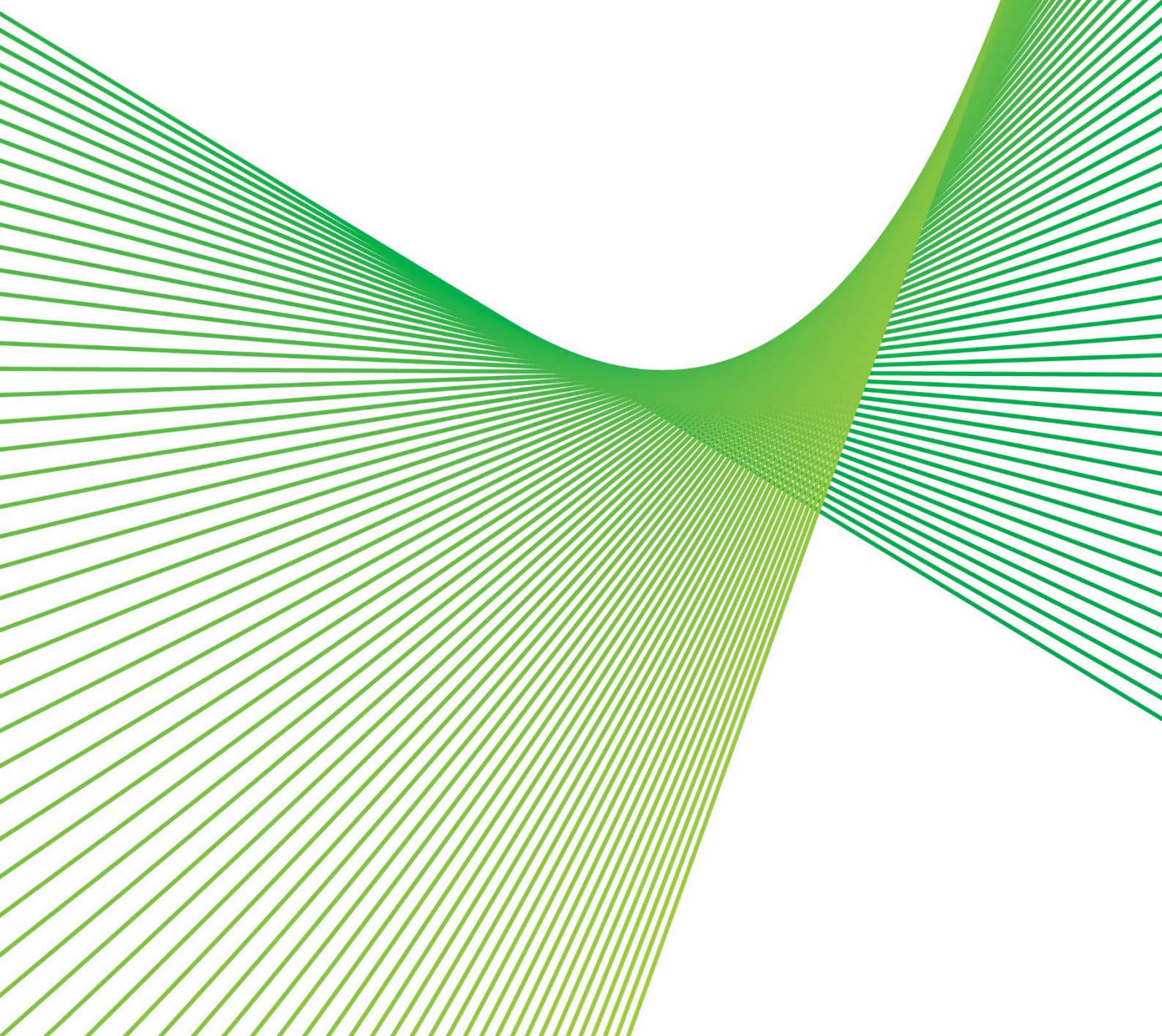


Opex Forecasting Methodology

Humelink Stage 2 Contingent Project Application

21 December 2023



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1. Purpose, scope and structure of this document

1.1. Purpose and scope of this document

This document sets out our incremental operating expenditure (opex) forecast for the Humelink Contingent Project Application Stage 2 (CPA-2) for the 2023-24 to 2027-28 regulatory period. It also explains the key steps to develop and validate the opex forecast. This document should be read in conjunction with our Principal Application document and other supporting documents.

Opex is the operating, maintenance and other non-capex that we incur to provide prescribed transmission services to our customers.

