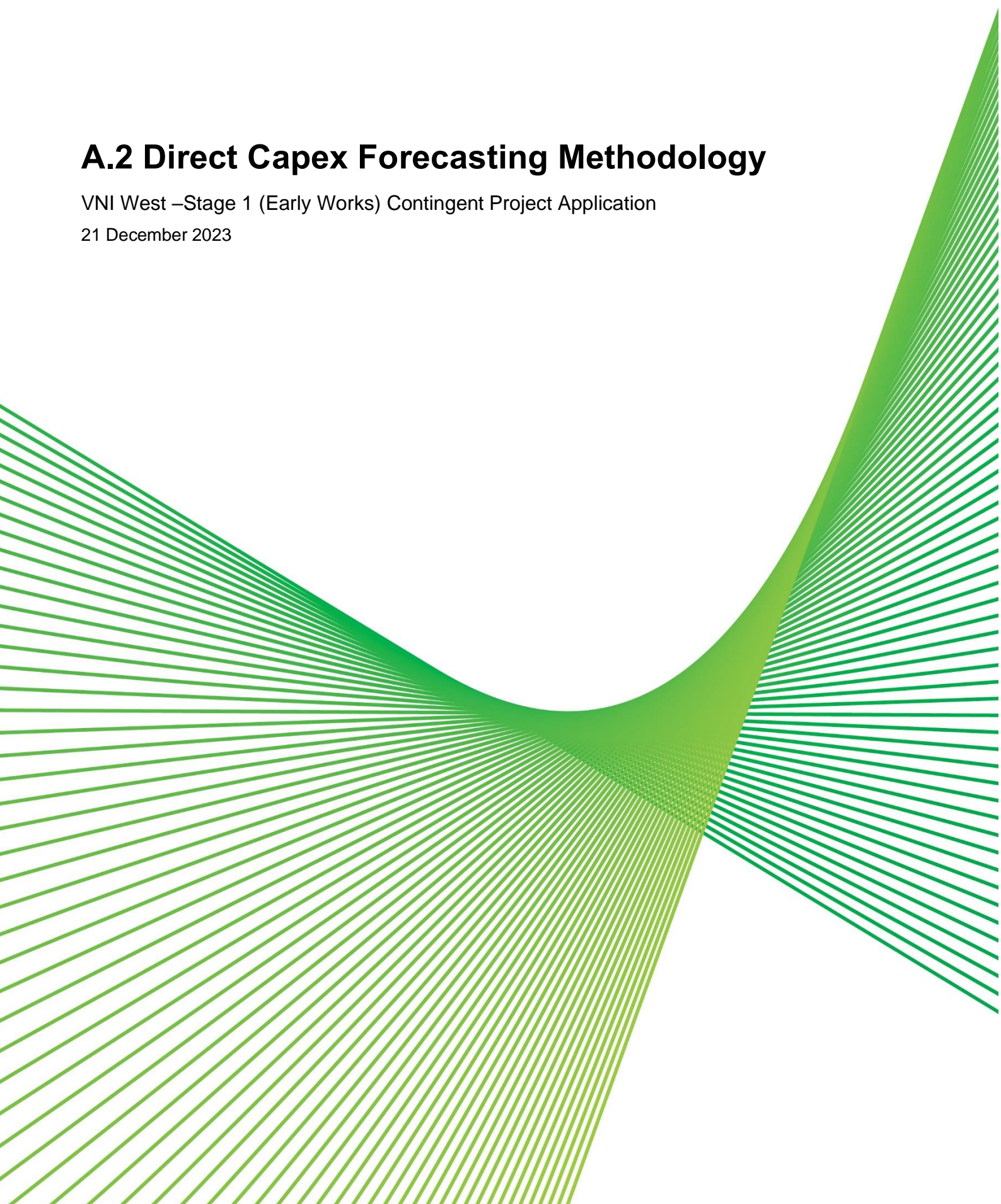


A.2 Direct Capex Forecasting Methodology

VNI West –Stage 1 (Early Works) Contingent Project Application

21 December 2023



Contents

1. Purpose, structure and scope of this document	1
1.1. Purpose and scope of this document.....	1
1.2. Structure of this document	2
1.3. Structure of our Stage 1 Application for VNI West.....	2
2. Overview of Stage 1 activities and total forecast capex	3
2.1. AEMO’s definition and approval of Stage 1 activities	3
2.2. Scope of our Stage 1 activities.....	4
2.3. Overview of our Stage 1 Capex	6
3. Our Stage 1 direct capex forecast	8
3.1. Procurement capex	8
3.1.1. Long lead time equipment for transformers, reactors, tower steel and conductor	10
3.1.2. Power flow controller technology.....	13
3.1.3. PEC Enhancement.....	14
3.1.4. Humelink Gugaa substation Integration Works.....	19
3.1.5. Pre-construction development activities.....	21
3.2. Forecast capex for land and environment.....	22
3.2.1. Biodiversity Offsets.....	22
3.2.2. Land access and easement acquisition	23
4. Project expenditure profile	29
5. Abbreviations	1

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1. Purpose, structure and scope of this document

1.1. Purpose and scope of this document

The Australian Energy Market Operator's (AEMO) 2022 Integrated System Plan (ISP) (2022 ISP) has defined Victorian to New South Wales (NSW) Interconnector West (VNI West) (VNI West or the Project) as a staged actionable ISP project, with no decision rules:¹

- Stage 1 is to complete the early works by approximately 2026, and
- Stage 2 is implementation of the Project with a target delivery date by July 2031 (or earlier).

VNI West is a joint Transgrid and Australian Energy Market Operator (AEMO) Victoria Planning (AVP) project that will provide a second transmission interconnection between Victoria and NSW.

Subsequent to the 2022 ISP, the State and Federal Governments have provided concessional financing under the Rewiring the Nation plan to accelerate the delivery of VNI West to 2028, to ensure that the Project's benefits are delivered as soon as possible.²

Importantly, achieving the 2028 target delivery date is subject to undertaking early works activities to obtain the necessary planning and environmental approvals, secure land and easements, progress detailed design, establish biodiversity stewardship sites and engage with the community and landholders. These activities are expected to take around two to three years to complete.

Transmission Company Victoria (a wholly owned subsidiary of AEMO) has already commenced early works for the Victorian portion of the Project.³

Our Stage 1 activities comprise direct and indirect and labour capital expenditure (capex) activities. Our indirect and labour capex activities are explained in our Labour and Indirect Capex Forecasting Methodology.

This document is our Stage 1 Direct Capex Forecasting Methodology for VNI West and forms part of our Stage 1 Contingent Project Application for (Stage 1 Application or CPA-1) for the Project. It should be read in conjunction with our Principal Application document and other supporting documents, in particular our Labour and Indirect Capex Forecasting Methodology.

The purpose of this document is to:

- overview the nature and scope of Stage 1 activities for VNI West
- explain and justify the methodologies we have used to determine our Stage 1 direct capex forecasts, and
- overview how we verified and validated our actual and forecast direct capex.

¹ AEMO, [Final 2022 ISP](#) (2022 ISP), June 2022, p. 74 (This document refers to AEMO's 2022 ISP, as it is the most recently completed ISP in accordance with the NER. It should be noted that the Draft 2024 ISP, published on 15 December 2023, confirms AEMO's 2022 ISP conclusions in relation to VNI West, including its proposed timings).

² AEMO, Transgrid, [VNI West Project Assessment Conclusions Report Volume 1: identifying the preferred option for VNI West \(VNI PACR\)](#), May 2023, p.30. The PACR explains that concessional financing of \$750 million from the Clean Energy Finance Corporation (CEFC) will ensure that the completion date for VNI West can be accelerated to 2028 from the 2031 date set out in the [2022 ISP](#) (see table 1, page 13)

³ These early works are enabled in Victoria by the February 2023 *National Electricity (Victoria) Act 2005* (NEVA Order)

Unless otherwise stated, all actual and forecast capex values in this document are presented in real 2022-23 dollars and include real input cost escalation.⁴

This document has been developed in accordance with:

- the actionable ISP framework under the National Electricity Rules (NER or Rules), and
- Australian Energy Regulator’s (AER’s) Guidance Note for Regulation of actionable ISP projects.⁵

1.2. Structure of this document

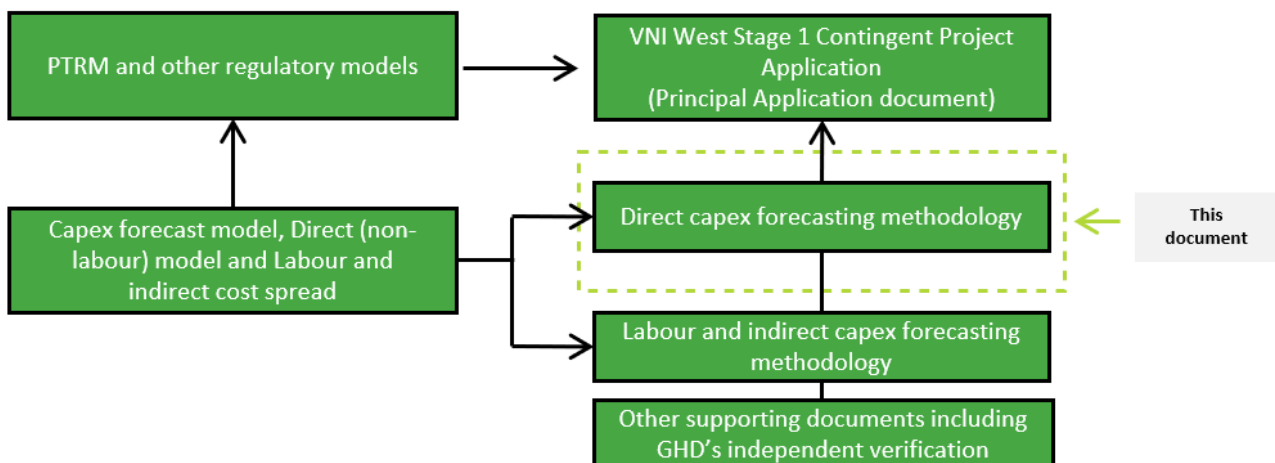
The remainder of this document is structured as follows:

- section 2 overviews AEMO’s definition and approval of Stage 1 (early works) our Stage 1 activities and our associated capex forecast
- section 3 explains our direct capex forecast associated with procurement and land and environment, and
- section 4 overviews our project expenditure profile.

