2023-27
POWERLINK QUEENSLAND REVENUE PROPOSAL

Supporting Document – PUBLIC

IT03 Network Design Management 2023-27

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Contents

EXECUTIVE SUMMARY

This investment case documents the justification for planned investment in network design management systems. It is based on the planning undertaken to date, the estimated costs (development, implementation, ongoing operations and maintenance), the anticipated business value to be gained and the associated risks.

It is proposed to invest in network design management solution renewal through the FY22/23 to FY26/27 regulatory period (referred to herein as 2023-27). The proposed investment is required to address the following drivers:

- **Requirement for renewal of aging IT systems capability for sustainability, supportability and security**

  The systems supporting Powerlink's network design and drawing management business functions are approaching end-of-life. This renewal investment is therefore needed to provide efficient, sustainable and secure systems capability to support critical network design and drawing management business processes.

- **Opportunity to leverage the renewal for improved network design practices, consistent with contemporary "digital engineering" principles**

  The move to modern systems will enable process improvements in the network design process, supporting the broader transition to "digital engineering" principles across the network "construct, commission and support" infrastructure lifecycle.

- **Opportunity to leverage the renewal for improved network information and drawing management**

  Through optimised renewal of the aging network design and drawing management systems, Powerlink can improve its ability to capture, maintain and share digitally modelled network information, including 2D/3Ds visualisation. The improvement supports integration with other systems, reducing the need for manual processes and data duplication.

- **Alignment with the Queensland Government Building Information Modelling (BIM)**

  Through the improved digital modelling of network design and construction information, Powerlink will be positioned for alignment with the Queensland Government's BIM directive.

The following three options are considered:

- **Option 1: Base Case (counterfactual) – Retain existing systems and defer replacement**
- **Option 2: Optimised replacement of design management systems (Recommended)**
- **Option 3: Like-for-like replacement of design management systems**

The risk benefits gained from investment in the recommended option will reduce the likelihood of all five identified risks from likely and possible to very rare in the 2023/27 regulatory period.

The initiative value assessment results reflect a strong alignment, on or near 75% across three of four assessment parameters. The ease of business change parameter scored slightly lower at approximately 60% reflecting the complexity of the work.

It is recommended to plan for implementation of Option 2, as the least cost solution to meet the identified need. Total forecast non-network (IT) expenditure for the recommended option is [redacted] capex and [redacted] opex (FY21/22 real terms) with an NPV benefit of $0.47 million relative to the base case counterfactual.

1. INVESTMENT NEED

1.1. Problem / Opportunity

Business systems and information management are essential to Powerlink's network and business operations. Like all contemporary businesses, Powerlink makes extensive use of technology and information to conduct normal business activities.

Powerlink uses a range of systems and tools to undertake design and secure management of design drawings for its power and communications networks, with the resultant information and supporting systems critical to the business' downstream construction, commissioning, operating and maintenance processes.

The current systems and tools supporting Powerlink's design, drawing management and related business processes have been in place typically in excess of 10 years and will reach end-of-life over the coming regulatory period (see Table 1). This business case supports the need to renew this capability to ensure ongoing efficiency, sustainability and security of these systems and processes.

Systems	Supported Business Functions
Autodesk AutoCAD PLS-CADD CDEGS EMPT CADConform MathCAD	Lines Design
Bentley Microstation Bentley Promis.e	Substation Design
Autodesk AutoCAD Bentley Microstation	Telecommunications Design
Hexagon Smart Plant Foundation (SPF)	Drawing Management & Transmittal

Table 1: Network Design and Drawing Management Systems

The lines design process is currently performed using several disparate Computer Aided Design (CAD) products, supported by highly specialised analysis tools to meet design rules/constraints (e.g. clearance heights, earthing, electromagnetic transients, etc.).

Substation design is performed using multiple tools, which have been progressively implemented since the 1990's, to meet specific needs in isolation. The currently implemented product versions are at, or approaching, end of support life. The systems are core to Powerlink's substation maintenance and renewal management, and are critical to achievement of required delivery durations for the growing volume of renewable energy projects.

The telecommunications design process is undertaken using CAD and specialised tools for layout design and the substation design tools for complex communication enclosure and room designs.

The Smart Plant Foundation (SPF) system from Hexagon was implemented in 2006. It provides the core repository for all electronic drawings (predominantly 2D), associated PDF format GIS maps, as well as managing the document transmittal process to ensure appropriate versions of drawings are provided to field staff. The SPF system has been highly customised with secondary systems configuration management capability. [redacted]

While the existing network design management capability supports the capture, maintenance and sharing of digitally modelled network information, the modern equivalent systems have extended this ability, including richer support for 3D modelling and visualisation. The digital representation of design elements is a key enabler for automated integration with other systems, removing the need for manual processes and data duplication.

The following investment drivers have defined Powerlink's investment need for the period 2023-27:

- **Requirement for renewal of aging IT systems capability for sustainability, supportability and security**

  The systems supporting Powerlink's network design and drawing management business functions are approaching end-of-life. This renewal investment is therefore needed to provide efficient, sustainable and secure systems capability to support critical network design and drawing management business processes. This renewal is consistent with established IT asset lifecycle management principles.

- **Opportunity to leverage the renewal for improved network design practices, consistent with contemporary "digital engineering" principles**

  The move to modern systems will enable process improvements in the network design process, supporting the broader transition to "digital engineering" principles across the network "construct, commission and support" infrastructure lifecycle.

- **Opportunity to leverage the renewal for Improved network information and drawing management**

  Through renewal and consolidation of the aging network design and drawing management systems, Powerlink can improve its ability to capture, maintain and share digitally modelled network information including 2D and 3D visualisation. This improvement supports integration with other systems, reducing the need for manual processes and data duplication.

- **Alignment with Queensland Government Building Information Modelling (BIM) agenda**

  The Queensland Government has committed to the adoption of BIM for major infrastructure projects by 2023 across departments, agencies and statutory authorities and are considering incorporating into regulatory frameworks. The BIM focusses on digital representation of the physical and functional characteristics of buildings, physical infrastructure and the environment. The provision of shareable asset information is key to collaborating across an asset's lifecycle (planning, designing, constructing, operating and maintaining).

  The renewal of Powerlink's Network Design Management capability will support alignment with the BIM agenda to enhance internal processes and interaction with government agencies.

