

Field Device and Telephony Communications Upgrade

Regulatory Business Case (RBC) 2024-29

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1 Summary

This business case has been prepared to support the 2024-29 Regulatory Proposal. The business case demonstrates that Power and Water has undertaken appropriate analysis of the need and identified a full suite of credible options that will resolve the need, to ensure that Power and Water continues to meet the National Electricity Objectives and manage the network prudently and efficiently.

The proposed expenditure identified in this business case will undergo further assessment and scrutiny through Power and Water's normal governance processes prior to implementation and delivery.

This business case addresses the risks of cessation of Telstra's services for field devices and telephony communications.

1.1 Business need

Telstra is phasing out the 3G services that Power and Water's field devices and telephony communications rely upon to support core business. Whilst most Telstra 3G services will cease from 30 June 2024, some 3G services will be retained by Telstra until it can offer a viable alternative (i.e. 4G, 5G, or satellite services). The cessation of Telstra 3G services will affect all Power and Water devices that are operating on 3G technology, including smart meters.

Additionally, ISDN (Integrated Services Digital Network) and PSTN (Public Switched Telephone Network) services are being shut down across Australia and Telstra advises that these services will be progressively switched off from mid-2022. Telstra has committed to provide ISDN and PSTN services until a replacement is available, however the hardware to keep them serviceable is becoming increasingly harder to source. The current telephony services at remote and regional sites are copper wire based and are starting to fail. They are also prone to lightning strikes and suffer regular service disruption due to ageing technology and infrastructure.

The inherent risk rating is Extreme, there are no redundant services (i.e. that that Power and Water can do without for the foreseeable future) and it is almost certain that the existing services will be withdrawn and the consequence would be extremely disruptive to Power and Water's operations.

Power and Water has commenced a program to replace the existing service with a modern equivalent service and address the identified risk in the current regulatory period.

1.2 Options analysis

The options considered to resolve this need are shown in Table 1.

Table 1 Summary of credible options

Option No.	Option name	Description	Recommended
1	Do nothing	Power and Water maintains existing telephony services at its sites across the Northern Territory. This option terminates the current program.	No

2	Upgrade to 4/5G Mobile, NBN and Satellite Services	Maintain an acceptable telecommunications and telephony functions for Power and Water by transitioning to 4/5G, NBN or satellite services across the Northern Territory, including remote and regional locations, by replacing necessary hardware. This option continues the current program.	Yes
3	Upgrade to Mesh Radio Network	Maintain an acceptable telecommunications function for Power and Water by transitioning to a mesh radio network across the Northern Territory, including remote and regional locations, by replacing necessary hardware. This option substitutes the technology used for the program.	No

A cost-benefit analysis has not been undertaken because the project driver is to maintain existing service levels (i.e. it is not benefit-driven), the Telstra services will be progressively discontinued and no later than the end of the next RCP, and the least cost technically viable option has been selected.

1.3 Recommendation

Option 2 (upgrade to 4/5G Mobile, NBN and Satellite services) is the recommended option at an estimated cost of [REDACTED] (real 2021/22) in the 2024-29 regulatory period. Opex charges for the new services are assumed to be the same as currently incurred in real terms for the duration of the next RCP.

This is the least-cost technically viable solution and is a continuation of the replacement program in the current regulatory period.

Table 2 shows a summary of the expenditure requirements for the 2024-29 regulatory period.

Table 2: Forecast annual capital and operational expenditure (\$m, real 2021/22)

Item	FY25	FY26	FY27	FY28	FY29	Total
Capex	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Opex	-	-	-	-	-	-
Total	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

The forecast expenditure for the next regulatory control period allocated to Standard Control Services as per the CAM is outlined in Table 3.

Table 3: Forecast annual capital and operational expenditure – allocated to SCS (\$m, real 2021/22)

Item	FY25	FY26	FY27	FY28	FY29	Total
Capex	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Opex	-	-	-	-	-	-
Total	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

The forecast expenditure for the next regulatory control period allocated to recurrent and non-recurrent categories is outlined in Table 4.

