Jemena Gas Networks (NSW) Ltd

Investment Brief
Asset Management & GIS Lifecycle

Glossary

2020-25 regulatory period	The period covering 1 July 2020 to 30 June 2025
AA	Access Arrangement
Act	Energy Legislation Amendment (Infrastructure Protection) Act 2009
AER	Australian Energy Regulator
Current regulatory period	The period covering 1 July 2015 to 30 June 2020
GIS	Geographic Information System
ICT	Information and Communications Technology
JEN	Jemena Electricity Networks (Vic) Ltd
JGN	Jemena Gas Networks (NSW) Ltd
NGR	National Gas Rules
RYxx	Regulatory year covering the 12 months to 30 June of year 20xx. For example, RY20 covers 1 July 2019 to 30 June 2020.

1. Geographic Information System – Life Cycle

The Australian Energy Regulator (**AER**) draft decision	In its draft decision[1], the AER provided a placeholder allowance of $3.9m for Geographic Information System (**GIS**) Life Cycle capital expenditure to upgrade to the 'most recent supported version' of the software. The AER stated that: '*We appreciate the benefits of maintaining systems inside the vendor support umbrella, but pending any support for the requirement for the most recent supported version, we question the magnitude of the proposed expenditure. We have allowed $3.9m as a placeholder to support existing systems in this draft decision'* This paper sets out further information addressing the AER's further information requirements.
Background	During the current regulatory period, JGN implemented a foundational GIS. The implementation process began in RY16. The GIS went live in late 2018, and the full implementation program will continue to run until RY20. Prior to the implementation of the GIS, there was no coordinated approach to managing geographic data, and most processes were not integrated, requiring manual intervention between systems. For example, although JGN's maps were 'electronic' they did not have any connectivity to systems such as those that manage customer connections. The mapping systems also were drawing-based, without any geographic data (geo-mapping/tagging) restricting any linkage to customer information or the ability to undertake detailed analysis. GIS solutions are the norm for utilities in Australia and worldwide. For the implementation of the GIS, JGN adopted a strategy that has replaced the mapping systems, and provided a foundation for the integration of the GIS with other systems JGN utilises to manage its assets and customers (GIS ecosystem). With the introduction of a GIS, JGN is shifting towards GIS-centric storage and management of information necessary for safe and efficient design, maintenance, operation and planning of the network. Through the data quality improvements expected to be achieved by the use of the GIS, design, construction and maintenance works will be carried out more efficiently and safely. The GIS is an ecosystem with core, web and mobile components, and closely integrated (or in the process of being integrated) with other JGN ICT systems, including SAP, Dial Before You Dig (DBYD), Drawing Management and field mobility. There is a feedback loop of changes required to ensure each of these systems keep pace with changes to the others. Therefore, as the GIS data is enhanced and elements of the ecosystem integrated, recurrent capital expenditure for life cycle updates and replacements is required to sustain the GIS and associated ecosystem. Additionally, updating the GIS and associated ecosystems to maintain vendor-supported versions (through version updates and regular patching) is important to ensure robust cyber-security defences. The Australian Signals Directorate's Essential 8 calls for "Applications that are no longer supported by vendors with patches or updates for security vulnerabilities are updated or replaced with vendor-supported versions."[2] Failing to do so means that an organisation is unable to meet even the lowest maturity level (1 of 3). Recurrent expenditure on the GIS and the associated ecosystem will enables JGN to continue to leverage the GIS (and its ecosystem links) to deliver safe, secure and efficient distribution services to customers by ensuring asset information is robust, accurate and fit-for-purpose. Conversely, if the GIS and ecosystems are not maintained and supported, they will be limited in their ability to sustain the delivery of the safe, secure and efficient distribution services. The recurrence of lifecycle upgrades strategically plans for three - four years cycle (criticality and dependency), with an alternating complexity (Minor / Major). Historical and planned JEN GIS (20+ years maturity) Lifecycle projects were used to forecast the Lifecycle strategy that would be required for the JGN GIS.

