DRAFT DECISION
Murraylink transmission determination
2018 to 2023

Attachment 6 – Capital expenditure

September 2017

AUSTRALIAN ENERGY REGULATOR

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Note

This attachment forms part of the AER's draft decision on Murraylink's transmission determination for 2018–23. It should be read with all other parts of the draft decision.

The draft decision includes the following documents:

Overview

Attachment 1 – Maximum allowed revenue

Attachment 2 – Regulatory asset base

Attachment 3 – Rate of return

Attachment 4 – Value of imputation credits

Attachment 5 – Regulatory depreciation

Attachment 6 – Capital expenditure

Attachment 7 – Operating expenditure

Attachment 8 – Corporate income tax

Attachment 9 – Efficiency benefit sharing scheme

Attachment 10 – Capital expenditure sharing scheme

Attachment 11 – Service target performance incentive scheme

Attachment 12 – Pricing methodology

Attachment 13 – Pass through events

Attachment 14 – Negotiated services

Contents

Shortened forms

Shortened form	Extended form
AARR	aggregate annual revenue requirement
AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
ASRR	annual service revenue requirement
augex	augmentation expenditure
capex	capital expenditure
CCP	Consumer Challenge Panel
CESS	capital expenditure sharing scheme
CPI	consumer price index
DMIA	demand management innovation allowance
DRP	debt risk premium
EBSS	efficiency benefit sharing scheme
ERP	equity risk premium
MAR	maximum allowed revenue
MRP	market risk premium
NEL	national electricity law
NEM	national electricity market
NEO	national electricity objective
NER	national electricity rules
NSP	network service provider
NTSC	negotiated transmission service criteria
opex	operating expenditure
PPI	partial performance indicators
PTRM	post-tax revenue model
RAB	regulatory asset base
RBA	Reserve Bank of Australia
repex	replacement expenditure
RFM	roll forward model
RIN	regulatory information notice

Shortened form	Extended form
RPP	revenue and pricing principles
SLCAPM	Sharpe-Lintner capital asset pricing model
STPIS	service target performance incentive scheme
TNSP	transmission network service provider
TUoS	transmission use of system
WACC	weighted average cost of capital

6 Capital expenditure

The National Electricity Rules (NER) require Murraylink to include a forecast of total capital expenditure (capex) in its revenue proposal for the 2018–23 regulatory control period.[1] The return on and of capex are components of the building block revenue requirement.[2]

We generally categorise capex as either network or non-network capex. Network capex includes:

- growth driven capex, including for augmentation and new connections
- non-load driven capex, including replacement and refurbishment capex.

Non-network capex covers expenditure in areas other than the network and includes capex to support the business such as business information technology (IT) and buildings/facilities.

This attachment sets out our draft decision on Murraylink's proposal on total forecast capex for the 2018-23 regulatory control period.

6.1 Draft decision

Our draft decision is to not accept Murraylink's proposed total forecast capex of $33.8 million ($2017-18) for the 2018-23 regulatory control period because we are not satisfied that it reasonably reflects the capex criteria. Our estimate of the total forecast capex that reasonably reflects the capex criteria is $26.6 million ($2017-18), a reduction of 21.3 per cent. Table 6.1 outlines our draft decision.

Table 6.1 AER draft decision on Murraylink's total capex ($2017-18, million)

	2018–19	2019–20	2020–21	2021–22	2022–2023	Total
Murraylink's proposal	5.8	13.9	10.8	2.4	1.0	33.8
AER draft decision	4.0	11.1	8.8	2.0	0.7	26.6
Difference ($million)	-1.8	-2.8	-2.1	-0.4	-0.2	-7.2
Difference (per cent)	-30.3	-19.9	-19.0	-18.0	-21.3	-21.3

Source: Murraylink, *Attachment 4.1 - Murraylink - Capex Model*, 31 January 2017; AER analysis.

Note: Numbers may not add to total due to rounding.

1 NER, cl. 6A.6.7(a).

2 NER, cl. 6A.5.4(a)(1).

In summary, our substitute estimate reflects the following adjustments to Murraylink's capex proposal:

- a $0.7 million ($2017-18) reduction to forecast capex to reflect the capex forecast that was not supported by a business case
- a $4.5 million ($2017-18) reduction to forecast capex for 'Control System Upgrade' related to the scope of APA management costs and further information provided by Murraylink
- a $0.6 million ($2017-18) reduction to forecast capex for 'Spare IGBTs' that is consistent with historical unit costs to assess the estimated efficient costs for this project
- a $0.8 million ($2017-18) reduction to forecast capex for 'Spare Capacitors' on the basis that the 'step change' increase in the volume of these assets has not been supported; and
- removal of the $0.6 million ($2017-18) to forecast capex for 'Maintenance Surveillance Cameras' on the basis that the proposed costs have not been sufficiently supported by Murraylink and appear to be related to reliability improvements which should not be funded in the forecast capex.

6.2 Murraylink's proposal

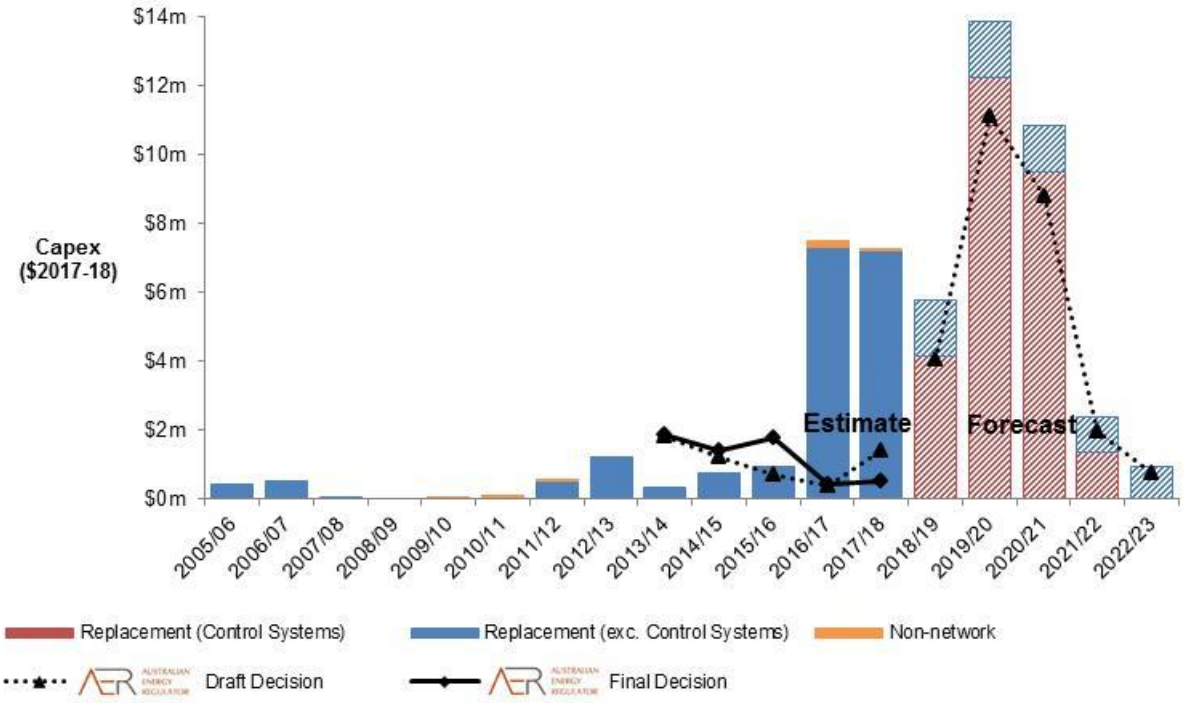
Murraylink's capex forecast of $33.8 million is $17.0 million or 101.1 per cent above Murraylink's actual and estimated capex of $16.8 million ($2017-18) for the 2013-18 regulatory control period.[3] Murraylink has submitted that its capex forecast relates only to the replacement or refurbishment of network assets. The replacement of Murraylink's control system is the major driver of the capex forecast, accounting for approximately 81 per cent of its capex forecast.[4]

Figure 6.1 shows Murraylink's capex forecast for each year of the 2018-23 regulatory control period. It also shows Murraylink's actual and expected capex for the 2013-18 regulatory control period, the AER's determination for this regulatory control period and the AER's draft decision for the 2018-23 regulatory period.

[3] Murraylink, *Attachment 4.1 - Murraylink - Capex Model*, 31 January 2017.

[4] Murraylink, *Attachment 4.1 - Murraylink - Capex Model*, 31 January 2017.

Figure 6.1 Murraylink total actual and forecast capex



Source: Murraylink, *Attachment 4.1 - Murraylink - Capex Model*, 31 January 2017; AER, *Final Decision - Murraylink Post Tax Revenue Model (PTRM)*, April 2013; AER analysis.

6.3 Assessment approach

This section outlines our approach to capex assessments. It sets out the relevant legislative requirements, outlines our assessment techniques, and explains how we build our alternative estimate of total forecast capex which we compare against that proposed by the service provider.

We will accept Murraylink's proposed total forecast capex if we are satisfied that it reasonably reflects the capex criteria.[5] If we are not satisfied, we replace it with an estimate of a total forecast capex that we are satisfied reasonably reflects the capex criteria.[6] The capex criteria are:

1. the efficient costs of achieving the capital expenditure objectives
2. the costs that are prudent operator would require to achieve the capital expenditure objectives
3. a realistic expectation of the demand forecast and cost inputs required to achieve the capital expenditure objectives.

[5] NER, cl. 6A.6.7(c).

[6] NER, cll. 6A.6.7(d) and 6A.14.1(2)(ii).

The Australian Energy Market Commission (AEMC) commented that '[t]hese criteria broadly reflect the NEO [National Electricity Objective]'.[7] The capital expenditure objectives (capex objectives) referred to in the capex criteria, are to:[8]

1. meet or manage the expected demand for prescribed transmission services over the period
2. comply with all regulatory obligations or requirements associated with the provision of prescribed transmission services
3. to the extent that there are no such obligations or requirements, maintain service quality, reliability and security of supply of prescribed transmission services and maintain the reliability and security of the transmission system
4. maintain the safety of the transmission system through the supply of prescribed transmission services.

Importantly, our assessment is about the total forecast capex and not about particular categories or projects in the capex forecast. The Australian Energy Market Commission (AEMC) has expressed our role in these terms:[9]

> It should be noted here that what the AER approves in this context is expenditure allowances, not projects.

In deciding whether we are satisfied if Murraylink's proposed total forecast capex reasonably reflects the capex criteria, we have regard to the capex factors.