Table 4: Forecast annual capital expenditure – recurrent and non-recurrent

Item	FY25	FY26	FY27	FY28	FY29
Recurrent	50%	50%	50%	50%	50%
Non-recurrent	50%	50%	50%	50%	50%

This project is categorised as non-recurrent as costs incurred by this project is the result of Power and Water's main telephony provider discontinuing the service that the business is operating on.

2 Identified need

This section provides the background and context to this business case, identifies the issues that are posing increasing risks to Power and Water and its customers, describes the current mitigation program and its delivery status, and provides a risk assessment of the inherent risk if no investment is undertaken.

2.1 Asset condition and emerging issues

2.1.1 Telstra 3G, ISDN and PSTN services are shutting down

Power and Water currently utilises Telstra 3G mobile, PSTN and ISDN communication services at sites across the Northern Territory:

- Telstra's 3G mobile services are utilised across multiple platforms – relevant devices are mobile phone sim cards, smart meters, and data loggers.
- Telstra's PSTN and ISDN services are utilised across multiple network asset sites (e.g. substations stations).

However, Telstra and other telecommunication carriers in Australia are phasing out their 3G networks to enable more advanced network services. Most of the services will be decommissioned by June 2024, however some services will persist as is until a viable alternative can be offered (e.g. satellite communications).

2.1.2 Current services are not fit for purpose

The current telephony services at remote and regional sites do not meet the needs for the sites and suffer regular (at least once a week) service disruption due to ageing technology and infrastructure. The sites are serviced by telecommunication services which are approaching or are at end of their technical life (which is one of the reasons why Telstra is phasing them out).

Unreliable data and telephony communications to Power and Water sites also presents a risk to the power network. If PSTN or ISDN services are not available, network operations suffer, which in turn jeopardises reliability of supply.

2.1.3 Current services do not support demand for high speed data

A further consideration is that the current telecommunications services do not allow for additional services to be installed to support new infrastructure or software projects. Power and Water is modernising its operations with projects like Meter to Cash,¹ Outage Management System (OMS), Distribution Management System (DMS), and enhanced cyber security maturity. Upgrading the telecommunications services will enable the functionality of these systems as they all require high speed data, in particular where meter data is key to market settlement and/or network stability.

This business case seeks to identify and assess credible options to future proof field devices and telephony communications to Power and Water sites across the Northern Territory.

¹ The Meter to Cash project is the upgrade of the billing system, market gateway and implementation of a compliant meter data management system.

2.2 Current management program

During the current regulatory period, Power and Water was notified of the intent to cease providing communications services. In response, similar to other DNSPs, Power and Water commenced a program to adopt the most cost-effective technically acceptable data and telecommunications service available for the relevant Power and Water geographical supply area (i.e. urban, remote, regional), whether that is 4G, 5G, satellite, or NBN. This in turn requires replacing obsolete devices or components within devices to enable the devices to interface with the new data and services.

A consequential benefit of replacement of devices (or components within devices) and of Telstra's telephony network with contemporary solutions is the availability of much higher data speeds and lower latency.² The transition to the improved telecommunications services will, as a 'by-product', help enable and leverage Power and Water's investment in modernising its operational systems. The new operational systems which require fast transfer of much higher volumes of data and high reliability include:

The current program is estimated to incur [REDACTED] (real 2021/22) in the current regulatory period, at an annual average of [REDACTED] (real 2021/22) per annum for FY23 and FY24.

The current program has included the following components:

2.2.1.1 Field device replacement

- Telstra is an established partner of Power and Water and has been selected as the continuing partner for provision of telecommunications services, as they are the only provider in the NT with the required range of services and provides the best value for money services due to its network coverage
- Power and Water has engaged an established metering contractor from our pre-qualified panel to support the roll out program
 - the contractor has a proven track-record in meter replacement rollouts
 - this partnership will enable the ongoing technology cut-over without disruption to operational services
- Telstra rates are negotiated at the end of each contract period.
- The Machine to Machine platform (M2M) and Jasper console that Power Services use to manage meter SIMs are established services (used since 2014) and is supported and managed by the Northern Territory Government's Department of Corporate and Digital Development (DCDD) who manage traffic, capacity, and security.

