AusNet

Electricity Distribution Price Review FY2027 to FY2031 (EDPR 2027-31)

Business case: Network Model Management

Date: January 2025

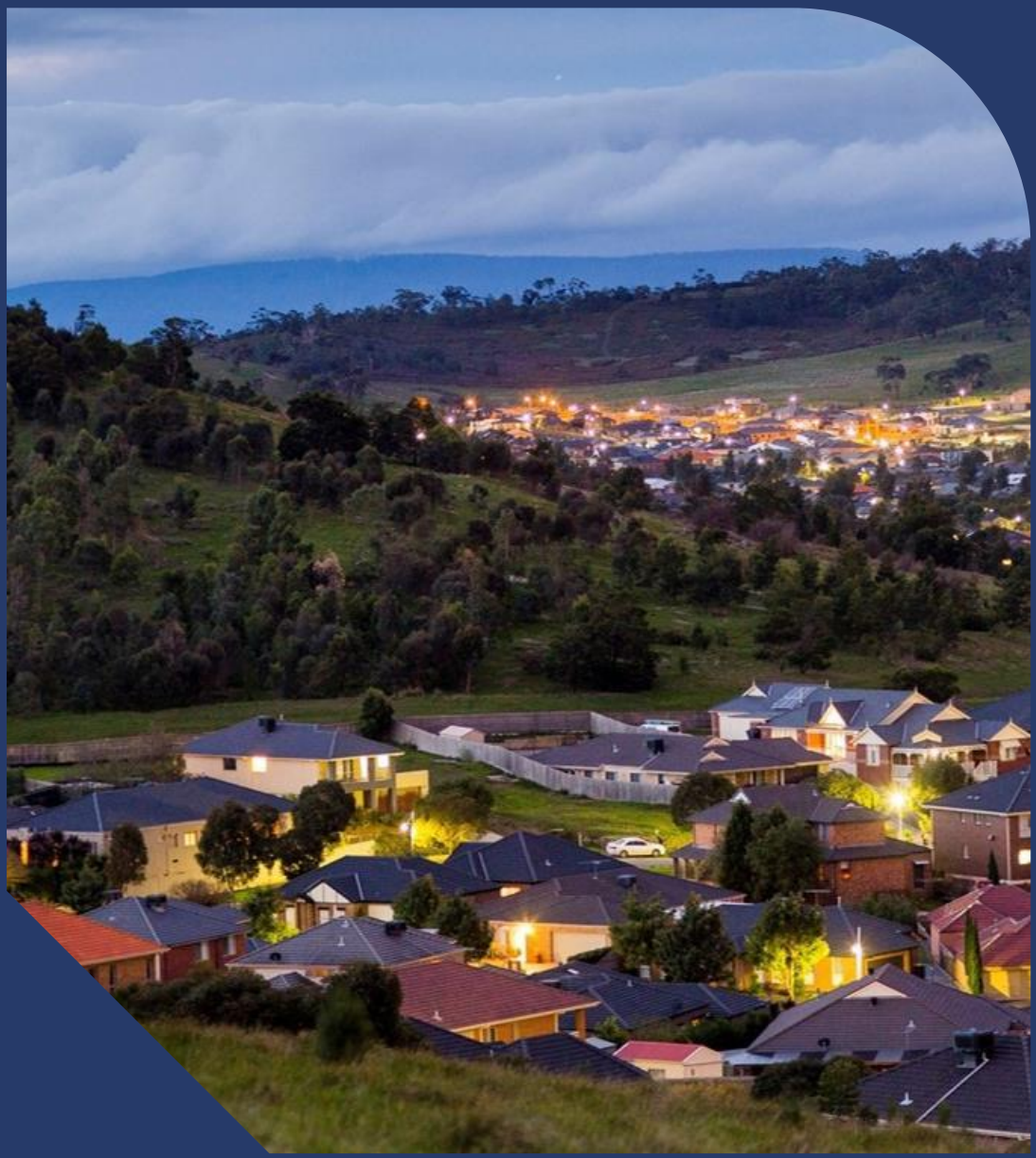


Table of contents

Document history

DATE	VERSION	COMMENT
17/10/2024	V1.0	Initial draft business case for review
26/11/2024	V2.0	Revised business case incorporating input
31/12/2024	V3.0	Final business case document

Related documents

DOCUMENT	VERSION	AUTHOR
Advanced Distribution Management System (ADMS) Business Case	V4.0	AusNet Services
Technology Strategy and Investment Plan	V3.0	AusNet Services
AusNet EDPR 2027-31 Digital Program NPV model	V3.0	AusNet Services
AusNet Resilience Strategy	V3.0	AusNet Services

Approvals

POSITION	DATE
Digital & Technology – Strategy, Regulatory and Partner Management	December 2024
Digital & Technology – Architecture	December 2024
Distribution – Strategy and Regulation	December 2024

1. Executive summary

This business case encompasses updates, capability enhancements, and connectivity improvements, to AusNet's distribution network models. While these models have a key linkage with AusNet's Advanced Distribution Management System (ADMS), which is proposed for enhancements as detailed in the ADMS business case, this business case is presented separately as the ADMS can be implemented with the existing network models, although with more limited functionality. Additionally, the network models, and associated capability enhancements, are also used in other AusNet business processes such as network planning, network safety and 3D visualisations e.g. LiDAR.

The operational network model, used day-to-day by our network controllers, provides a digital representation of the network showing the main assets, their connectivity and operational state. The Geographical Information System (GIS) is a planning suite used primarily by network planning engineers. It is the primary source of asset and connectivity data (master data) and contains the geographical information of all assets, asset characteristics and data.

Operating our network is becoming increasingly more complex, with recent major events experienced during the 2021-26 regulatory control period exposing deficiencies in our current network management systems that have led to poor network performance, reliability, resilience and customer outcomes[1]. The table below summarises key gaps identified with our existing network models, which are critical to enabling advanced functionality in the ADMS, and more broadly to improve reliability and asset management, and enable improved network planning capabilities. As the network becomes more complex, these gaps need to be addressed to ensure the continued safety and reliability of our network.

Table 1 – Summary of identified need

IDENTIFIED GAPS	RISK
AusNet's ADMS system does not source its network model from the master GIS system which results in a risk of differences between the GIS and ADMS's network models.	This lack of integration requires manual processes to maintain the ADMS's Network model which leads to model inaccuracies. This results in a risk to network reliability and safety as operation of the network could be undertaken based on incorrect network information.
There is no geospatial view of the network model available in ADMS.	This can increase the response time to an outage. The controllers currently only have a schematic view of the network model so have limited ability to accurately direct field crews to the precise location of a fault or advise of any potential accessibility issues.
The LV network is not incorporated into the network model used by the ADMS.	The lack of visibility of real-time representation of the LV model to the controllers can result in slower response to outages. Additionally, this prevents operationalising advanced LV management functionality which results in a higher likelihood of Human Error Incidents (HEI) during LV switching caused by switching errors
AusNet's geospatial systems have limited integration and capabilities, and do not enable single-view consolidation of network and broader geospatial information (e.g. bushfire or planning overlays, or 3D information such as LiDAR)	Asset planners do not have access to view overlays (GIS hazard layers) or incorporate additional data sets such as LiDAR, easements and environmental data that can be used to help manage asset lifecycles, outages and plan for emergency response.
The current GIS network model information is not aligned to the current industry standard (GDA2020).	Not fully complying with the current industry standard (GDA2020) can result in inconsistencies in data between AusNet and proponents that can result in asset appearing in the wrong location in GIS. This requires additional effort to manually correct and raises concerns regarding asset data quality.