1.3. Structure of our Stage 1 Application for VNI West

Our Stage 1 Application comprises the attachments and models illustrated in Figure 1.1. This Capex Forecasting Methodology document references these attachments, models and other supporting documents and should be read in conjunction with them.

Figure 1.1: Stage 1 CPA document structure for VNI West



Attachments and supporting models comprising our Stage 1 Application are also detailed in section 1 of our Principal Application document.

⁴ The financial values exclude both inflation and any real input cost escalation (e.g., labour) from 30 June 2023 onwards.

⁵ AER, [Guidance Note for Regulation of actionable ISP projects](#), March 2021.

2. Overview of Stage 1 activities and total forecast capex

This section:

- overviews AEMO's definition and approval of Stage 1 activities
- explains the scope of Stage 1 activities and outcomes for consumers, and
- overviews our Stage 1 capex.

2.1. AEMO's definition and approval of Stage 1 activities

AEMO defines Stage 1 activities as pre-construction activities that can be undertaken now, while keeping open the option to continue, defer or cancel the project as new information becomes available.⁶ AEMO identifies the following activities as likely to fall within Stage 1 for VNI West:⁷

- project initiation – scope, team mobilisation, service procurement
- stakeholder engagement – with local communities, landholders and other stakeholders
- land-use planning – identifying and obtaining all primary planning and environmental approvals, route identification, field surveys, geotechnical investigations, substation site selection and easement acquisition
- detailed engineering design – transmission line, structure and substation design, detailed engineering design and planning
- cost estimation – finalisation, including quotes for primary and secondary plant, and
- strategic network investment – an uplift to the delivered capacity of Project EnergyConnect (Energy Connect or PEC) between Dinawan and Wagga Wagga.⁸

AEMO has issued us with a direction in its 2022 ISP to proceed now with Stage 1 activities to achieve the following benefits:⁹

- insurance value and system reliance – providing greater system resilience to earlier than projected coal closures. AEMO has assessed that the earlier that coal-fired generation retires, the earlier VNI West is needed¹⁰
- option value – allowing delivery of the Project as soon as possible or defer it if circumstances change¹¹
- protection against rising costs – urgently undertaking further work to drive down costs given the risk to supply chains of increasing global demand for the same infrastructure expertise, materials and equipment.¹² It will also secure the fuel cost savings arising from a reduction in gas generation
- storage and firming access – it will increase access to Snowy 2.0's deep storage and other firming capacity from interstate, and¹³

⁶ AEMO, [Feedback Loop Notice](#), 27 January 2022

⁷ AEMO, [Draft 2022 ISP](#), p. 66

⁸ AEMO, 2022 ISP, p 75. The Commonwealth Government has underwritten funds to build a component of PEC at a larger capacity such that it removes the need to duplicate lines for VNI West when it is constructed.

⁹ AEMO, [2022 ISP](#), p.74

¹⁰ AEMO, [2022 ISP](#), pp. 67 and 92

¹¹ AEMO, [2022 ISP](#), pp.85 and 86

¹² AEMO, [2022 ISP](#), pp. 96-99

¹³ AEMO, [2022 ISP](#), p. 74

- variable renewable energy (VRE) reduction and support – it will reduce VRE curtailment by sharing geographically diverse VRE. It will also support new VRE needed to replace coal-fired generation (particularly in the Murray River and Western Victoria REZs).

2.2. Scope of our Stage 1 activities

The scope of our Stage 1 activities is in line with AEMO’s definition of early works. Our Stage 1 activities comprise:

- direct and labour and indirect pre-construction activities, and
- two design and construction (D&C) packages.

Our direct Stage 1 capex activities relate to:

- procurement activities including:
 - purchasing long lead time equipment (LLE) for transformers, reactors, conductor, steel and power-flow controllers
 - a D&C works package to enhance the capacity of a component of PEC (which forms part of the scope of the VNI West Project)¹⁴
 - a D&C works package for integration works required to connect the enhanced PEC component of the Project at the Gugaa substation (being constructed as part of Humelink), and
 - undertaking pre-construction development, including for substations and transmission lines, specifications and identifying quantities of plant and materials required.
- land acquisition activities, which relate to biodiversity offset costs, binding options for transmission line easements, and commencing compulsory acquisition.

Our labour and indirect development and approvals (D&A) activities relate to:

- internal labour resources for undertaking project management and corporate support (labour costs) for procurement, land and environmental activities, and
- indirect activities for a wide range of professional and consulting services, as well as tender payments and associated facilities costs (e.g., data room).

We have included two D&C packages in our Stage 1 capex. This will ensure that investment synergies between the integration works required for VNI West and the works being undertaken for other ISP projects, in particular PEC and Humelink, are fully realised. We have adopted this approach based on a careful review of our entire program of work for ISP projects, in order to identify synergies and cost savings during the construction phase to ensure these projects are delivered at the lowest sustainable cost for consumers overall. These D&C packages are:

- PEC enhancement to increase the capacity of the transmission line from the Dinawan Substation to Wagga Wagga from 330 kV to 500 kV,¹⁵ and
- Gugaa integration works required to integrate the 500kV PEC enhancement with the Gugaa 500/330kV Substation which is being built as part of Humelink.

¹⁴ Media Release, Minister Taylor, [Government supporting delivery of critical transmission infrastructure in Southwest NSW](#), 28 September 2021. This is per the pre-agreed variation under sub-clause 13.13(a) of the EPC Contract for PEC, dated 24 September 2021

¹⁵ The costs and benefits associated with this enhancement have been assessed as part of the VNI West RIT-T.

We estimate that the cost saving to consumers is \$787 million from undertaking these D&C works as part of our Stage 1 activities, rather than waiting until our Stage 2 delivery activities. This cost saving comprises:

- for the PEC enhancement, approximately \$697 million, and
- for the Gugaa integration works, approximately \$90 million.

We acknowledge that to date D&C activities and costs have not been included in Stage 1 Applications. However, the construction timeframes for PEC and Humelink, to which the PEC enhancement and Gugaa integration works relate, require us to undertake the D&C activities in VNI West Stage 1 in order to realise the synergies and costs savings from concurrent investment. As a consequence, we have reflected the cost of these activities in this Stage 1 Application. Further, undertaking the D&C works for the PEC enhancement is in line with AEMO’s expectation that Stage 1 activities for VNI West would include ‘strategic network investment’.¹⁶

The AER approval of our forecast capex is required in order for us to proceed with these investments. In the absence of the AER’s approval, we would not be funded to undertake this work and therefore could not reasonably be required to undertake it. This would disadvantage consumers, who would then face higher costs associated with undertaking these activities separately at a later time.

In the case of the PEC enhancement work it would not be practical (or cost efficient) to retroactively upgrade our current investment in PEC to 500kV. This is reflected in the current Federal Government underwriting which has been provided to ensure consumers realise the benefits of the enhancement as part of our VNI West Stage 1 activities.

In relation to the Gugaa integration work, we recognise that the regulatory process relating to our Contingent Project – Stage 2 delivery Application for Humelink has yet to conclude, and so our Final Investment Decision (FID) has yet to be confirmed. Notwithstanding this, in order to meet the required timing for Humelink we are proceeding on the basis that the regulatory process will result in the revenues required to enable us to make a positive FID, and therefore that the incremental integration works to connect VNI West into the new Gugaa substation will be required. The expected timing of our investment in Humelink means that these integration works are expected to occur as part of Stage 1 of VNI West. We consider it appropriate to include these integration works as part of this Stage 1 Application, rather than lodging a further Application following our FID for Humelink.

Table 2.1 shows how our Stage 1 activities map to AEMO’s Stage 1 categories.

Table 2.1: Forecast capex categories alignment with AEMO draft 2022 ISP

AEMO 2022 ISP ¹⁷	Stage 1 CPA– Capex categories
Direct costs	
Detailed engineering design	Procurement
Land-use planning	Land acquisitions
Strategic network investment	Procurement
Labour and indirect costs (D&A activities)	
Project initiation	Project management and project development
Cost estimation	Procurement

¹⁶ AEMO, 2022 ISP, p.66.

¹⁷ AEMO ISP 2022

AEMO 2022 ISP ¹⁷	Stage 1 CPA– Capex categories
	Regulatory approvals and other support
Stakeholder engagement	Community & stakeholder engagement
Land-use planning	Land and environment

Our Stage 1 capex will deliver the following outcomes:

- identify, explore and manage the project risks. This will allow us to mitigate and/or diversify the Project’s risks so that the residual risk costs included in our Stage 2 Application are as low as possible
- secure the cost savings for consumers from our programmatic approach to delivering the ISP projects, which we are responsible for delivering. This approach is known as the Powering Tomorrow Together (PTT) program and involves the integrated delivery of VNI West, Humelink and Project EnergyConnect (PEC or EnergyConnect) and has been established to accelerate the delivery of transmission infrastructure and drive costs down through economies of scale and scope. The combined cost saving for consumers from the PTT program in respect of long lead equipment (LLE) in this Stage 1 Application is estimated to be \$60 million
- achieve the target delivery date of 2028 by progressing activities on the critical path to ensure that construction can commence as soon as possible following the approval of our Stage 2 Application.¹⁸ Activities on the critical path include securing LLE, undertaking continued stakeholder engagement, acquiring access to land and establishing biodiversity stewardship sites using Biodiversity Stewardship Agreements (BSAs), and
- realise investment synergies arising from undertaking design and construction (D&C) works associated with the integration of VNI West with other ISP projects which we are responsible for delivering, in particular, Humelink and PEC. This will ensure that overall, this suite of ISP projects is delivered at the lowest sustainable cost for consumers.

