre

MARINUS LINK

Acknowledgements and Sources:

Data Source: Marinus Link GIS Data Repository, Institute for Marine and Antarctic Studies (IMAS), University of Tasmania (UTAS).
Background Image: Earthstar Geographics, DPIPWE, Esri, TomTom, Garmin, Foursquare, METI/NASA, USGS, Maxar
Produced By: Marinus Link for the Tasmanian Heybridge Shore Crossing EIS.
Date Figure Exported: 22/11/2024

6.3.3 Applicable legislation and guidelines

6.3.3.1 Tasmanian Threatened Species Protection Act 1995

The TSP Act provides for the protection and management of threatened native terrestrial and aquatic plant and animals. Several marine species are listed under the TSP Act, including whales, seals, seabirds, fishes, and invertebrates, which are required to be considered in the assessment.

6.3.3.2 Nature Conservation Act 2002

The NC Act provides for the conservation and protection of all native coastal and marine wildlife. The potential impacts of the proposal on marine receivers in the Tasmanian coastal waters are required to be considered in the assessment.

6.3.3.3 Living Marine Resources Management Act 1995

The *Living Marine Resources Management Act 1995* (LMRM Act) is the principal legislation that promotes the sustainable management of living marine resources in Tasmania, which enables protected areas to be declared. The purpose of this Act is to protect vulnerable fish species and their habitats and allow the establishment of scientific reference areas and public education in the resources, protection and use of the marine environment.

Fishing Tasmania manages Tasmania's commercial fisheries and provides regulations for each commercial fishery, for example the Abalone Fishery is regulated under the LMRM Act and the Fisheries (Abalone) Rules 2017.

6.3.3.4 National Light Pollution Guidelines for Wildlife

The *National Light Pollution Guidelines for Wildlife* (DCCEEW 2023a) provide guidance on how to manage the effect of artificial light on marine turtles, seabirds, and migratory shorebirds that are listed under the EPBC Act, species that are part of a listed ecological community, and species protected under state or territory legislation for which artificial light has been demonstrated to affect behaviour, survivorship, or reproduction. These guidelines operate to require night lighting impacts to be avoided or managed, and the proposal to consider night lighting impacts on marine fauna, and provide mitigation and management measures to avoid or reduce such impacts.

6.3.4 Existing conditions

6.3.4.1 Marine environmental values and receptors

6.3.4.1.1 Bioregional setting

The proposal is located at the centre of the Boags Mesoscale Bioregion, which extends 180 km east and 110 km west of the proposal site.

6.3.4.1.2 EPBC Act protected matters

Based on a database search of the EPBC Act Protected Matters Search Tool, the MNES and other EPBC Act protected matters relevant to the Tasmanian nearshore (Heybridge) area include the following:

- One Commonwealth Marine Area*.
- Four listed threatened ecological communities.
- 58 listed threatened species.
- 42 listed migratory species.
- 72 listed marine species.
- 14 whales and other cetaceans.

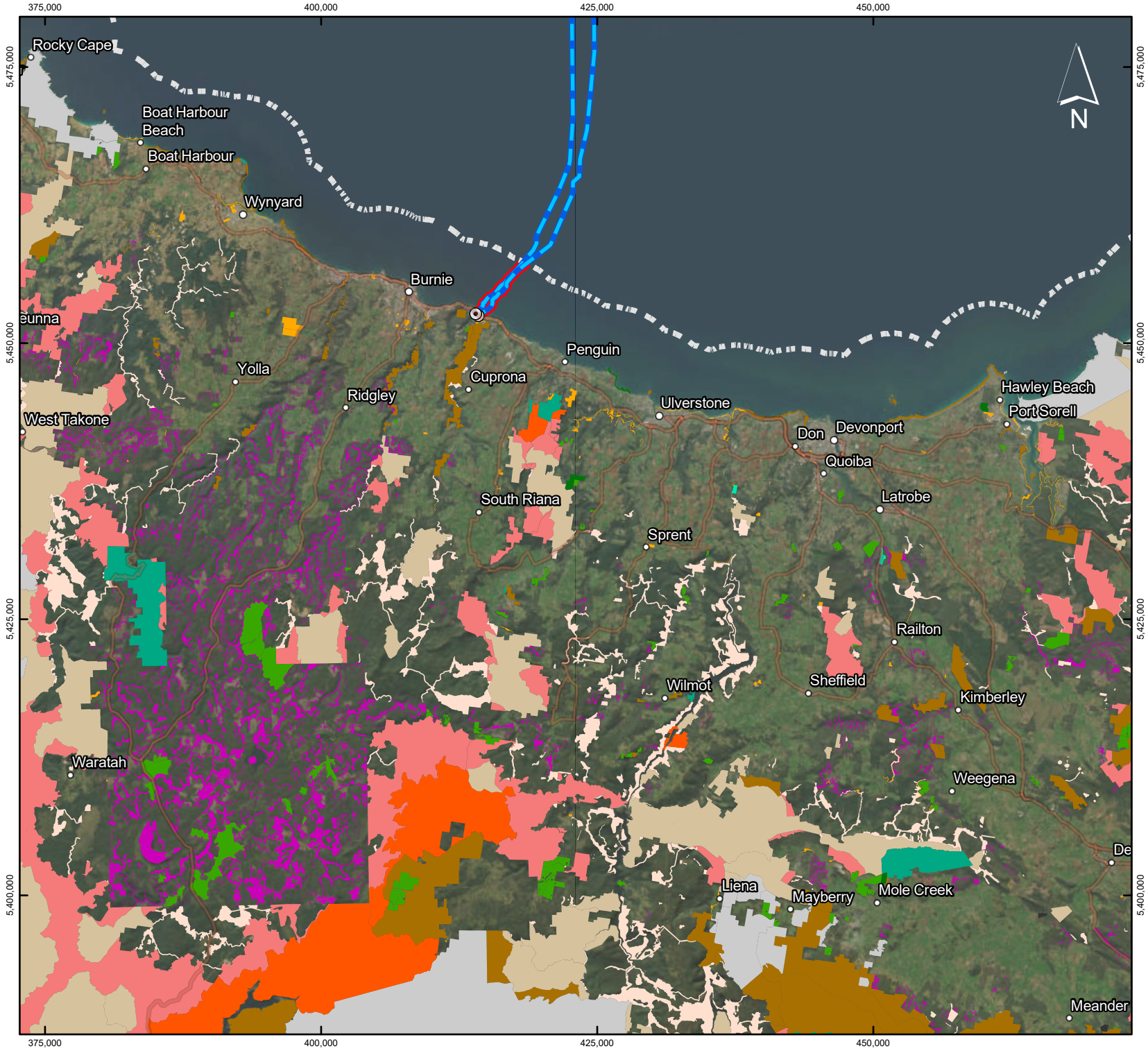
* Noting the results at Attachment C of Appendix D - Marine Ecology and Resource Use Impact Assessment states that the area is 'in buffer area only' of a Commonwealth Marine Area.

Where migratory species, threatened flora, fauna and ecological species and communities listed under the EPBC Act interact with listed species under the TSP Act, the potential for impacts are discussed in Section 6.1 and in 6.3.5. As noted previously, the Commonwealth and Victorian components of the project and MNES in the Tasmanian jurisdiction are being assessed as part of the combined EIS/EES assessment process.

There are no Ramsar wetlands, Nationally Important Wetlands or Australian Marine parks within the study area. In addition, there are no Commonwealth marine areas in the vicinity of the proposal with the closest reserves being more than 30 km from the project's proposed alignment. The detailed PMST results are provided in the Marine Ecology and Resource Use Impact Assessment (Appendix D).

The nearest national parks with coastlines adjoining Bass Strait are Narawntapu National Park and Rocky Cape National Park, located 45 km east and 38 km west of the proposal site respectively. The two national parks are located outside of the project's area of influence (refer to Figure 6.3-2).

Figure 6.3-2: Conservation and protected areas near the proposal



Legend

- HVDC Landfall
- Proposed HVDC Subsea Cable
- Proposal Site
- Limit of State Coastal Waters (3NM)

Reserve Estate

- Conservation Area
- National Park
- Nature Reserve
- Nature Recreation Area
- Regional Reserve
- State Reserve
- Future Potential Production Forest
- Informal Reserve on PTPZ Land or STT managed land
- Informal Reserve on other public land
- Conservation Covenant (NCA)
- Private Sanctuary
- Part 5 Agreement (Meander Dam Offset)
- Other Private Reserve

Scale: 1:475,000 @ A4

Spatial Reference: GDA2020 MGA Zone 55

0 2.5 5 10 15 20 25

Kilometre

MARINUS LINK

Acknowledgements and Sources:

Data Source: Marinus Link GIS Data Repository, Institute for Marine and Antarctic Studies (IMAS), University of Tasmania (UTAS) and theLIST ©State of Tasmania
Background Image: Earthstar Geographics, DPIPWE, Esri, TomTom, Garmin, Foursquare, FAO, METI/NASA, USGS
Produced By: Marinus Link for the Tasmanian Heybridge Shore Crossing EIS.
Date Figure Exported: 22/11/2024

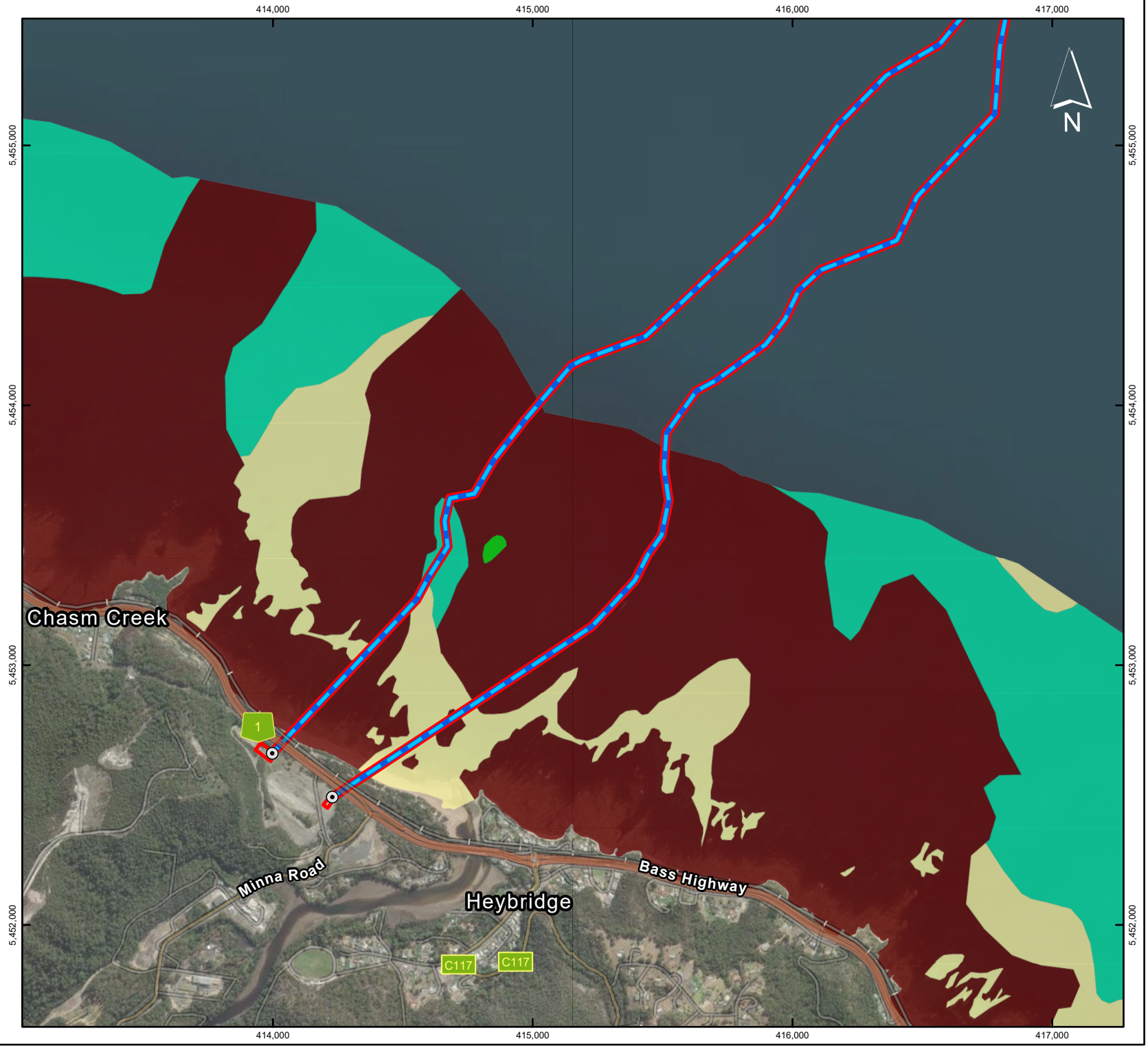
6.3.4.2 Seabed habitats

The seabed habitats mapped near the proposal site's seabed alignments indicate that much of the seabed to approximately 4 km offshore is comprised of rock reef habitat, cobble habitat, sand and sand gutter habitat. The four intermingled habitats follow sand gutters that intertwine through the wide rocky outcrops that characterise the nearshore seabed, which includes the proposal site (refer to Figure 6.3-3).

Within the Tasmanian coastal waters, the seabed is sandy at sites shallower than 30 m depth, comprising bare, medium to coarse sand and shell, with no associate biota visible during 2019 and 2021 surveys. Seaweeds (red and green macroalgae) dominated the reef in summer from shoreline to 30 m depth, with the larger brown algae restricted to depths less than 5 m. In winter, the seaweed is absent, and reefs are characterised by bare rock with some encrusting red algae, encrusting invertebrates and solitary ascidians.

Deeper than the 30 m depth, the seabed habitat contains unattached biota such as doughboy scallops, predatory sea stars and sparely distributed anemones, scallops, and flathead. The nearshore rock reef habitat for algae and other marine plants are an indicative preferred habitat for protected species such as pipefishes, sea dragons and seahorses.

Figure 6.3-3:
Mapped marine habitats in Tasmanian coastal waters



Legend

- HVDC Landfall
- Proposed HVDC Subsea Cable
- Proposal Site

Seamap Habitats

- Reef
- Cobble
- Sand
- Seagrass

Scale: 1:20,000 @ A4

Spatial Reference: GDA2020 MGA Zone 55

0 125 250 500 750 1,000

Metre

MARINUS LINK

Acknowledgements and Sources:

Data Source: Marinus Link GIS Data Repository and Institute for Marine and Antarctic Studies (IMAS), University of Tasmania (UTAS) - Lucieer VL (2007). SeaMap Tasmania Habitat Data. Tasmanian Aquaculture and Fisheries Institute.
Background Image: DPIPWE, Esri, TomTom, Garmin, Foursquare, METI/ NASA, USGS, Maxar
Produced By: Marinus Link for the Tasmanian Heybridge Shore Crossing EIS.
Date Figure Exported: 22/11/2024

6.3.4.3 Cetaceans (whales and dolphins)

Cetacean species with known or likely habitat in Tasmanian coastal waters include species of whales listed as threatened under the EPBC Act, NC Act and the TSP Act. The species relevant to the proposal are listed in Table 6.3-6 along with a description of their assessed occurrence and likelihood of the occurrence near the Tasmanian waters of Bass Strait, and the Heybridge nearshore waters.

Based on the assessment of cetaceans, listed species that are **very likely** to occur in the Tasmanian coastal waters relevant to the proposal site includes:

- Humpback whale (*Megaptera novaeangliae*).
- Southern right whale (*Eubalaena australis*).

Other cetacean species not listed on the EPBC Act, NC Act and the TSP Act, but **very likely** to occur in the Tasmanian coastal waters relevant to the proposal site includes:

- Common dolphin (*Delphinus delphis*).
- Common bottlenose dolphin (*Tursiops truncates*).

Table 6.3-6 Cetaceans (excluding common dolphin species) identified as relevant to the proposal

Species	Listing	Occurrence and distribution	Likelihood
Baleen whales			
Humpback whale (*Megaptera novaeangliae*)	Migratory – EPBC Act Endangered – TSP Act	• Foraging, feeding or related behaviour of humpback whale is known to occur in the vicinity of the project, including Tasmanian coastal waters. • Humpback whale species core range are mapped along the Tasmanian shoreline and Bass Strait, but not identified as core calving, resting or feeding area. • The main southern migration route is east of Tasmania; however, satellite tracking has shown that some humpback whales travel westwards through Bass Strait before heading south along the west coast of Tasmania to their summer feeding grounds in sub-Antarctic waters (Andrews-Goff et al. 2018). • Along the northern coast of Tasmania, humpback whales have been regularly recorded, including the nearshore area and approach to the project's proposed landfall at Heybridge.	The likelihood of occurrence of humpback whales in Bass Strait is assessed as **very likely** during the whales' northern migration (May to July) and southern migration (October to December).
Southern right whale (*Eubalaena australis*)	Endangered and migratory – EPBC Act Endangered – TSP Act	• Foraging, feeding or related behaviour of southern right whale is known to occur in the vicinity of the project, including Tasmanian coastal waters. • A region on the east coast of Tasmania centred on Great Oyster Bay and extending southwards to the Tasman Peninsula has been designated as a 'breeding or potential breeding' BIA.	The likelihood of occurrence of southern right whales in Tasmanian coastal waters is assessed as **very likely** during their peak presence during northern migration period (May and July), but

Species	Listing	Occurrence and distribution	Likelihood
		• In Tasmania, waters within the state's 3 NM limit of the mainland, King Island and the Furneaux Group (Flinders, Cape Barren and Clarke islands) are classified as connecting habitat BIAs for southern right whales	generally would be absent during their peak southern migration period (September to November), and very low during December through April when they are feeding in the Southern Ocean.
Antarctic blue whale (*Balaenoptera musculus intermedia*)	Endangered and migratory – EPBC Act Endangered – TSP Act	• There is limited information on the distribution of Antarctic blue whales in Australian waters, including Bass Strait. • In Bass Strait there are five confirmed sightings, all within far north-west Tasmania, with three records at King Island (one on the west coast and two offshore to the north), and two sightings at Table Cape on the north coast west of Burnie. While Table Cape lies 26 km west of the project's proposed alignment, the eastward direction of travel of the observed whale along the northern Tasmanian coast would have taken it past the Heybridge area.	The likelihood of occurrence of Antarctic blue whales in Bass Strait waters is assessed to be **remote**.
Pygmy blue whale (*Balaenoptera musculus brevicauda*)	Endangered and migratory – EPBC Act Endangered – TSP Act (as 'Balaenoptera musculus')	• Pygmy blue whale has possible foraging areas mapped in Bass Strait between Victoria and Tasmania, as well as areas of known foraging area and high use areas towards the western Bass Strait and extending along the Victorian coast, west of Melbourne. • The two subpopulations, South Eastern Indian Ocean (SEIO) pygmy blue whale subpopulation and the South West Pacific Ocean (SWPO) pygmy blue whale subpopulation, are both likely to have presence in the east of Bass Strait and farther offshore and are rarer in western and central Bass Strait. The SEIO subpopulation are the most likely to occur near the project.	The likelihood of occurrence of pygmy blue whales from the SEIO and SWPO subpopulations is assessed as **possible**.
Fin whale (*Balaenoptera physalis*)	Vulnerable and migratory – EPBC Act Vulnerable – TSP Act	• It is possible that fin whale presence in south-east Australia at the Bonney Upwelling might extend to coastal waters of the western Bass Strait (Gill 2002). However, analysis of the Tasmanian Natural Values Atlas (NRE 2022) indicates that there are no fin whale sightings in Bass Strait.	The likelihood of occurrence of fin whales in central Bass Strait and Tasmanian coastal waters is assessed to be **rare**, but if they were to be present it would be during the main migratory months of June to late September/October.

Species	Listing	Occurrence and distribution	Likelihood
Toothed whales			
False killer whale (*Pseudorca crassidens*)	Listed marine species and cetacean – EPBC Act	• The Tasmanian Natural Values Atlas (NRE 2022) shows 11 records of false killer whales around Tasmania with only two sightings on the north coast: one at Three Hummock Island and one a Sawyers Bay to the east of the Stanley Peninsula. • Stranding records in Tasmania also indicate previous mass strandings occurred in the region of Stanley Peninsula and Kind Island/Perkins Island and all occurred between May and July.	The likelihood of occurrence of false killer whales in central Bass Strait or along the central north coast of Tasmania is assessed as **rare**.
Sperm whale (*Physeter macrocephalus*)	Vulnerable and migratory – EPBC Act Endangered – TSP Act	• The distribution map in the SPRAT profile for the sperm whale (DCCEEW 2022b) does not include Bass Strait but does include the western and eastern edges of Bass Strait overlying the edge of the continental shelf where the deeper water and forms suitable foraging habitat for diving sperm whales. • The Tasmanian Natural Values Atlas (NRE 2022) shows 301 records of sperm whales in Tasmanian waters with 14 sightings in Bass Strait including one sighting between Burnie and Devonport. • Mass strandings of sperm whales in Tasmania are highly clustered historically, with six events in the vicinity of Stanley, and reported 51 single and 16 mass strandings (Warneke 2001).	The likelihood of occurrence of sperm whales in central Bass Strait and Tasmanian coastal waters is **rare**, given their preferred offshore deep-water habitat overlying the continental shelf and submarine canyons.

6.3.4.4 Pinnipeds (seals)

All *Otariidae* (eared seals) and *Phocidae* (true seals) pinnipeds within Australian waters are listed marine species under the EPBC Act. There are three Otariid seals present in Bass Strait, and three Phocidae seals identified as relevant to the proposal, with their likelihood of occurrence provided in Table 6.3-7.

Table 6.3-7 Seal species identified as relevant to the proposal

Species	Listing	Occurrence and distribution	Likelihood
Otariidae (eared seals):			
Australian fur seal (*Arctocephalus pusillus doriferus*)	Listed marine species – EPBC Act Endangered – TSP Act	• This species or its habitat may occur in the project's PMST search areas. • The BIAs for Australian fur seals are breeding colonies and haul-out sites. There are seven Tasmanian breeding colonies and three Tasmanian haul-out sites identified in the islands of Bass Strait, with the closest site being the Forty Foot Rocks haul-out site, located 27 km from the project's proposed alignment by sea. • The Australian fur seal is the most common seal in Tasmanian waters, with	The likelihood of occurrence of Australian fur seals in Tasmanian coastal waters is assessed as **very likely**.

Species	Listing	Occurrence and distribution	Likelihood
		frequent sightings along north coast of Tasmania and at nearshore Heybridge area.	
Sub-Antarctic fur seal (*Arctocephalus tropicalis*)	Endangered – EPBC Act Endangered – TSP Act	• The Tasmanian Natural Values Atlas (NRE 2022) list a total of 95 records of sub-Antarctic fur seals in Tasmanian waters, with most sightings located along the south and south-east coastline of Tasmania. • Based on the Tasmanian Natural Values Atlas (NRE 2022), along the north coast of Tasmania there were four sightings with one each at Sawyers Bay, Sisters Beach, Wynyard and George Town, with the Wynyard sighting being the closest, 25 km to the west. There were no sightings between Burnie and Devonport, including at the proposal site.	The likelihood of occurrence of sub-Antarctic fur seals in Tasmanian coastal waters is assessed as **remote**.
Long-nosed fur seal *(Arctocephalus forsteri)*	Listed marine species – EPBC Act Rare – TSP Act	• The Tasmanian Natural Values Atlas (NRE 2022) lists a total of 249 records of long-nosed seals in Tasmania waters, with most sightings located along the south and east coastline.	The likelihood of occurrence of long-nosed seals in Tasmanian coastal waters is assessed as **rare**.
Phocidae (earless seals)			
Southern elephant seal (*Mirounga leonina*)	Vulnerable – EPBC Act Vulnerable – TSP Act	• The Tasmanian Natural Values Atlas (NRE 2022) lists a total of 266 records of southern elephant seals around Tasmania, mainly along the western, eastern, and southern coastline. • There were six sightings along the north coast of Tasmania, including one at Heybridge.	The likelihood of occurrence of Southern elephant seals in Tasmanian coastal waters is assessed as **possible**.
Australian sea lion (*Neophoca cinerea*)	Endangered – EPBC Act	• The Tasmanian Natural Values Atlas (NRE 2022) lists a total of 25 sightings of Australian sea lions around Tasmania, with nine sightings in Bass Strait.	The likelihood of occurrence of Australian sea lions in Tasmanian coastal waters is assessed as **rare.**

6.3.4.5 Sea turtles

There are six species of sea turtles known to occur in Australia, with five known to occur in Bass Strait, including Tasmanian coastal waters. The only regular species occurrence is the leatherback turtle (*Dermochelys coriacea*). Relevant sea turtle species and their likelihood of occurrence is provided in Table 6.3-8.

In the current list of marine species for which BIAs have been identified as regionally significant in the National Conservation Values Atlas (Department of Agriculture, Water and the Environment (DAWE) 2021), no sea turtle BIAs are located within south-east Australia. Notwithstanding, the few species that do pass through Bass Strait are known to forage for: squid and jellyfish in the case of leatherback sea turtles; and seagrasses and algae for green sea turtles.

Table 6.3-8 Sea turtle species identified as relevant to the proposal

Species	Listing	Occurrence and distribution	Likelihood
Loggerhead turtle (*Caretta caretta*)	Endangered – EPBC Act Endangered – TSP Act	• This species or its habitat may occur in the offshore Bass Strait waters, however, loggerhead turtles are not listed in the Tasmanian coastal waters PMST search area. • The loggerhead turtle is the second most observed sea turtle in Bass Strait after the leatherback sea turtle. • The Tasmanian Natural Values Atlas (NRE 2022) indicates a total of 18 records of loggerhead turtles in Tasmanian waters with five sightings in Bass Strait, and no sighting along the north coast of Tasmania near the proposal site.	The likelihood of occurrence of loggerhead turtles in the Tasmanian waters of Bass Strait is assessed as **remote**.
Leatherback turtle (*Dermochelys coriacea*)	Endangered and migratory, listed marine species – EPBC Act Vulnerable – TSP Act	• The species has a global distribution, and the southern waters of Australia including Bass Strait are one of five identified foraging sites (where area restricted behaviour occurs) for leatherback turtles and mainly during the summer months from November to February. • The Tasmanian Natural Values Atlas (NRE 2022) indicates that there are 67 records for leatherback turtles in Tasmanian waters with a cluster of 15 sightings around King Island in western Bass Strait, with seven inshore water sighting along the north coast of Tasmania. The nearest sighting is near Wynyard, about 25 km from the proposal site, and there have been no sightings near the proposal site.	The likelihood of occurrence of leatherback turtles in the Tasmanian waters of Bass Strait is assessed as **possible**.
Hawksbill turtle (*Eretmochelys imbricata*)	Vulnerable and migratory, listed marine species – EPBC Act Vulnerable – TSP Act	• This species is not listed as present in any of the PMST search areas. • In both Victorian and Tasmanian waters of Bass Strait, hawksbill turtles have been recorded to occur irregularly as vagrants outside their normal range (Bauer 2011). • The Tasmanian Natural Values Atlas (NRE 2022) indicates a total of eight records of hawksbill turtles in Tasmanian waters, including five records for Bass Strait and no sightings along the north coast of Tasmania.	The likelihood of occurrence of hawksbill turtles in Tasmanian coastal waters is assessed as **remote**.
Green turtle (*Chelonia mydas*)	Vulnerable and migratory, listed marine species – EPBC Act	• The Tasmanian Natural Values Atlas (NRE 2022) listed two records of green turtles in Tasmanian waters with sightings at Burnie and Arthur Bay.	The likelihood of occurrence of green turtles in Tasmanian coastal waters is assessed as **remote**
Olive Ridley turtle (*Lepidochelys olivacea*)	Endangered and migratory, listed marine species – EPBC Act	• The Tasmanian Natural Values Atlas (NRE 2022) listed four records of olive ridley turtles in Tasmanian waters.	The likelihood of occurrence of Olive ridley turtles in Tasmanian coastal waters is assessed as **remote**

6.3.4.6 Marine birds

Pelagic and other marine birds include species of conservation significance (e.g., as classified under the EPBC Act or TSP Act) as well as non-threatened EPBC Act Listed Marine Species, some of which may have BIAs for foraging in offshore and/or Tasmanian coastal waters. Based on the PMST search areas, five pelagic seabirds are identified as endangered (Northern royal albatross (*Diomedea sanfordi*), Southern giant petrel (*Macronectes giganteus*), Gould's petrel (*Pterodroma leucoptera leucoptera*), Shy albatross (*Thalassarche cauta*) and Grey-headed albatross (*Thalassarche chrysostoma*)), and 18 pelagic seabirds are identified as vulnerable under the EPBC Act. The assessment focused on pelagic seabirds that may be expected to forage and feed over open waters of Bass Strait, including Tasmanian coastal waters.

The Little penguin (*Eudyptula minor*), a listed marine species under the EPBC Act, has a total 78 records of Little penguin sightings along the central North Coast between Burnie and Devonport. This species is not listed as threatened under either the TSP Act. Refer to Section 6.1 on further discussion on Little penguins. No marine bird species listed under the TSP Act are relevant to the proposal.

6.3.4.7 Shorebird and coastal species

The shorebirds or migratory wetland birds that may occur within Tasmanian coastal waters near the proposal site include three species are listed as critically endangered under the EPBC Act (refer to Table 6.3-9). Two of the species (the Swift parrot and Eastern curlew) are subject of draft national recovery plans and are listed as endangered under the TSP Act. Only the Common sandpiper is assessed as very likely to occur. Other common birds at Tasmanian coastal waters includes plovers, terns, snipes, godwits and knots. Refer to Appendix D for the full list of shorebirds or migratory wetland birds that may occur in Tasmanian coastal waters.

Table 6.3-9 Shorebirds and coastal species identified as relevant to the proposal

Species	Listing	Presence	Likelihood
Swift parrot (*Lathamus discolor*)	Critically endangered – EPBC Act Endangered – TSP Act	Species or species habitat known to occur – breeding	Assessed as **likely**
Eastern curlew (*Numenius madagascariensis*)	Critically endangered – EPBC Act Endangered – TSP Act	Species or species habitat is likely to occur	Assessed as **rare**
Curlew Sandpiper (*Lathamus discolor*)	Critically endangered – EPBC Act	Species or species habitat is likely to occur	Assessed as **rare**

6.3.4.8 Threatened, migratory and protected marine fishes

It is estimated that there are over 500 species of fish found in the waters of Bass Strait, including species of importance to commercial and recreational fisheries. The PMST search for Tasmanian coastal waters indicates two species of threatened and/or migratory fish species or their habitat may occur within the search areas, as provided in Table 6.3-10. Other protected fish species which are not listed as threatened or migratory however are protected under the LMRM Act and/or the TSP Act are provided in Table 6.3-11.

Table 6.3-10 Listed threatened and/or migratory fish species

Species	Listing	Occurrence and distribution	Likelihood
White shark (*Carcharodon carcharias*)	Vulnerable and migratory – EPBC Act Vulnerable – TSP Act	• The Tasmanian Natural Values Atlas (NRE 2022) indicates that there are 14 records of white shark sightings mostly in south-east Tasmania but only four records in Bass Strait. The nearest white shark sighting is just offshore of Doctors Rocks near Wynyard and is located 18 km west of the project's proposed alignment. • There are five foraging BIAs for white sharks in Bass Strait under Tasmanian jurisdiction, mostly centred around Kanowna Island where the project alignment intercepts about 18 km of the BIA. • The closest foraging BIA to the proposal site is at Tenth Island, about 45 km to the east. The island is a major Australian fur seal feeding site and is also a haul-out site for long-nosed fur seals.	The likelihood of occurrence of white sharks in Tasmanian coastal waters is assessed as **likely**, with occurrences anticipated between October and January.
Australian grayling (*Prototroctes maraena*)	Vulnerable and migratory – EPBC Act Vulnerable – TSP Act	• The Tasmanian Natural Values Atlas (NRE 2022) lists a total of 255 sighting records for Australia graylings in Tasmania with 18 sightings recorded between Burnie and Devonport, which includes the proposal site. • Along this central north coast reach most sightings are for the lower reaches of north-flowing rivers (e.g., Emu, Blythe and Don rivers, the River Leven and the River Forth). The species occurrence is rarer in the coastal marine environment.	The likelihood of occurrence of Australian grayling in Tasmanian coastal waters is assessed as **rare**.

Table 6.3-11 Other protected fish species

Protected fish species group	Listing	Details	Likelihood
Non-threatened fish species in Tasmania Protected under the LMRM Act and/or the TSP Act			
Protected handfishes	Endangered – TSP Act	There are three handfish species in the family *Brachionichthyidae* that are protected under the LMRM Act: • Spotted handfish (*Brachionichthys hirsutus*) • Red handfish (*Thymichthys politus*) • Ziebell's handfish (*Brachiopsilus ziebelli*)	• The likelihood of occurrence for spotted handfish is assessed as **remote**. • The likelihood of occurrence for red handfish is assessed as **rare**. • The likelihood of occurrence for Ziebell's handfish is assessed as **remote**.
Protected blennies of the genus *Forsterygion*	N/A	There are three blenny species in the genus *Forsterygion* in Tasmania: • Common threefin (*Forsterygion lapillum*) • Tasmanian robust triplefin (*Forsterygion gymnotum*)	• The likelihood of occurrence for common threefins and Tasmanian robust triplefins is assessed as **remote**. • The likelihood of occurrence for variable

Protected fish species group	Listing	Details	Likelihood
		• Variable threefin (*Forsterygion varium*).	threefin is assessed as **rare**.
Protected sharks	Protected under LMRM Act The white shark is also listed under the EPBC Act	There are five species of sharks protected by the LMRM Act: • White shark (*Carcharodon carcharias*) • Basking shark *(Cetorhinus maximus*) • Grey nurse shark (*Carcharias taurus*) • Megamouth shark (*Megachasma pelagios*) • Whale shark (*Rhincodon typus*).	• Only the White shark (*Carcharodon carcharias*) is a listed species relevant to the proposal. The description of occurrence for the White shark is provided in Table 6.3-10.

6.3.4.9 Common fish species

The numerically dominant and common fishes in the Tasmanian coastal waters of Bass Strait, including Tasmanian coastal waters, include the following species:

- Pilchards (*Sardinops neopilchardus*).
- Anchovies (*Engraulis australis*).
- Sandy sprat (*Hyperlophus vittatus*).
- Southern garfish (*Hyporhamphus melanochir*).
- Silver trevally (*Pseudocaranx dentex*).
- Blue warehou (*Seriolella brama*).
- Australian salmon (*Arripis spp.*).
- Tiger flathead (*Platycephalus richardsoni*).
- Sand flathead (*Platycephalus bassensis*).
- School whiting (*Sillago bassensis*).
- King George whiting (*Sillaginodes punctatus*).
- Snapper (*Pagrus auratus*).
- Gummy shark (*Mustelus antarcticus*).
- School shark (*Galeorhinus galeus*).
- Saw shark (*Pristiphorus spp.*).
- Elephant shark (*Callorhynchus milii*).

The key pelagic, benthic or demersal fish families in Tasmania include the following, which are likely to be encountered in Tasmanian coastal waters:

- Engraulidae: anchovies and sprats (e.g., Australian anchovy, *Engraulis australis*).
- Clupeidae: sardines and pilchards (e.g., Australian sardine, *Sardinops sagax*).
- Carangidae: trevallies and kingfish (e.g., Yellowtail kingfish, *Seriola lalandi*).
- Scombridae: jack mackerel (e.g., *Trachurus spp.*) and tuna (e.g., Southern bluefin tuna, *Thunnus maccoyii*).
- Triakidae: Gummy shark (*Mustelus antarcticus*) and School shark (*Galeorhinus galeus*).

- Lamnidae: White shark (*Carcharodon carcharias*).
- Alopiidae: Thresher shark (*Alopias vulpinus*).
- Platycephalidae: flatheads e.g., Southern sand flathead (*Platycephalus bassensis*).
- Arripidae: Australian salmon (e.g., *Arripis arripis* and/or *A. truttacea*).
- Monacanthidae: leatherjackets (e.g., Gunn's leatherjacket, *Eubalichthys gunnii*).
- Triglidae: sea robins and gurnards (e.g., Spiny gurnard, *Lepidotrigla papilio*).
- Neosebastidae: gurnard perches (*Neosebastes spp.*).
- Rajidae: rays and skates (e.g., Sparsely spotted stingaree (*Urolophus paucimaculatus*).
- Aracanidae: cowfishes (e.g., Shaw's cowfish, *Aracana aurita* and Ornate cowfish, *A. ornata*).
- Odacidae: weed whitings (e.g., Slender weed whiting, *Siphonognathus attenuatus*).

6.3.4.10 Marine invertebrates

The marine pelagic and benthic macroinvertebrates within Tasmanian coastal waters have high biodiversity. There is one threatened marine invertebrate species listed under the TSP Act relevant to the proposal, as provided in Table 6.3-12. Other relevant marine invertebrate species are also included in Table 6.3-12.

Table 6.3-12 Threatened marine invertebrate species

Species	Listing	Occurrence and distribution	Likelihood
Elephant snail (*Scutus antipodes*).	N/A	• The elephant snail is a large species of marine gastropod mollusc. • The Tasmanian Natural Values Atlas (NRE 2022) indicates a total of 261 records of the elephant snail in Tasmanian coastal waters with most sightings along the east coast of Tasmania, and some clusters in Bass Strait at King and Flinders islands and along the north coast of Tasmania, including 10 sightings between Burnie and Devonport. The closest sighting at Titan Point is 650 m from the proposal site.	The likelihood of occurrence of the elephant snail in the Tasmanian coastal waters is assessed as **possible**.
Limpets belonging to the superfamilies *Fissurellacea, Patellacea* and *Siphonariacea.*	N/A	• The Tasmanian Natural Values Atlas (NRE 2022) has a total 31 records of the scarred notched limpet (*Tugali cicatricosa*), which is mainly found at King and Flinders islands with eight records along the north coast of Tasmania. The closest sighting at Emu Bay near Burnie is 5.5 km west of the proposal site. • The Tasmanian Natural Values Atlas (NRE 2022) has a total 37 records of the pitted keyhole limpet (*Cosmetalepas concatenatus)* in Tasmanian coastal waters with 16 sightings in Bass Strait. There are no sighting records between Burnie and Devonport.	The likelihood of occurrence for scarred notched limpet in the Tasmanian coastal waters is assessed as **possible**. The likelihood of occurrence for pitted keyhole limpet in Tasmanian coastal waters is assessed as **remote**.
Gunns screw shell (*Gazameda gunnii*).	Vulnerable – TSP Act	• The Tasmanian Natural Values Atlas (NRE 2022) shows a total of 489 sighting records of Gunns screw shell in Tasmanian coastal waters including about 100 sightings in Bass Strait, with four sightings between Burnie and Devonport.	The likelihood of occurrence for Gunns screw shells in Tasmanian coastal waters is assessed as **possible**.

6.3.4.11 Other non-threatened marine invertebrate fauna

As there is no site-specific information on marine invertebrates in Tasmanian coastal waters at Heybridge, the description of common marine invertebrate species is based on a regional survey conducted by Aquenal (2005) at a Tasmanian north coast site off Five Mile Bluff (i.e., the site of a proposed marine outfall), which is located 64 km to the east of the nearest proposed alignment of the project in Tasmanian coastal waters.

The predominant benthic macroinvertebrate fauna at Five Mile Bluff nearshore (Aquenal 2005) were:

- Porifera – ball, plate and finger sponges (31 species).
- Bryozoa – bryozoans (10 species).
- Ascidiacea – ascidians, tunicates or sea squirts (6 species).
- Mollusca – gastropods (4 species) and bivalves (3 species).
- Brachiopoda – unidentified brachiopod (1 species).
- Cnidaria – Eencrusting gorgonian (*Erythropodium hicksoni*) (1 species).

The most common benthic macroinvertebrates in Tasmanian coastal waters at Heybridge are anticipated to be dominated by sponges (Porifera) and bryozoans (Bryozoa), followed by gastropod and bivalve molluscs.

6.3.4.12 Invasive marine species

The majority of the IMS observed in Tasmania are found in ports (e.g., ports of Devonport and Launceston) and are often restricted semi-enclosed embayments or estuaries (e.g., Tamar and Mersey estuaries in Tasmania). Fifteen IMS have been observed in Tasmanian coastal waters and nine IMS have been observed in Bass Strait or offshore island waters.

The only invasive species with a very likely occurrence relevant to the proposal is the New Zealand screw shell, which occurs at the mouth of the Blythe River estuary. The distribution of IMS in Tasmanian coastal waters with distance to, and likelihood of occurrence near, the proposal site is presented in Table 6.3-13.

Table 6.3-13 Invasive marine species

Taxon	Species	Present in Tasmania	Nearest location in Tasmania	Distance (km)	Likelihood of occurrence	Present in Tasmanian coastal waters
Invasive marine flora						
Phaeophyta	Wakame (kelp) (*Undaria pinnatifida*)	Yes	Table Cape	29	Possible	Yes
Rhodophyta	Devil's tongue weed (*Grateloupia turuturu*)	Yes	George Town	63	Remote	-
Chlorophyta	Deadman's fingers (*Codium fragile* subsp. *fragile*)	Yes	Hobart	>230	Remote	-

Taxon	Species	Present in Tasmania	Nearest location in Tasmania	Distance (km)	Likelihood of occurrence	Present in Tasmanian coastal waters
Invasive marine invertebrates						
Mollusca	Asian date mussel (*Arcuatula senhousia*)	Yes	Burnie	5.7	Possible	-
Mollusca	Pacific oyster (*Magallana gigas*)	Yes	Burnie	5.7	Possible	Yes
Mollusca	European clam (*Varicorbula gibba*)	Yes	Burnie	5.7	Possible	Yes
Mollusca	New Zealand screw shell (*Maoricolpus roseus*)	Yes	Heybridge	0.3	Very likely	-
Mollusca	East Asian bivalve (*Theora lubrica*)	Yes	George Town	63	Possible	Yes
Tunicata	Leathery sea squirt (*Styela clava*)	Yes	Hobart	>230	Remote	-
Tunicata	Solitary ascidian (*Ascidiella aspersa*)	Yes	Devonport	30	Possible	-
Asteroidea	Northern Pacific seastar (*Asterias amurensis*)	Yes	George Town	63	Possible	Yes
Asteroidea	Rough sea star (*Astrostole scabra*)	Yes	Penguin	7.2	Possible	Yes
Decapoda	European shore crab (*Carcinus maenas*)	Yes	Burnie	5.7	Possible	Yes
Polychaeta	Fan worm (*Euchone limnicola*)	Yes	Burnie	5.7	Possible	Yes
Polychaeta	European fan worm (*Sabella spallanzanii*)	Yes	Devonport	30	Possible	Yes

6.3.5 Potential impacts

6.3.5.1 Construction

Construction activities required for the proposal that have the potential to impact marine natural values identified in Section 6.3.4 include:

- Physical disturbance to the seabed within the study area from HDD of the shore crossing, cable laying, installation, and burial.
- Underwater noise generated by the cable laying vessel during cable installation and burial.
- Artificial lighting used onboard the cable laying vessel during cable lay operations and onboard other large support vessels.

- Introduction or translocation of IMS via cable laying vessel's ballast waters and hulls, depending on the origin of the vessel or previous ports travelled through.
- Vessel collisions with marine fauna during cable lay activities.

Potential impacts to marine natural values due to the above construction activities include the following:

- Physical impacts of seabed disturbance which has the potential to cause impacts to marine water quality and sediment quality.
- Impacts of seabed disturbance which can potentially impact marine fauna and benthic communities.
- Artificial lighting which may cause disorientation and collision for seabirds and interference for resting, migration and foraging.
- Underwater noise impacts on marine fauna.
- The establishment and dispersal of introduced IMS into new environments in Tasmanian coastal waters near the proposal site.
- Vessel collisions with marine fauna, causing injury or death.

Potential impacts on marine natural values are assessed in the sections below.

6.3.5.1.1 Seabed disturbance impacts

The potential impacts of seabed disturbance on marine natural values during construction include:

- Long trajectory HDD marine exit hole at 10 m water depth (approximately 1 km offshore) impacting nearshore seabed habitats and benthic communities.
- Cable lay, installation and burial on nearshore seabed:
  - Cable laying impacts include seabed disturbance and smothering, which are confined to the footprint of the individual HVDC cables in direct contact with the seabed.
  - Post-lay cable burial with wet jetting which can result in disturbance to soft seabed sediment, where water jet nozzles would fluidise the seabed sediment to a nominal depth of 1 m below the seabed surface, with a total width of disturbance being 1.67 m.
  - The jet trencher tracks can cause impaction of the seabed, leading to mortalities of benthic macroinvertebrates within the compacted sediment.
- Cable installation and burial disturbing contaminated seabed sediments.
- Cable installation and burial impacting seabed flora and fauna.
- Cable installation on hard seabed and crossing third-party seabed infrastructure.

6.3.5.1.1.1 Long trajectory HDD marine exit hole

The potential impacts of the HDD exit hole breakthrough in soft sediment seabed include the disturbance of seabed nearshore habitats and benthic communities.

Potential impacts to nearshore seabed habitats as a result of the HDD exit hole breakthrough include:

- Disturbance of 0.07 m^2 of nearshore seabed habitat based on the HDD marine exit hole diameter being 300 mm.
- Temporal seabed habitat disturbance as a result of the settling of HDD solids, which consists of cuttings and drilling fluid solids (bentonite clay). The disturbance impact area would be very small, with short-term duration. The deposit of cuttings and drilling fluid solids would be inert.

Solids released into the water column would be rapidly dispersed and any deposition would be restricted to the immediate vicinity of the exit holes. The impact of HDD on seabed habitat surrounding each of the six marine exit holes (less than 3 m^2), is assessed as having a residual impact significance rating of **very low**. The residual impact significance rating is based on the seabed habitat sensitivity which is low, due to frequent natural sediment mobilisation, and the magnitude of impact of negligible, due to the small area of sea habitat impacted, the short-term nature of the impacts, and the inert nature of the residual drilling fluids and cuttings.

The proposed long trajectory HDD is a trenchless technique does not disturb the beach, as the HDD borehole and ducts are deep underground (approximately 10 m).

The impacts to seabed benthic communities from the HDD works have a residual impact of **very low**. This is due to the low sensitivity of seabed benthic communities, given its wide distribution of common species, and a negligible magnitude of impact due the small disturbance area surrounding the HDD marine exit holes.

6.3.5.1.1.2 Cable lay, installation and burial on nearshore seabed

The two cable bundles would be buried by a jet trencher. The potential impacts of post lay cable installation and burial in soft sediment seabed include seabed disturbance and smothering.

The jet trencher tracks would cause direct disturbance of the seabed, likely in the form of compaction, with the jet trencher's left and right track each being 0.6 m wide and any soft surface sediment under the track would be compacted. The buoyancy of the jet trencher would be monitored and adjusted. The overall length of wet jetting disturbance is 1,465 m and 1,340 m for the western and eastern alignment respectively.

The jet trencher tracks may lead to mortalities of benthic macroinvertebrates within the compacted sediment, however the track depression is expected to be shallow and would be refilled by naturally mobile sediments within a few tidal cycles. The seabed habitat recovery is expected to be completed within a few months.

The potential impacts of nearshore cable installation and burial to seabed habitats has a residual impact of **very low**.

6.3.5.1.1.3 Cable installation and burial disturbing contaminated seabed sediments

The potential impacts by cable installation and burial on contaminated seabed sediments and sediment quality in includes:

- Disturbance of surface and deeper sediments from wet jetting could result in turbulent vertical mixing of sediment with varying particle sizes and metal contaminant content.

- Wet jetting disturbance can lead to sediment contaminants being released to the overlying water column and dispersed to adjacent environment. The altered sediment/water quality could have residual impacts on benthic communities.

Based on sediment quality field investigation of the nearshore seabed (Contaminated Land and Acid Sulfate Soils Impact Assessment (Appendix C)), residual trace metal contamination was present in both the surface and deeper sediment layers, with trace metals (nickel and chromium) and metalloid (arsenic) being of potential ecotoxicological concern if mobilised and dispersed. Potential sediment quality impacts relating to total arsenic and total nickel are assessed below.

Nearshore seabed sediments potentially exposed to arsenic contamination.

At the western paleochannel, wet jetting disturbance would mix sediment particles from different depth horizons, where the existing average total arsenic concentration is calculated to be approximately 31 mg/kg. This mixed sediment would disperse and be diluted in the direction of prevailing currents where it would mix with natural sediments when settling out, to below the DGVs of 20 mg/kg, with a low risk of biological effects.

At the eastern paleochannel, wet jetting disturbance would mix sediment particles, which have existing average total arsenic concentrations to be above 85 mg/kg, which exceeds the guideline values. A highly localised area of sediment disturbance and deposition would contaminate the existing surface sediment around the wet jetting operations. The sediment disturbance is expected to settle over a larger area of seabed around the wet jetting operations, where mixing of sediments in the high-energy hydrodynamic environment of the Tasmanian nearshore is expected to reduce the total arsenic concentrations to below the DGV value of 20 mg/kg.

The potential impact of wet jetting operations causing disturbance of seabed sediments contaminated with arsenic has a residual impact of **low**. The low residual impact is based on a sensitivity rating of moderate, given the existing arsenic contamination present in the sediment, and a magnitude of impact of minor, as the sediment disturbance would be contained to the wet jetting disturbance area, where the displaced coarse-grained sediment particles would rapidly settle out.

Nearshore seabed sediments potentially exposed to nickel concentrations

The average nickel concentration in the mixed sediments from wet jetting is calculated to be approximately 63 mg/kg, which is expected to contaminate the existing surface sediments in the vicinity. The disturbed mixed coarse-grained sediment deposits would be localised to the wet jetting disturbance area and would rapidly settle out from the wet jetting path. The contaminated fine-grained sediment including silts and clays would be transported down current and settle at a distance from the wet jetting path.

The potential impact of wet jetting operations causing disturbance of seabed sediments contaminated with nickel has a residual impact of **low**. The low residual impact is based on a sensitivity rating of moderate, given the existing nickel contamination present in the sediment, and a magnitude of impact of minor, as the sediment disturbance would be contained to the wet jetting disturbance area, where the displaced coarse-grained sediment particles would rapidly settle out.

6.3.5.1.1.4 Cable installation and burial impacting seabed flora and fauna

Wet jetting may result in potential impacts on benthic communities and nearshore benthic flora and fauna, which include:

- Lower mobility molluscs, sea cucumbers, starfishes and sea urchins may be buried or crushed by jet trencher leading to mortality.
- The jet trencher would disturb about 2.8% of the total seabed area of the western palaeochannel, and 2.9% of the total seabed area of the eastern palaeochannel, representing very small habitat impact zones.
- The jet trenching may displace benthic and mobile fishes and crabs.

