Jemena Gas Networks (NSW) Ltd

Investment Brief
Asset Management & GIS Enhancement

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bringing energy to life

Glossary

2020-25 regulatory period	The period covering 1 July 2020 to 30 June 2025
AA	Access Arrangement
AER	Australian Energy Regulator
CIC	Customer Initiated Construction
Current regulatory period	The period covering 1 July 2015 to 30 June 2020
DBYD	Dial Before You Dig
ECR	Engineering Change Request
GIS	Geographic Information System
GPR	Geolocated Ground Penetrating Radar
ICT	Information and Communications Technology
IS-U	SAP module for “Industry Specific – Utilities”
JEN	Jemena Electricity Networks (Vic) Ltd
JGN	Jemena Gas Networks (NSW) Ltd
ME	Mobile Enterprise
NECF	National Energy Customer Framework
NGR	National Gas Rules
OMS	Outage Management System
RIN	Regulatory Information Notice
RFS	Rural Fire Service
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. Asset Management & Geographic Information System Enhancement

Objective	The objective of this investment brief is to outline Jemena Gas Networks (NSW) Ltd (**JGN's**) proposed program to fully implement its Geographic Information System (**GIS**) to enable JGN to efficiently and effectively deliver safe and reliable services and support JGN's regulatory 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 and manual data duplication 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 maps were two dimensional CAD drawing-based without any geographical data (geo-mapping/tagging), restricting any linkage to customer information or the ability to undertake detailed analysis. GIS solutions are the best practice for utilities in Australia and worldwide. 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 safely. In line with a strategy of ensuring effective and targeted approach to ICT products, the initial implementation of the JGN GIS has been managed to a very tight scope – a 'vanilla foundational implementation'. This scope was limited to the replacement of the drawing-based mapping systems, and the provision of the fundamental elements required to enable the integration of the GIS with other systems JGN utilises to manage its assets and customers (known as the 'GIS ecosystem'). Key benefits – especially around the management of risk (including safety) and customer service (and other stakeholder services) – will be unlocked as JGN migrates this 'vanilla foundational GIS' product through targeted enhancements. Many of these key enhancements will stem from the interrelationships between the core GIS and other elements of the GIS ecosystem. The GIS is the cornerstone of a GIS ecosystem and is designed to be closely integrated with other JGN ICT systems, including SAP, Dial Before You Dig (**DBYD**), field mobility, drawing management, works management, environmental overlays (fire, storms, EPA ground pollution hazards, access permitting systems and potentially other systems in future – SCADA, synergy (hydraulic design software), Outage Management System (OMS) etc.
Non-recurrent ICT capital expenditure	The program of enhancements to JGN's GIS was originally submitted as recurrent expenditure in JGN's Access Arrangement proposal dated June 2019. In consideration of the recently released (November 19) Australian Energy Regulator (**AER**) *Non-network ICT capex assessment approach*,[1] JGN has recategorised the capex as 'non-recurrent ICT capital expenditure'. The JGN GIS was installed during the current regulatory period as a non-recurrent ICT capex project. In the 2020-25 regulatory period, JGN will need to continue investing in non-recurring costs to fully implement the full GIS capability. This requires a program of work that will result in changes to the system in response to changes in related systems, customer expectations, regulatory requirements, and ability to capture new network equipment types. Under the AER's proposed framework for assessing forecast ICT capex, non-recurrent ICT expenditure is to be assessed by the AER based on the submission of business cases and supporting information.

