31 January 2023

Attachment 5.9.a: Geographic Information Systems program

Ausgrid's 2024-29 Regulatory Proposal

Empowering communities for a resilient, affordable and net-zero future.

Ausgrid

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1. Document governance

1.1. Purpose of this document

The purpose of this document is to outline a program brief for the proposed Geographic Information Systems (**GIS**) investment, subject to investment governance processes, to form part of our 2024-29 regulatory proposal.

Related documents

Document	Version	Author
2022-29 Technology Strategy	V1.0	CIO
ICT Risk Appetite Statement	FY23	ICT Manage
Cyber Security Program Brief	V1.4	ICT Manage
Attachment 5.9 - Technology Plan	V2.1	ICT Manage
Attachment 5.9.g - GIS - CBA model	V1	ICT Manage
Consolidated Cost Model	V18	ICT Manage
2022-35 Corporate Strategy	V1.0	Head of Strategy
ICT Asset Lifecycle Management Guideline	V3	ICT Manage

Document history

Date	Version	Comment	Person
09/02/2022	V0.1	Initial draft for review	ICT Manage
28/02/2022	V1.0	ICT and Business feedback	ICT Manage
17/05/2022	V1.1	CIO Feedback	ICT Manage
26/05/2022	V1.2	Independent Review	ICT Manage
31/10/2022	V1.3	CIO Final Review	CIO

Approval(s)

Name	Position	Date
CIO	Chief Information Officer	31/10/2022
CFO	Chief Financial Officer	30/11/2022

2. Executive summary

The table below provides a summary of the GIS investment detailed in this program brief. It shows that the recommended program of work which requires a $14.0 million capital investment if approved and has a net present value (**NPV**) of $0.2 million based on our NPV modelling.

Executive summary	
Key Objective(s) of the program	To ensure that we maintain our GIS as the master record and interrogation tool for geospatial network data. The GIS is the system of record for our electrical connectivity model and therefore is essential to our enterprise business processes such as Financial Management, Enterprise Asset Management, Meter Data Management and Billing, and Advanced Distribution Management System (**ADMS**). The GIS is also the system of record for our asset locations enabling operations and asset maintenance information within Dial Before You Dig (**DBYD**) for public safety.
Customer benefits	• Improved outage planning and customer notification of outages; • Improves ability to model new equipment / changes in the field e.g., Electric Vehicle Charging Stations; • Enables continued delivery of safe and reliable electrical services to customers by accurately reflecting points of connection on, and connectivity of, our network; • Prudent mitigation of key operational risks by ensuring systems are up to date, and supported by vendors; • Appropriate risk management over the life of assets to ensure costs of delivering technology services are managed; • Maintains customer safety outcomes with the continued delivery of DBYD requests which assists in the identification of outages and restoration of power; and • Removes potential security vulnerabilities through ensuring security patching is up to date, thereby reducing the risk of unauthorised access leading to data loss or loss of service to customers. • Improved ability to respond to emerging customer and business requirements by enabling improved data accessibility and providing visualization and analysis tools.
Compliance requirements	• Security of Critical Infrastructure Act 2018 (**SOCI**), Security Legislation Amendment (Critical Infrastructure) Act 2021 (**SLACI**) and Security Legislation Amendment (Critical Infrastructure Protection) Act 2022 (**SLACIP**) - Ensuring that our GIS is supported and secured as a key enabler to comply with this Act. • Electricity Supply Act 1995 (NSW) - Requires GIS to have a high availability of service and enables us to deliver on our critical business services to meet obligations in this Act.

	• National Electricity Law (**NEL**) and National Electricity Rules (**NER**) - Requires GIS to have a high availability of service and enables us to deliver our critical business services to meet these Rules.					
Net Present Value (NPV) calculations	**Customer:** N/A		**Shareholder:** N/A		**Total: $0.2 million**	
Program timings	**Program duration**		3 years			
	Program start year		2025	Q1 ☒	Q2 ☐	Q3 ☐	Q4 ☐
Expenditure forecast	**($m)**	**FY25**	**FY26**	**FY27**	**FY28**	**FY29**	**Total[1]**
	CAPEX	(0.5)	(7.1)	(6.4)	-	-	**(14.0)**
	OPEX	-	-	-	-	-	**-**
	Total SCS[2]	(0.5)	(7.1)	(6.4)	-	-	**(14.0)**
Program type	**ICT[3] investment**		☒ Yes			☐ No	
	Recurrent ICT		☒ Yes			☐ No or n/a	
	Non-recurrent ICT		☒ Yes			☐ No or n/a	
	One-off SaaS opex		☐ Yes			☒ No or n/a	

[1] Due to rounding, some totals may not correspond with the sum of the separate figures.
[2] Cost Allocation Method (CAM) allocated standard control services component. Indirects are excluded.

[3] Information, Communications and Technology (**ICT**)

3. CONTEXT

3.1. Background

3.1.1. Introduction

This document outlines the case for investment in expanding on or migrating from GIS Smallworld Core to an identified GIS platform during the 2024-29 regulatory control period.

3.1.2. GIS provides a core service

The GIS contains location and connectivity information related to our electrical network assets. General Electric's (**GE**) GIS Smallworld Core is the core system of record used for network connectivity and will in future provide geospatial data to the ADMS to help control the network.[4]

The GIS needs to be continuously adaptive to changes in our network build standards. For instance, if there are new types of equipment, GIS needs to be modified to be able to capture these. In addition, the GIS data model and system needs to be maintained to meet our changing data and information requirements. This occurs when new equipment, technologies and configurations are installed on the network (i.e., community batteries), and to support new business systems, applications, and analytics tools with geospatial data. GIS is a key requirement for new interfacing systems. It further supports the delivery of critical geospatial data, through:

- Dissemination of spatial information for briefing executive, government, emergency services and media as well as provision of information to relevant network planning and field operational staff;
- Updating system diagrams with location of electrical system information, our telecoms and electrical connectivity data which supports analytics and insights, planning, maintenance, and operations. For example, ratings, capacity planning, ADMS, Outage Management System (**OMS**), new connections, network augmentation, restoration; and
- Providing the link between outage planning and customer notification of outages and is a key enabler between customer Network Meter Identifiers (**NMI**) and customer connectivity. The GIS is the source of connectivity information for SAP, OMS, ADMS, Power Network Model (**PNM**) and DBYD and anything else that needs connectivity information. It also provides information to Metering Business System (**MBS**) regarding NMI connectivity.

3.1.3. Interaction with other systems

The GIS provides network connectivity information to the following enterprise systems:

- SAP – Provides connectivity information for feeders, substations poles, pillars, switching points, streetlights, customers and enables these assets to be associated with the hierarchical maintenance model in SAP based on the feeder structure maintained in GIS;
- OMS – Provides a connectivity model from the customer NMI to bulk supply points;
- ADMS – Currently in development, GIS will provide the normal state network information to the ADMS; and
- PNM - Provides high-voltage network connectivity information for use in network modelling software for ratings, load analysis and planning.

[4] ADMS will include the outage management system for unplanned outages with key information obtained from the GIS system.

The connectivity model is maintained through a topology model rather than a database hierarchy. The GIS Smallworld Core converts this topology into hierarchical models for different systems that cannot support topology models such as SAP and OMS.

3.1.4. Current system capabilities and considerations

Our current version of the GIS Smallworld Core application is version 4.3. The initial system was implemented in 1997 and has had two major upgrades since. The latest upgrade was in 2012 and our GIS has been in sustaining support mode since 2016, at which time the extended vendor support for this version ceased as per **Figure 1 – Smallword Core Product Support Roadmap** below. Our GIS application is now 6 years outside of the vendor's extended support window and does not align with our *ICT Asset Management Guidelines*.

