

## Investment Evaluation Summary (IES)

❖ For work being proposed for inclusion into the capital works program.

Project name:	NOCS Distribution Network Control Program
Department:	Technology & Performance
Investment Type:	Distribution
Investment Category:	Standard Control - Operational Support Systems
Functional Area(s):	Click here and type the functional area(s) code.
Project ZoNe location:	Operational Technology R24 Distribution Zone Site
Document Number:	R0002306129
Needs Item Reference:	Click here and type the document R number.
Regulatory Investment Test Required?	No
Version Number:	0.5
Date:	16/12/2022

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Preferred Option:			Option 1		
Level 1 Estimate +/- 30 per cent (preferred option – base dollars):			\$10,024,110		
Expenditure profile	FY25	FY26	FY27	FY28	FY29
Capex	\$2,004,822	\$2,004,822	\$2,004,822	\$2,004,822	\$2,004,822
Opex	\$0	\$0	\$0	\$0	\$0

❖

Sign-offs (in support of the recommended option)			
Works Initiator:		Date	16/12/2022
Leader: (Endorsement)		Date	16/12/2022
Leader or General manager noting delegation levels. (Approval) <sup>1</sup>		Date	Click here and type the date.

<sup>1</sup> Approval based on delegation level.

❖ denotes mandatory field

## 1. RELATED DOCUMENTS

Description	URL
Needs Form	N/A
Estimate	
NPV	
Asset Management Plan	
[Insert other documents as required – eg. TQR]	
<a href="#">TasNetworks Towards 2030</a>	
<a href="#">Future Distribution System Vision</a>	
<a href="#">TasNetworks Corporate Plan</a>	
<a href="#">TasNetworks Business Plan</a>	
<a href="#">TasNetworks Risk Management Framework</a>	
<a href="#">National Electricity Rules (NER)</a>	

## 2. OVERVIEW

### 2.1 APPROVAL GATE STATUS



Approval Gate	Approver Title	Approver Name	Date
Gate 1 – Needs			
Gate 2 – Option	This project seeks <b>OPTIONS APPROVAL</b> to proceed		

In line with the Gated Investment Framework this Project seeks Gate 2 Option approval to proceed to budget and financial approvals. This IES presents economic and risk assessments for each option considered, together with recommendation of a preferred option to address the business need.

### 2.2 BACKGROUND

TasNetworks owns, maintains and operates critical infrastructure comprising physical transmission and distribution assets, information technologies, telecommunications networks and advanced control schemes. It plays a critical role in the security, social and economic wellbeing of Tasmania and other regions of the National Electricity Market (NEM).

There are various regulatory instruments governing TasNetworks, including, but not limited to the Tasmanian Electricity Code (TEC) and the National Electricity Rules (NER).

The Tasmanian Electricity Code sets out the detailed arrangements for the regulation of the Tasmanian electricity supply industry and is provided for and enforceable under the Electricity Supply Industry Act 1995, which is the principal Act governing the operation of the electricity supply industry in Tasmania.

Following Tasmania’s entry to the National Electricity Market in 2005, the NER has displaced much of the regulation contained in the TEC. However, TasNetworks distribution network operations remains regulated under Chapter 8 of the TEC. TasNetworks must comply with Chapter 8 of the TEC under its licence to distribute and supply electricity in Tasmania. Table 1 summarises the sections of the TEC relevant to this IES.

**Table 1: Tasmanian Electricity Code Obligations for TasNetworks**

Section	Summary
<b>Section 8.2.1</b>	TasNetworks must adopt ‘good electricity industry practice’, quality management and assurance procedures which: <ul style="list-style-type: none"> <li>• comply with the laws and other performance obligations which apply to the provision of distribution services; and</li> <li>• minimise the risks associated with the failure or reduced performance of assets.</li> </ul>
<b>Section 8.6.11</b>	TasNetworks must use reasonable endeavours to ensure that the average number and duration of planned and unplanned interruptions to customers caused by interruptions on the distribution system does not exceed the frequency and duration figures does not exceed frequency and duration thresholds.
<b>Section 8.7(a)</b>	TasNetworks must observe ‘good electricity industry practice’ as adopted by the national electricity supply industry for the planning, design, construction, maintenance and operation of its distribution system to ensure that the relevant standards for safety and reliability of the system are consistent with community, business and customer needs.
<b>Glossary: ‘good electricity industry practice’</b>	The exercise of that degree of skill, diligence, prudence and foresight that reasonably would be expected from a significant proportion of operators of facilities forming part of the power system or Bass Strait Island power system for the generation, transmission or supply of electricity under conditions comparable to those applicable to the relevant facility consistent with applicable laws, regulations, licences, codes, reliability, safety and environmental protection. The determination of comparable conditions is to take into account factors such as the relative size, duty, age and technological status of the relevant facility and the applicable laws, regulations, licences and codes.

Over approximately a 20 year period, commencing in 2003, TasNetworks (and its previous owners, Aurora and Transend) has invested prudently in its network control systems to deliver minimal capability at a time it is required to be utilised.

Commencing with the commissioning of the Transmission SCADA and Energy Management System, TasNetworks leveraged existing investment to extend the transmission SCADA to the distribution network, and commenced a program to move from paper pin boards in the distribution control room to screen based displays.

Most recently commencing in 2018, the distribution control system was complemented with an initial Distribution Management System (DMS) implementation with a limited number of advanced applications.

