MARINUS LINK

ROUTE OPTIONS REPORT

February 2021

Responsibilities

This document is the responsibility of Marinus Link Pty Ltd, ABN 47 630 194 562 (hereafter referred to as "Marinus Link").

You can contact us with any questions about Marinus Link via our dedicated email and phone line. If you would like to find out more you can also visit the Marinus Link website, email us at team@marinuslink.com.au, or call us on 1300 765 275.

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Acknowledgement of Country

We respectfully acknowledge Australia's Aboriginal and Torres Strait Islander community and rich culture. We acknowledge Aboriginal and Torres Strait Islander peoples as Australia's first peoples and as the Traditional Owners and custodians of the land and water on which we rely, and pay our respects to their Elders past, present and emerging.

We are committed to ongoing engagement with all traditional owners of Victoria, the Tasmanian Aboriginal community, and the broader Aboriginal community, including on matters relating to Native Title.

Foreword

I'm pleased to share Marinus Link's *Route Options Report* with you. This report is the culmination of extensive desktop and field research by the Marinus Link team, in consultation with government authorities, local agencies, energy market bodies and other stakeholders, to develop a proposed route. It is a starting point for discussion with landowners and the community as we seek your feedback on potential improvements and modifications to minimise the social, environmental and cultural heritage impacts of the route.

We appreciate that many stakeholders are seeking information on the route selection process, particularly for the shore crossings and the Victorian land route. This report sets out the selection process, including the alternative route options considered, and the specific challenges we have sought to address to identify a proposed route.

COVID-19 continues to present new challenges to our planned engagement efforts with landowners, communities and other key stakeholders. We are committed to providing accessible alternatives for cooperation and collaboration wherever feasible, and appreciate your understanding as we work to provide these opportunities.

Ultimately, Marinus Link is a key component of an Australia-wide strategy to future-proof our energy system with the sustainable development of critical infrastructure. The benefits of increased access to cleaner, reliable energy at a lower cost will flow throughout our local communities to the greater National Electricity Market. It will play a major part in our collective efforts to reduce emissions and care for our climate. Construction and operation of Marinus Link will also support local communities through creating jobs, building skills and delivering broader community benefits from significant regional economic stimulus.

Our team is committed to listen and respond to the concerns of everyone affected by the proposed route, and work cooperatively to find the best balance between meeting community needs, sustainable development, economic benefits and clean energy supply for the coming decades.

BESClark

Bess Clark
General Manager
Project Marinus

Background

What is Marinus Link?

Marinus Link is a proposed 1500 MW capacity high voltage direct current (HVDC) interconnector between Victoria and Tasmania, involving approximately 250 km of subsea cables and up to 90 km of land cables, and converter stations at each end to connect to the high voltage alternating current (HVAC) networks in Tasmania and Victoria. Marinus Link also includes optical fibre capacity for electricity system control, with spare capacity strengthening telecommunications and data connectivity between Victoria and Tasmania.

Marinus Link will increase energy exchange between Victoria and Tasmania and unlock affordable, reliable and clean energy by harnessing Tasmania's significant, world-class renewable energy resources, including existing wind energy and hydro schemes and planned pumped hydro long duration energy storage and wind farms. The connection between Marinus Link and Tasmania's renewable generation and storage capacity is supported by approximately 220 km of transmission developments in Tasmania's north west, known as the North West Transmission Developments (**NWTD**). Marinus Link and the NWTD are progressing as standalone but related projects, known collectively as **Project Marinus**.

Marinus Link is currently in the design and approvals phase, leading to an expected Final Investment Decision[1] in 2023-24. Potential route corridors and connection site options for the interconnector have been evaluated through a detailed selection process to identify the proposed route. The proposed route has been released for community input and we are currently working with communities, businesses and authorities in Victoria, Tasmania and the Commonwealth, to obtain necessary environment, heritage and planning approvals and deliver a successful project. This includes establishing long lasting relationships with many project stakeholders, including landowners and communities along the route.

[1] Relates to the stage in the project where everything is in place to execute the project (contracts can be signed). Getting to this stage involves arranging all financing, approvals and any other requirements that are needed prior to construction starting. It is the point where contracts for all major equipment can be placed, allowing procurement and construction to proceed and engineering to be completed.

Why is it needed?

Australia's National Electricity Market (**NEM**)[2] is experiencing rapid, unprecedented transformation driven by ageing infrastructure, changing technology, climate, the growing interdependency of our gas and electricity markets, and consumer preference and demand. Centralised coal-fired generation systems are retiring and being replaced by a diversified power system with significant contributions from large-scale renewable energy generators and storage. Strategic, cost-effective investments in transmission and dispatchable[3] energy sources are required to meet Australia's energy needs at lower cost.

The Australian Energy Market Operator[4] (**AEMO**) undertakes key analyses to tackle this challenge and has developed the *Integrated System Plan*[5] (**ISP**) as a blueprint for transmission developments and priority renewable energy zones to support Australia's transition to affordable, reliable and clean energy. Marinus Link, and supporting transmission developments in north west Tasmania, are identified in the 2020 ISP as a priority investment[6], and a key component in efficiently unlocking Tasmania's significant renewable energy generation and storage capacity for the NEM in the continuing transition to renewable energy.

AEMO highlights that the most cost-effective forms of new energy for Australia's future are variable renewables, supported by dispatchable generation and storage. This includes dispatchable energy from renewable hydroelectric generation, pumped hydroelectric

[2] The NEM operates in Victoria, Tasmania, New South Wales, the Australian Capital Territory and South Australia, and is both a wholesale electricity market and the physical power system. AEMO also operates the retail electricity markets which underpin the wholesale market.

[3] Dispatchable refers to generation sources that have a firm fuel source and do not rely upon the elements (sun, wind) for their operation. It includes coal, gas and hydro generators.

[4] AEMO manages electricity and gas systems and markets across Australia, helping to ensure Australians have access to affordable, secure and reliable energy. As part of its role, AEMO forecasts customer energy needs and carries out transmission planning for the NEM.

[5] The ISP forecasts customer demand, generation, constraints and opportunities for electricity market participants and prospective participants. It provides the blueprint for transmission investments and planning.

[6] AEMO, *2020 Integrated System Plan*, July 2020.

storage, and battery storage. Dispatchable energy sources have a firm fuel source and can be 'turned on' when required to provide energy to meet customer needs. In comparison, variable renewable generation relies on the elements, namely wind and sun, being available to generate energy. With the retirement of coal-fired generators and the growth of variable renewable energy generation from wind and solar, the traditional forms of dispatchable energy are becoming less available.

Tasmania has significant, world-class renewable energy resources, particularly hydro power and wind energy. The potential size of resources available from the capacity of existing Tasmanian hydro schemes, planned pumped hydro long duration storage and wind farms, far exceeds Tasmania's maximum demand of approximately 1800 MW and the capacity of the existing 500 MW Bass Strait interconnector, Basslink. Marinus Link would operate in addition to Basslink, providing an additional 1500 MW capacity[7] in the electricity network.

A megawatt (MW) is approximately equal to the energy required to power 1000 homes at a time. Marinus Link's maximum capacity would supply approximately 1.5 million homes with low cost, reliable, clean power.

Advancement in HVDC transmission technologies mean Marinus Link will be more controllable and capable of providing power system stability, beyond what is achievable with existing energy infrastructure[8]. This access to a range of power system stability services and more dispatchable on-demand power across Bass Strait will increase energy supply security in the NEM.

Greater energy exchange between Tasmania and Victoria will support the development of renewable energy in Victoria. There will be periods where more wind and solar energy is being generated in Victoria than is needed by customers at that time. This excess energy can be transferred to Tasmania to be stored in Tasmania's pumped hydro long duration energy storage facilities, ready to create 'firm' energy, able be dispatched to keep

[7] Maximum southward flow may be limited to less than 1500 MW subject to power system constraints in Tasmania.

[8] Basslink commenced commercial operation in 2006. Basslink uses HVDC LCC technology, which has limited ability to provide power balancing and FCAS compared to the technology proposed for Marinus Link.

customer lights on when needed. Increased energy exchange between Tasmania and Victoria will therefore unlock renewable energy generation opportunities in both states, and provide access to cost-effective dispatchable Tasmanian hydro and long-duration pumped hydro energy storage. Analysis by AEMO and TasNetworks shows that this will support affordable, reliable and clean energy in Victoria, Tasmania and the broader NEM.

Our analyses demonstrate that Marinus Link can unlock cost-effective long duration pumped storage in Tasmania that provides seasonal energy shifting capability.[9] Shorter duration storage solutions (such as batteries) are effective in shifting energy across hours or a day, but for deeper storage, pumped hydro is more cost-effective and will play an important role in the future energy market. The Project has welcomed 'high priority' status in Infrastructure Australia's previous listings of nationally significant initiatives, and has support at a State and Federal level.

[9] AEMO, 2020 *Integrated System Plan*, July 2020, page 82.

Who are we?

TasNetworks is progressing Marinus Link (and the NWTD), with funding support from the Australian and Tasmanian Governments. We are a regulated government electricity network business owned by the State of Tasmania. We have established a subsidiary business, Marinus Link Pty Ltd, to progress Marinus Link**,** and we are currently undertaking the design and approvals phase of the project via this subsidiary. For simplicity, in this report we refer to Marinus Link Pty Ltd and the TasNetworks team supporting the Project, as 'Marinus Link'.

TasNetworks owns and operates Tasmania's electricity transmission and distribution networks and is responsible for planning Tasmania's electricity network, under the National Electricity Rules. We also provide telecommunication services to customers within and beyond the electricity sector in Tasmania.

TasNetworks completed a full Feasibility Report and Business Case Assessment for Project Marinus with funding support from the Australian Renewable Energy Agency (**ARENA**). This assessment demonstrated that the project is technically and commercially viable. AEMO, as the Victorian transmission network planner and NEM asset operator, supported this work. The Business Case Assessment identified the optimal capacity for Marinus Link is 1500 MW, comprised of two independent 750 MW links. The 1500 MW capacity provides energy market and broader economic benefits.

Marinus Link is proposed to be progressed by a new entity jointly owned by the Australian and Tasmanian Governments, following a Memorandum of Understanding announced by the Tasmanian and Australian Governments in December 2020.

Glossary

Acronym/term	Description
AC	alternating current
AEMO	Australian Energy Market Operator. AEMO manages electricity and gas systems and markets across Australia, helping to ensure Australians have access to affordable, secure and reliable energy. As part of its role, AEMO forecasts customer energy needs and carries out transmission planning for the NEM.
Ancillary services	Ancillary services perform the essential role of ensuring a continuously stable power system operation, especially when subjected to unforeseen contingency events. Examples include a device which can rapidly alter the network voltage to correct for voltage disturbances (caused, for example, by a lightning strike), or the ability of a generator to rapidly change its power output in response to a sudden change in customer demand. Ancillary services are defined in the Rules as 'market ancillary services' and 'non-market ancillary services'. See chapter 10 of the Rules for more detail.
AER	Australian Energy Regulator
ARENA	Australian Renewable Energy Agency
circuit	an electrical circuit configured as alternating or direct current
Contingency event	An event affecting the power system which AEMO expects would be likely to involve the failure or removal from operational service of one or more generating units and/or transmission elements (Rules clause 4.2.3(a)) e.g. lightning striking a transmission line, a sudden unexpected generator failure, bushfire smoke causing a short-circuit between transmission circuits (Rules clause 4.2.3(a))
Converter station	Installed where alternating current is converted to direct current and vice versa
Corridor	The area in which a route(s) for linear infrastructure will be identified
Credible	Reasonably possible in the surrounding circumstances

Acronym/term	Description
Cwlth	Commonwealth
DC	direct current (only used in this document in relation to Marinus Link)
Dispatchable	Dispatchable refers to generation sources that have a firm fuel source and do not rely upon the elements (sun, wind) for their operation. It includes coal, gas and hydro generators.
Dispatchable on-demand	A generator in which the electrical output can be increased or decreased as required to meet varying customer demand. This contrasts with non-dispatchable generators, such as solar and wind, the output of which will fluctuate depending on the input power source.
double circuit	Two parallel electrical circuits supported on either side of the same transmission towers or as two sets of underground cables in the same easement; each circuit comprises three phases
Easement	Legal right of way registered on the title that protects underground cables or overhead transmission lines. Typically, less than the construction right of way but may be the same width. Described in survey plans and legal instruments. Conditions on land use may apply.
EMF	Electromagnetic fields
Energy security	Refers to the certainty of being able to supply customers' energy needs in the medium and long term.
EPBC Act	*Environment Protection Biodiversity Conservation Act 1999* (Cwlth)
Final Investment Decision	Relates to the stage in the project where everything is in place to execute the project (contracts can be signed). Getting to this stage involves arranging all financing, approvals and any other requirements that are needed prior to construction starting. It is the point where contracts for all major equipment can be placed, allowing procurement and construction to proceed and engineering to be completed.
GIS	geographic information system

Acronym/term	Description
ground-truthing	checking the accuracy of data bases and remotely sensed data by means of in-situ observations
ha	hectare; SI unit of measurement
HDD	horizontal directional drilling
HVAC	high voltage alternating current
HVDC	high voltage direct current
Interconnector	High voltage connection between transmission networks that allows energy flow between multiple regions. Allows buying and selling of energy across regions within the National Electricity Market
ISP	A plan prepared by AEMO that forecasts the overall transmission system requirements for the National Electricity Market
km	kilometre; SI unit of measurement
kV	kilovolt or 1,000 volts; SI unit of measurement
m	metre; SI unit of measurement
MW	megawatt or 1,000,000 watts; SI unit of measurement; a measure of energy transfer capacity
NEM	National Electricity Market
NER	National Electricity Rules
OHTL	overhead transmission line
PADR	Project Assessment Draft Report
PSCR	Project Specification Consultation Report
pinch point	a location where constraints preclude other route options
REZ	renewable energy zone, as defined in AEMO's Integrated System Plan 2018
RIT-T	Regulatory Investment Test – Transmission
Rules	The National Electricity Rules
shovel ready	the stage of a project when construction can commence
SI	International system of units

Acronym/term	Description
single circuit	single electrical circuit supported on transmission towers or as a set of underground cables; a single circuit comprises three phases
Tas	Tasmania
TasNetworks	Tasmanian Networks Pty Ltd
TASVEG	Comprehensive digital map of Tasmania's vegetation (DPIPWE)
TRET	Tasmanian Renewable Energy Target
UXO	Unexploded ordinance - any type of military ammunition or explosive ordnance which has failed to function as intended.
Vic	Victoria
VSC	voltage source conversion

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Executive summary

To identify a proposed route for Marinus Link, a corridor and site selection process required determination and evaluation of prudent and feasible route options. A route is considered 'prudent and feasible' if it is geographically practical, technically sound and economically viable when all existing values and constraints are considered. This process sought to minimise local impacts of a proposed route on communities and the environment, in balance with key project objectives of cost, efficiency and constructability.

The route and site selection process

Route and site selection are guided by technical, environmental, economic and social criteria, and constraints. Technical criteria include the project's energy transfer objectives, engineering considerations for connecting to the existing transmission network, and constructing and operating an interconnector and converter stations. Environmental and social criteria include the values that are important to people, communities and regulators. Seeking to optimise the overall cost is also important to benefit electricity consumers.

A number of route corridors were identified as prudent and feasible to assess through further evaluations. The existing Basslink route was considered and evaluated, however it was not pursued as it did not meet the key project objective of increased energy security.

Connection requirements

Proposed and anticipated development in Tasmania's Renewable Energy Zones (REZ) informed the capacity for Marinus Link. Considering the maximum contingency event[10] that the power system can accommodate, it is prudent to implement Marinus Link as two 750 MW stages, totalling 1500 MW. The large capacity of Marinus Link requires connection to strong parts of the Tasmanian and Victorian electricity grids. This enables the efficient operation of Marinus Link, and optimises the associated upgrades to the respective grids.

[10] A contingency event that is considered reasonably possible in the surrounding circumstances e.g. loss of a single generator, load or circuit in the network; loss of multiple circuits in a transmission corridor in the presence of a severe bushfire.

Connection points near the coast are preferable, to minimise the length of land cables and associated construction. Connection points either at, or close to existing electricity substations with sufficient capacity are preferred, as are sites which enable opportunities for efficient connection with the existing and prospective renewable energy generation and storage resources in renewable energy zones. Working with AEMO, it was identified that there were opportunities to design Marinus Link in a way that also optimised transmission network development to Tasmanian renewable energy zones. In this context, the route selection process focussed on the northern half of Tasmania and the southern half of Victoria.

As part of identifying prudent and feasible routes between Victoria and Tasmania, coastal landing points (known as 'landfalls') for the subsea cables and converter station sites at each end of the land component of the cables were identified and evaluated. Prudent and feasible routes were evaluated against route and site selection criteria, including the existing values of each area, to identify the least constrained route.

Landfalls and converter station sites were identified and evaluated before identifying prudent and feasible routes within each corridor. In some instances, several routes were identified in each corridor. Converter stations are required at each end of the HVDC cables, where the link connects to the Tasmanian and Victorian electricity grids. The converter stations transform alternating current (**AC**) to direct current (**DC**) and back again.

The prudent and feasible routes (see Figure 6-1) were evaluated against the route and site selection criteria to identify the least constrained route/s. The route and selection criteria comprise technical, environmental, economic and social criteria

The proposed route

The proposed route for Marinus Link (Figure 8-1) is between Victoria's Latrobe Valley, at or near Hazelwood, and Heybridge, just east of Burnie in north west Tasmania.

The route starts with connection to the Victorian 500 kV transmission network, either at the Hazelwood Terminal Station, or at a new terminal station in the Hazelwood area, adjacent to the existing 500 kV lines. The benefits of a new terminal station site, including the potential for reduced environmental, land-use planning and heritage impacts and lower cost, are being investigated. The final Victorian connection point will be confirmed in the detailed design.

The proposed route travels underground from the Hazelwood area in a southerly direction for approximately 90 km across the Strzelecki Ranges, down the Tarwin River valley to Waratah Bay on Victoria's south coast, just west of Sandy Point. The shore crossing to the land-sea joint would be designed to avoid impacts on the Waratah Bay–Shallow Inlet Coastal Reserve. The proposed use of underground technology on-land in Victoria means that terrain and topographic features are significant factors in route selection and refinement. Proximity to linear infrastructure, avoidance of extended road closures and traffic disruption, flood risks, and reduced impact on existing and future land uses are also considerations.

Crossing underneath the shore, subsea cables cross Bass Strait in a relatively straight line to Tasmania. The proposed route avoids offshore oil and gas developments, existing Victoria-Tasmania telecommunications cables and major fishing grounds. It also avoids marine national parks, biodiversity conservation areas and maritime archaeological sites. The proposed route crosses the least environmentally sensitive part of Bass Strait.

In Tasmania, the proposed route travels underneath the shore to make a direct connection to the proposed Heybridge converter station site, just outside Burnie on the Tasmanian north west coast. The Tasmanian converter stations connect to an augmented north west transmission network, to support the increased power flows across Marinus Link and optimise transport of new and existing renewable energy. It is proposed to locate the planned Marinus Link converter stations at Heybridge, and provide an augmented connection with the existing Tasmanian 220 kV AC overhead transmission network. This connection site is the least constrained and meets the project objectives due to:

- proximity to the North West Tasmania REZ, existing hydro capacity and proposed renewable generation and storage projects
- availability of a suitable converter station site close to the transmission network
- optimising network investment in Tasmania to support Marinus Link and related energy transfer from generation and storage projects

Studies to-date indicate there are no significant impacts of the Marinus Link route and that identified environmental, land use planning and heritage values can be managed. The proposed route is considered technically feasible and the least constrained for ecological, cultural heritage and socioeconomic values. The proposed route enables affected landowners and land managers to be identified to seek access to undertake further technical studies and field surveys, which may lead to further refinement of the route.

Marinus Link and supporting transmission developments in north west Tasmania (the NWTD) are progressing as separate but related projects as they have different infrastructure, considerations, interdependencies and requirements. The NWTD are subject to separate route selection and environmental, heritage and land use planning impact assessment processes, which are addressed in separate dedicated reports published on the TasNetworks website. The design and configuration of some aspects of these proposed developments are being finalised, and will be covered through separate route options information for north west Tasmania. Similar to the Marinus Link Victorian land component, the design of the NWTD will seek to balance landowner, community and other stakeholder input with environmental impacts, cultural heritage considerations, constructability, current and future land use, project costs and specific electricity system requirements.

Next steps

Identifying the proposed route for Marinus Link enables further refinement of the route, on the path to identifying a preferred route, through:

- engagement with, and feedback from landowners, communities and stakeholders;
- detailed ecology, cultural heritage and geomorphology field investigations;
- preliminary geotechnical and constructability site investigations; and
- review of business case assumptions and project cost estimates.

Marinus Link is engaging with landowners, the community, businesses, regulators, and other stakeholders on the proposed route between the Hazelwood area and Heybridge, and undertaking further site surveys, detailed environmental cultural heritage, socio-economic and technical studies to inform environmental, land use planning and cultural heritage approvals, on a path to identifying a preferred route.

Formal opportunities to make submissions will be available through the regulatory environmental, land use planning and cultural heritage impact assessment and approvals processes. Marinus Link will continue to keep landowners, the community and stakeholders updated as these opportunities arise.

For the latest information and opportunities to provide input on the proposed Marinus Link route, visit https://engage.marinuslink.com.au and register for updates.

Feedback from landowners, stakeholders, communities, business and regulators is essential to improve our understanding of necessary refinements to the proposed route as we work address concerns. All feedback is carefully considered, and helps inform our project design and construction considerations, reduce impacts, and refine the route. Further engagement opportunities will be available through the environmental, land use planning and cultural heritage approval processes, which will ultimately lead to the development of the final route.

The route selection process

Marinus Link has undertaken a rigorous selection process to identify the proposed route. The diagram below sets out the steps, which are reflected in the following section numbers of this report.

Section

Early 2018

1. **What connection is required?** (start and end points)
2. **What is proposed to be built?** (technical specification)
3. **What values exist in the area of interest?** (physical, biological and socioeconomic environments)
4. **How do the existing values inform route selection?** (map constraints and identify opportunities)
5. **Identify prudent and feasible corridors** (informed by strategic constraints)
6. **Identify prudent and feasible routes** (informed by tactical constraints and route selection criteria)
7. **Evaluate prudent and feasible route options** (evaluate options against route selection criteria)

Late 2020

8. **Proposed route** (least constrained route)
9. **Proposed timeline**
10. **Next steps**
    - Landowner and community engagement activities (late 2020 to mid 2021)
    - On-ground environmental and heritage surveys (commence late 2020)
    - Refine preferred route (early 2021)
    - Submission of Commonwealth and State environment, planning and heritage applications (mid 2021)

1. What connection is required?

The 1500 MW capacity of Marinus Link requires connection to strong parts of the Tasmanian and Victorian electricity grids. This enables the efficient operation of Marinus Link, and helps to minimise the need for associated upgrades to the respective grids.

