Energy Infrastructure Investments

Directlink Joint Venture

Directlink Transmission Determination Proposal

Effective

July 2020 to June 2025

January 2019

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Glossary

Term	Definition
AARR	Aggregate Annual Revenue Requirement
ABS	Australian Bureau of Statistics
AC	Alternating Current
ACCC	Australian Competition and Consumer Commission
AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
AWOTE	Average Weekly Ordinary Time Earnings
CGS	Commonwealth Government Securities
DC	Direct Current
DNSP	Distribution Network Provider
DRP	Debt Risk Premium
EBSS	Efficiency Benefit Sharing Scheme
EGWWS	Electricity, Gas, Water and Waste Services
EII	Energy Infrastructure Investments
HVDC	High Voltage Direct Current
LPI	Labour Price Index
MAR	Maximum Allowed Revenue
NEM	National Electricity Market
NEO	National Electricity Objective
NER	National Electricity Rules
NPV	Net Present Value
Proposal	Directlink Revenue Proposal
PTRM	AER Post Tax Revenue Model
RAB	Regulatory Asset Base
RIT	Regulatory Investment Test
RFM	(Asset Base) Roll Forward Model
Rules	National Electricity Rules
STPIS	Service Target Performance Incentive Scheme

TNSP	Transmission Network Service Provider
WACC	Weighted Average Cost of Capital

Executive Summary

This Revenue Proposal for the Directlink transmission interconnector (Directlink) is submitted by Energy Infrastructure Investments Pty Limited on behalf of the Directlink Joint Venture.

The demand for Directlink's services arises from the need for energy to be dispatched between the Queensland and New South Wales regions, in accordance with AEMO's requirements. The need for interconnection capacity is increasing, and this will require Directlink's maximum available capacity to be maintained with a high level of availability.

In 2018 more than 300,000 megawatt hours of electricity flowed across the Directlink interconnector. Given electricity flows across the interconnector from the low price region to the high price region or as a result of a network constraint affecting South East Queensland this means each one of those megawatt hours resulted in lower wholesale prices for electricity consumers in the National Electricity Market.

Directlink is proposing a transmission determination revenue as set out in the table below:

Table 1-1: Directlink Transmission determination revenue ($m FY20)

	2020/21	2021/22	2022/23	2023/24	2024/25
Smoothed Revenue	15.1	15.9	16.6	17.5	18.3

There are a number of characteristics that makes Directlink unusual in the National Electricity Market. These all affect its transmission determination proposal. The factors are:

- At the time of its commissioning, Directlink represented cutting-edge 'HVDC Light' technology. The Direct Current convertor stations were connected by the longest underground cable in the world. This type of equipment is highly specialised. It also has frequency and voltage stability that are not part of a high voltage alternating current networks.
- Directlink has a finite technical life. This is reflected in its regulatory asset base which will be fully depreciated in 2041/42. The older Directlink gets the faster it will depreciate.
- Directlink's initial regulatory asset base was calculated based on the value it provided to the market, and not the cost of its construction. This means the bulk of the regulatory asset base cannot be traced to the construction cost of different component assets.

- It is a small transmission line, its 59 km long and comprises 3 parallel cables running in 3 systems between two converter stations. Due to the limited diversity of assets its capital program is very variable, single items can have an outsized effect on total capex.
- In an average year over 25 percent of its annual operating expenditure is accounted for by two items - electricity purchases and insurance. While labour costs account for around 45% of its operating expenditure.

Directlink is focused on maintaining the quality of its service while minimising the cost of providing the interconnector.

There are a number of capital expenditure projects that Directlink are proposing for the next transmission determination period that are focused on maintaining the reliability and safety of the interconnector.

Directlink uses power system semi-conductor devices – transistors – to convert alternating current to direct current for transmission via its high voltage direct current cables, and for conversion of direct current into alternating current for delivery back into the alternating current transmission network. The control and protection system that oversees the operation of the components of the convertor station including the transistors has aged and become obsolete, and has required replacement during the current regulatory control period. During the next period, the transistors themselves and supporting equipment (all of which has similarly aged and become obsolete) will require replacement

These two assets represent two significant pieces of equipment in the Directlink convertor station and the level of capital expenditure is not expected to be as high in subsequent transmission determination periods.

Directlink is not proposing significant increases in operating expenditure but is looking to forecast insurance costs separately due to forecast changes in the insurance market expected to impact directly on a material operating cost item.

The depreciation and rate of return items are consistent with the AER's approach to the calculation of these values.

Directlink is focusing on its developing consumer engagement program and recommends stakeholders read attachment 1.3 for a plain English explanation of this Directlink proposal and encourages all interested parties to attend our half day workshop in March.

Table 1-2: Directlink Transmission determination workshop

Workshop	Date
Brisbane	March 2019

To be kept updated on the transmission determination or register interest in the workshop please contact Mark Allen on 02 9275 0010 or at mark.allen@apa.com.au.

1 Introduction

1.1 About Directlink

The Directlink interconnector consists of a 59 km, 180 MW High Voltage Direct Current (HVDC) interconnect running between Mullumbimby and Bungalora in NSW, a 110kV line from Bungalora to Terranora, NSW and a 132kv line from Dunoon to Mullumbimby.

Directlink has a number of unique features that distinguishes it from the more conventional static transmission assets operated by other Transmission Network Service Providers (TNSPs):

- It is a point to point transmission line, not a network with multiple connections or direct connected customers
- The cables are exposed to direct voltages, which imposes different stresses and potential insulation breakdown mechanisms, than alternating voltage cables.
- The cables have unusual installation approaches - Directlink cables are laid primarily underground, and partly in above-ground galvanised steel tray.
- Directlink has a finite technical life, to reflect this the entire asset will be fully depreciated in 2041.
- Directlink was initially valued for regulatory purposes on the benefit it provided to the market rather than cost.

The converter stations use what was, at the time of their installation, cutting edge High Voltage Direct Current (HVDC) Light technology.

The primary equipment at the converter stations comprise:

- 132 kV power transformers;
- AC/DC converter valve banks;
- harmonic filtering and power factor correction equipment; and
- busbars and switches;

The expected service life of the primary converter station equipment is 40 years. While the DC cables have a potential service life in excess of 40 years, their useful life will be limited to that of the converter stations.

This primary equipment is supported by a number of ancillary systems, all of which are essential for the secure operation of the link:

- power system protection equipment;
- computerised control systems and communications;
- air conditioning systems (necessary for the control system equipment to function);
- power transformer oil circulation pumps and cooling fans;

- converter valve water purification and cooling equipment;
- converter hall air filtering and ventilation; and
- fire protection systems.

It is important to note that the service life of these ancillary systems is much shorter than that of the primary equipment. Various components of the ancillary systems (eg. motor contactors and bearings, fluid control valves) require major maintenance or replacement at intervals ranging from 5 to 10 years.

1.2 Directlink provides significant market benefits in excess of its cost

Directlink engaged EnergyEdge to model the market benefit provided by Directlink in terms of wholesale prices in Queensland and New South Wales. The modelling based on pre dispatch bids by generators demonstrates that for the period 1 January 2016 to 30 December 2018, the existence of Directlink provided wholesale market benefits of $1.2 billion. This is massively in excess of the cost to customers for Directlink over the same period of $40m

This analysis does include the first quarter 2017 period where flows were from the higher price market in Queensland to lower price New South Wales. This demonstrates a different type of value provided by Directlink. When there were supply issues into Northern NSW during this period, at times, it was presence of Directlink that was the difference between customers being supplied with electricity or blackouts.

1.3 Purpose of this document

This Revenue Proposal provides details of Directlink's revenue requirements for prescribed transmission services during its third regulatory control period. This period is proposed to span 5 years, from 1 July 2020 to 30 June 2025.

This revenue proposal has been developed in accordance with Chapter 6A of the National Electricity Rules (Rules)1.

During the 2020-25 transmission determination period, Directlink will require the investment program outlined in this proposal, to continue to reliably perform its role as an interconnection between the Queensland and New South Wales regions of the National Electricity Market (NEM).

1 Australian Energy Market Commission, National Electricity Rules Version 45, as at 14 July 2011.

1.4 Length of regulatory control period

Directlink's current (second) regulatory control period was for the nominal 5-year period from 1 July 2015 to 30 June 2020. Directlink therefore proposes that the length of the new regulatory control period be 5 years, from 1 July 2020 to 30 June 2025.[2]

1.5 Services provided by Directlink

Directlink enhances the transfer of active power between the Queensland and NSW regions of the NEM.

Directlink is joined through the 100kV Terranora substation connection with Essential Energy to the Queensland region of the NEM. In the NSW region of the NEM, the converter station near Mullumbimby is joined through Dunoon to the Lismore 132kV substation by overhead 132kV lines owned by Essential Energy.

As an element of the transmission network, Directlink provides prescribed transmission services to customers throughout the NEM.

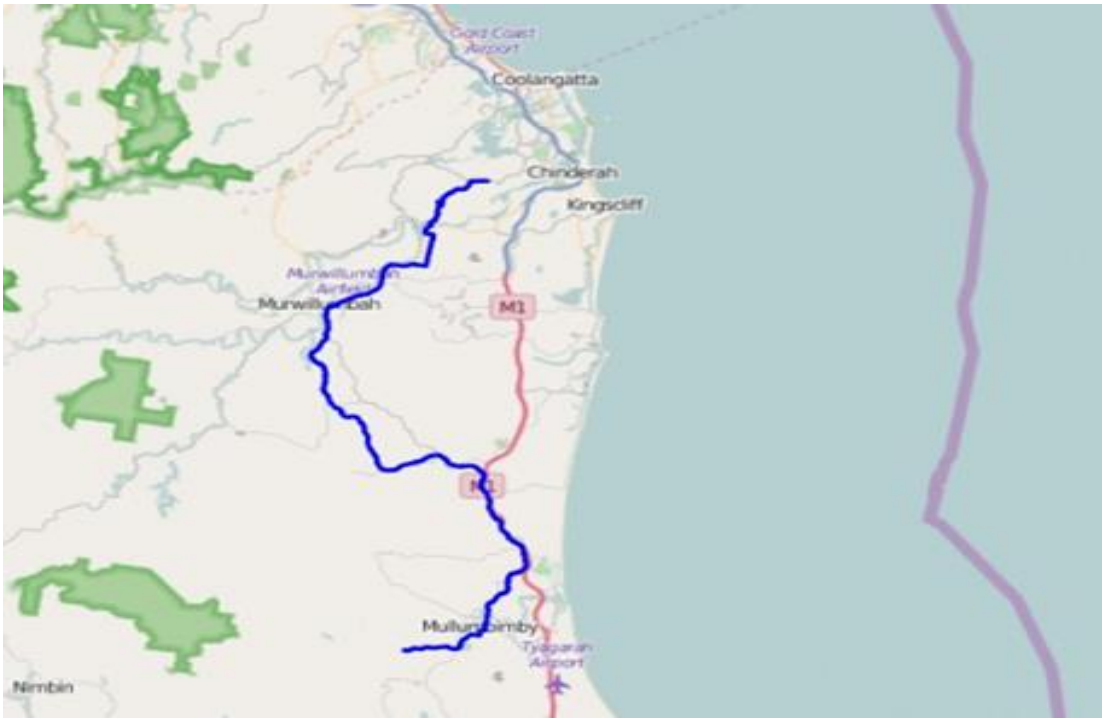
Directlink provides no negotiated services, and there are no negotiated services associated with these two connections to Directlink.

2 S6A.1.3(9) requires Directlink to propose the commencement and length of the regulatory control period.

1.6 Map of the transmission network

Figure 1-1 is a map of the location of the Directlink transmission lines. The dark blue line is the Directlink transmission network.

Figure 1-1: Directlink transmission connection



The flow in Directlink may be adjusted continuously up to its rating of 180 MW in either direction.

1.7 Structure of this document

The remaining elements of this Revenue Proposal are structured as follows:

- Chapter 2 describes the environment in which Directlink operates and the main challenges anticipated in the next regulatory control period.
- Chapter 3 describes how compliance with the requirements of the Rules and the AER's Guidelines has been met.
- Chapter 4 describes Directlink's consumer engagement strategy.
- Chapter 5 describes the historic cost and service performance.
- Chapter 6 describes Directlink's capital expenditure for the current period

- Chapter 7 outlines the calculation of the regulated asset base for the forthcoming regulatory control period, using the AER's Roll Forward Model (RFM).
- Chapter 8 explains Directlink's capital financing costs and taxation.
- Chapter 9 describes the capital expenditure forecast.
- Chapter 10 describes the operating expenditure forecast.
- Chapter 11 describes the depreciation allowance.
- Chapter 12 presents the revenue needs for the 2020-25 regulatory control period, calculated using the AER's Post-Tax Revenue Model.
- Chapter 13 presents the Incentive Schemes for Directlink (STPIS, CESS and EBSS).
- Chapter 14 explains set out a Pricing Methodology and a Negotiating Framework are for Directlink.
- Chapter 15 outlines additional legal obligations that EII is required to meet in this document

To assist the AER in assessing the compliance of this revenue proposal with the National Electricity Rules, Directlink has provided a compliance checklist in 15.3 of this Proposal. This checklist cross-references the relevant Sections of this Revenue Proposal and the attachments that address each Rule and RIN requirements.

2 Business environment and key challenges

2.1 Introduction

This revenue proposal demonstrates how Directlink expects to continue providing a flexible and cost effective transmission service in the NEM, whilst maintaining levels of service availability.

Directlink's capital and operating costs are driven by the business and natural environment in which it operates.

2.2 Directlink's operating environment (factors affecting costs)

2.2.1 Natural Environment

The natural environment that Directlink operates in is challenging.

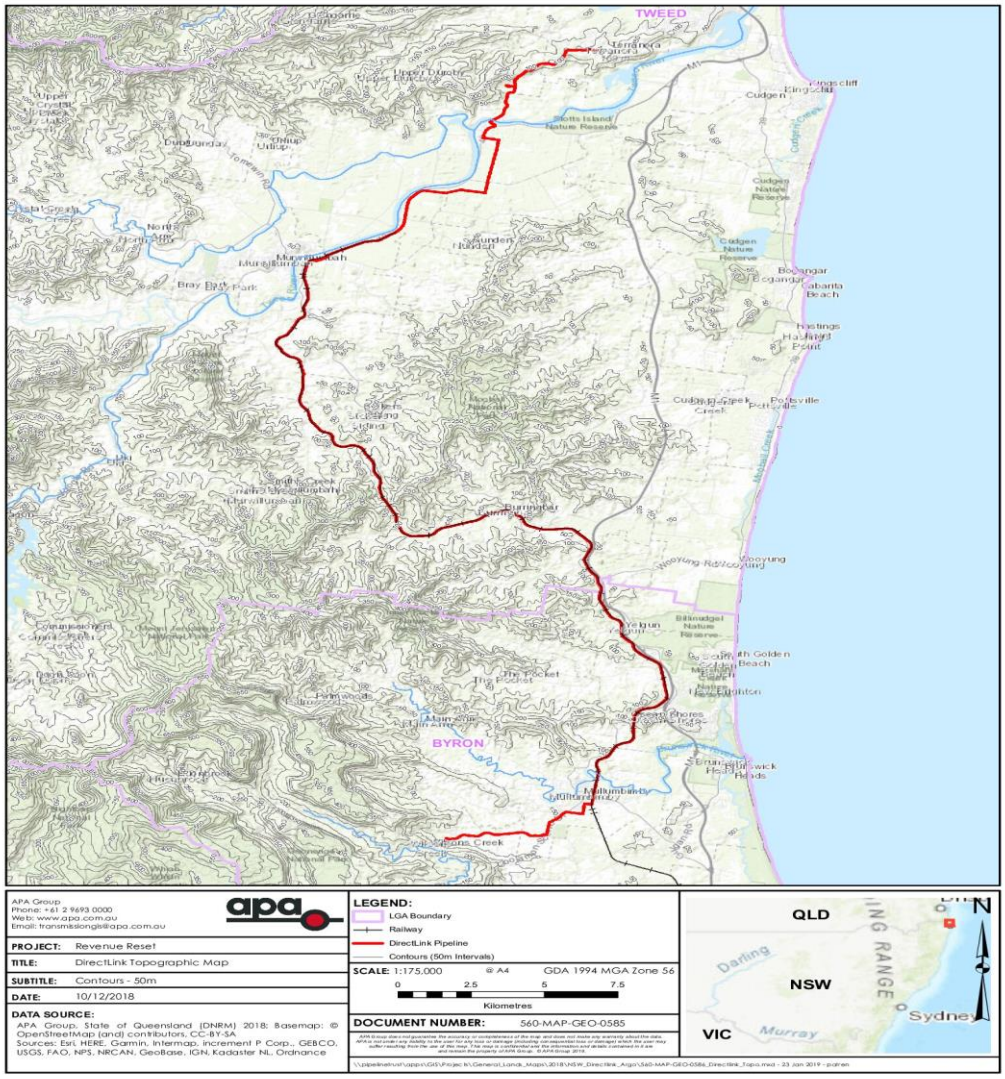
The area has high rainfall. Mullumbimby averages over 1800mm a year (climate-data.org, 2019). This compares to just over 1200mm in Sydney and 1000mm in Brisbane (Bureau of Meterology, 2019).

In some locations Directlink's easement is surrounded by dense vegetation which leads to issues of access to the easement and the above ground sections of the cable. The dense vegetation can be seen in the picture below.

Figure 2-1: Directlink galvanised steel tray

The terrain approaching the easement is rough as can be seen in the map below. Directlink runs from just North West of Byron Bay, to just south-east of Murwillumbah to just north-west of Kingscliff.

Figure 2-2: Topographic map of Directlink



In addition there are 124 water crossings and 17 tunnels in the 59kms. All of which required engineering solutions to address, each of which represents a point of reliability weakness for the transmission lines[3].

In addition due to the nature of the rainfall in the area, the water levels in the creeks are highly variable resulting in threats of flooding again a risk to the

[3] An engineering study performed for Directlink has identified that temperature changes in the cable when it enters and leaves the ground are a common source for cable failures.

reliable operation of the network if the flooding occurs in areas where the cable is above ground (see section 6.2.2).

2.2.2 *Technological environment*

Directlink is HVDC light technology. The convertor stations and the HVDC cables are designed to operate as a single system. Much (but not all) of the equipment, and the software which controls its operation, is proprietary technology; it is the intellectual property of ABB. This interconnected nature mean that any individual piece of this equipment must be capable of operating flawlessly with the other equipment.

This technical integration has the effect of making it very expensive to select equipment from another supplier other than the original equipment manufacturer as:

- In order to participate in any tender alternate manufacturers have to undertake detailed design work to make sure their equipment can be engineered to be compatible with the existing equipment (or risk making expensive losses on the project) then face the prospect of not winning the tender
  - EII could compensate the alternate tenderer/s for their pre design engineering costs to encourage them to compete in the tender. but paying engineering costs is expensive and the resulting cost of the tender may be greater than the cost savings compared to provision by ABB noting that due to the advantage of its access to equipment that definitely works in conjunction with the rest of the converter station ABB has an advantage in the tender.
- Directlink could get some engineering resources "in house" to design systems that could permit equipment from different manufacturers to work together. However, the savings from this approach are difficult to quantify and the cost can be estimated to a reasonable level of accuracy as it is the recruitment of additional staff.
  - When EII proposed moving part way down this path at the last Directlink Transmission Determination it was rejected by the AER on the basis EII had been unable to demonstrate it was economically efficient.
- Directlink could move to a different manufacturer for all significant equipment. This would require the replacement of functional ancillary equipment. Further, all the new equipment would be the new manufacturers' intellectual property exposing EII to the same issue with a new manufacturer and the upfront cost of replacing multiple pieces of currently operational ancillary equipment.

EII is exploring options which manage those elements of the risk of future costs, this includes managing the scope of any replacement carefully. EII is also exploring contractual arrangements with ABB which transfer the risk of

obsolescence or breakdown to the asset provider. However, these arrangements will only be undertaken where it is the efficient option for the ongoing operation of Directlink.

Where generic equipment is used - as in cooling and fire suppression systems – EII seeks to ensure that the maintenance and replacement of that equipment id sourced through competitive processes.

2.2.3 *A maturing asset base*

Directlink is middle aged. It was commissioned in 2000 and the converter stations are expected to continue to operate until 2041/42. However, the converter stations are made up of a range of equipment that have different life expectancies. Individual cable joints are only expected to have a relatively short life and require frequent replacement, the control and protection system is expected to last 15 years and the cables can be expected to last 50 years (which is beyond the operational life of Directlink).

An asset has reached the end of its life either when the cost of ongoing maintenance is greater than the cost of replacement or when it is no longer technically possible to maintain the equipment.

In the case of certain pieces of equipment the latter point will be determined by the ability and commitment of ABB to support equipment. With all equipment there comes a point where it is not practical commercially or technically to support equipment. Eg when parts are no longer available or maintenance is higher than replacement. When it becomes impossible to locate spares to continue the ongoing operation then equipment is obsolete. Examples of this are the control and protection system and the IGBTs.

2.2.4 *Regional development*

Directlink has an obligation to maintain standards of public safety. There is increasing public use of sites near Directlink. This encroachment of public activity next to or in the vicinity of the asset access is expected to increase materially in the next transmission determination period.

The Mullumbimby area, due to the appeal of its location and natural attributes, is undergoing substantial ongoing development. The estimated population of the Mullumbimby area has increased by 10% since 2012. (.idcommunityresources, 2019) Inevitability as population density increases what was previously acceptable practices and operations for industrial operations become no longer acceptable. Directlink is experiencing an increased number of noise complaints in relation to the operation of the converter stations.

Parts of the path of the Directlink transmission cables are along the easement for the former railway line corridor.

The Tweed Shire Council is undertaking the Northern Rivers Rail Trail along this rail corridor. The first stage of the trail is from Murwillumbah to Crabbes creek. The project has received $13m funding from the Federal and State Governments.

The Rail Trail will provide access to pedestrians and cyclists to the existing rail corridor.

The council is currently considering options of building the trail on the existing tracks or in adjacent land.

The construction of the Northern Rivers Rail Trail will impose a significant construction program adjacent to the above ground cable section in particular and following construction, will increase public access well beyond what was anticipated at the time of construction.