[1] AER Framework for Forecasting ICT Capex

Risks	Third party damage (generally caused by civil construction) to JGN's network threatens the integrity (leading to loss of supply occurrences) of JGN's gas distribution network and has the potential to lead to a significant increase in loss of supply incidents for customers. With over 500,000 enquiries per annum, if only one per cent were not effectively answered and led to third party hits, the number of hits would increase by a multiple of 25 compared to current level. This would have the potential to lead to a significant increase in injuries and potentially deaths, and costs. JGN as an operator of utility infrastructure, generally in the public environment, faces a number of risks related to the consequences to the public, often from circumstances that are not really in JGN's control – such as excavation by third parties damaging buried assets. Additionally, large amounts of the JGN assets are buried, and therefore effectively hidden from these third parties. The GIS ecosystem is a fundamental tool that supports the effectiveness of a number of key controls against these risks. JGN manages this risk through the GIS ecosystem which provides the basis for information as to the nature of JGN assets, including location, pressure levels, size, etc. This information supports such activities as response to incidents and emergencies, DBYD enquiries, growth planning, standby activities (supervision of high risk civil works), etc. Unlocking this information so that it is accessible and transferable is important, and the ongoing enhancement of the GIS ecosystem is targeted at these principles. Additionally, ensuring the information provided is as accurate as possible is another driver in enhancing the GIS ecosystem – especially as the linkage between the elements of the ecosystem will provide cross-check and validation of the data, improving the accuracy for stakeholders. The ability for JGN to effectively, efficiently and accurately respond to DBYD enquiries is key in the management of potential third party interference of JGN assets.
Customer Importance	The JGN GIS and related ecosystems play a critical role in enabling JGN to deliver the safe, secure, reliable and affordable services that its customers expect. The GIS impacts on all facets of JGN's business and is therefore critical to the supply of gas distribution services to customers. The JGN GIS supports the customer experience through the Customer Initiated Construction (**CIC**) Portal with the GIS mapping and correlation of customer address and gas services for a fully online service. **Customer benefits** Customer benefits (that is, benefits that customers / contractors will receive rather than JGN) expected from the GIS functionality are: 1) CIC portal • Connection to the application portal for the provisioning of Gas Connection Services. 2) Data visualisation • Display and reporting of Critical High Density Communities and correlation to high and medium pressure gas pipelines 3) Civil contractors safety • Assists in meeting their legal and safety obligations under the Infrastructure Protection Act and the Gas Supply Regulations • Expedient access to records / information • Higher levels of detail than currently available • Interface with their design tools 4) Unplanned outages • Higher levels of interface for customer information • Improved service and response to 'at risk' customers safety • Better tracking of schedules for re-establishment of supply.

Regulatory Obligations	The GIS ecosystem currently supports JGN's compliance with technical and commercial regulatory instruments. The presentation of 'mapping layers' for use by DBYD is a key component. On 1 July 2010 New South Wales became the first Australian jurisdiction to enshrine DBYD in law. The formal name for the legislation is the Energy Legislation Amendment (Infrastructure Protection) Act 2009 (**Act**). The relevant supporting Regulation is the Gas Supply (Safety and Network Management) Regulation 2013. Under this regulation, DBYD must be notified for: • Almost all work on private property, including work approved by a Council, • Work by a public authority, and • Work on underground utility services. Through its' Safety and Operating Plan JGN has committed to the NSW Government to respond to all DBYD enquiries within 48 hours. The Gas Supply Act also required JGN to comply with the Australian Standards – AS2885 series for high pressure pipeline systems; and AS4645 series for gas distribution systems. Both of these Standards place a strong reliance on the creation, maintenance and accessibility of records for the management of threats to gas infrastructure, especially where those risks are related to asset and public safety. AS2885.3 states that the primary purpose of records is to preserve: *a) Historical information required for the safe operation and maintenance of the pipeline over the pipeline's life;* *b) Objective evidence of pipeline management system effectiveness and compliance; and* *c) Records of decision making and approvals.* *Electronic records that can be accessed by common text, database or spreadsheet programs, including geographical information systems, are preferred since electronic data is readily stored with a level of security not possible with paper-based documentation.* AS4645.1 requires: *Records management shall provide for the efficient and systematic creation, receipt, maintenance, use and disposal of records. As a minimum, this shall include the establishment and implementation of records of design, construction, testing, commissioning and operation.* *The Standard identified the following types of records as being required to be collected and maintained:* • *Those required for the effectiveness of emergency response* • *As built details ... to monitor effectiveness of controls* • *Locations of buried mains...with sufficient accuracy...*
Strategic Approach	JGN's strategy is to implement GIS-centric storage and management of information necessary for safe and efficient, design, maintenance, operation and planning of the network. This requires fully integrating the GIS into the GIS ecosystem, existing work practices and changes to other systems and network assets, through efficient and prudent enhancement projects.

Summary of Program	JGN proposes GIS non-recurrent expenditure for enhancements to the GIS which are currently not in place. Based on the forecast, this requires a $5.7m increase in JGN's allowance for non-recurrent ICT expenditure during the 2020-25 regulatory period. The table below shows the full list of non-recurrent GIS enhancement projects to be undertaken during the 2020-25 regulatory period.