1.2. Investment Objectives

This investment in network design management renewal will deliver on the following objectives:

- Ensure the ongoing supportability and sustainability of the core systems enabling Powerlink's design and drawing management business processes, and the broader network infrastructure construction, operations and maintenance lifecycle.
- Support process efficiencies and information accuracy / integrity through:
  - Removal of manual interfaces and hand-offs (system consolidation and/or integration);
  - Enabling consistent application of design standards and business rules;
  - Enabling application of appropriate meta-data to support content searching;
  - Availability of designs in fit-for-purpose digital form;
  - Integration with field devices, including design changes (mark-ups) / approvals; and
  - Improving drawing management version control to ensure transmittals provide accurate network information to field service staff.
- Reduce risk through supported management of network designs across an infrastructure asset's lifecycle (planning, designing, constructing, operating and maintaining).
- Align with the Queensland Government's BIM requirements.

1.3. Alignment with IT Application Management Guidelines

Powerlink's applications are maintained for supportability, sustainability and security consistent with application asset lifecycle management (ALM) principles aligned with the "Pace" model developed by global research and advisory firm Gartner.

Under the Gartner Pace model, applications are classified as either Systems of Record, Systems of Differentiation or Systems of Innovation with considerations of:

- The nature of business processes supported by the application;
- The pace of change in both the business areas and technology domain;
- The strategic focus for the business area;
- The nature of stakeholder ownership; and
- Risk and funding models.

Consistent with these various considerations, the Pace model identifies typical expected application service lives and the corresponding prudent planning horizons. The guidelines provide forecast upgrade and renewal timeframes based on these classifications to maintain effective, sustainable and supportable business solutions across an asset's lifecycle.

Figure 1 (over page) depicts the Gartner Pace model's expected application service lives and planning horizons for each application category, as well as Powerlink's corresponding asset lifecycle management guideline applicable to each category.

Classification	Systems of Record	Systems of Differentiation	Systems of Innovation
Lifetime *How long it usually stays in layer*	5 to 10 years or longer	2 to 5 years	3 to 12 months
Planning Horizon *How long you describe the plan in application strategy*	More than 7 years	1 to 2 years	As long as 6 months
Powerlink Asset Lifecycle Management (ALM) Planning Guidelines	Structured minor releases Upgrade each 3 to 5 years Replace at 10 to 15 years	Upgrade each 2 to 3 years Replace at 6 to 8 years	Typically not upgraded unless provided as evergreen or cloud

Figure 1: Gartner PACE model and Powerlink ALM planning guidelines

An assessment of the systems within scope of the proposed investment are listed below with the relevant PACE model classification.

System / Repository	Implemented (Year)	Last Major Upgrade (Year)	Classification
Smart Plant Foundation (SPF)	2006	2016	System of Record
Bentley Microstation	1990's	2013	System of Differentiation
Bentley Promis.e	2017	2017	System of Differentiation
Autodesk AutoCAD	1990's	2013	System of Differentiation
MathCAD	2000	2015	System of Differentiation
CDEGS	1997	2019	System of Differentiation
PLS-CADD	2005	-	System of Differentiation
EMPT	2005	-	System of Differentiation
CADConform	2005	2018	System of Differentiation

Table 2: Existing systems in scope for renewal

1.4. Compliance Requirements

Network design management systems play an important role in enabling Powerlink to meet its statutory, regulatory and legal obligations as a transmission network service provider (TNSP). The table below details the obligations supported through the proposed investment.

Obligation	Description of Requirement
Workplace Health & Safety	Under Section 22 of the Workplace Health and Safety Act 2011, Powerlink is required to act in accordance with the Safe Design of Structures, Code of Practice. Section 22 requires that designers must give adequate information to each person provided with the design in order to give effect to it concerning: o The purpose for which the structure was designed; o The results of any calculations, testing, analysis or examination; and o Any conditions necessary to ensure that the structure is without risks when used for a purpose for which it was designed or when carrying out any activity related to the structure such as construction, maintenance and demolition. This investment will ensure that Powerlink maintains its compliance with the act.
Environmental	Powerlink's designs are subject to compliance with environmental obligations as specified in the Environment Protection Act, the Environment Protection and Biodiversity Conservation Act and the Sustainable Planning Act.
Record Keeping	Powerlink is obliged to ensure it maintains records in accordance with the Public Records Act 2002 (QLD), the Right to Information Act 2009 (QLD) and the Right to Information Regulation 2009 (QLD). The drawing management system in conjunction with its electronic document and records management solution are core to Powerlink meeting these obligations.
Privacy	Designs referencing customer information of individuals must comply with the Australian Privacy Act. This requires implementation of strong controls and security on the accessibility of such data, including spatial locations.
Critical Infrastructure	As a critical infrastructure provider Powerlink's designs must comply with the Security of Critical Infrastructure Act, requiring strong controls and security of the configuration and operations of the network.
Queensland Government Building Information Modelling (BIM)	The Queensland Government has committed to the adoption of BIM for major infrastructure projects across departments, agencies and statutory authorities by 2023, with consideration of incorporation into regulatory frameworks. While not a current obligation, it may become so within the coming regulatory period. This planned investment in contemporary network design management capability incorporates 3D design capability, which is a key enabler for the capture, manipulation and representation of objects and attributes in a single information model for sharing across the business and industry more holistically.

Table 3: Compliance Requirements

1.5. Investment Overview

Powerlink's network design and drawing management systems and processes are core to the operations of multiple business areas and functions. The proposed investment in renewal of network design and drawing management capability is essential for ongoing efficient and sustainable business operations.

1.5.1. Current State (2020)

Network Design

Powerlink's network design systems enable the design of both primary plant and secondary systems, including:

- Substation Design
- Lines Design
- Telecommunications Design

Powerlink has an internal design function, augmented through the use of external service providers. The key outputs of this business function are designs used within the network infrastructure project portfolio, supporting predominantly capital projects

The core platforms for lines design are AutoCAD and PLS-CADD, while Microstation and Promis.e provide the core platform for substation design. Telecommunications layout design is undertaken in AutoCAD and PLS-CADD, with network/circuit design performed in Microstation. As depicted below a range of ancillary tools and analysis products are also used to support the design process.

Powerlink's current network design and drawing management solutions are depicted below.