The capex factors are:[10]

1. the AER's most recent annual benchmarking report and benchmarking capex that would be incurred by an efficient TNSP over the relevant regulatory control period
2. the actual and expected capex of the TNSP during the preceding regulatory control periods
3. the extent to which the capex forecast includes expenditure to address the concerns of electricity consumers as identified by the TNSP in the course of its engagement with electricity consumers
4. the relative prices of operating and capital inputs
5. the substitution possibilities between operating and capital expenditure
6. whether the capex forecast is consistent with any incentive scheme or schemes that apply to the TNSP

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7 AEMC, *Final Rule Determination: National Electricity Amendment (Economic Regulation of Network Service Providers) Rule 2012*, 29 November, p. 113 (AEMC Economic Regulation Final Rule Determination).

8 NER, cl. 6A.6.7(a).

9 AEMC Economic Regulation Final Rule Determination, p. vii.

10 NER, cl. 6A.6.7(e).

7. the extent to which the capex forecast is referable to arrangements with a person other than the TNSP that, in the opinion of the AER, do not reflect arm's length terms
8. whether the capex forecast includes an amount relating to a project that should more appropriately be included as a contingent project
9. the most recent National Transmission Network Development Plan (NTNDP) and any submissions made by AEMO on the forecast of the TNSP's required capex
10. the extent to which the TNSP has considered, and made provision for, efficient and prudent non-network alternatives.
11. any relevant project assessment conclusions report under clause 5.6.6 of the NER.

In addition, the AER may notify the TNSP in writing, prior to the submission of its revised revenue proposal, of any other factor it considers relevant.[11] We have not had regard to any additional factors in this draft decision for Murraylink.

In taking these factors into account, the AEMC has noted that:[12]

> …this does not mean that every factor will be relevant to every aspect of every regulatory determination the AER makes. The AER may decide that certain factors are not relevant in certain cases once it has considered them.

For transparency and ease of reference, we have included a summary of how we have had regard to each of the capex factors in our assessment at the end of this attachment.

More broadly, we also note that in exercising our discretion, we take into account the revenue and pricing principles which are set out in the National Electricity Law.[13]

The Expenditure Forecast Assessment Guideline

We have published an Expenditure Forecast Assessment Guideline for Electricity Transmission (released in November 2013) (the Guideline). The Guideline sets out the AER's proposed general approach to assessing capex (and opex) forecasts. We also set out our approach to assessing capex in the relevant framework and approach paper. For Murraylink, our framework and approach paper (published in July 2016) stated that we would apply the Guideline, including the assessment techniques outlined in it. We may depart from our Guideline approach and if we do so, need to explain why. In this determination we have not departed from the approach set out in our Guideline, other than we have not assessed Murraylink's capex by specific reference to capex drivers as all capex is characterised as replacement expenditure, and we have used a more limited number of techniques than we would typically use. Our reasons for our approach are set out below.

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11 NER, cl. 6A.6.7(e)(14).

12 AEMC Economic Regulation Final Rule Determination, p. 115.

13 NEL, ss. 7A and 16(2).

Building an alternative estimate of total forecast capex

Our starting point is the service provider's proposal.[14] We then considered the service provider's performance in the previous regulatory control period to inform our alternative estimate. We also reviewed the proposed forecast methodology and the service provider's reliance on key assumptions that underlie its forecast.

We then applied the specific assessment techniques, outlined below, to develop and estimate and assess the economic justifications that the service provider put forward. The specific techniques that we have used in this draft decision include:

- trend analysis - forecasting future expenditure based on historical information,
- review of asset management practices and a business case review of each of the capex projects

Importantly, our review of particular projects and programs is not conducted for the purpose of determining at a detailed level what projects or programs of work the service provider should or should not undertake. For Murraylink, this is key part of our assessment but as the AEMC notes, the AER does not approve projects. Once we approve total revenue, which will be determined by reference to our analysis of the proposed capex, the service provider will have to prioritise its capex program given the prevailing circumstances at the time (such as demand and economic conditions that impact during the regulatory control period). Most likely, some projects or programs of work that were not anticipated will be required. Equally likely, some of the projects or programs of work that the service provider has proposed for the regulatory control period will not be required. We consider that acting prudently and efficiently, the service provider will consider the changing environment throughout the regulatory period and make sound decisions taking into account their individual circumstances.

As explained in our Guideline, we typically would not infer the findings of an assessment technique in isolation from other techniques.[15] However, for Murraylink we have primarily relied on a business case review of its proposed projects because we consider this technique to be the most robust given the nature and small scale of its operations, and also its previous regulatory allowance.[16]

We also need to take into account the various interrelationships between the total forecast capex and other components of a service provider's transmission determination. We have taken into account inter-relationships where relevant (e.g. proposed capex and the incentive framework and opex and capex interactions.

Underlying our approach are two general assumptions:

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[14] AER, *Expenditure Forecast Electricity Transmission Guideline*, November 2013, p. 9; see also AEMC Economic Regulation Final Rule Determination, pp.111 and 112.

[15] AER, *Expenditure Forecast Electricity Transmission Guideline*, November 2013, p.12.

[16] AER, *Expenditure Forecast Electricity Transmission Guideline*, November 2013, p.15

- Capex criteria relating to a prudent operator and efficient costs are complementary such that prudent and efficient expenditure reflects the lowest long-term cost to consumers for the most appropriate investment or activity required to achieve the expenditure objectives.[17]
- Past expenditure was sufficient for Murraylink to manage and operate its network in that previous period, in a manner that achieved the capex objectives.[18]

After applying the above approach, we arrive at our estimate of the total capex forecast.

Comparing the service provider's proposal with our estimate

Having established our estimate of the total forecast capex, we can test the service provider's proposed total forecast capex. This includes comparing our alternative estimate of forecast total capex with the service provider's forecast total. The service provider's forecast methodology and its key assumptions may explain any differences between our alternative estimate and its proposal.

As the AEMC foreshadowed, we may need to exercise our judgement in determining whether any 'margin of difference' is reasonable:[19]

> The AER could be expected to approach the assessment of a NSP's expenditure (capex or opex) forecast by determining its own forecast of expenditure based on the material before it. Presumably this will never match exactly the amount proposed by the NSP. However there will be a certain margin of difference between the AER's forecast and that of the NSP within which the AER could say that the NSP's forecast is reasonable. What the margin is in a particular case, and therefore what the AER will accept as reasonable, is a matter for the AER exercising its regulatory judgment.

Our decision on the total forecast capex does not strictly limit a service provider's actual spending. A service provider might spend more on capex than the total forecast capex amount specified in our decision in response to unanticipated expenditure needs.

The regulatory framework has a number of incentive mechanisms to deal with such circumstances. Importantly, a service provider does not bear the full cost where unexpected events lead to an over-spend of the approved capex forecast. Rather, the service provider bears 30 per cent of this cost if the expenditure is subsequently found to be prudent and efficient. Further, the pass through provisions provides a means for a service provider to pass on significant, unexpected capex to customers, where appropriate.[20] Similarly, a service provider may spend less than the capex forecast because they have been more efficient than expected. In this case the service provider will keep on average 30 per cent of this reduction over time.

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17 AER, *Expenditure Forecast Electricity Transmission Guideline*, November 2013, pp. 8-9.

18 AER, *Expenditure Forecast Electricity Transmission Guideline*, November 2013, p. 9.

19 AEMC Economic Regulation Final Rule Determination, p.112.

20 NER, r. 6.6.

We set our alternative estimate at the level where the service provider has a reasonable opportunity to recover efficient costs. The regulatory framework allows the service provider to respond to any unanticipated issues that arise during the regulatory control period. In the event that this leads to the approved total revenue underestimating the total capex required, the service provider should have sufficient flexibility to allow it to meet its safety and reliability obligations by reallocating its budget. As such, if there is an overestimation, the stronger incentives the AEMC put in place in 2012[21] should result in the service provider only spending what is efficient. As noted, the service provider and consumers share the benefits of the under-spend and the costs of an overspend under the regulatory regime.

6.4 Reasons for draft decision

Overall, we are not satisfied that Murraylink's proposed total forecast capex satisfies the capex criteria.[22] We compared Murraylink's proposed total capex forecast to our alternative capex forecast and for the reasons set out below, we consider that our substitute estimate reasonably reflects the capex criteria.

6.4.1 Ex post review of past capital expenditure

The capex incentive regime aims to ensure that only capex that is efficient should enter the regulatory asset base to be recovered from consumers.[23] We are required to provide a statement on whether past expenditure included in the roll forward of the regulatory asset base contributes to the achievement of the capital expenditure incentive objective.[24] For this decision, our statement only relates to 2014-15 and 2015-16 regulatory years.

6.4.1.1 Position

We are satisfied that Murraylink's capital expenditure in the 2014-15 and 2015-16 regulatory years should be rolled into the RAB.

6.4.1.2 AER approach

We have assessed the extent to which the roll forward of the regulatory asset base from the 2013–18 regulatory control period to the commencement of the 2018–23 regulatory control period contributes to the achievement of the capital expenditure incentive objective.[25] The capital expenditure incentive essentially requires that only prudent and efficient expenditure is included in the regulatory asset base.

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21 AEMC, *Economic Regulation of Network Service Providers, and Price and Revenue Regulation of Gas Services, Final Position Paper*, 29 November 2012, Sydney.

22 NER, cl. 6A.14.1(2)(ii), NER, cl. 6A.6.7(c), NEL, s.7 and s.7A.

23 AEMC, *Final Position Paper - National Electricity Amendment (Economic Regulation of Network Service Providers) Rule 2012*, 15 November 2012, p. v.

24 NER cl. 6A.14.2.(b)

25 NER cl. S6A.2.2A

Our approach to this assessment applies the approach set out in our Capital Expenditure Incentive Guideline.[26] Our Guideline outlines a two stage process for assessing whether past expenditure is likely to be efficient and prudent.[27] The first stage considers whether a service provider has over-spent against its approved total capex forecast and how that expenditure compares with previous levels of capex and with other service providers.

We are required to provide a statement on whether roll forward of the regulatory asset base from the previous period contributes to the achievement of the capital expenditure incentive objective.[28] The capital expenditure incentive objective is to ensure that where the regulatory asset base is subject to adjustment in accordance with the NER; only expenditure that reasonably reflects the capex criteria is included in any increase in value of the regulatory asset base.[29]

The NER requires that the last two years of the previous regulatory control period (for the purposes of this decision, the 2013–18 regulatory control period) are excluded from the ex-post assessment of past capex.[30] The 2013-14 regulatory year is also excluded as the Guideline was introduced during this year. Accordingly, our ex-post assessment only applies to the 2014-15 and 2015-16 regulatory years.

We may exclude capex from being rolled into the RAB in three circumstances.[31]

- Where the TNSP has spent more than its capex allowance
- Where the TNSP has incurred capex that represents a margin paid by the TNSP, where the margin refers to arrangements that do not reflect arm's length terms; and
- Where the TNSP capex includes expenditure that should have been classified as opex as part of a TNSP's capitalisation policy.

