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Goldfields Gas Transmission's Proposed Access Arrangement for the Goldfields Gas Pipeline

Review of Technical Aspects of the Proposed Access Arrangement (AA4)

PUBLIC VERSION

Report to

Economic Regulation Authority of Western Australia

from

Energy Market Consulting associates

April 2019

This report has been prepared to assist the Economic Regulation Authority (ERA) with its assessment of Goldfields Gas Transmission Pty Ltd's (GGT) Access Arrangement for the Goldfields Gas Pipeline (GGP), for the period from 1st January 2020 to 31st December

2024 (AA4), which it is required to conducted in accordance with the National Gas Law and the National Gas Rules (NGR). This report covers a particular and limited scope as defined by the ERA and should not be read as a comprehensive assessment of proposed expenditure that has been conducted making use of all available assessment methods.

This report relies on information provided to EMCa by the ERA and by GGT up until 29 March 2019. EMCa disclaims liability for any errors or omissions, for the validity of information provided to EMCa by other parties, for the use of any information in this report by any party other than the ERA and for the use of this report for any purpose other than the intended purpose.

In particular, this report is not intended to be used to support business cases or business investment decisions nor is this report intended to be read as an interpretation of the application of the NGR or other legal instruments. EMCa's opinions in this report include considerations of materiality to the requirements of the ERA and opinions stated or inferred in this report should be read in relation to this over-arching purpose.

Some numbers in this report may differ from those shown in GGT's Access Arrangement Information (AAI) or other documents due to rounding.

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About EMCa

Energy Market Consulting associates (EMCa) is a niche firm, established in 2002 and specialising in the policy, strategy, implementation and operation of energy markets and related network management, access and regulatory arrangements. EMCa combines senior energy economic and regulatory management consulting experience with the experience of senior managers with engineering/technical backgrounds in the electricity and gas sectors.

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Executive Summary

Purpose of this report

1. This report provides our assessment and findings from our review of Goldfields Gas Transmission's (GGT) capex incurred (or to be incurred) in the period from 1 January 2015 to 31 December 2019 (AA3), and its proposed capex and opex allowances for the period from 1 January 2020 to 31 December 2024 (AA4).

2. Our assessment framework is consistent with the requirements of the National Gas Law (WA) and National Gas Rules (WA). We have not been requested by the ERA to document compliance of the capex and opex proposals with the individual rules and tests included in the NGR as a part of our assessment.

3. We have undertaken our review primarily based on GGT's AA4 Access Arrangement Information document (AAI) and the documents that GGT provided in support of its proposal (referred to collectively in this paper as the 'AA4 Proposal'), and we have considered these documents to definitively provide its proposal and supporting rationale. To augment these sources, we sought and were provided with a range of additional documents[1], and we met with GGT for an onsite meeting (held on 6 March 2019) at which we provided GGT with the opportunity to provide clarifications and additional information on its proposal.

Review approach

4. Our review approach is to assess GGT's AA4 Proposal based on the methods that it claims to have used in preparing it. We have sought to understand GGT's expenditure governance and management processes, and the forecasting methods and relevant assumptions it has applied and, with this understanding, to then assess the projects and programs of work that form the basis of its submission.

5. Our review has placed emphasis on assessing those matters that are of greatest significance in driving the level of reference tariffs that the Economic Regulation Authority (ERA) is being asked to approve. Accordingly, we have deepened our

[1] We have sought to take account of all information provided, but we disclaim responsibility for full consideration or acknowledgment in this report, of information that was provided after 29 March 2019 as the information cut-off for completion of our assessment.

assessment process on such components of proposed expenditure, so as to provide the ERA with the necessary supporting evidence and supporting logic on matters of most significance. Our review does not, nor is it intended to, represent an expenditure approval process and the specific projects, programs and activities that GGT chooses to undertake are matters for GGT's management judgment.

GGT's proposal

6. GGT reports that it has incurred, or will incur, a total of $9.19m capex, which is $0.63m (-6.4%) less than the ERA's AA3 capex allowance of $9.82m[2]. The cumulative capex in the first three years of the AA3 period is significantly less than the ERA allowance, however GGT's forecast for the final two years would, if incurred, be materially greater than the allowance. The shift in timing of expenditure raises questions over the prudency of the delivered programs, and we review this as part of our AA3 assessment.

7. GGT has forecast total capex of $16.09m for the AA4 period. This represents an increase of 75.1% from the actual/estimated capex for the AA3 period. All of GGT's proposed AA4 capex is directed to 'Stay In Business' initiatives, which are designed to maintain the integrity and performance of the pipeline. The compressor station, SCADA and communications, and maintenance bases and depots categories dominate AA4 capex.

8. GGT reports that it has incurred or will incur total opex of $93.89m in the AA3 period and $95.88m in the AA4 period, an increase of 2.1%. The actual/estimated AA3 opex is $7.8m (or 7.8%) less than the ERA's AA3 opex allowance.

Our assessment of GGT's governance and management framework

9. Our assessment of GGT's governance and management framework is as follows:

   - Whilst for a business of its size and complexity it has an adequate level of governance components, GGT lacks a comprehensive, unified description of its governance framework.
   - We have found systemic issues in GGT's application of the governance components, including: (a) the apparent lack of management response to the significant capex underspend in the AA3 period (compared to its initial AA3 forecast); (b) inadequate justification of the scope of works, including lack of supporting evidence for stated risks; (c) the preliminary or out-dated status of the supporting documentation, including the Asset Management Plan (AMP), and (d) preliminary cost estimates which do not appear to have been adequately challenged. Each of these issues combine to undermine confidence in the AA4 expenditure forecast.
   - GGT's significant capital under-expenditure in the AA3 period indicates that the extent of risks may have been overstated (and/or the cost estimation process is biased towards over-estimating required expenditure).

Our assessment of GGT's forecasting methods, assumptions and regulatory accounting matters

10. GGT's methodology for deriving total cost estimates for capex projects is consistent with common industry practice, however, the outcomes of its approach indicate that there are

[2] The figure is based on the AA3 ERA Final Decision converted to real Dec 2018. Table 56 in the Amended Final Decision report page 140 was mistakenly labelled as 'real 31 Dec 2014'

often material flaws in its application. Whilst the expected 36% underspend of its initial AA3 capex forecast is an improvement on the 70% underspend of its AA2 ERA capex allowance, the variance casts serious doubts over GGT's forecasting methodology, the quality of the input data, and the assumptions underpinning its AA3 forecast.

11. GGT's AA2 and AA3 estimating performance gives rise to two significant concerns regarding GGT's forecast expenditure required for AA4 as follows:

    - *It is likely that GGT has again significantly overestimated the cost of work on the Covered Pipeline* – we have seen insufficient evidence that GGT has recognised the issues that led to the overestimation of its approved AA2 and AA3 capex and addressed them in deriving its AA4 forecast expenditure.
    - *It is likely that GGT will not complete the work it deems necessary in its AA4 Proposal* – not necessarily because of delivery constraints but because on closer inspection it may decide again that it can prudently defer or cancel a significant portion of the work.

12. GGT's forecasting performance for opex has been reasonable and considerably better than for its capex, though its reported opex is considerably influenced by its allocation of corporate costs, which has reduced considerably in the past 5 years. GGT has forecast its AA4 opex requirements with separate forecasts for components that it considers to be irregular, and the remainder (which is the majority) forecast using a base-step-trend approach. In principle this is an appropriate mix of methodologies, however there are some aspects of GGT's application of these methodologies that we consider have not led to a reasonable forecast.

13. GGT has allocated costs on bases consistent with those accept in the last ERA Decision.

Our assessment of GGT's AA3 capex

14. We make the following findings on GGT's AA3 capex:

    - GGT has sought to justify its AA3 capex primarily on the grounds of the integrity of the service, with the majority of the expenditure directed towards pipelines and compressor stations.
    - GGT has provided sufficient information to confirm that it has appropriately allocated expenditure between the Covered Pipeline and other GGP assets.
    - With the exception of two projects, GGT has provided sufficiently compelling information to conclude that the actual/expected AA3 capex is likely to satisfy the capex criteria. In these cases, we have made adjustments to the actual expenditure to determine a level that we consider is likely to satisfy the capex criteria.