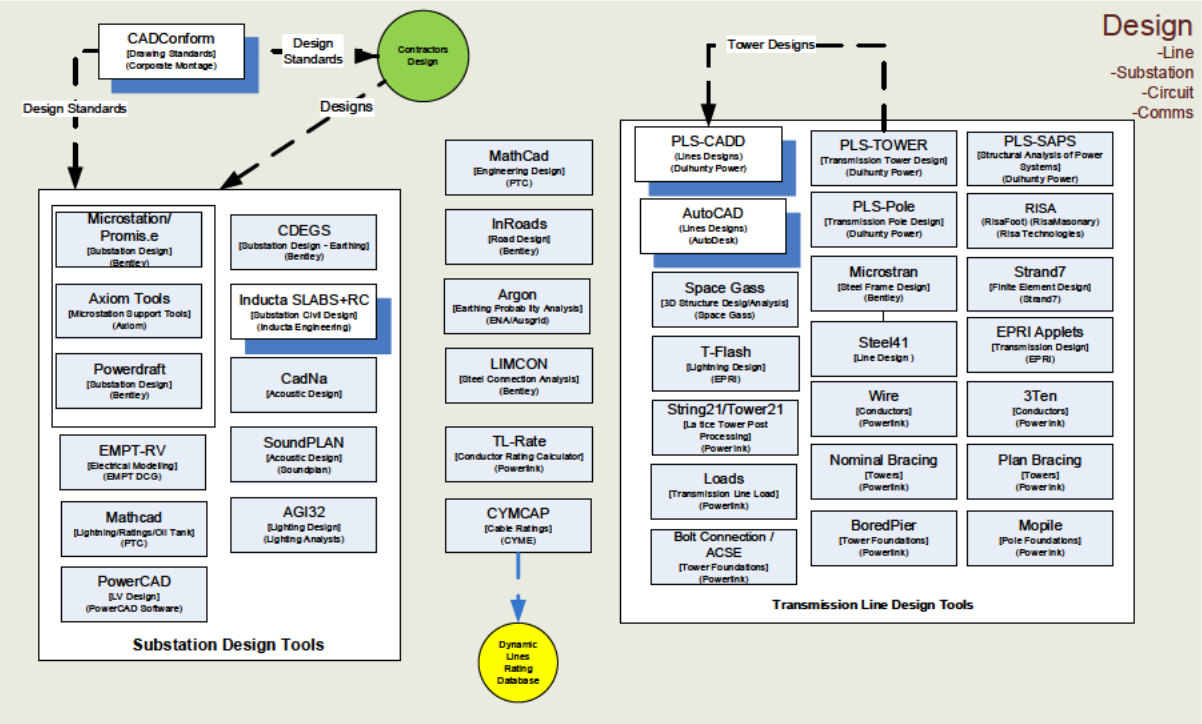

Figure 2 Powerlink's current network design systems

Drawings Management

Drawings management provides the capability to manage and distribute engineering drawings. These drawings include all aspects of network design including lines, substations and telecommunications. The network designs presented in these drawings encompass information from various engineering design disciplines including electrical, circuit, protection, civil and roads design.

Drawing management includes the management of "as-constructed" drawings which are completed at the end of the construction phase, or as changes are made through other asset lifecycle processes. This capability is critical to safely and efficiently support ongoing network maintenance and operations.

Network drawings are distributed in transmittals, a set of drawings which collectively make a version of the overall design. This capability includes the creation, management and distribution of transmittals.

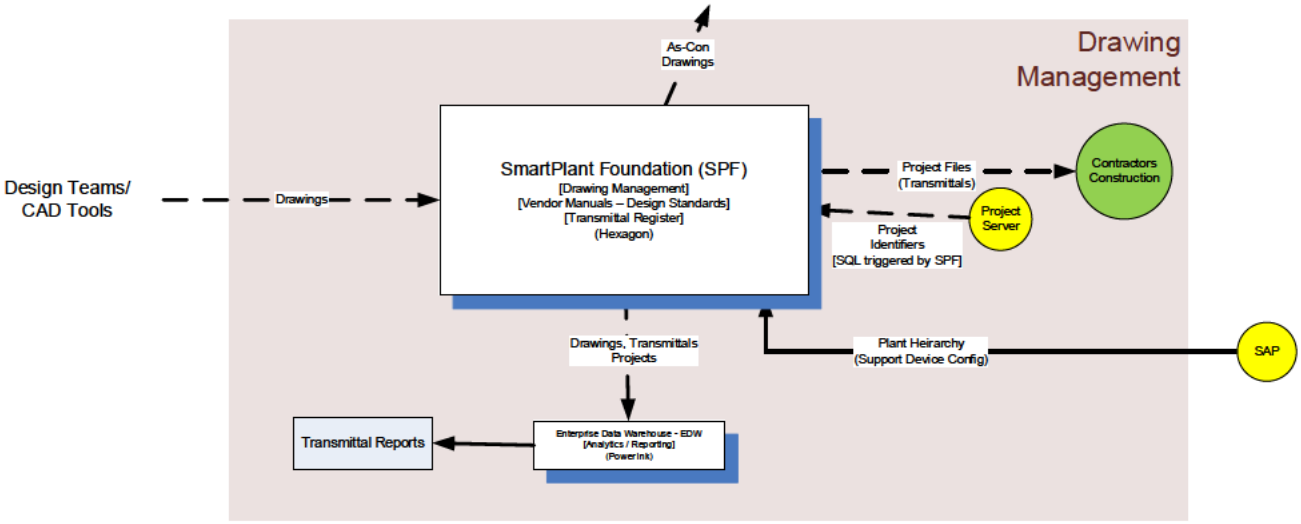

Figure 3 Powerlink's current drawing management systems

1.5.2. Target State (end of proposed investment)

Through this asset lifecycle renewal investment, Powerlink will seek to optimise, rationalise and renew its network design and drawing management systems with contemporary capability for long term efficiency, sustainability and supportability.

The rationalisation of systems and discrete tools across the network design and drawing management functions will support the simplification of processes and enhance the sharing of network information across systems through standardisation of network information models and repositories.

This renewed capability will be integrated with the refreshed ERP Asset Management and GIS solutions to support end-to-end process efficiencies (e.g. automated bill of materials generation based on inventory stock and geospatial visualisation of infrastructure assets). The existing field mobility solution will leverage the renewed capability to provide in-field viewing and maintenance of network designs and information.

2. INVESTMENT OPTIONS

The following options have been considered to address the investment needs identified in section 1.

Option	Description
Option 1: Base Case (Counterfactual) Retain existing systems and defer replacement	No significant investments in Powerlink's network design and drawing management systems will be undertaken in the 2023-27 regulatory period, with renewal deferral until the next period (2028-32).
Option 2: (Recommended) Optimised replacement of network design management systems	The existing network design and drawing management systems will be rationalised and renewed consistent with Powerlink's application asset lifecycle management guidelines for ongoing sustainability, supportability and security. Through the rationalisation, the opportunity will be taken to revisit existing business processes to enable productivity improvement and efficiency.
Option 3: Like-for-like replacement of network design management systems	The existing network design and drawing management systems will be progressively replaced with equivalent contemporary capability for ongoing sustainability, supportability and security.

Table 4: Investment Options

Each of these options is evaluated in the sections which follow.

2.1. OPTION 1: Base Case (Counterfactual) Retain existing systems and defer replacement

The base case (counterfactual) is an assessment of the forecast expenditure and implications if the proposed option(s) do not proceed.