[1] Post Incident Review into AusNet's response to the February 2024 outage event, Nous, May 2024

Current network models and geospatial capabilities do not enable detailed demand forecasting, with AusNet currently utilising spreadsheets for top-down demand forecasting	This additional information will also provide AusNet with the ability to complete detailed bottom-up forecasting, as required by the growing network complexity, and undertake scenario and sensitivity analysis for specific emerging trends.

AusNet has identified and assessed the following three options for addressing key gaps identified with our network model:

- **Option 1: Augment existing platforms with task-specific solutions**. This option retains the existing network model systems and augments them with task-specific software solutions to address new desired capabilities.
- **Option 2: Upgrade or update existing systems.** This option proposes investments aimed at addressing the identified deficiencies with network models by updating and upgrading existing systems and undertaking data remediation.
- **Option 3: Replace systems with a new platform.** This option proposes investments aimed at addressing the identified deficiencies with the network model by implementing a new GIS platform and network model, coupled with data remediation.

Options were assessed relative to their ability to address the identified gaps in system capability, the cost of implementing the option, deliverability and risk, and the benefits expected to be obtained. Risk has been assessed using AusNet's Enterprise Risk Management Framework.

Our analysis has found that Option 2 to be the preferred option as it provides the highest and only positive NPV, addresses the identified need while meeting customer expectations at a lower cost than Option 3.

Table 2 - Options analysis summary

Criteria	Option 1	Option 2	Option 3
NPV ($'000, real FY24)	-$6,756	$2,339	-$1,424
Capex ($'000, real FY24)	$40,990	$38,588	$43,588
Opex ($'000, real FY24)	$3,880	$1,836	$1,686
Technically feasible	✓	✓	✓
Addresses identified need	× (Partial)	✓	✓
Meets customer expectations	× (Partial)	✓	✓
Deliverable within timeframe	✓	✓	× (Risk of delay)
Delivery risk	Moderate	Low	High
Preferred option	×	✓	×

Key benefits that will be obtained from implementing Option 2 include:

- **Improved Operational Efficiency**: Reduced site visits, time for writing and executing LV switching, and overtime for coordinators. Enhanced approval processes for planned LV instructions.
- **Situational Awareness**: Real-time visibility of the as-operated LV network for network controllers, improving fault identification and restoration times.
- **Data Integration**: Better monitoring and management of the LV network through integration with the Geospatial Information System (GIS).
- **Grid Capacity**: Improved understanding and operation of distributed energy resources (DER) and increased demand from electric vehicles and heat pumps.
- **Customer Experience**: Faster restoration times, improved accuracy of outage notifications, and reduced penalties for notification breaches.
- **Safety**: Reduced human error incidents by leveraging enhanced safety logic for LV switching instructions.
- **Reliability**: Faster fault restoration using integrated system data, better visualization of outages, and accurate fault location identification.

- **Compliance and Guaranteed Service Levels**: Reduced penalties and costs for notification breaches, enhanced visualization of outages and more accurate fault locations resulting in improved restoration times and therefore fewer Guaranteed Service Level payments and meeting reliability targets.

These advancements are crucial for modernizing the electric distribution network, enhancing reliability and efficiency, and supporting the transition to renewable energy.

2. Context

There are four primary types of digital information that AusNet relies upon for managing our network:

- The **Network Model,** which provides a digital representation of AusNet's network in a schematic view.
- **Geospatial information**, which provides a representation of AusNet's network model in a geospatial view, and relative to other non-network geospatial overlays (e.g. hazard zones, easements etc).
- **Operational data,** which represents the real-time status and power flows of our electrical assets.
- **Asset data**, which includes the sizes and ratings of network assets, and their financial and condition information.

AusNet's digital systems integrate this information to deliver the safe and reliable operation of our network. As a key example, AusNet's Advanced Distribution Management System (ADMS) uses network model and real-time operational data (provided by our SCADA system), to enable network controllers to monitor the distribution network, identify issues, and operate the network to ensure reliability and efficiency.

This business case covers investments for updating and enhancing our network model and geospatial capabilities. These investments support the delivery of our ADMS roadmap[2], but have been separated out as the ADMS can be implemented with the existing network model, although with lower functionality. Additionally, this business case captures geospatial focused investments that enhance capabilities outside of ADMS network operations, such as integration of geographic hazard overlays and LiDAR information that are needed for engineering and asset management. Hence, this business case represents AusNet's holistic program to enhance network model and geospatial capabilities, with associated costs and benefits.

2.1. Network model and geospatial capabilities and systems - current state

AusNet uses network models in multiple systems to help operate, manage and plan the network. The systems are at various levels of maturity and connectivity with other important business systems. The current set of systems create inefficiencies as multiple systems must be used to perform network operations.

There are three core systems relevant to this business case:

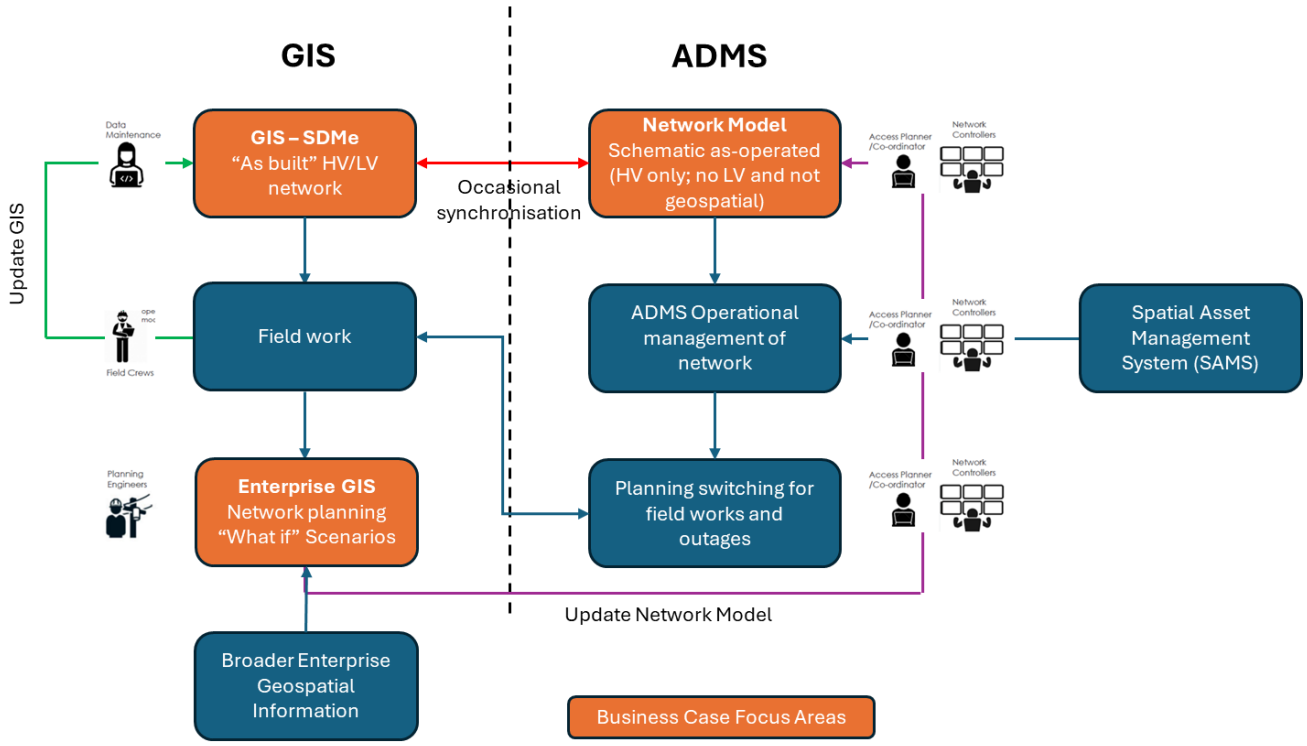
- The ADMS's network model which is a real-time as-operated digital representation of the network that is equivalent to a schematic diagram. It shows the network assets, their connectivity and operational state. It does not provide a geographic view of the network model.
- [CIC] (also referred to as SDMe) which is the Geospatial Information System (GIS) platform. This system provides an as-built digital representation of AusNet's network model in a geospatial view. This is the primary source of data including geographical/locational information and asset characteristics. This system does not contain the operational state of assets, other than whether they are in service or not, and is updated based on as-built drawings from the field.
- Enterprise GIS which combines the network model and [CIC] with additional non-network or 3D geospatial information layers. [CIC] GIS is used as the primary software platform, along with other task and information specific systems.