15. Based on our assessment of the information provided by GGT, we recommend that the ERA accept $8.80m of the $9.19m AA3 capex proposed by GGT as likely to satisfy the capex criteria.

Our assessment of GGT's proposed AA4 capex

16. We make the following findings on GGT's proposed AA4 capex:

    - The capex criteria require forecasts or estimates to be arrived at on a reasonable basis and represent the best forecast or estimate possible in the circumstances. GGT's 36% underspend of its initial AA3 forecast led us to look for compelling

evidence that in deriving its proposed AA4 capex, GGT had identified and taken into account the reasons for the AA3 (and AA2) underspend. We did not find sufficient evidence of material improvement to forecasting practices or investment governance for the majority of proposed projects. We are not satisfied that the expenditure forecasts in all cases satisfy the capex criteria. In these cases, we have recommended adjustments that we believe result in estimates that are derived on a reasonable basis.

- GGT has not adequately demonstrated in all cases that it has appropriately allocated forecast capex between the Covered Pipeline and other GGP pipeline assets. In these cases, we have made adjustments to the proposed expenditure based on a fair allocation between the assets to satisfy the capex criteria.

17. We therefore recommend the ERA approve $8.20m of the $16.09m proposed AA4 capex.

Our assessment of GGT's proposed AA4 opex

18. We make the following findings on GGT's proposed AA4 opex:

    - GGT has not justified excluding its base year Corporate cost from its 'base step trend' approach, and instead substituting a much higher separate forecast. We consider that its corporate costs should be included in its base-step-trend approach.
    - GGT has not provided sufficient justification for the amounts that it has proposed for Regulatory costs or for Major Expenditure Jobs. While AA4 allowances are required, we consider that lower amounts would be reasonable in both cases.

19. GGT has not justified the extent of the real labour cost escalation that it has applied to the labour component of its proposed opex. While there is a reasonable case to allow for real labour cost escalation, we consider that the evidence indicates a lower rate.

Aggregate Implications

20. Tables 1 to 3 show the summarised EMCa-recommended adjustments to GGT's proposed AA3 capex, AA4 capex and AA4 opex, respectively. Our specific findings, the supporting information for those findings and our recommended adjustments to the capex and opex that GGT has proposed are contained in Sections 5 to 7.

21. As discussed in Section 5.3, our assessment of GGT's proposed conforming AA3 capex is based on assessment of information provided by Project, rather than by Asset Class. We have translated our Project level adjustments to Asset Class adjustments.

Table 1: AA3 capex and EMCa adjustment

$m, Real Dec 2018	Actual			Estimate		Total AA3
	2015	2016	2017	2018	2019	2015-2019
Pipeline and laterals	1.86	0.51	0.28	0.07	0.00	**2.72**
Main line valve and scraper stations	0.12	0.00	0.00	0.00	0.00	**0.12**
Compressor stations	-0.02	0.00	0.98	0.52	1.01	**2.49**
Receipt and delivery point facilities	0.43	-0.41	0.00	0.19	0.12	**0.34**
SCADA and communications	1.02	1.03	0.07	0.11	0.00	**2.23**
Cathodic protection	0.00	0.00	0.00	0.00	0.07	**0.07**
Maintenance bases and depots	0.03	0.00	0.00	0.02	0.31	**0.35**
Other assets	0.07	0.33	0.13	0.12	0.22	**0.87**
Total	**3.51**	**1.46**	**1.46**	**1.03**	**1.73**	**9.19**

Sources: EMCa table derived from GGT response to EMCa01 (Capex by Asset Class)

Table 2: Summary of AA4 capex adjustment

$m, Real Dec 2018	Forecast					Total AA4
	2020	2021	2022	2023	2024	Capex
Pipeline and Laterals	0.39	0.00	0.00	0.00	0.20	0.59
Main Line Valve & Scraper Stations	0.00	0.00	0.00	0.00	0.00	0.00
Compressor Stations	1.70	0.33	1.10	0.21	1.82	5.15
Receipt & Delivery Point Facility	0.00	0.00	0.00	0.00	0.00	0.00
Scada & Communications	0.95	1.60	0.61	1.04	0.76	4.96
Cathodic Protection	0.23	0.18	0.33	0.44	0.06	1.23
Maintenance Bases & Depots	3.85	0.32	0.00	0.00	0.00	4.17
Other Assets	0.00	0.00	0.00	0.00	0.00	0.00
Total	**7.12**	**2.42**	**2.03**	**1.69**	**2.83**	**16.09**
Emca adjustment	*-3.16*	*-1.06*	*-1.02*	*-1.00*	*-1.65*	*-7.89*
EMCa adjusted	**3.96**	**1.36**	**1.01**	**0.69**	**1.18**	**8.20**

Sources: EMCa table derived from GGT response to EMCa01

Table 3: Summary of AA4 opex adjustment

$m, real Dec 2018	Forecast AA4					Total
	2020	2021	2022	2023	2024	AA4
Pipeline Operation	11.74	11.79	11.99	12.44	12.54	60.51
Major Expenditure Jobs	0.56	0.68	0.67	0.40	0.50	2.81
Commercial Operation	0.59	0.59	0.60	0.63	0.63	3.04
Regulatory costs	1.21	1.09	1.09	1.09	1.09	5.58
Corporate Cost	4.79	4.79	4.79	4.79	4.79	23.94
Total	**18.89**	**18.94**	**19.15**	**19.34**	**19.55**	**95.88**
EMCa adjustment	*-2.46*	*-2.47*	*-2.60*	*-2.73*	*-2.86*	*-13.11*
EMCa adjusted	**16.43**	**16.48**	**16.55**	**16.61**	**16.69**	**82.77**

Source: GGT AA SI Att. 4 Forecast Opex

1 Introduction

1.1 Purpose and scope of requested work

1.1.1 Purpose

22. The Economic Regulation Authority (ERA), in accordance with its responsibilities under the National Gas Law (NGL) and the National Gas Rules (NGR), is currently reviewing Goldfields Gas Transmission's (GGT) revised access arrangement (AA) proposal for the Goldfields Gas Pipeline (GGP) for the 5-year period from 1 January 2020 to 31 December 2024 (AA4).

23. To assist with its assessment of GGT's AA4 Proposal, the ERA has engaged Energy Market Consulting associates (EMCa) to review and provide technical advice on:

- the capital expenditure (capex) incurred (or to be incurred) by GGT in the current 5-year period from 1 January 2015 to 31 December 2019 (AA3);
- GGT's proposed capex for AA4;
- GGT's proposed operating expenditure (opex) for AA4;
- the governance arrangements, forecast methodology and cost estimation processes employed by GGT when developing its expenditure proposals; and
- other specific matters, including GGT's KPIs and asset lives assumed for depreciation purposes.

24. The results of our technical assessment are set out in this report.

1.1.2 Scope of the review

25. In regard to GGT's expenditure, the overarching objective of this review is to assist the ERA to determine whether the actual capex incurred, or to be incurred, by GGT in AA3 and its proposed capex for AA4 complies with the criteria set out in rule 79 of the NGR and whether its proposed opex for AA4 complies with rule 91(1). Whilst we have not been requested by the ERA to document compliance of the capex and opex proposals with the individual rules and tests included in the NGR as a part of our assessment, to

the extent that we consider that such expenditure does not comply, the ERA has sought our technical advice on adjusted expenditures that could be considered to comply.