6.4.1.3 Reasons for draft decision

We have reviewed Murraylink's capex performance for the 2014–15 and 2015-16 regulatory years. This assessment has considered Murraylink's out-turn capex relative to the forecast capex given the incentive properties of the regulatory regime for a TNSP to minimise costs.

Under the NER, we are able to exclude capex where a TNSP has overspent against the forecast. Murraylink incurred capex below forecast capex in both the 2014-15 and 2015-16 regulatory years. Therefore, the overspending requirement for an efficiency review of past capex is not satisfied. We also consider that the 'margin' and capitalisation RAB adjustments are not satisfied. Relevantly, given the incentive based

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[26] AER, *Capital Expenditure Incentive Guideline for Electricity Network Service Providers*, November 2013.
[27] AER, *Capital Expenditure Incentive Guideline for Electricity Network Service Providers*, November 2013, pp.19-22.
[28] NER, cl. 6A.14.2(b).
[29] NER, cl. 6A.5A(a).
[30] NER, cl. S6A.2.2A(a).
[31] NER, cl. S6A.2.2A.

regulatory framework provides an incentive for a TNSP to minimise costs and Murraylink has underspent, we are satisfied that Murraylink's expenditure was consistent with the capital expenditure incentive objective.

We note the CCP's concerns regarding Murraylink's forecast significant overspend for 2016-17 and 2017-18. Murraylink submitted that the reason for this over-spend is the forecast installation of fire suppression equipment at each of the buildings at Berri and RedCliffs.[32] However, as noted above this expenditure is not within the scope of this review and will be reviewed as part of our 2023-28 determination.

6.4.2 Assessment of proposed capital expenditure

We undertook a detailed review of the supporting information Murraylink provided in support of its capex forecast. This included a review of:

- Business cases and supporting information in the revenue proposal; and
- information provided by Murraylink in response to further requests.

Based on our review of the information provided by Murraylink in support of its forecast capex, we are satisfied that total forecast capex of $26.6 million ($2017-18) for Murraylink in the 2018-23 regulatory control period reasonably reflects the capex criteria. This is a reduction of $7.2 million or 21.3 per cent to Murraylink's capex forecast of $33.8 million. We are satisfied that total forecast capex of $26.6 million provides Murraylink with a reasonable opportunity to recover at least the efficient costs it incurs in providing direct control network services.[33]

Our alternative estimate reflects the following adjustments to Murraylink's capex proposal:

- a $0.7 million ($2017-18) reduction to forecast capex to reflect the capex forecast that was not supported by a business case
- a $4.5 million ($2017-18) reduction to forecast capex for 'Control System Upgrade' related to the scope of APA management costs and further information provided by Murraylink
- a $0.6 million ($2017-18) reduction to forecast capex for 'Spare IGBTs' that is consistent with historical unit costs to assess the estimated efficient costs for this project
- a $0.8 million ($2017-18) reduction to forecast capex for 'Spare Capacitors' on the basis that the 'step change' increase in the volume of these assets has not been supported; and
- removal of the $0.6 million ($2017-18) to forecast capex for 'Maintenance Surveillance Cameras' on the basis that the proposed costs have not been

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[32] Murraylink, *Revenue proposal Attachment 7.2 - Murraylink - Business Cases*, 31 January 2017.

[33] NER, s. 7A(2).

sufficiently supported by Murraylink and appear to be related to reliability improvements which should not be funded in the forecast capex.

We discuss the reasoning for each of our adjustments below.

6.4.2.1 Differences between Capex Model and Business Cases

Murraylink submitted business cases[34] in support of the majority of its proposed capital expenditure. This proposed capex is summarised in Table 6.2.

Table 6.2 Murraylink forecast capex by project ($2017-18, million)

Project	Total Forecast Capex
Replacement of Control System	27.2
Spare Capacitors	1.8
Spare IGBT's	1.5
Other Minor Capital Works	0.6
Maintenance Surveillance Cameras	0.6
VSD Refurbishment	0.6
Cable Relocation	0.4
Coms Site Huts x 2	0.2
Battery Chargers	0.1
Cable Fault Location Relays	0.1
Total	***33.1***

Source: AER analysis.

As shown in Table 6.2, the total forecast capex submitted in the business cases was $33.1 million ($2017-18). We note that this is lower than the amount of capex reported in Murraylink's proposal and capex model which both reported the total forecast capex of $33.8 million ($2017-18).

The difference between the total forecast capex between these sources reflects:

- The capex proposal included $0.3 million ($2017-18) for 'Site Security and Enhancement'. This project was not in the business cases.
- The capex proposal included $0.1 million ($2017-18) for 'NSW Runback Scheme'. This project was not in the business cases.

[34] Murraylink, *Revenue proposal Attachment 7.2 - Murraylink - Business Cases*, 31 January 2017.

- The capex proposal included a further $0.1 million ($2017-18) for three[35] other projects. None of these projects were included in the business cases.
- The capex proposal included a further unexplained total of $0.2 million ($2017-18). This was due to higher forecast capex in the capex model than in the business cases for the following projects:
    - Cable Relocation
    - Other Minor Capital Works
    - Replacement of Control System; and
    - Spare IGBT's.

This was a total difference of $0.7 million ($2017-18). Given that the above projects have either not been supported by Murraylink in a business case, or have been supported by Murraylink in a business case for an amount that this is less than the amount included in Murraylink's proposed capex, we do not consider this expenditure has been supported.

For the remainder of this attachment, all forecast capex refers to the capex as submitted in the business cases.

6.4.2.2 Control System Upgrade

Murraylink's forecast capex included a total of $27.2 million ($2017-18) for the upgrade of its control system.[36] The breakdown of the proposed capex is shown in Table 6.3.

Table 6.3 Murraylink proposed Control System Upgrade capex ($2017-18, million)

	201819	201920	2020-21	2021-22	Total
Control System Capex	3.3	9.8	7.6	1.1	**21.7**
Management	0.1	0.3	0.3	0.0	**0.7**
Owners Engineer	0.3	1.0	0.8	0.1	**2.3**
APA Management	0.4	1.1	0.9	0.1	**2.5**
Total	**4.1**	**12.2**	**9.5**	**1.4**	**27.2**

Source: AER analysis.

Murraylink stated that the basis of the cost estimate is the replacement of all superseded or obsolete computers and control cards; replacement of hardware and systems at all stations; migration of functionality from the existing cooling system

[35] These projects are 'Fan Coil Motors'; 'Spares' and 'Lifting Hoist'.

[36] Murraylink, *Revenue proposal Attachment 4.1 - Murraylink - Capex Model*, 31 January 2017.

controls into the main converter control system; and removal of superseded or obsolete SCADA system and hardware.[37]

Murraylink submitted that the current control system has not been materially modified in the 15 years it has been in service and that the manufacturer, ABB, has announced its intention to no longer support the systems in 2021.[38] However, no economic analysis was provided in support of the proposed project and timing of the upgrade. This concern was also raised by the South Australian Government,[39] the Central Irrigation Trust[40] and the CCP[41]. The CCP stated that:[42]

> The business case for the largest expenditure item, the Control System Upgrade, does not even provide an evaluation of simple alternatives such as delaying the upgrade by one or more years… Nor is that clear that Murraylink has sought to negotiate at least a temporary extension of support and assess the benefits of this, particularly in light of the uncertainty about future interconnector capacity and the implications for Murraylink. The expenditure program is due to commence in 2018/19 and conclude in 2020/21. The quantum of expenditure deserves a more comprehensive business case.

We recognise that the operation of the control system post withdrawal of vendor support may lead to an increase in reliability risk. However as highlighted by the CCP, we would expect that given the magnitude of these costs, the business case would have included an evaluation of available alternatives. In the context of these concerns Murraylink stated:[43]

> Unfortunately the withdrawal of support, including the withdrawal of the provision of replacement parts, means that the Murraylink control system cannot be delayed without a massive increase in the risk of total transmission line failure for an extended period of time. If a critical part of the control system fails in the absence of a replacement part then the solution is to replace the entire control system. If this replacement is to take place on an accelerated timeframe, as would be necessary to return Murraylink to service, it can be expected to come at a significant premium.

We also note the CCP's concerns that there is also no indication that the intended arrangement will manage the ongoing risk of being 'locked-in' to a single supplier.[44] We acknowledge this concern especially in consideration of the information provided by Murraylink that the manufacturer, ABB, has announced its intention to no longer support the systems in 2021. This suggests that the need and timing for future replacement will also be largely dependent on vendor (supplier) support. In response to this concern, Murraylink stated that:[45]

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37 Murraylink, *Revenue proposal Attachment 7.2 - Murraylink - Business Cases*, 31 January 2017.

38 Murraylink, *Revenue Proposal*, 13 January 2017.

39 Business SA, *Submission on Murraylink Revenue Proposal*, 12 May 2017.

40 Central Irrigation Trust, *Submission to the AER on the Murraylink Revenue Proposal 2018-23*, 2 March 2017.

41 Consumer Challenge Panel subpanel 9, *Response to proposals from Murraylink*, 12 May 2017.

42 Consumer Challenge Panel subpanel 9, *Response to proposals from Murraylink*, 12 May 2017, p.10.

43 Murraylink, *Response to AER issues paper*, 12 May 2017, p. 4.

44 Consumer Challenge Panel subpanel 9, *Response to proposals from Murraylink*, 12 May 2017, p.10.

45 Murraylink, Response to AER, 17 August 2017.

> The hardware and software components of the Murraylink control system are tightly integrated. Changing the specification of components in the control system requires substantial re-engineering to ensure consistent functionality. The control system was specifically developed by the OEM ABB for the operation of their HVDC facilities.

This also suggests that sourcing a new control system from another supplier may result in additional costs given the integrated nature of the components of the asset.

We also observe that Murraylink proposed a support agreement related to 'day to day' operations with the systems supplier in its proposed opex. However, this agreement does not appear to be related to managing the risk associated with the future obsolescence of the control system upgrade. Though, we also note that any support agreement that transfers the risk that the asset may become obsolete earlier than its expected asset life, to the supplier, may result in a premium sought by the supplier to compensate for this risk, especially if there is only one supplier.[46]

The CCP also considered that we should require the project to be advanced under a RIT-T.[47] The AEMC amended the NER in July 2017 to extend the coverage of the RIT-T to replacement capex, to take effect from 18 September 2017. As intended by our rule change proposal, we expect the application of the RIT-T process to replacement expenditure should:

- improve the application of economic analysis regarding the need for reinvestment following asset retirements; and
- improve decisions regarding the optimal timing of asset retirements.