Project name ($2018)	ProjectID	RY21	RY22	RY23	RY24	RY25
Asset Data Structures & Data Optimisation	ITGG03	0	255,024	255,024	0	0
GIS Data Asset Reporting & Dashboard - Service Improvement Requests	ITGG09	100,188	100,188	100,188	100,188	100,188
GIS Automate Generation of Schematics	ITGG10	0	400,752	0	0	0
GIS Data Sharing Capability (e.g. iWorks - Customer Portal)	ITGG11	0	0	303,600	0	0
GIS Data Warehouse Trend Analysis	ITGG12	400,752	0	400,752	0	0
GIS Field Capability	ITGG13	0	0	303,600	0	0
GIS High Definition Data Sources (New Capability)	ITGG14	0	0	0	255,024	255,024
Land Management System	ITGG15	0	303,600	0	0	0
GIS Service Improvement Requests (Across all GIS, Drawing & DBYD tools)	ITGG17	118,404	236,808	236,808	236,808	236,808
Integrated Project Portfolio Management - New System	ITSE05	0	0	451,594	0	0

JGN's estimates have leveraged Jemena's corporate knowledge of Jemena Electricity Networks (**JEN**) GIS projects. Historical and planned JEN projects were used as a basis to forecast the projects that would be required for the JGN GIS. Using this information, cost estimates were developed in the JGN IT Project Estimation Tool.

Based upon its experience with JEN GIS enhancements, JGN knows that the GIS enhancements will provide benefits to its customers (including civil contractors) but it's difficult to measure with any accuracy prior to the capture of the to-be requirements and development of the ultimate solutions. It is anticipated that the GIS enhancement will also provide benefits to JGN in the latter part of the 2020-25 regulatory period but at this stage it is difficult to know what the impact may be on JGN's operations. However, JGN expects that the GIS enhancements will contribute to JGN's 0.74% productivity growth factor proposed in its AA proposal and agreed by the AER in its draft decision[2], which in turn will be reflected in JGN's opex for future regulatory periods assuming the AER continues to apply the base-step-trend approach to opex.

The scope and basis for JGN's estimate of the non-recurrent enhancements is set out below for each project.

The NPV for this expenditure is -$4,438,804.

See attachment "NPV for GIS Enhancement Investment Brief" – NPV Calc|Option 2.

Conforming capex	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 the GIS enhancements, 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 for JGN's customers and contractors requiring access to JGN's network. The expenditure will ensure robust industry standard systems within a GIS ecosystem to effectively manage network safety through the capture of new network equipment, workforce mobilisation and integration of integrity management and DBYD systems. 2. Efficient – The option selected is the most cost effective long term option 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 – Addressing the risks associated with customers and retailers that is accepted as good industry practice. In addition to the reduction of

[2] AER Draft Decision, Jemena Gas Networks (NSW) Ltd, Access Arrangement 2020 to 2025, Attachment 6 Operating expenditure, November 2019 Table 6.6.