The large capacity of Marinus Link (1500 MW) was informed by proposed and anticipated development in Tasmania's renewable energy zones. Considering the maximum power system contingency event, it is prudent to implement Marinus Link as two 750 MW capacity stages, totalling 1500 MW.

Converter stations are required at each end of Marinus Link to connect with the Tasmanian and Victorian electricity grids. The converters connect to the AC network via new or existing electricity transmission infrastructure.

1.1. Connecting Victoria and Tasmania's energy grids

Connecting the Tasmanian and Victorian electricity grids to efficiently provide up to 1500 MW energy transfer capacity, with only optimal upgrades to the existing grids, is best achieved by linking each end of Marinus Link to a sufficiently strong part of the grid backbone (see Figure 1-1). Proximity to existing and proposed renewable generation and storage projects is also important. Backbone nodes can better manage the energy transfer, making them the starting point for the route selection process.

Victoria's grid backbone is much larger than Tasmania's, with the 500 kV transmission network linking Loy Yang, Hazelwood, Cranbourne, Rowville, South Morang, Keilor, Sydenham, Moorabool, Heywood and Portland Alcoa Substations. Basslink currently connects at George Town Substation in Tasmania and Loy Yang Power Station switchyard in Victoria. Northern Tasmania's grid backbone is a double circuit 220 kV network linking Sheffield, George Town and Palmerston Substations, in conjunction with Farrell Substation.

Connection points near the coast are preferable to minimise the required length of land cables, although the overall route length is also an important factor. In Victoria, potential connection points were examined at Portland, Tyabb, East Geelong, Moorabool, Cranbourne and Hazelwood. In Tasmania: Port Latta, Burnie and Sheffield. Connection points either at, or in close proximity to, existing substations (such as those listed in this section) were preferred.

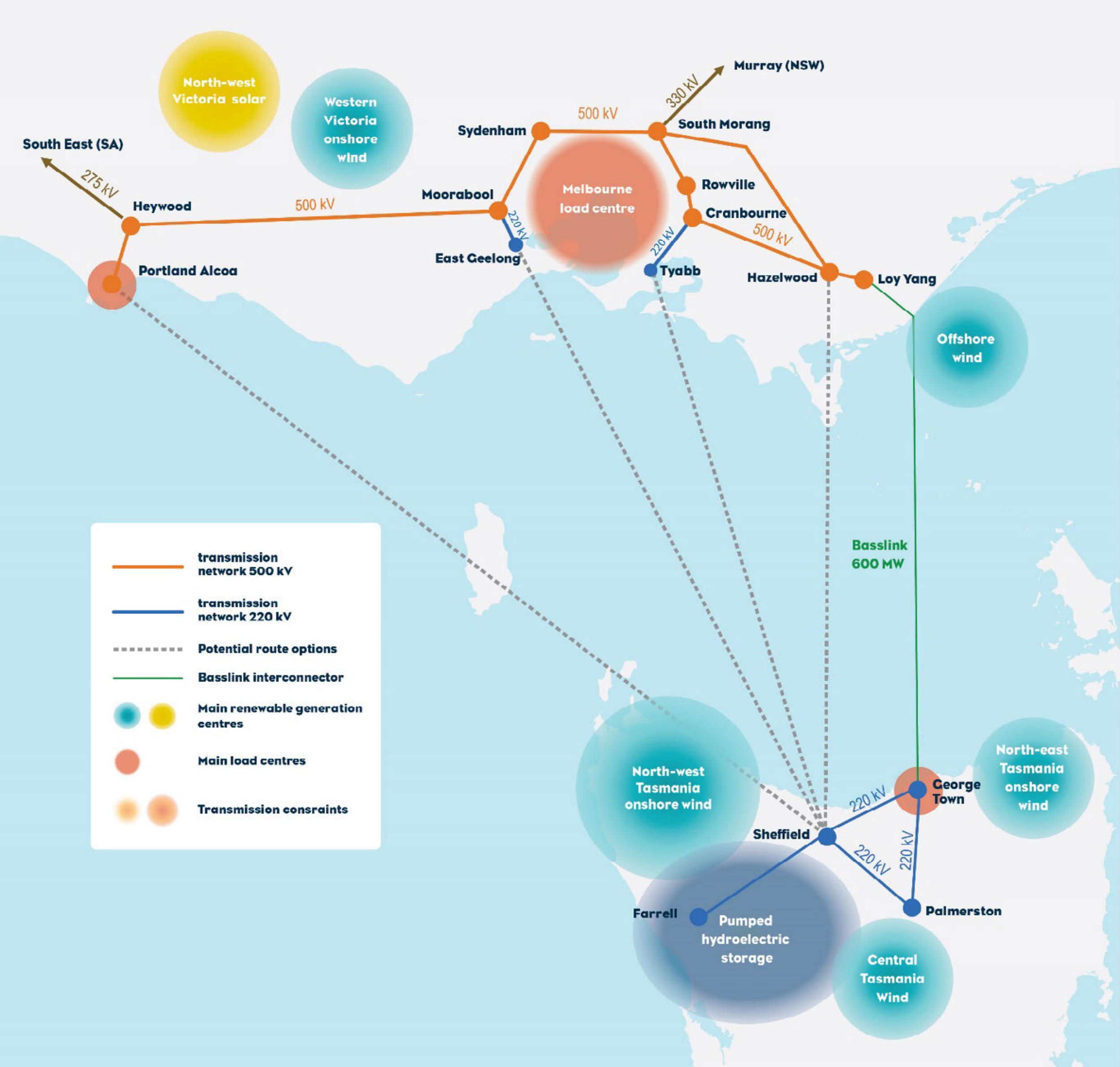

Figure 1-1 Strategic overview of potential grid backbone connection points

2. What is proposed to be built?

Marinus Link is a high voltage electricity interconnector, which comprises converter stations connected by underground and subsea HVDC cables. Marinus Link involves approximately 250 km of subsea HVDC cables and up to 90 km of underground HVDC cables. The link is proposed to be built in two independent 750 MW capacity stages, with converter stations required at each end, one for each stage. It is also proposed to include optical fibre cables along the route length of each stage.

Figure 2-1 HVDC interconnector major component

2.1. Converter stations

Converter stations are required to connect HVDC cables to the Victorian and Tasmanian AC energy grids. Converter stations are highly sophisticated and valuable grid assets, and are expensive as a result, but HVDC remains the only practical and most economic option overall for Marinus Link.

The converter stations will use Voltage Source Conversion (**VSC**) technology, which is a newer technology than was used for the Basslink interconnector, using transistors to convert between AC and DC instead of thyristors, as used for Basslink. VSC offers a range of advanced power system stability and security features to meet the challenges of the future energy grid including fast power reversals, frequency and voltage control, and black start[11]

[11] Black start is the capability to energise an AC transmission system after a major failure.

capability, among other services. VSC Converters also have a smaller footprint compared to the Basslink-style converters.

Converter station sites must be carefully selected. Important factors include energy transfer requirements, sufficient space for the buildings and equipment, site access for heavy equipment, and other generation and load sources that may connect to the transmission network. Four converter stations are required to provide Marinus Link's full 1500 MW capacity; with two converters required for each 750 MW stage.

VSC stations typically occupy 2 hectares (**ha**). As 2 converter stations are required at each end of Marinus Link, at least 4 ha are required. Up to 6 ha total are required when construction requirements are taken into consideration. Dimensions are 100 metres (**m**) wide by 200 m long. Figure 2-2 shows an indicative example of VSC station site layout.

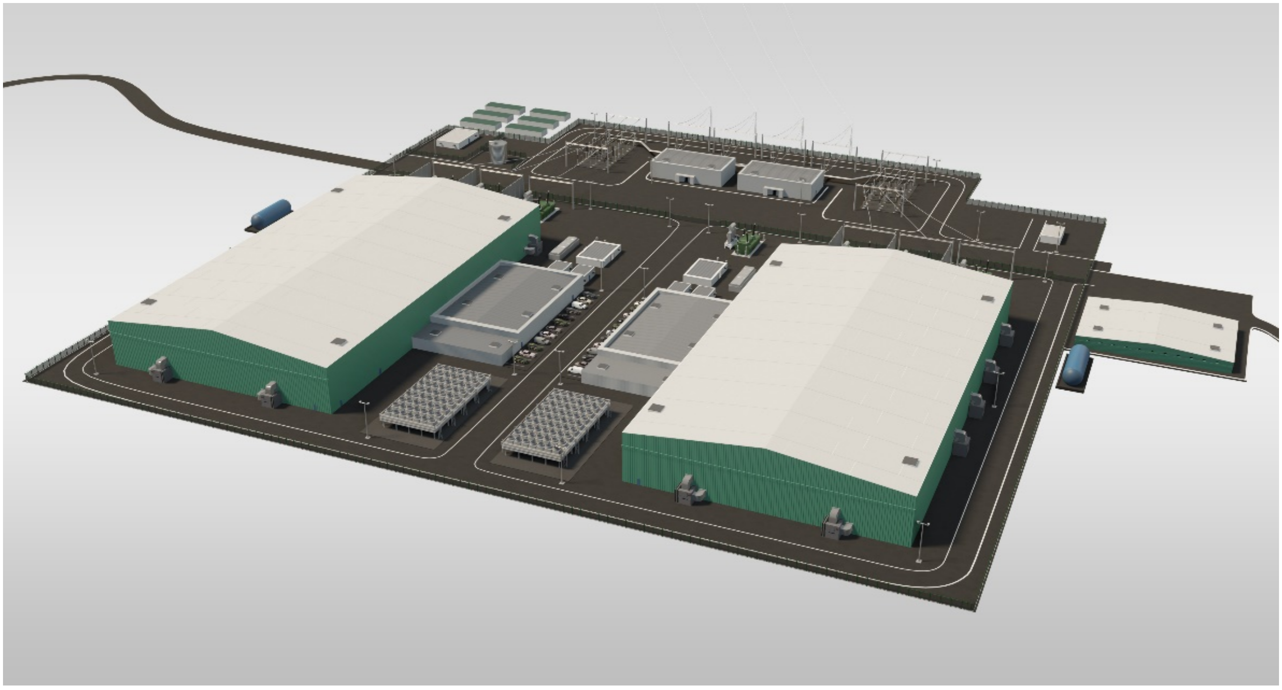

Figure 2-2 Indicative VSC converter station layout – Victorian and Tasmanian site schematic (artistic impression for illustrative purposes only).

2.2. HVDC underground and subsea cables

Overhead HVDC and HVAC, together with underground HVDC and HVAC were considered for the Project in the Feasibility Report and the Business Case Assessment. HVDC cables have been selected for the land and subsea sections of Marinus Link due to a range of key factors, including:

- AC cables sustain higher losses than DC when transmitted over long distances. For this reason, long interconnectors such as Marinus Link typically use HVDC to reduce losses.
- Costs of overhead HVAC and HVDC yielded no material savings compared to underground HVDC; underground HVAC was cost prohibitive.
- HVDC cables are more economical than HVAC, being less expensive per kilometre.
- HVDC cables are more economical by physical volume. For example, the proposed 1500 MW capacity of Marinus Link can be provided by four HVDC cables in two 750 MW stages, but would require 12 AC cables using 220 kV or six AC cables using 500 kV.

Analysis shows underground HVDC land cables are the preferred option for the Victorian land section. Overhead HVDC transmission lines were considered, however underground HVDC cables are proposed due to a range of factors, including:

- performance benefits of DC when transferring large volumes of energy over long distances (compared to AC), as mentioned above
- no plans or requirement to directly connect new generation projects in Victoria, resulting in cable termination at the existing HVAC lines in the Latrobe Valley
- overhead HVDC would require more costly lightning protection schemes and wider easements, whereas underground cables eliminate such risks and costs on HVDC.

HVDC subsea cables are the only suitable option for the Bass Strait section of Marinus Link. It is impractical to use HVAC to cross the distance of Bass Strait due to limitations on the practical length of AC cables mentioned above.

In Tasmania, efficient connection with planned and existing renewable energy projects and the best balance of energy transfer and load and will be achieved by locating the Tasmanian converter stations near the landfall on the north west coast, and a new connection to an augmented AC overhead transmission network (the NWTD). As a result, the land section of Marinus Link will be significantly shorter in Tasmania (approximately 200 m).

The NWTD are related but separate projects to Marinus Link, with different infrastructure, considerations, interdependencies and requirements. Analysis shows that overhead HVAC is more suitable for use in Tasmania due to factors including:

- technical constraints
- technical requirements to connect planned and existing renewable energy generation and storage (which use HVAC technologies)
- cost efficiency (underground HVAC is cost prohibitive**,** as mentioned above)

Design of the NWTD will seek to balance landowner, community and other stakeholder input with environmental impacts, cultural heritage considerations, constructability, current and future land use, project costs and specific electricity system requirements, similar to the Marinus Link Victorian land sections.

2.3. Interconnector configuration

To deliver the proposed 1500 MW capacity of the interconnector, each 750 MW link will comprise two HVDC power cables and an optical fibre cable for system control. Optical fibre will be laid alongside the power cables to allow the converter stations in Victoria and Tasmania to communicate over the interconnector. The remaining capacity will be available to strengthen data and telecommunication connectivity between Victoria and Tasmania.

Two HVDC land cables for each 750 MW link will be laid in an individual trench within a common easement[12]. Laying the cables close together in a trench largely cancels out

[12] Legal right of way registered on the land title, that protects underground cables or overhead transmission lines. Typically, less than the construction right of way but may be the same width. Described in survey plans and legal instruments. Conditions on land use may apply.

magnetic fields generated by electrical current flowing in the cables. Magnetic fields are low, becoming undetectable from the earth's natural magnetic field only a few metres from the centreline of the cables[13]. The interconnector will not emit an electric field. Electric fields are completely screened by the metallic sheath of the cable.

In Bass Strait, each 750 MW link comprises two HVDC subsea cables and an optical fibre cable, bundled together and buried in the seabed. Very small electric fields could be generated by sea-water or sea-creatures moving over the cable. Bundling the cables has the effect of largely cancelling out magnetic fields generated by the electrical current flowing in the cables.

Each 750 MW link will be laid nominally two km apart across Bass Strait, to reduce the risk of damage to both links from a single event, such as a dragged anchor or during a cable repair and to reduce the impact on the NEM as a result of a potential fault or outage. The two links will come together on approach to the Victorian and Tasmanian coasts, where the separation will be less than 100 m.

The nominal voltage of Marinus Link is expected to be ±320 kV or ±400 kV, therefore the operating DC voltage between a pair of cables is either 640 kV or 800 kV respectively. The final decision about proposed voltage will be made as part of the procurement process, to optimise value.

Detailed information on the interconnector configurations considered for Marinus Link is available in the Initial Feasibility Report.

2.4. Easements

As with other public utilities such as water, gas and sewerage, electricity assets require easements for construction, operation and maintenance. An easement will accommodate trenches for both Marinus Link stages, with space for a third trench. The space could be

[13] All electricity cables emit varying levels of electric and magnetic fields (EMF). Magnetic fields from Marinus Link will be well below the international guidelines recommended by International Commission of Non-Ionizing Radiation Protection, which have been adopted by the Australian Radiation Protection and Nuclear Safety Agency.

used to replace one 750 MW link if necessary in the future, or to accommodate a future interconnector.

The land cables will be buried in trenches approximately one metre wide and 1.5 m deep in the nominal 20-metre-wide easement. The easement may need to be wider in sections due to local constraints. Typical arrangement for the proposed easement is shown below in Figure 2-2.

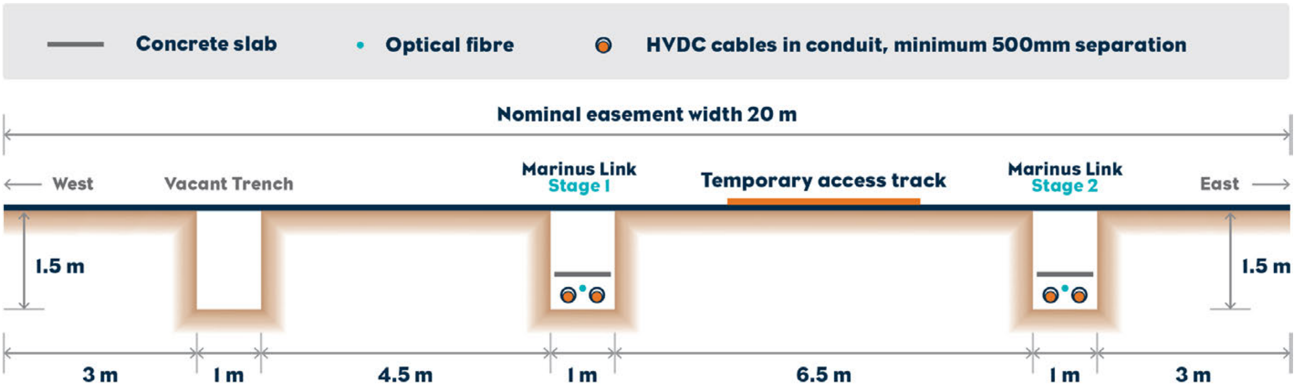

Figure 2-2 Typical easement arrangement

Land cables will be supplied in lengths up to approximately 1,200 metres, to avoid using oversize transport vehicles and to address constraints imposed by the road network, topography, terrain and land use. Cable lengths will connect at joint bays, consisting of a concrete pit approximately 10 m long, 2.5 m wide and 1 m deep, buried at least 0.5 m below the surface (see Figure 2-3).

Most farming practices like cropping, grazing and irrigation will be able to continue over the installed cables and joint pits, with some activities restricted due to safety, access and performance requirements (e.g. building structures over the cables, boring for groundwater or fence posts, and planting deep-rooted trees would be prohibited).

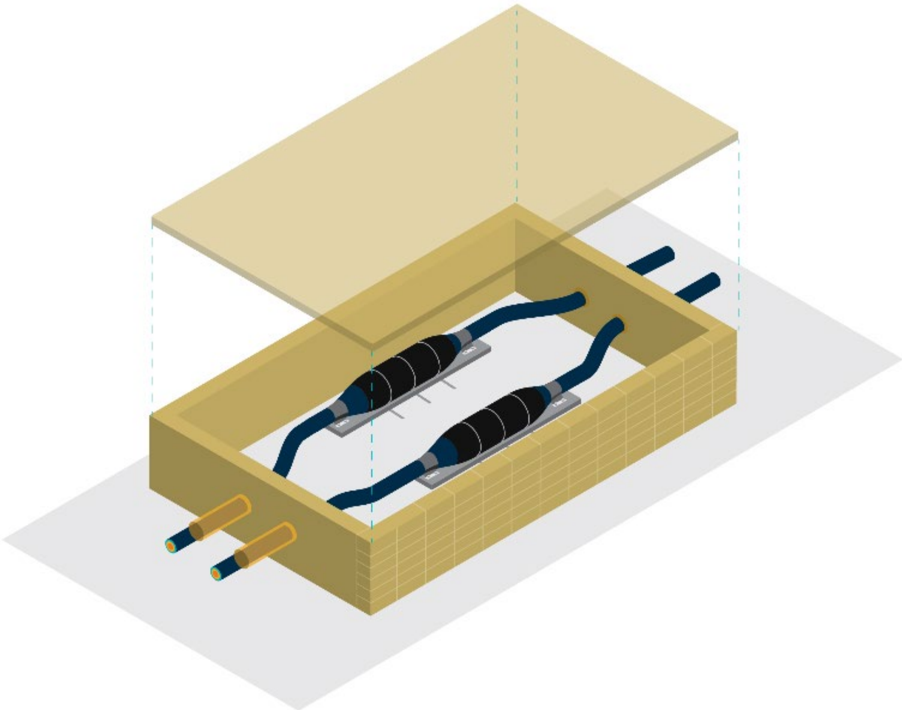

Figure 2-3 Typical land cable joint bay (Source: Europcable)

Where possible, joint bays will be located next to boundary fences or other features, as agreed with landowners and land managers, to reduce impacts on land use and landholdings. Access to joint bays will be required in the unlikely event of a fault. Existing roads and tracks such as farm access tracks or plantation forestry tracks would be used for access where possible. Tracks may be upgraded or supplemented to facilitate construction traffic.

2.5. Land-sea cable transition point

Land-sea joints are required to connect the HVDC subsea and HVDC land cables. Land-sea joints can be constructed as a pit or as a transition station, which is akin to a large farm shed. The specific location and details of the land-sea joints, including the need for potential transition stations, are still under investigation. A small adjacent communications hut to house the subsea to land connection of optical fibre cables is also required. Configuration of the land-sea joint will be confirmed in the detailed design.

3. What values exist in the area of interest?

The area of interest encompasses southern Victoria, Bass Strait and north west Tasmania. This section discusses the existing values with respect to the physical, biological and socioeconomic environments, including social, cultural, heritage and economic aspects including the landscape and scenic values.

3.1. Victoria

3.1.1. Physical environment

This section describes southern Victoria's physical environment (see Figure 3-1).

South western Victoria is an expansive volcanic plain consisting of lava flows which extend to the coast in places. The lava flows overlay, in some places, sculpting the underlying limestone formations to form rocky headlands, such as near Portland. The underlying limestone formations become steep cliffs where they reach the coast, shaped by the erosive power of the sea; the most notable being the cliffs flanking the Twelve Apostles between Port Campbell and Warrnambool.

The Otway Ranges extend east from Port Campbell to Lorne, reaching the coast. Lava flows east of the Otway Ranges extend to the coast near Torquay and Breamlea forming rocky headlands and slopes. Expansive coastal plains spread inland from Port Phillip Bay, Western Port Bay, and the South Gippsland coast either side of Wilsons Promontory, the rocky land mass projecting into Bass Strait.

The Strzelecki Ranges extend east from Western Port Bay to east of Traralgon. The western and eastern ranges are separated by a division extending in a line from Morwell to Meeniyan. Elevations range from 300 m to 500 m above sea level, with the highest point being Mount Tassie, at 730 m. The Grand Ridge runs east to west along the ranges and is the divide between coastal and inland river systems.