Unless otherwise stated, all forecast opex values in this document are presented in real 2022-23 dollars and include real input cost escalation, consistent with the 2023-28 Revenue Determination.

1.2. Document structure

The remainder of this document is structured as follows:

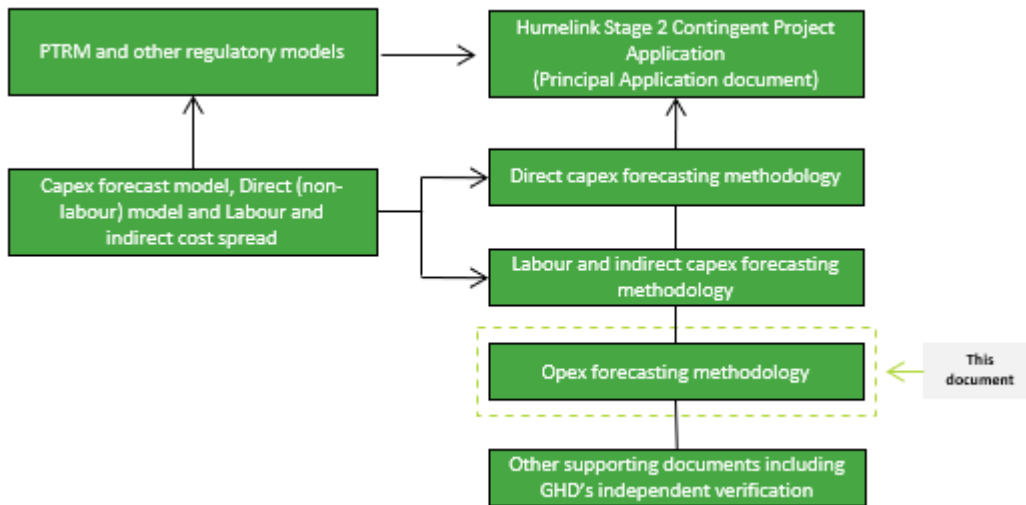
- section 2 overviews our incremental opex forecast
- section 3 sets out our opex forecasting methodology

1.3. Structure of the Revenue Proposal

There are a number of other Attachments and models that support, and form part of, our Application for Humelink. This document references these Attachments, models and other supporting documents for further detail and should be read in conjunction with all other documents comprising our Application.

Our Application is structured as illustrated in Figure 1-1 to be as clear and accessible as possible to the AER, customers and other stakeholders.

Figure 1-1: Stage 2 Application document structure for Humelink



The attachments and supporting models comprising our Application are detailed in section 1 of our Principal Application.

2. Summary of forecast opex for Humelink

2.1. Our stage 2 Opex forecast

Forecast incremental opex required for Humelink for the 2023-28 regulatory period is \$28.49 million, including debt raising costs, or \$23.17 million, excluding debt raising costs). Our forecast opex relates to:

- maintenance costs for substations, digital infrastructure and transmission lines
- property related expenses for council rates, land tax, water and electricity
- strategic benefit payments to compensate private landholders impacted by the Project, in accordance with the NSW Government's strategic benefit payment scheme
- insurance expenses for premiums for industrial special risks and operational third-party liability insurance for the Humelink assets, once they are commissioned, and
- vegetation integrity rehabilitation costs.

We have also applied the labour escalation rates as set out in our 2023-28 Revenue Determination to account for changes to real labour costs and added benchmark debt raising costs.

Our Stage 2 opex for Humelink is incremental to the opex approved by the AER in its 2023-28 Revenue Determination, because it relates to activities that are additional to our normal business activities and would not be incurred other than for undertaking Stage 2 activities for Humelink.

Table 2-1 sets out our incremental opex forecast for Humelink, by sub-category.

Table 2-1: Incremental forecast opex for Humelink (\$M, Real 2022-23)

Sub-category	2023-24	2024-25	2025-26	2026-27	2027-28	Total
Maintenance costs (excluding labour escalation)	-	-	-	2.33	5.98	8.31
Property	-	0.14	0.14	0.15	0.15	0.58
Strategic Benefits Payments	-	-	-	3.12	3.12	6.23
Insurance	-	-	-	3.59	3.59	7.19
Vegetation Integrity Rehabilitation Costs	-	-	-	0.36	0.36	0.71
Real input cost escalation	-	-	-	0.03	0.12	0.15
Total excluding debt raising costs	-	0.14	0.14	9.58	13.32	23.17
Debt raising costs	-	0.04	1.09	2.08	2.10	5.31
Total including debt raising costs	-	0.17	1.23	11.65	15.43	28.49

2.2. Basis of opex forecast

Table 2-2 sets out forecast incremental opex for Humelink by component, together with a summary of the basis of the forecast. We have applied a bottom-up build approach to forecast incremental opex. The bottom-up build approach reflects the AER's preferred approach for how it would like us to prepare our opex forecast. It is also consistent with the approach accepted by the AER for all contingent projects to-date.