26. In carrying out this review, the ERA has asked us to evaluate a range of matters that can affect capex and opex including, amongst others:

- GGT's substantiation and justification for forecast increases in opex and capex;
- GGT's project governance arrangements (e.g. procurement practices and delivery models), and the methods or models used by GGT to estimate its expenditure requirements and to prioritise areas of expenditure;
- the methodology GGT has used to develop capacity and utilisation forecasts as part of developing its capex and opex forecasts;
- the extent to which GGT has factored efficiencies into the opex and capex forecasts;
- GGT's ability to deliver its proposed capex program;
- the asset lives assumed by GGT when calculating depreciation; and
- the Key Performance Indicators (KPIs) used by GGT to support its capex and opex forecasts including comparison with industry standards and any proposed changes to GGT's operational and service level performance.

1.2 Regulatory framework

27. The provisions the ERA is required to have regard to when assessing GGT's capex and opex proposals are set out in Part 9 of the NGR. In short, these rules require the ERA to accept GGT's proposal if:

- the capex complies with the conforming capex criteria in rule 79 of the NGR and any forecasts or estimates underpinning the capex proposal are arrived at on a reasonable basis and represent the best forecast or estimate possible in the circumstances (rule 74(2)); and
- the opex complies with the criteria set out in rule 91(1) of the NGR and any forecasts or estimates underpinning the opex proposal satisfy rule 74(2).

28. The ERA's discretion under rules 79 and 91(1) is limited, which means it may not withhold its approval, if it is satisfied the opex and capex proposals comply with the relevant rules and/or provisions in the NGL.

1.3 Structure of this report

29. Our main findings are summarised in the Executive Summary at the beginning of this report.

30. In Section 2, we present a context overview of the capex and opex elements relevant to our review. This overview includes consideration of the expenditure trends and GGT's forecasting performance of AA3 capex, by way of contextualising its forecast regulatory allowances for AA4 capex and AA4 opex.

31. In the subsequent five sections, we present the assessment that supports our findings as follows:

- in Section 3, we describe our assessment of the governance and management framework that GGT uses to plan and approve its expenditure, its business planning process, asset lives that have been assumed in GGT's depreciation calculations, and management of KPIs, together with the implications for its forecast expenditure of any identified issues;
- in Section 4, we describe our assessment of GGT's demand forecast and of the forecasting methodology and regulatory accounting matters that GGT has used to determine its proposed capex and opex;
- in Section 5, we set out the results of our assessment of GGT's AA3 capex incurred, or to be incurred, against the capex criteria and describe any issues we have identified with the expenditure;
- in Section 6 we set out our assessment of GGT's proposed capex for the AA4 period; and
- in Section 7 we set out our assessment of GGT's proposed opex for the AA4 period.

32. Further supporting information is provided in appendices.

1.4 Other matters

1.4.1 Information sources

33. In the course of carrying out this review, we have examined a large number of documents. This includes the AA Information (AAI) and other documents that GGT provided to the ERA in support of its proposed AA, and a number of other significant documents that were provided by GGT during on-site meetings (held on 6 March 2019), or in response to our information requests.

34. Our assessment is based on our observations from the onsite meetings, together with information supplied prior to, at, and following the onsite meeting pursuant to EMCa information requests. The last information provided to us and which we have incorporated into our assessment, was on 27th March 2019.

1.4.2 Rounding of numbers and real conversion

35. Numerical totals in tables may not present as being equivalent to the sum of the individual numbers due to the effects of rounding. Also, some numbers in this report may differ from those shown in GGT's AA submission or other documents due to rounding.

36. This report refers to costs in real December 2018 dollars unless denoted otherwise.

2 Background

2.1 Introduction

37. In this section, we provide background context to the assessments which follow. We first provide an overview of the total capex for the AA3 and AA4 periods, and we include observations of GGT's actual capex in AA3 against the ERA's AA3 capex allowance. We provide an overview of the total opex for the AA3 and AA4 periods, and we include observations of the actual opex in AA3 against the ERA's AA3 opex allowance.

38. We then outline our review approach for the assessment we have undertaken, and which is described in the remainder of this report.

2.2 GGT's proposed AA4 capex and AA3 capex

2.2.1 GGT's historical and proposed capex

39. GGT has forecast total capex of $16.09m for the AA4 period. In the table below, we show the breakdown of capex in AA4 by capex category.

Table 4: Proposed AA4 capex by capex category

$m, Real Dec 2018	Forecast					Total AA4 Capex
	2020	2021	2022	2023	2024	
Pipeline and Laterals	0.39	0.00	0.00	0.00	0.20	0.59
Main Line Valve & Scraper Stations	0.00	0.00	0.00	0.00	0.00	0.00
Compressor Stations	1.70	0.33	1.10	0.21	1.82	5.15
Receipt & Delivery Point Facility	0.00	0.00	0.00	0.00	0.00	0.00
Scada & Communications	0.95	1.60	0.61	1.04	0.76	4.96
Cathodic Protection	0.23	0.18	0.33	0.44	0.06	1.23
Maintenance Bases & Depots	3.85	0.32	0.00	0.00	0.00	4.17
Other Assets	0.00	0.00	0.00	0.00	0.00	0.00
Total	**7.12**	**2.42**	**2.03**	**1.69**	**2.83**	**16.09**

Source: EMCa analysis referring to GGT's response to Information Request EMCa01

40. GGT reports that it has incurred, or will incur, a total of $9.19m capex in the AA3 period which includes $6.43m as actual and $2.75m as an estimate for years 2018 and 2019. In the table below, we show the breakdown of capex in AA3 by capex driver.

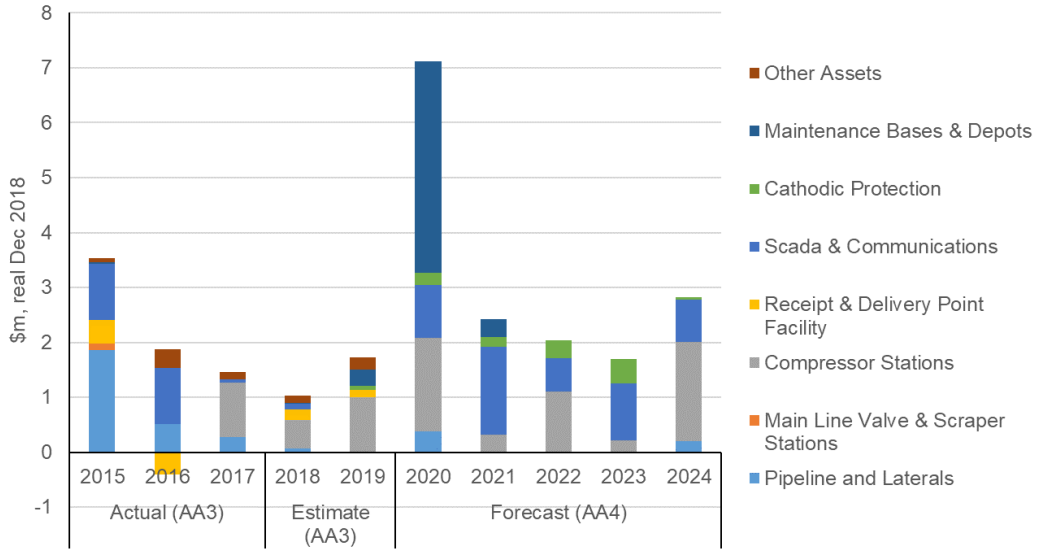
Table 5: Actual/estimate AA3 capex by capex category

$m, Real Dec 2018	Actual			Estimate		Total AA3 2015-2019
	2015	2016	2017	2018	2019	
Pipeline and laterals	1.86	0.51	0.28	0.07	0.00	**2.72**
Main line valve and scraper stations	0.12	0.00	0.00	0.00	0.00	**0.12**
Compressor stations	-0.02	0.00	0.98	0.52	1.01	**2.49**
Receipt and delivery point facilities	0.43	-0.41	0.00	0.19	0.12	**0.34**
SCADA and communications	1.02	1.03	0.07	0.11	0.00	**2.23**
Cathodic protection	0.00	0.00	0.00	0.00	0.07	**0.07**
Maintenance bases and depots	0.03	0.00	0.00	0.02	0.31	**0.35**
Other assets	0.07	0.33	0.13	0.12	0.22	**0.87**
Total	**3.51**	**1.46**	**1.46**	**1.03**	**1.73**	**9.19**

Source: EMCa analysis referring to GGT's response to Information Request EMCa01

41. In the figure below, we show capex for the AA3 and AA4 periods.

Figure 1: Capex trend for the AA3 and AA4 periods



Source: EMCa analysis referring to GGT's response to Information Request EMCa01

42. GGT's total proposed capex in AA4 is 75% ($6.9m) higher than the actual/estimated AA3 capex, driven primarily by increases in forecast expenditure in the Maintenance bases and depots and Compressor stations categories.

