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MARINUS LINK

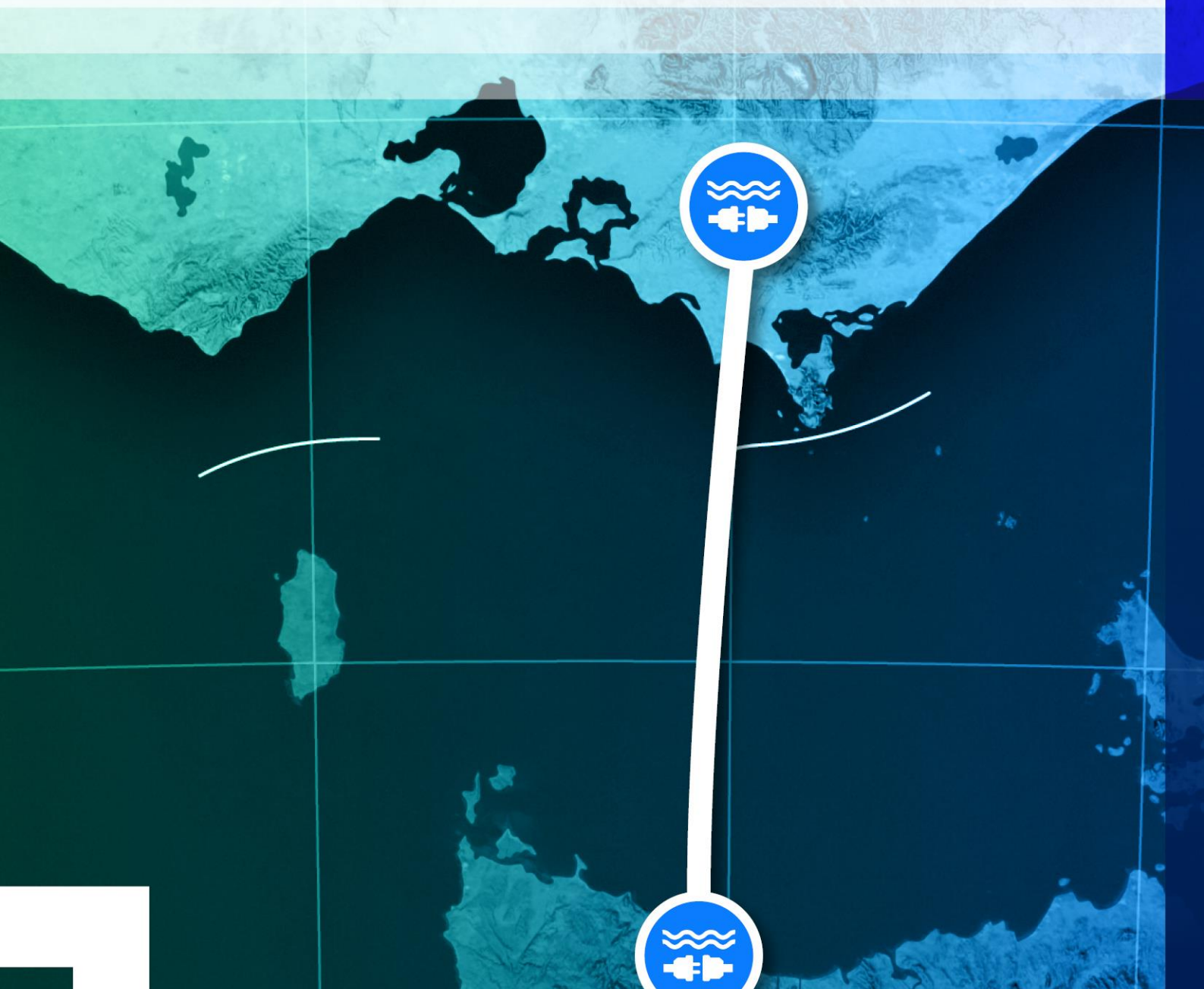
Project Marinus

Cost Estimate Report

IS360304-SO04-ZM-RPT-0006| 5

June 28, 2021

TasNetworks



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Contents

Glossary

Term	Definition
AACEI	Association for the Advancement of Cost Engineering International
Accuracy	Reflection of the maturity of the project scope, calculated on the Base Estimate, which includes growth, but excludes contingency, owner's costs and escalation. Generally the higher level of scope definition and more certainty of costing data, the more accurate is the estimate.
AEMO	Australian Energy Market Operator; an independent organisation responsible for national electricity transmission planning.
Base Date	The date which the estimate is based on in terms of prices and market conditions.
Basis of Design	Design framework for the cost estimates outlining: ▪ Data inputs forming the basis for preparation of site inventories ▪ Scope and battery limits for each cost component ▪ Key criteria, parameters and assumptions.
Base Estimate	It is the sum of Neat Estimate and Growth Allowances. This does not include contingency nor escalation.
CAPEX	Capital Cost Expenditure
Central Estimate [P50]	P50 is a common level to determine contingency and represents the point at which there is a 50% probability of over-running or under-running the cost.
Closure	The phase of the Project during which the facilities are shutdown, made safe and stable and may include the demolition and rehabilitation.
Commissioning	The intensive and critical efforts of bringing the interconnector into service after pre-commissioning approvals. The commissioning activities require a dedicated crew based at each end from initial energisation of valves through to build up of power transfer.
Contingency	A specific cost provision in the cost estimate over and above Growth Allowances to cover for unforeseeable items of work [the unknown] that may have to be performed or elements of cost which will have to be incurred within the defined project scope of work but that cannot be explicitly foreseen or adequately described at the time the estimate is being prepared because of lack of complete, accurate and detailed information.
D&C	Design & Construct; D&C Contract with warranty that the works will be fit for the Principal's intended purpose
Decommissioning	The process that begins near, or at, the cessation of facility life and ends with removal of all unwanted infrastructure and services.
Deterministic Contingency	This is the traditional method wherein Contingency is derived by considering uncertainty for each work package, facility, major commodity, overall project or a combination thereof.
Direct Costs	Direct costs are those that are directly attributable to the closure of specific facilities of the plant or associated infrastructure and rehabilitation and revegetation of existing landforms. These include all associated labour, equipment and material costs together with associated contractor distributable costs and provisional sums.
Escalation	A cost provision in the Estimate to cover for the forecast increase in the costs such as engineering, commodities and sub-contracts etc from the estimate base date, up to the completion of the project.
HDD	Horizontal Directional Drilling
HVAC	High Voltage Alternating Current; power transmission between the Victoria and Tasmania Converter Stations and the respective local grid networks.
HVDC	High Voltage Direct Current; power transmission between Converter Stations in Victoria and Tasmania
IDC	Interest During Construction
Indirect Costs	Indirect costs include temporary facilities and services, insurances, management services, site accommodation, travel, mobilisation and demobilisation, and consumables associated with Direct Costs.
JMME	The Project Team of Jacobs Group [Australia] Pty Limited, Mott MacDonald Group Ltd, Elia Grid International that operates to support the Project via the TasNetworks Technical, Engineering and Project Management Umbrella Contracts.
Labour Rates	The hourly cost of labour to the contractor, inclusive of wages, salaries and allowances.

Term	Definition
Management Reserve	Management Reserve is used to provide for cost impacts that are not included in the Overall Estimate but have the potential to impact the financial outcome. This may include specific limitations within the scope of work that result in changes of scope within the general production and operating parameters outside the detailed scope of work defined by the current Project Definition (e.g. Voltage, Power and changes to materials of construction).
