Jemena Electricity Networks (Vic) Ltd

IT Investment Brief – Network Operations Geospatial Enhancements

Non-recurrent – Maintain Existing Systems

Jemena
bringing energy to life

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Glossary

ADMS	Advanced Distribution Management System
Capex	Capital Expenditure
Current regulatory period	The period covering 1 July 2021 to 30 June 2026
DER	Distributed Energy Resources
DERMS	Distributed Energy Resources Management System
DMS	Distribution Management System
GIS	Geospatial Information System
ICT	Information and Communications Technology
Jemena	Refers to the parent company of Jemena Electricity Network
JEN	Jemena Electricity Network
JESA	Jemena Electricity Services Agreement
ME	Mobile Enterprise – (highly integrated mobile GIS client) GE Smallworld GIS suite of products
Next regulatory period	The period covering 1 July 2026 to 30 June 2031
NPV	Net Present Value
Opex	Operating Expenditure
OSI	Aspen Technology product name for ADMS
RYxx	Regulatory year covering the 12 months to 30 June of year 20xx for years in the Next Regulatory Period. For example, RY25 covers 1 July 2024 to 30 June 2025
SDW	Spatial Data Warehouse (“GSA Warehouse” product from Spatial Eye)
Totex	Total Expenditure

Network Operations Geospatial Enhancements

Objective	This initiative aims to deliver ongoing essential enhancements to the Jemena Electricity Networks Vic Ltd. (JEN) Geospatial system suite of applications by focusing on improving the asset data and supporting processes that these spatial systems underpin. This will improve asset data capture, analysis, accessibility, reporting and sharing of information required to continue to promote efficient, safe, and reliable service delivery for our customers.		
Non-recurrent ICT sub-categorisation	☒ Maintaining existing services, functionalities, capability, and/or market benefits	☐ Complying with new/altered regulatory obligations/requirements	☐ New or expanded ICT capability, functions, and services
Background	The geospatial ecosystem is essential for network operations and JEN's delivery of services to customers, from initial connection through to the ongoing management and maintenance of supply, as well as asset management and modelling for future planning. The JEN Geospatial Information System (GIS) platform serves as the central source for network asset data, proposed network arrangement and the "as-built" network model, consisting of the core GIS, web client, SAP interface, OSI Advanced Distribution Management System (ADMS) integration, and over 20 additional critical operational integrations. **GIS systems are necessary for informed decision making** The systems covered in this investment brief are vital for storing and managing the primary information required for the efficient design, maintenance, operation, and planning of our network. The geospatial system suite is integrated with other key JEN systems such as SAP, SCADA, BYDA and field mobility. Together, this complex, connected geospatial ecosystem helps organise, analyse, and present data to reveal asset information, patterns, and relationships, particularly across geographically distributed asset networks, for more informed decision-making and scenario modelling which ultimately means that design, construction and maintenance works can be carried out more efficiently and more safely. It is important to note that modern GISs, require enhancement over time to maintain relevance. They must evolve to integrate with new technologies, data sources, and functionalities to meet the dynamic demands of our network operations. JEN's geospatial ecosystem is business-critical and is the primary location-based record of our assets, it is key to enabling processes and functions including, but not limited to: • 2D Modelling, visualisation, and connectivity of the Network: JEN's GIS system facilitates the creation of connected spatial geometry, providing a visual representation of our network infrastructure location, attributes, and connectivity model. This enables JEN to analyse the spatial layout of assets and understand their interconnectivity, allowing for network optimisation or expansion. Visualising the network aids in better planning, design, and decision-making. • Data sharing and collaboration: The JEN GIS system serves as a central platform for sharing spatial data among various departments, systems and stakeholders within JEN. This enables seamless collaboration and coordination in managing assets and operations. Additionally, by supporting digital twins and industry-standard data models, the JEN GIS system enables interoperability with external systems, promotes efficient data exchange and supports integration and potential integration across a variety of internal and external 3rd party industry platforms. • Supporting DER integration The JEN geospatial ecosystem is crucial to support JEN in evaluating and understanding emerging innovations, including new technologies and renewable energy solutions, impacting the network. For example, GIS pinpoints the geographic locations of solar panels and other Distributed Energy Resources (DER), helping to identify high-concentration areas. This enables JEN to track how renewable generation affects load distribution and substations, helping to prevent overloading and maintain grid stability, avoiding outages and connectivity issues for our customers.		