2.2.2 EMCa observations on capex trends and performance

43. GGT forecasts spending $0.63m or 6.4% less than the ERA's regulatory capex allowance in the AA3 period, as shown in the table below.

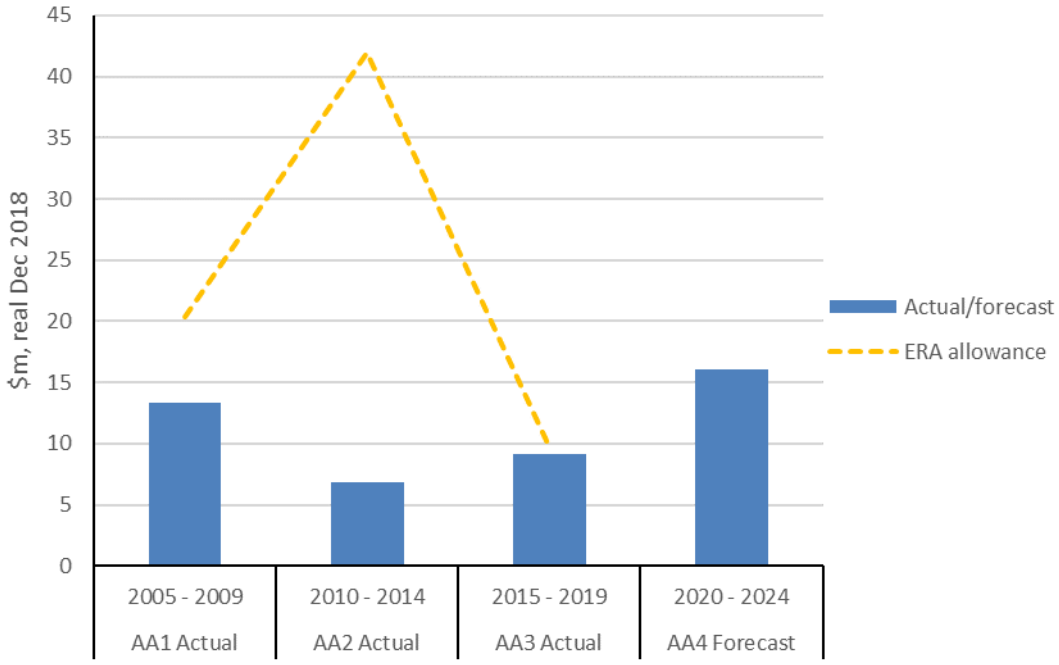
Table 6: Actual/estimated capex versus allowance in the AA3 period

$m, Real Dec 2018	Actual (AA3)			Estimate (AA3)		Total AA3 Capex
	2015	2016	2017	2018	2019	
Actual/estimate capex	3.51	1.46	1.46	1.03	1.73	9.19
ERA Allowance	4.98	2.99	0.79	0.60	0.46	9.82
Variance	**-1.47**	**-1.53**	**0.67**	**0.42**	**1.27**	**-0.63**

Source: EMCa analysis referring to GGT's response to Information Request EMCa01 and the ERA's Final Decision

44. In the figure below, we show the long-term capex trend for the AA2, AA3 and AA4 periods against the ERA allowance. The figure shows that GGT's actual capex has consistently been less than its capex allowance across both the AA2 and AA3 periods. GGT forecasts a significant increase in capex from the AA3 actual (or to be incurred) amount.

Figure 2: Annualised GGT capex versus ERA allowance for the AA2, AA3 periods, and the AA4 capex forecast



Source: EMCa graph derived from ERA dicisions

2.3 GGT's proposed AA4 opex

2.3.1 GGT's historical and proposed opex

45. GGT has forecast total opex of $95.88m for the AA4 period. In the table below, we show the breakdown of proposed AA4 opex in each category.

Table 7: Proposed AA4 opex by opex category

$m, real Dec 2018	Forecast AA4					Total AA4
	2020	2021	2022	2023	2024	
Pipeline Operation	11.74	11.79	11.99	12.44	12.54	60.51
Major Expenditure Jobs	0.56	0.68	0.67	0.40	0.50	2.81
Commercial Operation	0.59	0.59	0.60	0.63	0.63	3.04
Regulatory costs	1.21	1.09	1.09	1.09	1.09	5.58
Corporate Cost	4.79	4.79	4.79	4.79	4.79	23.94
Total	**18.89**	**18.94**	**19.15**	**19.34**	**19.55**	**95.88**

Source: GGT AA SI Att. 4 Forecast Opex

46. GGT reports that it has incurred, or will incur, a total of $93.89m opex in the AA3 period which included $57.48m as actual expenditure and $36.41m as an estimate for years 2018 and 2019. In the table below, we show the breakdown of opex in AA3 by opex category.

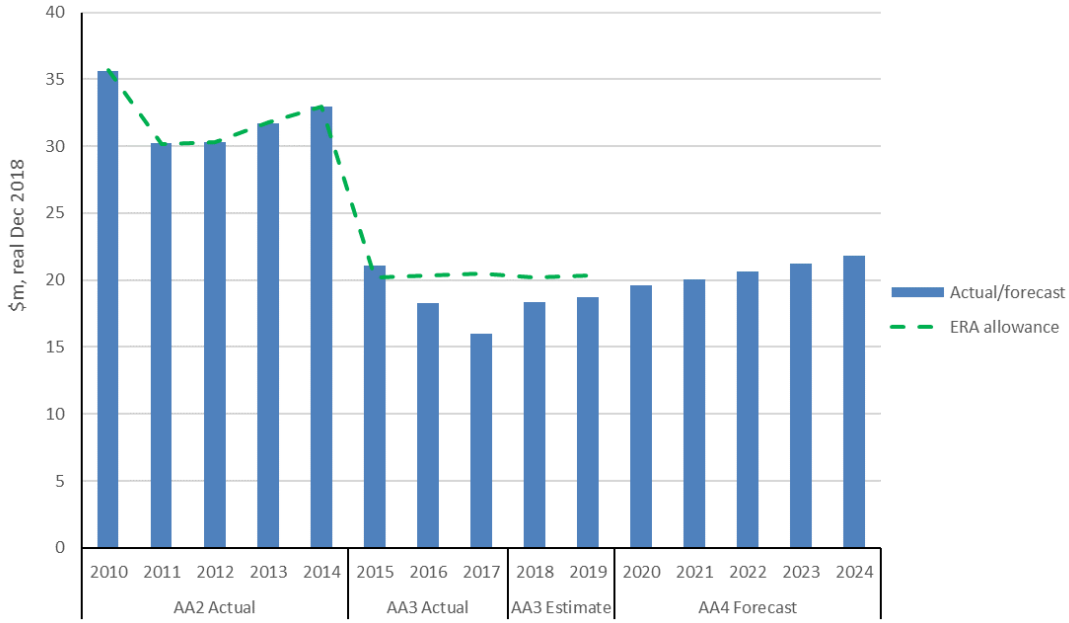
Table 8: AA3 opex by category

$m, real Dec 2018	Actual AA3			Estimate AA3		Total AA3
	2015	2016	2017	2018	2019	
Pipeline Operation	13.20	12.80	12.09	11.72	11.46	61.27
Major Expenditure Jobs	0.56	0.05	0.33	0.40	0.48	1.81
Commercial Operation	1.09	0.78	0.61	0.59	0.58	3.65
Regulatory costs	0.55	0.72	0.32	0.84	0.85	3.29
Corporate Cost	6.81	4.63	2.94	4.79	4.70	23.87
Total	**22.21**	**18.98**	**16.28**	**18.34**	**18.06**	**93.89**

Source: GGT AA SI Att. 4 Forecast Opex

47. In the figure below, we show the long-term opex trend for the AA2, AA3 and AA4 periods against the ERA allowance.

Figure 3: Opex trend for the access arrangement periods AA2 to AA4



Source: ERA decisions and GGT AA SI Att. 4 Forecast Opex

2.3.2 EMCa observations on opex trends and performance

48. GGT's average AA3 actual opex was significantly less than the AA2 average, but GGT is forecasting a significant step up in 2018 and then a steady increase in real terms in the period 2019 – 2024. GGT expects to spend considerably less than the ERA allowance in the AA3 period, with the majority of the underspend 'banked'.