Victorian nearshore coastal environments between Portland and Wilsons Promontory are comprised of rocky reefs and platforms interspersed with scattered coves and beaches consisting of sandy substrate. Rocky reefs and platforms occur at headlands near Portland, between Warrnambool and Point Lonsdale, and between Point Nepean and Wilsons Promontory. East of Wilsons Promontory, Ninety Mile Beach is comprised of predominantly sandy substrate with low-profile reefs offshore.

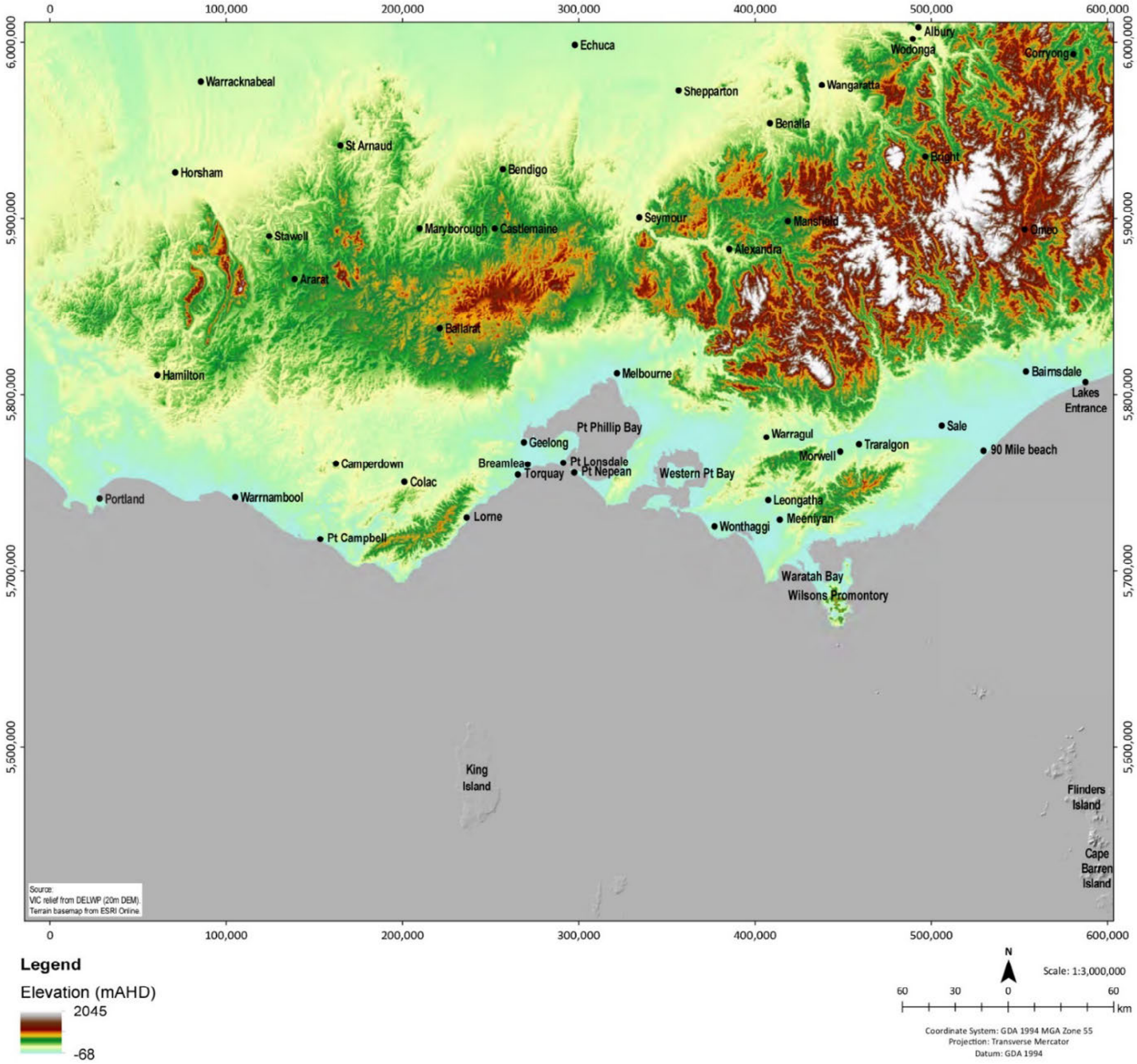

Figure 3-1 Southern Victoria relief[14]

[14] In geographic terms, 'relief' describes the difference between a location's highest and lowest elevation.

3.1.2. Biological environment

This section describes the distribution of flora and fauna and their relative habitats in Southern Victoria (see Figure 3-2).

Victoria's native vegetation has been extensively cleared for agriculture. The rich soils of the volcanic and coastal plains, Strzelecki Ranges and the drained Koo Wee Rup swamp support intensive agriculture including Australia's premier asparagus growing area at Koo Wee Rup.

Remnant vegetation concentrates in conservation reserves, state forests, road reserves and along watercourses. Fragmented native vegetation on private property remains a prominent feature of the landscape, providing important corridors connecting numerous small reserves and larger parks scattered throughout the region. Woody vegetation cover increases in the Strzelecki Ranges.

Extensive hardwood and softwood plantations occur along the northern slopes of the Strzelecki Ranges. Most of this area is managed plantation, however some areas (narrow corridors and some larger patches) of native vegetation exist alongside watercourses, providing wildlife corridors. North of the ranges, pastoral land interspersed with fragmented woodlands occurs throughout the undulating plains of the Latrobe Valley.

Native forest patches, native grasslands and riparian vegetation provide habitat for threatened species including the golden sun moth, swamp skink, southern brown bandicoot, growling grass frog and giant Gippsland earthworm. Coastal vegetation provides habitat for the critically endangered orange-bellied parrot which migrates between Tasmania and Victoria. Western Port Bay, Waratah Bay, Shallow Inlet and Corner Inlet support threatened wader and migratory shorebird habitats.

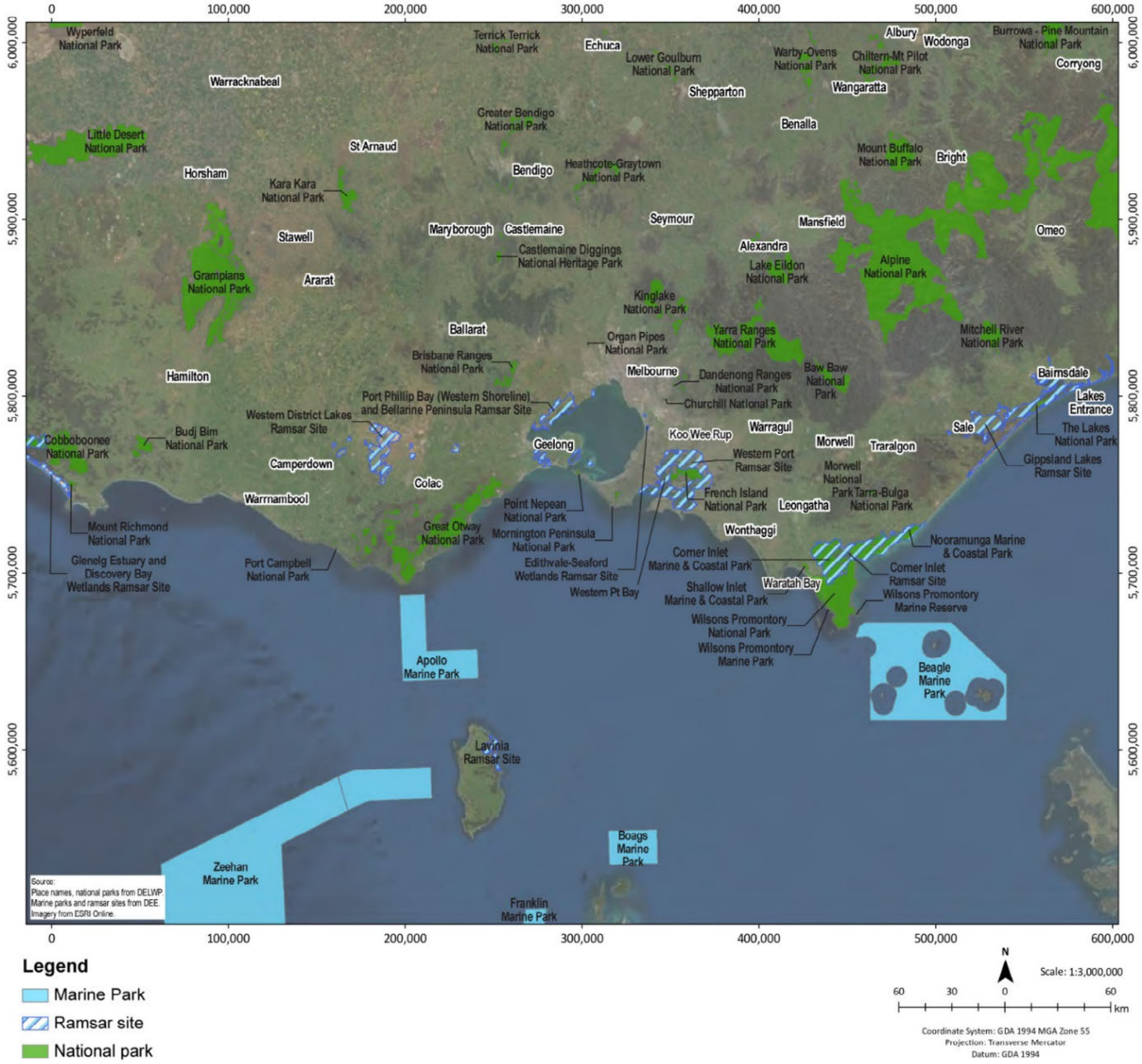

Figure 3-2 Southern Victoria vegetation cover and reserves

3.1.3. Socioeconomic environment

This section describes lifestyles, industry, infrastructure, recreational activities, and cultural heritage present in southern Victoria (see also Figure 3-2).

Coastal communities are experiencing ‘sea change’ growth as people move from Melbourne and Geelong. The Bellarine and Mornington peninsulas, Surf Coast and Bass Coast are particularly affected. Rural lifestyle properties extend inland from these communities and throughout the Otway and Strzelecki ranges.

The Great Ocean Road and Twelve Apostles are major tourist attractions west of Melbourne. Phillip Island and Wilsons Promontory, east of Melbourne, attract large numbers of tourists for the little penguin parade and outstanding coastal landscapes respectively.

The rich soils of the Victorian volcanic plain west of Melbourne, coastal plains of South Gippsland and plateaus of the Strzelecki Ranges provide high quality agricultural land. Dairy, horticulture, vineyards and berry farms are major agricultural enterprises.

Oil and gas production facilities at Iona near Port Campbell, Lang Lang near Western Port Bay and Longford in Gippsland are major industries. Portland is a major trading port, exporting wood products and aluminium produced in Alcoa’s Portland aluminium smelter. Portland, Port Campbell, San Remo and Port Welshpool are commercial fishing ports. Recreational fishing occurs along the coast and around coastal towns with boat ramps and beach access.

Natural features along the Victorian coast are protected in coastal reserves, parks and national marine parks. Notable protected areas include:

- Twelve Apostles Marine National Park
- Great Otway National Park
- Point Addis Marine National Park
- Mornington Peninsula National Park
- Western Port Bay Ramsar site
- Yallock-Bulluk Marine and Coastal Park

- Bunurong Marine National Park
- Cape Liptrap Coastal Park
- Shallow Inlet Marine and Coastal Park
- Wilsons Promontory National Park
- Wilsons Promontory Marine Park
- Wilsons Promontory Marine National Park.

Historic and Aboriginal cultural heritage occurs along the Victorian coast and hinterland. Shell middens occur in and beside coastal dunes, particularly those backed by freshwater bodies. Artefacts are found throughout the area of interest, more frequently on terraces bordering watercourses and along story line routes. Scar trees occur throughout the Latrobe Valley, including the Morwell River floodplain.

3.2. Bass Strait

3.2.1. Physical environment

Bass Strait is a relatively shallow body of water between mainland Australia and Tasmania, approximately 240 km wide, with an average depth of 80 m. Over 50 islands occur along the strait's eastern and western margins where the continental shelf gives way to the Tasman Sea and Southern Ocean respectively.

King Island punctuates the western edge of the strait and Flinders Island the eastern edge. A chain of small islands spreads north from Flinders Island to Wilsons Promontory, the southern-most point of the Australian mainland. Another small chain of islands spreads from King Island to north west Tasmania. The seabed is primarily sandy substrate and muddy sediment. Hard substrate is found near the islands.

Bass Strait is characterised as oceanic weak nearshore tidal currents, complex large-scale ocean currents, a high wave climate and a wide range in water temperatures. It is influenced by 3 very different water masses: the Southern Ocean, south Tasman Sea and the East Australian Current. In winter, surface water from the Great Australian Bight moves eastward through Bass Strait, transforming under the prevailing atmospheric conditions into the locally formed Bass Strait water, which reaches a minimum temperature near Flinders Island. A northward flow at the eastern shelf break of the strait carries Bass Strait water and sub-Antarctic surface water from the east of Tasmania towards the coast of Victoria. The influential strength of these water masses in Bass Strait is in turn influenced by seasonal and regional wind patterns. Movement of these water masses affects Bass Strait water quality, temperature, nutrient loads and phytoplankton abundance.

Bass Strait is a high-energy environment, with frequent gales. The central Bass Strait wave climate is dominated by westerly and south westerly swells, circulating through the western entrance. The average significant wave can range from 1 to 2 metres high in northern and central parts of the strait, to around 1 metre high in the southern part. However, maximum significant wave heights can reach over 9 metres high during large storms. In shallow waters, this wave climate can cause circular movement of water near the seabed, which can in turn stir up and transport fine seabed sediments.

3.2.2. Biological environment

This section describes the presence of flora and fauna and their relative habitats in Bass Strait.

Bass Strait's water column supports primarily ocean surface (pelagic) and ocean bottom (demersal) flora and fauna. Pelagic flora consists mainly of phytoplankton but also includes macroinvertebrates such as jellyfish, comb jellies, salps (jellyfish-like creatures), arrow squid and calamari, and vertebrates such as fish, sea turtles and marine mammals including whales, dolphins and seals.

The large brown kelps typical of cooler waters and hard seabeds in the south east bioregion are anticipated to be mostly absent from the area of interest across Bass Strait, where the seabed is comprised of unconsolidated or loose soft sediments. Soft sediments lack the hard substrate required for kelp holdfasts and other sea floor (benthic) algae to settle and establish, while mobile bed forms of coarser material are too active to be colonised. Light penetration necessary for photosynthesis becomes a limiting factor for algae and seagrass in the deeper waters of Bass Strait.

In the offshore soft seabed sediments of southern Bass Strait, a variety of deep water corals and sponges ('sponge beds') are located at depths between 65 m and 75 m and comprise a deep water community of barnacle-like, filter-feeding fauna. These generally contain habitat-forming organisms such as sponges, octocorals, and sea squirts.

Bass Strait supports a number of baleen whale species, including southern right, humpback, blue, sei and fin whales. Southern right whales frequent Bass Strait and coastal Victoria and Tasmania during winter and spring to calve in the shallow waters. The most well-known calving area is near Warrnambool in Victoria. Small numbers of humpback whales regularly enter Bass Strait and some pass through on their seasonal migrations to and from breeding grounds in tropical waters of eastern Australia in autumn and spring.

3.2.3. Socioeconomic environment

This section describes the fisheries, infrastructure and industry activity present in Bass Strait (see Figure 3-3 and Figure 3-4).

Major shipping lanes pass through Bass Strait; connecting coastal, regional and international trading ports. Coastal trading occurs between the Port of Melbourne, Burnie, Devonport and Bell Bay in the Tamar River. Bass Strait supports rich fishing grounds with scallops, school shark, octopus, crayfish and finfish the major fisheries. Fishing activities (Figure 3-3) concentrate at the western and eastern ends of Bass Strait around King and Flinders islands, and near the Tasmanian and Victorian coasts. Fishing activities are less intensive mid-strait, due to the deeper water and absence of habitat features.

Oil and gas production assets (Figure 3-4) occur in the Otway, Bass and Gippsland basins, off the south west Victorian coast, mid-strait and off the eastern Victorian coast respectively. The Yolla gas field is located mid-strait, producing and piping gas to Victoria for processing, crossing the coast at Kilcunda. The Tasmanian Natural Gas Pipeline supplies gas to Tasmania from the Longford Gas Plant in East Gippsland, Victoria.

Basslink, the existing HVDC interconnector between the Tasmanian and Victorian electricity grids, runs down the eastern side of Wilsons Promontory and the Hogan Group islands, west of Flinders Island, to Four Mile Bluff near George Town. There are also 3 telecommunication cables crossing Bass Strait; 2 active Telstra telecommunication cables located mid-Strait and the recently laid Indigo Central telecommunications cable. This infrastructure is shown in Figure 3-4.

Several Defence training areas exist off the Victorian coast and several sites in eastern Bass Strait (see Figure 3-4). Unexploded ordinances (**UXO**s) may be present within those areas.

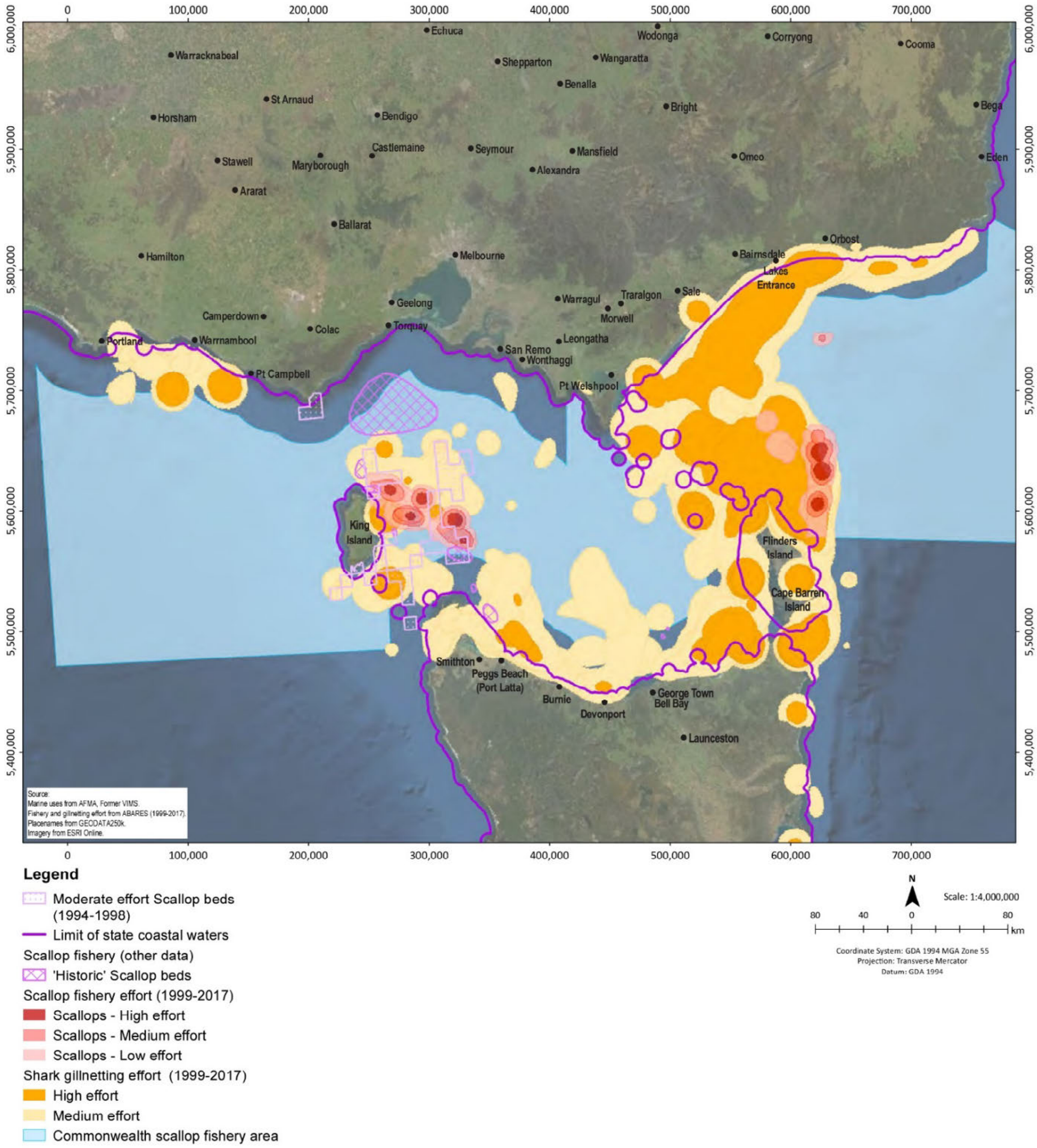

Figure 3-3 Bass Strait fisheries

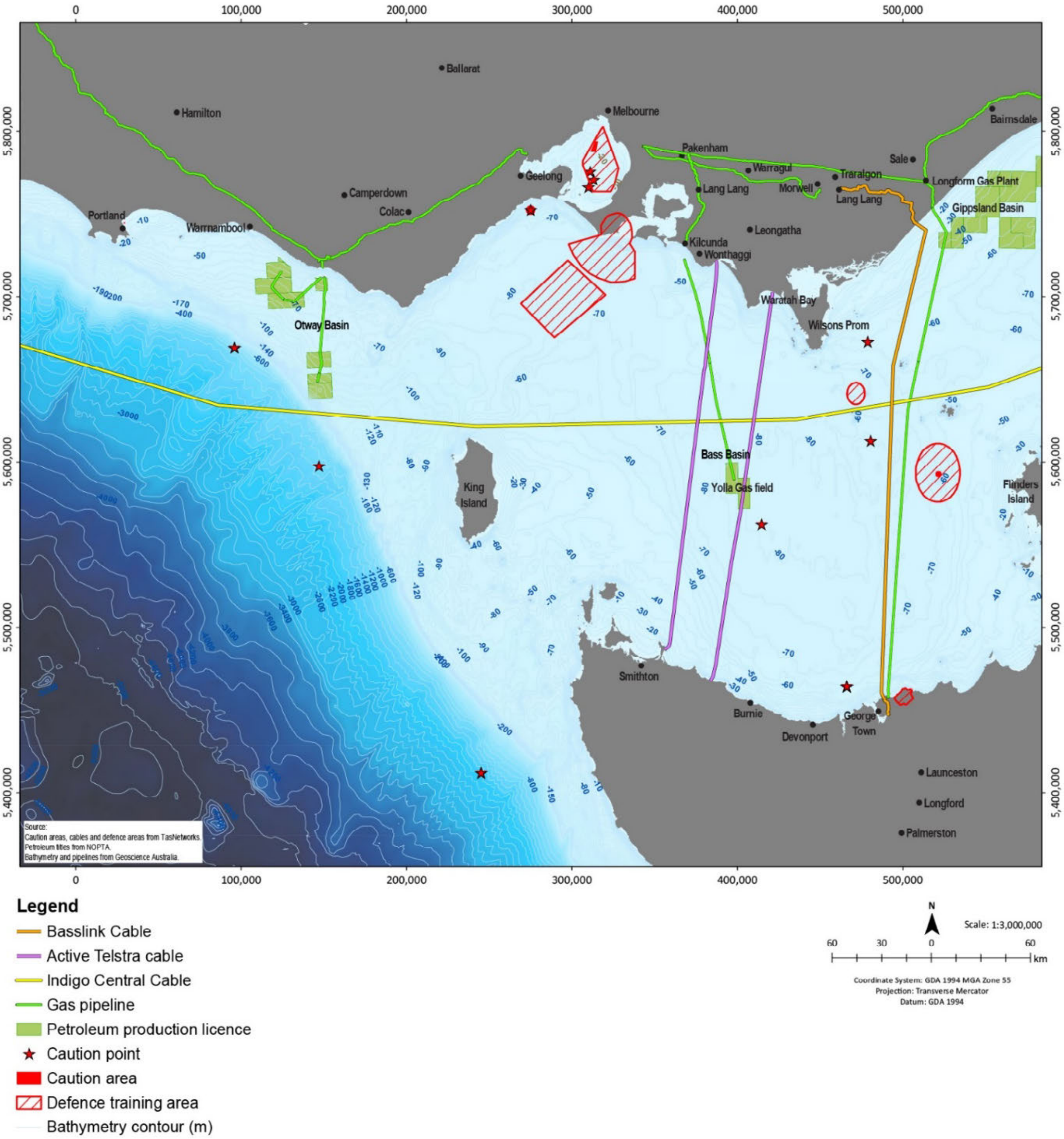

Figure 3-4 Bass Strait infrastructure

3.3. Tasmania

3.3.1. Physical environment

Northern Tasmania's physical environment (see Figure 3-5) is characterised by undulating plateaus with deep river and creek valleys, coastal ranges and estuaries, backed by an elevated plateau at the base of the Great Western Tiers and Central Highlands. The coastal plain bordering Bass Strait is narrow until west of Rocky Cape, where it becomes more expansive. Between Devonport and Sisters Beach, the plain is backed by steep slopes. The rich volcanic soils of the plateau support intensive agriculture.