Following delivery of this system in 2021, and a subsequent enhancement of the system in 2022, a project was commenced to retire the existing end of life Outage Management System (OMS) and to further leverage the existing control system platform by using a common network connectivity model to drive both the DMS and OMS. This base Advanced Distribution Management System constituted an

initial minimal base capability on which TasNetworks will continue to build to assist managing the increasing complexity of the electricity distribution network.

It is important to note that the Outage Management System has transitioned from a corporate IT system to the network control system due to the fundamental requirement to manage network connectivity in real time. In addition, corporate GIS network modelling functions have transitioned into the real time environment to manage the onerous requirement of ensuring the electricity network model is updated in ‘near’ real time (within 4 hours of a change occurring to the physical electricity network configuration or asset attributes).

TasNetworks, as a Distribution Network System Provider (DNSP), is experiencing changes similar to other DNSPs in the way customers are interacting with and utilising our electricity networks. This is creating greater complexity and challenges when attempting to maintain a high quality and reliable supply to customers. Increasing penetration of solar PV, the rapid evolution in battery storage solutions and the slow, yet growing, uptake of electric vehicles will continue to create challenges in how TasNetworks meets customer expectations.

These changing customer requirements, coupled with Distributed Energy Resource (DER) connections, are fundamentally altering when and how the network is being used, particularly in terms of two way power flows, network utilisation and peak periods. Some customers have become active prosumers of energy, demanding enhanced service capabilities to better manage and minimise their electricity bills, and leverage their asset investments. For example, TasNetworks is seeing increasing use of:

- home energy management systems;
- smart appliances; and
- DER.

TasNetworks’ current network control system was built primarily to manage the complexity of the Tasmanian transmission system and its interconnection to Victoria via Basslink. In 2014, it was expanded to perform basic distribution network monitoring and control functions when TasNetworks was formed to own, operate and maintain the transmission and distribution networks in Tasmania. The Transmission and Distribution Control System (TADCS) has performed reliably and to expectations, but is becoming less fit for purpose as the distribution network becomes more complex.

Over the past 5 years, TasNetworks has invested in its Distribution Control System (DCS) via the prudent implementation of a Distribution Management System by building up the existing network control system infrastructure that was already in place. As a part of this implementation, TasNetworks implemented a small number of advanced applications to assist with safe access to the electricity network by work crews and to assist in improving reliability for customers via automated fault restoration.

To maintain the network control systems, regular upgrades to the system are carried out in conjunction with the vendor to ensure currency and to implement critical patches and fixes identified by either TasNetworks or other users of the system. These upgrade invariably have improved functionality and enhancements that are provides as a part of the upgrade project and these changes are treated as recurring as they require no additional cost it implement, configure, test and deploy. A profile of the current recurrent expenditure is shown the table below:

	2019-20	2020-21	2021-22	2022-23	2023-24	R19 Total
Capex Spend	\$0.50M	\$0.53M	\$0.44M	\$0.2M	\$0.5M	\$2.2M

**Current R19 Period Spend on Network Control Systems**

It is anticipated that due to the expanded scope and complexity of the network control scheme moving forward, with the inclusion of advanced applications and low voltage network connective, the

complexity and cost of upgrade projects are anticipated to increase based on project experienced in the current period.

It is important to note that the OMS has transitioned from a corporate IT system to the network control system due to the fundamental requirement to manage network connectivity in real time. In addition, corporate GIS network modelling functions have transitioned into the real time environment to manage the onerous requirement of ensuring the electricity network model is updated in 'near' real time (within 4 hours of a change occurring to the physical electricity network configuration or asset attributes).

## 2.3 PROBLEM DEFINITION

TasNetworks, as a DNSP has a licence obligation to maintain customer reliability and safely manage its electricity distribution network, and is required to discharge this obligation using 'good industry practice'. In Australia, and overseas, the management of electricity distribution systems is converging to investment in mission critical real time control systems that manage the key functions of:

- monitor and control the electricity network;
- manage planned and unplanned outages;
- manage customer interactions and information;
- manage Advance Metering Infrastructure) AMI Metering for real time use;
- leverage advanced applications to provide insight, situational awareness, and automatic actions;
- maintain highly accurate HV and LV connectivity models; and
- manage the interaction with external parties to manage energy connections.

Recently, Australian DNSPs have been also extending the real time capability into:

- data mining and data analytics for real time insights and forecasting aggregated customer behaviour;
- managing Distributed Energy Resources; and
- undertaking System Operator functions such as managing localised constraints.

The distribution network control system is recognised a critical system in the critical energy delivery infrastructure at a local and Australian level. TasNetworks must prudently manage this system to ensure it remains current and supported by the vendor, is running on supported and reliable infrastructure and is appropriately protected from the increasing cyber security threats. This program will undertake investments in each of these areas to maintain a baseline real time system capability.

In addition to maintaining currency, infrastructure and cyber security risk, the system needs to adapt to the changing nature of the distribution electricity system. As described in the customer needs section of this IES, the electricity distribution network is changing and power flows driven by PV uptake, electric vehicle connections and battery storage, although not yet having critical impacts on our network, will at some stage trigger the need for investment in network upgrades and/or technology solutions to minimise or defer capital augmentation expenditure. The orchestration of DER on the low-voltage network via dynamic operating envelopes will enable significant increases in network utilisation, but this capability comes with drastic increases in data, new data sources and calculations beyond existing capabilities. The management of inverter based resources also comes with the complexities of new standards and protocols, such as IEEE 2030.5, increased cyber security concerns as well as new system architectures.