Figure 1 Smallworld Core Product Support Roadmap[5]

We are currently upgrading the servers on which our GIS is hosted to Microsoft Server 2019. Microsoft's support for this version will end on January 9, 2024, and extended support will be available until January 9, 2029.

If investment in replacing the server during the 2024-29 regulatory control period does not occur, the server would have an increasing risk of failure as it ages. A server failure or outage would result in key operational risks including:

- Limitations in our ability to respond to emerging customer or business requirements, with an extended outage having potential customer, program of work and business as usual operational impacts;
- Safety risk of not providing information regarding our underground assets to our customers when they are planning on excavating;
- Risk of network reliability service performance reducing as systems age; and
- Services no longer able to handle new data and storage loads.

There is also an additional risk that GE may withdraw from providing sustaining support for the current version (in place since 2012). In this situation we would be unable to access security patches to mitigate cyber security risk or receive technical support to remediate application outages. An aging system also increases the cyber threat opportunity where our business is considered as a high threat target for cyber-attacks.

3.2. Problem / opportunity

The GIS is needed to ensure that geographic master data and connectivity information is maintained. There is a potential risk that the vendor will no longer provide third party support beyond 2026, consequently this system needs to be upgraded by end of financial year 2026 to maintain the technical capability of our GIS system and associated environmental infrastructure.

Given GIS has reached end-of-life, not upgrading the system will come at an increased maintenance cost and risk of failure, putting at risk our ability to deliver a cost effective, safe, reliable, and secure electricity supply to customers. A GIS upgrade or replacement would

[5] Smallworld Core GE Product Roadmap 2022

maintain the technical capability of our GIS system and associated environmental infrastructure beyond 2026. It would reduce both cyber security and supportability risk due to no longer being on an unsupported software version, and will provide the following opportunities:

- Avoid increased maintenance cost and risk of failure of GIS; and
- Reduced impact in our ability to deliver cost effective, safe, reliable secure electricity supply customers.

3.3. Investment Objectives

Under the proposed program of work, we are aiming to:

- Mitigate operational and security risks by ensuring our critical GIS system is up to date and can be supported by the vendor routinely;
- Enable ongoing accessibility, support and security of technology that rely on the timely and accurate availability of information to support key business processes;
- Comply with our risk management policy and other regulatory obligations to follow best industry practice for its control system environment including appropriate vendor support;
- Support business efficiencies by ensuring supporting our GIS is the latest technology to meet our functionality, usability, and future network needs;
- Improve accessibility and presentation of the GIS data by providing role-based access;
- Procuring software and develop new interfaces to take advantage of a more accessible GIS dataset and improve data capture and design processes;
- Improving customer engagement by providing GIS data to enable better planning opportunities, safer work practices and problem reporting;
- Improving data exchange practices with our Accredited Service Providers (**ASP**);
- Improving data capture processes by taking advantage of better source data collection with better tools and improved interfaces; and
- Improving design process by enabling improved interfacing between GIS and SAP data.

3.4. Customer outcomes

Our 2022-35 Corporate Strategy has identified four key topics that will define our business into the future. The GIS program aligns to the thriving communities, and optimised assets & operations, as detailed below.

Objectives	Actions	Measures
Thriving Communities ***Listen and understand to exceed customer expectations*** 	• Support our customers to build resilient communities with a safe and reliable network • Strive to resolve customer issues quickly and meet changing expectations • Support customer choice by providing options and information	• Customer confidence score • Partner confidence score • Service ease score • Service resolution score

Objectives	Actions	Measures
	Continue to build trust and collaborate with our stakeholders	
Optimised Assets & Operations ***Excel at operations to deliver safe and affordable services*** 	• Improve operational efficiency • Lift our digital and data capabilities to make fast, evidence-based decisions • Enhance effectiveness of internal services • Grow revenue by leasing our assets	• Standard Control Services (**SCS**) opex • Delivery of network CAPEX program

Table 1 Customer Outcomes alignment

This investment is essential to improving our operation efficiency and lifting our data capabilities to make fast, evidence-based decisions in the field and in our network operations. This is achieved through GIS being the core system of record that:

- Is the database used for network connectivity and will in future provide data to ADMS. ADMS will include the outage management system for unplanned outages and will rely on geospatial data in the GIS application.
- Is the primary source of information for the connectivity data that will enable us to model new equipment or changes in the field. For instance, community batteries and electric car charging stations.
- Provides the link between outage planning and customer notification of outages (where information is supplied to the National Energy Customer Framework (**NECF**) Workflow application) and is a key enabler to communicate effectively with customers regarding outages. GIS is the source for the location and connectivity of supply points (customer connection points) and this information is sent to OMS, ADMS and WebGIS.
- Provides updating system diagrams with locations of electrical system information which supports processes such as new connections, network augmentation, restoration, ratings, and capacity planning.
- Enables the dissemination of spatial information for briefing executive, government, emergency services, media and ‘dial before you dig’ requests.
- Provides linkages from NMI to Consumer Energy Resources (**CER**) systems. This enables engineers to extract better quality information, as well as use automation to minimise human involvement and reduce errors. We obtain information of NMIs from MBS regarding life support status and meters, but we supply the location of the NMIs to several applications once we connect the NMI (via supply point) to the network.

3.5. Business drivers

The core business drivers behind this proposed investment are that by 2029 we will need to be able to:

- Maintain reliability of services;
- Enable services to be secure and up-to-date mitigating unnecessary vulnerabilities;
- Adapt to changing business demands (e.g., remote working, cloud connectivity to third party services and As-a-Service offerings, increased and more detailed information requirements, increased data, and service loads); and
- Maintain cyber and IT availability risk as per the organisation's risk management policy.

3.6. Compliance requirements

The proposed program of work is required to meet our regulatory obligations. The obligations, along with a brief description of the requirement, are set out below.

Obligation	Description of Requirement
Security of Critical Infrastructure Act	The *Security of Critical Infrastructure Act 2018 (**SOCI**)* applies in managing national security risks relating to critical infrastructure. The *Security Legislation Amendment (Critical Infrastructure) Bill (**SLACI**) 2021 and Security Legislation Amendment (Critical Infrastructure Protection) Act 2022 (**SLACIP**)* introduces new requirements: • additional security obligations for critical infrastructure assets, including a risk management program, to be delivered through sector-specific requirements, and mandatory cyber incident reporting; – enhanced cyber security obligations for those assets most important to the nation, described as assets of national significance; and – government assistance to relevant entities for critical infrastructure sector assets in response to significant cyber-attacks that impact on Australia's critical infrastructure assets[6]. Ensuring that our GIS is kept up to date, supported and secured is a key enabler of complying with this act.
Electrical (Consumer Safety) Act and the Codes of Practice	Obligations for the safe operation of the energy distribution network. Ensuring our GIS is highly available and secure enables our critical business services to meet this Act, particularly in ensuring our staff and our customer's safety.
National Electricity Rules (NER)	The operating and capital expenditure objectives[7] set out in the NER require us to maintain both the quality, reliability, and security of supply of standard control services and the reliability and security of the distribution network.

[6] Security Legislation Amendment (Critical Infrastructure) Bill 2021 Explanatory Memorandum: JC000738.pdf;fileType=application/pdf (aph.gov.au)
Security Legislation Amendment (Critical Infrastructure) Bill 2022 Explanatory Memorandum: JC004947.pdf;fileType=application/pdf (aph.gov.au)

[7] See clauses 6.5.6(a) and 6.5.7(a) of the National Electricity Rules.

Obligation	Description of Requirement
	Ensuring our GIS is highly available and secure enables our critical business services to meet these rules.