2.4 Approach for our review

49. Our review has entailed:

- carrying out a first pass review of GGT's capex and opex proposals to identify any areas where there has been a material change in either:
  - the capex incurred (or to be incurred) by GGT in AA3 relative to what was approved by the ERA in its 2016 Final Decision, with a focus on the material variances against the ERA allowance; or
  - the expenditure GGT has proposed for AA4 relative to what it spent in AA3;
- conducting a more detailed assessment of the capex and opex proposals using the review framework outlined in Appendix A and having regard to information provided by GGT in its initial submission to the ERA, at on-site meetings, and in response to our information requests. For:
  - capex, this typically involved review of various GGT planning documents and 'business case' documents for its proposed projects; and
  - opex, we reviewed GGT's forecasting methodology and relevant input assumptions; and
- carrying out a high-level review of the remainder of GGT's capex and opex proposals.

50. Our review has placed emphasis on those matters that are of greatest significance in driving the level of the reference tariffs that the ERA has been asked to approve.

Accordingly, we have deepened our assessment process on such components of proposed expenditure to provide the ERA with the necessary supporting evidence and supporting logic on matters of most significance. Our review does not, nor is it intended to, represent an expenditure approval process and the specific projects, programs and activities that GGT chooses to undertake are matters for GGT's management judgment.

3 Governance and Management Matters

3.1 Introduction

51. To inform our assessment of the capex incurred (or to be incurred) by GGT in the AA3 period and its proposed expenditure for the AA4 period, we have reviewed GGT's approach to investment governance and management systems, procedures, and practices and compared them to good industry practice (GIP).

52. We have also compared what GGT's governance framework requires and the evidence we have seen, or otherwise, of consistent application of those requirements.

3.2 Investment governance framework

3.2.1 Introduction

53. We have reviewed GGT's governance framework with the emphasis on the policies, processes, procedures and key documents that it has in place to:

- develop projects and programs of work;
- approve individual projects of work in the context of the business's portfolio of work, and
- manage the delivery of approved work.

54. GGT's methodology for forecasting work for the AA4 period is considered in Section 4, and its proposed KPIs are considered in Section 3.5.

55. Our review has focused on:

- the alignment of the governance framework with GGT's corporate objectives, including its regulatory and statutory obligations;

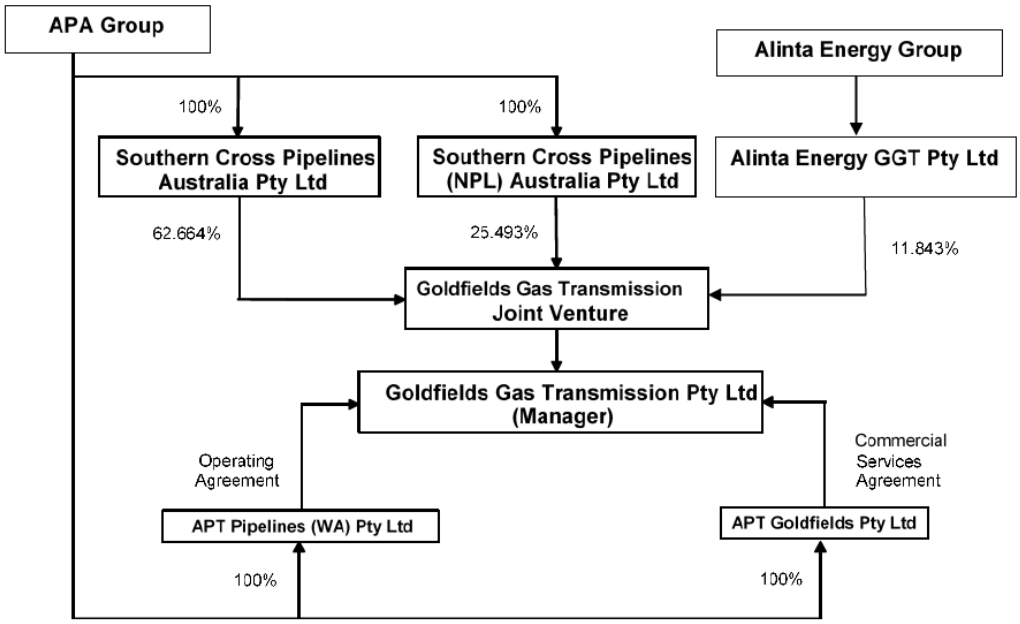
- the alignment with GIP, cognisant of the scale and scope of GGT's operations;
- evidence that the processes and procedures are used in practice; and
- the effectiveness of the governance process.

3.2.2 GGT's approach

Management and operation of the GGP

56. The current ownership and management structure of the GGP is shown in the diagram below. GGT was appointed Manager in 1994. As Manager, GGT is responsible for development and operation of the GGP and it submits '*certain programmes and budgets, including (now) proposed revisions to the GGP Access Arrangement, to the Management Committee for review and approval.*[3] The Management Committee is comprised of representatives from each of the GGT Joint Venture (JV) participants.

Figure 4: Ownership and management of the GGP



Source: GGT response to Information Request EMCa23

57. As shown in the figure above, APA Group has entered into agreements with the GGT JV participants for:

- APT Pipelines (WA) Pty Ltd to provide operation and maintenance services for the GGT ('Operating Agreement'); and
- APT Goldfields Pty Ltd to provide commercial and related services ('Commercial Services Agreement').

Capex governance

58. There is inadequate information in GGT's AA4 Proposal and in its supporting information documents[4] to enable us to understand its capex and operating governance process. We therefore asked GGT to explain the process via a formal Information

[3] GGT response to Information Request EMCa23

[4] AAI and Access Arrangement Supporting Information (AASI)

Request[5] and explored the process further at an 'on-site' meeting with GGT representatives on 6 March 2019. From the information provided, we understand that:

- capex forecasts for the GGP are prepared by the Asset Engineering group within APA's Infrastructure Development division;[6]
- the forecast capex is reviewed by the Asset Manager (WA and NT);
- the forecast capex and the AA4 Proposal are reviewed by General Manager, GGT; and
- finally, the GGT JV Management Committee reviews the capex and the AA4 Proposal.

59. GGT advises that for the AA4 Proposal, '[t]he final position was recorded when each of the CAPEX business cases, which GGT subsequently provided in support of the revision proposal, was endorsed by the Asset Manager (WA and NT) and approved by the General Manager, Goldfields Gas Transmission).'[7]

60. From our discussions with GGT representatives, we understand that routine monitoring and control of the approved budget follows a two-step process, including:

- monthly capex reports (current forecast of expenditure for the financial year compared with the approved budget) are provided to the JV participants for review; and
- quarterly reports are submitted to the Management Committee.

61. GGT also explained that all projects are assigned a risk rating in accordance with the APA risk matrix and that '[a]ll SIB projects ranked high and moderate (no project was ranked extreme) were included in the CAPEX forecast. Projects ranked low were reviewed to ascertain whether there were specific circumstances which would require that they be undertaken at the present time…'[8]

Opex governance

62. As with the capex governance process, GGT did not explicitly explain its opex governance process in its submission. However, from our discussion at the on-site meeting on 6 March 2019 with GGT representatives, we understand that at the start of each calendar year GGT prepares draft budgets of the operating activity for the following five years. The budget is subject to a similar review and monitoring process as described above for the capex process.