Relevantly, while Murraylink has not undertaken a quantitative economic analysis, which we consider to be good industry practice, this analysis is expected to be applied as part of the RIT-T process. Furthermore, in the event that the RIT-T process identifies alternative options that may be more efficient (e.g. such as a reduced scope of the upgrade or deferral of the upgrade), customers are expected to share in the benefits of more efficient capex through lower costs in the future. The obligation for Murraylink to undertake a RIT-T on the control system upgrade project also should identify and consider the issues highlighted by Business SA:[48]

> Murraylink have not explained the extent to which its success or otherwise in building a new or enhanced interconnector under ElectraNet's regulatory investment test for transmission (RIT-T) proposal would impact on the size and nature of its required control system replacement. For example, there may be improved economies of scale or some other benefit which could flow back to consumers.
>
> Furthermore, Murraylink have not articulated the improved productivity a new control system would deliver over a 15 year old and obsolete model, and how

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[46] Murraylink, *Revenue proposal Attachment 7.2 - Murraylink - Business Cases*, 31 January 2017, p. 12.

[47] Consumer Challenge Panel subpanel 9, *Response to proposals from Murraylink*, 12 May 2017, p. 4.

[48] Business SA, *Submission on Murraylink Revenue Proposal*, 12 May 2017, p. 3.

> in turn that will reduce operating costs over 2018-23 and future revenue control periods.

We also sought clarification as to whether the proposed control system upgrade is relevant to the proposed contingent project and ElectraNet's options identified in its RIT-T regarding interconnection into South Australia. Murraylink's submitted that:[49]

> There is no link between the timing of the forecast capital expenditure contained in the submission and the Murraylink proposed contingent project or ElectraNet's options contained in their Project Specification Consultation Report.

Murraylink also submitted that the nature of the control system is such that it would only need minor, if any, modifications in order to be able to support any addition to Murraylink capacity that may arise out of a Murraylink or ElectraNet Regulatory Investment Test processes.[50]

Overall, the circumstances submitted by Murraylink where the control system is considered obsolete and is no longer supported by the vendor and spares are limited are likely to require the project to be undertaken in forthcoming regulatory control period. While we recognise that Murraylink has not undertaken a quantitative risk analysis in support of this expenditure, this should be addressed as part of a RIT-T. On balance, we consider the replacement of the control system in the 2018-23 regulatory control period is likely to be consistent with the actions of prudent service provider. However, we are not reasonably satisfied that aspects of the project's capex forecast are likely to reflect efficient costs.

Firstly, we compared Murraylink's proposed capex with the estimated costs of the Directlink control system upgrade. We consider that Directlink is a relevant comparator business as this asset is also a HCVDC interconnector operated and managed by APA under a similar agreement. We noted that the cost for the Directlink upgrade was less than half of that proposed by Murraylink.[51]

Murraylink submitted that the Murraylink asset has four control and protection systems per converter while Directlink has only two per converter.[52] Murraylink further submitted that the estimated cost roughly reflects a linear increase that arises from the complexity of the additional control and protections systems that are required for the additional converter stations.[53] While, we accept the basis for the higher estimated costs for Murraylink, we would expect that there may be some scale efficiencies between the estimated costs of the Directlink and Murraylink control system upgrades. Murraylink has subsequently revised down the proposed capex for this project by $2.27 million ($2017-18).[54] This is consistent with our view that there may not be a

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49 Murraylink, *Response to information request #002*, 20 March 2017, p. 2.
50 Murraylink, *Response to the AER Issues Paper*, 12 May 2017, p. 5.
51 Directlink, *Revenue proposal 2015-20*, May 2014.
52 Murraylink, *Response to information request #002*, 20 March 2017, p. 7.
53 Murraylink, *Response to information request #007*, 30 May 2017, p. 4.
54 Murraylink, *Response to information request #008*, 13 June 2017, p. 2.

linear relationship between the estimated costs of the control system upgrades for Directlink and Murraylink. We have taken this revised estimate into account in our draft decision.

We also sought further information from Murraylink regarding the rationale for the inclusion of 'Management', 'Owners Engineer' and 'APA Management' costs in the total capex forecast for this project. Murraylink subsequently advised that the $0.7 million 'Management' costs refer to the costs specific to APA in undertaking the project (APA manage the Murraylink asset under the Management, Operations and Maintenance and Commercial Services Agreement or MOMSCA[55]). Murraylink submitted that:[56]

> these costs represent the cost of APA management, operations and engineering staff engaging in the execution of the project timing:
>
> - leadership and management oversight of the project;
> - participating in the factory acceptance tests as part of the detailed operator training;
> - participating in the site commissioning tests; and
> - general logistical and administrative functions (arranging outages, works permitting, documentation development and review, etc.

We consider that given the nature of this project, it is reasonable that APA as the operator of the asset will have to incur these costs in the management of the project and are hence likely to be prudent.

In regards to the proposed $2.3 million 'Owners Engineer' costs, Murraylink advised that it represented the costs of specialist consultant engineers to manage the operational risk associated with replacing the control system. In particular:[57]

> Owner's Engineer is the cost of a consultant engineer, with experience commissioning HDVC, to assist with:
>
> - The development of testing and commissioning procedures, and
> - the management and execution of the factory acceptance and site commissioning tests.
>
> The role of Owner's engineer is considered essential for Murraylink to mitigate the risk that the replacement of the control and protection system causes a prolonged outage of the transmission services… Oversight of this nature requires specialist skills and resources additional to that which Murraylink requires for the day to day operation and maintenance of the transmission line.

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55 Murraylink, *Revenue proposal Attachment 8.2 - Murraylink - Outsourcing arrangements and margins*, 31 January 2017.

56 Murraylink, *Response to information request #007*, 30 May 2017, p. 2.

57 Murraylink, *Response to information request #007*, 30 May 2017, p. 2.

We are satisfied that given the bespoke nature of the asset and the likely specialist expertise required to manage the supply risks associated the upgrade, these costs are reasonably likely to reflect prudent and efficient costs.

Lastly, in regards to the $2.5 million 'APA Management' cost, Murraylink submitted that this reflects the margin on all costs within the control system upgrade that Murraylink is required to pay under the MOMSCA. We note that 'APA Management' costs were included within the capex forecast for all projects within Murraylink's proposal. In particular:[58]

> The application of the margin to the costs is consistent with the application of clause 10.1(c)(i) of the Management, Operations and Maintenance and Commercial Services Agreement. In particular the provision of **capital services** under clause 10.1(a) and the engineering under 10.1(b) [emphasis added].

Murraylink submitted that in accordance with the MOMSCA, a margin is paid on all costs that APA incurs in the provision of asset management, operations, maintenance and capital services; all costs incurred in connection with existing third party subcontracts; and all expenses incurred by APA in the provision of commercial services.[59] The margin is paid to APA to access the economies of scale and scope to APA (i.e. know-how) as well as APA's asset management and corporate service expertise, IT systems and business processes, which Murraylink would be unable to achieve if operating the asset outright. In considering this arrangement we have identified some issues as outlined below.

Firstly, as we have identified, Murraylink is sourcing external consultant engineers to oversee the installation of the control system. As such, we do not consider that a margin which is based on APA know-how should apply to all of the control system upgrade costs as the expertise for the management of this project has been outsourced to an external party. Relevantly, the identified expertise and efficiencies expected to be achieved through these costs (referred to as 'owner's engineer' costs) is not attributable to APA's know-how, and hence we consider that Murraylink should not apply a margin to these costs.

Secondly, we note that Murraylink submitted elsewhere in its proposal that the forecast total margin payable under the MOMSCA for the provision of asset management, operating, maintenance and *capital services* is $0.38 million (nominal) per year or $1.9 million over the 2018-23 regulatory control period.[60] [61] Furthermore, it appears that Murraylink's proposed $0.38 million margin is to be recovered through forecast opex, which already includes the relevant margin for capital services as set out in the

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58 Murraylink, *Response to information request #008*, 9 June 2017, p. 1.

59 Murraylink, *Revenue proposal Attachment 8.2 - Murraylink - Outsourcing arrangements and margins*, 31 January 2017.

60 Murraylink, *Revenue proposal Attachment 8.2 - Murraylink - Outsourcing arrangements and margins*, 31 January 2017, p. 12.

61 We note that Murraylink submitted that the $0.38 million per annum margin benchmarks favourably to the equivalent margin paid by Envestra to APA under its commercial services agreement.

supporting attachment.[62] We have accepted this amount in out alternative estimate of opex (refer to attachment 7). Relevantly, this suggests that Murraylink is 'double dipping' on the recovery of the management fee that relates to capital services (i.e. the margin for capital services is recovered twice, once through forecast opex and then through forecast capex). Therefore we consider that Murraylink shall not apply the margin to the control system capex costs, as the margin payed for capital services is likely recovered through the opex proposal.

As discussed above, we have not accepted a margin on the owner engineer costs as this does not reflect APA know-how nor have we accepted a margin on the proposed control system costs. Instead, we consider that the margin should only apply to APA's own management costs, as these costs reflect the management, operations and engineering expertise that are relevant and contributed by APA's management of the control system upgrade. For the reasons identified above, we have only accepted the application of a margin to the proposed $0.7 million 'Management' capex.

Taking Murraylink's capex forecast adjustment into account with our estimate of APA management costs, we are satisfied that an amount of $22.7 million ($2017-18) for the control system upgrade is reasonably likely to reflect prudent and efficient costs and have included this amount in our alternative estimate of total capex.

6.4.2.3 Spare IGBTs

Murraylink's proposed capex of $1.5 million ($2017-18) for the purchase of 108 replacement and spare 'Insulated Gate Bipolar Transistors' (IGBT).[63] Murraylink submitted that the need to secure adequate stores of IGBTs arises from:[64]

- good procurement practices
- the need of having prudent store of critical inventory to meet operational requirements and minimise down-time of the asset; and
- the need to manage supply risk by regularly securing critical stock.

This cost forecast represents a $0.7 million or 77.6 per cent increase above the actual and expected capex of $0.9 million on IGBT's over the 2013-18 regulatory control period. The total project forecast is outlined in Table 6.4.

Table 6.4 Murraylink Spare IGBT capex ($2017-18, million)

	2018-19	2019-20	2020-21	2021-22	2022-23	Total
IGBT Purchases	0.2	0.4	0.3	0.3	0.3	**1.4**
APA Management	0.0	0.0	0.0	0.0	0.0	**0.1**

[62] Murraylink, *Revenue proposal Attachment 8.1 - Forecast Operating Expenditure Model*, 31 January 2017.
[63] Murraylink, *Attachment 4.1 - Murraylink - Capex Model*, 31 January 2017; AER analysis.
[64] Murraylink, *Revenue proposal Attachment 7.2 - Murraylink - Business Cases*, 31 January 2017, p.17.

Total	**0.3**	**0.4**	**0.3**	**0.3**	**0.3**	**1.5**

Source: AER analysis.