Table 2 Compliance requirements

4. OPTIONS

This section provides an overview of the options which could credibly address the investment need. The NPV associated with each option is also noted.

4.1. OVERVIEW OF OPTIONS

Four options have been considered, which are listed in the table below. The preferred option for the 2024-29 regulatory control period is option 2 based its ability to provide enhanced GIS capabilities to our business and to our customers during this period.

Two GIS vendors, GE and ESRI, dominate the market for electricity distribution businesses like Ausgrid. Ausgrid moved from an ESRI to a GE solution in 1997. Our instance of GE's Smallworld GIS is stable, mature and extensively customised. Our network connectivity enhancements have been licenced by GE and are progressively being included in releases of their new "Electric Office" solution.

We have investigated four options as a way of establishing the most prudent and efficient means of providing geospatial and network connectivity information and visualisation services:

- Simply modernising the current GIS with a lifecycle refresh maintaining current capability

And three alternative options means of opening up the information in our current GIS so that authorised third parties can pull geospatial and network connectivity data from Ausgrid and so that Ausgrid can present information from other sources geospatially to external parties:

- Updating the current GIS & opening up its data and presentation layer
- Replatforming the GIS to our current vendor (GE)'s Electric Office GIS solution and
- Replatform to new vendor (ESRI)'s GIS solution.

These four options differ architecturally and option 2 delivers more probabilistic benefits. For this reason, we are proposing to pursue option 2 which is reporting a positive NPV, less capex required, and less risky to implement.

Option	Description	NPV
Option 0: Defer upgrade	Defers renewal of legacy GIS system. This option is not a valid option as it does not align to our ICT Asset Lifecycle Management Guidelines and represents a material risk to the delivery of our network operations and service delivery obligations.	**NIL**
Option 1: Maintain GIS Core environment	Upgrade the GIS Core and associated environments to the latest Smallworld Core version (version 5.3). This will maintain current system environment in a supported and secure state.	**($2.2)**
Option 2: New or expanded capability (Preferred)	Upgrade the GIS Core and associated environments to the latest Smallworld Core version (version 5.3). Introduce new capability and tools to exchange, analyse and visualise data both to internal and external parties and create presentation layers with third-parties.	**$0.2**
Option 3: Re-platform (GE)	Re-platform existing GIS solution to current vendor (GE)'s Electric Office GIS solution	**($13.2)**
Option 4: Re-platform (ESRI)	Re-platform to new vendor (ESRI)'s GIS solution	**($19.7)**

Table 3 Overview of Options

To further demonstrate prudence and efficiency, we considered a 'defer upgrade' option. We did not consider this was a valid option and therefore have not included it in our cost benefit analysis for the following reasons:

- The asset has already been depreciated and is outside of its useful life;
- Potential for vendor to no longer provide third party support beyond 2026;
- Reduced protection against unknown cyber weaknesses;
- Limited integration with future technology for CER;
- The benefits of delaying investment are outweighed by the risks and potential remediation costs of not investing in appropriate capability; and
- There is an increasingly unacceptable risk of security and other organisational capabilities being impacted as the system ages leading to the system being outside the organisations risk appetite – see our ICT Risk Policy and our obligations in relation to SOCI, SLACI and SLACIP. There are no further mitigations available within the current environment beyond manual measures.

The 'defer upgrade' option would not be consistent with the prudency requirements given this option would lead to the GIS asset being unable to efficiently maintain its service performance.

Option 1 is a 'maintain capability' case as a regular refresh of end-of-life ICT infrastructure is accepted as good industry practice.

The principal difference between the two credible options is that Option 1 primarily maintains the current system capability (with some improved functionality) whereas Option 2 expands the system capabilities to include new and expanded functionality including better utilisation of modern integration capabilities such as built in APIs that enable easier integration with new

technologies in our future network (e.g., CER) and more seamless data sharing with our customers. Both credible options provide the following customer benefits:

- Enables continued delivery of safe and reliable electrical services to customers;
- Mitigation of key operational risks by ensuring systems are up to date and supported by vendors;
- Appropriate risk management over the life of assets to enable costs of delivering technology services to be managed; and
- Removes potential security vulnerabilities through ensuring security patching is up to date, thereby reducing the risk of unauthorised access leading to data loss or loss of service to customers.

4.2. OPTION 1: Maintain GIS Core environment

4.2.1. Description

Option 1 is to upgrade the GIS Core and associated environments to the latest Smallworld Core version (version 5.3). This will maintain the GIS Smallworld Core environment through upgrading to a supported version of the GIS Core software, as well as future proofing the underlying operating system and hardware.

GIS Smallworld Core (version 5.3) uses a more modern and industry standard technology platform which supports cross-functionality and future supportability. This option primarily maintains the existing capabilities, however, does not have the breadth of functional capabilities available in other alternate and modern SaaS GIS solutions.

Although this option is renewing existing capability, the implementation will require appropriate change management. Our expectation is that there will not be a requirement for significant training of the data capture staff as the changes to the interface and functions will be minimal. Given these considerations, we expect costs involved in change management should be modest with most GIS users accessing the system through the Network Viewer application.

Our objective of this option would be to enable the GIS Core and associated environments will be upgraded to the latest versions with the least impact to the business-as-usual activities of the users.

This is vanilla “recurrent expenditure” that maintains existing capability but in a supportable and risk-managed instance. The solution remains “on premise” but hosted externally, consistent with our ICT Infrastructure Brief where Ausgrid will migrate all on premise applications onto Microsoft’s Azure “infrastructure as a service” cloud.

The primary benefit of this option is maintaining GIS-services at a tolerable level of risk to the organisation and our stakeholders by keeping the version of Smallworld and Server Operation systems within vendor support. Consistent with the AER’s ICT capex assessment guidelines we have not quantified this benefit as the option is recurrent expenditure.

4.2.2. Option 1 assumptions

Option 1 has been estimated based on the following assumptions:

The projects that will need to be undertaken during 2024-29 regulatory control period are:

1. GIS end-of-life upgrade; and
2. Network Viewer upgrades (GIS viewer).

The cost of this option has been forecast based on historical actual costs of the previous upgrade to GIS Core, knowledge of recent market procurement for equivalent capability and services, as well as specialist advice and internal subject matter expertise.

A key assumption on project timing is that GIS Smallworld 5.3 is the latest available technology, with the upgrade planned for financial year 2025. However, should the next major release of GIS Smallworld be scheduled to occur in late 2025 then we would strongly consider delaying the upgrade to incorporate the latest technology. This would extend the project into financial year 2026 and could have a minor impact on the overall NPV.

There is no uplift in operating costs under this option.

4.2.3. Option 1 costs

For this option the estimated capital expenditure is $3.3 million, operation expenditure is $0 and the market NPV of $(2.2) million.

$ million	FY25	FY26	FY27	FY28	FY29	Total (FY25-29)
Direct labour	(1.3)	-	(0.1)	-	(0.2)	**(1.6)**
Materials	-	-	-	-	-	**-**
Contractor services	(1.4)	-	(0.2)	-	(0.1)	**(1.7)**
Other	**-**	**-**	**-**	**-**	**-**	**-**
Contingency	**-**	**-**	**-**	**-**	**-**	**-**
TOTAL CAPEX	(2.7)		(0.3)		(0.3)	**(3.3)**
Non-recurrent	(2.7)		-		-	**(2.7)**
Recurrent	**-**	**-**	**(0.3)**	**-**	**(0.3)**	**(0.6)**

Table 4 Capital Expenditure Costs and Scope Assumptions

4.2.4. NPV analysis

Under this option, given continued vendor support (including security patching), we consider the risk of system outages and functionality to be extremely low as per current supported levels. This upgrade primarily maintains the same functionality and we are not aware of any new or additional features that would drive additional business efficiency.