This investment program will prepare TasNetworks to respond to the requirements of our customers by extending the distribution control system with functionality to manage the complexity of the network in a scaled and prudent manner to meet requirements prior to when issue manifest due to the lead time in delivering these complex enhancements. This approach defers the requirement to invest augmentation capital on the network whilst also avoiding the cost of additional protection schemes, voltage control devices and monitoring systems. In many cases the investment targets an existing need and provides the immediate benefit for customers whilst providing a base foundation capability that can be built and leveraged for future leverage in Distributed Energy Resource Management System (DERMS) or Distribution System Operator (DSO) use cases. Although there is some level of uncertainty on timing of when customer behaviour will have an adverse impact on the network requiring network control system functionality, an approach of incrementally building forecasting, sensor integration, protocol support, real time analytics, constraint management and engineering tools in the distribution management and outage management systems has been adopted as prudent, in contrast to building full capability up front and having this latent capability unused in the system for a period. Conversely, this approach avoids the impact of not delivering the capability in time for the emerging or forecast need, thereby requiring inefficient capital spend on short term augmentation or constraints in the network whilst awaiting the long term solution to be delivered.

Under all scenarios, TasNetworks has assessed ongoing investment in high voltage and low voltage connectivity modelling capability, including the improvement in accuracy, attribution and asset detail in these models, is required to leverage automation and functionality available in the DMS and OMS to manage customer quality of supply and to manage the safe planned and unplanned access to the electricity networks.

### 3. CUSTOMER NEEDS AND IMPACT

The Advanced Distribution Management System (ADMS) is the network control system that manages the High Voltage and Low Voltage electricity distribution network that connects distribution electricity customers to their electricity supply. This critical real time system directly improves community, employee and contractor safety by monitoring the electricity networks, managing planned and unplanned outages and leveraging automation to manage customer quality of supply.

The impact of these customer behaviour changes is forecast to impact energy usage profiles across our network, including the increase of bi-directional power flows, variations in customer voltages and increase capital costs to modify network protections schemes and augment the network to increase capacity and utilisation. The impact of electric vehicles being taken up by our customers and the concentration of the vehicles and public fast chargers within our network are anticipated to create micro constraints in our LV networks, and potentially at local HV substations within the next 5 years, caused by the concentration of uncontrolled charging electric vehicles.

The base investment in currency, infrastructure and cyber security are required to ensure that the critical real time distribution control system is available to maintain customer quality of supply, reliability and safety. The capability extension capital is required to start the development of systems to cater for the customer needs changing the nature and complexity of our HV and LV networks. Central to this challenge is the better utilisation of available data, the capability to analyse this data in real time and to provide insights from this data to drive operational and asset decisions to maintain customer service.

## 4. CORPORATE ALIGNMENT ❖

### 4.1 BUSINESS PERFORMANCE OBJECTIVES

This project will help achieve the customer and business performance objectives in TasNetworks' Corporate Plan, and as shown in Table 2.

**Table 1** Performance objectives relevant to this project.

Performance category	Performance measure	Investment impact on performance
Safety and wellbeing	Significant incidents	A current, secure and reliable ADMS will directly identify significant incidents on the HV and LV electricity networks and will provide the capability to manage significant incidents effectively through provision of real time network configuration.
Our customers	Customer net promoter score	The effective monitoring of customer supply quality and effective ADMS tools in the OMS to manage customer outages and provide timely and accurate outage information to customers will positively impact customer net promoter score.
Our people	Employee engagement	Extending the ADMS capability to manage planned and unplanned outages on the electricity network, and providing the field workforce with high quality real time tools to do their work, will contribute to improved employee engagement.
Our business - Network service	Service incentive bonuses earned - transmission and distribution	The effective detection and management of electricity system outages, including the extension of automated solutions, will positively impact distribution STIPS

### 4.2 RISK OBJECTIVES

This project will assist in mitigating key business risks identified in TasNetworks' Corporate Plan. Table 3 presents all business risks, identifying those that would be positively impacted by the proposed project.

A detailed assessment of the risks mitigated by the project is presented in Section 5.3.

