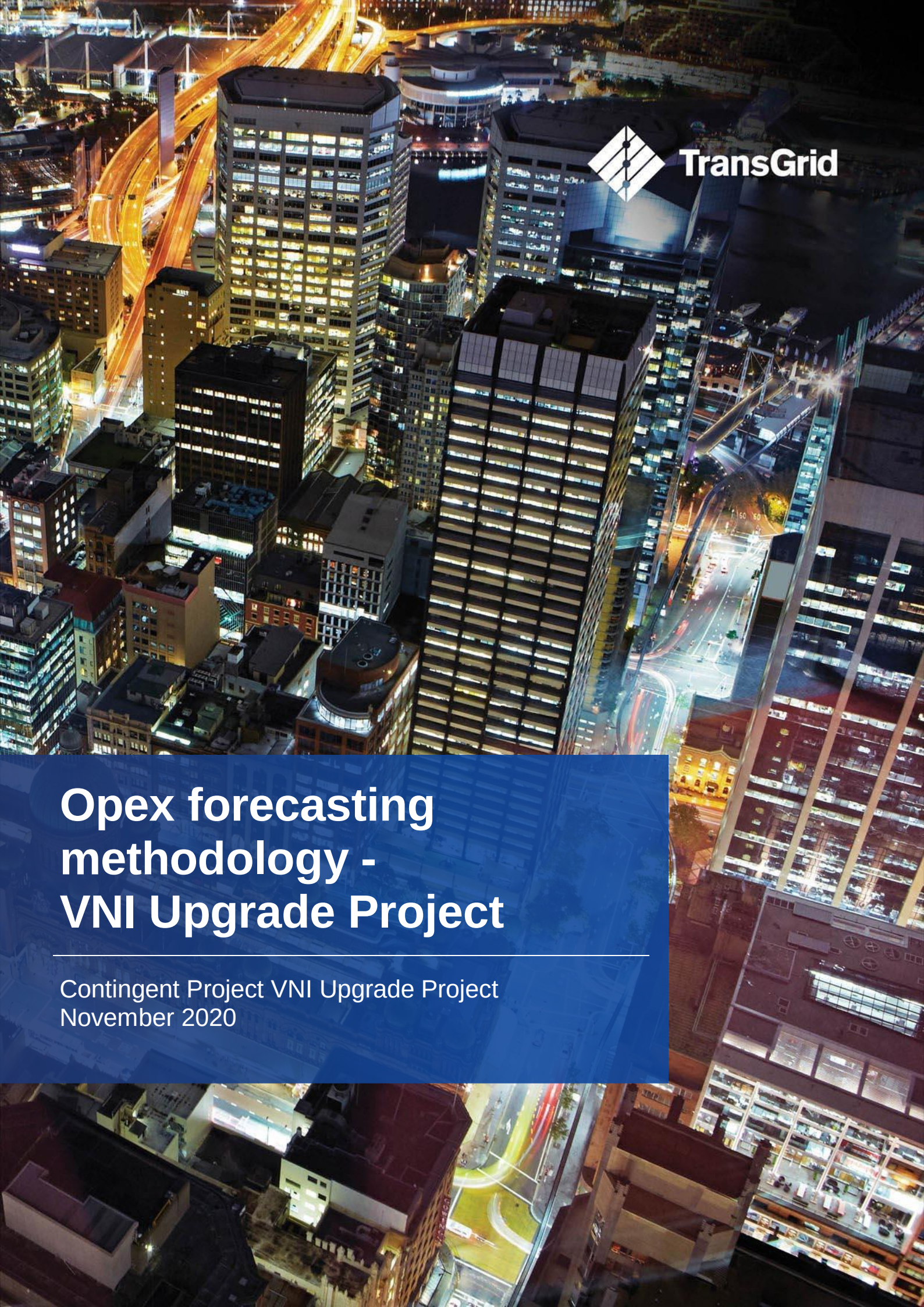

TransGrid

Opex forecasting methodology - VNI Upgrade Project

Contingent Project VNI Upgrade Project
November 2020

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1. Purpose, structure and scope of this document

1.1 Purpose of this document

This document sets out our incremental operating expenditure (opex) forecast for the VNI Minor Upgrade Project (the Project or VNI) for the 2018-19 to 2022-23 (2018-23) regulatory period. It also explains the key steps to develop and validate the opex forecast.