This is particularly problematic in that 14 kms of the Directlink cables are above ground. It is difficult to prevent intentional or unintentional interference with the high voltage DC cables inside the galvanised steel trays. Directlink's proposal to address this issue is discussed in more detail in section 9.6.

2.2.5 Labour costs

Like all other electricity networks Directlink operation relies on access to highly qualified staff. Labour costs reflect the level of competition from sectors seeking access to staff with the same skills such as the infrastructure, mining and resource sectors. While the forecast operating expenditure in this proposal reflects relatively modest increases in real labour costs compared to previous years this is subject to wages and salary competition from these competing sectors remaining modest.

2.3 Directlink's role and obligations

The National Electricity Rules require Directlink to identify its role and obligations.

Directlink is registered as a TNSP in the NEM under National Electricity Rule 2.5.1 and must comply with all obligations imposed on it by the National Electricity Law and Rules. These obligations require Directlink to operate as an efficient regulated network service provider and comply with the transmission network and technical performance standards (e.g. planning, design and operating criteria).

Directlink and its maintenance service providers are also subject to numerous other environmental, cultural heritage, planning approval, workplace health & safety, financial and other regulatory obligations or requirements under a range of federal, state and local government legislation, codes, standards, policies and other instruments in New South Wales.

The main legislative and statutory obligations that Directlink must meet are referenced throughout the proposal and in the supporting documentation.

Directlink is also required to meet legal obligations that arise out of common law such as contractual and tort law.

2.4 Meeting customer demand

Directlink is an integral part of the transmission system that forms the NEM. The demand that is placed on its network services arises from the requirement for energy to be transported between the NSW and Queensland regions, to minimise the overall costs of electricity production in the NEM.

Directlink's transmission network services must therefore remain available at their maximum available capacity and with a high level of availability, throughout the 2020-25 regulatory control period.

3 Operating and capital expenditure compliance

3.1 Introduction

This proposal has been prepared to comply with the requirements of the Rules and the AER's Regulatory Information Notice.

This chapter describes Directlink's governance and compliance arrangements. Specific compliance requirements are also set out in the following chapters of this proposal.

3.2 Expenditure governance

An excerpt from the EII Asset Management Plan (AMP) forms attachment 3.1 to this proposal and this underpins the associated capital and operating cost forecasts.

Also contained in the AMP is a description of the processes that are used to establish the risks associated with each asset and, from that, determine the required activity. Adherence to specific plans is required and these include:

- Environmental Management Plan;
- Emergency Response Plan; and
- Safety and Operating Plan

Directlink capital and operating expenditures are subject to an annual budgeting process and to close scrutiny by the shareholding entities.

This asset management plan underpinning this transmission determination proposal was approved by the EII Board.

3.3 Cost allocation

The Cost Allocation Methodology for Directlink and Murraylink was originally approved by the AER in July 2008. In December 2008, the Directlink and Murraylink assets were sold by the APA Group to the Energy Infrastructure Investments Group (EII Group). The EII Group subsequently applied to the AER for the approval of minor amendments to the Methodology. In March 2010, the AER approved this revised Cost Allocation Methodology[4].

4 Australian Energy Regulator, Final decision - Electricity Transmission Network Service Providers - Directlink & Directlink amended Cost Allocation Methodologies, March 2010.

In preparing the operating and capital expenditure records and forecasts accompanying this Proposal, Directlink has used the approved Cost Allocation Methodology on both a historical and prospective basis. This document is submitted as attachment 3.2 to the Proposal.

The Cost Allocation Methodology and related procedures are regularly reviewed to ensure compliance to statutory, taxation and regulatory requirements while meeting Directlink's business reporting needs.

Consistent with the requirements of the Regulatory Information Notice, the Directors' Responsibility Statement that accompanies this proposal as attachment 16.1 certifies that historic expenditure is presented fairly and in accordance with the Cost Allocation Methodology.

3.4 Interaction between operating and capital expenditure

The Rules[5] require that a revenue proposal identify and explain any significant interactions between capital and operating expenditure.

Directlink, as previously noted in section 1.1, is unlike a conventional transmission business in that it comprises a single transmission line, albeit one employing advanced technology. Directlink is only forecasting capital expenditure associated with a limited number of capital expenditure projects mainly associated with maintaining the reliability of the interconnector.

Moreover, maintenance activities are currently carried out by a principal contractor, in accordance with a long-term agreement. It is proposed that this will remain the case.

No proposed capital project has been identified that would involve a significant interaction between capital and operating expenditure.

3.5 Capitalisation policies

Directlink's capitalisation policies are the same as those approved by the AER in the previous Directlink transmission determination final determination, and have not changed during the current transmission determination period. Nor, at this time, is Directlink proposing to change its capitalisation policies during the next transmission determination period.

5 Chapter 6A, schedule S6A.1.3(1).

3.6 Related parties

Directlink confirms that there are no material related party transactions whose costs are attributed to prescribed transmission services. All related party transactions are made on normal commercial terms and conditions and on an arms-length basis. All transactions are also consistent with Directlink's cost allocation methodology and are disclosed in the annual regulatory financial statements in accordance with the AER's Information Guidelines.

3.7 Regulatory accounts

Directlink maintains a set of regulatory accounts which it uses to submit to the AER annually in compliance with the obligations the AER places on it. These accounts and reports are audited by an external auditor. These accounts form the basis for this submission.

4 Consumer engagement

4.1 Introduction

EII has commenced a stakeholder engagement process for the Directlink and Murraylink interconnectors. While EII has always engaged with its customers it has had more limited engagement with the broader set of stakeholders made up of representatives of end consumers, regulators and governments. EII has embraced, albeit recently, a changed approach and is broadening its stakeholder engagement.

EII engaged Newgate Research to advise on developing a suitable stakeholder engagement process.

EII recognise there is further work to be done to successfully implement a stakeholder engagement process for both Directlink and Murraylink. Stakeholder engagement to date on Directlink reflects the relatively recent commencement of this broader stakeholder engagement in late 2018.

4.2 Rules and guidelines

Under the National Electricity rules a network is required to describe how they have engaged with electricity consumers and sought to address any relevant concerns identified as a result of that engagement.

The AER's guideline identifies the best practice principles for engagement.

4.3 Engagement to date

In order to identify expectations about future stakeholder engagement EII contracted Newgate Research to undertake research into stakeholder expectations and to obtain feedback on consumer engagement to date. This feedback has been instrumental in EII recognising the need to amend its practice and embrace meaningful consumer engagement that has the following characteristics:

1. early and more frequent engagement on regulatory submissions
2. engage on an on-going, business-as-usual basis with its stakeholders
3. conduct a stakeholder deep dive (half-day workshop)
4. undertake ongoing Stakeholder Perceptions Research
5. Produce plain English reporting
6. Publish a stakeholder engagement framework
7. Affected Landowners Research & Engagement

As part of its implementation EII has also conducted a number of one on one meetings with key stakeholders prior to the submission of this proposal[6]. The purpose of these meetings were to introduce Directlink to these stakeholders, brief them on the key issues being faced by Directlink, what to expect in this proposal and the approach to stakeholder engagement that EII is proposing to adopt both as part of the Directlink transmission determination and over the longer term for both Directlink and Murraylink.

EII recognise that these meetings are not a substitute for earlier engagement with stakeholders but recognising that broader stakeholder engagement is in the early stages of implementation and the timing of the Directlink transmission determination proposal it is EII's view that early one on one engagement is preferable to waiting until an engagement approach is fully formed before commencing.

EII is also continuing the ongoing engagement with AEMO, Transgrid. Powerlink and Essential Energy in relation to the technical operation of the Directlink asset.

As part of this proposal EII has produced a user friendly plain English document to accompany this proposal document as part of its commitment to produce plain English reporting.

4.4 Further stakeholder engagement work

The long term intention of EII is to develop a stakeholder engagement framework that meets the best practice principles outlined by the AER.

This will include identifying representatives of the key stakeholder cohorts and engaging with them on an ongoing basis. This will involve periodic meetings and updates focused on receiving feedback on the issues that Directlink faces as they arise and incorporating that feedback into the management decision making processes of the organisation. This process will commence in 2019.

The key cohorts for stakeholder engagement are:

- Direct users and connected parties;
- Residential consumers of electricity;
- Business and Industrial consumers of electricity;
- Landholders and the local community near Directlink;
- Governments (Federal, State and Local); and

[6] EII approached a number of other key stakeholders but due to the proximity of the Christmas/New Year break mutually available times could not be co-ordinated or the key stakeholders were not available.

- Regulators (AER, AEMC, AEMO and ECA).

Recognising that for residential, business and industrial consumers that there is diversity within these cohorts, EII is of the view that engagement with representatives of these groups is a more efficient means to engage with these groups than attempts to get representative views across the cohort directly. This is consistent with the feedback that EII has received from stakeholders to date. However, EII welcomes any views in relation to its proposed approach.

In contrast, given the number of issues that arise for Directlink with a direct impact on the local community, EII is proposing to continue to engage directly with the local community and landholders. Examples of these relevant issues are the capital expenditure programs to address noise levels, ensure public safety and protection of the high voltage cables (see sections 9.6.2 and 9.6.11)

EII will continue to engage with stakeholders to determine the nature and form of stakeholder engagement appropriate. The feedback will be incorporated in adjustments to engagement going forward. It is EII's view that stakeholder engagement for Murraylink and Directlink will be an iterative process that could result in different approaches evolving for each asset depending on stakeholder needs.

In addition to direct approaches and workshops, EII will create a website that operates as a portal for stakeholder engagement, in particular focusing on enabling engagement from a wider section of the community than the key representatives identified above. This will include updating the EII website to provide more up to date information and updates on the activities of EII in relation to Directlink and Murraylink.

Once an approach to ongoing stakeholder engagement has been developed, including the necessary internal EII changes to support the engagement, EII will publish and consult on formalisation of the approach in a Stakeholder Engagement Framework document.

4.5 Engagement and this proposal

There have been three key takeaways by EII from our consumer engagement to date:

- There is strong support for improvement in this area from stakeholders contacted.
- In the future engagement needs to commence further in advance of the submission.

- There are a number of areas that stakeholders are keen to engage on which will benefit from that engagement even though the transmission determination process has commenced.

In response to this, EII is proposing to continue to implement its broader stakeholder engagement program in line with the recommendations from Newgate Research.

In recognition of the need to commence stakeholder engagement earlier and to build it into the decision making of the interconnector before a transmission determination period, the ongoing consultation during this transmission determination period will feed into the next Transmission Determination proposal from Directlink.

In particular as noted in section **Error! Reference source not found.** EII will be conducting a half day workshop on the Directlink transmission determination process. While the content to be considered at the workshop is still subject to feedback from stakeholders it will proposed to cover the following topics:

- Directlink's role in the National Electricity Market
- Risk management and Directlink's major equipment with a focus on the IGBTs
- Improving total system availability of the Directlink interconnector Communication – how would stakeholders like to be engaged

The roll out of the full stakeholder engagement program will take some time.

4.6 Workshop

As an interim measure for the purposes of the Directlink Transmission Determination, EII has attempted to engage with key stakeholders in the lead up to the proposal on the basis outlined in section 4.3.

EII will also be hosting a half day workshops in relation to the proposal. The details of these workshops are set out in the table below.

Table 4-1: Directlink Transmission determination workshop

Workshop	Date
Brisbane	March 2019

If you are interested in being kept informed on progress of the transmission determination or the workshop please contact Mark Allen on 02 9275 0010 or at mark.allen@apa.com.au.

It is expected that feedback received will be made available to the AER to form part of its draft determination and will be reflected in Directlink's revised proposal.

5 Historic cost and service performance

5.1 Introduction

This chapter presents a review of Directlink's historical operating costs and service performance, during the current transmission determination period.

Audited results are available and have been quoted for the three years from 2015/16 to 2017/18. An estimate has been used for 2018/19 and 2019/20. These costs are contained within the AER's Regulatory Information Notice template, which forms attachment 1.1 to this proposal. There is no difference from the material provided in the Regulatory Information Notice template and material previously provided to the AER.

This analysis includes the comparison of Directlink's capital and operating expenditure outcomes against the AER allowance.

This is followed by a review of performance under the AER's Service Target Performance Incentive Scheme (STPIS).

In order to undertake significant works Directlink needs to be taken offline in a "planned outage". In response to increased demand on the network and environmental factors including excessive temperatures AEMO have requested a hold on further planned outages from January to April. As all TNSPs will have a backlog of works at this time, it is difficult to forecast if the necessary planned outages post April will be delayed as well. This has affected Directlink's proposed capital works programs for the 2019 financial year with some capital expenditure being delayed. If further delays are requested this could result in the timing of capital expenditure between financial year 2020 and 2021.

5.2 Historic operating expenditure

Table 5-1 below sets out the actual incurred and estimated operating expenditure against the AER's forecast from the last revenue determination.

Table 5-1: Historic operating expenditure compared to AER forecast operating expenditure ($m FY20)

	FY16	FY17	FY18	FY19 (e)	FY20 (e)	Total
AER Forecast	4.4	3.6	3.7	3.7	3.7	19.1
Actuals	3.8	4.0	4.3	4.5	4.5	21.0
Difference	-0.6	0.4	0.5	0.8	0.8	2.0

The actual operating expenditure has risen from 2015/16 to 2017/18 by around $0.4m. The main expenditures that increased over that time period were for contractors and labour, which reflected the increase in the amount of operations and maintenance occuring on Directlink, and the cost of electricity bought to run the converter stations. Together these account for $0.3m of the difference.

5.2.1 *Movements in provisions*

Directlink does not have any provisions in its historic or forecast capital expenditure or operating expenditure.

5.3 Small scale incentive scheme

Directlink does not have a small scale incentive scheme and consistent with the AER's Framework and Approach paper, Directlink is not proposing one.

5.4 Historic service target performance incentive scheme

The table below sets out Directlink's performance against the AER's Service Target Performance Incentive Scheme. This data is produced on the same basis as the AER's Service Target Performance Incentive Scheme.

Table 5-2 STPIS outcomes

	AER Target	2015	2016	2017	2018
Circuit outage rate - fault	333%	633%	700%	1133%	1000%
Circuit outage rate – forced	180%	233%	233%	100%	67%
Failure of protection system	4	4	4	0	2

Table 5-3: STPIS outcomes – Market impact

	2016	2017	2018
Market Impact Parameter	921	4395	4758
AER Target	1462	1462	3105

5.5 Efficiency benefit sharing scheme

Directlink is subject to the AER's Efficiency Benefit Sharing Scheme (EBSS). The operating expenditure for the comparison to the AER's target is set out in Table 5-4. It is worth noting that the 2018/19 actuals is a forecast. It will be

corrected prior to the revised proposal as these results are not finalised until October each year.

Table 5-4: EBSS operating expenditure ($m FY20)

	FY16	FY17	FY18	FY19
AER Allowance	4.5	3.7	3.8	3.7
Actuals	4.4	4.1	4.5	4.7
EBSS operating expenditure	0.1	-0.4	-0.7	-1.0

This table does not make any adjustments to the proposed approach to calculating the EBSS for the current period.

The impact on Directlink's revenue for the forecast regulatory control period is set out in Table 5-5.

Table 5-5: EBSS outcomes ($m FY20)

	FY21	**FY22**	**FY23**	**FY24**	**FY25**
Efficiency Benefit Sharing Scheme	-0.7	-0.8	-0.3	0.0	0.3

6 Historic capital expenditure

This chapter sets out the historical capital expenditure performance. The historic capital expenditure for Directlink is set out in Table 6-1. This table also compares it to the AER's forecast for the same period.

Table 6-1: Capital expenditure for the current transmission determination period compared to AER forecast ($m nominal)

	FY16	FY17	FY18	FY19 (e)	FY20 (e)	Total
Actual						
Expansion	-	-	-	-	-	-
Replacement /refurbishment	3.95	3.34	9.97	7.62	6.82	31.69
Non-network	-	-	-	0.23	0.04	0.27
Total	3.95	3.34	9.97	7.85	6.86	31.96
AER Forecast						
Expansion	-	-	-	-	-	-
Replacement /refurbishment	6.92	1.94	1.97	2.86	15.07	28.75
Non-network	-	-	-	0.23	0.04	0.27
Total	6.92	1.94	1.97	3.09	15.10	29.02
Difference						
Expansion	-	-	-	-	-	-
Replacement /refurbishment	-2.97	1.40	8.00	4.76	-8.24	2.95
Non-network	-	-	-	-	-	-
Total	-2.97	1.40	8.00	4.76	-8.24	2.95

Under National Electricity Rule S6A.2.2A the AER may review the historic capital expenditure and exclude any capital expenditure from the regulatory asset base to the extent that the sum of capital expenditure for the review period exceeds the AER's forecast for the period and does not satisfy the Capital Expenditure Criteria.

The commencement date for these provisions is the start of the current transmission determination period. This is based on the AEMC's amendment to the rules in their final determination the AEMC state

> *"Given the relatively small size of Directlink, the Commission has decided not to subject it to the same transitional arrangements that have been proposed for both the 2014 and 2015-2016 groups of NSPs. The new rules will therefore apply to Directlink from the commencement of the next regulatory period." (AEMC, 2012)*

The capital expenditure incurred in the period 2015/16 to 2017/18 was $17.3m, the AER's allowance for this period was $10.8m so there was $6.5m of capital expenditure in excess of the AER's forecast.

6.1.1 *Historic capital expenditure compared to the AER's forecast*

Under rule S6A.2.2A the AER may determine to reduce the amount of historic capital expenditure for a review period that may be added to the capital based where one of the following requirements is satisfied.

- Overspending requirement
- Margin requirement[7]
- Capitalisation requirement[8]

Table 6-2 shows that Directlink's capital expenditure for the review period exceeds the AER's forecast.

Table 6-2: Capital expenditure and AER forecast in the review period ($m nominal)

	2015/16	2016/17	2017/18	Total
Actuals	3.95	3.34	9.97	17.25
AER Forecast	6.92	1.94	1.97	10.83
Difference	-2.97	1.40	8.00	6.43

This difference is explained by the timing difference in a single project, the replacement of the control and protection system ($6.73m difference between actuals and forecast).

[7] All Directlink's capital expenditure is undertaken on an arm's length basis.
[8] All capital expenditure for Directlink is consistent with its capitalisation policy and is the same as for its financial accounts.

The replacement was due to the obsolescence of the control and protection system on this generation of HVDC converter stations. This meant that there were a number of networks internationally that were seeking to replace their control and protection systems.

ABB informed EII that there was not sufficient time to replace all the control and protection systems internationally before support was withdrawn and that work would be undertaken on a "first come first served" basis.

Therefore, in order to ensure continuity of services EII signed a contract with ABB that meant the control and protection system for Directlink would be replaced before support was withdrawn. This brought forward the expenditure on the replacement.

Across the current transmission determination period the expectation is that the total expenditure for the control and protection system replacement will be very similar to the AER's forecast. Expenditure on the control and protection system to the end of financial year 2020 is forecast to be -$16,000 or -0.1 percent different from the AER's forecast.

6.2 Differences between AER forecast and Directlink actuals

This section sets out the projects where there was a material divergence between the AER's forecast for the current transmission determination period and the actual's incurred or forecast. For practical purposes in this context "material" has been defined as projects where the difference between the forecast and the actuals is greater than 15 percent[9] and where that difference is greater than five percent of the total difference between the AER's forecast and actual expenditure. The projects are organised in terms of size difference with the AER's forecast in the current transmission determination period.

9 This is inside the standard contingency that APA would add to a project for its own business purposes recognising the level of accuracy of the forecast undertaken for the AMP. It is therefore a good proxy for an amount where it is meaningful to explain divergences between forecast and actuals.

The 15% contingency is only used for the purpose of determining material differences. There was no contingency cost added to the total project expenditure for any project in the current transmission determination or included in the forecast capital expenditure for the next transmission determination period

6.2.1 *Phase reactor cooling revision project*

In the business case for the current transmission determination period EII identified that the phase reactor cooling design requires changes to address on-going damage caused by partial discharge. The current design uses a fibreglass dome and fibreglass ducting to direct air into the reactors. This design, known as the "Igloo Solution", has demonstrated on-going partial discharge across the fibreglass surfaces due to the electrical stress under which they operate. The proposed design change increases the air gap around the phase reactor coils by removing the fibre glass dome and ducting and therefore removing this partial discharge path. This design change was made by ABB to a similar plant in Gotland Sweden. This design, known as the "Gotland Solution", has been proven to eliminate partial discharges in the Gotland plant.

The project was forecast to include:

- Removal of redundant fibreglass domes and ducting and the installation of new fibreglass caps;
- installation of an air barriers at the base of each reactor;
- Installation of a "T/Guard" temperature monitoring system to control the operation of the cooling fans based on the measured temperature of the reactor;
- Modification of the exhaust air ducting from the side of the phase reactor EMC shielding enclosure;
- Sealing of the EMC shielding enclosure

As can be seen in Table 6-3 this project commenced in the previous transmission determination period but while there was a $1.2m difference in the current transmission determination period overall the capital expenditure was very close to that forecast by the AER.

Table 6-3: Capital expenditure Phase Reactor Cooling ($m nominal)

	2014/15	2015/16	2016/17	2017/18	2018/19 (e)	2019/20 (e)	Total
Actual Capital Expenditure	1.05	0.37	1.23	2.02	-	-	4.66
AER Forecast Capital Expenditure	2.19	2.46	-	-	-	-	4.65
Difference	-1.14	-2.10	1.23	2.02	-	-	0.00

The operation of the phase reactor cooler is necessary to support the ongoing temperature control (and therefore operation) of the convertor stations equipment. This is consistent with National Electricity Rule 6A.6.7(3)(i).

6.2.2 *Landslip*

In 2018 as a result of Cyclone Debbie there was heavy rainfall in the area where Directlink's cables are located. This led to landslips and damage to Directlink.

In particular, there was damage at two locations:

- an earth crack and landslide at Stokers Siding; and
- galvanised steel tray damage at Mooball.

In October and November 2018, an interim project was completed at the landslide (Stokers Siding) to realign the Galvanised Steel Tray and reinstate existing fallen posts. This cost $0.17m.

