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Directlink Revenue Determination 2026 - 30

Asset Management Plan

January 24, 2024

Document control

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Table 1.1: Revision Record

Version	Date	Updated By	Changes Made
0.1	08/11/2023	James Brandt	Initial draft
0.2			Feedback received from group discussions

Table 1.2: Review and Distribution

Name	Role	Action	Sections
Noel Power	Senior HV Power Engineer	Input	All
Shan Paramasibam	Power Systems Engineering Manager	Input	
Paul McKinnon	Team Lead - Operations and Maintenance	Input	
Shane Matthews	Regional Manager – Operations and Maintenance	Input	
Mark Allen	Regulatory Manager	Review	All

Table 4: Approvals

Name	Role	Approval	Date Approved
Annie Martyn	Asset Manager	Approved	18/01/24
Paul Alexander	GM Asset Management	Approved	18/01/24

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1. Executive Summary

1.1. Background

The Asset Management Plan (AMP) covers the planning period from 1 January 2022 to 31 December 2026 and is updated and reissued on an annual basis.

The AMP identifies the necessary actions required to optimally manage the Directlink Electricity Interconnector. The consideration of the integrity of the asset and its components is necessary to ensure Directlink remains fit-for-purpose and meets the long-term interest of customer needs.

1.2. Purpose

The objective of the 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, the Operator (being APA Operations EII Pty Ltd) has considered the approved policies and procedures of the APA Group.

The purpose of the AMP is to:

- provide a comprehensive understanding of the current management approach relating to the asset, its controls and utilisation.
- provide a platform for approval of work programs; and
- identify specific issues affecting the assets and the proposed remediation for budget consideration.

1.3. Health Safety and Environmental

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.

1.4. Reviews

The AMP is written on the basis the best-known information at the time of writing and is reviewed each year to ensure 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.

2. Asset Objective

Directlink's strategic objective is to be a prudent and efficient operator that manages asset risks to ensure safety, compliance and deliver maximum availability to realise long-term value for the community, our customer and APA.

3. Asset Description

Directlink Electricity Interconnector (**Directlink**) is a 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.

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 ± 80 kV.
- 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.

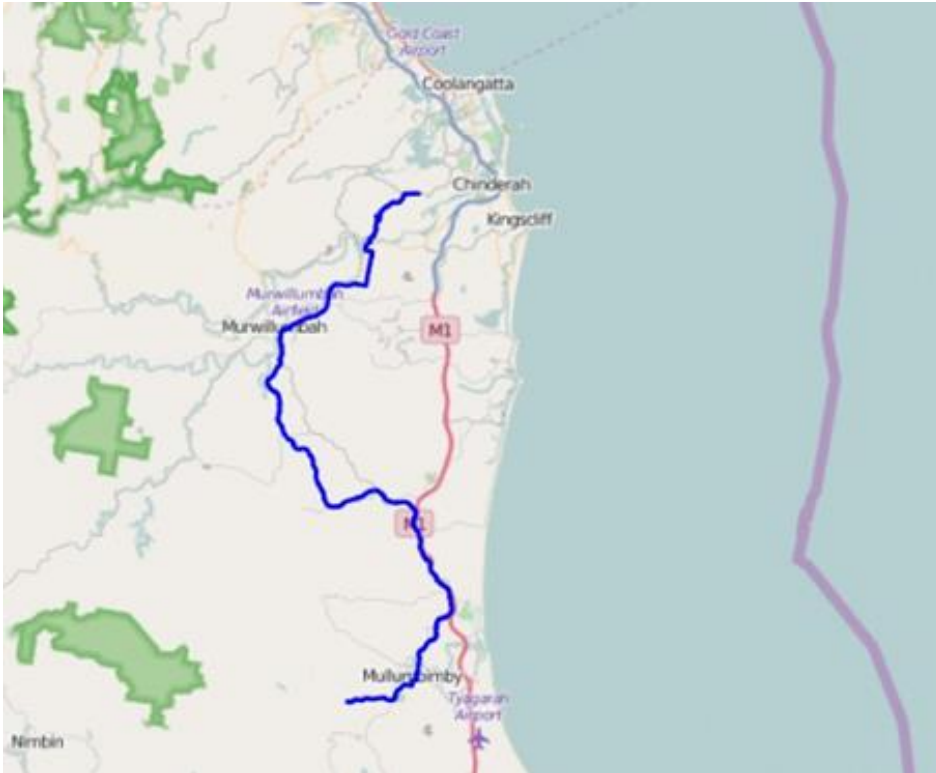


Figure 1 – Directlink asset location and DC cable route

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 ± 80 kV DC cables.