The impacted benthic communities are expected to cover small areas of the seabed, with no threatened species identified in the Tasmanian nearshore underwater surveys along the alignments.

The seabed habitats along the project alignments impacted by wet jetting are anticipated to be restored to natural seabed surface within a few days or weeks of disturbance, and the biodiversity is expected to recover within 6-12 months, through natural recruitment from adjacent sandy areas, reefs and rocks.

Overall, the potential impacts of wet jetting on benthic macroinvertebrates and sediment infauna are assessed to have a residual impact of **very low**.

6.3.5.1.1.5 Cable installation on hard seabed and crossing third-party seabed infrastructure

The proposal alignment in the western palaeochannel would cross over the disused outfall pipelines at two locations, and the construction methodology such as rock mattressing for the pipeline crossing would likely have a total area of 180 m^2, resulting in a small area of loss of soft-bottom sandy seabed habitat.

The potential impacts of cable burial over hard substrate and at the crossings of third-party seabed infrastructure include.

- Changes to seabed habitats due to replacement of soft sediment seabed habitats with new hard seabed habitats. This represents a transition from soft sediment seabed to harder seabed with higher structure diversity, which can offer new source of sites suitable for colonisation for encrusting algae and macroalgae holdfasts.
- Changes to water quality due to targeted rock emplacement.
- Disturbance to existing soft sediment benthic flora and fauna.

The predicted impacts to seabed habitats and soft sediment benthic flora and fauna are assessed to have a residual impact significance rating of **very low**.

Seabed surveys did not detect presence of benthic flora in the soft sediment sandy palaeochannels in the Tasmanian coastal waters (CEE 2023). For benthic fauna, the loss of habitat would represent a direct loss of benthic macroinvertebrates and inferred infauna at the two crossing locations. However, seabed surveys previously indicated benthic macroinvertebrates were not visible (CEE 2019).

The assessment of residual impacts to seabed disturbance from the construction of the proposal has been summarised in Table 6.3-14.

Table 6.3-14 Residual impact of seabed disturbance

Construction activity	Receiver	Receiver sensitivity	Magnitude of impact	Residual impact significance
Long trajectory HDD marine exit hole at 10 m water depth (approximately 1 km from the shore)	Nearshore seabed habitats	Low	Negligible	Very low
	Nearshore benthic communities	Very low	Negligible	Very low
Cable lay, installation and burial on nearshore seabed	Nearshore seabed habitats	Very low	Negligible	Very low
	Nearshore benthic communities			
Cable installation and burial disturbing contaminated seabed sediments	Nearshore sediment quality and arsenic	Moderate	Minor	**Low**
	Nearshore sediment quality and nickel	Moderate	Minor	
Cable installation and burial impacting seabed flora and fauna	Nearshore benthic community (benthic macroinvertebrates, sediment infauna)	Very low	Negligible	Very low
Cable installation on hard seabed and crossing third-party seabed infrastructure. Crossing of the two disused outfall pipelines in the western palaeochannel.	Nearshore seabed habitat	Very low	Negligible	Very low
	Nearshore existing soft sediment benthic communities	Low	Negligible	Very low

During the construction phase of the proposal, the assessment concludes that all seabed disturbance impacts to water and sediment quality, seabed habitats and associated benthic biological communities are short-term and recoverable, with the assessed residual impact significant ratings all being between **low** and **very low**. It is expected that the ecological effects of the cable installation and burial on benthic communities would be transient and minor for soft sediments where the cable is buried.

6.3.5.1.2 Underwater noise impacts

The primary underwater noise sources for the proposal are generated during the construction stage. The main sources of proposal underwater noise are:

- Cable laying vessel and laying cable (e.g., CS Giulio Verne), which has an underwater noises source level of 185 dB re 1 μPa_{rms} at 1 m.
- Cable installation and burial using a seabed jet trencher in burial mode (e.g., A HELIX T-1200 jet trencher):
  - Source level of 150 dB re 1 μPa_{rms} at 1 m for the seabed trencher in burial mode.
  - Source level of 180 dB re 1 μPa_{rms} at 1 m for the jet trencher's host vessel at 0.5 knots.
- Nearshore floated cable pulling to shore using a spread of small boats:
  - Source level of 145 dB re 1 μPa_{rms} at 1 m for boats idling.

- Source level of 165 dB re 1 μPa_{rms} at 1 m for boats manoeuvring floated cables.

The underwater noise level adopted for the assessment are conservative and have been selected as a worst-case scenario. No verification of vessel noise levels is required for the underwater noise impact assessment as the cable lay vessels that are to be utilised are within a small deviation from the typical noise source level adopted. Therefore it is not necessary to consider further verification of vessel noise levels.

Potential impacts to marine fauna through the predicted increase in underwater noise include:

- Mortality of marine fauna.
- Acoustic damage impacts such as permanent threshold shift (PTS), which is the physical injury (such as tissue damage) and/or the permanent hearing loss of marine fauna.
- Temporary threshold shift (TTS), which is the temporary hearing loss of marine fauna.
- Behavioural disturbance impacts, such as the displacement or interference or migration, foraging, breeding and navigation habits.
- Auditory masking impacts, such as reduced ability to communicate, echolocate or to detect predators.

Existing background (ambient) noise levels at Tasmanian nearshore location off Heybridge has an average of 107 dB re 1 μPa_{rms} (range 95 to 135 dB re 1 μPa_{rms}). All underwater SPL are reported in units of dB re 1 μPa_{rms}, and referenced to a representative (theoretical) distance of 1 m from an assumed point source of noise (dB re 1 µPa at 1 m).

The underwater noise impact assessment included an area of up to 10 km either side of the alignments to account for low-frequency (LF) underwater noise propagation and is based on the loudest noise source.

The tolerance to underwater noise differs for different species groups, due to their varying sensitivity to noise and their ability to avoid underwater noise. The species groups that have been considered in the underwater noise impact assessment and their respective noise threshold levels are outlined in Table 6.3-15. The acoustic threshold criteria for marine fauna groups have been sourced by peer reviewed paper NMFS (2018). If noise level thresholds outlined in Table 6.3-15 are exceeded there is potential for mortality, PTS, TTS, behavioural disturbance and auditory masking impacts to the identified noise sensitive marine fauna groups.

Table 6.3-15 Noise threshold levels for marine fauna groups

Marine fauna group	Hearing and physiological damage thresholds		Behavioural disturbance thresholds	
	PTS (dB re 1 μPa^2-s)	TTS (dB re 1 μPa^2-s)	Lower limit (dB re 1 μPa_{ms})	Upper limit (dB re 1 μPa_{ms})
LF hearing cetaceans: • Baleen whales (Humpback, Southern right, Blue, Sei, Fin, and Minke Whales)	199	179	130	160
Mid-frequency (MF) hearing cetaceans: • Dolphins, including the bottlenose and common dolphins	198	178	130	160

Marine fauna group	Hearing and physiological damage thresholds		Behavioural disturbance thresholds	
	PTS (dB re 1 μPa^2-s)	TTS (dB re 1 μPa^2-s)	Lower limit (dB re 1 μPa_{ms})	Upper limit (dB re 1 μPa_{ms})
• Sperm whale, False killer whale, long finned whale, killer whale and strap tooth whale				
High-frequency (HF) hearing cetaceans: • Pygmy sperm whale and pygmy white whale • Dusky dolphins	173	153	130	160
Phocidae pinnipeds (earless or true seals)	201	181	120	160
Otariidae pinnipeds (eared seals)	219	199	120	160
Sea turtles	204	189	-	175
Little penguins	-	-	-	150
Bony fishes	-	189	-	-
Group 3 fishes: • Fish with structure that mechanically connects to their inner ear and only detect particle motion, providing a greater hearing sensitivity	-	-	-	150
Cephalopod	-	-	-	150

A conservative SPL of 130 dB re 1 μPa_{rms} has been adopted as a threshold level for subtle behavioural responses in cetaceans. A conservative higher acoustic behavioural disturbance threshold for non-impulsive continuous broadband noise has been adopted for Tasmanian coastal waters, which considers the background ambient upper range values of 145 dB re 1 μPa_{rms} and 135 dB re μPa_{rms} estimated for Tasmanian coastal waters.

Appendix D presents the underwater noise modelling results that have been used to calculate the distances to acoustic threshold criteria for noise-sensitive marine fauna. These radial distances are presented in Table 6.3-16 with a SPL of 185 dB re 1 μP_{arms} at 1 m. If marine fauna groups are within the outlined radial distances presented in Table 6.3-16, impacts to hearing loss or behavioural changes may occur.

Table 6.3-16 Calculated distances from noise source to noise level thresholds for marine fauna groups

Marine fauna group	Zone of physiological damage and hearing loss		Zone of physiological damage and hearing loss	
	Radial distance of PTS onset (m)	Radial distance of TTS onset (m)	Distance to lower threshold for subtle behaviour change (m)	Distance to upper threshold for disruptive behaviour (m)
LF hearing cetaceans	DNE*	114	4,641	46.4
MF hearing cetaceans	DNE	43	4,641	46.4
HF hearing cetaceans	67	1,433	4,641	46.4
Phocidae pinnipeds	DNE	56	4,641	46.4
Oteriidae pinnipeds	DNE	4	4,641	46.4
Sea turtles	DNE	DNE	215	4.6

Marine fauna group	Zone of physiological damage and hearing loss		Zone of physiological damage and hearing loss	
	Radial distance of PTS onset (m)	Radial distance of TTS onset (m)	Distance to lower threshold for subtle behaviour change (m)	Distance to upper threshold for disruptive behaviour (m)
Little penguins	-	-	-	215
Group 3 Bony fishes	-	201	-	215
Cephalopod	-	-	-	215

**DNE: Does not exceed threshold level*

6.3.5.1.2.1 Permanent threshold shift

A PTS could result in physical injury or permanent hearing loss in marine fauna. PTS noise thresholds are not exceeded at any distance from the vessel noise source for the majority of the assessed marine fauna groups. Due to the very small acoustic disturbance impact zone for PTS, the residual impact has not been predicted for pinnipeds, sea turtles, fish, LF and MF cetaceans.

The PTS onset for HF cetaceans is anticipated to be 67 m from the cable vessel noise source. This this radius impact zone, HF cetaceans could experience physical injury or permanent hearing loss (from noise sound level exceeding 173 dB re 1 μPa^2-s, refer to Table 6.3-15) if they are to remain within 67 m from the noise source for an hour or more. The residual impact is **moderate**. The rating is based on an unlikely scenario of the receiver (such as an HF cetacean) staying at a constant distance from the noise source (the cable laying ship) for a period of time. It is expected that an HF cetacean sensing underwater noise emissions would be not likely to approach close to the ship, given the HF cetacean's ability to sense the cable lay ship's radiated underwater noise gradient and avoid the approaching the ship, and are not anticipated to remain in the zone of exposure to the underwater noise.

6.3.5.1.2.2 Temporary threshold shift

TTS has the potential to result in temporary hearing loss in marine fauna. The distances of where the TTS noise threshold are exceeded for marine fauna groups are presented in Table 6.13-16. All marine fauna groups have a low sensitivity rating, this is due to the fauna's ability to sense and move away from the noise source, and also the wide distribution in Tasmanian coastal waters and Bass Strait. The magnitude of impact of temporary hearing loss is moderate, as the effects of TTS are reversible within a few days.

The residual impact for temporary hearing loss in cetaceans, pinnipeds and fish marine fauna groups is **low**.

6.3.5.1.2.3 Behavioural impacts

Behavioural disturbance impacts, such as the displacement or interference of migration, foraging, breeding and navigation habits may occur where the behavioural disturbance threshold is exceeded. The lower and upper limits for behavioural disturbance are exceeded for cetaceans and pinnipeds are exceeded at 46 m and 4,641 m from the cable laying vessel noise source (refer to Table 6.3-16).

All cetaceans have a sensitivity of low, this is due to the marine fauna's large distribution, and their ability to sense and move away from noise sources. The magnitude of impact for cetaceans is assessed to be low for HF and MF cetaceans, this is due to the small behavioural impact zone of 46.4 m (upper behavioural

threshold), in which cetaceans are unlikely to enter. The magnitude of impact for LF cetaceans is moderate, as the TTS noise threshold would be exceeded but confined within a 114 m radius of the cable laying vessel's area of influence. For all cetaceans, behavioural impacts due to underwater noise have a residual impact of **low**.

Pinnipeds have a sensitivity of low, this is due to the marine fauna's large distribution, and their ability to sense and move away from noise sources. The magnitude of impact of behavioural disturbance is moderate, as radial distance to the upper acoustic threshold criterion (160 dB re 1 μP_{arms}) is 60 m. Behavioural impacts due to underwater noise for pinnipeds have a residual impact is **low**, given the short term duration of the cable laying vessel operating along the proposed route.

Disruptive behavioural impacts to sea turtles may occur above the threshold of 175 dB re 1 μP_{arms}, which is anticipated to be reached at 4.6 m from the cable laying vessel. Sea turtles are unlikely to approach within 4.6 m of the cable laying vessel. Both the sensitivity and magnitude of impact for sea turtles is low due to the small behavioural impact zone of 4.6 m where the noise threshold are exceeded. The overall behavioural impacts to sea turtles due to underwater noise have a residual impact of **low**.

The Little penguin has sensitivity and magnitude of impact to behavioural disturbance of low, this is due to their wide distribution in Bass Strait and Tasmanian coastal waters, as well as their ability to sense and move away from a noise source. Further, any passage through the 215 m radius behavioural impact zone would be short in duration. The overall residual impact is **low**.

The behavioural impacts to bony fish due to underwater noise is **low**. This is due to the short term and temporary disruption to bony fish within the predicted 215 m radius behavioural impact zone.

Some groups of Cephalopods respond to sound pressure. The behavioural displacement Cephalopods however would be temporary, and impacted cephalopods are expected to return to previously occupied areas once the cable laying vessel moves further away. The overall behavioural impacts to Cephalopods due to underwater noise have a residual impact of **very low**.

6.3.5.1.2.4 Acoustic auditory masking impacts

There are no threshold or acoustic criteria for the assessment auditory masking impacts for any of the marine fauna groups that require sound to navigate and orientate.

Overall, auditory, acoustic and communication masking impacts due to underwater noise has a residual impact of **low** for all marine fauna groups. This is based on the low sensitivity of all marine fauna groups, given their wide distribution in Bass Strait and Tasmanian coastal waters. The magnitude of impact for all marine fauna groups, except bony fish, is also low, as the cable laying vessel's noise would be transient and only cause minor cessation of vocal behaviour. Bony fish have a magnitude of impact of moderate, given their ability of soniferous fishes to navigate and detect predators may be temporarily reduced.

Table 6.3-17 Underwater noise and vibration impacts and residual impact rating

Underwater noise source level	Receiver	Potential impact	Receiver sensitivity	Magnitude of impact	Residual impact significance
185 dB re 1 μPa_{rms} at 1 m	LF cetaceans	LF cetacean disturbance and TTS onset impacts	Low	Moderate	**Low**
		LF cetacean behavioural disturbance impacts	Low	Moderate	**Low**
		LF cetacean communication masking impacts	Low	Low	**Low**
	MF cetaceans	MF cetacean behavioural disturbance impacts	Low	Moderate	**Low**
		MF cetacean communication masking impacts	Low	Low	**Low**
		Acoustic auditory masking impacts on MF cetaceans	Low	Low	**Low**
	HF cetaceans	HF cetacean disturbance and PTS onset impacts	Low	High	**Moderate**
		HF cetacean disturbance and TTS onset impacts	Low	Moderate	**Low**
		HF cetacean behavioural disturbance impacts	Low	Low	**Low**
		HF cetacean communication masking impacts	Low	Low	**Low**
	Pinnipeds - Phocids	Phocid disturbance and TTS onset impacts	Low	Moderate	**Low**
		Phocid behavioural disturbance impacts	Low	Moderate	**Low**
		Auditory masking impacts to phocids	Low	Low	**Low**
	Pinnipeds - Otariids	Otariid acoustic disturbance and TTS onset impacts	Low	Moderate	**Low**
		Otariid acoustic behavioural impacts	Low	Low	**Low**
		Otariid acoustic masking impacts	Low	Low	**Low**
	Sea turtles	Sea turtle acoustic behaviour impacts	Low	Low	**Low**
		Sea turtle acoustic auditory masking impacts	Low	Low	**Low**
150 dB re 1 μPa_{rms}	Marine birds (Little penguins)	Little penguins acoustic behaviour impacts	Low	Low	**Low**
		Little penguins acoustic masking impacts	Low	Low	**Low**
185 dB re 1 μPa_{rms} at 1 m	Fishes	Fish acoustic disturbance and TTS onset impacts	Low	Moderate	**Low**
		Group 3 pelagic fish behaviour impacts	Moderate	Low	**Low**

Underwater noise source level	Receiver	Potential impact	Receiver sensitivity	Magnitude of impact	Residual impact significance
		Group 3 benthic fish behaviour impacts	Moderate	Negligible	**Low**
		Acoustic auditory masking of natural sounds and fish communications	Low	Moderate	**Low**
185 dB re 1 μPa_{rms} at 1 m	Marine invertebrates	No mortalities or sublethal physiological impacts on benthic marine invertebrates are predicted to arise from proposal generated vibrations within the seabed	Not predicted	Not predicted	**Not predicted**
150 dB re 1 μPa_{rms}	Cephalopods	Cephalopod 'hearing' sensitivities, sensitive to vibration stimuli	Very low	Negligible	**Very low**

6.3.5.1.3 Artificial lighting impacts

The principal sources of artificial lighting during construction are the lights used onboard the cable laying vessel during cable lay operations and onboard other large support vessels. Light spill from the cable laying vessel operating during construction night works is also anticipated to occur.

Potential impacts of night-time artificial lighting from project vessels may affect terrestrial and marine birds and near surface marine fauna (e.g., sea turtles). Potential lighting impacts on birds include:

- Attraction to illuminated sources such as the cable laying vessel and other large construction vessels outside daylight hours.
- Bird collisions with cable laying vessels, resulting in injury of mortality.
- Light-induced disorientation with possible deviations in the flight paths of nocturnally migrating birds.
- Light entrapment by cable laying vessel illumination of nocturnally migrating birds and their and reluctance to continue their migration.
- Resting (i.e., temporary harbourage) and habitual roosting sites for seabirds and/or temporary refuge for migrating land birds.
- Lighting may provide an enhanced capability for seabirds to forage at night.

Potential lighting impacts and interactions with near-sea surface marine fauna include:

- Night-time lighting at the sea surface and localised light glow can act as an attractant to light sensitive marine fauna such as invertebrate zooplankton and micronekton.
- Fishes and cephalopods (especially squids that are caught using high intensity lamps to which they area attracted) may be directly attracted to the light glow surrounding the project's vessels but may also be indirectly attracted to the vessels due the direct attraction of invertebrates and smaller fish, which form a food source for predatory fishes.

Lighting impacts and increased light glow would be highly localised to the immediate vicinity of the cable lay ship and at the stern.

Impacts to birds from artificial lighting is anticipated to be minimal. The magnitude of impact of artificial lighting on all marine birds and near-sea surface marine fauna is negligible due the short term duration of operation of the cable laying vessel. Overall, the residual impact of artificial lighting on marine birds is **low**. This rating is based on the negligible magnitude of impact, and the high sensitivity of marine bird species due to the potential for threatened bird species to be impacted.

Artificial lighting impacting the vertical migration of zooplankton and micronekton and have been assessed as having a residual impact rating of **low**, due the short term duration of the cable laying vessel operation and transient exposure to the light.

The artificial lighting impacts to marine fish have a residual impact rating of **low**. This is due to a small amount of group of fish that are attracted to night-time lighting, and the magnitude of impact of negligible due to the localised zone of water that is illuminated compared to the available habitat of the fish.

Potential impacts of artificial lighting on marine mammals are not anticipated as there are minimal known direct effects, and such are not assessed. Additionally, due to the low small distribution and density of sea turtles in the study area, artificial lighting impacts to sea turtles have not been assessed.

Table 6.3-18 Artificial lighting impacts on marine fauna

Receiver	Potential impact	Receiver sensitivity	Magnitude of impact	Residual impact significance
Marine birds including nocturnal seabirds and migrating birds	Collision with vessel superstructure. Disorientation, or light entrapment of nocturnally migrating birds.	High	Negligible	**Low**
Marine fishes	Near-surface pelagic fish behaviour	Moderate	Negligible	**Low**
Marine invertebrates – zooplankton and micronekton	Near-surface zooplankton and micronekton migration	High	Negligible	**Low**

6.3.5.1.4 Introducing or translocating invasive marine species

There are 15 species of IMS in Tasmanian coastal waters within the vicinity of the proposal site which are listed in Table 6.3-13.

Construction activities required for the proposal that have the potential to cause unplanned introduction of IMS are detailed below:

- The cable laying vessel to be used during the proposal's construction phase have the potential to carry IMS through the ballast waters and hulls, depending on the origin of the vessel or previous ports travelled through.
- Discharges of ballast water that may contain the planktonic stages of organisms, free swimming juveniles or adults, fouling organisms attached to the vertical walls of the ballast compartments, and benthic organisms in deposits of sediments that accumulate at the bottom of ballast tanks (Carlton 2001).

- Release of IMS attached to the exterior hulls and nooks and crannies (e.g., thruster tunnels, rudder specie and water intake port) of the cable lay ship or other project vessels.
- Construction vessels moving between south-eastern Australian ports may translocate existing IMS, which are typically found at higher numbers of species and densities within ports and harbours.
- Targeted rock placement and/or the use of concrete mattresses to cover exposed or shallow buried cables (i.e., less than 1 m) provides hard substrate seabed that has the potential to be colonised by both native and introduced IMS that prefer hard substrate for attachment.

Potential impacts from the introduction of IMS include:

- The establishment and dispersal of introduced IMS within new habitats in or near the proposal site. IMS have the potential to outcompete local species for space and resources, prey directly on local species, or introduce pathogens.
- The introduction of pathogens that may infect native fauna.

Given the legislative requirements, guidelines, and standard control measures (outlined in MM MERU10) for managing vessel ballast water and hull biofouling, the residual rating of IMS being introduced has been assessed to have to be **low** and **very low**.

Due to the very small areas of rock placement and/or rock mattresses required by bundled cable crossings, the residual rating of colonisation of newly formed hard substrates in offshore waters is **very low**.

Based on guidelines for hull cleaning, low densities and sparse distribution of IMS species, the residual rating is assessed to range from **low** and **very low** .

Table 6.3-19 Introduced marine species impacts and risk

Potential risk/impact	Likelihood of occurrence	Consequence rating	Residual risk of IMS being introduced
Residual impacts of ballast water discharges	Unlikely	Minor	**Low**
Residual impacts IMS present in hull biofouling	Unlikely	Negligible	**Very low**
Residual impacts of IMS colonisation of new habitat – in nearshore areas	Possible	Minor	**Low**

6.3.5.1.5 Vessel collision with marine fauna

Proposal vessels have the potential to collide with marine fauna, causing injury and potentially death. Vessel collision can potentially impact slow moving marine megafauna including threatened species of large cetaceans and sea turtles listed under the TSP Act.

The assessment considers the following to impact scenarios to large cetaceans and sea turtles:

- Slow-moving cable laying vessel during the cable lay colliding with large cetaceans and sea turtles.
- Slow-moving offshore support vessel and tethered subsea remotely operated vehicle trencher during cable installation and burial colliding large cetaceans and sea turtles.

- Fast-moving construction vessels transiting between port and the construction areas, potentially colliding with large cetaceans and sea turtles.

The risk of collision between slow-moving proposal vessels and cetaceans or sea turtles is **very low**, this is due to the low anticipated speeds (from 0.22 to 1.5 knots) of these specialised vessels, resulting in unlikely mortality or serious injury to cetaceans or sea turtles. Further, cetaceans and sea turtles have the ability to sense the noise from the proposal vessels and move away. The risk of collision between fast-moving construction vessels is accessed as **low**, the risk is slightly higher due to the faster moving speeds (around 12 to 18 knots).

Table 6.3-20 Risk of vessel collision to marine fauna

Receiver	Potential risk/impact	Likelihood of occurrence	Consequence rating	Residual impact significance
Large cetaceans	Cable lay ship or offshore support vessel strike risks to large cetaceans	Rare	Negligible	Very low
	Fast-moving vessel strike risks to large cetaceans	Unlikely	Minor	Low
Sea turtles	Cable lay ship or offshore support vessel strike risks to sea turtles	Rare	Negligible	Very low
	Fast-moving transit vessel strike risks to sea turtles	Unlikely	Minor	Low

Cable laying and specialised vessels required for the construction of the proposal cannot be scheduled around flora or fauna movements (migrations that may occur for several months of the year across a range of species) as the specialised vessels required are limited in availability. As such, construction of the subsea cables would occur when cable-laying vessels are available.

Mitigation measures (outlined in Table 6.3-25), specifically the implementation of a marine fauna management plan and a cetacean interaction management plan (MERU07 and MERU08) would manage the proposal's risk of marine fauna entanglement or collision with vessels.

6.3.5.2 Operation

The main impact sources during the operations phase relate to the energised HVDC cables (i.e., when transmitting power), which generate:

- Magnetic fields.
- Induced electric fields.
- Thermal fields.

6.3.5.2.1 Magnetic field impacts

Magnetic fields are primarily generated during the operations phase when the project's proposed HVDC cables are energised (i.e., during power transmission).

Weaker magnetic fields are present when the HVDC cables are not energised, owing to the Earth's magnetic field interacting with the copper conductors and steel armouring in the HVDC cables. These weak magnetic

field may be present during construction, after the HVDC cables are laid, however, these magnetic fields are considered to be negligible and are subsequently not assessed.

Magnetic field predictions during the operation of the proposal have been modelled in Tasmanian coastal waters location at 15 m water depth, it is here that electric and magnetic fields are considered most likely to be detected from the project.

For the purpose of assessing the proposal's magnetic field impacts on marine fauna the following worst-case scenario has been adopted:

- Operation of both circuits at full power (750 MW).

For the operating scenario, the assessment has undertaken the following:

- Graphical representation of the calculated magnetic flux density at different heights above the sea floor.
- Graphical representation of the calculated magnetic flux density at the sea floor.
- Tabular representation of the calculated magnetic flux density levels at different heights above the sea floor. The magnetic flux density levels are presented in a table at various horizonal and vertical distances from the cable.

The total magnetic field associated with the subsea HVDC cable bundle off Heybridge at a full power transmission of 750 MW would have highest total magnetic density flux of 96.591 microtesla (µT) compared to the existing geomagnetic background value of 61.393 µT, and reduces to 0.15 µT at the sea surface.

Potential impacts on magnetosensitive marina fauna (i.e. fauna that are affected by the strength or orientation of a magnetic field) can include:

- Interference of cetaceans sensing of the geomagnetic field that is used for navigation during long open-ocean migrations.
- Disorientation of sea turtles that use components of the geomagnetic field for orientation and positioning.
- Disorientation and interference of pinniped species such as elephant seals that undertake long migrations or long ocean transits.
- Disorientation of species of bony fishes (*Osteichthyes*) such as eels that use the geomagnetic field during long migrations.
- Disorientation of species of cartilaginous fishes (*Chondrichthyes*) such as elasmobranchs (sharks, skates and rays) that sense the geomagnetic field indirectly through their electrosensory systems as they move through the geomagnetic field.
- Interference of marine invertebrates that sense the geomagnetic field.

6.3.5.2.1.1 Cetaceans

Magnetic field impacts on cetaceans, such the humpback whale, include the potential interference of sensing of the geomagnetic field that is used for navigation during long open-ocean migrations. For the purpose of assessing magnetic field impacts on cetaceans, the assessment of humpback whale impacts have been

used, as it is known to be known magnetosensitive, and the species migration habits are relatively well understood.

Humpback whales have the ability to sense the gradient of magnetic fields from the subsea cables as they pass through Bass Strait. The sensitivity of humpback whales is low given their increasing population levels and their ability to continue migration patterns across operating HVDC cables, sensing magnetic fields as additional magnetic anomalies. The magnitude is negligible due to the very low predicted increase in magnetic fields, and the temporary sensing of the magnetic anomaly by the whale as it passes over the cables. Overall, residual impacts of the magnetic fields on cetaceans are assessed to have an impact significance range of **very low**.

6.3.5.2.1.2 Sea turtles

The residual impact of the subsea HVDC cables magnetic fields to sea turtles during their passage is **low**. This is due to their common and widespread distribution within Tasmanian coastal waters and Bass Strait, and their non-magnetic sensory cues (e.g., olfactory, auditory and visual cues) which are likely be used to assist during their passage. Further, sea turtles are likely to swim close to the surface when migrating, where magnetic fields are low.

6.3.5.2.1.3 Pinnipeds

The magnetosense of pinnipeds are expected to be of limited use in Tasmanian coastal waters as other cues (e.g., currents, physical landmarks, bathymetric features, or following the coastline) would also assist in navigation.

The weak magnetic fields generated by the energised HVDC cables are not predicted to have any effects on otariid (eared) seals, due to their lack of magnetosense. As a result, the residual impact of magnetic fields on the fur seals and sea lions is assessed as **very low.**

The southern elephant seal has been assumed to have a weak magnetosense that could be used for navigation over vast expanses of o. The residual impact on the southern elephant seal is **low** given the likely presence of a magnetosensory system.

6.3.5.2.1.4 Fish

The bony fishes that are potentially at risk from the magnetic fields produced by the proposal are the short-finned eel (*Anguilla australis)* and the long-finned eel (*Anguilla reinhardtii*), which are known to migrate through Tasmanian coastal waters. The magnetic fields of the energised HVDC cables are unlikely to present a barrier to the migration. Overall, the residual impact of magnetic fields on bony fish is **low***,* given the moderate sensitivity rating due the presence of a magnetosensory system and the non-threatened conservation status, and a magnitude of impact of negligible as the proposal's HVDC cables magnetic fields reduce to back to background levels within around 10 m.

Potential magnetic fields impacts are only likely on those sharks that undertake long-distance migrations or movements within south-east Australia. Within Tasmanian coastal waters, this might include resident species such as the white shark (*Carcharodon carcharias*) and the school shark (*Galeorhinus galeus*). The overall

residual impact of magnetic fields to magnetosensitive cartilaginous fishes is **low**, due to the short-term duration of potential transit through the HVDC cables' magnetic fields.

6.3.5.2.1.5 Marine invertebrates

Magnetic field impacts may lead to the interference of marine invertebrates that sense the geomagnetic field. The impacts of magnetic fields on marine invertebrates are **very low**. This is based on the low to very low sensitivities of decapods and benthic macro invertebrates as they lack magneto-sensory capabilities. The negligible magnitude of impact is due to the lack of migratory decapods in the study area, and the low incremental magnetic fields expected at the seabed. The potential magnetic field impacts and residual impact significance rating are summarised in Table 6.3-21.

Table 6.3-21 Magnetic field impacts on marine fauna

Receiver	Potential impact	Receiver sensitivity	Magnitude of impact	Residual impact significance
Cetaceans	Impacts on cetaceans	High	Negligible	Low
Sea turtles	Impacts on sea turtles	High	Negligible	Low
Otariid (eared) seals	Impacts on pinnipeds – eared seals	Very low	Negligible	Very low
Pinnipeds – Phocidae (true) seals	Impacts on pinnipeds – true seals	Moderate	Negligible	Low
Bony fishes	Impacts on bony fishes	Moderate	Negligible	Low
Cartilaginous fishes	Impacts on cartilaginous fishes	Moderate	Negligible	Low
Marine invertebrates	Impacts on marine invertebrates	Low	Negligible	Very low

The potential impacts of magnetic field on marine fauna would be managed by MERU12 (refer to Table 6.3-25) by bundling the HCDV cables together, separating each circuit, and burying the cables. This would result in a high degree of magnetic field cancellation, lowering magnetic field interaction and reducing the magnetic field omitted at the seabed surface and overlying water column.

While some migratory terrestrial and marine birds are known to use the geomagnetic field for positioning and goal direction, they are unlikely to use this magnetosense when under water (i.e., diving seabirds and little penguins). In addition, no aerial magnetic field impacts of the proposal on overflying birds are anticipated due to the low magnetic fields predicted at the water surface. Therefore, magnetosensitive birds (including long distance, night-migratory terrestrial birds) flying over Tasmanian coastal waters do not require any further assessment.

6.3.5.2.2 Electric field impacts

The metal armouring of the HVDC cables would be grounded to earth to prevent any direct electric field being generated. However, seawater flowing through the cables' DC static magnetic field would induce a corresponding DC static electric field. The induced electric field would reduce with distance from the cables.

Marine mammals such as whales, dolphins and seals and marine birds such as Little penguins are not known to possess electrosensory systems that would be impacted by electric fields. The only terrestrial and freshwater semi-aquatic mammal with an electrosensory system is the platypus (*Ornithorhynchus anatinus*).

Platypuses in rivers would not be in proximity to the electric fields generated by the HVDC cables and are not expected to be impacted by electric fields.

The electrosensitive marine fauna include sharks, skates, rays and chimaeras and the sea lamprey, all of which are known to occur in Bass Strait, including Tasmanian coastal waters. The potential impacts of induced electric fields on marine fauna include:

- Impacts to benthic and demersal electrosensitive fish species, such as elasmobranchs (sharks, skates and rays), including direct effects on elasmobranch electrosensory systems and feeding behaviour.
- Indirect impacts of the electric fields on commercial fisheries targeting demersal sharks, such as gummy sharks.
- Interference on migration of electrosensitive elasmobranchs, such as ability to pass over the HVDC cable locations.
- Impacts to electrosensitive benthic macroinvertebrates.

Elasmobranch electroreceptors with a very high sensitivity can detect very weak electric fields. However, there are no benthic elasmobranchs listed as threatened in the PMST search reports in Tasmanian coastal waters (i.e. a low receiver sensitivity) and the induced electric fields are localised at the seabed (above background only within a few metres of) and of insufficient strength to cause displacement of elasmobranchs from the general area of the HVDC cables. Overall, the residual impact of electric field impacts to benthic elasmobranchs is **very low**.

The potential electric field impacts as a result of seawater flowing through the HVDC cable-generated magnetic fields at the seabed, and the residual impact significance rating are provided in Table 6.3-22.

Table 6.3-22 Electric field impacts on marine fauna

Receiver	Potential impact	Receiver sensitivity	Magnitude of impact	Residual impact significance
Benthic elasmobranchs such as sharks, skates and rays	Impacts on benthic elasmobranchs	Low	Negligible	Very low

6.3.5.2.3 Thermal field impacts

During operation, the HVDC cables would generate heat inside the conductor and insulation. Some power being transmitted would be lost as heat and lead to an increase in temperature at the cable surface, and a subsequent warming of the immediate surrounding seawater (if exposed) or seabed sediment (if buried).

For exposed sections of the HVDC cables, the seawater around the cable would dissipate heat and result in only the cable surface having a higher temperature than the surrounds. However, for buried cables sections, thermal radiation can significantly warm the surrounding sediment, at several tens of centimetres away from it. The thermal resistivity of the seabed and ground in which the subsea and land HVDC cables are buried respectively, has a significant impact on the temperature of the cable and the surrounding soil.

A cable heating assessment was undertaken in order to calculate seabed sediment temperature rise contours for various operating scenarios for the buried subsea HVDC cables in different areas along the proposed proposal alignment.

The heating assessment was performed for three operating scenarios:

- The cables operating at a proposed steady-state current.
- The cables operating at a temperature of 70°C.
- The cables operating at a temperature of 90°C.

Based on the cable heating assessment, it is predicted that the HVDC cable's conductor temperature can reach a maximum of 90°C and the sheath temperature can reach 70°C. The heating assessment results for three operating scenarios are summarised in Table 6.3-23. At steady state current and 1 m depth below seabed, the increase in sediment temperature would be 7°C, and at maximum conductor temperature, the increase in sediment temperature would be 30°C. At 0.1 m depth below seabed, the temperature increase is negligible in all three operating scenarios.

Table 6.3-23 HVDC cable heating assessment results

Operating condition	Depth below seabed (m)	Increase in sediment temperature above ambient (18°C)	Predicted total temperature in sediment
Steady state current	0.1	+0°C	18°C
Conductor temperature of 70°C	0.1	+0°C	18°C
Conductor temperature of 90°C	0.1	+0°C	18°C
Steady state current	0.5	+2°C	20°C
Conductor temperature of 70°C	0.5	+9°C	27°C
Conductor temperature of 90°C	0.5	+12°C	30°C
Steady state current	1.0	+7°C	25°C
Conductor temperature of 70°C	1.0	+22°C	40°C
Conductor temperature of 90°C	1.0	+30°C	48°C

The potential impacts of thermal field and heating around the HVDC cables at the seabed surface (i.e., upper 10 cm) include:

- Increased temperature effects on bottom water along subsea HVDC cable routes.
- Thermal effects on species composition, population density and productivity of benthic algae and seagrasses.
- Thermal effects on species composition, population density and productivity of benthic invertebrate fauna, epifauna and infauna.

- Indirect effects on fish by thermal-induced changes in the amount or type of benthic food (e.g., benthic flora and invertebrates) available to benthic and epibenthic fishes.

As the predicted water temperature rise at the seabed surface from cable heat emissions is indistinguishable from ambient temperatures, there is no significant impact on marine fauna. As most of sediment infauna live within the top 10 cm of seabed sediments, and there is no significant temperature increase in this zone below the surface, the infauna is not expected to be impacted by the cable's heat emissions. Overall, the residual impact of potential thermal field impacts is **very low** (refer to Table 6.3-24).

Table 6.3-24 Thermal field impacts on marine fauna

Receiver	Potential impact	Receiver sensitivity	Magnitude of impact	Residual impact significance
Benthic, seabed surface macroinvertebrates; epibenthic fauna such as benthic and demersal fishes	Impacts on benthic and epi-benthic fauna	Low	Negligible	Very low
Seabed sediment infauna such as polychaete worms and molluscs within the top 10 cm of the seabed		Low	Negligible	Very low

6.3.5.3 Cumulative impacts

This section provides a summary of the cumulative impact assessment on potential impacts from the interaction of the proposal with the Heybridge Converter Station proposal and proposed and foreseeable projects identified near the proposal site.

Proposed and reasonably foreseeable developments have been identified based on their potential to contribute to cumulative impacts by overlapping with the proposal's location and timeframe. The relevant Tasmanian developments include the Port of Burnie Shiploader Upgrade and the QuayLink - Devonport East Redevelopment. Further details of these developments are provided in Section 6.14.

6.3.5.3.1 Construction

There are no known third-party activities proposed within the Tasmanian coastal waters that are likely to interact significantly with the proposal's marine construction activities.

6.3.5.3.1.1 Cumulative underwater noise impacts

Underwater noise generated by the proposal's construction vessels, general maritime traffic vessels, and other potential projects' vessel traffic have the potential to cause underwater noise cumulative impacts. Due to the distance of more than 78 km between the proposal and other identified projects, the cumulative impacts for PTS onset, TTS onset, or behavioural impacts to marine fauna are not assessed.

As the underwater noise generated by the proposal combined with other projects and the background maritime traffic can travel for hundreds of kilometres, this low-frequency noise has the potential to mask communication calls between LF hearing cetaceans. The potential impact of auditory masking to LF cetaceans has a residual impact of **very low**, given the short term duration of the proposal's cable laying vessel.

6.3.5.3.1.2 Cumulative impact with the Heybridge Converter Station

The proposal is not anticipated to result in cumulative impacts with the proposed Heybridge Converter Station during the construction stage that cannot be managed by mitigation measures. The proposals would be constructed concurrently, with potential interaction between HDD, and building of the converter station adjacent to the HDD launch pads. Both components have the potential to result in changes to water quality due to ground disturbance and potential uncontrolled run-off from site (refer to Section 6.3). These potential impacts to water quality are considered to be negligible for marine natural values, provided that the appropriate mitigation measures are implemented during construction. As a result, potential cumulative impacts can be avoided or suitably managed.

6.3.5.3.2 Operation

During operations and at third party cable crossings, the magnetic fields generated by the proposal subsea HVDC cables during power transmission have the potential to interact with the magnetic fields generated around existing operating subsea telecommunication cables (e.g., Telstra's Basslink 1 cable).

At cable crossings over third party subsea telecommunication cables, the HVDC cable magnetic fields would mask those of the underlying telecommunication cables, which would be separated from the proposal HVDC cable by concrete mattresses by up to one metre. Therefore, it is expected that there would be little interaction between the cables' magnetic fields and no cumulative impacts are predicted.

There are no known third party crossings in the Tasmanian coastal waters.

6.3.6 Management, mitigation and monitoring

Proposed measures to minimise potential impacts associated with marine natural values are presented in Table 6.3-25. Mitigation measures in other sections that are relevant to the management of marine natural values include:

- Section 6.2 (Potentially contaminated material and acid sulfate soils), specifically measures which address the management of contaminated soils, including ASS, excavated during construction.
- Section 6.5 (Water quality), specifically measures which address impacts to surface and groundwater quality from erosion, sedimentation and contamination.
- Section 6.8 (Waste management), specifically measures which address the storage and handling of wastes during construction.
- Section 8.2 (Mitigation measures), specifically measures which address emergency response and incident management (MM Gen05).

Table 6.3-25 Marine natural values – mitigation measures

Ref	Mitigation measure	Proposal stage
MERU01	Monitor HDD activities and drilling fluid pressures to minimise release of drilling fluid to the environment. Extract cuttings and drilling fluids from the HDD pilot boreholes prior to breaking through to the sea floor.	Construction

Ref	Mitigation measure	Proposal stage
MERU02	Any changes to the seabed alignment should be located, to the extent reasonably practicable: • Within the sand-filled palaeochannels and gutters in Tasmanian coastal waters. • To avoid obstacles such as rocks and relocated to areas of soft-sediment seabed. • As informed by the completed geophysical surveys and geotechnical investigations, and seabed sampling.	Design
MERU03	Prior to subsea cable installation commencing, undertake a pre-lay survey to inform the final subsea project alignment so that it is clear of obstacles to the extent reasonably practicable, including low-profile reefs.	Design
MERU04	Prior to commencement of subsea cable installation during Stage 2, measures will be developed and documented in the CEMP to manage the disturbance of sediments associated with the crossing of the disused tioxide pipeline/s in the event the sediment to be disturbed is above the default guideline values for sediment quality of the Australia and New Zealand Guidelines toxicant default guideline values for sediment quality (ANZG 2024).	Construction
MERU05	In the event that third party subsea cables will be intersected during construction and prior to marine construction commencing, develop a cable crossing management plan with measures to avoid impacts on existing third-party subsea cables during construction. The cable crossing management plan will: • Be developed through consultation with the owner of any third-party cable crossed by the proposal. • Describe the approach and key requirements for safe cable crossing. • Include an engineering solution for the crossing with relevant infrastructure owners. • Include requirements for informing the Australian Maritime Safety Authority of the location, timing and duration of cable crossing works. • Be informed by guidelines published by the ICPC to assist the cable industry to adopt a harmonised approach in relation to crossings (ICPC 2023b). • Document the crossing point locations for the subsea cables, and the distances that the jet trencher will stop before crossing existing third-party subsea cable. • Outline the notification protocols for informing third-party cable owners of the final design and construction approach. The plan will be implemented during construction.	Construction
MERU06	Prior to marine construction commencing, develop and implement a marine communication plan that includes: • Identification of relevant stakeholders. • A protocol for notifying the Australian Maritime Safety Authority of the proposed locations, timing and duration of proposed marine construction activities. • The approach for compliance with *AMSA Marine Orders Part 30 (Prevention of Collisions), AMSA Marine Orders Part 59 (Offshore Support Vessel Operations)* and the convention on the *International Regulations* for *Preventing Collisions at Sea, 1972* (COLREGs). • A protocol for informing the Australian Hydrographic Office of the locations, dates, times and duration of proposed marine construction activities. • A plan to engage with commercial and recreational fisheries on the project activities, schedule, locations and durations.	Construction Operation

Ref	Mitigation measure	Proposal stage
	• The approach for using guard vessels to enforce the temporary exclusion zone during cable laying across Bass Strait and at the shore crossings. • The approach for informing recreational users of marine activities, in accordance with the community and stakeholder engagement framework (MM S03). This plan will be implemented during construction.	
MERU07	Prior to marine construction commencing, develop a marine fauna management plan to avoid or minimise impacts to marine fauna. The management plan will outline the approach to: • Managing interactions with marine fauna where there is not a specific species management plan required under MM MERU08 and MM MERU09. • Reporting and collation of information about siting of and interactions with marine fauna, including those covered by species specific management plans. • Protocols for incident management and reporting. • Protocols for managing injured seabird or coastal bird if discovered on a lit vessel. The management plan will include species specific management plans as sub plans. The measures in the plans will be consistent with the objectives of relevant EPBC Act recovery plans, including: • *Recovery Plan for Marine Turtles in Australia.* • *National Recovery Plan for threatened Albatrosses and Giant Petrels 2011-2016.* • *Recovery plan for the White Shark (Carcharodon carcharias).* • *Sub-Antarctic Fur Seal and Southern Elephant Seal Recovery Plan.* • *Recovery Plan for the Australian Sea Lion (Neophoca cinerea).* The marine fauna management plan and species specific sub-plans will be implemented during construction.	Construction
MERU08	Prior to marine construction commencing, develop a cetacean interaction management plan to avoid or minimise impacts to cetaceans during construction. The cetacean interaction management plan will: • Be developed in accordance with relevant guidelines including: - *EPBC Act Policy Statement 2.1 – Interaction between Offshore Seismic Exploration and Whales: Industry Guidelines* (DEHWA 2008). - *Environmental and wildlife regulations* (Marine Safety Victoria 2022). - *A Guide to Boating and Swimming Around Whales, Dolphins and Seals* (DELWP 2022). - *Whale and Dolphin Viewing Guidelines for Tasmanian Waters* (NRE 2022). • Define the area for visual monitoring for cetaceans that is appropriate for cable laying works. • Define precaution zones for maintaining a separation distance of cable laying works from cetacean and the distance at which works should be suspended when cetaceans approach. • Outline vessel-cetacean strike avoidance measures to minimise the potential for collision. • Include a procedure for marine mammal observations which may include the role of Marine Mammal Observers on construction vessels at or around active construction locations. The measures under the plan will be consistent with the goals of the *EPBC Act Conservation Management Plan for the Blue Whale* and *Conservation Management Plan for the Southern Right Whale* and any relevant national	Construction Operation

Ref	Mitigation measure	Proposal stage
	recovery plans. The cetacean interaction management plan can be a sub plan to the marine fauna management plan (MM MERU07) and be implemented during construction.	
MERU09	Prior to marine construction commencing, develop a sea turtle interaction management plan for managing interactions with sea turtles to avoid or minimise impacts during construction. The plan will: • Define the area for visual monitoring. • Document the approach to vessel based visual monitoring with a minimum visual monitoring buffer zone of 200 m. • Define exclusion and buffer zones for maintaining a separation distance of vessels from sea turtles, including the requirement for transiting vessels to maintain a minimum separation distance of 50 m from sea turtles. • Outline vessel-sea turtle strike avoidance measures to minimise the potential for collision with sea turtles, including if sea turtles are sighted within the 50 m separation distance, vessels must reduce speed and shift the engine to neutral, not engaging the engines until sea turtles are clear of the area. • Consider all construction vessels including guard vessels, small boats manoeuvring floated cables, crew transit vessels and dive boats. A plan is not required for slow moving vessels laying cable, towing gear or subsea machines. The sea turtle interaction management plan can be a sub plan to the marine fauna management plan (MM MERU07) and be implemented during construction.	Construction Operation
MERU10	Prior to marine construction commencing, develop measures to minimise impacts on marine fauna due to artificial lighting for construction and operation. The measures will consider the following: • *Australia's National Light Pollution Guidelines for Wildlife* (DCCEEW 2023a), to manage the effect of artificial light on marine turtles, seabirds, and migratory shorebirds that are listed under the EPBC Act, species that are part of a listed ecological community, and species protected under state or territory legislation for which artificial light has been demonstrated to affect behaviour, survivorship, or reproduction. • Australian Standard AS/NZS 4282:2019 *Control of the obtrusive effects of outdoor lighting and recognise the impact of artificial light on living organisms*. • EPBC Act Policy Statement 3.21 - *Industry Guidelines for avoiding, assessing and mitigating impacts on EPBC Act (Cwlth) listed migratory shorebird species*. The measures will: • Minimise lighting where practicable and where safety is not compromised, minimise the number of lights, the intensity of lights, and the amount of time lights are turned on. • Direct lighting to where it is needed and avoid general area floodlighting. • Limit area and deck lighting to the amount and intensity necessary to maintain deck crew safety. • Direct lighting inboard and downward (where possible) to reduce the potential for seabird attraction. • Avoid direct lighting of the sea surface and minimise indirect lighting on the sea surface to the extent practicable. • Include routine inspection of lighted areas of the cable lay vessel and other night-time operating vessels for birds that may have been attracted. The measures can be included in the marine fauna management plan (MM MERU07) and be implemented during construction.	Construction Operation

Ref	Mitigation measure	Proposal stage
MERU11	Prior to marine construction commencing, develop and implement a ballast water management plan and biofouling management requirements for each marine vessel to avoid the introduction of marine pests via ballast water or biofouling of the vessel's hull and semi-enclosed spaces. During construction and operation, vessel owners will comply with the: • *Australian Ballast Water Management Requirements* (DAFF 2020). • *Biosecurity Act 2015* (Cwlth). • *International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004* (BWM Convention). • *Australian Anti-fouling and in-water Cleaning Guidelines* (DoA and DoE 2015). • *Ballast Water Management Requirements* (DAWE 2020). • Maritime and Aircraft Reporting System (MARS) and the Vessel Compliance Scheme (VCS): - Prepare and submit a Pre-arrival Report (PAR) for answering the ballast water questionnaire from DAFF. - Non-First Point of Entry (NFP) application v16. - Ballast Water (BW) report v108. International marine traffic will have a ballast water management plan for ballast water and sediments that includes: • A ballast water record book. • An International Ballast Water Management certificate where ships are 400 gross tonnes and above in accordance with the BWM Convention and specifies which standard the ship is complying with, as well as the date of expiry of the Certificate. • Vessels with a ballast water management system must carry a type of approval certificate specific to the type of ballast water management system installed. • Complete and accurate record of all ballast water movements. • Detailed information regarding vessel maintenance history for treating biofouling. During construction and operation, vessel owners will comply with the following biofouling management requirements: • *Biosecurity Amendment (Biofouling Management) Regulations 2021 (Cwlth)* requires operators of all vessels to provide information on biofouling management practices prior to arriving in Australia. • Australian Biofouling Management Requirements (ABFMR) (DAFF 2022) via: - Biofouling Management Plan. - Biofouling Record Book. - Alternatively, clean all biofouling within 30 days prior to arriving in Australia and submit a cleaning report to DAFF. - *Australian National Antifouling and In-water Cleaning Guidelines* (DoA and DoE 2015). The ballast water management plans and biofouling management requirements will be implemented during construction and operation.	Construction Operation
MERU12	The cable and construction method will be designed to install and bury subsea cables in a manner that reduces the EMF emitted from the subsea cables at the seabed and overlying the water column. The cable design and installation will include: • Cable burial from 0.5 m up to 1.5 m. • Bundling the HVDC cables in each subsea circuit to cancel out or greatly reduce EMF.	Design Construction

Ref	Mitigation measure	Proposal stage
	• Separating each subsea circuit to reduce interaction of EMF.	
MERU13	At the completion of marine construction, inform the Australian Hydrographic Office of the locations and coordinates of the final seabed alignments to enable the Australian Hydrographic Office to publish Notices to Mariners to inform maritime users of the presence of seabed power cables and mark them on navigation charts.	Operation

6.4 Marine water quality

This section provides a summary of the findings of the Marine Ecology and Resource Use Impact Assessment and Marine Benthic Habitat Characterisation provided in Appendix D and Appendix E.