Under this option, renewal of systems capability would be deferred until the 2028-32 regulatory period. Investment in the proposed network design and drawing management systems during the coming period would be limited to adhoc reactive maintenance, as the aged versions of existing systems generally preclude the possibility of undertaking back to back upgrades to bring the systems up to date. Such an endeavour would be largely equivalent to undertaking a system renewal.

2.1.1. Base Case Assumptions

The base case has been estimated based on the following assumptions.

Construction Cost and Scope Assumptions

- Annual investment over the coming regulatory period will be limited to supporting adhoc reactive responses to the “in scope” systems.
- Vendor support for functional changes to these systems will be minimal. Consequently, no capital expenditure has been forecast over the 2023-27 period and business process workarounds would be required in the event of functional capability gaps.
- Necessary lifecycle renewal of existing hardware, operating system and database management systems are likely to impact the operations of these aged applications within the coming period. To isolate the applications from these consequences, $100,000 is estimated to separate the hosting of these applications onto independent infrastructure platforms.
- While a replacement investment will not be undertaken in the 2023-27 period, it would be required in the 2028-32 period. At that point, the costs of the renewal are based on the assumptions detailed in Option 2, escalated by 15% in real terms due to the increased complexity of the deferred systems replacement as the existing application versions fall further out-of-date.

Operating Cost Assumptions

- IT operating costs are forecast to increase as extended support arrangements are negotiated with vendors to provide support in the event that an IT system outage or application fault is encountered (e.g. system malfunction, data corruption etc). These extended support arrangements are estimated at $200,000p.a.

Other Assumptions (Non-Financial)

- Business operations can be maintained on the current suite of systems subject to likely performance degradation and the risks identified in Table 6 over page. Achievement of Powerlink’s forecast productivity improvements may not be possible.

2.1.2. Base Case Benefits

The following benefits may be achieved with selection of this base case option. Financial benefits are identified as "per annum" ongoing savings where relevant, and will begin accruing six months following implementation of the option.

Benefit Description	Financial Value ($M Real 2021/22p.a.)
1. Minimises businesses change disruption through continuation of existing work practices.	N/A (Non-Financial)

Table 5: Option 1 - Base Case Benefits

2.1.3. Risk Mitigation

Table 6 (below) summarises the inherent risks which would be experienced by the end of the coming regulatory period (2027) if the base case (counterfactual) option is selected.

The equivalent risk analyses associated with undertaking Option 2 and Option 3 have been conducted with respect to their effectiveness in mitigating the below base case risks. This assessment has been undertaken in alignment with the Powerlink risk management framework.

Risk Description	Inherent risk 2028	Risk Level
R1 – Business operational impact Inability to undertake design or utilise existing designs due to system failure or data corruption, coupled with ineffective business workarounds and limited ability to progress updates/upgrades to aged systems to rectify system or data issues. **Risk categories – (Legal & Compliance, Projects, Safety)**	While the systems are generally stable, by 2028 there is increasing potential for failure as the systems age. **(Likely)** Further, an extended outage would have potential customer, program of work and business as usual operational impacts. **(Moderate)** The negotiation of extended support arrangements will assist in rectification and return to service in the event of system outages, this is reactive in nature and provides limited proactive mitigation.	**Significant**
R2 - Business operational impact Ineffective version control in the drawing management system leads to projects using incorrect network design drawings. **Risk categories** – Projects	While manual control processes are in place to minimise these occurrences, ongoing longer term reliance on manual measures may have diminishing effectiveness and does not remove the risk. **(Possible)** The project impact will vary depending on when the issue is detected in the project lifecycle. Rework during the design phase is less impactful than during the construction phase. **(Insignificant)** There are no further mitigations within the current solution beyond manual measures.	**Moderate**
R3 - Business operational impact Ineffective network design version control in the drawing management system leads to an incorrect document being used in the field with a potential workplace health and safety (WHS) impact. **Risk categories – Safety**	While manual control processes are in place to minimise these occurrences, ongoing longer term reliance on manual measures may have diminishing effectiveness and does not remove the risk. **(Possible)** The impact will varying depending on the nature of the field work and extent to which the specific area of the design has impact. This could range from no impact to the potential for injury. **(Moderate)** There are no further mitigations within the current solution beyond manual measures.	**Significant**

Risk Description	Inherent risk 2028	Risk Level
R4 – Cybersecurity With the inability to progress systems updates/upgrades, including access control/security updates, and the growing sophistication of cyber**security attacks, there is increasing potential for:** • **undetected data corruption or manipulation** • **disclosure of design and configuration information.** **Risk categories – Projects, Safety, Legal & Compliance, Stakeholder**	The energy sector is considered a high threat area for cyber-attacks. Up-to-date systems are considered a base level defence against a range of these threats. An aging system profile increases the threat opportunity. **(Possible)** A successful cyber-attack resulting in a system outage, data corruption and undetected data manipulation or information disclosure may lead to disruption of normal business operations, project delays, safety issues and external stakeholder concerns. **(Moderate)** There are no further mitigations within the current solution beyond manual measures	**Significant**
R5 – Potential future BIM Compliance Potential inability to comply with future (beyond 2023) Queensland Government Building Information Modelling (BIM) requirements for network infrastructure design data for whole of state modelling. **Risk categories – Legal & Compliance, Stakeholder**	BIM compliance has been mandated for Departments, Agencies and Statutory Authorities by 2023. The Government has indicated that regulation is under consideration. It is likely that this would be post-2023. **(Possible)** The network design management systems would not readily support compliance with this mandate. **(Minor)** Significant manual effort would be required to comply with this obligation.	**Moderate**

Table 6: Option 1 - Base Case Risk Mitigation

Figure 4 below summarises the risk position of adopting the base case (assessment of each risk tabled above).