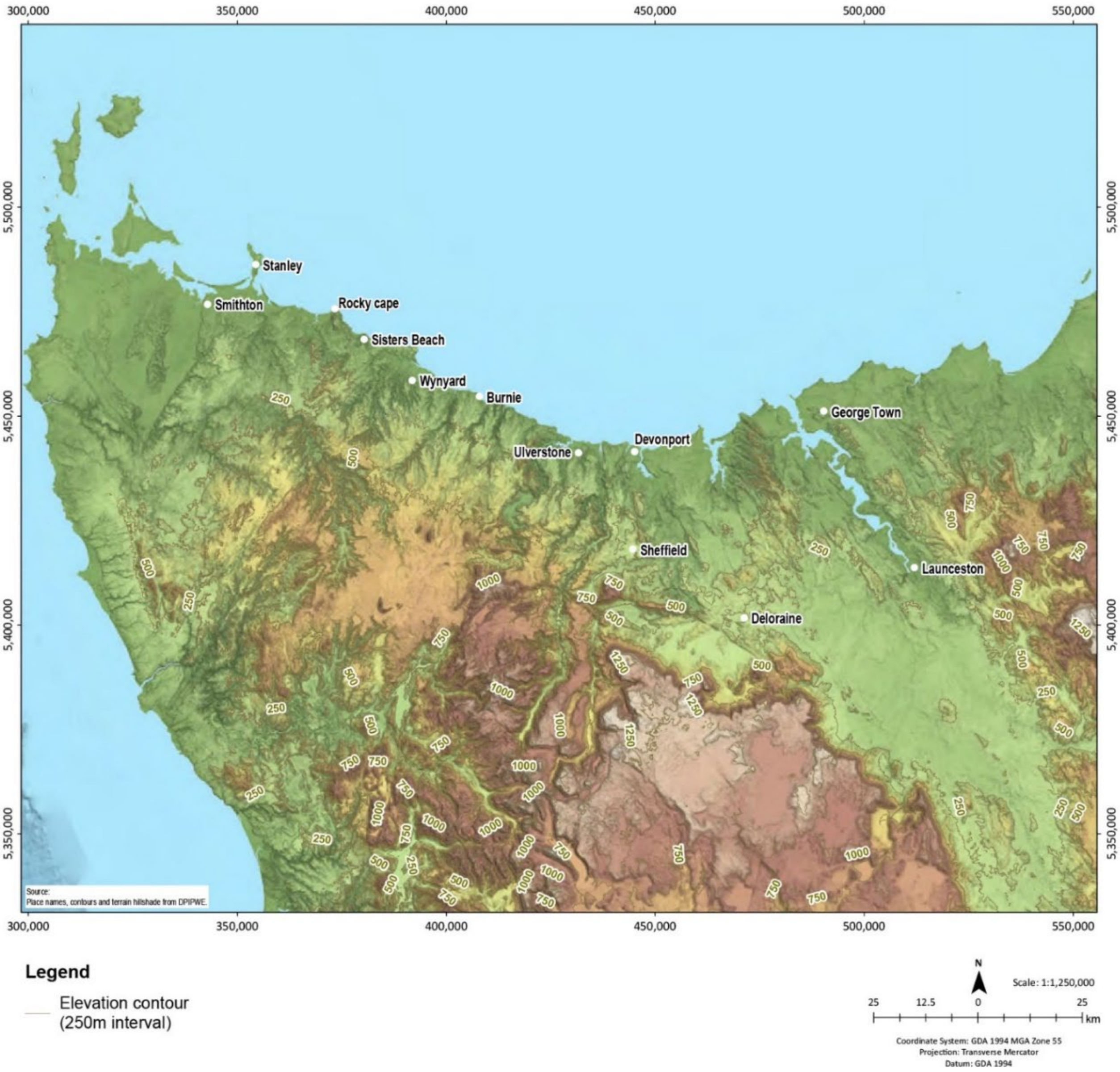

Figure 3-5 Northern Tasmania relief

3.3.2. Biological environment

This section describes the distribution of flora and fauna and their relative habitats in Northern Tasmania (see Figure 3-6).

Remnant vegetation persists on coastal ranges, along major watercourses and as relatively intact tracts. The productive soils have resulted in extensive clearing for agricultural use.

Northern Tasmania’s coast is predominantly rocky reefs and cobbles, interspersed with sand and sediment. Reefs are distributed widely from Devonport to Rocky Cape consisting mostly of high relief bedrock and boulders, supporting the accumulation of benthic species, which live in the seabed.

Little penguin habitat occurs along the northern Tasmanian coast. Little penguins, also known as fairy penguins, are the smallest of the world’s penguins. These birds make nests in crevices between rocks or burrows in sand dunes, and are known to utilise sites between Burnie and Lillico Beach.

Soft seabed sediments such as sands, silts and shell grit, tend to have sparse and less dense populations of benthic flora and fauna. Soft silty-sand seabed areas also provide habitat suitable to commercially important scallops.

Hard seabed habitats or reefs have high environmental value due to their diverse range of microhabitats, which are utilised by a larger diversity and abundance of benthic flora, benthic and epibenthic macroinvertebrates, and benthic and epibenthic fish. The Tasmanian nearshore rocky platform and reefs provide habitat for the benthic algae and other marine plants which in turn provide a preferred habitat for pipefishes, sea dragons and seahorses listed under the *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth).

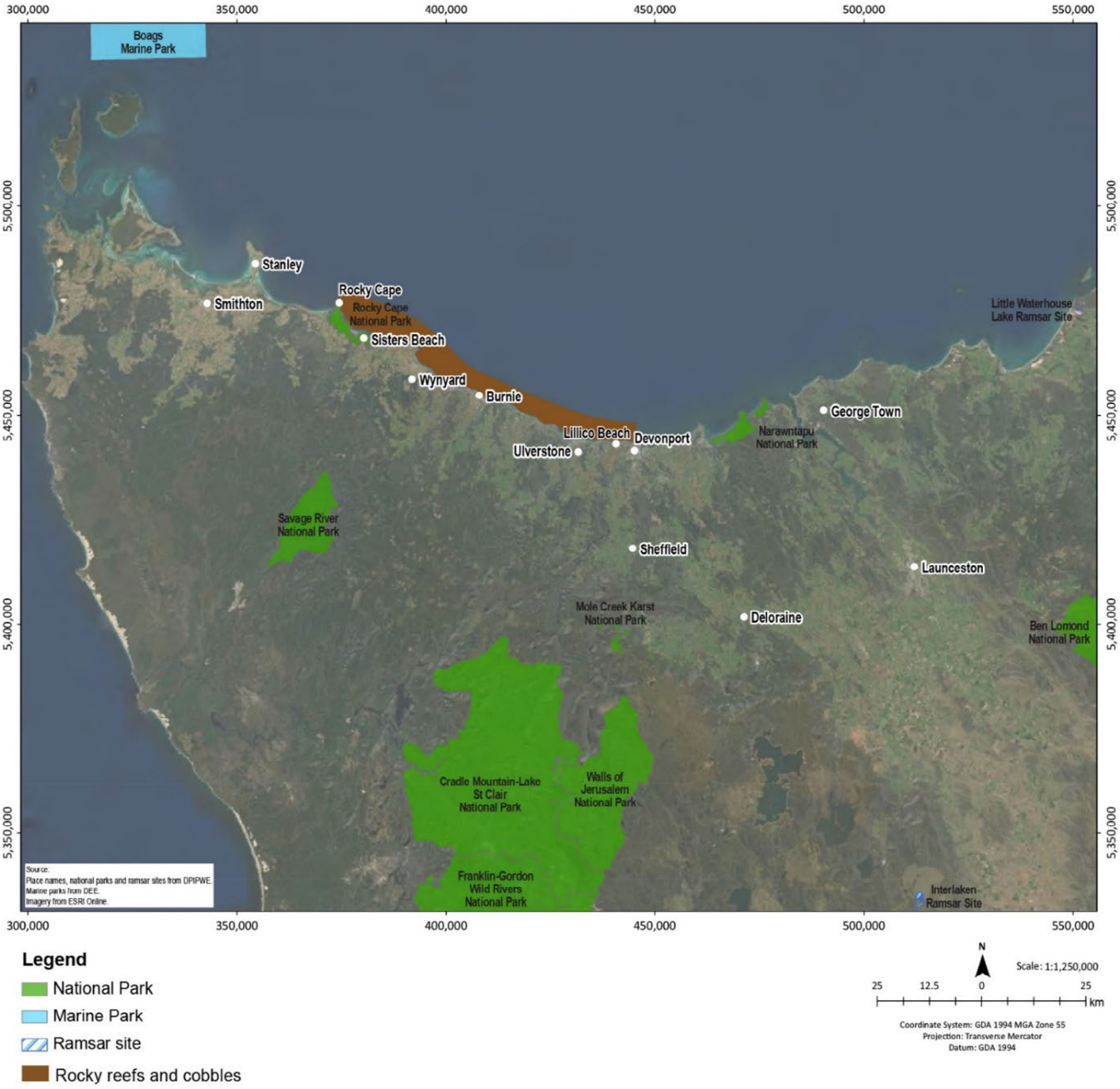

Figure 3-6 Northern Tasmania vegetation cover and reserves

3.3.3. Socioeconomic environment

The socioeconomic environment includes industry, infrastructure, recreational activities, and cultural heritage present in northern Tasmania.

Small rural communities are located throughout northern Tasmania with major towns located along the coast. Coastal development is spreading along the coast from major towns and smaller coastal communities.

Trading ports operate at Devonport and Burnie, with the major north coast fishing port at Stanley. Recreational fishing activities occur in proximity to the coastal population centres. Grange Resources operates the Port Latta pelletising and loading facility, a dedicated iron ore export business.

Agriculture and plantation forestry are major industries in northern Tasmania. Agricultural enterprises include horticulture, dairy and medicinal crops. Forest products are exported through the Port of Burnie. Historic major industries include the decommissioned Associated Pulp and Paper Mill at Burnie and Australian Tioxide's titanium dioxide plant at Heybridge, now closed, demolished and rehabilitated for industrial use.

Tourism is a major industry, with visitors attracted by the region's natural features and scenic coastline. Devonport is a gateway to the region, with the Spirit of Tasmania operating regular freight and passenger ferry services between Devonport and Melbourne. Stanley is a destination popular for its historic buildings and natural features. Lillico Beach and Penguin are renowned for their little penguin colonies. Small coves and beaches along the north coast are popular with residents and tourists. Rocky Cape National Park protects natural beaches and sea caves between Wynyard and Stanley, striking rock formations and important Aboriginal cultural heritage sites.

Coastal Tasmania has high potential for Aboriginal cultural heritage, as does land and the terraces neighboring inland waterways. Recorded Aboriginal cultural heritage includes artefacts, artefact scatters, stone quarries and rock shelters. Shell midden sites and fish traps have been found along the north coast, and seal hides are often found at cobblestone beaches. The highest concentration of known fish traps in Tasmania occurs on the northern coastline between Ulverstone and Burnie.

Several maritime archaeological sites have been identified within the area of interest, associated with Van Diemen's Land Company (a farming corporation founded in 1825) activities and shipwrecks.

4. How do the existing values affect route and site selection?

Understanding the physical, biological and socioeconomic environment of an area potentially impacted by the route is a key stage in the route selection process. Existing values information provides context and helps to identify constraints and opportunities for prudent and feasible routes and converter station site options.

Existing values constrain route options or provide opportunities to locate alongside existing linear infrastructure, such as transmission lines and road corridors. Constraints and opportunities are mapped by:

- collecting all relevant publicly available information, including spatial data, reports and previous investigations
- building a project geographic information system (**GIS**) to store and facilitate analysis of publicly available spatial data
- using the project GIS to understand constraints and support the identification and evaluation of prudent and feasible route and site options
- using the collective experience and knowledge of our team and consultants to identify and analyse all prudent and feasible route and site options
- ground-truthing shortlisted prudent and feasible alternatives by technical specialists to identify any fatal flaws and key issues requiring management.

4.1. Constraints

Constraints are considered in strategic and tactical contexts, and identified through statutory and regulatory requirements, technical considerations, environmental, social and cultural heritage values and community expectations. For example:

- Legislation and planning controls list acceptable land uses in reserves and planning zones.
- Australian, Tasmanian and Victorian Government legislation lists and protects threatened species and ecological communities, and cultural heritage sites.

Existing values are grouped by the level of constraint route and site selection (as defined by layers in the Project GIS). This data is located in Appendix A.

The categories of constraint are defined as follows:

- **'Very high'**: Areas or land uses where transmission infrastructure may have significant impacts that may be difficult to effectively mitigate. Avoiding these areas is an objective, although may not always be practical to achieve.
- **'High'**: Areas or land uses where avoidance is prudent, but transmission infrastructure could be sited and impacts mitigated with careful route selection and design and/or specific management measures.
- **'Moderate'**: Areas or land uses where transmission infrastructure could be sited, and impacts can be managed with standard mitigation and site-specific measures that address the type and nature of constraint.
- **'Low'**: Areas or land uses where transmission infrastructure is compatible with existing land uses and/or the impacts can be effectively mitigated.

Technical considerations

Technical criteria include the project objectives and engineering considerations for constructing and operating an HVDC interconnector. Technical and connection requirements provided the starting point to identify potential route corridors between suitable landfalls and converter sites. In some cases, a corridor offered several potential routes for evaluation.

Regulatory requirements

The Regulatory Investment Test for Transmission (**RIT-T**) is a cost-benefit analysis overseen by the Australian Energy Regulator (**AER**) and defined in the National Electricity Rules (**NER**). It assesses the economic and technical impact of, and preferred timing for, all major network investments in the NEM. The RIT-T process ensures regulated transmission investment decisions are in the long-term interests of customers.

The RIT-T requires that all "commercially and technically feasible" options are considered to identify the option resulting in the greatest net economic benefit to the electricity market. Net economic benefit is calculated by assessing the total benefits to the energy market of an investment such as Marinus Link, and reducing these gross benefits by the costs of the required investment. To optimise net benefits it is therefore important that the cost of prudent and feasible routes is considered in the route selection process, to manage impacts on customer electricity charges.

The principal objective (also referred to as 'identified need') of Marinus Link as defined in the RIT-T, is to deliver 'market benefits'. The broad categories of market benefit include:

- Enabling access to increased dispatchable generation
- Increased energy security, including greater seasonal reliability
- Export of ancillary services[15] (through export of dispatchable power)
- Offsetting network investment (by locating the interconnector near renewable energy zones)
- Increased inter-regional market access.

Marinus Link has met and satisfied all RIT-T milestones and activities to-date. RIT-T reports and feedback received during consultation are available on the Marinus Link website.

4.2. Opportunities

Available and potential infrastructure corridors are becoming highly constrained by industrial, urban and rural residential growth. In many instances, existing infrastructure corridors provide the only opportunities for cost-effective new infrastructure.

Existing infrastructure corridors and sites may pose opportunities for co-location as part of route selection where:

- Uses are compatible
- Terrain and land use constraints can be managed
- Existing easements include space for additional infrastructure
- Easement widening is possible
- Replacement of ageing existing infrastructure is possible.

[15] Ancillary services perform the essential role of ensuring a continuously stable power system operation, especially when subjected to unforeseen contingency events. Examples include a device which can rapidly alter the network voltage to correct for voltage disturbances (caused, for example, by a lightning strike), or the ability of a generator to rapidly change its power output in response to a sudden change in customer demand.

The existing Tasmanian and Victorian electricity transmission networks may provide such opportunities, as would compatible third-party linear infrastructure corridors. Co-location with other infrastructure must be carefully considered to avoid impacting on the existing or proposed asset.

5. Identify prudent and feasible corridors

Prudent and feasible corridors were identified by evaluating suitable grid connection points in Victoria and Tasmania and respective coastal landfalls, informed by the project objectives, constraints and opportunities.

Corridors were considered prudent and feasible where they satisfy the project objectives of:

- connecting Tasmanian renewable energy zones, offsetting network investment in Tasmania
- facilitating export of dispatchable power from Tasmania, to support seasonable reliability across the NEM
- increasing inter-regional market access
- increasing energy security.

Prudent and feasible corridors are shown in Figure 5-1, with further explanation available in Appendix B.

Suitable connection points

Suitable connection points in the Victorian grid backbone which are relatively close to the coast are the nodes at Portland, Moorabool, Cranbourne and Hazelwood terminal stations, and Loy Yang Power Station switchyard. These are all strong connection points on the 500 kV backbone; with existing levels of Victorian synchronous generation operating. If augmented, nodes on the 220 kV network create further connection opportunities, including:

- The future substation site at East Geelong on the double circuit 220 kV OHTL, connecting Point Henry Substation to Geelong Terminal Station
- Tyabb Terminal Station which is connected to Cranbourne Terminal Station by a double circuit 220 kV OHTL.

In Tasmania, the strongest existing node in the grid backbone of the possible connection points is Sheffield Substation, which is also relatively close to the Tasmanian coast. Sheffield is within Tasmania's North West REZ and near to the North East and Midlands REZs[16]. Augmentation of Tasmania's North West transmission network would create additional potential connection points, including:

- Burnie Substation, which connects to Sheffield via a single circuit 220 kV overhead transmission line (**OHTL**) and double circuit 110 kV OHTL
- Port Latta Substation, which connects to Sheffield via the double circuit 110 kV OHTL running through Burnie
- Smithton Substation, which connects to Sheffield via the double circuit 110 kV running through Burnie and Port Latta.

Grid capacity

The Victorian transmission network is experiencing considerable change from the historic operation it was designed for. The closure of Hazelwood Power Station and the ultimate closure of other coal-fired power stations in the Latrobe Valley is reducing energy flows in that part of the transmission network, at least for the short to medium term.

Rapid growth in wind and solar energy projects in south west, western and north-west Victoria are increasing energy flow into Moorabool Terminal Station north-west of Geelong. Combined with significant urban growth in the western and south-eastern suburbs of Melbourne and around Geelong, this will increase load on transmission circuits from Moorabool to Sydenham and South Morang and potentially overload transformers at Moorabool.

AEMO has modelled the implications of connecting Marinus Link to the Victorian network at various locations; AEMO commented in their 2018 *Victorian Annual Planning Report*[17] that for each of the 220 kV connection options the associated transmission lines could become overloaded under certain operating conditions. AEMO further commented that there

[16] Sometimes referred to as the Central Tasmania REZ

[17] AEMO, *Victorian Annual Planning Report*, *Electricity transmission network planning for Victoria*, July 2018.

would be no material impact on the transmission network if Marinus Link connected at the 500 kV lines in the Latrobe Valley or at Cranbourne.

The smaller 220 kV transmission circuits between Moorabool Terminal Station and Geelong Substation (East Geelong); Geelong Substation and Keilor Substation; Cranbourne Terminal Station and Tyabb Terminal Station all have limited capacity. These lines would need to be upgraded or duplicated to overcome these constraints, with much of the existing corridors encumbered by urban development.

Engagement with Victoria's jurisdictional transmission network planner, AEMO, and transmission asset owner AusNet Services, identified sufficient available capacity to connect with the Victorian grid on the existing 500 kV AC lines in the Hazelwood area of the Latrobe Valley. It is more efficient to transport energy into the Latrobe Valley using underground HVDC, as opposed to extending the HVAC overhead transmission network closer to landfall on the Victorian coast.

The recent and ongoing growth of renewable generation in south-west Victoria is leading to increased constraints on the 500 kV network between Heywood and Moorabool.