2.2.1.2 ISDN and PSTN replacement

- Power and Water have partnered with Telstra, NEC and DCDD to replace the obsolete Telstra ISDN and PSTN services:
 - Telstra, NEC, and DCDD have established delivery arms to ensure Power and Water are adequately supported
 - All service contracts are in place, so minimal procurement activities are required.
- The roll out of replacing technology SIP and NBN services will occur as Telstra progressively provide alternative solutions, with remote and non-urban centres the lagging areas. This may either require additional fibre connections, Session Initiated Protocol (SIP) or related infrastructure.

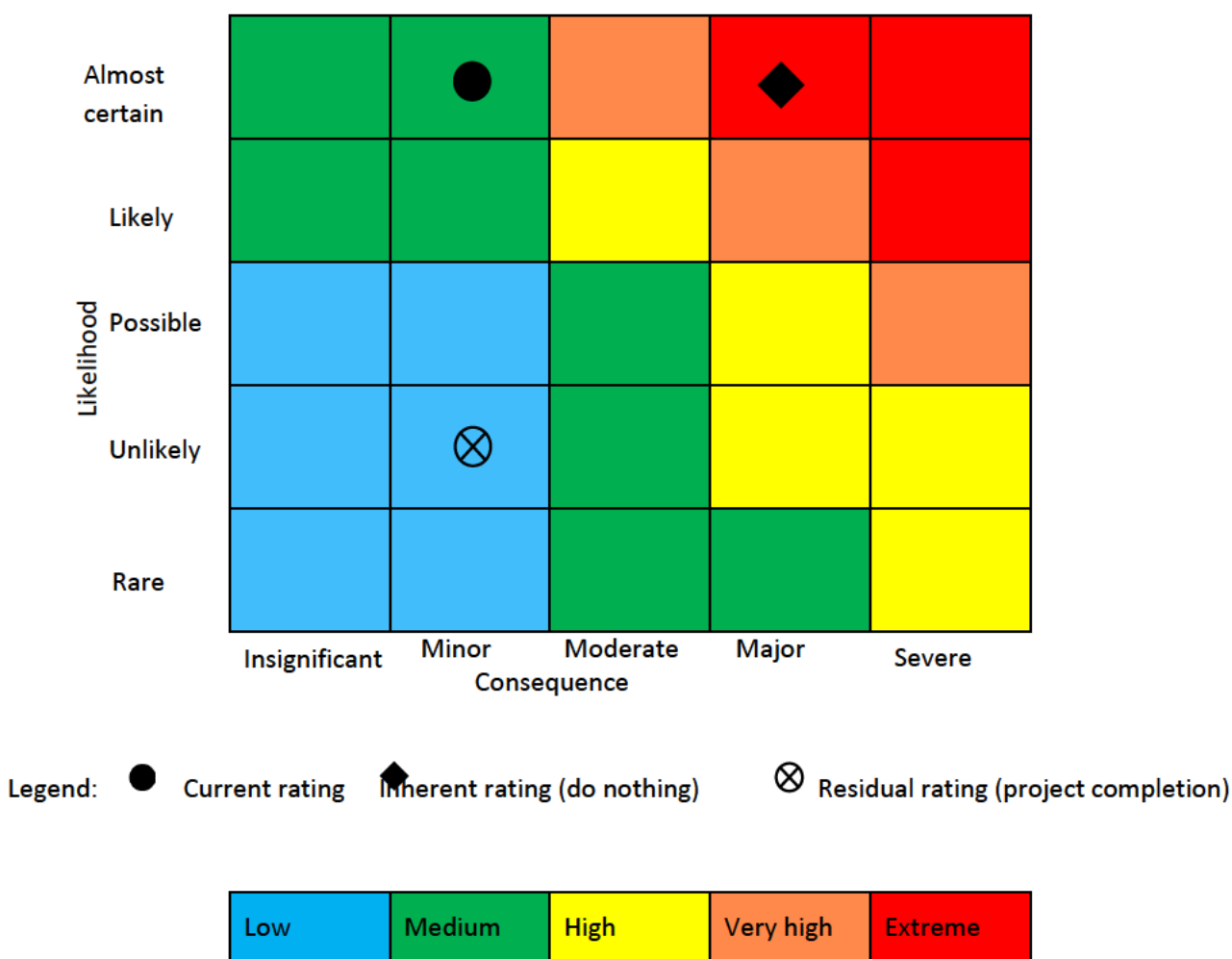
² the time it takes for packets of data to travel from its source to its destination