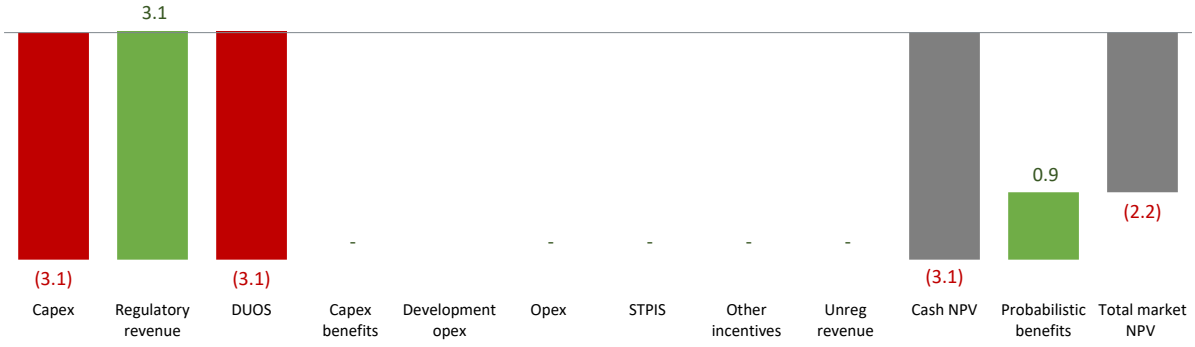

Figure 2 Option 1 - Market NPV ($' millions, real FY24)

4.3. OPTION 2: New or expanded capability (preferred)

4.3.1. Description

This option consists of updating our GE Smallworld instance and Network Viewer as in option 1 and implementing an authorisation platform and providing tools to customers and Ausgrid users to expose the information within the GIS without the costs and risks of replatforming the core solution.

The Data to Intelligence (**D2I**) project will provide the foundations for the opportunity to expose information from the GIS to authorised third parties and to present information from other sources geospatially. Option 2 enables Ausgrid to deploy tools from from vendors (like GE and ESRI) to enable this capability.

The benefits of options 1-4 are the same in regards to providing an up to date, supported environment– they differ architecturally and in terms of options for future regulatory periods. In the period 2024-29 we have considered them as alternative ways of opening up GIS data and the presentation layer. Option 2 though includes the establishment of frameworks to expose the data and the procurement of the additional software to enable the consumption of the data in a variety of ways. The benefits of this additional capability are

- providing tools to access historical GIS data in the data lake in a format that can easily be queried and accessed for a variety of analysis requirements;
- enables data to be modified to suit the cyber and security needs of the organisation by removing sensitive information that is for in-organisational use only; and
- easier to access and enhance with other data sources to enrich the dataset to suit the needs of the various users and their unique scenarios.

Further use cases can be explored to incorporate data from not only the GIS but also the ERP into engineering designs to enable a better integration with SAP and dynamically enhance project costing and GIS data capture processes.

By disassociating the GIS data from the GIS GE Core environment, the market can be explored to provide better (including non-GE) tools to improve the field data capture experience – not only for GIS, but also SAP.

Using this capability to support other business processes and external stakeholders is in scope for other briefs (ie customer). The costs and benefits of doing so is captured in those briefs.

4.3.2. Option 2 assumptions

The costs associated with this option have been estimated based on internal experience with similar projects which require a high level of change management. These costings are preliminary and would be subject to further evaluation should this option be selected.

There is potential for uplift in operating costs due to maintenance and support cost on new software purchases

A further assumption is that the GIS data is available in the Ausgrid data lake and the implementation of the interface is part of the D2I program.

4.3.3. Option 2 costs

For this option, the estimated capital expenditure is $14.0 million and a market NPV of $0.2 million.

$ million	FY25	FY26	FY27	FY28	FY29	Total
Direct Labour	(0.2)	(3.0)	(2.7)	-	-	**(5.9)**
Materials	-	(0.7)	(0.6)	-	-	**(1.3)**
Contractor services	(0.3)	(3.4)	(3.1)	-	-	**(6.8)**
Indirect cost	**-**	**-**	**-**	**-**	**-**	**-**
Other	**-**	**-**	**-**	**-**	**-**	**-**
Contingency	**-**	**-**	**-**	**-**	**-**	**-**
TOTAL INVESTMENT CAPEX	(0.5)	(7.1)	(6.4)	-	-	**(14.0)**
Non-recurrent	(0.2)	(7.1)	(6.1)	-	-	**(13.4)**
Recurrent	**(0.3)**	**-**	**(0.3)**	**-**	**-**	**(0.6)**

Table 5 Capital Expenditure Cost and Scope Assumptions

4.3.4. NPV analysis

The NPV of this option is $0.2 million. Under this option, compared to Option 1, we do not consider there is likely to be any change in the organisation's risk profile regardless of whether the 'maintain' or 'new capability' option is chosen.

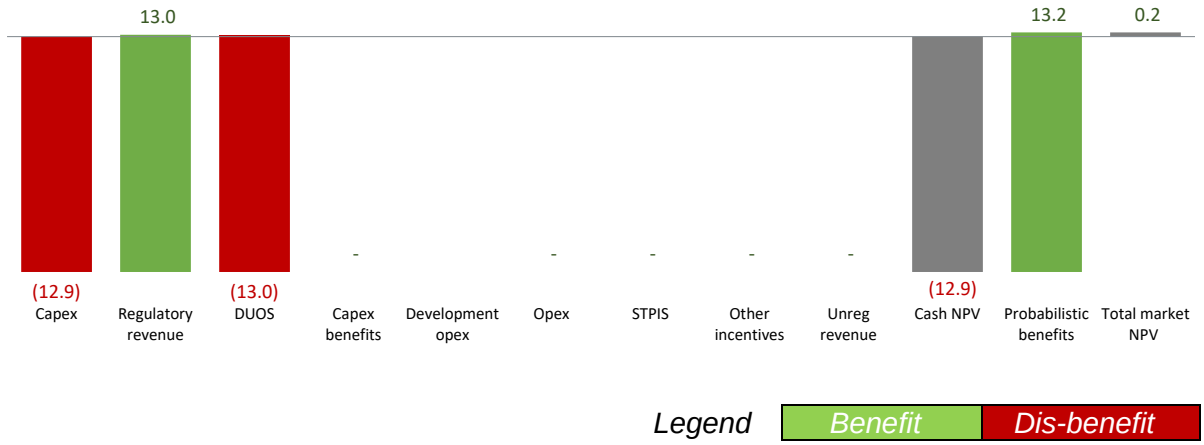

Figure 3 Option 2 - Market NPV ($' millions, real FY24)

4.4. OPTION 3: Re-platform to current vendor (GE)'s Electric Office GIS solution

4.4.1. Description

This option is a major migration from our current instance of GE's GIS product, *Smallworld Core*, to their newer Electric Office (**EO**) product. Although GE provide tools to support the transition from one to another, the EO product has a significantly different data model and this option is effectively a complete reimplementaiton of the GIS with all the costs, risks and complexity of replacing and testing integration to other Ausgrid systems, and processes and associated user training.

Although all efforts will be made to adopt to the standard EO offering, Ausgrid will require customisation to meet the needs of the business. This includes the EO offering of the Network Viewer product which has been adapted to assist in improving a variety of core Ausgrid workpractises and procedures.

For both option 3 and 4 there are significant interface changes that will have to be catered for to every system that the GIS currently provides information too, including but not limited to ADMS, SAP, Metering, Power network model and DBYD. All of these interfaces will have to be redesigned on both sides and reimplemented and in some cases, historical data will have to be rectified or incorporated into the solution.

