



# **Regulatory Investment Test for Distribution (RIT-D)**

## **Connection of a Large Load Customer in the Greenvale Network Area**

### **Final Project Assessment Report**

11 July 2023



Part of Energy Queensland

# Connection of a Large Customer connection in the Greenvale Network Area

## Final Project Assessment Report

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### EXECUTIVE SUMMARY

#### About Ergon Energy

Ergon Energy Corporation Limited (Ergon Energy) is part of Energy Queensland and manages an electricity distribution network which supplies electricity to more than 765,000 customers. Our vast operating area covers over one million square kilometres (around 97% of the state of Queensland) from the expanding coastal and rural population centres to the remote communities of outback Queensland and the Torres Strait.

Our electricity network consists of approximately 160,000 kilometres of powerlines and one million power poles, along with associated infrastructure such as major substations and power transformers.

We also own and operate 33 stand-alone power stations that provide supply to isolated communities across Queensland which are not connected to the main electricity grid.

#### Identified Need

Ergon Energy has received a connection application from a major customer to connect to the network in the Greenvale region with a requirement for a large supply. The connection arrangement, which has been agreed by, in consultation with the customer, is for a dedicated connection which is composed of both Alternate Control Services (ACS) and Standard Control Services (SCS), as defined in Chapter 10 of the National Electricity Rules (NER).

Works classified as ACS requires that customer fund the cost directly. SCS works are those that are central to the supply of electricity and provided by Ergon Energy, including design, construction and operation of the shared network. Cost for these services is recovered through network charges for all relevant customers.

This RIT-D only considers the SCS component, as this is network expenditure, under the identified need. It should also be noted that included within the SCS component is a portion of cost attributed to Powerlink Queensland, as pass-through cost, and as such is covered under joint planning for the region. For transparency purposes this cost has been included in this report.

With the connection of a dedicated 6MVA load connection in the Greenvale region Ergon Energy has a requirement to upgrade the communication path in the area to enable duplicate three terminal line differential protection. As a requirement of the NER (refer to Schedule 5.1; Schedule 5.3; S5.1.9(d); S5.3.3(d)) the communication path is required to be dual and diverse so that the protection scheme can continue to operate for a single protection element out of service. The completion date for the works is October 2025, which is driven by the customer timeframes for connection.

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#### Approach

The National Electricity Rules (NER) require that, subject to certain exclusion criteria, network business investments for meeting service standards for a distribution business are subject to a Regulatory Investment Test for Distribution (RIT-D). Ergon Energy has determined that network investment is essential in this case for it to continue to provide electricity to the consumers in the Greenvale supply area in a reliable, safe and cost-effective manner. Accordingly, this investment is subject to a RIT-D.

Ergon Energy published a Notice of No non-Network options report for the above described network constraint on 10 July 2023.

One feasible option has been investigated:

- **Option A:** New Communication Feeder Network

This Final Project Assessment Report (FPAR), where Ergon Energy provides both technical and economic information about possible solutions, has been prepared in accordance with the requirements of clause 5.17.4(o) of the NER.

Ergon Energy's preferred solution to address the identified need is Option A – New Communication Feeder Network.

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### 1. INTRODUCTION

This Final Project Assessment Report has been prepared by Ergon Energy in accordance with the requirements of clause 5.17.4(o) of the NER.

This report represents the final stage of the consultation process in relation to the application of the RIT-D on potential credible options to address the identified need for the Greenvale network area.

In preparing this RIT-D, Ergon Energy is required to consider reasonable future scenarios. With respect to major customer loads and generation, Ergon Energy has, in good faith, included as much detail as possible while maintaining necessary customer confidentiality. Ergon Energy is aware of potential large future connections and these are in different stages of progress and are subject to change (including outcomes where none or all proceed). These and other customer activity can occur over the consultation period and may change the timing and/or scope of any proposed solutions.

#### 1.1. Response to the DPAR

Ergon Energy published a Notice of No non-Network Options Report for the identified need in the Greenvale network area on the 10 July 2023.

