# Energy Infrastructure Investments

# FINAL

# Asset Management Plan

2019-2023

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# Executive Summary

## Background

The Asset Management Plan (**AMP**) covers the planning period from 1 January 2019 to 31 December 2023 and is updated and reissued on an annual basis.

The AMP identifies the necessary actions required to optimally manage the Energy Infrastructure Investment (**EII**) assets. A long-term consideration of the integrity of assets is necessary to ensure that they remain fit-for-purpose.

The AMP is written on the basis of the best known information at the time of writing.

## Purpose

The purpose of the AMP is to:

- provide a comprehensive understanding of the current management approach relating to the assets, their condition and utilisation;
- identify strategic recommendations for future utilisation;
- provide a platform for approval of work programs; and
- identify specific issues affecting the assets and the proposed remediation for budget consideration.

## Health Safety and Environmental

The objective of this AMP is to ensure that a strong focus on safety and reliability is maintained in relation to the operation and management of the EII assets. In developing the operating and maintenance procedures incorporated within the AMP, APA Operations EII Pty Limited (as **Operator**) has considered the approved policies and procedures of APA Group.

Suitable safety management systems are in place and operating to ensure that the risks relating to the operation of all EII assets are effectively managed to keep risks as low as reasonably possible. The APA Group HSE Management System is called 'Safeguard' and provides a framework by which the processes relating to EII's HSE activities are written, approved, issued, communicated, implemented and controlled. Additionally, the management system is also subject to review and improvement to ensure objectives and obligations are continually satisfied.

## Reviews

The AMP is reviewed each year to ensure that the content is current.

Changes to the assets will inevitably occur during the life of the AMP. Unless there are issues identified that significantly impact the validity of the plan it is only intended to amend the AMP at each annual review.

# DIRECTLINK ELECTRICITY INTERCONNECTOR

## 1.1 Asset Information

Directlink Electricity Interconnector (**DIrectlink**) is a high voltage direct current (**HVDC**) facility that connects the power transmission networks at Mullumbimby and Terranora (both in New South Wales) via HVDC cables. The facility consists of the three converter stations at each site at Mullumbimby and Bungalora, the DC cables connecting them and the AC cables, busbar, switchgear and converter transformers connecting each converter station (Mullumbimby Converter Station and Bungalora Converter Station) to the nearby AC substation. Directlink utilises Voltage Source Converter technology. The DC cables are either buried underground or installed in galvanised steel troughing (**GST**) along the route which is 59km in length. The three parallel HVDC links each deliver 56MW at the receiving end converter station, with each link operating independent of the others.

The Australian Energy Market Operator (**AEMO**) determines the power transmission through Directlink as a part of their central dispatch process.

There are three pairs of DC cables connecting their respective converter stations, labelled System 1, System 2 and System 3:

- bi-directional maximum power flow of 168MW delivered;
- maximum reactive power generation of each converter between +35MVAr and -55MVAr at each end;
- AC connection voltage of 110kV at Bungalora and 132kV at Mullumbimby; and
- DC voltage of ±80kV.

Directlink can be divided into six categories:

- AC cable connection between Terranora substation and the Bungalora converter station;
- Bungalora converter station;
- underground DC cables;
- Mullumbimby converter station;
- strung bus connection between Mullumbimby substation and the Mullumbimby converter station; and
- remote operator workstation and associated telecommunications.

A high level location map is provided in Figure 1.