1 AER Draft Decision, Jemena Gas Networks (NSW) Ltd Access Arrangement 2020 to 2025, Attachment 5 Capital expenditure, November 2019 p 5-42

2 See https://www.cyber.gov.au/publications/essential-eight-maturity-model

Conforming capital expenditure	Rule 79(1)(a) of the National Gas Rules (**NGR**) states: *The capital expenditure must be such as would be incurred by a prudent service provider acting efficiently, in accordance with accepted good industry practice, to achieve the lowest sustainable cost of providing services.* Undertaking this program, the proposed capital expenditure is consistent with the NGR rule 79 as it is: 1. Prudent – The expenditure is necessary to maintain and improve the safety of services and maintain the integrity of services to customers and personnel and is of a nature that a prudent service provider would incur. The expenditure will ensure JGN has a robust industry standard system to manage the GIS ecosystem for the 2020-25 regulatory period and the subsequent system impacts, risks and opportunities for improvement this will invariably create. 2. Efficient – The use of recurrent expenditure to maintain (and opportunistically incrementally improve) currency provides the basis for the cost-effective long-term options that meets the necessary operational requirements in order to meet the compliance with legislative, regulatory obligations and Australian Standards. 3. Consistent with accepted and good industry practice – The program is founded upon good industry practice for digital systems and is consistent with Jemena's Risk Management Manual and AS2885. The project is also consistent with NGR rule 79(2)(c), because it is necessary to: 1. Maintain and improve the safety of services (79(2)(c)(i)) – The nature of the recurrent expenditure on these projects, to proven industry standards, will ensure stable solutions to manage large volumes of information that has a direct correlation to the safety of the network. 2. Maintain the integrity of service (79(2)(c)(ii)) – The nature of the recurrent expenditure on these projects is that they maintain the level of service to customers provided by JGN's gas distribution network. Comply with a regulatory obligation (79(2)(c)(iii)) – JGN is required by the Energy Legislation Amendment (Infrastructure Protection) Act 2009 (**Act**) to ensure the network is operated in a safe manner and a continuous supply of gas to customers is maintained at all times – the management of this program is critical to compliance with many of the obligations of the relevant legislative frameworks for JGN.
Reason for Step Change	Under the AER's proposed [3] framework for assessing forecast ICT capex, recurrent ICT expenditure is to be assessed by the AER based on revealed costs. Under this approach, forecast recurrent capex is based on the actual recurrent ICT capex during the current regulatory period. Where a regulated network has a significant increase in recurrent ICT capex, a justification must be provided for the step change increase to the previous period expenditure. The JGN GIS was installed during the current regulatory period as a non-recurrent ICT capex project and some further enhancements are planned for the 2020-25 regulatory period. As the GIS did not exist for most of the current period, and because it is new and has not yet required life cycle replacements, only a small amount of recurrent expenditure was incurred during the current regulatory period. The life cycle for the components of the GIS, including the linkages to the other systems that form part of the ecosystem, with the vendor products that are regularly upgraded with major releases occurring between three and four years. JGN, in the 2020-25 regulatory period will need to invest in recurring costs to maintain the GIS as a fit-for-purpose system. Additionally, other systems in the GIS ecosystem will also undergo life cycle updates, requiring minor to moderate changes to the GIS

[3] AER Framework for Forecasting ICT Capex

system (compatibility to Operating Systems, Patches, Databases, and Windows Servers, browsers and the like).

JGN requires a step change increase in its recurrent ICT expenditure to reflect these additional recurrent costs that will be incurred.

The forecasts for individual projects were made using JGN's standardised IT Project Estimation Tool and reflects the cost incurred for previous projects of similar complexity historically experienced with similar management of JEN GIS environment (+20 years). The forecast capital expenditure has leveraged Jemena's corporate knowledge of GIS recurrent projects that are necessary to maintain the established JEN GIS. JEN projects were used to forecast the projects (same footprint to JGN planned works) that would be required for the JGN GIS.