Our Principal Application and Scope definition documents discuss the activities that comprise our Stage 1 activities and how our capex will deliver these outcomes.

2.3. Overview of our Stage 1 Capex

Table 2-3 shows that our total Stage 1 capex is \$1,096.33 million, excluding equity raising costs. We will incur most of this capex in the 2023-28 regulatory period. Our direct forecast capex is additional to the capex approved by the AER in its 2023-28 Revenue Determination.

Table 2-3: Stage 1 capex (\$M, Real 2022-23)

	2018-21	2021-22	2022-23	2023-24	2024-25	2025-26	Total
Actual	0.15	8.18	10.71	-	-	-	19.04
Forecast	-	-	58.10	499.68	450.11	69.41	1,077.29
Total capex	0.15	8.18	68.81	499.68	450.11	69.41	1,096.33

Notes: Including overheads, excluding equity raising costs

Table 2-2 details our Stage 1 total capex by sub-category of capex.

¹⁸ AEMO, 2022 ISP, June 2022, p.13. (See Table 1).

Table 2-2: Stage 1 capex by category (\$M, Real 2022-23, including overheads)

Direct costs		Millions	Per cent of total capex
Direct capex		890.72	81.25
Procurement		792.87	72.32
LLE	Transformers, Reactors, Conductor	93.82	8.56
	Steel	47.67	4.35
	Power flow controllers	87.40	7.97
PEC enhancement	500kV Transmission line enhancement	345.61	31.52
Humelink (Gugaa) integration	Connection of the enhanced PEC component of the Project at the Gugaa substation	168.97	15.41
Pre-construction development	Transmission lines and substations	49.40	4.51
Land acquisition		97.85	8.92
Land acquisition	Valuation and acquisition costs	30.73	2.80
Biodiversity offsets	Biodiversity offset liability requirements	67.12	6.12
Labour and indirect costs		205.61	18.75
Labour	Internal resource requirements	65.16	5.94
Indirect	Professional and consulting services	140.45	12.81
Total		1,096.33	100.00

Our Stage 1 activities and the associated capex relating to:

- Labour and indirect capex are explained in our Labour and Indirect Capex Forecast Methodology.
- Direct capex activities are explained in Chapter 3 of this document.

3. Our Stage 1 direct capex forecast

Our forecast direct capex comprises procurement activities and land acquisition for transmission line easements. This Chapter explains and justifies the methodologies we have used to determine our Stage 1 direct capex forecasts.

3.1. Procurement capex

This section explains and justifies how we have determined our Stage 1 procurement capex of \$792.87 million for the following activities:

- purchasing long lead time equipment (LLE) for transformers, reactors, conductor, steel and power-flow controllers
- undertaking a D&C work package to enhance the capacity of a component of PEC (which forms part of the scope of the VNI West Project)¹⁹
- undertaking a D&C work package for integration works required to connect the enhanced PEC component of the Project at the Gugaa substation (being constructed as part of Humelink), and
- undertaking pre-construction development activities for substations and transmission lines including:
 - finalising the concept design work for substations and transmission lines
 - finalising the technical specifications
 - identifying quantities of plant and materials required, and
 - completing project documentation and obtaining the necessary approvals to commence construction.

Table 3-1 summarises our Stage 1 forecast capex for procurement activities. We have developed our forecast capex based on a detailed scope of works using methods that reflect the specific nature of the costs. This includes externally tendered (competitive) design and construct contracts, manufacture and supply contracts, pricing from suppliers, independent specialist advice, and actual costs for PEC and Humelink. These costs have been verified by GHD as being efficient and prudent.

Our capex forecast is efficient and prudent because it reflects actual costs and the best available information.

Table 3-1: Early works forecast capex for procurement (\$M, Real 2022-23)

Direct costs		Millions	Basis of estimate
Procurement			
Long-lead time equipment (LLE)	Transformers, Reactors	59.29	Competitively tendered manufacture and supply contracts, which set out quantities and costs.
	Conductor	34.53	Agreement with suppliers, which set out quantities and costs

¹⁹ Media Release, Minister Taylor, [Government supporting delivery of critical transmission infrastructure in Southwest NSW](#), 28 September 2021. This is per the pre-agreed variation under sub-clause 13.13(a) of the EPC Contract for PEC, dated 24 September 2021

Direct costs		Millions	Basis of estimate
	Steel	47.67	Fission independent estimate based on quantities and costs.
	Units to control power flows along segments of Transmission Line	87.40	<p>██████████ cost estimate for 10-1800 units in NSW. This covers:</p> <ul style="list-style-type: none"> • Murray-Dederang-1 \$44.60M • Murray-Dederang-2 \$42.80M.
PEC enhancement	500KV Transmission line enhancement	██████████	Contract cost (PEC variation) externally tendered (competitive) D&C contract.
		██████████	<p>This is based on a combination of:</p> <ul style="list-style-type: none"> • Our actual property compensation costs, from Ellipse,²⁰ to acquire easements \$19.16M • An alignment change request form from the D&C contractor ██████████ • A 330kV line diversion cost agreed variation of ██████████ • An independent estimate from WSP for biodiversity offset cost \$10.12M • Independent advice from Fission on the appropriate contingency allowance \$57.60M.
Gugaa integration works	Connection of the enhanced PEC component of the Project at the Gugaa substation.	168.97	Contract cost (Humelink variation) externally tendered (competitive) D&C contract. This includes contingency based on advice from Fission.
Pre-construction development	Transmission lines and substations	49.40	We have adopted costs based on ██████████ of the total construction cost from PACR based on independent advice from AECOM.
Land acquisition			
Land acquisition	Valuation and acquisition costs including options for acquiring transmission line easements and compulsory acquisition	30.73	An independent estimate from JLL.
Biodiversity offsets	Addressing our biodiversity offset liability requirements	67.12	An independent estimate from WSP.

²⁰ Ellipse is our enterprise resource planning (ERP) system.

Direct costs		Millions	Basis of estimate
Total direct costs		890.72	

Note: 1. See Direct Non-labour cost model.

3.1.1. Long lead time equipment for transformers, reactors, tower steel and conductor

Our Stage 1 (Part 2) Application for Humelink, submitted to the AER in April 2023, explains that the delivery of Major Projects, including VNI West, are subject to rapidly evolving external factors. These factors include inflationary pressure, a heated construction market, increasing demand for capital and an extremely competitive global supply chain. Collectively, these factors are resulting in unprecedented cost increases for labour and materials as well as significant extensions on lead times for critical equipment.

In light of these conditions, we have worked with Commonwealth Government to establish a programmatic approach to:

- accelerate the delivery of transmission infrastructure
- drive down costs through economies of scale and scope, and
- improve certainty of deliverability in a highly constrained labour and equipment supply chain market.

This is known as PTT program, which involves the integrated delivery of PEC, Humelink and VNI West. Through the PTT program we are securing the lowest risk-adjusted price for LLE for VNI West. This has involved:

- in February 2023, we entered into agreements with suppliers to purchase transformers and reactors, and we shortly expect to execute an agreement with the preferred supplier for conductors, and
- we are currently progressing similar procurement activities for tower steel.

Our procurement process for transformers and reactors highlighted the capacity challenges in the market and that large-scale equipment orders require extensive lead time due to factory order books nearing capacity. We found that near-term capacity outside of China is exhausted. A letter from a key supplier received through the recent procurement process, provided as an Attachment to this Application, evidences the current market capacity challenges. It states that:

As TransGrid would be aware, the increase in both global and local demand for power transformers is growing exponentially and we cannot forecast what will happen in the next 6 or more months. Our manufacturing slots are booked on a first come first served basis and those organisations that have secured factory capacity in binding agreements will meet their targeted project dates. As a local example, Central West Orana which has a larger demand than [sic] the Humelink project for this portfolio and also requires delivery at the same time as Humelink.

The timing of establishing the LLE agreements with suppliers means that purchasing LLE will form part of our Stage 1 activities. Purchasing LLE as part of our Stage 1 activities will maximise benefits to customers by:

- providing the necessary cost certainty by locking in lower prices for LLE now. This will provide confidence that they will not be over-or-under investing in the Project
- protecting against future inflationary pressures, which are driving-up prices globally. This will ensure that the Project is delivered at the lowest sustainable cost, and

- securing supply-chain availability in a competitive global market, which is resulting in extensions on lead times for critical equipment. This will ensure that we meet AEMO’s target delivery date of July 2028.

The combined cost saving for consumers from the PTT program in respect of long lead equipment (LLE) in this Stage 1 Application is estimated to be \$60 million.

Importantly, the assumed resale value of the LLE for transformers, reactors, conductor and steel is the same as the forecast capex of \$141.50 million, included in this Application. This means that should the VNI West not proceed to Stage 2, then we could:

- repurpose the LLE for other projects that we are currently progressing
- sell the LLE to enable the delivery of NSW Government’s Renewable Energy Zones (REZs) such as Central-West Orana REZ, New England REZ or Hunter-Central Coast REZ
- sell the LLE to enable the delivery of large transmission projects being progressed by other transmission businesses, such as CopperString which is being built by Powerlink in north Queensland, or
- sell the LLE to the Commonwealth Government in return for any underwritten funds.