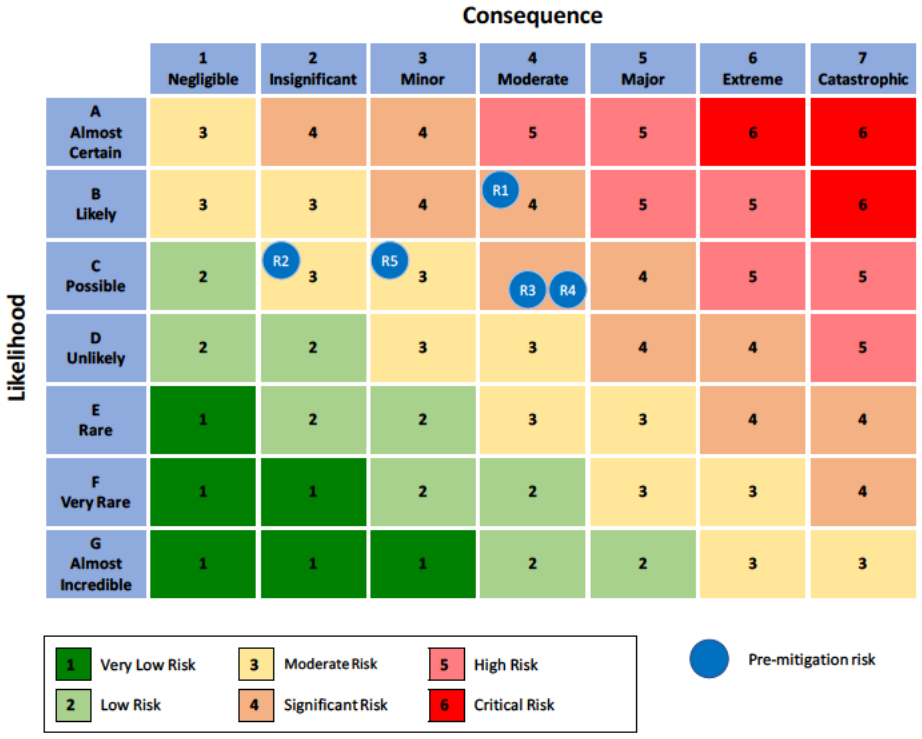

Figure 4 Base Case Risk Assessment

2.2. OPTION 2 Optimised replacement of network design management systems (recommended)

The existing network design and drawing management systems will be rationalised and renewed consistent with Powerlink's application asset lifecycle management guidelines for ongoing sustainability, supportability and security.

Through the rationalisation, Powerlink will leverage this opportunity to revisit processes to support planned productivity improvements in the network design management processes consistent with modern "digital engineering" principles across the network infrastructure construct, commission and support lifecycle.

2.2.1. Option 2 Assumptions

This recommended option has been estimated based on the following assumptions.

Construction Cost and Scope Assumptions

- The project costs are based on a build-up of forecast resourcing, vendor & specialist services, as well as software licensing costs as detailed in the tab le below.

[redacted]

Table 7: Option 2 Cost Build-Up (2021/22 $real)

- This preliminary estimate has been formulated using a combination of standard unit rates for Powerlink internal and external resourcing across the proposed timeline, leveraging current and previous projects for vendor software estimates.
- The final business case development process will be used to refine the scope, costs and impacts for this investment. As indicated above, a procurement activity will likely be undertaken to inform costs and solution options.

Operating Cost Assumptions

- While some L&M may increase with return to vendor supported systems, it is forecast that the rationalisation of systems in this option will offset any increase. Consequently, ongoing IT operating costs are forecast to remain unchanged.

Other Assumptions (Non-Financial)

- Commercially available solutions will be available to meet Powerlink's network design and drawing management scope.
- While this investment is replacing existing capability, the implementation of more contemporary capability will require change management. This is key to deriving business process improvement efficiencies.

2.2.2. Option Benefits

The following benefits may be achieved with selection of this recommended option. Financial benefits are identified as "per annum" ongoing savings where relevant and will begin accruing following implementation of the option.

Benefit Description	Financial Value ($M Real 2021/22p.a.)
B1. Systems sustainability Powerlink's core network design and drawing management functions and processes will be underpinned by efficient, reliable and supportable systems.	N/A (Non-Financial)
B2. Process improvement efficiencies The implementation of contemporary capability is anticipated to support process improvement efficiencies through: • removal of manual process steps and interventions; • enabling application of appropriate meta-data to support content searching; • enabling consistent application of design standards and business rules; • integration with field devices, including design changes (mark-ups) / approvals; and • improved drawing management version control to ensure transmittals provide accurate network information to field service staff.	Contributes to Powerlink's productivity improvement
B3. Alignment with Queensland Government BIM The move to contemporary capability through this investment positions Powerlink to be aligned with the Queensland Government's mandate for BIM.	Aligns with future mandate at no additional cost

Table 8: Option 2 Benefits

2.2.3. Risk Mitigation

Listed below is a summary of how this option addresses risks identified through the base case. The opening risk position represents the risk level at the end of the coming 2023-27 period should the base case have been selected.

Risk Description	Inherent Risk 2027	Nature of Mitigation	Mitigation through this option
R1 – Business operational impact Inability to undertake design or utilise existing designs due to system failure or data corruption, coupled with ineffective business workarounds and limited ability to progress updates/upgrades to aged systems to rectify system or data issues. **Risk categories** – Legal & Compliance, Projects, Safety	**Significant**	Consolidation and replacement of design management systems with modern capability significantly reduces the likelihood of systems failure. Likelihood – **Very Rare** Consequence – **Moderate**	**Low**

Risk Description	Inherent Risk 2027	Nature of Mitigation	Mitigation through this option
R2 - Business operational impact Ineffective version control in the drawing management system leads to projects using incorrect network design drawings. **Risk categories** – Projects	**Moderate**	Consolidation and replacement of design management systems with modern capability provides improved version control ensuring current network design versions are utilised automatically. L kelihood – **Very Rare** Consequence – **Insignificant**	**Very Low**
R3 - Business operational impact Ineffective network design version control in the drawing management system leads to an incorrect document being used in the field with a potential WHS impact. **Risk categories** – Safety	**Significant**	Consolidation and replacement of design management systems with modern capability provides improved version control ensuring current network design versions are utilised automatically. L kelihood – **Very Rare** Consequence – **Moderate**	**Low**
R4 – Cybersecurity With the inability to progress systems updates/upgrades, including access control/security updates, and the growing sophistication of cybersecurity attacks, there is increasing potential for: • undetected data corruption or manipulation • disclosure of design and configuration **information.** **Risk categories** – Projects, Safety, Legal & Compliance, Stakeholder	**Significant**	Consolidation and replacement of design management systems with modern capability and application of cyclic updates reduces threat vulnerability. L kelihood – **Very Rare** Consequence – **Moderate**	**Low**
R5 – Potential future BIM Compliance Potential inability to comply with future (beyond 2023) Queensland Government Building Information Modelling (BIM) requirements for network infrastructure design data for whole of state modelling. **Risk categories** – Legal & Compliance, Stakeholder	**Moderate**	Consolidation and replacement of design management systems with modern capability provides "out of the box" support for BIM. L kelihood – **Very Rare** Consequence – **Minor**	**Low**

Table 9: Option 2 Risk Mitigation

Figure 5 below summarises the risk position of adopting option 2 (pre- and post-mitigation assessment of each risk tabled above).