NWTD	North West Transmission Developments
OEM	Original Equipment Manufacturer
OPEX	Operating Cost Expenditure
Probabilistic Contingency	Also known as capex range analysis, this uses Monte Carlo simulation to derive Contingency. For large projects [typically >$100 million], most clients insist on the probabilistic method for deriving Contingency. Under probabilistic method, Contingency is derived based on the difference between a P value as directed by the client and the Base Estimate [i.e. Neat + Growth Allowances]. Generally, using the "Mean" value to derive Contingency.
Project Marinus	• a 1500 MW transmission High Voltage Direct Current (HVDC) undersea and land-based interconnector, to be built in two 750 MW stages currently known as 'Stage 1' and 'Stage 2', (Marinus Link); and • • the supporting transmission High Voltage Alternating Current (HVAC) network developments in North West Tasmania named North West Transmission Developments (NWTD) required to support Marinus Link interconnector flows
Rehabilitation	The return of disturbed land to a safe, stable, non-polluting/ non-contaminating landform.
RFSU	Ready for Start Up; the operational condition during Commissioning that affected parties authorise.
RIT-T	Regulatory investment test for transmission
VSC	Voltage Source Converter; includes power electronic valves, control suite, valve cooling , auxiliary systems and external power plant
WBS	The Work Breakdown Structure is used as the basis to develop the estimate in sufficient detail and to provide the basis for development and use in project execution.

Important note about your report

The sole purpose of this report and the associated services performed by JMME is to present the results of the capital cost estimate for Project Marinus in accordance with the scope of services set out in contract IS360304 Service Order #04 dated 22 December 2020 between JMME and the Client. That scope of services, as described in this report, was developed with the Client.

In preparing this report, Jacobs understands that its use is by TasNetworks in support of the Regulatory investment test for transmission (RIT-T) and that sections of this Report may be used by TasNetworks to form a Report issued under their name. The information contained in this Report precis the Jacobs Basis of Estimate Report[1] and does not alter its quantitive or qualitative data and statements.

Information available in the public domain at the time or times outlined in this Report has been considered and JMME cannot – either explicitly nor implicitly – make any recommendation or endorsement regarding the viability or otherwise of such data. The passage of time, manifestation of latent conditions or impacts of future events may require further examination of the project and subsequent data analysis, and re-evaluation of the data, findings, observations and conclusions expressed in this Report. JMME has prepared this Report in accordance with the usual care and thoroughness of the consulting profession, for the sole purpose described above and by reference to applicable standards, guidelines, procedures and practices at the date of issue for this report. However, no other warranty or guarantee, whether expressed or implied, is made as to the data, observations and findings expressed in this report, to the extent permitted by law.

This report should be read in full and no excerpts are to be taken as representative of the findings. No responsibility is accepted by JMME for use of any part of this report in any other context.

This report has been prepared on behalf of and for the exclusive use of TasNetworks and is subject to, and issued in accordance with, the provisions of the contract between Jacob's and TasNetworks. Jacobs's accepts no liability or responsibility whatsoever for, or in respect of, any use of, or reliance upon, this report by any third party.

BASIS OF ESTIMATE – COVID-19 IMPACT

Our estimate has been prepared on the basis of normal economic and industry circumstances. The full impact of COVID-19 is unknown at this stage and is a developing situation. Our estimate makes no provision for the impacts of COVID-19 virus and we advise that an impact on the estimate is possible.