Table 2-2: Forecast incremental opex for Humelink by category (\$M, Real 2022-23)

Opex item	Value	Basis for forecast expenditure
Maintenance costs (excluding labour escalation)	8.31	Current and proposed maintenance activity unit rates multiplied by projected volumes of activities
Property	0.58	Land tax based on estimated land value and estimated council and utility rates
Strategic Benefits Payments	6.23	Calculated in accordance with NSW Government's Strategic Benefit Payments scheme
Insurance	7.19	Based on independent report from Aon
Vegetation Integrity Rehabilitation costs	0.71	Based on works required within Humelink Easement Clearance Zone
Real input cost escalation	0.15	Labour escalators as set out in our 2023-28 Revenue Determination

Opex item	Value	Basis for forecast expenditure
Debt raising costs	5.31	Calculated using the same approach applied by the AER in its 2023-28 Revenue Determination, as reflected in the PTRM
Total incremental opex	28.49	

3. Opex forecasting methodology

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

3.1. Choice of “bottom-up-build” forecasting method

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

- is consistent with the approach used to derive our internal budget for Humelink over the remainder of the current regulatory period
- reflects the AER’s preferred approach to opex forecasting¹, and
- is consistent with the approach accepted by the AER for all contingent projects to-date.

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

3.2. Alignment with our capex forecast for Humelink

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

- operating and maintenance activities are assumed to begin once capital assets are installed and commissioned, namely July 2026 for the east and west transmission line sections, Gugaa substation, Wagga substation, and Bannaby substation, and December 2026 for Maragle substation.
- property ownership costs are assumed to be incurred once land and easements are acquired
- strategic benefit payments are assumed to commence once the transmission lines are commissioned
- operational insurance coverage will commence 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 underpinning our capex forecast are captured – albeit indirectly – in the operating forecast.

The entire asset life cycle forms part of our ISO55000 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 applied a two-step process to forecast incremental opex for Humelink:

Step one involves determining the base expenditure by:

- multiplying unit rates by forecast volumes for maintenance activities

¹ 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.

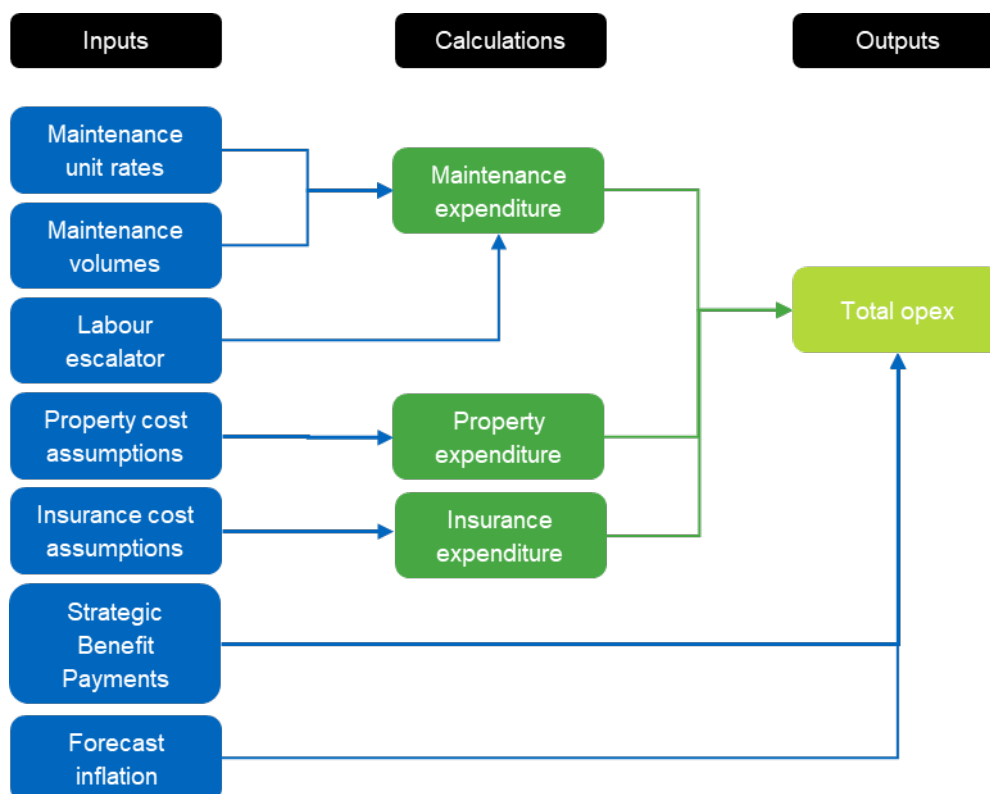
- identifying current property ownership costs and scaling these in proportion to the estimated property value of the acquisition
- calculating strategic benefit payments in accordance with the NSW Government’s scheme, and
- basing the operational insurance premium costs on the independent expert report from our brokers.