Further complications to this approach is that the cutover for the applications and interfaces can not be staggered as the underlying data model will change.

Currently, GE's Electric Office product is an on-premise solution like *Smallworld Core* so would be implemented on Microsoft's Azure Infrastructure as a Service platform. They have suggested that a platform-as-a-service option may be available after the period 2024-29.

4.4.2. Option 3 assumptions

The costs associated with this option have been estimated based on internal experience with similar projects which require a high level of change management. The change management is not limited to the core data capture application, but also to the Network Viewer audience, the DBYD plans that are sent to customers, and CAD designs. These costings are preliminary and would be subject to further evaluation should this option be selected.

There is no cost to software as EO is available to Ausgrid under the existing Enterprise license.

There is no uplift in operating costs under this option.

4.4.3. Option 3 costs

For this option, the estimated capital expenditure is $19.3 million and a market NPV of $(13.2) million.

$ million	FY25	FY26	FY27	FY28	FY29	Total
Direct Labour	(3.8)	(1.9)	(1.7)	(1.8)	-	**(9.2)**
Materials	-	-	(0.2)			**(0.2)**
Contractor services	(4.1)	(2.0)	(1.9)	(1.9)		**(9.9)**
Indirect cost	-	-	-	-	-	**-**
Other	-	-	-	-	-	**-**
Contingency	-	-	-	-	-	**-**
TOTAL INVESTMENT CAPEX	(7.9)	(3.9)	(3.8)	(3.7)	-	**(19.3)**
Non-recurrent	(7.9)	(3.9)	(3.8)	(3.7)	-	**(19.3)**
Recurrent	**-**	**-**	**-**	**-**	**-**	**-**

Table 6 Capital Expenditure Cost and Scope Assumptions

4.4.4. NPV analysis

The NPV of this option is $(13.2) million. Under this option, compared to Option 1, we do not consider there is likely to be any change in the organisation's risk profile regardless of whether the 'maintain' or 'new capability' option is chosen.

This migration to new capability provides an 'out-of-the-box' Network Viewer functionality (through the GE Electric Office option) that is more advanced and may provide the opportunity for less customisation than present in the current Network Viewer.

Other benefits which have not been quantified include:

- GE Electric Office has an already built-in method of being able to keep track of discarded assets and it is a function that will have to be built by us in our customised model. Keeping track of discarded items is beneficial for regulatory reporting; and
- There is likely to be additional standardised capabilities in the future, which could provide several operational expenditure efficiencies. Given these are future capabilities, we have not been able quantify the associated costs and benefits at this stage.

Figure 4 Option 2 - Market NPV ($' millions, real FY24)

4.5. OPTION 4: Re-platform to alternative vendor (ESRI)'s newest GIS solution

4.5.1. Description

We have considered this option to test whether another GIS vendor offers a solution that better suits Ausgrid's needs than our current vendor, GE. ESRI and GE are the dominant GIS suppliers to electricity distribution businesses worldwide.

ESRI's ArcGIS solution differs from GE's Electric Office product in its user interface, which is easier to use (supporting staff / productivity), and modular which allows the incremental deployment of new functions and capability without major system change and cloud offerings which include a platform-as-a-service option where ESRI themselves host client instances of the solution.

While Ausgrid's technology strategy identifies a progressive migration into the cloud of all our information services, the dependence of our real-time systems (particularly the ADMS) on information from the GIS creates additional risks and complexities in moving to a third-party managed instance of the solution. Given the substantially higher costs of this option over option 2, we propose investigating it and any GE alternative further for the period 2030-34.

4.5.2. Option 4 assumptions

The costs associated with this option have been estimated based on internal experience with similar projects which require a high level of change management. These costings are preliminary and would be subject to further evaluation should this option be selected.

There is a possibility of an uplift in operating cost as new software licenses will need to be procured this could require additional support and maintenance funding.

As with option 3, there is significant effort in re-establishing interfaces to new systems. We have estimated that the cost for this option will be slightly higher as the EO data model is loosely based on the existing Ausgrid model, and therefore subject matter experts are more familiar with the EO model.

With option 4 the change management will be more extensive especially in the GIS Core data capture environment as all capture procedures will need to be modified to cater for the new product even if it is potentially more user friendly.

Extensive customisation and training will be required for the internal GIS users of the current Network Viewer product as it too will be a new tool and data presentation will be different.

4.5.3. Option 4 costs

For this option, the estimated capital expenditure is $26.3 million and a market NPV of $(19.7) million.

$ million	FY25	FY26	FY27	FY28	FY29	Total (FY25-29)
Direct labour	(5.1)	(1.9)	(2.3)	(2.4)	-	**(11.7)**
Materials	-	(1.2)	(0.2)	-	-	**(1.4)**
Contractor services	(5.8)	(2.2)	(2.6)	(2.6)	-	**(13.2)**
Other	**-**	**-**	**-**	**-**	**-**	**-**
Contingency	**-**	**-**	**-**	**-**	**-**	**-**
TOTAL CAPEX	(10.9)	(5.3)	(5.1)	(5.0)	-	**(26.3)**
Non-recurrent	(10.9)	(5.3)	(5.1)	(5.0)	-	**(26.3)**
Recurrent	**-**	**-**	**-**	**-**	**-**	**-**

Table 7 Capital Expenditure Cost and Scope Assumptions

4.5.4. NPV analysis

The NPV of this option is $(19.7) million. Under this option, compared to Option 1, we do not consider there is likely to be any change in the organisation's risk profile regardless of whether the 'maintain' or 'new capability' option is chosen.

This migration to new capability provides an 'out-of-the-box' GIS viewer functionality (through the ESRI option) that is more advanced and may provide the opportunity for less customisation than present in the current Network Viewer.

Other benefits which have not been quantified include:

- There is likely to be additional standardised capabilities in the future, which could provide several operational expenditure efficiencies. Given these are future capabilities, we have not been able quantify the associated costs and benefits at this stage.

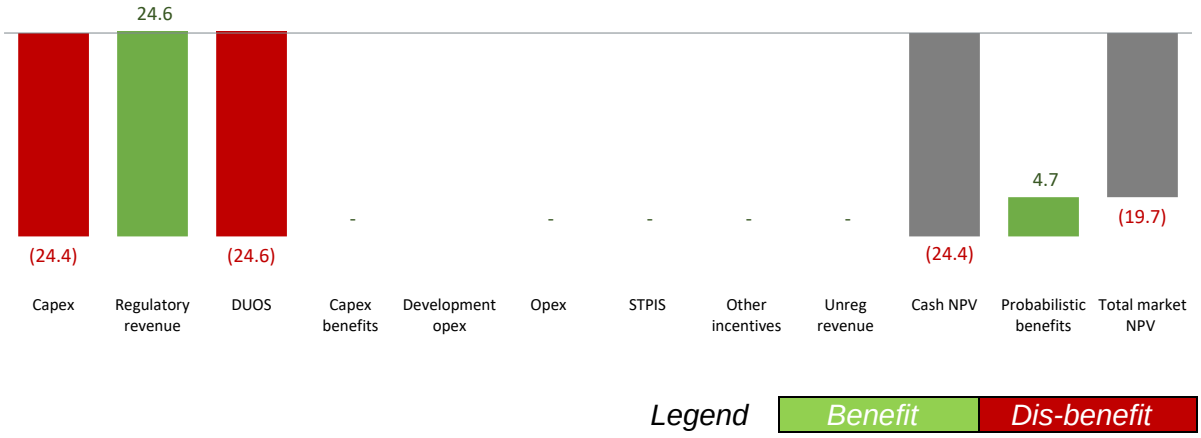

Figure 5 Option 2 - Market NPV ($' millions, real FY24)

5. RECOMMENDATION

5.1. Recommended Solution

The preferred option is **Option 2: New or expanded capability** as it enables us to modernise our GIS and drive ongoing value from our geographic data for both us and our customers. This is the preferred option as it:

- Enables our future network by easily integrating with CER technology, and sharing important geographic data with our customers and key stakeholders;
- Meets our regulatory and other compliance obligations; and
- Demonstrates prudent and efficient management of our critical ICT systems in alignment with our *ICT Asset Lifecycle Management Guidelines.*

While both Option 1 and Option 2 both mitigate the business and operational risks (these risks are discussed further in **Appendix 1, 2 and 3**) and are consistent with the organisations risk management policy. Option 2 enables our business to have ongoing access to regular feature updates. This will provide ongoing value by enabling us to be more adaptive to changing network requirements and customer expectations, particularly around sharing and transparency of data.

