Jemena Gas Networks (NSW) Ltd

IT Investment Brief – Enhancements to Geospatial Systems

Non-Recurrent – Maintain

Jemena
bringing energy to life

Public – 25 June 2024

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Glossary

AER	The AER is one of 3 major market bodies that oversee national electricity and gas markets in Australia. (aer.gov.au)
Asset Data Structure	Functional model of the physical Network components, often in a hierarchy format, that is shared/common between Asset Management systems. This model allows complex interactions (i.e. business processes) to occur in a consistent manner
BYDA	Before You Dig Australia (byda.com.au)
Capex	Capital Expenditure
CBD	Central Business District
Current regulatory period	The period covering 1 Jul 2020 to 30 Jun 2025
Data warehouse	In technology, a term for a functional view of business data that allows its lineage to be modelled and the changes to data over time to be captured. Typically associated with other technology products used for data reporting and analysis to form a complete solution.
EICU	NSW Government Spatial Services Emergency Information Coordination Unit
GASS, GASS+	General Accounts and Services System (retired application)
GIS	Geospatial Information System
ICT	Information and Communications Technology
iWORCS	A 3rd party collaboration web platform that enables NSW councils, utilities, government agencies and private companies to cooperate in the scheduling of infrastructure works. Community disruption, traffic congestion, safety issues and loss of revenue for local businesses are the benefits of collaboration on the platform
Jemena	Refers to the parent company of Jemena Gas Network
JGN	Jemena Gas Network
Next regulatory period	The period covering 1 July 2025 to 30 June 2030 for the Jemena Gas Network
NPV	Net present value
Opex	Operating Expenditure
RYxx	The regulatory year covering the 12 months to 30 June of year 20xx for years in a Regulatory Period. For example, RY25 covers 1 July 2024 to 30 June 2025
SAP	SAP accounting and Enterprise Resource Planning software
SCADA	Supervisory Control and Data Acquisition System
SDW	Spatial Data Warehouse, a data warehouse for JGN GIS, implemented at Jemena using GSA Warehouse product from GE
Totex	Total Expenditure

Enhancements to Geospatial Systems

Objective	This initiative aims to further enhance the Jemena Gas Network's (JGN) Geospatial systems 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 to 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 critical to JGN's delivery of gas 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.

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. It's important to note that modern GIS (Geographic Information Systems) systems, crucial components of this infrastructure, are not static entities. Rather, they are continuously enhanced and updated over time. Unlike traditional models, modern GIS systems are not bought off the shelf and left unchanged for decades. They evolve incorporating new technologies, data sources, and functionalities to meet the dynamic demands of our network operations and planning.

With the retirement of GASS+ in 2015/2016, and the introduction of a geospatial capability in the 2020-25 regulatory period, the central role of design for the network has shifted to the GIS. Since 2022 the establishment of the JGN Spatial Data Warehouse (SDW) has also strengthened the functionality available related to the gas network assets. These systems, in turn, are integrated with other key Jemena systems such as SAP, SCADA 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.

As JGN's GIS system is a business-critical system 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:

  JGN'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 JGN to analyse the spatial layout of assets, understand their interconnectivity, and identify the arrangement, allowing for network optimisation or expansion. Visualising the network aids in better planning, design, and decision-making processes.

- Data Sharing and Collaboration Supporting Digital Twins and Industry Data Models:

  The JGN GIS system serves as a central platform for sharing spatial data among various departments and stakeholders within JGN. This enables seamless collaboration and coordination in managing assets and operations. Additionally, by supporting digital twins and industry-standard data models, the JGN GIS system enables interoperability with external systems and promotes efficient data exchange and supports potential integration across a variety of internal and external 3rd party industry platforms.

- Climate Impact Analysis (e.g. Bushfire and Flood Risk, Land Subsidence):