We note that over the last five years Murraylink's failure/purchase rate of IGBT's was on average 20 IGBT units per year and that Murraylink is expecting this to increase to 22 units per annum during the 2018-23 regulatory control period.[65]

We note that the capex forecast implies an average cost per IGBT of $14,074,[66] which is significantly higher than the unit cost implied by the cost estimates of the current regulatory control period of $8,557.[67] We sought further information from Murraylink on the proposed step-change in costs for IGBTs. Murraylink advised that:[68]

> The cost for the IGBTs are based on estimates provided by ABB… Note in relation to the estimate provided the 5% year on year and 10% provision amount for delivery was removed to give a unit cost of $10,300 per IGBT. The per unit cost was then used to calculate the expenditure based on the forecast need for IGBTs.

However, we do not consider that this explanation has sufficiently justified the proposed increase in the cost per IGBT. Our reasons are discussed below.

In assessing the proposed capex we compared the proposed unit costs to the unit costs supporting the IGBT forecast in our Directlink determination.[69] Directlink also proposed to source IGBTs from the same supplier over the 2015-20 regulatory control period, and are also managed by APA.[70] Directlink's proposal was broken down as shown in Table 6.5.

Table 6.5 Directlink IGBT replacement capex ($2017-18)

	2015-16	2016-17	2017-18	2018-19	2019-20	Total
Capex Forecast ($ million)	0.4	0.4	0.4	0.3	0.3	2.0
Quantity Purchased	50	50	50	40	40	230
Implied Cost per IGBT ($'s)[71]	**8536**	**8536**	**8536**	**8536**	**8536**	**8536**

Source: Directlink, *Capex Business Cases*, 26 May 2014; AER analysis.

Table 6.5 indicates an estimated cost per IGBT of $8,536 ($2017-18). We note that this is consistent with the unit cost estimate of $8,557 incurred by Murraylink for the

65 Murraylink, *Revenue proposal Attachment 7.2 – Murraylink – Business Cases,* 31 January 2017.
66 $1.52m / 108 = $14,074.
67 $0.86m / 100 = $8,557
68 Murraylink, *Response to information request #002*, 20 March 2017, p. 9.
69 AER, *Draft decision Directlink transmission determination - Attachment 6 - Capital expenditure*, November 2014.
70 Directlink, *Capex Business Cases*, 26 May 2014.
71 This was calculated by dividing the capex forecast by the quantity purchased for that year.

purchase of IGBTs in the current regulatory control period. We also make the observation that the final two years of Directlink's proposal occur at the same time as the first two years of Murraylink's forthcoming regulatory proposal such that these unit costs should be directly comparable. In the absence of further information, we consider that it is unlikely that there would be any material differences in IGBT costs between the two assets.

On this basis, we have substituted an estimated cost of $8,557 per IGBT based on Murraylink's historical expenditure as a more reasonable estimate of the costs required to purchase the 108 IGBTs over the 2018-23 regulatory control period. For these reasons we are satisfied that an amount of $0.9 million[72] for the purchase of IGBTs is reasonably likely to reflect prudent and efficient costs and have included this amount in our alternative estimate.

6.4.2.4 Spare Capacitors

Murraylink's capex forecast included $1.8 million ($2017-18) for the purchase of 293 spare capacitors over the 2018-23 regulatory control period. Murraylink submitted that 160 out of a total 1016 capacitor units have now degraded to the point where they require replacement, which is an average of 32 capacitor units per annum.[73] The breakdown of the cost forecast is shown in Table 6.6.

Table 6.6 Murraylink proposed Spare Capacitor capex ($2017-18, million)

	2018/19	2019/20	2020/21	2021/22	2022/23	Total
Capacitor Purchases	0.5	0.6	0.2	0.2	0.2	**1.7**
APA Management	0.0	0.1	0.0	0.0	0.0	**0.2**
Total	**0.5**	**0.6**	**0.2**	**0.2**	**0.2**	**1.8**

Source: AER analysis.

It appears that Murraylink is expecting to incur no spare capacitor capex in the current regulatory control period.[74] This suggests that for the five years prior to the submission of this proposal, Murraylink has observed 32 capacitor units degrade per year and has found it efficient to not replace them over this period. Given that Murraylink has been able to effectively operate the interconnector while this has occurred, this indicates that there has been a sizable level of redundancy in regards to the number of capacitors that can fail at a given time.

[72] $8557 x 108 = $0.92 million

[73] Murraylink, *Revenue proposal Attachment 7.2 - Murraylink - Business Cases*, 31 January 2017.

[74] Murraylink, *Attachment 4.1 - Murraylink - Capex Model*, 31 January 2017.

It is possible that the reason that Murraylink is not expecting to spend on capacitors in the current regulatory period is that it currently has a stock of spare capacitors. However, Murraylink did not detail how many spare capacitors have been in stock at various times throughout the current regulatory control period, or are currently in stock, or how many spares are expected to remain going into the 2018-23 regulatory control period. Furthermore, Murraylink did not detail how many capacitors would further need to degrade for there to be a significant operational risk at which replacement is considered to be necessary. This raises question as to the number of spare capacitor purchases which are likely to be required over the forthcoming regulatory control period.

We asked Murraylink to provide analysis in support of its proposed increase in spare capacitor purchases. Murraylink subsequently advised that it "identified an error in regards to the business case" and submitted that the project is consistent with 6A.6.7(a)(3) and (4) not 6A.6.7(a)(1) of the NER.[75] However, Murraylink did not provide any reasons in support of this view. In the absence of this information, we consider that Murraylink has not supported the need to purchase 293 capacitor units over the forthcoming regulatory control period.

We consider that in the absence of sufficient justification for the purchase of 293 spare capacitors, it is reasonable to assume that if Murraylink was able to safely operate the interconnector while 32 capacitors have failed each year then it is possible to continue to safely operate the interconnector by replacing 32 capacitors each year throughout the forthcoming regulatory period. This is because replacing capacitors at the observed annual rate of failure (32 capacitors per year) will likely be consistent with maintaining the safety and reliability of the asset.

We have therefore included an estimate of capex for the purchase of 32 capacitors per year or 160 over the next five years, to cover for the expected number of capacitors that are likely to degrade in the 2018-23 regulatory control period. Based on this consideration, our estimate of the capex required to purchase 160 spare capacitors is 54.6 per cent[76] of Murraylink's proposed capex for this project. As such we are satisfied that an amount of $1.0 million ($2017-18) is reasonably likely to reflect the prudent and efficient costs and have included this amount in our alternative estimate.

6.4.2.5 Maintenance Surveillance Cameras

Murraylink's proposed capex included $0.6 million ($2017-18) to "install surveillance and infra-red cameras, in the AC and DC filter yards of the converter building, for the purpose of undertaking routine inspections of the high voltage equipment areas that cannot be accessed while the converter is in operation".[77] The breakdown of the cost forecast by component by year is shown in Table 6.7.

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75 Murraylink, *Response to information request #002*, 20 March 2017, p. 9.

76 160/293 = 54.6.

77 Murraylink, *Revenue proposal Attachment 7.2 - Murraylink - Business Cases*, 31 January 2017, p. 33.

Table 6.7 Murraylink proposed Maintenance Surveillance Cameras capex ($2017-18, million)

	2019-20	2020-21	Total
Specification / Administration	0.01	0.01	**0.01**
Materials / Installation	0.23	0.23	**0.47**
Outage Resource Costs	0.00	0.00	**0.00**
Project Supervision	0.03	0.03	**0.05**
APA Management	0.03	0.03	**0.05**
Total	**0.30**	**0.30**	**0.59**

Source: AER analysis.

Murraylink submitted that this new initiative will lead to a reduction in outages for inspection and maintenance as it will enable Murraylink to inspect the converter stations at Berri and Redcliffs remotely.[78] However, Murraylink did not provide any economic analysis justifying the installation of maintenance surveillance cameras for the 2018-23 regulatory control period. Upon requesting this, Murraylink subsequently advised that it "identified an error in regards to the business case" and submitted that the project is consistent with 6A.6.7(a)(3) and (4) not 6A.6.7(a)(1) of the NER.[79] However, Murraylink did not provide any reasons in support of this view. In the absence of this information, we consider that Murraylink has not supported the need to install maintenance surveillance cameras over the forthcoming regulatory control period.

Furthermore, this project appears to be an initiative that will improve the reliability of the interconnector. We note that any reliability improvements are in principle funded through the STPIS and therefore the proposed capex should not be included in the capex forecast.

For the reasons discussed above we are not satisfied that the proposed capex for maintenance surveillance cameras is likely to reasonably reflect prudent and efficient capex.

6.4.2.6 Consideration of the capex factors

In deciding whether or not we are satisfied Murraylink's forecast reasonably reflects the capex criteria, we have had regard to the following capex factors when applying our assessment techniques to the total proposed capex forecast. Table 6.8 summarises how we have taken into account the capex factors.

[78] Murraylink, *Revenue proposal Attachment 7.2 - Murraylink - Business Cases*, 31 January 2017, p. 33.

[79] Murraylink, *Response to information request #002*, 20 March 2017, p. 9.

Table 6.8 AER consideration of the capex factors

Capex factor	AER consideration
The actual and expected capex of Murraylink during any preceding regulatory control periods	We have had regard to Murraylink's actual and expected capex during the 2013–2018 regulatory control period in assessing its proposed total forecast capex and in determining our substitute estimate for the 2018–2023 regulatory control period. However, Murraylink's proposed capex reflects the costs of upgrading the control system on the basis of an 'end of life' replacement and so the majority of proposed capex does not reflect recurrent capital expenditure programs.
The most recent annual benchmarking report and benchmarking capex that would be incurred by an efficient TNSP over the relevant regulatory control period	We have considered Murraylink's capex performance with the Directlink interconnector for some proposed capex as this asset is similar in nature (also a HVDC interconnector). This comparison was relevant in considering some of the proposed capex programs and the proposed costs of the control system upgrade.
The extent to which the capex forecast includes expenditure to address concerns of electricity consumers as identified by Directlink in the course of its engagement with electricity consumers	We have had regard to the extent to which Murraylink's proposed total forecast capex includes expenditure to address consumer concerns that have been identified by Murraylink. On the information available to us, Murraylink has not identified any expenditure to address concerns by consumers.
The relative prices of operating and capital inputs	Murraylink did not propose material real cost escalators. We consider that real material cost escalation should not be applied in determining Murraylink's required capital expenditure.
The substitution possibilities between operating and capital expenditure	We have had regard to the substitution possibilities between opex and capex. We have considered whether there are more efficient and prudent trade-offs in investing more or less in capital in place of ongoing operations. We consider that Murraylink's operating risk should not increase based on the proposed replacement of the control systems. Murraylink proposed an opex 'step change ' for an operating services agreement which we have not accepted in the proposed opex. This is explained in the Attachment 7 (Opex). We have not accepted proposed capex for maintenance surveillance cameras, which appears to be driven by improved reliability in terms of expected outages for maintenance purposes. As capex for reliability improvements are funded by the STPIS we have not included this proposed capex in our alternative estimate. Murraylink proposed no reductions in maintenance costs and so there is no implication for proposed opex.
Whether the capex forecast is consistent with any incentive scheme or schemes that apply to Murraylink.	We have had regard to whether Murraylink's proposed total forecast capex is consistent with the STPIS. We have not accepted proposed capex for the maintenance of surveillance cameras on the basis that this appears to be driven by reliability improvements that should be funded through the STPIS (as set out in Attachment 11) and not in the ex-ante capex forecast.
The extent to which the capex forecast is referable to arrangements with a person other than the TNSP that do not reflect arm's length terms	We have had regard to whether any part of Murraylink's proposed total forecast capex or our substitute estimate is referable to arrangements with a person other than Murraylink that do not reflect arm's length terms. We did not identify any parts of Murraylink's proposed total capex or our substitute estimate is referable in this way. Though we did identify concerns with an aspect of the management fee that is levied by APA (the part owner and operator of the interconnector). We have adjusted the amount of the proposed management fee (margin) for capital services included in our substitute estimate.