5.1.1. Alignment to ICT Risk Appetite

Objective	Outcomes and how this investment contributes
The organisation will maintain Information and Communications Technology to support the safe supply and restoration of energy and to support the day-to-day operations.	• Maintains GIS Core environment by upgrading to a supported version of the GIS Core software and future proofing underlying operating system and hardware.
The organisation is risk neutral in the way it: • Invests appropriately to facilitate the continuity of business applications systems that support the day-to-day operations of the organisation. • Implements transformational change by embracing innovation and change (especially modern technologies) that could improve the way we operate.	• Invests in cyclical renewals of GIS system components to maintain cyber and ICT availability risks within appetite per the organisation's risk management policy; • Ensuring ongoing accessibility, supportability, and security of technology • Ensuring ICT infrastructure solutions are the latest technology to meet our functionality and usability needs.
However, the organisation is risk sensitive in the way it, manages the availability of network control systems and manages other mission critical systems to prevent any interruptions that impact on the safe supply and restoration of energy.	• Compliance with our risk management policy for mitigating high rated risks within 6 months and medium rated risks within 12-24 months. • Compliance with ICT risk management procedure for end-of-life and end of support assets.

Table 8 Summary of ICT risk appetite

5.2. Program delivery risks

Risk #	Risk Category	Description	Inherent Risk Level	Mitigation Plan	Residual Risk level
01	New Technology Skills	If modern technology is being introduced as part of this program, there may be insufficient skills to support the new technology after the program of work has been completed.	Medium	Plan and ensure that skillset is developed to ensure that technology can be supported in the future.	Low
02	Scope Expansion	Requests for additional features or capabilities not captured in the originally scope, may extend the timeline of the project.	Medium	Set scope expectations early on and define boundaries.	Low

Risk #	Risk Category	Description	Inherent Risk Level	Mitigation Plan	Residual Risk level
03	Costs	Project Costs are estimated based upon market knowledge in FY22, and costs could increase as the project is executed in FY25-29 regulatory control period.	Medium	Develop a Gate 3 Business Case prior to executing the program and revise costs accordingly.	Low
04	Key Program Resources	Availability of suitable project delivery resources within the local market to deliver the program of work.	Medium	Define resource requirements early and leverage existing relationships with strategic partners.	Low
05	Integration	Complex interfaces to other critical business systems may require significant integration effort.	High	Ensure existing and target state data models are well understood and regression testing Is thoroughly planned.	Low

Table 9 Summary of program delivery risks

5.3. Program assumptions

#	Type	Description
01	**Resourcing**	GIS data operations resources will be available for testing the new GIS and its functionality. The data capture team is outsourced and is a flexible work force that can be scaled to meet demand.
02	**Commitment**	GIS is a critical system supporting several key business processes and remains as a core element of our Technology Strategy.
03	**Prioritisation**	GIS remains a critical system to us due to the critical business processes it supports. GIS maintains data subject to our Licence Conditions and this program provides the data security controls to maintain design and operating effectiveness.
04	**Prioritisation**	Given the nature of the risks and the potential consequences of failures or disruptions to business operations, this program will be prioritized accordingly (see Appendix 1,2 and 3 – Risk Assessments).

#	Type	Description
04	**Scope**	Scope will be restricted to upgrading the existing products to a supported version to maintain ongoing support and security patches. Scope will not include any new functionality that will significantly impact on the delivery.

Table 10 Summary of program assumptions

5.4. Program dependencies

The table below provides an overview of key program dependencies

#	Program Dependency	Description
01	**Program resourcing**	We have existing commercial relationships in place with Tata Consulting Services (**TCS**) to provide ongoing business support for GIS (data entry).

Table 11 Summary of program dependencies

5.5. Business area impacts

The table below provides key business area impacts.

#	Impacted Group	Description
01	All GIS Users	Migrate the current GIS Core product to a modern GIS will positively impact user experience.
02	All GIS Users	Any asset upgrade or change requires appropriate ICT Change Management processes to be followed. Impact to customer facing services or employees will be scheduled optimally minimise the risk of unplanned outages is minismised.

Table 12 Summary of business area impacts

6. GLOSSARY

Shortened Form	Extended Form
ASP	Accredited Service Provider
ADMS	Advanced Distribution Management System
DBYD	Dial Before You Dig
Capex	Capital Expenditure
CER	Consumer Energy Resources
D2I	Data to Intelligence
EO	Electric Office
FY25-29	Financial Year 2025 to Financial Year 2029
GE	General Electric
GIS	Geographic Information Systems
ICT	Information, Communications and Technology
MBS	Metering Business System
NECF	National Energy Customer Framework
NEL	National Electricity Law
NEO	National Electricity Objective
NER	National Electricity Rules
NMI	National Meter Identifier
NPV	Net Present Value
OMS	Outage Management System
Opex	Operating Expenditure
PNM	Power Network Model
SaaS	Software-as-a-Service
SCS	Standard Control Services
SOCI	Security of Critical Infrastructure Act 2018

Shortened Form	Extended Form
SLACI	Security Legislation Amendment of Critical Infrastructure Act 2021
SLACIP	Security Legislation Amendment of Critical Infrastructure Protection Act 2022
TCS	Tata Consulting Services

7. APPENDICES

Appendix 1 Risk Assessment – Option 0

Table 11 - Option 0 - Key risks and residual risk position by 2029 summaries the inherent risks which could be experienced by the end of the coming regulatory control period of (2029) if the base case (counterfactual) option is selected.

Option 0 does not reduce the likelihood or impact of residual risks R1, R2 and R3 materialising. By 2029, it is **likely** all three risks will materialise causing **major** impact to the organisation.

The equivalent risk analyses provided with the recommended option (Option 1 and 2) have been conducted with respect to effectiveness of mitigating the below base case risks. This assessment has been undertaken in alignment with the Ausgrid Groups Risk Management Framework.