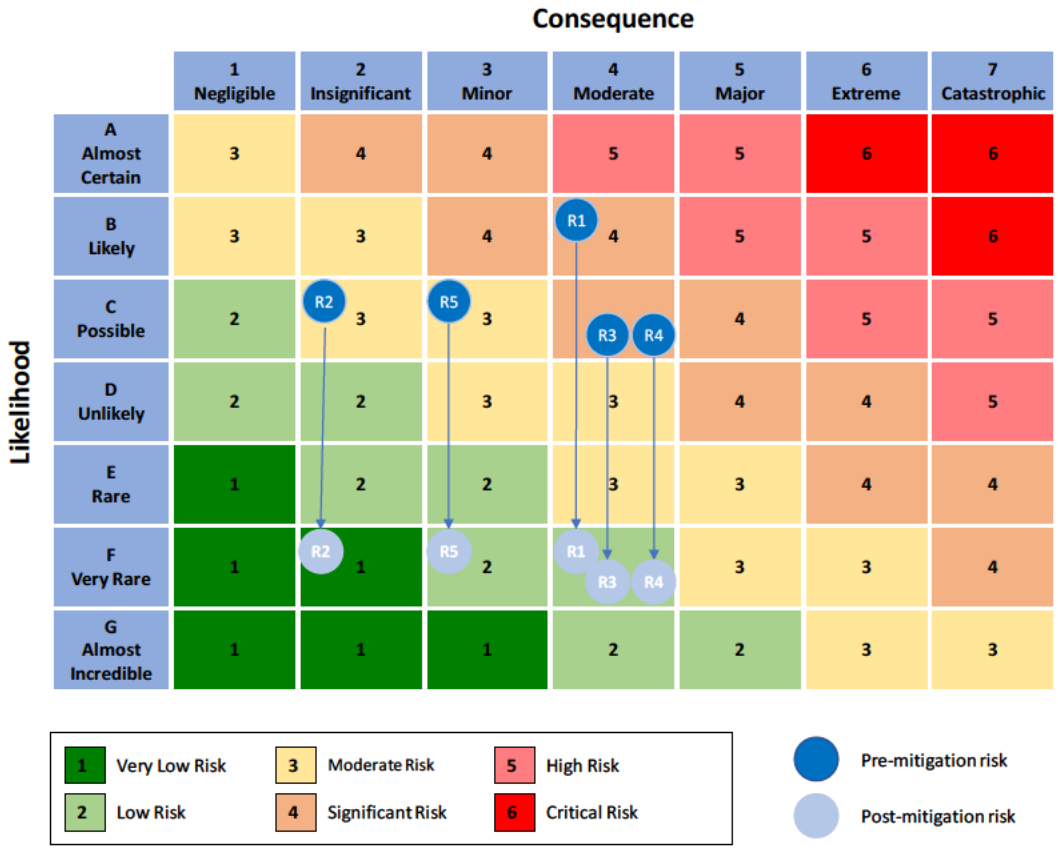

Figure 5 Option 2 - Risk Assessment

2.3. OPTION 3 Like-for-like replacement of network design management systems

This option will progressively replace each of the identified end-of-life systems with contemporary equivalents consistent with Powerlink's application asset lifecycle management guidelines for ongoing sustainability, supportability and security.

While the implementation of contemporary systems typically provides the opportunity to enable process improvements, the opportunity in this option is reduced due to the combination of overlapping system footprints and niche, highly specialised systems.

2.3.1. Option 3 Assumptions

This option has been estimated on the basis of the following assumptions.

Construction Cost and Scope Assumptions

- The project costs are based on the Option 2 build-up of forecast resourcing, vendor & specialist services, as well as software licensing costs (page 12), but adjusted to reflect the additional effort and cost associated with implementing a larger number of systems as individual projects, as follows:
  - 25% increase in planning, design, construct / test and hypercare support effort;
  - 15% increase in licence re-acquisition costs associated with the higher overhead of a larger number of small, individual projects;
- This preliminary estimate has been formulated using a combination of standard unit rates for Powerlink internal and external resourcing across the proposed timeline, leveraging current and previous projects for vendor software estimates.
- The program of system replacements is planned to run across an extended 30 month timeframe.
- The final business case development process will be used to refine the final scope, costs and impacts for this investment. One or more procurement activities will likely be undertaken to further inform costs and solution options.

Operating Cost Assumptions

- IT operating costs are forecast to increase as a consequence of the continued volume of independent systems. This is likely to be further impacted by a return to full licence maintenance (L&M) charges in comparison with previous support-only arrangements.

Other Assumptions (Non-Financial)

- Commercially available solutions will be able to meet Powerlink's network design and drawing management scope.
- While this investment is replacing existing capability, the implementation of more contemporary capability will require business change management. It is possible that business areas are impacted multiple times through the progressive delivery of replacement capability as no systems rationalisation is being undertaken.

2.3.2. Option Benefits

The following benefits may be achieved with selection of this option. Financial benefits are identified as "per annum" ongoing savings where relevant and will begin accruing following implementation of the option.

While the potential range of benefits matches those of Option 2, it is unlikely they can be achieved at the same level due to continued breadth of systems underpinning the business processes.

Benefit Description	Financial Value ($M Real 2021/22p.a.)
B1. Systems sustainability Powerlink's core network design and drawing management functions and processes will be underpinned by efficient, reliable and supportable systems.	N/A (Non-Financial)
B2. Process improvement efficiencies The implementation of contemporary capability is anticipated to support process improvement efficiencies through: • enabling application of appropriate meta-data to support content searching; • integration with field devices, including design changes (mark-ups) / approvals; and • Improve drawing management version control to ensure transmittals provide accurate network information to field service staff.	Contributes to Powerlink's productivity improvement (less than with Option 2, and occurs later)
B3. Alignment with Queensland Government BIM The move to contemporary capability through this investment positions Powerlink to be aligned with the Queensland Government's mandate for BIM.	Aligns with future mandate at no additional cost

Table 10: Option 3 Benefits

2.3.3. Risk Mitigation

Listed below is a summary of how this option addresses risks identified through the base case. The opening risk position represents the risk level at the end of the coming 2023-27 period should the base case have been selected.