2.3 Risk assessment

The figure below shows the current risk rating, inherent rating in 2029 (if no proactive action is taken), and the residual risk ratings. Importantly, the 'do nothing' risk rating is assessed as 'Extreme' for reasons provided below.

- **Current Rating** is 'High': it is 'Almost certain' that the Telstra telecommunications and telephony services will progressively be withdrawn over the next few years and with the majority of 3G, ISDN, PSTN services withdrawn by the end of 2024. Some services are already unreliable. There is likely to be residual services available well into the next RCP in remote/regional areas, so the current risk in these areas is less than in the Darwin-Katherine area of Power and Water's network. The current consequences are minor, as Power and Water has time to respond. The consequence is therefore likely to be 'Medium'.
- **Inherent rating** is 'Extreme': this assumes no remedial action being implemented over the course of the next RCP. This would be despite the warning and advance notice from Telstra of withdrawal of services and the lack of a suitable alternative service provider in the Territory. There are no redundant services (i.e. that that Power and Water can do without for the foreseeable future). It is almost certain that these services will be withdrawn and the consequence would be extremely disruptive to Power and Water's operations, resulting in a 'Major' consequence and an 'Extreme risk rating.
- **Residual rating** is 'Low': the proposed project to upgrade the devices and telephony to comply with contemporary Telstra services will immediately address the high priority Darwin-Katherine risks and progressively respond to the withdrawal of regional/remote services. It is therefore 'Unlikely' that there will be widespread, prolonged telecommunications issues and so the consequences are likely to be, in aggregate, 'Minor' with the new services/devices etc in place. Therefore the overall risk rating is rated as 'Low'

Figure 1: Risk assessment through to the end of the RCP



2.4 Summary

Telstra is currently phasing out the 3G services that Power and Water's field devices and telephony communications rely upon to support core business. Whilst most Telstra 3G services will cease from 30 June 2024, some 3G services will be retained by Telstra until it can offer a viable alternative (i.e. 4G, 5G, or satellite services). The cessation of Telstra 3G services will affect all Power and Water devices that are operating on 3G technology, including smart meters.

Additionally, ISDN (Integrated Services Digital Network) and PSTN (Public Switched Telephone Network) services are being shut down across Australia and Telstra advises that these services will be progressively switched off from mid-2022. Telstra has committed to provide ISDN and PSTN services until a replacement is available, however the hardware to keep them serviceable is becoming increasingly harder to source. The current telephony services at remote and regional sites are copper wire based and are starting to fail. They are also prone to lightning strikes and suffer regular service disruption due to ageing technology and infrastructure.

Power and Water has commenced a program to replace the existing service with a modern equivalent service and address the identified risk in the current regulatory period.

The inherent risk rating is Extreme, there are no redundant services (i.e. that that Power and Water can do without for the foreseeable future) and it is almost certain that the existing services will be withdrawn and the consequence would be extremely disruptive to Power and Water's operations.

In section 3, the options to address this risk are assessed.