3.2.3 EMCa assessment

63. GGT has provided evidence of a governance process that provides progressive and iterative review of proposed expenditure in development of its AA4 Proposal, but we do not see evidence that this is an effective process.

[5] Information Request EMCa23

[6] This is different to the process applied for the AA3 forecast – the Infrastructure Development Group provides technical and engineering support services to all assets in which APA has ownership interests – GGT Response to Information Request EMCa23, page 2

[7] GGT response to Information Request EMCa23

[8] GGT response to Information Request EMCa24

64. A source of confidence in forecasts that may be derived from an effective governance process, is evidence that:

- at the portfolio level there is consistency between forecast and actual expenditure;
- the portfolio of work is refined through a 'top-down' or Board-level challenge process that results in a lower portfolio of work and/or expenditure;
- at the project level, there are compelling explanations of any variance between actual and estimated expenditure;
- forecasting issues have been identified, the processes improved, and the outcomes are progressively improving, and
- expected benefits from the expenditure have been realised.

65. GGT advises that its endorsed 'bottom-up' forecast of $15.05m was not approved by the Management Committee, but it instead approved an increase to $16.09m (+7%)[9]. Whilst this indicates active participation of the Management Committee in the forecasting process, we see no indication or evidence that it proactively took into account GGT's history of significantly underspending the ERA AA2 capex allowance by 70% and its initial AA3 capex forecast by 36%.

66. GGT has provided ten business cases in support of the majority of its AA4 capex. It is clear that the business cases were developed primarily to support the AA4 Proposal (i.e. not for its internal expenditure governance process). As discussed in more detail in Section 6, in our view the business cases do not provide sufficiently compelling information to satisfy the NGR capex criteria. Given the significant underspend of GGT's AA2 and AA3 capex forecasts, we would have expected the Management Committee to at least insist on more robust business cases.

67. In regard to project-level expenditure governance:

- GGT advises that it typically does not develop business cases (i.e. aside from those to support its regulatory submissions) and did not develop business cases for new AA3 projects (i.e. not included in the revised AA3 Proposal), relying instead on Authority for Expenditure documents. Whilst we consider these forms to be adequate for reporting and monitoring small variations in small expenditure items, in our view they are not sufficient to support the expenditure of hundreds of thousands of dollars or more (i.e. in lieu of business cases);[10]
- GGT provided somewhat inconsistent explanations of AA3 expenditure variance and inconsistent dollar values of expenditure;[11] and
- Although GGT's governance 'framework' provides for change control documentation and project close out reports, GGT advised that they '*…require input from technical and engineering staff, and are only produced for major capital projects where the value of "lessons learned" is expected to exceed the cost of that input."*[12] GGT did not produce any such documents for the AA3 projects/programs. Whilst we acknowledge that GGT undertook few multi-million-dollar projects in AA3, in our view, GGT would have benefited from reviews of the

[9] The Management Committee took into account new information regarding the reliability and criticality of its compressor stations – GGT response to Information Request EMCa23

[10] GGT response to Information Request EMCa03

[11] GGT's response to Information Requests EMCa01 and EMCa22 and its AA Supporting Information documents, in particular

[12] GGT response to Information Request EMCa03

many projects with significant variations from the initial scope and cost expectations to identify root causes, rectify them where practicable, and to then apply the improved forecasting practices to the development of the AA4 forecast.

68. In summary, based on the information provided, we have found:

- evidence of considerable variance between the actual and forecast expenditure at a portfolio level;
- evidence of considerable variance between actual and forecast expenditure at the project level;
- lack of compelling evidence that the forecasting issues have been identified and addressed; and
- limited application of a formal change control process.

69. These apparent failures in governance indicate systemic issues, which in turn diminish confidence in the prudency and efficiency of the proposed programs of work.

70. The impact of each of these issues on our assessment of capex and opex expenditure is discussed in Sections 5 to 7.

3.3 Safety Case and Formal Safety Assessments

3.3.1 GGT's approach

71. GGT's Safety Case describes the minimum standards and requirements for operation and maintenance of the GGP. The Safety Case was first developed in 2003 and has been revised a number of times. The current version was accepted by the Department of Mines & Petroleum (DMP), the relevant regulator, in February 2017, having been updated by GGT in September 2016. No changes were denoted in the revision history between the latest and penultimate versions. The Safety Case is scheduled for a major review in 2021.

72. A key component of the Safety Case is Formal Safety Assessments (FSA). The objectives of FSAs are to:

- identify all major hazards and assess those that pose particular risk to personnel, public, pipeline and environment;
- ensure adequate and effective control, mitigation and recovery measures have been or will be put in place to manage the risks; and
- reduce risks to a level that is tolerable and As Low As Reasonably Practicable (ALARP).

73. The types of risks considered in risk assessments include, but are not limited:

- operational risks to personnel (AS/NZS ISO 31000:2009);
- loss of integrity of the pipeline (AS2885); and
- any other event that could result in a Major Accident Event (MAE).

3.3.2 EMCa Assessment

74. The Safety Case is a comprehensive document. It contains an extensive description of the facilities, the Safety Management System, and FSAs (among other things).

75. As discussed in more detail in Sections 5 and 6, our main concerns are with GGT's application of the Safety Case in practice. GGT's significant capital under-expenditure in the AA3 period indicates that:

- the extent of risks may have been overstated; and/or
- more cost-effective alternatives (such as administrative controls) may not have been adequately considered due to the preliminary nature of the project analyses.

3.4 Asset management

3.4.1 GGT's approach

76. In response to our request for copies of both the GGP Strategic Asset Management Plan (AMP) applicable to the AA4 Proposal and any other relevant asset management plans (e.g. for asset classes), we were provided with the latest version of the AMP only. The latest version was approved in February 2017.

77. The 2017 AMP states that its purpose is to:

- provide a comprehensive understanding of the current management approach relating to the assets, their condition and their utilisation;
- present capex and opex longer term funding requirements;
- provide a platform for approval of work programs by providing discussion of the options available and recommendations; and
- identify specific issues affecting the assets and the proposed remediation for budget consideration.

78. The document summarises the assessment of capacity requirements, estimated expenditure required and potential threats to future operation. Asset class strategies and plans are included in the AMP. It also considers the requirements to fulfil the pipeline's regulatory, safety, environmental and performance targets over the five-year period (in this case 1 July 2017 – 30 June 2021).

3.4.2 EMCa Assessment

79. GGT advises that even though it is supposed to be updated, approved and reissued on an annual basis,[13] there is no 2018 AMP or 2019 AMP. GGT further advises that '*a new asset management plan is being prepared…*' and that *'[t]he pipeline, compression plant and associated facilities remain in good condition, and the new plan is not expected to raise new strategic asset management issues'*.[14]

80. At the on-site meeting with GGT on 6 March 2019 we understood from our discussion that in lieu of a current version of the AMP, there was another document 'underpinning'

[13] GGP AMP FY17 – FY21, page 4

[14] GGT response to Information Request EMCa06

the AA4 capex program. We requested this document, but as of 29 March 2019 we had not received a response.[15] We have therefore referred to the 2017 AMP in our assessment.

81. The 2017 AMP cross references the Safety Case, recognising that it provides '*the framework for a consistent and appropriate process throughout the business for all pipelines operating under AS2885'*[16]. Australian Standard 2885 covers the design, construction, operation and maintenance of the pipeline. This approach to structuring its asset management system is appropriate and consistent with GIP.

82. When we reviewed the content of the 2017 AMP, we found three aspects which diminish our confidence in GGT's AA4 capex prioritisation, cost estimation, and timing:

    (i) *There is a significant disconnect between the AMP and the AA4 capex forecast* – this is not surprising, because the AMP only covers expenditure through to 2021 (i.e. year two of the AA4 period):

    - project information (scope, cost and timing) for 2020-2021 is not consistent with the AA4 Proposal; and
    - project information (scope, cost and timing) for 2022 – 2024 is very limited and has very limited alignment with the corresponding information provided in the AA4 Proposal.