The repair project at Mooball is currently planned for April 2019, at Directlink's next opportunity to obtain required outages for safe completion. This is expected to cost $0.18m.

A further earth crack at a different location in Stokers Siding will have ongoing monitoring at the recommendation of a third party Civil Engineer. No additional expenditure has been included in the forecast for this.

Table 6-4: Capital expenditure landslip ($m nominal)

	2015/16	2016/17	2017/18	2018/19(e)	2019/20(e)	Total
Actual	-	-	-	0.35	-	0.35
AER Forecast	-	-	-	-	-	-
Difference	-	-	-	0.35	-	0.35

This expenditure is consistent with the National Electricity Objective and the requirements of the National Electricity Rules as it necessary to maintain the reliability of the network consistent with Rule 6.A.6.7(a)(3)(i).

6.2.3 *Optic Fibres*

Fibre optics are cables used to transmit information from the valve control unit (valve control unit) to the insulated gate bi-polar transistors. The valve control unit is the smarts behind the coordinated insulated gate bi-polar transistors control and protection. The valve control unit communicates to each IGBT using two dedicated optic fibres for each insulated gate bi-polar transistors position. The on /off signals are sent to the insulated gate bi-polar transistors from the valve control unit via a 'red' fibre optic cable. The information about the insulated gate bi-polar transistors performance and health is sent back to the valve control unit via the 'blue' fibre optic cable.

Deterioration in the performance of the optic fibres was identified during the maintenance of Directlink prior to the current transmission determination

period. The deterioration of the IGBT optic fibres has impacted the availability of the Directlink, necessitating a program of work to replace the fibres with known poor performance. The forecast assumed replacement of 459 cables per annum which was based on past total failures of the optic fibres. However, Directlink tested the optic fibres and it revealed that sub optimal performance of the optic fibres was having an impact on the durability of IGBTs. As a result Directlink now replaces optic fibres upon failing testing for sub optimal performance.

This project replaced IGTB optic fibres in the valve rooms and arose from:

- The current degradation of the existing IGBT fibre optic systems and the depletion of all inbuilt spares with in the valve enclosures
- the potential of significant outages due the exhausting of all spare fibre optic cable normally contained in the IGBT enclosures.
- good asset management practices driving a solution that ensures there is adequate supply of IGBT optic fibres to replace degraded fibres as they are identified.

Table 6-5: Capital expenditure Optic Fibre parts ($m nominal)

	2015/16	2016/17	2017/18	2018/19(e)	2019/20(e)	Total
Actual Capital Expenditure	-	-	0.38	0.38	0.43	1.19
AER Forecast Capital Expenditure	0.16	0.17	0.17	0.17	0.18	0.84
Difference	-0.16	-0.17	0.21	0.21	0.26	0.35

This expenditure is consistent with the National Electricity Objective and the requirements of the National Electricity Rules as it necessary to maintain the reliability of the network consistent with Rule 6.A.6.7(a)(3)(i).

6.2.4 *Cable modification*

Directlink is undertaking expenditure to reduce the increasing frequency of cable faults. In particular the workstream involves analysing historic faults and identifying whether there are particular locations where these faults are occuring. EII have engaged an engineering expert to investigate the cable fault trends and identify changes that can be made to reduce the number of faults occuring at various and multiple locations. Directlink engaged Amplitude in 2018 at a cost of 150k. Amplitude have a long standing and in depth understanding of Directlink and are often engaged for technical analysis.

The current scope for Amplitude includes data analysis, fault modelling and obtaining physical cable extract samples for forensic testing of any cable contaminant potential or properties that would indicate fault cause.

Preliminary results of the investigation have identified that more information is required about faults occuring at cable transitions. A mechanical stress on the cable at the transition is of concern and analysis is continuing.

Amplitude will deliver a Cable Fault Investigation report to Directlink early 2019 that will include findings and recommendations on rectification options that would have a fault reduction outcome.

When complete Directlink will make those changes that are prudent to reduce failures and maintain the current level of reliability.

Table 6-6: Capital expenditure cable modification ($m nominal)

	2015/16	2016/17	2017/18	2018/19(e)	2019/20(e)	Total
Actual Capital Expenditure	-	-	-	0.19	0.15	0.34
AER Forecast Capital Expenditure	-	-	-	-	-	-
Difference	-	-	-	0.19	0.15	0.34

This expenditure is consistent with the National Electricity Objective and the requirements of the National Electricity Rules as it necessary to maintain the reliability of the network consistent with Rule 6.A.6.7(a)(3)(i).

6.2.5 *Essential Spares*

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

- Capacitors
- IGBTs

The expenditure in this category was higher than that forecast due to changes in volumes. The unit price per capacitor or IGBT has only risen slightly over the current transmission determination.

Table 6-7: Capital expenditure Essential Spares ($m nominal)

	2015/16	2016/17	2017/18	2018/19(e)	2019/20(e)	Total
Actual Capital Expenditure	0.09	0.45	0.62	0.81	0.40	2.37
AER Forecast Capital Expenditure	0.41	0.42	0.43	0.44	0.36	2.06
Difference	-0.33	0.03	0.19	0.37	0.04	0.31

This expenditure is consistent with the National Electricity Objective and the requirements of the National Electricity Rules as it necessary to maintain the reliability of the network consistent with Rule 6.A.6.7(a)(3)(i).

6.2.6 *Transmission determination review*

Consistent with past practice EII has capitalised revenue reset expenditure. EII have engaged Newgate Research to provide advice on stakeholder engagement processes that increase focus on end of network consumers. Engineers have also been contracted to provide services associated with the preparation of the forecast capital expenditure proposal (preparation of cost estimates and business cases). There was no forecast expenditure association with the transmission determination reset in the AER's capital expenditure forecast.

Table 6-8: Capital expenditure transmission determination ($m nominal)

	2015/16	2016/17	2017/18	2018/19(e)	2019/20(e)	Total
Actual	-	-	-	0.23	0.04	0.27
AER Forecast	-	-	-	-	-	-
Difference	-	-	-	0.23	0.04	0.27

This expenditure is consistent with the National Electricity Objective and the requirements of the National Electricity Rules as it forms part of the regulatory obligations and is consistent with 6A.6.7(a)(2).

6.2.7 *Other capital expenditure*

Other capital expenditure was close to the AER's forecast amount for these projects or were not material in the level of expenditure. They were undertaken in line with the EII Asset Management Plan. It was all undertaken to keep Directlink in operation in the short and long term. It is consistent with the requirements of Rule 6.A.6.7(a)(3)(i).

These projects were:

- Control and protection system replacement
- Fire suppression system
- Other stay in business capex
- Building safety upgrade
- Phase Link Reactor
- Converter Buildings Ventilation Sound Dampers Corrosion
- Converter station roof repair
- Zero Sequence Reactor
- Cooling Tower Enclosure

6.3 Capital expenditure sharing scheme

The AER has included a CESS for the current period. The outcomes of the calculation using the AER's model is in Table 6-9

Table 6-9: CESS outcomes ($m real FY20)

	2018/19	2019/20	2020/21	2021/22	2022/23
Capital efficiency sharing scheme	-0.2	-0.2	-0.2	-0.2	-0.2

7 Regulatory asset base

7.1 Introduction

This chapter explains how Directlink has determined the proposed opening Regulatory Asset Base (RAB) for the new regulatory control period.

Directlink is required by the Rules to provide a completed asset Roll Forward Model (RFM) to accompany its proposal. The RFM forms attachment 7.1 to this Proposal.

7.2 Roll forward methodology

Directlink has calculated the value of its opening RAB as at 1 July 2020. The annual adjustments to the RAB included:

- Increase by the amount of capital expenditure incurred during the previous regulatory control period, to 2015/16;
- Increase by the estimated amount of capital expenditure for 2015/16, 2016/17 and 2017/18;
- Reduction by the amount of depreciation of the RAB, using the rates and methodologies allowed for in the AER's final determination for the current regulatory control period;
- Reduction by the value of assets disposed of during the current regulatory control period; and
- Indexation by CPI.

These adjustments have been calculated using the AER's Roll Forward Model.

7.3 Opening RAB as at 1 July 2018

The outcome of applying the AER's roll forward methodology and Roll Forward Model is an opening RAB for Directlink of $148.4m, for the 2020-25 transmission determination period. This calculation is set out in Table 7-1.

Table 7-1: Opening regulatory asset base ($m, nominal)

	FY16	FY17	FY18	FY19	FY20
Opening RAB	129.4	130.8	130.9	138.2	144.2
Capital expenditure	4.0	3.4	10.2	8.3	7.7
Depreciation	-4.9	-5.3	-5.4	-5.6	-5.8
Indexation	2.2	1.9	2.5	3.3	3.5
Adjustment	-	-	-	-	-1.1
Closing RAB	130.8	130.9	138.2	144.2	148.4

7.3.1 *Asset classes*

Directlink is not proposing any new asset classes for the current transmission determination period. The standard lives of the current assets are consistent with the complete depreciation of Directlink in 2040/41.

Table 7-2: Standard asset lives by asset class

Asset class	Useful life
Switchyard	26.2
Transmission line	26.2
Easements	n/a

7.4 Depreciation

Table 7-3: Regulatory Depreciation in Roll Forward Model ($m, nominal)

	FY16	FY17	FY18	FY19	FY20
Forecast Depreciation	2.7	3.3	2.9	2.2	2.4

Consistent with the AER's final determination Directlink has utilised forecast depreciation in the Roll Forward Model as generated by the AER's final determination Post Tax Revenue model.

7.5 Tax Asset Base

Directlink has also used the AER's Roll forward model to calculate the Tax Asset Base. This is set out in Table 7-4.

Table 7-4: Opening Tax Asset Base ($m, nominal)

	2013/14	2014/15	2015/16	2016/17(e)	2017/18(e)
Opening TAB	99.0	99.2	98.6	104.6	108.2
Capital Expenditure	3.9	3.3	10.0	8.0	7.5
Depreciation	-3.7	-3.9	-4.0	-4.4	-4.7
Closing TAB	99.2	98.6	104.6	108.2	111.0

8 Rate of return and value of imputation credits

For this revenue proposal, Directlink has calculated the return on capital, for each regulatory year of the regulatory control period, as the product of a rate of return – the allowed rate of return – and the projected regulatory asset base for the regulatory year.

Directlink has used, as the rate of return, a rate of 5.18% calculated using the methods and parameter values set out in the *Rate of return instrument* issued by the AER in December 2018.

8.1 Allowed rate of return

Directlink has calculated the rate of return as a nominal "vanilla" weighted average of an allowed rate of return on equity and an allowed rate of return on debt:

$$k_t = k^e \times (1 - G) + k_t^d \times G$$

where:

- k_t is the rate of return in regulatory year t (the allowed rate of return);
- k^e is the allowed rate of return on equity for the regulatory control period;
- k_t^d is the allowed rate of return on debt for regulatory year t; and
- G is the gearing ratio.[10]

8.2 Gearing

The weight to be applied to the allowed rate of return on debt, in the weighted average cost of capital which is to be taken as the allowed rate of return is, the *Rate of return instrument* advises, to be the gearing ratio. That ratio is set at a value of 0.6.[11]

Directlink has used a gearing ratio of 0.6 when calculating the rate of return.

[10] Australian Energy Regulator, *Rate of return instrument*, December 2018, clause 3.

[11] Australian Energy Regulator, *Rate of return instrument*, December 2018, clause 3.

8.3 Rate of return on equity

In accordance with clause 4 of the *Rate of return instrument*, Directlink has calculated the allowed rate of return on equity component of the rate of return (k^e) using the asset pricing model:

$$k^e = k^f + \beta \times MRP$$

where:

- k^f is the allowed risk free rate of return for the regulatory control period;
- β (beta) is the allowed equity beta; and
- MRP is the allowed market risk premium.

8.3.1 Risk free rate

The risk free rate of return is to be estimated, for the purpose of estimating the rate of return on equity, using a simple average of the daily yields on Commonwealth Government Securities with terms to maturity of 10 years.[12]

Directlink understands that the estimate of the risk free rate will be updated during the AER's revenue proposal approval process, and updated again for the AER's final decision on the revenue proposal.

For the revenue proposal, Directlink has estimated the risk free rate as an average of the yields on Commonwealth Government Securities with terms to maturity of 10 years over a period of 20 business days to 31 December 2018.

Directlink's estimate of the risk free rate is 2.45%.

8.3.2 Market risk premium

Clause 4 of the *Rate of return instrument* sets the allowed market risk premium at an effective annual value of 6.1%.

Direct link has used the MRP estimate of 6.1% when applying the asset pricing model to clause 4 to estimate the allowed rate of return on equity.

8.3.3 Beta

An estimate of beta of 0.6 is set in the *Rate of return instrument*, and Directlink has used this estimate when applying the asset pricing model to clause 4 to estimate the allowed rate of return on equity.

12 Australian Energy Regulator, *Rate of return instrument*, 18 December 2018, clause 5.

8.3.4 *Rate of return on equity estimate*

Directlink's estimate of the rate of return on equity is, in these circumstances:

$$2.45\% + 0.6 \times 6.1\% = 6.11\%$$

8.4 Rate of return on debt

The estimate of the return on debt in regulatory year t of the regulatory control period (k_t^d)), the *Rate of return instrument* advises, is to be a trailing average of rates of return on debt for a period of 10 years.

A transition into the trailing average is required, and the first regulatory year of the transition period for Directlink is the period of 12 months from 1 July 2015.

Directlink has calculated the trailing average, which is to be the allowed rate of return on debt until that allowed rate is updated, as:

$$k^d_{2019\text{-}20} = \left(\sum_{i=1}^{4} k_i^d + 6 \times k^d_{2019} \right)$$

where k_i^d, i = 1, 2, 3, 4, are the previously allowed rates of return on debt for 2015-16, 2016-17, 2017-18 and 2018-19. They are, respectively, 4.35%, 4.47%, 4.55% and 4.57%.

k^d_{2019} is Directlink's estimate of the on-the-day rate of return on debt for 2019.

Directlink has estimated k^d_{2019} in the way required by clauses 10 to 22 of the *Rate of return instrument*. That estimate, for an assumed BBB+ credit rating implemented as 1/3 A rated and 2/3 B rated, has been made using data for 20 business days to 31 December 2018, is 4.16%.

$k^d_{2019\text{-}20}$ is then 4.55%, and Directlink has used this percentage as its estimate of the rate of return on debt for the regulatory control period.

Directlink understands that the estimate of the rate of return on debt will be updated during the AER's revenue proposal approval process, and updated again for the AER's final decision on the revenue proposal. It will also be updated annually during the regulatory control period.

8.5 Rate of return

Directlink's estimate of the rate of return for the regulatory control period is 5.18% (see Table 8-1 below).

Table 8-1: Rate of return

Component		Value
Rate of return on equity		
Risk free rate	k^f	2.45%
Beta	β	0.60
Market risk premium	MRP	6.1%
Rate of return on equity	$k^e = k^f + \beta \times MRP$	**6.11%** = 2.45% + 0.60 x 6.1%
Rate of return on debt		
Rate of return on debt	$k^d_{2019\text{-}20}$	**4.55%**
Gearing ratio	G	**0.6**
Rate of return	$k = k^e \times (1 - G) + k^d_{2019\text{-}20} \times G$	**5.18%** = 6.11% x (1 – 0.6) + 4.55% x 0.6

8.5.1 *Averaging periods*

The risk free rate of return and the on-the-day rate of return on debt are to be calculated from current market data. Those data are to be for:

- a period of 20 consecutive trading days;
- a period which is as close as possible to commencement of the access arrangement period; and
- a period which has not commenced at the time of its nomination.

Directlink nominates the period of 20 days from (confidential) for the equity averaging period.

Directlink nominates the periods of 20 days shown in Table 8-2 in as "averaging periods" for estimation of the components of the rate of return on debt used in the Directlink Transmission Determination.

Table 8-2: Averaging periods (confidential)

Regulatory year	Averaging period
2020-21	(confidential)
2021-22	(confidential)
2022-23	(confidential)
2023-24	(confidential)
2024-25	(confidential)

8.6 Forecast inflation

Financial information used in preparing the revenue proposal has been provided on a nominal basis. All financial information has been provided, and all calculations have been made, consistently on this basis.

Making a forecast of financial information expressed in nominal terms requires a forecast of inflation.

Directlink has forecast inflation using the method adopted in the AER's December 2017 final position paper on the regulatory treatment of inflation. The forecast obtained, 2.41%, has been used in preparing the revenue proposal.

Directlink understands that the forecast of inflation will be updated during the AER's revenue proposal approval process, and updated again for the AER's final decision on the revenue proposal.

8.7 Value of imputation credits

Under Australian taxation law, company profits are taxed, and dividends paid from the after-tax profits are also taxable as income accruing to Australian resident tax payers. So that a given income stream from company profits is not taxed twice, the law provides for imputation or franking credits to be distributed to equity investors when dividends are paid, providing those investors with a potential offset against their personal tax liabilities.

The estimated cost of corporate income tax is, therefore, to be reduced by an amount which represents the value of those imputation or franking credits.

The value to be attributed to imputation credits – the estimate of the factor γ – is set in the *Rate of return instrument*: $\gamma = 0.585$.[13]

Directlink has used this estimate of γ in preparing the revenue proposal.

[13] Australian Energy Regulator, *Rate of return instrument*, December 2018, clause 27.

9 Forecast capital expenditure

9.1 Introduction

This chapter contains Directlink's capital expenditure forecasts for each year of the 2020-25 transmission determination period, as well as the total expenditure for the period. The chapter describes the capital expenditure categories used and the methodology adopted to forecast the capital expenditure. The major inputs and assumptions underpinning the forecasts are explained.

The major projects that contribute to the capital expenditure forecast are described. The forecast capital expenditure is then demonstrated to be efficient.

The resulting forecast capital expenditures are set out in the response to the AER's Regulatory Information Notice, which forms attachment 1.1 to this Proposal.

9.2 Rules

The information and matters relating to capital expenditure that must be provided in Directlink's Proposal are set out in Rules 6A.6.7 and schedule S6A. The proposed capital expenditure must:

- Meet the capital expenditure objectives;
- Be allocated to prescribed transmission services in a manner consistent with the Cost Allocation Methodology;
- Include both total and year-by-year forecasts; and
- Be a reliability augmentation, or have satisfied the AER's Regulatory Investment Test (RIT), if required.

The Proposal should also, if relevant, include capital expenditure required in relation to contingent projects.

No capital expenditure corresponding to augmentations or for projects that have satisfied the RIT has been included.

9.2.1 Capital expenditure objectives

Directlink's forecast capital expenditure is capital expenditure that is considered to be required in order to meet the capital expenditure objectives. Rule 6A.6.7(a) sets out the capital expenditure objectives which are:

- meet or manage the expected demand for prescribed transmission services over that period;

- comply with all applicable regulatory obligations or requirements associated with the provision of prescribed transmission services;
- to the extent that there is no applicable regulatory obligation or requirement in relation to:
  - the quality, reliability or security of supply of prescribed transmission services; or
  - the reliability or security of the transmission system through the supply of prescribed transmission services,
- to the relevant extent:
  - maintain the quality, reliability and security of supply of prescribed transmission services; and
  - maintain the reliability and security of the transmission system through the supply of prescribed transmission services; and
- maintain the safety of the transmission system through the supply of prescribed transmission services.

Directlink considers that this revenue proposal achieves the capital expenditure objectives set out in Rule 6A.6.7. Directlink also considers that the forecast of required capital expenditure reasonably reflects the efficient costs that would be incurred by a prudent network operator in meeting the capital expenditure objectives consistent with 6A.6.7(c).

9.2.2 *National Transmission Network Development Plan*

In the 2018 NTNDP AEMO has moved from focusing on interconnection between regions to recommending specific projects in conjunction with its Integrated System Plan. This change in focus is evidenced by AEMO making recommendations that particular organisations receive funding for the feasibility and engineering studies (AEMO, 2018). These studies are the pre-work that proceed any major addition to an infrastructure asset.

The NTNDP has not identified any scope for an augmentation of the role for Directlink or EII to play in relation to additional interconnection between NSW and Queensland.

Integrated System Plan

In 2018, the Australian Energy Market Operator (AEMO) published an Integrated System Plan (ISP) report which has forecast increasing utilisation and average transfers on Directlink in the future. By 2028-29, Directlink south flow transfer levels are forecast to exceed 125 MW for 33% of the time. By 2038-39, this is expected to increase to exceed 125 MW south flow for 50% of the time.

In terms of recommended outcomes In the ISP, AEMO has recommended:

- A minor upgrade to provide additional transfer capacity to New South Wales from Queensland prior to the closure of Liddell Power Station in 2022.
- A medium to large upgrade of the New South Wales – Queensland interconnector in the early to mid-2020s (depending on planning approvals and construction timelines) to increase transfer capability as generation connects to support the QRET and to improve reliability.

Neither of these is expected to have an impact on the capability or future scope for augmentation of the Directlink interconnector.

9.2.3 *Explanation of variations in forecast capital expenditure from historical capital expenditure*

Rule S6A.1.1(7) requires the TNSP to provide an explanation of any significant variations in the forecast capital expenditure from historical capital expenditure. Directlink considers that this is a meaningful requirement in a mature, steady state system with recurrent capital expenditure programs. However, Directlink is a single asset with stochastic capital expenditure requirements. So Directlink can be expected to have significant variation year on year based on the work being undertaken.

Table 9-1: Forecast and historic capital expenditure ($m FY20)

	YR 1	YR 2	YR 3	YR 4	YR 5	Total
Forecast capital expenditure	11.6	8.2	7.2	8.5	4.9	40.5
Historic capital expenditure	4.4	3.6	10.7	9.3	6.9	34.9
Difference	7.2	4.6	-3.5	-0.7	-2.0	5.6

The historic variation reflects the timing of the control and protection system replacement whereas the increases in forecast expenditure reflect the presence of the projects outlined in section 9.6.

9.2.4 *Asset management system*

Energy Infrastructure Investment (EII) has an asset management plan that identifies the necessary actions required to optimally manage the EII assets. A long-term consideration of the integrity of assets is necessary to ensure that they remain fit-for-purpose.

The asset management plan is written on the basis of the best known information at the time of writing.

The purpose of the asset management plan is:

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

The objective of the asset management plan 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 asset management plan, the Operator (being APA Operations EII) has considered the approved policies and procedures of the 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 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.