Capex factor	AER consideration
Whether the capex forecast includes an amount relating to a project that should more appropriately be included as a contingent project	We have had regard to whether any amount of Murraylink's proposed total forecast capex or our substitute estimate relates to a project that should more appropriately be included as a contingent project. We did not identify any such amounts.
The extent to which Murraylink has considered and made provision for efficient and prudent non-network alternatives	We have had regard to the extent to which Murraylink made provision for efficient and prudent non-network alternatives as part of our assessment of the capex associated with the non-network capex driver. On the information available to us, Murraylink has not identified any expenditure related to non-network alternatives.
Any relevant final project assessment report (as defined in clause 5.10.2 of the NER) published under clause 5.17.4(o), (p) or (s)	There are no final project assessment reports relevant to Murraylink for us to have regard to.
Any other factor the AER considers relevant and which the AER has notified Murraylink in writing, prior to the submission of its revised regulatory proposal under is a capex factor	We did not identify any other capex factor that we consider relevant.

6.4.3 Conclusion

For the above reasons, we do not accept the total forecast capex of $33.8 million that Murraylink proposed in its revenue proposal for the 2018–23 regulatory control period. This is because we are not satisfied that a total forecast capex of $33.8 million reasonably reflects the capex criteria.

Our alternative estimate of Murraylink's required capex reflects a reduction in capex for a number of proposed projects to reflect more the efficient costs of a prudent service provider.

Our substitute estimate of the total forecast capex that Murraylink requires over the 2018–23 regulatory control period is based on our alternative estimate. We are satisfied that this amount of $26.6 million ($2017-18) reasonably reflects the capex criteria. We consider this should provide Murraylink with a reasonable opportunity to recover at least its efficient costs. Table 6.9 shows the adjustments we have made to Murraylink's proposed capex.

Table 6.9 Draft decision: capex adjustment ($2017-18, million)

Project	Murraylink proposed capex	AER adjustment	Draft decision
Site Security Enhancement	0.28	-0.28	0.00
Cable relocation	0.37	-0.01	0.36
Replacement of Control System	27.25	-4.54	22.71
Fan coil motors	0.08	-0.08	0.00
Spare IGBT's	1.55	-0.63	0.92
Other minor capital works	0.70	-0.09	0.61

Project	Murraylink proposed capex	AER adjustment	Draft decision
NSW Runback Scheme	0.15	-0.15	0.00
VSD Refurbishment	0.58	-	-
Coms Site Huts x 2	0.16	-	-
Maintenance surveillance cameras	0.59	-0.59	0.00
Battery chargers	0.14	-	-
Cable fault location relays (WAP)	0.14	-	-
Spare capacitors	1.82	-0.83	1.00
Spares	0.01	-0.01	0.00
Lifting hoist	0.02	-0.02	0.00
TOTAL	**33.83**	**-7.21**	**26.63**

Source: Murraylink, *Revenue proposal*, 31 January 2017; Murraylink responses to AER Information Requests; AER analysis.

Note: Numbers may not add to total due to rounding.

A Contingent projects

Murraylink proposed $994 million ($2017-18) for a three stage contingent project for the 2018–23 regulatory control period. Murraylink submitted that the proposed project would be capable of addressing the capacity constraints in the South Australian Riverland, north-western Victoria and south-western NSW transmission regional networks as well as providing increased South Australian interconnection capacity. Murraylink submitted that its proposed contingent project will improve system security and reliability in these regions as well as providing for the continued effective contribution of Murraylink.[80]

The three stages of the proposed contingent project are:[81]

- removal of the Murraylink transmission constraint in South Australia ($276 million)
- duplication of Murraylink ($477 million); and
- capacity upgrade to Darlington Point ($399 million).

Generally, contingent projects are significant network augmentation projects that are reasonably required to be undertaken in order to achieve the capex objectives. However, unlike other proposed capex projects, the need for the project within the regulatory control period and the associated costs are not sufficiently certain. Consequently, expenditure for such projects does not form a part of the total forecast capex that we approve in this determination. Such projects are linked to unique investment drivers (rather than general investment drivers such as expectations of load growth in a region) and are triggered by defined 'trigger events'. The occurrence of the trigger event must be probable during the relevant regulatory control period.[82]

If, during the regulatory control period, Murraylink considers that the trigger event for an approved contingent project has occurred, then it may apply to us. At that time, we will assess whether the trigger event has occurred and the project meets the threshold. If satisfied of both, we would determine the efficient incremental revenue which is likely to be required in each remaining year of the regulatory control period as a result of the contingent project, and amend the revenue determination accordingly.[83]

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80 Murraylink, *Revenue Proposal*, 31 January 2017, p. 94.
81 Murraylink, *Revenue Proposal*, 31 January 2017, pp. 94-95.
82 NER, cl. 6A.8.1(c)(5).
83 NER, cl. 6A.8.2.

A.1 Murraylink's proposed contingent project

A.1.1 Revenue proposal

Murraylink submitted that the power transfer capability of the Murraylink interconnection is frequently constrained, not by the capacity of the DC link, but by transmission system capability connected to its converter stations in both South Australia and Victoria.[84] Murraylink stated that the South Australian Riverland area and the north-western Victorian and the south-western NSW regional transmission networks are all nearing the time when they will need to be reinforced to improve system security and reliability, as well as to provide for the continued effective contribution of Murraylink. Murraylink noted that the Annual Planning Reports of ElectraNet, AEMO (Victoria) and TransGrid all describe plans for the staged reinforcement of these regional portions of their networks.[85]

Murraylink submitted that they have developed a conceptual proposal with three stages in order to:[86]

- address the capacity constraints in the regional transmission networks; and
- provide increased South Australian interconnection capacity.

The three stages of the contingent project are set out in Table A-1 below:

Table A-1 Murraylink - Contingent projects ($m, 2017-18)

Project	Total
Stage 1: Removal of the Murraylink transmission constraint in South Australia Reinforce the connection between Murraylink and the ElectraNet transmission system with a new double circuit 275kV transmission line between Robertstown and Berri.	$266
Stage 2: Duplication of Murraylink Expansion of the substation at Berri and the construction of a new DC link (Murraylink 2), with cable and overhead sections connecting between Berri and Buronga in NSW, by-passing the Victorian transmission network. Murraylink submitted that Murraylink 2 would provide about 300MW of additional interconnection capacity for export from South Australia and additional import capability to South Australia from NSW and increase the level of support to the regional transmission networks.	$477
Stage 3: Capacity upgrade to Darlington Point Construction of an additional Buronga to Darlington Point DC line and convertor station in Darlington to address the limited capacity and losses in the existing 220kV line.	$399
Total (if all three projects are undertaken)	$994[(a)]

84 Murraylink, *Revenue Proposal*, 31 January 2017, p. 94.
85 Murraylink, *Revenue Proposal*, 31 January 2017, p. 94.
86 Murraylink, *Revenue Proposal*, 31 January 2017, p. 94.

Source: Murraylink, Regulatory Proposal 2018–23, January 2017, pp. 94–95, Murraylink - Attachment 1.1 - Murraylink - Regulatory Information Notice v2 - 20170131, tab 7.2 contingent projects.

(a) There are two discrepancies in the numbers identified in Murraylink's regulatory proposal. (1) The total (if all three projects are undertaken) sourced from the Murraylink regulatory proposal and Regulatory Information Notice is not the sum of the projects represented below ($266 million plus $477 million plus $399 million = $1,142 million) and (2) Murraylink stated on page 94 of its regulatory proposal that the first stage of the contingent project would cost approximately $276 million, not $266 million as set out in table 7.8 on page 95 of its regulatory proposal. However, in its response to AER Information Request #006, Murraylink submitted that "There are cost savings that can be delivered from undertaking all three stages as one single project. That is constructing a second link that runs from Robertstown through to Buronga."[87]

Murraylink proposed the following trigger events for its proposed contingent project:[88]

- the completion of a RIT-T consultation and cost-benefit analysis that justifies any one, or more than one element of the contingent project to upgrade the capacity of the Murraylink corridor; and
- a financial commitment by the board of Energy Infrastructure Investments Pty Limited to undertake an element of the project.

A.1.2 Additional information

In response to our Issues Paper and Information Requests, Murraylink provided us with additional information in respect to its proposed contingent project.[89] Murraylink's responses addressed our concern that its revenue proposal did not contain sufficient information to support the need for the contingent project or specific trigger events.[90] Murraylink acknowledged the high level nature of the material it provided us in its revenue proposal.[91]

Murraylink submitted the following additional information to us in respect of its proposed contingent project:

- although each stage of the project delivers benefits directly to the customers of South Australia, the benefits are not completely independent. To realise the full benefits of a second HVDC link (stage two) for South Australia requires alleviating some of the restrictions in the South Australian network which is the purpose of stage one. While some benefits would be realised from extending the Murraylink connector into NSW, to realise the full benefits it is necessary to undertake both stage one and two. This staging means the project could be undertaken at different times to be compatible with delivering the benefits to the South Australian market as required.[92]

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87 Murraylink, *Response to AER Information request #006 - Contingent Projects (Public)*, 16 May 2017, p. 1.

88 Murraylink, *Revenue Proposal*, 31 January 2017, pp. 95-96.

89 Murraylink, *Response to AER issues paper (public),* May 2017, *Response to AER Information request #005*, 21 April 2017 and *Response to AER Information request #006 - Contingent Projects (Public)*, 16 May 2017.