Opex is the operating, maintenance and other non-capex (i.e. insurance costs) that we incur to provide prescribed transmission services to our customers.

This document supports our Contingent Project Application (Application) for VNI and should be read in conjunction with our Application.

Unless otherwise specified, all dollar values in this document are in real 2017-18 dollars, consistent with the 2018-23 Revenue Determination, and are expressed in total costs (i.e. direct costs plus real input cost escalation and any overheads).[1]

1.2 Structure of this document

The remainder of this document is structured as follows:

> section 2 summarises our forecast incremental opex for VNI, and

> section 3 explains our forecasting methodology for determining incremental opex for VNI.

1.3 Scope of this document

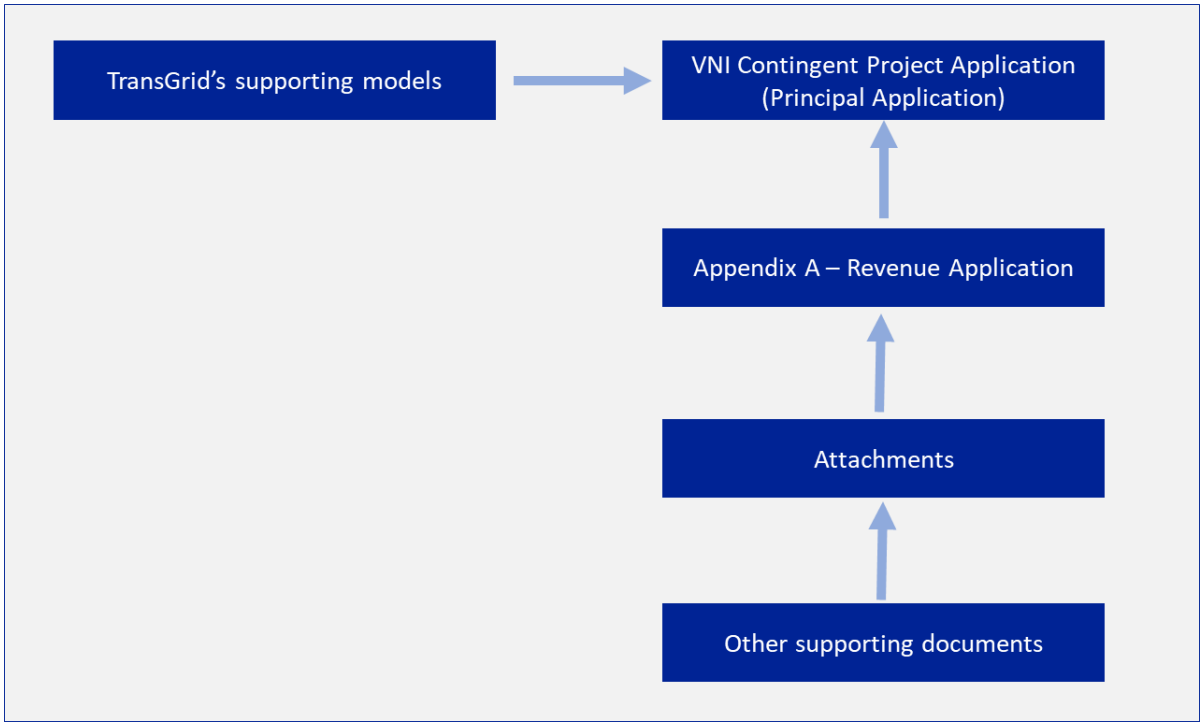
The scope of the document is limited to forecast opex for VNI. This document does not explain or justify our capital expenditure (capex) for VNI. This is done in a separate document entitled VNI Capex Forecasting Methodology.

1.4 Structure of VNI Application

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

[1] Consistent with the opex model adopted by the Australian Energy Regulator (AER) in its 2018-23 Revenue Determination, we have treated real 2017-18 dollars as being in *end of* year terms and nominal dollars as being in *middle of* year terms. Throughout the document numbers shown in tables may not add due to rounding.

Figure 1.1: VNI Contingent Project Application document structure



The attachments and supporting models that, together with this document, comprise our Application are detailed in section 1 of our Principal Application.