#### 1.2. Structure of the Report

This report:

- Provides background information on the network capability limitations of the distribution network supplying the Greenvale area.
- Identifies the need which Ergon Energy is seeking to address, together with the assumptions used in identifying and quantifying that need.
- Describes the credible options that are considered in this RIT-D assessment.
- Quantifies costs and classes of material market benefits for each of the credible options.
- Describes the methods used in quantifying each class of market benefit.
- Provides details of classes of market benefits that are not considered material to this RIT-D assessment and provides explanations as to why these classes of market benefits are not considered material.
- Provides the results of Net Present Value (NPV) analysis of each credible option and accompanying explanatory statements regarding the results.
- Identifies the proposed preferred option, including detailed characteristics, estimated commissioning date, indicative costs, and noting that it satisfies the RIT-D.
- Provides contact details for queries on this RIT-D.

#### 1.3. Dispute Resolution Process

In accordance with the provisions set out in clause 5.17.5(a) of the NER, Registered Participants or Interested Parties may, within 30 days after the publication of this report, dispute the conclusions

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made by Ergon Energy in this report with the Australian Energy Regulator. Accordingly, Registered Participants and Interested Parties who wish to dispute the conclusions outlined in this report based on a manifest error in the calculations or application of the RIT-D must do so within 30 days of the publication date of this report. Any parties raising a dispute are also required to notify Ergon Energy. Dispute notifications should be sent to [demandmanagement@ergon.com.au](mailto:demandmanagement@ergon.com.au)

If no formal dispute is raised, Ergon Energy will proceed with the preferred option to build a new overhead fibre optic network.

#### 1.4. Contact Details

For further information and inquiries please contact:

E: [demandmanagement@ergon.com.au](mailto:demandmanagement@ergon.com.au)

P: 13 74 66

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## 2. BACKGROUND

### 2.1. Geographic Region

Greenvale is situated approximately 250km west of Townsville. There is an existing 66/11kV substation which supplies customers in the Greenvale area, however this is not sized or equipped appropriately for the addition of a large load. A major customer has requested electrical connection within the area, shown in the blue are in Figure 1. (Note: To ensure commercial in confidence the exact location of the customer has not been depicted). Currently, there are two major feeders in the area, 132kV Ross-Kidston line (7158) and the 66kV Ingham to Greenvale line (IN-GR-A), as shown in Figure 1. A planning report was developed in consultation with the customer with numerous options presented, with connection to the 132kV network being the preferred solution.

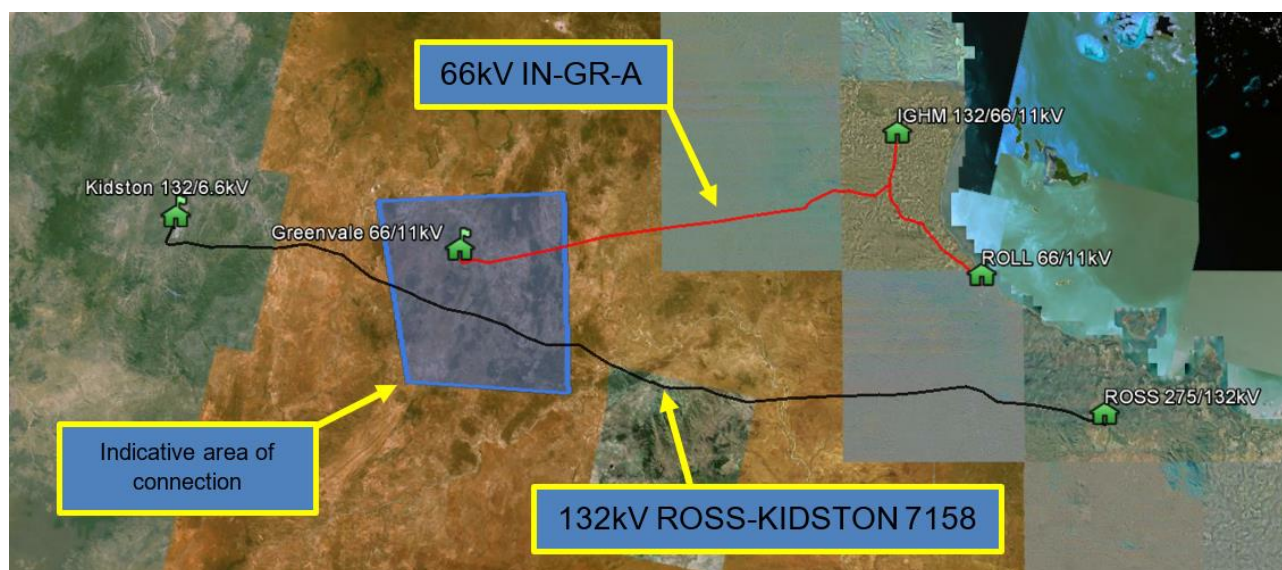


Figure 1: Existing network arrangement (geographic view)