Risk Description	Inherent Risk 2027	Nature of Mitigation	Mitigation through this option
R1 – Business operational impact Inability to undertake design or utilise existing designs due to system failure or data corruption, coupled with ineffective business workarounds and limited ability to progress updates/upgrades to aged systems to rectify system or data issues. **Risk categories** – Legal & Compliance, Projects, Safety	**Significant**	Like-for-like replacement of design management systems with modern capability significantly reduces the l kelihood of systems failure. Likelihood – **Very Rare** Consequence – **Moderate**	**Low**
R2 - Business operational impact Ineffective version control in the drawing management system leads to projects using incorrect network design drawings. **Risk categories** – Projects	**Moderate**	Like-for-like replacement of design management systems with modern capability provides version control ensuring current network design versions are utilised automatically. Likelihood – **Very Rare** Consequence – **Insignificant**	**Very Low**

Risk Description	Inherent Risk 2027	Nature of Mitigation	Mitigation through this option
R3 - Business operational impact Ineffective network design version control in the drawing management system leads to an incorrect document being used in the field with a potential WHS impact. **Risk categories** – Safety	**Significant**	Like-for-like replacement of design management systems with modern capability provides version control ensuring current network design versions are utilised automatically. Likelihood – **Very Rare** Consequence – **Moderate**	**Low**
R4 – Cyber Security With the inability to progress systems updates/upgrades, including access control/security updates, and the growing sophistication of cybersecurity attacks, there is increasing potential for: • undetected data corruption or manipulation • disclosure of design and configuration information. **Risk categories** – Projects, Safety, Legal & Compliance, Stakeholder	**Significant**	Like-for-like replacement of design management systems with modern capability and application of cyclic updates reduces threat vulnerability. However, the range of systems continues to provide broader attack possibilities. Likelihood – **Very Rare** Consequence – **Moderate**	**Low**
R5 – Potential future BIM Compliance Potential inability to comply with future (beyond 2023) Queensland Government Building Information Modelling (BIM) requirements for network infrastructure design data for whole of state modelling. **Risk categories** – Legal & Compliance, Stakeholder	**Moderate**	Like-for-like replacement of design management systems with modern capability will provide improved "out of the box" support for BIM, but it is likely that some manual effort is required to collate information across systems. Likelihood – **Very Rare** Consequence – **Minor**	**Low**

Table 11: Option 3 Risk Mitigation

Figure 4 (over page) summarises the risk position of adopting option 2 (pre- and post-mitigation assessment of each risk tabled above).

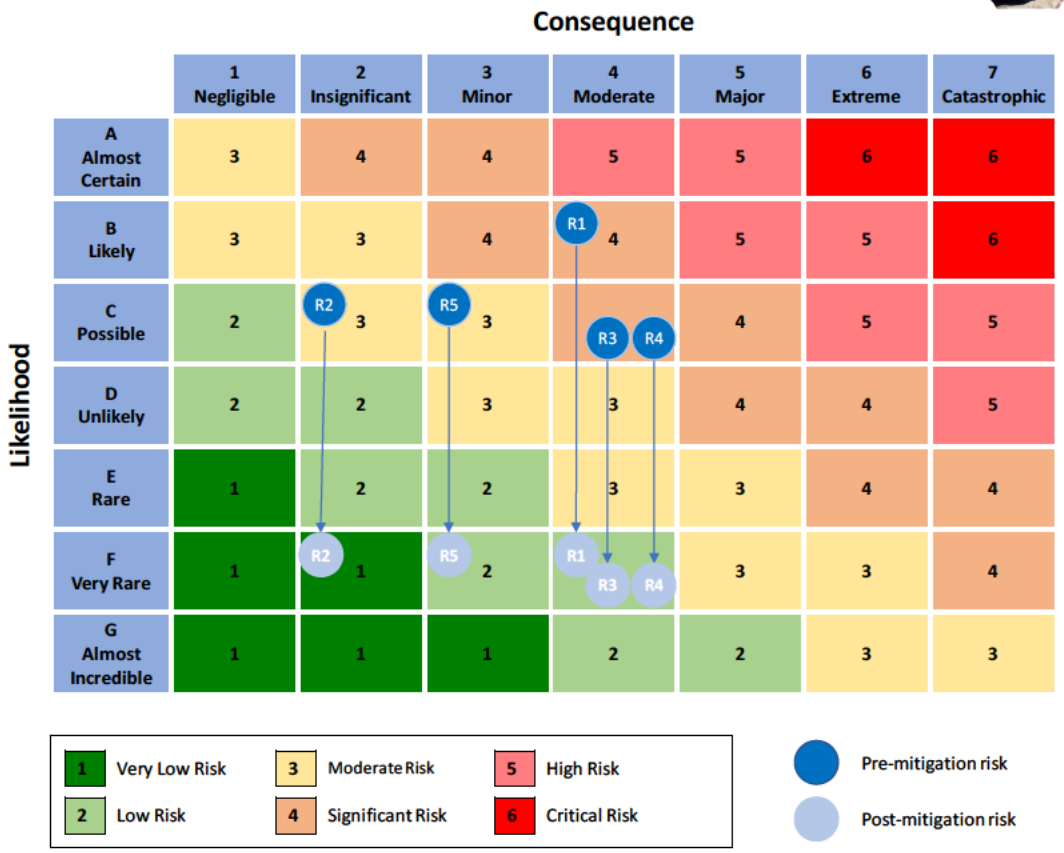

Figure 6: Option 3 - Risk Assessment

2.4. Option Financial Comparison

Table 12 (below) provides a summary comparison of the identified options.

Option	Title	NPV	Counterfactual Difference	Result
Option 1	Base Case (Counterfactual) Retain existing systems and defer replacement	(4,117,526)		
Option 2	Optimised replacement of network design management systems	(3,650,132)	467,394	**Least Cost**
Option 3	Like-for-like replacement of design management systems	(4,815,706)	(698,179)	

Table 12: Option NPV Financial Comparison

Consistent with the above analysis, Option 2 "Optimised replacement of network design management systems" is recommended.

2.5. Cashflow Summary

Table 13 (below) provides a summary of forecast cashflow over the 10 year analysis period for the recommended option (i.e. Option 2).

[redacted]

Table 13: Cashflow Summary (Recommended Option)

3. RECOMMENDATION

3.1. Recommended Solution

It is recommended to endorse "**Option 2 Optimised replacement of network design management systems**". This option represents the prudent replacement of core systems capability, ensuring ongoing sustainability and support for broader business improvement, consistent with "digital engineering" principles in the delivery and management of network infrastructure.

Delivery of the recommended option will begin in FY22/23.

Total forecast non-network (IT) expenditure for the recommended option within the 2023-27 regulatory period is [redacted] capex and [redacted] opex (FY21/22 real terms) with a 10 year NPV benefit of $0.47 million relative to the base case counterfactual.

3.2. High Level Timeline

Figure 7 (below) depicts the planned timeframe for implementation of the recommended option.