The integration and management of these models is critical to the safe and reliable operation of the network.

As shown in Figure 1, the network model in ADMS and GIS are maintained separately as there is no inbuilt data transfer or export/import functionality. Hence, there can be inconsistencies in the network model between the ADMS and GIS, which adds risk due to changes in the network not being immediately reflected in the operational model.

[2] Refer Advanced Distribution Management System (ADMS) Business Case

Figure 1 Different processes to maintain GIS and ADMS's Network Model



As the ADMS does not include geospatial information, AusNet utilises an in-house designed GIS viewer, called Spatial Asset Management System (SAMS), to provide the controllers with the geospatial representation of the network model. SAMS combines all our assets, including distribution, transmission and gas into a single operational view.

Beyond network control, AusNet relies upon enterprise GIS for network planning, risk management, forecasting and maintenance management. Currently there are multiple systems and information sources that are used in our enterprise GIS landscape, including [CIC], [CIC] and others. We have identified opportunities for systems to be integrated and consolidated to improve analytical capability, efficiency of the business and outcomes for customers.

Consequently, further enhancements to AusNet's ADMS network model and GIS platforms are required to ensure that they are reliable, based on complete and high-quality data, and cover the full network, including HV and LV assets. Without this, AusNet will not be able to properly utilise the functionality enabled from the implementation of a modern ADMS, or best manage and plan the network into the future.

2.2. Resilience Strategy

During the 2021-26 regulatory control period, AusNet has experienced a number of major events which have exposed deficiencies in our current network management systems that have led to poor network performance, reliability, resilience and customer outcomes. In response, AusNet has developed a Resilience Strategy that details planned performance improvements. The Strategy has been informed by our engagement with our Electricity Availability Panel and consumers more broadly, who have helped us to target our efforts to best meet the needs of our customers and communities.[3]

While this Resilience Strategy formalises our approach to improving resilience for the first time, it is important to acknowledge that this has been an area of increasing focus for AusNet, our customers, the Victorian Government and industry regulators. Our Resilience Strategy describes our vision and approach for ensuring that we factor resilience into our decision-making, so that we deliver optimal outcomes for our customers when disruptive events occur.

A core element of the Resilience Strategy is to develop digital solutions to replace or enhance existing practices and invest in systems and processes to avoid outages and reduce their duration. This includes systems that improve network visibility and control, avoid outages, and improve response to reduce their duration. The Network Model Management program forms a component of the Resilience Strategy as an enabler for delivery of the target ADMS program, and to improve field asset visibility, hazard management, and response.

[3] Refer AusNet Resilience Strategy

Through our EDPR 2027-31 customer engagement program with our Electricity Availability Panel, our customers have provided strong support for the Resilience Strategy, and their willingness to pay for the investments required to deliver improved outcomes. [4]

2.3. Investments in the 2021-26 regulatory period

To improve performance following the February 2024 storms, during the current period we have initiated key investments in our geospatial and network model systems. The focus has been to initiate the deployment of the base platforms which will be completed during the 2027-31 regulatory period, and which will be expanded to incorporate new functionality. We have started implementing upgrades to:

- [CIC] which will be used as our Enterprise GIS viewer with functionality that will enhance our asset management, network performance and risk management capabilities.
- The ADMS network model which will be expanded to include LV network and geospatial views.

We do not expect that the upgrades to the base platforms will be completed in the current period and expenditure on these items will continue into the 2027-31 regulatory period. This expenditure is included in this business case, along with expenditure for new capabilities and interconnectivity that builds from these platforms.

[4] Refer AusNet Resilience Strategy

3. Identified need

Following the recommendations of internal and external reports, and as part of our Resilience Strategy, we have identified several deficiencies in our current network model and geospatial capabilities. These deficiencies negatively impact our network's performance (particularly during major events), our ability to plan to maximise asset utilisation through more granular demand forecasting, and to improve asset management by incorporating broader data such as geographic and environmental hazards or LiDAR into our analysis.

As the network becomes increasingly more complex to manage and operate due to the increased uptake of distributed energy resources and two-way flows on the network, and the increasing severity and frequency of extreme weather, AusNet's network performance will increasingly become compromised if the deficiencies identified with our geospatial and network model capabilities are not addressed.

3.1. Limitations with current network model and geospatial capabilities

There are currently several limitations with our existing network model and geospatial capabilities that pose an increasing risk to safety, reliability, and efficient utilisation as the network becomes more complex. These include:

- Currently, the HV **network model in ADMS lacks integration with the GIS**. The network models in ADMS and GIS are maintained separately as there is no simple data transfer or export/import functionality. Hence, there can be inconsistencies between the network models in the systems which adds risk due to changes in the network not being immediately reflected in the operational model.
- The **LV network is not incorporated into the ADMS's network model**, compromising situational awareness, safety, and efficiency, especially during major events. This also means that the network switching safety logic implemented in the ADMS is not available on the LV network. AusNet has identified that a high proportion of safety incidences occur on the LV network because of lack of visibility of the as-operated network state.
- **The ADMS has no geospatial view**, currently only incorporating a schematic view of the network model. The absence of geospatial view or indication of distance inhibits the ability of controllers to fault find and direct field crews.
- **The GIS environment is poorly integrated,** with multiple systems and inconsistencies in the provision of geospatial information. Current capabilities limit the ability to assess integrated network and geospatial information sources, such as bushfire and other hazard overlays, planning and easement locations, or inclusion of 3D modelling such as LiDAR.
- **Limitations with developing new advanced functionality** that can utilise detailed network model and geospatial data for network planning, analysis and optimisation, including demand forecasting and scenario analysis.

The deficiencies in the current systems have impacted network performance, particularly during major events, and impeded improvements to our asset management and network planning practices. Several external and internal reviews have identified the underlying causes and made recommendations about how they can be addressed.

3.2. Addressing external reviews

Operating our network is becoming increasingly complex, with recent major events experienced during the 2021-26 regulatory control period exposing required improvements in our current network management systems[5].

Several independent reviews have been undertaken to assess AusNet's performance during major events and identify actions that AusNet should seek to implement to improve its network management practices:

[5] Post Incident Review into AusNet's response to the February 2024 outage event, Nous, May 2024

- The **Network Outage Review**[6] made 19 recommendations to improve network reliability and management of network outages. The recommendations are largely focused on changes to regulation, cooperation between government agencies and electricity businesses, and reporting.
- The **Network Resilience Review**[7] made 8 recommendations to improve network resilience and management of network outages. These recommendations are primarily focused on actions that should be undertaken by the electricity businesses and include improved use of geospatial data, improved collaboration with other emergency support agencies, improved communications with customers and sharing data with other agencies.
- The **Post Incident Review by Nous** was focused on AusNet's response to the major event of storms that occurred during February 2024. The review identified several deficiencies that were materially impacted or caused by inadequate functionality of the AusNet's network model and geospatial systems.