	These processes and functions are critical to maintaining the safety, efficiency and reliability of JEN's network. Furthermore, JEN requires robust GIS information to support many business processes, e.g., asset investment decision-making in the context of increasingly complicated investment decision-making in the energy transition. **JEN must keep pace with improvements of the geospatial ecosystem** The significance of geospatial systems is increasing as JEN is growing, and a broader range of capabilities are being extended or developed either within the GIS or are reliant on core geospatial asset data. During the current regulatory period, JEN made considerable progress in enhancing geospatial data quality and asset visibility within the GIS. Field-based data verification, geospatial reporting, and downstream analytics have collectively contributed to safer, more efficient design, construction, and maintenance work by providing accurate data from a trusted source. For the JEN geospatial ecosystem to remain an effective, critical data source for multiple business systems and processes as described above, JEN must continue evolving its geospatial structures, data, and integration capabilities. Key enhancements are required within this ecosystem to ensure JEN can continue meeting operational and strategic demands. This includes: • **Network Asset Data Alignment:** The GIS – ADMS interface is a critical interface which enables as built asset and network information to be provided to our operational systems as it changes. Enhancements are required to align the physical network infrastructure and digital models, ensuring accurate representation and management of new assets and technologies within JEN's GIS and integrated enterprise systems. This improvement allows for better decision-making, network optimisation, and more efficient construction and maintenance processes. • **Spatial Data Warehouse (SDW):** The SDW provides a consolidated current and historical view of geospatial information and enables reporting and sharing of this information. The SDW must be updated and adapted to support evolving operational, regulatory, and reporting needs, ensuring seamless integration between GIS data and downstream systems. This will enable the delivery of network models, digital twins, and necessary data extracts to meet internal and external requirements. • **Mobile Enterprise (ME) Asset Data Capture:** ME provides a platform to enhance the alignment between the physical and digital network and facilitates digital data capture. Fully transitioning from paper-based data capture to digital solutions, will ensure more accurate and timely asset data collection in the field. The ME application will be updated to support new data capture requirements and improve data integration into enterprise systems, enhancing overall asset and network management. For instance, a recent review of service line height risk assessments has led to updated data capture requirements for field staff that will require ME configuration.
Customer Importance	This initiative will deliver essential enhancements to the geospatial system suite of applications, specifically focusing on enhancing the integration of asset and network data into the ADMS system and improving the visibility of the network data in our operational systems. Spatial Data Warehouse enhancements will also enable greater depth and visibility of asset and network data. Consequently, the initiative will deliver key customer benefits, including: • Switching incidents often arise from inaccurate or incomplete data. By improving network asset data quality, JEN can ensure that network configurations and routing decisions are based on up-to-date data. This will reduce the likelihood of switching incidents which occur when errors in network configuration result in unintended power loss or incorrect system routing, impacting service continuity. For customers, switching incidents can lead to unexpected power outages or poor service delivery, affecting their daily lives and operations. • The enhancement of the integration between asset and network data within the ADMS system ensures that data flows seamlessly and automatically between operational systems, reducing the need for manual data entry or corrections. This in turn will minimise disruption in service.

	• Real-time situational awareness enables JEN's operations team to have an up-to-the-minute understanding of the network's status, including potential issues or faults that may arise. For customers, network downtime translates directly into a lack of access to critical services. By enhancing real-time situational awareness, JEN can quickly identify and resolve issues in the network, reducing the time customers experience service interruptions. • For customers, enhanced visibility into asset and network data allows JEN to proactively identify and address potential weaknesses in the network before they lead to service issues. By improving the quality and depth of data available, JEN can anticipate and prevent outages or service degradation that might otherwise impact customers.
Key Considerations	JEN's strategic approach to managing its asset and network information using the GIS systems, is to continue the optimisation and consolidation of asset-related applications, and to leverage a common geospatial platform across JEN assets. Updates to the ME application to ensure more accurate and timely asset data collection in the field will improve data availability (timeliness) and quality to the GIS and downstream systems; this has a direct impact to reducing risk of planned outage breaches and outage management. JEN is also submitting an investment brief for a major upgrade of JEN's GIS system and the implementation of the geospatial enhancements described in the preferred option will align to the timing of the major upgrade planned to ensure maximum efficiencies across all projects, utilising shared resources where possible. We consider these geospatial enhancements critical in supporting the Digital Twin and Data Visibility and Analytics (DVA) programs that rely on the geospatial ecosystem and will plan execution of the enhancements accordingly. **How we estimated costs** The costs for this initiative have been estimated based on the experience within JEN of previous work undertaken on these systems. The majority of costs are capex as these are on-premises systems; the costs assume a blended team of internal and external resources to deliver capabilities required on existing platforms. Opex costs are associated with the delivery of change management activities by internal resources. It is expected that majority of the change management activities required will be for changes impacting field staff using ME and office staff using the GIS toolset, as well as control room staff which may receive updated information and symbology. Recurrent step opex costs are additional licences, witth costs based on the existing subscription licencing model.
Options	JEN has considered two alternatives to deliver the capability articulated above: (1) Option 1- Do nothing – not recommended. (2) Option 2 - Implement enhancements to ME, GIS-ADMS integration and Spatial Data Warehouse - recommended. **Option 1: Do nothing** **Description** This option would mean that existing geospatial capabilities and services would not be enhanced. **Benefits** By doing nothing, JEN would avoid incurring the costs and many of the risks outlined at Option 2 below in relation to the proposed initiative. **Risks**