This section summarises the assessment outcome for marine water quality within the Tasmanian jurisdiction for the project, at the seabed alignments, which is within the Heybridge nearshore area, denoted by Tasmanian coastal waters within 3 NM. The Commonwealth marine waters outside 3 NM are outside the scope of this EIS and have been considered in the Commonwealth and Victorian combined EIS/EES for the project (refer to Section 1.3).

6.4.1 Assessment guidelines

The relevant sections of the EIS guidelines for the Heybridge Shore Crossing, and where these have been addressed in this EIS, are outlined in Table 6.4-1.

Table 6.4-1 Relevant EIS guidelines

Marine water quality – EIS guidelines	Section
Discuss potential impacts of construction and operation of the proposal on marine water quality, including:	
Details and results of any baseline water quality, biological or sediment monitoring undertaken. Please note it is preferable that any such monitoring be undertaken over a minimum 18-month period on a monthly basis but may include reference to historical water quality monitoring. As available, other relevant information for assessing potential impacts such as ecotoxicological, hydrological or electromagnetic data should be included.	Section 6.4.2
Consideration of applicable Default Guideline Values (DGVs) and Protected Environmental Values (PEVs) under the *State Policy on Water Quality Management 1997.*	Section 6.4.2, 6.4.4 and Section 6.5
Consideration of construction impacts on water quality, including: • the potential for pollutants such sediment, fuel, drilling fluid or other hazardous chemicals to enter the marine environment. • specific consideration of the potential for contaminated material or acid sulfate soils to be disturbed. • any potential diffuse or point source liquid emissions (e.g., stormwater or runoff from waste materials). • cumulative impact with proposed Heybridge converter station works and the remainder of cabling works for Marinus Link.	Section 6.4.5.1 and Section 6.4.5.3
Consideration of operational impacts on water quality, including: • electromagnetic fields (noting that electromagnetic radiation is within the definition of 'pollutant' under the EMPC Act); and • potential maintenance works.	Section 6.4.5.3, 6.3.5.2
Discuss proposed avoidance and mitigation measures to minimise potential impacts on marine water quality. In regard to potential acid sulfate soils, the risk should be managed and monitored in accordance with the applicable *Australian Government ASS guidelines* and *Tasmanian ASS Management Guidelines*, as per requirements under Key Issue 2: Potentially Contaminated Material and Acid Sulfate Soils.	Section 6.4.6 and Section 6.2.6
Provide justification for any proposed emission of pollutants to marine waters in accordance with the principles under the *State Policy on Water Quality Management 1997* and with application of a 'weight of evidence approach' consistent with the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*. Reference should be made	Section 6.4.4.2

Marine water quality – EIS guidelines	Section
to published or determined (site specific) water quality guideline values for receiving environments.	
Legislative and policy requirements	
It must be demonstrated that the proposal is consistent with the objectives and requirements of relevant water management policies and legislation including the *Water Management Act 1999*, the *State Policy on Water Quality Management 1997*, and the *Tasmanian State Coastal Policy 1996*.	Section 6.5.4

6.4.2 Methodology

The methodology and study area for Marine Ecology and Resource Use Impact Assessment (Appendix D) are summarised in Section 6.3.

The assessment for potential impacts on marine water quality considered literature review of similar HVDC power transmission cables within the environment to identify credible impact sources and pathways, including impact pathways specific to the proposal.

The potential impacts to marine water and sediment quality is evaluated by comparing predicted quantities (for example, of waste fluids) of the proposal against relevant water quality guidelines, quantitative criteria, or standards. These guidelines would include:

- The *Australian and New Zealand guidelines for marine water quality and the protection of marine ecosystems* (ANZG 2018).
- The *Australian and New Zealand guidelines for sediment quality* (ANZG 2024).

6.4.3 Existing conditions

6.4.3.1 Existing water quality

Existing water quality in Bass Strait and the proposal site is obtained from historical water quality data and water quality samples collected in 2020 and 2021 on the passenger ship *Spirit of Tasmania I*, which crosses the Tasmania nearshore west of Tamar Estuary entrance. The location of the water quality collection point is shown in Figure 6.4-1 and the water quality summary data is shown in Table 6.4-2.

Table 6.4-2 Water quality summary data in Tasmanian coastal waters

Statistics	Temperature (°C)	Turbidity (NTU)	Salinity (PSU)	Chlorophyll (mg/m^3)
Winter (1 June to 31 August 2021):				
No. of samples	51,191			
Average	13.705	1.136	33.260	0.400
Summer (1 December 2020 to 28 February 2021):				
No. of samples	71,219			
Average	17.532	0.521	35.073	0.295

Source: MV Spirit of Tasmania I water quality data (AODN, 2021). NTU=Nephelometric Turbidity Units. PSU=Practical Salinity Units.

Based on the water quality data, the average temperature in Tasmanian coastal waters is 13.71°C in winter and 17.53°C in summer.

The average low surface turbidity values indicate high water clarity and low total suspended solids concentrations. Tasmanian coastal waters had lower surface salinity and higher chlorophyll concentrations in winter compared to summer.

Figure 6.4-1 Location of water quality sampling as shown in red boxes

6.4.3.2 Existing sediment quality

A seabed sediment sampling program was carried out in 2022 to assess existing quality of the sediment and presence of residual historic contamination from the former Tioxide Australia plant disused outfall pipelines (Tetra Tech Coffey 2022). The locations of the sampling sites are shown in Figure 6.4-2.

The sample analysis assessed for metals and metalloids including mercury (Hg), arsenic (As), cadmium (Cd), chromium (Cr), copper (Cu), lead (Pb), nickel (Ni), and zinc (Zn). The sample analysis results were compared against the sediment quality guidelines outlined in the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZG 2018), which provide DGV and upper guideline value (GV-high). At concentrations above GV-high, toxicity related biological effects can be expected to occur. For concentrations between DGV and GV-high, toxicity may occur, however further investigations would be required. For concentrations lower than DGV, there is a low risk of biological effects.

The sediment sampling analysis results are summarised as follows:

- Surficial sediment concentrations of mercury, cadmium, chromium copper, lead and zinc concentrations for every sample were less than their respective DGVs at all sites.
- Surficial sediment concentrations of arsenic exceeded its DGV at most sampling depths across all sites, except for SED-E1 in the eastern palaeochannel (refer to Figure 6.4-2).
- Surficial sediment concentrations of nickel for most sites were below its DGV, except for sites SED-E4 and SED-E5 in the eastern palaeochannel. At site SED-E5, the concentration of nickel was 27 mg/kg (dry weight), which is slightly higher than the DGV of 21 mg/kg. It was 41 mg/kg (dry weight) at site SED-E4.

- Arsenic concentrations decreased with sediment depth at sites SED-E3, SED-E4, SED-W1, SED-W4 and SED-W5, however increased with depth at site SED-E5 to levels indicating toxicity in deeper sediment layers.
- Chromium concentrations increased with sediment depth at site SED-E5 without exceeding the chromium GV-High value indicate that toxicity related effects are not expected in deeper sediment layers.
- Nickel concentration increased with sediment depth at site SED-E5. The exceedance of the nickel GV-High value indicates that toxicity related effects would be expected in the deepest sediment layer sampled.

Field surveys and laboratory testing of existing and residual contaminants at the outfall pipeline surveys were undertaken to determine contamination of the sediment and impacts to water quality if disturbed. The findings of this sampling are addressed in Section 6.2 and 6.4.5.

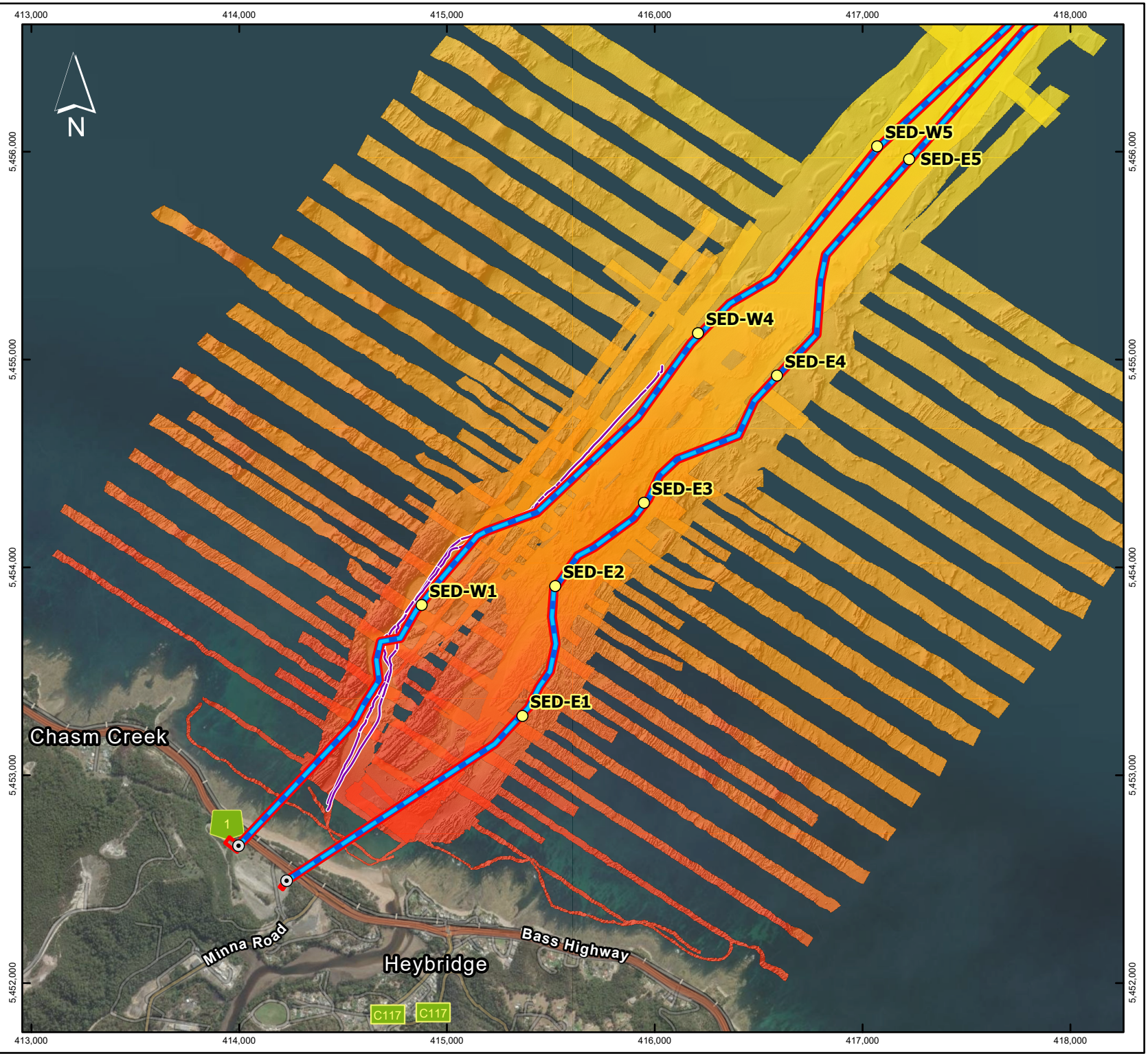
6.4.4 Applicable legislation

6.4.4.1 State Policy on Water Quality Management 1997

The *State Policy on Water Quality Management 1997* aims to protect marine ecosystem water quality and recreational water quality and aesthetics, and also provides a framework to manage water quality for all Tasmanian surface waters. Section 7.1 of the policy states that *"Water quality objectives may be set for surface waters and groundwaters in Tasmania by determining which protected environmental values (PEVs) should apply to each body of water".*

The assessment of water quality impacts in Section 6.4.6 has considered and applied the principles of the state policy and the *Australian Water Quality Guidelines for Fresh and Marine Waters* (ANZG 2018).

Figure 6.4-2: Sediment sampling sites in Tasmanian coastal waters



Legend

- HVDC Landfall
- Proposed HVDC Subsea Cable
- Proposal Site
- Sediment Sample Site
- Former Tioxide Plant Outfall Pipeline

Scale: 1:25,000 @ A4

Spatial Reference: GDA2020 MGA Zone 55

0 250 500 1,000 1,500

Metre

MARINUS LINK

Acknowledgements and Sources:

Data Source: Marinus Link GIS Data Repository and theLIST ©State of Tasmania .
Background Image: Earthstar Geographics, DPIPWE, Esri, TomTom, Garmin, Foursquare, METI/NASA, USGS
Produced By: Marinus Link for the Tasmanian Heybridge Shore Crossing EIS.
Date Figure Exported: 22/11/2024

6.4.4.2 Australian and New Zealand Guidelines for Fresh and Marine Water Quality

The *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZG 2018) were adopted for the project. Table 6.4-3 presents a list of ANZG (2018) ambient water quality guidelines for the protection of 99% of marine species as it applies to Bass Strait waters.

Table 6.4-3 Marine water quality guideline values

Metal or metalloid	99% species protection
Silver (Ag)	0.8
Arsenic (As)	N/A
Cadmium (Cd)	0.7
Chromium (Cr III)	7.7
Chromium (Cr VI)	0.14
Cobalt (Co)	0.005
Copper (Cu)	0.3
Mercury (Hg inorganic)	0.1
Nickel (Ni)	7
Lead (Pb)	2.2
Zinc (Zn)	3.3
Tin (Sn tributyl)	0.004
Vanadium (V)	50

Source: ANZG (2018)

Under the sediment quality guidelines, metals and metalloids are also assigned DGV and GV-High values which can be used to compare with samples collected for the project. Table 6.4-4 presents selected metal DGV and GV-High values which are relevant to the proposal and the assessment of marine sediment quality.

Table 6.4-4 Marine sediment quality guideline values

Metal or metalloid	DGV (mg/kg)	GV-High (mg/kg)
Silver (Ag)	1	4
Arsenic (As)	20	70
Cadmium (Cd)	1.5	10
Chromium (Cr)	80	370
Copper (Cu)	65	270
Mercury (Hg)	0.15	1
Nickel (Ni)	21	52
Lead (Pb)	50	220
Antimony (Sb)	2	25
Zinc (Zn)	200	410

Source: ANZG (2024)

6.4.4.3 Tasmanian State Coastal Policy 1996

The *Tasmanian State Coastal Policy 1996* provides guidance on coastal planning in Tasmania. Its three guiding principles are that natural and cultural values of the coast shall be protected, the coast shall be used and developed in a sustainable manner, and integrated management and protection of the coastal zone is a

shared responsibility. The design, construction and operation of the proposal would adhere to the guidelines outlined in this policy.

6.4.5 Potential impacts

6.4.5.1 Construction

6.4.5.1.1 HDD activity water quality impacts

As described in Section 2, there would be six HDDs drilled sequentially one at a time, and each of the six HDDs would produce about 200 m^3 of cuttings. Drilling fluids consisting of fresh water and bentonite (non-toxic clay) would also be used to wash the cuttings and hydraulically drive the drilling head.

The drilling fluid and cuttings would be managed in a closed circulation system, and would be recycled and reused until the HDD activity is complete. There would be a temporary pit to capture drilling mud (cuttings) and these would be reused or disposed of in accordance with MM WM01. Cuttings would be tested and treated where ASS are encountered in accordance with MM CL02. However impacts due to disturbance of ASS are not predicted as a result of the proposal. Prior to HDD exit hole breakthrough and within about 5 m of the remaining hole to be drilled, all drilling fluid in the HDD borehole would be pumped out as far as is possible to remove excess drilling fluid. Any remaining drilling fluid would escape to the external marine environment however this would be very small quantity, inert and non-toxic as bentonite clay is a natural mineral.

6.4.5.1.2 Cable laying water quality impacts

Construction activities in the nearshore zone that may give rise to impacts are from cable laying in the seabed alignments and post lay cable installation. Based on literature review, the cable burial by wet jetting method involves the 'lowest environmental impacts' on water quality (OSPAR 2012). If the jetting system only fluidises the seabed sediment to allow the cable to sink through it, as in the proposal's construction method, the impact would be negligible since there would be no significant sediment displacement (Vise et al. 2008).

During the wet jetting, the jet trencher progression would be at a speed of 400 m/hr and total duration for the eastern and western alignments are 12.7 hours and 13.2 hours respectively. These durations represent small periods when water quality may be exposed to localised turbidity plumes with increased initial suspended sediment concentrations. The residual impact to marine water quality as a result of cable burial by wet jetting is **low**.

The proposal's potential impacts on marine water quality from these activities are considered in Table 6.4-5. The residual impact significance is rated based on implementation of mitigation and management measures to minimise identified potential impacts to marine water quality.

Table 6.4-5 Construction impacts on water quality and residual impact significance

Construction activity	Potential impacts on water quality	Receiver sensitivity	Magnitude of impact	Residual impact significance
Long trajectory HDD marine exit hole breakthrough	Once off, very-short term release of residual drilling fluids, containing	High	Negligible	**Low**

Construction activity	Potential impacts on water quality	Receiver sensitivity	Magnitude of impact	Residual impact significance
in soft sediment seabed	fine-grained cuttings and bentonite clay. The increase in suspended sediment concentrations and associated turbidity would disperse and dilute rapidly, given the small volume (less than 2.35 m^3) of residual drilling fluid released at breakthrough.			
Cable installation and burial causing sediment resuspension and turbidity	Development of wet-jetting turbidity plumes with increased suspended sediment concentrations, which would reduce as sediment particles are deposited with distance and the plumes are dispersed down current. Due to the lack of silts and clays particles (less than 1%) in Tasmanian coastal waters, there is a limited volume of very fine-grained sediment that can be mobilised during wet jetting. The quantities of resuspended fine-grained sediments would be small and therefore turbidity plumes would disperse and dilute not very far from the wet jetting. With the mouth of the Blythe River estuary located 300 m from the nearest wet jetting location, at this distance the turbidity plumes would already be diluted to low suspended sediment concentrations, and would only enter the estuary at flood tides.	High	Negligible	**Low**
Cable burial disturbing contaminated seabed by wet jetting which can release particulate-associated and dissolved trace metals to the overlying water column	Wet jetting causing short term changes to nearshore sediment quality and release of sediment-associated contaminants to the overlying water column. The primary sediment contaminants are arsenic and nickel, and sediment pore water with elevated concentrations of dissolved metals would also be present. The wet jetting would cause disturbance and then settling of fine-grained sediments with elevated total arsenic concentrations which would then be readily reduced and diluted due to high-energy hydrodynamic environment. The wet jetting would also cause dilution of sediment poor water and continued mixing with seawater and would reduce concentrations of any dissolved metal.	Moderate	Minor	**Low**

Construction activity	Potential impacts on water quality	Receiver sensitivity	Magnitude of impact	Residual impact significance
	The very short duration of wet jetting at any one point would result in only a brief disturbance to contaminated sediments.			
Cable burial over hard substate at crossing of third-party infrastructure	Use of targeted rock fill generating short term turbidity plumes which would disperse in the water column. The lowering of rock mattresses to the seabed is not expected to generate any turbidity plumes of significance.	High	Negligible	**Low**

6.4.5.2 Operation

Water quality impacts can arise from faulty cable removal and the installation and burial of replacement cable, which can lead to increased suspended sediment and turbidity plumes when the seabed is disturbed. Both cable de-burial and new cable installation and burial operations are expected to be completed within a few hours given the short lengths of cable removed and replaced. Operational impacts to water quality from a major cable fault repair are considered **very low** to **low**.

6.4.5.3 Cumulative impacts

During the construction phase, there are no presently known or expected activities occurring in Bass Strait that are likely to interact significantly with the proposal's marine constructions activities. No impacts of the Heybridge Converter Station proposal are likely to occur offsite and therefore impact and accumulate in the marine environment.

6.4.6 Management, mitigation and monitoring

Proposed mitigation measures to minimise potential impacts on marine water quality have been provided in the marine natural values section (refer to Section 6.3.6). There are no additional management, mitigation and monitoring measures for marine water quality.

6.4.7 Residual impacts

With appropriate mitigation measures in place, the residual impacts on marine water quality during construction would be **low** (refer to Table 6.4-6). During operation, residual impacts on marine water quality are not anticipated.

Table 6.4-6 Residual impact significance rating for the proposal on marine water quality

Potential impact	Residual impact significance rating
Once off, very-short term release of residual nature based drilling fluids	**Low**
Wet jetting causing short term increase in suspended sediment and turbidity	**Low**
Wet jetting causing short term changes to nearshore sediment quality and release of sediment-associated contaminants to the overlying water column	**Low**
Use of targeted rock fill (associated with third party crossing method) generating short term turbidity plumes which would disperse in the water column	**Low**

The residual impact due to minor release of drilling fluids is **low** due to a short term release, minimal volumes, the inert nature, and rapid dispersal of fluids.

The residual impact to marine water quality due to wet jetting from suspended sediments is **low** due to relatively small quantities of resuspended fine-grained sediments and the generated turbidity plumes dispersal.

The residual impact due to wet jetting from release of sediment-associated contaminants is **low**, due to sediment disturbance being highly localised, and rapid sediment particle settling.

The residual impact due to use of targeted rock fill generating turbidity plumes is **low** due to the very short term nature of the plumes which rapidly disperse and dilute.

6.5 Water quality (surface and groundwater)

This section provides a summary of the findings of the Surface Water Impact Assessment provided in Appendix G and the Groundwater Impact Assessment provided in Appendix F.

Insofar as these assessments address contamination risks, they have considered the risk assessment prepared and summarised in Section 6.2.

6.5.1 Assessment guidelines

The relevant sections of the EIS guidelines for the Heybridge Shore Crossing, and where these have been addressed in this EIS, are outlined in Table 6.5-1.

Table 6.5-1 Relevant EIS guidelines

Water quality (surface and groundwater) – EIS guidelines	Section
Results of any baseline water quality, biological and sediment monitoring undertaken of potentially impacted waterways.	Section 6.5.3
Consideration of Protected Environmental Values (PEVs) under the *State Policy on Water Quality Management 1997*.	Section 6.5.4.2
Identify any freshwater ecosystems of high conservation management priority using the Conservation of Freshwater Ecosystem Values (CFEV) database, including values in the vicinity of the proposal. The specific CFEV information should include Conservation Management Priority Potential.	Section 6.5.3.1.1
Details of potential stormwater management (including during reasonably foreseeable flood events). A map of the on-land above ground works area, with indicative locations of stormwater collection systems and details of drainage control measures such as cut-off drains and sediment settling ponds.	Section 6.5.6
Consideration of construction and operational impacts on water quality, including: • works undertaken in and near waterways. • the potential for pollutants to become entrained in stormwater. • specific consideration of the potential for contaminated material or acid sulfate soils to be disturbed. • cumulative impact with proposed converter station works.	Section 6.5.5.1, 6.5.5.2
Discuss proposed avoidance and mitigation measures to minimise potential impacts on surface water quality.	Section 6.5.6
Provide justification for any proposed emission of pollutants to surface water in accordance with the principles under the *State Policy on Water Quality Management 1997* and with application of a 'weight of evidence approach' consistent with the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*. Reference should be made to published or determined (site specific) water quality guideline values for receiving environments	Section 6.5.4.2
Where any subsurface works are proposed: • Provide a map showing the location of any groundwater bores (refer to the Groundwater Information Portal), a conceptual groundwater model for regional and local aquifer flows and details of any baseline groundwater quality monitoring undertaken. • Identify any surface water and groundwater dependent ecosystems that may receive groundwater from areas impacted by the proposal. • Discuss potential impacts of the proposal on groundwater (quality and quantity), including interruption of flow and release of sediment, and cumulative impact with proposed converter station works.	Section 6.5.3.2, 6.5.5.2

Water quality (surface and groundwater) – EIS guidelines	Section
Discuss proposed avoidance and mitigation measures to minimise potential impacts on surface and groundwater quality.	Section 6.5.6
Provide justification for any potential impact to groundwater in accordance with the principles under the *State Policy on Water Quality Management 1997* and with reference to likely groundwater community values, associated guideline values and guideline values for receiving surface waters. For information regarding the water quality management framework and evaluation criteria in Tasmania refer to *Technical Guidance for Water Quality Objectives (WQOs) Setting for Tasmania, August 2020*	Section 6.5.4.2
Legislative and policy requirements	
It must be demonstrated that the proposal is consistent with the objectives and requirements of relevant water management policies and legislation including the *Water Management Act 1999*, the *State Policy on Water Quality Management 1997*, and the *Tasmanian State Coastal Policy 1996*. In particular, it must be demonstrated that the proposal will not prejudice the achievement of any water quality objectives set for water bodies under the *State Policy on Water Quality Management 1997*. Where water quality objectives have not yet been set, EPA should be consulted to identify the baseline water quality data required to enable the water quality objectives to be determined. For information regarding the water quality management framework and evaluation criteria in Tasmania refer to *Technical Guidance for Water Quality Objectives (WQOs) Setting for Tasmania, August 2020*.	Section 6.5.4

6.5.2 Methodology

Groundwater and surface water existing conditions and impacts for the proposal site (including the Heybridge Converter Station site) have been assessed together, providing an assessment of the cumulative impacts of the two proposals. For the purposes of this EIS, existing conditions and impacts have been discussed separately where feasible.

6.5.2.1 Surface water

The assessment adopted a **risk assessment approach** and relied on existing data, contamination sampling conducted for the contamination assessment, and proposal-specific modelling. The assessment considered the potential for the construction and operation of the proposal to influence the key surface water values, including water quality, geomorphology and flooding. From these key surface water values, a range of potential risks associated, including their respective hazards and impact pathways for these risks were identified, with a risk assessment approach adopted for the purposes of determining these potential effects of the proposal.

Three main aspects relating to surface water and their impact pathways, have been considered:

- **Flooding**: the potential for the proposal and the Heybridge Converter Station proposal to affect waterways and hydrology with respect to flooding and future climate change scenarios.
- **Water quality**: the potential for contaminated runoff or sediment to be transported into surface waters.
- **Geomorphology**: the study of landforms and their origin. The assessment focused on the banks and beds of waterways, for example, the potential for the proposal and the Heybridge Converter Station proposal to contribute to or initiate erosion.

Baseline conditions, based on available data and literature, as well as baseline flood modelling, included:

- **Flooding**: flood mapping of existing conditions in the 0.5% AEP event indicated that the Blythe River is largely confined to its floodplain and does not interact with the proposal site. Surface flows follow well defined valleys before joining the Blythe River. The proposal is situated outside the Blythe River floodplain, adjacent to Bass Highway. The existing conditions model highlighted significant ponding of water in the northern extent of the Heybridge Converter Station proposal footprint, with depths up to 1.6 m at the entrance to the outfall culvert that passes beneath Bass Highway.
- **Water quality**: monitoring data for the site and Blythe River estuary is lacking. Known factors influencing existing water quality in the Blythe catchment, river and estuary include:
  - Forestry, cropping, dairy, and other agricultural activities.
  - Industrial activities such as:
    - The paint pigment factory (tioxide Australia) at the proposal site that historically released an iron-rich acid solution into the water until it's closure in 1996.
    - Mineral processing operations with significant discharges of silica sand to the Lower Blythe River.
- **Geomorphology**: the shear stress analysis for the 0.5% AEP and climate change events indicate that the areas of higher shear stress are concentrated in the confined valleys with surface flows coalescing before joining the low energy, Blythe River. Given the existing land use of the area, the bed material is predominately bare land and sand at the former tioxide plant, erosion is typically expected under the current and climate change scenarios as the values through these areas are subject to 10-20 newton per metre squared (N/m^2). The methodology used for the flooding impact assessment differed to those used for the water quality and geomorphology impact assessment, the impact assessment approaches are described separately. The flood impact assessment for the proposal was based on site specific developed flood models used to undertake a comparison of flood levels and shear stress in the existing and proposal post-development conditions.

Existing geomorphic conditions and relative erosion potential at the site have been established through hydraulic modelling. The adopted hydrologic and hydraulic modelling approach assess the relevant catchment area for the proposal, with its immediate catchment considered for the purposes of assessing the potential impact.

Once the risk pathway was identified, the risk of harm rating was assessed. The impact assessment considered the potential for the construction and operation of the proposal to influence the key surface water values, including water quality, geomorphology and flooding. From these key surface water values, a range of potential risks, including their respective hazards and impact pathways for these risks were identified, with a risk assessment approach adopted for the purposes of determining these potential effects of the proposal.

A detailed methodology, including any relevant assumptions and limitations, is included in the Surface Water Impact Assessment (Appendix G).

6.5.2.2 Groundwater

A **significance assessment approach** was used as the groundwater assessment benefits from a sensitivity analysis, as it is dealing with groundwater dependent ecosystems (GDEs), springs and shallow and perched aquifers, which have different sensitivities to change. Understanding the sensitivity provides a robust assessment of impacts.

The first step of the groundwater assessment methodology was the desktop review to support the evaluation of the baseline conditions, to identify environmental values and potential of impacts. This included:

- Baseline characterisation of groundwater quality, uses, levels and influences from factors such as climate, hydrology, existing land uses and geological conditions.
- Understanding the geology and nature of aquifers within and surrounding the proposal area.
- Developing a conceptual model of groundwater levels and flows.

Data sources reviewed during the baseline characterisation included:

- BoM:
  - Climate data.
  - Groundwater Dependent Ecosystem Atlas.
- Publicly available reports and mapping products commissioned by State (i.e., Mineral Resources Tasmania), Department of Natural Resources and Environment Tasmania (NRE)) and Federal agencies (i.e., Commonwealth Scientific and Industrial Research Organisation (CSIRO), BoM, DAWE).
- NRE LIST Map geospatial datasets including:
  - River catchments, rivers, creeks and water bodies.
  - Water management plan areas.
  - Conservation of Freshwater Ecosystems Values (CFEV) wetlands, waterbodies, karsts and GDEs.
  - Sites currently regulated by EPA Tasmania under the EMPC Act.
  - Geological mapping information including 1:25,000 and 1:250,000 scale geological maps.
  - NRE Groundwater Information Access Portal.
  - CFEV spatial database tool and project database.
- Site geotechnical and contamination investigation reports prepared for the site.

In addition to the desktop assessment, four groundwater monitoring wells were installed in the study area. Groundwater levels as well as groundwater quality was measured in these wells. This information has informed the impact assessment.

The information obtained by the desktop literature and groundwater data review was considered sufficiently detailed to characterise baseline groundwater conditions to a level that is proportionate to the risk of adverse effects posed by the proposal.

The second step was to assess the possible range of changes to groundwater level or quality in response to proposed construction methods, such as groundwater dewatering.

The third step was the assessment of the sensitivity of groundwater values and aquifers to change, the assessment of the magnitude of potential impacts, and the significance of those impacts. This step also included considering possible mitigation measures to reduce the impact and assess a residual impact significance after application of further controls.

A detailed methodology, including any relevant assumptions and limitations, is included in Groundwater Impact Assessment (Appendix F).

6.5.3 Existing conditions

6.5.3.1 Surface water

Surface water includes any natural water on land that has not infiltrated below the ground, including runoff from rainfall, and waterways and wetlands.

The existing surface water conditions of the proposal site were established based on a review of the following:

- Aerial photography.
- CFEV spatial database tool.
- Topographic light detection and ranging data sourced from Land Information System Tasmania (The LIST).
- Publicly available reports and mapping, including waterway mapping from The LIST and state-wide land use, soil and geomorphological mapping.
- Australian Rainfall and Runoff data hub, rainfall depth and storm temporal patterns.

6.5.3.1.1 Waterways and water bodies

The Heybridge Converter Station site (and site of the underground crossings) is located within the Blythe catchment, approximately 100 m inland from the coast of Bass Strait at Heybridge. The Blythe River estuary is located around 240 m south and east of this site. The tidally influenced Blythe River estuary wraps partly around the southern side of the site, where the smaller Minna Creek discharges. The Blythe River discharges into Bass Strait, approximately 380 m to the east of the underground crossings. There are no wetlands located within any component of the proposal site.

Previous local investigations of the Blythe River estuary determined that the estuary is rated as being of low conservation significance and of a moderately degraded nature (DPIWE 2001). The Conservation of Freshwater Ecosystem Values (CFEV) database identifies the Blythe River estuary as having an Integrated Conservation Value of High and a Conservation Management Priority – Potential Very High Moderate. Wetland no.12601 on the south side of the estuary, within 300 m of the proposal site, is also listed in the CFEV database as having an Integrated Conservation Value of Very High and a Conservation Management

Priority – Potential of High, and Minna Creek (river no.180445) is listed as having an Integrated Conservation Value of Low and a Conservation Management Priority of Moderate.

6.5.3.1.2 Surface water quality

Surface water quality includes consideration of parameters such as temperature, dissolved oxygen, pollutants, nutrients, and turbidity. There is a lack of water quality monitoring for the Blythe River estuary, with monitoring stations located further up the catchment. Historical or current factors known to influence water quality in the Blythe catchment, river and estuary include:

- Forestry, cropping, dairy, and other agricultural activities (Crawford & White 2007).
- Industrial activities such as:
  - Former tioxide plant, which historically released an iron-rich acid solution from the proposal site into Bass Strait until the plant was closed in 1996 (Crawford & White 2007).
  - Mineral processing operations, which included significant discharges of silica sand to the Lower Blythe River (Green 2001).

6.5.3.1.3 Flooding

Flood mapping for the 0.5% AEP event indicates that the Blythe River is largely confined to its floodplain and does not interact with the proposal site. A relatively major tributary is located south of the proposal site, which joins the Blythe River around 300 m from the proposal site boundary and does not impact the site.

Under existing conditions, the unnamed access/haul road to the west and south of the proposal site is subject to flood depths up to 0.2 m. Localised flows move across the proposal site from west to east and accumulate in a settling pond. Modelling of existing flood depths for the 0.5% AEP event indicates significant ponding of water in the northern extent of the proposal site, with depths up to 1.6 m at the entrance to the outfall culvert that passes beneath Bass Highway, as shown in Figure 6.5-1.

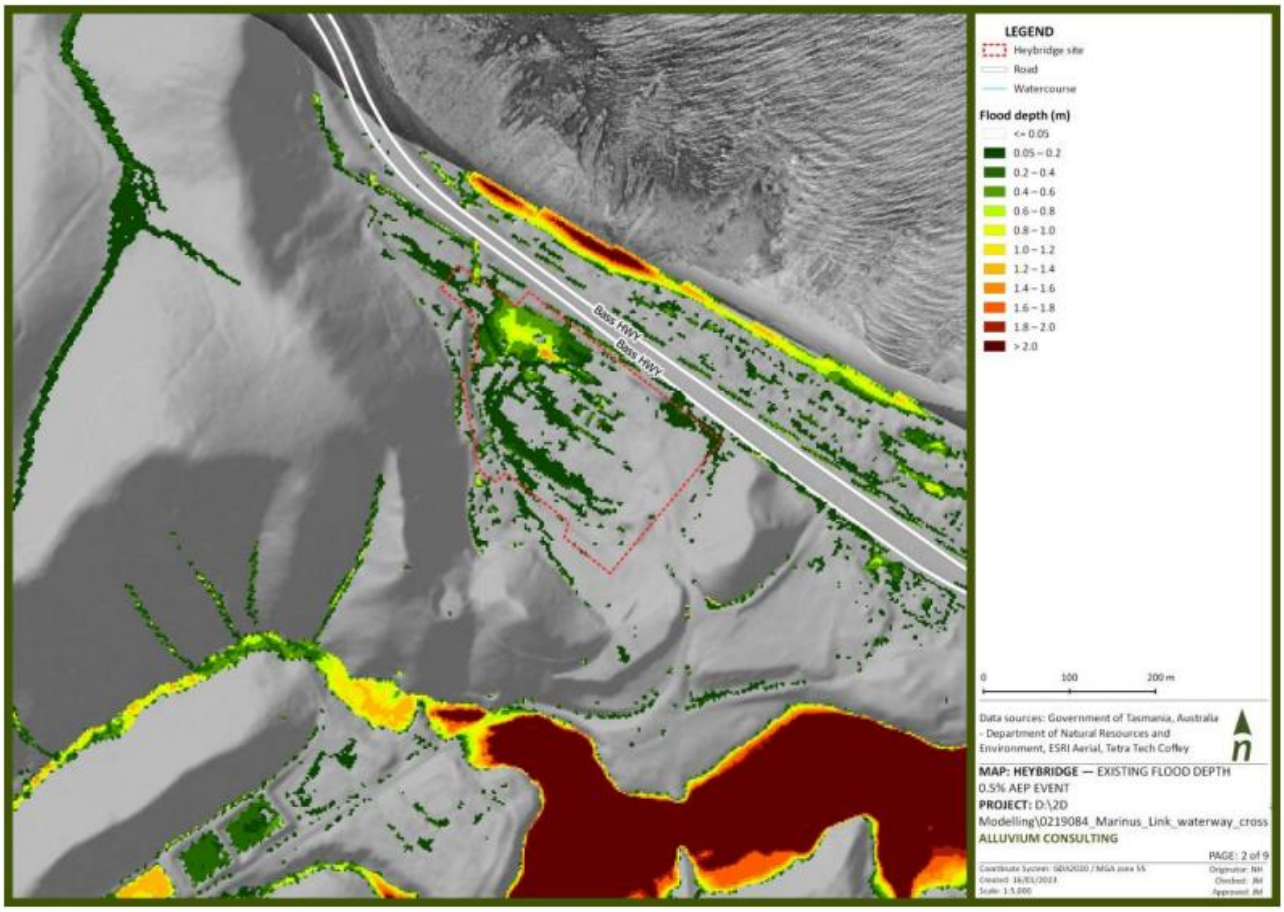


Figure 6.5-1 Baseline characterisation of the 0.5% AEP flood depth of and near the proposal site

6.5.3.2 Groundwater

Groundwater refers to a water resource below the surface of the earth collected within aquifers. For the purpose of the Groundwater Impact Assessment (Appendix F), a study area was defined based on the inferred small groundwater catchment that is likely to interact with the Heybridge Converter Station/HDD launch pad site. This study area includes a 500 m onshore radius of this site.

The existing groundwater conditions of the study area were established based on a review of the following:

- BoM climate data and Groundwater Dependant Ecosystem Atlas.
- Publicly available reports and mapping.
- The LIST Map geospatial datasets (NRE).
- NRE Groundwater Information Access Portal.
- CFEV spatial database tool and project database.
- Site geotechnical and contamination investigation reports prepared for the site.

The findings of the existing conditions assessment are presented in the following sections.

6.5.3.2.1 Groundwater levels and flow

Based on the geotechnical site investigations, groundwater within the study area is likely to be present within two primary aquifers:

- **Quaternary sand aquifer:** A shallow unconfined porous media aquifer represented by the unconsolidated Quaternary deposits of aeolian sand, and river and marine gravels, sand and clays.
- **Bedrock aquifer:** A fractured rock aquifer formed by the Precambrian aged Burnie and Oonah Formation turbidite sequence, likely to be weathered by the upper horizon, and may be confined or semi confined by the overlying Quaternary sand aquifer at the proposal site and unconfined to the south and west where the bedrock outcrops at surface.

As part of the geotechnical site investigation, four groundwater monitoring wells were installed within the Heybridge Converter Station site: HB-BH01-C, HB-BH02-C, HB-BH03-C and HB-BH06-C C (refer to Figure 6.5-2). Groundwater levels were measured in all wells on one occasion. The water table is likely to be shallow across the site, typically less than 1 m below ground level. The relative elevation of groundwater was inferred based on measured levels in the deeper bedrock aquifer. The Quaternary sand aquifer is likely to be recharged by both rainfall infiltration and the upward discharge of groundwater from the underlying bedrock aquifer. The bedrock aquifer is likely to be recharged by rainfall infiltration in areas of higher topography to the west and south where the bedrock outcrops.

The measured hydraulic gradient of the bedrock aquifer shows an inferred northerly groundwater flow towards the coastline, which is likely to represent the main groundwater discharge point. Shallow groundwater in the Quaternary sand aquifer is likely to follow a similar northerly flow direction. Groundwater flow directions and flow velocities are likely to be highly variable and may be based on the presence of fault or fracture zones in the weathered and fresh rock.

6.5.3.2.2 Groundwater quality

Groundwater samples collected from the monitoring wells were analysed to determine groundwater quality. The results from the groundwater samples identified:

- Total dissolved solid (TDS) concentrations ranging from 260 milligrams per litre (mg/L) (HB-BH03-C) to 1,400 mg/L (HB-BH01-C).
- Electrical conductivity values ranging from 370 µs/cm to 1,290 µs/cm.
- Slightly acidic pH (5.49 to 6.55).
- Metals that exceeded the *Australian Water Quality Guidelines for Fresh and Marine Water Quality* (ANZG 2018) Marine Water 95% ecosystem protection criteria at most locations: cobalt (2 to 18 µg/L), copper (3 to 8 µg/L), and zinc (22 to 57 µg/L).
- Concentrations of titanium below the 10 µg/L laboratory limit of report, with the exception of 20 µg/L reported at HB-BH02-C.
- No detectable concentrations of polycyclic aromatic hydrocarbons, monocyclic aromatic hydrocarbons, phenols, phthalates, herbicides, pesticides, explosives, halogenated benzenes and halogenated

hydrocarbons, solvents or volatile organic compounds, with the exception of detectable concentrations of chloroform reported at HB-BH01-C (6 ug/L) and HB-BH02-C (13 ug/L).

- Several per- and poly-fluoroalkyl substances (PFAS), including perfluorooctane sulfonate (PFOS) and perfluorohexane sulfonate. Several PFAS were detected in both the Quaternary sand aquifer and the fractured bedrock aquifer. The compounds detected included PFOS and perfluorohexane sulfonate, which represented the highest concentration PFAS (maximum of 0.11 ug/L for both compounds at BH-06 and BH-05(S)), PFOA (maximum of 0.02 ug/L at BH-06), and PFPeA (maximum of 0.04 ug/L at BH-06 and BH-05(S)). PFAS concentrations were generally greatest at HB-BH06-C and C(S), showing comparable results between the shallow and deep wells at this location.

6.5.3.2.3 Groundwater users and groundwater dependent ecosystems

One registered bore (ID: 41789) is located approximately 350 m south of the Heybridge Converter Station site on the left bank of the Blythe River (see Figure 6.5-3). This bore is listed with an unknown use and 'capped' status, suggesting that it is unlikely to remain in active use. As such, it is unlikely that any active groundwater users are present within the study area.

Potential GDEs within the study area were identified based on a review of the BoM's (2012) Groundwater Dependent Ecosystem Atlas and the state-wide freshwater ecosystem mapping provided by the CFEV spatial database tool.

No terrestrial GDEs are expected to be present within the study area (refer to Figure 6.5-3). The Blythe River, located approximately 260 m south of the Heybridge Converter Station site, is identified as an aquatic GDE with high likelihood for groundwater dependence. The wetlands associated with the Blythe River are likely to have aquatic ecosystems that rely on periodic fresh groundwater input to balance the saline inundations that may occur during tidal fluctuations.

Figure 6.5-2: Groundwater monitoring locations

Legend

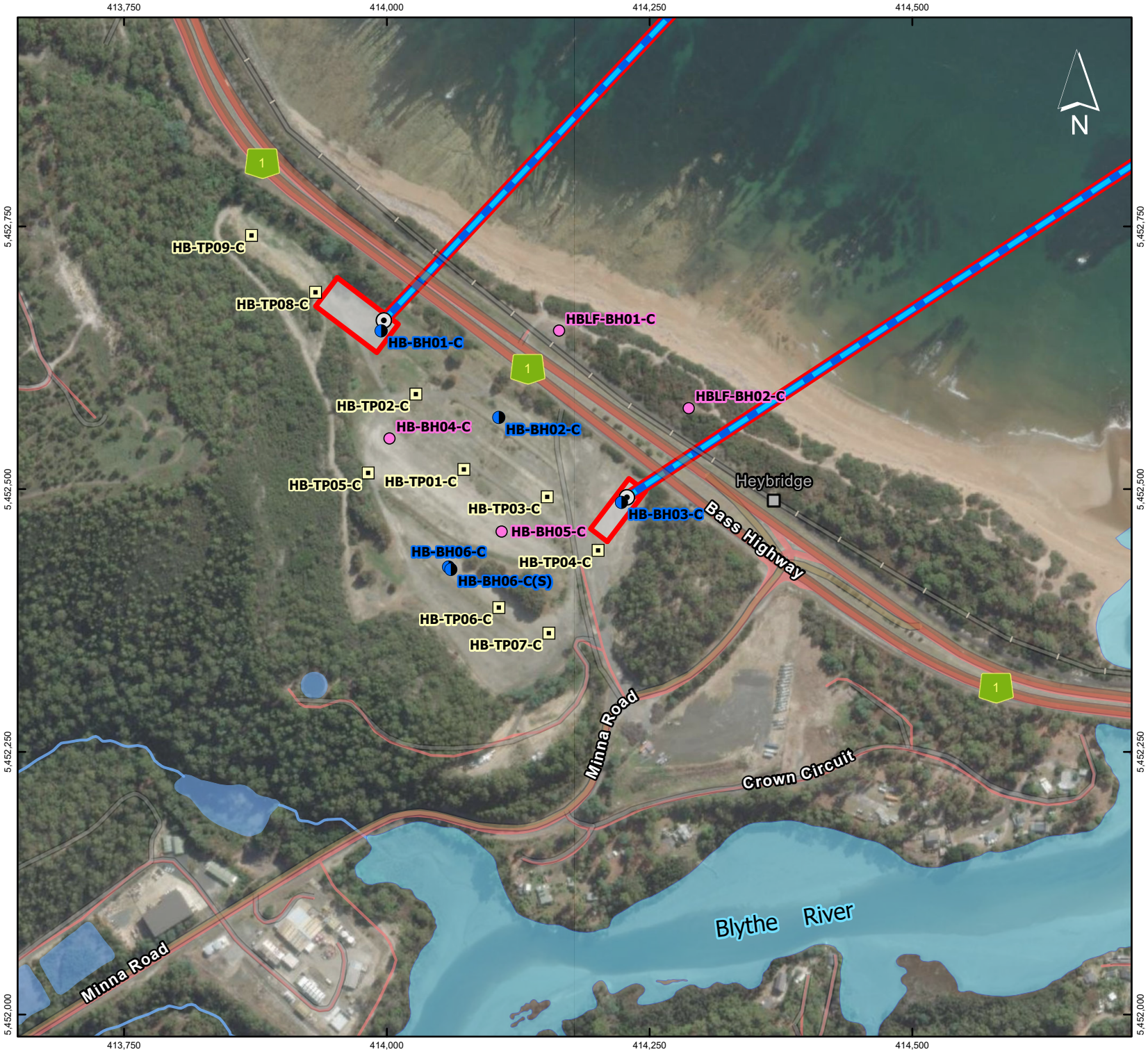
- HVDC Landfall
- Proposed HVDC Subsea Cable
- Proposal Site
- Groundwater Well
- Soil Bore
- Test Pit
- Estuary
- Water Body
- Watercourse
- Major Road
- Minor Road

Scale: 1:5,000 @ A4

Spatial Reference: GDA2020 MGA Zone 55

0 50 100 200 300

Metre



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Acknowledgements and Sources:

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Background Image: Esri Community Maps Contributors, DPIPWE, © OpenStreetMap, Microsoft, Esri, TomTom, Garmin, Foursquare, METI/ NASA, USGS, Maxar
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Date Figure Exported: 22/11/2024

Figure 6.5-3: Groundwater dependent ecosystems

Legend

- HVDC Landfall
- Proposed HVDC Subsea Cable
- Proposal Site
- Groundwater Bore (ID: 41789)

Groundwater Dependent Ecosystem

- Aquatic: High Potential GDE National Assessment
- Terrestrial: Moderate Potential GDE National Assessment
- Water Body
- Watercourse
- Major Road
- Minor Road

Scale: 1:7,500 @ A4

Spatial Reference: GDA2020 MGA Zone 55

0 50 100 200 300 400

Metre

MARINUS LINK

Acknowledgements and Sources:

Data Source: Marinus Link GIS Data Repository and theLIST ©State of Tasmania .
Background Image: Esri Community Maps Contributors, DPIPWE, © OpenStreetMap, Microsoft, Esri, TomTom, Garmin, Foursquare, METI/ NASA, USGS, Maxar
Produced By: Marinus Link for the Tasmanian Heybridge Converter Station EIS.
Date Figure Exported: 22/11/2024

6.5.4 Applicable legislation

6.5.4.1 Water Management Act 1999

The *Water Management Act 1999* provides for the use and management of Tasmania's freshwater resources, including watercourses, dispersed surface water (e.g., from rainfall or surface expression of groundwater) and groundwater. The focus of the Act is on management of water as a resource. As the proposal would not involve the management of water as a resource, this Act has limited relevance to the proposal aside from its water quality management regulations.

6.5.4.2 State Policy on Water Quality Management 1997

The *State Policy on Water Quality Management 1997* provides overarching principles and objectives for surface water and groundwater quality management in Tasmania.

This policy provides a framework for the identification of PEVs of waterbodies, development of water quality guidelines and water quality objectives (WQOs), and the management and regulation of point and diffuse sources of emissions to surface waters and groundwater. The WQOs are the most conservative of the water quality guidelines to protect PEVs such as aquatic ecosystems.

6.5.4.2.1 Surface water

For the Blythe River Estuary (DPIWE 2000), the PEVs are:

- Protection of Aquatic Ecosystems:
  - Protection of modified (not pristine) ecosystems from which fish are harvested.
- Recreational Water Quality and Aesthetics:
  - Primary contact water quality (between bridge and estuary mouth).
  - Secondary contact water quality.
  - Aesthetic water quality.

The default guideline value water quality indicators (e.g., Dissolved Oxygen, pH, Turbidity, Total Phosphorus) for aquatic ecosystems of the Blythe Catchment are outlined in the *Default Guideline Values (DGVs) for Aquatic Ecosystems of the Blythe Catchment* (EPA 2021) and summarised in the Surface Water Impact Assessment (Appendix G).