**Table 2 Business risks mitigated by this project**

Key Business Risks	Describe the specific risk(s) to which the business is currently exposed, for mitigation through the proposed project, and how it aligns with the Key Business Risk(s)
Death or Injury (Employee)	A current, secure and functional distribution network control system manages the safe unplanned and planned access to the hazardous electricity networks. Clear, accurate and reliable real time status of the electricity network and field crews working on permits or in the proximity of the network reduces the probability of work related deaths
Death or Injury (Public)	A current, secure and functional distribution network control system manages the reported hazards and faults on the electricity network. Through automation and safety logic, the likelihood of death for a member of the public is reduced.
Widespread Power Disruption	The Distribution Network Control System is the central system to manage initial power disruptions and the subsequent management of restoration of wide spread power disruptions. Though automation, visualisation and accurate real time data, the impact of widespread power disruptions is minimised
Bushfire Start	The Distribution Network Control System manages the remote setting of bushfire protections settings on high bushfire risk days, and allows for remote monitoring and disconnection of power to bushfire areas if required. The likelihood of a bushfire start is reduced through this investment and the impact of bushfires is also reduced.
Customer Focus	The Distribution Network Control System provides direct information regarding customer supply quality and provides the central system to log customer calls, manage customer fault queries and provide information to other systems for customers to view such as internet portals, integrated voice recordings etc. Customer service is improved through investment in these systems.
Business Continuity Management	The Distribution Network control System is a key system in the restoration of electricity supplies following a major system loss or a system black. This investment program maintains the reliability and availability of the redundant systems to ensure the business continuity risk is not diminished.
Cyber Security	The cyber-security investment in this critical national infrastructure maintains the existing low tolerance risk profile to a cyber-security breach that can impact the power flows of the state and the mainland.
Tasmanian Power System Complexity	This investment in the Distribution Network Control System manages the current complexity of the Tasmanian distribution system and extends the capability of TasNetworks to manage the increased complexity driven by changing customer requirements for the distribution grid. This investment reduces the risk of non-compliance in delivering customer services in a more complex operating environment
Emerging Complexity of the NEM	This investment in the Distribution Network Control System reduces the risk of non-compliance for TasNetworks in meeting obligations that will arise in the future relating to distributed energy resource management and distribution system operator requirements. An incremental investment profile prepares TasNetworks for the future whilst deferring significant capital until more certainty arises.

### 4.3 STRATEGIC OBJECTIVES

The capital expenditure proposed will be utilised to meet the capital expenditure objectives as defined in the National Electricity Rules (NER) as follows:

NER Objective	Relationship to NER Capital Objective
Meet or manage the expected demand for standard control services over that period	The Distribution Network Control System investment will ensure the system continues to monitor, control and manage electricity flow in delivery of standard control services.
Comply with all applicable regulatory obligations or requirements associated with the provision of standard control services	The Distribution Network Control System investment will ensure the system continues to monitor, control and manage electricity flow in delivery of standard control services and will provide the data for reporting against regulatory reporting obligations.
Maintain the quality, reliability and security of supply of standard control services	The Distribution Network Control system investment will maintain the capability in monitoring, control and management of electricity flows whilst extending automation opportunities to improve customer quality, reliability and security of supply.
Maintain the reliability, safety and security of the distribution system through the supply of standard control services.	The Distribution Network Control system investment will maintain the capability in monitoring, control and management of electricity flows whilst extending automation opportunities to improve customer quality, reliability and security of supply.

The investment program proposed will provide foundation capability to deliver the advanced network control capabilities required to achieve the TasNetworks Vision 2030 and the Future Distribution Network strategy.

Table 3 summarises strategic objectives that will be addressed by this project.

**Table 3 Strategic objectives relevant to this project**

Strategic Document	Strategic Objective	How the proposed investment will address the strategic goal
Future Network Strategy	Invest in Distribution Network Control System to advance automation	This investment is the primary vehicle to deliver improved distribution network control capability
Towards 2030	Achieve efficiencies and reinvest gains in innovation for customers and growth	The harnessing of new and innovative technologies build on the foundation of the Distribution Network Control System will provide opportunities for improved automation, improved network monitoring and improved customer quality of supply.

## PROJECT OBJECTIVES ❖

The objectives of this investment program are to:

- Ensure software currency and vendor software support for the mission critical distribution network control system
- Ensure hardware currency and vendor hardware support for the mission critical distribution network control system
- Ensure investment is maintained in protecting the mission critical distribution network control system from cyber security attack
- Extend the distribution network control system to meet the needs of our customers and to ensure good industry practice is maintained in operating our distribution electricity network safely

## 5. OPTIONS ANALYSIS ❖

### 5.1 OPTIONS CONSIDERED AND ECONOMIC ANALYSIS

Table 4 lists the options considered, the outcome of the economic analysis for each option, and the option being proposed for endorsement in this Investment Evaluation Summary. Details of the NPV analysis are included in Appendix A1. It is important to note that the costing for this project includes the synergy of a common control system platform shared across Transmission and Distribution and investments below assume that the Transmission projects are funded as a part of the regulatory price determination process for 2024-2029.

**Table 4** Options considered

Option No.	Option summary	Direct cost (\$m)	NPV (\$m)	Preferred option (yes/no)	Reason for selection/rejection
0	<b>Do nothing</b> – This option is included for comparison purposes as the baseline scenario and involves no investment in the Network Control System over the 5 year period	0	0	No	This option is not viable as the critical network control system will no longer be supported by the vendor from a currency perspective, will have unacceptable cyber security risks and will not be delivering energy to the standard demanded by our customers.
1	<b>Deliver limited extended capability</b> - This option includes investment required to manage base currency, infrastructure and cyber security updates whilst extending the distribution control system to manage minimal requirements for DR, AMI, EV, DERMS, System Operator Obligations. DERMS and System Operator deferred to end of next period	\$18.8M	-\$7.1M	No	This option risks delivering capability before a clear need of either the network, customer or regulatory obligation. There is uncertainty of timing as to when DERMS and System Operator capability is required with the Tasmanian network context.