The asset management plan is reviewed each year to ensure that the content is current.

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

The asset management plan will identify any material changes to budget items for the previous period.

A copy of the Directlink asset management plan is included in attachment 3.1

9.2.5 Cost escalation

Directlink is not proposing any real cost escalation to capital expenditure beyond adjustments for consumer price inflation. There are no step changes in input costs for capital expenditure.

9.3 Capital expenditure categories

The demand for Directlink's service will remain equal to its maximum capability throughout the 2020-25 transmission determination period. The capital expenditure described in this proposal is therefore not growth related. Expenditure is directed at maintaining the capability and reliability of the network, whilst ensuring that all regulatory, statutory and legislative requirements are met.

The major items of plant that comprise Directlink: the convertor equipment; transformers; harmonic filters; and cable, all of which have been maintained in serviceable condition in accordance with the manufacturer's recommendations.

The projects that can go to make up the proposed capital expenditure program are associated with the following investment drivers:

- Augmentation/Expansion: This is capital expenditure that is associated with the augmentation or expansion of the capacity of the Directlink network;
- Replacement/refurbishment: The refurbishment or replacement of items of auxiliary equipment, necessary for the continued reliable and secure operation of the link. The replacement of the control system is a major project in this category; and
- Non System: This is capital expenditure that is associated with the provision of network services but is not directly on the network itself.

However, Directlink did not have any expenditure in the Augmentation/Expansion in the current period and is not forecasting any in the next period.

To assist the AER's understanding of the capital expenditure program, capital expenditure projects have been subdivided into categories that reflect these principal drivers in the table below.

Table 9-2: Forecast capital expenditure by driver ($m FY20)

	FY21	FY22	FY23	FY24	FY25	Total
Augmentation/expansion		-	-	-	-	-
Replacement/refurbishment	11.6	7.8	6.8	8.1	4.5	38.8
Non System	0.0	0.0	0.0	0.0	0.0	-
Total	11.6	8.2	7.2	8.5	4.9	40.5

9.4 Forecasting methodology

Directlink's forecast of capital projects in the Replacement/refurbishment categories was developed in the context of its asset management practices,

These management practices and a description of the associated projects are discussed in section 9.2.4

The 2018 Directlink Asset Management Plan follows the strategic direction established in the Asset Management Strategy[14]. The Plan contains detail of asset management processes and lists individual maintenance and improvement projects.

This document has been supplemented with documents outlining the business cases for the significant projects that are expected to be required during the course of the regulatory control period, in attachment 9.1.

9.5 Key inputs and assumptions

9.5.1 Asset replacement/refurbishment framework

Directlink's asset management processes are described in the Asset Management Plan. This process calls for the:

- maintenance history;
- condition; and
- service performance.

of each component of equipment to be monitored.

Plans to replace or refurbish equipment components are formulated when:

- The service performance of the equipment deteriorates, to the point where it jeopardises the reliability and availability performance of the link;
- Maintenance costs escalate, to the point where it becomes economic to replace or refurbish the equipment; and
- Equipment associated with auxiliary systems becomes obsolete, with the potential to jeopardise the availability performance of the link due to unavailability of spares.

The forecast capital expenditure has been based on the Asset Management Plan approved by the EII Board in November 2018. The only adjustments to those relate to conferring calendar years values into financial years and

14 APA Group, Directlink Asset Management Plan ML-DO-06, 9 January 2017.

changes that relate to information available to Directlink post the AMP approval in November 2018 that relates to capital expenditure for obsolete IGBTs, replacement of cooling fans and variable speed drives.

The forecast capex has been reviewed after models were completed compared to the Asset Management Plan.

9.5.2 *Project scope, cost and timing estimates*

Directlink's approach to estimating the scope, cost and timing of the projects that comprise the capital expenditure program is set out in Table 9-3.

Table 9-3: Project scope and costs estimates

Expenditure Category	Refurbishment	Compliance	Capability(Contingent)
Project Scope	All projects are relatively small in scope and readily specified.		Not able to be fully determined at this stage
Project Timing	Based on equipment condition.	As soon as is reasonably practicable.	Pending detailed analysis, not able to be determined at this stage.
Project Cost Estimate	Based on similar minor works carried out for Directlink, or by obtaining a quotation for the work from existing service providers.		Not able to be accurately estimated at this stage, based on generic estimating procedures.

9.6 Significant components of the capital expenditure program

The following projects form significant elements of the capital expenditure program. They are detailed in the supporting information that accompanies this Proposal, which also explains how each project meets the capital expenditure objectives and capital expenditure criteria set out in the Rules at clauses 6A.6.7(a) and 6A.6.7(c). These significant projects are set out below. Business cases for these projects are provided in attachment 9.1.

9.6.1 *Obsolete Insulated gate bi-polar transistors*

The insulated-gate bipolar transistor (IGBT) is essentially a three-terminal power semiconductor device typically used as an electronic switch in a wide range of applications. There are several thousand IGBTs in service at any one time at Directlink. Directlink utilises ABB's Generation One IGBTs on 5

systems[15] (Mullumbimby System 1 was reconstructed using Generation three IGBTs following the fire). IGBTs switch power from AC/DC to DC.

IGBTs are both the workhorse and basic building block of the VSC (Voltage Source Controlled) HVDC station. Each convertor station at Directlink contains six valve rooms. Each valve room contains two valves each made up of 148 individually controlled IGBTs connected in series that must switch together in a fraction of a microsecond. To successfully handle these series-connected IGBTs, they all need to be switched (on or off) at the same time so each IGBT experiences the same voltage stress.

Without IGBTs, the converter stations would not operate which means that Directlink would be unable flow electricity.

There are 296 IGBTs in operation in a phase. When an IGBT fails that voltage load is spread across the remaining IGBTs. However, should five IGBTs fail that phase will be taken offline to restore the IGBTs because with six failures there is a significant risk of a voltage arc which have a cascading affect and destroy all the IGBTs in the phase.

The IGBTs and the equipment that houses, and operates, them is the intellectual property of ABB. In October 2018 ABB notified APA that due to the cessation of the manufacture and supply of crucial items it is unable to continue support for Generation One IGBTs, and in particular will no longer be producing new Generation One IGBTs. This means that only currently available spares are the entirety of spares for all time. This problem can't be avoided, a solution must be found.

APA has some spares in stock so failure would not be immediate. However, it would be inevitable as the failure rate of IGBTs is increasing and when a sufficient number of IGBTs fail Directlink's systems would go offline reducing the capacity of the network until it reaches 0 MW.

ABB have identified that they have 88 IGBTs in store available for order. Directlink are purchasing these to extend the life of the existing equipment.

Given the recent nature of the notification Directlink continues to explore a range of options with regards to the solution of this problem. We have approach ABB requesting a quote for the continued production of Generation One IGBTs, recognising that this would come at a cost. However, ABB indicated that they can no longer source components for the IGBTs and will be unable to do so.

[15] A phase is the name for an integrated group of IGBTs. There are 296 IGBTs to a phase there are two phases per system and three systems make up Directlink. Therefore, Directlink is using 1776 IGBTs.

This leaves Directlink with the following broad alternatives:

- Undertake replacement all the IGBTs and the associated equipment with more modern versions
- A staged replacement of the IGBTs such that one phase at a time is replaced with the replaced IGBTs acting as spares for the rest of the systems
- A staged replacement of the IGBTs such that one building at a time is replaced with the replaced IGBTs acting as spares for the rest of the systems
- A long term capex replacement contract with ABB whereby they replace the systems and take future responsibility for their continued operation – a transfer of the significant obsolescence and technical risk
- Cannibalise systems to provide spares for the other two systems with the resultant reduction of 60 MW of capacity for each system cannibalised.

EII's current preferred option is to have a long term capex replacement contract with ABB. It is important to note that this project will be subject to a Regulatory Investment Test – Transmission and will form part of the ongoing stakeholder engagement outlined in section 4.4.

The reason for the preferred option is that it currently is the lowest cost long term option for consumers. It also ensures risk of technical obsolescence is addressed by ABB. The EII business case includes analysis that demonstrates the NPV of different options.

Valve control unit upgrade

The valve control unit is the smarts behind the coordinated control and protection of the insulated gate bi-polar transistors control and protection. The valve control unit communicates to each IGBT using two dedicated optic fibres for each insulated gate bi-polar transistors position. The on /off signals are sent to the insulated gate bi-polar transistors from the valve control unit via a 'red' fibre optic cable. The information about the insulated gate bi-polar transistors performance and health is sent back to the valve control unit via the 'blue' fibre optic cable.

Valve control units must be compatible with the IGBTs used. For the sake of clarity in this document the Valve Control Unit will be referred to in terms of their IGBT compatibility. Generation one valve control units are only compatible with generation one IGBTs. Generation three valve control units are compatible with generation one, two and three IGBTs.

As a result of the replacement of generation one IGBTs with generation three IGBTs the valve control units will also need to be upgraded. There are two

Valve control units per phase. However, the ABB cost of replacing all 15 VCUs (3 per system) is $2m whereas the ABB cost of replacing them individually is $0.6m[16]. This means it is more cost effective in the long term to replace all Valve control units when the first replacement is required. However, if the long term capex replacement contract with ABB is signed then the Valve Control Units should be in the scope of the contract and should impose no additional cost on Directlink or Customers.

This expenditure is necessary to maintain the operation of Directlink.[17]

Table 9-4: Forecast capital expenditure obsolete insulated-gate bipolar transistor ($m FY20)

	FY21	FY22	FY23	FY24	FY25	Total
Obsolete Insulated gate bi-polar transistors	3.5	3.5	3.5	3.5	3.5	17.3

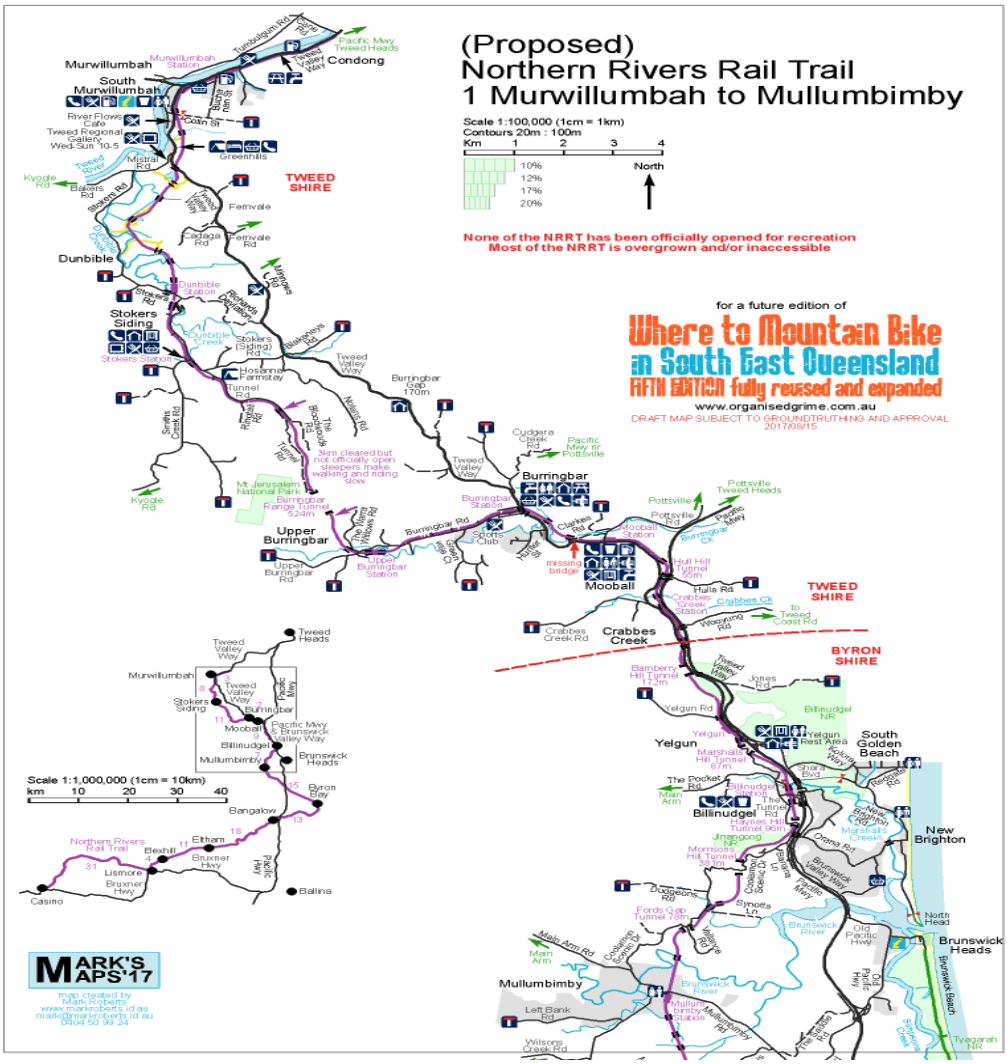
9.6.2 *Cable protection*

There is increasing development of the hinterland area that Directlink is located on. However, there is one development in particular that is likely to result in capital expenditure being necessary to accommodate appropriate shared use of the corridor, being the Northern Rivers Rail Trail.

For 24 kms of its length Directlink runs through an easement on an abandoned railway line owned by Transport for NSW (previously NSW rail). However, a project is underway which will transfer ownership of the land to the NSW Department of Primary Industries, with the intention of having Tweed Shire Council take responsibility for maintenance of the land – in addition to being the proponent of the rail trail.

[16] There are additional costs for project management etc in addition to the ABB quoted cost. However, these in total are more for individual replacement that a one off project.
[17] This means it complies with the requirements of 6A.6.7(a)(3).

Figure 1 Northern Rivers Rail Trail route (public issue)



The land of, or near, the rail trail is to be converted to a multiuse recreational path. This work will involve the construction of a trail and bridges to facilitate pedestrian, cycling and equestrian use of the trail. The trail itself currently has two design options, with the trail being on the formation of the existing train tracks or off formation in adjacent parallel.

Initial funding for the project has been obtained from both the federal and state governments.

The construction of the trail, based on either design option, will be a significant program forecast to exceed 12 months including early works.

Tweed Council are currently targeting a September 2019 construction commencement however there are multiple schedule variables in regards to legislation that the council must overcome to achieve this target.

With the information available at this time, it is expected that whilst Directlink agree it is probable the project will be constructed – delays are likely to shift the construction period in to the determination period.

When it does occur, rail trail construction activity (including personnel and equipment) will be in close proximity with the Directlink interconnector assets. The three cables run through a galvanised steel tray that runs adjacent to the current railway line.

The construction activity and significant change of use of the corridor in to a recreational area represents real changes to the current risk profile of cable interference probability.

The tray is designed to enclose the cables and provide some protection from the elements but has limited capacity to withstand accidental or deliberate physical damage.

Given that risks are envisaged for the scale and type of construction activity near Directlink's high voltage cable, but are yet to be assessed on a final design option, it is essential that EII conduct an appropriate scale of risk assessment which will include ALARP.

Consistent with accepted industry practice and community expectation, Directlink will seek to reduce risk associated with the location and operation of its assets to "As Low As Reasonably Practical". This requires that Directlink undertake mitigation action up to the point that it is disproportionate to the risk. Directlink will undertake a detailed ALARP study.

ALARP is conducted by assigning a likelihood to a risk and determining the consequences of the event. These two factors form a matrix and the conjunction of the two concepts determine the risk.

Directlink is operated based on the APA risk matrix which is set out in Figure 9-1.

Figure 9-1: APA risk matrix.

ERM Risk Tables – Projects MAY 2018 – APPROVED

1. **Enterprise Risk Matrix – Project Likelihood table**

Level	Descriptor	Description
5	Frequent	Expected to occur on a regular basis and many times
4	Occasional	May occur occasionally or in many circumstances
3	Unlikely	Unlikely to occur but possible when certain circumstances prevail
2	Remote	Not anticipated but may occur if certain abnormal circumstances prevail
1	Rare	Conceivable, but has not been known to arise previously

2. **Enterprise Risk Matrix – Project Impacts (Consequence Ratings)**

Consequence Category	Impact (Consequence) Ratings				
	1. Minimal	2. Minor	3. Significant	4. Major	5. Catastrophic
1. Health & Safety Injuries, illness or death of employees, contractors or members of the public	Injuries or illness requiring first aid treatment only i.e. able to return to work immediately or the next day	- Injury / illness resulting in time lost from work of one day / one shift or more (LTI) - Member of the public requiring medical treatment	- Injury / illness resulting in permanent or partial disability to employees - Member of the Public requiring hospitalisation	Fatality or life threatening injuries or illness or permanent total disability of employees and contractors or members of the public	Fatality arising from systemic failure of APA safety or multiple fatalities of employees and contractors or members of the public
2. Environment (including heritage) Environmental harm or adverse effect on ecosystem i.e. the surroundings in which APA operates, including natural, built and Aboriginal cultural heritage, soil, water, vegetation, fauna, air and their interrelationships	One or a combination of the following consequences: - onsite and impacting < 1 ha - no remediation needed - impact continues for < 1 wk	One or a combination of the following consequences: - onsite and impacting > 1 ha - able to be remediated easily - impact continues for <1 yr	One or a combination of the following consequences: - offsite and impacting < 1 ha - able to be remediated with some difficulty - impact continues for <5 yrs	One or a combination of the following consequences: - offsite and impacting > 1 ha - able to be remediated with difficulty - impact continues for <10 yrs	One or a combination of the following consequences: - offsite and impact is widespread (>1ha) - unable to be remediated - impact is irreversible or lasts >10 yrs
	Impact that causes negligible or no damage to heritage	Temporary and repairable impact or infringement to heritage	Permanent but repairable impact or infringement to heritage	Temporary but irreparable impact or infringement to heritage	Permanent and irreparable impact or infringement to heritage
3. Schedule Impact on delivery schedule	The higher of: - < 1 month; or - 1% - 10% of the approved schedule	The higher of: - 1 - 3 months; or - 10% - 25% of the approved schedule	The higher of: - 3 - 6 months; or - 25% - 40% of the approved schedule	The higher of: - 6 - 12 months; or - 40% - 50% of the approved schedule	The higher of: - more than 12 months; or - More than 50% of the approved schedule
4. People Impact size, engagement, capability of our Staff	Little or no impact on individual or team engagement	Some impact on team or site engagement / minor site level complaints or breaches	Some impact on Business unit engagement / rising complaints or breach levels / some staff turnover	Some serious complaints or breaches / Staff turnover rising	Increasing serious complaints and breaches/ High staff turnover

The consequence of the cable interaction is easily determined and any harmful contact is likely to result in a single or few deaths. The definition of 'harmful' contact however would be explored as the rail trail design and construction activity details (including personnel and equipment interaction) progresses.

In the event that harmful interaction potential is substantiated, further information about ALARP follows.

For the purposes of valuing safety, the risk to life is valued based on the value of a statistical life. The Australian Government (Office of Best Practice Regulation, 2014) published a guidance note that recommends the adoption of a value of statistical life. Adjusted for inflation to 2020 the value of statistical life is $4.7m.

Attempts to quantify the likelihood of an accident or deliberate act that could result in harm is impossible to calculate with precision. There are too many unknowns. For example:

- The amount of traffic that the rail trail will introduce to the area,
- the probability that each additional person in the area adds to the likelihood of a fatal interaction with the existing asset are unknown.

However, logic indicates that the construction of the rail trail will result in a non-zero increase in the probability of death from the Directlink HVDC cables.

Where the likelihood can't be determined probabilistically other approaches to determining the likelihood are adopted. For example, another approach is to identify whether an incident of this nature has occurred.

The table below sets out how this has been characterised.

Table 9-5: Likelihood based on occurrence

Rare	Remote	Unlikely	Occasional	Frequent
Has never occurred internationally	Has occurred internationally	Has occurred in Australia	Has occurred on an APA asset	Has occurred on multiple occasions on APA assets

For the purposes of the ALARP there is no evidence internationally of death as a result of deliberate or accidental damage to high voltage cables in a galvanised steel tray less than a metre off the ground. However, given this arrangement is unusual by international standards (high voltage cables are overwhelmingly usually underground or raised well off the ground) this is not a strong indicator of likelihood at this time. There have been deaths resulting from contact with high voltage cables both underground and overhead in Australia. This usually involves the use of equipment or vehicles. The likelihood of this type of risk for Directlink has risen as equipment used to construct and maintain the rail trail will be in close proximity to the galvanised steel tray.

Subject to the results of a detailed ALARP study Directlink's current expectation is that efficiently meeting the standard of ALARP will involve either moving the cable underground in, or close to, its current location or where that is not feasible relocating the cable away from the trail to make it once again remote and difficult to physically access for the public and workers on the rail trail.

The final design of an ALARP cable has yet to be completed but estimates of the cost are based on a *minimal* 4.1km of the 14 km cable in the Galvanised steel tray being safely undergrounded.

As noted above, while the rail trail is proceeding the exact nature of the trail is yet to be finalised. The options are controversial in the region with proponents of both options advocating their position to council.

The uncertainty around the construction options being pursued creates uncertainty as to the ability of EII to require capital contributions from the Shire councils towards the relocation of the cable. If the companies

undertaking construction do not require the use of the Directlink easement then EII has limited options to require the council to enter into negotiations about contributing towards the cost of relocation cables and would be reliant on the goodwill of the council to cover some of the costs of relocation.

Directlink assumes that the council will account for the possible cost of cable relocation in its selection of its preferred route and given the likely cost of $3.8m+ for this project then Council will select an option that does not require their compensating EII (and therefore EII's customers) for the cost. The forecast capital expenditure assumes the entire cost for relocation is borne by EII.

There is also a smaller amount of capital expenditure in this program for cable protection/risk mitigation on the existing sections of the Directlink interconnector these relate to the replacement of signage and other existing protection measures which have deteriorated over time.

This expenditure is necessary to ensure the ongoing safe and secure operation of the cables.[18]

Table 9-6: Forecast capital expenditure cable protection ($m FY20)

	FY21	FY22	FY23	FY24	FY25	Total
Cable Protection	1.0	1.1	1.0	1.2	0.6	4.8

9.6.3 *Reliability*

Reliability maintenance projects seek to increase Directlink's availability by ensuring key components and equipment that contribute to reliability are in optimum working order and utilising advanced technologies and products available to high-voltage direct current assets.