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 and proposed maintenance plans and unit rates
- expected property ownership costs
- the NSW Government’s Strategic Benefit Payments scheme
- external input as appropriate (e.g. third-party estimates for insurance premiums), and
- real cost escalators and debt raising costs.

This forecasting approach is summarised in Figure 3-1 below.

Figure 3-1: Process to determine forecast incremental opex for Humelink



Note: debt raising costs, although a component of forecast incremental opex, are not shown. Debt raising costs are calculated within the PTRM.

3.4. Opex forecasting methodology

Humelink involves constructing and augmenting new and 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 the Humelink specification and the associated unit costs. The calculations and inputs differ across:

- operating and maintenance expenditure
- other property costs
- strategic benefit payments
- 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 maintenance tasks for Humelink and the associated unit costs. This includes both:

- routine maintenance and inspection work
- condition based maintenance, and
- defect maintenance.

We expect to incur some routine inspection, condition based and corrective maintenance costs from 2026-27, when the assets are first commissioned.

Forecast incremental opex for Humelink has been calculated by multiplying current standard unit rates for various maintenance activities by expected quantities. The maintenance activities are assigned to four broad maintenance plan requirements as set out in Table 3-1.:

Table 3-1: Maintenance activities

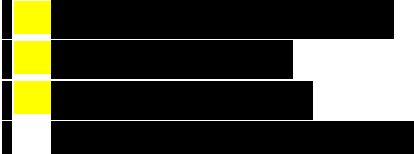
Maintenance plan requirement	Maintenance activity
Substations assets maintenance	Warranty period maintenance for transformers, transformer tap changers and reactors
	Warranty period maintenance for circuit breakers, current transformers and ancillary switchbay equipment
	██████ oil samples for transformers and reactors and routine maintenance on tap changers
	██████ minor maintenance on reactive plant circuit breakers
	██████ site inspection and management in Maragle and Gugga substations
	██████ defibrillator checks
	██████ site safety inspections
	██████ site management, site inspection, and thermovision inspections. Incremental increases in ██████ inspection requirements have been included for Wagga and Bannaby substations.

Maintenance plan requirement	Maintenance activity
Digital infrastructure assets maintenance	Warranty checks for transformer and reactor protection systems
	████████ filter checks
	████████ line protection performance checks
	████████ maintenance and inspections for batteries, OTN data backup and BAS
	████████ maintenance for VHF repeater or link radio
	████████ routine maintenance for optical fibre communications links
Transmission line assets maintenance	████████ aerial imagery inspections
	████████ compliance inspections in high bushfire risk areas and ██████████ compliance inspections in public safety areas
	End of defects liability climbing and thermographic inspections
	Surge arrestor inspection and replacement following a fault
Easements and access tracks maintenance	████████ LiDAR inspections
	Easement and access track inspection prior to end of defects liability period
	Easement vegetation operational condition based maintenance. An annualised cost has been forecast to take into account that an operational environmental management plan is likely to be a condition imposed through the EIS.

Table 3-2 sets out the key inputs and assumptions used to calculate the maintenance expenditure forecast.