[1] Jacobs Basis of Estimate Report IS360304-S004-ZM-RPT-0002_0, Issued 19 May 2021

1. INTRODUCTION

1.1 Jacobs commission

TasNetworks engaged Jacobs under a Technical, Engineering and Project Management Service Agreement to prepare estimates of cost for Project Marinus in the Australian states of Tasmania and Victoria. Jacobs worked with Mott MacDonald and Elia Grid International as sub-contractors under the title JMME.

Section 4 of this Report summarises the outcomes of JMME's estimate of capital cost and its commentary on the operating costs.

The estimated cost is aligned to the Base Case scope as defined within Section 1.2 of this Report, inclusive of Project Marinus Common Phase, Stage 1 and Stage 2, where each Stage has a transfer design capacity of 750MW across the Bass Strait between the two states.

As the Project will likely be developed by two separate entities, the capital costs have been prepared for the stakeholders in two accounts: Marinus Link (primarily the HVDC facilities) and North West Transmission Development (NWTD - the HVAC supporting transmission integration facilities to the Tasmanian grid network).

1.2 Introduction to the Base Case

TasNetworks is progressing the economic case for and development of a further Bass Strait electricity transmission interconnection that will link Tasmania's renewable energy generation and storage resources to Victoria, as part of Australia's future electricity grid.

TasNetworks proposes to deliver this project, titled Project Marinus, in two separate but interdependent scopes of work:

- a 1500 MW transmission High Voltage Direct Current (HVDC) undersea and land-based interconnector, to be built in two 750 MW stages currently known as 'Stage 1' and 'Stage 2', (Marinus Link); and
- the supporting transmission High Voltage Alternating Current (HVAC) network developments in North West Tasmania named North West Transmission Developments (NWTD) required to support Marinus Link interconnector flows

Marinus Link and NWTD have discrete areas of scope, common aspects and a number of key interdependencies.

MARINUS LINK

Marinus Link is a proposed undersea and underground electricity interconnector with associated converter stations to further link Tasmania and Victoria as part of Australia's future electricity grid. The project straddles two States, Tasmania and Victoria, and Commonwealth waters (Bass Strait) between them.

Marinus Link scope is depicted in Figure 1

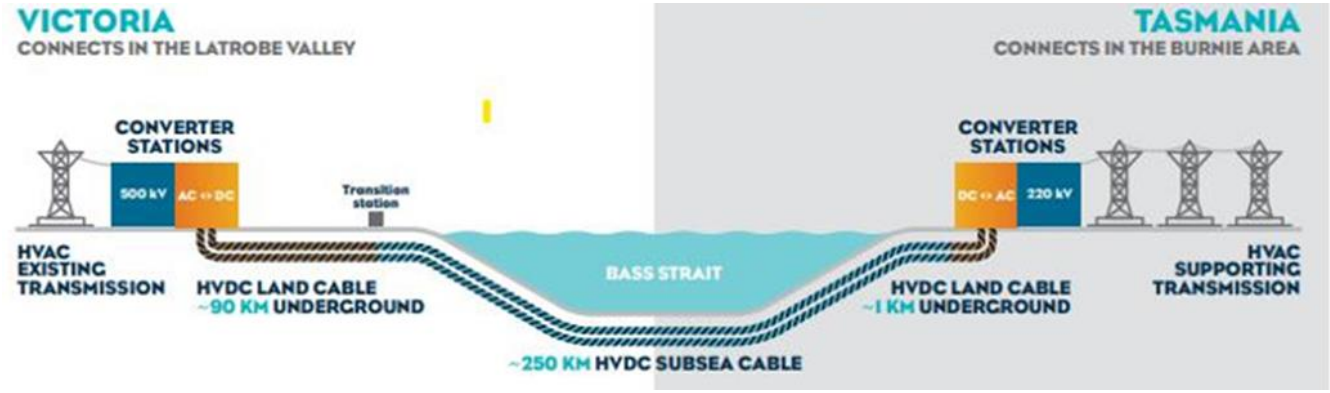

Figure 1 Marinus Link Scope

Marinus Link scope is summarised as follows:

- Submarine cable supply and installation (incl. landfall Horizontal Directional Drilling (HDDs)) in Tasmania and Victoria.
- Land cable design, supply and installation in Victoria only
- Land cable civil works (incl. land HDD services crossings) in Victoria.
- Converter and converter stations in Tasmania and Victoria including
- Converter station site preparation and establishment in Tasmania and Victoria.
- A possible transition station that connects the land and submarine cables at the Victorian landfall.

On the Victorian side, the proposed route connects to the existing HVAC transmission network in the Hazelwood area in the Latrobe Valley.

The proposed converter station location in north-west Tasmania is at Heybridge near Burnie, located adjacent to the beach and highway. Horizontal Direct Drilling (HDD) ducts will bring submarine cables directly into the converter station (no land cable required).

On the Victorian side, it is proposed that the shore crossing will also be by HDD. If the Base Case (a single Land and Submarine cable contractor) is altered to allow separate submarine and land cable contractors to be appointed, most likely a transition station will provide the interface between submarine and land cables before running the land cable 90km to connect into the HVAC network in the Hazelwood area. We understand that this Base Case scope alteration would only occur if the net effect was a project cost reduction.