Directlink continues to make an integral contribution to the Queensland and New South Wales transmission markets. The demand on the network continues to increase as these regions grow. However, Directlink currently experiences reliability issues. The full 180MW of Directlink capacity is available 70 percent of the time.

In order to avoid further deterioration of Directlink's availability EII has identified a number of projects that have an affect on Directlink's reliability performance.

[18] As such it is consistent with the requirements of rule 6A.6.7(a)(3).

Cyber security - communications/network upgrade

Directlink was commissioned in 2000 with Information Technology and Security capabilities available at the time of construction for High-Voltage Direct Current assets.

In 2019, Information Technology continues to evolve globally across all industries. With the benefits of continuous increased capabilities – the challenge to the business is to ensure the consequential associated risks are identified and mitigated.

Any disruption or breach to the IT infrastructure Directlink operates on has the potential of serious consequences for the market and end customers. Directlink's operations have multiple interfaces with third parties (Essential Energy Connection Agreement etc) where information is both dispatched and received on a daily basis. This data often includes market sensitive information and requires protection.

Failure to upgrade the cybersecurity increases the risk of cyberattack and the consequent impact on the Directlink transmission service.

This project will be sent to tender to engage a suitably qualified contractor ensure value for money. The project will take in to consideration recommendations from a past APA Internal Audit on Cyber Security. More information on the audit conducted is available in the Reliability Business Case appendix.

Power supply upgrade

Directlink must receive power at all times in order to run its auxiliary equipment. The source of auxiliary power for the converter stations is the Essential distribution network. However, this supply is significantly impacted by severe weather events. For example, Directlink have identified recurring instances of losing auxiliary power through the failing of Aux 11KV supply to Bungalora substation at least every 18 months.

During short interruptions to auxiliary power, the control systems are maintained by the Uninterrupted Power Supply (UPS) systems, however long duration auxiliary power outages exhaust the UPS systems, causing significant downtime from the subsequent control system faults. Significant work is required restore the control systems after these events. Repeatedly exhausting the UPS systems can damage critical computer equipment causing extended outage times awaiting repair or replacement.

Existing UPS systems are battery based and have limited backup time after loss of auxiliary power (approx. 8 hours). This has resulted in extended unplanned outages for all three systems on Directlink due to power loss from the Essential Network being of greater duration.

The forecast is to augment the existing UPS systems with additional equipment that will have longer backup times, such as additional batteries and diesel generators.

For Directlink to ensure reliability continues, augmentation of the UPS capability is required.

Variable Speed Drive (VSD) for phase reactor and cooling pumps

The phase reactor provides a large reactance that allows the valves to control the active and reactive power flow with AC network. They also help to reduce the high frequency harmonic content of the AC currents created by the valves.

They operate, phase reactors heat up, and must be cooled. The motors on the phase reactors currently run only in on/off mode. When the temperature rise above the recommended operating temperatures the phase reactor cooling switches on at maximum capacity[19]. This temperature cycling creates additional wear and tear on the phase reactors shortening their operation life.

A variable speed drive provides greater flexibility to the temperature control function, increasing and decreasing cooling air flow to manage phase reactor temperatures. This has the impact of reducing wear and tear on the phase reactor and also reducing overall operation noise from the convertor station, a concern for local residents (see section Noise Monitoring Equipment).

Table 9-7: Forecast capital expenditure reliability ($m FY20)

	FY21	FY22	FY23	FY24	FY25	Total
Reliability	0.7	0.7	0.8	2.1	-	4.4

9.6.4 *Optic Fibres*

As noted in section 6.2.3 deterioration in the performance of the IGBT optic fibres has been identified during the maintenance of Directlink. The deterioration of the IGBT optic fibres has impacted the availability of the Directlink, necessitating a program of work to replace the fibres with known poor performance.

The failure of the red fibre will prevent the IGBT from switching, causing the immediate failure of the IGBT. Failure of the blue fibre will prevent the IGBT from reporting as healthy. As a result this will be seen as an IGBT failure. The

[19] technically it switches on and reaches maximum operational levels as quickly as its can

life expectancy of an IGBT will be dramatically shortened if it is subject to continuous voltage stress beyond that of normal operation. This voltage stress is created when individual IGBTs are slower to turn off than the other IGBTs that they are in series with.

While there are things inherent to the IGBT construction that can affect the switching speed of an IGBT these can be corrected during the IGBT testing. The degradation of the switching signal as a result of degradation of the optical transmitter, optical receiver or the optic fibre light guides is harder to protect against. ABB has indicated that, while there is a degree of protection within the new IGBTs to help detect rapid voltage rise and protect the IGBT from immediate failure, continual operation in this mode will lead to premature IGBT failure.

As a result of recent testing of the Fibre Optics it is proposed to significantly increase the replacement program for the valve optic fibres. The latest testing of four converter buildings has returned 943 optic fibres requiring replacement.

The lead times for project planning and replacement mean that this replacement will occur in early financial year 2021. This expenditure is necessary to maintain the reliable operation of Directlink.[20]

Table 9-8: Forecast capital expenditure optic fibres ($m FY20)

	FY21	FY22	FY23	FY24	FY25	Total
Fibres	3.8	-	-	-	-	3.8

9.6.5 *Corrosion and environmental deterioration*

Corrosion and Environmental Deterioration issues have been identified in prior revenue determination proposals and are a recurring challenge at both Bungalora and Mullumbimby substations.

The following projects need to be undertaken to prevent corrosion as well as to repair or replace deteriorated equipment as a result of deterioration due to corrosion, rotting or environmental damage. These items are:

- Annual Spraying for Corrosion
- Barn Door Replacement
- Barn Roof Repair
- Barn Sound Damp Vent Inlet Replacement
- Circuit Breaker Pole Repair and Refurbishment
- Capacity Voltage Transformer (CVT) Replacement

[20] As such it is consistent with the requirements of rule 6A.6.7(a)(3).

- Fire System Equipment Protection
- Phase Reactor Silencer Replacement
- Site Cable Tray Installation and Relocation of Cables
- Transformer Painting and Protection

The efficient maintenance and preventative action for the asset has driven the need for a program of work to address corrosion forming on these areas of the substations at both Bungalora and Mullumbimby.

The items have been scheduled based on multiple considerations inclusive of priority, severity of issue, planning required, lead times, and outage requirements for the replacement projects to occur. They are necessary to maintain the safe and reliable operation of Directlink.[21]

Table 9-9: Forecast capital expenditure corrosion ($m FY20)

	FY21	FY22	FY23	FY24	FY25	Total
Corrosion and Environmental Deterioration	0.5	0.8	0.6	0.8	0.1	2.9

9.6.6 *Land Rectification and Restoration*

When it was being constructed Directlink the State Rail Authority of NSW issued a deed of licence to run the cable through State Rail Authority land.

Under clause 12(b) of its deed of licence Directlink is required to

> *"the Licensee must remove all of its cables or other wires, hardware, equipment, fixtures and fittings and restore the Premises to the condition they were in at the commencement of this Licence"*

Under the deed, and environmental legislation in NSW, Directlink will be required to return the easements and other land it uses back to the state it was in when Directlink commenced construction.

Directlink's regulatory life runs until 2041/42. At that time the legal requirements to restore the land will crystallise. The requirement to restore the land is undoubtedly a cost of providing the transmission service.

Directlink is proposing to set aside an annual amount to cover the cost of restoration and rectification works at the end of the life of the interconnector. As this amount will be saved it is an asset.

[21] As such it is consistent with the requirements of rule 6A.6.7(a)(3).

This proposal is consistent with the National Electricity Rules. In order to be considered forecast capital expenditure it must be consistent with the capital expenditure objectives. The capital expenditure objectives includes rule 6A.6.7(a)(2) which is capital expenditure required to comply with all applicable regulatory obligations or requirements associated with the provision of prescribed transmission services. This is demonstrated by the deed of licence from the NSW Government and requirements from the NSW Environmental Protection Agency. Notably rule 6a.6.7(a)(2) is not bound in time to the next regulatory control period.

In order to approve the forecast capital expenditure under rule 6A.6.7(c)the AER must be satisfied that the total of the forecast capital expenditure for the *regulatory control period* reasonably reflects each of the following (*capital expenditure criteria*):

(1) the efficient costs of achieving the *capital expenditure objectives;*

(2) the costs that a prudent operator would require to achieve the *capital expenditure objectives;* and

(3) a realistic expectation of the demand forecast and cost inputs required to achieve the *capital expenditure objectives*.

The issue then becomes a question of how is the efficient and prudent level of costs for rectification work to be conducted in the future to be determined. Directlink is proposing to estimate the efficient cost of meeting the required obligation as they exist today and discounting that cost in real terms from 2041/42. (see attachment 9.2).

The rectification is based on removal of the Directlink cable and restoration of the land to its original condition. The land of the converter stations is freehold and is not included in the cost or rectification and restoration.

Utilising current cost estimates has the advantage that it can be reviewed at each transmission determination review to determine if the standard or the cost of meeting the standard has changed and the annual amount set aside can be varied according so that by the end of the life of Directlink the correct amount to fund rectification and restoration has been set aside.

Setting aside an annual allowance has two distinct benefits.

The first is it uses the benefit of compounding return to the benefit to consumers. The amount to be set aside each year will be less than the amount that will be required to be charged to customers in 2041/42 demonstrating prudency and efficiency that not allowing this cost would not possess.

The other is consistency with the National Electricity Objective, by setting aside an allowance in each year of the operation of Directlink it is charging customers who are benefiting from the presence of Directlink the total cost of Directlink (including decommissioning costs) rather than charging customers who are no longer receiving the prescribed transmission service.

Table 9-10: Forecast capital expenditure Land rectification ($m FY20)

	FY21	FY22	FY23	FY24	FY25	Total
Reclamation and Restoration	0.4	0.4	0.4	0.4	0.4	2.1

9.6.7 *Cable modification*

Directlink seeks to invest in regular analysis of cable fault data, to assist with any improvement strategies that could be implemented to maintain reliability. Cable faults cause downtime to the network and are a disruption to productivity in the business. Fault repairs can be a strain on resources and our normal operations.

The Directlink cable is 59km and approximately 14km is above ground in the galvanised steel tray. There are approximately 76 cable transition points between below and above ground.

In 2018 Amplitude Consultants were commissioned to conduct a cable fault analysis. In partnership with Directlink operations team Amplitude were able to identify that a significant number of cable faults appear to be occuring at, or near, cable transitions.

An early recommendation from the ongoing cable analysis is to replace cable transitions with the objective of removing a mechanical stress identified.

The Cable Modification project includes budget allocated for ongoing technical analysis and investigation. This is in order to identify more sources for the reliability issues on Directlink and to ensure where a solution is selected to both the cable transitions and other issues identified are effective in the long term.

Further, the project seeks funding to commence executing an action plan that may include the replacing of cable transitions in a staged approach. Directlink is forecasting the commencement of works to fix issues identified in the technical analysis in the next transmission determination period. However, until the technical analysis is completed in 2019 the exact nature of the intervention cannot be finalised.

As an interim measure Directlink has included an educated estimate of the cost of this subsequent work. However, a final cost will be determined prior to the revised proposal. The AER and stakeholders will be updated as this cost estimate develops.

This project is critical in Directlink's ability to be a reliable network provider. Without this scope of work there is no ability to understand why and how cable faults occuring and to stop it continuing into the future.

Table 9-11: Forecast capital expenditure cable modification ($m FY20)

	FY21	FY22	FY23	FY24	FY25	Total
Cable modification	0.9	0.9	0.3	-	-	2.1

They are necessary to maintain the safe and reliable operation of Directlink.[22]

9.6.8 *Stay in Business*

Stay in Business (SIB) projects are generally ad-hoc and discrete packages of work, with a low to medium cost associated as opposed to major projects. Essentially SIB is a group of projects that may be unrelated but have been identified as beneficial to business operation.

This category proposes ad-hoc projects or items of purchase in relation to:

- Improved Security Surveillance
- The concreting of a switchyard area (Bungalora substation)
- The Motorisation and Relocation of Isolation switches

Directlink personnel perform a series of rectification and maintenance duties on both the High-Voltage Direct Current (HVDC) cable and the converter stations on a daily basis to ensure the optimum performance capability is achieved at all times. These activities, including cable fault repairs, require tools specific to HVDC operations and maintenance. Periodically our essential tools and equipment require replacing due to age, an item requiring repair, or a new technology coming to market. The Stay in Business (SIB) project includes the purchase of the following essential tools and equipment:

- Directlink Operations Trailer and Cable Handling Equipment (Stands, Winches)
- HV Cable Cutter/Earthing Spike
- Cable Repair Tents
- SF6 Gas Specialist Handling Gear and Leak Detection Equipment

[22] As such it is consistent with the requirements of rule 6A.6.7(a)(3).

Over a determination period it is probable that stay in business projects arise that cannot be forecast. Notably, the budget requested is a decrease from prior determinations as Directlink has sought to identify specific Stay in Business items where possible at this time. This expenditure is consistent with the National Electricity Objective and the requirements of the National Electricity Rules as it necessary to maintain the reliability of the network consistent with Rule 6.A.6.7(a)(3)(i).

Table 9-12: Forecast capital expenditure stay in business ($m FY20)

	FY21	FY22	FY23	FY24	FY25	Total
Stay in business	0.2	0.5	0.0	0.0	0.0	0.8

9.6.9 *Essential spares*

Due to the failure rates associated with IGBTs and capacitors a stock of these items is held in storage to be available when either of these items fails so it does not result in significant outages for any of the systems that make up Directlink. The forecast for replacement capacitors is based on the current failure rate being experienced. On an aging asset this is likely to underestimate the rate at which EII will end up buying spare capacitors, however it is difficult to derive a better basis on which to forecast a failure rate which by its very nature is an unknown.

The volume of spares of Generation three IGBTs is based on the historically observed failure rate for these IGBTs experienced at Mullumbimby system one (3-5 per year).

The expected failure rate for capacitors for the 2020-2025 period is 5-6 per year based on current failures.

Table 9-13: Forecast capital expenditure essential spares ($m FY20)

	FY21	FY22	FY23	FY24	FY25	Total
Essential Spares	0.2	0.2	0.2	0.2	0.2	0.8

9.6.10 *Testing Equipment*

Testing Equipment projects seek to ensure systems and equipment are in a condition capable of meeting operational requirements.

This program has identified three specific projects to replace equipment that has reached the end of its life or new purchase equipment to increase our testing capabilities:

- Thumper Unit (Thumper, Hi-Pot tester + Trailer) ($0.3m)
- IGBT tester ($0.07)
- Power Quality metering ($0.3)

Thumper Unit (Thumper, Hi-Pot tester + Trailer)

The thumper unit is a piece of equipment designed to test the insulation on the cable. The current thumper unit at Directlink had performed 170+ cable faults at the end of 2018. The Thumper Unit is showing signs of deterioration. For the purposes of this project, 'Thumper Unit' includes the Hi-Pot tester equipment and the trailer that transports the Hi-Pot and Thumper to faults. The Hi-Pot unit is used to test the Directlink cable is ready for service, after a cable fault repair

The tester is approaching the end of its life and needs to be replaced. The trailer that carries the tester has significant levels of corrosion due to age and exposure and will be replaced at the same time.

This equipment is critical in the identification of cable fault locations and improves the repair time to ensure downtime is limited. Total cost is $0.35m. This equipment is necessary to maintain the reliable and safe operation of the Directlink cables.

IGBT Tester

The program will also include the purchase of an IGBT tester for Generation One IGBTs ($0.07m). As noted in section 9.6.1, Generation One IGBTs are no longer being manufactured. Directlink requires the ability to test IGBTs at any time to ensure that those in place are operating effectively and the spares are suitable to avoid running short.

This equipment is necessary to maintain the reliable operation of IGBTs. Therefore, replacement of these systems is necessary to maintain the operation of Directlink.[23]

Power Quality Metering

Directlink seeks to ensure power quality in accordance with of its connection agreements and the National Electricity Rules by having transparency of quality performance. This will be achieved by investing in power quality metering equipment and software. Previously power quality was monitored on an ex-post basis (predictable quality meant that what had occurred in the past was a reasonable forecast for what expected in the future and quality management could be undertaken in a gradual manner). Widespread investment in solar and wind projects in Queensland and New South Wales means that there is increased presence of power generation issues which means ex-post assessment is no longer consistent with good industry practice or the National Electricity Rules.

[23] As such it is consistent with the requirements of rule 6A.6.7(a)(3).

Power quality metering with logging software is proposed to be installed in order to manage power quality in real time.

Purchase of this equipment is necessary to maintain the quality of the prescribed transmission services. Replacement of these systems is necessary to maintain the operation of Directlink.[24]

Table 9-14: Forecast capital expenditure test equipment ($m FY20)

	FY21	FY22	FY23	FY24	FY25	Total
Test Equipment	0.4	-	0.2	0.2	-	0.8

9.6.11 *Noise Monitoring Equipment*

There have been multiple complaints about noise levels at the Bungalora and Mullumbimby Convertor stations, with a notable recent increase at Mullumbimby.

These communities, and the region, is forecast for increased growth and development. In addition to population increase trends, projects such as the Northern Rivers Rail Trail project (see section 6.2.4) suggest more attention on converter station noise outputs is probable.

Directlink will be increasing Stakeholder Engagement activity in the communities concerned commencing 2019 (see section 4.4) and there will is an expectation that the local community will wish to engage in relation to a noise improvement strategy.

NSW Industrial Noise Policy set the level of acceptable or unacceptable noise (nuisance noise) under the legislation. Where the noise is found to be a nuisance this can lead to both corporate and personal fines and the resulting damage to corporate reputation in the area where EII operates its asset. EII needs to be confident that it is meeting its legal obligations with regards to noise pollution.

Directlink is proposing to install noise monitoring equipment and engage external noise experts. This equipment will have the benefit of providing data for analysis to identify sources of unacceptable noise, if they exist, or to enable Directlink to respond to concerns about noise levels demonstrating it is not the source of noise. This is the first measure proposed, and a critical element, of a longer term strategy to reduce noise outputs.

[24] As such it is consistent with the requirements of rule 6A.6.7(a)(3).

Table 9-15: Forecast capital expenditure noise control ($m FY20)

	FY21	FY22	FY23	FY24	FY25	Total
Noise Monitoring Equipment	0.1	0.1	0.1	0.1	0.1	0.5

9.6.12 *Regulatory*

Consistent with past practice on Directlink, EII has capitalised expenditure associated with the regulatory reset. This expenditure is for the purposes of putting together a regulatory submission that is compliant with the requirements of the National Electricity Rules.

Consistent with accounting treatment with EII, it is only those costs that can be specifically identified as for regulatory purposes that is charged by APA. In this case it is only those costs that result from the use of consultants and experts external to APA. The costs of the regulatory staff, engineers and accounting staff internal to APA are assumed to be covered by the commercial management charge under the MOMSCA (operating agreement).

The forecast costs are those associated with establishing the stakeholder engagement over the next transmission determination period. These are the advisory costs associated with the establishment and implementation of the program and incorporating it into business as usual operations for EII. This does not represent the cost of APA staff in executing the stakeholder engagement program. This cost is based on estimates provided to APA by Newgate Research.

There are also the costs associated with external engineer expertise used to prepare the submission documents and justifications.

Table 9-16: Forecast capital expenditure regulatory ($m FY20)

	FY21	FY22	FY23	FY24	FY25	Total
Regulatory	0.1	0.1	0.1	0.1	0.1	0.3

9.7 Total forecast capital expenditure

The forecast capital expenditure required to maintain the prescribed transmission services by Directlink during the 2020-25 regulatory control period is set out in Table 9-17.

Table 9-17 – Forecast capital expenditure by asset class ($m FY20)

	FY21	FY22	FY23	FY24	FY25	Total
Transmission Assets	11.2	7.8	6.8	8.1	4.5	38.4
Restoration and Rectification	0.4	0.4	0.4	0.4	0.4	2.1
Total	11.6	8.2	7.2	8.5	4.9	40.5

Table 9-18 – Forecast capital expenditure by asset driver ($m real FY20)

	FY21	FY22	FY23	FY24	FY25	Total
Augmentation/Expansion	-	-	-	-	-	-
Replacement/Refurbishment	11.6	8.2	7.1	8.5	4.9	40.2
Non-network	0.1	0.1	0.1	0.1	0.1	0.3
Total	11.6	8.2	7.2	8.5	4.9	40.5

9.8 Proposed contingent capital expenditure projects

There are no contingent projects proposed for Directlink in the forecast transmission determination period.

10 Forecast Operating Expenditure

10.1 Introduction

In this chapter Directlink outlines its proposed forecast operating expenditure for the 2020 to 2025 period. The approach outlined by Directlink is consistent with the rules in particular rule 6A.6.6. The rules requirements are discussed in more detail in section 10.2.

The approach is also consistent with the AER's Framework and Approach for Directlink[25] and Directlink's expenditure forecast methodology[26].

10.2 Rule requirements

Clause 6A.6.6 and schedule S6A.1.2 of the Rules establish the information and matters relating to operating expenditure that must be provided in Directlink's Proposal. The principal requirements are that the proposed operating expenditure must:

- Meet the operating expenditure objectives;
- Be subdivided into particular programs or types of expenditure and identify the fixed and variable components;
- Include a forecast of key variables used to derive the forecast;
- Have Directors' sign off on the reasonableness of key assumptions used in the operating expenditure forecast; and
- Identify any methodology or programs to improve the performance of the transmission network, in relation to the service target performance incentive scheme.

10.2.1 Operating expenditure objectives

The operating expenditure that Directlink has proposed is required to:

- meet or manage the expected demand for prescribed transmission services over that period;
- comply with all applicable regulatory obligations or requirements associated with the provision of prescribed transmission services;

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25 AER, Framework and approach for Directlink: For regulatory control period commencing 1 July 2018, July 2016,

26 Directlink, Proposed Forecasting Methodology, July 2016

- to the extent that there is no applicable regulatory obligation or requirement in relation to:
  - the quality, reliability or security of supply of prescribed transmission services; or
  - the reliability or security of the transmission system through the supply of prescribed transmission services,
- to the relevant extent:
  - maintain the quality, reliability and security of supply of prescribed transmission services; and
  - maintain the reliability and security of the transmission system through the supply of prescribed transmission services; and
- maintain the safety of the transmission system through the supply of prescribed transmission services.