2. Summary of forecast incremental opex for VNI

Forecast incremental opex required for VNI for the 2018-23 regulatory period is $2.04 million. We used a bottom-up build to determine our incremental opex. In particular, we have forecast opex for each relevant category of opex, as detailed in the AER's Annual Regulatory Information Notices (RIN):

- operating and maintenance costs for major works – these costs are estimated based on the routine inspection maintenance regimes as per the proposed maintenance plans for power flow converters, switchbay, and transmission lines
- property related expenses – such as council rates, water and electricity which are expected to be negligible, and
- insurance expenses – that covers the expected insurance premiums for the period following the commissioning of VNI.

We have also:

- applied the labour escalation rates approved by the AER in its 2018-23 Revenue Determination to account for changes to real labour costs, and
- added benchmark debt raising costs. These costs have been calculated using the same approach applied by the AER in its 2018-23 Revenue Determination, as reflected in the post-tax revenue model (PTRM).

Table 2.1 sets out forecast incremental opex for VNI by expenditure category.

Table 2.1: Incremental forecast opex for VNI for the current regulatory period, ($M, Real 2017-18)

	2018-19	2019-20	2020-21	2021-22	2022-23	Total
Operating & Maintenance (excluding labour escalation)	-	-	-	1.72	0.08	1.79
Property	-	-	-	-	-	-
Insurance	-	-	0.04	0.08	0.08	0.21
Real input cost escalation	-	-	-	0.00	0.00	0.00
Debt raising costs	-	0.00	0.00	0.01	0.02	0.03
Total		0.00	0.04	1.81	0.18	2.04

Table 2.2 sets out the forecast incremental opex for VNI by component, together with a summary of the basis of the forecast. Table 2.2 shows that forecast incremental opex does not include incremental expensed overheads or project risk costs.

Table 2.2: Forecast incremental opex for VNI by component ($M, Real 2017-18)

Opex Item	$M	Basis for Forecast Expenditure
Operating and maintenance expenditure (excluding labour escalation)	**1.79**	Current maintenance activity unit rates multiplied by projected volumes of activities and third party maintenance of the power flow converter devices
Property	**-**	Expected to be negligible
Insurance	**0.21**	Based on independent insurance report
Real input cost escalation	**0.00**	Labour escalators approved in the AER's 2018-23 Revenue Determination have applied to the labour component of the unit rates
Project risks	**-**	No incremental project risk costs have been included in the incremental opex forecast
Overheads	**-**	No incremental expensed overheads have been included in the incremental opex forecast[2]
Debt raising	**0.03**	The benchmark approach used in the AER's 2018-23 Revenue Determination has been applied to calculate debt raising costs
Total incremental opex	**2.04**	

Forecast incremental opex for VNI is prudent and efficient having regard for the opex objectives, criteria and factors in the National Electricity Rules (NER). This is demonstrated by:

> the rigorous, well-defined and transparent opex forecasting methodology set out in this document, and

> the alignment of forecast opex for VNI with forecast capex for VNI. In this way, forecast incremental opex is aligned with our corporate objectives and governance framework and process.

[2] That is, we have not included incremental costs from increasing our overall maintenance program, such as works scheduling, tools or training.

3. Opex forecasting methodology

This section explains and justifies the forecasting methodology used to determine our incremental forecast opex for VNI.

3.1 Choice of "bottom-up-build" forecasting method

We have used a bottom-up build to forecast incremental opex for VNI. This approach:

- is consistent with the approach used to derive our internal budget for VNI over the remainder of the current regulatory period
- reflects the AER's preferred approach for how it would like us to prepare our opex forecast[3]
- is consistent with the approach accepted by the AER for all contingent projects to-date, and
- is consistent with the approach used to forecast incremental opex for the QNI minor upgrade project contingent project application submitted to the AER on 17 January 2020.[4]

A bottom-up build approach allows for a more precise estimate of the required incremental opex for VNI.

3.2 Alignment with the capex forecast for VNI

Our incremental opex forecast for VNI aligns with our capex forecast for VNI:

- operating and maintenance activities are assumed to begin once capital assets are installed (namely, once all assets are commissioned in December 2021)
- operational insurance coverage will commence[5] once the assets are commissioned (with the premium costs incurred prior to the year of coverage), and
- debt raising costs are assumed to be incurred when new debt is required to fund capital investment.