90 AER, *Issues Paper - Murraylink electricity transmission revenue proposal 2018-23*, p. 19, March 2017.

91 Murraylink, *Response to AER Information request #005*, 21 April 2017, p. 1.

92 Murraylink, *Response to AER Information request #006 - Contingent Projects (Public)*, 16 May 2017, pp. 1-2.

- Murraylink acknowledges that the planning of the future transmission in the NEM is prescribed in the NER.[93] Murraylink submitted that the planning framework implies that if it proceeds with a project that requires a connection, or that materially affects an existing connection, then consultation should be commenced at the planning stage with:[94]
    - AEMO – as both the national planner responsible for advising on interconnection capacity and the jurisdictional planner responsible for augmentations in Victoria
    - ElectraNet for augmentations in South Australia; and
    - TransGrid for augmentations in NSW.
- specific details for each stage of the project:
    - Stage 1 - the ElectraNet network is heavily utilised by Riverland customers, and frequently has insufficient spare capacity to allow full export to Victoria over Murraylink. Murraylink claim that ElectraNet has recognised the need for major augmentation from Robertstown to Berri in the future to address further load growth and that AEMO has identified the eventual need for this line, and has reported on the costs of inefficient dispatch of generators that are caused by the constraints that currently exist on this line. Murraylink submitted that it may be a cost effective approach to extend Murraylink and create a connection point to the 275kV at Robertstown rather than augment ElectraNet's system. Murraylink claim that this would have the benefit of removing the current level of constraint, and that system security benefits would be realised when the DC Murraylink line is more closely tied to the South Australian 275 kV network.[95]

      Murraylink submitted that another advantage of extending Murraylink rather than augmenting the ElectraNet network is that it permits the 132 kV connection to be used to support ElectraNet's Riverland network.[96]

      Other justifications of the project listed by Murraylink include:[97]

        - removal of a constraint on Murraylink that causes costly inefficient dispatch on South Australian export
        - more effective support of the Riverland and western Victorian networks, and avoidance of some future costs (e.g. capacitor banks at Monash)
        - transfer of Murraylink's enhanced control attributes to Robertstown, where they can be more effectively applied to the Davenport to Adelaide 275 kV network. Murraylink claim that this releases the full range of

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93 Murraylink, *Response to AER Information request #006 - Contingent Projects (Public)*, 16 May 2017, p. 5.
94 Murraylink, *Response to AER Information request #006 - Contingent Projects (Public)*, 16 May 2017, p. 5.
95 Murraylink, *Response to AER Information request #006 - Contingent Projects (Public)*, 16 May 2017, pp. 6-7.
96 Murraylink, *Response to AER Information request #006 - Contingent Projects (Public)*, 16 May 2017, p. 6.
97 Murraylink, *Response to AER Information request #006 - Contingent Projects (Public)*, 16 May 2017, pp. 6-7.

reactive power support and frequency control support services that would otherwise remain constrained by Murraylink being located at the end of the weak 132 kV network; and

- avoidance or deferral of ElectraNet's need to undertake a number of other network augmentations including line rating upgrades, installation of reactors and future static VAR compensators.

- Stages two and three[98] - construction of additional capacity on Murraylink to transfer electricity between South Australia and the NSW network by constructing a HVDC line to the north, passing through conservation areas towards the Buronga switching station in NSW.

  Murraylink submitted that the power transfer over the new interconnector into NSW, in addition to the further development of renewables in north western Victoria, may require reinforcement of the Victorian and New South Wales 220kV network. Murraylink noted that AEMO has commenced the RIT-T for augmentation of the north western Victorian 220kV network to accommodate Victorian wind and solar projects.

  Murraylink submitted that unless significant industrial or mining load investments occur in South Australia, it can be expected that a need for higher South Australian export capability will eventually arise as identified high-potential renewable generation becomes predominant in South Australia. Murraylink consider that the need to plan and secure approvals for construction of an additional interconnection could arise soon, depending on the rate of take-up of renewable incentives.

  Murraylink's contingent project proposes transferring up to an additional 400 MW with low losses between the South Australian 275 kV network and the 330 kV NSW network. Murraylink claim that a 400 MW development will integrate well with the existing network and that the total capacity will be approximately 600 MW in either direction, thereby effectively doubling the current firm total capacity including the Heywood interconnector.

  Murraylink submitted that its proposal creates the possibility of opening the Buronga – Red Cliffs line when beneficial. As an alternative, Murraylink submitted that a lower capacity back-to-back link could be inserted in the Buronga – Red Cliffs line to achieve finer control of power sharing. Murraylink submitted that if terminated at Buronga, it would be possible to transfer up to about 300MW on the existing 220 kV Darlington Point – Buronga line. Murraylink stated that this line is owned by TransGrid and forms part of the AC supply to Balranald and Broken Hill and the tie into the Victorian network. Murraylink submitted that changes to the line owned by TransGrid between Buronga and Darlington Point would be undertaken to achieve the full 400MW capacity upgrade.

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[98] Murraylink, *Response to AER Information request #006 - Contingent Projects (Public)*, 16 May 2017, p. 8.

Murraylink submitted that there are some fundamental aspects of how the South Australian, Victorian and New South Wales markets operate that have either been changed in recent months or are under review.[99] Murraylink submitted that this significantly adds to the difficulty in refining its analysis to the next level of detail to determine a more detailed proposal.[100] Murraylink acknowledged that further cost benefit analysis would need to reflect the nature of the electricity market in South Australia, Victoria and New South Wales.[101] Murraylink further acknowledged that detailed consideration of the ownership and allocation of costs for the proposed contingent projects has yet to be decided and that consultation with third parties had yet to commence.[102]

Proposed trigger events

Murraylink provided further justification for its proposed trigger events.[103] Murraylink submitted that in a broader context the needs that its contingent projects are seeking to address are those that have been broadly reported on in South Australia - the reduction in network security and increasing prices in the South Australian wholesale and forward electricity markets. Murraylink consider that this is not a single faceted problem that would lend itself neatly to being defined as the trigger event. Murraylink submitted that an augmentation that has a single and obvious trigger is a product of a much more static electricity market than now exists in the NEM. Murraylink are analysing whether its proposed contingent project needs to be refined in order to best address the issues it identified in South Australia. Murraylink considers in this context the successful application of the RIT-T test as the trigger event would put Murraylink and the AER in a position where they are applying the law in relation to contingent projects and behaving in a manner consistent with the broader regulatory framework.[104]

Murraylink addressed each condition that we must have regard to in determining whether a trigger event is appropriate for the purposes of subparagraph 6A.8.2(b)(4) of the NER:[105] [106]

- *6A.8.1(c)(1) to be reasonably specific and capable of objective verification;*

Murraylink contend that the rule is a binary decision on whether a proposed project has satisfied the RIT-T rule requirements. Murraylink submitted that the proposed trigger event meets this criterion.

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99 Murraylink, *Response to AER Information request #005*, 21 April 2017, p. 1.
100 Murraylink, *Response to AER Information request #005*, 21 April 2017, p. 1.
101 Murraylink, *Response to AER Information request #005*, 21 April 2017, p. 1.
102 Murraylink, *Response to AER Information request #005*, 21 April 2017, pp. 2-3.
103 Murraylink, *Response to AER issues paper*, May 2017.
104 Murraylink, *Response to AER issues paper*, May 2017, p. 6.
105 NER, cl. 6A.8.1(c).
106 Murraylink, *Response to AER issues paper*, May 2017, pp. 6-7.

- *6A.8.1(c)(2) to be a condition or event, which, if it occurs, makes the undertaking of the proposed contingent project reasonably necessary in order to achieve any of the capital expenditure objectives;*

Murraylink submitted that if its proposed contingent project satisfies the RIT-T process, it would by definition also satisfy the criteria of the capex objectives s6A.6.7(a)(1)(meet or manage the expected demand for prescribed transmission services over that period) and/or s6A.6.7(a)(3)(iv)(maintain the reliability and security of the transmission system through the supply of prescribed transmission services). On this basis, Murraylink consider that its proposed trigger event satisfies this criterion.

- *6A.8.1(c)(3) to be a condition or event that generates increased costs or categories of costs that relate to a specific location rather than a condition or event that affects the transmission network as a whole;*

Murraylink submitted that the location of the costs to be incurred relate to the specific improvements that underpin the RIT-T project and therefore its proposed trigger event satisfies this criterion.

- *6A.8.1(c)(4) to be described in such terms that the occurrence of that event or condition is all that is required for the revenue determination to be amended under clause 6A.8.2;*

Murraylink submitted that Clause 6A.8.2 of the NER (amendment of revenue determination for contingent project) sets out the conditions on which a contingent project will be rolled into the capital base and that the successful completion of a RIT-T project would in no way be in conflict with the requirements outlined in this clause. Murraylink claimed that its proposed trigger event satisfies this criterion.

- *6A.8.1(c)(5) to be an event or condition, the occurrence of which is probable during the regulatory control period, but the inclusion of capital expenditure in relation to it under clause 6A.6.7 is not appropriate because:*

(i) it is not sufficiently certain that the event or condition will occur during the regulatory control period or if it may occur after that regulatory control period or not at all; or

(ii) subject to the requirement to satisfy clause 6A.8.1(b)(2)(iii), the costs associated with the event or condition are not sufficiently certain.

Murraylink did not propose the capital expenditure for its proposed contingent project under clause 6A.6.7 and it does not form part of its forecast capital expenditure. Murraylink submitted that its proposed trigger event therefore satisfies this criterion.

A.2 Assessment approach

We reviewed Murraylink's proposed contingent projects against the assessment criteria in the NER.[107] We considered whether:

[107] NER, cl. 6A.8.1.

- the proposed contingent project is reasonably required to be undertaken in order to achieve any of the capex objectives[108]
- the proposed contingent project capital expenditure is not otherwise provided for in the capex proposal[109]
- the proposed contingent project capital expenditure reasonably reflects the capex criteria, taking into account the capex factors[110]
- the proposed contingent project capital expenditure exceeds the defined threshold;[111]and
- the trigger events in relation to the proposed contingent project are appropriate.[112]

We reviewed each stage of the contingent project based on Murraylink's analysis and the additional information provided by Murraylink as well as our own analysis. Given the uncertainty about the timing and requirements for each stage of the project, at this time, it is not necessary to assess the costs and technical scope of each project in detail. Rather, we reviewed whether each stage of the contingent project is reasonably likely to be required in the 2018–23 regulatory control period based on the materiality and plausibility of the trigger event conditions. This gives us a high-level view of whether the project is reasonably required to be undertaken in the regulatory control period in order to achieve any of the capex objectives and reflect the capex criteria.

We also considered whether the proposed trigger events for the project are appropriate. This includes having regard to the need for the trigger event:

- to be reasonably specific and capable of objective verification;[113]
- to be a condition or event which, if it occurs, makes the project reasonably necessary in order to achieve any of the capex objectives;[114]
- to be a condition or event that generates increased costs or categories of costs that relate to a specific location rather than a condition or event that affects the transmission network as a whole;[115]
- is described in such terms that it is all that is required for the revenue determination to be amended;[116]

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[108] NER, cl. 6A.8.1(b)(1) c.

[109] NER, cl. 6A.8.1(b)(2)(i). Relevantly, a TNSP must include forecast capex in its revenue proposal which it considers is required in order to meet or manage expected demand for prescribed transmission services over the regulatory control period (see NER, cl. 6A.6.7(a)(1)).