Marinus Link is being progressed in a staged approach that provides the delivery of Stage 1 in 2027/28 and Stage 2 in 2029/30. For efficiency and economy, the Base Case delivers Stage 2 Land cable Civils work at the same time as Stage 1. This schedule reflects the expected time to complete the Design and Approvals Phase activities, the manufacturing, construction, and commissioning activities and the anticipated timing to maximise the net economic benefits of the project to the National Energy Market.

NWTD

The NWTD scope is summarised as follows:

- Construction of new 220 kV double circuit overhead transmission lines between:
  - Palmerston and Sheffield,
  - Sheffield and Heybridge (including dismantling and removal of the existing TL503 single circuit 220 kV transmission line from Sheffield to Stowport),

  - Heybridge to Burnie (including dismantling and removal of the existing TL503 Sheffield to Burnie single circuit 220 kV transmission line from Stowport to Burnie),
  - Burnie to East Cam,
  - East Cam to Hampshire Hills, and
  - Staverton to Hampshire Hills.
- Modifications to the existing Sheffield to Staverton 220 kV transmission lines.
- Construction of new 220 kV switching stations at Staverton (including modifications to Sheffield Bays and Mersey Forth Bays Protection Schemes), Hampshire Hills and Heybridge.
- Modifications within the following existing substations:
  - Palmerston (2 new line bays to Sheffield), within existing switchyard,
  - Sheffield (2 new 1.5cb diameters to Palmerston requiring an extension of the 220kV Switchyard at the eastern end, and 2 new line bays to Heybridge at the western end), and
  - Burnie (2 new 1.5cb diameters to Heybridge and 2 new 1.5cb diameters to East Cam), requiring an extension of the 220kV Switchyard.
- Construction of associated telecommunications assets at new or existing substation sites (or co-located with transmission lines).

NWTD routes are depicted in Figure 2 NWTD RouteFigure 2

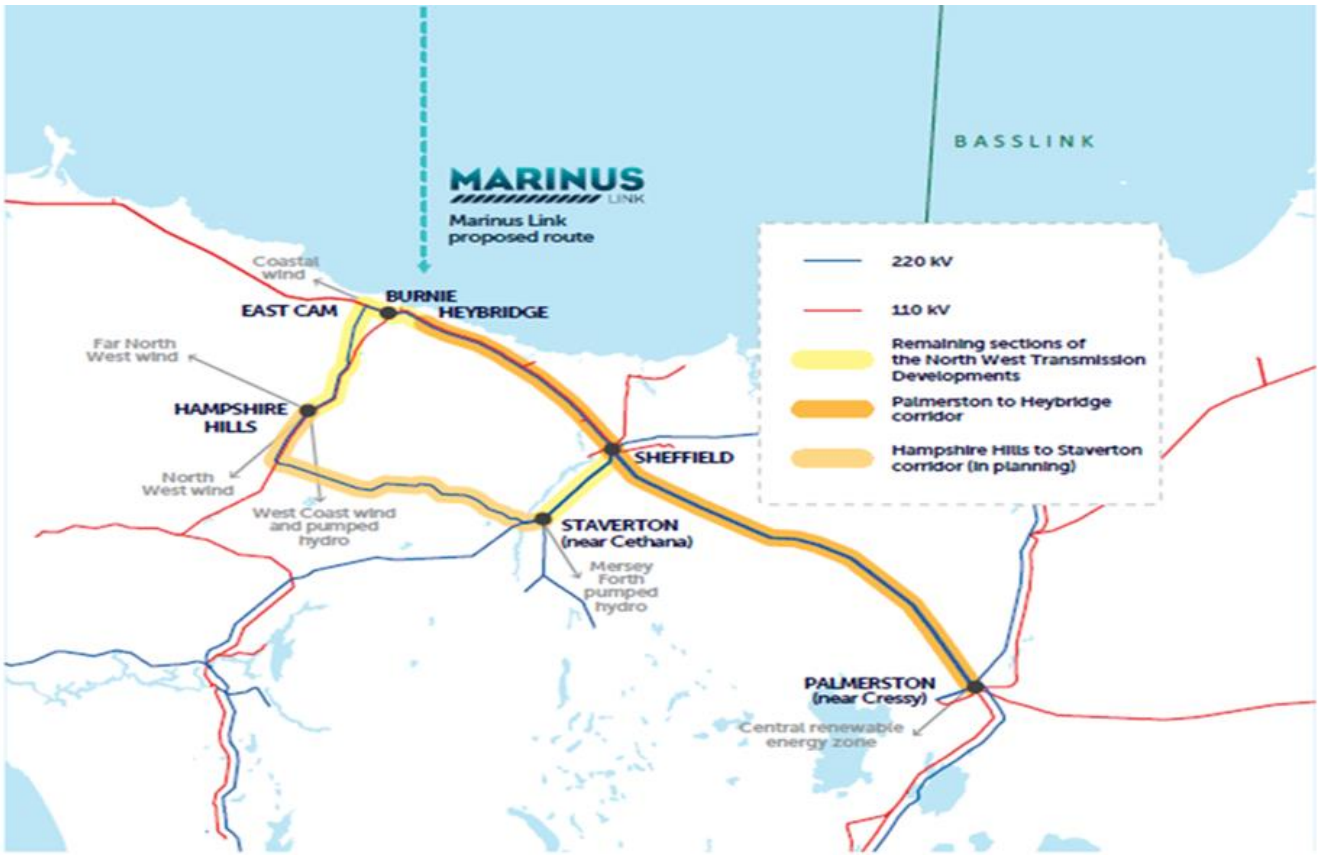

Figure 2 NWTD Routes

2. SUMMARY COST ESTIMATES

The estimate of the overall Project capital costs (CAPEX), as at 2Q 2021 is tabulated in Table 2.1 below.