6.5.4.2.2 Groundwater

The *State Policy on Water Quality Management 1997* sets PEVs for groundwater based on the reported TDS concentrations, as listed in Table 6.5-2.

Table 6.5-2 Protected environmental values of groundwater (reproduced from DPIWE 2000)

Protected environmental value	Category and TDS (mg/L)			
	A Less than 1,000	B 1,000 – 3,500	C 3,500 – 13,000	D Greater than 13,000
Drinking water	✓			
Irrigation	✓	✓		
Industry	✓	✓	✓	
Stock	✓	✓	✓	
Ecosystem protection	✓	✓	✓	✓

Groundwater TDS in the lower bedrock aquifer ranged from 261 mg/L to 1,400 mg/L in the lower aquifer and would likely be assigned to the Category A band (i.e., less than 1,000 mg/L). While TDS concentrations were not reported for the Quaternary aquifer, this aquifer is also likely to be assigned Category A. Category A groundwater requires the protection of the environmental values of drinking water, irrigation, industrial water use, stock watering, and ecosystem protection.

Table 6.5-3 identifies the PEVs of groundwater that may require protection. In addition to the PEVs outlined in Table 6.5-3, the values 'recreational use' and 'Cultural or spiritual values' have been conservatively adopted.

Table 6.5-3 Assessment of environmental values of groundwater requiring protection

Protected environmental value	Existing use	Potential future use	PEV requiring protection	Assessment
Drinking water	No	Unlikely	No	The industrial setting of Heybridge and known existing groundwater contamination beneath the Heybridge Converter Station site would likely preclude this value from being realised in the immediate vicinity of the site in the future. Reticulated potable water supply is readily available and would be a preferred potable supply.
Irrigation	No	Unlikely	No	Land use zoning in study area includes Rural which may include some limited agricultural activities. Irrigated agriculture for food or fibre production is highly unlikely. Sports fields and public parks are not located within the study area and would be unlikely due to the limited available land.
Industry	No	Possible	Yes	Groundwater is not currently exploited for industrial use and is unlikely to be a preferred future industrial water. However, the presence of readily available surface water and reticulated water alternatives make it possible but unlikely that groundwater would be used for industrial purposes.
Stock	No	Unlikely	No	Land use zoning in the study area includes Rural which may include some limited agricultural activities. The presence of existing groundwater contamination (including PFAS) would likely preclude use for stock water.
Ecosystem protection	Yes	Yes	Yes	Groundwater originating from the Heybridge Converter Station site is likely to discharge to marine environment of Bass Strait. All marine and

Protected environmental value	Existing use	Potential future use	PEV requiring protection	Assessment
				freshwater features in the study area require protection of the aquatic ecosystem.

6.5.4.3 Tasmanian State Coastal Policy 1996

The *Tasmanian State Coastal Policy 1996* provides guidance on coastal planning in Tasmania. Its three guiding principles are that natural and cultural values of the coast shall be protected, the coast shall be used and developed in a sustainable manner and integrated management and protection of the coastal zone is a shared responsibility. The design, construction and operation of the proposal would adhere to the guidelines outlined in this policy.

6.5.5 Potential impacts

6.5.5.1 Surface water

Works associated with HDD activities on and from the Heybridge Converter Station site have the potential to impact surface water due to changes to flooding, water quality and geomorphology, including in the context of a changed climate. Potential impact pathways relevant to the proposal:

- Flooding:
  - Design, construction and temporary activities for the proposal causing the displacement of flood waters, reducing the volume of temporary storage within the floodplain, and/or increased shear stress values and increased scour of adjacent bed and banks, leading to adverse flood impacts to surrounding property, key infrastructure and the environment.
- Water quality and geomorphology:
  - Increased sediment loads, nutrient loads, addition of metals, hydrocarbons or other potentially polluting chemicals or materials from spills that can lead to degradation in water quality, ecosystem health/reproduction or aesthetics.
  - Groundwater emergence at the new ground surface and diversion of stormwater or drainage alignment.
  - Altered fluvial geomorphic processes, initiation of bed and bank scour and sediment delivery, resulting in habitat loss and ecosystem decline.
  - Alteration of the flow regime resulting in habitat loss and sediment delivery.

6.5.5.1.1 Construction

Soil washed from the launch pad site due to surface water runoff or flood events can deposit as sediment in outfall drainage channels and watercourses. This soil has the potential to include contaminants and ASS. Increased sediments and pollutants from construction activities can increase turbidity, affect aquatic vegetation growth and aesthetic values, and impact surface water users.

Surface water runoff and flood events have the potential to create unstable landforms, degrade soil structure, and change surface flow conditions. Potential unmitigated impacts on geomorphology and soils as a result of cut and fill, slope regrading and alteration to drainage at the Heybridge Converter Station site include soil loss, rilling, and possibly gullying and landslides, sedimentation and exposure of ASS.

Potential risks to surface water during construction of the proposal in combination with the Heybridge Converter Station construction are summarised in Table 6.5-4 below. For the methodology used for the risk assessment, refer to Appendix G.

Table 6.5-4 Assessment of potential surface water risk pathways during construction

Risk pathway	Value(s)	Potential risk without mitigation	Risk rating
Temporary activities (e.g., excavation, stockpiling and alteration of topography or change in impervious surfaces) altering floodplain capacity and/or diversion of flow	Flooding	Increase in flood inundation frequency, velocity or level, which affects users or assets within the floodplain.	**Moderate**
Construction activities on existing flow paths (e.g., excavation and/or filling)	Flooding	Changes in flow conveyance behaviour, direction, velocity or other characteristics	**Moderate**
Direct alteration of watercourses	Flooding, geomorphology	Construction activities causing unintended damage to watercourses, resulting in changed flow behaviour, bed or bank erosion, and/or disrupts physical habitat (e.g., bank disturbance).	**Low**
Spill of hazardous or potentially polluting chemicals or materials	Surface water quality	Hazardous materials being released into the watercourses and drainage channel (discharging under Bass Highway directly to the beach).	**High**
Direct or indirect activities damaging drainage channels	Surface water quality, geomorphology	Construction activities (e.g., heavy machinery on channel banks) damaging the bed or bank of drainage channels, such as bank slumping/collapse, resulting in bed or bank erosion and sediment release into the watercourses and drainage channels (discharging under Bass Highway directly to the beach).	**Moderate**
Inundation of open excavation or exposed soil during a flood event	Surface water quality, Geomorphology	A flood event due to overland flows on the proposal site causing inundation of assets and release of sediment into drainage channels (discharging under Bass Highway directly to the beach).	**Moderate**
Inundation of stockpiled soil during a flood event	Surface water quality, Geomorphology	A flood event inundating soil stockpiles, causing release of sediment into drainage channels (discharging under Bass Highway directly to the beach).	**Moderate**

6.5.5.2 Groundwater

6.5.5.2.1 Construction

Potential impacts to groundwater during construction considered in the Groundwater Impact Assessment (Appendix F) include:

- Impacts to groundwater levels and quantity from:
  - Temporary dewatering of onshore HDD entry/exit pits leading to groundwater level drawdown.
- Impacts to groundwater quality from:
  - Groundwater acidification due to temporary or permanent groundwater level drawdown.
  - Saline water intrusion to aquifers due to temporary groundwater level drawdown. Temporary dewatering may result in groundwater level drawdown propagating through the aquifer towards the coastline. Drawdown in coastal zones may alter the naturally occurring fresh/saline water interface within the aquifer that runs parallel with the coastline, causing salinisation of the fresh groundwater resource.
  - Mobilisation of existing groundwater contamination towards the project due to temporary groundwater level drawdown, affecting groundwater uses or GDEs.
  - Release of contaminated groundwater to the environment generated during dewatering to the environment.
  - Accidental spills and leaks (e.g., from diesel fuel).

The proposal site (launch pad site and underground crossings) is underlain by a shallow water table that is likely to be encountered at depths of less than 1 m below the current ground surface. It is assumed that most excavations would extend below the water table, into the Quaternary sand aquifer, and may require temporary or permanent dewatering. The radius of influence of construction dewatering is likely to be in the order of approximately 150 m. Drawdown is assessed as unlikely to extend offsite to the south, east or west due to the presence of outcropping, low permeability bedrock. Groundwater level drawdown and mobilisation of groundwater events have the potential to create unstable landforms and alter groundwater flow dynamics, leading to induced settlement through subsidence.

Whilst groundwater contamination has been detected beneath the Heybridge Converter Station site in both the shallow Quaternary sand aquifer and the deeper bedrock aquifer, there are no known discreet plumes of groundwater contamination present which might represent a source of impact to sensitive receptors should they be mobilised by the dewatering activities (should dewatering be required for the HDD).

The reported concentration of PFOS may exceed the marine ecosystem protection criteria based on a requirement to achieve either 95% (0.13 ug/L) or 99% (0.00023 ug/L) species protection (National Environmental Management Plan 2020). The reported concentration of PFOS may not be suitable for discharge to surface water without baseline sampling that will be carried out as part of the Heybridge Converter Station proposal, which includes the HDD launch pads (refer to the Heybridge Converter Station

EIS). Approval from the EPA may be required to discharge produced groundwater to surface water or marine environment, should that be a proposed disposal option sought post-approval.

The potential groundwater impact pathways are summarised in Table 6.5-5 below. There are no expected operational impacts on groundwater.

Table 6.5-5 Assessment of potential groundwater impact pathways during construction

Impact pathway	Likely impacts without mitigation	Significance of impact
Groundwater levels and quantity		
Temporary dewatering impacts to groundwater users	Considering the absence of known groundwater users and the limited extent of groundwater level drawdown that can propagate away from the site based on an assessment of potential drawdown, it is highly unlikely that temporary construction dewatering activities would impact groundwater users.	Very low
Temporary dewatering impacts to GDEs	There are no known terrestrial GDEs within the study area. Groundwater drawdown has been assessed as unlikely to propagate offsite to the south and west where large areas of non-groundwater dependent native vegetation is present. While earthworks may result in some drawdown that may temporarily reduce the freshwater input to the Blythe River aquatic GDE estuarine zone, this ecosystem would be adapted to highly variable salinity and the effect of changes to the freshwater input over a short section of the total catchment would be negligible.	Very low
Groundwater quality		
Groundwater acidification	Where potential ASS are present and allowed to oxidise it may result in the acidification of groundwater. Acidic groundwater, if generated, would likely discharge to the marine environment and potentially impact to the aquatic ecosystem and affect various environmental values of the receiving environment, including human health.	**Moderate**
Saline groundwater intrusion	Temporary dewatering may result in groundwater level drawdown propagating towards the coastline. However, there would be limited direct impacts as a result of increased groundwater salinity due to the absence of existing local groundwater users and GDEs between the coastline and the proposal site.	**Low**
Mobilisation of existing groundwater contamination	There are no existing groundwater users within the study area that would experience an increased risk posed by mobilising known or undetected groundwater contamination.	**Low**
Release of contaminated groundwater to the environment	Dewatering activities are likely to generate groundwater that may be contaminated by metals, PFAS and other contaminants that may be unsuitable for discharge to the environment without prior treatment.	**Low**
Groundwater contamination from drilling fluids	While drilling for groundwater monitoring wells is required to be undertaken without chemicals and other drilling fluid additives that could leave a residual toxicity, it is possible that drilling conducted for purposes other than groundwater investigation (such as HDD) could use alternative drilling fluid additives that might cause contamination by low concentrations of toxic chemicals.	**Low**
Groundwater contamination from construction chemicals and fuels	Construction activities would require the use of light vehicles, drill rigs and excavators. Hydrocarbon based fuels, lubricants and degreasing agents are likely to be required on site to power and maintain machinery. These, and other raw materials may either be hazardous or pose a contamination risk to groundwater if not adequately stored, handled and used during the construction period. Spills and leaks	**Low**

Impact pathway	Likely impacts without mitigation	Significance of impact
	during storage and use may infiltrate to groundwater and cause contamination.	

6.5.5.3 Cumulative impacts

6.5.5.3.1 Surface water

Construction activities required for the proposal and other nearby projects (such as site establishment, ground improvement or site levelling work) have the potential to cause cumulative adverse flooding impacts. These include potential impact pathways such as:

- Displacement of flood waters/volume that lead to adverse flood impacts to surrounding property, key infrastructure and the environment.
- Constricting the passage of flows passing through the site along the river channel or flow path that leads to increased shear stress values and increased scour of adjacent bed and banks.
- Altered fluvial geomorphic processes, initiation of bed and bank scour and sediment delivery, which can result in habitat loss and ecosystem decline.
- Disturbance to the bed or banks of waterways through ground disturbance activities (excavation, trenching clearing, vehicular traffic etc.) within the riparian zone or instream.
- Changes to water quality, such as increased sediment loads, nutrient loads, addition of metals, hydrocarbons or other chemicals from spills that can lead to degradation in water quality, ecosystem health/reproduction or aesthetics.
- Alteration of the flow regime, such as diversion, duration, frequency, duration and timing of high and/or low.
- Flow events, which have potential to initiate bed and bank scour, resulting in habitat loss, sediment delivery and possible ecological and physical form consequences.

Through the proposal's implementation of mitigation measures outlined in Section 6.5.6, impacts to water quality and flow regime from the proposal and the Heybridge Converter Station are unlikely to accumulate with any impacts from other projects.

6.5.5.3.2 Groundwater

Potential impacts to groundwater of the proposal together with the Heybridge Converter Station have been assessed together as discussed above. No other known proposed or foreseeable projects, other than the Heybridge Converter Station, would interact spatially with the groundwater impacts from the proposal. Therefore, no cumulative impacts are expected to arise from these other projects.

6.5.6 Management, mitigation and monitoring

Proposed mitigation measures to minimise potential impacts on surface water and groundwater quality are presented in Table 6.5-6. Mitigation measures in other sections that are relevant to the management of water quality include:

- Section 6.2 (Potentially contaminated material and acid sulfate soils), specifically measures which address the management of potential contamination, ASS, and the storage of dangerous goods or environmentally hazardous materials.
- Section 6.9 (Dangerous goods and environmentally hazardous materials), specifically measures which address spill prevention and clean up and transport of dangerous goods.
- Section 8.2 (Mitigation measures), specifically measures which address emergency response and incident management (MM Gen05).

Together, these measures will minimise the potential water quality impacts.

Table 6.5-6 Water quality – mitigation measures

Ref	Mitigation measure	Proposal stage
SW01	*Not relevant to this proposal*	
SW02	Prior to construction commencing, a progressive sediment and erosion control plan for the proposal will be developed (either as a standalone document or part of the CEMP) and submitted to the EPA for approval. The plan will: • Be implemented throughout construction. • Identify all major drainage lines and waterways and site-specific management and mitigation to be implemented, including controls such as sandbags, sediment fences, sediment traps and diffusion paths to ensure stormwater is suitably contained, managed and released to avoid and minimise sediment release, pollution and erosion. The plan must describe erosion and sediment controls and monitoring requirements in accordance with: • EPA Tasmania fact sheets: Soil and Water Management on Large Building and Construction Site; Erosion Control Matts and Blankets; Scour Protection – Stormwater Pipe Outfalls and Check Dams; Stabilised Access and Sediment Fences and Fibre Rolls. • IECA *Best Practice Erosion and Sediment Control Guidelines 2008*. • EPA Tasmania *Bunding and Spill Management Guidelines 2015*.	Construction
SW03	Prior to construction commencing, a flood risk management plan for the launch pad site will be developed in line with the requirements outlined in the Floodplain Risk Assessment Guidelines for Municipal Councils in Tasmania (White 2019).	Construction
SW04	Prior to construction commencing, a surface water monitoring program will be developed in consultation with EPA Tasmania and must include, as a minimum: • Parameters, frequency, durations of water quality monitoring, and flow paths and drainage channels condition inspections. • Requirements for daily visual monitoring of active construction areas for visible water quality issues including high sediment loads or erosion. • Requirements for daily inspections of the launch pad site construction controls (including sediment and erosion control measures).	Construction
SW05	*Not relevant to this proposal*	

Ref	Mitigation measure	Proposal stage
GW01	*Not relevant to this proposal*	
GW02	*Not relevant to this proposal*	
GW03	Prevent groundwater movement and contamination as a result of HDD and other drilling activities, including: • Develop specifications and methods that address seal the borehole annulus, prevent saline water movement along the cable conduit, use non-toxic drilling additives (where additives are necessary), and include drainage systems to prevent runoff entering boreholes. • Prepare a frac-out prevention and management plan to be implemented during HDD. These specifications and methods will be informed by site specific geotechnical data, be consistent with relevant guidelines, and will be documented in the CEMP.	Construction
GW04	Develop and implement a groundwater management plan to manage, monitor, reuse, treat, and dispose of groundwater during construction dewatering. The groundwater management plan will: • Prioritise groundwater reuse (such as for construction water supply, dust suppression, or reinjection for hydraulic control, where feasible). • Specify approved disposal options (e.g., discharge to surface water, sewer, or stormwater). • Document agreed water quality discharge criteria and action trigger levels. • Outline suitable treatment technologies that will be implemented or reserved as contingency measures should unforeseen contamination be encountered.	Construction
GW05	*Not relevant to this proposal*	
GW06	*Not relevant to this proposal*	

6.5.7 Residual impacts

6.5.7.1 Surface water

An assessment of residual surface water risks associated with the construction of the proposal was undertaken following the incorporation of the surface water mitigation measures outlined in Section 6.5.6. The results of this assessment are presented in Table 6.5-7. The methodology used for the residual risk assessment is provided in Appendix G.

Table 6.5-7 Surface water – residual risk assessment summary

Impact pathway	Initial risk (without mitigation)	Mitigation measures	Residual risk
Temporary activities (e.g., excavation, stockpiling and alteration of topography or change in impervious surfaces) altering floodplain capacity and/or diversion of flow	Moderate	SW02, SW03	**Low**
Construction activities on existing flow paths (e.g., excavation and/or filling)	Moderate	SW02, SW03	**Low**
Direct alteration of watercourses	Low	SW02, SW03	**Low**
Spill of hazardous or potentially polluting chemicals or materials	High	SW02, SW04, DG01, CL01, DG02	**Low**

Impact pathway	Initial risk (without mitigation)	Mitigation measures	Residual risk
Direct or indirect activities damaging drainage channels	Moderate	SW02, SW04	Low
Inundation of open excavation or exposed soil during a flood event	Moderate	SW02, SW03, SW04	Low
Inundation of stockpiled soil during a flood event	Moderate	SW02, SW03, SW04	Low
HDD resultant frac out impacting on water quality	Moderate	SW02, SW04	Low

The implementation of the mitigation measures proposed in Section 6.5.6 is considered to effectively manage the identified surface water risks associated with the construction phase to an acceptable level. As such, the proposal is not expected to impact surface water quality, flows or bed and bank stability within local waterways, or create adverse flood impacts.

6.5.7.2 Groundwater

An assessment of residual groundwater impacts associated with the construction and operation of the proposal was undertaken following the incorporation of the groundwater mitigation measures outlined in Section 6.5.6. The results of this assessment are presented in Table 6.5-8. The methodology used for the residual impact assessment is provided in Appendix F.

Table 6.5-8 Groundwater – residual impact significance assessment summary

Proposal stage	Impact pathway	Significance of impact (without mitigation)	Mitigation measures	Residual impact significance
Groundwater levels and volume				
Construction	Temporary dewatering impacts to groundwater users	Very low	No mitigation measures are proposed or required for this potential impact.	Very low
	Temporary dewatering impacts to GDEs	Very low		Very low
Groundwater quality				
Design and construction	Groundwater acidification	Moderate	GW03	Low
Design and construction	Saline groundwater intrusion	Low	GW03	Low
Design and construction	Mobilisation of existing groundwater contamination	Low	GW03	Low
Design and construction	Release of contaminated groundwater to the environment	Low	CL01, GW01, GW03	Low
Construction	Groundwater contamination from drilling fluids	Low	CL01, GW01, GW03	Low
Construction	Groundwater contamination from construction chemicals and fuels	Low	CL01, GW01, GW03	Low

The implementation of the mitigation measures proposed in Section 6.5.6 is considered to effectively manage the potential groundwater impacts associated with the construction of the proposal, with all residual impacts assessed as **very low** or **low**.

6.6 Noise and vibration emissions

This section provides a summary of the findings of the Noise and Vibration Impact Assessment provided in Appendix H.

6.6.1 Assessment guidelines

The relevant sections of the EIS guidelines for the Heybridge Shore Crossing, and where these have been addressed in this EIS, are outlined in Table 6.6-1.

Table 6.6-1 Relevant EIS guidelines

Noise and vibration emissions – EIS guidelines	Section
Discuss impacts on human sensitive receptors of the proposal on ambient (surrounding) noise levels during both the construction and operational phases (e.g., maintenance works), including:	
Identifying and describing all sources of noise with the potential to cause nuisance, including vehicle movements;	Section 6.6.5.1
A map of the location of all such sources of noise;	Figure 2-2, Figure 2-3
Considering the potential for noise emissions during both the construction and operational phases to cause nuisance for nearby land users, particularly at noise sensitive premises, including:	
Establishing the baseline (pre-existing) noise in the area with particular focus on sensitive receptors likely to be influenced by the proposal	Section 6.6.3
Establishing noise level criteria for the operational phases of the proposal	Section 6.6.2.4
Predicting noise levels at noise sensitive premises;	Section 6.6.5
Consideration of timing and duration of noise;	Section 2.3.5, 6.6.5
Consideration of existing noise levels to determine whether predicted noise levels are likely to result in nuisance for sensitive premises	Section 6.6.5
Consideration of the potential for cumulative noise impact from the Heybridge shore crossing works	Section 6.6.5.3
Development of a construction noise and vibration management plan, including management of noise complaints and options for noise and vibration monitoring, if required;	Section 6.6.6
Legislative and policy requirements	
Consideration should be given to the requirements of the *Tasmanian Environment Protection Policy (Noise)* 2009	Section 6.6.4.2

6.6.2 Methodology

The method to assess noise and vibration emissions associated with the construction of the proposal includes:

- Identifying sensitive receptors, including existing and potential future dwellings.
- Characterising the existing noise environment.
- Determining noise and vibration management levels in accordance with relevant guidelines.
- Modelling to quantify the potential construction and operational noise and vibration impacts.
- Risk assessment.

- Identifying mitigation measures that are like to be required to minimise construction noise and vibration impacts.
- Consideration of residual impacts, after the application of mitigation measures.

The method is described further in the following sections, with a detailed methodology, including any relevant assumptions and limitations, included in Appendix H.

6.6.2.1 Study area

Sensitive receptors, which include existing and potential future residential dwellings, were identified through review of aerial imagery and cadastral parcels.

A total of 151 existing receptors in the vicinity proposal site were identified. Due to the large number of receptors identified, a subset of receptors was selected to represent the distribution of existing residential dwellings and future residential dwellings in the area, to provide the basis for the assessment of noise and vibration (refer to Figure 6.6-1). Refer to Section 6.6.3 for further discussion on the existing conditions.

6.6.2.2 Baseline characterisation

The baseline noise environment is relevant to the assessment of the construction stage of the proposal and provides context to the predicted noise levels associated with the proposal. The baseline noise levels also inform the selection of management levels for the assessment of construction noise.

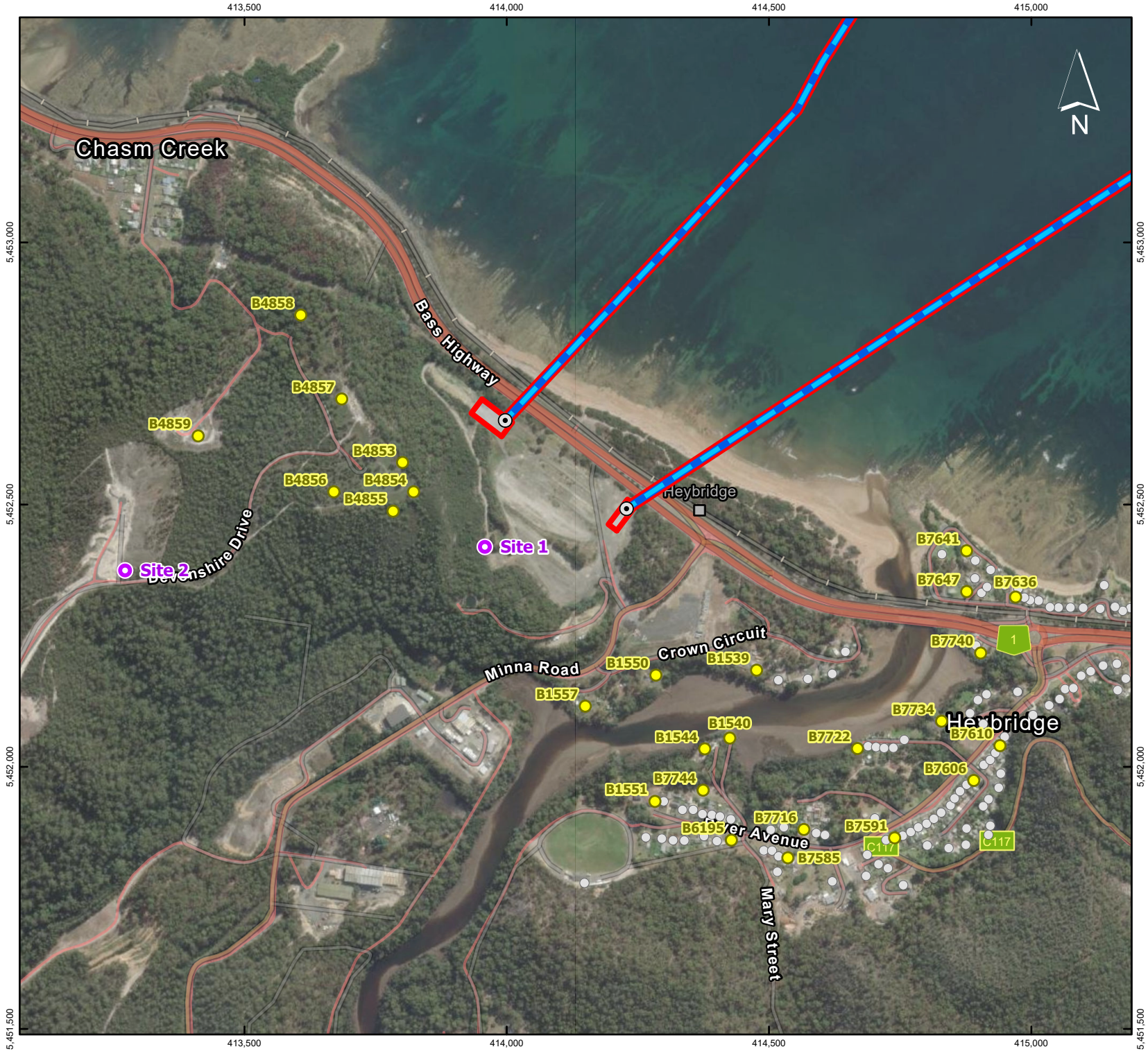
Baseline noise conditions vary due to factors such as the presence of localised background sources. To characterise the baseline noise environment at the proposal site, the following noise monitoring locations were monitored continuously during the day, evening and night over a period of one to two weeks between 6 May and 25 May 2022:

- Within the proposal site.
- At the residential nature reserve.

The location of these sites is shown in Figure 6.6-1.

Baseline vibration levels at human sensitive receptors near the proposal site are expected to be very low, due to the few residential properties and largely vacant land comprising of native forest and bushland surrounding the proposal site. Given this, and that background vibration levels are not used to set the criteria values when assessing potential vibration impacts from construction, an assessment of the existing vibration levels at the proposal site has not been conducted.

Figure 6.6-1:
Noise monitoring locations and sensitive receptors near the proposal site



Legend

- HVDC Landfall
- Proposed HVDC Subsea Cable
- Proposal Site
- HDD Converter Pad
- Noise Monitoring Location
- Noise Receptor Location
- Sensitive Receptor Location
- Major Road
- Minor Road

Scale: 1:10,000 @ A4

Spatial Reference: GDA2020 MGA Zone 55

0 50 100 200 300 400 500

Metre

MARINUS LINK

Acknowledgements and Sources:

Data Source: Marinus Link GIS Data Repository and theLIST ©State of Tasmania .
Background Image: Esri Community Maps Contributors, DPIPWE, Esri, TomTom, Garmin, Foursquare, METI/NASA, USGS, Maxar
Produced By: Marinus Link for the Tasmanian Heybridge Shore Crossing EIS.
Date Figure Exported: 22/11/2024

6.6.2.3 Construction assessment

Tasmanian environmental noise legislation and guidelines do not set mandatory noise level requirements for construction activities which are proposed to occur during the day-time (i.e. outside of the time periods specified as prohibited hours by the EMPC Noise Regulations). The New South Wales *Interim Construction Noise Guideline* (NSW ICNG) (NSW DECC 2009), which sets out the application of noise management levels for noise at residences was used, in agreement with EPA Tasmania. The NSW ICNG requires the development of noise management levels and a comparison of predicted construction noise levels with the noise management levels.

A 'rating background level' (RBL) was established for the assessment of the proposal, which is the overall single-figure background level representing each assessment period (day/evening/night) over the whole monitoring period. The RBL is the level used for assessment purposes (NSW EPA 2017). The 'worst case' noise levels from construction are predicted and then compared to the noise management levels in a 15-minute assessment period to determine the likely impact of construction noise. Refer to Table 6.6-2 for the NSW ICNG noise management levels for residential receptors. Section 6.6.5.1 provides further detail on the noise management levels established for the proposal.

In addition to noise management levels, the NSW ICNG refers to recommended standard working hours which are broadly equivalent to the permissible working hours defined under EMPC Regulations, with the main difference being that the NSW ICNG defines more restrictive standard working hours for weekend works (i.e. standard working hours under the NSW ICNG do not include Saturday afternoons or Sundays).

To further support adoption of this proposed approach, a recent Tasmanian approval included project-specific standard working hours which retained work on Saturday afternoons, consistent with the EMPC Regulations, but excluded construction work on Sundays, consistent with the NSW ICNG. For consistency, the same modified standard working hours have been adopted for assessment of construction noise, as outlined in Table 6.6-2 (referred to hereafter as standard working hours).

Table 6.6-2 NSW ICNG noise management levels

Time of day	Noise management level, dBA $L_{eq,\ 15\ min}$	Application
Standard working hours Monday to Friday 0700 to 1800 hrs Saturday 0800 to 1800 hrs No work on Sundays or public holidays	RBL + 10 dB	Above this level, locations are categorised as 'noise affected' and the NSW ICNG guidance notes that all feasible and reasonable work practices to minimise noise should be applied. In addition, all potentially impacted residents should be informed of the nature of the works to be carried out, the expected noise levels and duration, as well as contact details. As the noise management level is based on the RBL, different levels apply to different receivers.
	75 dB	Corresponds to the NSW ICNG definition for 'highly noise affected' locations. Above this level, the NSW ICNG guidance indicates there may be strong community reaction to noise, and additional noise controls are warranted (such as respite periods, and consultation with the community around the times of day when the work

Time of day	Noise management level, dBA $L_{eq, 15\ min}$	Application
		would be least disruptive and possible changes to the duration of work).
Outside standard working hours	RBL + 5 dB	Corresponds to the NSW ICNG noise management level outside recommended standard hours. The NSW ICNG guidance notes that all feasible and reasonable work practices should be applied to meet the noise management level. Where all feasible and reasonable practices have been applied and noise is more than 5 dB above the noise affected level, the proponent should consult with the community.

Additionally, the assessment of noise levels during the night period also referred to the Tasmanian *Environment Protection Policy (Noise) 2009* (Noise EPP) acoustic environment indication, based on guidance from the WHO publication *Guidelines for Community Noise 1999* which is commonly used to inform an assessment of the risk of sleep disturbance (the WHO publication details the relationship between the definition of health and the effects of community noise exposure). The Noise EPP and WHO guidelines set a value of 45 dB at a façade location which includes the noise reflected from the dwelling. This is broadly equivalent to 42 dB measured at a location away from the façade.

A subset of the noisiest construction activities was identified for prediction and assessment of construction noise levels, and representative noise emission data for major equipment was compiled using standards (AS 2436, BS 5228-1), project contractors, and historical data. Noise modelling was then conducted to predict the highest noise levels at each assessment receiver for each construction activity, which were compared against NSW ICNG noise management levels and reference level for evaluating the risk of sleep disturbance. The results of the assessments were used to identify the types of mitigation and management measures that are likely to be required.

Due to the limitations of the standards AS 2436 and BS 5228-1, which tend to overestimate noise levels at distant locations, and the complex terrain profile of the area around the proposal, noise predictions were also calculated using ISO 9613-2:1996 *Attenuation of sound during propagation outdoors – Part 2: General method of calculation (ISO 9613-2).* SoundPLAN version 9.0 noise modelling software was used, with adjustments made for terrain and ground effects. Conservative assumptions were adopted including construction equipment operating continuously and simultaneously at maximum operating duty, and atmospheric conditions with low levels of atmospheric absorption of sound.

The assessment considered the cumulative noise impacts of HDD works and if these were to occur at the same time as the noisiest phases of the earthworks, civil works or infrastructure works for the Heybridge Converter Station (refer to Section 6.6.5.2).

6.6.2.4 Operational assessment

Operation of the proposal would involve periodic maintenance activities of the subsea cables which would be undertaken in the marine environment. Potential impacts of underwater noise are discussed in Section 6.3.

The underwater noise impacts have been considered for construction activities, with operational maintenance activities expected to be on a substantially smaller scale.

6.6.2.5 Risk assessment

The assessment adopted a **risk assessment approach**. Given that noise and vibration is an inevitable consequence during construction of a major infrastructure project, it is the risk of potential community disturbance which is assessed. The risk rating is determined by considering the consequence (having regard to the noise level, character and duration) and likelihood, with the objective being to determine appropriate risk controls. The risk rating matrix adopted for the assessment is provided in Table 6.6-3 below.

Table 6.6-3 Noise and vibration – risk rating matrix

Consequence	Likelihood				
	Certain	Likely	Possible	Unlikely	Rare
Severe	**Extreme**	**Extreme**	**High**	**High**	**Medium**
Major	**Extreme**	**High**	**High**	**Medium**	**Medium**
Moderate	**High**	**High**	**Medium**	**Medium**	**Low**
Minor	**High**	**Medium**	**Medium**	**Low**	**Low**
Low	**Medium**	**Medium**	**Low**	**Low**	**Low**

6.6.3 Existing conditions

The areas adjoining the proposal site consist of a residential area to the east and south-east, existing commercial uses to the south, and conservation areas to the west and further south beyond the adjoining commercial uses. Human sensitive receptors identified in proximity to the proposal site are shown in Figure 6.6-1 and include:

- Existing residential dwellings to the east of the proposal site, with the locations ranging in distance from 138 m (B1550) to 693 m (B7610) from the proposal site.
- Future residential dwellings to the west and south-west including the Heybridge Residential Nature Reserve hamlets (which consists of six hamlets for residential subdivision the nearest being the Devonshire Drive Hamlet which will comprise 15 residential lots), with six locations ranging in distance from 123 m (B4854) to 267 m (B4856) from the proposal site.
- A future residential dwelling, located north of the Heybridge Residential Nature Reserve on George Street, located 436 m (B4859) from the proposal site.

The distance of each of the representative receptors to the proposal site is provided in Table 6.3-10. The measured background noise levels for the day, evening, and night periods are summarised in Table 6.6-4. The ambient noise levels at both noise monitoring locations were in the range of 40-50 dB A-weighted, equivalent continuous sound level (L_{Aeq}),10min, except on days when noise levels are elevated by high winds and rains. The existing noise levels at the proposal site are below the Noise EPP indicator noise levels presented in Table 6.6-5.

Table 6.6-4 Measured background noise levels, dB L_{A90} per period

Noise monitoring location	Day (0700 – 1800 hrs)	Evening (1800 – 2200 hrs)	Night (2200 – 0700 hrs)
Site 1: Heybridge Converter Station site	42	36	32
Site 2: At the Residential nature reserve	38	35	32

As discussed in Section 6.6.2, baseline vibration levels at human sensitive receptors near the proposal site are expected to be very low. As such, an assessment of the existing vibration levels at the proposal site has not been conducted.

6.6.4 Applicable legislation

6.6.4.1 Environmental Management and Pollution Control (Noise) Regulations 2016

The EMPC Noise Regulations, made pursuant to the EMPC Act, is the primary mechanism for managing and controlling construction noise. The regulations define the hours that equipment and machinery used on construction and demolition sites can be heard in neighbouring residential properties. Construction works that result in audible noise to the proposal site's neighbouring residential properties must not occur during the prohibited hours outlined in Section 2.3.5. However, audible construction works may occur during the prohibited hours where there are established dedicated noise requirements via an approved instrument (such as any instrument granted following this EIS).

6.6.4.2 Environment Protection Policy (Noise) 2009

The Tasmanian Noise EPP is strategic framework document that defines overarching principles and objectives for reducing health risks and amenity impacts associated with environmental noise.

The Noise EPP identifies a range of factors that need to be considered when setting appropriate noise controls, including the protection of amenity and the wider economic and social benefits of a new project. The Noise EPP acknowledges that specific requirements relating to noise levels and hours of operation are to be primarily covered by the EMPC Noise Regulations.

The Noise EPP provides the acoustic environment indicator levels which provide a reference when considering the acoustic environment and the effectiveness of implemented noise control measures and strategies (refer to Table 6.6-5).

Table 6.6-5 Noise EPP acoustic environment indicator levels

Specific environment	Health effects	Average noise levels and time base (hours) levels	Maximum noise levels
Outdoor living area	Serious annoyance, daytime and evening	55 dB $L_{Aeq,16h}$	-
	Moderate annoyance, daytime and evening	50 dB $L_{Aeq,16h}$	-
Outside bedrooms	Sleep disturbance, window open	45 dB $L_{Aeq,16h}$	60 dB L_{AFmax}

6.6.4.3 Tasmanian State Road Traffic Noise Management Guidelines

The *Tasmanian State Road Traffic Noise Management Guidelines* provides target noise levels for public roads as outlined in Table 6.6-6.

However, the criteria represent targets for normal traffic flows and does not address temporary noise increases associated with construction generated traffic. The target noise levels can be used as a conservative reference for contextualising predicted construction traffic noise levels. An assessment of noise levels associated with construction traffic is provided in Section 6.6.5.

Table 6.6-6 Reference levels for traffic noise

Description	Target criteria
Public roads	63 - 68 dB $L_{A10,18h}$

6.6.4.4 AS 2436 – Guide to noise and vibration control on construction, demolition and maintenance sites

AS 2436 provides the Australian Standard and guidance on noise and vibration control in respect to construction, demolition, and maintenance sites. Noise levels of construction equipment used for the proposal are to be obtained from the AS 2436.

6.6.4.5 NSW Construction Noise and Vibration Guidelines

The NSW *Construction Noise and Vibration Guidelines* (CNVG) sets out minimum working distances from human sensitive receptors for typical items of vibration intensive plant. The minimum working distances outlined in the CNVG are indicative and would vary depending on the particular item of plant and the local geotechnical conditions.

As there is no standard or regulation that specifies criteria for the control of construction vibration levels in Tasmania, the following minimum working distances (as outlined in the CNVG) have been adopted for the assessment of the proposal:

- To avoid cosmetic building damage: up to 25 m.
- For human comfort: up to 100 m (greatest distance relates to vibratory rollers).

The CNVG would be used to determine site-specific safe working distances for vibration generating activities during construction.

6.6.4.1 NSW Interim Construction Noise Guideline

The NSW ICNG provides guidance on the management of noise from construction sites. In the absence of mandatory noise requirements for construction activities during the day in Tasmania, the NSW ICNG has been used in assessing construction noise generated from the proposal. The NSW ICNG requires the development of noise management levels and a comparison of predicted construction noise levels with the noise management levels. This can then be used to inform the extent of noise controls required for construction activities.

During consultations with EPA Tasmania during the EIS preparation, the NSW ICNG noise management levels were discussed and agreed as a suitable basis for assessing construction noise. Refer to Table 6.6-8 for the noise management levels, based on the NSW ICNG, adopted for the construction of the proposal.

6.6.5 Potential impacts

6.6.5.1 Construction

Construction of the proposal would involve the following noise and vibration generating activities:

- Construction of two HDD launch pads.
- Drilling of six bores from the HDD launch pad site.
- Subsea cable installation.

6.6.5.1.1 Noise emission data

Table 6.6-7 presents an indicative selection of plant and machinery required for construction of the proposal and associated noise emissions (sound power levels).

Table 6.6-7 Sound power levels of construction plant/equipment

Noise source/construction activity	Plant/equipment	Sound power level, dB L_{WA}	Approximate overall sound power level, dB L_{WA}
Shore crossing construction	Drill rig crawler	98	**117**
	Drill rig powerpack	108	
	Excavator 36T	104	
	High pressure mud pump	98	
	Excavator	106	
	Light vehicles	106	
	Crew bus	106	
	Mud mixing System	104	
	Mud separation system	100	

6.6.5.1.2 Noise management levels

A set of noise management levels have been adopted to assess the predicted construction noise levels and are outlined in Table 6.6-8. The noise management levels referred to in the NSW ICNG (refer to Section 6.6.2) are based on a measure of the background noise environment (refer to Section 6.3.3) referred to as the RBL.

In recognition of the night-time being the critical period for the assessment of construction outside standard working hours, the noise management levels are defined for the proposed standard working hours and the night-time only. Updated background noise data obtained in the future may be used to separately define noise management levels for the evening and Sundays. Noise management levels based on Site 1 data are primarily relevant to existing receptors to the south-east and east of the proposal site, and Site 2 data is primarily relevant to potential future receptors to the west.

Table 6.6-8 Adopted noise management levels – construction

Time of day	Noise management level, dB L_{Aeq},15min		Description
	Site 1	Site 2	
Standard working hours	52	48	Above this level, locations are categorised as 'noise affected'. Feasible and reasonable work practices to minimise noise should be applied. Potentially impacted residents should be informed of the works, the expected noise levels and duration, and contact details.
	75	75	Corresponds to the NSW ICNG definition for 'highly noise affected' locations. Above this level, there may be strong community reaction to noise, and additional noise controls are warranted.
Night	37	37	Corresponds to the NSW ICNG noise management level outside recommended standard hours. The NSW ICNG guidance notes that all feasible and reasonable work practices should be applied to meet the noise management level.

6.6.5.1.3 Predicted noise levels and assessment

The primary sources of noise associated with the construction of the proposal is the drilling from the launch pad site of the underground crossings, which would involve an HDD rig operating for a period of up to 6 months. This activity is proposed to occur inside and outside of standard working hours. The night works required for the construction of the proposal include the following activities:

- Drilling for proposal which is expected to involve HDD works occurring continuously (24 hours per day, seven days per week), over a period of 6 months.

For the HDD shore crossing works, employee shifts would occur each day from 7:00 am to 7:00 pm, and from 7:00 pm to 7:00 am. Construction workers are expected to arrive to the proposal site before 7:00 am and leave after 7:00 pm. Construction workers travelling into and out of the proposal site in motor vehicles during the prohibited hours are exempt from the EMPC Noise Regulations time restrictions.

The level of noise at each identified human sensitive receptor from construction activities would vary significantly throughout construction depending on the construction activities being carried out, proximity to works, the types of equipment being used, and the duration of operation of each equipment item. As such, assumptions made in the construction noise assessment represent a conservative approach. For example, noise modelling predicts the highest noise level at each identified sensitive receptor for each construction activity based on a minimum separation distance between the construction activity and receptor. Additionally, the predicted noise levels are based on a conservative approach of combined simultaneous operation of all relevant plant/equipment associated with shore crossing works for the proposal.

Predicted noise levels generated from the construction of the proposal were assessed against the noise management levels outlined in Table 6.6-8. Table 6.6-9 presents the predicted noise levels at nearby residential receptors during the construction of the proposal, with modelled noise contours presented in Figure 6.6-2 and Figure 6.6-3.

Table 6.6-9 Predicted construction noise levels – standard working hours

Receptor no.	Distance to proposal site (m)	HDD launch pad west (dB L_{Aeq})	HDD launch pad east (dB L_{Aeq})
Existing residential dwellings			
B1539	233	35	32
B1540	305	41	30
B1544	302	41	31
B1550	138	39	35
B1551	375	41	37
B1557	186	34	41
B6195	482	39	32
B7585	558	38	29
B7591	645	37	28
B7606	691	37	32
B7610	693	37	36
B7636	618	37	33
B7641	518	39	36
B7647	525	41	41
B7716	526	38	29
B7722	477	35	29
B7734	575	38	34
B7740	581	38	38
B7744	374	40	33
Future residential dwellings – Heybridge Residential Nature Reserve – Devonshire Drive Hamlet			
B4853	131	**60**	**54**
B4854	123	**49**	**54**
B4855	164	41	**54**
B4856	267	39	**49**
B4857	154	42	43
B4858	252	34	37
Future residential dwellings – George Street residential development			
B4859	436	29	32
Range – Existing residential dwellings		**34 – 41**	**28 – 41**
Range – Future residential dwellings		**29 – 60**	**32 – 54**

Orange shaded cell indicate exceedance of adopted noise management level for standard working hours (48 L_{Aeq} /52 dB L_{Aeq}).

6.6.5.1.4 Construction noise during standard working hours

In relation to existing residential receptor locations, the predicted noise levels are below the adopted noise management level of 52 dB L_{Aeq} for standard working hours.

For the nearest future residential receptors within Devonshire Drive Hamlet (B4853, B4854, B4855 and B4856), the predicted noise levels would exceed the noise management level of 48 dB L_{Aeq}. In all cases, the predicted noise levels are below the highly affected noise management level of 75 dB L_{Aeq}.

At the George Street residential development (B4859), the predicted noise levels are well below the noise management level of 48 dB L_{Aeq}.

Overall, the predicted noise levels for construction during standard working hours indicate an exceedance of noise management levels. As such, disturbance from noise generated from construction activities during standard working hours prior to mitigation has an overall risk rating of **medium** (refer to Table 6.6-10). It is however important to note that the predictions represent the upper noise levels of construction activities based on worst-case scenarios. In practice, noise levels are likely to be lower than predicted in most instances.

Table 6.6-10 Construction during standard working hours – risk assessment

Item	Rating	Description
Risk consequence	Low to moderate	Predicted noise levels are within the typical of the range expected for construction of a major infrastructure project in a semi-urban area. However, some construction activities could result in noise levels above the noise management level at the nearest existing receptors, and predicted noise levels at the nearest receptor locations of Devonshire Drive Hamlet are well above the noise management level, and are sufficient to represent a risk of disturbance to future residents in this area, particularly given the duration of construction works.
Likelihood	Possible	The predicted noise levels are based on conservative assumptions. Noise levels in reality are expected to be lower than predicted for most of the time. Further, the highest noise impacts relate to the Devonshire Drive Hamlet which remains undeveloped and it is presently unclear whether dwellings would be established at the time of the proposed construction works.
Overall risk	**Low to medium**	The applicable guidance for this rating is that the risk can be acceptable if controls are in place, and attempts should be made to reduce the risk to low.

6.6.5.1.5 Construction noise outside standard working hours

Table 6.6-11 Predicted construction noise levels – outside standard working hours

Receptor no.	Distance to proposal site (m)	HDD launch pad west (dB L_{Aeq})	HDD launch pad east (dB L_{Aeq})
Existing residential dwellings			
B1539	233	35	32
B1540	305	**41**	30
B1544	302	**41**	31
B1550	138	**39**	35
B1551	375	**41**	37
B1557	186	34	**41**
B6195	482	**39**	32
B7585	558	**38**	29
B7591	645	37	28
B7606	691	37	32
B7610	693	37	36
B7636	618	37	33
B7641	518	**39**	36
B7647	525	**41**	**41**

Receptor no.	Distance to proposal site (m)	HDD launch pad west (dB L_{Aeq})	HDD launch pad east (dB L_{Aeq})
B7716	526	**38**	29
B7722	477	35	29
B7734	575	**38**	34
B7740	581	**38**	**38**
B7744	374	**40**	33
Future residential dwellings – Heybridge Residential Nature Reserve – Devonshire Drive Hamlet			
B4853	131	**60**	**54**
B4854	123	**49**	**54**
B4855	164	**41**	**54**
B4856	267	**39**	**49**
B4857	154	**42**	**43**
B4858	252	34	37
Future residential dwellings – George Street residential development			
B4859	436	29	32
Range – Existing residential dwellings		**34 – 41**	**28 – 41**
Range – Future residential dwellings		**29 – 60**	**32 – 54**

Orange shaded cell indicate exceedance of adopted noise management level for outside of standard working hours (37 L_{Aeq})

The primary works outside standard working hours includes the drilling of six bores from the HDD launch pad site. The drilling activity (for both stages) is anticipated to occur almost continuously for a total period of approximately 6 months.

The predicted noise levels at existing residential receptors range from 28 to 41 dB L_{Aeq}. There are existing residential receptor locations that exceed the adopted noise management level of 37 dB L_{Aeq}, which are highlighted in pink in Table 6.6-11 above.

For the future residential receptor located in the George St Residential Development where construction work has commenced, the predicted noise levels range between 29 and 32 dB and would be below both the noise management level and the reference level for sleep disturbance.

At potential future residential receptors within the Devonshire Drive Hamlet, the predicted noise levels at all receptor locations except for B4858, exceed the noise management level of 37 dB L_{Aeq}, with the nearest receptor locations being considerably higher at levels up to 60 dB for the western HDD location and 54 dB for the eastern HDD location to the west (refer to Table 6.6-11). These predicted noise levels are also well above the sleep disturbance reference level of 42 dB L_{Aeq}. This indicates a risk of sleep disturbance at these locations if a dwelling was to be developed and occupied by the time the HDD drilling occurs. As noise from construction activities would potentially impact sleep disturbance, the overall risk rating prior to the implementation of mitigation measures is **high** (refer to Table 6.6-12).

Table 6.6-12 Construction outside standard working hours – risk assessment

Item	Rating	Description
Risk consequence	Moderate to major	Shore crossing HDD works are predicted to result in noise levels above the noise management level for the nearest existing sensitive receptors, and

Item	Rating	Description
		well above the noise management level for potential future human sensitive receptors within the Devonshire Drive Hamlet. The predicted noise levels are also above the sleep disturbance reference level in the Devonshire Drive Hamlet. As HDD works may need to occur for a total period of up to 6 months, there is potential for noise levels above sleep disturbance levels for an extended period of time.
Likelihood	Possible to likely	The predicted construction noise levels are based on conservative assumptions, and noise levels in practice are expected to be lower than predicted for most of the time. Irrespective, the results are sufficient to indicate that noise levels above the reference level for sleep disturbance are likely to occur at receivers within the Devonshire Drive Hamlet, and possible at existing receivers, if mitigation measures are not implemented.
Overall risk	**High**	The applicable guidance for this rating is that there is unacceptable level of risk and controls must be put in place to reduce to lower levels.