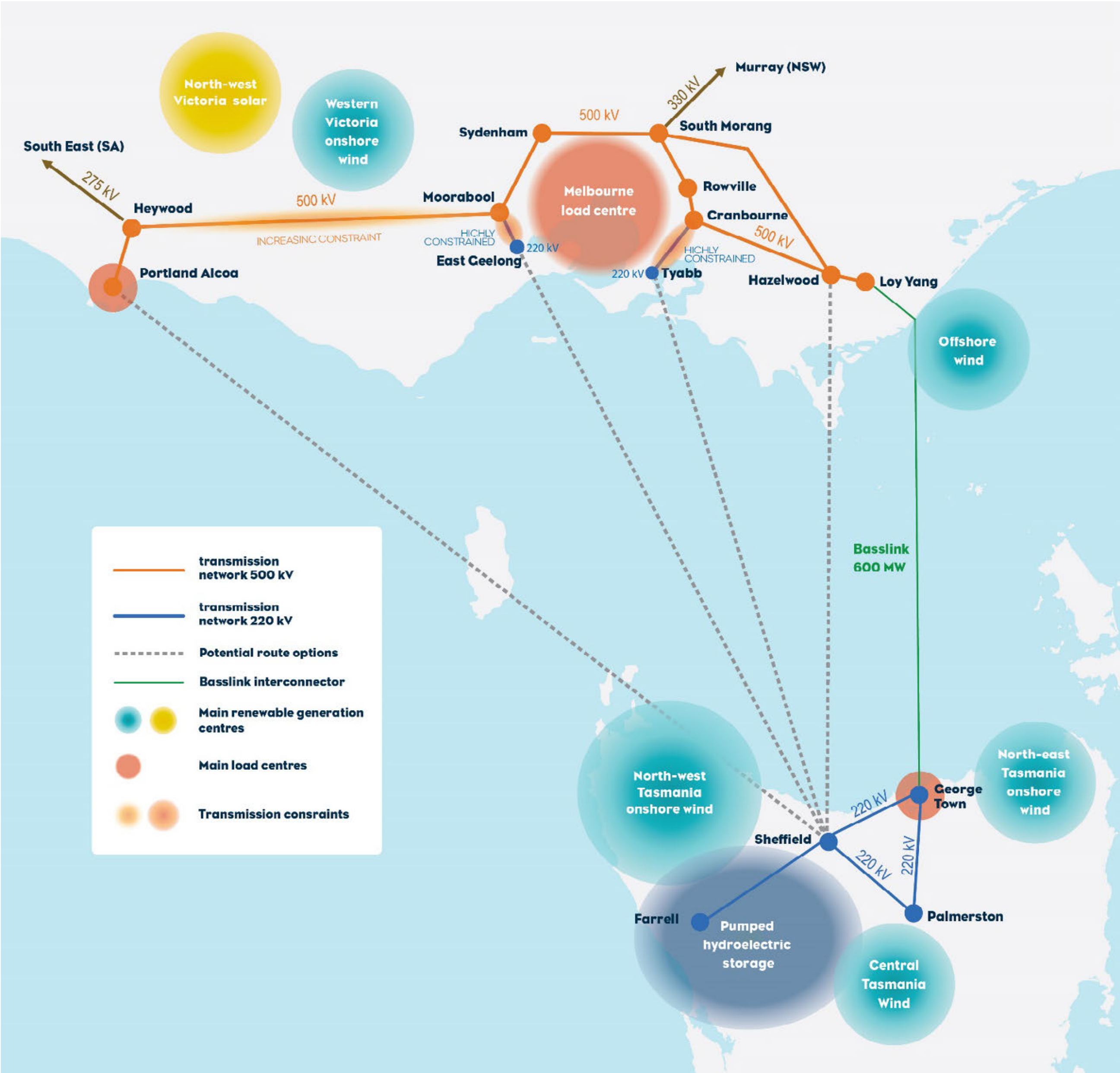

Figure 5-1 **Potential grid connection points**

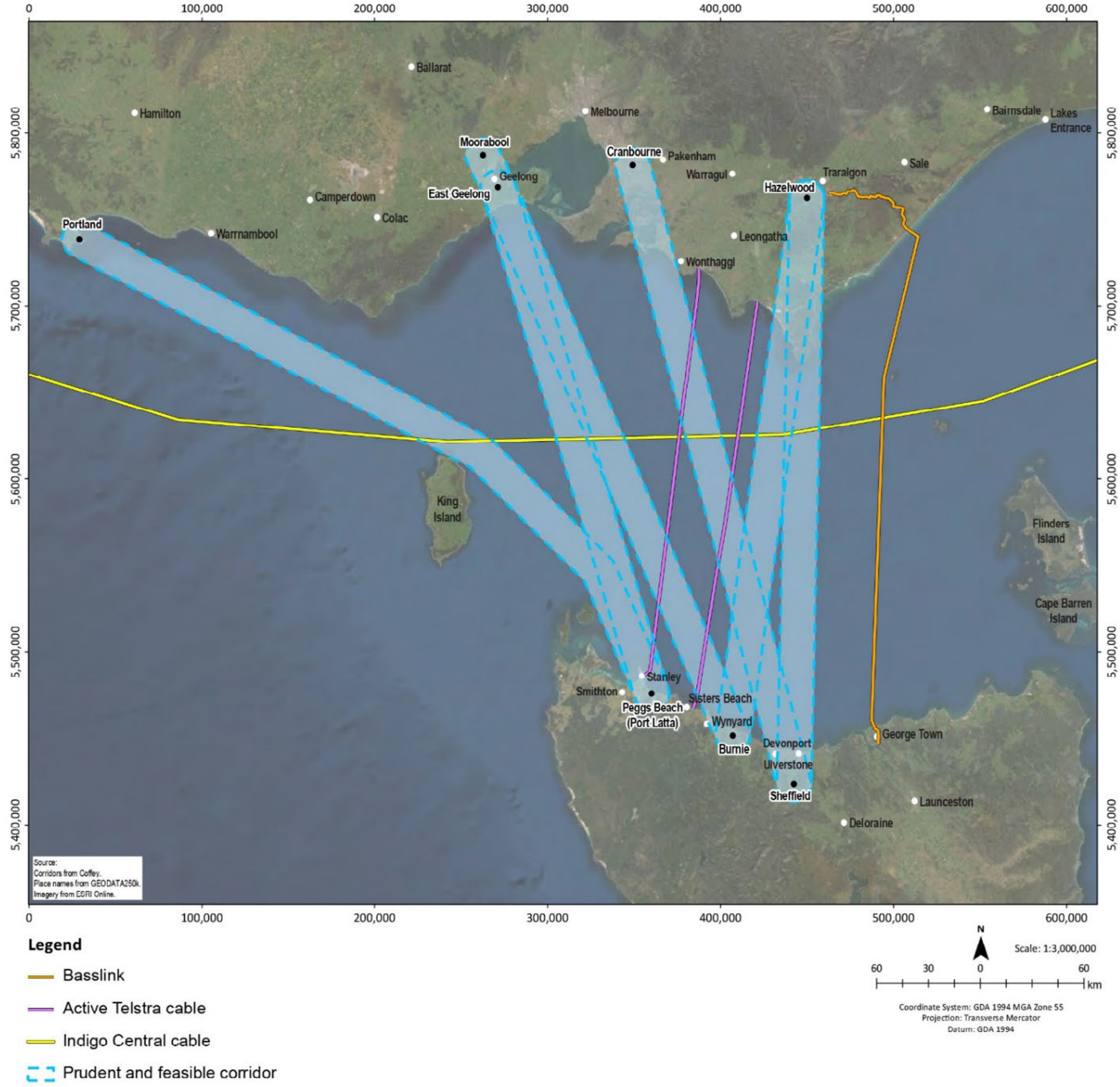

Figure 5-2 Prudent and feasible corridors

5.1. Why not follow the Basslink route?

While the existing Basslink interconnector creates a potential opportunity for co-location, this option does not fulfil a key project objective - that of increasing energy security. This option was considered and evaluated, however it was not pursued as it was not considered a prudent and feasible corridor due to the following factors:

- risk to energy supply from a single event which could render both interconnectors inoperable such as a bush fire impacting on northern Tasmania's transmission network, or an anchor strike from shipping activity in Bass Strait. There is less chance of this when both interconnectors are geographically separate and have multiple connection points to the existing network
- potential capacity constraints in the grid backbone between Loy Yang (Basslink's Victorian connection site) and Hazelwood
- further connection at Basslink's Tasmanian connection point at George Town would require significant upgrades to the Tasmanian transmission network
- connection points close to Victorian and Tasmanian REZs are favourable as they provide more efficient access to existing and planned renewable generation, such as existing hydro plant, large and feasible pumped hydro energy storage options, and areas with high potential for solar and wind development.
- an interconnector from north-west Tasmania to the Victorian Basslink shore crossing at Ninety Mile Beach would result in a very long subsea cable route, making it a high cost option compared to some others considered.

6. Identify prudent and feasible routes

Prudent and feasible route options were identified within potential corridors, guided by detailed technical, environmental and social criteria. These routes are shown in Figure 6-1. The shortest, technically feasible route between connection points that minimises environmental, land use and cultural heritage impacts is preferred, as a shorter distance generally results in lower cost.

6.1. Route and site selection criteria

Route and site selection criteria are derived from the technical specification and environmental and social constraints. Relevant technical criteria include the project objectives and engineering considerations for constructing and operating an HVDC interconnector. Environmental and social criteria include the values important to people and communities, and relevant government regulatory processes. The route and site selection criteria adopted for this project are located in Appendix C.

6.2. Potential landfalls

Before identifying prudent and feasible routes, suitable Tasmanian and Victorian landfalls (coastal crossings) need to be identified. Landfalls close to potential grid connection points are preferred, to reduce the length (and therefore cost) of land cables. Landfalls identified for suitable potential connection points are shown in Figure 6-1, and further detailed in Appendix D.

6.3. Potential converter station sites

Converter stations sited close to the Tasmanian and Victorian transmission networks are preferred, to reduce the length of HVAC cables required to connect the HVDC interconnector to the existing HVAC network. As a switching station or substation is required at each converter station site to make the connection, proximity to existing switching stations or substations is an advantage. The potential converter station sites identified for each corridor are listed in Appendix E.

6.4. Prudent and feasible route options

Physical, biological and socioeconomic values captured in the environmental and social route and site selection criteria guided route selection in the identified corridors. Prudent and feasible routes between the landfalls across Bass Strait and between the landfalls and converter stations in Tasmania and Victoria were identified (see Figure 6-1).

Crossing Bass Strait in a straight line is mostly possible, with some small deviations around identified constraints, including:

- aquaculture fisheries between Stanley and King Island (existing and proposed)
- ammunition disposal grounds off Barwon Heads and south of Cape Liptrap
- defence training areas off Barwon Heads and Western Port Bay (HMAS Cerberus)
- Otway Basin petroleum tenements
- Yolla, Trefoil, White Ibis and Rockhopper gas fields and export pipelines
- ship graveyards off the Surf Coast; and
- seabed bathymetry off the Tasmanian and Victorian coasts where the Bass-Strait seabed floor (approximately 80 m deep) rises to the coasts.

Other fishing activity is not a constraint as it is concentrated at the eastern and western margins of Bass Strait where the King and Flinders Island chains and associated reef habitats support a wide variety of seafood. Scallop fishing is concentrated in the softer substrates east of Wilsons Promontory and off the north-west tip of Tasmania. Central Bass-Strait is relatively benign ecologically, due to the deep muds and silts deposited in the basin. Nearshore reefs, sea mounts and rock platforms are important habitats, with routes selected to avoid these features.

Onshore, terrain is a major factor when selecting routes for land cables, as obstacles and environmentally sensitive areas cannot be overflown, as is possible with overhead transmission lines. Land cables require trenches or trenchless methods for the entire route. Routes which run at right angles to slopes are preferred to avoid lateral forces on the cables from slumping or slope failure, and to minimise land disturbance (such as landslip). Constructing land cables across slopes may require excavation of a road to provide a stable platform for construction equipment and the trenches, depending on the gradient.

Another important consideration is land use. Following property and road reserve boundary fences reduces impacts on farm paddocks and infrastructure, noting that in places diagonal crossings of paddocks are necessary to cross from one boundary fence to another or avoid unfavorable topographic features. Adopting back boundary fences, where practicable, locates routes away from farm houses, buildings and infrastructure typically located closer to roads.

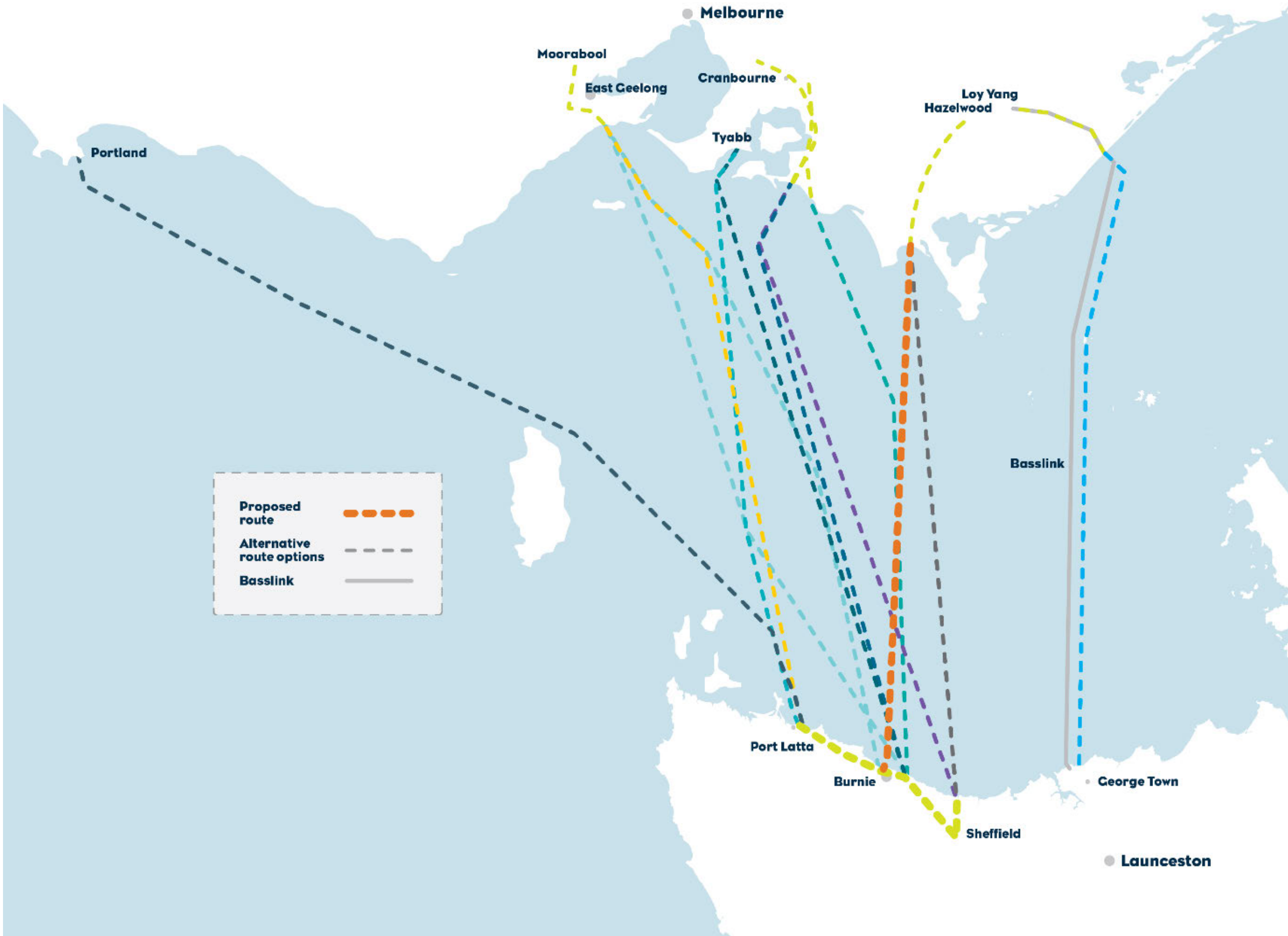

Figure 6-1 Prudent and feasible route options

7. Evaluate prudent and feasible route options

Prudent and feasible routes were evaluated against the route and site selection criteria, enabling a process of elimination to identify the routes considered to be least constrained.

Detailed desktop studies, ground-truthing (checking the accuracy of geospatial databases and remotely sensed data by means of onsite observations from the public road network) and a marine geophysical reconnaissance survey informed selection of the least constrained route. The least constrained route/s were subject to detailed review and refinement to address recommendations from the initial investigations, and an engineering review to identify the proposed route. This process is outlined throughout Section 7.

7.1. Compare of prudent and feasible routes

Routes identified as prudent and feasible were evaluated against each technical, environmental and social criteria to determine which route/s met the project objectives and were least constrained (see Appendix F). The level of constraint (relative to other evaluated routes) is indicated using a traffic light system; highly constrained (red), moderately constrained (orange) or least constrained (green).

7.2. Route options evaluation summary

Port Latta to Portland (far north-west coastal Tasmania to far south-west coastal Victoria):

- Closer to Tasmania's North West REZ, but further from the Tasmanian Midlands REZ
- Would potentially enable better inter-regional trading with South Australia
- Would be the longest route and therefore the most costly option
- Would pass close to and potentially impact important fisheries
- Would cross the Otway Basin gas fields and production infrastructure
- Additionally, the existing corridor between Portland and Melbourne is likely to become congested in the near-term due to significant wind generation development in south-west Victoria, and would be exacerbated by connection at Portland.

Port Latta to East Geelong (Far north-west coastal Tasmania to south-west coastal Victoria near Geelong); **Burnie to East Geelong** (Coastal North West Tasmania to south-west coastal Victoria near Geelong); and **Burnie to Moorabool** (Coastal north-west Tasmania to south-west coastal Victoria, inland and west of Geelong):

- The east Geelong area would require significant upgrades to existing transmission lines, at a substantial cost
- Both East Geelong and Moorabool options deemed highly constrained by urban development, requiring routes to follow and impact existing roads and reserves, with associated construction and cost issues
- The approach to landfalls on the Victorian south-west coast would be through or near defence training areas and ship graveyards, adding complexity to offshore routes and construction

Burnie or Sheffield to Cranbourne (coastal North West Tasmania or inland North West Tasmania, to inland south east of Melbourne):

- Cranbourne is considered unconstrained electrically and close to areas of demand in south-eastern Melbourne and the Mornington Peninsula, however this area is considered highly constrained by urban development in the Casey-Cardinia corridor, with significantly higher land values and lack of availability
- The route from Kilcunda (near Wonthaggi, south east of Melbourne) is also considered highly constrained due to existing infrastructure, small landholdings, the Koo Wee Rup swamp drains and associated ecological values, and asparagus growing areas around Koo Wee Rup.

Burnie or Sheffield to Tyabb (coastal North West Tasmania or inland North West Tasmania, to coastal south east of Melbourne):

- Tyabb presented a strong option from the perspective of a close and major connection point, which could be achieved by connection through to Cranbourne Terminal Station. However, the Tyabb to Cranbourne 220 kV transmission section is highly constrained by urban development and would require upgrading or duplicating the existing lines

- The Victorian landfall location on this route has significant environmental and technical constraints, including required crossing of the Western Port Bay Ramsar wetland and traversing a busy shipping channel
- Urban growth in Victoria, in particular this corridor, is significantly reducing land availability and inflating land costs relative to some other options.

Burnie or Sheffield to Hazelwood (coastal North West Tasmania or inland North West Tasmania, to inland east of Melbourne in Latrobe Valley, Gippsland, Victoria):

- Limited subsea infrastructure crossings would be required
- Both routes have the shortest marine sections
- Long onshore cable sections in Victoria, resulting in a higher number of affected landholdings than other routes and potential constructability challenges
- Good proximity to the North West Tasmania REZ and Tasmania Midlands REZ
- Burnie to Hazelwood better meets the project objectives due to the ability to optimise network expenditure given proximity to existing hydroelectricity resources, the North West Tasmania REZ, and proposed renewable generation projects including pumped hydro long duration energy storage
- Strong connection at Hazelwood to existing 500 kV Victorian transmission network, with sufficient capacity for interconnection
- Good geographic diversity to support power system stability and supply redundancy
- Both routes regarded as having limited exposure to incompatible land and/or seabed uses.

The evaluation identified two route options as the least constrained; Burnie (Heybridge) to the Hazelwood (area); and Sheffield to Hazelwood (area). These routes were further investigated through detailed desktop studies, ground-truthing and initial field investigations.

7.3. Further investigation of the least constrained routes

Detailed desktop studies into the terrestrial ecology, marine ecology, resource use, cultural heritage, maritime archaeology and geomorphology were completed to further assess the feasibility of the Burnie to Hazelwood and Sheffield to Hazelwood routes. Ecologists, geomorphologists and cultural heritage consultants conducted 'ground-truthing' during drive-by inspections from the public road network.

In Victoria, Aboriginal elders and other indigenous community members whose country is crossed by the potential route accompanied Marinus Link representatives on an inspection of the onshore route and provided advice regarding whether the proposed route had any potential significant sites or places in relation to cultural heritage values. No significant sites or places were reported, with the representatives noting that Aboriginal cultural heritage would exist on and near the routes as artefact scatters, shell middens and story lines, particularly at the coast but also along and near inland watercourses. In Tasmania, engagement was also completed with the Aboriginal community for areas impacted by the proposed Marinus Link route, with an aboriginal heritage officer and an archaeologist finding no significant sites or places on or near the proposed route.

Marine ecologists inspected the landfalls using still and video cameras mounted on remotely operated submersible vehicles to verify SeaMap Australia[18] seabed and benthic habitat types. The following observations were made:

- The survey showed good correlation between mapped and observed habitats.
- No biological assemblages or species particularly sensitive to disturbance were identified.
- Hard substrates (rocky reef and boulders) and cobbles extend to deeper water off Tasmania.
- Leith Point landfall is more exposed to cobbles than Blythe River mouth and Cam River heads.
- Waratah Bay landfall is predominantly sandy substrate with some patches of cobbles and low-profile reef.

A marine geophysical reconnaissance survey was commissioned to confirm seabed bathymetry and composition along the routes. The survey identified the following:

- Victorian nearshore substrate is predominantly sand with silt/clay layers, areas of gravelly shells, cobbles, small reefs and isolated outcrops.

[18] SeaMap Australia is the Australian seabed habitat classification scheme that maps and classifies benthic habitat around the Australian coast.

- Central Bass Strait substrate is predominantly silty sand/sandy silt with silt/clay layers.
- Tasmanian nearshore substrate is predominantly sand interspersed with cobbles and complex outcropping rock.
- In respect of the landfalls and shore approaches, the following was noted:
  - Cam River heads comprises complex outcropping rock sequences incised with palaeochannels infilled with sand and coarser sediments.
  - Blythe River heads substrate comprises complex outcropping rock sequences incised with palaeochannels infilled with sand and coarser sediments. The abandoned former tioxide plant outfall pipeline is in one of two major palaeochannels.
  - Leith Point substrate comprises bedrock overlain with extensive cobble banks.