This alignment ensures that the same considerations which underpin the forecast capex are captured – albeit indirectly – in the incremental opex forecast.

The entire asset life cycle forms part of our ISO55001 Certified Asset Management System. This represents a shift in lifecycle phase from build to operate and maintain. The drivers, objectives and values underpinning the entire asset lifecycle are aligned across our business.

3.3 Robust approach to determining forecast incremental opex

We have applied a two-step process to forecast incremental opex for VNI:

- **step one** involves determining the base expenditure by:
  - multiplying unit rates by forecast volumes for operating and maintenance activities, including a one-off setup cost for third-party maintenance of the power flow converter devices,[6] and

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3 The AER advised us on 18 October 2019 in relation to Project EnergyConnect that it preferred a bottom-up build approach to forecast incremental opex.

4 TransGrid, 17 January 2020, *Opex forecasting methodology for the QNI Minor Upgrade Project*.

5 Operational insurance is expected to cover industrial special risks and operational third-party liability. In practice, it would also likely include business interruption insurance. However, as with the QNI Upgrade Project, we have not included that cover in the VNI opex forecast at this stage.

6 Specifically, as the provider of the devices, [redacted] will also be engaged to provide annual maintenance of the devices. Setup of the maintenance agreement with [redacted] includes a [redacted] million cost (Real$2020).

- basing the operational insurance premium costs on the independent expert report.

> **step two** involves applying labour escalators to the base labour expenditure (in step one), as relevant, and adding an allowance for debt raising costs.

This bottom-up build approach reflects the following:

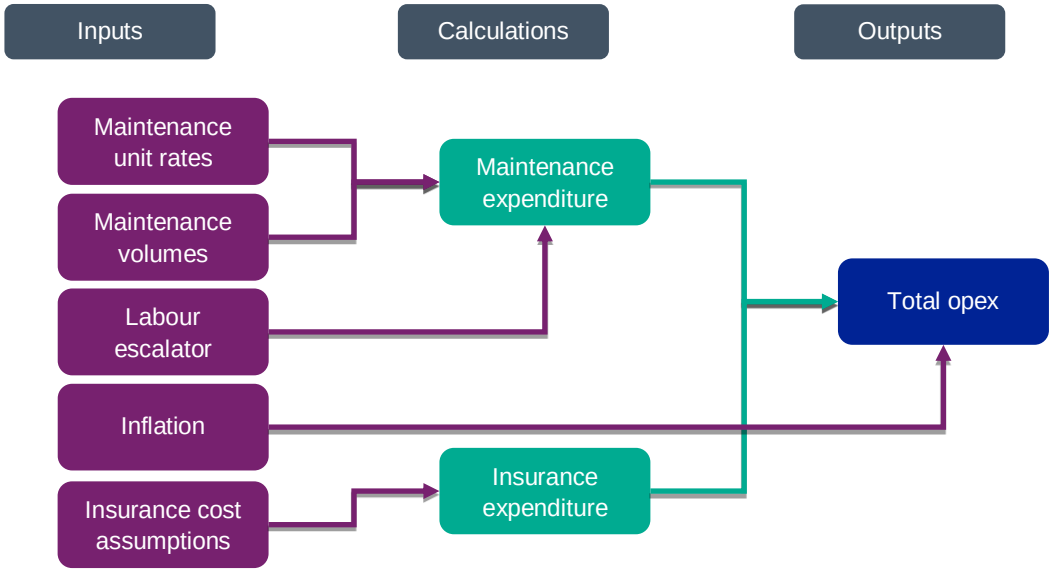
> existing maintenance plans, unit rates, and property ownership costs

> external input as appropriate (e.g. third-party estimates for power flow converter maintenance and insurance premiums)

> real cost escalators and debt raising costs consistent with the AER's 2018-23 Revenue Determination.

This forecasting approach is summarised in Figure 3.2 below.

Figure 3.2: process to determine forecast incremental opex for VNI



Note: debt raising costs, although a component of forecast incremental opex, are not shown. Debt raising costs are calculated within the PTRM, as explained in Appendix A of the VNI Minor Upgrade Application.

3.4 Opex forecasting methodology

VNI involves augmenting existing substations and transmission lines. The detail of this work is set out in the Capex Forecasting Methodology.