Figure 6.6-2: Predicted noise contours for the shore crossing HDD East works

Legend

- HBHW Landfall Location
- Proposed HVDC Subsea Cable
- Proposal Site
- Noise Monitoring Location
- Noise Receptor Location
- Sensitive Receptor Location
- HDD Launch Pad - East
- Major Road
- Minor Road

Noise Contours - HDD East (dB)

- 20
- 25
- 30
- 35
- 40
- 45
- 50
- 55
- 60

Scale: 1:10,000 @ A4

Spatial Reference: GDA2020 MGA Zone 55

0 50 100 200 300 400 500

Metre

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Produced By: Marinus Link for the Tasmanian Heybridge Shore Crossing EIS.
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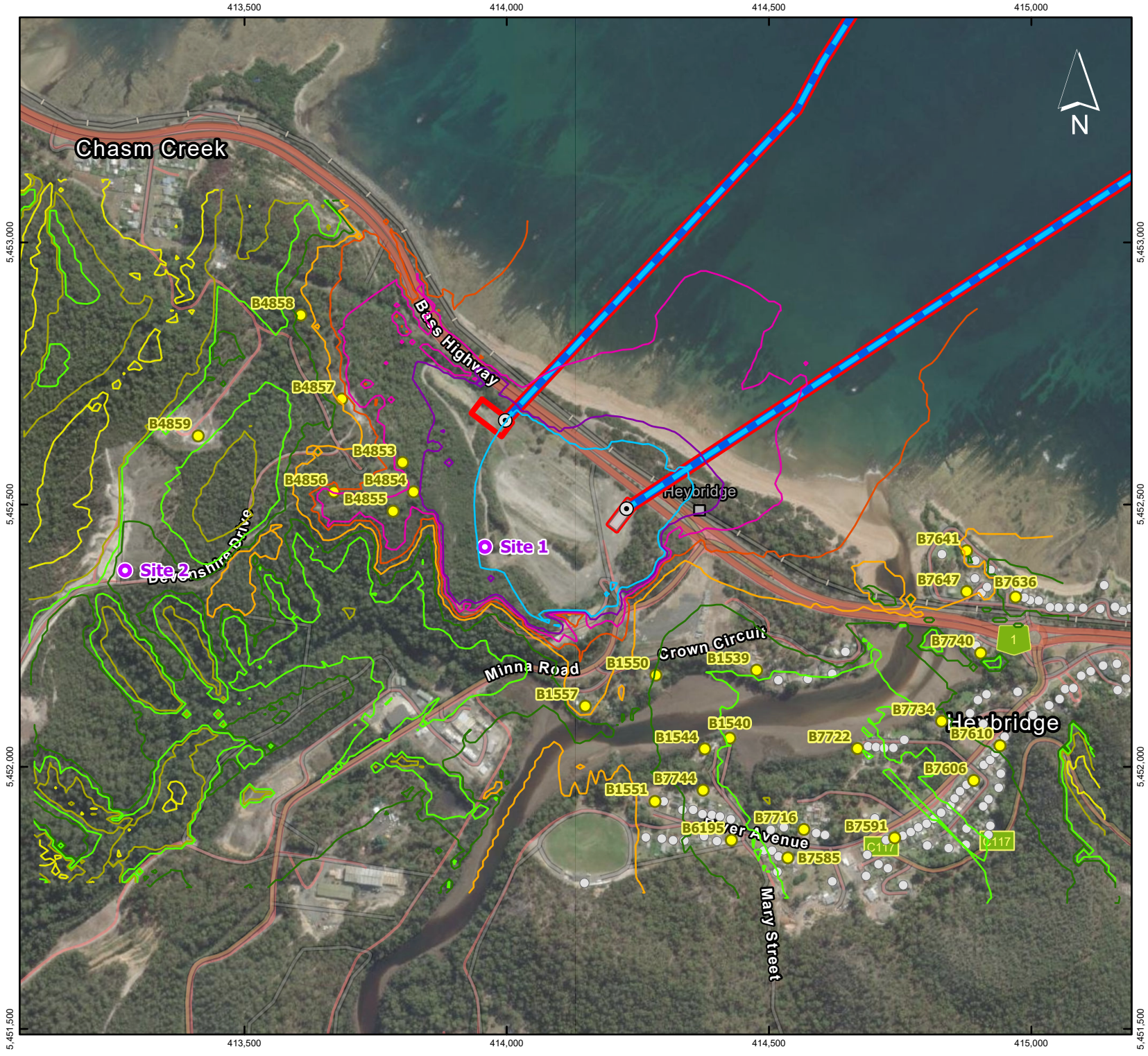

Figure 6.6-3: Predicted noise contours for the shore crossing HDD West works

Legend

- HBHW Landfall Location
- Proposed HVDC Subsea Cable
- Proposal Site
- Noise Monitoring Location
- Noise Receptor Location
- Sensitive Receptor Location
- HDD Launch Pad - West
- Major Road
- Minor Road

Noise Contours - HDD West (dB)

- 20
- 25
- 30
- 35
- 40
- 45
- 50
- 55
- 60

Scale: 1:10,000 @ A4

Spatial Reference: GDA2020 MGA Zone 55

0 50 100 200 300 400 500

Metre

MARINUS LINK

Acknowledgements and Sources:

Data Source: Marinus Link GIS Data Repository and theLIST ©State of Tasmania .
Background Image: Esri Community Maps Contributors, DPIPWE, Esri, TomTom, Garmin, Foursquare, METI/NASA, USGS, Maxar
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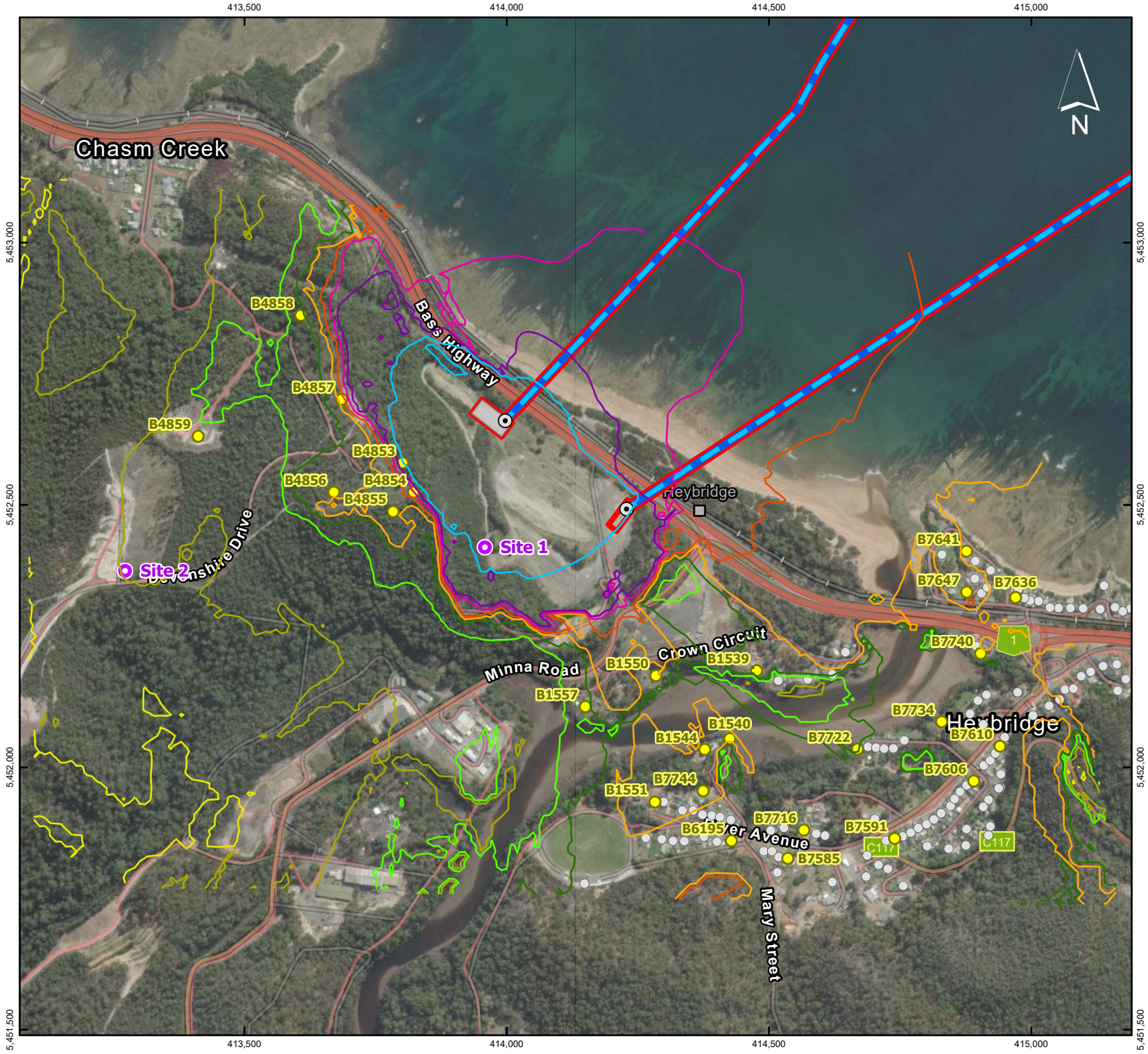


6.6.5.1.6 Off-site traffic noise

Off-site construction noise generated by traffic associated with the proposal has the potential to impact human sensitive receptors along the transport routes to the proposal site.

The majority of the routes to the proposal site are along Bass Highway from either Burnie (to the west of the proposal site), Devonport or Launceston (to the east of the proposal site). Vehicles would turn off Bass Highway into the proposal site at the Minna Road intersection. Heavy construction vehicles required for the proposal would be restricted to standard working hours, with exception for instances of required oversized deliveries. Refer to Section 6.13 for further discussion of construction traffic generated by the proposal.

Noise levels generated by the passing of heavy vehicles have been estimated to assess the noise levels along the route. These estimations of traffic noise are intended as an indication of the potential contribution of construction related vehicle movements to total road traffic noise levels along the routes.

The predicted off-site construction traffic noise levels at various distances are presented in Table 6.6-13.

Table 6.6-13 Estimated heavy vehicle noise levels at varying distances

Distance from road (m)	15 m	25 m	50 m	100 m
Average noise level, dB $L_{Aeq,1hr}$	55	53	50	47

The *Tasmanian State Road Traffic Noise Management Guidelines* provides target noise levels for public roads at normal traffic flows and does not address temporary increases associated with construction generated traffic, however target criteria can be used as a conservative reference for contextualising predicted construction traffic noise levels. The predicted noise contribution for off-site construction traffic is well below the 63 – 68 dB $L_{A10,\ 18\text{-hour}}$ targets which apply to permanent road traffic noise levels.

Due to the temporary nature of construction, the disturbance from noise generated construction traffic has an overall risk rating of **low**.

6.6.5.1.7 Vibration

The nearest buildings and human sensitive receptors to the proposal site are beyond the minimum working distances set by the NSW CNVG for both cosmetic building damage (up to 25 m) and human comfort (up to 100 m). The nearest existing residential dwelling (B4854) is located 123 m from the proposal site and would therefore be beyond the indicative minimum working distances provided by the NSW CNVG for both cosmetic building damage and human comfort. As such, impacts associated with vibration generated from construction activities are considered unlikely to occur, with an overall risk rating of **low** (refer to Table 6.6-14).

Table 6.6-14 Construction vibration – risk assessment

Item	Rating	Methodology
Risk consequence	Low	All sensitive receptors are located well beyond the indicative distance where there is a risk of cosmetic building damage as a result of vibration intensive construction plant. However, some of the proposed future sensitive receptors may be close enough for there to be the potential for disturbance of human comfort

Item	Rating	Methodology
Likelihood	Unlikely	Given that the sensitive receptors are significantly further than the distances for cosmetic building damage, vibration impacts are unlikely.
Overall risk	**Low**	The applicable guidance for this rating (the lowest risk rating under the Victorian EPA Publication 1695.1 guidance) is that the level of risk is acceptable.

6.6.5.2 Cumulative Impacts

6.6.5.2.1 Cumulative impacts with the Heybridge Converter Station proposal

If construction of the Heybridge Converter Station occurs at the same time as the noisiest phases of the HDD shore crossing works, the cumulative construction noise levels may be higher than indicated. Specifically, cumulative construction noise levels during noisier stages of construction may be approximately 1-3 dB higher than indicated for civil works, infrastructure works or HDD if works occur at the same time.

However, it is important to note that the existing sensitive receptor locations with the potential for the greatest cumulative increase in noise are the receptor locations with lowest predicted noise levels. At all locations where the predicted cumulative noise increase is more than 1 dB, the highest predicted noise levels of each construction activity are at least 5 dB lower than the applicable noise management level (refer to Table 6.6-8). In relation to potential future residential sensitive receptors to the west of the proposal site, cumulative noise with the Heybridge Converter Station works would increase the number of sensitive receptors where noise levels are predicted to be above the noise management level of 48 dB L_{Aeq}. The increase in noise levels at these receptor locations would be managed by the mitigation measures outlined in Table 6.6-16 (specifically MM NV02).

It is also important to note that the predictions represent the upper noise levels of construction activities based on worst-case scenarios for each activity. In practice, noise levels are likely to be lower than predicted in most instances. Cumulative construction noise impacts are not anticipated to occur in the evening and night-time periods as simultaneous night works are not expected to occur.

6.6.5.2.2 Cumulative impacts with the nearby projects

Of the nearby proposed and foreseeable projects identified for consideration, only the NWTD is in close proximity to the proposal. All other projects are located over 5 km away and therefore do not cause a significant impact to noise and vibration emissions at the proposal site. Heavy vehicle traffic when multiple projects are constructed at the same time could result in cumulative noise increases, however for this to occur the projects must use the same construction traffic routes, and peak traffic generating phases of the projects must overlap. Based on these considerations, the risk of cumulative construction noise impacts is **low**.

The primary cumulative consideration that is relevant to the proposal is the potential for cumulative operational noise with the NWTD, however, the operational noise sources associated with the remaining NWTD are limited, and therefore the risk of cumulative operational noise impacts is low.

6.6.5.3 Risk assessment

Potential risks associated with the elevated noise levels and vibration emissions generated by the construction of the proposal have been summarised in Table 6.6-15. Potential risks have been assessed prior to the implementation of mitigation measures. The methodology used for this risk assessment is detailed in Noise and Vibration Impact Assessment (Appendix H).

Table 6.6-15 Noise and vibration emissions – risk assessment

Affected value	Potential risk	Initial risk (without mitigation)
Ambient noise environment	Airborne noise generated by construction activities during standard working hours impacting noise sensitive areas.	**Medium**
Ambient noise environment	Airborne noise generated by construction of the proposal involving night works over an extended period, affecting noise sensitive areas (including disturbance of sleep).	**High**
Ambient noise environment	Airborne noise generated by heavy construction vehicles using the public road network during normal working hours affecting noise sensitive areas.	**Low**
Ambient vibration environment	Ground borne vibration generated by construction activities resulting in perceptible vibration in sensitive (habited) areas or building damage.	**Low**

6.6.6 Management, mitigation and monitoring

Proposed measures to minimise potential impacts associated with noise and vibration impacts are presented in Table 6.6-16. Mitigation measures in other sections that are relevant to the management of noise and vibration include:

- Section 6.13 (Infrastructure and off-site ancillary facilities), specifically measures which address construction traffic management.
- Section 8.2 (Mitigation measures), specifically general measures which address consultation with relevant stakeholders to manage the interface of nearby projects under construction at the same time (MM Gen06).

Together, these measures will minimise the potential noise and vibration impacts.

Table 6.6-16 Noise and vibration emissions – mitigation measures

Ref	Mitigation measure	Proposal stage
NV01	Prior to construction commencing, conduct additional background noise monitoring at noise affected sensitive receptors in the vicinity of the proposal site. The background noise monitoring data will: • Inform the assessment of construction noise (MM NV02 and MM NV03). • Be conducted at a selection of locations which are representative of the existing human receivers that could be impacted by construction. The background noise monitoring and results analysis will be conducted, where relevant, in accordance with procedural guidance detailed in: • *Noise Measurement and Procedures Manual 2008*.	Construction

Ref	Mitigation measure	Proposal stage
	• Australian Standard 1055:2018 *Acoustics - Description and measurement of environmental noise*.	
NV02	Prior to commencement of construction, develop a construction noise and vibration management plan in consultation with EPA Tasmania. The construction noise and vibration management plan will document: • A description of all noise generating construction activities and their locations. This must include a schedule of equipment types and numbers for each activity and location. • A description of the construction program including timing and duration of construction activities. • The results of additional background monitoring conducted under MM NV01. • Detail the reasonable and feasible work practices and mitigation measures to be applied to minimise noise and vibration associated with both on-site and off-site sources of construction activities (including heavy vehicle movements on local roads), including: - Requirement for the selection major plant items with low noise emissions, characterised by sound power levels that are equivalent to, or lower than, the values/ranges indicated in AS 2436 *Guide to Noise and Vibration Control on Construction, Demolition and Maintenance Sites (Reconfirmed 2016)*, unless it can be demonstrated that adhering to these values would not be reasonably practicable. - Measures for the control of potentially annoying characteristics such as tonality, impulsive and low-frequency. - Scheduling protocols for minimising the potential disruption caused by high noise levels as a result of transient construction activities which occur near to receivers for brief periods. - Details of any locations where temporary screens or enclosures are identified as a reasonably practicable control measure, informed by updated construction noise modelling. • Requirements for monitoring including verification noise testing (if warranted) to assess the effectiveness of the noise controls before commencing continuous night works. • Communication protocols for notifying affected receivers in advance of the works occurring. • Protocols for providing respite in circumstances where residents are affected by prolonged exposure to elevated noise levels as a result of construction works outside of standard working hours. • Complaint handling and response protocols. The construction noise and vibration management plan will address the requirements of: • *Environmental Management and Pollution Control (Noise) Regulations 2016*. • *Environment Protection Policy (Noise) 2009*. • Australian Standard AS 2436. The construction noise and vibration management plan will be a sub plan to the CEMP and implemented for the duration of construction.	Construction
NV03	Conduct construction noise monitoring in accordance with the requirements of the construction noise and vibration management plan prepared in accordance with MM NV02. The results of the construction noise monitoring must be documented in accordance with the timeframe and reporting requirements established in the construction noise and vibration management plan. The report must identify if changes to the construction noise mitigation and management measures are warranted to minimise the impact of noise as far as reasonably practicable.	Construction
NV04	*Not relevant to this proposal*	

Ref	Mitigation measure	Proposal stage
NV05	*Not relevant to this proposal*	
NV06	*Not relevant to this proposal*	

6.6.7 Residual impacts

An assessment of residual noise and vibration risks associated with the proposal was undertaken following the implementation of the noise and vibration mitigation measures. The results of this assessment are presented in Table 6.6-17. The methodology used for the residual risk assessment is detailed in Appendix H.

Table 6.6-17 Noise and vibration residual - risk assessment summary

Affected value	Potential risk	Initial risk rating	Mitigation measures	Residual risk
Ambient noise environment	Airborne noise generated by construction activities during standard working hours impacting noise sensitive areas.	Medium	NV02	**Low**
Ambient noise environment	Airborne noise generated by construction of the proposal involving night works over an extended period, affecting noise sensitive areas (including disturbance of sleep).	High	NV02	**Medium**
Ambient noise environment	Airborne noise generated by heavy construction vehicles using the public road network during normal working hours affecting noise sensitive areas.	Low	NV02	**Low**
Ambient vibration environment	Ground borne vibration generated by construction activities resulting in perceptible vibration in sensitive (habited) areas or building damage.	Low	NV02 and NV03	**Low**

The implementation of the mitigation measures outlined in Section 6.6.6 is considered to effectively manage the identified noise and vibration risks associated with the proposal to an acceptable level, with all residual impacts assessed as **medium to low**.

6.7 Air quality

This section provides a summary of the findings of the Air Quality Impact Assessment provided in Appendix I.

6.7.1 Assessment guidelines

The relevant sections of the EIS guidelines for the Heybridge Shore Crossing, and where these have been addressed in this EIS, are outlined in Table 6.7-1.

Table 6.7-1 Relevant EIS guidelines

Air quality – EIS guidelines	Section
Identify, describe, and show on a site map all sensitive receptors that could potentially be affected by dust and particulate matter emissions.	Section 6.7.3, Figure 6.7-1
Identify and map all possible sources of air emissions including dust and particulate matter from the site, particularly that associated with the proposed construction. This includes emissions generated from: • Upgrading/building of roads; • On-site and off-site vehicle and vessel movements; • Use of generators; • Site ground preparation/vegetation clearance/trenching/general disturbance; • Infrastructure construction (e.g., horizontal directional drilling pad construction); • Horizontal directional drilling of shore crossing cables from the Heybridge launch pad.	Section 6.7.5
Provide the details of equipment used on the site.	Section 2.3.3
Discuss potential impact of fugitive dust and particulate matter emissions from the proposed activity on the environment and the likelihood for the activity to cause environmental nuisance or harm. The discussion should consider: • Land uses in the vicinity of the activity. • Terrain and local climatic conditions, especially the direction and strength of prevailing winds and rainfall. • Special consideration of the environmental impact of the activity during adverse meteorological conditions. • The potential for cumulative impact with the proposed converter station.	Section 5.2.2, 6.7.3, 6.7.5
Provide information about proposed management measures to be implemented to avoid or mitigate potential impact of emissions to air during various phases of the project including construction, commissioning and operation, especially during adverse meteorological conditions. This may include but not be limited to watering or sealing of roads, covering of truck loads, reduced vehicle speed, road surfacing/maintenance details, enclosures, water sprays, windbreaks, and revegetation/stabilisation. Evidence of application of accepted modern technology for reduction of unavoidable emissions to the greatest extent practicable should be provided.	Section 6.7.6
Legislative and policy requirements	
Consideration should be given to the requirements of the *Tasmanian Environment Protection Policy (Air Quality)*	Section 6.7.4.1

6.7.2 Methodology

The Institute of Air Quality Management (IAQM) *Guidance on the assessment of dust from demolition and construction* (Holman et al. 2014) (IAQM Methodology) provides a framework for the assessment of risk associated with dust emissions during construction. This IAQM Methodology has been adopted to assess construction dust impacts and to inform the implementation of appropriate dust management measures.

The IAQM Methodology considers the potential for impacts to 'human receptors' within 350 m of the boundary of construction works, or within 50 m of roads used by construction vehicles within 500 m of the site. The methodology adopts a **risk assessment approach**. Data from the closest EPA air monitoring station (at Emu River, located approximately 8.6 km to the south-west of the proposal site) was used for the assessment. The ambient background levels of particulates at Emu River are considered reasonably representative of air quality conditions at the proposal site due to the similar setting and proximity.

The IAQM Methodology determines the receptor sensitivity by measuring particulate matter (PM), which describes extremely small solid particles and liquid droplets suspended in air. The size of particles affects their potential to cause health problems; particles with a diameter of 10 micrometres or less (PM_{10}) are small enough to pass through the throat and nose and enter the lungs, whilst particles with a diameter of 2.5 micrometres or less ($PM_{2.5}$) have the potential to enter the lungs and into the bloodstream.

The assessment begins with a position of understanding receptor sensitivity. The sensitivity of receptors to dust soiling, human health effects and ecological effects are defined by the general principles outlined in the IAQM) and are summarised in Table 6.7-2.

Table 6.7-2 Receptor sensitivity to dust

Receptor category	Dust soiling effects on people and property	Human health effects of PM_{10}	Ecological effects
High	• Users can reasonably expect enjoyment of a high level of amenity; or • The appearance, aesthetics or value of their property would be diminished by soiling; and • The people or property would reasonably be expected to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land.	• Locations where members of the public are exposed over a time period relevant to the air quality criteria for PM_{10} (in the case of the 24-hour criteria, a relevant location would be one where individuals may be exposed for eight hours or more in a day).	• Locations with an international or national designation and the designated features may be affected by dust soiling; or • Locations where there is a community of a particularly dust sensitive species.
Medium	• Users would expect to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home; or • The appearance, aesthetics or value of their property could be diminished by soiling; or • The people or property wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land.	• Locations where the people exposed are workers, and exposure is over a time period relevant to the air quality criteria for PM_{10} (in the case of the 24-hour criteria, a relevant location would be one where individuals may be exposed for eight hours or more in a day).	• Locations where there is a particularly important plant species, where its dust sensitivity is uncertain or unknown; or • Locations with a national designation where the features may be affected by dust deposition.
Low	• The enjoyment of amenity would not reasonably be expected; or property would not reasonably be expected to be diminished in	• Locations where human exposure is transient	• Locations with a local designation where the features may be affected by dust deposition.

Receptor category	Dust soiling effects on people and property	Human health effects of PM_{10}	Ecological effects
	appearance, aesthetics or value by soiling; or • There is transient exposure, where the people or property would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land.		

The dust emission magnitude is then determined based on the scale of the anticipated works. The categories of magnitude (large, medium and, small) are defined by reference to multiple factors, including soil type, dryness, equipment being used, and the extent of works (e.g. the volume of soils being disturbed).

The risk impacts for this assessment are determined by the dust emission magnitude combined with the sensitivity of the receptor. A detailed methodology, including any relevant assumptions and limitations, is included in the Air Quality Impact Assessment (Appendix I).

6.7.3 Existing conditions

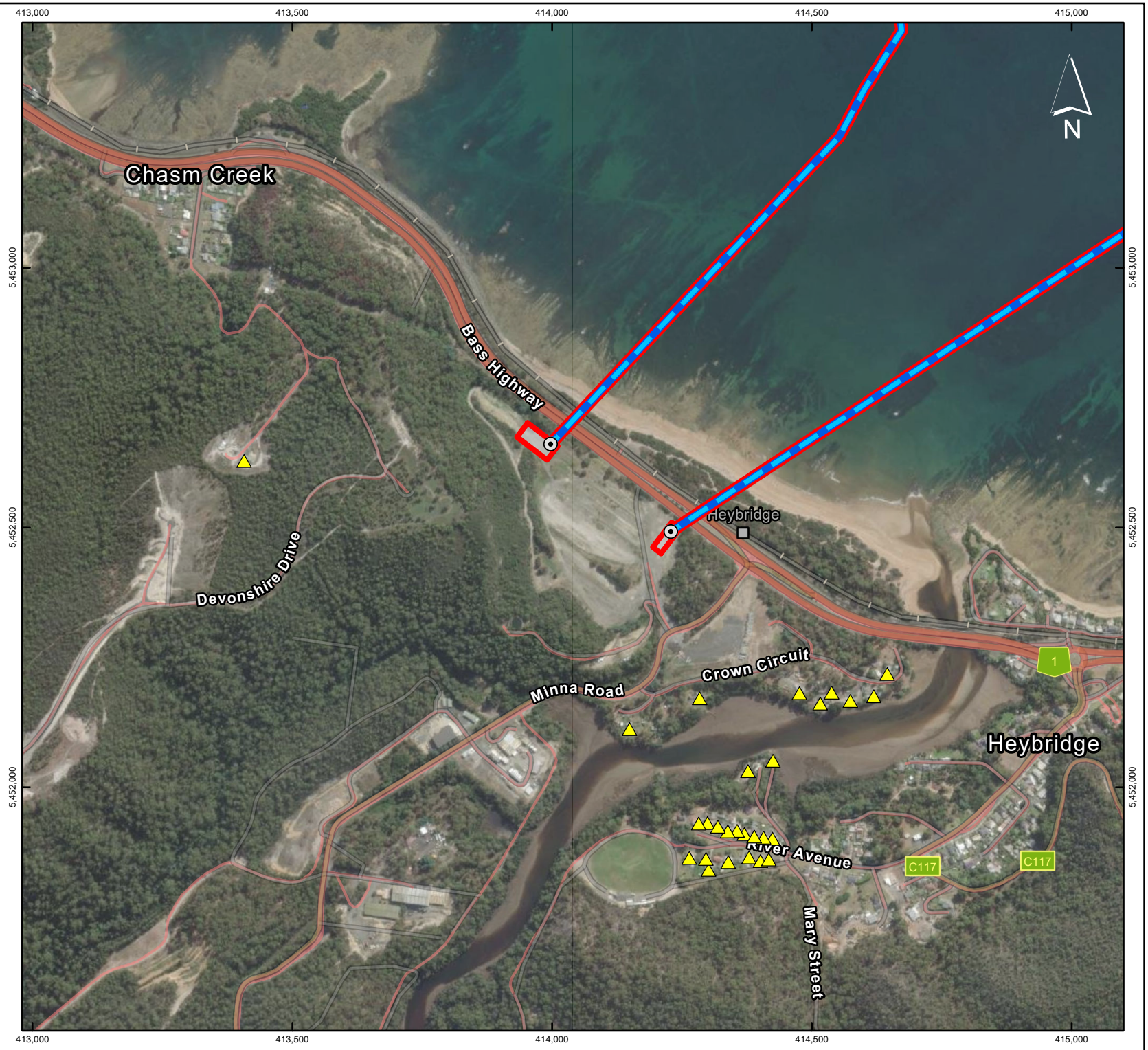
A number of industrial facilities are located south-west of the proposal site. Existing waste treatment and disposal facilities near the proposal site include the Heybridge Asbestos Landfill, Heybridge East Waste Depot and the Heybridge Inert Waste Depot, all located between 1.9 and 2.2 km south-west of the proposal site, off from Minna Road and Devonshire Drive. However, there are no significant industrial operations that report to the National Pollutant Inventory within 5 km of the Heybridge Converter Station site and the existing potential for dust and odour generation is very limited. The nearest industrial facility to the proposal is the Old Surrey Road Cheese Factory which is located approximately 5.6 km south-west. There may be dust generation through the usage of nearby unsealed roads or from wind. Climatic conditions of the proposal site are described in Section 5.

6.7.3.1 Sensitive receptors

There are 27 sensitive receptors (residential dwellings) within 500 m of the Heybridge Converter Station site/HDD launch pad site, located within the Heybridge township (Figure 6.7-1). The nearest sensitive receptor is located approximately 157 m south-east of the Heybridge Converter Station site, and there are seven residential properties within 350 m.

For human health impacts, the sensitivity is considered low where the background annual mean PM_{10} concentration is below 15 micrograms per cubic metre ($\mu g/m^3$) (a background concentration of 8 $\mu g/m^3$ was used in the Air Quality Impact Assessment – see Table 6.7-4).

Figure 6.7-1:
Nearby air quality residential receptors



Legend

- HVDC Landfall
- Proposed HVDC Subsea Cable
- Proposal Site
- Residential Receptors
- Major Road
- Minor Road

Scale: 1:10,000 @ A4

Spatial Reference: GDA2020 MGA Zone 55

0 50 100 200 300 400 500

Metre

MARINUS LINK

Acknowledgements and Sources:

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Produced By: Marinus Link for the Tasmanian Heybridge Shore Crossing EIS.
Date Figure Exported: 22/11/2024

6.7.3.2 Ambient air quality

EPA carries out air quality monitoring to determine its compliance with the National Environment Protection (Ambient Air Quality) Measure. The closest EPA air monitoring station to the Heybridge Converter Station site is Emu River, located approximately 8.6 km to the south-west.

The highest 70th percentile and annual average results from Emu River (recorded from January 2015 to October 2020) are presented in Table 6.7-3. These background concentrations were used to inform the assessment of potential health impacts from dust associated with the proposal. EPA air monitoring station data was analysed to understand likely ambient background concentrations of particulates in the vicinity of the proposal site. The ambient background concentrations highlight the low background levels at the proposal site. These ambient backgrounds are used to inform the human health impacts of additional dust.

Table 6.7-3 Ambient background concentrations

Pollutant	Averaging period	Estimated ambient background concentration (µg/m^3)	Source
PM_{10}	24-hour	9.5	EPA Emu River, highest 70th percentile
	Annual	8.0	EPA Emu River, highest annual average
$PM_{2.5}$	24-hour	2.7	EPA Emu River, highest 70th percentile
	Annual	2.7	EPA Emu River, highest annual average

6.7.4 Applicable legislation

6.7.4.1 Environment Protection Policy (Air Quality) 2004

The Tasmanian *Environment Protection Policy (Air Quality)* (Air Quality EPP) provides the framework for the management and regulation of point and diffuse sources of emissions to air, and for pollution that has the potential to cause environmental harm. The Air Quality EPP defines environmental values to be protected, air quality standards and management requirements for sources of air contaminants.

The National Environment Protection Council defines national ambient air quality standards and goals in the National Environment Protection (Ambient Air Quality) Measure (Air NEPM). The Air NEPM sets national standards for six key air pollutants, including particulates PM_{10} and $PM_{2.5}$.

The Air Quality EPP adopts the Air NEPM standards for ambient air quality. The standards and design criteria for particulate matter adopted for the Air Quality Impact Assessment are presented in Table 6.7-4. Where pollutant concentrations are below the designated standards, the environmental risk can be considered acceptable.

Table 6.7-4 NEPM air quality standards and Air Quality EPP design criteria

Pollutant	Averaging period	Value
PM_{10}	24-hour average	50 µg/m^3
	Annual	25 µg/m^3
$PM_{2.5}$	24-hour average	25 µg/m^3
	Annual	8 µg/m^3

6.7.5 Potential impacts

6.7.5.1 Construction

The key potential emissions to air from construction of the proposal would be in the form of dust (particulate matter). Construction activities that have the potential to generate dust emissions are associated with the HDD for the shore crossing and include:

- Earthworks and site preparation, including HDD of shore crossing cables from the launch pad.
- Surface preparation of access track/s where necessary.

Dust emissions associated with the above ground construction activities would be generated due to:

- Materials handling associated with excavation and dozing.
- Wheel generated dust from transport.
- Wind erosion from stockpiled material and exposed ground.

The generation of dust emissions can potentially lead to reduced public amenity due to dust soiling, health impacts due to elevated levels of PM_{10} and $PM_{2.5}$, and harm to ecological receptors due to dust deposition in aquatic ecosystems or on vegetation. Dust emissions would be greater when temperatures are highest and rain infrequent, typically in summer months.

The magnitude of dust emissions (small, medium or large) is based on the scale of the anticipated works as outlined in IAQM (2014) and provided in the Air Quality Impact Assessment (Appendix I). The magnitude of dust emissions (small, medium or large) is based on the scale of the anticipated works. The magnitude of emissions associated with earthworks and trackout during the construction stage of the proposal are presented in Table 6.7-5. No demolition works are proposed.

Table 6.7-5 Construction activities and emissions magnitude

Construction activity	Magnitude of emission	Details
Earthworks	Large	Heavy earth moving vehicles.
Trackout	Medium	Establishment of access tracks where necessary.

As discussed in Section 6.7.3, there is minimal sensitive receptors situated within 350 m of construction works, therefore the sensitivity to dust deposition and any subsequent human health impacts is **low**.

Table 6.7-6 Sensitivity of the area surrounding the proposal site

Potential impact	Earthworks	Construction	Trackout
Dust soiling effects	Low	Low	Low
Human health effects	Low	Low	Low

Without the implementation of mitigation measures, especially during windy or dry conditions, the risk of dust soiling effects and human health impacts due to the construction of the proposal is categorised as **low** for all activities (earthworks and trackout) due to the small number of receptors and the separation distance between the construction areas and surrounding residences (refer to Table 6.7-7). The risk of impacts is determined by the dust emission magnitude combined with the sensitivity of the receptor.

Table 6.7-7 Air quality – risk assessment

Potential impacts	Earthworks	Construction	Trackout
Dust soiling effects	Low	Low	Low
Human health effects	Low	Low	Low

Other construction emissions to air include:

- Exhaust emissions from construction plant and equipment.
- Odours and vapours from contaminated soils or ASS.

The main source of exhaust emissions would be from the combustion of diesel fuel and petrol from heavy vehicles, mobile excavation machinery, and stationary combustion equipment as well as from the handling and/or on-site storage of fuel and other chemicals. Exhaust emissions would involve periodic localised emissions of carbon monoxide, particulate matter (PM_{10} and $PM_{2.5}$), oxides of nitrogen (including nitrogen dioxide), sulfur dioxide, volatile organic compounds, and polycyclic aromatic hydrocarbons associated with the combustion of diesel fuel and petrol. The volume of emissions from construction vehicles and machinery would depend on the type of fuel used, the power output and condition of the engine, and duration of use. Exhaust emissions generated during construction would be temporary and would not significantly contribute to emissions in the local area. These emissions would be adequately managed by the implementation of standard construction mitigation measures, described in Section 6.7.6. No long-term adverse impacts to air quality from these emissions are anticipated.

The risk of mobilising airborne hazardous materials, odours or vapours could occur as a result of uncovering contaminated soils (including asbestos-containing materials) and ASS. As identified in Section 6.2 (Contaminated material and acid sulfate soils) and Section 6.5 (Water quality), potential contamination impacts including management of odours and vapours generated during construction can be managed with the implementation of appropriate mitigation measures (refer to Section 6.7.6).

6.7.5.2 Operation

The operational stage of the proposal does not require any land-based activities and is therefore not expected to generate any dust impacts at nearby sensitive receptors. Maintenance of the sea cables may require the use of vessels, which would not generate significant emissions to air. As such, a detailed assessment of impacts to air quality during the operational stage of the proposal is not required.

6.7.5.3 Cumulative impacts

The preceding impact assessment combines the impacts of the proposal and the Heybridge Converter Station, so represents a cumulative impact assessment of the proposal with the Heybridge Converter Station.

Out of the nearby proposed and foreseeable projects identified for consideration, only the NWTD is in close proximity to the proposal, with a potential overlap in construction activities. All other projects are located over 5 km away and it is considered unlikely that cumulative air quality impacts would occur.

For NWTD, key activities for dust creation include the construction of the facility and associated infrastructure and occasional vehicle operation along access tracks, with the greatest potential for dust impacts being attributable to the construction phase. The adoption of the mitigation measures identified in Table 6.7-8 are expected to adequately manage dust emissions for the proposal. Potential cumulative air quality impacts would be temporary and/or managed through consultation with the relevant stakeholders and where practicable, coordinating construction programs (refer to MM Gen06).

6.7.6 Management, mitigation and monitoring

Proposed measures to minimise potential impacts on air quality are presented in Table 6.7-8. Mitigation measures in other sections that are relevant to the management of air quality impacts include:

- Section 6.2 (Potentially contaminated materials and acid sulfate soils), specifically measures which address the management of contaminated soils (including ASS) during construction, which would include the assessment and management of vapours and gas. Also measures which address appropriate handling and management of hazardous materials.
- Section 6.9 (Dangerous goods and environmentally hazardous materials), specifically measures which address spill prevention and clean up.
- Section 6.11 (Greenhouse gas and ozone depleting substances), specifically measures which address use of low emission fuel and maintenance of equipment and vehicles.
- Section 8.2 (Mitigation measures), specifically MM Gen06 which addresses consultation with relevant stakeholders to manage the interface of nearby projects under construction at the same time.

Together, these measures will minimise the potential air quality impacts of the proposal.

Table 6.7-8 Air quality – mitigation measures

Ref	Mitigation measure	Proposal stage
AQ01	The following best-practice dust management measures will be implemented during construction: • Regular wetting down of exposed and disturbed areas including stockpiles, in dry and windy weather. • Adjust the intensity of construction activities based on observed dust levels and weather forecasts (MM AQ02). • Minimise the amount of materials stockpiled and position stockpiles away from proposal site boundary (where practicable). • Regularly inspect dust emissions (MM AQ02) and apply additional controls as necessary.	Construction
AQ02	Conduct construction air quality monitoring including: • Daily monitoring of wind/weather forecasts and temperature and humidity using data from nearby automatic weather station and/or BoM. • Hourly monitoring of rainfall using data from nearby automatic weather station and/or BoM. • Daily monitoring of odour when odour generating works are being carried out, or when a complaint is made.	Construction

Ref	Mitigation measure	Proposal stage
	• Daily visual surveillance to confirm effectiveness of dust control mitigation and that there are no visible dust emissions beyond the boundary of the proposal site. • Investigations as required in response to a complaint. This may require review of monitoring data, frequency, and effectiveness of mitigation.	
AQ03	Plant and equipment will be maintained in a proper and efficient manner. Visual inspections of emissions from plant will be carried out as part of pre-acceptance checks.	Construction
AQ04	The following best-practice odour management measures will be implemented during relevant construction works: • The extent of opened and disturbed contaminated soil at any given time will be minimised. • Temporary coverings or odour supressing agents will be applied to excavated areas where appropriate. • Monitoring as outlined in MM AQ02.	Construction

6.7.7 Residual impacts

With appropriate mitigation measures in place, the residual impacts on air quality during construction are not significant, with the overall residual risk reduced to **negligible** (refer to Table 6.7-9). The proposal would pose a minimal risk for human health and, therefore, a quantitative assessment using dispersion modelling is not required to verify Air NEPM compliance for PM_{10}, $PM_{2.5}$ and combustion gases.

During adverse weather conditions, short-term dust annoyance may occur, however, the scale of this would not normally be considered sufficient to change the conclusion that overall, the effects would not be significant.

Table 6.7-9 Air quality – residual risk assessment

Potential impact	Earthworks	Construction	Trackout
Dust soiling effects	Negligible	Negligible	Negligible
Human health effects	Negligible	Negligible	Negligible

6.8 Waste management

This section provides an assessment of waste generation and waste that would be managed during construction and operation.

6.8.1 Assessment guidelines

The relevant sections of the EIS guidelines for the Heybridge Shore Crossing, and where these have been addressed in this EIS, are outlined in Table 6.8-1.

Table 6.8-1 Relevant EIS guidelines

Waste management – EIS guidelines	Section
Identify the source, nature, and quantities of all wastes, (liquid, atmospheric or solid) including marine wastes or sea debris, general refuse and by-products from the various stages of the process likely to be generated.	Section 6.8.4
Identify any Controlled Waste which may be generated by the proposal. Note: Controlled Waste is defined in the EMPC Act and associated regulations. This may include extracted sediment.	Section 6.8.4
Identify best practice methods and facilities available to collect, store, reuse, treat or dispose of each waste stream, including maintenance requirements.	Section 6.8.4, 6.5.5
Describe the source, nature, quantity of each controlled waste, and potential best practice methods of treatment, storage and disposal for each controlled waste.	Section 6.8.4, 6.8.5
Legislative and policy requirements	
Waste management measures must be in accordance with the following hierarchy of waste management, arranged in decreasing order of desirability: • Avoidance • Recycling/reclamation • Re-use • Treatment to reduce potentially adverse impacts • Disposal	Section 6.8.3, 6.8.5

6.8.2 Methodology

A desktop assessment was carried out and comprised:

- A review of applicable legislation.
- Identification of the likely waste streams.
- Estimates of the quantities of different types of wastes to be generated.
- Development of strategies to avoid, minimise and manage wastes generated during construction and operation.
- Identification of possible disposal facilities for wastes generated.

6.8.3 Applicable legislation

6.8.3.1 Waste and Resource Recovery Act 2022

The *Waste and Resource Recovery Act 2022* enabled the development of the Tasmanian Waste and Resource Recovery Strategy 2023-2026. Under the Act, the Strategy is an instrument to identify long term and short-term objectives to divert products and materials from disposal and landfill.

The Tasmanian targets for waste and resource recovery include:

- Reduce waste generated in Tasmania by 5% per person by 2025 and 10% by 2030.
- Achieve a 40% average recovery rate from all waste streams by 2025 and 80% by 2030.

The waste management hierarchy provides an order of preference for implementing waste management options. The primary objective of the waste management hierarchy is to reduce potential hazard to human health and the environment by avoiding or minimising the production of wastes. The waste management hierarchy is illustrated in Figure 6.8-1.

Figure 6.8-1 Waste management hierarchy

The proposal would follow the waste management hierarchy and would aim to avoid waste where possible and explore opportunities for reuse and recycling of waste prior to other disposal or treatment options. The proposal would also implement a waste management plan to establish specific targets for waste reduction and management.

6.8.3.2 Environmental Management and Pollution Control Act 1994

The EMPC Act is the primary piece of legislation governing potentially polluting activities in Tasmania. The Act is administered by Tasmanian EPA and ensures that activities do not have an unacceptable impact on

the environment or the community and that measures are taken to protect, restore and enhance the quality of the environment. The focus of the Act is preventing environmental harm from pollution and waste.

Categories of 'controlled waste' are defined under the EMPC Act. Controlled waste is the most hazardous category of waste and requires careful management. Controlled wastes that are potentially generated by the proposal are outlined in Section 6.8.4.1.

The Waste Management Regulations are used to regulate and manage controlled waste and some aspects of the general waste disposal within Tasmania.

6.8.3.3 EPA Tasmania (2018) Information Bulletin No. 105, Classification and Management of Contaminated Soil for Disposal

Information Bulletin No. 105, Classification and Management of Contaminated Soil for Disposal (Information Bulletin 105) defines the criteria used by the EPA for the classification of contaminated soil that requires treatment and/or off-site disposal and outlines the management of each classification in accordance with the Waste Management Regulations. The Contaminated Land and Acid Sulfate Soils Impact Assessment (Appendix C) classified all soil stockpiles present on the proposal site as having a preliminary classification of Low Level Contaminated Soil (Level 2). Refer to Section 6.2 for further discussion on contaminated soils.

Surplus soils generated during construction of the proposal that require offsite disposal would be classified and managed in accordance with Information Bulletin 105.

6.8.4 Waste generation

6.8.4.1 Construction

6.8.4.1.1 Waste streams

During the construction phase of the proposal, the anticipated indicative waste streams, quantity (total for construction) and management strategies are outlined in Table 6.8-2.

Table 6.8-2 Indicative waste generation and management

Waste type	Description/source	Quantity	Management
Wood	Pallets and cable drums, timber offcuts, crates, concrete formwork	50 pallets x 15 (750 kg)	Separated for reuse or recycling.
Paper and cardboard	General office wastes, packaging materials, packing boxes	150 kg	Separated for reuse or recycling.
Metal	Offcuts, unused metal sections, cable waste, concrete formwork	750 kg	Separated for reused or recycling.
Plastic	Packaging, cable waste	300 kg	Separated for reused or recycling.
Green waste	Cleared vegetation	Vegetation removal is not anticipated.	Weeds would be separated, sprayed and bagged and non-weed vegetation (if removed) would be mulched for reuse.

Waste type	Description/source	Quantity	Management
			Any excess green waste would be disposed as appropriate.
Spoil	Surplus spoil from excavations and earthworks	Quantities of spoil from excavation and earthworks to be determined during detailed design.	It is anticipated any material extracted to establish the launch pads would be reused. If encountered, acidic soils would be managed in accordance with Section 6.2.
HDD drilling fluids and mud	Drilling fluid (bentonite) and mud (cuttings)	Drilling fluid and mud (cuttings) are managed in a closed system (recycled). Cuttings generated during drilling and at the completion of drilling would be reused as a priority.	Cuttings would be tested and treated where ASS are encountered in accordance with Section 6.2.
General domestic	Food scraps, aluminium cans, glass bottles, plastic and paper containers	Onsite crew 10 pax x 20 kg each (200 kg)	Waste would be separated and recycled where feasible, and residual waste would be collected by a contractor and disposed off-site at a suitably licensed facility.
Sewage	Biological wastes from on-site septic systems	50L(kg)/person/day	Waste would be collected by a contractor and disposed off-site at suitably licensed facility or through existing sewage treatment system.
Hydrocarbon	Spills from construction plant, refuelling of equipment, machinery, vehicles, used lubricants and oils	To be determined during further detailed design	Any spills would be cleaned up, with the clean-up material placed in dedicated covered skip bin for collection and off-site disposal at a suitably licensed facility. Used liquids would be collected in tanks and transported to a suitably licensed facility.
Commercial waste	Empty fuel drums, filters, fuel storage containers, herbicide and pesticide storage containers	To be determined during further detailed design	When in use, storage containers would be stored in appropriately bunded areas. Empty containers would be collected by a contractor for off-site disposal at a suitably licensed facility.

Existing waste treatment and disposal facilities near the proposal site include the Heybridge Asbestos Landfill, Heybridge East Waste Depot and the Heybridge Inert Waste Depot, all located between 1.9 and 2.2 km south-west of the proposal site from Minna Road and Devonshire Drive. There are also additional waste facilities that are located at Burnie and Ulverstone.

The Burnie Resource Recovery Centre accepts asbestos, concrete, green waste, steel, timber and waste oils, which may be generated during the proposal's construction or operational stages. Burnie City Council currently transports residual waste to the Dulverton, Port Latta or Ulverstone landfills following the extraction of reusable and recyclable products at its Resource Recovery Centre.

Further consultation with councils and various waste facilities would be carried out prior to any proposal waste disposal to understand the capacity at the facilities to accept different types of waste streams.

6.8.4.1.2 Controlled waste

Controlled wastes are not anticipated to be generated by the proposal.

6.8.4.1.3 Contaminated soil

The requirements for the management of contaminated soil and construction waste (for instance, containing heavy metals) is detailed in the Information Bulletin 105. The EPA uses four categories to classify contaminated soil and construction waste. These categories determine where and how the soil and construction waste can be disposed.

Surplus soils generated during construction works that require offsite disposal must be classified and managed in accordance with Information Bulletin 105. Where soils are classified as 'contaminated soil' (Level 3) or 'contaminated soil for remediation' (Level 4), these soils are to be managed in accordance with the Waste Management Regulations and only transported to a premises authorised by EPA to accept such wastes. Should the soils be classified as 'low level contaminated soil' (Level 2), MLPL may apply to EPA for a permit to retain the soils within the proposal site.

6.8.4.2 Operation

There would be no 'day to day' wastes generated during operation of the proposal. General maintenance activities (refer to Section 2.4) are not expected to generate wastes. Wastes would only be expected if there is an unlikely event such as an anchor strike, which may result in replacement of sea cable infrastructure. Wastes would be disposed of in Victoria.

6.8.5 Management, mitigation and monitoring

Proposed measures to minimise potential impact associated with the generation of waste during construction are presented in Table 6.8-3. Mitigation measures in other sections that are relevant to the management of waste materials include:

- Section 6.2 (Potentially contaminated materials and acid sulfate soils), specifically measures which address the management of contaminated soils, including ASS, excavated during construction and the appropriate handling and management of hazardous materials.
- Section 6.3 (Marine natural values) specifically measures which address the management of disused outfall pipelines.
- Section 6.5 (Water quality), specifically measures which address the management of contaminated surface and groundwater.
- Section 6.9 (Dangerous goods and environmentally hazardous materials), specifically measures which address spill prevention and clean up.

Together, these measures will minimise the potential impacts associated with the generation of waste.