The proceeds from the sale of LLE would be treated as disposals and deducted from our regulatory asset base (RAB) when it becomes time to roll forward the RAB over the 2023–28 period. This means that customers would not be worse off from purchasing the LLE in Stage 1 given the Commonwealth Government’s underwriting agreement and the overall demand for LLE for other large transmission projects. This provides confidence that the sale proceeds would not be lower than the cost included in this Application. Moreover, consumers would benefit if the sale proceeds exceeded the costs in this Application.

The following section 3.1.1.1 to 3.1.1.3 explain the methodologies we have used to determine our Stage 1 direct capex forecasts for transformers, reactors conductor and steel.

3.1.1.1. Transformers and reactors

Our forecast capex for transformers and reactors is \$59.29 million, and is calculated based on agreements with suppliers, which contain the number of transformers and reactors required for the project as well as the associated unit rates. These agreements are provided as Attachments to this Application along-side our procurement strategy, which demonstrates how we maximised the responsiveness of the supplier market to ensure that costs for transformers and reactors is prudent and efficient:



The forecast capex for the transformers and reactors is calculated as follows:

-  = \$59.29 million (\$ Real 2022-23).

3.1.1.2. Conductors

Our forecast capex for conductor is \$34.53 million and is calculated based on an agreement with a supplier, which contain the unit costs for various conductor types and estimated delivery quantities. This agreement is provided as Attachments to this Application along-side our procurement strategy, which demonstrates how we maximised the responsiveness of the supplier market to ensure that costs for conductor is prudent and efficient.

We have estimated that the following conductor quantities will be needed:

[REDACTED]

Our agreement with the supplier estimates that these quantities translate into the following shipping quantities:

[REDACTED]

This provides a total of [REDACTED]

Based on these quantities and the unit rates in the supplier agreement, the forecast capex for conductor (including delivery costs) is calculated as follows:

- [REDACTED]
[REDACTED] \$34.53 million (\$ Real 2022-23).

3.1.1.3. Tower steel

We are currently progressing similar procurement activities for tower steel. We undertook expression of interests with market (early market sounding) in late 2022, however we have not yet established the designs required to commence the formal tender process. Given this, we do not expect to have agreements with suppliers until the end of 2023. We have therefore calculated our forecast capex of \$47.67 million for tower steel based on rates and quantities contained in a report from Fission who has been engaged to provide cost advice and information for the VNI West Project.²¹ Our Stage 2 (Delivery) Application will explain our formal tender process and outcomes.

Fission assessed forecast capex of \$47.67 million for tower steel using:

- weights (tonnes) based on the quantities in the option feasibility study, which underpinned the PACR, and
- rates (prices), developed from Fission's internal library, which is informed by benchmark rates from other recent major infrastructure projects encompassing Power, Rail and Transport Infrastructure.

Table 3-2 sets out the tower steel weights and Table 3-3 sets out the rates as assessed by Fission.

²¹ Fission is accredited with ISO 9001:2015/45001:2018/14001:2015 and provides independent cost estimating, risk management and quantity surveying disciplines.

Table 3-2: Fission tower steel weights

Description	No. towers	Weight per tower	Total tonnes
500kV D/C suspension structure			
500kV D/C tension structure			
330kV D/C tension structure			
330kV D/C tension structure	n.a.		n.a.
Total tower steel			

Fission has used its engineering expertise and knowledge from its role as independent estimator in other similar early contractor involvement (ECI) processes and:

- obtained the average weight per tower from Transgrid's database and verified by it by comparing against other 500kV and 330kV Transmission Line projects
- determined the quantity of towers by using the Transgrid average span between towers on its network of between 420m and 430m for the 500kV transmission line which is 203km long
- based the type of tower on Transgrid's generic tower split on its existing network for 500kV Transmission Lines with 80% Suspension and 20% Tension Towers, and
- determined the rates in Table 3-3 from fission extensive library of rates built up from previous job.

Table 3-3: Fission tower steel rates (\$Real 2022-23)

Description	tonnes	Rate \$	Amount \$M
Supply of steel structure galvanized - CIF			
Unload to Peg			
Transport of Steel structure galvanized - CIF			
Total steel			47.67

3.1.2. Power flow controller technology

Installing power flow control equipment will improve network load sharing between the new 500kV network and the existing network, which comprises the:

- 330kV Victoria – New South Wales Interconnector between Upper/Lower Tumut and South Morang, and
- 220kV western Victoria network between Dederang and Thomastown.

Power flow controllers can:

- reduce or increase reactance on parallel lines, which are not fully utilised, by 'forcing' power down the alternate line, which is not fully utilised, and
- provide greater control over power flows that will arise from intermittent generation.

In the absence of power flow controllers, the existing network may overload. To prevent this, power flow controllers are required on two 330 kV transmission lines between Murray and Dederang and will be installed near the existing Murray substation.

The lead time on this equipment is between 18-24 months from the placement of the order. As outlined in the VNI West PACR, a critical Stage 1 activity involves assessing the feasibility and determining the type of power flow controllers that are required to deliver the Project. Subject to this assessment confirming the technology, we would purchase this equipment in Stage 1 to minimise the risk of project delays which would arise if we did not receive this LLE in time.

If, however, our assessment determines that an alternative solution (e.g., Phase Shifting Transformers) is required, we would use the revenues associated with the cost of procuring the Power Flow Controllers in this Stage 1 Application to place orders and secure manufacturing slots for that equipment. This would minimise the risk of project delays, which would arise if we did not receive LLE in time. The cost of purchasing Phase Shifting Transformers is expected to be \$400 million more than the cost of Power Flow Controllers included in this Stage 1 Application. This would therefore require us to submit a further Stage 1 Application (i.e., Stage 1 (Part 2) Application) for the additional cost of purchasing the Phase Shifting Transformers.

We have based our forecast capex in this Application on a quotation from SmartWires to provide the following modular power flow control equipment:

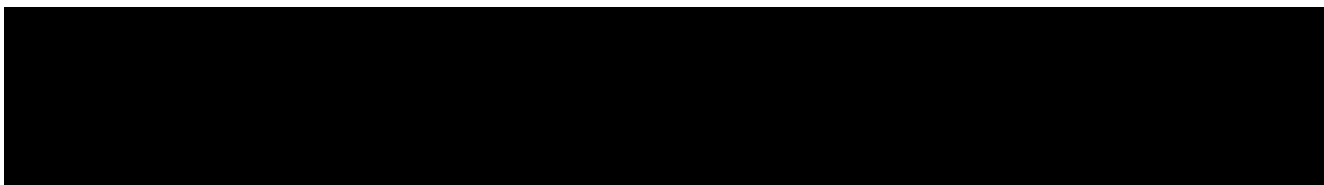


Table 3-4: SmartWires quotation for SmartValve 10-1800 (\$Real 2022-23)

SmartValve 10-1800	Murray- Dederang 1	Murray – Dederang 2	Total
Device cost ¹			
Deployment ²			
Type testing ³			
Total			87.40

Notes: 1. Device Costs assume standard T&Cs and make no allowance for spare parts and assumes a delivery date of January 2026 2. Deployment Costs include procurement and shipping of insulators & base steel, shipping of devices, installation supervision, and commissioning and project management. They do not include civil works, earthworks or equipment installation. 3. Type testing costs assume similar amount of additional testing as required under the VNI Minor project.

Importantly, SmartWires has confirmed that the modular flow control equipment is a flexible solution. This means it can be scaled up or down in size by adding or excluding individual units from an installation. The units may also be redeployed to other locations or other lines with different system voltage if the detailed planning studies determine that they should be located elsewhere. This is in line with AEMO’s ‘least-regret’ approach to planning, which is not possible with solutions such as Phase Shifting Transformers.

3.1.3. PEC Enhancement

Our forecast capex for the PEC enhancement comprises the following six components:

- Transmission line (Dinawan to Wagga Wagga) upgrade

- Route alignment changes
- 330 KV line diversion
- Property compensation
- Biodiversity offset liabilities, and
- Project contingency - design and construct contingency and Other Construction costs.

The following sections 3.1.3.1 to 3.1.3.6 explain the methodologies we have used to determine the forecast capex for each of these six components.

3.1.3.1. PEC enhancement

PEC involves the construction of a double circuit 330kV transmission line between from Dinawan Substation to the Wagga Wagga Substation, with a target delivery date of 2026. VNI West involves the construction of approximately 157km of double circuit 500kV transmission line in the same corridor by 2028. Enhancing the 330kV PEC transmission line to 500kV to meet the VNI West Project's requirements will:

- avoid the duplication costs associated with first building the 330kV transmission and then subsequently building another 500kV transmission line in the same corridor (within a two-year period), making the initial PEC 330kV transmission line redundant, and
- minimise disruption to landholders and the environment in the area resulting in additional savings for consumers.

The costs and benefits associated with enhancing this section of PEC to operate at 500kV were assessed as part of the VNI West regulatory investment test for transmission (RIT-T) and form a component of the works for the Project. AEMO confirmed in the 2022 ISP its expectation that this strategic network investment would form part of the Stage 1 works for VNI West.²²

The construction contractor for PEC (SecureEnergy JV) included the cost of PEC enhancement works in a pre-agreed variation under the EPC contract dated 24 September 2021.²³

In September 2021, the Federal Government agreed to provide up to \$181.5 million in underwriting support to enable the section of transmission lines being built from Dinawan to Wagga Wagga as part of PEC, stating that:²⁴

This agreement, and the Government's commitment to VNI West, forms part of ongoing support for development of all major priority electricity transmission infrastructure in the National Electricity Market in line with the Australian Energy Market Operator's 2020 Integrated System Plan.'

The NSW Minister acknowledged that it would not be practical (or cost efficient) to retroactively upgrade our current investment in PEC to 500kV:

²² AEMO, 2022 ISP, p.75.