AUD $ 3.50 Bn

inclusive of $ 232M[2] Contingency at a P-Mean confidence level

The Estimate excludes Provisional Sums that are captured separately to the cost above. This is explained in Section 2.2 and is $ 70.025M.

The CAPEX cost estimate presents the probable out-turn for equipment, infrastructure, services and indirect costs as defined within the scope, assumptions and qualifications.

Jacobs has assessed the maturity level of the Project Definition on which the estimate is derived and perceive that the Estimate Classification to be a Class 4, as defined by AACEI (see Table 2.1 below), for which they consider the purpose to be budget authorisation.

Table 2.1

	Primary Characteristic	*Secondary Characteristic*			
ESTIMATE CLASS	**LEVEL OF PROJECT DEFINITION** Expressed as % of complete definition	**END USAGE** Typical purpose of estimate	**METHODOLOGY** Typical estimating method	**EXPECTED ACCURACY RANGE** Typical variation in low and high ranges [a]	**PREPARATION EFFORT** Typical degree of effort relative to least cost index of 1 [b]
Class 5	0% to 2%	Concept Screening	Capacity Factored, Parametric Models, Judgment, or Analogy	L: -20% to -50% H: +30% to +100%	1
Class 4	1% to 15%	Study or Feasibility	Equipment Factored or Parametric Models	L: -15% to -30% H: +20% to +50%	2 to 4
Class 3	10% to 40%	Budget, Authorization, or Control	Semi-Detailed Unit Costs with Assembly Level Line Items	L: -10% to -20% H: +10% to +30%	3 to 10
Class 2	30% to 70%	Control or Bid/ Tender	Detailed Unit Cost with Forced Detailed Take-Off	L: -5% to -15% H: +5% to +20%	4 to 20
Class 1	50% to 100%	Check Estimate or Bid/Tender	Detailed Unit Cost with Detailed Take-Off	L: -3% to -10% H: +3% to +15%	5 to 100

Notes: [a] The state of process technology and availability of applicable reference cost data affect the range markedly. The +/- value represents typical percentage variation of actual costs from the cost estimate after application of contingency (typically at a 50% level of confidence) for given scope.

[b] If the range index value of "1" represents 0.005% of project costs, then an index value of 100 represents 0.5%. Estimate preparation effort is highly dependent upon the size of the project and the quality of estimating data and tools.

[2] This is equivalent to 7.11% applied to the Base Cost and is the sum of deterministic and probabilistic contingencies. (see Section 5.3).

Contingency provision funds the contingent risks associated with the Base Case scope, with any change to scope from the Base Case excluded.

JMME have worked with TasNetworks to assess the risks and opportunities within the scope and estimate. The assessments of variance from the estimated costs have been iterated in three separate workshops with the final risk profile producing a P-Mean Contingency of 7.11%.

The methodology and estimated Contingency are explained in Sections 5.3. We note that the AACEI framework for expected accuracy of a Class 4 Estimate is a low range of -15% +20% and the calculated accuracy of the Estimate is reported to be -9.9% +10.1%. Table 2.2 summarises the Contingency by Work Breakdown Structure and includes the Monte Carlo outcomes associated with confidence levels of P10, P50 and P90.

Table 2.2

		R6					
		Contingency Summary Table (AUD)				Estimate Accuracy	
	Base Estimate	Mean	P10	P50	P90	P10	P50	P90
Common	$ 273,609,308	$ 48,153,590	$ 26,700,000	$ 46,800,000	$ 71,700,000	$ 300,309,308	$ 320,409,308	$ 345,309,308
		17.6%	9.8%	17.1%	26.2%	-6.3%		7.8%
Stage-1	$ 1,887,248,501	$ 114,092,770	$ (53,800,000)	$ 113,500,000	$ 282,500,000	$ 1,833,448,501	$ 2,000,748,501	$ 2,169,748,501
		6.0%	-2.9%	6.0%	15.0%	-8.4%		8.4%
Stage-2	$ 1,107,036,857	$ 54,707,569	$ (102,996,278)	$ 53,671,973	$ 212,914,959	$ 1,004,040,579	$ 1,160,708,830	$ 1,319,951,816
		4.9%	-9.3%	4.8%	19.2%	-13.5%		13.7%
Total	$ 3,267,894,666	$ 216,953,929	$ (130,096,278)	$ 213,971,973	$ 567,114,959	$ 3,137,798,388	$ 3,481,866,639	$ 3,835,009,625
		6.6%	-4.0%	6.5%	17.4%	-9.9%		10.1%
Deterministic Contingency on Design & Approvals		$ 15,469,982						
Overall Contingency at P-mean		$ 232,423,911	7.11%	Applied to Base Estimate				
Overall Base Estimate + Contingency at P-mean		$3,500,318,577						

We are satisfied that the Estimate Classification, which is derived from the input data to the Base Case scope, is consistent with the accuracy data, which is based on the outputs of the Risk/Opportunity Register and its associated Monte Carlo simulations of out-turn cost, and as such includes the impact of some significant future opportunities identified by TasNetworks, which may act to reduce the capital cost of the Project without limiting performance or scope criteria.

Whilst Jacobs experience would lead them to a higher deterministic Contingency, we suggest that the confidence in the estimated cost demonstrated in the workshops is reasonable and appropriate.