2	<b>Delivery full DERMS and limited System Operator Capability:</b> This option includes investment required to manage base currency, infrastructure and cyber security updates whilst extending the distribution control system to manage full DERMS capability and defers the majority of System Operator capability to the next period	\$30.4M	-\$16.1M	No	Based on current forecast and uptake of DER/EVs, high impact timing for implementation of systems will occur in the next regulatory price period
3	<b>Deliver full DERMS and System Operator Capability:</b> This option includes investment required to manage base currency, infrastructure and cyber security updates whilst extending the distribution control system to manage full DERMS capability and full System Operator capability in the current price period	\$39.5M	-\$17.5M	No	System Operator definition is uncertain and more likely to solidify though the next period with compliance obligations required in the R29-33 period.
4	<b>Deliver limited extended capability on separate Distribution platform:</b> Driven by cyber security, this option separates the Transmission and Distribution SCADA and controls system platforms and delivers a re-implemented Distribution Control System with extended capability to manage minimal requirements for DR, AMI, EVs, DERMS, System Operator Obligations. DERMS and System Operator deferred to end of next period	\$26.8M	-\$20.1M	No	Evolving cyber security legislation requiring full separation of Transmission and Distribution platforms has not been defined and timing has been assessed as low likelihood of requiring separation in the next 5 years.
5	<b>Consolidation and minimal investment in DMS/OMS:</b> This option includes investment required to manage base currency, infrastructure and cyber security updates whilst consolidating previous investment in the distribution control system. This includes minimal investment to provide foundational technology to build future capabilities such as DR, AMI, EV, DERMS, System Operator Obligations.	\$10M	-\$4.2M	Yes	This options balances the requirement to meet changing customer needs and the risk of not having capability in place when required by potential regulatory obligation changes in the future.
6	<b>Recurrent Expenditure:</b> This option maintains the existing system as is and includes only the capital to complete the inflight ADMS project (implementation of OMS and LV Connectivity). This option does not extend the capability of the network control system in any way apart from the	\$7.5M	-\$6.8M	No	This options maintains the existing systems in currency but does not address changing customer needs and the changing nature of

	ongoing enhancements to the systems provided through regular upgrades.				electricity flows and their impacts on the electricity network.
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## E2E - Stage 2 options analysis (project initiation)

### 5.1.1 OPTION 0: DO NOTHING

This option discontinues the ongoing investment in software currency, infrastructure currency, cyber security and capability enhancement for the distribution network control system. Under this investment scenario, TasNetworks accepts the increasing risk over time of a control system failure, cyber security breach or compliance breach due to the inability to configure functionality delivered in later versions of software.

This option is not a viable option and is included for the purposes of comparison as a baseline scenario.

### 5.1.2 OPTION 1: DELIVER LIMITED EXTENDED CAPABILITY

This option includes the recurrent investment required to manage base currency, infrastructure and increased expenditure on cyber security improvement whilst extending the distribution control system to manage minimal requirements for DER, AMI, EV, DERMS and System Operator. Under this option the ADMS project would be completed in the first year of the period and a ADMS enhancement project would be initiated to incorporate AMI meter integration and customer communication enhancements to the IVR, SMS messaging and web portal notifications. DERMS capabilities would be piloted however the full DERMS solution would be deferred to the next period as it anticipated the deferred capex benefit from the DERMS solution would not materialise in the current period based on current constraint projects and DERMS installed capability in Tasmania being limited. The additional expenditure on enhancements would be targeted via benefits based business cases that leverage existing capability in the control systems, and additional benefits would be realised in the current period directly resulting from this investment. Improvements such as automated Volt Var Control, Voltage Reduction Schemes, enhanced load shedding, selective load shedding are current prioritised initiatives that would be pursued under this option.

This option is not the recommended option as it risks delivering capability before being needed within the Tasmanian context. Although this option defers expenditure to future years, due to regulatory uncertainty, it is probable it will deliver capability not required within the upcoming regulatory period.

### 5.1.3 OPTION 2: DELIVERY FULL DERMS AND LIMITED SYSTEM OPERATOR CAPABILITY

This option includes investment required to manage base currency, infrastructure and cyber security updates whilst extending the distribution control system to manage full DERMS capability and defers the majority of System Operator capability to the next period.

Under this option TasNetworks would pursue initiatives identified in Option 1 and in addition would pursue a full DERMS solution addition to the current network control system via the procurement and implementation of the required software and associated systems. This option would include also include the associated systems to accurately forecast short term constraints, identified the best commercial solution to address the constraint, dispatch the DER to resolve the constraint, verify the DER met its obligation and initiated the payment for the dispatched service. Although DERMS solutions are rapidly evolving, this project would implement the initial base capability that would be expanded in future years to cater for specific TasNetworks scenarios and network configurations.

Under this option, complementary work would be undertaken to build background capability for potential Distribution System Operator requirements that may emerge over the period using the

approach of incrementally adding to the DERMS solution to pilot and test some of the quality of supply, system security and constraint management use cases. It is not anticipated the DSO obligation will emerge in the current regulatory period however this approach would allow learning at very low cost to prepare for the future requirement.

Based on TasNetworks forecast of DER uptake behind the meter being lower than on the mainland, and the current installed capacity of distribution level DER providers, it is envisaged that the installed DERMS capability would not be significantly utilised in the current period, and hence the benefit would not be realised in the shorter term, taking note that the implementation of this system itself may be an enabler to encourage innovative DERM solution providers to invest in the Tasmanian market. Notwithstanding the stimulus that may be provided by early implementation of this system, TasNetworks has deferred this requirement and it is now forecast to be required in the next regulatory period and is therefore note the recommended option.