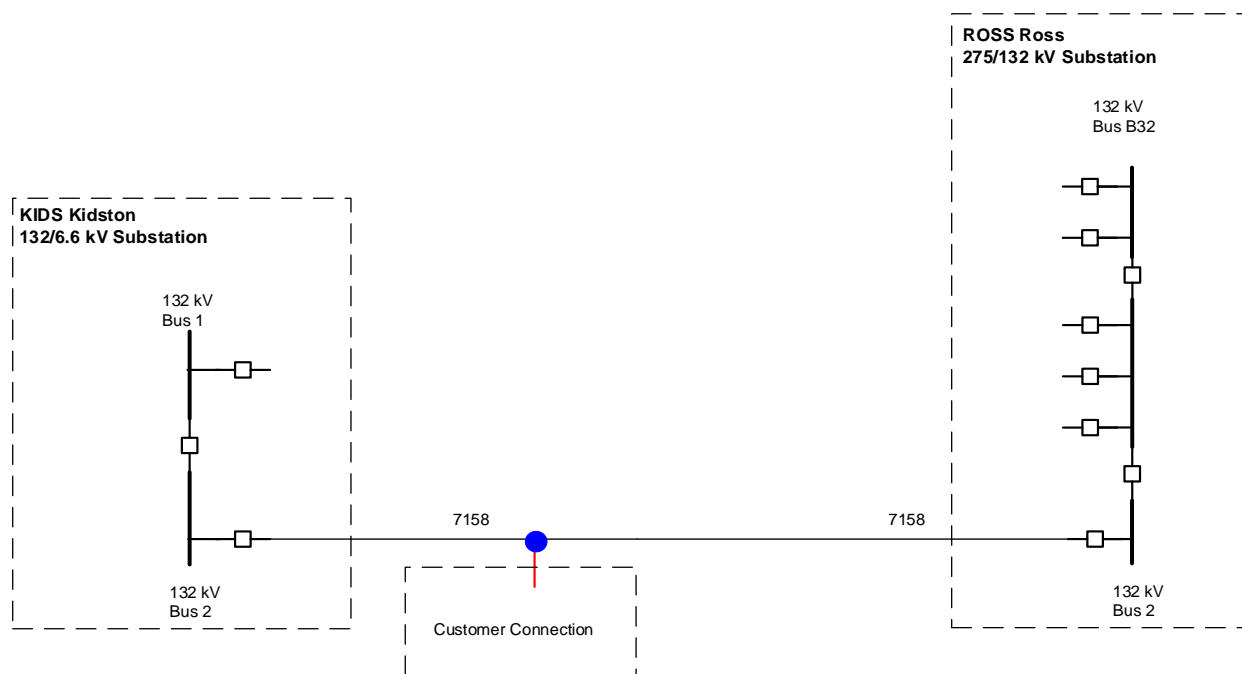
### 2.2. Supply System

The connection will be off the existing 7158 132kV Ross-Kidston feeder. A schematic view of the sub-transmission network arrangement is shown in Figure 2. There is currently no dual and diverse communication network in the area, which is a requirement to ensure adequate protection with any single protection element out of service (refer to NER Schedule 5.1; Schedule 5.3; S5.1.9(d); S5.3.3(d)).



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**Figure 2: Existing network arrangement (schematic view)**

### 2.3. Load Profiles / Forecasts

The load for the customer connection is commercial in confidence, along with the load profiles and load duration.

The only impact to shared network is the ability to continue to supply Kidston substation from the existing Ross-Kidston 7158 feeder. The total load under the Low, Base and High case load forecast for Kidston, plus the connection load does not exceed the line rating of 7158 feeder. The Kidston forecast and line rating is shown in Table 1.