Directlink's operating expenditure forecast has been prepared in line with the operating expenditure objectives as defined in the Rules. Directlink considers that this revenue proposal achieves the operating expenditure objectives, having regard to these factors.

10.3 Types of expenditure and key drivers

10.3.1 Operations and Maintenance

Routine

This expenditure is the recurrent maintenance activities undertaken by Directlink.

The materials and spare parts associated with routine maintenance are also included in this category of expenditure.

The majority of the routine maintenance activities for Directlink equipment are currently carried under the Agreement with APA, as a contractor. All routine maintenance on the link equipment, is in accordance with the manufacturer's recommendations.

Fault and condition

This is expenditure undertaken in response to the condition of the asset. That is the condition of the asset is such that that operating expenditure is necessary to enable it to continue in or return it to operating service. Logically, the main driver of this activity is the condition of the assets and their likelihood of failing.

10.3.2 Operations

Whilst the flow levels of Directlink are controlled in response to AEMO requirements, the operation of Directlink is controlled remotely. This control room is manned by shift staff and also used for the control of other assets. Accordingly, Directlink is charged an allocated cost for the control room. This amount is consistent with charges in previous periods.

10.3.3 Commercial services

APA Operations recovers contract costs and its direct overheads, such as rent, electricity and telecommunications from EII on the basis of a Management, Operations and Maintenance and Commercial Services Agreement (MOMCSA) entered into between the parties in 2008. The AER has reviewed the MOMSCA previously in both the Directlink and Murraylink reviews and has found it to be consistent with the requirements on the National Electricity Rules.

APA also provides corporate support to Directlink on the same basis as other assets in its infrastructure portfolio. These support services include IT facilities, legal, accounting and regulatory support

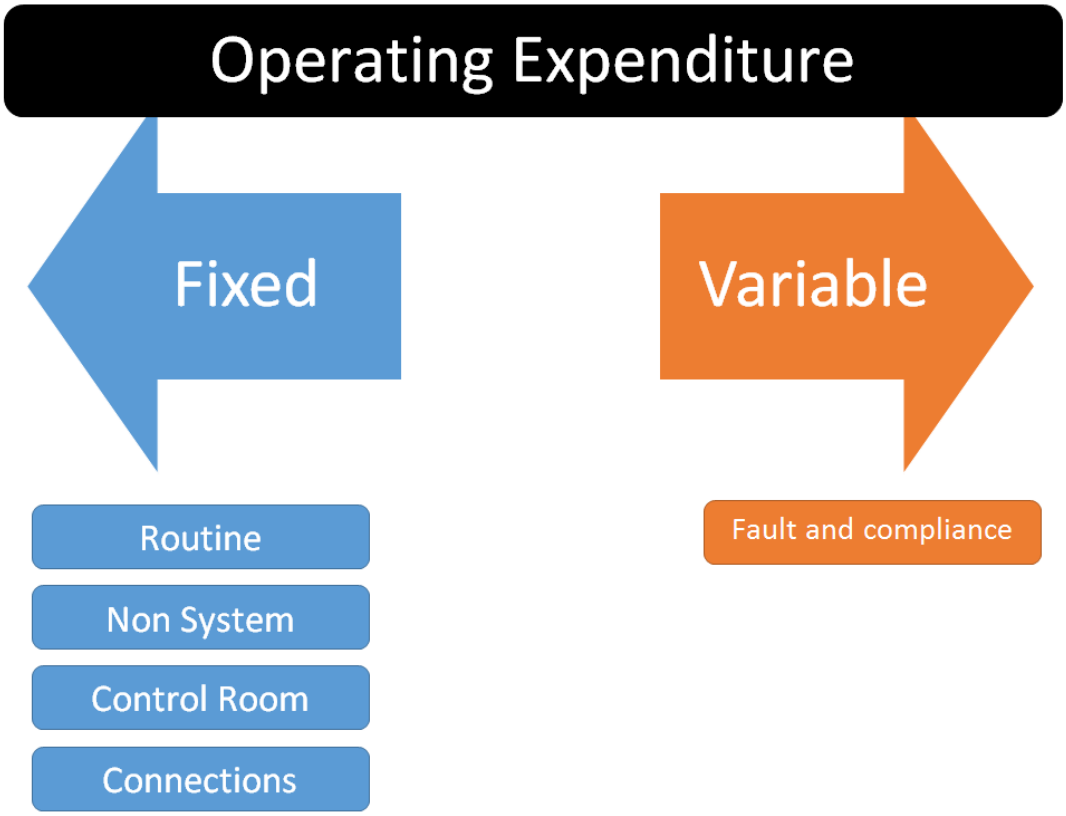
10.4 Methodology or programs to improve performance of transmission network

Directlink has no identified projects or programs to improve reliability performance.

10.5 Fixed and variable operating costs

Rule S6A.1.2 requires Directlink to identify the extent to which the categories of costs above are fixed and the extent to which they are variable. This has been illustrated by the diagram in Figure 10-1.

Figure 10-1: Fixed and variable operating costs



Consistent with the nature of Directlink's operations, in particular AEMO's control of its dispatch, none of its costs vary directly with the amount of electricity transported through the interconnector.

But this is not to say that all costs are controllable. Electricity costs, used for driving fans and cooling equipment, appear to vary to some degree with the load on the interconnector, which is driven by AEMO's dispatch procedures. While Directlink has control over the unit cost of electricity, it does not have control over the amount of electricity used.

As outlined above, most maintenance on the converter stations is scheduled and programmed well in advance. Maintenance in accordance with the programmed procedures and manufacturer's recommendations also involves predictable costs for spares and consumables; this category of operating cost is therefore largely fixed.

Operations costs (an allocated component of control room costs) are expected to remain fixed for the regulatory control period.

Insurance, governance and taxes do not change with volumes.

10.6 Outsourcing arrangements and margins

Energy Infrastructure Investments Pty Limited (EII) understands that the AER will need to satisfy itself that the payments made under the Management, Operations and Maintenance and Commercial Services Agreement (MOMCSA) for the following services satisfy the relevant provisions in chapter 6A of the Rules:

- asset management, operating, maintenance and capital services; and
- corporate services.

To assist the AER with its assessment of this issue, EII has prepared an attachment that demonstrates the consistency of the payments made under this agreement with the operating and capital expenditure criteria contained in rules 6A.6.6(c) and 6A.6.7(c).

Attachment 10.1 addresses outsourcing arrangements and margins in more detail, including:

- providing an overview of the MOMCSA;
- setting out EII's understanding of the framework that the AER has developed for the purposes of assessing the consistency of outsourcing arrangements with the Rules; and
- applying the AER's framework to the MOMCSA and demonstrates the consistency of its arrangement with the operating and capital expenditure criteria.

10.7 Methodology

Directlink has adopted the AER's approach to forecasting operating expenditure.

10.7.1 The AER's approach

The AER state

> *"We prefer a 'base-step-trend' approach to assessing most opex categories."….*
>
> *"The 'revealed cost' approach is our preferred approach to assessing base opex. If actual expenditure in the base year reasonably reflects the opex criteria, we will set base opex equal to actual expenditure for those cost categories forecast using the revealed cost approach."*

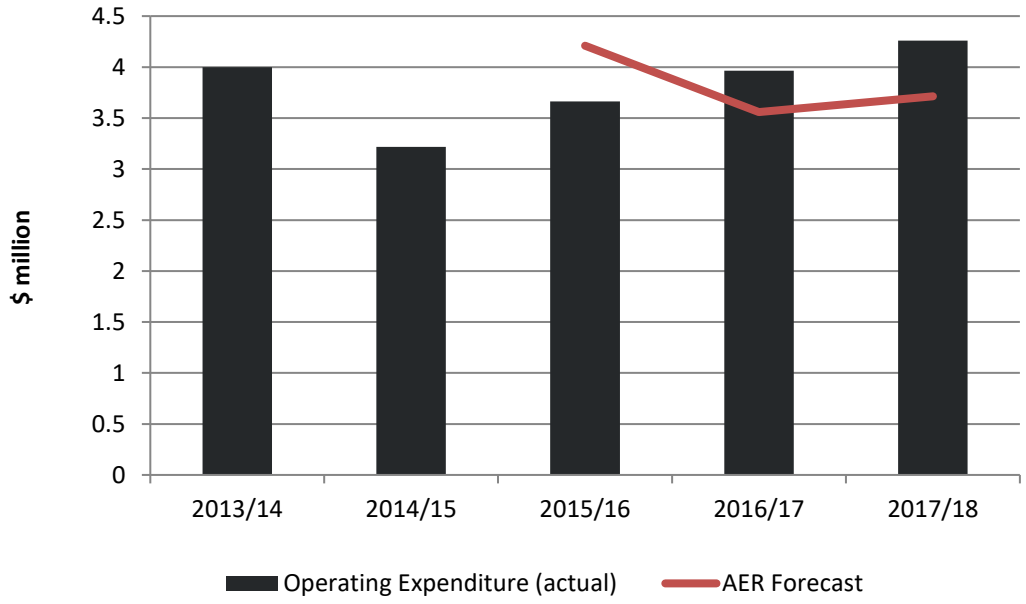
10.7.2 Base Year

Directlink has selected the 2017/18 financial year as its base year. This year has the following characteristics:

- It is the most recent completed financial year

- It has no non-recurring costs included; this makes it a transparent starting point for the calculation of forecast operating expenditure.

Figure 10-2: Historic operating expenditure



10.7.3 *Adjustments to base year*

The only adjustment made to the base year was to remove that line item cost that was separately forecast to avoid double counting (insurance).

10.7.4 *Real cost escalation*

Directlink has applied the AER's approach to the calculation of cost escalation adopted in the draft determination for the AusNet services most recent transmission determination.[27]

The AER divided forecast operating expenditure into labour and non-labour. Then applied a CPI only escalation factor to non-labour costs and a labour escalator derived by Deloitte Access Economics to the labour component.

Directlink has divided the forecast operating expenditure into labour and non-labour costs based on historic division of labour and non-labour costs for

[27] This is based on the expectation that labour costs are market driven and reflecting these costs is consistent with the requirement of the National Electricity Rules. A position that is accepted by the AER in past determinations.

the period financial year 2014 to financial year 2018. This resulted in a ratio of labour to non-labour of 46:54.

For AusNet the AER used the calculated labour ratio from Economic Insights report. But the correct decision has been made to exclude Directlink and Murraylink from these reports because of the significant difference in characteristics that these networks display compared to other transmission networks. It would therefore be incorrect to apply the benchmark split for Directlink.

Directlink has then applied the labour cost escalators calculated by Deloitte Access Economics until 2024 and then applied the increase for financial year 2024 to financial year 2025.

10.7.5 Step changes

There are no forecast step changes in the forecast operating expenditure.

10.7.6 Separate Forecasts

The forecast of future insurance costs are based on the forecast from EII's expert insurance provider Marsh. Marsh has identified that insurance costs are expected to increase through to 2025.

Marsh indicate in 2017, the insurance market moved out of the "Soft Market" and moved through a transition into a "Hard Market" which has continued to exist in 2018. This has mainly effected Property and Directors and Officers insurance but pressure is beginning to build in other lines including Motor and Liability.

We are seeing capacity reductions from many insurers and local underwriters having to refer more to their regional underwriting managers. Market consolidation including Chubb/ACE, XL/Catlin and most recently AXA/XL has reduced the amount of capital deployed. Other agreements between insurers, such as CGU and Berkshire Hathaway (the former ceding their ASX portfolio to the latter), has also reduced capacity.

The table of Property insurance premiums is extracted from the Marsh report provided to Directlink setting out Marsh's expectation of insurance costs going forward.

Table 10-1: Forecast property insurance premiums ($ FY18)

	FY21	FY22	FY23	FY24	FY25
Insurance	426,381	467,527	500,722	523,504	533,975

And the table below sets out the liability insurance forecast from Marsh

Table 10-2: Forecast liability insurance premiums ($ FY18)

	FY21	FY22	FY23	FY24	FY25
Insurance	59,313	62,279	63,836	65,432	65,432

Combine these lead to an insurance premium forecast for Directlink as set out in Table 10-3.

Table 10-3: Forecast property insurance premiums ($FY18)

	FY21	FY22	FY23	FY24	FY25
Insurance	485,694	529,806	564,557	588,936	599,406

Due to the inability of Directlink to control the insurance market it is appropriate to adopt a separate forecast for this item. In particular in light of the recognition in the Marsh report that Directlink has actually lowered its individual insurance costs through the installation of fire suppression equipment and the Gotland solution.

10.8 Forecast operating expenditure

The proposed total operating expenditure forecast for Directlink is $25.9 million

Table 10-4: Forecast operating expenditure by year ($m FY20)

	FY21	FY22	FY23	FY24	FY25	Total
Operating Expenditure	4.8	5.0	5.2	5.4	5.5	25.9

Figure 10-3 sets out the historic and forecast operating expenditure for Directlink.

Figure 10-3: Historic and forecast operating expenditure

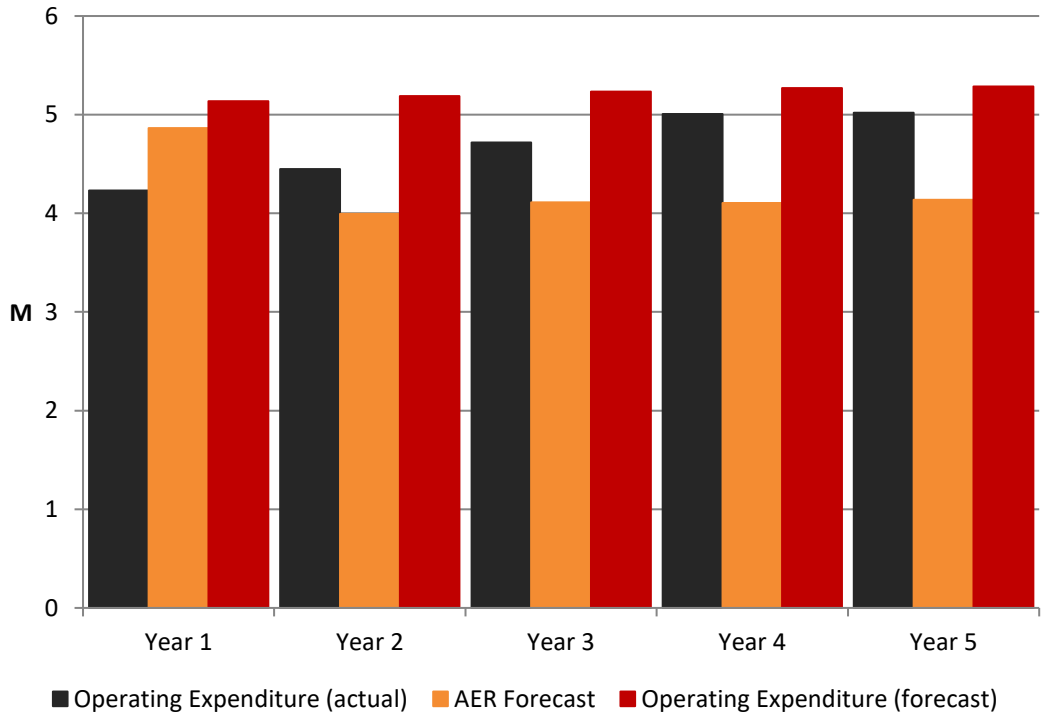


Table 10-5 sets out the forecast operating expenditure and EBSS as entered into the revenue calculation in the AER's post tax revenue model.

Table 10-5: Forecast operating expenditure including debt raising costs ($m FY20)

	2018/19	2019/20	2020/21	2021/22	2022/23	Total
Operating expenditure	4.8	4.8	4.9	4.9	4.9	24.3
Debt raising costs	0.1	0.1	0.1	0.1	0.1	0.4
Total operating expenditure	4.8	4.9	5.0	5.0	5.0	24.7

11 Depreciation

This chapter sets out how the proposed depreciation allowance for Directlink has been determined.

11.1 Depreciation methodology

The depreciation methodology used is that inbuilt into the AER Post Tax Revenue Model.

11.2 Changes to asset classes

Directlink is proposing to merge the Converter Stations, Transmission Lines and Easements into a single asset class. This reflects a number of considerations:

- The finite technical life of Directlink means that all these assets will need to be fully recovered by 2041/42. There is no distinction between the economic lives of the asset classes.
- When the initial capital base was set the value was allocated to these classes, it does not reflect the cost of construction, so the division doesn't provide a meaningful distinction.
- The merger does not affect the revenue outcomes.
- This is a unique issue for Directlink that is not faced by other Electricity Transmission Networks.

In order to facilitate the ongoing management of the annual allocation of restoration and rectification costs from one Transmission Determination Period to the next it is proposed to make this a separate asset class. It will have the same asset life as the rest of Directlink, limited to the technical life of the asset. At the end of the life of Directlink is when the rectification and restoration asset will be required.

11.3 Standard asset lives

Due to the declining asset life of the Directlink asset the standard life of the asset in the regulatory asset base roll forward model is 5 years greater than the standard life of the asset in the Post Tax Revenue model. The standard life per asset class is set out in Table 11-1.

Table 11-1: Forecast standard life of regulatory assets

	Standard Life/Remaining Life
Transmission assets	21.2
Restoration and rectification	21.2

11.4 Remaining asset lives

As the remaining asset lives is greater than the standard asset life the remaining asset lives are reduced to be a maximum of the standard asset life. The weighted average remaining asset lives are set out in Table 11-2.

Table 11-2: Weighted average remaining asset lives as at 1 July 2020

Asset class	Useful life
Transmission Assets	21.2
Restoration and rectification	21.2

11.5 Depreciation forecast

The regulatory depreciation has been calculated using the AER's PTRM.

The forecast regulatory depreciation for Directlink during the 2020-25 regulatory control period is set out in Table 11-3.

Table 11-3: – Forecast depreciation 2020-25 ($m, nominal)

	FY 21	FY 22	FY 23	FY 24	FY 25
Depreciation	7.1	7.9	8.5	9.1	9.7
Indexation	3.6	3.8	3.9	4.0	4.1
Regulatory depreciation	3.5	4.1	4.6	5.1	5.7

12 Maximum allowable revenue

Directlink's revenue proposal is derived from the post-tax building block approach outlined in the Rules[28] and the AER's PTRM.[29] The completed PTRM forms attachment 12.1 to this revenue proposal. This chapter summarises the building block approach, the components of which are detailed in the preceding chapters. The Maximum Allowed Revenue (MAR) and X factor for Directlink are calculated from the PTRM. Future adjustments to the revenue cap are also described.

12.1 Building block approach

The building block formula to be applied in each year of the regulatory control period is:

MAR = return on capital + return of capital + opex + tax

= (WACC × RAB) + D + opex + tax

Where:

MAR = Maximum Allowable Revenue.

WACC = post-tax nominal weighted average cost of capital ("vanilla" WACC).

RAB = Regulatory Asset Base.

D = Regulatory Depreciation.

opex = operating expenditure.

tax = income tax allowance.

The MAR is then smoothed with an X factor, in accordance with the Rules requirements.[30]

The Rules allow for revenue increments and decrements arising from the Efficiency Benefit Sharing Scheme (EBSS). Directlink is proposing the EBSS adjustments outlined in section 13.2.2.

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28 *National Electricity Rules*, Part C of Chapter 6A, AEMC.

29 AER, Final decision, Amendment - Electricity transmission network service providers Post-tax revenue model, December 2010.

30 AEMC, *National Electricity Rules*, Chapter 6A, clause 6A.6.8.

Any increment or decrement associated with the Service Target Performance Incentive Scheme (STPIS) is not included in this Revenue Proposal, but as a future revenue cap adjustment.

12.2 Building block components

The building blocks that formed a part of the revenue calculation are set out below.

12.2.1 Regulatory asset base

Chapter 7 described the calculation of the estimated RAB of $148.4 million, as at 1 July 2025.

The capital expenditure forecast in Chapter 9 was used to roll forward the regulatory asset base, using the expected regulatory depreciation detailed in this chapter. The regulatory asset base for the next regulatory control period is set out in Table 12-1.

Table 12-1: Summary of forecast regulatory asset base ($m, nominal)

	FY 21	FY 22	FY 23	FY 24	FY 25
Opening regulatory asset base	148.4	156.9	161.6	164.9	169.3
plus indexation	3.6	3.8	3.9	4.0	4.1
plus forecast capital expenditure	12.1	8.8	7.8	9.5	5.6
less forecast depreciation	-7.1	-7.9	-8.5	-9.1	-9.7
less forecast disposals	-	-	-	-	-
less forecast redundant assets	-	-	-	-	-
Closing regulatory asset base	156.9	161.6	164.9	169.3	169.2

12.2.2 Return on capital

The return on capital was calculated by applying the post-tax nominal vanilla WACC to the opening regulatory asset base in the respective year.

The post-tax nominal vanilla WACC of 5.18 per cent was established as detailed in chapter 8. Directlink has calculated the return on capital using the PTRM. This calculation is summarised in Table 12-2.

Table 12-2: Summary of return on capital forecast ($m, nominal)

	FY 21	FY 22	FY 23	FY 24	FY 25
Return on capital	7.7	8.1	8.4	8.5	8.8

12.2.3 *Return of capital*

Chapter 11describes how Directlink has calculated the return of capital provided by depreciation. The AER's PTRM combines both the straight line depreciation and an adjustment for inflation on the opening RAB. A summary of the regulatory depreciation allowance is given in Table 12-3.

Table 12-3: Summary of regulatory depreciation ($m, nominal)

	FY 21	FY 22	FY 23	FY 24	FY 25
Forecast straight line depreciation	-7.1	-7.9	-8.5	-9.1	-9.7
Forecast Indexation	3.6	3.8	3.9	4.0	4.1
Forecast regulatory depreciation	-3.5	-4.1	-4.6	-5.1	-5.7

12.2.4 *Operating expenditure*

Chapter 10 of this transmission determination proposal details Directlink's operating expenditure requirements in each year of the next regulatory control period. This is summarised in Table 12-4.