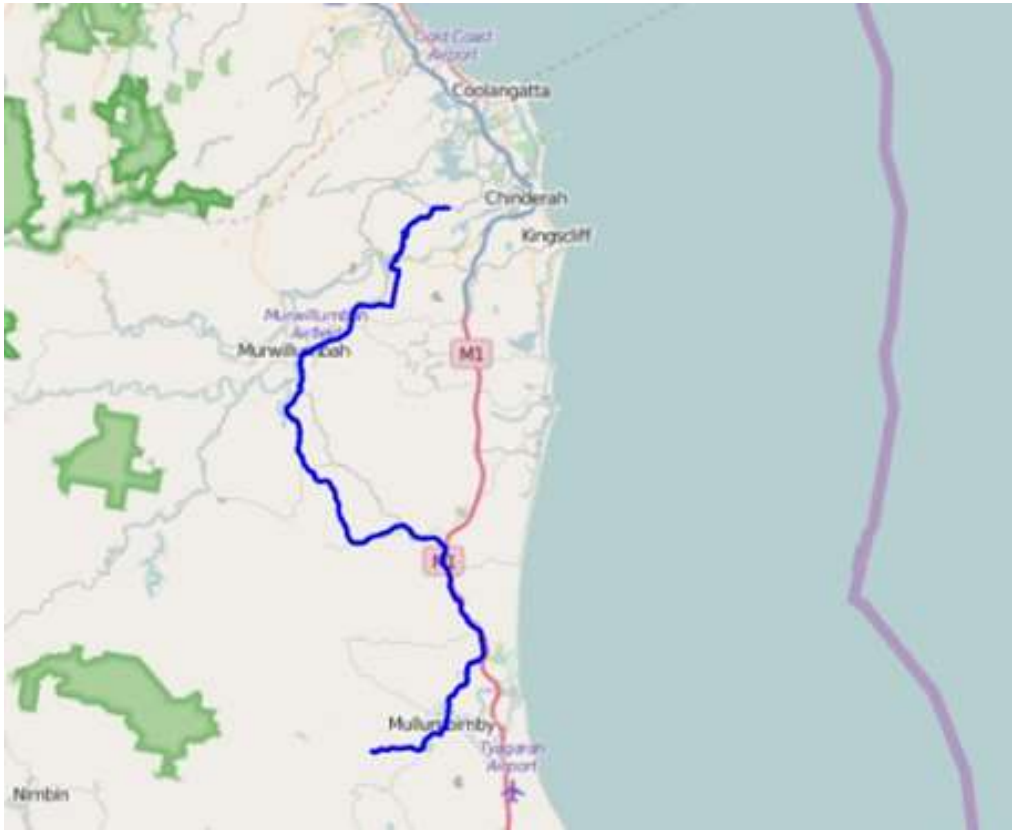


**Figure 1 – Directlink asset location and DC cable route**

A simplified single line representation of Directlink is provided in Figure 2. This diagram represents one of the three converter stations, at either end, between the connection to the AC cable (either 110kv or 132kV) and the ±80kV DC cables.

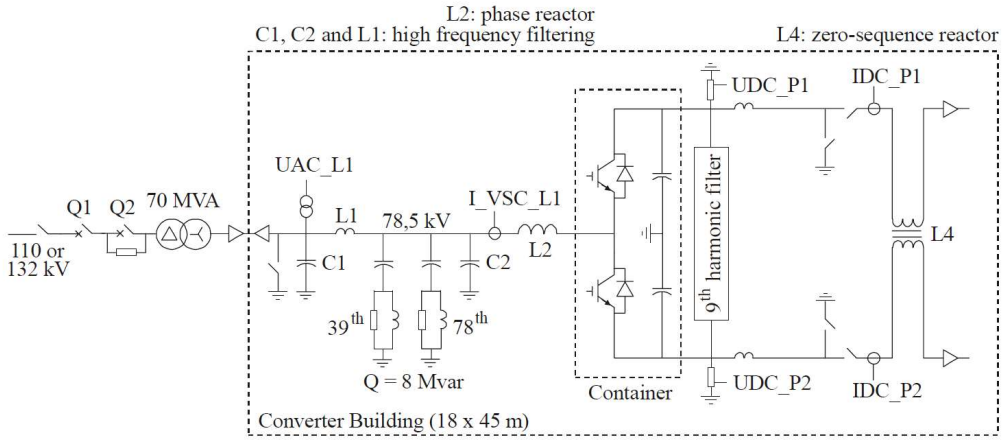


**Figure 2 – Directlink simplified single line diagram**

Within each of the two converter stations, there are a number of sub-systems and major equipment categories. Based on the asset categories, 17 asset classes have been identified on which individual asset maintenance strategies are developed and maintained. These are listed below:

1. circuit breakers
2. disconnectors and earth switches
3. power transformers
4. phase reactors
5. filter reactors (including zero sequence and DC smoothing)
6. capacitors
7. filter resistors
8. surge arresters
9. current and voltage transformers
10. wall bushings
11. IGBTs and valve enclosures

12. high voltage cables
13. control, protection and telecommunication equipment
14. fire system equipment
15. HVAC, valve cooling systems
16. auxiliary power supply
17. buildings and structures

Directlink also includes a substantial spare parts holding which are stored in a spare parts building located at the Bungalora converter station. Large spare parts are stored at an off-site warehouse facility used by APA in Eagle Farm, Brisbane. Those spare parts requiring controlled temperature/environments are stored in the air conditioned valve cooling rooms at each site.

## 1.2 Economic Regulation

A final revenue determination was published by the Australian Energy Regulator (**AER**) on 30 April 2015. The outcomes of the revenue determination are set out in the tables below.

| Year ($millions) | FY2016 | FY2017 | FY2018 | FY2019 | FY2020 |
|---|---|---|---|---|---|
| Return on capital | **7.1** | **7.4** | **7.4** | **7.3** | **7.4** |
| Regulatory depreciation | **1.7** | **1.9** | **2.1** | **2.4** | **2.6** |
| Operating expenditure | **4.3** | **3.6** | **3.8** | **3.8** | **4.0** |
| Efficiency benefit sharing scheme (carryover amounts) | **-** | **-** | **-** | **-** | **-** |
| Net tax allowance | **0.3** | **0.4** | **0.4** | **0.4** | **0.5** |
| Annual building block revenue requirement (unsmoothed) | **13.3** | **13.3** | **13.7** | **14.0** | **14.4** |
| Annual expected Maximum Allowed Revenue (smoothed) | **13.1** | **13.4** | **13.7** | **14.1** | **14.4** |
| X factor (%) | n/a | **0.0** | **0.0** | **0.0** | **0.0** |

**Table 1 – Directlink revenue determination for FY2016 to FY2020**

## 1.3 Compliance

### 1.3.1 Applicable Regulations

#### 1.3.1.1 *Legislation*

The relevant legislation that applies to the Directlink Asset includes:

- Electricity Supply Act 1995;
- Electricity Supply (General) Regulation 2014;
- Electricity Supply (Safety and Network Management) Regulation 2014;
- National Electricity (New South Wales) Act 1997;
- IPART Electricity Networks Audit Guidelines October 2017;
- National Electricity Rules;
- Work Health and Safety Act 2011; and
- Work Health and Safety Regulation 2011.

#### 1.3.1.2 *Standards*

##### 1.3.1.2.1 *Supply Quality Standards*

Directlink has been designed and is operated to meet the standards required by the National Electricity Rules. In addition, a connection agreement exists between EII and Essential Energy, specifying power quality obligations.

Performance quality is monitored against supply quality standards 24 hours a day, 7 days a week, at the Directlink control centre located in Dandenong.

##### 1.3.1.2.2 *Supply Reliability Standards*

The supply reliability standards for Directlink are set by the AER in their final decision on the 2015 Directlink transmission revenue determination.

The AER determination outlines the financial bonus/penalty in terms of cap and collar as outlined in **Table 2**. The bonus/penalties are set as a proportion of MAR which is the AER determined maximum allowed revenue.

| Parameter | Collar | Target | Cap | Weighting (of MAR) |
|---|---|---|---|---|
| Circuit outage – fault | 500.00% | 333.33% | 166.67% | 1.0% |
| Circuit outage – forced outage | 383.31% | 180.00% | 35.19% | 0.0% |
| Failure of protection system | 8 | 4 | 1 | 0.0% |

**Table 2 – Directlink service standard AER targets**

Internally set availability and reliability targets are outlined in **Table 3** and **Table 4**.

| Performance Measure | Target |
|---|---|
| Scheduled circuit availability | 99.45% |
| Forced outage circuit availability in peak periods | 99.23% |
| Forced outage circuit availability in off–peak periods | 99.23% |

**Table 3 – Directlink network management plan targets**

| Performance Measure | Target |
|---|---|
| Minimum Total System Availability | 91.00% |
| Maximum Power not transferred to daily targets | 5.00% |
| Minimum Planned maintenance to schedule | 95.00% |

**Table 4 – Directlink EII targets**

### 1.3.1.3 *Licences*

No licence is required to operate Directlink.