Step Change Benefits

The step change in recurrent expenditure enables the GIS and its linkages to the ecosystem to continue to provide/support the safe, secure and efficient processes that were been implemented with its' introduction. Without this expenditure, the GIS would become out of date and no longer fit for purpose. The step change provides for both regular life cycling of GIS components (patching, version updates and renewal of the software and hardware environment).

The GIS contains sensitive information critical to the operation and maintenance of the gas network and, therefore, is a high-value target from a cybersecurity perspective. Ensuring all GIS components are regularly patched and maintained on the latest software versions is necessary to mitigate security risks to JGN's network. This is best practice security management, and failure to patch and upgrade would diminish the effectiveness of other cybersecurity investments made by Jemena.

Minor GIS enhancements are necessary to ensure the system remains fit for purpose and are undertaken on a recurrent basis in response to business and regulatory needs, which are set out in a separate investment brief (see IT Capex Investmet Brief – Asset Management and GIS Enhancement).

Proposed Step Changes

JGN proposes a step change for the total incremental increase in GIS Life Cycle recurrent expenditure in the 2020-25 regulatory period, noting that life cycle expenditure was very low ($0.8m) in the current regulatory period as it was bundled with implementation projects. Based on the forecast, this requires a $3.9m increase in JGN's allowance for recurrent ICT expenditure during the 2020-25 regulatory period.

The table below shows the full list of recurrent GIS Life Cycle projects to be undertaken during the 2020-25 regulatory period.

Project Name ($2018)	ProjectID	RY21	RY22	RY23	RY24	RY25
GIS Data Sharing Capability (C&I Customers) Lifecycle Upgrade	ITGF03	0	0	0	0	303,600
GIS Engineering Analysis Lifecycle Upgrade	ITGF05	75,900	75,900	75,900	75,900	75,900
GIS Mobile Enterprise Server Major Lifecycle Upgrade	ITGF06	0	0	0	0	400,752
GIS Mobile Enterprise Server Minor Lifecycle Upgrade	ITGF07	0	303,600	0	0	0
GIS Gas Office Major Lifecycle Upgrade	ITGF08	400,752	0	0	400,752	0
GIS Gas Office Minor Lifecycle Upgrade	ITGF09	0	0	0	200,376	0
GIS Web Viewer Lifecycle Upgrade	ITGF10	0	303,600	0	0	0
GIS DBYD System Consolidation	ITS2022	12,639	0	0	0	0
AutoCAD & Drawbridge Intray Lifecycle Upgrade	ITSD29	68,765	0	0	68,765	0
DrawBridge Major Lifecycle Upgrade (or new product)	ITSD30	0	0	0	0	332,825
DrawBridge Minor Lifecycle Upgrade	ITSD31	0	137,531	0	0	0
Integrated Project Portfolio Management - Lifecycle	ITSE06	0	0	0	0	103,490

JGN notes that project ITGF04 has been brought forward since JGN submitted its Access Arrangement proposal in June 2019 and will now be completed in the current regulatory period. Therefore, JGN has excluded it from the revised Access Arrangement proposal.

The project estimates above were developed based upon historical delivery of similar lifecycle release /upgrades as previously delivered through the JEN GIS experience (+20 years), and by IT Project Estimation Tool. The life cycle upgrade schedule correlates to historical vendor release strategies, where updates vary between minor (patches) and major (version updates) levels of complexity, depending upon product and technology roadmaps. Key components in the life cycle upgrades are remaining on supported OS, Infrastructure and Security Patched environments.

The scope and basis for JGN's estimates is set out below for each project.