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**Table 1 Load Forecast on the 132kV 7158 Feeder**

Year	Kidston 132/6.6kV <b>Low Load</b> Forecast (MVA)		Kidston 132/6.6kV <b>Base Load</b> Forecast (MVA)		Kidston 132/6.6kV <b>High Load</b> Forecast (MVA)		7158 Thermal Line Rating (MVA)
	10POE	50POE	10POE	50POE	10POE	50POE	
2024	5.87	5.32	5.93	5.38	5.99	5.44	85.4
2025	5.80	5.27	5.88	5.34	6.00	5.45	85.4
2026	1.20	0.67	1.40	0.86	1.57	1.01	85.4
2027	1.17	0.65	1.41	0.87	1.63	1.06	85.4
2028	1.18	0.65	1.46	0.92	1.72	1.15	85.4
2029	1.16	0.63	1.46	0.91	1.80	1.22	85.4
2030	1.11	0.59	1.50	0.95	1.89	1.30	85.4
2031	1.11	0.59	1.55	0.99	1.97	1.38	85.4
2032	1.09	0.57	1.59	1.03	2.06	1.46	85.4
2033	1.07	0.55	1.61	1.05	2.16	1.54	85.4
2034	1.08	0.57	1.66	1.10	2.30	1.67	85.4

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### 3. IDENTIFIED NEED

#### 3.1. Description of the Identified Need

As part of a major load connection in the Greenvale area a project has been initiated which includes both ACS and SCS cost components. This RIT-D covers the identified need pertaining to the SCS component of the cost.

##### 3.1.1. Protection and Communication Requirements

As depicted in Figure 2 the load connection will be teed off the existing Ross- Kidston 132kV line. While most costs are ACS there is an SCS component for a dual and duplicate comms path to provide adequate protection, as outlined in the NER, of the shared network. Currently there is insufficient protection grade communication system in the Greenvale area and as such these need to be established before the customer can connect to the network.

#### 3.2. Quantification of the Identified Need

##### 3.2.1. Legislative Requirements

The NER under Schedule 5.1, Schedule 5.3, S5.1.9(d), and S5.3.3(d) requires that the protection system will operate for any single protection element (including any communications facility upon which the protection system depends) out of service. Therefore, the communication system is intended to be dual and diverse. As this is a legislative requirement the least cost solution is the preferred option.

#### 3.3. Assumptions in Relation to Identified Need

Below is a summary of key assumptions that have been made when the identified need has been analysed and quantified.

It is recognised that the below assumptions may prove to have various levels of correctness, and they merely represent a 'best endeavours' approach to predict the future identified need.

##### 3.3.1. Large Load connection

The following items were considered when working through the customer enquiry:

- In consultation with the connecting customer a 66kV option was disregarded due to reliability concerns and only the 132kV option was pursued.
- Operation of Georgetown SVC is within technical limitations
- Staged approach to construction and supply to maximise existing network
- No impact to Ross 132kV bus voltage

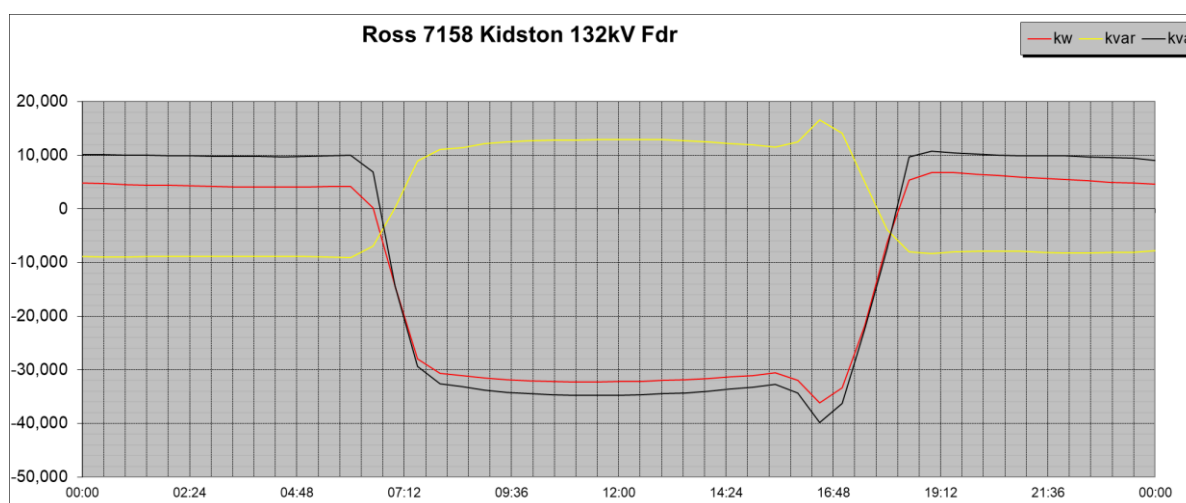
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- PLQ can change operating voltage at Ross substation within 0.9-1.1p.u.