Risk Description	Inherent Risk 2029	Nature of Mitigation	Residual Risk 2029
R1 – Cyber Security With the inability to progress major system release upgrades, which can include access control and security updates, coupled with the growing sophistication of cybersecurity attacks, there is increasing potential for: • Undetected data corruption or manipulation; • Disclosure of Network Asset information; and • Loss of control of GIS ICT Services.	High	Cyclic renewal of technology components with modern capability and application of cyclic updates reduces threat vulnerability.	High
R2 – Business Operational Impact Inability to use Network Asset Information to dispatch field crews for planned and unplanned outages causing delayed restoration of energy or unplanned outages caused by asset failure and improper dispatch of field crews.	High	Cyclic renewal of technology components with modern capability and application of cyclic updates reduces likelihood of risk materialising.	High
R3 – Interoperability and/or incompatibility issues with contemporary systems Inability to integrate with other systems to share Network Asset Information data causing process inefficiencies and eroding of data and analytic program investment benefits.	High	Cyclic renewal of technology components with modern capability and application of cyclic updates reduces likelihood of risk materialising.	High

Table 13 Option 0 - Key risks and residual risk position by 2029

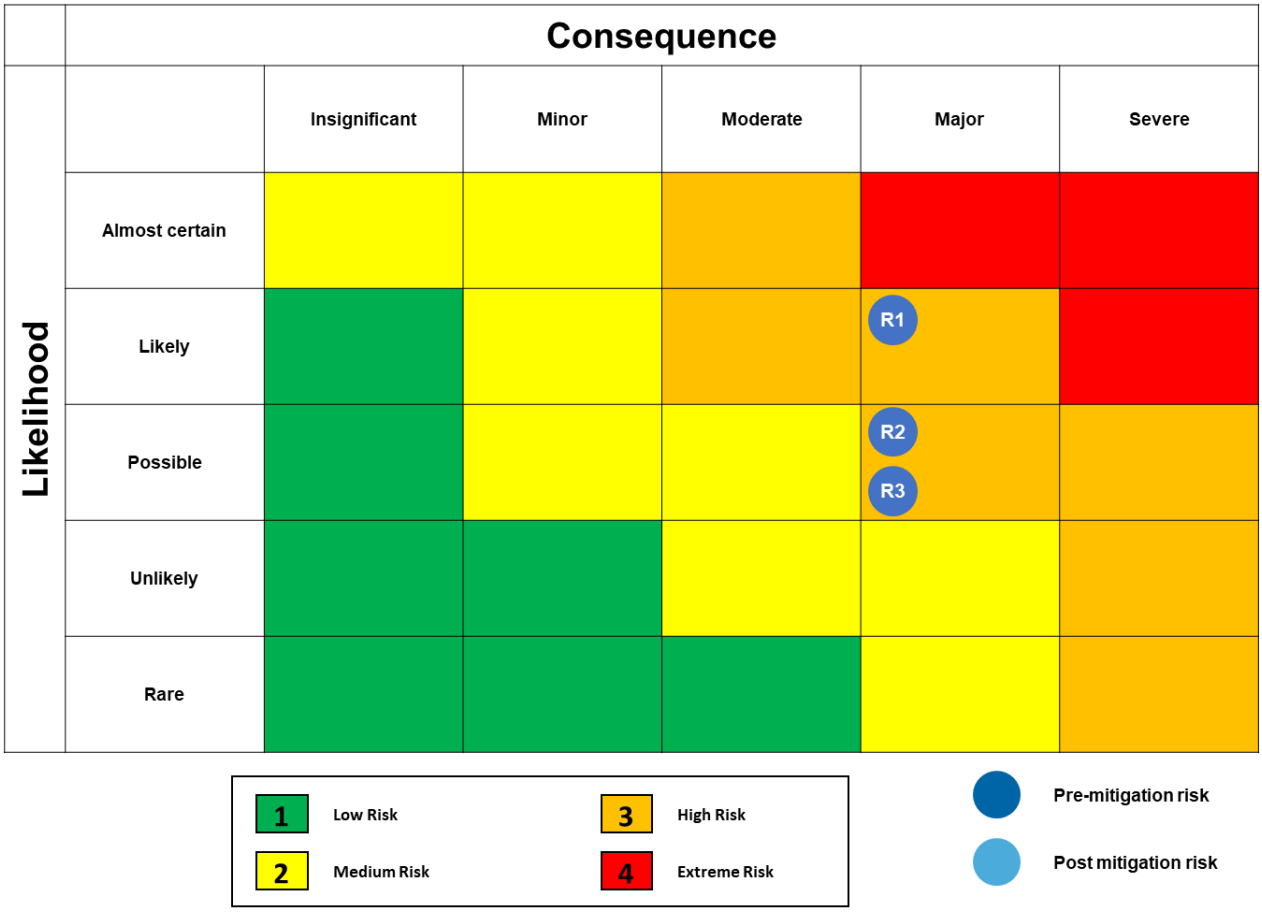

Figure 6 Change in risk position with Option 0 by 2029

Appendix 2 Risk Assessment – Option 1

Table 13 - Option 1 - Key risks and residual risk position by 2029 summaries the inherent risks which could be experienced by the end of the coming regulatory control period of (2029).

Option 1 reduces the likelihood and impact of residual risks R1, R2 and R3 materialising. By 2029, it is **possible** R1 and R2 risks will materialise causing **moderate** impact to the organisation and it is **unlikely** R3 will materialise causing **moderate** impact to the organisation.

Note: residual risk is reduced so far as is reasonably practicable and Option 1 does not further reduce residual risk.

Risk Description	Inherent Risk 2029	Nature of Mitigation	Residual Risk 2029
R1 – Cyber Security With the inability to progress major system release upgrades, which can include access control and security updates, coupled with the growing sophistication of cybersecurity attacks, there is increasing potential for: • Undetected data corruption or manipulation; • Disclosure of Network Asset information; and • Loss of control of GIS ICT Services.	High	Cyclic renewal of technology components with modern capability and application of cyclic updates reduces threat vulnerability.	Medium
R2 – Business Operational Impact Inability to use Network Asset Information to dispatch field crews for planned and unplanned outages causing delayed restoration of energy or unplanned outages caused by asset failure and improper dispatch of field crews.	High	Cyclic renewal of technology components with modern capability and application of cyclic updates reduces likelihood of risk materialising.	Medium
R3 – Interoperability and/or incompatibility issues with contemporary systems Inability to integrate with other systems to share Network Asset Information data causing process inefficiencies and eroding of data and analytic program investment benefits.	High	Cyclic renewal of technology components with modern capability and application of cyclic updates reduces likelihood of risk materialising.	Medium