Table 6.8-3 Waste management – mitigation measures

Ref	Mitigation measure	Proposal stage
WM01	Prior to construction commencing, develop and implement a waste management plan, for the identification of waste management strategies, in accordance with the waste management hierarchy. The waste management plan will include (at a minimum): • The waste mitigation measures in this EIS. • Identification of a designated waste area on site, where all waste (and recyclables) would be stored or stockpiled. • Responsibilities of the key personnel implementing this plan. • Waste area inspection frequency.	Construction
WM02	All waste will be assessed, classified, managed, transported and disposed of in accordance with the *Environmental Management and Pollution Control (Waste Management) Regulations 2020*.	Construction
WM03	If hazardous waste, controlled waste (e.g., asbestos containing materials) or contaminated soil is encountered, it will be handled and managed in accordance with relevant legislation, codes of practice and Australian standards.	Construction
WM04	Construction waste will be minimised by accurately calculating materials brought to the site and limiting materials packaging, and maximising reuse where feasible and reasonable.	Construction
WM05	Waste streams will be segregated, using appropriately labelled and managed bins, to avoid cross-contamination of materials and maximise reuse and recycling opportunities.	Construction
WM06	A materials tracking system will be implemented for material transferred between the proposal site and offsite licensed waste management facilities.	Construction
WM07	*Not relevant to this proposal*	

6.9 Dangerous goods and environmentally hazardous materials

This section provides an assessment of potential risks associated with dangerous goods and environmentally hazardous materials required for construction of the proposal.

6.9.1 Assessment guidelines

The relevant sections of the EIS guidelines for the Heybridge Shore Crossing, and where these have been addressed in this EIS, are outlined in Table 6.9-1.

Table 6.9-1 Relevant EIS guidelines

Dangerous goods and environmentally hazardous materials - EIS guidelines	Section
Discuss impacts of the proposal in relation to dangerous goods and environmentally hazardous materials, including:	
The nature, quantity and storage location of all environmentally hazardous materials including Dangerous Goods (as defined in the *Australian Code for the Transport of Dangerous Goods by Road and Rail*) that will be used during the construction and operation of the proposal.	Section 6.9.4
A map showing the location of temporary and permanent storage areas for fuels, oils, and other dangerous goods or chemicals.	Figure 2-2, Figure 2-3
The measures (such as bunded areas or spill trays) to be adopted to prevent or control any accidental releases of dangerous goods and environmentally hazardous materials.	Section 6.9.5, 6.2.6, 8.2
Contingency plans for when control measures, equipment breakdowns or accidental releases to the environment occur, including proposed emergency and clean-up measures and notification procedures.	Section 6.9.5, Section 6.2.6, Section 8.2
Identify any safety management requirements for the protection of human health and safety affecting the community.	Section 6.9.5, Section 8.2
Legislative and policy requirements	
Reference the Australian Code for the Transport of Dangerous Goods by Road and Rail	Section 6.9.3.3

6.9.2 Methodology

The purpose of this section is to demonstrate best environmental management of dangerous goods and hazardous materials in a way that minimises environmental risks during the construction of the proposal.

The desktop assessment included:

- Consideration of the relevant regulatory framework and guidelines.
- Identification of dangerous goods and hazardous materials requiring use and storage at, or transport to, the proposal site during construction and operation.
- Potential risks that can arise due to these dangerous goods or hazardous materials.
- Identification of measures to manage the storage, transport, handling and disposal of these materials.

Impacts to surface or groundwaters have been assessed in the Section 6.5. Other work, health and safety hazards are not specifically considered in this EIS. These issues would be addressed by the relevant construction contractor in accordance with relevant guidelines and legislative requirements.

6.9.3 Applicable legislation

6.9.3.1 Dangerous Goods (Road and Rail Transport) Act 2010

The *Dangerous Goods (Road and Rail Transport) Act 2010* provides the framework to regulate the transport of dangerous goods by road and rail in order to promote public safety and protect property and the environment. The Act gives effect to the standards, requirements and procedures of the Australian Code for the Transport of Dangerous Goods by Road and Rail. Refer to Table 6.9-2 for further details of the proposal's compliance to the *Dangerous Goods (Road and Rail Transport) Act 2010*.

6.9.3.2 Australian Code for the Transport of Dangerous Goods by Road & Rail

The relevant authority for the transport of hazardous substances and dangerous goods is WorkSafe Tasmania, which can provide authorisations under the Australian Code for the Transport of Dangerous Goods by Road and Rail in Tasmania. The code outlines the requirements for classification, vehicle transfer and other details for dangerous goods.

The Code provides definitions for Class 9 – Dangerous / Environmentally Hazardous Substances. The substances can include asbestos, lithium batteries, solid or liquid substances which are dangerous to the aquatic environment and ammonium nitrate-based fertilisers. Refer to Table 6.9-2 for further details of the proposal's compliance to the code for the transport, use or storage of any substances under the code.

6.9.3.3 National Code of Practice for Storage and Handling of Workplace Dangerous Goods NOHSC:2017(2001)

The National Code of Practice for Storage and Handling of Workplace Dangerous Goods NOHSC: 2017 (2001) provides guidance on how to comply with the National Standard for the Storage and Handling of Workplace Dangerous Goods, with consideration of dangerous goods such as gases, flammable liquids and solids, oxidising, toxic and corrosive substances. The code provides that hazard identification involves identifying all physical components, systems and activities which may have the potential to harm the safety and health of a person and/or cause damage to property and the environment. An example of hazards that should be identified is potential ignition sources. Refer to Table 6.9-2 for further details of the proposal's compliance to the code's guidance.

6.9.4 Potential impacts

6.9.4.1 Construction

During construction of the proposal, potentially dangerous goods and hazardous materials are anticipated to be temporarily used, stored on and transported to and from the proposal site. This involves the following:

- **Use:** The potentially hazardous materials include petrol, diesel, lubricating and hydraulic oils and greases and contaminated waste.
- **Storage:** The method of storage would vary depending on the substances but would include drums of various sizes, small and intermediate bulk containers, bags, pallets and bunded areas where appropriate. Volumes of potentially hazardous materials such as petrol, diesel and lubricants would be stored on-site.

- **Transport**: The volume of potentially hazardous materials required to be transported to and from site would depend on the proposal design and requirements of the proposal construction traffic vehicles. Unexpected finds and potential handling and transport of contaminants, including potential presence of asbestos contaminated materials at the proposal site.

Specific proposal components that involve the storage or handling of dangerous goods or hazardous materials include:

- Fuel for machinery and vehicles (several thousand litres).
- Hydraulic oil and various lubricants for machinery (several thousand litres).

Refuelling and maintenance of equipment would likely occur on site. Dangerous goods and environmentally hazardous materials can present a risk to the environment or human health if these are inadvertently released into the nearby environment as a result of a spill or exposure event, or as a result of incorrect storage or disposal.

Spills of these materials to waterways, drainage channels and wetlands can present risks to aquatic flora and fauna ranging from direct toxicity impacts to smothering effects (e.g., from hydrocarbons). Spills of these materials to ground can present similar risks if the water table is reached by the spilt materials or washed into drainage lines during rains. The key tools for managing this risk are suitable storage, bunding, handling and disposal as outlined in Section 6.9.5. The storage areas for fuels, oils, and other dangerous goods or chemicals would therefore be located in the most appropriate locations to best manage risk for the work that is being done on the proposal site. Those locations would be identified and varied from time to time as part of the implementation of these mitigation measures.

6.9.5 Management, mitigation and monitoring

Proposed measures to minimise risks and potential impacts associated with dangerous goods and environmentally hazardous materials are presented in Table 6.9-2. Mitigation measures in other sections that are relevant to the management of dangerous goods and environmentally hazardous materials include:

- Section 6.2 (Potentially contaminated materials and acid sulfate soils), specifically measures which address the identification and handling of contaminated materials and the storage of dangerous goods or environmentally hazardous materials.
- Section 6.5 (Water quality), specifically measures which address the management of potentially contaminated water.
- Section 6.8 (Waste management), specifically measures which address appropriate classification, handling and disposal of waste materials, including contaminated waste.
- Section 8.2 (Mitigation measures), specifically measures which address emergency response and incident management (MM Gen05).

Together, these measures will minimise the potential for impacts associated with dangerous goods and environmentally hazardous materials.

Table 6.9-2 Dangerous goods and environmentally hazardous materials – mitigation measures

Ref	Mitigation measure	Proposal stage
DG01	Ensure spill prevention and clean up equipment is readily available and accessible in the vicinity of all plant and machinery, including mobile and fixed fuel storages. Spill prevention and clean up procedures will be in accordance with the following principles: • Adequate training and site induction for personnel for the handling of dangerous goods and environmentally hazardous materials. • Install trays, thick plastic mats or similar beneath stationary machinery and equipment to protect the soil from oil/fuel spills and leaks. • Install spill trays immediately if there is any potential or, evidence of, leakage. • Maintain a supply of oil-absorbent material.	Construction
DG02	The transport of dangerous goods will be in accordance with the *Australian Code for the Transport of Dangerous Goods by Road and Rail*, and the *Dangerous Goods (Road and Rail Transport) Act 2010*, including, but not limited to measures for: • Classification. • Documentation. • Safety equipment and procedures.	Construction

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6.9.6 Residual impacts

With the implementation of recommended mitigation measures for managing potential spill or leaks of hazardous materials, the residual risk of impacts to human health and environment is considered to be **low**.

6.10 Marine and coastal

This section provides a summary of the findings of the Marine Ecology and Resource Use Impact Assessment provided in Appendix D, to the extent potential impacts of the proposal on marine and coastal areas not addressed in other sections.

This section summarises the assessment outcome for the marine and coastal area within the Tasmanian jurisdiction for the proposal, which includes the Heybridge nearshore area, denoted by Tasmanian coastal waters (within 3 NM of the shore). The Commonwealth marine waters beyond 3 NM are outside the scope of this EIS and have been considered in the Commonwealth and Victorian combined EIS/EES for the project (refer to Section 1.3).

6.10.1 Assessment guidelines

The relevant sections of the EIS guidelines for the Heybridge Shore Crossing, and where these have been addressed in this EIS, are outlined in Table 6.10-1.

Table 6.10-1 Relevant EIS guidelines

Marine and coastal – EIS guidelines	Section
Identify any potential impacts of the proposal on marine and coastal areas not addressed in other sections. It should identify measures to avoid and mitigate any possible adverse impacts and assess the overall impacts on marine and coastal areas following implementation of the proposed avoidance and mitigation measures. Cross referencing should be made to other relevant sections dealing with conservation values (marine flora and fauna, geoconservation) and coastal impacts.	Section 6.10.4, 6.10.5 and 6.10.6
Legislative and policy requirements	
It must be demonstrated that the proposal is consistent with the objectives and requirements of all relevant marine and coastal policies and legislation, including the *Living Marine Resources Management Act 1995*, *State Policy on Water Quality Management 1997*, and the *Tasmanian State Coastal Policy 1996*.	Section 6.10.3

6.10.2 Existing conditions

6.10.2.1 Physical environment

The proposal site is located at the southern extent of Bass Strait, in the Tasmanian coastal waters. The Bass Strait regional climate has subtropical high-pressure systems resulting in warm, dry summers and sub-polar low-pressure systems leading to wet winters.

In the wet winter months (May to August), the wind conditions generally see strong to gale-force westerlies which can persist for weeks at a time in Bass Strait. Cold fronts and strong westerly winds generally move from west to east across Bass Strait, with associated winds from the west, north-west and south-west.

The Bass Strait current and wave conditions are influenced by three different water masses: the northern Bass Strait, south Tasman Sea and the East Australia Current, all of which contribute to a high-energy environment. Wave climate in Tasmanian coastal waters can induce bed sediment transport and resuspension of fine-grained seabed sediments.

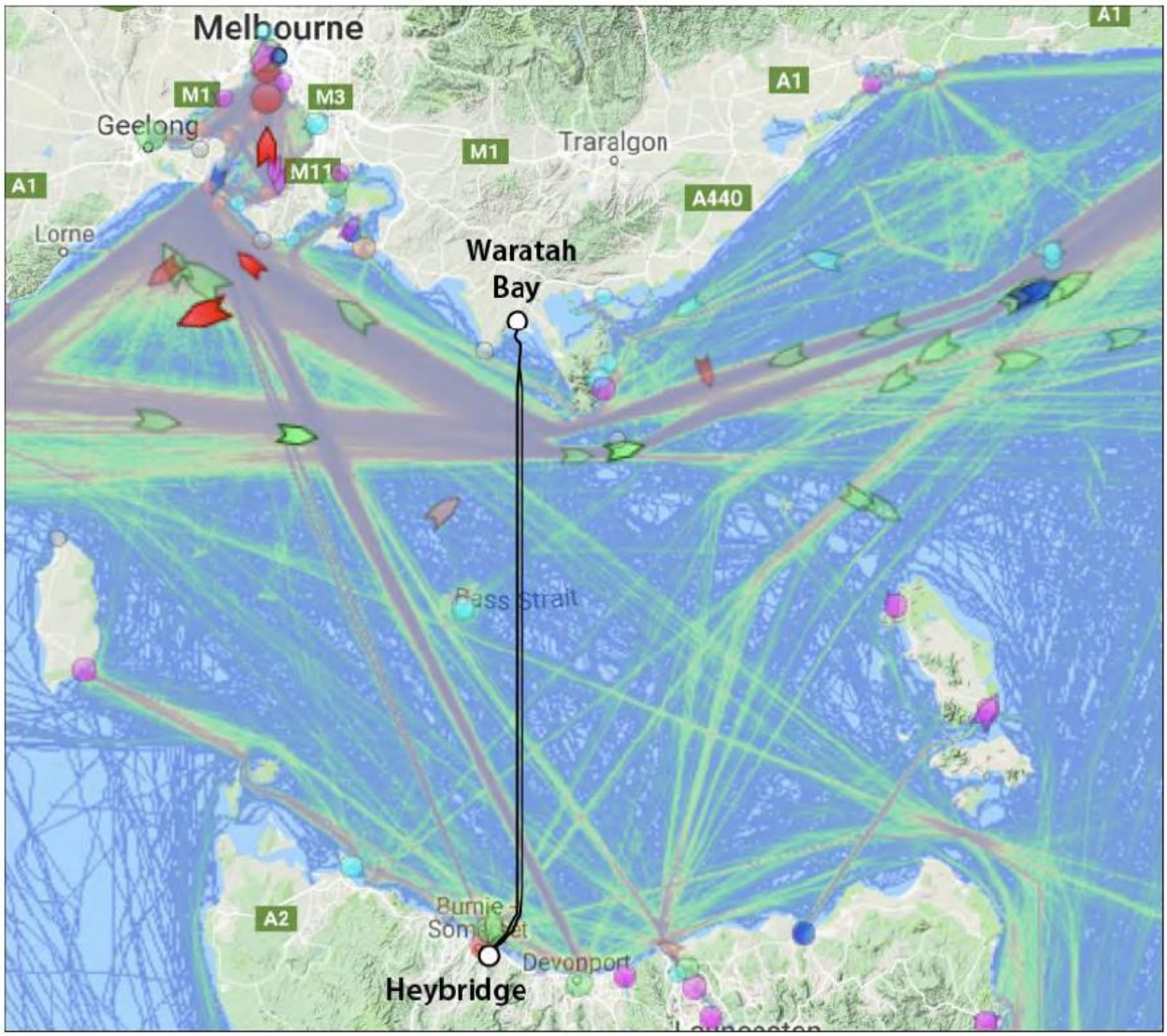
The average depth of Bass Strait is around 50 m and in Tasmanian coastal waters, the seabed slopes from the coastline to the 40 m depth contour. From the coastline to 3 km offshore there is presence of high relief reef habitat, which is indicated by sharp changes in depth. Beyond 3.5 km offshore the seabed is relatively smooth and flat and reaches the 40 m depth at approximately 6.5 km offshore.

6.10.2.2 Navigation and shipping traffic

There are numerous shipping routes in Bass Strait which are used by commercial cargo ships, bulk carriers, passenger ferries and commercial fishing vessels. The existing navigation and shipping data was obtained from the following sources:

- AMSA.
- Spirit of Tasmania I and II which are ferries between the ports of Geelong and Devonport.
- Automatic Identification System for vessel identification and tracking, and shipping traffic density (Fleetmon 2019).
- Consultation with fishery representatives regarding commercial fishing grounds, boating and recreational fishing areas.

The tracked vessel activity in Bass Strait in March 2019 is shown on Figure 6.10-1, which shows an annual shipping traffic density. The proposal's alignment would pass through a 40 km wide section of the main shipping lane to the south-west of Wilson Promontory (Victoria), and the alignment would also intersect a major shipping route between Melbourne and Devonport, which includes container ships and bulk carriers and combined cargo and passenger ferries. Other minor shipping routes are also intersected by the proposal alignment, including near the proposal site in Tasmanian coastal waters (shown in green in Figure 6.10-1).



Source: Fleetmon (2019). Ship type icons: red = oil/chemical tanker; green = container or bulk cargo ship; light blue: offshore support vessel; orange = fishing vessel; purple = pleasure craft. Black lines denote the project's proposed alignment. The various ship types (coloured vessel icons) shown in this figure are incidental to the day that the marine traffic density snapshot was taken (i.e., 25 March 2019).

Figure 6.10-1 Annual cumulative marine traffic density in Bass Strait

6.10.2.3 Ports and harbours

The main ports near the proposal site along the north coast of Tasmania are Burnie, Devonport and Bell Bay ports, with Burnie being the closest to the proposal area at Heybridge about 8 km west. Smaller ports and harbours such as Port Latta and Stanley, about 68 km and 55 km west of Heybridge respectively.

The larger Tasmanian islands in Bass Strait also contain ports or harbours that undertake vessel tracking and coastal traffic management, including Port of King Island, Lady Barron harbour, Flinders Island and Cape Barren Island terminal.

6.10.2.4 Commercial fisheries

The South East Trawl Fishing Industry Association (SETFIA 2022) identified the commercial fishing sectors near the proposal's seabed alignments. The seafood and fishing industries are broadly represented by Seafood Industry Australia and Commonwealth Fisheries Association at the Commonwealth level, and at the State level some bodies include Tasmanian Seafood Industry Council and Tasmanian Rock Lobster Fishermen's Association.

In the SETFIA study, a study area was defined by a 250 km long and 16 km wide marine corridor along the proposal's proposed alignment (SETFIA 2022). Commercial fishing areas outside the 16 km wide zone are considered to be outside the proposal's area of direct influence. Table 6.10-2 provides a list of managed fisheries relevant to the proposal within the 16 km wide study area with catch data within the last 10 years, defined as 'active' fisheries (SETFIA 2022). Four of the 11 are Commonwealth managed, and three are Tasmanian State managed.

Table 6.10-2 Active commercial managed fisheries within the marine study area in Bass Strait

Tasmanian	Commonwealth
• Abalone Fishery • Rock Lobster Fishery • Scalefish Fishery	• SESSF – Commonwealth Trawl Sector • SESSF – Shark Gillnet and Shark Hook Sector • Southern Squid Jig Fishery • Bass Strait Central Zone Scallop Fishery

Source: SETFIA (2022). SESSF = Southern and Eastern Scalefish and Shark Fishery

The fishing technique and target species specific to Tasmanian-managed fisheries are shown in Table 6.10-3. All of which below intersect the proposal's seabed alignments in Bass Strait.

Table 6.10-3 Commercial fisheries target species, technique and catch data

Fisheries	Fishing technique	Target species	Total allowable catch (t)	Catch in 2019-20 season (t)
Commonwealth managed fisheries				
SESSF Commonwealth Trawl Sector (operates year-round)	• Otter-board trawls (mid-water or pelagic trawling) • Otter-board trawls (demersal or bottom-trawling) • Danish seine	• Gummy shark, school shark, silver trevally, redfish, jackass morwong, blue grenadier, and tiger flathead • Gummy shark, school shark, silver trevally, redfish, jackass morwong, and tiger flathead • Tiger flathead, eastern school whiting	22,857	18,118
SESSF Shark Gillnet and Shark Hook Sector	• Demersal gillnet, gillnets, fish traps and automatic longlines • Demersal longline, shark hook	• Gummy shark and byproduct fishes such as school shark, elephantfish and sawsharks • Gummy shark and deepwater blue eye trevalla and pink ling	2,516	2,268
Southern Squid Jig Fishery	Squid jig	Gould's (arrow) squid	N/A	480

Fisheries	Fishing technique	Target species	Total allowable catch (t)	Catch in 2019-20 season (t)
Bass Strait Central Zone Scallop Fishery	Bottom-towed scallop dredge harvester	Commercial scallop and to a lesser extent, the doughboy scallop	N/A	N/A
Tasmanian managed fisheries				
Abalone Fishery	Diving	Black-lipped and green-lipped abalone	1,019	1,011
Rock Lobster Fishery	Rock Lobster pots	Rock Lobster	1,051	991
Scalefish Fishery	Various method including pot, hook and line, gillnet, squid jig, beach seine, Danish seine, purse seine	Australia salmon, banded morwong, tiger flathead, eastern school whiting, bluethroat and purple wrasses, bastard and striped trumpeters, warehou, flounder, and silver trevally	N/A	115

Source: SETFIA (2022).

Table 6.10-4 Commercial fisheries activities and likelihood of occurrence in marine study area

Fisheries	Subsectors	Fishery/subsector activity	Likelihood of occurrence
Commonwealth managed fisheries			
SESSF – Commonwealth Trawl Sector (operates year-round)	Otter-board mid-water or pelagic trawling subsector	Targets blue grenadier (*Macruronus novaezelandiae*), a deep-water fish caught mainly over continental shelf edge waters to the east and west of Bass Strait Mid-water trawling is unlikely to occur within the marine study area as almost all trawling is south-east Australia is demersal (bottom) trawling	Remote
	Otter-board demersal or bottom-trawling subsector	Targets blue grenadier (*Macruronus novaezelandiae*), mirror dory (*Zenopsis nebulosa*), pink ling (*Genypterus blacodes*) and many others in the marine study area. The trawl vessels are typically 18-28 m long and involves towing two boards behind the fishing vessel. The boards on the trawlers can spread as wide as 100-120 m when towing. The trawl, boards and the cable connecting the boards would all have contact with the bottom of the seabed.	Very likely
	Danish seine subsector	Mainly used to catch fish species found on sandy or muddy seafloor areas and the main species targeted using Danish seine gear are tiger flathead (*Platycephalus richardsoni*) and eastern school whiting (*Sillago flindersi*). Weighted rope attached to an anchor is deployed sinking to the bottom of the seabed, the Danish seine net and another weighted rope is also sunk, the gear is towed until the ropes come together and the net scoops up fish back to the vessel.	Very likely
SESSF Shark Gillnet and Shark Hook Sector	Demersal gillnet shark fishery subsector	Targets gummy shark (*Mustelus antarcticus*), however School shark (*Galeorhinus galeus*), elephantfish (*Callorhinchus milii*) and sawsharks (*Pristiophorus cirratus* and *P. nudipinnis*) are also caught as byproducts.	Very likely

Fisheries	Subsectors	Fishery/subsector activity	Likelihood of occurrence
		Primarily uses bottom-set gillnet, which are not towed but the fish are caught in the filaments of the gillnet mesh.	
	Demersal longline fishery subsector	Demersal (bottom) longlines are set horizontally along the seafloor and are held in place using anchors. The longline can be 1.5-5 km in length and may have several thousand hooks. Each line is left for around 6-8 hours before being hauled.	Very likely
Southern Squid Jig Fishery	N/A	Targets Gould's squid (*Nototodarus gouldi*), also known as arrow squid. The fishery is single method, low impact and single species fishery, managed by limiting effort and number of boats, as well as regulating gear allowance.	Very likely
Bass Strait Central Zone Scallop Fishery	N/A	The Commonwealth zone operates in Central Bass Strait in between the Victorian and Tasmanian scallop fisheries, beyond the Tasmanian 24 NM zone (beyond the proposal area in Tasmanian coastal waters). Single species fishery targets dense aggregations of commercial scallop using scallop dredges. The scallop harvesters are towed across the seabed, comprised of steel mesh cages 4.4 m wide and can penetrate 15 cm into the seabed.	Very likely (in the marine study area, less relevant for Tasmanian coastal waters)
Tasmanian managed fisheries			
Abalone Fishery	N/A	Targets blacklip abalone (*Haliotis rubra*) with greenlip abalone (*Haliotis laevigata*) typically accounting for around 5% of the total wild harvest. Blacklip abalone is usually aggregating on intertidal rocky shores from low-tie mark to depths of 25 m, and Greenlip abalone in Tasmania are commonly found on reef/sand edge, seagrass habitats. The abalone fishing area of Bass Strait Block 46 is relevant to the proposal, in the nearshore area at Heybridge. There is known presence of blacklip abalone near Heybridge.	Possible
Rock Lobster Fishery	N/A	Targets the southern rock lobster (*Jasus edwardsii*), and small amounts of eastern rock lobster (*Jasus verreauxi*) (less than 1% of the fishery). Baited pots are used to harvest lobster all around Tasmania, with most of the catch from the western half of the state. One record of the southern rock lobster was identified between Burnie and Devonport, about 13 km from the proposed alignment of the proposal.	Remote
Scalefish Fishery	N/A	The fishery has diverse species and gear, with many vessel types and sizes. Marine scalefishes including salmon, flathead and marine invertebrates such as calamari, squid and octopus are commercially targeted for catches. Commercial scalefish fisheries are generally absent from Tasmanian coastal waters near the proposal site. However, the nearshore area at Heybridge is used by recreational fishers.	Rare

6.10.2.5 Recreational activities

6.10.2.5.1 Recreational fishing

Recreational fishing is undertaken in the Tasmanian nearshore waters either from the land (e.g., beach fishing) or from small boats. In addition, recreational game fishing is undertaken in offshore waters generally outside the 3 NM limits or further offshore.

In Tasmania, recreational fishing data between Burnie and Penguin surveyed by Lyle et al. (2019) provides information relevant to the proposal site at Heybridge. The North West Coast region was surveyed during 2017-18 and the target species and catch numbers are shown in Table 6.10-5.

Table 6.10-5 Recreational fishing activities and likelihood of occurrence in marine study area

Target groups or species	2017-18 catch (count)
Flathead	116,124
Australian salmon	19,490
Mullet	7,057
Flounder	5,672
Gurnard	4,918
Whiting	4,630
Pike	4,564
Sharks and rays	4,246
Cod	3,894
Wrasse	2,774
Scalefish	2,010
Barracouta	2,002
Silver trevally	1,841
Striped trumpeter	<1,000
Bastard trumpeter	<1,000
Black bream	<1,000
Southern garfish	<1,000
Jackass morwong	<1,000
Leatherjackets	<1,000

In the annual recreational catch surveyed, flatheads and Australian salmon account for the highest number of catches. Many of the fish groups or species are associated with estuaries, reefs and shallow coastal areas such as sand banks and seagrass beds. Some fish species that occupy deeper waters of Bass Strait would also have overlaps with shallow coastal waters where nearshore habitats are used as nurseries.

For recreational fish catches reported in Heybridge, Fishbrain (2022) also provides fisher reports data. The reported fish and invertebrates caught at Heybridge were limited and very low in species diversity, including the following:

- Australian salmon (*Arripis spp.*).
- Blue-throated wrasse (*Notolabrus tetricus*).
- Yellow-eye mullet (*Aldrichetta forsteri*).

- Black barred halfbeak (*Hemiramphus far*).
- Common thresher shark (*Alopias vulpinus*).
- Broadnose sevengill shark (*Notorynchus cepedianus*).
- Southern calamari (*Sepioteuthis australia*).

In general, most recreational fishing at the Heybridge proposal site is based on shore-fishing that targets Australian salmon, flatheads, mullet, and various shark species.

6.10.2.5.2 Recreational boating

Recreational boating is popular along the north coast of Tasmania and the boating types cover power boats, jet skis, yachts, kayaking, sea-going canoes, which are accessible from the coastal towns. Public and private boat ramps are available at Wynyard, Burnie, Ulverstone and Devonport.

Most recreational boating takes place within coastal waters, especially within sheltered waters such as the Blythe River and Blythe Estuary near the proposal site at Heybridge. There is expected to be some alongshore small boat transits between coastal towns however most recreation boats would remain close to the towns. Near the seabed alignments there is expected to be very low numbers of recreational boaters using the nearshore waters at Heybridge. Potential interaction between the proposal and recreational boating is assessed in Section 6.10.4.

6.10.2.5.3 Other recreational activities

Other than fishing and boating, recreational activities available at the north coast of Tasmania in nearshore environments at Heybridge can include swimming, fishing and beach activities. Tioxide Beach, Titan Point, and Blythe Heads offer opportunities including nearshore shallow water snorkelling, rocky reef diving, spear fishing, collecting for marine invertebrates and nature walks via pedestrian access tracks.

There is an access track from Bass Highway to the beach opposite the former Tioxide Australia plant, which provides four-wheel drive access for vehicles to the beach for leisure, fishing and sport.

6.10.3 Applicable legislation

6.10.3.1 Living Marine Resources Management Act 1995

The LMRM Act is the principal legislation that promotes the sustainable management of living marine resources in Tasmania, which enables protected areas to be declared. The purpose of this Act is to protect vulnerable fish species and their habitats and allow the establishment of scientific reference areas and public education in the resources, protection and use of the marine environment.

Fishing Tasmania manages Tasmania's commercial fisheries and provides regulations for each commercial fishery, for example the Abalone Fishery is regulated under the LMRM Act and the Fisheries (Abalone) Rules 2017.

6.10.3.2 Water Management Act 1999

The *Water Management Act 1999* provides for the use and management of Tasmania's freshwater resources, including watercourses, dispersed surface water (e.g., from rainfall or surface expression of groundwater) and groundwater. The focus of the Act is on management of water as a resource. As the proposal would not involve the management of water as a resource, this Act has limited relevance to the proposal beyond other water quality management regulations.

6.10.3.3 State Policy on Water Quality Management 1997

The *State Policy on Water Quality Management 1997* aims to protect marine ecosystem water quality and recreational water quality and aesthetics, and also provides a framework to manage water quality for all Tasmanian surface waters.

Insofar as this policy is relevant to the proposal, it is addressed in Section 6.5.

6.10.3.4 Tasmanian State Coastal Policy 1996

The *Tasmanian State Coastal Policy 1996* provides guidance on coastal planning in Tasmania. Its three guiding principles are that natural and cultural values of the coast shall be protected, the coast shall be used and developed in a sustainable manner and integrated management and protection of the coastal zone is a shared responsibility. The proposal would seek to protect and avoid impacts to the natural and coastal values of the coast at Tasmania nearshore.

6.10.4 Potential impacts

This section provides an assessment of the potential impacts of construction and operation on the marine resource uses considered in Section 6.3.

The marine resource uses assessed include:

- Navigation and shipping traffic.
- Commercial fisheries.
- Recreational fishing, boating, and water sports.
- Other marine resource uses.

6.10.4.1 Construction

6.10.4.1.1 Navigation and shipping traffic

The proposal's proposed alignment would intersect major and minor shipping routes in Bass Strait, with relatively higher density near the Victorian shores and relatively fewer shipping routes near the proposal site at Heybridge, in Tasmanian coastal waters.

The potential impacts on navigation and shipping traffic include:

- Impacts of temporary exclusion zones on shipping traffic.
- Impacts of possible permanent exclusion zones on shipping traffic.

In Tasmanian coastal waters, the main ports are the Port of Burnie, 6 km west of the proposed seabed alignments, and Devonport Port, about 34 km east. Container ships and ferries such as the Spirit of Tasmania I and II regularly transit between Devonport Port and Geelong Port, which is intercepted by the project alignment at about 34 km north of Heybridge (in Commonwealth marine waters).

The cable lay ship would lay the cables progressively across Bass Strait and during cable laying it would be restricted in manoeuvrability. Signals and lighting would be indicated on the cable lay ship in accordance with AMSA requirements to notify other vessels. Commercial fishing vessels are required to keep at least 1 NM away from the cable lay ship displaying signals and would not operate within this zone.

The potential impact on shipping traffic and the assessment of residual impact significance rating is provided in Table 6.10-6.

Table 6.10-6 Shipping traffic – potential impacts and residual impact significance rating

Construction activity	Potential impact (Tasmanian coastal waters)	Receiver	Sensitivity of receiver	Magnitude of impact	Residual impact significance
Cable laying	Temporary moving exclusion zone placed around the cable lay ship would mean passing ships need to detour around the cable lay ship.	Shipping traffic	Low	Minor	Very low

The potential impacts of the proposed alignment on navigation in terms of magnetic compass deviation are addressed in Section 6.3.5.2.1, as an operational impact when the HVDC cables are energised.

6.10.4.1.2 Commercial fisheries

The potential impacts on commercial fisheries within Bass Strait (Commonwealth and Tasmanian waters) include:

- Interference with access to commercial fishing grounds by the proposed temporary exclusion zones around the cable lay ship and shore-end construction activities.
- Interference with access to commercial fishing grounds by a temporary anchoring and fishing exclusion zone over the bundled cables while they are initially laid but not yet installed and buried in the soft-sediment seabed.
- Direct impacts on commercial fishery resources (e.g., fish stocks, squid, rock lobster abalone etc) and resource habitats (e.g., pelagic fishery habitats and demersal fishery habitats).
- Indirect impacts on food sources of commercial fishery resources (e.g., construction impacts on water column or benthic macroinvertebrate food resources, which can impact on pelagic fish or benthic/demersal fish that are targeted by fisheries).

Direct impacts to commercial fisheries can occur if the targeted fish are impacted, whereas indirect impacts refer to if the food or habitat of fish are impacted, which can in turn impact the fish population, leading to potential indirect impacts on the commercial fishery.

The cable lay ship would have a moving exclusion zone around it during cable laying activities, including a buffer zone around the cable that is still suspended behind the ship. Two guard vessels would accompany this cable lay ship which would communicate with approaching commercial fishing vessels, or alert other vessels of the presence of the cable lay ship.

The main commercial fisheries and vessels expected along the zone of the proposal's alignment in Bass Strait is expected to be scallop dredging and demersal (bottom) fishing targeting gummy sharks and other demersal fish. Fishing in these fisheries would be disrupted during cable laying activities, and fishing in alternative areas would be required. With prior and ongoing communication to potentially affected commercial fishing stakeholders through the implementation of MM MERU06, the residual impacts are expected to have a significance rating of **very low**, as provided in Table 6.10-7.

Potential impacts on fish habitats and food resources for commercial fisheries are assessed in terms of marine ecology and marine habitats in Section 6.3 and were assessed to have a residual impact significance rating ranging from low to **very low**. Therefore, the residual impact significance rating for commercially targeted fish is also considered to be **low** (refer to Table 6.10-7).

Table 6.10-7 Commercial fisheries – potential impacts and residual impact significance rating

Construction activity	Potential impact (Tasmanian coastal waters and offshore)	Receiver	Sensitivity of receiver	Magnitude of impact	Residual impact significance
Cable laying	Temporary moving exclusion zone placed around the cable lay ship would lead to commercial fishing operations being disrupted and alternative fishing area to be used for scallops, gummy sharks and demersal fish.	Commercial fishing grounds and vessels	Low	Negligible	Very low
	Construction disturbance on water column and seabed having potential impacts on commercial fishery fish stock and habitats for fish.	Fish stocks and fish habitats	High	Negligible	Low
	Construction disturbance on water column and seabed having potential indirect impacts on food resources for fish.	Commercially targeted fish	High	Negligible	Low

6.10.4.1.3 Recreational activities

The potential impacts on recreational activities in Tasmanian coastal waters include:

- Impacts of temporary exclusion zones on shoreline and nearshore recreational fishing.
- Impacts of temporary exclusion zones on navigation and transits of recreational boats and boats used for recreational fishing.
- Impacts of construction activities such as cable laying on nearshore fish species and macroinvertebrate species targeted by recreational fishers.

- As the proposal would be using long trajectory HDD, no impacts on the beaches or shorelines are anticipated and no temporary exclusion zones are required at the beach/shoreline. Shore-based recreational activities such as fishing would not be impacted at Tioxide Beach.

During nearshore cable laying activities, small boats would pull the floated cables towards the HDD marine exit hole at 10 m water depth. As a result, a 1 km x 1 km temporary exclusion zone would be placed at Tasmanian coastal waters at Heybridge, which would result in recreational fishing boats diverting from this area and finding alternatives. It is expected that recreational users can use many other alternative nearshore and alongshore areas for recreational fishing and other activities, and the exclusion zone would only create a temporary loss of use in the nearshore area at Heybridge. Any diversion required for recreational boats would also be sufficiently accommodated as safe transit around the temporary exclusion zones would be readily available.

Potential impacts on fish targeted by recreational fishers are assessed in terms of marine ecology and marine habitats as detailed in Section 6.3 and were assessed as having a residual impact significance rating of **low**. Therefore, the residual impact significance rating for recreationally targeted fish is also considered to be **low** (refer to Table 6.10-8).

Table 6.10-8 Recreational activities – potential impacts and residual impact significance rating

Construction activity	Potential impact (Tasmanian coastal waters)	Receiver	Sensitivity of receiver	Magnitude of impact	Residual impact significance
Cable laying	Temporary exclusion zone placed around the boats at the HDD marine exit hole, impacting on shoreline and nearshore recreational fishing at Heybridge.	Recreational users and boats	Moderate	Negligible	**Low**
	Temporary exclusion zone place around the marine exit hole, requiring recreational fishing boats to divert around the zone.	Recreational users and boats	Moderate	Low	**Low**
	Construction activity disturbing fish and fish habitats targeted by recreational fishers due to construction cable laying, underwater noise.	Recreationally targeted fish	High	Negligible	**Low**

6.10.4.1.4 Other marine resources or uses

Other marine resource use relevant to the proposal include:

- Marine-based tourism and recreation.

Marine based tourism and recreation in Tasmanian coastal waters are primarily associated with recreational fishing and boating, as discussed in Section 6.10.4. The residual impact significance rating for nearshore

recreational activities is considered to be low. Beach recreational activities are not expected to be impacted by the proposal as beaches would remain open during the construction of the proposal at Tasmanian coastal waters at Heybridge.

6.10.4.2 Operation

The impacts associated with the operation of the proposal are primarily related to the energised HVDC cables which may create marine biological effects through magnetic fields, induced electric fields and thermal fields. The assessment of these operational impacts on marine ecology and habitats have been addressed in Section 6.3.

The operation of the proposal beneath the coastal environment at Heybridge is not anticipated to have any impacts.

6.10.4.3 Cumulative impacts

During the construction phase, there are no presently known or expected third-party activities in Bass Strait that are likely to interact significantly with the proposal's proposed marine constructions activities, and that have not been addressed in other sections of this EIS.

In the case of third-party shipping, the transits of ships, ferries and other vessels across the proposed proposal alignment are highly manoeuvrable and would readily pass around any temporary exclusion zones surrounding pre-lay cable laying vessels or post-lay cable installation and burial installation vessels. Third party vessels would be made aware in advance of time schedules and durations of proposed Project marine construction activities through Notices to Mariners. Therefore, interactions with existing vessel navigation and transit are predicted to be minor and no cumulative impacts of project marine construction vessels and third-party vessel activities are envisaged.

6.10.5 Management, mitigation and monitoring

Proposed mitigation measures to minimise potential impacts on marine and coastal issues have been provided in the marine natural values section (refer to Section 6.3.6). There are no additional management, mitigation and monitoring measures for marine and coastal issues.

6.10.6 Residual impacts

With appropriate mitigation measures in place, the residual impacts on marine and coastal environments during construction are not significant, with the overall residual risk reduced to low or very low for all construction activities (refer to Table 6.10-9).

Table 6.10-9 Marine and coastal – residual impact significance

Potential impact	Residual impact significance rating
Temporary moving exclusion zone placed around the cable lay ship would mean passing ships need to detour around the cable lay ship.	Very low

Potential impact	Residual impact significance rating
Temporary moving exclusion zone placed around the cable lay ship would lead to commercial fishing operations being disrupted and alternative fishing area to be used for scallops, gummy sharks and demersal fish.	Very low
Construction disturbance on water column and seabed having potential impacts on commercial fishery fish stock and habitats for fish.	Low
Construction disturbance on water column and seabed having potential indirect impacts on food resources for fish.	Low
Temporary exclusion zone placed around the boats at the HDD marine exit hole, impacting on shoreline and nearshore recreational fishing at Heybridge.	Low
Temporary exclusion zone place around the marine exit hole, requiring recreational fishing boats to divert around the zone.	Low
Construction activity disturbing fish and fish habitats targeted by recreational fishers due to construction cable laying, underwater noise.	Low

The residual risk rating has been determined to be low to very low due to the following factors, amongst others:

- Passing ships should adhere to AMSA requirements to avoid collisions and undertake regular navigation course changes.
- Commercial fishing vessels can easily manoeuvre around temporary exclusion zones and can move into other Bass Strait waters.
- There would be no significant indirect impacts on fish food resources and there exists a large expanse unaffected fish food resources and fish stock in the region of impact.
- Recreational fishers (that fish nearshore waters by boat) would have access to alternative nearshore areas during the short period of nearshore marine construction activities.
- Low fish sensitivity to underwater noise and a wide abundance of fish in Bass Strait.

6.11 Greenhouse gases and ozone depleting substances

This section provides a summary of the findings of the Greenhouse Gas Assessment provided in Appendix J.

6.11.1 Assessment guidelines

The relevant sections of the EIS guidelines for the Heybridge Shore Crossing, and where these have been addressed in this EIS, are outlined in Table 6.11-1.

Table 6.11-1 Relevant EIS guidelines

Greenhouse gases and ozone depleting substances – EIS guidelines	Section
Discuss the direct and indirect effects of the proposal, including construction, in relation to production, use and reduction of greenhouse gases and ozone depleting substances including:	
Consideration of the evolving national response to climate change and greenhouse gas emissions, and the targets set in the *Tasmanian Climate Change Action Plan 2017-2021* or any updated versions thereof available at the time of preparing the EIS.	Section 6.11.3
Provide an estimate of greenhouse gas emissions, energy production and energy consumption for both construction and operational phases of the proposal, including emissions associated with vegetation removal (as relevant). Calculators are available on the Australian Government Clean Energy Regulator website;	Section 6.11.4
Demonstration that the development will implement cost-effective greenhouse best practice measures to achieve on going minimisation of greenhouse gas emissions. Where less emissions-intensive options are not adopted, justification should be provided and/or mechanisms to offset greenhouse gas emissions identified.	Section 6.11.5
Legislative and policy requirements	
The *Tasmanian Climate Change Action Plan 2017 – 2021* or any subsequent versions. Proponents will need to determine whether they are required to report to the Commonwealth under the *National Greenhouse and Energy Reporting Act 2007.*	Section 6.11.3.1

6.11.2 Methodology

The Greenhouse Gas Assessment uses a **discipline specific** assessment methodology. The purpose of the impact assessment is to calculate the GHG emissions attributable to the proposal during construction and operation. These emissions have been determined using data and assumptions and the methods described in the following resources:

- The National Greenhouse Accounts, October 2020 (Commonwealth of Australia 2020).
- National Greenhouse and Energy Reporting (Measurement) Determination 2008.
- The Greenhouse Gas Protocol (WRI/WBCSD 2004).

The technical assessment on climate change does not provide an impact assessment, unlike other assessments summarised in Section 6. Rather, using models and climate forecasts, recommends appropriate climate adaptation measures for the proposal.

The assessment did not estimate the GHG emissions of the proposal separately. Rather, it assessed the GHG emissions of the Heybridge Converter Station, while assessing together the remaining components of the project: Heybridge shore crossing, subsea cabling across Bass Strait, Victorian shore crossing, Victorian onshore cabling and converter station.

6.11.3 Applicable legislation

6.11.3.1 National Greenhouse and Energy Reporting Act 2007

The *National Greenhouse and Energy Reporting Act 2007* establishes the national framework for corporations to report GHG emissions and energy consumption. National Greenhouse and Energy Reporting registration and emission reporting are mandatory for corporations or facilities that have energy production, energy use or GHG emissions that exceed specified thresholds:

- 50,000 tonnes of carbon dioxide equivalent (tCO_2-e) per annum per organisation, or 25,000 tCO_2-e per facility.
- 200 terajoules energy usage per annum per organisation, or 100 terajoules per annum for a single facility.

MLPL is required to report their Scope 1 and Scope 2 emissions if the operation of the proposal generates GHG emissions and energy consumption that exceeds the specified thresholds.

While the anticipated emissions from the proposal would not exceed the thresholds, the anticipated emissions of the project as a whole would exceed both the organisation and facility thresholds, such that MLPL would need to report its operating emissions.

6.11.3.2 Rewiring the Nation

The Commonwealth Government's Rewiring the Nation policy highlights Marinus Link as the key Tasmanian project to provide 'new transmission lines to deliver affordable, reliable renewable energy to cities, towns and regional communities' and in so doing 'help achieve Australia's emissions reduction targets of 43% by 2030 and net zero emissions by 2050'.

Australia's commitment to the renewables transition was demonstrated at the 28th Conference of Parties to the UNFCCC in Dubai. Australia was one of 118 nations that promised to triple global renewable energy capacity by 2030.

6.11.3.3 Climate Change (State Action) Act 2008

Following amendments to the Tasmanian Government's climate change legislation, the *Climate Change (State Action) Act 2008*, Tasmania's net zero GHG emissions target is now legislated.

The Act includes new objectives, including relevantly to the project:

- To identify, promote and support measures to help Tasmania adapt to climate change and to manage the risks and opportunities of a changing climate.
- To facilitate Tasmania's contribution to international, national and local government emissions reduction and adaptation measures to support the transition to a low emissions future.

The legislated target is net zero emissions, or lower, from 2030. Under the Act, the government must prepare a climate change action plan, a climate change risk assessment, and emissions reduction and resilience plans for key sectors. The emissions reduction and resilience plan must support GHG emissions reduction, and the transition to a low emissions economy, amongst other features.

6.11.3.4 Climate Change Action Plan 2023-2025

Tasmania's *Climate Change Action Plan 2023-25* was released on 1 June 2023, superseding its earlier *Climate Action 21*. These plans reflect a long-standing commitment by Tasmanian government to address climate change and contribute to the global response. The 2023-25 plan sets a target to maintain net zero GHG emissions, or lower, from 2030, and a target to double Tasmania's renewable electricity production (from 2020 levels) by 2040, with an interim target of 150% by 2030. One of the actions to meet this target is 'to 'progress national-scale renewable energy projects such as Marinus Link and the Battery of the Nation'.

6.11.4 Potential impacts

GHG emissions are categorised into three different scopes:

- **Scope 1**: Refers to direct GHG emissions released as a direct result of a company's activities.
- **Scope 2**: Refers to indirect GHG emissions produced to generate the energy used by a company.
- **Scope 3**: Includes all indirect GHG emissions (not included within Scope 2 emissions) that are generated in the wider economy, as a consequence of the project activities but from sources not owned or controlled by the company. These emissions are noted in the cumulative impacts of the proposal with the project as a whole.

GHG emissions associated with the proposal have the potential to contribute to Tasmanian and national GHG inventories. Gases of significance to climate change associated with the proposal and the Heybridge Converter Station proposal include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O) and sulfur hexafluoride (SF_6).

6.11.4.1 Construction

Construction of the proposal together with the Heybridge Converter Station proposal would generate Scope 1 and Scope 2 emissions through the following construction activities:

- Diesel combustion through the use of light vehicles, generators, heavy machinery and various other equipment including rigid trucks, excavators, cranes, drill rigs, front end loader, graders, water trucks and concrete agitators.
- Land disturbance emissions.
- Electricity consumption of site offices during construction.
- Marine fuel combustion through the use of the sea cable laying vessel.

The construction period is anticipated to occur over five years from 2026 to 2031however not all construction activities would occur in every year.

As noted above, the total GHG emissions generated for the construction of the proposal have not been estimated. The whole-of-project assessment is discussed in Section 6.11.4.2.

6.11.4.2 Cumulative impacts

A whole-of-project impact assessment for GHG emissions was carried out, which covered the entire route of the project from Heybridge in Tasmania to Hazelwood in Victoria.

The technical assessment provided breakdowns of emissions attributable to the Heybridge Converter Station, and separately, emissions attributable to the Heybridge Shore Crossing (this proposal) to the Hazelwood converter station.

When the GHG emissions from the Heybridge Converter Station proposal are combined with the proposal and the remainder of the project to the Hazelwood converter station, they are calculated as follows:

- The construction of the project would create a further 53,015 tCO_2-e Scope 1 and 2 emissions and a combined 188,508 tCO_2-e Scope 3 emissions.
- The operation of the project is estimated to contribute no more than 0.05% of the national GHG emissions inventory (as of December 2021) on an annual basis.

6.11.5 Management, mitigation and monitoring

Proposed measures to minimise potential impacts associated with GHG and ozone depleting substances are presented in Table 6.11-2. Mitigation measures in other sections that are relevant to the management of GHG and ozone depleting substances include:

- Section 6.7 (Air quality), specifically measures which address the management of emissions from plant and equipment.
- Section 6.8 (Waste management), specifically measures which address minimisation of waste.

Together, these measures will minimise the potential GHG and ozone impacts.

Table 6.11-2 Greenhouse gas and ozone depleting substances – mitigation measures

Ref	Mitigation measure	Proposal stage
GHG01	Identify opportunities to reduce Scope 1 and Scope 2 GHG emissions (as defined in the *National Greenhouse and Energy Reporting Act 2007)* so far as reasonably practicable and in accordance with the Marinus Link Sustainability Framework. Consideration will be given to: • Use of low emission fuels. • Maintenance of equipment and vehicles. • Purchase of green energy. • Procurement of energy efficient machinery. • Use of low carbon emission concrete. • Use of recycled materials.	Construction
GHG02	*Not relevant to this proposal*	
CC01	*Not relevant to this proposal.*	

6.12 Socio-economic issues

This section provides a summary of the findings of the provided in Appendix K, and the Economic Impact Assessment provided in Appendix L.

6.12.1 Assessment guidelines

The relevant sections of the EIS guidelines for the Heybridge Shore Crossing, and where these have been addressed in this EIS, are outlined in Table 6.12-1.