  The JGN GIS system plays a crucial role in understanding and assessing the impact of climate-related events, such as bushfires, floods, and land subsidence, on our network. Two recent examples of this are the devastating NSW bushfires in 2018 and the more recent flooding in Bathurst. Our GIS system emerged as a crucial tool for assessing and mitigating risks within our network coverage and optimising emergency response strategies. By integrating various environmental and geographical data layers, we can identify vulnerable areas, assess risks, and develop mitigation strategies. This analysis is essential for enhancing the resilience of our

	infrastructure and ensuring business continuity in the face of serious weather events and natural disasters. These processes and functions are critical to maintaining the safety, efficiency, reliability, and environmental compliance of JGN's network. Furthermore, JGN requires robust GIS information publishing to support many business processes, e.g. asset investment decision-making in the context of increasingly complicated investment decision-making in the energy transition. **GIS is interdependent with other integral systems** JGN's GIS and SDW are the source of location-based (geospatial) data for several upstream and downstream systems such as SAP, capacity modelling, drawings management, enterprise content management, outage management Before You Dig and field mobility. This geospatial ecosystem is integrated at the software level to provide the requisite business functionality and access to asset information in a spatial context. This extends to external services such as Before You Dig Australia (BYDA), an important safety service. **Jemena must keep pace with the continual improvements of GIS** The importance of GIS for JGN continues to grow, and a range of new capabilities are being extended or developed either within GIS or reliant on core geospatial asset information. Progress has been made in improving geospatial data quality and visibility of assets in the GIS during the 2020-25 regulatory period through field-based data verification and geospatial reporting and downstream analytics have also improved. Together, this has resulted in design, construction and maintenance works that are able to be carried out more efficiently and more safely as decision making is based on accurate data from a trusted source. The JGN GIS system must continuously improve to include new geospatial structures, data and integration to ensure the GIS remains an effective critical system and data source of many JGN business systems. **Jemena's current processes need to be uplifted** Where there is a significant reliance on manual and ad-hoc data extract processes (rather than automated integrations), that can lead to delays (e.g. in commercial or customer projects) or risk of decisions executed using outdated geospatial information. For example, when there is a gas mains outage, field crews rely on near real-time access to accurate location-based asset data to locate and fix the damage. Further consolidation and focus on the data, functional capability and supporting processes that underpin the GIS technology and related systems are required to improve asset data capture, analysis, JGN and 3rd party accessibility, reporting and sharing of information required to meet JGN's regulatory obligations (e.g. BYDA) and maintain service levels.
Customer Importance	IT plays a critical role in Jemena's ability to deliver safe, secure, reliable, and affordable services to our customers. Throughout our engagement with customers[1], they outlined that they expect us to maintain our current services throughout the 2025-30 period. To enable us to maintain our current service levels, our systems which store, analyse and report on Jemena's asset and geospatial information must continue to improve and become embedded in the way we work. Our customers expect that Jemena provide accurate and timely information related to customer-initiated work or work that impacts them. Applications such as the JGN GIS system are a key platform to JGN's drive to improve our customers' key concern to be kept informed. The information that underpins customer enquiries is derived from our asset information and GIS systems which ensure information pertaining to outages, network planning, design through to build phases and Before You Dig (through BYDA) services is accurate and reliable.

[1] Jemena Draft Plan 2024

	Continued enhancement to the GIS ecosystem is important for our customers. For example; • Public safety issues arise when network practices adapt, for example, in recent times, shallow gas mains in the Sydney CBD were damaged by excavation, resulting in the evacuation of city blocks. The JGN GIS has responded by implementing changes supporting the adequate data structure, visualisation and integration to BYDA to ensure public safety can be optimised. Many Government authorities or non-government companies can benefit from collaboration and data sharing, in some cases enabling safer working practices and reduced asset damage. A specific example is sharing gas mains digital data with a major water Authority such as Sydney Water, enabling both parties to establish digital records of common assets at a given location.
Key Considerations	In considering whether and how to address the gap in capability related to JGN's GIS technology and related systems, data and processes, we have considered various strategic factors: • Jemena's strategic approach to managing our asset & GIS systems is to continue the optimisation and consolidation of asset-related applications, to the extent possible, to leverage a common geospatial platform across Jemena's network assets which minimises the overall whole-of-life capital and operating costs. • This strategy of continuous improvement to meet evolving needs and opportunities to share geospatial / location-based data with 3rd parties will continue to drive Jemena's approach to enhancing the Geospatial ecosystem thereby delivering improved capabilities, greater digital customer and workforce engagement, analytics and automation opportunities in the future. • It is necessary to take action to address the gap as soon as possible and within the 2025-30 period and respond in a timely manner to the drivers identified above (ref "Background section") to maintain service standards and ensure negative outcomes are avoided. While our decision-making timeframe is dynamic and responsive to change, the timeframe for implementation of decisions is long in duration due to the processes necessary for planning and execution of works. To mitigate the impacts of this lag, improvements to the inputs for our decision-making need to be made at the earliest possible stage for the outcomes of these changes to have effect in time to avoid potential risks. • Through the investment proposed in this initiative brief, JGN will be positioned to address this capability gap within the 2025-30 period. The approach described in this brief builds on the capability associated with our GIS ecosystems delivered during this 2020-25 period.
Options	JGN has considered two alternatives to deliver the capability articulated above: (1) Do nothing (2) Investment in a program of works to continue to enhance GIS technology and related systems, data and processes. **Option 1: Do nothing** **Description** This option requires only recurrent maintenance is performed on the GIS system and interfaces and that existing services will not be enhanced. **Benefits** • By doing nothing, JGN 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 JGN's geospatial ecosystem, we anticipate the following risks: • Failure to update GIS systems to comply with evolving regulatory requirements or industry standards may result in safety incidents, non-compliance penalties, legal liabilities, or reputational damage. • Benefits of the previous work undertaken on the development of GIS technology in the 2020-25 period may not be maximised. Some aspects of the previous work are building blocks implemented with a view to benefits being realised through continued investment in this regulatory period. For