As a transmission line in NSW Directlink must comply with the Safety Management System developed in accordance with the requirements of the NSW Electricity Supply (Safety and Network Management) Regulation 2014.

### 1.3.1.4 *Reporting*

Directlink reports internally each month on its performance against both internal targets and the targets set by the AER. The AER also requires annual reporting of Directlink's actual performance against performance targets set in the 2015 AER determination. These results are publically available from the AER web site.

EII monthly operations report is prepared at operating business unit level and compiled at national operations level and submitted to EII.

### 1.3.1.5 *Management of Regulatory Changes*

Applicable regulations are reviewed routinely by APA.

During the last year the Independent Pricing and Regulatory Tribunal (IPART) of New South Wales has published detailed guidelines in respect to the requirements of the Safety Management System and its audits.

### 1.3.2 Risk Management

Risk management processes align with the requirements of the APA Risk Management Policy and Risk Management Handbook.

A register of integrity risks has been developed to identify any threats to the integrity of the operations and maintenance of the Directlink assets and to the ability of the asset to achieve the Service Levels detailed in this AMP.

The register is routinely reviewed and updated to ensure the continued safe and reliable operation of Directlink and achievement of the service levels.

The register has been developed in accordance with APA's Risk Management Policy to ensure that:

- appropriate systems are in place to identify all material risks that affect or could affect the integrity of Directlink;
- the impacts of identified risks are understood and appropriate mitigation measures are in place to control exposures to those risks; and
- appropriate responsibilities are delegated to control the identified risk effectively.

In assessing the risks associated with the Directlink assets, the processes set out in the APA Risk Management Handbook will apply. Where assessing conflicting risks and mitigation measures, an imminent risk to the health, safety and the environment (**HS&E**) must always be addressed with priority. Outside of HS&E, asset management decisions shall prioritise on the basis of maintaining high availability and maximising the life of the asset.

The register covers all components of Directlink, including the converter stations and AC and DC cables.

### 1.3.3 Environmental Plan

Directlink manages environmental considerations through the Operations Environmental Management plan (DL-DO-05). This plan is managed by the APA Environmental Group and is periodically reviewed. The general structure includes:

- a description of the main components of Directlink including an outline of the route and location of each component (with a brief description of the environmental resources found along Directlink);
- a description of APA's environmental emergency response procedures;
- the environmental management strategies that are employed to minimise and mitigate against environmental impacts; and
- a description of monitoring, measurement and evaluation processes including incident reporting and notification.

### 1.3.4 Emergency Plan

APA maintains an Emergency Response Manual.

There are currently four key documents related to the management of emergencies and major failures of Directlink. These are:

- 330-PL-CMP-2004 - Emergency Response Plan;
- DL-DO-05 - Operations Environmental Management plan;
- 330-PR-OM-0006 - Response to a Serious Electrical Accident; and
- 330-PR-OM-0007 - Response to a Serious Electrical Accident – External.

In addition to these procedures, which deal primarily with the safety and environmental issues associated with an emergency incident and the subsequent management, reporting and investigation of the incident, APA are committed to developing emergency plans for mitigating the impact of major events. The intent of these plans is to ensure that a process can be immediately implemented to prevent delays to the commencement of repair and replacement and to ensure any required engineering or planning has been done before the event has occurred. The major items of plant for which these plans are being developed include:

- power transformers;
- phase reactors;
- zero sequence reactor; and
- high voltage cables.

APA have implemented or are developing emergency plans to respond to natural events that threaten to affect Directlink including:

- bush fire; and
- flooding.