²³ Addition of Separable Portion L5 and Omission of Separable Portion L3 to the scope of the Works, comprising the upgrading of the double circuit transmission line between the Dinawan and Wagga Wagga substation from 800 MVA 330 kV to 3200 MVA 500 kV Addition of Separable Portion L5 and Omission of Separable Portion L3 to the scope of the Works, comprising the upgrading of the double circuit transmission line between the Dinawan and Wagga Wagga substation from 800 MVA 330 kV to 3200 MVA 500 kV

²⁴ NSW Minister for Energy and Environment, [Government supporting delivery of critical transmission infrastructure in Southwest NSW](#), September 2021

Building a single line with larger capacity will save consumers hundreds of millions of dollars by removing the need for duplicate lines for the Victoria-New South Wales West (VNI West) interconnector to be constructed.

Since the pre-agreed contract variation for the PEC enhancement was procured, there have been significant changes in the operating environment and construction market. Over the last year or so, the cost of delivering projects across the energy sector has increased by around 30 per cent. External factors that are driving-up these costs include:

- since mid-2021, construction costs have increased faster than inflation. This recent divergence is particularly evident with the change in the Input to Manufacturing PPI
- the surge in infrastructure projects required to support the transition and broader government construction initiatives across all sectors of the economy including hospitals, road, rail and ports. These projects are competing for increasingly scarce labour and material resources. This surge in infrastructure projects is expected to continue as we deliver the urgent energy transition to achieve our net zero targets, and
- the prices of raw materials, such as steel, copper and aluminium which are set by international markets, have been increasing and are forecast to continue to increase.

To ensure the cost of enhancing the transmission line reflects a realistic view of the prevailing market conditions, we sought an updated cost estimate from the PEC construction contractor.

Based on the updated cost, the forecast capex for the transmission line upgrade (the incremental cost between 330kV and 500kV) is [REDACTED] million.

Fission assessed the updated cost to be efficient stating:

The revised D&C price equates to [REDACTED] / klm which is low when benchmarked against comparative transmission projects but can be explained as the scope is being delivered under an overarching project and there-for shares indirect job costs including supervision and site facilities. Provision for this observation is provided within the recommended Other Construction Costs range.

We estimate that the cost saving to consumers from of undertaking the PEC enhancement approximately \$697 million. We have included design and construction and Other Construction costs based on advice from Fission. These are discussed in Section 3.1.3.6.

In order, however, for the PEC construction contractor to undertake the enhancement work by 2026, we require the AER to approve the cost of these 'enhancement' work as part of VNI-W CPA-1. In the absence of the AER's approval, we would not be funded to undertake this work and therefore could not reasonably be required to undertake it. This would disadvantage consumers, who would then face higher costs associated with undertaking these activities separately at a later time.

3.1.3.2. Route alignment changes

Alignment and tower location changes are required to the Dinawan to Wagga Wagga section of transmission line based on responses from stakeholders on our Environmental Impact Statement (EIS) application and would not have been required if this section of the line remained at 330KV. These changes, which involve revisions to the centreline alignment and tower locations have emerged from land-holder consultation and are necessary to:

- enable easement negotiations with landholders to be finalised

- reduce impacts to biodiversity and heritage, and
- improve safety in close proximity to roads and engineering constraints.

The forecast capex for the alignment changes is [REDACTED] million. This reflects the additional 3.58km of route length and 11 additional towers required as a result of the alignment changes. This forecast capex is based on the expected cost provided by [REDACTED]

3.1.3.3. 330kV line diversion

A modification is required to the Dinawan 330kV switching station on L5 transmission outgoing line to accommodate the future construction of a 500kV Dinawan substation extension substation without any outages on the 330kV PEC lines. The line deviation must:

- provide sufficient electrical clearances surrounding the future 500kV substation site allowing greenfield construction adjacent to the live 6L and 6J lines, and
- ensure the deviation alignment allows for the future 500kV gantries, ensuring the entry angles to the 500kV gantries are not violated.

The forecast capex for the 330kV line diversion is [REDACTED] based on a pre-agreed variation under the [REDACTED], dated 13 July 2023.

3.1.3.4. Property compensation

The increase in capacity from 330kV to 500kV increases our property compensation costs for 72 properties. The compensation offers to the property owners associated with the 330 kV transmission line was \$20.47 million, however the settlement amount for the 500kV enhancement is \$39.63 million. The difference of \$19.16 million relates to the directly to the PEC enhancement work.

To date, we have made compensation payments to 70 of the 72 property owners. Therefore, the majority of the costs reflect our actual costs.

The final compensation amounts reflect the site-specific surveys and valuations. In some cases, these varied significantly from the initial compensation offers, which were based on desktop surveys. JLL, in their letter dated 7 June 2022, outline that the reasons for the change in compensation assessments has been driven by:

- the significantly larger tower footprint for 500 kV towers, increasing the value rates
- increase in land value over the time period between initial assessments and the 500 kV assessments
- greater visual impact of the 500 kV transmission lines, and
- greater number of dwellings impacted by audible noise from the 500 kV transmission line.

3.1.3.5. Biodiversity offset liabilities

Increasing the transmission line from 330 kV to 500 kV requires an associated increase in easement width from 60 meters to 80 meters. This represents a 33 per cent increase in the disturbance footprint for the transmission line. WSP estimate that the biodiversity offsets costs will increase by \$10.12 million as based on a proportional increase of the total offset liability:

- 33 per cent disturbance footprint increase x 22 per cent of the PEC route (Dinawan to Wagga Wagga section) = 7.26 per cent disturbance footprint increase
- 7.26 per cent x \$139.48 million (total assumed biodiversity offset budget) = \$10.12 million.

3.1.3.6. Project contingency

There is a level of complexity specific to VNI West and additionally a complexity inherent to all major projects. Major projects are considered to have a higher risk profile due to the number of interfaces and complexities both internally to manage the delivery of the project and externally to manage key stakeholders.

The impact of these complexities is evident in the performance of recent major projects and often related to exposure of these projects to abnormal contractor delivery challenges, resulting in substantial claims including Westgate Tunnel, Melbourne Metro, Sydney Metro City and South-West, Inland Rail, WestConnex and NorthConnex.

The current market is characterised by:

- an unprecedented number of infrastructure projects (> 200B in NSW and VIC government infrastructure projects in 4 years to FY2027) including >20B pipeline of Australian transmission line projects to be delivered in the ISP target timeline.
- ongoing market challenges due to insufficient labour market capacity, global supply chain security and inflationary pressures on construction costs.
- contractor distress on recent traditional fixed price D&C lump sum projects which has shifted the risk appetite of the market including Snowy Hydro 2.0 and PEC, and
- increases in the price of raw materials, such as steel, copper and aluminium which are set by international markets, are forecast to increase.

The AER's guidance note on the regulation of actionable ISP projects states that it can accept a project risk allowance by assessing the residual risks identified by the TNSP, and the efficiency of the associated cost estimates, i.e., the consequential cost adjusted to reflect the likelihood of occurrence.²⁵

The infrastructure industry over the past decade has matured in its approach to contingency estimating. It is now standard practice for organisations managing major projects to allow for project contingency costs within a reasonable and transparent framework. Contingency costs are needed to allow the business to address unexpected expenses or risks that may arise during the project's implementation and thereby facilitate the smooth execution of these projects.

Fission has assessed the PEC enhancement scope of work and associated costs included in this Stage 1 Application and finds that:

... the following Risk Contingency ranges to be (a) for the Design and Construct Contractor risk, consistent with typical Contractor risk provisions, and (b) for the Other Construction Costs, consistent with the AACE Guidance provisions.

- *Design and Construct Contractor Risk Contingency @ 10%. Fission assess Contractor has included some risk provision within their cost estimate but recommend Transgrid allow an additional [REDACTED] ... D&C risk contingency.*
- *Other Construction Costs on the D&C value @ 15% to 25%. Fission recommends that [REDACTED] be applied to the Design and Construction Contract Value; [REDACTED] for potential contract changes and [REDACTED] for observations here-in.*

Based on an independent advice from Fission, we have included:

²⁵ AER, *Regulation of actionable ISP projects*, Guidance note, March 2021, pp 16-17.

- a [REDACTED] Design and Construct contingency on the updated contract cost for the PEC enhancement cost of \$11.21 million

This is calculated as: [REDACTED] x [REDACTED] million = \$11.21 million.

- a [REDACTED] owners' contingency to the PEC costs [REDACTED] million, which comprise:
 - the PEC enhancement cost of [REDACTED] million
 - the alignment changes of [REDACTED] million
 - the 33kV line diversion cost of [REDACTED] million
 - the property compensation cost of \$19.16 million, and
 - environmental offset costs of [REDACTED] million.

This is calculated as: [REDACTED] x [REDACTED] million = \$57.60 million.

3.1.4. Humelink Gugaa substation Integration Works

Humelink involves the construction of the 500/330kV Substation at Gugaa by 2026. The VNI West Project involves integrating the 500kV PEC enhancement with the Gugaa 500/330kV Substation which is being built as part of Humelink. Without these integration works, the 500kV PEC enhancement, and therefore VNI West, will not be connected to broader transmission network. The integration works involve:

- upgrading two 330kV transmission lines being constructed as part of Humelink to connect Gugaa and Wagga Wagga to 500kV. This will connect the 500kV PEC enhancement (discussed above), which finishes at Wagga Wagga, to Gugaa substation where it will interface with Humelink, and
- expanding the size of Gugaa substation, allowing the connection of the two 500kV transmission lines (i.e., the PEC enhancement that is occurring as part of VNI West) to Gugaa by adding:
 - Two new 500kV switchbays and busbar diameters
 - A new 500kV transformer and associated switchbays

The cost of the integration and expansion works at the Gugaa substation is set out as a Separable Portion and pre-agreed variation under the contract with our Humelink delivery partner.