	The NPV for this expenditure is -$2,906,913. See attachment "NPV for GIS Lifecycle Investment Brief" – NPV Calc|Option 2.
ITGF03	**GIS Data Sharing Capability (C&I Customers) Lifecycle Upgrade** The GIS has enabled JGN to provide higher levels of geographic information to a range or third parties, including Emergency Services, councils, government planning agencies, developers, other utilities and major customers. This geographic information is used by these organisations (including customers) to: • better prepare and manage emergencies – providing safer and more efficient response to the public and emergency services workers; • enable more efficient and integrated plans for developments. The integrated planning process provides a better outcome for future customers through more cost effective solutions for the planning and construction of infrastructure, including gas infrastructure. This in turn ensures efficient connection costs for new gas customers; • enable customers (current and potential) to identify where gas is available and thus self-service elements of the connection process. This project relates to a newly implemented capability included in the Minor GIS enhancements brief, and is the first cycle upgrade that will ensure that this geographic information remains available and relevant to these external organisations, as well as providing a foundation for additional users, enhanced user interfaces and provide the basis for the anticipated increase in utilisation as the markets become more aware of the service available. Based on experience implementing the solution, JGN assesses that the ongoing lifecycle activity to maintain the system will require a small-medium level project that will take less than 3 months to implement and is of low complexity.
ITGF05	**GIS Engineering Analysis Lifecycle Upgrade** The design of gas distribution networks requires both engineering and computational work to ensure the optimum hydraulic designs of pipelines, facilities, mains and services. JGN, along with the majority of gas distribution companies across the world, utilised the Synergi Model Builder Engineering Analysis (**Synergi**) desktop package application to support the engineering analysis for the prudent and efficient design (and operation) of the JGN gas distribution networks. Synergi relies on the accurate input of the gas network elements – pipelines, pressure reduction facilities, storage facilities, mains and customer locations and information to derive these optimum design and operating strategies. Therefore, Synergi is an element of the GIS eco-system, though currently the linkages between the two software packages have not yet been fully developed. The Synergi software is a specialised engineering package, which has historically been subject to an annual cycle of updates – requiring implementation and ongoing vendor support for training and technical support. This project will provide for the annual cyclic upgrade of the package, including the maintain vendor support fundamentally due to the progressive development and implementation (and then) maintenance of the integration of Synergi as part of the GIS ecosystem – providing more accurate and efficient design (and operation) of the gas distribution networks. JGN bases its estimation of effort on the level of complexity for upgrading the tool and maintaining the interfaces and considers this to be a very small sized, annual effort taking less than 3 months to implement and of low complexity.
ITGF06 / ITGF07	**GIS Mobile Enterprise Server Major Lifecycle Upgrade** During the current regulatory period, JGN has initiated the development and implementation of preliminary projects related to the deployment of field mobility solutions as part of the GIS ecosystem. These preliminary projects have been based upon changing the culture of the field staff from paper based systems to digital systems – with simplified systems and a focus on training and change management. The projects have also provided a platform for future developments to liberate greater functionality and effectiveness.