The purpose of this contingency planning is to minimise outages and/or downtime caused by these events and therefore to maximise reliability.

## 1.4 Key Performance Measures

### 1.4.1 Supply Performance Criteria

Annual performance measures and targets as set by AER are as follows:

| Calendar Year Performance Measure and Results | Measure | Target | CY2017 | YTD 2018 (Jan to Sep) |
|---|---|---|---|---|
| Average Circuit Outage Rate – Fault | % | 333.00% | 916.67% | 1,000.00% |
| Average Circuit Outage Rate – Forced Outage | % | 180.00% | 383.33% | 566.76% |
| Failure of protection system | No | 4 | 0 | 5 |
| Outage constraints with a marginal value > $10/MWh in a Dispatch Interval | No | 1462 | 4612 | 1,866 |

**Table 5 – Directlink performance measures and data**

**Commentary**

Wherever possible planned maintenance work is scheduled during forced outages to minimise the possibility of outage constraints with a significant market impact.

### 1.4.2 SIB Project Measurement

#### 1.4.2.1 *CY2018 Capital Works*

A reflection on the capital projects for the current year.

| Year | Forecast $000s | Budget $000s | $ Variance | % Variance |
|---|---|---|---|---|
| 2018 | 12,263 | 14,619 | 2,356 | 16.1% |

**Table 6 – Directlink capital projects review**

**Commentary**

The increase in capital expenditure is due to timing of the payment milestones for the Control System Upgrade Project.

#### 1.4.2.2 *Major Planned Operational Expenditure (OPEX)*

| Year | Description | Budget Month | Actual Month |
|---|---|---|---|
| 2018 | System 1 Annual Maintenance | August | July |

| | | | |
|---|---|---|---|
| | System 2 Annual Maintenance | August | August |
| | System 3 Annual Maintenance | September | September |

**Table 7 – Directlink major operational works**

## 1.5 Lifecycle and Technical Operating

### 1.5.1 Capital Works (Stay in Business)

| Id | Description | 2019 $000s | 2020 $000s | 2021 $000s | 2022 $000s | 2023 $000s |
|---|---|---|---|---|---|---|
| 1 | Spare IGBTs | 407 | 326 | - | - | - |
| 2 | Cable replacement program | 568 | - | - | - | - |
| 3 | Spare cable joint kits | 388 | 388 | - | - | - |
| 4 | Spare valve optic fibres | 480 | 480 | - | - | - |
| 5 | Sound dampening replacement for ventilation inlet | 11 | 11 | - | - | - |
| 6 | Site security enhancements | 100 | - | - | - | - |
| 7 | Emergency lighting | 30 | - | - | - | - |
| 8 | Cooling tower sound enclosure panel replacement | 41 | 41 | - | - | - |
| 9 | Building roof corrosion repair | 50 | 50 | - | - | - |
| 10 | Zero sequence reactor repair | 950 | - | - | - | - |
| 11 | Spares | 34 | 34 | - | - | - |
| 12 | Refurbishment works | 1,215 | - | - | - | - |
| 13 | Contingent cable route repairs / relocation | 150 | 150 | - | - | - |
| 14 | Industrial control system upgrade | 5,145 | - | - | - | - |
| 15 | Corrosion and Environmental Deterioration | - | - | 197 | 681 | 742 |
| 16 | Cable Protection and Replacement | - | - | 560 | 1150 | 550 |
| 17 | Cable Modification | - | - | 165 | 578 | 825 |
| 18 | Essential Equipment and Tooling | - | - | 100 | - | - |
| 19 | Essential Spares | - | - | 316 | 450 | 208 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 20 | IGBT Staged Upgrade | - | - | 1,122 | 5,610 | 4,488 |
| 21 | Fibres Lightguides | - | - | 1,815 | 1,815 | - |
| 22 | DC Spare Cable and Joints | - | - | 187 | 374 | 374 |
| 23 | Noise Control Improvements | - | - | 275 | 1,031 | 1,513 |
| 24 | Obsolete Systems, Equipment including Test Equipment | - | - | 471 | 938 | 755 |
| 25 | Reliability Improvement initiative | - | - | 308 | 1,271 | 1,108 |
| 26 | Stay in Business | - | - | 110 | 110 | 110 |
| | Totals | 9,569 | 1,480 | 5,626 | 14,008 | 10,673 |

**Table 8 – Directlink stay in business proposals including margin**

**Commentary**

As noted earlier, no costs in respect of the rectification/replacement of the damaged convertor station have been included in this AMP.