In the absence of necessary investment to support JEN's geospatial ecosystem, the customer benefits outlined in the Customer Importance section above will not be realised.

Furthermore, without network asset data alignment, SDW integration improvement and digital asset data capture, we also anticipate the following risks:

- The GIS platform represents a critical repository of data, network information and topology. It is widely integrated to business functions. Doing nothing will prevent the business from optimising growth to meet increasing rates of electrification in the most prudent and efficient manner.
- Ineffective integration, data interoperability and collaboration between systems across JEN and external parties places additional delivery risk on JEN's network augmentation projects.
- The remaining paper-based data capture would result in delays in receiving information and require additional effort to verify, correct, and manually transcribe data into the GIS; JEN would continue to see discrepancies between the digital and physical network for longer periods of time thus potentially increase the risk of outages.
- Updated data capture requirements from the recent review of service line height risk assessments will not be fully enabled by ME and integrated with other systems.
- The SDW will continue to have limitations in analysis and availability of information for equipment types and the interface between GIS and ADMS will continue to have limitations in the data that can be ingested.
- Reduced or non-existent data, process, and system efficiency improvements may result in poor quality, out-of-date data being posted to JEN portals and internal business processes e.g. data used for detailed planning would be refreshed manually, limiting the frequency of updates to once a year at best. In contrast, the currently maintained GIS is a live 24x7 system, therefore field and external partners have real-time availability of information.

Summary

This option 1 (Do nothing) is not recommended as we do not consider it reflects good industry practice given the risks outlined above in relation to improving our GIS-related asset data quality, accessibility, reporting, sharing of information and asset data capture. Moreover, there would generally be no benefits for JEN for incurring these risks other than avoiding the costs and risks outlined below in options 2.

Option 2: Implement enhancements to ME, GIS-ADMS integration and Spatial Data Warehouse

Description

This option focuses on improvements to network asset data alignment, SDW integration improvement and digital asset data capture. Key focus areas to enhance JEN's geospatial systems are described below.

Network Asset Data Alignment

The focus will be on optimising the integration between GIS and the ADMS to meet the growing data demands of ADMS and other downstream systems. This comprehensive and connected geospatial ecosystem organises, analyses, and presents data to reveal asset information, patterns, and relationships—especially across geographically distributed networks. These insights enable more informed decision-making and scenario modelling, which ultimately supports safer and more efficient design, construction, and maintenance activities.

Spatial Data Warehouse

The focus will be on evolving the Spatial Data Warehouse (SDW) to meet changing operational and regulatory requirements. As the design and schema of the SDW continues to adapt, we will work on the following:

- Network Models: Enhance the SDW to support the development and delivery of network models, digital twins, and other data extracts required both internally and externally.
- Regulatory Reporting: Implement new reporting capabilities to align with emerging regulatory requirements, ensuring that the SDW can accommodate any updates or changes mandated by regulatory bodies.
- Extended Analysis: Expand the SDW's analysis capabilities by adding new equipment types, fields, and use cases, ensuring it continues to meet evolving business and operational needs.

These efforts will ensure that the SDW remains a vital tool for managing data and supporting compliance and operational efficiency.

Mobile Enterprise (ME) – Asset Data Capture

The focus will be on ensuring that new data collection requirements are introduced to field operations, enabling the accurate capture of digital asset information through the ME application. The key areas of focus include:

- New data collection requirements: as business needs evolve; new data capture requirements will be introduced to field operations. For example, new requirements following a recent review of service line height risk assessments will now be recorded digitally in the ME application during asset installation.
- Reconfiguring enterprise systems: to support these new data capture needs, enterprise systems—including ME—will be reconfigured. This will ensure the accurate collection of up-to-date asset information, supporting efficient asset and network management.
- Asset and network management: the updates will allow for the effective capture of both new asset information (e.g., community batteries) and refined data for existing assets, including values such as manufacturer details and other enhanced data for better insights.
- Enhanced integration: as part of these changes, the integration of data between ME and other enterprise systems, such as GIS and SAP, will be enhanced. This will ensure seamless data flow between systems, enabling timely updates and improved operational efficiency.