Undertaking this work as part of the Humelink project, with a single Principal Contractor (i.e., the Humelink Delivery partner) will benefit consumers by reducing Project risk, driving cost efficiencies, and supporting the 2028 target delivery date for VNI West.

In particular, appointing a single Principal Contractor (i.e., the Humelink Delivery partner) to deliver these integration works, which are in close proximity to the investment works to be carried out for Humelink Stage 2, will assist to:

- reduce costs by having a single contractor's mobilisation costs
- improve accountability and mitigate risk of coordination and interface issues with respect to project design and drawings between the two investments
- eliminate the need to coordinate amongst multiple contractors and subcontractors on different project components, and streamline stakeholder interaction
- facilitate smoother communication, coordination, and decision-making processes through a centralized point of contact

- promote more efficient resource allocation across the two investment elements, to minimise the potential for delays, and
- avoid the need to undertake multiple asset commissioning and upgrades within 12 months of original build (i.e., if undertaken by a single contractor, assets could be commissioned once).

Our forecast capex for the Gugaa integration is based on a pre-agreed variation with our Humelink delivery partner of [REDACTED] million. We have adjusted this cost for contingency based on advice from Fission who found that:

Typical Design and Construct Contractor contingency would range between 5% to 10% of the contract value for a well-defined project where-in the Contractor assumes typical industry risk allocation. Owners Contingency would typically range between 12% to 15% of the total out-turn cost (Design and Construction Cost plus Owners Costs).

There are however several market constraints which are impacting these typical norms. These include:

- *Gugaa VNI West Project comprises brownfield interface with live substation,*
- *Contractor's price is budgetary*
- *Geotechnical investigations and information is limited*
- *The continued effects of COVID and Ukraine War on constraining global supply chains (with Transgrid free issuing primary equipment)*
- *The strength of the Australian Economy and interest rates and the high, and*
- *Competition of transmission power projects across Australia.*

Accordingly, we consider the following Risk Contingency ranges to be (a) for the Design and Construct Contractor risk, consistent with typical Contractor risk provisions, and (b) for the Other Construction Costs, consistent with the AACE Guidance provisions.

- *Design and Construct Contractor Risk Contingency @ 10% to 12%.*
- *Other Construction Costs @ 25% to 40% (applied to the Design and Construction Contract Value).*

We calculated contingency costs by increasing contract costs of [REDACTED]

The total forecast capex for the Humelink Gugaa upgrade is \$168.97 million, based on

- *a pre-agreed variation contract variation cost of \$165.20 million (including contingency of \$52.88 million)*
- *storage costs of \$1.10 million, and*
- *land purchase costs of \$2.67 million.*

We estimate that the cost saving to consumers from of undertaking the Gugaa integration works as Part of our Stage 1 CPA to be approximately \$90 million.

We recognise that the regulatory process relating to our Contingent Project – Stage 2 delivery Application for Humelink has yet to conclude, and so our Final Investment Decision (FID) has yet to be confirmed. Notwithstanding this, in order to meet the required timing for Humelink we are proceeding on the basis

that the regulatory process will result in the revenues required to enable us to make a positive FID, and therefore that the incremental integration works to connect VNI West into the new Gugaa substation will be required. The expected timing of our investment in Humelink means that these integration works are expected to occur as part of Stage 1 of VNI West. We consider it appropriate to include these integration works as part of this Stage 1 Application, rather than lodging a further Application following our FID for Humelink.

3.1.5. Pre-construction development activities

To meet the 2028 target project completion date, detailed design and construction needs to commence as soon as possible following approval for our Stage 2 (Delivery) Application. This, in turn, requires that the following are finalised as part of pre-construction early works activities:

- concept design for substations and transmission lines
- equipment specifications, and
- quantities of plant and materials.

The pre-construction activities to achieve the above include:

- project management and related costs
- management plans and documentation
- resources and scheduling
- procurement
- design activities (inclusive of Site Surveys, etc.), and
- permits and stakeholders.

AECOM has provided cost estimates for the pre-construction project development activities listed above. This has been provided as a percentage of the expected total cost of a transmission project, subject to major construction contractors being engaged, including for detailed design, planning, procurement (other than for major LLE), construction and commissioning. AECOM has assumed that ‘the contractors are experienced in the industry and based in Australia’. This represents only the pre-construction work and costs necessary to be included in Stage 1. AECOM has estimated 4.43 per cent for the required pre-construction costs (for transmission lines and substations in total for VNI West²⁶).

Importantly, this approach is consistent with the approach that we proposed, and the AER accepted for our Stage 1 (Part 1) Application for Humelink.

The expected contract price for transmission lines and substations is based on the Option 5A PACR estimates. The estimated contractor costs are lower than the respective substation and transmission line costs shown in the PACR²⁷ because the PACR values include long lead equipment costs and our apportioned labour and indirect costs. The PACR costs are based on our MTWO cost estimating data base actual outturn costs built up over more than 10 years from:

- Period order agreement rates and market pricing for plant and materials
- Labour quantities from recently completed project, and

²⁶ See: Direct Non-Labour Model, ‘Substation’ sheet and ‘Lines’ sheet, *Item 1: AECOM advice*.

²⁷ [VNI West PACR](#), May 2023. See Table 6: Our substation costs align with the NSW portion of the “Substation/ terminal station works” plus “Power flow controllers/ series compensation” line items and our transmission line costs align with the NSW portion of the “Line works” line item.

- Construction tender and contract rates from recent projects.

The contract costs for VNI West are expected to be around:

- [REDACTED] million (Real 2021) or [REDACTED] million (Real 2023) for transmission lines, and
- [REDACTED] million (Real 2021) or [REDACTED] million (Real 2023) for substations.

We then calculate the pre-construction development costs as follows:

- (Transmission Line costs [REDACTED] + Substation costs [REDACTED]) x [REDACTED] = \$49.40 million

For the purposes of allocating capex to the respective transmission line and substation asset classes, we have used the [REDACTED] percentage as follows:

- transmission line costs [REDACTED] x [REDACTED] = \$32.63 million, and
- substation costs [REDACTED] x [REDACTED] = \$16.77 million.

Our total forecast pre-construction development capex is \$49.40 million comprising \$32.63 million for transmission lines and \$16.77 million for substations.

Our pre-construction development capex forecast is based on:

- the estimated contract price for transmission lines and substations. The contract cost is based on the costs in the PACR for substations and transmission lines, less long lead equipment costs and apportioned Transgrid labour and indirect costs, and²⁸
- independent advice from AECOM on the expected pre-construction costs (for both transmission lines and substations) as a percentage of the total contract price.

3.2. Forecast capex for land and environment

3.2.1. Biodiversity Offsets

Biodiversity offsets are conservation actions intended to compensate for the impact on biodiversity caused by projects to ensure there is no net loss of biodiversity arising from the activities that occur during and after construction.

The Biodiversity requirements, under the Biodiversity Conservation Act 2016, in NSW involve the following for developments with significant impact on biodiversity:

- avoid biodiversity impacts through selection and design to minimise our footprint
- mitigate biodiversity impacts through our management measures such as partial clearing, and
- offset biodiversity impacts by setting up stewardship sites, purchasing credits or paying directly into the Biodiversity Conservation Fund (BCF)

Prior to commencing construction, we must demonstrate that we have acquired the required biodiversity credits to offset the impact of the Project. We can achieve this by either:

- providing a bank guarantee equal to the value of paying the total liability into the BCF. This is the higher cost option, or

²⁸ VNI West PACR, May 2023. See Table 6: Our substation costs align with the NSW portion of the “Substation/ terminal station works” plus “Power flow controllers/ series compensation” line items and our transmission line costs align with the NSW portion of the “Line works” line item.

- establishing biodiversity stewardship sites using BSAs. While these are a lower cost option compared to paying into the BCF they take between 2-3 years to establish, because they require:
 - identification of appropriate land with the relevant flora and fauna, and
 - establishing agreements with local landholders to develop stewardship sites on that land.

Establishing stewardship sites as part of Stage 1 will therefore minimise costs to consumers and assist to meet the target delivery date. The omission of cost for biodiversity offsets was a key learning from our Stage 1 (Part 1) Application for Humelink.

Biodiversity Specialists, WSP, have prepared an independent offset liability approach which is consistent with the cost analysis it completed for the Offset liability calculation for PEC. This approach uses actual Biodiversity Conservation Fund (BCF) credit prices from 2022.

To identify the likely Biodiversity costs, WSP conducted a desk-top analysis of the potential corridors using publicly available information from NSW State-based regional mapping tools. The studies identified the plant community types are grassland or low height communities and therefore are unlikely to have any operational impact or credit liability. Their assessment assumed the following construction and operational footprints:

- an indicative centreline of the Corridor Option 1 area as at 2 June 2023²⁹
- 80m wide transmission line easement
- 500m spaced towers with 80m x 80m full construction footprints
- 20 m wide full construction centreline clearing within the transmission line easement
- partial impacts in the residual 30m easement either side of centre line clearing, and
- no associated ancillary construction facility impacts or access tracks.

Our forecast capex is based on the WSP cost estimate of \$67.12 million, which comprises:

- land value of \$10.00 million
- perpetuity management of \$10.00 million
- payments into the Biodiversity Conservation fund of \$29.76 million
- a 20 per cent risk cost of \$27.36 million based on a forecast worst case offset liability of \$136.80 million for credit liability not sought through BSAs, and
- less \$10.00 million for the residual liability and establishment costs which are expected to be incurred after EIS approval in Stage 2.