Table 6.12-1 Relevant EIS guidelines

Socio-economic issues – EIS guidelines	Section
An estimate of total capital investment for the proposal and where that capital will be expended (particularly in relation to the source of large capital items of processing equipment).	Section 6.12.4.2
Operational expenditures and revenues.	Section 6.12.4.2
The impacts on local and State labour markets for both the construction and operational phases of the proposal. The number and nature of direct and indirect jobs arising from the proposal must be detailed. Skills and training opportunities should also be discussed.	Section 6.12.4
The impacts on upstream/downstream industries, both locally and for the State.	Section 6.12.4
The extent to which raw materials, equipment, goods, and services will be sourced locally.	Section 2.3.4, 6.12.4.2.2
A qualitative assessment of impacts on local social amenity and community infrastructure, including recreational, cultural, health and sporting facilities and services. Any proposals to enhance or provide additional community services or facilities should be described.	Section 6.12.4
Potential interaction of the proposal with existing uses of Bass Strait, and whether the construction or operation of the proposal will impact those uses.	Section 6.12.4.4
Community demographic impacts (changes to cultural background, occupation, incomes).	Section 6.12.4.2, 6.12.4.3
Impacts on land values, and demand for land and housing.	Section 6.12.4.4.1
Impacts on the local, regional, state, and national economies.	Section 6.11.4.2, 6.12.4.4.2
Any publicly funded subsidies or services to be relied upon for the construction or operation of the proposal.	Section 6.12.4
Any impacts on Local, State and Federal Government rate, taxation and royalty revenues.	Section 6.12.4.2, 6.12.4.4.2

6.12.2 Methodology

The key steps in characterising existing social conditions and assessing the values and impacts for the purpose of the Social Impact Assessment for the proposal, reflecting a **significance-based assessment approach**, included:

- Defining a study area.
- Conducting community engagement and Social Impact Assessment consultation to develop an understanding of community values and important places. Section 4 provides details on engagement activities undertaken for the proposal.

- Defining a social wellbeing framework.
- Conducting a literature review including demographic data from the ABS, governmental websites, government plans and strategies, industry news and academic literature, as well as the findings and recommendations of other studies.
- Developing a social baseline to identify those potentially vulnerable to changes from the proposal, and to profile community infrastructure.

The Economic Impact Assessment adopted a **discipline-specific assessment approach**, relying on data about the proposal and the project provided by MLPL. It used modelling methods and various data and publicly available predictions on quantitative and qualitative changes in the economy and society at various scales (from local to national) to compare the positive and adverse economic consequences of the project against a scenario where the project does not proceed.

6.12.3 Existing conditions

6.12.3.1 Study area

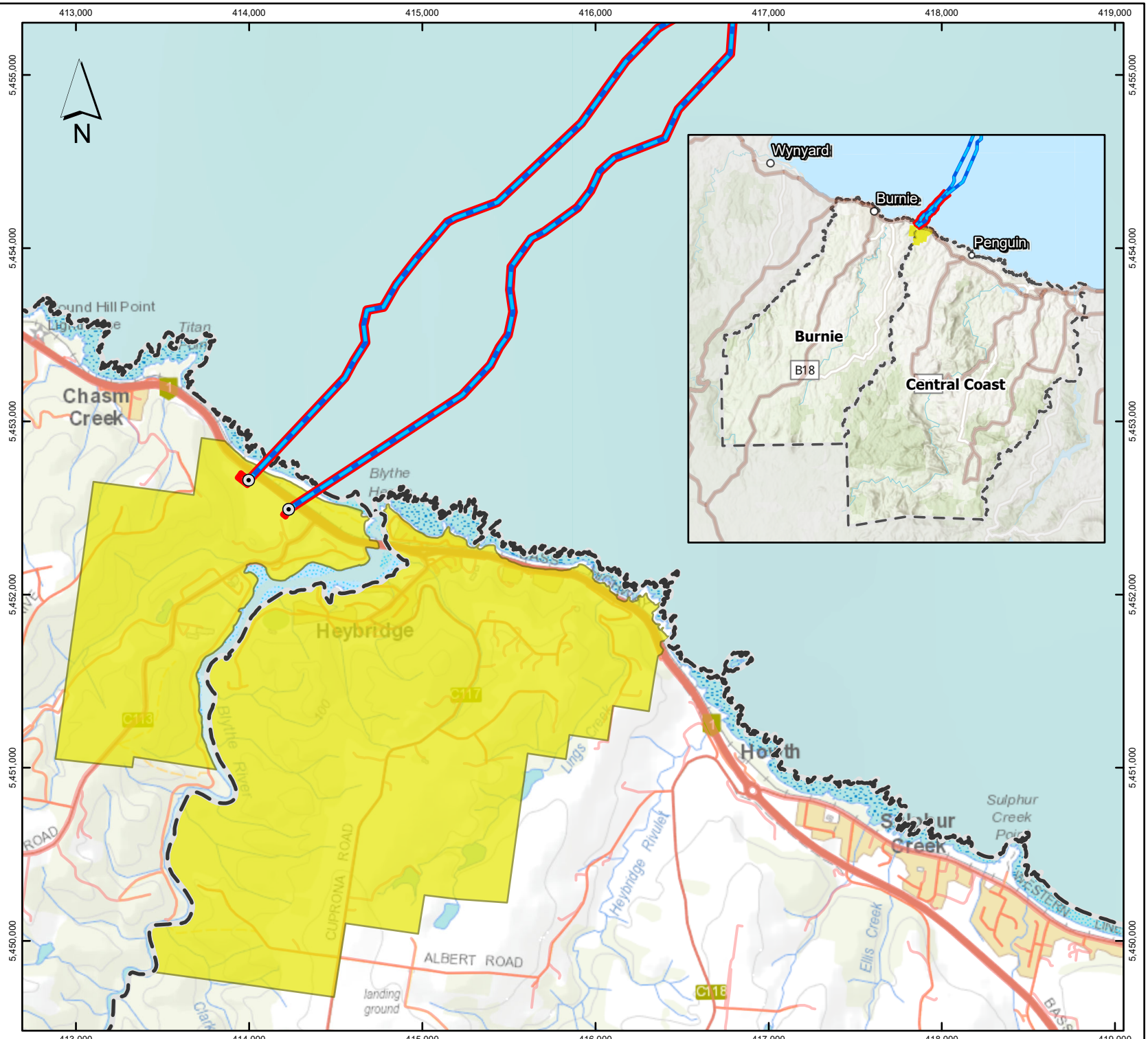
The Social Impact Assessment study area encompasses the communities that may experience the effects of the proposal's construction, operation, and decommissioning in Tasmania. The study areas shown in Figure 6.12-1 are derived from ABS Census Statistical Areas and includes:

- **The local study area** – Heybridge.
- **The regional study area** – Burnie City Council and Central Coast Council LGAs. Broader impacts, including to Tasmania and its regions, are considered where relevant.

The Economic Impact Assessment generally examines the spending and employment impacts at a state level and for regional communities. As such, the study area includes, relevant to Tasmania:

- North West Tasmania, defined as ABS SA4 areas of West and North West Tasmania.
- The whole of Tasmania.

Figure 6.12-1:
Socio-economic study areas



Legend

- HVDC Landfall
- Proposed HVDC Subsea Cable
- Proposal Site
- Heybridge Study Area
- Local Government Area
- Major Road
- Minor Road

Scale: 1:30,000 @ A4

Spatial Reference: GDA2020 MGA Zone 55

0 250 500 1,000 1,500

Metre

MARINUS LINK

Acknowledgements and Sources:

Data Source: Marinus Link GIS Data Repository and theLIST ©State of Tasmania .
Background Image: Creative Commons BY 3.0 AU © State of Tasmania, Esri, CGIAR, DPIPWE, Esri, TomTom, Garmin, Foursquare, FAO, METI/ NASA, USGS
Produced By: Marinus Link for the Tasmanian Heybridge Shore Crossing EIS.
Date Figure Exported: 22/11/2024

6.12.3.2 Social baseline characterisation

The social baseline describes the existing social environment for the study areas, the people within the study areas and their living conditions. The baseline is informed by stakeholder engagement, literature research, and various secondary sources, including:

- ABS Census demographic information.
- Selected Commonwealth Government websites (e.g., My School; Australian Bureau of Agricultural and Resource Economics and Sciences).
- Australian and Tasmanian government agencies, including the Department of Police, Fire and Emergency Services, Tasmania Health Service, and NRE.
- Regional and local government plans and strategies.

6.12.3.2.1 Social wellbeing framework

An important requirement of Social Impact Assessment is to have a framework that allows for identifying potential community issues and concerns and conveying the Social Impact Assessment's outcomes. The Social Impact Assessment identified four social values which are used to understand the social baseline and assess the potential social impacts (positive and negative) of the proposal. A significance-based approach was used to assess potential project impacts on the identified social values. A significance-based approach uses the principles of social sensitivity and magnitude of impact to assess the significance of an impact.

The four social values and the associated attributes and indicators and the sensitivity of those attributed and indicators to the community, which form the social wellbeing framework, are provided in Table 6.12-2.

Table 6.12-2 Social wellbeing framework

Social value	Attributes and indicators	Sensitivity
Community identity Describes how a community defines itself in terms of civic participation, resilience, feelings of trust and safety and a sense of belonging and place.	• Amenity and landscape. • Natural resources and ecology.	Very sensitive
Economy and livelihood Describes how people make a living and the economic structure of the affected community.	• Employment and workforce. • Industry and business. • Housing affordability and availability. • Socio-economic dis/advantage.	Very sensitive to extremely sensitive
Infrastructure and services Describes the infrastructure and services that meet the needs and priorities of the affected community including municipal and social infrastructure and associated services.	• Community infrastructure and services (health and wellbeing). • Community infrastructure (childcare). • Physical infrastructure (connectivity). • Physical infrastructure (safety and capacity).	Sensitive to very sensitive
People's productive capacities Describes the skills, knowledge, and experience that are vital to survival and participation in society and its economy.	• Health – physical and mental. • Education, training, and skills.	Sensitive to very sensitive

6.12.3.3 Population and demography

6.12.3.3.1 Regional context

The proposal site extends into the Tasmanian coastal waters from Heybridge, which is located in the Burnie City Council LGA, and immediately to the west of the Central Coast Council LGA, which is where most of the population of Heybridge lives.

Burnie City Council is located on land within the ancestral territory of the Plairhekenillerplue band of the North Peoples Tribe. The Burnie City Council LGA has a total land area of 611 km^2, is located on Tasmania's North West coast and as of 30 June 2021, had an estimated residential population of 19,646 (ABS 2021). Most of the population lives along or close to the coast.

The township of Burnie is served by Bass Highway and Ridgley Highway. It is the primary population centre for the Burnie City Council LGA, the people of Heybridge, and the regional activity centre for the Cradle Coast Region. Burnie City Council LGA provides a range of health, education, cultural, community support and industrial services for the wider region, including the people of Heybridge (Cradle Coast Regional Planning Initiative 2010).

Central Coast Council LGA is located on the land of the Palawa/Pakana of the Punnilerpanner clan. The Central Coast Council LGA has a total land area of 933 km² and is located on Tasmania's north coast between the large townships of Burnie and Devonport. As of 30 June 2021, the LGA had an estimated residential population of 22,176 (ABS 2021). Most of the population lives along or close to the coast.

The estimated resident population for the two LGAs in the regional study area is presented in Table 6.12-3. Population changes between the years 2001 to 2021 for both LGAs were less that of the State of Tasmania, which grew by 19.9% over this period. Central Coast Council shows a larger increase in population in the same period (9.6%) than Burnie City Council (7.1%).

Table 6.12-3 Estimated resident population in the regional study area and Tasmania, 2001 to 2021

Area	2001	2006	2011	2016	2021	Percentage change	
						Average annual	2001-2021
Burnie City Council LGA	19,077	19,748	20,164	19,228	20,441	0.3%	7.1%
Central Coast Council LGA	21,242	21,428	22,332	21,736	23,278	0.5%	9.6%
Tasmania	473,668	489,302	511,483	517,514	567,909	0.9%	19.9%

Source: ABS (2022) Estimated Residential Population by LGA 2001 to 2021

Between 2027 and 2042, both LGAs within the regional study area are projected to experience population decline. The population of Burnie City Council LGA is predicted to decrease by -8.5%, and the population of Central Coast Council LGA is predicted to decrease by -3.0%. Over the same period, the Tasmanian state population is projected to grow by 12.5% to 603,470 in 2042.

The regional study areas have an ageing population with generally higher median age compared to Tasmania. The median age is highest in the suburb of Heybridge and the Central Coast Council LGA, at 48 years.

The sex ratio for both LGAs is similar to the sex ratio for Tasmania, with 93 males to every 100 females. However, Heybridge has a less balanced sex ratio, with 118 males for every 100 females.

6.12.3.3.2 Local context

The southernmost part of the proposal site is in the Heybridge township, which is a small rural town covering an area of 6.5 km^2 with a population of 442 people (ABS 2021). Locals describe Heybridge as a tight knit community.

Heybridge is partly in the Burnie City Council LGA and partly in the Central Coast Council LGA. Heybridge shares land borders with Chasm Creek, Round Hill, Stowport, Cuprona, and Howth localities. Bass Strait, which constitutes the northernmost part of the proposal site, lies to the northern border.

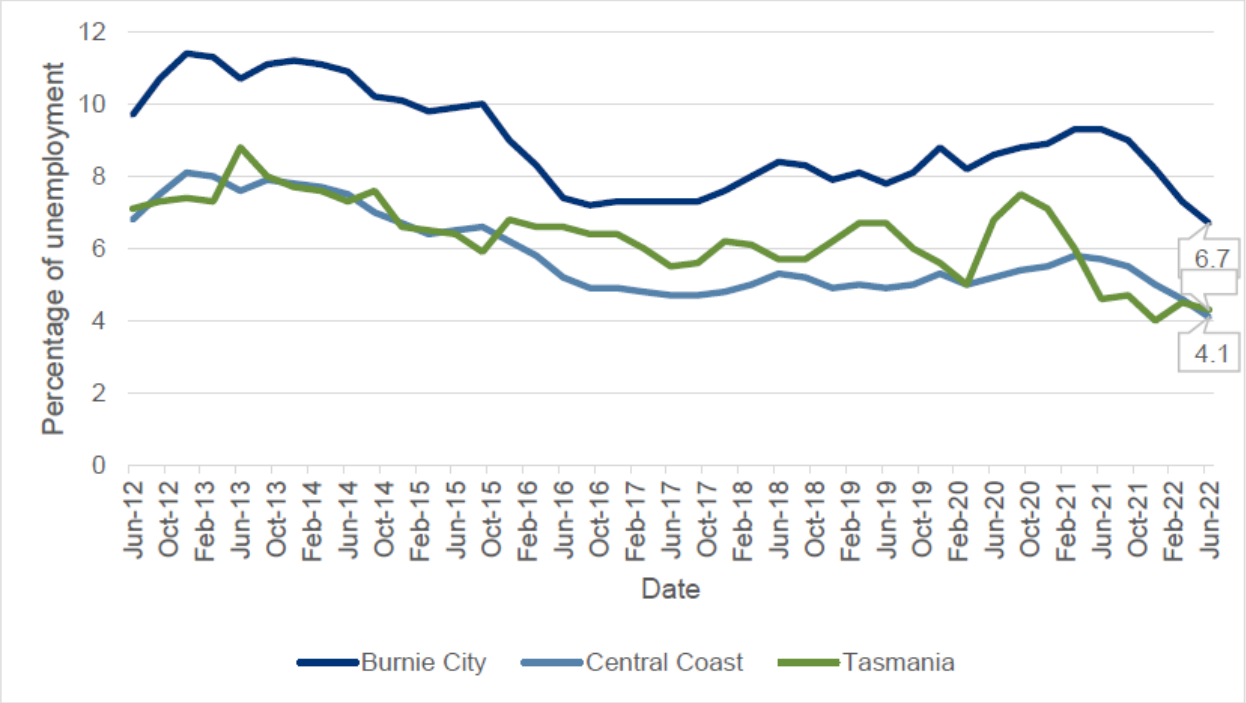
Heybridge's history over the 20th Century is dominated by the construction, operation and eventual closure of the tioxide plant. The factory, at its peak, produced 35,000 tons per annum of tioxide and employed up to 450 people (Summers 2006). At present day, Heybridge is a small coastal retirement town with proximity to waterways including Tioxide Beach and Blythe Creek.

Within the local study area, the top ancestries are English, Australian, and Scottish, with 6.2% of people identifying as Australian Aboriginal (ABS 2021). Overall, there is a high degree of cultural homogeneity in Heybridge, with about 89% of residents who only speak English at home, and more than 80.8% of residents were born in Australia.

6.12.3.4 Workforce and industry

At the ABS 2021 Census, labour force participation for Heybridge (53.7%), Central Coast Council LGA (54.6%) and Burnie City Council LGA (56.9%) was lower than that of the state (58.2%). Lower participation rates may be due to the comparatively aged population in the local and regional study areas.

Figure 6.12-2 below shows the unemployment rate in the regional study area from June 2012 to June 2022. The unemployment rates in Central Coast Council LGA area have generally been below that of the state of Tasmania. Burnie City Council LGA has had unemployment rates consistently higher than that of the state. Both study area LGAs have lower youth unemployment rates than the region and the state.



Source: Department of Education, Skills and Employment (Department of Education, Skills and Employment 2022) Small Area Labour Markets, June Quarter 2022 and ABS (ABS 2022b) 6202.0 Labour Force, Australia

Figure 6.12-2 Unemployment rate in the regional study area, June 2012 to June 2022.

The most common levels of educational achievement in the regional study area were year 10 and above (secondary education), and Certificate III.

At the 2021 Census, the top industries of employment in the local and regional study areas are Health Care and Social Assistance, Education and Training, followed by Retail Trade. Nearly one-quarter of the Heybridge local study area works in the Health Care and Social Assistance (22%). The other dominant industries of employment include Agriculture, Forestry and Fishing, Manufacturing, and Construction (ABS 2021).

Approximately 840 tourism businesses (excluding Airbnb hosts) operate across North West Tasmania in the form of accommodation providers (45%), attractions (19%), tours, transport, events, dining and information services.

The workforce availability, including potential workforce shortages, are identified in Table 6.12-4. The *Civil Construction Industry Workforce Plan 2019-2025* (Civil Contractors Federation Tasmania 2019) projected that additional workers required state-wide to 2028 would include roles such as construction managers, engineers, machinery and plant operators and onsite construction workers. In addition to the skills requirements for the construction phase of the proposal and project, the workforce requirements of the operations phase would be focused on electricians.

Table 6.12-4 Published status of workforce availability for occupations relevant to the proposal

Occupation	Labour market rating	Key findings	Date
Civil engineering professionals (Engineers Australia 2020)	Shortage	The majority of vacancies were located across Tasmania. The majority of vacancies were for civil engineers, geotechnical, structural and transport engineers. Regional vacancies were more difficult to fill than metropolitan vacancies.	February 2019
Electrical engineer (National Skills Commission, Skills priority list)	Shortage	There is a shortage of electrical engineers in Tasmania and nationally with a moderate future demand.	July 2023
Electrician (National Skills Commission, Skills priority list)	Shortage	Shortage in Tasmania and nationally, with strong future demand.	July 2023

Source: Department of Small Jobs and Small Business (2019; 2023)

6.12.3.5 Income and housing

The median household income in the local and regional study areas is lower than the median in Tasmania, with the Central Coast Council LGA median almost $150 per week less than the state median of $1,358 (refer to Table 6.12-5).

Table 6.12-5 Median household income for areas relevant to proposal

Area	Heybridge	Burnie City Council LGA	Central Coast Council LGA	Tasmania
Median household income ($/weekly)	$1,289	$1,225	$1,209	$1,358
Median household income ($/annual)	$67,028	$63,700	$62,868	$70,616

Source: ABS (2021)

Housing in the local and regional study area is predominantly detached or separate houses, making up 96.4% of dwellings in Heybridge and 90.2% across Central Coast Council and Burnie City Council LGAs. Both the local and regional study areas have a higher percentage of detached or separated houses than Tasmania (87.7%).

The rate of home ownership (owned outright or with a mortgage) was higher in Heybridge (78.3%) and Central Coast Council LGA (75.7%) than in Tasmania (70.1%) and Burnie City Council LGA (65.5%).

In terms of housing availability, rental vacancy rates are used to indicate the demand and potential difficulty of securing rental housing. Generally, rates below 1.0% are indicative of a rental shortage, which often results in rent increases and pushes low-income households out of the private rental market (REIQ 2020; UTAS 2019). In the local study area, vacancy rates in April 2023 were 0.7%. The region has experienced a rental shortage since COVID and has not yet recovered. The rental vacancy rate for Burnie City Council LGA was 1.1% and Central Coast Council LGA was 0.5%.

6.12.3.6 Social infrastructure

Social infrastructure is comprised of the spaces, facilities and services that support the quality of life and community wellbeing. Across the study areas, as described in Social Impact Assessment (Appendix K), there are multiple schools, hospitals, medical centres, fire and emergency services, sport and recreation facilities, and conservation areas and public reserves. They are considered important to support the productive capacities and health needs and educational of residents.

Burnie City Council LGA has a higher proportion within their communities who experience a mental health condition (12.7%) than Central Coast Council LGA (10.5%), Heybridge (7.6%) and the Tasmanian average (11.5%). Burnie City Council LGA and Central Coast Council LGA also have a higher need for assistance (7.8% and 7.5% respectively) than the Tasmanian average of 6.8% and Heybridge with 5.0%.

There are three education facilities in the local study area including a primary school and two schools combining primary and secondary at the same location. The regional study area has a number of training and industry development programs, including those that are targeted to the renewable energy sector and the project in particular.

There are five hospitals and two ambulance services to the regional study area. The rate of general practitioners compared to the population is lowest in Central Coast Council LGA, with 108.3 general practitioners per 100,000 people. Burnie City Council LGA has the highest proportion of general practitioners GPs in the regional study area, with 263.9 general practitioners per 100,000 people compared to the state (154.8 general practitioners per 100,000 people).

The Heybridge Fire Station, located in the Central Coast Council LGA, is the only fire station located within 1 km of the project in the regional study area. There are three police stations within the regional study area. The closest police station to the project site is in the township of Burnie, 8 km away.

Recreation areas considered sensitive to potential project impacts include the Blythe River Conservation Area and Chasm Creek Conservation Area.

6.12.4 Potential impacts

6.12.4.1 Social impacts

A summary of potential positive and negative impacts to social values of the proposal (including the Heybridge Converter Station) and project is provided in Table 6.12-6, with detailed assessment, including by reference to state and local policies, provided in Appendix K.

Mitigation measures are proposed to be implemented to minimise the negative impacts (and reduce the impact significance rating) and harness the benefits of the proposal and project, where feasible.

In brief, the anticipated impacts of the proposal across social values include:

- **Community identity**: Construction activities would affect very localised amenity including through noise and dust.

- **Economy and livelihood**: While the proposal would contribute positively to employment opportunities, local and regional economic investment and skill development, there would also be adverse impacts to housing availability and affordability due to increased demand from an influx of non-local construction workforce. This effect would be mostly experienced during the construction period and the impact is reduced during operations of the proposal.
- **Community infrastructure and services**: Social infrastructure would potentially be impacted during the construction period, where hospitals and healthcare, childcare services, emergency services and local road traffic would experience some increase in demand that would need to be managed.
- **People's productive capacities**: The local workforce and skillset may require upskilling and additional training to enable their employment pathways to energy-related development in the region and the broader Tasmanian state. Generally, the health and wellbeing of residents near the proposal site would not be significantly impacted by the proposal.

Table 6.12-6 Social value impact assessment summary

Potential impact	Pre-mitigated impact assessment			Mitigation measure	Residual impact significance
	Sensitivity	Magnitude	Impact significance		
Community identity					
Construction					
Noise, vibration and visual disturbances causing amenity impacts (standard hours).	Very sensitive	Moderate	High (negative)	NV02, S03	**Moderate (negative)**
Amenity impacts for nearby residents from dust from construction activities	Very sensitive	Minor	Moderate (negative)	AQ01, S03	**Low (negative)**
Construction activity undertaken outside of regular working hours to complete shore crossing works with noise levels exceeding sleep disturbance measure.	Very sensitive	Major	Major (negative)	NV01, S03	**High (negative)**
Noise from construction activities may affect the enjoyment of recreational spaces within the study area.	Very sensitive	Minor	Moderate (negative)	NV02, S03	**Moderate (negative)**
Impact on fauna from potential roadkill with a consideration for as a result of construction vehicle movements	Very sensitive	Minor	Moderate (negative)	EC01, EC02, EC03, EC04	**Low (negative)**
Impact on marine environment with the cable installation on Tasmanian coastal waters seabed habitats.	Very sensitive	Minor	Moderate (negative)	MERU01, MERU02	**Moderate (negative)**
Economy and livelihood					
Construction					
Construction is expected to support the short-term employment of approximately 45% of the total construction workforce within the local and regional study area.	Very sensitive	Minor	Moderate (positive)	S01, S02, S04, S05	**Moderate (positive)**

Potential impact	Pre-mitigated impact assessment			Mitigation measure	Residual impact significance
	Sensitivity	Magnitude	Impact significance		
Construction is expected to support the short-term employment of approximately 30% of the total construction workforce from the state and national workforce.	Sensitive	Negligible	Low (positive)		**Low (positive)**
Construction would generate demand for construction workers, potentially drawing employees from other construction projects, industry sectors and local businesses. Due to this potential constraint on the workforce, there may be longer lead times for other construction projects and possible workforce shortages in the study area.	Very sensitive	Moderate	High (positive)		**High (positive)**
The project may contribute to a diversity of longer-term and secure employment opportunities and skills training opportunities for residents across a range of skill levels. There might also be jobs created in related industries who benefit from the economic activity, including retail, administrative services and accommodation and food.	Very sensitive	Minor	Moderate (positive)		**Moderate (positive)**
Construction may contribute to existing and predicted demand for the construction sector, which may require formalised workforce training and development in the study area.	Very sensitive	Minor	Moderate (positive)		**Moderate (positive)**
Construction would support local businesses through the goods and services required to support the project's development.	Very sensitive	Minor	Moderate (positive)		**High (positive)**
The workforce may contribute to the demand for rental housing in the regional study area and exacerbate existing rental availability and affordability issues, disproportionally affecting low- and low-income households.	Extremely sensitive	Major	Major (negative)	S01, S02	**High (negative)**
The workforce may provide job opportunities directly and indirectly that help to help improve the socio-economic outcomes of the study area.	Very sensitive	Negligible	Low (positive)	S04, S05	**Moderate (positive)**
Operation					
Generation of large taxation receipts ($762 million in total from 2025 to 2050) from the economic activity generated by the project, which would flow to local, state and the Australian Government	Very sensitive	Moderate	High (positive)	N/A	**High (positive)**

Potential impact	Pre-mitigated impact assessment			Mitigation measure	Residual impact significance
	Sensitivity	Magnitude	Impact significance		
Job creation during operation	Very sensitive	Negligible	Low (positive)	S05	**Low (positive)**
Community infrastructure and services					
Construction					
The construction workforce may increase demand for health and emergency service providers, compromising service provision to the existing local and regional community.	Sensitive	Moderate	Moderate (negative)	S01	**Low (negative)**
The construction workforce may increase demand for childcare providers, compromising service provision to the existing local and regional community.	Very sensitive	Moderate	High (negative)	S01	**High (negative)**
Reduced road safety, including safety for the vulnerable particularly along school bus routes.	Very sensitive	Moderate	High (negative)	T01 S03	**Low (negative)**
General road safety with an increase in construction vehicles and the potential to impact traffic and pedestrian safety.	Very sensitive	Moderate	High (negative)	T01 S03	**Moderate (negative)**
Increased safety risk due to poor road lighting for shore crossing works at night.	Very sensitive	Major	High (negative)	T01	**Moderate (negative)**
People's productive capacities					
Construction					
Construction fatigue causing mental and health impacts, given HDD night works are expected to occur seven days a week for 6 months, and the works are expected to exceed average noise levels that result in sleep disturbance	Very sensitive	Major	**Major (negative)**	NV02 S03	**Moderate (negative)**
Lack of understanding of the scope, cumulative impacts of projects in the areas and not seeing local benefit.	Very sensitive	Major	**Major (negative)**	S03, S04	**High (negative)**
Transporting hazardous goods and materials.	Very sensitive	Severe	**Major (negative)**	T01	**Moderate (negative)**
Employment opportunities for the Tasmanian Aboriginal Community, First Peoples, women, youth and socially vulnerable groups in the regional construction workforce are made available.	Very sensitive	Negligible	Low (positive)	S04, S05	**Moderate (positive)**
Operation					
Enhancement of the health and wellbeing of residents in the study area through investments in community infrastructure, the	Very sensitive	Moderate	High (positive)	N/A	**High (positive)**

Potential impact	Pre-mitigated impact assessment			Mitigation measure	Residual impact significance
	Sensitivity	Magnitude	Impact significance		
potential for downward pressure to be placed on the market regarding energy prices, as well as greater telecommunication security through expansion of the supply-side infrastructure.					

6.12.4.2 Economic impacts

This section provides a summary of potential economic costs, benefits and impacts of the project, with a focus on the proposal. A detailed economic impact assessment and the project scope and assumptions for that assessment is provided in Appendix L.

6.12.4.2.1 Project costs and state support

The estimated capital cost of the proposal combined with the Heybridge Converter Station is $1.25 billion, representing 40% of the $3.1 billion cost of the project overall. The project would be fully subsidised by state and federal governments. Refer to Section 1 for a discussion of the ownership of the project, and therefore the likely financial share of the project costs by each of the Commonwealth, Victorian and Tasmanian governments. $352 million would be spent on the local economy during the five years of construction of the proposal and the Heybridge Converter Station. This would be to cover the costs of wages, construction activities and environmental management, amongst other expenses.

An average of $13 million per annum would be spent in the local economy during the operation and maintenance of the proposal. This would cover the costs of wages, maintenance, and environmental management, amongst other expenses.

6.12.4.2.2 Local sourcing

For the project components in Tasmania, various equipment, large-scale machinery and materials would be manufactured overseas and anticipated to be transported to the Port of Burnie, before being trucked to the proposal site. Some of the project infrastructure that would be delivered this way includes the converter station and switching station electrical components, including the transformers for the Heybridge Converter Station, and the cables for the shore crossing. These large capital expenditure items or processing equipment could not be locally manufactured as there is no suitable local manufacturing capability.

As discussed in Section 2, and consistent with the *Tasmanian Renewable Energy Action Plan* and affirmed in the proposed industry participation, MLPL would maximise local supply of goods and services and would source raw materials locally where practicable. These materials would include gravel, water and asphalt all of which would be obtained from Tasmania from local suppliers and not require air or sea transportation. Local businesses and service providers, including those operating in the wholesale trade industries, would be engaged during the construction and operation phases of the project, with those businesses likely to be within 100 km of the proposal site.

6.12.4.2.3 Investment and employment

Across the lifecycle of the project including the proposal, direct and indirect jobs would be created during construction, operation and decommissioning phases, spanning industries such as construction, professional services, retail, manufacturing and accommodation and food services. Many of the direct jobs would go to local workers. Workers from North West Tasmania are predicted to make up approximately 45% of the construction workforce, with 30% from elsewhere within Tasmania. Interstate resources coming from other locations within Australia may make up approximately 17% of the workforce, with the balance international. The increase in jobs, a diversification of jobs, and the introduction of people from out of the region would change the income and cultural backgrounds of the region for the period of construction. In addition to the labour market changes, the whole project would create economic benefits including the creation of skills and training opportunities, local sourcing of materials, tax and other revenues, as well as potential to reduce electricity costs for the community.

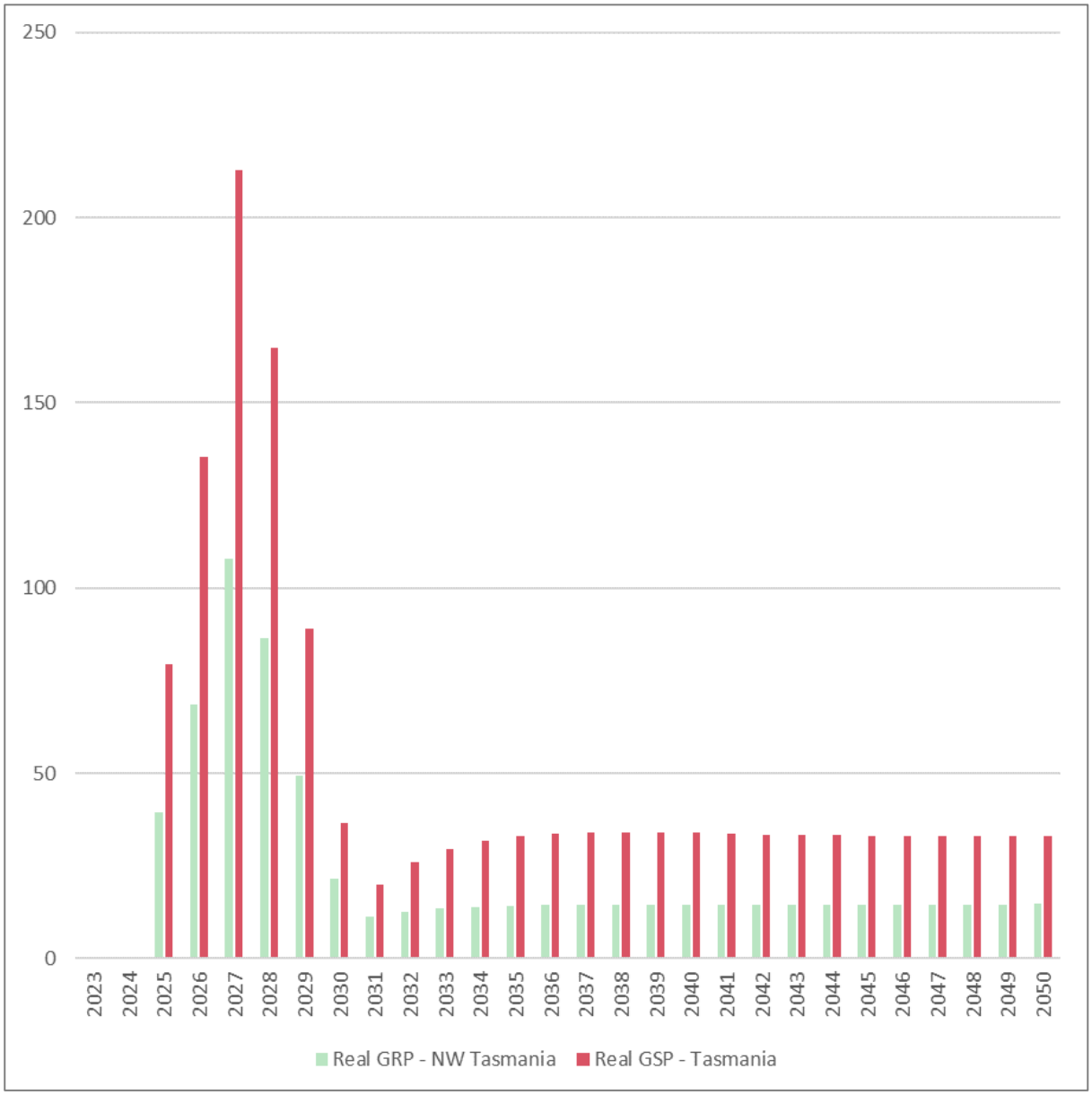
For North West Tasmania, over an assessment period of 25 years from 2025 to 2050, the project would provide:

- $352 million to the local economy during five years of construction. The peak annual contribution is almost $108 million.
- $361 million to the regional economy between 2030 and 2050 for operations and maintenance, at an average of $17 million per annum.
- 1,297 full time equivalent (FTE) job-years in the regional economy during five years of construction. The peak number of jobs is 430 FTE job-years.
- 306 FTE job-years in the regional economy between 2030 and 2050 for operations and maintenance, at an average of 15 FTE job-years supported each year.

For the State of Tasmania over the same period, the project would provide:

- $681 million to the state economy during five years of construction, peaking at $213 million.
- $679 million to the state economy between 2030 and 2050 for operations and maintenance, at an average of $32 million per annum.
- 2,661 FTE job-years during five years of construction, with a peak of 895 FTE job-years.
- 306 FTE job-years during operations in the state between 2030 and 2050, at an average of 15 job-years supported annually.

The economic activity from the combined construction and operation of six induced renewable energy projects has been predicated to contribute: $4.4 billion in the Tasmanian economy between 2028 and 2050 (average $190 million per year), including $2.1 billion to the North West Tasmania economy (average $92 million per year). 11,705 FTE job-years to 2050 (average 509 job-years per annum) in the Tasmanian economy, including 5,051 job-years (average 220 job-years per annum) in the North West Tasmania economy. The economic value-add per annum, regionally and across the state, from construction and operation is shown in Figure 6.12-3.



Source: SGS Economics & Planning; Centre of Policy Studies (2023)

Figure 6.12-3 Economic value-add from construction and operation of Marinus Link ($ millions)

6.12.4.3 Community benefits

The proposal (including the Heybridge Converter Station) would benefit local communities through providing employment and training opportunities, with potential job and training opportunities for women, young people, members of the Tasmanian Aboriginal Community, and vulnerable groups.

The proposal (including the Heybridge Converter Station) would be targeting opportunities for Tasmanian Aboriginal Community employment and procurement throughout the construction and operational phase, through direct and indirect employment as well as other actions to increase economic opportunities. An industry participation plan would be prepared to identify efforts and actions to increase the economic opportunities for the Tasmanian Aboriginal Community. This would be further investigated as part of ongoing consultation with the Tasmanian Aboriginal Community and stakeholders, and would be implemented as part

of the community and stakeholder engagement framework and the industry participation plan (refer to Section 6.12.5).

Investment in renewable energy projects also provides regional communities with economic and social capital growth. Benefits would also accrue for the study areas through the implementation of the project's industry participation plan and the community benefits sharing scheme for the project. The proponent would invest in the local region directly, as it is already committed and doing through grant funding arrangements with Burnie City Council.

6.12.4.3.1 Opportunities for training and skills development

The Tasmanian Government's skills and training initiative, Energising Tasmania (Tasmanian Government 2021), is supporting the expansion of workforce skills in areas such as engineering, project management, civil construction and trades. The program includes a training grants fund, a training market development fund to support training providers, a fund to deliver an industry-led workforce development plan, and the establishment of an industry advisory group. These would all likely be leveraged by training providers to support projects like and including Marinus Link.

The University of Tasmania, TAFE Tasmania, Skills Tasmania, and the Education Department are all looking to the project and the renewable energy projects that would likely follow construction of the project to provide demand for high-quality jobs and career pathways for students. These organisations are planning to shape curriculums and course offerings to create the workforce required and provide opportunities to young Tasmanians.

With respect to the proposal specifically, skills development would be pursued through a social impact management plan with a focus on providing local opportunities.

6.12.4.4 Other industry impacts

The proposal would support jobs across a range of industries. The construction phase of the proposal and the Heybridge Converter Station would lead to employment for technicians and trades workers (e.g., electricians, architectural, building and surveying technicians, welders and metal fitters and machinists), labourers and machinery operators.

The agriculture, forestry and fishing (in Bass Strait) industry (as defined by the ABS) is a critical economic driver in both North West Tasmania with 3,800 employed in this industry recorded at the 2021 Census. Construction of the proposal and the Heybridge Converter Station would indirectly place pressure on the industry through increased competition for labour. During construction of the proposal, employment in the agriculture, forestry and fishing industry may fall by 18-80 FTE job-years per annum but stabilise post-construction.

In addition, the retail trade, accommodation and food services industry would see an increased demand, with the project estimated to generate support for approximately 358 FTE job-years in Tasmania between 2025 and 2050.

The greater the role industry and business in the region can have in supplying goods and services for the construction and operations of the project, the greater the positive and beneficial workforce and economic impacts may be realised. The project would be implementing its industry participation plan to support local businesses, including local sourcing of materials, goods and services. Over the long term, the objective of the project is to leverage local supply chains and spending where feasible in Tasmania.

Recreational business and shipping users of Bass Strait are not predicted to be affected significantly by the project. Tourism operators could see negative impacts if tourism accommodation is used by the construction workforce. Avoiding this impact would feature in the workforce and accommodation strategy.

6.12.4.4.1 Land and housing impacts

While the project would lead to rental housing demand increase as a result of the influx of construction workforce, independently, the North West Tasmania region (despite population decline forecast for the local and regional study areas in the near term) is also projected to require an additional 3,928 dwellings in the longer-term, by 2040. It is considered possible that housing demand pressures could increase during construction of the project, including an upward pressure on housing prices, rents and potentially land values. The provision of temporary housing/accommodation for the construction workforce, a consideration for the workforce and accommodation strategy, may mitigate against this upward pressure.

During construction, the likely effects related to housing demand and land value include:

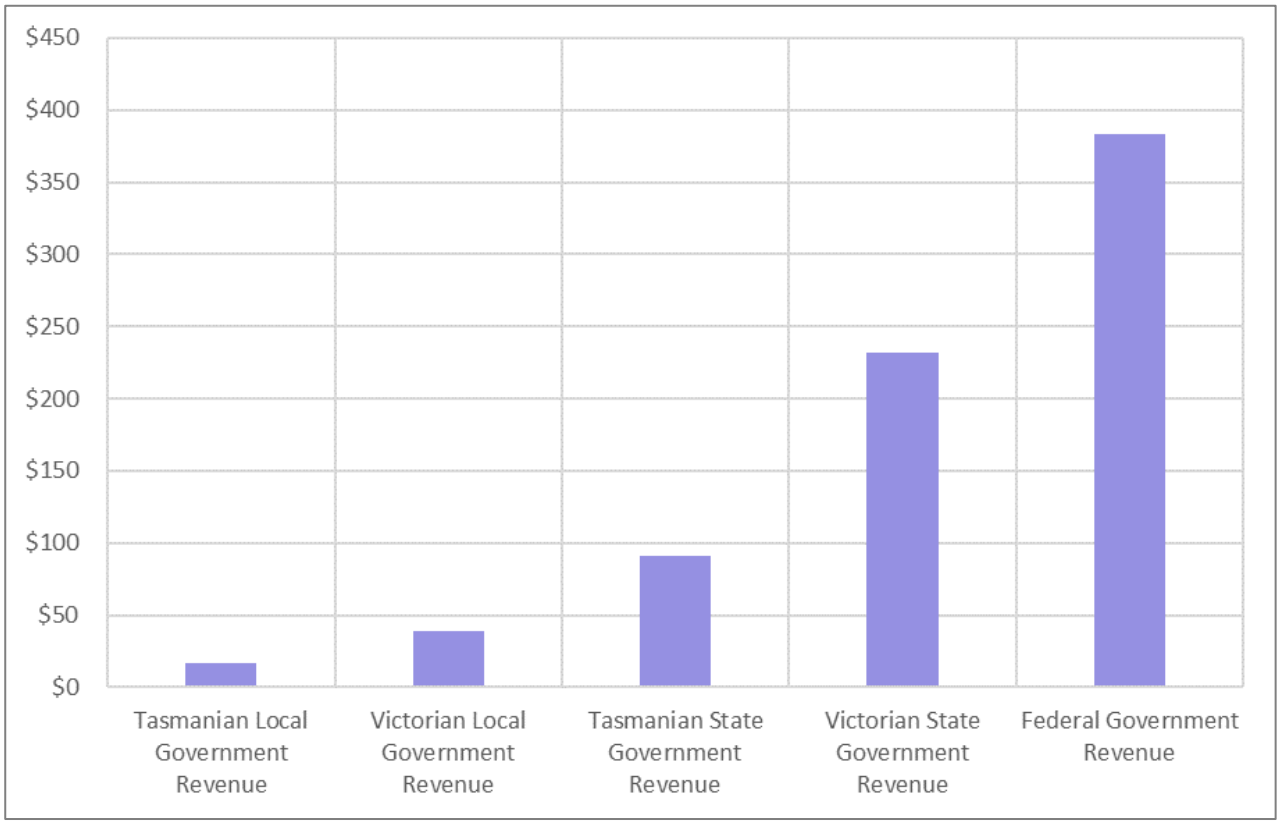
- Employment levels are substantially elevated from a business-as-usual level, which can lead to elevated housing demand levels.
- Households for the locally employed workers may experience an escalation in home values, or alternatively if renting, an escalation in their rental rates.
- Non-local workers from outside the North West Tasmania region may relocate, rent or purchase a home, which represented increased demand for housing supply, with potential to increase prices and rents. This increased pressure may lead to increased land values.
- Further effects could materialise in the form of housing stress, where households spend more than 30% of their gross income on housing.

During the operational phase of the Heybridge Converter Station, upward pressures on housing prices and rents are unlikely to be as strong as the construction phase. Both local and non-local workers would be expected to be employed during the operational phase and a portion of these workers may choose to relocate closer to the proposal or continue to reside non-locally, overall contributing to less pressure on the local housing demand compared to the construction phase. The proponent is exploring opportunities to reduce pressure on local housing markets, including through a workforce and accommodation strategy.

6.12.4.4.2 Local, state and federal tax and revenues

Based on the outputs of the technical modelling, the project is projected also to generate public taxation receipts for various levels of government. Figure 6.12-4 illustrates the following:

- Local governments in Tasmania are expected to collect an additional $17 million from increased rates revenues.
- The Tasmanian Government is expected to collect an estimated $91 million. This tax revenue includes property and payroll taxes and stamp duties.
- The Australian Government is expected to collect an estimated $383 million. This tax revenue largely stems from taxation on the provision of goods and services and income taxes on individuals.



Source: SGS Economics & Planning; Centre of Policy Studies (2023)

Figure 6.12-4 Total added taxation revenue 2025-2050 ($ millions)

6.12.4.5 Cumulative impacts

Each of the Social Impact Assessment and the Economic Impact Assessment assessed the impacts of the proposal together with the impacts of the Heybridge Converter Station. The impacts presented here reflect a cumulative impact assessment of the two proposals.

The overlap and interaction between this proposal and the proposed Heybridge Converter Station is a necessary requirement to allow the sharing of workforce and skilled labour, local and regional infrastructure and services, and local employment targets across the overall project to enable a coordinated approach to manage social/economic impacts while maximising the benefits. Overall, the overlap of the two proposals in both footprint and schedule would contribute to positive economic outcomes, enhance employment and livelihoods, while potentially impacting on availability of infrastructure and services for the local and regional communities.

The overlap in construction activities may, however, give rise to community concerns about disruption to their amenity. However, the project is not anticipated to result in significant cumulative impacts for noise (refer to Section 6.6), air quality (refer to Section 6.7) and visual amenity, for the sensitive receptors near the proposal site, provided that the proposed mitigation measures are implemented for the proposal to minimise such impacts. The mitigation measures provided in Section 8 considers the various potential impacts to amenity.

The potential cumulative impacts associated with construction of other foreseeable future projects (listed in Section 6.14) are anticipated to place significant demands on construction workforce availability and related issues of workforce accommodation. The management of socio-economic impacts would need to address the peaks in the construction workforce relating to the construction activities in Tasmania in the context of other large-scale infrastructure construction projects in the region.

The residual cumulative social impacts are summarised in Table 6.12-7. The mitigation measures outlined in Section 6.12.5 would be implemented to minimise potential cumulative impacts on the Heybridge and regional communities in Tasmania.

The combined construction of renewable energy projects supported by the proposal and project is predicated to lead to an average of an additional 220 FTE job-years in North West Tasmania and contribute $4.4 billion in the Tasmanian economy between 2028 and 2050 (average $190 million per year), including $2.1 billion to the North West Tasmania economy (average $92 million per year).

Based on the assessment of social and economic impacts, it is anticipated that the proposal would lead to beneficial cumulative impacts on:

- Income levels.
- Cost of goods and services.
- Workforce participation.
- Construction supply chain.
- Government revenue.

In addition, adverse cumulative impacts would be anticipated for:

- Housing availability and affordability.
- Demand for competition for construction workers.
- Demand for health and emergency services.

Mitigation measures to address cumulative impacts listed above include MM S01 and MM S02.

Table 6.12-7 Cumulative impacts summary

Potential impact	Cumulative residual impact assessment		
	Sensitivity	**Magnitude**	**Impact significance**
Economy and livelihood			
The cumulative impact of the project workforce would contribute to the demand for rental housing in the regional study area and exacerbate existing rental availability and affordability issues,	Very sensitive	Major	**Major (negative)**

Potential impact	Cumulative residual impact assessment		
	Sensitivity	Magnitude	Impact significance
which would affect very low and low-income households disproportionally.			
The demand and competition for skilled labour resources may impact industries requiring similar skill sets and potentially draw from other industries and local businesses within the study area.	Very sensitive	Moderate	**High (negative)**
Infrastructure and services			
The cumulative impact of the project workforce would contribute to the demand for health and emergency service providers, which may compromise the service provided to the existing regional population.	Very sensitive	Moderate	**Moderate (negative)**
The cumulative impact of increased construction workforce on demand for childcare providers, compromising service provision to the existing local and regional community.	Very sensitive	Moderate	**High (negative)**
People's productive capacities			
Employment pathways for First Nations people, women, youth and socially vulnerable groups in the regional construction and operations workforce are made available.	Very sensitive	Minor	**Moderate (positive)**

6.12.5 Management, mitigation and monitoring

Proposed measures to minimise potential impacts associated with socio-economic issues are presented in Table 6.12-8. Mitigation measures in other sections that are relevant to the management of social and economic issues include:

- Section 6.6 (Noise and vibration), specifically measures which address the management of noise emissions on sensitive receptors.
- Section 6.7 (Air quality), specifically measures which address the management of dust and odours associated with contaminated soils.
- Section 6.13 (Infrastructure and off-site ancillary facilities), specifically measures which address construction traffic management.
- Section 8.2 (Mitigation measures), specifically MM Gen06 which addresses consultation with relevant stakeholders to manage the interface of nearby projects under construction at the same time.

Together, these measures will minimise the potential socio-economic impacts.