The recommendations made by the Victorian Government reviews and AusNet's internal post event review found several deficiencies in AusNet's systems which led to poor reliability and resilience outcomes. Addressing key recommendations from external reviews will require AusNet to resolve the following issues:

- **Inaccurate and unreliable data** and lack of a geospatial view of the network in ADMS pose limitations on the functionality of the network model. These will need to be addressed to enable:
    - AusNet to meet the proposed attestation requirements (Outage review recommendation 2) while providing capability to support AusNet complying with recommendations related to collaboration with other agencies (such as Outage review Recommendation 5).
    - Operators to comply with requirements that relate to geographic analysis of risk and prioritisation of power restoration (Resilience review Recommendations 1, 2 and 5).
- The need to upgrade the technology and implement new functionality to **increase the visibility of restoration work**. Implementation of a new, more comprehensive network model in ADMS that included HV and LV networks with schematic and geographical views that is fully aligned with GIS would help with achieving this recommendation.

Supporting the recommendations from these reviews with the Victorian Government will require improved network information and data accuracy than is currently available achieved by AusNet's network model and geospatial capabilities and systems.

3.3. Emerging issues (CER and climate change)

The emerging limitations and issues that were identified in the Future Distribution Network Management business case (submitted for the 2021-26 regulatory submission) are still relevant and have become increasingly urgent to address. These include:

- Increasing renewables challenges the ability to keep supply and demand in balance, and the ability to ensure frequency and voltage levels remain within technical limits on a grid originally designed and built for large scale one-way power flows that now must accommodate two-way power flows.
- Increased frequency of extreme weather events, reduced base load generation, rapid technological change, evolving market conditions, and changing customer/regulator expectations are also factors that drive increased complexity on our network.

The above factors are driving significant increase in workload and stress on our controllers and negatively impact on AusNet's ability to effectively operate the network.

[6] Network Outage Review, Independent review of Transmission and Distribution Businesses Operational Response, Final report, September 2024
[7] Electricity Distribution Network Resilience Review, Final Recommendations Report, May 2022

3.4. Data requirements

Consistent with the deficiencies identified in Sections 3.1 and 3.2, accuracy and interconnectivity of data is a core issue. In particular, the lack of automated synchronisation of the network model between GIS and the ADMS, compounded by separate methods for updating the two models, creates risk to safety and reliability of network operations. As more advanced functionality is incorporated and more reliance is placed on the logic and functionality of the ADMS, the need for accurate and high-quality data becomes increasingly important.

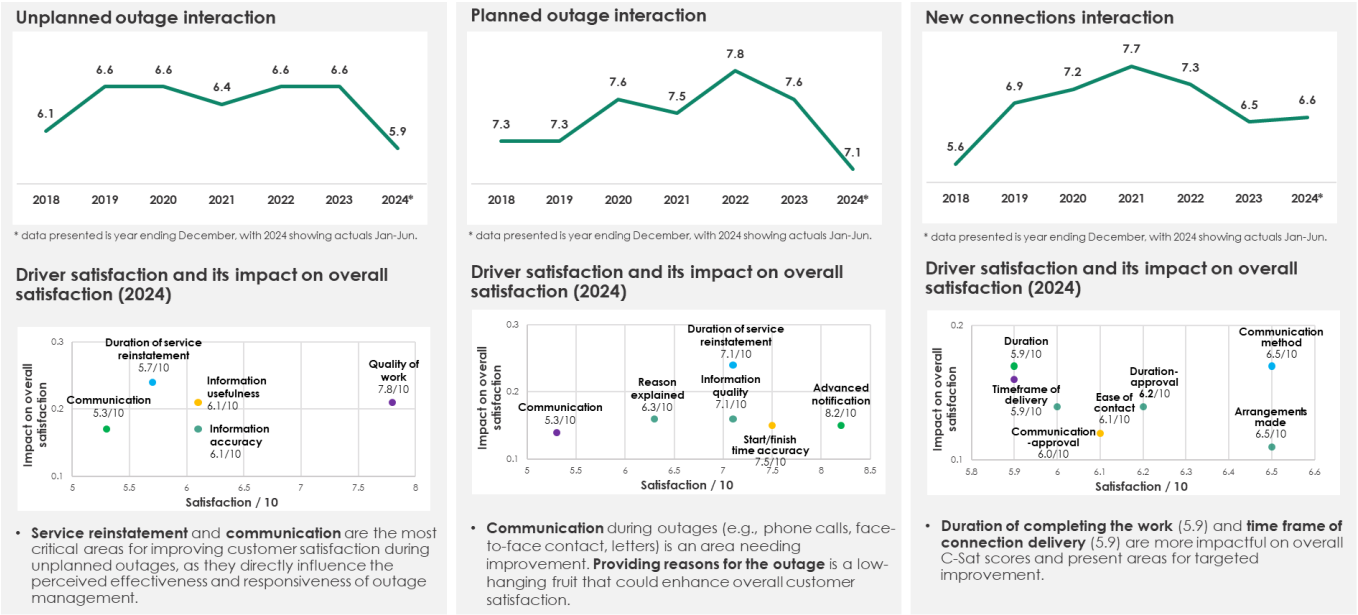
Key issues associated with data and integration issues include:

- Multiple network models that are each maintained separately: **AusNet needs to establish one source as the master data** to be used for populating other systems to ensure consistency and accuracy of all systems that rely on network and connectivity information.
- Network asset data quality and model connectivity issues: Data remediation is required to **ensure the master data source is accurate, reliable** and is of the required quality, including complete LV connectivity in both the GIS and ADMS. Incorrect data can result in poor decisions being made or an incomplete or inaccurate view of the network state.
- **Consistent integration of broader geospatial overlays** with network information, to support activities such as bushfire preparation and response, network and asset planning relative to environmental, hazard and easement overlays, and incorporation of 3D data modelling such as LiDAR.
- **Alignment to the current industry standard (GDA2020)**. The GIS is not fully aligned to the latest standard which creates difficulties and increases the workload (due to additional review and quality assurance requirements) when importing data from other sources or working with third parties for new network connections through to advanced data modelling applications.

3.5. Customer expectations

We aim to deliver services to a level of quality that is expected by our customers. Recent major events experienced during the current regulatory control period have highlighted deficiencies in how we respond to and manage outages. This has resulted in poor customer outcomes and less than satisfactory customer experience, as evidenced by recent findings from our customer satisfaction program which showed declining customer sentiment towards the level of service they received in relation to planned and unplanned outages and new connections. The results of the research are shown in Figure 2 below.

Figure 2 - Summary of customer satisfaction research



Improved knowledge and visibility of the network will enable controllers to respond more quickly and effectively during major events and be able to provide improved directions to field crews for restoring supply. This will improve our customers experience and help us meet their expectants for the level of service provided.

3.6. Summary of identified need and initiatives

The table below summarised the gaps identified in the sections above and lists the risk they pose to the network. These identified gaps will be assessed and addressed as part of the options analysis in Section 4.