	The Mobility suite of solutions extends critical back office functions to the field, enabling office and field personnel to collect, audit, visualize and share network data and work tasks in real-time, agnostic of the mobile device or operating system in use. This capability is critical in maintaining the operational efficiency of our existing field service technicians, with provision of data / process to operate and maintain the physical world assets. Although there maybe efficiencies gained through these mobility solutions, the key benefits are seen in the reduction of risk levels (though more expedient access, up-to-date and accurate data and records enabling better decision making), improved levels of service for customers (through – likewise - improvements to data access, reduced cycle times and accuracy of customer data), and expectation management of technical regulators who are becoming more aware of digital platforms and their ability to enable safer and more efficient management of utility assets. These projects reflect the on-going lifecycle of the mobility solutions that JGN has (and will) implemented – with industry expectations that the lifecycle of these systems will be characterised by both minor (or mid-life) and major (full-life) upgrades or updates. The typical scheduling of these upgrades is a full upgrade every six years, with the mid-life upgrade every three years. This scheduling is consistent with other similar software platforms, and this will be the first cycle upgrade since implementation in 2019. Based on experience with implementing this system alongside the core GIS, JGN estimates this to be a small to medium size project in nature and take less than 6 months to implement with either low or medium complexity depending on the size of the release.
ITGF08 / ITGF09	**GIS Smallworld (Gas Office) Lifecycle Upgrades** GIS Smallworld (Gas Office) is the centrepiece of the JGN GIS ecosystem. These projects are critical GIS management tools for the development, operation and maintenance of its networks. The spatial context of assets support integrated services for ADMS (SCADA), Asset Management Systems (SAP) for Works and Asset Management, DBYD for Regulatory responses to underground assets Management. JGN has observed that the lifecycle of GIS Smallworld (Gas Office) is characterised by both minor (or mid-life) and major (full-life) upgrades or updates. The typical scheduling of these upgrades is a full upgrade every six years, with the mid-life upgrade every three years. This scheduling is consistent with other similar software platforms including the GIS system in use in JEN which is from the same vendor. These upgrades also incorporate the review of the connectivity elements within Gas Office required to maintain the linkages with other platforms in the eco-system. This will be the first cycle upgrade since implementation in 2018. Based on experience with implementing the GIS, JGN estimates this to be either a small or small to medium size project depending on the size of the release and take less than 6 months to implement with medium complexity. JGN also notes that a recent major upgrade to the GIS used in JEN, which also had to replace the SAP integration product at the same time, has recently been completed for $1.2m.
ITGF10	**GIS Web Viewer Lifecycle Upgrade** To enable the GIS ecosystem to be effectively (and easily) accessed, JGN has incorporated a Web Viewer into the JGN GIS ecosystem. This Web Viewer has (and will continue) to enable users of the ecosystem controlled (read secured) accessibility through web browsers as well as providing a platform for some minor enhancements to the presentation of the rich information within the JGN GIS ecosystem. This capability provides the read-only access to GIS data and processes for the majority of the office based organisation, and is key for the completion of daily operations and planning tasks. The scope of the project is to the cyclic upgrade the GIS web client. JGN's experience with similar web clients is that there is a significant upgrade of the viewers – for infrastructure such as the GIS ecosystem – every five years. JGN recognises that there are continual updates in this area of the digital environment, however, it considers that the incremental changes that this represents will be absorbed into other upgrades within the GIS ecosystem. This will be the first cycle upgrade since implementation in 2018.