There exists the potential for scope change or execution strategy change to occur during further design development. Management Reserve funds by TasNetworks appropriate to the following items for which costs have not been included are:

a. Capitalisation of forecast losses resulting from failures and the time to repair.
b. Converter and cable overload capacity.
c. Change of location for the Victorian side Converter Station.
d. Alternate contracting strategy for the HVDC subsea and land cable that may result in cable transition stations.
e. Change in Link voltage rating from 320kV to 400kV
f. Costs associated with establishment of any Special Purpose Vehicle commercial arrangement.

2.2 Provisional Sums

A provisional sum for the Finance Charges has been identified in the cost estimates prepared by TasNetworks, also referred to as "interest during construction" (IDC). Although it is recognised to be an element of capital expenditure, it falls outside the overall definitions of our Estimate and is reported here for guidance purposes.

Table 2.3

Provisional Sum Description	Common	Stage 1	Stage 2	Totals
PC Sum of Finance Costs	-	$ 57,194,000	$ 12,831,000	$ 70,025,000

3. ESTIMATING METHODOLOGY

The scope of the estimated cost is from the commencement of the Design and Approvals phase to beneficial operation. Cost that have been expended or 'sunk' prior to this are not included in the Estimated costs.

For clarity, we consider beneficial operation of the Marinus Link and NWTD systems are the condition achieved after commissioning and start-up are completed and where CAPEX stops and OPEX begins.

3.1 Pre-Construction

The Pre-construction costs are estimated as follows:

- Design and Approvals phase costs:
  Incurred from the completion of the Feasibility and BCA activities to the Financial Investment Decision (FID). The costs include both TasNetworks internal and external services costs, where internal costs are estimates of TasNetworks salaries, lease costs, overheads and the like, and have not been verified by Jacobs. Jacobs has reviewed the nature and extent of external services costs within the TasNetworks Estimate and provided comments thereon and discussed these with TasNetworks.

- Acquisition costs:
  These have been developed by TasNetworks; see Section 5.9.1

3.2 Construction Directs

Direct costs are major contract and OEM Packages and are estimated with Marinus Link and NWTD in separate accounts and in the following categories and methods

Marinus Link:

a. HVDC Submarine cable
   OEM Package conditioned quote for supply and install
b. Foreshore drilling HDD's
   Jacobs estimate with external consultant support
c. HVDC Land cable
   OEM Package conditioned quote for supply and install and JMME benchmarking data
d. HVDC Civils
   Jacobs estimate with external consultant support
e. HVDC Converter Stations
   OEM Package conditioned quote for supply and install and JMME benchmarking data
f. HVAC Connection
   Jacobs estimate from in-house data
g. System Studies
   TasNetworks estimate from in-house data
h. Easement
   TasNetworks and Jacobs estimate from in-house data

NWTD:

a. HVAC Transmission
   Jacobs estimate from in-house data
   Construction all-risks insurance (see 3.3.2)
b. System Studies
   TasNetworks estimate from in-house data
c. Testing
   TasNetworks estimate from in-house data
d. Easement
   TasNetworks and Jacobs estimate from in-house data

3.3 Construction Indirects

The proposed contracting strategy of letting OEM and Design & Construct packages means that the construction indirects consist of the Owners Team costs and the Insurance. The methodology for estimating these is summarised below:

3.3.1 Owners Teams

Project Management

This team directs and provides leadership services, being home office-based personnel required from the time of financial investment decision to the project handover. During the detailed design phase, TasNetworks do not plan to intervene in the OEM services with an approvals cycle, however the cost includes for drawing and document review activities to ensure the project achieves the specified standards.

Owners Construction Management

This team is site-based personnel required for the construction phases generally from construction mobilisation to completion of commissioning. Costs for the services of senior commissioning personnel during construction are carried within this cost component. TasNetworks awarded Contractors will be required to manage functions within their price, without a significant TasNetworks overlay of personnel.

Owners Testing and Commissioning Management

These services are site-based personnel required generally from mechanical completion to project handover.

The method of estimating these services has been with a manpower projection aligned to the project schedule. The mix of local and travelling personnel and their respective costs has been developed from Jacobs' experience of the regional job market.

The costs have been estimated as single management teams, with the separation of the costs between Marinus Link and NWTD by a simple pro-rating from the total of the respective capital cost.

3.3.2 Insurance

Marinus Link

Construction All-Risks costs for the Marinus Link HVDC scope are based on Broker advice to TasNetworks in October 2020, noting that it includes a Terrorism levy applied up to 12 nautical miles offshore and an Emergency Services Levy applied up to 3 nautical miles offshore from Tasmania.

Stamp Duty charges on the final Insurance Policies are assumed to be levied by Victoria and Tasmania for the entire length of the cable, not just up to the seawards state boundaries and are therefore included at 10% overall, allocated to the two States in equal portions.

NWTD

Construction All-Risks (CAR) insurance costs for the NWTD HVAC scope are derived from the Marinus Link insurance quote. Whereas the HVAC CAR cost is 2.0% of construction Direct cost, we recognise that coverage for marine risks is not required here., and the HVDC is estimated to be 0.35% of Construction Direct cost $1.63M.

4. INDEPENDENT REVIEW OF COSTS

Following the publication of the PADR, TasNetworks received a number of submissions commenting on the underlying assumptions and approach used in deriving the resultant market cost rates.