Table 3-2: Incremental maintenance opex for Humelink

Item	Description
Unit rates	<p>Unit rates for each maintenance activity combine both standard labour and material unit rates and:</p> <ul style="list-style-type: none"> are based on standard jobs sourced from data in our accounting system (in 2022-23 dollars) reflect the average actual rates of all employees assigned to labour resource categories (based on the nature of the work performed). 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 expected estimates to undertake the maintenance task

Item	Description
	<ul style="list-style-type: none"> condition based vegetation maintenance is based on the annualised historical cost of managing vegetation on existing transmission lines in proximity to the Humelink.
Quantities	<p>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, digital infrastructure, transmission lines and easements.</p> <p>The activities are assumed to start in the 2026-27 year, i.e. once the assets are commissioned.</p> <p>Allowance for 1 FTE in 2026-27 has been included to integrate the Humelink assets into our AMS across all asset streams, reducing to 0.5 FTE in 2027-28 for ongoing asset monitoring and renewal and maintenance plan development.</p>
Escalation and inflation	<p>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 2023-28 Revenue Determination. This is the simple average of forecasts provided by KPMG and BIS Oxford Economics. The materials component is only escalated by inflation, which is consistent with the AER's 2023-28 Revenue Determination.</p> <p>The unit rates are current and in 2022-23 dollars.</p>
Assumptions	<p>Key assumptions:</p> <ul style="list-style-type: none"> no allowance has been made for non-standard assets or design, other than transmission line surge arrestors based on past experience defect costs have been estimated as a percentage of expected routine maintenance costs: 

3.4.2. Property costs

We expect to incur incremental property related opex due to the establishment of Gugaa substation and Maragle substation (on the basis that Maragle Substation will be shared asset between Snowy 2.0 and Humelink on a 40/60 split and the same portion between non prescribed and prescribed) for the following costs;

- council rates
- water rates

- electricity
- land tax, and
- easement establishment costs.

This opex is expected to be incurred from 2024-25 with Gugaa acquisition expected to be completed in July 24 while the Maragle Substation is not expected to be acquired until 2025 due to the delay from the State Forest revocation process via both houses of parliament followed by the compulsory acquisition process.

Table 3.3 sets out the key inputs and assumptions used to calculate the incremental property related opex for Humelink.

Table 3.3: Incremental property related opex for Humelink

Item	Description
Unit rates	<p>Property ownership unit rates (council rates, land tax, electricity and water rates) are based on current statutory rates or costs. Property ownership unit rates are on a per land value basis.</p> <p>For instance:</p> <ul style="list-style-type: none"> • water and electricity charges are based on costs for existing sites and adjusted to reflect the new substation becoming operational • council rates estimates are based on costs for existing sites and adjusted to reflect the new substations and apply once the land is acquired, and • land tax estimates have been calculated based on the land value assessment and land tax rates and apply once the land is acquired. <p>Easement establishment costs are costs associated with the establishment of new easements to deal with landholder issues, easement development applications and encroachment resolution.</p>
Escalation and inflation	Land and easement establishment cost values are assumed to stay constant in real terms.
Assumptions	<p>Key assumptions:</p> <ul style="list-style-type: none"> • Gugaa land value of █████ million • Maragle land value of █████ million • Land tax rate of 2 per cent

3.4.3. Vegetation Integrity Rehabilitation Costs

The project is required to maintain a target native vegetation condition state (or vegetation integrity), the attributes of which are defined in the biodiversity impact assessment under the Humelink development approval.

Whilst routine operational maintenance activities will seek to avoid and minimise impacts to native vegetation at all times, it is likely, and acknowledged in the approval, that routine maintenance activities may impact native vegetation below the target condition state. As a result, budget allocation is required for works to rehabilitate native vegetation to its target condition following each easement maintenance event, in association with environmental mitigation measures.

Rehabilitation works would be delivered by appropriately qualified and experienced bush regeneration crews, and include (but not be limited to): topsoil replacement, soil decompaction, stabilisation and erosion control, targeted weed control, brush-mattin, opportunistic direct seeding and plant translocation.

Table 3.4: Vegetation Integrity Rehabilitation costs for Humelink

Item	Description
Bush regeneration crew and positrack bobcat	<p>Assumes works required within Humelink Easement Clearance Zone (~155 ha) and on-easement Hazard Tree Zone (~83 ha) only, coming to a total of 238 ha implementation area.</p> <p>Budget allows for:</p> <ul style="list-style-type: none"> • Team of 5 bush regenerators per hectare of implementation area per day • Team of 5 bush regenerator day rate of [REDACTED] ex GST • One day's positrack bobcat wet-hire per hectare of implementation area • Positrack bobcat hire day rate of [REDACTED] ex GST <p>Based on the above allowances the total cost of vegetation integrity rehabilitation per easement run = [REDACTED].</p> <p>Based on a 3-yearly maintenance cycle, an annualised maintenance budget for vegetation integrity rehabilitation = [REDACTED] p.a. ex GST</p>
Escalation and inflation	Vegetation integrity rehabilitation cost values are assumed to stay constant in real terms.
Assumptions	Implementation area: 238 ha (Hemelink ECZ + on-easement HTZ) Team of 5 bush regenerators for 1 day / ha implementation area @ [REDACTED] / day One day positrack bobcat hire / day @ [REDACTED] / day