#### **5.1.4 OPTION 3: DELIVER FULL DERMS AND SYSTEM OPERATOR CAPABILITY**

This option includes investment required to manage base currency, infrastructure and cyber security updates whilst extending the distribution control system to manage full DERMS capability as per Option 2 and full DSO capability in the current price period. Given the current forecast of DER and System Operator capability is not required for some time in Tasmania, this is not the recommended option as the benefits would not be realised until later years when the full requirement is used to defer capital expenditure and deliver network quality and security benefits for customers.

#### **5.1.5 OPTION 4: DELIVER LIMITED EXTENDED CAPABILITY ON SEPARATE DISTRIBUTION PLATFORM:**

This option includes the same currency, infrastructure and capability extension scope as Option 1 and includes the full separation of the network control systems between Transmission and Distribution. TasNetworks anticipates that the cyber security arrangement for Transmission will continue to evolve and will be more prescriptive and onerous than those required for Distribution. Under the *Protecting Critical Infrastructure and Systems of National Significance* initiative of the Australian Government's Department of Home Affairs, ongoing amendments the Security Legislation (Critical Infrastructure) Bill will place regulatory obligations on TasNetworks. TasNetworks considers it probable that a legislative obligation will be impose to limit cyber security risk resulting in the requirement to provide physical separation between the control system platform, SCADA systems and advanced applications (EMS for transmission and DMS/OMS for distribution). This significant project will require duplicated hardware, software and communication systems to be rebuilt in parallel and implemented as full system replacement. Although this is considered probable in the future, TasNetworks has determined that it would be prudent to place this significant project into the next price reset period as there is still uncertainty around timing at this stage.

#### **5.1.6 OPTION 5: CONSOLIDATION AND MINIMAL INVESTMENT IN DMS/OMS:**

This option undertakes the recurrent expenditure of \$2.5M (comparable to the \$2.2M of recurrent expenditure incurred in the current period) and a further \$1.2M to complete the inflight ADMS project.

The comparison of current period and projected future period recurrent expenditure is shown here:

Recurrent Expenditure						
	2020	2021	2022	2023	2024	TOTAL PERIOD
R19 Recurrent Spend SCADA	503,444	531,406	437,608	193,453	542,185	2,208,097
R24 Forecast Recurrent SCADA	650000	475000	390000	530000	450000	2495000
<b>Difference</b>	<b>146,556</b>	<b>-56,406</b>	<b>-47,608</b>	<b>336,547</b>	<b>-92,185</b>	<b>286,903</b>
Non Recurrent Expenditure						
	2020	2021	2022	2023	2024	TOTAL PERIOD
R19 Non-Recurrent Spend SCADA	2,093,742	1,317,398	1,309,900	694,943	2,440,844	7,856,828
R24 Forecast Non -Recurrent Spend SCADA	1350000	1525000	1,562,392	1470000	1550000	7457391.616
<b>Difference</b>	<b>-743,742</b>	<b>207,602</b>	<b>252,492</b>	<b>775,057</b>	<b>-890,844</b>	<b>-399,437</b>

### Comparison of recurrent expenditure between R19 and projected R24.

This planned expenditure includes the investment required to manage base currency, infrastructure and additional cyber security updates (to reinforce security boundaries between the Transmission and Distribution SCADA and control systems) whilst consolidating previous investment in the distribution control system. It will complete the inflight ADMS project (to deliver the OMS and LV model) and will provide minimal foundational technology to build future capabilities such as Demand Response, AMI meter integration, EV charging, DERMS, and System Operator Obligations. This option avoids the loss of benefit from completing the inflight ADMS project, balances the requirement to meet changing customer needs as well accepting the risk of not building capability prior to network and customer needs as well as regulatory obligations. This option defers benefits attributed DERMS implementation and advanced distribution management system applications to the next period.

The approach under this option is to undertake targeted projects to build capability with the DMS and the HV and LV connectivity model that will deliver benefits in the current period whilst providing an underlying capability in the systems to cater for future DERMS and DSO requirements. By targeting specific problems in the current period to address relating to LV constraints and HV power flows, investment will be made in improving the short term forecasting capability within the DMS and improving the modelling relating to solar installations and other distributed energy resources. Targeted additional IoT sensors and AMI meter capability will be utilised where possible and prudent to improve power quality measurement and monitor sensitive customers such as life support customers. Pilots and proof of concepts will also be undertaken at minimal cost to build the capability to dispatch signals to DER resources via the control system based on identified constraints of power quality issues to inform the design in the next period of the DERMS solution. Under this option, the funding for additional licences, SCADA points, historian capacity and software development is included to achieve the extension to real time system capability.

Further to this option, improved customer interaction with integrated voice recordings, SMS outage messaging, web portal communications and AMI metering integration will be pursued to extend the capability of the newly implemented OSM to respond to feedback from customers in recent major events where communications and update systems were identified as requiring improvement.

This option is the recommended option as it balances the need to start building new capability within forecasted timeframes and defers expenditure to future years to deliver identified capabilities.

#### 5.1.7 OPTION 6: RECURRENT EXPENDITURE ONLY:

This option undertakes only the activities required to maintain the network control systems through recommended upgrades and critical fixes, and to complete the inflight ADMS Project (OMS and LV modelling) and does not address the customer needs that are changing the nature of electricity flows and their resultant impacts on the electricity network. This option exposes TasNetworks to the risk of not being able to maintain required quality of supply limits and decreases the ability to respond to constraints on the network using real time control and dispatch systems.