The Blythe River mouth shore crossing at Heybridge near Burnie is less constrained than other options for connection through to the Sheffield area.

In addition to survey data, economic analysis suggested greater value is achievable for the energy market with converter stations sited in the Burnie area, connecting back to Sheffield Substation via an augmented North West HVAC transmission network and through to Palmerston Substation. This configuration supports efficient energy flow between Marinus Link and renewable energy generation and storage resources at the Tasmanian end of Marinus Link.

Ultimately, information from the desktop studies, ground-truthing and marine geophysical reconnaissance surveys identified that the least constrained route, which also meets the project objectives, is Burnie to Hazelwood with landfall at Heybridge and Waratah Bay. The studies confirmed that the identified environmental values could be managed and neither route had significant impacts.

7.4. Review and refinement of the least constrained route

The Burnie to Hazelwood conceptual route was further reviewed and revised to consider recommendations by technical specialists regarding issues identified in the desktop studies. An engineering review was then conducted and issues raised in onshore and offshore engineering reviews were considered during review and refinement of the conceptual route. In some instances, variations to the conceptual route were identified and investigated as possible alternative routes between the connection points (see Figure 7-1). Variations are discussed at a local level in Appendix G.

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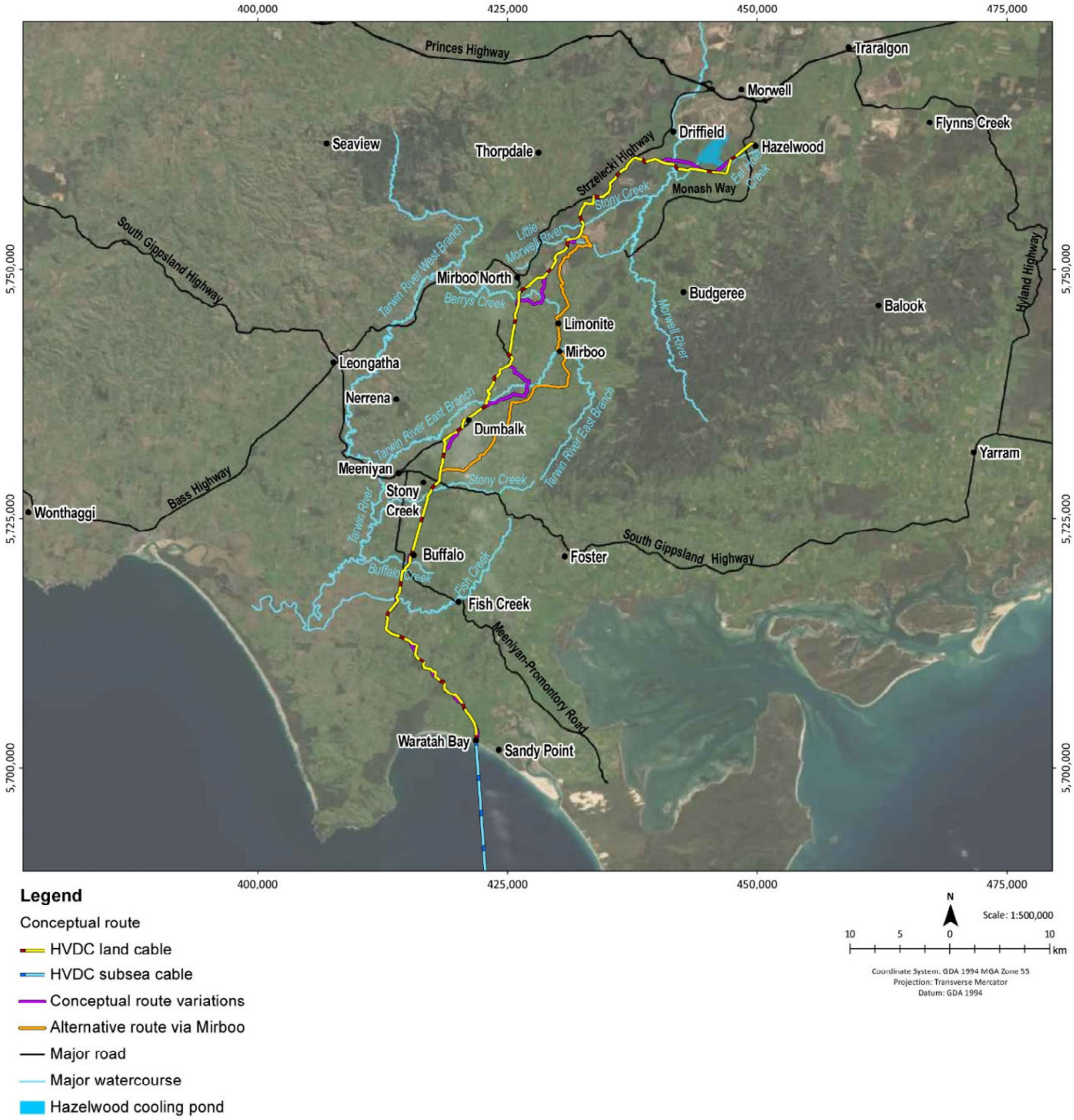


Figure 7-1 Victorian land section conceptual route variations

8. The proposed route

The proposed route for Marinus Link runs between the Hazelwood area in Victoria's Latrobe Valley and Heybridge, just east of Burnie in North West Tasmania (see Figures 9-1 to 9-6).

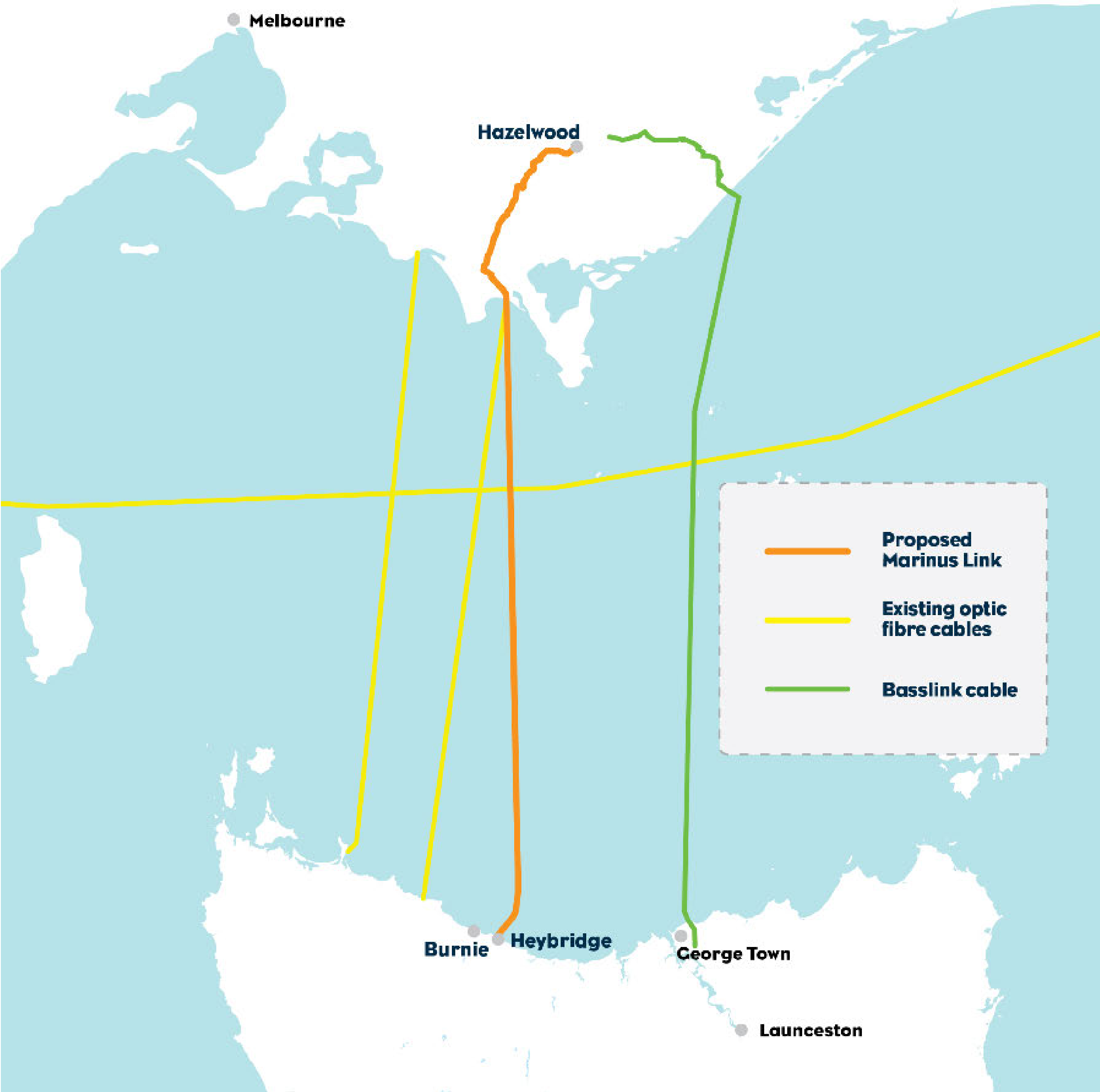


Figure 8-1 Marinus Link proposed route

The proposed route has been informed by detailed desktop studies, ground-truthing, a marine geophysical reconnaissance survey and engineering reviews to understand and address ecological, geomorphological, land use and constructability issues. Advice on historic and Aboriginal cultural heritage was considered in selecting and refining the proposed route.

8.1. Victoria

The Victorian land section of the proposed route is approximately 90 km, between the landfall at Waratah Bay on Victoria's south coast and the connection point with Victoria's existing 500 kV transmission network in the Latrobe Valley (see Figure 8-2, Figure 8-3, Figure 8-4 and Figure 8-5).

A potential alternative connection point along the existing 500 kV lines west of Hazelwood is being investigated. The alternative connection site would require construction of a new 500 kV terminal station adjacent to the existing transmission lines. The alternative site would require a shorter HVDC land cable route and may have fewer environmental, land use and social impacts and result in lower overall costs. Further analysis is required, and has commenced, to determine whether this converter station site option is viable.

From the Latrobe Valley connection point, the proposed route passes through the Morwell River valley, crossing the Strzelecki Ranges between Driffield and Dumbalk, and Grand Ridge at Mirboo North. The proposed route proceeds in a south-to-south-westerly direction through the Tarwin River Valley before turning southeast to a proposed land-sea joint on the approach to Waratah Bay.

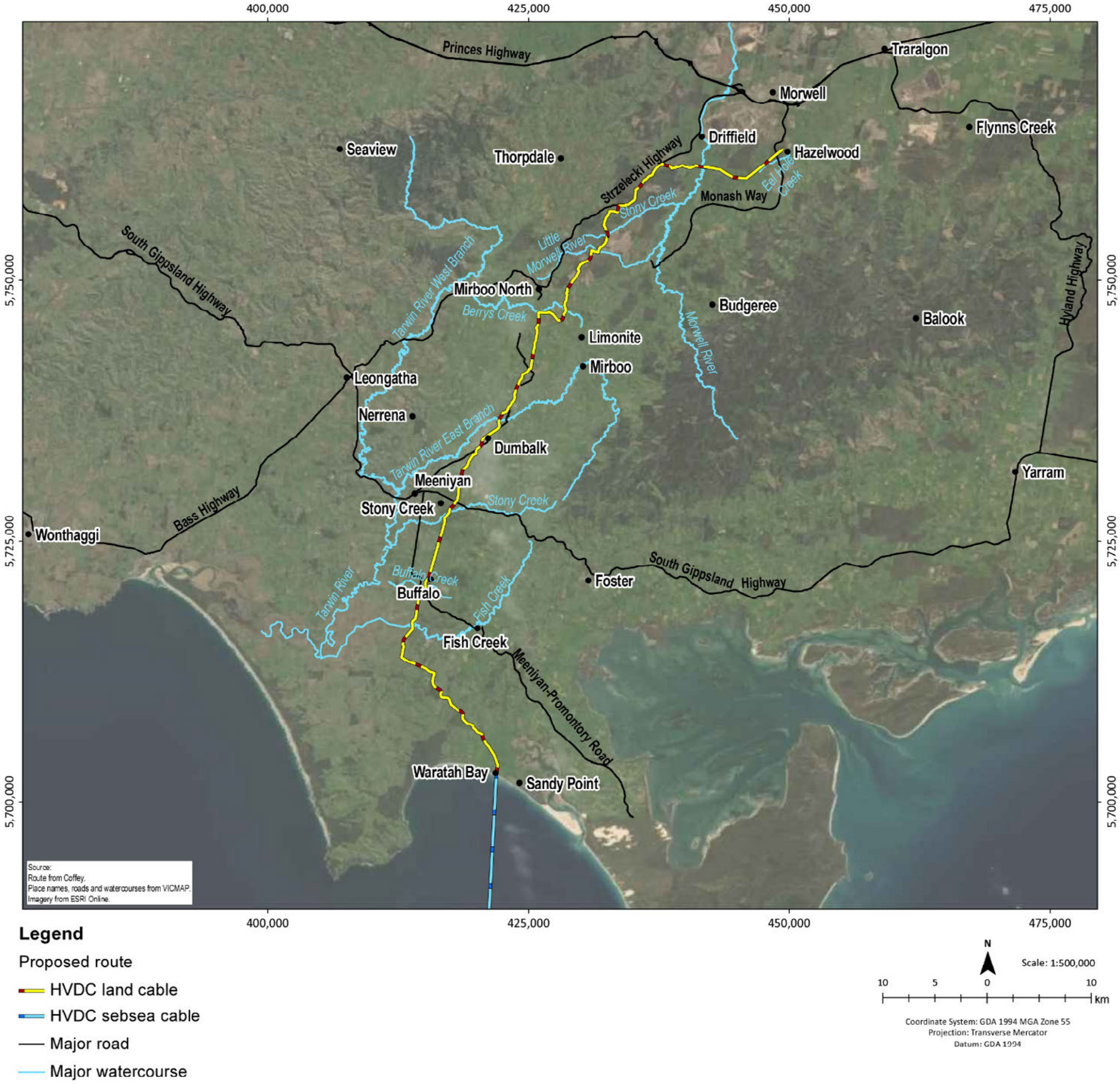


Figure 8-2 Proposed route (Victoria)

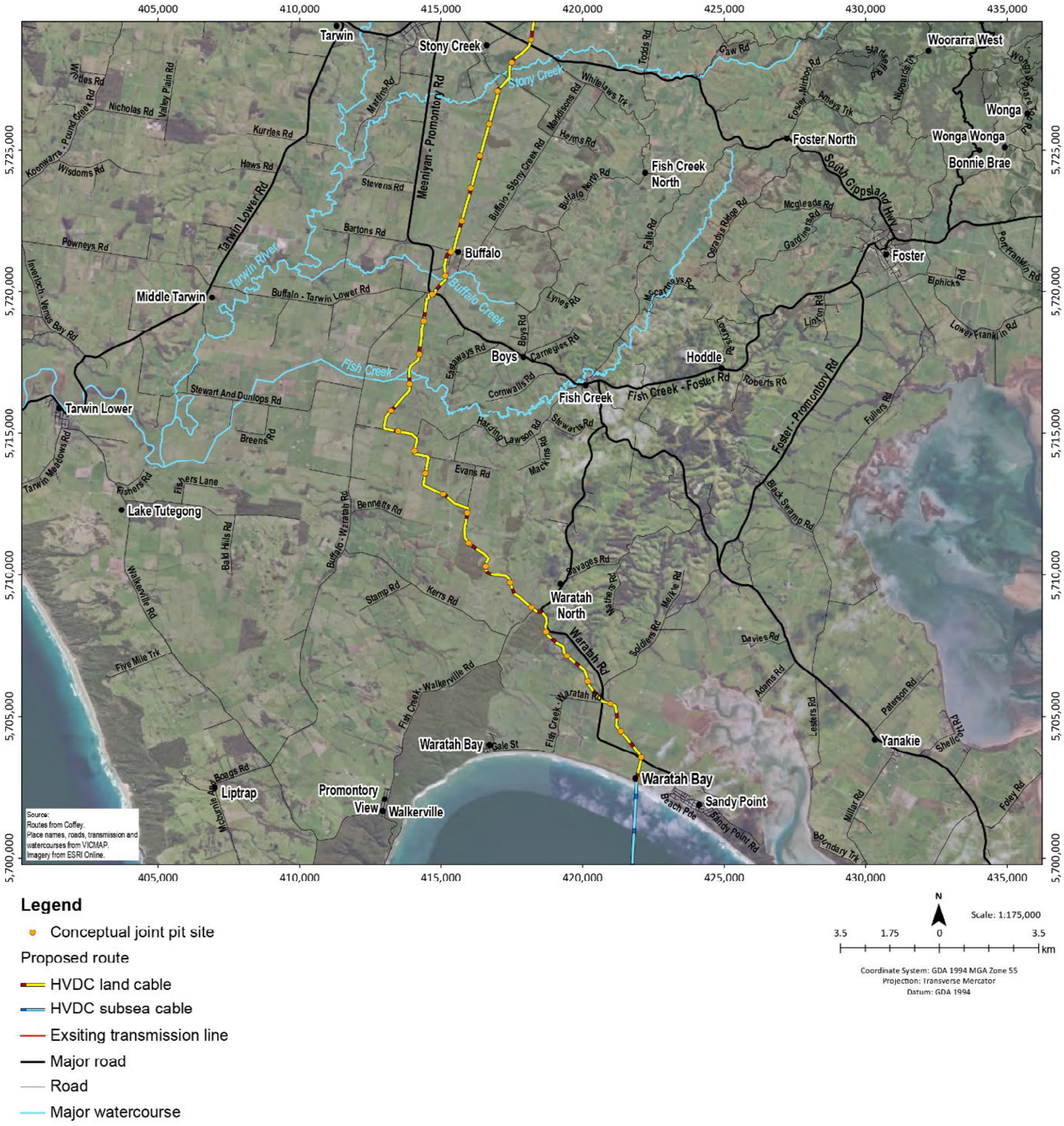


Figure 8-3 Proposed route (Victoria - Coast to Stony Creek)

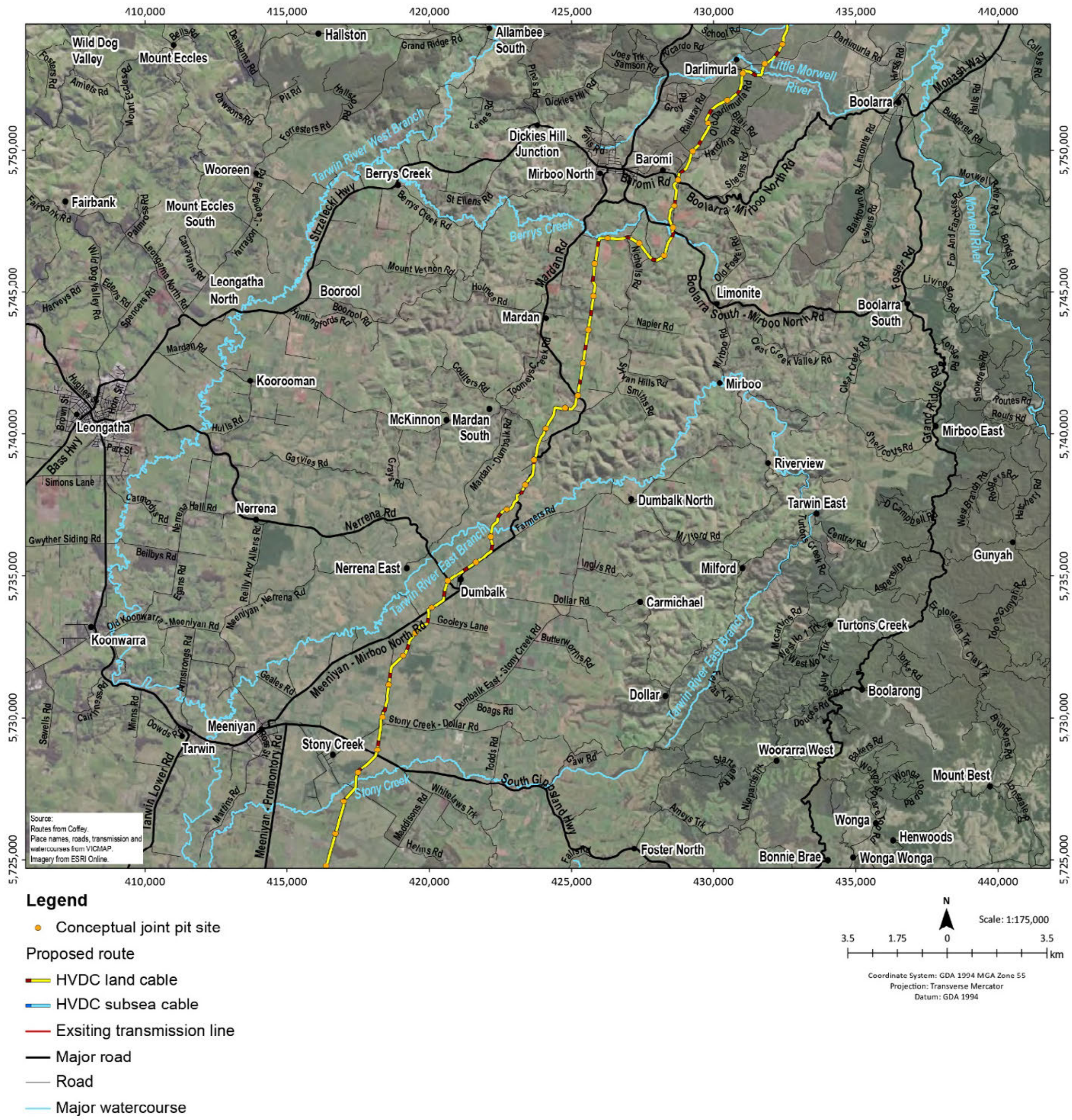


Figure 8-4 Proposed route (Victoria – Stony Creek to Mirboo North)