[110] NER, cl. 6A.8.1(b)(2)(ii).

[111] NER, cl. 6A.8.1(b)(2)(iii).

[112] NER, cl. 6A.8.1(b)(4).

[113] NER, cl. 6A.8.1(c)(1).

[114] NER, cl. 6A.8.1(c)(2).

[115] NER, cl. 6A.8.1(c)(3).

[116] NER, cl. 6A.8.1(c)(4).

- is probable during the 2018–23 period but the inclusion of capex in relation to it (in the total forecast capex) is not appropriate because either it is not sufficiently certain that the event or condition will occur during the regulatory control period or if it may occur after that period or not at all; or (and assuming it meets the threshold) the costs associated with the event or condition are not sufficiently certain.[117]

A.3 Position

A.3.1 Position on contingent project

We do not consider that Murraylink's proposed trigger events for each of the three stages of the contingent project are appropriate because we are not satisfied that they are sufficient to make the project, or any stage of it, reasonably necessary in order to achieve any of the capex objectives.[118]

Given that the transmission networks that interconnect with Murraylink in South Australia and Victoria can already be constrained under certain conditions[119], we consider it highly unlikely that an upgrade or augmentation to Murraylink could occur that would not be dependent on the upgrade, by other parties, of assets on the adjacent transmission networks. Given that Murraylink's interconnector supplies electricity to both South Australia and Victoria, it is likely that these parties would include one or more of AEMO, AusNet Services, ElectraNet and TransGrid.

We are aware of network constraints that interconnect with Murraylink and the planning considerations relevant parties are undertaking, in particular:

- AEMO, who is responsible for the planning of the Victorian transmission network operated by AusNet Services, has identified potential congestion in north western Victoria in respect to wind farms.[120] AEMO reported that the majority of wind farms in Victoria are currently located in the regional Victoria corridor (west and north-west Victoria) and that within this area, a significant portion of recent generator connection inquiries relate to a stretch of 220 kV network between Ballarat and Horsham. AEMO noted that there is one existing wind farm (Waubra Wind Farm) connected in this area, and another committed project (Ararat Wind Farm) planned to connect in July 2016. AEMO stated that with the connection of Ararat Wind Farm, the Ballarat–Horsham 220 kV transmission line will be at its thermal capacity under peak wind conditions.[121] We are aware that the last rotor of Ararat Wind Farm's 75 turbines was installed on 17 February 2017.[122]

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117 NER, cl. 6A.8.1(c)(5).

118 NER, cl. 6A.8.1(b)(1).

119 AEMO, *National Transmission Network Development Plan*, December 2016, p. 39 and p. 41.

120 AEMO, *Victorian Annual Planning Report*, June 2016, pp. 26-28.

121 AEMO, *Victorian Annual Planning Report*, June 2016, p. 26.

122 Accessed on 18 July 2017 from Ararat Wind farm website (http://www.ararat-windfarm.com/all-75-turbines-erected/).

In its 2017 Victorian Annual Planning Report, AEMO reported that low system strength in north-western Victoria could potentially constrain generators using power electronic interface technology, such as wind and solar generators. AEMO stated that if not constrained, low system strength could lead to unstable power system operation. AEMO's Western Victoria Renewable Integration RIT-T is investigating the requirements for prospective generation projects and will identify a preferred option for maintaining system strength above minimum levels.[123]

AEMO has identified where network strength is inadequate, new asynchronous generator connections will not be allowed to connect unless synchronous machines (generation or synchronous condenser) can be sourced to improve fault level availability. AEMO stated that in some cases, the issues caused by low network strength might be mitigated through modification of converter controls and synchronous dynamic reactive support.[124]

We consider that the issues identified by AEMO in respect to potential congestion issues in north-western Victoria are relevant to Murraylink's proposed contingent project. Murraylink submitted that given the constraints that exist on the Western Victorian Transmission Network, there is benefit in connecting Robertstown directly into the NSW transmission network.[125] Murraylink also submitted that the justification of stage 1 of its proposed contingent project (removal of constraints on South Australian export capacity over Murraylink) included more effective support of the western Victorian network.[126]

Murraylink acknowledged that the further development of renewables in north western Victoria (as indicated in AEMO's 2016 Victorian Annual Planning Report) may require reinforcement of the Victorian and New South Wales 220kV network.[127]

- ElectraNet, who has commenced an economic cost benefit assessment to explore options that can help to facilitate South Australia's energy transition. One of the potential credible options that ElectraNet has identified to address the identified need of facilitating greater competition between generators in different regions, providing appropriate security of electricity supply and facilitating the transition to lower carbon emissions and the adoption of new technologies, is constructing a new interconnector from mid-north South Australia to NSW.[128] One of the configurations that ElectraNet is considering for this route is augmenting the

123 AEMO, *Victorian Annual Planning Report*, June 2017, p. 2.

124 AEMO, *Victorian Annual Planning Report*, June 2016, p. 28.

125 Murraylink, *Response to AER Information request #006 - Contingent Projects (Public)*, 16 May 2017, p. 1.

126 Murraylink, *Response to AER Information request #006 - Contingent Projects (Public)*, 16 May 2017, p. 6.

127 Murraylink, *Response to AER Information request #006 - Contingent Projects (Public)*, 16 May 2017, p. 8.

128 ElectraNet, *South Australian Energy Transformation, RIT-T: Project Specification Consultation Report*, 7 November 2016, pp. 34-36.

existing Murraylink capacity (e.g. by adding a parallel HVDC link) and upgrading control systems to provide fast frequency response.[129]

ElectraNet submitted that they have had initial discussions with Murraylink in relation to its augmentation plans. ElectraNet further submitted that they will continue to engage with Murraylink on its plans, together with indicative cost and timings, as part of its assessment of its Project Assessment Draft Report.[130]

- TransGrid, who has proposed two contingent projects relevant to Murraylink's contingent project:[131]
    - New South Wales to South Australia Interconnector. TransGrid submitted that to manage low reserve conditions and elements of system security in South Australia is to increase interconnection to an adjacent state such as NSW. TransGrid has proposed a trigger event for this project to be successful completion of the RIT-T for the South Australian Energy Transformation, with a NSW to South Australia interconnector identified as the preferred option or part of the preferred option. Murraylink submitted that although to date its analysis has focused on combining stages two and three of its contingent project, they could be conducted separately should a delay between Murraylink2 and extension into NSW prove to maximize net benefits.[132]
    - Support South Western NSW for Renewables. TransGrid submitted that the potential for up to 1,000 MW of new renewable generation combined with an import from Victoria, primarily as a result of renewables developments in north-west Victoria, could be constrained due to transmission system limitations. TransGrid identified transmission system limitations between Buronga and Broken Hill and Buronga and Darlington Point, two transmission lines identified by Murraylink as relevant for stages two and three of its proposed contingent project and acknowledged by Murraylink as being part of TransGrid's network.[133]

      Trigger events proposed by TransGrid for the 'Support South Western NSW for Renewables' project included new generation in north-west Victoria and successful completion of a RIT-T, either by TransGrid for south-west NSW or AEMO for north-west Victoria, demonstrating positive net market benefits with an augmentation of the transmission network south-west of Wagga identified as the preferred option or part of the preferred option.

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[129] ElectraNet, *South Australian Energy Transformation, RIT-T: Project Specification Consultation Report*, 7 November 2016, p. 35.

[130] ElectraNet, *South Australian Energy Transformation, RIT-T: Project Specification Consultation Report*, 7 November 2016, p. 35.

[131] TransGrid, *Revenue Proposal 2018-23*, 31 January 2017, pp. 107-112.

[132] Murraylink, *Response to AER Information request #006 - Contingent Projects (Public)*, April 2017, p. 1.

[133] Murraylink, *Response to AER Information request #006 - Contingent Projects (Public)*, April 2017, p. 8.

The NER includes joint planning obligations whereby a TNSP's transmission network is connected to another TNSP's transmission network or to a DNSPs distribution network.[134] Given the level of network constraints that interconnect with Murraylink, and the importance of joint planning for achieving market benefits via any upgrade or augmentation of the Murraylink interconnector, we do not consider Murraylink's proposed trigger event for its contingent project (either in whole or in stages) is sufficient to ensure that the market benefits of the project as a whole, or of a stage of the project, are maximised.

Our position is consistent with submissions that we have received in respect to Murraylink's proposed contingent project. The Consumer Challenge Panel (CCP) submitted that there is insufficient information provided to consider the proposed project as a genuine contingent project.[135] The CCP considered that the contingent project must be developed in much further detail or rejected.[136] The South Australian Department of the Premier and Cabinet submitted that although they agree with the potential benefits of increased interconnection, Murraylink's contingent project is not sufficiently described or justified. The Department of Premier and Cabinet consider that to be convinced as to the value of the contingent project, it would need to see a clear case showing how each stage would change how Murraylink operates within the NEM. The Department submitted that a new interconnection project resulting from ElectraNet's current South Australian Energy Transformation RIT-T may negate the need for Murraylink's proposed contingent project.[137]

Murraylink acknowledged that detailed consideration of the ownership and allocation of costs for the proposed contingent projects has yet to be decided and that consultation with third parties had yet to commence.[138] Murraylink further acknowledged that an augmentation that has a single and obvious trigger is a product of a much more static electricity market than now exists in the NEM and that they are analysing whether its proposed contingent project needs to be refined in order to best address the issues it identified in South Australia.[139] We therefore consider it reasonable to extend the trigger to all relevant parties in order to ensure that the RIT-T is part of an overall program that has a positive net market benefit. Therefore, for us to be satisfied that this project should be a contingent project, Murraylink should amend its trigger events to the following:

1. Successful completion of a RIT-T (including comprehensive assessment of credible options), and all joint planning obligations under the NER, demonstrating that the

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[134] NER, cl. 5.14.1 and 5.14.3/

[135] Consumer Challenge Panel Sub-Panel 9, *Submission to the Australian Energy Regulator (AER) - Response to proposals from Murraylink for a revenue reset for the 2018-23 regulatory period*, 12 May 2017, pp. 9-10.

[136] Consumer Challenge Panel Sub-Panel 9, *Submission to the Australian Energy Regulator (AER) - Response to proposals from Murraylink for a revenue reset for the 2018-23 regulatory period*, 12 May 2017, p. 11.

[137] South Australian Department of Premier and Cabinet, *Submission on Murraylink proposal,* 17 May 2017.

[138] Murraylink, *Response to AER Information request #005*, 21 April 2017, pp. 2-3.

[139] Murraylink, *Response to AER issues paper*, May 2017, p. 6.

establishment of a new or upgraded high voltage interconnection is the option that maximises the positive net economic benefits.

2. A determination by the AER that the proposed investment satisfies the regulatory investment test for transmission; and
3. Murraylink Board commitment to proceed with the project subject to the AER amending Murraylink's revenue determination pursuant to the Rules.