1. Spare IGBTs

There are several thousand IGBTs in service at Directlink. IGBTs have a failure rate above that of other HV equipment. There is an on-going need to maintain a level of spare IGBTs.

2. Cable replacement program

It is proposed to implement and expand the cable replacement program in response to cable faults. The expanded cable replacement program is expected to decreases the rate of cable failure with time and maintain the overall reliability of Directlink. The expanded replacement program will consume increased lengths of spare cable and as such will result in increased cable procurement. The procurement of spare cable has a long time period between order and delivery, therefore the proactive procurement of spare cable will reduce the risk of prolonged plant outages.

Within the current revenue determination (refer 4.2), the AER has included $88k per annum, for the cost of cable repairs, within the operating expenditure allowance. This represents the AER's estimated cost of three cable faults per annum. The quantum stated in Table 8 reflects the forecast cost of materials required for a more conservative estimate of 6 cable faults per annum, however it is noted that these faults are unpredictable in nature.

3. Spare cable joint kits

It is proposed to maintain an inventory of cable joint kits in preparedness for cable faults. These kits have long lead times between order and delivery which increases the risk of prolonged plant outages. The spare cable joint kits will ensure that repairs can be carried out swiftly reducing the risk of prolonged plant outages.

As noted above, the AER has included the cost of cable repairs within the operating expenditure allowance.

4. Spare valve optic fibres

It is proposed to significantly increase the replacement program for the valve optic fibres. Deterioration in the performance of the IGBT optic fibres has been identified during the maintenance of Directlink in recent years. The deterioration of the IGBT optic fibres is causing failure of IGBTs and is impacting the availability of Directlink, necessitating a program of work to replace the fibres with known poor performance. Replacement of all optic fibres will occur in one converter (system 1 at Bungalora) in order to confirm the performance improvement. Once confirmed this will be rolled out across all systems in future years.

5. Sound dampening replacement for ventilation inlet

Considerable rusting has occurred to the sound damping at the inlet of the barn ventilation at both Mullumbimby and Bungalora. This is starting to collapse and will result in the blocking of the ventilation shaft. As system 1 is not operating only 5 dampers are costed to be replaced.

6. Site security enhancement

This project aims to implement a combination of fence replacement and security system installation to control the risk of unauthorised entry. The Directlink Bungalora and Mullumbimby sites have experienced frequent incidents of trespassing, theft and vandalism. Improved security arrangements are required to mitigate the risk of liability in the event of a trespasser being killed or injured, and the risk of major equipment failure as a consequence of theft or other malicious damage. The Bungalora security fence was upgraded in 2011, due to the highest level of trespass and incident. The result of increased security at these sites will reduce the likelihood of trespass and incident.

7. Emergency lighting

Directlink has limited emergency lighting and illuminated exit signs. Additional lighting is required at the converter station sites to allow safe movement of maintenance personnel at night. Current building code specifications and good industry practice require the updating of emergency lighting systems for the safety of personnel that work in high voltage buildings and enclosed secure compounds.

Within the current revenue determination (refer 4.3.1), the AER did not accept this as prudent and/or efficient capital expenditure within their approved allowance. Consequently this work will only be undertaken where it is shown, via risk assessment, to be absolutely necessary.

8. Cooling tower sound enclosure panel replacement

Corrosion is present in a large number of the panels making up the cooling tower sound enclosure. The corrosion has occurred due to moisture ingress into the sound damping material. These panels require replacing to ensure the integrity of the cooling tower sound enclosure.

9. Building roof corrosion repair

The converter buildings roofs have areas of corrosion. These areas require treating to prevent the corrosion progressing further.