#### 3.3.2. Load Profile

Characteristic load profile for the 7158 132kV feeder is shown in Figure 3. The reverse power flows are from a large generator connected at Kidston Substation.



**Figure 3 132kV Ross-Kidston Feeder Load Profile**

#### 3.3.1. Communication Network

There is no existing dual and diverse communication network in the area. Given the remoteness and cost of communication medium, the need for protection grade communication and Ergon's experience with these types of projects, it was assumed no other communication medium is available.

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### 4. CREDIBLE OPTIONS ASSESSED

#### 4.1. Assessment of Network Solutions

Ergon Energy has identified one credible network options that will address the identified need.

##### 4.1.1. Option A: New Communication Feeder Network

This option involves, constructing a 17km overhead fibre optic communication line, terminating the fibre cable into a pole mounted connectorized box adjacent to the new 132kV Powerlink feeder and constructing a dual and diverse overhead fibre optic communication line between KIDS substation and a new Powerlink Substation to address the identified need.

A schematic diagram of the proposed communication network arrangement for Option A is shown in Figure 4.

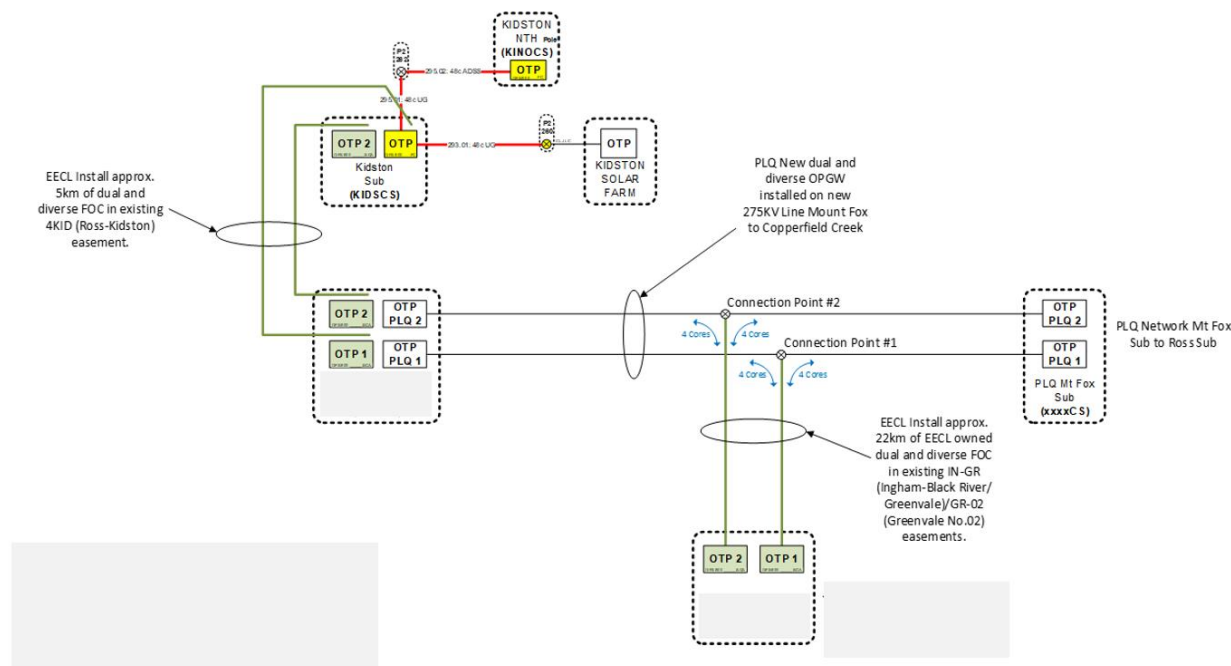


Figure 4: Option A proposed communication network arrangement (schematic view)

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#### 4.2. Assessment of Non-Network Solutions

This project is associated with Ergon Energy's communication network to abide with the legislative requirements of the NER (refer Schedule 5.1; Schedule 5.3; S5.1.9(d); S5.3.3(d)). No alternative to the Option presented has been deemed as a potential non-network alternative.