	Based on experience with implementing this system alongside the core GIS, JGN estimates this to be a small to medium size project in nature and take less than 3 months to implement with low complexity.
ITS2022	**GIS DBYD System Consolidation** Commencement of the consolidated DBYD Platform in CY 2020. The project best sits with the DBYD investment brief as it is the commencement of the consolidation project. However, its inclusion in the short term forecast, as it starts off in CY2020, resulted in this activity being grouped with the GIS lifecycle activities and included in the AER's placeholder decision of GIS lifecycle. This would be the first lifecycle upgrade post implementation of capability as outlined in Minor GIS enhancements brief. The cost estimate is derived from the IT Project Management Office budget for CY2020 which will establish the full business case for the solution covered in the DBYD investment brief.
ITSD29	**AutoCAD & Drawbridge In-tray Lifecycle Upgrade** The GIS ecosystem includes drawing software (AutoCAD) and as Drawing Management software (Drawbridge – as outlined below). Most stakeholders access the engineering drawings directly through the Drawbridge interface, however, the GIS interface is increasingly used as it provides a geographic representation of the location of the assets. JGN maintains engineering drawings of all high pressure facilities, meter sets (standard and bespoke), above ground / exposed mains and pipelines, alignment sheets for high pressure pipelines, construction details of secondary, critical plastic and high pressure steel pipelines, along with other specialist assets. Engineering drawings need to be maintained and accessed to meet safety and regulatory requirements (gas technical regulators and under WHS legislation), customer information (such as meter sets) and in accordance with good engineering practice. AutoCAD is the computer-aided-drafting software used by JGN to represent its assets as engineering drawing through the lifecycle of these assets (design, construction, maintenance and decommissioning). Drawings are completed by internal resources and when provided by third parties, JGN specifies AutoCAD compatible files. AutoCAD drawings are stored, managed (including the reviews and approvals, versioning) and accessed through the drawing management system, Drawbridge (and increasingly through the GIS). One of the elements of Drawbridge is 'Drawbridge In-Tray'. Drawbridge In-Tray enables the integration between the receipt of a AutoCAD drawing and the lodgement of the drawing file into the Drawbridge repository. The receipt process managed by In-Tray includes the confirmation of file formats and trackability of the drawings. is the CAD/Repository integration, and any lifecycle upgrade of AutoCAD is dependent upon an In-Tray integration compatibility. This project is the cyclic upgrade of AutoCAD and Drawbridge In-Tray. Good industry practice is to update / upgrade AutoCAD on a three year cycle to ensure currency – including the implementation of some new features, such as those for 3-dimensional drawing, walk-through design and future implementation of LIDAR as-building technology. As external design-houses provide these drawings to JGN as part of the design of assets (in many cases to meet regulatory expectations in areas such as safety-in-design), there is a requirement to maintain the compatibility of JGNs software. As Drawbridge In-tray is configured to receipt AutoCAD, there is a requirement to update concurrently this element of the GIS ecosystem as opposed to being updated as part of normal AutoCAD lifecycle. This is a re-occurring upgrade cycle as AutoCAD has been in place for many years in Jemena. Based on experience with upgrading this system for past version releases, Jemena assesses that this is small sized project that will take less than 3 months to implement and is of low complexity.

ITSD30 / ITSD31	**Drawbridge Lifecycle Upgrades** As outlined above, Drawbridge is a critical part of the JGN GIS ecosystem, providing the linkage between storage and management of drawings to support the geographic access through the GIS. Drawbridge provides secure access for managing engineering drawings and asset photos, to over 800 office and field-based users and is tightly integrated to other parts of the GIS ecosystem including, GIS, SAP, AutoCAD and JGN DBYD. Drawbridge is also an enabler for the field mobility solutions that JGN is and will be implementing as part of the GIS ecosystem. Jemena has over ten years' experience of utilising Drawbridge as a means for the storage and management of drawings. Over this period of time, JGN has observed that the lifecycle of Drawbridge is characterised by both minor (or mid-life) and major (full-life) upgrades or updates. The typical scheduling of these upgrades is a full upgrade every six years, with the mid-life upgrade every three years. This scheduling is consistent with other similar software platforms. JGN has identified the following as likely areas where the Drawbridge package will be augmented by the planned minor and major upgrades: • Compatibility of storage of higher end AutoCAD drawing – 3D, walk through drawing • Compatibility of storage of higher end survey drawings • Augmented mobility solutions for drawing revisioning and viewing • Integrated mechanical design tools • Drawing approval controls and workflows • Automated drawing logic corrections. This is a re-occurring upgrade cycle as AutoCAD has been in place for many years in Jemena. Based on experience with upgrading this system for past version releases, which are of either small to medium size in nature for smaller releases up to medium sized for more major releases, Jemena assesses that will take less than 6 months to implement and is of either low or moderate complexity based on the size of the release.
ITSE06	**Integrated Project Portfolio Management (PPM) – Lifecycle** This is an expected lifecycle upgrade to the shared PPM system planned for implementation at the start of the 2020-25 regulatory period and which will receive a regular cycle of product updates once deployed. This would be the first lifecycle upgrade post implementation of capability as outlined in Minor GIS enhancements brief. The sizing of the upgrade project are based on an expectation of the size and complexity of the product that will be required and its interface requirements. Jemena estimates this lifecycle upgrade to be a small project and take less than 6 months to implement with moderate complexity.