example, the opportunity to capture and analyse location-based asset data may not be fully realised.

- JGN may not realise the value GIS provides to JGN as it relates to efficient, safe and reliable service; for example, maintaining status-quo with respect to the quality and frequency of GIS-related information presented through the BYDA platform may miss the opportunity for benefits related to a reduction in the unplanned strikes to the gas network as a result of out-of-date geospatial data.
- Customers may become increasingly dissatisfied with JGN's service provision as they must endure reduced access to network data and remain reliant on manual and ad-hoc data extract processes. Manual processes will lead to delays in commercial or customer projects or risk them being executed on outdated geospatial information.
- Reduced or non-existent data, process, and system efficiency improvements may result in poor quality, out-of-date data being posted to JGN 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, currently maintained GIS is a live 24x7 system, therefore field and external partners have real-time availability of information. Stopping enhancements to integrated asset information systems, including GIS where critical processes for asset planning and maintenance are executed may negatively impact efficient work practices.
- Outdated GIS systems may lack new features, functionalities, or integrations that streamline operations and enhance productivity. This inefficiency can result in wasted time and resources.
- As technology evolves, outdated GIS systems may become incompatible with newer software, data formats, or hardware platforms, limiting interoperability and hindering collaboration with external stakeholders.
- Unsupported GIS software versions may lack crucial security patches or updates, making them vulnerable to cyber threats and data breaches, compromising the confidentiality, integrity, and availability of sensitive spatial information.

Summary

This option 1 (Do nothing) is not recommended. This option is not recommended as we do not consider it reflects good industry practice given the risks outlined above. Furthermore it does not provide the lowest sustainable cost. As outlined above, there are risks of doing nothing in relation to improving our GIS-related asset data quality, accessibility, reporting and analytics. Moreover, there would generally be no benefits for JGN for incurring these risks other than avoiding the costs and risks outlined below in Options 2.

Option 2: Invest in the continued enhancement of Geospatial systems

Description

This option focuses on the continued enhancement of geospatial systems by improving asset data capture, analysis, reporting, accessibility and sharing of information. JGN considers that it best reflects good industry practice and provides the lowest sustainable cost.

Key focus areas to enhance JGN's geospatial systems are described below.

Geospatial Data Optimisation

The JGN GIS has provided opportunities for the use of asset and location data to enhance business processes by facilitating improvements in safety performance (such as better structured and visual representations for risk assessments) and providing information to customers (such as detailed overlays). Over time, the integration of the GIS into JGN's ecosystem has highlighted limitations that restrict the continued utilisation of geospatial data (e.g., streets, suburbs, connection point addresses) therefore we recommend ongoing data optimisation.

Data Sharing Capability

This work will leverage the core capabilities of the JGN GIS system and related asset data to provide timely, consistent, and appropriate information to internal and external stakeholders (e.g., customers,

emergency services, council and planning organisations, and industry service organisations) as and when they require it.

This will draw upon the asset data structures described above to ensure consistent and accessible information to these stakeholders and will seek to utilise existing technology, such as customer portals and APIs to ensure efficient outcomes.