	risk as low as reasonably practicable in a manner that balances cost and risk is consistent with Jemena Risk Management Manual and AS2885 and AS4645.1. 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)) – Using proven gas utility industry solutions within a GIS ecosystem including the integration to Workforce Mobilisation, impact assessment and permitting, access to asset location and characteristics in the field, visual decision making contributes to access to quality and current information for sound decision making minimises the likelihood of damage, reduced reliability and safety of services as follows: a. Reduced 3rd party damage to JGN's network by developing the DBYD interface b. Improved information provision for civil contractors including drawings and depth of cover c. Bushfire mitigation by improving the interface with NSW Rural Fire Service and implement smart systems for isolation management for bushfires d. Improved emergency response by obtaining visibility of affected customers and critical customer identification, being able to isolate management processes and interface with SCADA and Outage Management Systems e. Improved Workforce Mobilisation by: i. Obtaining access to GIS and Asset Data in the field to support site Safety Assessments and location of underground assets ii. Providing electronic work packs, including supporting information such as DBYD plans from other utilities. f. Improved data visualisation: i. Display and reporting of Critical High Density Communities and correlation to high and medium pressure gas pipelines ii. Display of critical isolation devices with links to as-built information g. Active encroachment management to integrate to a future "Impact Assessment and Permitting System" to actively and effectively manage 3rd party encroachments for increased network safety. 2. Maintain the integrity of service (79(2)(c)(ii)) – JGN will be able to maintain the integrity of the following services: a. Interface with integrity management programs such as Pigging, Direct Current Voltage Gradient (**DCVG**) survey and Cathodic Protection (**CP**) results b. Management decision data - provision of visual decision-making data including for age of mains, materials and previous ownership c. Management of critical infrastructure – access and analysis of design construction and maintenance records against the geographical and supply elements (or threat categories – floods, bushfires, etc.) such as major supply lines, shallow mains and exposed mains d. Facilitate workforce mobilisation including: i. Access to GIS and Asset Data in the field to support site Safety Assessments and location of Underground assets ii. Electronic work packs, including supporting information - other utilities DBYD responses iii. Equipping the Field Services organisation with the ability to audit, record and visualise GIS and Asset data in the field iv. Reduced cycle times through implementation of electronic work packaging dispatch, scheduling and closeout. 3. Comply with a regulatory obligation (79(2)(c)(iii)) – JGN is required by the Act and the Gas Supply (Safety and Network Management) Regulation 2013 to ensure the network is operated in a safe manner and a continuous supply of gas to customers is maintained at all times.
ITGG03	**Asset Data Structures & Data Optimisation** The scope of the project is to reset the data hierarchy and architecture in JGN's SAP system (in particular the modules related to ERP and IS-U which hold the data models for how information is

	stored around the assets and the interaction between assets and customers). Resetting the data hierarchy is an *enabler*, that provides the foundation for enhancements – for the GIS and more importantly between the GIS and the eco-system of asset data systems within which the GIS operates. The implementation of the JGN GIS has provided opportunities for the use of asset and location data to enhance businesses processes by facilitating improvements in safety performance (such as better structured and visual representations for risk assessments) and providing information to customers. However, the integration of the GIS into JGN's ecosystem has highlighted limitations that restrict this potential (future) utilisation of asset data and location data in SAP (e.g. SAP Functional Location Hierarchy, Streets, Suburbs, Connection point addresses), including a lack of granular data that supports effective decision making. The original data hierarchy was designed as part of the SAP (enterprise system) implementation which itself was influenced by the structure of the legacy ERP, and prior to the development of the GIS. This hierarchy was continued into the GIS to ensure consistency and that the GIS was implemented without undue complexity. The data hierarchy for SAP is based upon a fiducial logic, with respect to the nature of utility assets it has been found not to be well structured to exploit the advantages of a geographical tool such as GIS. The limitations of the current data hierarchy require significant manual processes and workarounds due to the configuration and form of asset hierarchy utilised, restricting the ability to analyse information. This project will provide an ability to more effectively identify opportunities for future maintenance improvements to systems. The formal scoping and project definition includes the review of accepted and good industry practice. The cost estimate is based on JGN's understanding of the data structures in the GIS and SAP systems and the size and complexity of the interfacing requirements that this is likely to incur. Based on this, JGN assesses that this is small-medium sized level project that will take up to 2 years to implement and is of medium complexity.
ITGG09	**Asset Reporting & Dashboard - Service Improvement Requests** The scope of the project is to ensure a technical structure / framework to enable consistent and appropriate quality of asset information, for the development of reports and dashboards. This technical structure will facilitate the visibility and exploration of data relationships across asset data systems, within the GIS ecosystem (Location & Spatial context) to provide the basis for input to decision making processes outlined in the JGN Asset Management System. The consistency provided by the technical framework is a foundation element for Jemena's Asset Data Governance Framework that sets the requirements for the alignment to specification, availability and quality of asset data (and thus information). The alignment of data quality to stated specifications and requirements is subjective and can introduce a level of risk and inefficiency to the use of such data in decision making. The technical structure will also provide for the measurement and dashboarding of data quality and thus the ability to: a. identify gaps for prudent data investment b. identify data that conforms to requirements c. inform data consumers to ensure that decisions and use cases are reflective of data quality. The project will enable the leverage of valuable asset data by providing insights into asset data quality and the impacts on related data user cases. The project will provide valuable and comprehensive information (and confidence in that information) to analyse and detect data patterns and anomalies to prioritise and allocate resources to ensure the effective outcomes for reduction of asset and public safety risk (e.g. correlation of accurate and detailed locations and asset characteristics data with high levels of civil construction (DBYD) activity). The consistent technical structure will provide self-service reporting (through more effective and uniform training), maximising the benefit across the various stakeholders (internal and external to JGN) utilising the information from the reports and dashboards. The proposed project spend will: • Improve asset management capability through informed decision making resulting from timely and accurate data across the GIS and SCADA domain.