3 Options analysis

This section describes the various options that were analysed to address the identified need and increasing risk of inability to provide field device and telephony communications and to identify the recommended option. The options are analysed based on ability to address the identified needs, commercial and technical feasibility, deliverability, benefits and an optimal balance between long term asset risk and short-term asset performance.

3.1 Comparison of credible options







Credible options are identified as options that address the identified need, are technically feasible and can be implemented within the required timeframe. The following options have been identified:





- Option 1 – Do nothing / stop the program. This option proposes to maintain existing telephony services at its sites across the Northern Territory. This option terminates the current program.
- Option 2 – Replace obsolete devices. This option proposes to maintain an acceptable telecommunications and telephony functions for Power and Water by transitioning to 4/5G, NBN or satellite services across the Northern Territory, including remote and regional locations, by replacing necessary hardware. This option continues the current program.
- Option 3 - Wireless Mesh Network. This option proposes to maintain an acceptable telecommunications function for Power and Water by transitioning to a mesh radio network across the Northern Territory, including remote and regional locations, by replacing necessary hardware. This option substitutes the technology used for the program.

A comparison of the three identified credible options and the issues they address in the identified need is depicted in Table 5.

These options are described and assessed in detail in the sections below.

Table 5 Summary of options analysis outcomes

Assessment metrics	Option 1	Option 2	Option 3
NPV (\$m, real 2022)	0.00		
Capex (\$m, real 2022)	0.00		
Opex (\$m, real 2022)	0.00	0.00	0.00
BCR	n/a	n/a	n/a
Meets customer expectations	○	●	○
Aligns with Asset Objectives	○	●	○
Technical Viability	○	●	○
Deliverability	n/a		
Preferred	✗	✓	✗
Ranking	3	1	2

 Fully addresses the issue
  Adequately addresses the issue
  Partially addresses the issue
  Does not address the issue

n/a = not applicable noting that as this is not a benefits-driven project, a cost-benefit analysis has not been completed

3.1.1 Option 1 – Do nothing / stop the program

3G Mobile services are scheduled to be switched off in June 2024. 3G mobile services are utilised across multiple platforms and include mobile sim cards, mobile devices, smart meters, and data loggers. PSTN and ISDN services are scheduled to be decommissioned starting March 2022. If an alternate service is not available at sites, Telstra has committed to retaining the PSTN/ISDN service until an alternate service is available.

The do nothing option is not technically viable. When the 3G, ISDN, and PSTN services are shut down, Power and Water needs to have hardware that is compatible with the replacement/alternative services to provide telecommunications and telephony functionality to support core operations. There are no redundant services (i.e. that that Power and Water can do without for the foreseeable future).

The program completed during the current regulatory period is insufficient to replace all impacted equipment.

This option does not cater for any future requirements for telephony and data communications to the sites nor reflect the need to improve unreliable services that currently exist. Eventually services will fail and Telstra has only committed to 'best endeavours' to restore services while replacement legacy hardware is available. If these services do fail, Power and Water's operations will be disrupted, which is likely to lead to electricity supply and other service-related disruptions.

This option is not recommended.

3.1.2 Option 2 – Upgrade to 4/5G Mobile, NBN and Satellite Services

This option is based on adopting the most cost-effective technically acceptable data and telecommunications service available for the relevant Power and Water geographical supply area (i.e. urban, remote, regional), whether that is 4G, 5G, satellite, or NBN. This in turn requires replacing obsolete devices or components within devices to enable the devices to interface with the new data and services.

This option continues the current program, at an estimated cost of [REDACTED] (real 2021/22) for the 2024-29 regulatory period.

A consequential benefit of replacement of devices (or components within devices) and of Telstra's telephony network with contemporary solutions is the availability of much higher data speeds and lower latency.³ The transition to the improved telecommunications services will, as a 'by-product', help enable and leverage Power and Water's investment in modernising its operational systems. The new operational systems which require fast transfer of much higher volumes of data and high reliability include:

- Meter data management
- Outage management system
- Distribution management system
- Energy management system.