Table 3 Summary of identified need

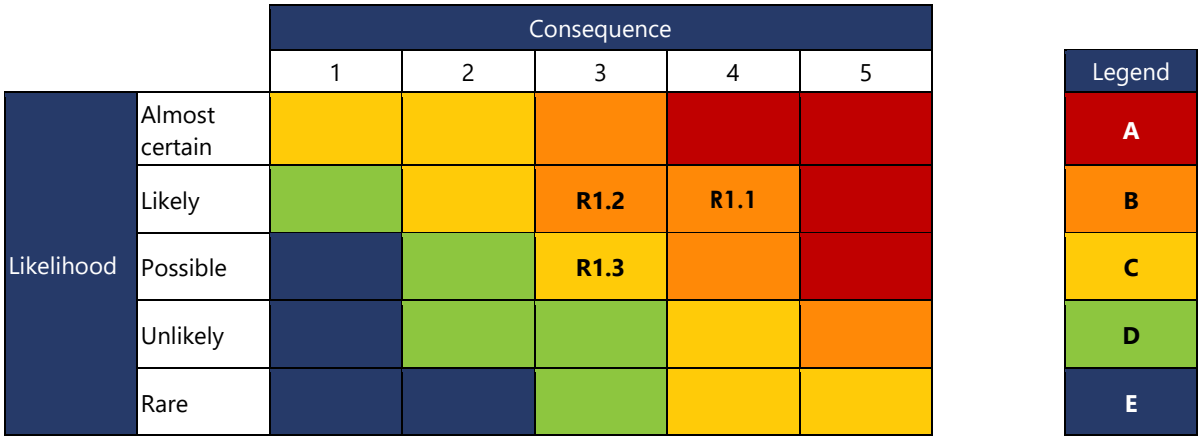
IDENTIFIED GAPS	RISK
AusNet's ADMS system does not source its network model from the master GIS system which results in a risk of differences between the GIS and ADMS's network models.	This lack of integration requires manual processes to maintain the ADMS's Network model which leads to model inaccuracies. This results in a risk to network reliability and safety as operation of the network could be undertaken based on incorrect network information.
There is no geospatial view of the network model available in ADMS.	This can increase the response time to an outage. The controllers currently only have a schematic view of the network model so have limited ability to accurately direct field crews to the precise location of a fault or advise of any potential accessibility issues.
The LV network is not incorporated into the network model used by the ADMS.	The lack of visibility of real-time representation of the LV model to the controllers can result in slower response to outages. Additionally, this prevents operationalising advanced LV management functionality which results in a higher likelihood of Human Error Incidents (HEI) during LV switching caused by switching errors
AusNet's geospatial systems have limited integration and capabilities, and do not enable single-view consolidation of network and broader geospatial information (e.g. bushfire or planning overlays, or 3D information such as LiDAR)	Asset planners do not have access to view overlays (GIS hazard layers) or incorporate additional data sets such as LiDAR, easements and environmental data that can be used to help manage asset lifecycles, outages and plan for emergency response.
The current GIS network model information is not aligned to the current industry standard (GDA2020).	Not fully complying with the current industry standard (GDA2020) can result in inconsistencies in data between AusNet and proponents that can result in asset appearing in the wrong location in GIS. This requires additional effort to manually correct and raises concerns regarding asset data quality.
Current network models and geospatial capabilities do not enable detailed demand forecasting, with AusNet currently utilising spreadsheets for top-down demand forecasting	This additional information will also provide AusNet the ability to complete detailed bottom-up forecasting, as required by the growing network complexity, and undertake scenario and sensitivity analysis for specific emerging trends.

3.7. Risk analysis

We assessed the key risks to our network using the Enterprise Risk Management Framework. Our risk assessment has considered the cumulative impact of gaps identified in Table 3 above on our ability to provide safe and reliable electricity services to our customers.

Figure 3 shows our assessment of the network risk with the current systems and platforms in place. These risks are reassessed to determine the residual risk under each option. Risks of highest concern are rated red, whereas those of lowest concern are rated blue.

Figure 3 – Risk assessment of current state



	RISK	CONSEQUENCE	LIKELIHOOD	RISK RATING
R1.1	Poorly integrated network models restrict performance of network operations (ADMS) during major events, resulting in customer outage impacts from limited visibility and sub-optimal coordination of response works	Level 4: Major impact to customer service levels with regulatory implications	Likely	**B**
R1.2	Sub-optimal network planning decision making due to modelling limitations, resulting in higher costs and deterioration performance as network complexity increases	Level 3: Financial impact of sub-optimal decision making, with increased expenditure > $2m	Likely	**B**
R1.3	Risk of non-compliance due to inconsistencies or inaccuracy in geospatial data, leading to incorrect decision making relative to environmental or hazard locations	Level 3. Regulatory compliance impact, with resulting fines and additional audit and reporting requirements imposed	Possible	**C**

4. Options assessed

This section provides an overview of the options identified that may feasibly enable AusNet to address the limitations with our existing systems identified in Section 3. In developing these options, we considered alternative approaches for addressing the issues and gaps identified. Each option considers a different approach to implementation that will achieve the outcomes required for the future sustainability of the network, using a different system architecture and potentially delivering different benefits.

The AER's guidance note – "Non-network ICT capex assessment approach" of November 2019 notes that non-recurrent expenditure should have a positive net present value unless a compliance requirement, or unless strong customer support and willingness to pay is demonstrated. In this case, we have developed 3 timing and scope options for the investments (to demonstrate prudency) and options for alternative systems and service providers (to demonstrate efficiency) and discounted these costs against the benefits of the programme.

As per the AER guidelines, we have examined credible options for delivery of the network model management proposal. We examined whether one or more of the systems could be retained into the next period and augmented with task specific software, whether the existing systems could be leveraged and upgraded to address the network needs or if a new system/platform would be required.

4.1. Quantifying benefits

The identified credible options have been assessed in relation to addressing the identified gaps in system capability, the cost of implementing the option, deliverability and risk, and the benefits expected to be obtained. Risk has been assessed using AusNet's Enterprise Risk Management Framework.

The benefits to customers and AusNet from the Network Model Management program were calculated based on review of the systems and process for each of the key task types and an estimation of potential improvements. Analysis of historical data related to outages and safety incidents has been undertaken to assess improvements in reliability and network safety. Workshops with members of the impacted teams was undertaken to calculate the total potential time savings if new systems and/or functionalities are implemented.

Benefits expected to be achieved and included in the cost benefit model are:

- Improved outage response resulting in reduced emergency operational expenditure.
- Improved employee productivity through using a single system and improved functionality.
- Improved notification of planned outages and reduced duration of unplanned outages due to the inclusion of LV network connectivity model and geo-spatial view of the network.
- Avoided risk of compliance penalties.
- Reduction in network safety incidents by leveraging enhanced safety logic for LV switching instructions.
- Other capital and operational benefits obtained through improved network model and GIS functionality that can be applied to network planning.

The benefits obtained by AusNet were calculated based on review of the systems and process for each of the key task types, risk areas, and the potential productivity benefits. Expected improvements in employee productivity were valued based on the average salary of a full-time employee.

The economic value of the reduction in outages experienced by customers was calculated based on the average value of customer reliability (VCR) for the AusNet distribution network.

These benefits have all been modelled in the economic assessment of identified options based on the consistent set of assumptions set out in Table 4 below.[8]

[8] Refer AusNet EDPR 2027-31 Digital Program NPV Model

Table 4 Key assumptions

Assumption	Value	Comments
WACC	5.45%	Based on EDPR WACC
Annual reduction in emergency opex	[CIC]	Reduction of historical average emergency opex costs (FY23 RIN, DOPEX0103).
Improved business efficiency	[CIC]	Efficiency gains from improving the Network Model (HV/LV), improved geospatial systems, data, and tools that enable more efficient work and decision-making.
Value of customer reliability ($ per hour)	[CIC]	Modelled average VCR for AusNet's network
Reduction in outages caused by vegetation	[CIC]	Improvement on vegetation related outages through improved fault location and visibility of vegetation on the network (LiDAR and 3D modelling functionality) enabling quicker response by field crews.
Compliance penalty avoidance per year	[CIC]	Compliance penalty of [CIC] (Energy Safe Victoria).
Safety incident avoidance	[CIC]	As a result of consolidating geospatial capability and implementing hazard, environment, access and easements layers
Avoidance of [CIC] GSL related penalties per year	[CIC]	Based on [CIC] improvement.
Direct capex improvements	[CIC]	Reduction in LV demand driven augex through improved modelling and demand forecasting.