	• Support proximity based activity like Reliability Centred Maintenance through the capture and analysis of asset information in correlation to location, allowing for optimisation of maintenance and replacement strategies of high value / cost assets. • Provide assurance on the GIS data quality supplied to SCADA, Outage Management and other downstream systems such that systems performance is adequate to support emergency response (e.g. Isolation management processes and visibility of affected customers). • Provide assurance on data quality to support upstream systems such as the JGN CIC Portal and inherent automations that rely on asset, location and address data within GIS and SAP. Asset errors introduce delays in customer connection processes. • Highlight issues in key data elements (e.g. the identification of critical customers and the ability to measure customer impacts through network tracing) that require prompt remediation. • Support analysis and visualisation of asset related use cases like: High Density Community Use (HDCU) where spatial analysis of assets and correlation of high population sites are mashed-up and then exported into visualisation across the organisation through web viewing tools,. • Provide metrics to prioritise data management activities for critical infrastructure to maintain the integrity of supply • Ensure that data investment is aligned to strategic objectives within Asset Class Strategies. As the GIS ecosystem is developed, one of the supporting activities to ensure the enhancements are leveraged, will be to ensure that reports (information in a functional and exploitable format) and performance indicators can be generated, to enhance stakeholders decision-making capability and capacity. To ensure that the approach to reporting and dashboards is consistent, JGN has identified this activity as a project line in the enhancement program and spread the costs equally across the 2020-25 regulatory period as a reflection of the on-going enhancements that are a feature of an evolving GIS ecosystem. The cost estimate is based on experience from JEN's use of reporting on the data in its GIS environment. Based on this, JGN assesses that this is a very-small, annual activity that will take up to 6 months to implement each year and is of medium complexity.
ITGG10	**Automate Generation of Schematic** The scope of this project is to develop an industry standard simplified view of Network Connectivity which offers several operational advantages over a complex geographical view. The GIS ecosystem is being developed to provide a rich source of information, including detailed engineering drawings, photos of infrastructure over various periods, survey information, maintenance records, facility designs, engineering change documentation, etc. against the geographic (and topographic) areas where JGN operates. The JGN network system is spread over a wide area of NSW, which when displayed in a geometrically accurate manner can complicate the retrieval of some of this rich information. An industry standard method for simplifying this complexity is to utilise a series of schematics – in a similar manner as the railway system does with its 'schematic network maps'. The project will develop automated generation of: • A schematic view of JGN's gas network will support efficient incident management (gas leakage) and the determination of appropriate network isolation. • Schematics from the source-of-truth as opposed to parallel information maintained in isolation within other repositories such as CAD drawings and hardcopy folders in the field vehicles. • A schematic view that retains network topology and relationships to other systems rather than a drawing style schematic. For example, links from assets to SAP, Drawing Management System and ECMS will persist. The cost estimate is based on an expectation of the size and complexity of the task of extracting suitable schematic data taking account of experience in JEN. Based on this, JGN assesses that this is a small to medium project that will take up to 6 months to implement and is of medium complexity.
ITGG11	**GIS Data Sharing Capability Platform** The scope of this project is to leverage the core capabilities of GIS systems and asset data to provide timely, consistent and appropriate information to external stakeholders (e.g. emergency services,