³ the time it takes for packets of data to travel from its source to its destination

This option represents the prudent approach to maintain Power and Water's corporate telecommunications, in turn supporting core business activities. It is by far the lowest cost technically viable approach.

This is the recommended option.

3.1.3 Option 3: Wireless mesh network

A wireless mesh network (WMN) is a multi-hop wireless network formed by a number of stationary wireless mesh routers. These routers are connected wirelessly using a mesh-like backbone (core network) structure. Some routers function as wireless access points (e.g. laptops and smart devices with wireless access) to attach themselves to the network.

This option substitutes the technology used for the program, at an estimated cost of \$15.0 million (real 2021/22) in the 2024-29 regulatory period.

One key challenge in adopting wireless mesh networking is the capacity of effective throughput (successful message delivery). Due to the broadcast nature of the wireless medium, signals transmitted from different devices over the same channel (frequency band) will result in collisions, which cause data loss. A number of techniques are available to combat this and the capacity of a wireless mesh network can be increased by equipping the routers with multiple radio interfaces, each of which is tuned to a different channel. Adoption of this remedy has been included in the cost estimate, which is based on a similar implementation for Energex Queensland.⁴

Advantages associated with a WMN are:

- A mesh network is reliable and offers redundancy - when one node can no longer operate, the rest of the nodes can still communicate with each other
- Easy to add new devices
- Scalability is simple
- Adding new devices does not affect the network.

The main disadvantage of adopting a WMN compared to Option 2 is the cost. WMN is significantly higher than the services proposed for adoption in Option 2 because:

- Multiple specialised hardware components are required – these are more expensive than traditional networking hardware
- Complexity - the configuration of routers is complex and time-consuming (but once the mesh is operational, adding new nodes is relatively simple)
- Radio mesh network deployment to service remote areas is more expensive (initial capex and maintenance) than for alternatives such as satellite communications
- WMNs often have a large number of nodes and messaging 'traffic collisions' leading to lost packets of data and avoiding this issue adds to the cost.

This option is not recommended.

⁴ The geographical area was for South East Queensland, which is approximately ¼ the size of the Northern Territory

3.2 Non-credible options

No non-credible options were identified.

4 Recommendation

Option 2 (upgrade to 4/5G Mobile, NBN and Satellite services) is the recommended option at an estimated cost of [REDACTED] (real 2021/22) in the 2024-29 regulatory period. Opex charges for the new services are assumed to be the same as currently incurred in real terms for the duration of the next RCP.

The upgrade to newer technologies will ensure Power and Water continues to have access to adequate communications, mitigating the risk of service disruption to an acceptable level.

The proposed investment is consistent with the National Electricity Rules Capital Expenditure Objectives as the expenditure is required to maintain the quality, network device visibility, service reliability, and the ability to roll out smart meters.

4.1 Strategic alignment

The “Power and Water Corporation Strategic Direction” is to meet the changing needs of the business and our customers and is aligned with the market and future economic conditions of the Northern Territory projected to 2030.

This proposal aligns with Asset Management System Policies, Strategies and Plans that contributes to the D2021/260606 “Power and Water Strategic Direction” as indicated in the table below.

Table 6 Strategic alignment

	Strategic direction focus area	Strategic direction priority
1	One Power and Water	Embed our Future Operating Model
2	Customer and the community at the centre	Enhance Customer Experience and Engagement
3	Always Safe	Improve Public Health and Safety
4	Living within our means	Cost Prudence

4.2 Dependent projects

There are no dependent projects.

4.3 Deliverability

No material delivery risks have been identified. The delivery of this project will be a phased approach arranged in accordance with priorities established with Telstra.

Any scheduling issues will be managed by Power and Water, with defined processes in place. Power and Water's project pipeline is actively managed, giving consideration to dependencies and balancing the delivery of large, medium and small projects. A highly flexible workforce provides the agility to ramp up and down the work as required. The pipeline also offers the visibility to forecast and manage resource demand.