## 5.2 OPTION EXPENDITURE PROFILES

The following tables show the expenditure profile for each investment option.

<b>Option 0 – Do nothing</b>					
<b>Estimate (in nominal dollars) \$</b>					
<b>Option 0 expenditure profile</b>	<b>FY25</b>	<b>FY26</b>	<b>FY27</b>	<b>FY28</b>	<b>FY29</b>
Capex	0	0	0	0	0
Opex	0	0	0	0	0

<b>Option 1 – Deliver limited extended capability</b>					
<b>Estimate (in nominal dollars) \$</b>					
<b>Option 1 expenditure profile</b>	<b>FY25</b>	<b>FY26</b>	<b>FY27</b>	<b>FY28</b>	<b>FY29</b>
Capex	5.0M	4.9M	2.36M	2.5M	4.0M
Opex	0.69M	0.77M	0.80M	0.83M	0.9M

<b>Option 2 – Deliver full DERMS and limited system operator capability</b>					
<b>Estimate (in nominal dollars) \$</b>					
<b>Option 2 expenditure profile</b>	<b>FY25</b>	<b>FY26</b>	<b>FY27</b>	<b>FY28</b>	<b>FY29</b>
Capex	5.6M	6.9M	5.4M	5.5M	7.0M
Opex	0.7M	0.82M	1.06M	1.15M	1.43M

<b>Option 3 – Deliver full DERMS and system operator capability</b>					
<b>Estimate (in nominal dollars) \$</b>					
<b>Option 3 expenditure profile</b>	<b>FY25</b>	<b>FY26</b>	<b>FY27</b>	<b>FY28</b>	<b>FY29</b>
Capex	6.1M	8.9M	6.7M	7.8M	9.95M
Opex	0.71M	0.87M	1.29M	1.43M	1.76M

<b>Option 4 – Deliver limited extended capability on separate distribution platform</b>					
<b>Estimate (in nominal dollars) \$</b>					
<b>Option 4 expenditure profile</b>	<b>FY25</b>	<b>FY26</b>	<b>FY27</b>	<b>FY28</b>	<b>FY29</b>
Capex	8.0M	7.9M	4.4M	2.5M	4.0M
Opex	0.75M	1.2M	1.4M	1.45M	1.51M

<b>Option 5 – Consolidation and minimal investment in DMS/OMS</b>					
<b>Estimate (in nominal dollars) \$</b>					

Option 5 expenditure profile	FY25	FY26	FY27	FY28	FY29
Capex	2.0M	2.0M	2.0M	2.0M	2.0M
Opex	0.2M	0.2M	0.2M	0.2M	0.2M

Option 6 – Recurrent expenditure only Estimate (in nominal dollars) \$					
Option 6 expenditure profile	FY25	FY26	FY27	FY28	FY29
Capex	2.0M	1.6M	0.39M	0.39M	0.45M
Opex	0.15M	0.15M	0.3M	0.3M	0.3M

### 5.3 RISK MITIGATION

The matrix presented in Table 6 compares the options, showing how each assists TasNetworks in mitigating its key business risks (previously identified in section 4.3 “Risk objectives”).

Appendix B provides supporting details of the risk assessment outcomes presented in Table 6.

**Table 6 Risk matrix summary**

Risk Drivers	Current risk (Corporate Plan)	Option 0 – Do nothing Unmitigated risk	Option 1 - Net risk	Option 2 - Net risk	Option 3 - Net risk	Option 4 - Net risk	Option 5 – Net risks	Option 6 – Net risks
Death or Injury (Employee)	High	Very High	High	High	High	High	High	High
Death or Injury (Public)	High	Very High	High	High	High	High	High	High
Widespread Power Disruption	Medium	Very High	Medium	Medium	Medium	Medium	Medium	High
Bushfire Start	High	Very High	High	High	High	High	High	High
Customer Focus	Medium	Low	Medium	Medium	Medium	Medium	Medium	Medium
Business Continuity Management	Medium	Very High	Medium	Medium	Medium	Medium	Medium	High
Cyber Security	High	Very High	Medium	Medium	Medium	Medium	High	High
Tasmanian Power System Complexity	Medium	High	Medium	Medium	Medium	Medium	Medium	High
Emerging Complexity of the NEM	High	Very High	Medium	Medium	Medium	Medium	Medium	High

## 5.4 QUANTITATIVE RISK ANALYSIS

Quantitative risk analysis was not undertaken as a part of this IES.

## 5.5 PREFERRED OPTION

The preferred option is Option 5 – Delivering the currency, infrastructure and cyber security programs whilst prudently investing in foundational technology to build future capabilities to support the expected transition of the distribution electricity system and the distribution network control system over the next price period. Piloting and trailing capability for DER and System Operator capability will be undertaken in preparation for implementation in future price periods.

## 6. INVESTMENT TIMING ❖

The investment timing is indicated by the sped profile of the preferred option, commencing in July 2024 and concluding in June 2029.