Ergon Energy's Demand & Energy Management (DEM) team has assessed the potential non-network alternative (NNA) options required to defer the network option and determined there is no viable demand management (DM) option to replace or reduce the need for the network options proposed, as the entire major load would need to be supplied from an alternate source.

Credible options must be technically and commercially viable and must be able to be implemented in sufficient time to satisfy the identified need.

##### 4.2.1. Demand Management (Demand Reduction)

In this instance demand reduction is not a viable alternative to a network connection for the major customer and large load. As such no further investigation into demand reduction solutions was pursued.

##### 4.2.1. Non-Network Solution Summary

Ergon Energy has not identified any viable non-network solutions internally that will provide a complete or a hybrid (combined network and non-network) solution to provide the magnitude of network support required to address the identified need.

#### 4.3. Preferred Network Option

Ergon Energy's preferred internal network option is Option A, to install a new overhead optic fibre communication network.

Upon completion of these works, the NER requirements for protection systems will be addressed and the customer able to connect to the Ergon Network. The preferred option will provide the greatest reliability and benefit for customers.

The total estimated capital cost of this option inclusive of interest, risk, contingencies and overheads is \$9.085 million. Annual operating and maintenance costs are anticipated to be 0.5% of the capital cost. The estimated project delivery timeframe has design commencing in end of 2023 and construction completed by October 2025.

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## 5. MARKET BENEFIT ASSESSMENT METHODOLOGY

The purpose of the RIT-D is to identify the option that maximises the present value of net market benefits to all those who produce, consume and transport electricity in the National Electricity Market (NEM).

In order to measure the increase in net market benefit, Ergon Energy has analysed the classes of market benefits required to be considered by the RIT-D as discussed in section 5.1 and section 5.2.

### 5.1. Classes of Market Benefits Considered and Quantified

No classes of market benefits are considered material, and have not been included in this RIT-D assessment (refer section 5.2).

### 5.2. Classes of Market Benefits not Expected to be Material

The following classes of market benefits are not considered to be material for this RIT-D, and have not been included in this RIT-D assessment:

- Changes in involuntary load shedding and Customer Interruptions caused by Network Outages
- Changes in voluntary load curtailment
- Changes in costs to other parties
- Differences in timing of expenditure
- Changes in load transfer capacity and the capacity of Embedded Generators to take up load
- Changes in network losses
- Option value
- Other Class of Market Benefit

#### 5.2.1. Changes in Voluntary Load Curtailment

The credible options presented in this RIT-D assessment do not include any voluntary load curtailment as there are no customers on voluntary load curtailment agreements in the Greenvale area that will facilitate the load connection. Therefore, market benefits associated with changes in voluntary load curtailment have not been considered.

#### 5.2.2. Changes in Costs to Other Parties

Ergon Energy does not anticipate that any of the credible options included in this RIT-D assessment will affect costs incurred by other parties.

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#### 5.2.3. Differences in Timing of Expenditure

The credible option included in this RIT-D assessment is not expected to affect the timing of other distribution investments for unrelated identified needs.

#### 5.2.4. Changes in Load Transfer Capacity and the capacity of Embedded Generators to take up load

The credible options included in this RIT-D assessment are not expected to have an impact on the load transfer capacity or the capacity of embedded generators to take up load between the zone substations in the Greenvale area.

#### 5.2.5. Changes in Network Losses

Ergon Energy does not anticipate that any of the credible options included in the RIT-D assessment will lead to any significant change in network losses.

#### 5.2.6. Option Value

The AER's view is that option value is likely to arise where there is uncertainty regarding future outcomes, the information that is available in the future is likely to change, and the credible options considered by the RIT-D proponent are sufficiently flexible to respond to that change<sup>1</sup>.

Ergon Energy does not consider that the identified need for the options included in this RIT-D would be affected by uncertain factors about which there may be more clarity in future.

#### 5.2.7. Other Class of Market Benefit

Ergon Energy has not identified any other relevant class of market benefit for this RIT-D.

## 6. DETAILED ECONOMIC ASSESSMENT

### 6.1. Methodology

The Regulatory Investment Test for Distribution requires Ergon Energy to identify the credible option that maximises the present value of net economic benefit to all who produce, consume and transport electricity in the National Electricity Market.