    (ii) *There is very limited analysis of reasons for systemic capex underspending* – GGT underspent its AA2 capex by 70% and it was on track to significantly underspend its AA3 forecast capex when the AMP was written, yet there is: (a) inadequate recognition of this in the AMP, (b) little apparent critical analysis of the reasons for the underspend; and (c) no apparent changes to asset class strategies.

    (iii) *Lack of link between expenditure and KPIs* – there is no discernable link between the proposed expenditure and the key performance measures reported in Section 5.1 of the AMP.

83. Our concerns with the AMP described above are mitigated by supplementary information that GGT has provided in AASI Attachment 1 (for AA4 capex) and in response to our information requests.

84. However, systemic overestimating of forecast capex and the issues with the AMP discussed above, combine to indicate that there are systemic issues in GGT's application of its certified asset management methodology, and its governance process.

85. This in turn casts significant doubt about GGT's capability to accurately forecast the prudent and efficient capex and opex necessary to satisfy the expenditure drivers denoted above. We have taken this high-level assessment into account in our detailed assessment of the proposed capex in Section 5 (AA3 capex) and Section 6 (AA4 capex).

[15] Information Request EMCa18

[16] GGP AMP FY17 – FY21, page 6

3.5 Procurement and contract management

3.5.1 GGT's approach

86. All purchasing decisions for capex are made in accordance with APA's 2017 Procurement Policy[17] and 2015 Procurement Guide.

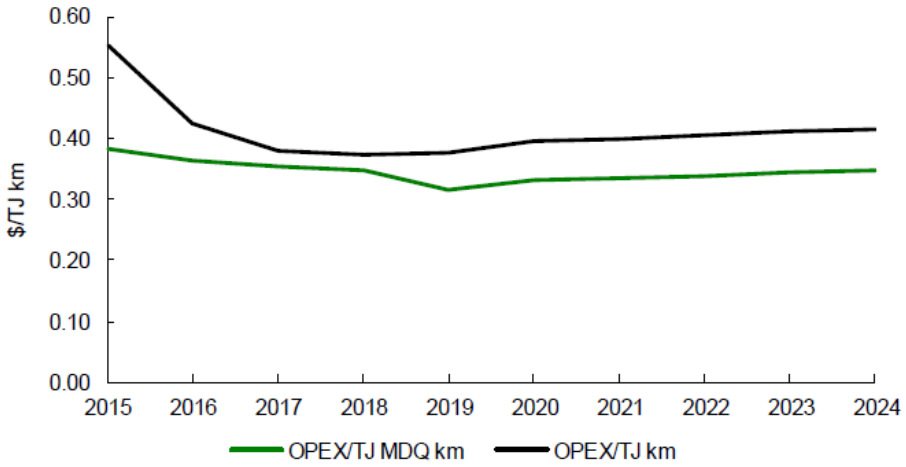
3.5.2 EMCa Assessment

87. The principles, processes, scope and required actions are consistent with GIP for expenditure of the scope and scale associated with the GGP.

3.6 Key Performance Indicators

88. The figure below shows two of GGT's KPIs: $/TJ MDQ km (i.e. normalised against capacity reservation) and $/TJ km (i.e. normalised against throughput). In its AAI document, it also present $/GJ MDQ and $/GJ KPIs.

Figure 5: GGP unit operating expenditure KPI ($Sep 2018)



Source: GGT, AAI, page 18

Benchmarking with other gas transmission pipelines

89. There are four other current regulated gas transmission submissions, each of which provide KPIs for opex per pipeline km and opex per mmkm. These KPIs are not able to be compared to GGT's KPIs.

90. We asked GGT to provide any available benchmarking information it had to support its AA4 Proposal in addition to the 'Solomon benchmarking report' we were advised GGT had (at our on-site meeting with GGT on 6 March 2019). In its response,[18] GGT provided four graphs of aspects of 'Stay In Business' capex normalised for Equivalent Pipeline Complexity (EPC), a measure of asset complexity developed by Solomon Associates. The comparisons are between GGP and the APA Group (US & Canada and the Company average). The GGP compares very favourably on the four metrics

[17] APA *Procurement Policy,* 2017

[18] Response to Information Request EMCa20 – GGT advised that the information in the Solomon Associates Report was confidential and could not be released

provided, however the intra-company information is of limited value in meaningfully assessing the relative efficiency of GGP operations.

Compliance with Rule 72(1)(f)

91. In accordance with the requirements of rule 72(1) of the NGR, GGT is required to include KPIs supporting the expenditure forecast for the next AA period.

92. GGT has provided opex KPIs which are intended to support its expenditure over the AA4 period. We believe this is a satisfactory KPI for this purpose. However, it does not provide an explicit basis for comparison with other regulated Australian gas transmission pipelines. We therefore recommend that the ERA requires GGT to present an opex KPI based on opex per pipeline km to facilitate comparison with other Australian gas transmission pipelines.

3.7 Implications for GGT's AA4 Proposal

93. We have identified a number of issues with GGT's governance and management systems, procedures, and practices which individually and collectively undermine the credibility of GGT's expenditure proposals, and accordingly we consider are systemic in nature. These include:

- insufficient evidence of risk-based investment portfolio development and management;
- inadequate links to historical plans, expenditure (including expenditure variances), and performance outcomes in critical documents;
- lack of evidence of consistent and rigorous application of the investment governance framework;
- immature justification documents for the capex portfolio;
- poor project and program options analysis, including cost-benefit analysis; and
- inadequate KPIs.

94. We have reflected the implications of these findings in our assessment of expenditure in Sections 5, 6 and 7.

4 Forecasting Methods, Assumptions and Regulatory Accounting Matters

4.1 Introduction

95. In this section, we describe and assess the forecasting methods and assumptions that GGT has applied in developing its capex and opex forecasts. We first review GGT's demand forecast, which includes its forecast customer connections and volumes, then we describe our assessment of GGT's capex and opex forecasting methods, its real cost escalation assumptions, and asset life assumptions. Finally, we comment on the implications of our assessment for GGT's proposal.

4.2 Forecast demand growth

96. GGT has not forecast any demand growth. Its forecast contracted capacity for each of the years for AA4 is the same as for 2019. GGT advises that this is consistent with its existing gas transportation agreements and user advice.

97. On information provided, EMCa considers this to be a reasonable forecast.

4.3 Capex forecasting

4.3.1 GGT's approach

98. The capital project requirements are derived from GGT's AMP as part of the GGT's annual planning process. As discussed in more detail in Section 3, GGT draws on individual asset class plans to present a five-year capital works program. We were

advised that the capex cost estimation process for the AA3 Proposal is scaled to the type, size and risk of the project:[19]

- *'Business & technology projects: if the estimated project cost is >$150,000, and/or impacts more than one business unit, APA uses the Portfolio Project Management services provided by its corporate Portfolio Office. Under those processes, project cost estimations are conducted via an Estimations Forum which draws on the expertise from the core project delivery disciplines;*
- *Infrastructure projects: APA has a dedicated Infrastructure Development area that manages infrastructure projects >$2m (non-stay-in-business). It uses a standard high-level framework for the management of projects; and*
- *Small/simpler projects: Cost estimation methodologies for these projects are developed and applied on a case by case basis, largely driven by the nature of the project. The project plans and costings are developed in the local engineering areas and are presented for approval through the annual budget process. Many smaller projects involve using local labour and contractors, such that past experience in the cost of delivering similar projects is used as a guide for future expenditure. Projects that involve one-off replacement of assets are often based on quotes.'*

99. GGT has derived its AA4 forecast capex by applying a combination of the following expenditure techniques which collectively are similar to its AA3 cost estimation process:

- *Continuation projects/programs* – where expenditure is incurred from works commenced in AA3, but to be completed in AA4, the cost estimate is based on the latest cost projection (i.e. based on actual expenditure and the forecast cost to complete the work).
- *Historical costing* – where GGT has relatively recently undertaken similar work (i.e. in the AA3 period), it derives the cost for the AA4 scope of work using historical costs adjusted for any material scope variations (e.g. volume of activity).
- *Bespoke projects* - for several of the AA4 projects GGT has sought vendor quotes for components of the work, adding its internal costs (e.g. labour[20] and materials) depending on the breadth of the vendors scope.