By updating the ME application, JEN will ensure that asset information is captured in the field efficiently, accurately, and in alignment with changing industry and business standards, supporting timely integration into enterprise systems.

GIS prioritised enhancements

Other prioritised enhancements to the GIS ecosystem, which are predominantly driven by continual changes in regulatory (e.g. NEM Reform), safety, operational and efficiency requirements. They extend the GIS ecosystems through development, data modelling, accessibility, integration, and configuration changes.

Benefits

The customer benefits outlined in the Customer Importance section above will be realised. There are several other key benefits associated with this option as outlined below:

- This option would mitigate the risks detailed in the risks section of option 1.
- Improvement of our geospatial systems and data will enable agility of decision-making in the face of a changing operating environment that includes improved data hierarchy, preparation and publishing that is required for efficient capacity engineering analysis and for planning new and existing sections of the network.
- Additional equipment types, fields and use case implementation of the SDW will support the internal capabilities of our new data analytics platform, Distributed Energy Resource Management System (DERMS) and digital twin planned for next period.

- Improvements and additions to Mobile GIS (ME) including integration to meet field requirements will support increased physical and digital network model alignment, improving operational efficiency.
- Ongoing enhancements will support critical and ongoing decision-making aligned to investment decisions related to network planning, e.g. (scenario modelling), investment support and/or predictive maintenance. Maintaining agility of decision-making in the face of a changing operating environment that includes electrification of the network will be increasingly important.

In summary, enhancement of the geospatial systems will allow for the continued reliance on accurate and up-to-date geospatial information to inform decision-making across JEN.

Risks

The key risk associated with implementing these enhancements is internal staff availability and capacity given we also plan to undertake a major upgrade of the GIS platform in the next period. We will mitigate this risk by planning ahead and aligning the timing of the major upgrade planned to ensure maximum efficiencies across both projects and to ensure relevant subject matter experts and developers are available. Where this isn't possible, we will leverage external vendor support.

Costs

JEN's costs for this option are outlined in the table below.

$2024	RY27	RY28	RY29	RY30	RY31
Total Capex	$1,698,900	$1,015,350			
Non-recurrent Opex	$246,000	$171,750			
Recurrent-step Opex	$10,000	$45,500	$62,500	$17,500	$57,500
Total Opex	$256,000	$217,250	$62,500	$17,500	$57,500
Totex	**$1,954,900**	**$1,232,600**	**$62,500**	**$17,500**	**$57,500**

The forecast of non-recurrent capex is $2,714,250, non-recurrent opex is $417,750, and recurrent-step opex is $193,000, with a total expenditure to deliver for this solution over the 2026-31 period of **$3,325,000**.

Summary

This option is recommended as we consider it reflects good industry practice given the benefits outlined above. Furthermore, it provides the lowest sustainable cost.

Options Summary

The table below summarises the quantitative and qualitative differences between the analysed options.

($2024)	Capex	Opex	Totex	NPV	Residual Risk
Option 1	Not Applicable	Not Applicable	Not Applicable	Not Applicable	High
Option 2	$2,714,250	$610,750	$3,325,000	Not Applicable	Low

What We Are Recommending	Option 2 is recommended as JEN consider it reflects good industry practice given the benefits outlined above. Furthermore, it provides the lowest sustainable cost. Option 2 will allow the business to provide a range of geospatial system, process and data enhancements that respond to both internal and external drivers that are critical to network operations. This option best represents a prudent and efficient future with customer benefits through sustained features and capabilities.
Dependencies on other Investment Briefs	The network operations geospatial enhancements provide capability that is a key dependency for the following Investment Briefs for the 2026 - 2031 period: • Facilitation of the DVA program and 3D Digital Twin through improved network asset data resulting from these enhancements. The costs included in this initiative assume a major upgrade to the GIS Platform will be delivered through 'GIS Lifecycle Upgrade'. As such, no additional costs for lifecycle upgrades to these systems have been included in this business case. Timing and Subject matter experts will be aligned to accommodate both.
Relationship to ICT Capital Forecast	The supporting modelling for this investment brief is contained in the following model**: JEN – IT Investment Brief – Network Operations Geospatial enhancements – Costs and Benefits Analysis Model**