4.2. Options analysis

We identified three credible options that addressed the identified needs by improving our systems and/or functionality. Each option considered a different system architecture approach to address the identified need and achieve the same outcomes required for the future sustainability of the network.

The resulting system functionality is forecast to provide the same benefits, however the system architectures to achieve the functionality is different and have different costs and risks.

Table 4 below outlines the options considered by this business case.

Table 5 Options considered

OPTION	SUMMARY
Option 1: Maintain existing systems, augment with task specific applications	Retains current existing network model systems and augment them with task-specific software solutions to address new desired capabilities.
Option 2: Maximise use of existing systems with updates and upgrades.	Address the identified deficiencies with network models by updating and upgrading existing systems and undertaking data remediation.
Option 3: Replace existing systems with a new platform that addresses all needs	Address the identified deficiencies and opportunities by implementing a new GIS platform and network model along with data remediation.

4.2.1. Option 1: Maintain existing systems, augment with task specific applications

This option proposes to complete the already commenced development and integration of network model and geospatial data between GIS and ADMS, however would leverage task specific solutions for broader geospatial data integration and network planning. This would address the gaps with the ADMS capability, but would see AusNet continue to maintain multiple geospatial systems (with associated data integration and consistency challenges) for asset planning and forecasting capabilities.

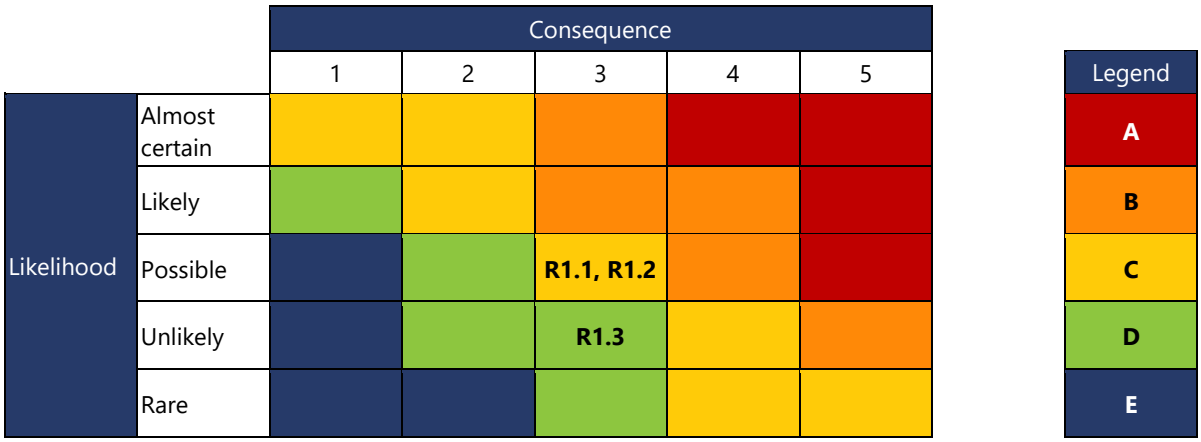
While investment will be made to address the gaps, and enable use of best of breed solutions, based on experience where we have implemented multiple task specific systems, this approach is not expected to result in an efficient solution as it will rely on operators and engineers using multiple independent platforms that are unlikely to be well integrated. As a result, this option would not fully deliver the desired single source of truth functionality, as shown in Table 6, as compared to the integrated solutions proposed in Options 2 and 3. With the required capabilities not being fully delivered, we have reflected this in our analysis through a 20% reduction in the business efficiency benefit achieved through this option.

Table 6 - Summary of Option 1's ability to meet identified capability gaps

Identified capability gap	Achieved?
Establishing a single source as master data that is used to populate other systems.	**No**
Establish integration of the network model from GIS to ADMS to ensure currency and accuracy of the network model applied in the ADMS.	Yes
LV network incorporated into the ADMS network model.	Yes
Implementing additional functionality/capability such as geospatial view in ADMS.	Yes
Enable development of new advanced functionality in GIS including task specific layers, 3D modelling and LiDAR visualisation.	Yes (but integration limited)
Remediation of data so it is of the required quality, completeness, accuracy, reliability and fully aligned to the current industry standard (GDA2020), as required for modern ADMS functionality and third-party interactions.	Yes

We have assessed the key risks following implementation of Option 1 using the Enterprise Risk Management Framework. Our analysis shows that improving network models functionality and consistency will reduce the consequence and likelihood of the identified risks. However, the risks under this option remain elevated compared to Options 2 and 3 due to the complexity of operating multiple systems across a broad workforce, and the higher degree of systems integration complexity.

Figure 4 – Option 1 risk assessment



	RISK	CONSEQUENCE	LIKELIHOOD	RISK RATING
R1.1	Poorly integrated network models restrict performance of network operations (ADMS) during major events, resulting in customer outage impacts from limited visibility and sub-optimal coordination of response works	Level 3: Enhanced functionality reduces consequence, however integration challenges and complexity of multiple systems still inhibit performance and outage response, resulting in customer impacts	Possible	**C**
R1.2	Sub-optimal network planning decision making due to modelling limitations, resulting in higher costs and deterioration performance as network complexity increases	Level 3: Financial impact of sub-optimal decision making caused by inconsistent integration between network models. Enhanced functionality reduces likelihood but risk consequence remains	Possible	**B**
R1.3	Risk of non-compliance due to inconsistencies or inaccuracy in geospatial data, leading to incorrect decision making relative to environmental or hazard locations	Level 3. Regulatory compliance impact due to inconsistent integration of systems (no single source of truth). Enhanced functionality reduces likelihood but risk consequence remains	Unlikely	**C**

Due to dealing with multiple vendors and software products and the need for integration with existing systems, there is a higher cost to implement this option and there is also a higher deliverability risk for this option compared to Option 2. The expected cost of this option is $40.99 million capex and $3.88 million opex. Based on the cost and benefits we found that this option has an NPV of -$6.78 million[9].

Table 7 Forecast expenditure for Option 1 ($'million, real FY24)

Cost item	FY27	FY28	FY29	FY30	FY31	Total
Capex	$14.56M	$6.76M	$13.52M	$0.23M	$5.92M	$40.99M
Opex	$0M	$0.23M	$0.77M	$1.23M	$1.65M	$3.88M
Total	$14.56M	$6.99M	$14.29M	$1.46M	$7.57M	$44.87M

We consider that overall, this option to be high risk and it does not enable AusNet to achieve the desired objectives of improve performance for our customers, and enabling improved network management and planning.

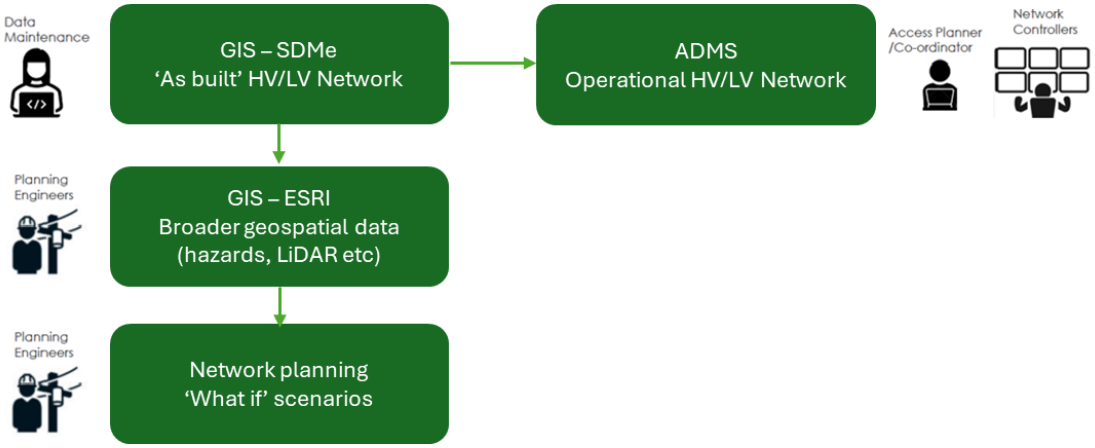
The NPV is lower than that of Option 2 and the overall risk profile is higher, hence this option is not recommended.