10. Zero sequence reactor repair

A recent audit of Directlink's critical spares identified corrosion in the core laminates of the spare zero sequence reactor. The repair requires replacement of the core. The zero sequence has a long lead time for replacement and will be installed in its current condition if required. A spare is essential to prevent prolonged outages of Directlink.

11. Spares

To maintain the high level of plant integrity critical spares has been allocated.

12. Refurbishment works

The refurbishment works are planned to ensure the ongoing serviceability of a range of ancillary equipment at the converter stations (such as fans, pumps, air conditioners). This equipment is essential to the continued reliable performance of the converter stations. The program contains numerous periodic and one-off items of expenditure.

13. Contingent cable route repairs / relocation

The Directlink cables are installed in the coastal area and associated hinterland in north-eastern NSW which is subject to greater development pressures than most other areas. There is a strong likelihood that development adjacent to the route of the cables will impact upon their safety, reliability and integrity. As the timing of this potential requirement is unknown, the total cost has been factored into the Directlink capital expenditure program on the basis of 5 equal annual amounts. However, it is noted that where this request is made by a third party operator it is reasonably likely that as least a portion of the relocation costs would be funded by that party.

Within the current revenue determination (refer 4.3.1), the AER did not approve this capital expenditure as they determined any cash outflows would be reimbursed by the relevant third party.

14. Upgrade industrial computer control system

This project aims to fully replace the Directlink control system. ABB have advised that spares for the current control system cannot be obtained. As the control system approaches the end of life, being CY2020, it is anticipated that there will be an escalating rate of failures and poor availability of spare parts. As a result, this project was brought forward to CY2018.

15. Corrosion and Environmental Deterioration

This category of capital expenditure work refurbishes the condition of various items that have deteriorated during the operating life of Directlink. The items include:

- Cooling tower sound enclosure panel replacement and corrosion inhibitor spraying.
- Converter building door repair and replacement.
- Phase reactor silencer replacement - rusting / noise.
- Barn sound damp vent inlet replacement.
- Barn roof repair.
- Transformer painting.
- CVT replacement.
- CB pole repair and refurbishment.
- Fire system equipment protection.
- Cable fault locator trailer replacement.
- Site cable tray installation & relocation of cables.

16. Cable Protection and Replacement

This category of capital expenditure work improves the security of the cables by improving the cable protection increasing public awareness of the cable location. The items include:

- Undergrounding GST cable sections.
- Improving cable route protection and risk mitigation
- Proactive relocation of the cable route.

17. Cable Modification

This category of capital expenditure work allows for the redesign and modification of the cable to reduce the frequency of cable faults. In the event that the Cable Protection and Relay Project is rejected by the AER, this project would need to widen in scope to include fault solutions to reduce the frequency of cable faults in the underground to above ground transitions.

18. Essential Equipment and Tooling

This category of capital expenditure procures equipment to facilitate the safe repair of cable faults and minimises the environmental impact of operating SF6 insulated high voltage equipment. The items include:

- Cable repair trailer
- Cable handling equipment (stands, winches)
- HV cable cutter/Earthing spike
- Repair tents
- SF6 handling gear

19. Essential Spares

This category of expenditure procures spare parts essential for the ongoing operation of the converter stations. The items include:

- Capacitors
- IGBTs

20. IGBT Staged Upgrade

This category of capital expenditure provides an allowance for a staged upgrade process critical to the ongoing reliability and operation of the converter stations. The upgrade is required due to Generation One IGBTs no longer being manufactured, and the stage of the asset in its lifecycle.

21. Fibres/Lightguides

This category of capital expenditure procures essential parts to replace degraded optic fibres in the valve chambers.

22. DC Spare Cable and Joints

This category of expenditure procures essential spares related to cable and cable joint kits. The items are critical for fault repair work and maintaining the reliability of the cable.