## 7. EXPECTED OUTCOMES AND BENEFITS

The benefits to TasNetworks from implementation of the preferred option will be:

- The continued high reliability and high availability distribution network control system supporting the ongoing reliability of the distribution system and avoiding the catastrophic shutdown of the electricity system in Tasmania due to unsupported software or hardware.
- The maintenance at current levels of very high impact/low likelihood cyber security breaches causing electricity network shutdowns and asset failures
- The delivery of high quality and reliable supply to our customers in a manner that meets their changing electricity consumption requirements over the next price period

## 8. RECOMMENDATION ❖

It is recommended that the preferred option is approved and progressed as it best satisfies the customer and business needs.

## APPENDIX A – ECONOMIC ANALYSIS

The assumptions used in the economic analysis are as follows:

- NPV analysis is carried out for a 10 year period (2024-33).
- Weighted Average cost of Capital (WACC) of 2.79 per cent is used.
- Value of Customer Reliability (VCR) of \$30,950 per MWh of electricity is used for calculating cost of customer outages.
- No voluntary load shedding has been assumed.
- Reduction in system losses has been ignored.
- 10% of project cost is assumed to be software and a 22% support opex cost is assumed as incremental operations and maintenance cost (OPEX).



**APPENDIX B – KEY BUSINESS RISK COMPARISON**

The project options each have a different impact on key business risks. The table below provides a qualitative summary of the impacts of each option on key business risks, with consideration for the risk approach and risk management process outlined in TasNetworks’ Risk Management Framework.

Key business risks	Current risk as per Corporate Plan			Option 0 Do nothing				Option 1 Deliver limited extended capability				Option 2 Deliver full DERMS and limited system operator capability				Option 3 Deliver full DERMS and system operator capability			
	Likelihood	Consequence	Risk	Likelihood	Consequence	Risk	How does this option mitigate current situation risk?	Likelihood	Consequence	Risk	How does this option mitigate current situation risk?	Likelihood	Consequence	Risk	How does this option mitigate current situation risk?	Likelihood	Consequence	Risk	How does this option mitigate current situation risk?
Death or Injury (Employee)	Possible	Major	High	Likely	Severe	Very High		Unlikely	Severe	High		Unlikely	Severe	High		Unlikely	Severe	High	
Death or Injury (Public)	Possible	Severe	High	Likely	Severe	Very High		Unlikely	Severe	High		Unlikely	Severe	High		Unlikely	Severe	High	
Widespread Power Disruption	Unlikely	Major	Medium	Likely	Severe	Very High		Rare	Severe	Medium		Rare	Severe	Medium		Rare	Severe	Medium	
Bushfire Start	Unlikely	Severe	High	Likely	Severe	Very High		Unlikely	Severe	High		Unlikely	Severe	High		Unlikely	Severe	High	
Customer Focus	Unlikely	Moderate	Medium	Unlikely	Moderate	Low		Unlikely	Moderate	Medium		Unlikely	Moderate	Medium		Unlikely	Moderate	Medium	
Business Continuity Management	Possible	Moderate	Medium	Likely	Severe	Very High		Rare	Severe	Medium		Rare	Severe	Medium		Rare	Severe	Medium	
Cyber Security	Likely	Major	High	Likely	Severe	Very High		Rare	Severe	Medium		Rare	Severe	Medium		Rare	Severe	Medium	
Power System Complexity	Possible	Moderate	Medium	Likely	Moderate	High		Unlikely	Moderate	Medium		Unlikely	Moderate	Medium		Unlikely	Moderate	Medium	
Emerging Complexity of the NEM	Likely	Major	High	Likely	Severe	Very High		Rare	Severe	Medium		Rare	Severe	Medium		Rare	Severe	Medium	

Key business risks	Current risk as per Corporate Plan			Option 4 Deliver limited extended capability on separate distribution platform				Option 5 Consolidation and minimal investment in DMS/OMS				Option 6 Recurrent expenditure only			
	Likelihood	Consequence	Risk	Likelihood	Consequence	Risk	How does this option mitigate current situation risk?	Likelihood	Consequence	Risk	How does this option mitigate current situation risk?	Likelihood	Consequence	Risk	How does this option mitigate current situation risk?
Death or Injury (Employee)	Possible	Major	High	Unlikely	Severe	High		Unlikely	Severe	High		Unlikely	Severe	High	
Death or Injury (Public)	Possible	Severe	High	Unlikely	Severe	High		Unlikely	Severe	High		Unlikely	Severe	High	
Widespread Power Disruption	Unlikely	Major	Medium	Rare	Severe	Medium		Rare	Severe	Medium		Rare	Severe	High	
Bushfire Start	Unlikely	Severe	High	Unlikely	Severe	High		Unlikely	Severe	High		Unlikely	Severe	High	
Customer Focus	Unlikely	Moderate	Medium	Unlikely	Moderate	Medium		Unlikely	Moderate	Medium		Unlikely	Moderate	Medium	
Business Continuity Management	Possible	Moderate	Medium	Rare	Severe	Medium		Rare	Severe	Medium		Rare	Severe	High	
Cyber Security	Likely	Major	High	Rare	Severe	Medium		Unlikely	Severe	High		Unlikely	Severe	High	
Power System Complexity	Possible	Moderate	Medium	Unlikely	Moderate	Medium		Unlikely	Moderate	Medium		Unlikely	Moderate	High	
Emerging Complexity of the NEM	Likely	Major	High	Rare	Severe	Medium		Rare	Severe	Medium		Unlikely	Severe	High	