	council, customers, industry service organisations) enabling the external stakeholders the ability self-service to information that has the benefit of reducing JGN risks and providing some opportunities for JGN. The project draws upon the technical structure developed through the Asset Reporting & Dashboard project series to ensure consistent and accessible information to these external stakeholders. The project will seek to utilise (or modify) existing infrastructure, such as customer portals to ensure efficient outcomes. Several opportunities have already been identified where provision of information through self-service tools (such as customer portal or other stakeholder interfaces) will benefit external stakeholders. Examples of opportunities include: • Planned outages information – JGN is required under the National Energy Customer Framework (**NECF**) rules to publish outage information in a manner that is available to affected customers. JGN's current approach requires a high degree of manual intervention to provide basic locational information to customers. The GIS ecosystem provides the platform to provide this information in a more easily digestible, more discriminate and timely manner – both ensuring ongoing regulatory compliance and an incremental improvement in safety for customers. • 'iWork's' - JGN currently subscribes to the iWork's service that publishes information from councils, utilities and other organisations undertaking civil works in public lands (such as streets, footpaths, parklands, etc.). This service enables better planning – through sharing of information - for all these organisations, enabling coordinating road opening and restoration works as well as minimising impacts to the broader community, including JGN customers. This project will enable better two-way flows of information between JGN and other organisations undertaking civil works, through the provision of more discriminate, accurate and timely (scheduling) data. • Lands Planning information – Developers, councils and NSW planning organisations regularly request data as to the extent and proposed changes to the JGN gas infrastructure. These stakeholders use this data to generate planning information to more effectively determine activities such as land releases, development roads layouts, etc. The project will facilitate easier and more timely access these stakeholders. • Rural Fire Service (**RFS**) planning – The RFS, and other emergency service organisations are provided information as to the JGN assets on request. These stakeholders use this data to generate planning information to more effectively determine activities such as back-burning or asset protection, etc. The project will facilitate easier and more timely access these stakeholders. The cost estimate is based on experience from JEN's sharing of GIS data. Based on this, JGN assesses that this is a small to medium project that will take less than 3 months to implement and is of low complexity.
ITGG12	**GIS Data Warehouse Trend Analysis** The scope of this project is to establish / extend the Geographical Analysis and Data Warehouse capability for key asset data. It includes: • Implementing a Common Information Model (reporting and analytics, annual data historian and snapshots) to facilitate location based analytics for assets and related spatial and non-spatial data • 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, opportunities to identify network reliability improvements. The following are examples where this capability will provide benefits include: • Development of Regulatory Information Notice (**RIN**) and other regulatory data – as part of its regulatory obligations, JGN is required to provide data (and analysis of the data) to various regulatory authorities. The enhancement of the current geographic analytical and presentation tools will not only support the provision of this data, but also provide more accurate data and the ability to present the data in more functional or convenient formats. • Risk assessments – JGN undertakes a series of detailed risk assessments, including those to meet regulatory requirements (such as Formal Safety Assessments outlined in AS4645.1 and Safety Management Studies outlined in AS2885.6 – required by the *Gas Supply Act* and

	Pipelines Act respectively in NSW) and for internal business decision making – including decisions as to safety and appropriate levels of service for customers. These risk assessments draw upon multiple data sources and outputs include geospatial products such as heat maps, location class assessments, topographical analysis, etc. This project would increase the tools available to provide more in depth and expedient processing and presentation of these risk assessments. • Reliability Centred Maintenance – An opportunity to leverage a number of the enhancement activities in collaboration (e.g. Asset Reporting function, GIS Field Capability, Asset Data Structure and GIS Service Improvement requests) to develop a holistic view of works (defect and reliability centred activity) for Field Services teams to execute planned and preventative works in same geographic areas, minimising customer impacts (planned and unplanned outages), as well as optimise delivery of works in an operational efficient manner. The cost estimate is based on experience from JEN's use of reporting and analysis on the data extracted from the GIS environment. Based on this, JGN assesses that this is a small to medium project that will take up to 6 months to implement and is of medium complexity.
ITGG13	**GIS Field Capability** The scope of the project is to replace paper based (or use of independent software-desktop packages) processes still used in construction, inspections and maintenance activities with utilising asset and location (geospatial) focussed mobility to facilitate the viewing, collection/ inspection or update of asset data in the field. The project would extend Mobile Enterprise (**ME**) GIS Field Clients to broarder field services community, and increase capabilities, that provided redlining/blacklining applications for some routine Construction Processes (such as laying of plastic mains and services). Mobile Enterprise suite of solutions extends critical back office functions to the field, enabling office and field personnel to visualize and update asset information, undertake work tasks and update backoffice systems realtime. Updates can be redline – unstructured feedback in text or tablet drawing, and blackline – structured updates including asset attributes inserts / updates, and location information as a result of planned and unplanned works. The ME GIS Field Client implementation had a positive NPV at the time of implementation (2019) with payback in four years. This project would seek to extend the foundational system with further use cases, such as: • Secondary steel mains construction – enabling more detailed site drawings to an engineering standard, improving the quality of information and records (reinforcing some of the benefits outlined in the information about records in the regulatory obligations section above); • Maintenance interaction with the Engineering Change Request (**ECR**) process. The maintenance of the more complex higher pressure infrastructure can require updates to equipment on the sites – necessitating engineering review and approval. JGN employs an ECR process to manage these field changes. The ECR process is currently an independent SharePoint system, not interlinked with the GIS ecosystem and thus not able to seamlessly access or update key records – slowing the provision of information and approvals. The conversion of the ECR process to be integrated with the mobility elements of the GIS ecosystem will provide an incremental reduction in safety and more effective records management of proposed and as-built changes. • Mobile Enterprise (ME) phase 2 additional capabilities like : o Gas leak survey (planning to do actual field leak detection) o Gas leak spatial data (ability to store and analyse leak locations spatially), encroachments, exposed mains, shallow mains, potential construction o Corrosion Point (CP) Management, location based audits and corrective activities. o Asset View – Provide broader Field Services with generic capability for Asset locations (predominantly underground) and red-line capability for un structured feedback. o Asset Update – broader field services coverage with Blackline (Attribute and Location) updates for asset information, data updates as a result of Works, Audits, Corrective actions (planned and unplanned) with correlation of location and asset information in the field.