Spatial Data Warehouse and Analytics

The scope of this work is to extend the geospatial analysis capability for critical asset data. Implementing a common information model (reporting and analytics, annual data history and data snapshots) to facilitate location-based analytics for assets and related spatial and non-spatial data and the provision of "super-user" analytics tools, heat maps, demographic and statistical analysis with a geographic context to unlock the potential of asset data to support reporting, network impacts (i.e. customers joining or leaving a location in the network), opportunities to identify network reliability improvements as required. Visualisations of geospatial information, e.g. fauna and flora endangered species maps, will also support decision-making, in this instance, related to works management prioritisation.

GIS prioritised enhancements

Deliver prioritised enhancements to the GIS ecosystem, which are predominantly driven by continual changes in regulatory, safety, operational and efficiency requirements. They extend the GIS ecosystems through software development, data modelling, accessibility, integration and configuration changes.

Benefits

- As detailed in the risks section of Option 1, this option would mitigate the risks highlighted.
- Enhancement to our geospatial systems will remove manual processes and support the continued delivery of customer experience in alignment with services involving 3rd parties through increased and improved data sharing. These publishing and sharing capabilities will support many and varied external geospatial data requests, including the NSW Government EICU[2], NSW government planning co-ordination[3], various NSW Water Boards, the iWORCS initiative[4], major projects (Road, Rail, Construction) and emergency response organisations that require, or provide, data for JGN to use to develop its GIS.
- Continued improvement of our geospatial 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.
- 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, continued enhancement of the geospatial systems will allow for the continued reliance on accurate and up-to-date geospatial information to inform decision-making across JGN.

Risks

There are potential risks in relation to this option compared to the other options outlined in this brief:

- The participation of relevant external parties will be required to ensure alignment with modern and common standards in order to maintain data-sharing arrangements with customers and third parties.

[2] NSW Government EICU - Spatial Services' Emergency Information Coordination Unit (EICU) ensures the emergency management sector has the best spatial and related data available to deal with multi-agency emergencies, such as terrorism and natural disasters. The EICU aims to implement and maintain a collaborative data sharing system on behalf of emergency service organisations and the emergency management sector in general.
[3] NSW government planning
[4] the iWORCS initiative

- Vendor application and standards updates will need to align to achieve the most efficient outcomes and reduce customisation.

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

Costs

Costs for this option 2 are outlined in the table below.

$2023	RY26	RY27	RY28	RY29	RY30
Total Capex	$568,000	$286,000	$286,000	$286,000	$286,000
Non-recurrent Opex					
Recurrent-step Opex	$20,000	$132,000	$132,000	$132,000	$132,000
Total Opex	$20,000	$132,000	$132,000	$132,000	$132,000
Totex	**$588,00**	**$418,000**	**$418,000**	**$418,000**	**$418,000**

The total non-recurrent totex costs for JGN of **$1,712,000** and recurrent-step opex for JGN of **$548,000** for the 2025-30 period to deliver GIS capabilities.

Options Summary

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

	Capex ($2023)	Project Opex ($2023)	Ongoing Opex ($2023)	NPV	Residual Risk
Option 1	Not applicable	Not applicable	Not applicable	Not applicable	Moderate
Option 2	$1,712,000	$548,000	$548,000	Not applicable	Low

What We Are Recommending

Option 2 is recommended as JGN consider it reflects good industry practice given the benefits and risks outlined above. Furthermore, it provides the lowest sustainable cost. Proceeding with an option to mitigate key risks outlined in “Option 1 – Do Nothing” is crucial for JGN. Failure to maximise previous GIS technology investments may lead to missed opportunities, dissatisfied customers, and inefficient processes. Outdated systems not only waste resources but also pose security and compliance risks, highlighting the necessity for continual updates to ensure efficiency, safety, and regulatory compliance.

Option 2 will allow the business to provide a range of system, process and data enhancements that respond to both internal and external drivers and deliver the benefits.

The option best represents a prudent and efficient future with customer benefits through sustained features and capabilities.

Dependencies on other Investment Briefs

This Investment Brief is also related and aligned to the following Investment Briefs for the 2025-30 period;

- Cybersecurity Program - The Shift Left Model will ensure cybersecurity measures are incorporated into the GIS platform from inception
- Network Management Advanced Analytics - The Shift Left Model will ensure cybersecurity measures are incorporated into the advanced analytics platform from inception
- Data Governance - Data platform will enable seamless integration with core data, such as GIS

Relationship to ICT Capital Forecast

The supporting modelling for this investment brief is contained in following investment framework model: **JGN - IT Investment Brief - Enhancements to Geospatial Systems - Costs and Benefits Analysis Model**