In response to submissions, TasNetworks engaged Jacobs to undertake an independent review of Marinus Link and North West Transmission Development.

4.1 INDEPENDENT REVIEW OF CAPITAL COSTS

The Jacobs Basis of Estimate Report is published alongside the PACR and is displayed in Table 2.2.

To provide a consistent and auditable approach to construction cost provisioning, methodologies utilised in preparing the Estimate are based on a delivery strategy broadly defined as follows:-

- Packaging and awarding of works to optimise the use of available resources in Victoria and Tasmania.
- Design, Procurement, Manufacture and Delivery of major systems by experienced OEM Contractors.
- Maximisation of the local Australian content where resources, skills and facilities are available.
- Incorporation of project requirements for local cultural heritage, environmental, social, industrial relations and indigenous issues.
- Maximisation of work offsite to ease pressure on site and the local area whilst benefiting from a wider resource pool, and reduced costs.
- Utilisation of proven and experienced contractors to achieve the project HSE, quality, schedule, and cost objectives.
- Maximisation of shared common site facilities and services between all parties.
- Development of flexible and alternative forms of contracting, bounded by the practices acceptable to the OEM's, to encourage contractor participation, reduce risk costs, and ensure positive commitments.
- Submarine and Land Cable supply and Installation packages to be executed by a single contractor.

5. BASIS OF ESTIMATE

This basis of estimate serves to clearly define the planning basis, cost basis, risk basis, assumptions informing the capital cost estimates together with exclusions to the capital cost estimates

5.1 PLANNING BASIS

Contracting strategies for engineering, design, procurement, construction, resourcing and project execution plans, project schedule and key milestone dates are, at the time of writing, are well advanced but not fully established to project execution level.

TasNetworks has developed a project plan and a high-level schedule, including preliminary planning as part of the PACR preparation.

5.2 COST BASIS

The source of all pricing used in the estimate is from a range of cost intelligence resources including TasNetworks and Jacobs cost databases, industry package vendors, and industry subject matter experts in infrastructure and utilities sector, and Jacobs cost modelling experience

Prices are based on 2Q 2021 costs for labour, materials and equipment and no allowance for future price changes is included in the price estimate.

5.3 RISK BASIS

Movement potential from Jacobs Base Cost Estimate associated with known-unknown risks and opportunities is to be funded with a contingency allowance over and above the Base Cost Estimate. This allowance does not provide for alteration in scope, performance levels or Standards.

The known-unknown risks and opportunities were documented in the Project Risk and Opportunities Register[3] and associated possible cost variances considered in workshops held by TasNetworks and JMME. Variances were assigned to each of the Register items based on their effect on the work breakdown structure costs in Common, Stage 1, Stage 2, since each has a different risk profile.

Monte Carlo simulations using @RISK software were produced by Jacobs resulting in a P-mean contingency of **$216.95M.**

In addition to the probabilistic contingency there is a deterministic contingency applied by TasNetworks to the Design and Approval phase costs of **$15.47M.**

The combined deterministic and probabilistic project contingency derived at the P-Mean value over and above the Base Estimate is.

Overall Project = $ 232.42 [or 7.11% applied to the Base Cost]

The Overall Range of Accuracy for the Estimate is calculated to be –9.9% +10.1% which indicates the Base Estimate is conservative resulting in

a. narrow risk banding (3-point risk ranges) on estimate uncertainty.

b. risk events with lower than expected likelihoods (% probabilities) as opposed to the TasNetworks Risk Framework and the consequences (3-point risk ranges) by the Risk Workshop participants; and

c. potential opportunities identified by TasNetworks, with significant material cost and time savings.

[3] Project Risk Register Doc. No. HOLD

Hence estimate classification based on the qualitative assessment will fall within the AACEI range for a Class 4 Estimate.

5.4 CLASS 4 ESTIMATE

This Estimate is assessed to be Class 4 to AACE International Recommended Practice and Estimate Classification. This classification is based on the experience of JMME in assessing the characteristics of the estimate (See AACEI Table 2.1):

- Degree of Project scope definition is 1% to 15% of full project definition
- End Usage is technical feasibility analysis and preliminary budget approval
- Estimating methodology is stochastic building blocks and schedules of rates and other parametric and modelling techniques. TasNetworks has engaged with industry vendors for budgetary costing and verification of the estimates.
- Expected Accuracy Range: the AACEI framework for expected accuracy of a Class 4 Estimate is a low range of -15% +20% and the calculated accuracy of the Estimate is reported to be -9.9% +10.1%. We suggest that the confidence in the estimated cost demonstrated in the workshops is reasonable and appropriate but note that accuracy ranges could exceed those indicated in unusual circumstances.

We are satisfied that the Estimate Classification, which is derived from the input data to the Base Case scope, is coincident with the accuracy data, which is based on the output data of the Risk/Opportunity Register and its associated Monte Carlo simulations of out-turn cost and as such includes the impact of some significant future opportunities identified by TasNetworks, which may act to reduce the capital cost of the Project without limiting performance or scope criteria.

5.5 COSTS FROM THIRD PARTIES

Sections of the cost estimate are derived from OEM Package budgetary quotes obtained by TasNetworks and developed for use by JMME.

- Convertor Stations package:
  Engineering, management, supply of equipment and materials, installation and commissioning.
- HVDC Cable package, Land and Submarine
  Engineering, management, supply of equipment and materials, installation and commissioning.