3.2.2. Land access and easement acquisition

VNI West requires the acquisition of easements over a 200 km segment of transmission line between Dinawan and the Victorian border north of Kerang. Securing access to land is a critical Stage 1 (early works) activity, so that construction can start as soon as possible following the approval of Stage 2. Our forecast land access and easement acquisition capex is \$30.73 million, which comprises 3.45 per cent of the total direct capex forecast.

²⁹ WSP PS135761-Eco Offsets 001 Rev B VNI Corridor 1 offset liability review, p2 – p3

Based on our desktop assessments we have identified around 150 landholdings along the indicative route, which includes a range of compensable interest including freeholders and leaseholders. The route is currently being refined and door-to-door assessments have yet to commence.

Our property acquisition process is guided by the NSW *Land Acquisition (Just Terms Compensation) Act 1991*. Under the Act, acquisition can be by agreement or compulsory acquisition. The acquisition process must be a fair and transparent process with appropriate engagement and negotiation undertaken before compulsory acquisition can be considered as a last resort.

Figure 3-1 overviews the process for acquisition by negotiation with landowners.

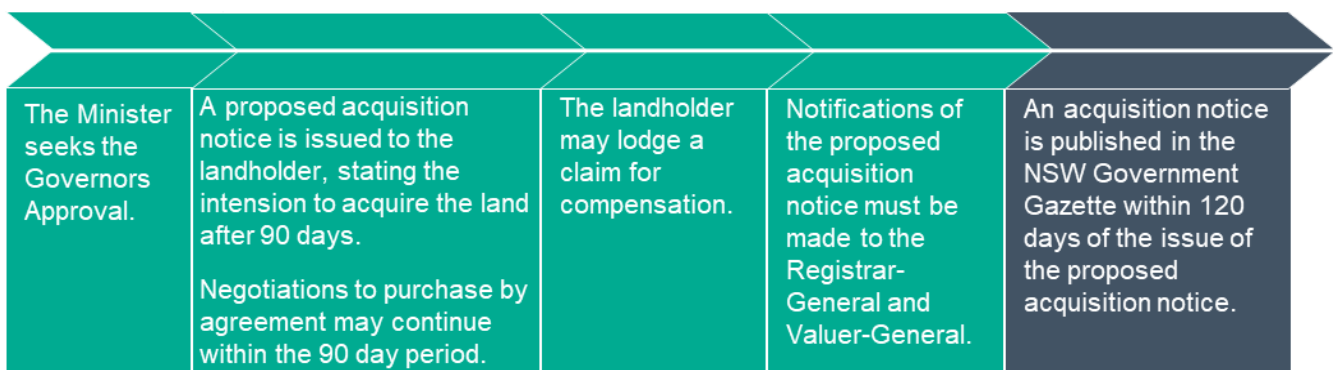
Figure 3-1: Acquisition process by negotiation with landholder



To align the timing of funding approval and construction site access, we will seek to negotiate and enter into property option agreements with willing landholders. These conditional contracts are an agreement for us to acquire an easement over the land at a pre-agreed value at a future date. This approach will deliver greater certainty for the implementation costs of the Project and will reduce the time to access site for construction once funding is approved.

If an agreement cannot be reached, we have the option of compulsory acquisition under the *Land Acquisition (Just Terms Compensation) Act 1991* (JTC Act) with the approval of the Governor. The Act sets out a process that must be followed. The compulsory acquisition process is generally as shown in Figure 3-2.

Figure 3-2: Compulsory acquisition process



The key success factors for land acquisition are:

- early landholder consultation, prudent land valuations and genuine negotiations to minimise compulsory acquisition
- accurate and efficient refinement of the easement corridor to specific property requirements
- certainty of property costs prior to Stage 2, and

- alignment of the land acquisition schedule with construction site access to avoid delays and contract disputes.

We have engaged independent experts JLL to assist us estimate the potential costs of securing land access and acquiring easements. JLL’s advice has been informed by recent experience with PEC and other high voltage transmission line projects under development in NSW and Victoria.

JLL in its report titled ‘Budget Forecasts for Land Access Payments – CPA1 Funding’ has estimated the costs of the following activities required for each landholder:

- land access consent fees, payable upon execution of a ‘land access consent’
- professional advice fees for review of the land access consent
- option fees, payable upon execution of an option for easement
- payment of fees incurred by landholders for professional advice, such as their legal and valuation fees
- caveat on title registration fees
- stamp duty liability payment within 3 months of entering option agreements
- transfers granting easement, for early acquisition compensation payments for some landowners
- Valuer General fees for compulsory acquisitions
- compensation funds which are required to be held in Trust until the acquisition has reached agreement of settled
- construction accommodation and laydown lease payments, and
- expected payments for damages during survey, caretaker costs and other incidentals.

All figures as quoted below are excluding any GST.

The forecast capex for land acquisitions is summarised in Table 3-5.

Table 3-5: Forecast capex for early works land acquisitions (\$M, Real 2022-23)

Category	Millions
Biodiversity Offsets	67.12
Land Access Consent Payments	1.50
Professional Advice Fees – Land Access Consent	0.15
Option Fees	2.26
Professional Advice Fees (Legal, valuation, other professional) - Options for Easements	3.75
Caveat on Title – Protect Easement Interest	0.05
Stamp Duty Liability – Option for Easement	2.83
Early Easement Acquisition	██████
Valuer General Fees	0.57
Compensation Funds to be held in Trust Account (Pending Finalisation)	██████

Category	Millions
Accommodation camp and lay down area leases	0.48
Contingency	0.75
Total	97.85

Notes: 1. See Direct Non-labour cost model. 2. Land Valuation includes 0.31 million actual costs.

Further information below is provided to support the forecast costs for each of the above categories.

Land Access Consent Payments

AVP is planning to offer each landholder who agrees to land access for a period of 2 years, a payment of \$10,000 or \$5,000 per year which is paid up front. For consistency across the VNI West project, we will match this commitment. This is consistent with JLL's estimate of \$10,000 per landholder.

Our forecast capex is calculated as follows:

- 150 landholders x \$10,000/landholder = \$1,500,000

Professional Advice Fees – Land Access Consent

It is becoming more common for landholders to seek legal advice before entering land access agreements. AVP has advised it is planning to offer up to \$1,000 per landholder for this legal advice. For consistency across the VNI West project, we will match this commitment. This is consistent with JLL's estimate of \$1,000 per landholder.

Our forecast capex is calculated as follows:

- 150 landholders x \$1,000/landholder = \$150,000

Option Fees

The Project requires the acquisition of easements over a substantial amount of land that impacts many landholders. To ensure site access as soon as possible, we need to establish early option agreements to secure future acquisitions, and to commence any compulsory acquisition process prior to FID.

The current route has approximately 150 landholders in total. Consistent with JLL's estimate, we have established a standard allowance for option fees for private land holders. This is based on section 7.3 of our Property Acquisition Compensation Principles for NSW Major Projects. JLL has assumed 75 per cent of the 150 total landholders enter into an option (i.e., 113 Landholders) at \$20,000/Option fee.

Our forecast capex is calculated as follows:

- 113 landholders x \$20,000/landholder = \$2,260,000

Professional Advice Fees

We are required by the JTC Act to compensate landholders for their legal and valuation costs. We have allowed for 150 landholders requiring legal advice and valuations at \$25,000 per landholder based on JLL's estimate.

Our forecast capex is calculated as follows:

- 150 landholders x \$25,000/landholder = \$3,750,000

Caveat on Title – Protect Easement Interest

Upon entering an Option for Easement (Option), our interest will not be shown on the property title until the easement is formally acquired and registered (which may take a few years).

To protect Transgrid's unregistered interest under the Option, we will prepare and register a caveat on the landholder's property title immediately following entry into the Option. This is a safeguard mechanism that will ensure all incoming purchasers or transferees enter into an appropriate agreement, honouring the existing terms of the Option.

Caveats are registered at the Land Registry Services. JLL has estimated \$400 per landholding. Assuming 75% of the total 150 landholders (i.e., 113 landholders) enter into an Option, the total estimated cost is \$45,200.

Our forecast capex is calculated as follows:

- 113 landholders x \$400/landholder = \$45,200

Stamp Duty Liability – Option for Easement

Stamp duty is payable on Options and must be paid within 3 months of entering into the agreement. In the event the Option is not exercised, we may apply for a refund of the duty amount paid. JLL has advised a total duty liability and legal cost at \$25,000 per Option.

Assuming 75% of the total 150 landholders (i.e., 113 landholders) enter into an Option, the total estimated cost is \$2,825,000.

Our forecast capex is calculated as follows:

- 113 landholders x \$25,000/landholder = \$2,825,000.

Valuer General fees

Valuer General fees are necessary for a determination on the compensation to be paid to each landholder for establishing easements resumed under compulsory acquisition.

A forecast of these costs requires consideration of the following three factors:

- the number of properties estimated to require compulsory acquisition during CPA-1
- the Valuer General Fee per property
- the % of total land holders who are expected to pursue compulsory acquisition. As noted above,
 - the number of landholders is 150
 - 25% of these landholders are expected to require compulsory acquisition.
 - This means that the expected number of private properties requiring compulsory acquisition is 38.

JLL's estimated Valuer General Fee per property is \$15,000.

Our forecast capex is calculated as follows:

- 38 landholders x \$15,000/landholder = \$570,000

Early Easement Acquisition

Based on JLL's recent project experience with PEC and other NSW and Victoria 500kV transmission projects (see Table 1.0 of JLL's report) JLL has estimated a land acquisition compensation rate of

████████ km. When applied to the 200km route for VNI West, this is a total of \$60 million. Based on 150 landholders, this will be equivalent to ██████████ per landholder.

It is also estimated that 5 per cent of landholders will seek an early settlement of the easement with compensation payment being required in full.