Table 12-4: Summary of forecast operating expenditure ($m nominal)

	FY 21	FY 22	FY 23	FY 24	FY 25
Forecast operating expenditure	5.0	5.1	5.3	5.5	5.6

12.2.5 *Tax allowance*

The tax allowance is calculated by the AER's PTRM based on the tax asset base outline in section 7.4. The forecast tax allowance is summarised in Table 12-5.

Table 12-5: Summary of tax allowance 2020-25($m nominal)

	FY 21	FY 21	FY 21	FY 21	FY 21
Tax allowance	0.3	0.3	0.3	0.4	0.4

12.3 Maximum allowable revenue

The total revenue cap and the MAR for each year of the next regulatory control period is provided below. Based on the building blocks outlined in the previous section, the total revenue cap and maximum allowable unsmoothed revenue requirement is summarised in Table 12-6.

Table 12-6: Summary of unsmoothed revenue requirement ($m, nominal)

	FY 21	FY 22	FY 23	FY 24	FY 25	Total
Return on capital	7.7	8.1	8.4	8.5	8.8	41.4
Return of capital	3.5	4.1	4.6	5.1	5.7	22.9
plus operating expenditure	5.0	5.1	5.3	5.5	5.6	26.5
plus Revenue adjustment	-1.0	-1.1	-0.5	-0.2	0.1	-2.8
plus net tax allowance	0.3	0.3	0.3	0.4	0.4	1.7
Unsmoothed revenue requirement	15.5	16.5	18.0	19.2	20.5	89.8

12.4 X-factor smoothed revenue

A net present value (NPV) neutral smoothing process is applied to the building block unsmoothed revenue requirement, while ensuring the expected MAR for the last regulatory year is as close as reasonably possible to the annual building block revenue requirement. The associated X factors are presented in Table12-7.

Table12-7: Smoothed revenue requirement and X factor ($m, nominal)

	FY 21	FY 22	FY 23	FY 24	FY 25	Total
Unsmoothed Revenue	15.5	16.5	18.0	19.2	20.5	89.8
Smoothed Revenue	15.5	16.6	17.9	19.2	20.6	89.8
X factors		-4.93%	-4.93%	-4.93%	-4.93%	

12.5 Revenue cap adjustments

In accordance with the Rules,[31] Directlink's revenue cap determination by the AER is in the CPI-X format, and may be subject to adjustment during the next regulatory control period for the following reasons:

- Adjustment for actual CPI - Directlink's revenue cap will be calculated each year using the actual CPI.
- STPIS – Directlink's revenue cap will be adjusted by the impact of the STPIS as discussed in chapter 13;
- Pass through – Directlink's revenue cap may be adjusted in the event that an eligible pass through amount is approved by the AER.

12.6 Proposed cost pass through events

The National Electricity rules contain a number cost pass through events:

- Network support pass through;
- A regulatory change event;
- A service standard event;
- A tax change event; and
- An insurance event.

Directlink is proposing a cost pass through event under 6A.6.9. In addition to the cost pass through events in the National Electricity Rules, Directlink is proposing a cost pass through of expenditure in relation to the following events

- Terrorism event;
- Insurance credit risk event

12.6.1 Rules Requirements

The nominated pass through event considerations are outlined in Chapter 10 of the National Electricity Rules as:

> *(a) whether the event proposed is an event covered by a category of pass through event already specified;*
>
> *(b) whether the nature or type of event can be clearly identified at the time the determination is made for the service provider;*

31 AEMC, National Electricity Rules, Chapter 6A.5.3.

(c) whether a prudent service provider could reasonably prevent an event of that nature or type from occurring or substantially mitigate the cost impact of such an event;

(d) whether the relevant service provider could insure against the event, having regard to:

(1) the availability (including the extent of availability in terms of liability limits) of insurance against the event on reasonable commercial terms; or

(2) whether the event can be self-insured on the basis that:

(i) it is possible to calculate the self-insurance premium; and

(ii) the potential cost to the relevant service provider would not have a significant impact on the service provider's ability to provide network services; and.

(e) any other matter the AER considers relevant and which the AER has notified Network Service Providers is a nominated pass through event consideration.

12.6.2 *Terrorism event*

In consideration of the requirements in the rules Directlink notes the following:

- Expenditure resulting from a terrorism attack on the network is not covered by any of the pre-existing cost pass throughs listed above;
- A terrorist attack is a clearly defined event;
- A deliberate attack, nor the damage resulting from such an attack, on the Directlink can not reasonably be prevented;
- Insurance can not be obtained for all forms of terrorist attack; and
- Self-insurance is not possible given the magnitude of damage that is possible under potential attacks

Therefore, a terrorist attack event is consistent with the requirements of the National Electricity Rules as a cost pass through event.

12.6.3 *Insurer credit Event*

Directlink is also proposing an insurer credit event as a cost pass through event. An insurer credit event is where for reasons of insolvency, or other cause, an insurer not pay out on a legitimate claim.

This is on the basis that:

- While default by an insurer might fit within the definition of an insurance event it would require a broad interpretation of (c) in the definition that it is arguably unwarranted;
- An insurer credit event is a clearly defined event;

- A credit event on a holder of an insurance licence can not be reasonably prevented by the TNSP as it would require the TNSP to have an operating knowledge of insurance market or financial status of a particular insurer that is greater than APRA's knowledge as prudential supervisor.
- Insurance against an insurance credit event is not a normal offering of the insurance market and as such is unlikely to be available on terms consistent with the expenditure objectives, therefore for the purposes of this criteria is not available to the TNSP;
- Self-insurance is not possible given the magnitude of event that insurance may be claimed for.

Therefore, an insurer credit event is consistent with the requirements of the National Electricity Rules as a cost pass through event.

13 Incentive schemes

13.1 Service Target Performance Incentive Scheme

13.1.1 Introduction

This chapter comments on the parameters of the STPIS, including the market parameters, to apply for the 2019-23 regulatory control period.

13.1.2 STPIS during the 2020-25 transmission determination period

There are two components of the STPIS that will apply to Directlink in the 2020-25 regulatory control period. These are the service component and the market impact component. In setting service component targets for the 2020-25 period Directlink is proposing applying the AER's latest version of the scheme.[32]

Service component

The service component of the AER's scheme has two sub-parameters. These are:

- Circuit event rate – fault
- Circuit even rate - forced

The AER require that a TNSP must propose the following in relation to these parameter:

- Performance target
- Floor
- Cap

Directlink has calculated these in accordance with the AER's model.

The table below sets out the proposed parameters for the service target

Table13-1: Service Target Performance Incentive Scheme parameters

Unplanned circuit outage event rate	Floor	Target	Cap
Circuit event rate – fault	1091%	740%	389%
Circuit event rate - forced	339%	207%	75%

32 AER, Service Target Performance Incentive Scheme version 5 (corrected), October 2015

Failure of Protection system	4	3	1

Directlink is not proposing a change to the parameter weightings outlined by the AER.[33] These weightings are 0.75 and 0.5 respectively.

Market impact component

The AER's market impact component is based on unplanned outages. The AER requires the provision of a performance target, unplanned outage event limit and dollar per dispatch interval incentive.

Directlink provides this information in Table13-2

Table13-2: Market impact values

	Target	Event limit	Dollar per dispatch
Unplanned outage dispatch intervals	1,205	614	$128

Directlink is proposing a target based on the annual average of the past four years from the commencement of the STPIS scheme for Directlink.

13.2 Efficiency Benefits Sharing Scheme

13.2.1 Introduction

Directlink proposes that a 5-year carryover should be adopted. This would then provide incentive properties for the scheme that matched those of all other NSPs in the NEM.

13.2.2 Proposed EBSS

Directlink is proposing that debt raising costs should continue to be excluded from the calculation of the EBSS.

In principle costs associated with difficult to forecast activities or costs that are volatile and not within the scope of the business to control should be excluded from the calculation of EBSS. However, dependent on the AER's determination on operating expenditure in the draft determination Directlink in not proposing any adjustments to operating expenditure for EBSS purposes.

Excluding the debt raising costs is consistent with the AER's historic approach for the EBSS. Based on excluding these items from the forecast Directlink proposes the EBSS operating expenditure set out in Table13-3.

33 AER, Service Target Performance Incentive Scheme version 5 (corrected), October 2015

Subject to the outcomes of the AER's draft determination Directlink is not proposing any other changes to the EBSS operating expenditure.

Table13-3: EBSS Operating Expenditure ($m FY20)

	2018/19	2019/20	2020/21	2021/22	2022/23	Total
Total Operating Expenditure	4.8	4.9	5.0	5.0	5.0	24.7
Excluded items	0	0	0	0	0	0
Total	4.8	4.9	5.0	5.0	5.0	24.7

13.3 Capital Expenditure Sharing Scheme

Subject to the outcomes of the AER's Draft Determination Directlink is proposing that the Capital Expenditure Sharing Scheme for the forecast period is the same as that applied to the current transmission determination period.

14 Pricing methodology and negotiating framework

The Negotiating Framework is provided in attachment 14.1

In satisfaction of clause 6A.10.1(a) of the NER, Directlink provided a *Pricing Methodology*. The revised Pricing Methodology is attached as attachment 14.2.

15 Legally required information

This section includes that information that is legally required under the National Electricity Rules or the AER's regulatory information notice that has limited impact on people forming a view on whether the transmission determination proposal is consistent with the National Electricity Objective.

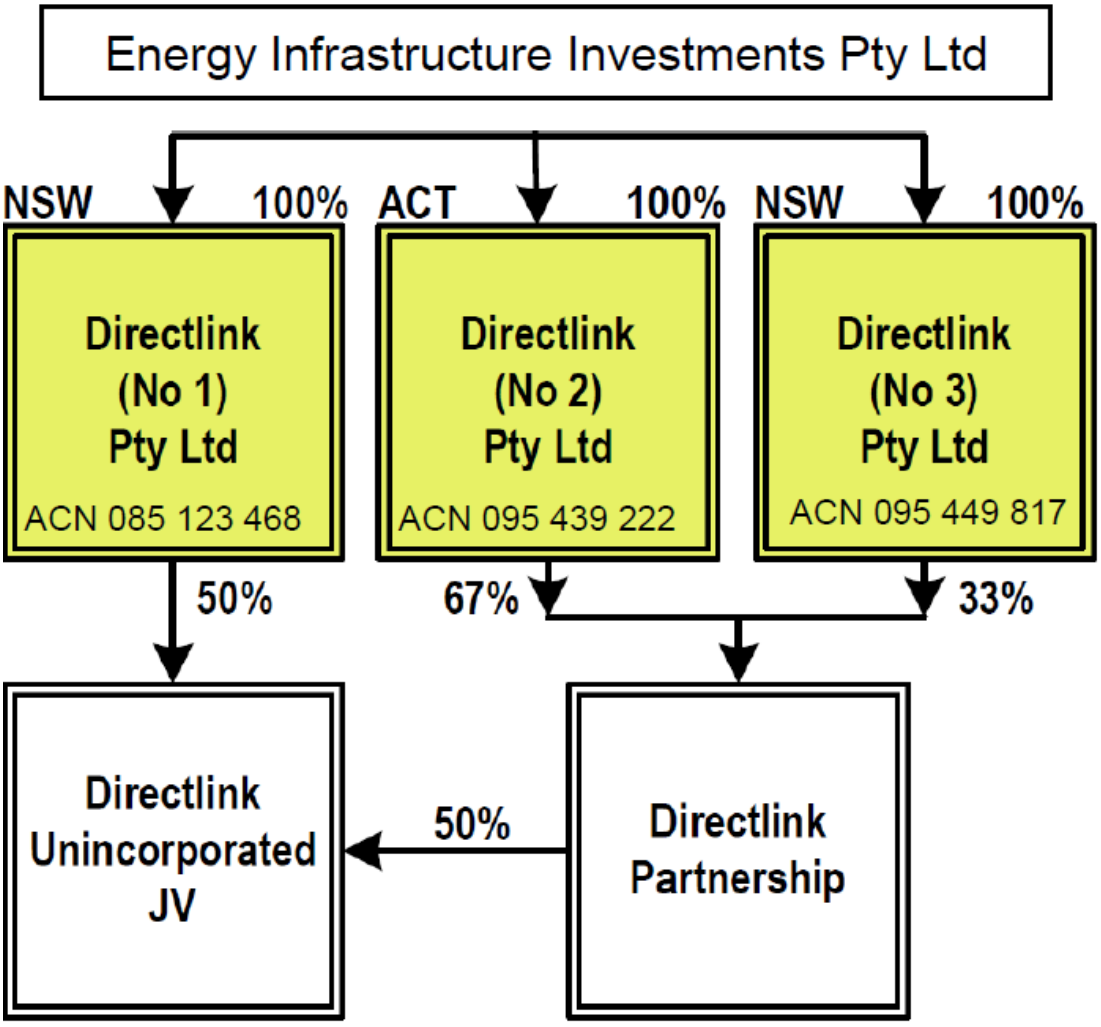
15.1 Corporate Structure and ownership

Directlink transmission interconnector is one of a suite of gas and electricity infrastructure assets owned by Energy Infrastructure Investments Pty Limited (ABN 95 104 348 852). Those infrastructure assets are managed by an APA Group wholly owned subsidiary, APA Operations (EII) Pty Ltd.

This Revenue Proposal for Directlink is submitted by Directlink Transmission Company Pty Limited (ACN 089 875 080 Level 25, 580 George Street, Sydney) on behalf of Energy Infrastructure Investments.

The current Energy Infrastructure Investments organisational chart is set out in Figure 15-1.

Figure 15-1: Energy Infrastructure Investments corporate structure



Each of these businesses is 100% owned by Energy Infrastructure Investments Pty Ltd, which in turn is owned by a consortium of investors, as shown below.

Shareholder	Ownership percentage
MC EII Holdings Pty Ltd	49.9
Osaka Gas Energy Europe BV	30.20
Australian Pipeline Limited	19.90
Total	**100.0**

15.2 Directors' statement

In accordance with the National Electricity Rules, this proposal contains a certification of the reasonableness of the key assumptions that underlie the capital and operating expenditure forecast by the Directors of Directlink.

The Directors' responsibility statement is included in attachment 16.1.

15.3 RIN Compliance

The AER requires a table that references the RIN. See Table 15-1

Table 15-1: RIN Compliance

#	Requirement	Location
1.1	Provide the information required in each *regulatory template* in the Microsoft Excel *Workbook 1 - Regulatory determination* and *Workbook 2 - MIC*	Attachment 5.2
1.1A	Provide the information required in each regulatory template in the Microsoft Excel *Workbook 3- EBSS,* and *Workbook 4 - GESS*	Attachment 5.1
1.2	a *basis of preparation* demonstrating *Directlink* has complied with this *notice*	Attachment 16.2
1.3	any proposed changes to Directlink's approved cost a/location methodology for the next regulatory control period compared to the approved cost allocation methodology applying in the current regulatory control period	Section 3.3
1.4	all consultants' reports commissioned and relied upon in whole or in part;	See Marsh report – attachment 10.2
	all *material* assumptions relied upon;	Section 9.5 ,2 and 9
	a table that references, for the instances where *Directlink* has responded to a paragraph in this Schedule 1, where it is provided in or as part of the *revenue proposal, proposed pricing methodology* and *negotiating framework; and*	This document
	a table or chart that references each document provided in or as part of the *revenue proposal* and its relationship to other documents provided	
1.5	Provide for each material assumption identified in the response to paragraph 1.4(b)	Section 2 and 9

1.6	Where historical information provided in the regulatory templates has previously been reported to the AER: (a) this information must reconcile with the previously provided information; or (b) Directlink must explain why the information does not reconcile; and (c) quantify the effect of the historical information which does not reconcile on the regulatory accounting statements for the relevant regulatory years.	Section 5 and 6
1.7	Provide reconciliation of the capex and opex expenditure forecasts provided in the regulatory templates to the ex-ante capital and operating allowances in the post-tax revenue model for the forthcoming regulatory control period	Section 9.7 and 10.8
1.8	Where the *revenue proposal* varies or departs from the application of any component or parameter of the *efficiency benefit sharing scheme, capital expenditure sharing scheme* or *service target performance incentive scheme* set out in the *framework and approach paper*	n/a
2.1	Provide: (a) the name and a brief description of each category of prescribed transmission service provided by Directlink that is the subject of the revenue proposal; (b) a brief description of the required quality, reliability and security of supply of each prescribed transmission service provided by Directlink; and (c) a brief description of the required reliability, safety and security of the transmission system provided by Directlink in the supply of prescribed transmission services	Section 1.5
3.1	Provide justification for Directlink's total forecast capex, including: (a) why the total forecast capex is required for Directlink to achieve each of the objectives in clause 6A.6.7(a) of the NER;	Section 9.6
	(b) how Directlink's total forecast capex reasonably reflects each of the criteria in clause	Section 9.2.4

	6A.6.7(c) of the NER;	
	(c) how Direct /ink's forecast capex accounts for the factors in clause 6A.6.7(e) of the NER;	Sections 6, 9.2.5, 3.4, 3.6, 9.2.2, 9.8,
	(d) an explanation of how the plans, policies, procedures and regulatory obligations or requirements identified in regulatory templates 7.1 and 7.3 in Workbook 1 - regulatory determination, consultants reports and assumptions identified in paragraph 1.4 have been incorporated; and	Attachment 1.1 Main RIN
	(e) an explanation of how each response provided to paragraph 3.1(a) to (d) above is reflected in any increase or decrease in expenditures or volumes, particularly between the current and forthcoming regulatory control periods, provided in regulatory templates 2.1 and 2.6 in Workbook 1 - regulatory determination.	Sections 0, 6 and 9.6
3.2	Provide the model(s) and methodology Directlink used to develop its total forecast capex, including; (a) A description of how Directlink prepared the forecast capex, including: (i) how its preparation differed or related to budgetary, planning and governance processes used in the normal running of . Directlink's business; (ii) the processes for ensuring amounts are free of error and other quality assurance steps; and Regulatory Information Notice under Division 4 of Part 3 of the National Electricity Law 8 (iii) if and how Directlink considered the resulting amounts, when translated into price impacts, were in the long term interest of consumers; (b) any source material used (including models, documentation or any other items containing quantitative data); and (c) all calculations that demonstrate how data from the source material has been manipulated or transformed to generate data provided in the regulatory templates in Workbook 1 - regulatory determination.	Sections 3.7, 09.2.4 and attachment 9.2
3.3	identify which items of Directlink's forecast capex	Attachment 9.1 business

	have been: (a) derived directly from competitive tender processes; (b) based upon competitive tender processes for similar projects; (c) based upon estimates obtained from contractors or manufacturers; (d) based upon independent benchmarks; (e) based upon actual historical costs for similar projects; and (f) reflective amounts for risk, uncertainty or other unspecified contingency factors, and if so, how these amounts were calculated and deemed reasonable.	cases
3.4	Provide all documents which were materially relied upon and relate to the deliverability of forecast capex and explain the proposed deliverability.	Attachment 3.1 AMP and 9.1 business cases
4.1	Provide: (a) the model(s) and the methodology Directlink used to develop its total forecast opex;	Attachment 10.4 Forecast Opex Model
	(b) justification for Directlink's total forecast opex, including: (i) why the proposed total forecast opex is required for Directlink to achieve each of the objectives in clause 6A.6.6(a) of the NER; (ii) how Directlink's proposed total forecast opex reasonably reflects each of the criteria in clause 6A.6.6(c) of the NER; and (iii) how Directlink's total forecast opex accounts for the factors in clause 6A.6.6(e) of the NER.	Section 10.2.1
4.2	Provide actual historical opex and forecast opex by category for each year of the current regulatory control period and forthcoming regulatory control period in table 2.16.2 for prescribed transmission services opex.	Attachment 1.1 Main RIN
4.3	Provide: (a) the quantum of non-recurrent costs for each year of the forthcoming regulatory control period; and	n/a

	(b) an explanation of each non-recurrent cost.	
4.4	If Directlink used a revealed cost base year approach to develop its total forecast opex proposal, provide: (a) in Microsoft Excel format, reconciliation (including all calculations and formulae) of Directlink's forecast total opex proposal to forecast prescribed transmission services apex by opex driver in table 2.16.1; (b) the base year Directlink used; and (c) explanation and justification for why that base year represents efficient and recurrent costs.	Section 10
4.5	If Directlink does not use the revealed costs base year approach to forecasting opex, provide in Workbook 1 - regulatory determination:	n/a
4.6	Provide the amount of total forecast opex attributable to changes in output growth for each year of the forthcoming regulatory control period in table 2.16.1 for prescribed transmission services apex.	n/a
4.7	Provide an explanation of: (a) how, in developing the amount of total forecast opex attributable to changes in output growth, Directlink applied the output growth change measure in paragraph 4.6; and (b) whether Directlink's output growth change measure compensates for any form of productivity change or forecast price change.	n/a
4.8	Provide the_ amount of total forecast opex attributable to changes in the price of labour and materials for each year of the forthcoming regulatory control period in table 2.16.1 for prescribed transmission services opex.	Attachment 10.4 Opex Model
4.9	Provide an explanation of: (a) how, in developing the amount of total forecast opex attributable to changes in the price of labour and materials, Directlink applied the real price measures in paragraph 4.8; and (b) whether Directlink's labour price measure compensates for any form of labour productivity change.	Section 10.7.4