Table 6.12-8 Socio-economic issues – mitigation measures

Ref	Mitigation measure	Proposal stage
S01	Prior to construction commencing, in preparing the project's worker health and safety plan, include: • Requirements and measures for responding to health, medical and safety incidents of construction personnel during the construction phase. • Strategies for provision of first response medical capabilities on-site for both local and non-local employees and contractors to minimise the impact on local health services.	Construction

Ref	Mitigation measure	Proposal stage
S02	Develop a workforce and accommodation strategy to address the potential social impact from the workforce and accommodation requirements during construction. The strategy will: • Be developed in consultation with government, industry and other relevant providers. • Include a protocol for the identification and management of impacts due to accommodation requirements. • Address cumulative impacts on accommodation due to other large-scale construction and infrastructure projects in the identified local study areas. The outcomes of the strategy will be considered during construction planning.	Construction
S03	Prior to construction commencing, develop a community and stakeholder engagement framework for the whole project, which outlines the approach to engagement with community, stakeholders, First Peoples and the Tasmanian Aboriginal Community that will be undertaken for the project, including the proposal, and by all contractors. The community and stakeholder engagement framework must: • Be consistent with IAP2 principles and guidance in the National guidelines *Community engagement and benefits for electricity transmission projects* (ECMC 2024), and *Renewable energy development in Tasmania: A guideline for community engagement, benefit sharing and local procurement* (Department of State Growth 2024). • Identify key community and stakeholder groups across the project, including for the proposal, with a likely interest such as property owners, local residents, business owners, business and industry associations road users, and local Council. • Describe the approach for engaging the community, stakeholders, First Peoples and the Tasmanian Aboriginal Community. • Establish communication protocols and tools for communication that provide: - Early and ongoing information and notification to local communities and stakeholders about timing and duration of works, potential impacts and proposed management measures. - Information on issues of community concern and proposed management measures such as project scope, construction noise (including out of hours works), construction air quality and construction traffic. Outline complaints policies and management procedures for recording, managing, and resolving complaints. The complaints management system will be consistent with Australian Standard AS/NZS 10002: 2014 *Guidelines for Complaints Management in Organisations*. Principal contractors will prepare a community and stakeholder engagement management plan in accordance with the framework for their works package, including tailored to the proposal. The community and stakeholder engagement framework and contractors' community and stakeholder engagement management plan will be updated annually to reflect any project or stakeholder changes and improvements identified. The community and stakeholder engagement framework will be implemented during construction.	Construction
S04	Prior to construction commencing, develop a Tasmanian community benefits sharing scheme in consultation with communities and the Tasmanian Aboriginal Community in the identified local study area. The Tasmanian community benefits sharing scheme should be developed having regard to *Renewable Energy Development in Tasmania: A guideline for community engagement, benefit sharing and local procurement* (Department of State Growth 2024).	Construction
S05	Prior to construction commencing, develop an industry participation plan to integrate First Peoples, the Tasmanian Aboriginal Community, women, youth and socially vulnerable groups into the project workforce. The purpose of the industry	Construction

Ref	Mitigation measure	Proposal stage
	participation plan is to stimulate entrepreneurship, business and economic development, providing First Peoples, the Tasmanian Aboriginal Community and vulnerable groups with more opportunities to participate in the economy. The plan will: • Set out an employment and supplier-use participation target within the project's locality. • Outline the project's social procurement policies and local procurement policies considering each component and phase of construction. • Be developed in conjunction with the requirements under the Indigenous Employment and Supplier-use Infrastructure Framework (February 2019). • Identify a range of potential opportunities for job-seekers and businesses to be involved in the project across the construction supply chain. • Set employment targets with reference to local First Peoples or the Tasmanian Aboriginal Community working age population within the project area and consistent with the 'locals first principle'. • Identify opportunities for women, youth and other socially vulnerable groups to be involved in the project workforce.	
S06	Prior to construction commencing, engage with local emergency service providers in the preparation, planning, monitoring and review of the project's emergency response plan and procedures. The project's emergency response plan must outline protocols for: ▪ Ongoing engagement with emergency services about changes to local access and project activities that have potential to cause delay or disruption to emergency response. ▪ Engaging with the community and managing social impacts during an emergency incident. The protocols will form part of the project's emergency response plan and will be implemented during construction.	Construction

6.13 Infrastructure and off-site ancillary facilities

This section provides a summary of the findings of the Traffic and Transport Impact Assessment provided in Appendix M.

6.13.1 Assessment guidelines

The relevant sections of the EIS guidelines for the Heybridge Shore Crossing, and where these have been addressed in this EIS, are outlined in Table 6.13-1.

Table 6.13-1 Relevant EIS guidelines

Infrastructure and off-site ancillary facilities – EIS guidelines	Section
Discuss potential environmental impacts of the proposal on any significant offsite or infrastructure facilities (including increased use of existing infrastructure, such as roads, ports and quarries).	Section 6.13.5
Identify measures to avoid and mitigate any possible adverse impacts and assess the overall impacts following implementation of the proposed avoidance and mitigation measures	Section 6.13.6
Identify roads and other infrastructure to be used by vehicles for the proposal (during both construction and operation).	Section 6.13.3, 6.13.5
Potential environmental impacts associated with construction and use of such infrastructure should be assessed.	Section 6.13.5, 6.13.7

6.13.2 Methodology

The Traffic and Transport Assessment included:

- **A baseline characterisation of the existing environment:** for the impact assessment to measure the degree of change, and to determine the level of impact associated with the change.
- **An identification of values:** an analysis of the core traffic engineering principles, and knowledge of the proposal to inform the identification of values to be used in the impact assessment. This analysis included:
  - A site inspection of the surrounding road network, comprising photos and videos, measurements of road cross sections, sight distance assessments at key intersections, observational reviews of traffic behaviours, review of site constraints along proposal travel routes, and recording of pavement conditions.
  - Traffic surveys to determine existing traffic volumes at the surrounding road network. These surveys were undertaken over a week between 8 and 14 November 2022 using Automatic Traffic Count tube counts and video cameras.
- **Technical analysis:** to identify the impacts of the proposal.

The assessment considered the significance of potential impacts based on the sensitivity of the value and magnitude of the impact. In so doing, it used both **significance** and **risk assessment approaches**.

For further details about the methods adopted and assumptions and limitations, refer to Appendix M. The description of the significance of an impact adopted for this assessment is outlined in Table 6.13-2.

Table 6.13-2 Significance of impact

Significance of impact	Description
Major	Occurs when impacts will cause irreversible or permanent change to the road and/or active transport networks or creates a significant safety risk. Avoidance through appropriate design responses is the only effective mitigation.
High	Occurs when the proposed activities are likely to cause unmanageable transport volumes on the existing road and/or active transport networks or creates a high safety risk. While management of unavoidable impacts is possible, avoidance through appropriate design responses is preferred to preserve existing levels of capacity or safety.
Moderate	Occurs where, although reasonably resilient to increased transport volumes on the existing road network or impact to the active transport network would be degraded, the value would be degraded due to its scale of impacts or susceptibility to further change. The abundance of the value ensures it is adequately represented in the region, and that replacement, if required, is achievable.
Low	Occurs where a value is of local importance and temporary and transient changes will not adversely affect its viability provided standard controls and management measures are implemented.
Very low	A degraded (very low sensitivity) value exposed to minor changes (negligible magnitude impact) will not result in any noticeable change in its intrinsic value and hence the proposed activities will have negligible or no effects on the road and/or active transport networks. This typically occurs where the activities occur in industrial or highly disturbed areas.

6.13.3 Existing conditions

6.13.3.1 Road network

The existing intersections and road network relevant to the proposal are presented in Table 6.13-3 and Table 6.13-4, respectively.

Table 6.13-3 Existing intersections

Intersection	Intersection arrangement	Sight distance	Intersection characteristics
Minna Road / proposal site access point	T-intersection	Curves and topography limits sight distance from minor road.	The intersection is sealed with fading line marking
Bass Highway / Minna Road	'Seagull' T-intersection. Give way from minor road	No issues with sight distance.	The intersection is sealed with road markings and signage.
Bass Highway / Edwardes Street	Signalised X-intersection	No issues with sight distance.	The intersection is sealed with signals and line marking

Table 6.13-4 Existing road network

Road and classification	Speed limit	Road measurements	Road capacity*	Road characteristics	Vehicles per day**	Heavy vehicle %***
Bass Highway (National / State Highway)	90 km/hr	Total carriageway width = 37 m Total lane width = 7 m one way (2 x 3.5 m) Shoulder width = 3.7 m	>40,000	• State significant highway with two lanes in each direction. • Emergency stopping lane shoulders. • No active transport infrastructure.	19,673	10%
Minna Road, Heybridge (Sub Arterial Road)	100 km/hr	Total carriageway width = 7.8 m Total lane width = 3.9 m (2 x 3.9 m) Shoulder width = 2 m	>3,000	• Sealed road with single lane in each direction. • Gravel shoulder with topographic barriers. • No active transport infrastructure.	798	14%
Edwardes Street, Burnie (Arterial Road)	50 km/hr	Total carriageway width = 20 m Total lane width = 20 m (2 x 10 m) Shoulder width = 0 m	>3,000	• Access between Bass Highway and Port of Burnie. • Wide lanes for truck turning movements. • Pedestrian infrastructure crossing at traffic lights along Bass Highway.	1,355	25%
Tarleton Street, East Devonport (Arterial Road)	60 km/hr	Total carriageway width = 12 m Total lane width = 12 m (2 x 6 m) Shoulder width = 0 m	>3,000	• Sealed road with single lane in each direction. • Footpaths on western frontage.	10,621	7%
Wright Street, East Devonport (Arterial Road)	50 km/hr	Total carriageway width = 8 m Total lane width = 8 m (2 x 4 m) Shoulder width = 0 m	>3,000	• Sealed road with single lane in each direction. • Footpaths on western frontage,	5,275	17%

Notes:
* Theoretical capacities based on Austroads guidelines
** Surveyed Annual Average Daily Traffic values at each section of road
*** Percentage of heavy vehicles identified from the traffic surveys

6.13.3.2 Traffic volume

The traffic surveys undertaken are expected to represent typical operating conditions for the roads surveyed. The results of these surveys are summarised in Table 6.13-5.

Table 6.13-5 Summary of traffic surveys undertaken

Road	Location	Average 2-way traffic volumes		
		AM peak hour (7:30-8:30)	PM peak hour (16:00-17:00)	Daily
Bass Highway	Adjacent to the proposal site	460	478	19,673
Minna Road	Adjacent to the proposal site access point	64	71	798
Tarleton Street	Between Riverview Avenue and Bass Highway	766	935	10,621
Wright Street	Between Anchor Drive and Torquay Road	421	467	5,275

6.13.3.3 Public and active transport

The proposal site has minimal access to public transport services, and limited formal pedestrian footpaths and cycle tracks. Public bus services are available in Burnie, a township west of the proposal site. These services run at a low-frequency and generally provide access to the centre of the township for the local residents or connect towns. The 708 and 190 bus services operate along Bass Highway, which passes the proposal site. The 190 bus services the Heybridge Bus Stop, which is a short walk from the Heybridge Converter Station site. These services operate at a low-frequency.

School bus services operate within the surrounding road network, however the route of these services is not known, and consultation would be required with local councils to determine these school bus routes, noting that these are subject to change based on the residences of the children being picked up each year.

6.13.4 Applicable legislation

6.13.4.1 Austroads Guide to Road Design

The *Austroads Guide to Road Design* (2022) provides road designers with a framework that promotes efficiency in design and construction, economy, and both consistency and safety for road users.

The guidance is intended to inform the design, construction, maintenance and operation of the road network in Australia and New Zealand. The design and construction of all road works required for the project are to comply with the applicable Austroads guidelines.

6.13.4.1.1 Austroads Guide to Road Design Part 4a: Section 3.2 Sight Distance Requirements for Vehicles at Intersections

The *Austroads Guide to Road Design Part 4a* was used to identify the approach sight distance and the safe intersection sight distance requirements on major and minor arm approaches on Minna Road and the proposal site access point. The results of the sight distance assessment are detailed in Table 6.13-6.

Table 6.13-6 Sight distance assessment results

Intersection	Approach	Sight distance	Existing measures
Minna Road / the proposal site access point	The proposal site access point (minor arm)	Approach sight distance is achieved	There are curves in the road in both directions on the major carriageway which limit the available sight distance as well as vegetation and topography. The intersection currently has appropriate signage to identify the curves in the road and the location of the intersection.

6.13.5 Potential impacts

6.13.5.1 Construction

The proposal would generate increased traffic movements on the surrounding road network, potentially causing impacts to the condition, traffic safety, transport access and capacity of the road network. The increased generation of traffic would be caused by:

- The transportation of construction workers to the Heybridge Converter Station/launch pad site.
- The delivery of materials, plant and machinery to the Heybridge Converter Station/launch pad site.

Potential impacts to the road network associated with the proposal are limited to the construction stage. The proposal would utilise arterial roads, minor streets, bridges and intersections surrounding the proposal site for the transport of infrastructure and workforce personnel. Travel routes that would be used by heavy and light vehicles for the construction of the proposal are presented in Figure 6.13-1 and Figure 6.13-2 respectively (with a description of the existing intersections and road network relevant to the proposal provided in Section 6.13.3).

Impacts to traffic and transport may result from increased volumes of traffic, leading to impacts on the condition, safety, performance and capacity of the road network. Potential impacts have been assessed based on the level of traffic anticipated to be generated by the various construction activities and routes that vehicles are anticipated to take to the proposal site.

Figure 6.13-1 Heavy vehicle travel routes to and from the proposal site

Figure 6.13-2 Light vehicle routes to and from the proposal site

6.13.5.1.1 Traffic generation

Construction (associated with the HDD boring) would occur over a 6-month timeframe for 24 hours, seven days a week. Two, 12 hours employee shifts would occur each day, from 7:00 am to 7:00 pm and 7:00 pm to 7:00 am. On each shift change over, it is assumed that 10 employee vehicles would arrive and depart. However for the purposes of the assessment, a conservative assumption of vehicles entering and leaving the site during peak hour was used.

Worker parking for proposal would be provided within the Heybridge Converter Station site. It is assumed that workers would generate an average of two vehicle movements per day. The need for construction works to leave the site during their shift is considered low due to the size of the construction activity, the number of workers on-site and the associated amenity which is likely to be provided for a construction activity of this scale. The predicted construction traffic volumes for the proposal are summarised in Table 6.13-7.

Table 6.13-7 Estimated traffic volume summary

Time period	Heavy vehicles (construction)	Light vehicles (construction)	Light vehicles (employees)	Total vehicles
Peak hour (AM 7:30-8:30 / PM 16:00-17:00)	8 movements	6 movements	20 movements	34 movements
Daily	8 movements	6 movements	60 movements	74 movements

The impact of construction traffic generated by the proposal has been considered together with the Heybridge Converter Station construction traffic as provided in Table 6.13-8 and Table 6.13-9.

Table 6.13-8 Estimated traffic volume summary for the Heybridge Converter Station

Time period	Heavy vehicles (construction)	Light vehicles (employees)	Total vehicles
Peak hour (AM 7:30-8:30 / PM 16:00-17:00)	30 movements	180 movements	210 movements
Daily	60 movements	360 movements	420 movements

Table 6.13-9 Estimated construction traffic movements per quarter

Movements per quarter	2025				2026				2027	
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
Stage 1	-	353	619	367	300	367	357	264	-	-
Stage 2	-	-	512	512	159	159	169	239	229	209

6.13.5.1.2 Road network capacity

The operational performance and capacity of the surrounding road network has the potential to be impacted from the increased generation of traffic to the proposal site.

The Minna Road/converter station site access point and Bass Highway/Minna Road intersections are the main intersections likely to be impacted by the increased proposal generated traffic. However, modelling undertaken by the Traffic and Transport Impact Assessment (Appendix M) identified that while traffic volumes would increase, these intersections would not exceed their capacity during peak operational periods. The impact significance is considered **low**.

No arterial roads (as outlined in Table 6.13-4) would exceed their theoretical capacity during peak operational time periods, and Minna Road and Bass Highway are expected to operate well below capacity with the addition of proposal generated traffic during construction. The impact significance is considered **very low**.

The assessment has assumed that the peak hour traffic volumes generated by the proposal would occur at the same time as the road network peak (i.e., worst case scenario). However, it is assumed that most construction-related traffic would arrive to the proposal site at 7:00 am, which is before the recorded road network peak hour.

All vehicles entering the proposal site are expected to approach using Bass Highway. No roads are proposed to be closed as a result of construction. However, if road closures are required (due to unforeseen events), the impact significance is considered **moderate** to address the potential for a closure of Bass Highway, given significant detours would occur to the public.

A significance assessment has been undertaken on potential impacts to the road network surrounding the proposal site prior to the implementation of mitigation measures. The significance assessment is presented in Table 6.13-10. The methodology for the assessment is provided in Appendix M.

Table 6.13-10 Road capacity network – initial significant assessment

Attribute	Impact	Description	Significance
Arterial road link capacity	No impact. No arterial roads identified would exceed their capacity	• No arterial roads identified would exceed or approach capacity. • Total traffic generation is small percentage of arterial road capacity.	Very low
Impacted intersections	Intersections would not be operationally impacted with appropriate intersection treatment existing.	• There are two intersections primarily impacted by site generated traffic to access the site. • The intersections would operate in accordance with industry standards.	Low
Connectivity	Bass Highway is a primary Highway utilised by the Tasmanian north coast.	• No roads are proposed to be closed as a result of the proposal, however if road closures are required due to unforeseen events, significant detours would occur to the local public on Bass Highway.	Moderate

6.13.5.1.3 Road safety

The design, condition and safe operation of the surrounding road network has the potential to be impacted by the increased generation of traffic to the proposal site.

6.13.5.1.3.1 Adequate road geometry

All bridges and turning movement requirements on the surrounding road network are accessible by all construction vehicles required for the proposal. No additional road works are required for construction vehicles to gain access to the proposal site. The impact significance is considered to be **low** to **very low**.

6.13.5.1.3.2 Sight distance

Assessment of intersection sight distances were undertaken for the converter station site's access point to Minna Road to determine the existing sight distances and further measures that could be installed to improve the safety of Minna Road/the proposal site access point intersection.

The Minna Road/the proposal site access point has existing sight distance constraints, and warning signage is provided. Due to the increased traffic volume generated by the construction of the proposal, there is an increased safety risk at this intersection. The impact significance is considered **very low**.

6.13.5.1.3.3 Crash risk and safe operation of the road network

While there is an inherent risk of increasing the number of crashes by increasing the volume of traffic on a road, given the low values of percentage impact at higher risk locations, there is no material increase in the likelihood of crashes during the construction phase as a result of the proposal. The impact significance is considered **low**.

HDD works required for the proposal would involve night works, so if adequate road lighting is not provided, there would be an increased crash risk. Without mitigation, the impact significance is considered to be **moderate**. Any construction related activities occurring at night would require the provision of appropriate road lighting to improve road safety.

Pedestrian activity within the study area construction traffic routes is primarily limited to the townships. The heavy movements through townships are primarily constrained to Bass Highway and are therefore operating in line with expectation and existing use. Vehicle movements may occur through smaller townships in the event of a road closure on Bass Highway. When construction vehicles pass through these locations there is a potential for an increased risk of crashes due to the increased number of pedestrians that are present within the townships. The impact significance is considered to be **low**.

There are a number of schools and kindergartens within the townships that construction vehicles would be travelling through to access the proposal site. These paths of travel would remain on Bass Highway, which does not contain direct access points to schools. If any detours are required during construction, a review of schools along the detour route should be conducted. When construction vehicles pass by schools there is potentially an increased risk of crashes, particularly given the high number of children within the road network during pick-up and drop-off time periods. The impact significance is considered **low**.

A significance assessment has been undertaken on potential impacts to the safe performance, road condition, design and operation of the road network surrounding the proposal site prior to the implementation of mitigation measures. The significance assessment is presented in Table 6.13-11.

Table 6.13-11 Safe road performance, condition and design – initial significance assessment

Attribute	Impact	Description	Significance
Adequate road geometry	Semi-trailer access via the surrounding road network	The paths of travel to the site are contained on the Department of State Growth approved B-double road network. It is assumed the Department of State Growth approved road network can accommodate the construction vehicles accessing the proposal site.	Low
	Semi-trailer access to the site	The existing proposal site access point is designed to be accessible to large vehicles.19 m semi-trailers can access the proposal site.	Very low
Historic crash safety review	Increased crash risk on the external road network surrounding the proposal site	No noted crash trend. The traffic generated by the proposal site is not expected to increase the safety risk.	Low
Provisions of safe sight distance at intersections	Increased safety risk at the Minna Road/ site access point with sight distance constraints.	Poor sight distance with warning signage provided. Traffic generated at intersection with warning signage.	Very low
Safe operation	Roads may require resurfacing/remediation works.	The road network on the paths of travel to the site are high capacity freight routes, designed to accommodate heavy vehicles. The traffic generated would increase wear and tear on the road network.	Low

Attribute	Impact	Description	Significance
	Increased crash risk due to poor road lighting for HDD at night.	Provisions of road lighting at the Minna Road/ proposal site access point. Vehicle movements generated with insufficient lighting provided.	**Moderate**
	Provision of adequate quality intersection treatments, notably at the Minna Road site access point.	Infrastructure treatments utilised by construction traffic should be up to an appropriate quality as required by the standards. Traffic generated on intersections with poor line marking.	**Low**
	General driver safety	General driver behaviour and crash risk.	**Moderate**
	Safety risk of pedestrians in townships with increased truck movements	Roads used to access the site travel past townships on the Highway. Heavy vehicle movements through townships contained on highways.	**Low**
	Safety risk around schools	Roads used to access the site are contained to the highway.	**Low**
	Unforeseen safety risk	Diverted roads should be constructed to the same or better standard than the original.	**Low**
	Peak seasonal events	Increase in the number of unfamiliar drivers onto the road network during seasonal holiday periods.	**Very low**

6.13.5.1.4 Public and active transport

The Western Line Railway is located on the northern side of Bass Highway, adjacent to the proposal site. The HDD would go under the rail line, avoiding impacts to rail services as a result of the proposal. The impact significance is considered **very low**.

The movement of construction vehicles would predominantly be confined to major arterial roads and highways and heavy vehicle routes, avoiding impacts to public bus services. The impact significance is considered to be **very low**.

Construction of the project would likely result in heavy construction vehicles sharing roads that are utilised by school buses (refer to Section 6.13.3.3). School bus routes are subject to change over time, with the current school bus routes likely to differ by the time construction activities commence. Without mitigation, the impact significance is considered **high**.

The proposed works would not impact pedestrian footpaths or cycling infrastructure. The impact significance is considered **very low**.

A significance assessment has been undertaken on potential impacts to public and active transport prior to the implementation of mitigation measures and is presented in Table 6.13-12. Impacts with an initial impact significance of ‘moderate’ and above, would be managed by the mitigation measures outlined in Section 6.13.6.

Table 6.13-12 Public and active transport – initial significance assessment

Attribute	Impact	Description	Significance
Public transport	Impact on train services.	No railway lines utilised for public transport are in the study area.	Very low
	Impact on public bus services.	Low-frequency bus routes are in towns along travel routes.	Very low
	Impact on school bus routes.	School buses may be present on travel routes by construction vehicles. Construction vehicles may pass school buses and waiting children.	High
Active transport	Impact on dedicated cycling infrastructure.	There is minimal cycling infrastructure present within the study area. Construction vehicles may pass some cycling infrastructure.	Very low
	Impact on footpaths.	There are minimal footpaths present within the study area. Construction vehicles may pass some footpaths.	Very low

6.13.5.2 Operation

The potential impacts to the road network associated with the proposal are limited to the construction stage. There would be no operational impacts associated with the proposal as maintenance associated with the subsea cables would be undertaken in the marine environment.

6.13.5.3 Cumulative impacts

The above construction impact assessment incorporates impacts associated with the Heybridge Converter Station. During operation, traffic movement for the Heybridge Converter Station would be minor (five light vehicles entering and exiting the site per day, increasing to 15 to 20 light vehicles entering and existing the site per day during periods of maintenance) and are not expected to compromise the safety function or operation of the surrounding road network.

Other regional projects would have a minimal cumulative impact alongside the construction of the proposal due to their location. Negligible additional volumes of traffic would intersect on lower order roads throughout the region, with more substantive traffic volumes combining along Bass Highway, which has a high capacity and is therefore considered capable of accommodating the extra temporary traffic.

6.13.6 Management, mitigation and monitoring

Proposed measures to minimise potential impacts to infrastructure and off-site ancillary facilities are presented in Table 6.13-13. Mitigation measures in other sections that are relevant to the management of infrastructure and off-site ancillary facilities include:

- Section 6.2 (Potentially contaminated materials and acid sulfate soils), specifically measures for the transport of contaminated materials.
- Section 6.9 (Dangerous goods and environmentally hazardous materials), specifically measures for the transportation of hazardous materials.

Together, these measures will minimise the potential infrastructure impacts.

Table 6.13-13 Infrastructure and off-site ancillary facilities – mitigation measures

Ref	Mitigation measure	Proposal stage
T01	Prior to construction commencing, prepare and implement a transport management plan in consultation with Burnie City Council. The transport management plan will include: • Requirements for maintaining transport capacity and appropriate performance for all travel modes in the peak travel demand periods, particularly at the key intersections of Bass Highway / Minna Road and Minna Road / the Heybridge Converter Station site access point. • Management of full or partial traffic lane closures. • Requirements that construction vehicles use identified vehicle routes or nominate alternatives as required, obtaining road authority approvals where necessary. • Containment of construction worker car parking within the Heybridge Converter Station site. • Identification of methods to reduce impact of project generated traffic where practicable. • Driver training requirements, with drivers required to undertake project training that addresses site specific road safety risks along haulage routes. • Measures to minimise heavy vehicle movements through designated school zones when these zones are in operation (8:00 am to 9:30 am, 2:30 pm to 4:00 pm, school days). • Mitigation measures to minimise potential roadkill risk in accordance with *Tasmanian Devil Survey Guidelines and Management Advice for Development Proposals,* including, but not limited, to: - Protection measures for Tasmanian devils and Spotted-tailed quolls with a focus on construction traffic and awareness regarding roadkill included in site inductions. - Establishing and implementing a recording and reporting process for roadkill on Minna Road between intersection with Bass Highway and the entry to site, where vehicles associated with the proposal will travel, especially for reporting Tasmanian devils and spotted-tail quoll roadkill incidents to NRE. - Construction vehicles to maintain low speeds between dusk and dawn. - Removing roadkill mortalities off the road within a specified distance of the site to reduce attracting carnivorous fauna during the construction period.	Construction
T02	*Not relevant to this proposal*	

6.13.7 Residual impacts

Table 6.13-14 presents the findings of the residual impact assessment following implementation of mitigation measures, extracting only the residual impacts with an initial impact significance of moderate or above.

With the implementation of the proposed mitigation measures, the impact significance of traffic and transport impacts have been reduced to **moderate** to **low**, with no high or major residual impacts anticipated.

Table 6.13-14 Traffic and transport - residual impact significance assessment

Value	Attribute	Impact	Initial impact significance	Mitigation measures	Residual impact	Residual impact significance
Road capacity network	Connectivity	Bass Highway is a primary Highway utilised by the Tasmanian north coast	Moderate	Nil	No roads are proposed to be closed as a result of the proposal. If road closures are required due to unforeseen events, consultation with authorities should be undertaken to minimise disruption.	**Moderate**
Safe road performance, condition & design	Safe operation	General driver safety	Moderate	T01	General driver safety	**Moderate**
		Increased crash risk due to poor road lighting for HDD at night	Major	T01	Lighting to be provided to sufficiently meet the appropriate standards	**Moderate**
Public and active transport	Public transport	Impact on school bus routes.	High	T01	Continuous engagement to ensure any changes to school bus routes are known.	**Low**

6.14 Cumulative and interactive impacts

This section provides a summary of the proposal-level cumulative impacts, based on the findings of technical studies appended to this EIS.

6.14.1 Assessment guidelines

The EIS guidelines for the Heybridge Shore Crossing require consideration of cumulative impacts across environmental and social aspects. Sections of the EIS where the EIS guidelines have been referenced already include:

- Terrestrial natural values (Section 6.1.1).
- Potentially contaminated materials and acid sulfate soils (Section 6.2.1).
- Marine water quality (Section 6.4.1).
- Water quality (Section 6.5.1).
- Noise and vibration (Section 6.6.1).
- Air quality (Section 6.7.1).
- Social and economic (Section 6.12.1).

The relevant sections of the EIS guidelines for the Heybridge Shore Crossing, and where these have been addressed in this EIS, are outlined in Table 6.14-1.

Table 6.14-1 Relevant EIS guidelines

Cumulative impacts – EIS guidelines	Section
Cumulative and interactive impacts	
Provide an assessment of the potential cumulative impacts of the proposal in the context of existing and approved developments in the region, if such impacts have not been addressed in previous sections, including proposed transmission infrastructure. Other proposals which have been formally proposed, and for which there is sufficient information available to the proponent to allow a meaningful assessment of their impacts, should also be considered in that assessment. Uncertainties about potential impacts in such cases should be identified, and interactions between biophysical, socio-economic, and cultural impacts of the proposal discussed.	Section 6.14.3, 6.14.4, 6.14.5, 6.14.6

6.14.2 Approach to cumulative impact assessment

Cumulative impacts can occur when impacts from a project interact or overlap with impacts from other project(s), potentially resulting in a larger overall effect on the environment. The approach for identifying projects for assessment of cumulative impacts considers:

- **Temporal boundary**: the timing of the relative construction, operation, and decommissioning of other existing developments and/or approved developments that coincides (partially or entirely) with the project.
- **Spatial boundary**: the location, scale, and nature of the other approved or committed projects expected to occur in the same area of influence as the project. The area of influence is defined as the spatial extent of the impacts a project is expected to have.

Technical specialists carried out a cumulative impact assessment for their field of expertise, using a methodology and a framework developed by Tetra Tech Coffey for this task. The methodology included an assessment of the combined impacts of the proposal with the Heybridge Converter Station (refer to Section 6.14.4), the NWTD project (refer to Section 6.14.5) and foreseen developments in the north of Tasmania (refer to Section 6.14.6).

It is conceivable that other smaller developments would emerge through the life of the approval and development of the proposal that have not been considered in the cumulative impact assessment conducted by the technical specialists. It is not possible to perform a cumulative impact assessment on unknown projects. Nevertheless, where localised developments happen, including for example road upgrades, residential developments, recreation events, vegetation management or commercial developments, there may be temporary or minor additional impacts. Some technical specialists have considered the possibility of these localised impacts and reached the view that any impact would not be significant, and therefore have no cumulative potential.

6.14.3 Cumulative impacts with existing infrastructure

The proposal is not anticipated to interact or create impacts in common with any existing infrastructure in close proximity to the proposal site and therefore would not result in cumulative impacts with existing infrastructure.

Existing conditions have been considered as part of the impact assessment process. Data gathered in order to establish the baseline conditions is influenced by existing developments. For example, traffic counts, background noise monitoring data and ambient air quality data are influenced by existing projects and developments in the region. As such, existing projects have been considered as part of the existing conditions assessment.

6.14.4 Cumulative impacts with the proposed Heybridge Converter Station

The proposal would have overlapping construction and operation location and timeframe with the Heybridge Converter Station as both proposals are being developed together as part of the project.

A number of the technical assessments have considered the proposal and Heybridge Converter Station together, such that the cumulative impacts of these two elements are clearly identified, as discussed throughout this Section 6.

The overlap in construction activities between this proposal and the Heybridge Converter Station are not anticipated to result in significant cumulative impacts for noise, air quality and visual amenity for the sensitive human receptors near the proposal site, provided that the appropriate mitigation measures are implemented for the proposal to minimise such impacts. There is expected to be no cumulative impacts from contamination or to water quality if mitigation measures are implemented for the proposal. The mitigation measures are provided in Section 7 which also address the potential cumulative impacts to amenity.

A summary of cumulative impacts between the proposal and the Heybridge Converter Station is provided in Table 6.14-2.

Table 6.14-2 Summary of cumulative impacts between the proposal and the Heybridge Converter Station

Aspect	Cumulative potential/interaction	Additional impact or mitigation measures required
Potentially contaminated material	The impacts of the two proposals were assessed collectively as one study area.	None. The impacts requiring management were centred on the proposal site and would be addressed through the management of impacts on the site.
Terrestrial natural values	The Heybridge Converter Station would not disturb native vegetation and the impacts of the two proposals on fauna were assessed collectively.	The cumulative increase in traffic on Bass Highway could potentially increase incidents of roadkill from twilight and night-time traffic movements. Specific requirements have been included in MM T01, including roadkill awareness training and recording and reporting of roadkill occurrences.
Noise and vibration	Up to three decibels greater if construction works occur at the same time.	The increase would still result in noise levels being less than reference levels at existing receivers and can be managed through the use of proposed management measures. A monitoring program would be in place during construction to record noise levels.
EMF	A whole-of-project impact assessment was done with the greatest potential EMF impact on the seafloor at the shore crossings during operation. EMF would have very low-low impacts on marine fauna. This impact is detailed in the section concerning marine fauna. At the Heybridge Converter Station, EMF would be below reference levels for people in the study area. This constitutes the cumulative impact of the proposal and the Heybridge Converter Station.	None. At its most impactful location, EMF would be below reference levels.
Greenhouse	When combined with the impacts of the remainder of the project, including the Heybridge Converter Station, GHG emissions increase from 508 to 53,015 tCO_2-e (Scope 1 and 2 emissions) due to the scale of the remainder of the project. This still constitutes a negligible increase to Australia's emissions.	None. The GHG mitigation measures seek to identify opportunities to reduce GHG emissions for both the construction and operational phases of the project.
Groundwater and surface water quality	The impacts of the two proposals were assessed collectively as one study area.	None. The impacts requiring management from across the two proposals were centred on the proposal site, so would be managed through the management of impacts on the site.
Air quality	The impacts of the two proposals were assessed collectively as one study area.	None. The impacts requiring management were centred on the proposal site, so would be managed through the management of impacts on the site.
Traffic	The impacts of the two proposals were assessed collectively.	None. The increase of traffic on Bass Highway is considered to be within its capacity.

Aspect	Cumulative potential/interaction	Additional impact or mitigation measures required
Socio-economic impacts	The impacts of the two proposals were assessed collectively, and would result in positive economic outcomes, enhanced employment opportunities and livelihoods. However, there would also be potential impacts on availability of infrastructure (including housing) and services for the local and regional communities.	None. MM S02 (workforce and accommodation strategy), MM S03 (community and stakeholder engagement framework), MM S04 (community benefits sharing scheme) and MM S05 (industry participation plan) would address these impacts.

6.14.5 Cumulative impacts with North West Transmission Developments project

The NWTD project includes the construction and operation of a switching station that has been assessed as part of the Heybridge Converter Station EIS. This means that cumulative impacts of that component of NWTD have already been considered.

The NWTD also includes the proposed construction of overhead powerlines along an alignment within TasNetworks' land interests. Figure 6.14-1 shows the NWTD overhead powerline area of development close to the Heybridge Converter Station site.

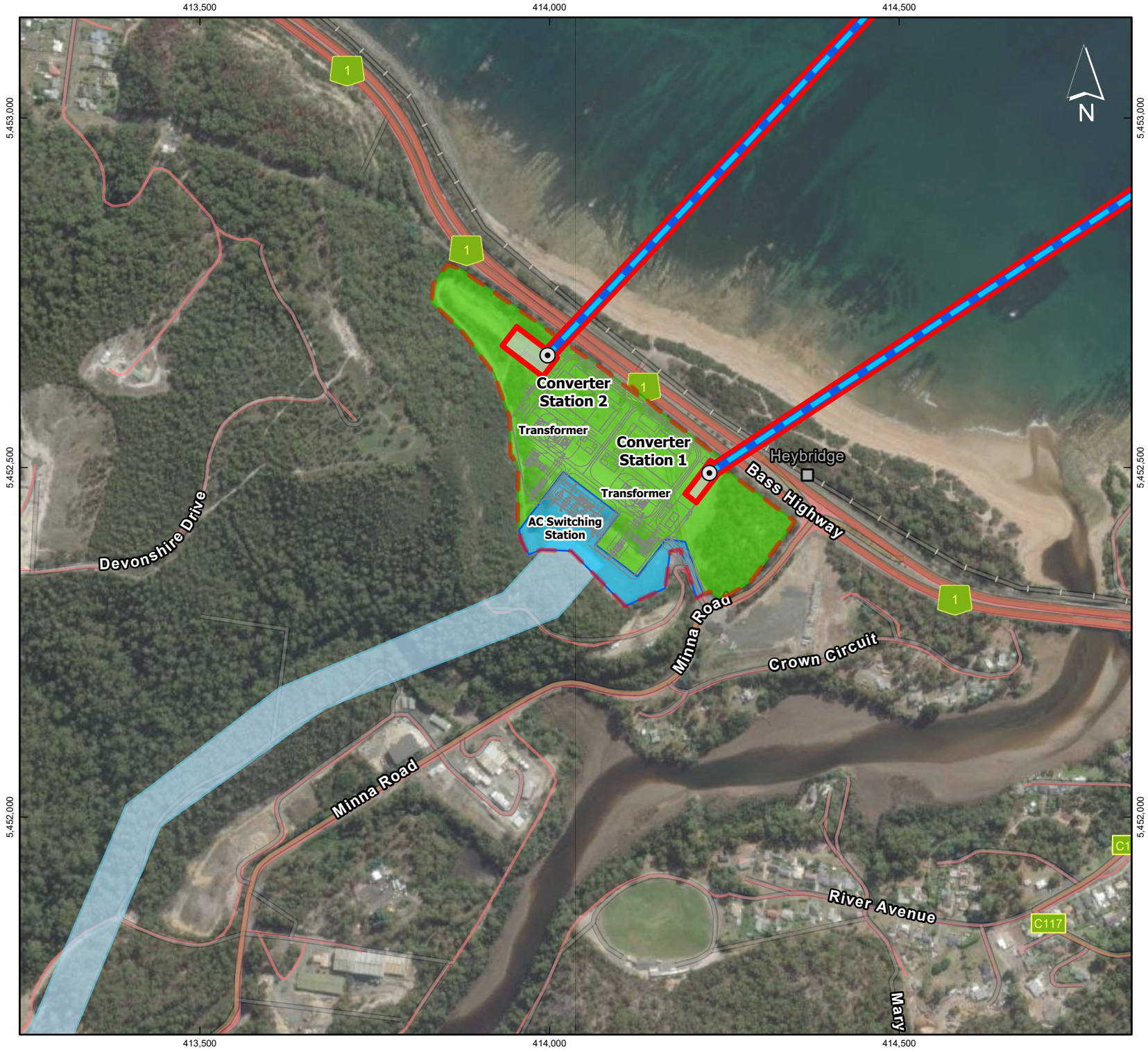
The NWTD project would have common environmental impacts with the Heybridge Converter Station (including the switching station that connects the Marinus Link converter station with the NWTD overhead powerlines) and the Heybridge Shore Crossing in aspects relating to EMF, noise, dust, and terrestrial and natural values.

A summary of the potential cumulative impacts relating to the NWTD is summarised in Table 6.14-3, with further discussion provided below.

Table 6.14-3 Summary of potential cumulative impacts with NWTD

Common impacts with the NWTD project	Impacts from the proposal and the Heybridge Converter Station (including switching station)	Additional potential impact from the NWTD project
Reduction in housing availability and affordability	**Moderate** to **high** – putting stress on local housing and social infrastructure	**Low**
Increase in traffic	**Low** to **very low** – the traffic increase is within the road capacity of Bass Highway	**Low**
Roadkill of protected fauna species	**Low** – higher traffic volumes at twilight and nighttime creates a risk to Tasmanian devil and Spotted-tailed quoll species	**Low**
Eagle nest disturbance	**Low** – the proposal site is 1.6 km from a Tasmanian wedge-tailed eagle nest	**Low**
Construction noise, including from traffic	**Medium** – the greatest impacts would be short term from HDD, with all other construction confined to working hours	**Low**
Construction dust	**Negligible** – the application of standard procedures on the proposal site would be effective to avoid dust becoming a nuisance	**Insignificant**

Figure 6.14-1:
Cumulative area development



Legend

- HVDC Landfall
- Proposed HVDC Subsea Cable
- Proposal Site
- Converter Station Proposal Site
- Indicative Site Layout
- Marinus Link Parcel Boundary
- TasNetworks Parcel Boundary
- TasNetworks NWTD Corridor (Indicative)
- Major Road
- Minor Road

Scale: 1:7,500 @ A4

Spatial Reference: GDA2020 MGA Zone 55

0 50 100 200 300 400

Meters

MARINUS LINK

Acknowledgements and Sources:

Data Source: Marinus Link GIS Data Repository and theLIST ©State of Tasmania .
Background Image: Esri Community Maps Contributors, DPIPWE, © OpenStreetMap, Microsoft, Esri, TomTom, Garmin, Foursquare, METI/ NASA, USGS, Maxar
Produced By: Marinus Link for the Tasmanian Heybridge Converter Station EIS.
Date Figure Exported: 22/11/2024

Construction of the NWTD overhead corridor is unlikely to contribute significant accumulating adverse **social** impacts with the proposal. This is because the corridor would be completed with much the same labour force involved in the completion of Stage 1 of the project (the first converter station, the switching station and HDD activity). Insofar as the NWTD would have impacts on housing and social infrastructure, those impacts are already accounted for and managed in the assessment of the proposal and the Heybridge Converter Station, in particular through MM S02 (workforce and accommodation strategy) and MM S04 (community benefits sharing scheme). The additional impact, if any, is likely to be that the impact lasts for a longer period of time, until the completion of both the NWTD switching station and the overhead corridor.

While additional **traffic** is expected on Bass Highway from the construction in the NWTD corridor, even if the proposal and Heybridge Converter Station construction occurs at the same time, the traffic impact assessment concluded that Bass Highway has capacity to accommodate the extra traffic.

The increase in traffic from the construction of all parts of the NWTD, the proposal and Heybridge Converter Station would create additional risks of **roadkill of fauna**. Twilight and night traffic movements on Minna Road would increase by at least 10% at times due to construction activities associated with the two projects, and they may approach a 10% increase on Bass Highway. Therefore, there is a possibility for cumulative impacts to Tasmanian devils and Spotted-tailed quolls, related to roadkill from twilight and night-time traffic movements from construction of both the project and the NWTD corridor works. The application of standard management measures (including MM T01) means that this extra 10% of traffic on a very limited stretch of road (about 200 m), is unlikely to result in a significant impact or decrease in population of Tasmanian devil and Spotted-tailed quoll.

The construction of the NWTD corridor would involve the removal of potential habitat of **native species**. The proposal and the Heybridge Converter Station would not remove any potential habitat of any terrestrial native species.

The construction of the NWTD corridor would also encounter Tasmanian wedge-tailed eagle **nests** at much greater number and at closer distance than works associated with the proposal. However, there are standard measures that must be adopted that require both inspection of nests and work stoppages (MM EC03 and MM EC04) that are considered effective to avoid risks to raptors. Because the two projects would adopt similar management measures to protect raptors, and minimise risks to species from roadkill, a mitigation measure has been developed to co-ordinate with other nearby projects and collaborate on data collection and the alignment of management processes between the two projects (MM Gen06).

Construction of the NWTD overhead corridor is unlikely to contribute any significant additional **dust** impacts. This is because the corridor would be completed after the completion of Stage 1 works associated with the proposal. Should the NWTD project have dust impacts concurrently with the construction of the proposal and the Heybridge Converter Station, those impacts are already accounted for and managed in the assessment of the proposal and the switching station, in particular through MM AQ01.

Nevertheless, where there are sites that could have a cumulative impact, the IAQM guidance recommends that the following additional mitigation measure is implemented: *“Hold regular liaison meetings with other high risk construction sites within 500 m of the site boundary, to ensure plans are co-ordinated and dust and*

particulate matter emissions are minimised. It is important to understand the interactions of the off-site transport/deliveries which might be using the same strategic road network routes". This liaison and coordination would take place under MM Gen06.

The moderate impacts of construction **noise** from the proposal are attributable to HDD. With HDD works occurring as part of Stage 1, these works are expected to be completed before the construction of the NWTD overhead powerlines. Even if the construction of the NWTD overhead powerlines is constructed at the same time as the Heybridge Converter Station (including the NWTD switching station), the noise sources associated with the construction of the NWTD overhead powerlines are limited, and are not expected to represent a noise compliance consideration for that project (in isolation or cumulatively with other neighbouring developments). Construction work for the NWTD overhead powerlines would occur during daytime hours.

Heavy vehicle **traffic** is one aspect of construction where the development of multiple projects at the same time can potentially result in cumulative increases in traffic movements on the surrounding road network, with corresponding increases in road traffic noise levels. However, for cumulative construction traffic noise impacts to occur, this would require projects to use the same construction traffic routes, and the construction phases (including peak construction traffic phases) to overlap. The risk of potential cumulative construction traffic noise impacts was considered low due to the construction traffic noise for the proposal being well below the 63 – 68 dB $L_{A10,\ 18\text{-hour}}$ targets which apply to permanent road traffic noise levels. Further, as construction traffic volumes typically vary throughout the construction of a project, this further reduces the likelihood of cumulative construction traffic noise being a material consideration in practice.

6.14.6 Cumulative impacts with reasonably foreseeable future development

Further proposed and reasonably foreseeable projects have been identified based on their potential to contribute to cumulative impacts by overlapping with the proposal location and timeframes. Projects were identified based on a search of publicly available information carried out in October 2023 (which formed the basis of projects considered in technical assessments). A further review in August 2024 identified some projects that are no longer proceeding or have since been completed. The list of projects considered, and where there is a possibility of cumulative impact on an environmental value assessed under the EIS guidelines, are listed in Table 6.14-4.

The projects listed in Table 6.14-4, taken together, are not anticipated to increase the residual environmental impacts of the proposal or require additional management measures to be applied to the project, except for specific socio-economic impacts.

Overall, the overlap in both footprint and schedule of developments would contribute to economic outcomes, enhance employment and livelihoods, while potentially impacting on availability of infrastructure and services for the local and regional communities.

The developments, including the proposal and the Heybridge Converter Station, are anticipated to place major demands on construction workforce availability and related issues of workforce accommodation. The management of socio-economic impacts would need to address the peaks in the construction workforce relating to the construction activities in Tasmania in the context of other large-scale infrastructure

construction projects in the region. The cumulative socio-economic impacts and residual impacts are summarised in Section6.12.4.5. Mitigation measures such as the workforce and accommodation strategy (MM S02) and the industry participation plan (MM S05) would minimise these potential cumulative impacts.

Table 6.14-4 Future development identified for cumulative impact assessment

Development/ proponent	Description	Location in relation to proposal	Timing	Identified possible cumulative impact on environmental value
Guildford Wind Farm / Epuron Pty Limited	• Wind farm with up to 80 wind turbines. • Generation of up to 450 MW of wind energy. • Estimated capital: $50 million.	• 7 km north-east of Waratah and 15 km south of Hampshire. • 42 km south-west of the proposal.	• Notice of intent submitted in 2020. • Construction to commence 2024.	Socio-economic.
Robbins Island Renewable Energy Park / ACEN Robbins Island Pty Limited	• Wind farm with up to 122 wind turbines. • Generation of up to 900 MW of wind energy. • Estimated construction value: $1.2 billion. • Construction workforce: 250 personnel.	• Robbins Island, north-west coast of Tasmania. • 87 km north-west of the proposal.	• Approved by the Australian Government and EPA assessment underway. • Project approvals currently under appeal. • Construction proposed to commence between 2023-2025.	Socio-economic.
Jim's Plain Renewable Energy Park / UPC (now ACEN) Robbins Island Pty Limited	• Wind farm with up to 31 wind turbines and possible solar generation. • Generation of up to 200 MW of wind energy and up to 40 MW of solar energy. • Capital investment: $350 million. • Construction workforce: over 150 personnel. • Operations workforce: 15 personnel.	• 23 km west of Smithton. • 97 km north-west of the proposal.	• Approved by the Council and State and Commonwealth governments in 2020. • Construction to commence from 2023.	Socio-economic.
Robbins Island Road to Hampshire Transmission Line / UPC (now ACEN) Robbins Island Pty Limited	• A new 220 kV overhead transmission line spanning 115 km, estimated to have 245 towers. • Connects Jim's Plain and Robbins	• Between Robbins Island Rd at West Montagu and Hampshire. • Closest point at 29 km south-	• Detailed planning/environmental approvals phase underway. • Commonwealth Government determined the project to be a	Socio-economic.

Development/ proponent	Description	Location in relation to proposal	Timing	Identified possible cumulative impact on environmental value
	Island Renewable Energy Parks transmission infrastructure to Tasmanian transmission network. • Construction workforce: up to 100 personnel over 24 months.	west of the proposal.	controlled action under the EPBC Act (Cwlth) in September 2020. • Construction to commence from 2023.	
Bass Highway targeted upgrades between Deloraine and Devonport / Department of State Growth	• Targeted highway upgrades between Deloraine and Devonport. • Estimated project cost: $50 million.	• Targeted areas along Bass Highway between Deloraine and Devonport. • Closest point at 40 km south-east of the proposal.	• In planning. • Construction expected to commence from late 2023. • Expected completion in 2027.	Socio-economic. Traffic and transport.
Hellyer Wind Farm / Epuron Pty Limited	• Wind farm with up to 48 wind turbines. • Generation of up to 300 MW of wind energy.	• 8.5 km south-west of Hampshire. • 35 km south-west of the proposal.	• Design phase. • Notice of intent issued. • Tasmanian EPA EIS guidelines issued in November 2022.	Socio-economic.
Table Cape Luxury Resort / Table Cape Enterprises	• Resort accommodation.	• Table Cape, 4.5 km north of Wynyard. • 25 km north-west of the proposal.	• Approved by Waratah-Wynyard Council.	Socio-economic.
Lake Cethana Pumped Hydro / Hydro Tasmania	• Storage and underground pumped hydro power station with associated infrastructure, with up to 600 MW capacity. • Estimated construction cost: $900 million.	• 19 km south-west of Sheffield. • 48 km south-east of the proposal.	• Progressing with the final feasibility stage. • Construction likely to commence in 2027.	None identified.
Port of Burnie Shiploader Upgrade / TasRail	• Minerals shiploader and storage expansion at TasRail's existing Bulk Minerals Export.	• Port of Burnie. • 6 km north-west of the proposal.	• Commissioning has commenced. Expected to be operational by 2025.	Socio-economic. Traffic and transport.

Development/ proponent	Description	Location in relation to proposal	Timing	Identified possible cumulative impact on environmental value
	• Facility Estimated cost: $64 million. • Design and construction workforce: 140 personnel.			
Bass Highway – Cooee to Wynyard / Department of State Growth	• Priority works upgrade along Bass Highway between Cooee and Wynyard to realign and upgrade approximately 3.2 km of road. • Estimated cost: $50 million.	• Bass Highway from the intersection of Brickport Road in Cooee, across the Cam River Bridge, to the intersection of the Old Bass Highway at Doctors Rocks near Wynyard. • 9 km north-west of the proposal.	• Construction commenced late 2021. • Expected completion in 2025.	Socio-economic. Traffic and transport.
Sheffield to Staverton Upgrades: existing electricity transmission line upgrades / TasNetworks	• A component of the NWTD, comprising modifications to two 18.5 km-long sections of existing 220 kV overhead transmission lines between Staverton and Sheffield. • Supports new and existing renewable energy developments in North West Tasmania, including the project.	• Between Staverton and Sheffield. • 40 km south-east of the proposal.	• Planning and approvals phase. • Construction expected to commence in 2025.	None identified
QuayLink – Devonport East Redevelopment / TasPorts	• Port terminal upgrade project to support TasPorts in increasing capacity of both freight and passenger ferry services across Bass Strait. • Estimated cost: $240 million. • Design and construction workforce: 1060 direct and indirect jobs in North West Tasmania, and a	• Port of Devonport. • 35 km south-east of the proposal.	• Early works/construction commenced 2022, approvals phase ongoing. • Expected completion in 2027.	None identified.

Development/ proponent	Description	Location in relation to proposal	Timing	Identified possible cumulative impact on environmental value
	further 655 broader Tasmanian jobs during construction.			