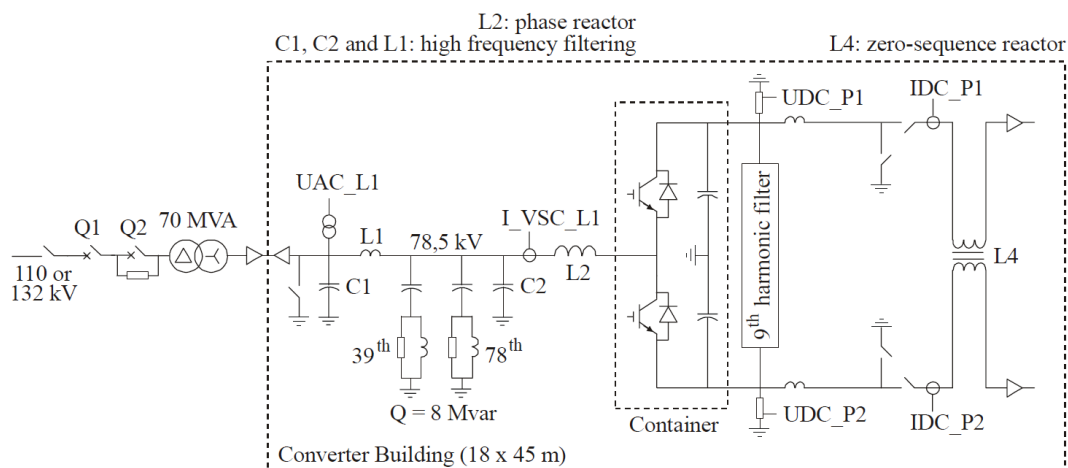


Figure 2 – Directlink simplified single line diagram

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:

- circuit breakers
- disconnectors and earth switches
- power transformers
- phase reactors
- filter reactors (including zero sequence and DC smoothing)
- capacitors
- filter resistors
- surge arresters
- current and voltage transformers
- wall bushings
- IGBTs and valve enclosures
- high voltage cables
- control, protection and telecommunication equipment
- fire system equipment
- HVAC, valve cooling systems
- auxiliary power supply
- 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.

4. Economic Regulation

During CY2023 Directlink commenced the Transmission Determination process for the FY2026 to FY2030 period. Key dates set out in the table below.

Revenue Proposal Timetable	Due Date
Regulatory Proposal	31 January 2024
Draft Decision (indicative)	30 September 2024
Revised Regulatory Proposal (indicative)	December 2024
Final Decision	30 April 2025

Table 4.1– Directlink revenue proposal process for FY2026 to FY2030

The last regulatory reset occurred on 5 June 2020. The outcomes of the FY2021 to FY2025 transmission determination are set out in the tables below.

Year (\$millions)	FY2021	FY2022	FY2023	FY2024	FY2025
Return on capital	6.6	6.6	6.5	6.4	6.3
Regulatory depreciation	3.6	4.0	4.5	4.9	5.4
Operating expenditure	4.7	4.8	5.0	5.2	5.3
Efficiency benefit sharing scheme (carry-over amounts)	-0.8	-1.5	-0.7	-0.3	0
Net tax allowance	0.2	0.2	0.1	0.1	0.2
Annual building block revenue requirement (unsmoothed)	14.3	14.1	15.5	16.4	17.2

Annual expected Maximum Allowed Revenue (smoothed)	14.3	14.9	15.4	16.0	16.7
X factor (%)	n/a	-1.57%	-1.57%	-1.57%	-1.57%

Table 4.2 – Directlink revenue determination for FY2021 to FY2025

5. Compliance

5.1. 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;
- Work Health and Safety Regulation 2011; and
- Security of Critical Infrastructure Act 2018 (Cth).

5.2. Standards

5.6.1. 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 at the APA Integrated Operations Centre.

5.6.2. Supply Reliability Standards

The supply reliability standards for Directlink are service standards set by the AER in their final decision on the 2020 Directlink transmission revenue determination and apply to FY2021 to FY2025.

The AER determination outlines the financial bonus/penalty in terms of cap and collar as outlined in **Table 3** and **Table 4**. 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	1,352%	933%	582%	0.75%
Circuit outage – forced	277%	147%	15%	0.5%
Failure of protection system	6	3	0	0.0%

Table 5.1 – Directlink service standard AER targets

Parameter	Target	Cap	\$ per Dispatch Interval
No. of Market impact Dispatch Intervals	1,189	499	\$117.7

Table 5.2 – Directlink AER market impact targets

5.6.3. Supply Performance Criteria

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

Calendar Year Performance Measure and Results	Measure	Target	YTD 2023 (Jan to Sep) [To be updated in final report]
Average Circuit Outage Rate – Fault	%	467%	600%
Average Circuit Outage Rate – Forced Outage	%	74%	100%
Failure of protection system	No	3	0
Outage constraints with a marginal value > \$10/MWh in a Dispatch Interval	No	1,189	~2,000 ¹

Table 5.3 – Directlink performance measures and data. ¹ Outage constraint count subject to finalisation as part of EY's annual review.