Forecast incremental opex is the product of volumes or inputs obtained from VNI and the associated unit costs. The calculations and inputs differ across:

> operating and maintenance expenditure

> operational insurance costs, and

> debt raising costs.

3.4.1 Operating and maintenance expenditure

Operating and maintenance expenditure is based on an assessment of the number and timing of expected operating and maintenance tasks for VNI and the associated unit costs.

Operating and maintenance includes both:

> condition based or defect maintenance, and

> routine maintenance and inspection work.

We expect to incur some relatively minor routine condition based and corrective maintenance and inspection costs from 2021-22, when the assets are in service. Key elements of the forecast routine maintenance opex are:

> warranty inspections on all major components such as the Stockdill substation switchbay

> annual maintenance tasks on the power flow converters as directed by the original equipment manufacturer (OEM)

> engagement of the power flow converter OEM in a Maintenance Support Agreement, and

> end of defects liability period transmission line inspections for the two new structures at the Stockdill substation.

Forecast incremental opex for VNI has been calculated by multiplying current standard unit rates for different maintenance activities by expected quantities of these activities for the regulatory years 2021-22 and 2022-23. The maintenance activities are assigned to four broad maintenance plan requirements as set out in Table 3.1.

Table 3.1: Operating and maintenance activities for VNI

Maintenance plan requirement	Maintenance activity
New maintenance activities	[redacted]
	[redacted]
	[redacted]
	[redacted]
Substations assets maintenance	[redacted]
	[redacted]
Power flow converter	[redacted]
Transmission Line Maintenance	[redacted]

Table 3.2 sets out the key inputs and assumptions used to calculate the operating and maintenance expenditure forecast.

Table 3.2: Incremental operating and maintenance opex for VNI

Item	Description
Unit rates	Unit rates for each maintenance activities combine both standard labour and material unit rates and: > are based on standard jobs for the augmented sites of Yass and Stockdill substations. They are sourced from data in our accounting system (in 2019-20 dollars) and have been converted to 2017-18 dollars > reflect the average actual rates of all employees assigned to labour resource categories (based on the nature of the work performed) which exclude labour on-costs and overhead costs. Actual labour rates reflect our Enterprise Agreement (EA) and individual employment contracts where the EA does not apply > for maintenance of assets that are not currently in our fleet, are based on preliminary commercial information provided by (third-party) suppliers as part of the estimating process.
Quantities	Quantities, or maintenance frequencies, are based on the standard frequencies outlined in our maintenance plan for each asset class under our ISO55001 certified Asset Management System (AMS) and Electricity Network Safety Management System to manage network safety risks to SFAIRP and ALARP. These include substations plant and equipment, and transmission lines.
Escalation and inflation	Real input escalation is applied only to the labour component of the unit rates and is based on the labour escalation rates approved by the AER in its 2018-23 Revenue Determination.[7] This is the simple average of forecasts provided by Deloitte Access Economics and BIS Oxford Economics. The materials component is only escalated by inflation, which is consistent with the AER's 2018-23 Revenue Determination. As the unit rates are current – and so assumed to be in 2019-20 dollars – real labour escalation is applied cumulatively for three years from 2019-20 to 2022-23. Escalated costs have been deflated to 2017-18 dollars using actual inflation for 2018-19 (of 1.59 per cent) and 2019-20 (of -0.35 per cent).[8]
Assumptions	Key assumptions: > no allowance has been made for non-standard assets or design, apart from the power flow converter devices > power flow converter costs converted from US$ to AU$ at an assumed exchange rate of AU$1.53 per US$1 for both contract establishment costs and annual maintenance costs > changes in commissioning dates may have considerable impact on forecast 2021-2022 and 2022-23 costs – as costs could either increase or decrease depending on earlier or later commissioning

[7] Specifically, the labour escalation rates adopted by the AER in the capex model used for that 2018-23 Revenue Determination were adopted. As the AER accepted our revised proposal opex forecast, it did not make a separate determination on labour escalators used for opex forecasting purposes.

[8] Actual inflation for 2018-19 and 2019-20 were taken from the Australian Bureau of Statistics' reported annual inflation to June 2019 and June 2020, respectively, for the weighted average eight capital cities. We have assumed that the unit rates are in *middle of* year terms and so needed to be deflated by 1.5 years of inflation from 2019-20 dollars to give real 2017-18 dollars in *end of* year terms.