Table 14 Option 1 - Key risks and residual risk position by 2029

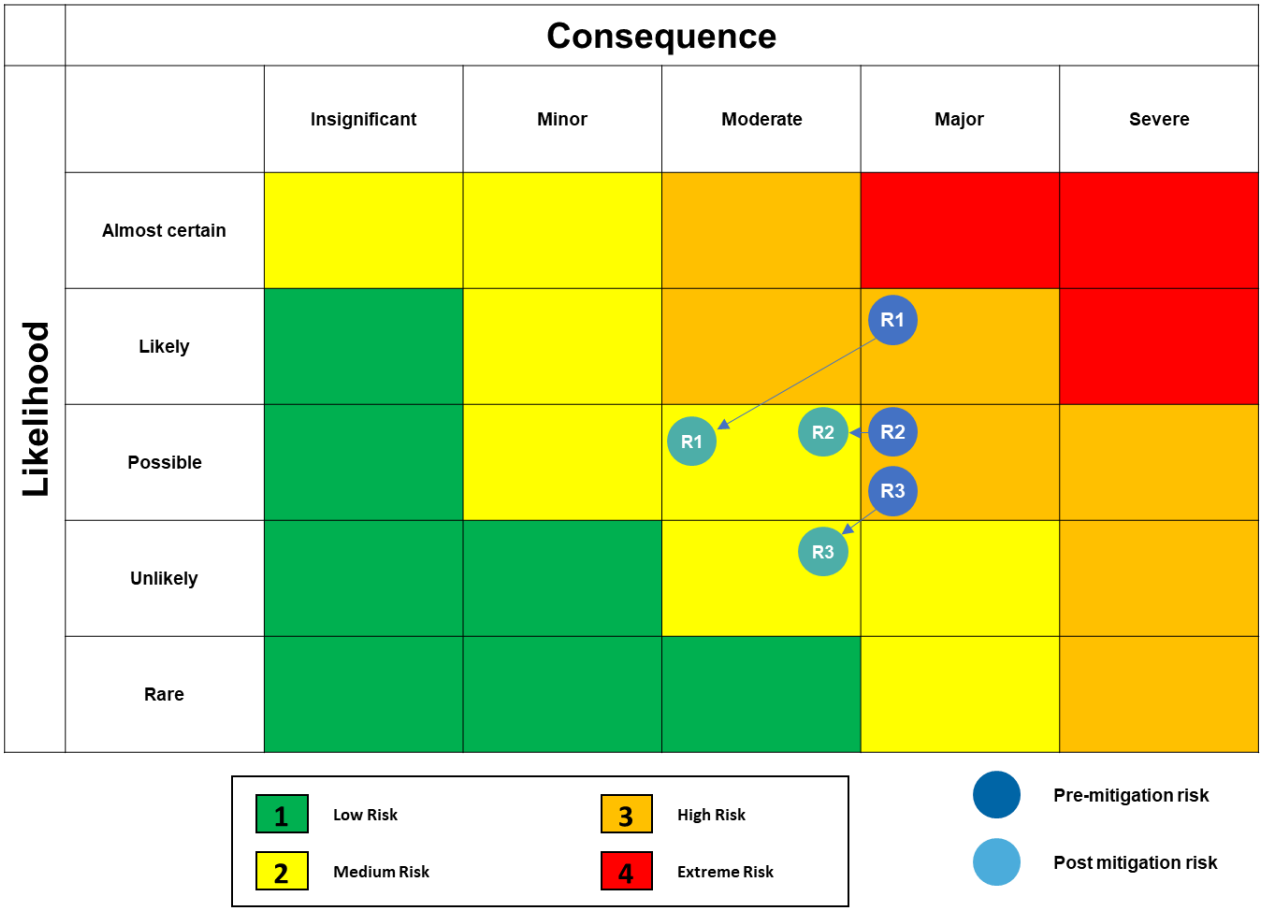

Figure 7 Change in risk position with Option 1 by 2029

Appendix 3 Risk Assessment – Option 2-4

Table 14 - Option 2-4 - Key risks and residual risk position by 2029 summaries the inherent risks which could be experienced by the end of the coming regulatory control period of (2029).

Option 2-4 reduces the likelihood and impact of residual risks R1, R2 and R3 materialising. By 2029, it is **possible** R1 and R2 risks will materialise causing **moderate** impact to the organisation and it is **unlikely** R3 will materialise causing **moderate** impact to the organisation.

Note: residual risk is reduced so far as is reasonably practicable and both Option 2-4 does not further reduce residual risk.

Risk Description	Inherent Risk 2029	Nature of Mitigation	Residual Risk 2029
R1 – Cyber Security With the inability to progress major system release upgrades, which can include access control and security updates, coupled with the growing sophistication of cybersecurity attacks, there is increasing potential for: • Undetected data corruption or manipulation; • Disclosure of Network Asset information; and • Loss of control of GIS ICT Services.	High	Cyclic renewal of technology components with modern capability and application of cyclic updates reduces threat vulnerability.	Medium
R2 – Business Operational Impact Inability to use Network Asset Information to dispatch field crews for planned and unplanned outages causing delayed restoration of energy or unplanned outages caused by asset failure and improper dispatch of field crews.	High	Cyclic renewal of technology components with modern capability and application of cyclic updates reduces likelihood of risk materialising.	Medium
R3 – Interoperability and/or incompatibility issues with contemporary systems Inability to integrate with other systems to share Network Asset Information data causing process inefficiencies and eroding of data and analytic program investment benefits.	High	Cyclic renewal of technology components with modern capability and application of cyclic updates reduces likelihood of risk materialising.	Medium

Table 15 Option 2-4 - Key risks and residual risk position by 2029

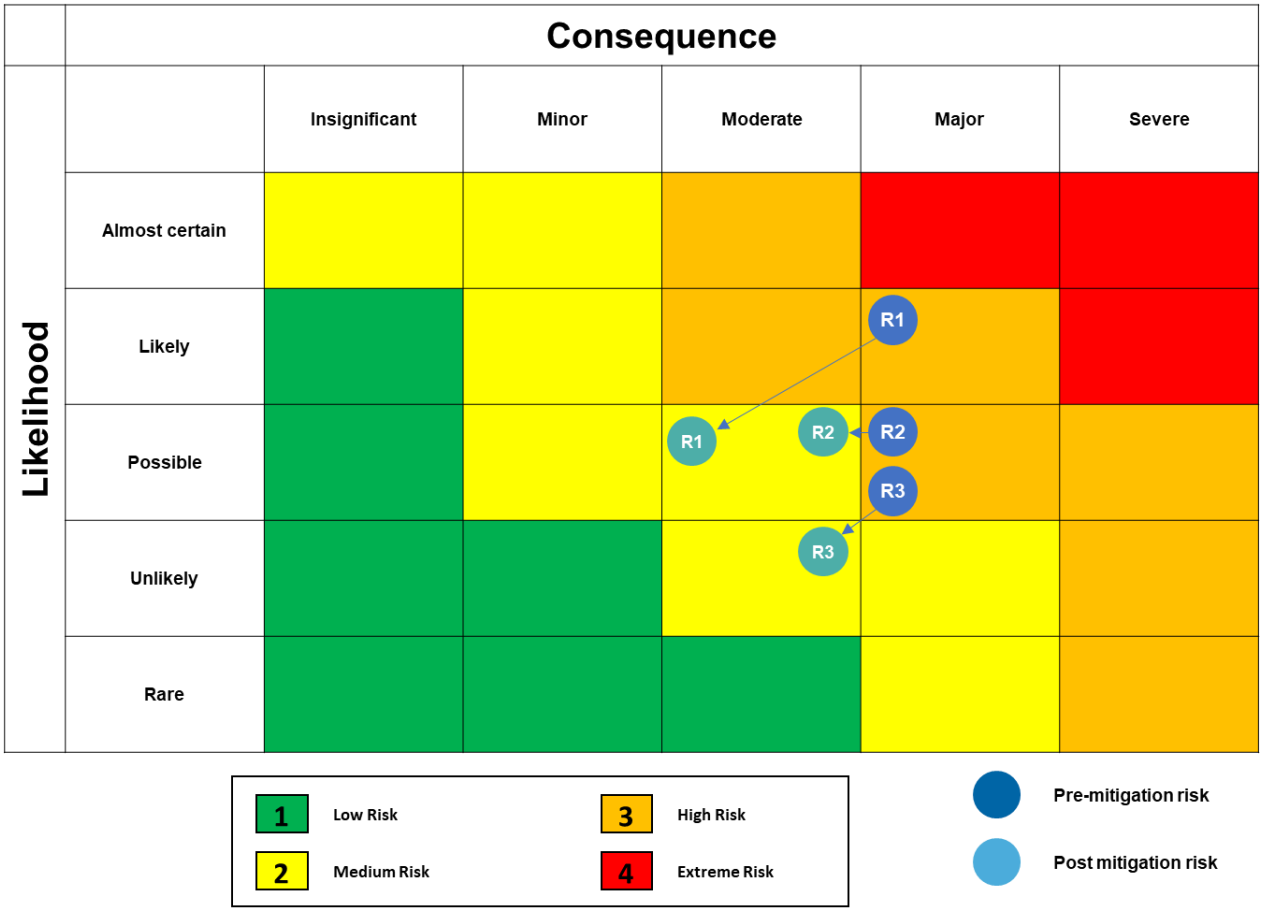

Figure 8 Change in risk position with Option 2-4 by 2029