	The cost estimate is based on experience from the current rollout of mobility functionality. Based on this, JGN assesses that this is a small to medium project that will take less than 3 months to implement and is of low complexity.
ITGG14	**GIS High Definition Data Sources (New Capability)** The scope of the project is to extend JGN's foundation GIS beyond the management of 2D asset data through the establishment of an appropriate technology / capability (and associated tools) as a central repository to cater for data sources beyond the currently utilised traditional 2D, relational database or file based GIS vector/raster data sources. The solution will facilitate the storage of data and its use for analytics and operational decision making. It is anticipated that significant storage and computing capability will be required regardless of the mix of on-premise versus Cloud based functionality and storage Potential Data Types include: 3D city scapes and the built environment, LIDAR, geolocated ground penetrating radar (**GPR**), remote sensing, drone patrols/data, aerial photography and satellite imagery and the terrestrial scanning of facilities. JGN is already interacting with several stakeholders – government security organisations (and their regulators), council developers (generally those responsible for CBD areas), etc – who are providing and requesting this type of data for both security (risk reduction and safety) and development processes. The proposed project benefits include: • The use of non-destructive asset location techniques such as GPR minimises the need for physical excavation and disruption, and improves the accuracy of asset location (including depth and identification of shallow mains) which is a key control in minimising third party damage – greatly enhancing the information available for DBYD enquiries, etc. • When overlain with asset location, the use of 3D city scapes and the built environment provides a high level of situational awareness when making operational decisions in response to faults and emergencies. • In-house capability for high resolution, spatial data sources provides opportunities to combine information and perform analytics from a variety of current and historic information sources which would not be possible if data acquisition and storage was decentralised and outsourced. • Integrity management programs are supported through the availability of asset condition data from remotely sensed activities such as drones that would otherwise be prohibitive to capture (in location, time or cost) – for sentencing (analysis) of critical infrastructure, such as corrosion defects on mains attached to bridges, etc where access is severely restricted and at times unsafe to access. • Management of critical infrastructure through access to sophisticated data on terrain, floods, bushfires etc., assessment of threat and the identification of mitigation measures to maintain integrity of supply. The cost estimate is based on experience with other systems involving the storage and classification of other types of un-structured data and documents. Based on this, JGN assesses that this is a small to medium project that will take up to 2 years to implement and is of medium complexity.
ITGG15	**Land Management System (LMS)** The scope of the project is to provide a digital platform and process for the management of land and property owner related information, including location based integration with the GIS. JGN currently uses spreadsheets (and other independent packages) and paper based processes, with no locational context for tracking landowner information, property interests, easements, leases and the like. Access to this information is problematic and there is no timely or digital access for field staff. This project scope efficiently leverages the existing LMS in the pipes business to provide a new capability that brings together process and data consistency across Jemena's networks. JGN High Pressure Assets are operated to AS 2885 (as required under the *Pipelines Act)*, and utilisation of an LMS would support regulatory compliance, and communication consistency with landowners, property managers, developers, councils etc. As an example of the requirements of AS2885.3, JGN is required to comply with the following: *7.3.2.2 Landowner and occupier liaison*