Item	Description
	> no allowance for property rates, taxes or rates are included in this estimate as these costs are anticipated to be immaterial, and > based on past experience defect costs have been estimated for substation inspections, thermovision and the bay ancillary warranty maintenance activities as 200 per cent of expected maintenance costs.

3.4.2 Insurance costs

We expect to incur incremental opex associated with insurance premiums for assets required for VNI once they are commissioned. We require three types of insurance for our infrastructure assets including those for VNI:

> industrial special risks – this covers physical loss, destruction or damage to the assets occurring during operation

> business interruption – this covers financial losses resulting from insured industrial special risks, and

> operational third-party liability – this covers legal liability for third party property damage or bodily injury occurring during operation.

All three insurance types are prudent as they cover risks that are both material and that we cannot easily (or cost effectively) avoid. Insurance cover will be required once VNI assets are commissioned (during 2021-22) so the 2021-22 coverage year will be paid prior to commissioning. Further, our insurance premiums for each financial year are paid in the prior September (i.e. nine months before the start of the financial year). This means that premiums for the 2021-22, 2022-23 and 2023-24 coverage years will be incurred during the 2020-21, 2021-22 and 2022-23 financial years respectively.

Our insurance partner, has estimated the costs of insuring VNI during construction and once the assets are operational:[9]

> the construction phase insurance costs are included in the capex forecast (indirect costs). This is explained in the VNI Capex Forecasting Methodology and the Corporate and network overhead forecast document, and

> the operational phase insurance costs are included in the incremental opex forecast for VNI. Note, this does not include business interruption insurance because our insurance provider has not priced the expected premium cost.

Table 3.3 sets out the key inputs and assumptions used to calculate the incremental insurance related opex for VNI, split between industrial special risk and operational third-party insurance. Full details are set out in an independent letter our insurance provider, which is provided as an attachment to this Application.

Table 3.3: Incremental insurance related opex for VNI

Insurance type	Description
[redacted]	> [redacted] > [redacted] > [redacted]

9 [redacted]

Insurance type	Description
[redacted]	> [redacted] > [redacted] > [redacted] > [redacted] > [redacted]

3.4.3 Debt raising costs

We will incur costs for raising the debt required to fund the delivery of VNI. We have adopted the same benchmark approach applied by the AER in its 2018-23 Revenue Determination to determine our debt raising costs for VNI.

Under AER's benchmark approach, debt raising costs for a given year are calculated by multiplying:

> the debt portion of the opening regulatory asset base – calculated as the product of the opening RAB for that year by the 60 per cent gearing assumption, and

> Debt raising cost benchmark – the 8.5 basis point debt raising cost benchmark rate adopted by the AER.

Table 3.4 sets out the key inputs and assumptions used to calculate incremental debt raising costs.

Table 3.4: Incremental debt raising costs for VNI

Item	Description
Forecast debt	This is calculated by multiplying the forecast incremental VNI Project RAB in the PTRM by the assumed leverage ratio (of 60 per cent) adopted by the AER in its 2018-23 Revenue Determination
Debt raising cost	Debt raising cost benchmarking (0.085 per cent) adopted by the AER in its 2018-23 Revenue Determination
Assumptions	Key assumptions: > forecast incremental VNI Project RAB > leverage ratio of 60 per cent, and > debt raising cost benchmark of 0.085 per cent.

Glossary

Abbreviation	
AMS	Asset Management System
Application	Contingent Project Application
BIS	BIS Oxford Economics
Capex	Capital Expenditure
CCTV	Closed Circuit Television
DAE	Deloitte Access Economics
EA	Enterprise Agreement
HR	Human Resources
HV	High Voltage
M	Million
NER	National Electricity Rules
NSW	New South Wales
Opex	Operating Expenditure
OEM	Original Equipment Manufacturer
PACR	Project Assessment Conclusion Report
QNI	Queensland NSW Interconnector Upgrade Project
RIN	Regulatory Information Notices
RIT-T	Regulatory Investment Test for Transmission
PTRM	Post-tax Revenue Model
PwC	PricewatherhouseCoopers
RAB	Regulatory asset base
VNI	Victoria NSW Interconnector Upgrade Project