4.4 Stakeholder expectations

Evolving customer expectations regarding service levels, cost efficiency, and integration of renewables into the power system are driving Power and Water's modernisation of its operational systems. New operational systems are being delivered via four large projects in the next RCP, each of which will require increased data transfer speed and reliability as each are or will be critical to day-to-day operations.

A seamless transition of Power and Water's telecommunications to 4G/5G, NBN and/or satellite services with the appropriate investment in new devices that interface with them underpins the positive changes that the new systems and processes will introduce and in turn help Power and Water meet customer expectations.

Our customers would also expect us to adopt the economically prudent solution, not just a functional solution. Option 2 assists satisfy this expectation.

4.5 Expenditure profile

Table 7 shows a summary of the expenditure requirements for the 2024-29 regulatory period.

Table 7: Forecast annual capital and operational expenditure (\$m, real 2021/22)

Item	FY25	FY26	FY27	FY28	FY29	Total
Capex	■	■	■	■	■	■
Opex	-	-	-	-	-	-
Total	■	■	■	■	■	■

The forecast expenditure for the next regulatory control period allocated to Standard Control Services as per the CAM is outlined in Table 8.

Table 8: Forecast annual capital and operational expenditure – allocated to SCS (\$m, real 2021/22)

Item	FY25	FY26	FY27	FY28	FY29	Total
Capex	■	■	■	■	■	■
Opex	-	-	-	-	-	-
Total	■	■	■	■	■	■

The forecast expenditure for the next regulatory control period allocated to recurrent and non-recurrent categories is outlined in Table 9.

Table 9: Forecast annual capital expenditure – recurrent and non-recurrent

Item	FY25	FY26	FY27	FY28	FY29
Recurrent	50%	50%	50%	50%	50%
Non-recurrent	50%	50%	50%	50%	50%

This project is categorised as non-recurrent as costs incurred by this project is the result of Power and Water's main telephony provider discontinuing the service that the business is operating on.

4.6 High-level scope

The scope includes:

- Replacing remaining 3G modems and/or SIMs with 4G/5G-enables smart meters.
- Replacing remaining connections for the current ISDN and PSTN connections.

The following activities are included within the scope of work for these upgrade projects:

- Initiation & Business Engagement
- Business Requirements
- Technical Requirements / Product Architecture Changes
- Updated Design
- Establish new application environments (dev, test, production)
- Application Migration
- Testing (System, Integration and User Acceptance)
- End-user Communication, Coordination, Change Management
- Updated Support Documentation and End-users Training
- ICT Change Management, and
- Deployment into production.

Appendix A. Cost estimation

The table below shows the build-up of the cost estimate for the project.

Table 8: Cost estimate breakdown (\$k, real 2022)

Item	FY25	FY26	FY27	FY28	FY29	Total
Hardware	■	■	■	■	■	■
Project Manager	■	■	■	■	■	■
SME	■	■	■	■	■	■
Business Analyst	■	■	■	■	■	■
ICT Personnel	■	■	■	■	■	■
Total	■	■	■	■	■	■

Project assumptions

- Up-front project management and SME involvement in project initiation and technical liaison.
- Support resources are available across the project cycle and especially during the roll-out phase and as required during the Initiation & Business Engagement phase.
- Support is provided from Business units with testing.
- The discovery data provided by Telstra is accurate.
- NBN, 4/5G Mobile and satellite services are available at the identified sites.

Assumptions for the next RCP

- Smoothed replacement of modems at meter locations over the period at \$140 per single phase meter and \$500 per three phase meter, installed and connected
- 200 network connections to monitor renewable and other required network instrumentation.
- ISDN/PSTN change-outs are assumed to cost \$25 per connection, unless it is a multiple of 100 at one location (e.g. a call centre) in which case the assumed unit cost is \$2600.
- Lower requirement for all resources than included for the first two years of the project, incurred in the current regulatory period.

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