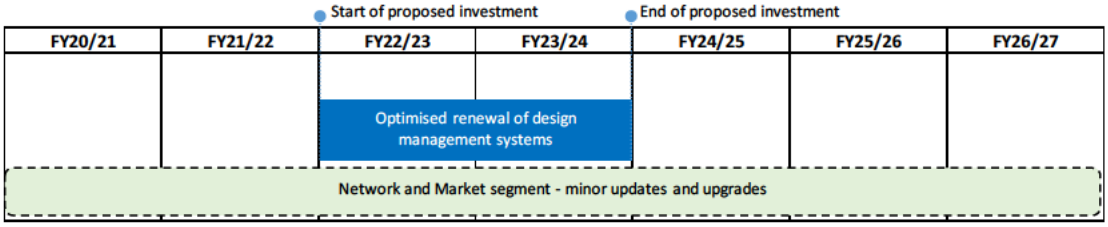

Figure 7: High Level Investment Timeline

3.3. Initiative Value Assessment

Figure 8 (below) summarises the planned initiative value across parameters of:

- **A:** Strategic Alignment and Value
- **B:** Ease of Business Change
- **C:** Architecture Alignment
- **D:** Ease of Delivery and Operation

As indicated in the figure, the planned investment is at or approaching the 75th percentile in assessment against parameters A, C and D. The investment scores lower against parameter B, which is reflective of the potential business impact associated with the renewal of contemporary network design and drawing management IT systems capability.

Figure 8: Initiative Value Assessment

4. SUPPORTING DETAIL

4.1. Program Delivery Risks

Table 14 (below) summarises a set of key risks associated with delivery of the program.

Risk #	Risk Category	Description	Inherent Risk Level	Mitigation Plan	Residual Risk Level
01	Key Resources	This initiative is dependent on the knowledge and expertise of Powerlink's network design and standards personnel including (but not limited to): • Primary, secondary and communications systems design engineers • Standards engineers • IT specialists These resources also have business as usual (BAU) responsibilities, including support for program of work (PoW) activities. BAU and PoW rescheduling may impact resources availability.	Moderate	**Accept and Mitigate:** The project will be delivered through a combination of internal and external resourcing, with budgetary capacity to enable backfilling of key roles where required. The project and line-managers also have a responsibility to identify potential constrains and manage potential fatigue. This initiative is renewing Powerlink's design management systems, which are core to the production of designs for the forward network infrastructure program of work. It is therefore important to allocate the company's most capable staff wherever practical and apply appropriate resource retention strategies.	Low
02	New Compliance Obligations	As described in section 1 the Queensland Government has mandated compliance with Building Information Modelling (BIM) for departments, agencies and statutory authorities by 2023, with consideration of regulation. If this new obligation is imposed on Powerlink in an unexpected form, this may require replanning of the program and potential program delay with key resources re-focused on compliance activities.	Low	**Accept and Mitigate:** While this renewal program will deploy capability aligned with this mandate, an earlier mandate may be partially satisfied through manual workarounds. The risk will be further mitigated through Queensland Government engagement with respect to likely BIM timing and Powerlink's alignment via this initiative.	Very Low

Table 14: Network Design Management Program Delivery Risks

4.2. Program Constraints

Table 15 (below) summarises a set of key risks associated with delivery of the program.

#	Type	Description
01	Schedule	The program is undertaking application lifecycle replacement of existing capability and planned for completed by June 2024, to ensure efficient, reliable and supportable systems capability underpinning Powerlink's network design and drawing management processes
02	Financial	The financial estimate for this initiative has been based on historic expenditure, standard unit rates, market interactions and the knowledge of internal subject matter experts. Endorsement of this business case does not constitute approval for expenditure. A more detailed business case will be developed consistent with Powerlink's investment governance processes to confirm the final initiative scope and budget. The business case will require endorsement by the Powerlink Governance and Assurance Executive Committee (GAEC).
03	Workforce Impact and Change Management	Network information and designs are used throughout the organisation, and as such, the program incorporates close involvement of the BAU teams and business leaders. The program will consult on required work practice changes and employ contemporary training methods and change management techniques to minimise the impact of the workforce.

Table 15: Network Design Management Program Constraints

4.3. Program Assumptions

Specific assumptions for each investment option are provided in section 2. Table 16 (below) summarises additional assumptions which are relevant to all options.

#	Type	Description
01	Resourcing	Powerlink internal resources allocated to the program will remain available to the program as planned. The program will supplement internal resourcing with external service provision, including services provided by solution vendor(s), non-vendor specialist service providers and experienced contract resourcing.
02	Commitment	Program resources (internal and external) have the commitment, drive and capability to deliver agreed work products to agreed plans. Depending on the resolution of the COVID-19 situation, this delivery may need to be undertaken remotely, either in part of in full, for some work products.
03	Priority	Through the life of the program, Powerlink and our stakeholders will continue to prioritise the need for investment in design management systems consistent with the "Investment Need" described in section 1 of this document.
04	Scope	This program seeks to undertake an optimised replacement of Powerlink's design management systems in line with prudent application software asset lifecycle management. The scope covers the systems support this capability as outlined in section 1.5.1.

Table 16: Network Design Management Program Assumptions

4.4. Program Dependencies

This project is inter-dependent with the projects and activities described in Table 17 below.

#	Type	Description
01	GIS Upgrade	It is planned that the GIS will be upgraded before commencement of the design management systems replacement to ensure resource availability and integration design planning.
02	ERP & Asset Management	The existing SAP ERP system, like many other systems, is currently hosted on-premise using Powerlink technology infrastructure. Through the planned ERP roadmap, SAP and other systems may progressively transition to cloud-based "as a service" hosting models. ERP and asset management integration is dependent on the refresh of the ERP environment completing prior to design management system delivery phase.

Table 17: Network Design Management Program Dependencies

4.5. Business Area Impacts

Table 18 (below) summarises key business area impacts.

#	Impacted Group	Description
01	Powerlink Executive Leadership Team	• Require awareness of the planned investment goals and to provide ongoing oversight of the program, with direct governance duly delegated to the Program Board. • Provide leadership and serve as role models in the rollout of improved network design work practices.
02	IT and OT Workgroups	• Contribute to the planned deployment of design management systems and work practices, to optimise coordination with other planned projects and programs as well as planned software and hardware renewals.
03	Delivery and Technical Solutions Workgroups	• Provide resourcing into the program as key SMEs and users of the systems in undertaking primary, secondary and communications design. • Infrastructure Project Delivery teams require awareness and training in the new systems pursuant to delivering the network infrastructure program. • Design Standards team will provide key input in to the implementation of the replacement systems to ensure design standards are appropriately configured / enforced.
04	Operations and Service Delivery Workgroups	• Operations and Service Delivery teams will require training in the new systems to enable their use in conjunction with infrastructure maintenance activity.

Table 18: Network Design Management Business Area Impacts

Appendix A: Glossary of Terms

The following terms or abbreviations are used within this document.

Term	Definition
ALM	Asset Lifecycle Management
BIM	Business Information Modelling
CAD	Computer Aided Design
Capex	Capital Expenditure
GAEC	Governance & Assurance Executive Committee
GIS	Geographic Information System
IT	Information Technology
NPV	Net Present Value
Opex	Operating Expenditure
OT	Operational Technology
PQ	Powerlink Queensland
TNSP	Transmission Network Service Provider