[9] Refer AusNet EDPR 2027-31 Digital Program NPV Model

4.2.2. Option 2: Maximise use of existing systems with updates and upgrades (recommended option)

This option proposes to establish the GIS as the primary source of master data. An automated process will be established to ensure regular and reliable updates are transferred into the network model applied in the ADMS. Figure 5 provides a simple overview of how data will flow from the primary source (master data) to other systems and applications used throughout the business.

Figure 5- Proposed system architecture



The network model applied in the ADMS would be expanded to include the LV network, geo-spatial views and a data remediation program will be implemented to ensure there are fields available for all relevant data, the data is of appropriate quality and compliant with the latest industry standard.

The GIS will be upgraded to the latest version (retaining the same vendor and platform to minimise delivery risk) and additional layers required for recurrent network tasks and to address any compliance requirements will be developed. Additional GIS and forecasting capabilities will be added including 3D network, LiDAR and multi view demand forecasting.

While [CIC] (SDME) will continue to be the system of record for the network model, and SDME's LV connectivity and asset data quality will be uplifted. The broader business will use [CIC] as a Geospatial viewer of the [CIC] data, with additional capability to integrate broader non-network geospatial data overlays. This provides a simple, functional and economical viewer of the master data. [CIC] will replace the current SAMS which was developed in house.

With the improvements in functionality of GIS, we will be able to bring several systems in house which are currently outsourced due to lack of functionality. This includes our current third-party provider of 3D data and LiDAR. The implementation of the 'multi view demand planning' functionality will improve the productivity of planners and improve our ability to defer augex, reducing overall cost to our customers.

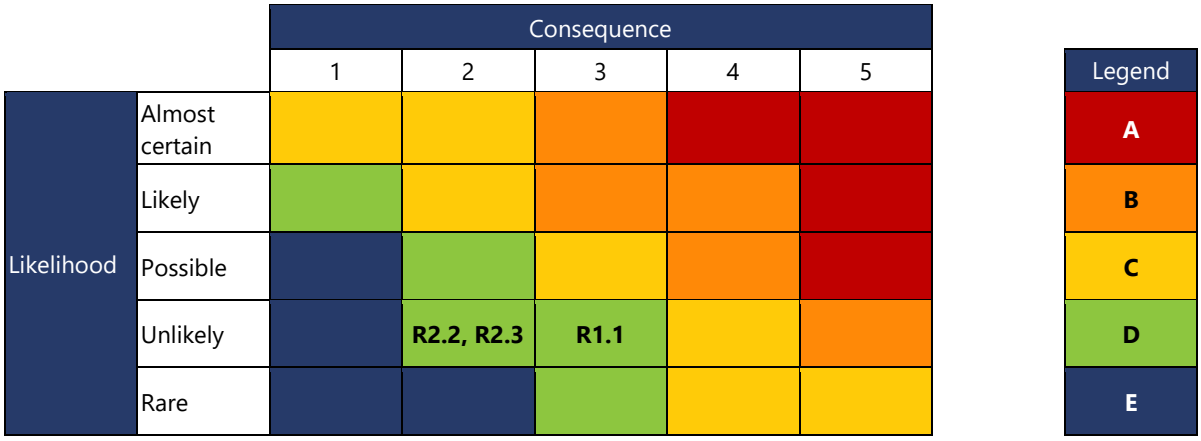
The inclusion of the LV network connectivity model in ADMS will provide better insight to AusNet when planning outages and managing network faults. It would also enable AusNet to more accurately identify customers who will be affected and therefore improve the accuracy of our customer notifications.

Table 8 - Summary of Option 2's ability to meet identified capability gaps

Identified capability gap	Achieved?
Establishing a single source as master data that is used to populate other systems.	Yes
Establish integration of the network model from GIS to ADMS to ensure currency and accuracy of the network model applied in the ADMS.	Yes
LV network incorporated into the ADMS network model.	Yes
Implementing additional functionality/capability such as geo-spatial view in ADMS.	Yes
Enable development of new advanced functionality in GIS including task specific layers, 3D modelling and LiDAR visualisation.	Yes
Remediation of data so it is of the required quality, completeness, accuracy, reliability and fully aligned to the current industry standard (GDA2020), as required for modern ADMS functionality and third-party interactions.	Yes

The figure below shows the risk level matrix to which we have assessed each of risks within the options. Our analysis shows that this option will materially reduce the risk to AusNet as shown in Figure 6 below. The planned degree of functionality and integration of these systems reduces both the consequence and likelihood of the identified risks. This sees Option 2 reduce the risks relative to the current risk profile and Option 1.

Figure 6 – Option 2 risk assessment



	RISK	CONSEQUENCE	LIKELIHOOD	RISK RATING
R2.1	Poorly integrated network models restrict performance of network operations (ADMS) during major events, resulting in customer outage impacts from limited visibility and sub-optimal coordination of response works	Level 3: Enhanced functionality and integrated systems provide consistent visibility and performance to manage and respond to network outages and minimise customer impact, reducing the consequence and likelihood of major impacts.	Unlikely	**D**
R2.2	Sub-optimal network planning decision making due to modelling limitations, resulting in higher costs and deterioration performance as network complexity increases	Level 2: Improved functionality and integrated systems improve decision making, reduce the potential for, and financial impact of, any sub-optimal network planning decision making	Unlikely	**D**
R2.3	Risk of non-compliance due to inconsistencies or inaccuracy in geospatial data, leading to incorrect decision making relative to environmental or hazard locations	Level 2. Integrated, single source of truth systems, reduce the potential for, and the magnitude of, the risk of regulatory compliance impacts	Unlikely	**D**

The expected cost of this option is $38.6 million capex and $1.8 million opex, as shown Table 9. This cost includes capex to implement the proposed capabilities and system architecture, and opex for new software licences and vendor support required to support the functionality. Based on the cost and benefits we found that this option has an NPV of $2.3 million[10].

Table 9 Forecast expenditure for Option 2 ($'million, real FY24)

Cost item	FY27	FY28	FY29	FY30	FY31	Total
Capex	$14.56	$6.76	$10.83	$2.63	$3.83	**$38.59**
Opex	$0.00	$0.23	$0.23	$0.69	$0.69	**$1.84**
Total	**$14.56**	**$6.98**	**$11.05**	**$3.32**	**$4.52**	**$40.42**

We consider that overall, this option poses a low risk as it is based on updating and upgrading existing systems, which minimises risk of deployment and integration. The scope addresses the identified deficiencies with the existing systems, and it enables AusNet to achieve its asset management objectives, improve service level, safety and efficiency outcomes to its customers, and remain compliant with compliance obligations.

Consequently, this option is recommended.

4.2.3. Option 3: Replace existing systems with a new platform that addresses all needs

This option proposes to implement the same changes as for Option 2, however, it proposes to do so by implementing a new GIS to provide consolidated geospatial and network model capabilities, with integration into ADMS. The target platform would be the [CIC], providing a single platform for mastering and viewing all geospatial data and replacing [CIC] (SDMe).

The option will have the same benefits as Option 2, and additionally see AusNet consolidate to a single geospatial system, however there is a higher degree of delivery risk due to the implementation of new systems and need for integration and data transfer. Customisation in SDMe would need to be reimplemented in [CIC], and [CIC] would need to be integrated into ADMS.