Our forecast capex is calculated as follows:

- █████ million ÷ 150 landholders = ██████████ per landholder
- 5% of 150 landholders = 8 landholders
- 8 landholders x ██████████ per landholder ██████████

Compensation Funds to be held in Trust Account (Pending Finalisation)

It is a legislative requirement to pay the final compensation offered to the landholder into a trust account pending finalisation of the compulsory acquisition process.

As noted in the Early Easement Acquisition section, JLL forecasts the average compensation per landholder will be ██████████. Based on their experience from other recent 500kV transmission line projects in NSW and VIC, JLL forecast around 25% (38) of landholdings will proceed to compulsory acquisition.

Our forecast capex is calculated as follows:

- 38 landholders x ██████████ = ██████████

Accommodation camp and lay down area leases

We will be required to procure property tenure for the purposes of providing accommodation for the construction camps or laydown areas. For a project of this nature, JLL anticipate four sites will be required. This is based on the practical distances to transport concrete across the project.

Typically, we will enter into a lease and pay upfront the rent costs circa \$100,000 for a two-year period. A total allowance of \$20,000 will be made for the landholder's independent legal and valuation costs, per lease.

Our forecast capex is calculated as follows:

- 4 sites x (\$100,000 + \$20,000) = \$480,000

Contingency

It is prudent to allow a contingency in dealings with landholders for land access and acquisition programs. We anticipate a contingency of around \$5,000 per landholder is prudent to cover items such as crop or fence damage.

Our forecast capex is calculated as follows:

- 150 landholders x \$5,000/landholder = \$750,000

4. Project expenditure profile

The expenditure profile for the CPA for Stage 1 is shown below in Table 4-1. The respective expenditure in the financial years for each category aligns with the high-level delivery timetable and milestones shown in Figure 4-1.

Direct labour and external resources will be engaged to meet the deliverables which are detailed in our Scope definition supporting document, provide with our Application.

Deliverability has been ensured through the development of our Project Implementation Plan for the early works and with the project scheduling and resourcing set up in via our P6 project planning and scheduling software platform. The scope, forecast expenditure and project schedule have been reviewed through our internal and external risk and assurance processes.

Figure 4-1: VNI West delivery timetable and milestones

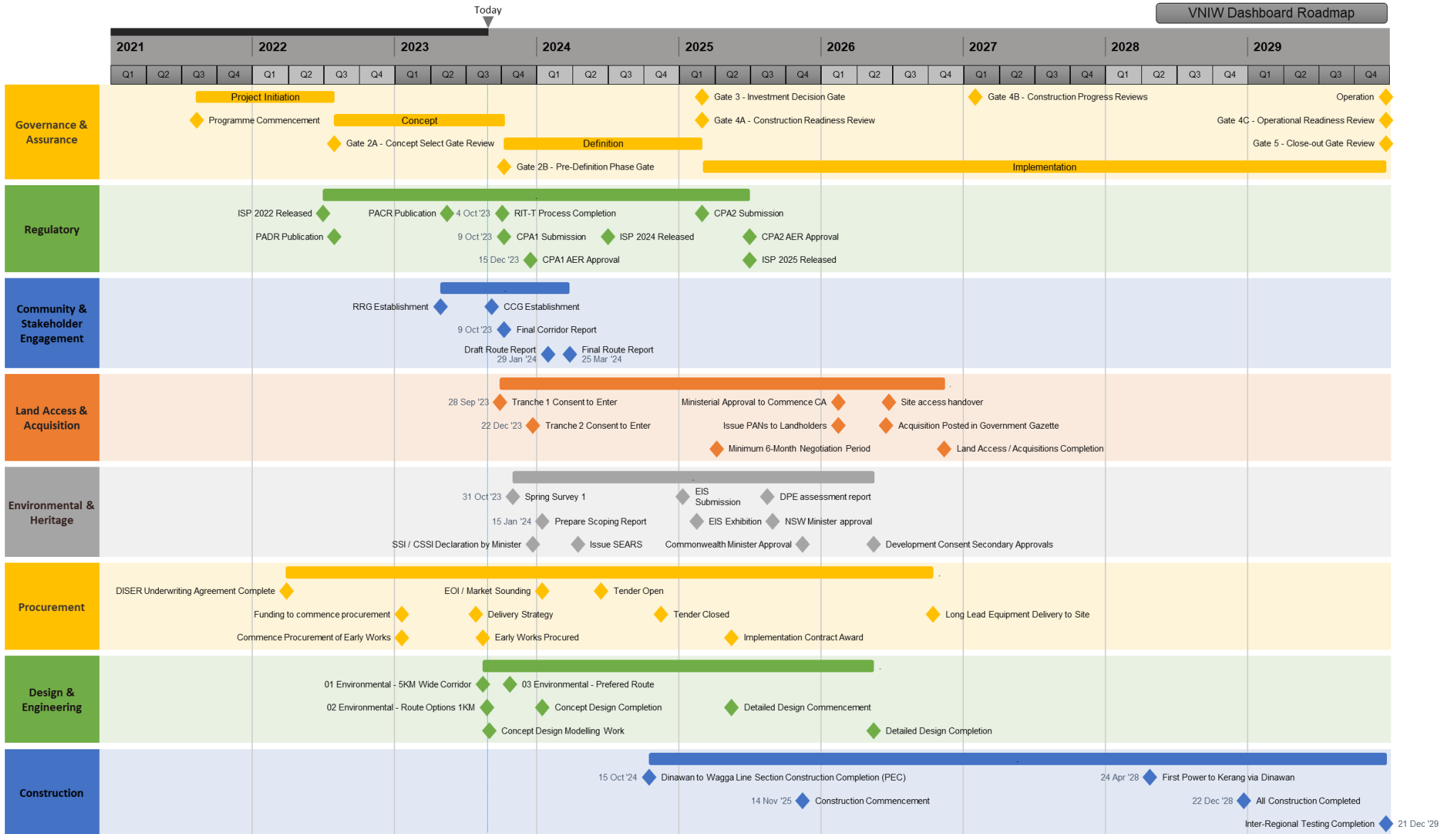


Table 4-1: VNI West Stage 1 CPA expenditure profile (\$M, Real 2022-23)

Category capex	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	Total
Direct capex	-	-	-	-	1.60	52.70	421.59	345.42	69.41	890.72
Procurement	-	-	-	-	1.60	45.43	392.04	290.49	63.31	792.87
<i>Long-lead time equipment (LLE)</i>	-	-	-	-	-	-	97.65	67.93	63.31	228.89
<i>PEC enhancement</i>	-	-	-	-	-	41.77	201.90	101.94	-	345.61
<i>Humelink integration</i>	-	-	-	-	-	-	76.81	92.17	-	168.97
<i>Pre-construction development</i>	-	-	-	-	1.60	3.66	15.69	28.45	-	49.40
Land acquisition	-	-	-	-	-	7.27	29.56	54.92	6.10	97.85
<i>Land acquisition</i>	-	-	-	-	-	7.27	23.46	-	-	30.73
<i>Biodiversity offsets</i>	-	-	-	-	-	-	6.10	54.92	6.10	67.12
Labour and indirect capex	0.00	-	0.15	0.00	6.58	16.11	78.08	104.69	-	205.61
Labour and related costs	0.00	-	0.15	0.00	1.99	6.47	30.65	25.90	-	65.16
<i>Internal project team resources</i>	0.00	-	0.15	0.00	1.99	6.47	30.65	25.90	-	65.16
Indirect Costs	-	-	-	-	4.59	9.64	47.43	78.79	-	140.45
<i>Project management</i>	-	-	-	-	0.64	0.39	3.35	2.52	-	6.91
<i>Project development</i>	-	-	-	-	1.88	1.68	9.01	24.83	-	37.41
<i>Land and environment</i>	-	-	-	-	0.19	0.52	7.99	9.08	-	17.78
<i>Procurement</i>	-	-	-	-	-	0.04	1.95	20.71	-	22.69
<i>Community & stakeholder engagement</i>	-	-	-	-	0.23	0.66	4.63	1.10	-	6.63

Category capex	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	Total
<i>Regulatory approvals and other support costs</i>	-	-	-	-	1.63	6.35	19.56	19.84	-	47.38
<i>Contingency (indirect only)</i>	-	-	-	-	-	-	0.92	0.72	-	1.64
Total Capex	0.00	-	0.15	0.00	8.18	68.81	499.68	450.11	69.41	1,096.33

5. Abbreviations

The following abbreviations are used in this Stage 1 Application.

Abbreviation	Definition
2022 ISP	Final 2022 Integrated System Plan
AACE	Association for the Advancement of Cost Engineering
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
AVP	AEMO Victoria Planning
BCF	Biodiversity Conservation Fund
BSA	Biodiversity Stewardship Agreement
capex	capital expenditure
CPA	Contingent Project Application
D&A	Development and approvals
D&C	Design and construction
EIS	Environmental Impact Statement
FID	Final Investment Decision
ISP	Integrated System Plan
JTC Act	Land Acquisition (Just Terms Compensation) Act 1991
kV	kilovolt
LLE	Long Lead Equipment
MAR	Maximum allowed revenue
NEVA Order	National Electricity (Victoria) Act 2005
NPV	Net present value
NSW	New South Wales
PACR	Project Assessment Conclusions Report
EnergyConnect or PEC	Project EnergyConnect
PTT	Powering Tomorrow Together
REZ	Renewable energy zone
RIT-T	Regulatory Investment Test for Transmission
Stage 1 Application or CPA-1	Contingent Project Application for early works

Abbreviation	Definition
Stage 2 Application or CPA-2	Stage 2 Contingent Project Application for delivery
VNI PACR	VNI West Project Assessment Conclusions Report
VNI West or the Project	Victorian to New South Wales (NSW) Interconnector West
VRE	Variable renewable energy