3.4.4. Strategic Benefit Payments

The NSW Government is committed to transform NSW's electricity system into one that is cheaper, cleaner and more reliable. To facilitate the timely delivery of the ISP investments needed to transform the energy system, the NSW Government has introduced a Strategic Benefit Payments (SBP) scheme to compensate private land holders impacted by these projects.²

The proposed SBP scheme will provide additional compensation to private landowners in NSW who provide their land for the transmission easements required to enable the construction of Actionable ISP Projects, including Humelink. These payments:

acknowledge the critical role these landowners have in hosting the new energy infrastructure that will power NSW into the future, and ensure that these landholders share directly in the benefits of this significant economic investment.

² NSW Government, [Strategic Benefit Payments Scheme](#), October 2022. This requires that annual payments for a given line are calculated, in \$ Real 2022, as eligible line length KMs x \$200,000 / 20 yea

These payments comprise annual payments for a period of 20 years and are separate and in addition to compensation under the Land Acquisition (Just Terms Compensation) Act 1991 (Just Terms Act).

Table 3.5 sets out the key inputs and assumptions used to calculate the strategic benefit payments for Humelink.

Table 3.5: Strategic benefits payment opex for Humelink

Item	Description
Unit rates	Under the SBP scheme, private landowners hosting new high voltage transmission projects critical to the energy transformation will be paid \$200,000 per kilometre (Real \$2022) of transmission lines hosted, in annual instalments over 20 years, linked to CPI. Once Humelink is commissioned we will make these annual payments to private landowners.
Escalation and inflation	Strategic benefit payment amount have been escalated by CPI to Real \$2023.
Assumptions	<p>Key assumption: Calculations of SBP per annum is Length of easement x \$10,000 per Kilometre + CPI (for the years following the initial amount)</p> <p>Private land owners:</p> <ul style="list-style-type: none"> • East section: 187 landowners, 204.07km • West section: 81 landowners, 89.73km

3.4.5. Insurance costs

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

- 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 the Humelink assets are commissioned (i.e. from July 2026).

Our insurance broker has estimated the costs of insuring Humelink during construction and once the assets are operational³:

- the construction phase insurance costs are included in the capex forecast (indirect costs). This is explained in the Capex Forecasting Methodology, and

³ Aon, *Transgrid HumeLink Insurance Report*, 16 June 2023.

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

Table 3-6 sets out the key inputs and assumptions used to calculate the incremental insurance related opex for Humelink, split between industrial special risk and operational third-party insurance.

Table 3-6: Incremental insurance related opex for Humelink

Insurance type	Description
Industrial special risks	Industrial special risks insurance covers physical loss, destruction or damage of insured property occurring during operation. Aon estimated premium of \$3,367,394 (\$Real 2022-23), assuming \$3.8 billion declared asset value.
Operational third-party liability	Operational third-party liability insurance covers our legal liability for third party property damage and bodily injury occurring during operation. Aon estimated the premium of \$123,638 (\$Real 2022-23), assuming a \$100,000,000 limit (aggregate for products and pollution liability).

3.4.6. Debt raising costs

We will incur costs for raising the debt needed to fund the capex required to deliver Humelink. We have adopted the same benchmark approach applied by the AER in its 2023-28 Revenue Determination to determine these debt raising costs for Humelink.

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 8.3 basis point debt raising cost benchmark rate adopted by the AER.

Table 3-7 sets out the key inputs and assumptions used to calculate incremental debt raising costs.

Table 3-7: Incremental debt raising costs for Humelink

Item	Description
Forecast debt	This is calculated by multiplying the forecast incremental Humelink RAB in the PTRM by the assumed leverage ratio (of 60 per cent) adopted by the AER in its 2023-28 Revenue Determination
Debt raising cost	Debt raising cost benchmarking (0.083 per cent) adopted by the AER in its 2023-28 Revenue Determination
Assumptions	Key assumptions: <ol style="list-style-type: none"> forecast incremental Humelink RAB leverage ratio of 60 per cent, and debt raising cost benchmark of 0.083 per cent.