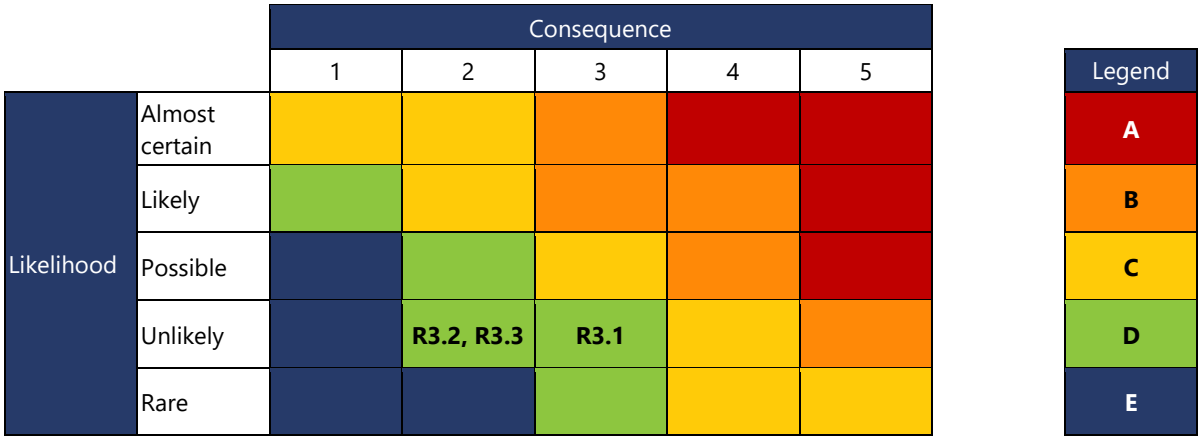
Table 10 Summary of Option 3's ability to meet identified capability gaps

Identified capability gap	Achieved?
Establishing a single source as master data that is used to populate other systems.	Yes
Establish integration of the Network model from GIS to ADMS to ensure currency and accuracy of the network model applied in the ADMS.	Yes
LV network incorporated into the ADMS network model.	Yes
Implementing additional functionality/capability such as geo-spatial view in ADMS.	Yes
Enable development of new advanced functionality in GIS including task specific layers, 3D modelling and LiDAR visualisation.	Yes
Remediation of data so it is of the required quality, completeness, accuracy, reliability and fully aligned to the current industry standard (GDA2020), as required for modern ADMS functionality and third party interactions.	Yes

The figure below shows the risk level matrix to which we have assessed each of risks within the options. Risks of highest concern are rated red, whereas those of lowest concern are rated blue. Consistent with Option 2, the degree of functionality and integration of Option 3 reduces both the consequence and likelihood of the identified risks.

[10] Refer AusNet EDPR 2027-31 Digital Program NPV Model

Figure 7 – Option 3 risk assessment



	RISK	CONSEQUENCE	LIKELIHOOD	RISK RATING
R3.1	Poorly integrated network models restrict performance of network operations (ADMS) during major events, resulting in customer outage impacts from limited visibility and sub-optimal coordination of response works	Level 3: Enhanced functionality and integrated systems provide consistent visibility and performance to manage and respond to network outages and minimise customer impact, reducing the consequence and likelihood of major impacts	Unlikely	**D**
R3.2	Sub-optimal network planning decision making due to modelling limitations, resulting in higher costs and deterioration performance as network complexity increases	Level 2: Improved functionality and integrated systems improve decision making, reduce the potential for, and financial impact of, any sub-optimal network planning decision making	Unlikely	**D**
R3.3	Risk of non-compliance due to inconsistencies or inaccuracy in geospatial data, leading to incorrect decision making relative to environmental or hazard locations	Level 2. Integrated, single source of truth systems, reduce the potential for, and the magnitude of, the risk of regulatory compliance impacts	Unlikely	**D**

The forecast capital expenditure for this option is higher than Option 2, due to the implementation and integration of a full new platform, and the duration for delivery is expected to be longer. The consolidation may see a reduction in ongoing opex costs, with consolidation of multiple existing licences down to a single platform, however the capex cost recovery would be significantly longer than 5 years.

The expected cost of this option is $43.6 million capex and $1.7 million opex, as shown in Table 11. Based on the cost and benefits we found that this option has an NPV of -$1.4 million[11].

Table 11 Forecast expenditure for Option 3 ($'million, real FY24)

Cost item	FY27	FY28	FY29	FY30	FY31	Total
Capex	$14.56	$11.76	$10.83	$2.63	$3.83	**$43.59**
Opex	$0.20	$0.63	-$0.03	$0.44	$0.44	**$1.69**
Total	**$14.76**	**$12.38**	**$10.80**	**$3.07**	**$4.27**	**$45.27**

This option addresses the identified deficiencies with the existing systems, and it enables AusNet to achieve its network model management objectives, improve service level, safety and efficiency outcomes to its customers, and remain compliant with compliance obligations. However, this option has a high deliverability risk as it is based on implementing a new system that must be integrated with other existing systems, and the higher cost results in negative NPV.

As a result, this option is not recommended due to the elevated level of delivery risk and higher capex resulting in a negative NPV.

[11] Refer AusNet EDPR 2027-31 Digital Program NPV Model

5. Preferred option

Our analysis has found that Option 2 provides the highest (and only positive) NPV and will result in reduced cost to our customers while meeting customer expectations.

Additionally, Option 2 is the option that represents the lowest deliverability risk while delivering AusNet's customer commitments of improving resilience, service outcomes and enhancing performance. The conclusions of this assessment are shown by Table 12 below.

Table 12 - Options analysis summary

Criteria	Option 1	Option 2	Option 3
NPV ($'000, real FY24)	-$6,756	$2,339	-$1,424
Capex ($'000, real FY24)	$40,990	$38,588	$43,588
Opex ($'000, real FY24)	$3,880	$1,836	$1,686
Technically feasible	✓	✓	✓
Addresses identified need	× (Partial)	✓	✓
Meets customer expectations	× (Partial)	✓	✓
Deliverable within timeframe	✓	✓	× (Risk of delay)
Delivery risk	Moderate	Low	High
Preferred option	×	✓	×

Key benefits that will be obtained from implementing Option 2 include:

- **Improved Operational Efficiency**: Reduced site visits, time for writing and executing LV switching, and overtime for coordinators. Enhanced approval processes for planned LV instructions.
- **Situational Awareness**: Real-time visibility of the as-operated LV network for network controllers, improving fault identification and restoration times.
- **Data Integration**: Better monitoring and management of the LV network through integration with the Geospatial Information System (GIS).
- **Grid Capacity**: Improved understanding and operation of distributed energy resources (DER) and increased demand from electric vehicles and heat pumps.
- **Customer Experience**: Faster restoration times, improved accuracy of outage notifications, and reduced penalties for notification breaches.
- **Safety**: Reduced human error incidents by leveraging enhanced safety logic for LV switching instructions.
- **Reliability**: Faster fault restoration using integrated system data, better visualization of outages, and accurate fault location identification.
- **Compliance and Guaranteed Service Levels**: Reduced penalties and costs for notification breaches, enhanced visualization of outages and more accurate fault locations resulting in improved restoration times and therefore fewer Guaranteed Service Level payments and meeting reliability targets.

These advancements are crucial for modernizing the electric distribution network, enhancing reliability and efficiency, and supporting the transition to renewable energy.

AusNet Services

Level 31
2 Southbank Boulevard
Southbank VIC 3006
T +613 9695 6000
F +613 9695 6666
Locked Bag 14051 Melbourne City Mail Centre Melbourne VIC 8001
www.AusNetservices.com.au

Follow us on

@AusNetServices
@AusNetServices
@AusNet.Services.Energy

AusNet