A base case Net Present Value (NPV) comparison of the option has been undertaken as described in section 6.4.

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<sup>1</sup> AER "Regulatory Investment Test for Distribution Application Guidelines", Section A6.  
Available at: <http://www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/regulatory-investment-test-for-distribution-rit-d-and-application-guidelines>



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#### 6.2. Key Variables and Assumptions

The economic assessment contains anticipated costs of providing, operating and maintaining the option as well as expected costs of compliance and administration associated with the option.

The present value comparison summary includes all costs directly associated with constructing and providing the option. This includes the cost of land and easements currently owned or to be acquired for network augmentation.

Interest on borrowings is not included as a cost in the comparison of options as it represents a cost of project financing, and as such is accounted for in present value calculations through the discounting of the project cash flows at the regulated WACC. The interest on borrowings is included in the Total Project Cost for which approval is being sought as it represents a legitimate cost of network augmentation.

#### 6.3. Scenarios Adopted for Sensitivity Testing

No sensitivity analysis was conducted based on the forecast load as this has no bearing on the benefits, cost or options presented.

#### 6.4. Net Present Value (NPV) Results

An overview of the initial capital cost and the base case NPV results are provided in Table 2.

Option	Option Name	Rank	Initial Capital Cost	PV of Capex (\$ real)	PV of Opex (\$ real)
A	New Communication Feeder Network	1	\$9,085,000	-\$7,194,000	-\$3,261,000

**Table 2: Base case NPV ranking table**

Based on the economic assessment, Option A is considered to provide the optimum solution to address the forecast limitations and is therefore the recommended development option.

## 7. CONCLUSION

The Final Project Assessment Report (FPAR) represents the final stage of the consultation process in relation to the application of the RIT-D.

Ergon Energy intends to take steps to progress the proposed preferred option to ensure any statutory non-compliance is addressed and undertake appropriately justified network reliability improvements, as necessary.

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#### 7.1. Preferred Option

Ergon Energy's preferred internal network option is Option A, to install a new overhead optic fibre communication network.

Upon completion of these works, the NER requirements for protection systems will be addressed and the customer able to connect to the Ergon Network. The preferred option will provide the greatest reliability and benefit for customers.

The total estimated capital cost of this option inclusive of interest, risk, contingencies and overheads is \$9.085 million. Annual operating and maintenance costs are anticipated to be 0.5% of the capital cost. The estimated project delivery timeframe has design commencing in end of 2023 and construction completed by October 2025.

#### 7.2. Satisfaction of RIT-D

The proposed preferred option satisfies the RIT-D.

This statement is made on the basis of the detailed analysis set out in this report. The proposed preferred option is the credible option that has the highest net economic benefit under the most likely reasonable scenarios.

### 8. COMPLIANCE STATEMENT

This Final Project Assessment Report complies with the requirements of NER section 5.17.4(j) as demonstrated below:

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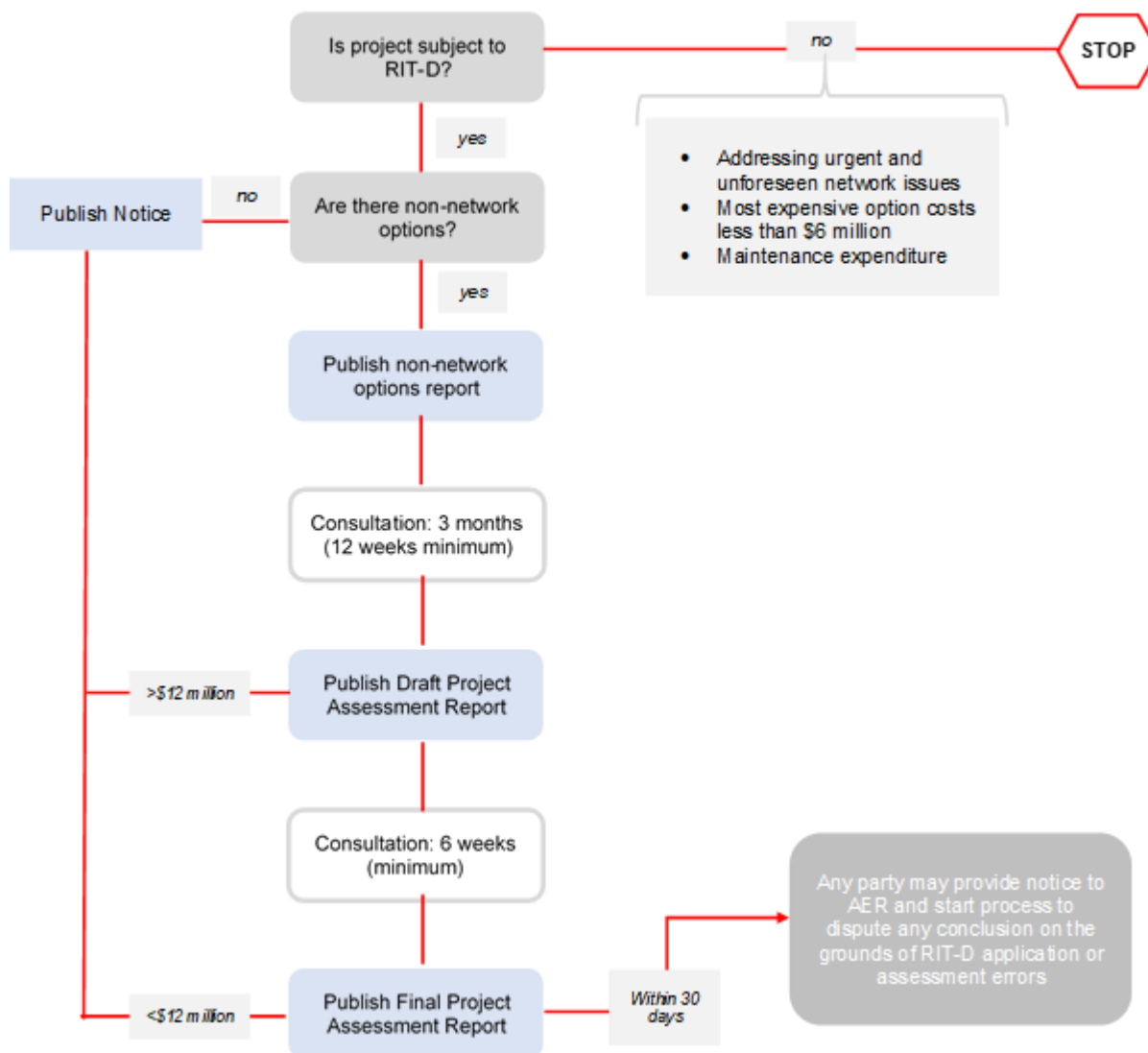
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Requirement	Report Section
(1) a description of the identified need for investment;	3
(2) the assumptions used in identifying the identified need (including, in the case of proposed reliability corrective action, why the RIT-D proponent considers reliability corrective action is necessary;	3.3
(3) if applicable, a summary of, and commentary on, the submissions received on the DPAR;	N/A
(4) a description of each credible option assessed	4
(5) where a <i>Distribution Network Service Provider</i> has quantified market benefits in accordance with clause 5.17.1(d), a quantification of each applicable market benefit of each credible option	5
(6) a quantification of each applicable cost for each credible option, including a breakdown of operating and capital expenditure	3.2
(7) a detailed description of the methodologies used in quantifying each class of costs or market benefit	5
(8) where relevant, the reasons why the RIT-D proponent has determined that a class or classes of market benefits or costs do not apply to a credible option	5.2
(9) the results of a NPV analysis of each credible option and accompanying explanatory statements regarding the results	6.4
(10) the identification of the proposed preferred option	7.1
(11) for the proposed preferred option, the RIT-D proponent must provide: <ul style="list-style-type: none"> <li>(i) details of the technical characteristics;</li> <li>(ii) the estimated construction timetable and commissioning date (where relevant);</li> <li>(ii) the indicative capital and operating costs (where relevant);</li> <li>(iv) a statement and accompanying analysis that the proposed preferred option satisfied the RIT-D; and</li> <li>(v) if the proposed preferred option is for reliability corrective action and that option has a proponent, the name of the proponent</li> </ul>	7.1 & 7.2
(12) contact details for a suitably qualified staff member of the RIT-D proponent to whom queries on the final report may be directed.	1.4

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### APPENDIX A – THE RIT-D PROCESS



Source: AEMC, *Rule determination: National Electricity Amendment (Replacement expenditure planning arrangements) Rule 2017*, July 2017, p. 64.