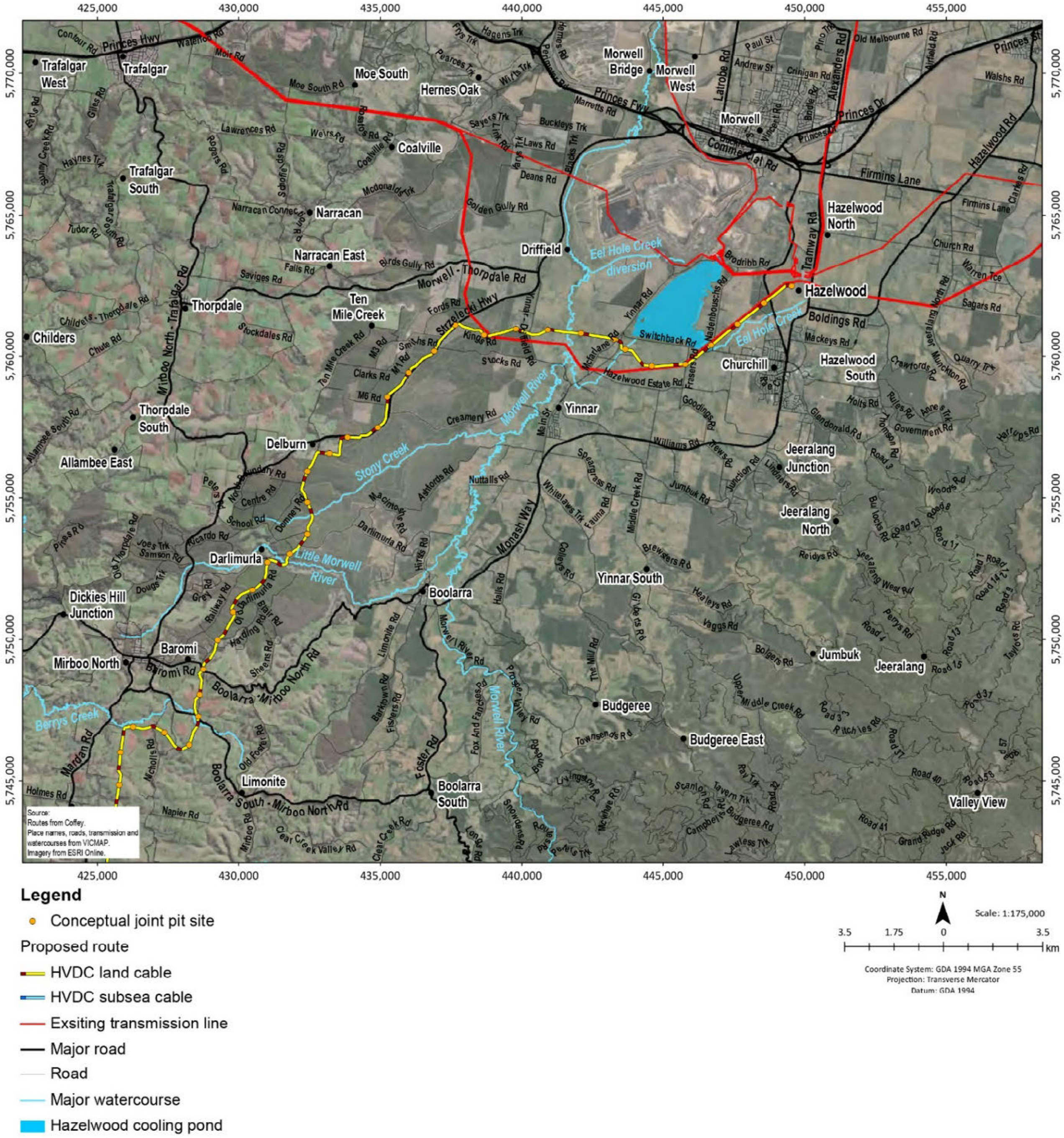


Figure 8-5 Proposed route (Victoria – Mirboo North to Hazelwood)

8.2. Bass Strait

The proposed route uses subsea HVDC cables to cross Bass Strait in a relatively straight line from the land-sea joint at Waratah Bay to the Tasmanian coastal converter station site at Heybridge.

From the landfall in Waratah Bay, the route descends the northern slope of Bass Strait, deviating slightly west of Tongue Point (Wilsons Promontory), to join and follow longitude 146°05' south through Bass Strait and its central basin. From approximately 60 m depth, it runs south west up the southern slope of Bass Strait to Tasmania's north west coast.

8.3. Tasmania

The best balance of energy transfer and efficient connection of the forecast new energy generation and load in North West Tasmania will be provided by siting the converter stations just east of Burnie at Heybridge, only two hundred meters from landfall. The proposed route proceeds north east from the converter station site and across the narrow strip of coastal land containing the Bass Highway and Western Line railway following one of two paleochannels to deep water of Bass Strait. This short distance allows the HVDC subsea cables to be brought underground directly to the converter stations, with no land-sea joint required.

The Heybridge converter station site is proposed to connect to an augmented Tasmanian 220 kV HVAC overhead transmission network (see Figure 9-7). Designs for the proposed connections are being finalised as part of the NWTD. These designs will be covered in a separate, dedicated route options report for that area, and are proposed to be released for consultation once finalised, in 2021. This is the only Tasmanian land section of Marinus Link (see Figure 8-6).

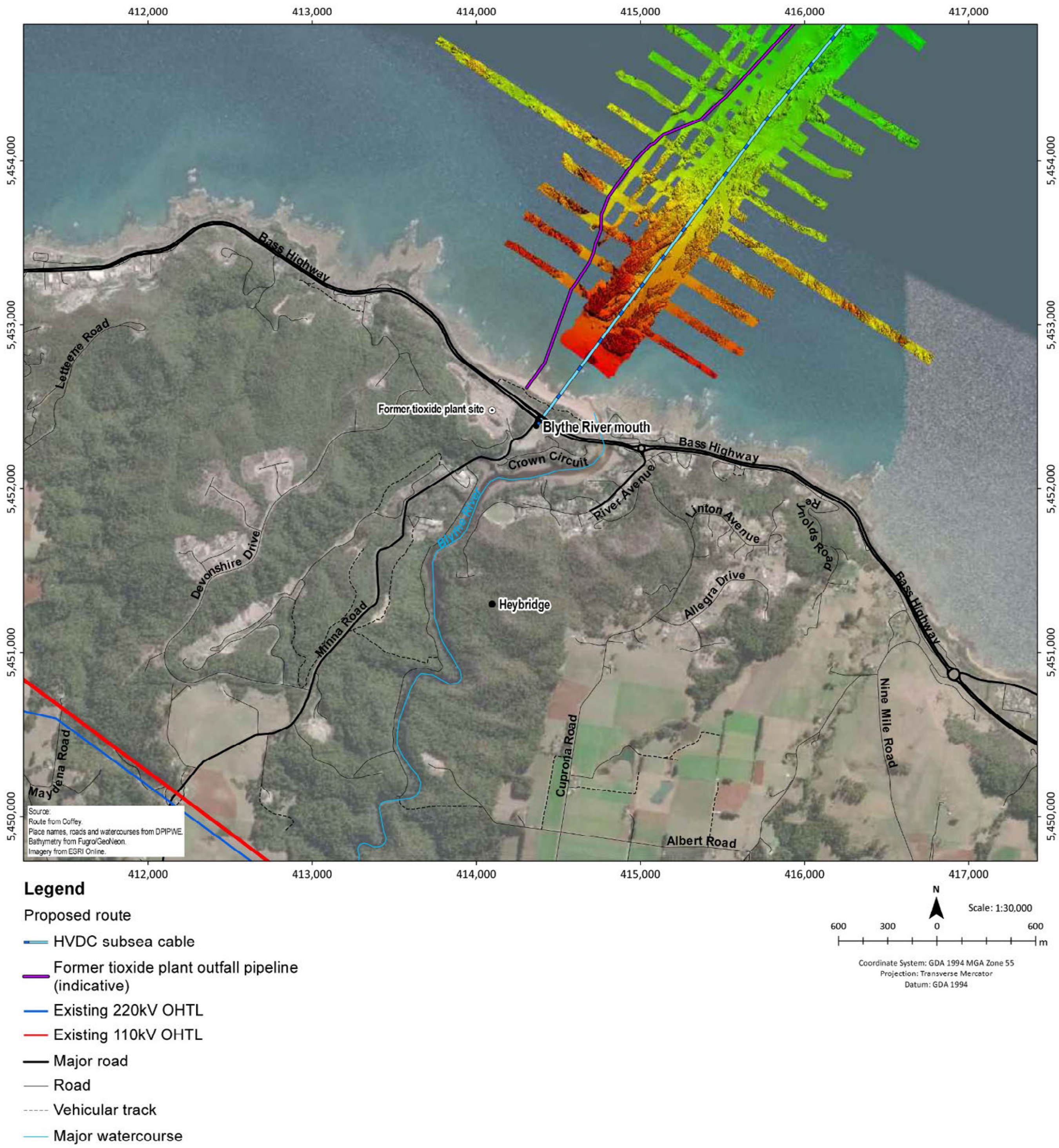


Figure 8-6 Proposed route (Tasmania)

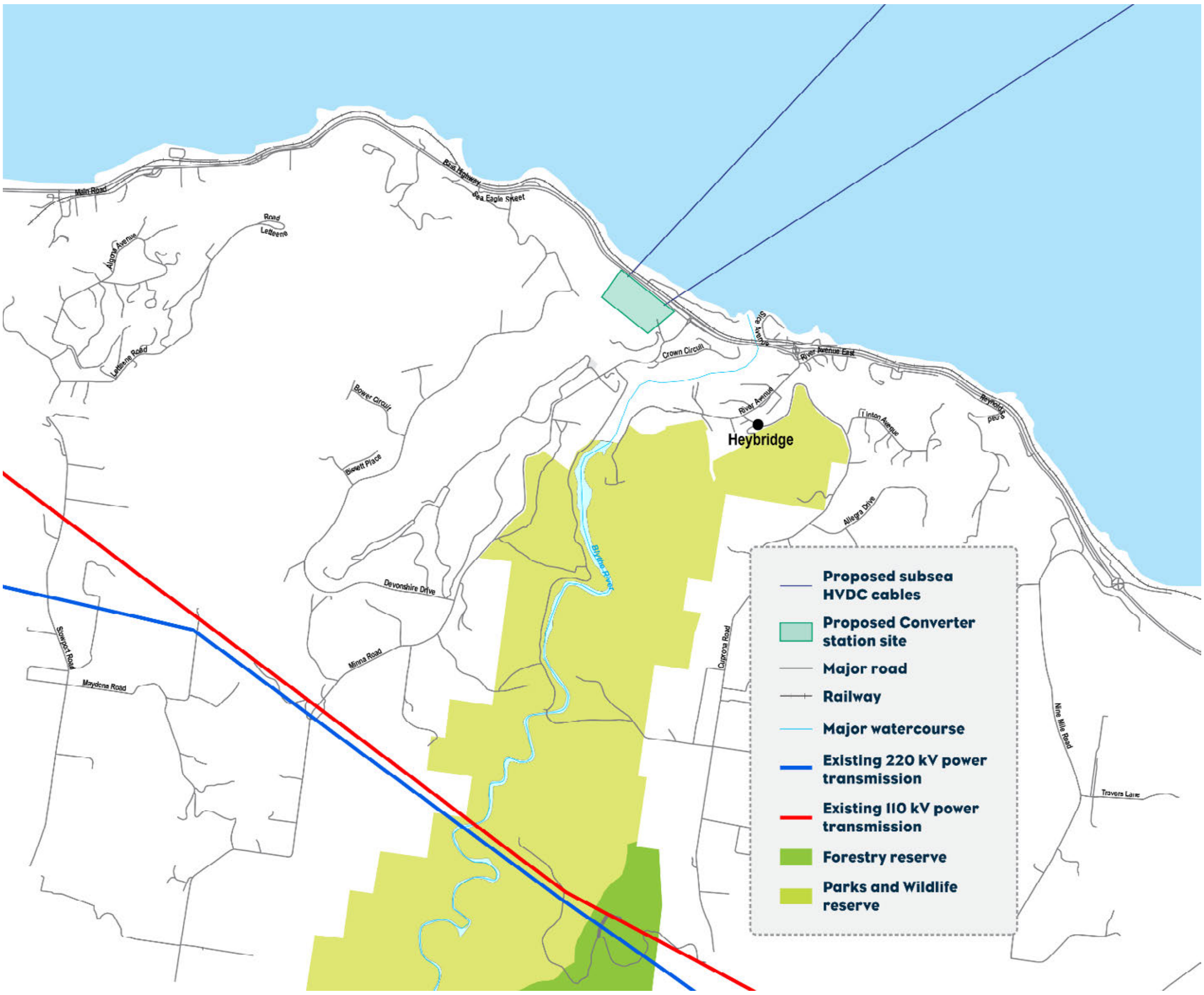


Figure 8-7 Proposed converter station site (Tasmania)

8.4. Proposed construction methods

The majority of the land cable route will be trenched. Where geotechnical conditions permit, auger boring or Horizontal Directional Drilling (**HDD**) is proposed where it is necessary to avoid sensitive areas, deep watercourses, some third-party underground assets and to minimise traffic disruption when crossing major roads.

HDD is proposed for the shore crossings at the Tasmanian and Victorian coasts. This method minimises impacts on coastal reserves, beach and shallow marine areas, and high value coastal foreshore. The length of each HDD is limited by how far the cables can be pulled through the installed duct without damage, which is up to approximately one km.

In Victoria, HDD is proposed for the shore crossing to the land-sea joint to avoid impacts on Waratah Bay–Shallow Inlet Coastal Reserve. This would see drill rigs install ducts well below the surface, under the coastal dune system, beach and near shore seabed, to approximately 800 m offshore (see Figure 8-8).

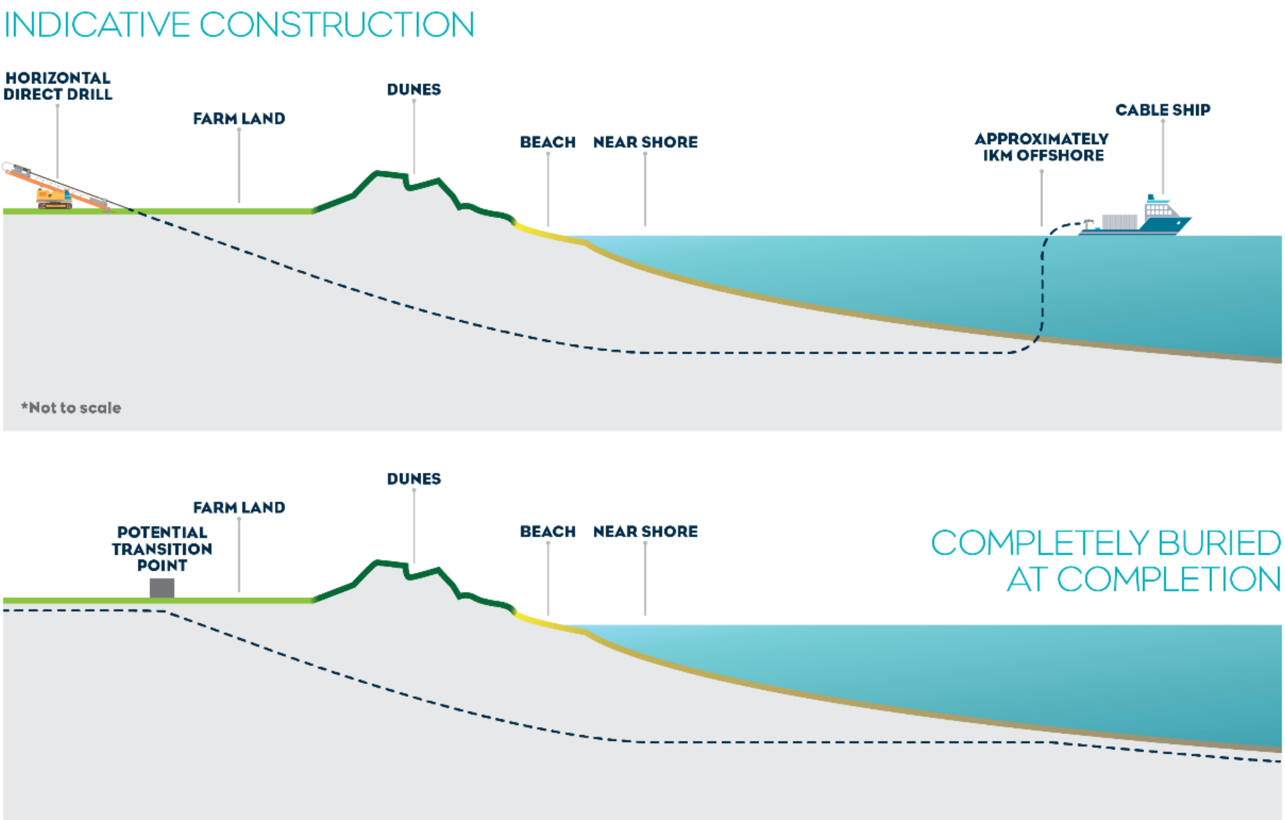


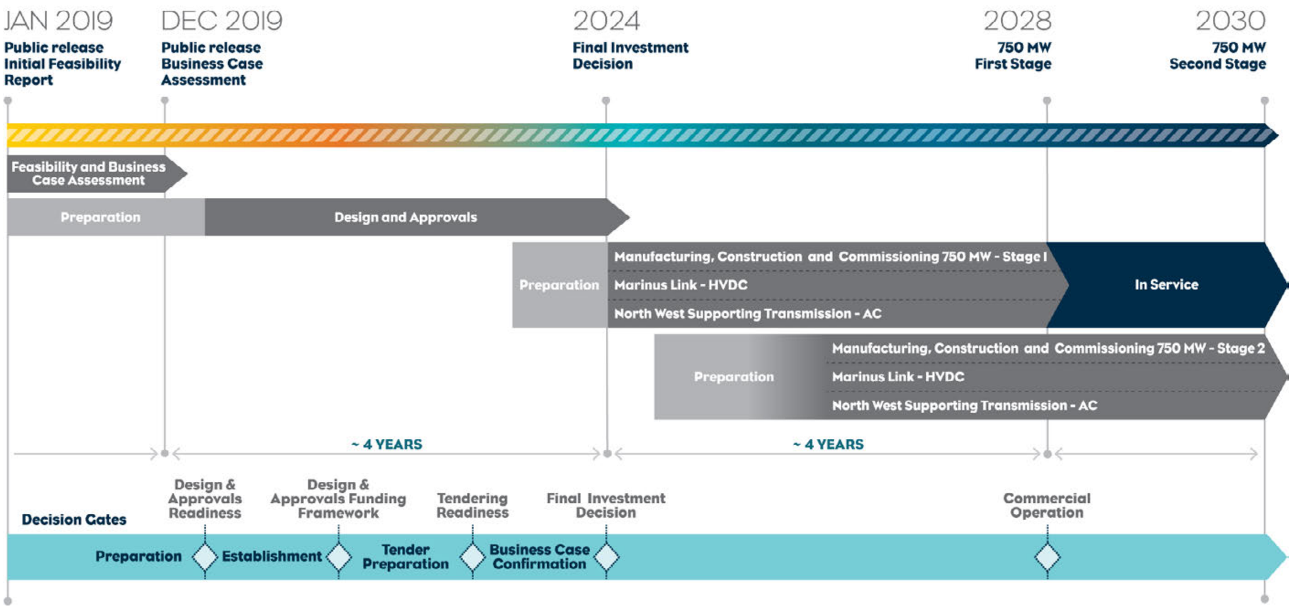
Figure 8-8 Indicative Victorian shore crossing showing proposed horizontal directional drilling installation

In Tasmania, no land-sea joint is proposed. HDD would allow the HVDC subsea cables to be brought directly to the converter stations. Ducts would be installed from the converter station site underneath the Bass Highway, adjacent rail line, beach and near shore seabed to approximately 800 m offshore.

Where trenching is proposed, vegetation such as native plants, crops and pasture within the easement will be cleared. After construction, disturbed areas will be remediated in consultation with landowners. Remediation measures must consider protection of the easement and cables, such as from the root systems of large trees.

9. Proposed timeline

The proposed 1500 MW capacity of Marinus Link is planned to be built in two 750 MW stages, commissioned two to three years apart. A number of activities must be completed before a Final Investment Decision is made, and manufacturing and construction commences. Marinus Link is currently in the Design and Approvals phase, with a range of activities underway.



It is important to note that progress to the Design and Approval phase enables Marinus Link to proceed in accordance with timeframes envisaged in the 2020 ISP, with the first 750 MW stage in service as early as 2027. Whilst it is prudent to progress the project in this way, this timing does not pre-empt the outcomes of forthcoming consultation, regulatory and commercial processes.

During the Design and Approvals phase we:

- develop plans outlining how the existing transmission networks and potential new transmission routes will be developed to increase network capacity and ensure the power system can accommodate future energy developments proposed for the region
- undertake economic and regulatory analysis of the project

- engage with landowners and the community to gather feedback that helps to further refine or confirm sectors of the proposed new and upgraded transmission corridors through online briefing and, meetings, local community meetings, webinars and pre-arranged face-to-face sessions
- conduct a range of field surveys including cultural heritage, ecological and geotechnical surveys.

Marinus Link will only progress to equipment manufacturing and construction once necessary approvals, funding and pricing arrangements are in place, following rigorous economic assessment, and completion of land use planning and environmental approvals processes at local, state and national levels. We aim to reach a Final Investment Decision in 2023-2024, with manufacturing and construction to commence shortly after that decision is made.

10. Next steps

Your feedback

We recognise the need to provide many avenues to engage with the Marinus Link team on the project and the proposed route. Marinus Link will continue to host a range of community engagement activities to provide more information on the proposed route and answer questions. Where possible, we will host in-person briefing and information sessions throughout the Gippsland region and North West Tasmania.

Feedback from landowners, stakeholders, communities, businesses and regulators is essential to improve our understanding of necessary refinements to the proposed route as we work to address concerns. The proposed route is also subject to environmental, cultural heritage, socio-economic and geotechnical studies. All feedback is carefully considered, and these activities provide essential information which helps inform our project design and construction considerations, reduce impacts, and inform the environmental, cultural and socioeconomic impact assessments.

Formal opportunities to make submissions will be available through the regulatory environmental, land use planning and cultural heritage impact assessment and approvals processes, which will ultimately lead to the development of the final route. Marinus Link will continue to keep landowners, the community and stakeholders updated as these opportunities arise.

For the latest information and opportunities to provide input, and to register for email updates, visit https://engage.marinuslink.com.au.

Further information

We invite you to contact us with any questions about the proposed developments via our website, email, phone line or social media.

visit marinuslink.com.au
email team@marinuslink.com.au
call 1300 765 275

We remain committed to working closely with landowners, community, businesses, stakeholders and regulators as planning continues for the project.

References

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AEMO (Australian Energy Market Operator) , *2020 Integrated System Plan*, *For the National Electricity Market*, July 2020.

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TasNetworks, *Project Marinus Business Case Assessment Report*, 2019.

TasNetworks, Project Marinus Initial Feasibility Report, 2019.