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

5.3. Licences

No license 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.

5.4. 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 2020 AER determination. These results are publicly 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.

The National Greenhouse and Energy Reporting Act 2007 requires that organisations triggering thresholds, as defined by the Act, report energy and emissions data. Thresholds relate to emissions of CO2 equivalent, total amount of energy produced and total amount of energy consumed. APA includes the emissions from Directlink as part of their emissions reporting.

5.5. 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.

5.6. Emergency Plan

APA has in place an Emergency Response Management Plan (320-PL-ER-0001) that applies across all of APA assets and APA managed assets, including Directlink. This plan sets out the procedures and resources to be deployed by APA personnel in the event of an emergency or security incident at Directlink.

The other key documents related to the management of emergencies and major failures of Directlink 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.
- 320-PL-ER-0016 - Bushfire Management Plan

6. Asset Lifecycle Management

The Asset Lifecycle Management process considers the scope of works required over each revenue determination period based on 5 yearly cycles. On an annual calendar year basis, APA submits a final Asset Management Plan to EII each December requesting funding approval over the following 5-years. The process to develop and prioritise projects is outlined in Asset Performance and Lifecycle Plan (section 2.4).

6.1. CY2023 Capital Works

A reflection on the capital projects for the current year.

Year	Forecast \$000s	Budget \$000s	\$ Variance	% Variance
2023	8,112	10,480	(2,368)	(23.0%)

Table 3 – Directlink capital projects review

Commentary

Full year forecast is \$2.4 million lower than budget mainly due to the lower spend on Cable Modification (\$1.3 million) with delivery of the solution to be over a longer time horizon; and Essential Spares (\$0.5 million) due to the cost of required capacitors being less than budgeted.

6.2. CY2023 Major Planned Operational Expenditure (OPEX)

Year	Description	Planned/Completed month
2023	System 3 Maintenance Program Works	April
	System 2 Maintenance Program Works	April/May
	System 1 Maintenance Program Works	May
	System 1 Maintenance Program Works	August
	System 2 Maintenance Program Works	September
	System 3 Maintenance Program Works	October
	3 system outage for CVT maintenance	November

Table 4 – Directlink major operational works

6.3. Capital Works (FY25 – FY30)

ID	Description	2026 \$000s	2027 \$000s	2028 \$000s	2029 \$000s	2030 \$000s
	Asset Monitoring	757	229	93	93	136
	Major Maintenance	1,429	1,995	2,196	2,110	869
	Safety and Protection	3,698	1,092	212	-	-
	Spares Management	1,836	1,216	1,698	1,548	6,210
	IGBTs	6,057	-	-	-	-
	Transmission Determination Costs	-	-	-	146	146
	Total	13,777	4,533	4,199	3,897	7,362

Table 6.3– Directlink stay in business proposals including margin

1. Asset Monitoring

This category of capital expenditure includes improved monitoring of asset condition through improved asset data acquisition monitoring capabilities, upgraded communications infrastructure and remote access equipment resulting in better remote support and asset optimisation capabilities.

2. Major Maintenance

This category of capital expenditure is for larger itemised preventative maintenance works. The items include;

- Cable Transitions
- Facility Cable Tray Install and Cable Relocation
- Circulating Cooling Water System Preventative Maintenance
- Reactor Cooling Reliability Improvement
- Circuit Breakers

- Fire System Updates
- Land Grading
- Major Capital Maintenance

3 Safety and Protection

This category of capital expenditure is for the cooling components of the HVDC conversion process, including cooling tower fans and the reactor cooling systems. The items include;

- Bungalora Facilities Improvements
- Bungalora Storage Facilities
- Cameras for Inspections
- DC disconnectors
- Environmental Damage from Landslips
- Fire Systems Updates
- Physical Site Security and Public Protection
- Reposition Nitrogen Tanks
- Sound Wall Earthing

4 Spares Management

This category of capital expenditure is for the spares management of critical equipment required throughout the life of the asset to maintain integrity of the asset.

An external engineering advisor has been engaged to conduct a complete review of Directlink's spares strategy, as part of the recent stakeholder engagement, feedback on the approach has also been received from external stakeholders.

There are two risks that need to be addressed; increasing lead times due to global supply issues and obsolescence of key components. Based on known improvements in sparing required, APA has estimated \$12.5 million will be required over the next transmission determination period to be spent on capital spares and storage. This may be slightly adjusted based on stakeholder feedback, the outcome of the external review and will depend on supplier quotations to inform lead times and spend phasing.

5 IGBTs

This category of capital expenditure is for the ongoing project to replace Bungalora System 1, valve room VA and VB, generation one IGBTs positions with a newer version (generation 3 IGBTs) by Hitachi.