The quotes have been conditioned by JMME to account for:
- Escalation of cost from the end of quote validity to the Estimate Base Date of 2Q 2021
- Changes in exchange rate from the end of quote validity to the Estimate Base Date of 2Q 2021
- Changes in HVDC cable copper pricing from the quote basis to London Metal Exchange published pricing at April 2021
- Changes in HVDC conductor sizes to align with Base Case data

In addition, Jacobs benchmarked the Vendor budget pricing against an international portfolio of Projects after normalising the cost of these with location, rating, and time factors.

5.6 GENERAL PROJECT DATA

- Project definition: estimated to be 15%
- Capacity of facility: fixed
- Plant location: firm
- Plot Plans: firm
- Power schematics: firm

- HVDC Line routes: preliminary
- HVAC Line routes: preliminary
- Geology: assumed
- Project Plan: assumed
- Project schedule: preliminary
- Contracting Strategy: defined

5.7 GENERAL PRICING ASSUMPTIONS

All costs are based on 2Q 2021 prices for services, equipment, bulk materials and construction.

5.7.1 Approvals

The following approvals, agreements and data are envisaged to be in place at commencement of construction:

a) Necessary State and Commonwealth environmental approval for the project
b) Necessary land access or easement agreements are in place with landholders or other third parties
c) Necessary heritage agreements with traditional owners for access are in place and no Native Title issues
d) Ground conditions – exact site locations
e) Access conditions – exact site locations
f) Competitive tender process
g) Reasonable market conditions
h) Substantially level sites

5.7.2 Foreign Exchange Rates

The estimated pricing has used foreign exchange rates based on spot rates at April 2021 as shown in Table 5.0.

Table 5.0

AUD $1.00 Currency of Expenditure conversion rates	SEK 0.154	Euro 1.56	USD 1.32
Cost Item	Base AUD $ Value of native currencies		
Total Currency Base AUD $	$ 1,495,345,500	$ 419,863,540	$ -
Total Base Cost AUD $	$ 3,283,364,648		
% of Base cost	46%	13%	0%
		58%	

Risk associated with change of exchange rates from 2Q 2021 to dates of expenditure are managed within the Contingency without hedging.

5.8 COST ESCALATIONS

No provision has been included for Forward Escalation in this estimate.

Escalation that brings past costs from a previous date up to the Estimate base date of 2Q 2021, is included within the Estimate.

5.9 LAND & EASEMENT COSTS

5.9.1 HVDC Acquisition

The land acquisition required for the Converter Stations at Hazelwood (Victoria) and Heybridge (Tasmania) has been identified by TasNetworks. The acquisition of the land for Heybridge Converter Station includes the area required for the horizontally drilled land-marine installation for the submarine cable and its routing directly to the Converter Station and also for an acoustic buffer zone surrounding the converter infrastructure.

5.9.2 HVDC Easement

The estimate of easement acquisition costs to install and maintain the HVDC cables have been developed by TasNetworks. This access is for the permanent Victoria installation of.

- Buried cable conduit
- Horizontally drilled cable conduit for land route locations such as services crossings and where ground conditions require
- Horizontally drilled cable conduit for land-marine routes.
- Cable joint bays
- Cable
- Drainage facilities
- Utility service crossings

And the temporary Victoria installation of.

- New light vehicle access tracks
- New heavy vehicle access tracks
- Reinforcement of existing tracks, bridges and crossings

The construction easement width is 30m for the working area along the whole 90km cable route with provision for the two Marinus Link circuits. A narrower permanent easement width of approximately 20m is envisaged after construction is completed . No provision is made for a third circuit in the future. The construction methodology is that the permanent civils works for both circuits will be installed in one continuous workflow, therefore the whole easement will be required during Stage 1 of the Project.

Please note that the Marine Easement cost is estimated to be zero in line with preliminary advice regarding State and Commonwealth regulations.

5.9.3 HVAC Easement

The Tasmania easement area required for the HVAC supporting transmission installation is a 60m wide corridor for the whole distance of the overhead transmission line routes (219.9km). We have identified that clearance of trees and shrubs within the easement corridor is significant and these requirements are estimated to cost of $43.92M.

5.10 EXCLUSIONS

The following costs items are excluded from the CAPEX Estimate:

a) Mobile plant and fit-out of Buildings:
   Costs provisioned in the Operations account e.g. vehicles, forklifts, radios, furniture, laptops/screens etc.
b) Disposal costs offsite greater than 5km.
c) Establishment of accommodation/camp facilities for construction activities:
   Cost provisions made by the OEM's within their pricing is accounted for in the Estimate.
d) Cost of stoppages in construction due to Operational activities and cost of stoppages in Operations due to Construction activities.

e) Decommissioning and rehabilitation costs associated with overall facility closure. The exception to this is the existing Sheffield to Burnie transmission line (demolition/disposal/rehabilitation) where scope is removal to 0.5m below grade.
f) Financing costs
g) GST
h) Owner's Costs, typically:
    Feasibility and BCA (sunk or expended costs at 2Q 2021)
    Licensor Fees
    Royalties and Market Operator Fees
    Removal and Remediation of Contaminated Soils
    Capital Spare Parts (other than land/subsea cable and the warrantied initial 5-years of Operations)
    Hedging costs
    Import Duties
i) GST Taxes
j) Chemicals and Lubricants (beyond first fill)
k) Operating, Maintenance and Administration Costs
l) Operator Training
m) Any scope arising from the environmental authority permit
n) Escalation of costs and prices forward from the Base Date Q2 2021