SeaMap Australia(https://seamapaustralia.org/).

Appendix A Route and site selection constraints

Back to Section 4.1

Category	Constraint
Very high	World Heritage Areas*
	National, marine and coastal parks declared under Tasmanian, Commonwealth and Victorian legislation
	Threatened (critically endangered) species listed under Tasmanian, Commonwealth and Victorian legislation
	Residential, township and village-zoned land**
	Cemeteries and crematoriums***
High	Conservation areas and reserves declared under Tasmanian, Commonwealth and Victorian legislation
	Threatened (endangered and vulnerable) species listed under Tasmanian, Commonwealth and Victorian legislation
	Threatened native vegetation and ecological communities listed under Tasmanian, Commonwealth and Victorian legislation
	Nationally important wetlands and Ramsar wetlands
	Registered historic cultural heritage properties and places
	Registered maritime archaeology sites (shipwrecks, etc.)
	Registered Aboriginal cultural heritage places and sensitivity areas
	Planning scheme zones, overlays and land use including: - coastal inundation area - commercial development - environmental management (contamination) - landslide hazard area - land subject to inundation - operational airspace and airport environments - public conservation and resource area

Category	Constraint
	- public park and recreation area - priority habitat - salinity management area - significant landscape - scenic landscapes, roads and management areas - tree preservation and significant vegetation - urban growth - significant agricultural land
	Airstrips and runways
	Intensive agriculture including animal husbandry and vineyards
	Mining leases
	Onshore and offshore oil and gas production leases
	Properties less than 0.4 ha
	Houses****
	Aquaculture sites
	Defence training areas
	Institute for Marine and Antarctic Studies scallop survey sites
	Marine hazard areas
	Marine critical habitat sites
	Australian fur seal colonies
	Little penguin biologically important areas
	Sponge garden sites
	Anchorages
	Igneous rock, karst limestone and alluvial/swamp deposits
Moderate	Unreserved Crown land
	Waterbodies
	Threatened (near threatened and rare) species listed under Victorian legislation

Category	Constraint
	Threatened (depleted or rare) ecological communities listed under Victorian legislation
	Seagrass beds or meadows
	Little penguin biologically important areas (foraging)
	Waterbodies
	Planning scheme zones, overlays and land use including: - bushfire management - low density residential - rural living and rural growth - cropping and irrigated grazing and plantations - manufacturing uses - special uses
	Community facilities
	Properties between 0.4 ha and 2 ha
	Actual and potential coastal acid sulphate soil sites
	Submerged reef
	Port boundaries
	Metamorphic rock
Low	Native vegetation not listed for protection
	Planning scheme zones overlays and land use including: - industrial areas - electricity transmission infrastructure sites - farming land - green wedge land - roads
	Mineral and petroleum exploration licences and permits
	Sedimentary rock

* Existing transmission lines traverse these areas and reserves; re-use of existing easements and widening of existing corridors is not excluded.

** Existing electricity network assets traverse these areas; re-use of existing easements and widening of existing corridors is not excluded, nor is creation of a suitable corridor through these areas to connect new assets to existing transmission assets.

*** Cemeteries can be overflown by overhead transmission lines. Underground cables are unlikely to be appropriate.

**** As defined by building point or house point in applicable datasets. Proximity to houses, schools and other sensitive occupancies was verified by interrogation of satellite imagery and ground-truthing.

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Appendix B Prudent and feasible route corridors

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Corridor	Reason
Port Latta to Portland (Far north west coastal Tasmania to far south west coastal Victoria)	o Port Latta is closest to Tasmania's North West REZ and proposed Robbins Island and Jim's Plain Renewable Energy Parks. o Port Latta is the preferred connection point in this area, rather than Smithton, due to the long radial connection required to support Smithton Substation. o Portland is close to South Australia, and could provide better interregional trading.
Port Latta to East Geelong (Far north west coastal Tasmania to south west coastal Victoria near Geelong)	o Port Latta is closest to Tasmania's North West REZ and proposed Robbins Island and Jim's Plain Renewable Energy Parks. o East Geelong is adjacent to the Greater Geelong and western Melbourne demand centres.
Burnie to East Geelong (Coastal North West Tasmania to south west coastal Victoria near Geelong)	o Burnie is connected via 220 kV overhead transmission lines (**OHTL**) to Sheffield and close to the North West Tasmania REZ. TasNetworks 2019 Annual Planning Report identified a need to strengthen the North West Tasmania transmission network to support the connection of renewable generation and Marinus Link. Strategic planning recommends creating a 220 kV 'rectangle' connecting the existing Sheffield and Burnie substations with new substations at Staverton and Hampshire Hills. The rectangle will support connection of proposed wind and pumped hydro storage projects.

Corridor	Reason
	o East Geelong is adjacent to the Greater Geelong and western Melbourne demand centres.
Burnie to Moorabool (Coastal North West Tasmania to south west coastal Victoria, inland and west of Geelong)	o Burnie Substation is part of the planned augmentation of Tasmania's North West transmission network to create a 220 kV rectangle to support connection of proposed renewable generation and Marinus Link. o Moorabool Terminal Station is located on the 500 kV grid backbone, close to the Greater Geelong and western Melbourne demand centres but is becoming constrained with solar and wind development in western, north western and south western Victoria.
Burnie to Hazelwood (Coastal North West Tasmania to inland east of Melbourne in Victoria's Latrobe Valley)	o Burnie Substation is part of the planned augmentation of Tasmania's North West transmission network, to create a 220 kV rectangle supporting the connection between Marinus Link and proposed renewable generation sources. o Hazelwood Terminal Station is one of the strongest nodes in the Victorian transmission network. o The 500 kV OHTLs from Hazelwood Terminal Station to Melbourne have 11,000 MW thermal rating and a secure transfer capacity of 8,250 MW. The retirement and closure of Hazelwood Power Station has freed 1,600 MW of capacity on these OHTLs. o Future retirement of Yallourn Power Station will free further capacity between the Latrobe Valley and Melbourne.

Corridor	Reason
Burnie or Sheffield to Cranbourne (Coastal North West Tasmania or inland North West Tasmania, to inland south east of Melbourne)	o Sheffield is the strongest node in the Tasmanian grid backbone. It is close to Tasmania's North East Tasmania REZ and Tasmania Midlands REZ and in the North West Tasmania REZ. o Cranbourne was considered electrically unconstrained and close to areas of demand in south eastern Melbourne and the Mornington Peninsula, however this area was considered highly constrained by urban development in the Casey-Cardinia corridor, with significantly higher land values and lack of availability o the corridor from Kilcunda (near Wonthaggi, south east of Melbourne) was also considered highly constrained due to existing infrastructure, small landholdings, the Koo Wee Rup swamp drains and associated ecological values, and asparagus growing areas around Koo Wee Rup
Burnie or Sheffield to Hazelwood (Coastal North West Tasmania or inland North West Tasmania, to inland east of Melbourne in Victoria's Latrobe Valley)	o Sheffield is the strongest node in the Tasmanian grid backbone. o Sheffield is close to the North East Tasmania REZ, Tasmania Midlands REZ and in the North West Tasmania REZ. o Hazelwood Terminal Station is one of the strongest nodes in the Victorian transmission network. o The 500 kV OHTLs from Hazelwood Terminal Station to Melbourne have 11,000 MW thermal capacity and 8,250 MW of secure transfer capacity. The retirement and closure of Hazelwood Power Station has freed 1,600 MW of capacity on these OHTLs.

Corridor	Reason
	o Future retirement of Yallourn Power Station will free further capacity between the Latrobe Valley and Melbourne. o Onshore and offshore wind developments in the Gippsland REZ have potential for at least 2,000 MW of generation, with connection at Hazelwood or Loy Yang most likely.
Burnie or Sheffield to Tyabb (Coastal North West Tasmania or inland North West Tasmania, to coastal Victoria south east of Melbourne)	o Tyabb presented a strong option as a close and major connection point, which could be achieved by connection through to Cranbourne Terminal Station o Sheffield is the strongest node in the Tasmanian grid backbone. o Sheffield and Burnie are within Tasmania's North West REZ o Sheffield is also close to the North East and Midlands REZs o Augmentation of the transmission network between Burnie and Sheffield could reduce the length of HVDC land cables required, and optimise expenditure by augmenting the HVAC grid to support energy transport from proposed renewable generation and storage projects in the North West REZ.

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Appendix C Route and site selection criteria

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Criterion	Considerations
Cost	o capital expenditure (construction costs) o optimise overall route length and trade-off between onshore and offshore o operating expenditure (maintenance and transmission energy loss costs)
Available land for converter stations	o sufficient space for facilities and potential buffers o stable landforms o suitable terrain, geology and geotechnical conditions o good access
Onshore (and landfall) constructability	o ease of access o disruption to existing access, services and businesses o potential for relocation of existing services o workspace including stringing for horizontal directional drills or horizontal bores o potential for contaminated land o potential for UXO o landform, geology and soil conditions including exposure to hard and/or fractured strata, and slope failure o watercourse crossings o geotechnical considerations o sea level rise and other impacts of climate change or extreme weather events (such as flood, bushfire, heat)
Offshore constructability	o nearshore water depth

Criterion	Considerations
	o nearshore littoral currents (and drift) o velocity of currents o subsea infrastructure crossings o potential for shipwrecks and other obstructions o potential for UXO o disruption to existing access, services and businesses o constraints on port operation (channels and anchorages) o seabed conditions (exposure to hard and/or fractured strata) o seabed mobility (sand-waves or other mobile bed-forms)
Third party interference	o exposure to dragged anchors o exposure to excavation or deep ripping o exposure to piling or other intrusive activities
Avoid incompatible land/seabed uses	o anchorages o ammunition disposal grounds o cemeteries and crematoriums o Defence training areas o ship graveyards o shipping lanes o fishing activities that impact the seabed (trawling, scallop dredging)
Avoid or minimise other subsea infrastructure crossings	o submarine telecommunication cables o subsea electricity interconnectors o subsea oil and gas pipelines o outfall pipelines
Avoid co-location with incompatible linear infrastructure	o such as steel pipelines, fences and other metallic structures parallel to the interconnector which increase potential for induced current in steel

Criterion	Considerations
	infrastructure and fault current affecting the steel infrastructure
Transmission network security	o geographic diversity to avoid single contingency events
Capacity to facilitate renewable generation connections	o Connection point proximity to wind, solar and pumped hydro storage projects
Expansion potential	o capacity to accommodate future interconnectors
Opportunity for third party benefit / contribution	o proximity to renewable energy zones
Land/sea tenure	o freehold, Crown land, reserves o land holdings (small private and commercial properties)
Occupation	o proximity to houses or sensitive businesses (noise from converter station sites, amenity impacts)
Planning (zones and overlays)	o zones, including residential, rural, agriculture, transport/access routes, etc. o overlays (as applicable) including environmental significance, significant landscapes, erosion management, landslip hazard and contaminated land
Land Use	o intensively farmed land with substantial infrastructure including berry farms, piggeries, poultry farms, vineyards, etc.
Native vegetation	o TASVEG (digital map of Tasmania's vegetation) o EVC (digital map of Victorian ecological communities)

Criterion	Considerations
Threatened ecological communities	o native vegetation communities listed under Tasmanian, Commonwealth and Victorian legislation
Threatened species	o records of threatened terrestrial, aquatic and marine flora and fauna species listed under Tasmanian, Commonwealth and Victorian legislation
Sensitive ecosystems	o seagrass beds and meadows o wader and migratory species foraging and nesting habitat o wetlands/groundwater dependent ecosystems
Registered historical cultural heritage properties and places	o historical cultural heritage sites listed under Tasmanian, Commonwealth and Victorian legislation
Registered Aboriginal cultural heritage places and sensitivity areas	o Aboriginal cultural heritage sites listed under Tasmanian, Victorian and Commonwealth legislation o areas mapped as having high potential for Aboriginal cultural heritage o Native title
Marine archaeology (shipwrecks)	o shipwrecks listed under Tasmanian, Victorian and Commonwealth legislation
Fisheries	o aquaculture sites o Institute for Marine and Antarctic Studies scallop survey sites
Disposal site/potential contamination	o ammunition disposal grounds o ship graveyards o outfall pipeline deposits

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Appendix D Prudent and feasible landfalls

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Connection point	Landfall
Port Latta Substation (TAS)	- Peggs Beach in Sawyer Bay, west of Port Latta - Anthony Beach in Perkins Bay, west of Stanley
Burnie Substation (TAS)	- Heybridge east of Burnie - Cooee Beach west of Burnie - Cam River heads west of Burnie
Sheffield Substation (TAS)	- Leith Point between Turners Beach and Lillico
Portland Substation (VIC)	- Grant Bay between Point Danger and Cape Sir William Grant
East Geelong future substation and Moorabool Terminal Station (VIC)	- Black Rock Road adjacent to Barwon Water's Black Rock wastewater treatment facility at Breamlea - Thirteenth Beach east of Barwon Water's Black Rock wastewater treatment facility
Cranbourne Terminal Station (VIC)	- Sandy Waterhole west of Kilcunda - Kilcunda adjacent to the Bass Gas Pipeline landfall
Hazelwood* Terminal Station (VIC)	- Waratah Bay between Sandy Point and Waratah Bay

*Hazelwood is the closest node to the coast in Gippsland when considered in a regional context.

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Appendix E Potential converter station sites

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Corridor	Converter station site
Port Latta to Portland	Mawbanna Plain, south west of Port Latta Madeira Packet Road west of Alcoa Portland aluminium smelter
Port Latta to East Geelong	Mawbanna Plain, south west of Port Latta Sparrovale Road, Charlemont and AusNet Services proposed substation site at St Albans Park
Burnie to East Geelong	Heybridge Sparrovale Road, Charlemont and AusNet Services proposed substation site at St Albans Park
Burnie to Moorabool	Heybridge and East Cam Adjacent to Moorabool Terminal Station
Burnie to Hazelwood	Heybridge and East Cam Adjacent to Hazelwood Terminal Station and south west of Driffield
Sheffield to Cranbourne	Adjacent to Sheffield Substation Pakenham South
Sheffield to Hazelwood	Adjacent to Sheffield Substation Adjacent to Hazelwood Terminal Station and south west of Driffield

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Appendix F Comparison of prudent and feasible routes

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Relative to other routes in the evaluation: Red = highly constrained Orange = moderately constrained; or Green = least constrained **Criterion**	Port Latta–Portland	Port Latta–East Geelong	Burnie–East Geelong	Burnie–Moorabool	Burnie–Hazelwood	Sheffield–Cranbourne	Sheffield–Hazelwood
Length (km)	446	321	359	391	346	395	376
Cost*							
Availability of land for converter stations							
Onshore (and landfall) constructability - Tas							
Onshore (and landfall) constructability - Vic							
Offshore constructability							
Third-party interference							
Incompatible land/seabed uses							
Subsea infrastructure crossings							
Co-location with incompatible linear infrastructure							
Transmission network security and capacity**							
Capacity to facilitate renewable generation connections							
Expansion potential							
Opportunity for third party benefit/contribution							
Land tenure***							
Occupation							
Planning (zones and overlays)							
High quality agricultural land							
Native vegetation							
Threatened ecological communities							

Relative to other routes in the evaluation: Red = highly constrained Orange = moderately constrained; or Green = least constrained **Criterion**	**Port Latta–Portland**	**Port Latta–East Geelong**	**Burnie–East Geelong**	**Burnie–Moorabool**	**Burnie–Hazelwood**	**Sheffield–Cranbourne**	**Sheffield–Hazelwood**
Threatened species							
Sensitive ecosystems							
Registered historical cultural heritage properties and places							
Registered Aboriginal cultural heritage places and sensitivity areas							
Maritime archaeology (shipwrecks)							
Fisheries							
Disposal sites/potential contamination							

*Cost estimates as at the time of the assessment

**At the time of the evaluation, capacity was available in the Moorabool to Heywood 500 kV OHTL

** Includes costs associated with higher number of landholdings or higher land values

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Appendix G Review and refinements of the Burnie to Hazelwood area conceptual route (local detail)

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Skip to Bass Strait

Skip to Tasmania

Victoria

Possible alternative route variations were considered during review and refinement of the conceptual route, such as alternative routes across the Strzelecki Ranges, which are the major topographic feature between Waratah Bay and Hazelwood in the Latrobe Valley. Variations which followed the Tarwin River Valley further upstream before crossing the ranges were investigated. While this variation initially suggested favorable terrain, narrow/single lane roads, adjacent houses and farm infrastructure, and steep terrain adjacent to roads crossing the ranges, resulted in these options being more constrained than the proposed route. The need for road closures and traffic and business disruption to construct on those routes were further reasons these options were discounted.

The use of underground technology for Marinus Link means that terrain and topographic features are significant factors in route selection and refinement. The Hoddle and Strzelecki Ranges pose significant constraints to route selection due to deep valleys and steep slopes. The geology (weathered volcanic overlying sedimentary rock) results in zones of instability along the southern and northern slopes of the Strzelecki Ranges and in places on the plateau at the interface between the zones. This instability has resulted in slumping and landslides, posing risks to land cables. As the Strzelecki Ranges extend from near Grantville to near Gormandale in two major sections, the shortest and least constrained crossing is desirable. The shortest crossing is between Dumbalk in the Tarwin River East Branch Valley and Mirboo North on the Grand Ridge.

The least constrained terrain is between Waratah Bay and the southern end of the Hoddle Range, Tarwin River Valley, Tarwin River East Branch Valley, the plateau that extends north from Mardan to Mirboo North, and the broad ridge along which the Strzelecki Highway runs into the Latrobe Valley. The conceptual route traverses these features. To enter the Tarwin River Valley, the conceptual route runs north west from Waratah Bay between Cape Liptrap Coastal Park and the southern end of the Hoddle Range. The Great Southern Rail Trail runs north to south in Tarwin River Valley. Locating Marinus Link infrastructure adjacent to the rail reserve reduces impacts on farmland.

North of South Gippsland Highway, two options were investigated – the conceptual route and an alternative route (see Figure 7-1). The alternative route runs along the eastern side of Tarwin River (East Branch) Valley to Dumbalk North where it turns north to Mirboo and Limonite. At Limonite the route continues north to Boolarra–Mirboo North Road before descending the Grand Ridge along ridges through farmland and plantations to Darlimurla, where it joins the conceptual route. The alternative route is highly constrained from Mirboo to Boolarra–Mirboo North Road, particularly from Limonite to Boolarra–Mirboo North Road where the route runs in Old Foster Road. The road is on top of a narrow steep-sided ridge leaving no opportunity to locate the route on either side. Constructing the route in this section may require extended road closures. For these reasons, the alternative route was discounted from further investigation.

The southern slopes of the Strzelecki Ranges near Dumbalk are challenging. The conceptual route follows Loves Lane up the ranges to the plateau. The engineering review concluded this was not feasible given the significant disruption to traffic, farm access, and shallow rock visible in road batters in the northern section of the road. Alternative routes up the Ranges to the east and west were investigated. An alternative route via Campbells Road was identified and assessed (see Figure 7-1). The Campbells Road route involved traversing a very steep ridge from Tarwin River East Branch Valley to and along Campbells Road to Meeniyan–Mirboo North Road. This alternative route was assessed as more difficult than the conceptual route from a constructability perspective and discounted from further investigation. The conceptual route was revised in this section to run up the ridge west of Loves Lane and then either side of Loves Lane to H Wallers Road. North of H Wallers Road, the conceptual route was revised to follow the steep ridge adjacent to Loves Lane to the top of the plateau, a relatively short section compared to the Campbells Road alternative.

North of Berrys Creek, the conceptual route crosses an area mapped as erosion management overlay in the South Gippsland Planning Scheme. Geomorphic assessment confirmed this area was susceptible to slumping and/or slope failure and would be wisely avoided. The conceptual route was revised to run south of Berrys Creek, east up its valley before crossing the valley and watercourse in the stable area near the end of Fullertons Road (see Figure 8-1).

Old Darlimurla Road and Darlimurla Road despite offering feasible routes, are highly constrained due to the significant traffic disruption required to lay cables under the road carriageways. Alternative routes around these 'pinch points' were investigated. The terrace below and east of Old Darlimurla Road is a feasible route around this pinch point. An alternative route across Little Morwell River was identified approximately 700 m downstream of Darlimurla (see Figure 7-1).

The conceptual route follows the Hazelwood to Cranbourne 500 kV OHTLs across Morwell River. The crossing is in a wide part of the floodplain, which would result in joints pits being placed in land subject to inundation. The crossing was moved north to the narrowest part of the floodplain ensuring adjacent joint pits are on high ground above the 1-in-100-year flood level. Moving the conceptual route north required revising the route between the Morwell River crossing and Frasers Road, Churchill where the revised route joins and follows the transmission lines to Hazelwood Terminal Station. An option of connecting into the 500 kV overhead transmission lines slightly west of Hazelwood is also being considered.

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Bass Strait

The proximity of the Burnie to Hazelwood route with its two Tasmanian landfall options (Cam River heads/East Cam and Blythe River mouth/Heybridge) and Sheffield (Leith Point) to Hazelwood route prompted investigation of a more efficient arrangement to avoid closely spaced offshore routes. Aligning the offshore routes and adopting a line of longitude will benefit navigation in Bass Strait and reduce impacts if future interconnectors were developed from East Cam or Sheffield.

Burnie to Hazelwood and Sheffield to Hazelwood routes were aligned to longitude 146°05' from a point approximately 28 km off the Tasmanian coast to a point off Wilsons Promontory (in the vicinity of Tongue Point), where they deviate slightly to the Waratah Bay landfall. Offshore of the Tasmanian coast, the routes splay to run to their respective landfalls effectively creating a trident arrangement.

The Bass Strait route was refined at the Tasmanian and Victorian coasts to avoid seabed features including low profile reef and sea mounts identified in the marine geophysical reconnaissance survey and to take advantage of the palaeochannels at the Tasmanian coast.

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Tasmania

The proposed Heybridge converter station site is on the former Tioxide plant site neighboring the Bass Highway, which is separated from the Tasmanian coast by a narrow strip of coastal land. The coastal land is partly protected by an informal reserve extending from Blythe River mouth to the rail crossing opposite the former Tioxide plant site. Two paleochannels extend from the coast to deeper water offering feasible nearshore routes. The disused former Tioxide plant outfall pipeline is in the western channel.

Engineering advice indicates the Bass Highway and coastal land can be crossed using HDD with the exit holes in either paleochannel. The route was revised to run from the nearshore palaeochannels, directly into the Heybridge site. Planned geotechnical investigations and detailed benthic habitat surveys will confirm the least constrained option for the shore crossing.

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