4.10	Provide the amount of total forecast opex attributable to changes in productivity for each year of the forthcoming regulatory control period in Workbook 1 - regulatory determination, table 2.16.1 for prescribed transmission services opex.	Section 10.7
4.11	Provide, in percentage year on year terms, the productivity measure that Directlink used to develop the amount of total forecast opex attributable to changes in productivity;	Section 10.7
4.12	Provide an explanation of: (a) how, in developing the amount of total forecast opex attributable to changes in productivity, Directlink applied the productivity measure in paragraph 4.11; (b) whether Directlink's forecast productivity changes capture the historic trend of cost increases due to changes in regulatory obligations or requirements and industry best practice; and (c) whether Directlink's productivity measure includes productivity change compensated for by the labour price measure used by Directlink to forecast the change in the price of labour.	Section 10.710.7
4.13-4.20	No Step changes were proposed in this proposal	Section 10.7.5
4.21	For each opex category specific forecast, that is forecast on a stand-alone basis and not included in base year opex or step changes, provide: (a) In Workbook 1 - regulatory determination, regulatory template 2.17, the quantum of the category specific forecast: (i) forecast in each year of the forthcoming regulatory control period; and, if applicable; (ii) incurred, or expected to be incurred, in the current regulatory control period;	Attachment 10.4 Opex Model
	(b) a description of the category specific forecast and why it is appropriate to treat this expenditure as a category specific forecast.	10.7.6
5.1	For each of Directlink's provisions, provide the information required in Workbook 1 - regulatory determination, regulatory template 3.2.3 in accordancewith the Australian Accounting Standard AASB 137 Provisions, Contingent Liabilities	Section 5.2.1

	and Contingent Assets.	
	(b) In a given year, where there is an increase in the amount of a provision, provide reasons for this increase, including: (i) the expected timing of any resulting outflows of economic benefits; (ii) an explanation of the uncertainties about the amounts or timing of the outflows; (iii) supporting consultant's advice, including actuarial reports; and (iv) if there is no supporting consultant's advice, the process and assumptions Directlink used in determining the increase in the provision. (c} Provide the allocation of the movement in total provisions in Workbook 1- regulatory determination, regulatory template 3.2.3 to: (i) opex; (ii) as-incurred capex by roll forward model asset class; (iii} as-commissioned capex by roll forward model asset class; and (iv} other, where the movement in the provision is neither capex nor opex. (d} Identify and explain any assumptions used for the allocation of asset class provided under paragraph 5.1(c)(ii} and (iii}.	Section 5.2.1
6.1	In Workbook 1 - regulatory determination, regulatory template 2.14, provide the labour and material price changes assumed by Directlink in estimating Directlink's forecast capex proposal and the forecast opex proposal. All price changes must be expressed in percentage year on year real terms.	Section 9.2.5 and 10.7.4
6.2	Provide: (a) the model(s) used to derive and apply the materials price changes, including model(s) developed by a third party; (b) in relation to labour escalators, a copy of the current Enterprise Bargaining Agreement or equivalent agreement; and (c) documents supporting or relied upon that accurately explain the change in the price of	Attachment 10.4 – Opex Model

	goods and services purchased by Directlink, including evidence that any materials price forecasting method explains the price of materials previously purchased by Directlink.	
6.3	Provide also an explanation of: (a) the methodology underlying the calculation of each price change, including: (i) sources; (ii) data conversions; (iii) the operation of any model(s) provided under paragraph 6.2(a); and (iv) the use of any assumptions, such as lags or productivity gains. (b) whether the same price changes have been used in developing both the forecast capex proposal and forecast opex proposal; and (c) if the same price changes have not been used in developing both the forecast capex proposal and forecast apex proposal, why it is appropriate for different expenditure escalators to apply.	Sections 9.2.5 and 10.7.4
6.4	If an agreement provided in response to paragraph 6.2(b) is due to expire during the forthcoming regulatory control period, explain the progress and outcomes of any negotiations to date to review and replace the current agreement.	n/a
7.1-7.4	There are no related party transactions	Section 3.6
8.1-8.3	No proposed contingent project	Section 9.8
9.1	Identify the policies and strategies and procedures provided in the response to Workbook 1 - regulatory determination, regulatory template 7.1 which relate to the selection of efficient non-network solutions.	
9.2	Explain the extent to which the provision for efficient non-network alternatives has been considered in the development of the forecast capex proposal and the forecast opex proposal.	Attachment 9.1 business cases
9.3	Identify each non-network alternative that Directlink has:	Attachment 9.1 business cases

	(a) commenced during the current regulatory control period; and (b) selected to commence during, or will continue into the forthcoming regulatory control period.	
9.4	For each non-network alternative identified in the response to paragraph 9.3, provide a description, including cost and location.	Attachment 9.1 business cases
10.1	For the service component of the STPIS, provide the values that Directlink proposes are to be attributed to the performance incentive scheme parameters for the purposes of the application to Directlink of the STP/S in the attached Workbook 1- regulatory determination, regulatory template 7.9, in	Attachment 1.1 General RIN
	(d) an explanation of how the proposed values to be attributed to those . performance incentive scheme parameters comply with the requirements of the STPIS;	Section 13
	(e) an explanation of the method used to calculate the proposed values to be attributed to those performance incentive scheme parameters and provide supporting calculations;	Section 13
	(f) performance data (including outage and exclusion data) used to calculated the proposed performance targets in Excel spreadsheet format;	Attachment 1.1 General RIN
	(g) for each exclusion claim, please provide supporting evidence which shows how the proposed exclusion claim meets the requirement of the relevant exclusion clause. If such evidence has previously been provided to the AER, Directlink may refer to its previous submission, and is not required to resubmit the evidence;	Attachment 5.1 MIC RIN
	(h) confirmation that data provided in response to paragraph 10.1(f) is consistently recorded based on the parameter definitions that apply to Directlink under the service component of the STPIS.	Attachment 5.1 MIC RIN
10.2	For the Market Impact Component of the scheme, provide performance data in accordance with Appendix C of the STPIS for the seven calendar years:	Attachment 5.1 MIC RIN

	(e) For each exclusion claim, please provide supporting evidence which shows how the proposed exclusion claim meets the requirements of the relevant exclusion clause. If such evidence has previously been provided to the AER, Directlink may refer to its previous submission, and is not required to resubmit the evidence;	Attachment 5.1 MIC RIN
11.1	Provide Directlink's calculation of the: (a) estimated total revenue cap for the forthcoming regulatory control period; and (b) maximum allowed revenue for each year of the forthcoming regulatory control period using the AER's post-tax revenue model, which is to be submitted as part of Directlink's revenue proposal.	Section 12.3
11.2	Provide details of any departure from the AER's post-tax revenue model for the calculations referred to in paragraph 11.1 and the reasons for that departure.	Section 12
12.1	The Rate of Return Guideline sets out how the rate of return will be calculated.	Section 8
13.1	Provide Directlink's calculation of the RAB for the relevant transmission system for each regulatory year of the current regulatory control period using the AER's roll forward model, which is to be submitted as part of Directlink's revenue proposal	Attachment 7.1 RAB Roll Forward Model
13.2	Provide details of any departure from the underlying methods in the AER's roll forward model for the calculation referred to in paragraph 13.1 and the reasons for that departure.	Section 7
13.3	If the value of the RAB as at the start of the forthcoming regulatory control period is proposed to be adjusted because of changes to asset service classification, provide details including relevant supporting information used to calculate that adjustment value.	Section 7
14.1	Provide Directlink's calculation of the depreciation amounts for the relevant transmission system for each regulatory year of: (a) the current regulatory control period using the AER's roll forward model, which is to be submitted as part of the revenue proposal; and (b) the forthcoming regulatory control	Sections 7.4 and 11.511.5

	period using the AER's post-tax revenue model, which is to be submitted as part of the revenue proposal.	
14.2	Provide details of any departure from the underlying methods in the AER's roll forward model and post-tax revenue model for the calculations referred to in paragraph 14.1 and the reasons for that departure.	n/a
14.3	Identify any changes to standard asset lives for existing asset classes from the previous determination. Explain the reason/s for each change and provide relevant supporting information.	Section 11.3
14.4	Identify any changes to asset classes from the previous determination. Explain the reason/s for using these new asset classes and provide relevant supporting information on their proposed standard asset lives.	Section 11.2
14.5	If any existing asset classes from the previous determination are proposed to be removed and their residual values to be reallocated to other asset classes, explain the reason/s for the change and provide relevant supporting information. This should include a demonstration of the materiality of the change on the forecast depreciation allowance.	Section 11.2
14.6	Describe the method used to depreciate existing asset classes as at 1 July 2020 (the start of the forthcoming regulatory control period) and provide supporting calculations, if the approach differs from that in the roll forward model.	Section 7.4
15.1	Provide Directlink's calculation of the estimated cost of corporate income tax for the forthcoming regulatory control period using the AER's post-tax revenue model, which is to be submitted as part of the revenue proposal.	Section 12.2.5
15.2	Provide details of any departure from the AER's post-tax revenue model for the calculations referred to in paragraph 15.1 and the reasons for that departure.	n/a
15.3	Identify any changes to standard tax asset lives for	Section 11.3

	existing asset classes from the previous determination. Explain the reason/s for the change and provide relevant supporting information, including Federal tax laws governing depreciation for tax purposes.	
15.4	Describe the method used to depreciate existing tax asset classes as at 1 July 2020 and provide supporting calculations, if the approach differs from that in the AER's roll forward model.	Section 7.5
15.5	Provide Directlink's calculation of the tax asset base for the relevant transmission system for each regulatory year of the current regulatory control period using the AER's roll forward model, which is to be submitted as part of the revenue proposal.	Section 7.5
15.6	Provide details of any departure from the underlying methods in the AER's roll forward model for the calculation referred to in paragraph 15.5 and the reasons for that departure.	n/a
15.7	Identify each difference in the capitalisation of expenditure for regulatory accounting purposes and tax accounting purposes. Provide reasons and supporting calculations to reconcile any differences between the two forms of accounts.	Attachment 1.1 General RIN
16.1	Provide charts that set out: (a) the group corporate structure of which Directlink is a part; and (b) the organisational structure of Directlink.	Section 15.1
17.1	Provide a forecast map of Directlink's transmission system for the forthcoming regulatory control period.	Section 1.6
18.1	Provide the audit opinion report and review conclusion statements as applicable, prepared in accordance with the requirements set out at	Submitted with regulatory accounts

	Appendix C; and	
18.2	Provide all reports from the auditor to Directlink's management regarding the review conclusion statements and/or auditors' opinions report or assessment.	Submitted with regulatory accounts
19.1	Provide information on existing potential transitional issues (expressly identified in the NER or otherwise) which Directlink expects will have a material impact on it and should be considered by the AER in making its transmission determination. For each issue, set out the following information: (a) the transitional issue; (b) what has caused the transitional issue; (c) how the transitional issue impacts on Directlink, and · (d) how Directlink considers the transitional issue could be addressed.	n/a
20.2	If Directlink wishes to make a claim for confidentiality over any of Directlink's information, provide the details of that claim in accordance with the requirements of AER's Confidentiality guideline, as if it extended and applied to that claim for confidentiality.	

15.4 National Electricity Rules compliance

Rule	Requirement	Location
S6A.1.1	*(1) a forecast of the required capital expenditure that complies with the requirements of clause 6A.6.7 and identifies the forecast capital expenditure by reference to well accepted categories such as:* *(i) asset class (eg. transmission lines, substations etc); or* (ii) category driver (eg. regulatory obligations or requirements, replacement, reliability, net market benefit, business support etc), (iii) the location of the proposed asset; (iv) the anticipated or known cost of the proposed asset; and (v) the categories of transmission services	Sections 1.5 and 9

	which are to be provided by the proposed asset;	
	(2) the methodology used for developing the capital expenditure forecast;	Section 0
	(3) the forecasts of load growth relied upon to derive the capital expenditure forecasts and the methodology used for developing those forecasts of load growth;	n/a
	(4) the key assumptions that underlie the capital expenditure forecast;	Section 9.5
	(5) a certification of the reasonableness of the key assumptions by the directors of the Transmission Network Service Provider;	Section 15.2
	(6) capital expenditure for each of the past regulatory years of the previous and current regulatory control period, and the expected capital expenditure for each of the last two regulatory years of the current regulatory control period, categorised in the same way as for the capital expenditure forecast and separately identifying for each such regulatory year: (i) margins paid or expected to be paid by the Transmission Network Service Provider in circumstances where those margins are referable to arrangements that do not reflect arm's length terms; and (ii) expenditure that should have been treated as operating expenditure in accordance with the policy submitted under paragraph (9) for that regulatory year;	Section 6
	(7) an explanation of any significant variations in the forecast capital expenditure from historical capital expenditure;	Section 9.2.3
	(8) any non-network options considered by the Transmission Network Service Provider; and	Attachment 9.1 Business cases
	(9) the policy that the Transmission Network Service Provider applies in capitalising operating expenditure.	Section 3.5
S6A.1.2	(1) a forecast of the required operating expenditure that complies with the requirements of clause 6A.6.6 and identifies the forecast operating expenditure by reference to well	Section 10

	accepted categories such as: (i) particular programs; or (ii) types of operating expenditure (eg. maintenance, payroll, materials etc), and identifies in respect of each such category: (iii) to what extent that forecast expenditure is on costs that are fixed and to what extent it is on costs that are variable; and (iv) the categories of transmission services to which that forecast expenditure relates;	
	(2) the methodology used for developing the operating expenditure forecast;	Section 10.7
	(3) the forecasts of key variables relied upon to derive the operating expenditure forecast and the methodology used for developing those forecasts of key variables;	Section 10
	(4) the methodology used for determining the cost associated with planned maintenance programs designed to improve the performance of the relevant transmission system for the purposes of any service target performance incentive scheme that is to apply to the Transmission Network Service Provider in respect of the relevant regulatory control period; .	Section 10.4
	(5) the key assumptions that underlie the operating expenditure forecast;	Section 10
	(6) a certification of the reasonableness of the key assumptions by the directors of the Transmission Network Service Provider;	Section 15.2
	(7) operating expenditure for each of the first three regulatory years of the current regulatory control period, and the expected operating expenditure for each of the last two regulatory years of that regulatory control period,	Section 00

	categorised in the same way as for the operating expenditure forecast;	
	(8) an explanation of any significant variations in the forecast operating expenditure from historical operating expenditure; and	Section 10
	(9) any non-network options considered by the Transmission Network Service Provider	Section 10
S6A.1.3	(1) an identification and explanation of any significant interactions between the forecast capital expenditure and forecast operating expenditure programs;	Section 3.4
	(2) the values that the Transmission Network Service Provider proposes are to be attributed to the performance incentive scheme parameters for the purposes of the application to the Transmission Network Service Provider of any service target performance incentive scheme that has been specified in a framework and approach paper and that applies in respect of the relevant regulatory control period, and an explanation of how the values proposed to be attributed to those parameters comply with any requirements relating to them set out in that scheme;	Section 13
	(3) the values that the provider proposes are to be attributed to the efficiency benefit sharing scheme parameters for the purposes of the application to the Transmission Network Service Provider of any efficiency benefit sharing scheme that has been specified in a framework and approach paper that applies in respect of the relevant regulatory control period, and an explanation of how the values proposed to be attributed to those parameters comply with any relevant requirements set out in that scheme;	Section 0
	(3A) a description, including relevant explanatory material, of how the Transmission	Section 13.3

	Network Service Provider proposes any capital expenditure sharing scheme that has been specified in a framework and approach paper that applies in respect of the forthcoming revenue determination should apply to it;	
	(3B) a description, including relevant explanatory material, of how the Transmission Network Service Provider proposes any small-scale incentive scheme that has been specified in a framework and approach paper that applies in respect of the forthcoming revenue determination should apply to it;	Section 5.3
	(4) the provider's calculation of: (i) the estimated total revenue cap for it for the relevant regulatory control period; and (ii) the maximum allowed revenue for it for each regulatory year of the relevant regulatory control period, using the post-tax revenue model referred to in rule 6A.5, together with: (iii) details of all amounts, values and other inputs used by the Transmission Network Service Provider for that purpose; (iv) a demonstration that any such amounts, values and other inputs comply with the relevant requirements of Part C of Chapter 6A; and (v) an explanation of the calculation of the amounts referred to in subparagraphs (i) and (ii) and of the amounts, values and inputs referred to in subparagraph (iii); (vi) where one of those amounts, values or inputs is the allowed rate of return, details of any departure from the Rate of Return Guidelines in calculating that allowed rate of return and the reasons for that departure;	Section 12
	(4A) the Transmission Network Service Provider's calculation of the proposed return on equity, return on debt and allowed rate of return, for each regulatory year of the regulatory control	Section 8

	period, in accordance with clause 6A.6.2, including any departure from the methodologies set out in the Rate of Return Guidelines and the reasons for that departure;	
	(4B) if the Transmission Network Service Provider proposes that the return on debt for a regulatory year of the regulatory control period is to be determined using the methodology referred to in clause 6A.6.2(i)(2), the formula it proposes should be applied in accordance with clause 6A.6.2(l);	n/a
	(4C) the Transmission Network Service Provider's proposed value of imputation credits as referred to in clause 6A.6.4;	n/a
	(5) the provider's calculation of the regulatory asset base for the relevant transmission system for each regulatory year of the relevant regulatory control period using the roll forward model referred to in clause 6A.6.1, together with: (i) details of all amounts, values and other inputs used by the Transmission Network Service Provider for that purpose; (ii) a demonstration that any such amounts, values and other inputs comply with the relevant requirements of Part C of Chapter 6A; and (iii) an explanation of the calculation of the regulatory asset base for each regulatory year of the relevant regulatory control period and of the amounts, values and inputs referred to in subparagraph (i);	Section 7
	(7) the depreciation schedules nominated by the Transmission Network Service Provider for the purposes of clause 6A.6.3, which categorise the relevant assets for these purposes by reference to well accepted categories such as: (i) asset class (eg transmission lines and substations); or (ii) category driver (eg regulatory obligations or requirements, replacement, reliability, net	Attachment 7.1 RAB Roll Forward model

	market benefit, and business support), and also by location, together with: (iii) details of all amounts, values and other inputs used by the Transmission Network Service Provider to compile those depreciation schedules; (iv) a demonstration that those depreciation schedules conform with the requirements set out in clause 6A.6.3(b); and (v) an explanation of the calculation of the amounts, values and inputs referred to in subparagraph (iii);	
	(8) the X factors nominated by the Transmission Network Service Provider for each regulatory year of the relevant regulatory control period for the purposes of clause 6A.6.8(a), together with a demonstration that those X factors comply with the requirements set out in clause 6A.6.8(b) of the Rules;	Section 12.4
	(9) the commencement and length of the regulatory control period proposed by the Transmission Network Service Provider; and	Section 1.4
	(10) if the Transmission Network Service Provider is seeking a determination by the AER that a proposed contingent project is a contingent project for the purposes of the relevant revenue determination: (i) a description of the proposed contingent project, including reasons why the Transmission Network Service Provider considers the project should be accepted as a contingent project for the regulatory control period; (ii) a forecast of the capital expenditure which the Transmission Network Service Provider considers is reasonably required for the purpose of undertaking the proposed contingent project; (iii) the methodology used for developing that forecast and the key assumptions that underlie it; (iv) information that demonstrates that the	n/a

	undertaking of the proposed contingent project is reasonably required in order to achieve one or more of the capital expenditure objectives; (v) information that demonstrates that the proposed contingent capital expenditure for the proposed contingent project complies with the requirements set out in clause 6A.8.1(b)(2) ; and (vi) the trigger events which are proposed in relation to the proposed contingent project and an explanation of how each of those conditions or events addresses the matters referred to in clause 6A.8.1(c).	

15.5 Confidentiality table

Title, page and paragraph number of document containing the confidential information	Description of the confidential information.	Topic the confidential information relates to (e.g. capex, opex, the rate of return etc.)	Identify the recognised confidentiality category that the confidential information falls within.	Provide a brief explanation of why the confidential information falls into the selected category.	Specify reasons supporting how and why detriment would be caused from disclosing the confidential information.	Provide any reasons supporting why the identified detriment is not outweighed by the public benefit (especially public benefits such as the effect on the long term interests of consumers).
Proposal Section 8.5	Averaging Periods	Rate of return	Market sensitive cost inputs	Sets out the averaging period that Directlink uses	Could affect financing outcomes	Confidentiality claim previously approved by AER
Marsh attachment P 9 –	Sensitive insurance information	Operating expenditure	Market sensitive cost inputs	Set out risk sensitive data that could	Could result in higher opex costs being	Forecast premiums are publicly available but

declared values P10 – loss history P11 – coverage assumptions P13 – liability limits				affect Directlink's ability to negotiate cost effective insurance	charged to customers	some inputs used by Marsh which could affect insurance cost have been claimed as confidential. Core information is public.
RIN Table 7.8.1 and 7.8.2	Averaging Periods	Rate of return	Market sensitive cost inputs	Sets out the averaging period that Directlink uses	Could affect financing outcomes	Confidentiality claim previously approved by AER

15.6 Attachments

Attachment Number	Name	Purpose
1.1	RIN template General	Information required by AER
1.2	RIN template MIC	Information required by AER
1.3	Plain English Overview	Plain English summary of the proposal
1.4	Energy Edge Report	Establishes the market benefits of Directlink. Used in Capex modelling for IGBTs
3.1	Asset Management Plan	Explains EII asset management processes and forecast capital expenditure
3.2	Cost Allocation Methodology	Set out the allocation method for the allocation of costs consistent with the expenditure requirements of the NER and RIN
4.1	Newgate Research - Interconnector Engagement - Research Report	Sets out feedback on consumer engagement and proposed next steps in consumer engagemeNT

5.1	RIN template STPIS	Information required by AER
5.2	RIN template EBSS	Information required by AER
6.2	RIN template CESS	Information required by AER
7.1	RAB Roll Forward Model	Calculates the opening asset base for the forecast transmission determination period.
9.1	Business Cases	Sets out the proposed forecast capital expenditure consistent with section 9
9.2	Forecast Capital Expenditure Model	Calculates the forecast capital expenditure based on the Asset Management Plan and section 9
9.3	ABB IGBT Letter	Letter from ABB setting out the obsolescence of Generation One IGBTs supporting the forecast capital expenditure
10.1	Outsourcing arrangements and margins	A report demonstrating that the margins paid to APA are consistent with operating expenditure and capital expenditure NER requirements for section 9 and 10.
10.2	Marsh – insurance forecast	Sets out a forecast for insurance operating expenditure used in the forecast operating expenditure model and section 10
10.3	Deloitte - Labour price growth forecasts	Sets out a forecast for real labour cost escalation used in the forecast operating expenditure model and section 10
10.4	Forecast Operating Expenditure Model	Calculates forecast operating expenditure
12.1	Post Tax Revenue Model	Calculates proposed Revenue
14.1	Negotiating Framework	

14.2	Pricing Methodology	
16.1	Officer Responsibility Statement	Sign off required by the National Electricity Rules
16.2	Officer Statutory Declaration	Sign off required by the RIN