	Landowners and other occupiers of land through which the pipeline passes shall be visited, at approved intervals, to provide the landowners or occupiers with information regarding the asset and the requirements to obtain permission before carrying out certain works to ensure that their activities do not endanger the pipeline and its appurtenances. The project will require a significant data migration and data cleanse. The proposed project benefits include: • Access to Land Management and GIS data in the field to assist with user location in relation to restricted areas which may change over time or be unclear when in the field. • Consolidated location based view of asset and property related data to assist in the management of Jemena's interests in the environment surrounding its assets, and the manager of risk from third party activities within the same environment. • Minimise the loss of land and property information and facilitate prompt and efficient recording. The cost estimate is based on experience with Land Management Systems in Jemena's pipes business. Based on this, JGN assesses that this is a small to medium project that will take less than 3 months to implement and is of low complexity.
ITGG17	**GIS Service Improvement Requests (Across all GIS, Drawing & DBYD tools)** The scope of the project is facilitate the delivery of business-requested enhancements to the GIS ecosystem, which are predominantly driven through regulatory, safety, operational and efficiency reasons. These enhancements (customisations) are predominantly small in effort, with moderate volume occurring throughout the year, and extend the GIS ecosystems through software development, styling / visibility, integration and configuration changes. The GIS is the single-point-of-truth for the gas network model and the source of data for several downstream systems such as DBYD, SAP, Capacity Modelling, drawbridge, ECMS, Outage Management and field mobility. Similarly the GIS ecosystem is integrated at the software level to a number of key JGN asset data systems to provide the requisite business functionality and access to asset information in a spatial context. Such system and data integration requires constant change management and modification to respond to the changing requirements of the business. Higher levels of integration results in an increased level of effort and complexity for delivery. All these critical applications are constantly modified to meet JGN's operational, commercial and customer objectives as well as changing and increasing demands of its regulatory obligations and the increased exposure of the GIS and its data in customer facing systems. The inherent capability of the foundation GIS for JGN is leveraged as the business matures in its use of asset systems and data, and the agile extension of its capabilities through this project approach allows the system to efficiently keep step with requirements. System changes are usually a combination of regulatory changes, customer initiated and safety related requests typically <$10k. Requests are prioritised and delivered through agile development with low overhead costs, may be combined for efficient delivery, and with a focus on stay-in-business changes. The proposed project benefits include: • Maintaining security of data supply to real-time and modelling systems • System modifications to cater for new asset classes, equipment types or characteristics and relationships with objects in other related asset data systems • Data model changes to meet changed regulatory requirements to meet minimum asset document requirements (including related changes to data collection, management and display systems, processes and user interfaces) • System or data changes to meet changes in asset information requirements within Asset Class Strategies • Safety requirements such as the identification of High Density Community Use (HDCU) through a GIS interface • Modification to RIN reporting requirements including provision of asset data to the Fixed Asset Register • Data Management and capture as part of the data governance strategy • DBYD improvement for previously unrecorded Jemena and other asset content.

	The cost estimate is based on experience from JEN's GIS, where equivalent activity is also regularly and routinely performed. Based on this, JGN assesses that this is a small annual activity occurring throughout the year that is of medium complexity.
ITSE05	**Integrated Project Portfolio Management (PPM)** The scope is to implement a shared PPM capability across Jemena. This is not related to the GIS ecosystem but applies to the works and asset management function and the management of the entire program of work for the JGN distribution network. Core functions include: 1. Planning and control including Project Management Office (PMO), reporting, inventory management 2. Resource planning 3. Commercial management of service providers (e.g. Zinfra, Mondo), and the mechanism of service provider selection and engagement. 4. Reporting: a) Portfolio reporting data b) Customer performance data c) Control and process data. The solution will implement a consistent program management view of asset works in both networks to be able to manage and schedule the project work and balance resourcing. This process is currently completed manually or with the aid of simple spreadsheets and Microsoft Project plans. The cost estimate is based on expectations of the size and complexity of the likely shared solution obtained from Jemena's experiences using a basic cloud based solution in the current regulatory period. Based on this, Jemena assesses that this is a medium sized project that will take up to 6 months to implement and is of medium complexity.