23. Noise Control Improvements

This category of capital expenditure work improves the level of sound emitted by the converter stations as a mitigation for future noises complaints. The items include:

- Low noise fans for cooling towers
- Low noise fans for transformers

- Additional sound barriers

24. Obsolete Systems, Equipment including Test Equipment

This category of capital expenditure work replaces obsolete equipment and systems for the ongoing reliable operation of the converter stations as a mitigation for future noises complaints. The items include:

- Valve control unit replacement
- Phase reactor cooling control improvement
- Hi pot tester, thumper replacement
- Bungalora Control Room UPS replacement
- IGBT Tester for older style IGBTs
- Auxiliary power changeover

25. Reliability Improvement Imitative

This category of capital expenditure work enhances the service provided by Directlink to the National Electricity market. The items include:

- Master controller
- Control system UPS replacement
- Communications/Network upgrades
- RTU for AEMO AGC
- Redundant control room air-conditioning
- Variable speed drives for phase reactor and cooling pumps
- Valve cooling temperature control

26. Stay in Business

This category of capital expenditure work enhances the safety and security of the converter stations. The items include:

- PLC - Concreting

- Motor Operated AC Isolators and Earth Switch
- DC isolator and Earth switch locking relocation
- Additional security cameras

**Appendix D** outlines the delivery schedule for the CY2019.

### 1.5.2 Capital Works (Growth)

Subject to economic regulatory approval the following project are considered opportunities to grow the asset base:

| Id | Description | 2019 $000s | 2020 $000s | 2021 $000s | 2022 $000s | 2023 $000s |
|---|---|---|---|---|---|---|
| | n/a | | | | | |
| | Totals | - | - | - | - | - |

**Table 9 – Directlink growth proposals including margin**

#### Commentary

No growth capital expenditure was approved by the regulator within the current Access Arrangement.

## 2 Appendix– Directlink Stay in Business Capital for CY2019

| DL SIB Capital | Jan-19 | Feb-19 | Mar-19 | Apr-19 | May-19 | Jun-19 | Jul-19 | Aug-19 | Sep-19 | Oct-19 | Nov-19 | Dec-19 | CY19 Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Spare IGBTs | | | | | 407,000 | | | | | | | | 407,000 |
| Cable replacement program | | | | 568,000 | | | | | | | | | 568,000 |
| Spare cable joint kits | | 77,600 | | | | | | 310,400 | | | | | 388,000 |
| Spare valve optic fibres | 96,000 | | | | 384,000 | | | | | | | | 480,000 |
| Site security enhancements | 100,000 | | | | | | | | | | | | 100,000 |
| Sound dampening replacement for ventilation inlet | | | | | 11,000 | | | | | | | | 11,000 |
| Emergency lighting | | | 30,000 | | | | | | | | | | 30,000 |
| Cooling tower sound enclosure panel replacement | | | | 41,000 | | | | | | | | | 41,000 |
| Building roof corrosion repair | | | | | | | 50,000 | | | | | | 50,000 |
| Zero sequence reactor repair | | | | | | | | | 100,000 | 523,000 | | 327,000 | 950,000 |
| Spares | 2,833 | 2,833 | 2,833 | 2,833 | 2,833 | 2,833 | 2,833 | 2,833 | 2,833 | 2,833 | 2,833 | 2,833 | 34,000 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Refurbishment works** | | | | 215,000 | 200,000 | 200,000 | 200,000 | 200,000 | 200,000 | | | | 1,215,000 |
| **Contingent cable repairs / relocation** | 12,500 | 12,500 | 12,500 | 12,500 | 12,500 | 12,500 | 12,500 | 12,500 | 12,500 | 12,500 | 12,500 | 12,500 | 150,000 |
| **Industrial control system upgrade** | 31,753 | 31,753 | 31,753 | 68,418 | 1,382,248 | 71,378 | 1,152,638 | 104,534 | 395,586 | 1,378,739 | 67,869 | 427,876 | 5,144,543 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Directlink Sub Total** | 243,086 | 124,686 | 77,086 | 907,751 | 2,399,581 | 286,711 | 1,417,971 | 630,267 | 710,919 | 1,917,072 | 83,202 | 770,209 | 9,568,543 |