100. GGT advises that it the cost estimates for the AA4 projects at the current stage of development '*usually have an accuracy of +/-30%.'* GGT also advises that for more complex projects a '*pre-FEED or FEED study may be requested, allowing greater accuracy - +/-10%. – in cost estimation.'*[21] From our review of the information provided, FEED or pre-FEED studies have not been undertaken for any of the proposed AA4 projects.

101. We asked GGT to explain the status of each of the proposed AA4 projects in relation to the capex governance process in a formal Information Request.[22] GGT advised that all AA4 business cases had been endorsed by the General Manager GGT and approved by the Management Committee (as discussed in Section 3).

[19] EMCa, Report to the Economic Regulation Authority, Review of Technical Aspects of the Proposed Access Arrangement, December 2014, page 23

[20] E.g. project management, engineering design, commissioning, permitting/isolation

[21] GGT response to Information Request EMCa24

[22] Information Request EMCa23

4.3.2 EMCa assessment

Capex forecasting methodology is satisfactory

102. GGT's methodology for deriving total cost estimates for capex projects is consistent with common industry practice for businesses with similar levels of complexity/capex, however, the outcomes of its approach indicate that there are often material flaws in its application, as discussed below.

Evidence of unsatisfactory capex project forecasting accuracy

103. GGT's AA2 actual capex was 70% less than its initial AA2 forecast. Its AA3 actual/estimated capex of $9.19m is 36% less than its initial forecast of $14.01m and $0.63m (6%) less than the ERA allowance of $9.82m.

104. It is not unusual over the course of a five-year period (with forecasts developed up to seven years in advance of the final year) for there to project 'roll-ins'[23] and 'roll-outs'.[24] The table below shows that project 'roll-outs' contributed the most to the underspend. However, GGT now has a track record of significant under-expenditure of its forecast.

Table 9: AA3 capex project expenditure against revised forecasts

Expenditure type	AA3 Forecast	AA3 Actual	Variance $	Variance %
Forecast and spent	8.65	6.57	-2.08	-24%
Forecast and not spent	3.75	0.00	-3.75	-100%
Spent but not forecast	0.00	2.62	2.62	N/A
Total	**12.41**	**9.19**	**-3.22**	**-26%**

Source:GGT response to EMCa01

105. As shown in the table below, there was considerable volatility in spending against the ERA allowance at an asset category level. The asset category with the largest underspend was Pipelines and laterals (-$1.69m, -38.4%), with SCADA and communications being overspent by $1.69m (+314.4%).

[23] Projects bought forward from future periods of unforeseen work being prioritised

[24] Projects deferred to beyond the current period (in this case, to 2020 or beyond) or cancelled

Table 10: AA3 capex project expenditures against ERA allowances

$m, Real Dec 2018	Actual AA3	ERA Allowance	Variance $	Variance %
Pipeline and Laterals	2.72	4.41	-1.69	-38.4%
Main Line Valve & Scraper Stations	0.12	0.56	-0.44	-79.0%
Compressor Stations	2.49	2.17	0.33	15.0%
Receipt & Delivery Point Facility	0.34	1.06	-0.73	-68.5%
Scada & Communications	2.23	0.54	1.69	314.4%
Cathodic Protection	0.07	0.25	-0.18	-70.7%
Maintenance Bases & Depots	0.35	0.18	0.18	99.6%
Other Assets	0.87	0.65	0.22	33.9%
Total	**9.19**	**9.82**	**-0.63**	**-6.4%**

Source: ERA decision and GGT response to EMCa01

Lack of compelling information about improvements

106. The main source of underspend was in the pipelines and laterals asset category. As discussed in more detail in Section 5, the main reasons for underspend appear to be that the cost estimates for the planned work were overly conservative:

- *The volume of work was over-estimated* – either because the risk was reassessed to be lower (e.g. the condition of the assets was not as bad as thought); and
- *The cost was over-estimated* – because cheaper ways of undertaking the work were found or for other reasons, the original estimate was too conservative.

107. GGT has not provided sufficiently compelling information in its AA4 Proposal documentation or in answers to our information requests to convince us that it has taken effective steps to improve its capex forecasting outcomes.

4.4 Opex forecasting

4.4.1 GGT's approach

108. GGT has forecast opex using a combination of a 'base-step-trend' (BST) approach, and separate forecasts for those items that it considers to be irregular or cyclical.

109. For the components included in GGT's BST forecast, GGT has escalated only for its forecast increase in real labour cost. No other escalation factors have been applied. GGT has also not applied any 'step' changes in its BST forecast.

110. For the components that GGT has forecast separately, GGT has provided the information that it has utilised in developing those forecasts. For two components (Corporate and Regulatory costs) GGT has relied on estimates provided in a report which it commissioned from KPMG. For Major Expenditure Projects (MEJ), GGT has provided a breakdown comprising specific programs and explanatory text in its Access Arrangement Supporting Information.

111. To the extent that GGT has allocated costs between its Covered and Uncovered Pipeline services, it has done so based on the ratio of covered to total contracted capacity.

4.4.2 EMCa assessment

112. EMCa considers that GGT's forecasting method, comprising a combination of separate forecasts for irregular and cyclical costs, and a BST forecast, is reasonable. EMCa further considers that it is reasonable that GGT has escalated only for real labour costs and has not applied any step changes, and that its method for cost allocation between Covered and Uncovered services is also reasonable.

113. We assess GGT's opex forecast in Section 7.

4.5 Depreciation – asset economic life assumptions

4.5.1 GGT's proposal

114. The table below sets out the asset lives that GGT has used when calculating depreciation in AA3. GGT has adopted the same asset lives that were approved by the ERA in its June 2016 Final Decision on the last proposed revision of the Access Arrangement for the GGP.

Table 11: Asset economic lives

Asset class	Economic lives (years)	
	GGP	Other Transmission pipelines
Pipeline and laterals	70	55 - 80
Mainline valves and scraper stations	50	50 - 55
Compressor stations	30	30 - 35
Receipt and delivery point facilities	30	30 - 40
SCADA and communications	10	15
Cathodic protection	15	not available
Maintenance bases and depots	50	40 - 60
Other assets	10	5 - 30

*Source: GGT, AASI, Table 1*8; Victorian Transmission System Access Arrangement Information Jan 2017, Table 3.5; Roma to Brisbane Pipeline Access Arrangement Information Sep 2016, Table 3.5; Amadeus Gas Pipeline, Access Arrangement Information, Aug 2015, Table 3.5; Dampier to Bunbury Natural Gas Pipeline Access Arrangement Information, Jun 16, Table 14

4.5.2 EMCa assessment

115. GGT has adopted the same asset lives that were approved by the ERA in its June 2016 Final Decision on the last proposed revision of the Access Arrangement for the GGP.

116. We have compared GGT's proposed asset class economic lives with those approved by the AER and ERA in regulatory determinations for other transmission pipelines. In all but the Cathodic protection category, direct comparison with at least one other comparator is available – in each case the GGT's proposed economic life is commensurate with the other sources. In the case of Cathodic protection, we were not able to find a direct, publicly available comparator, but based on our experience, the nominated 15 years is an acceptable economic life.

117. We therefore recommend that the ERA accept the economic lives proposed by GGT.

5 AA3 Capex

5.1 Introduction

118. This section contains our assessment of the capex incurred (or to be incurred) by GGT in AA3. We have undertaken this review using the assessment framework set out in Appendix A and having regard to our findings in Sections 3 and 4.

119. The results of our review and our overall assessment of whether this capex satisfies the capex criteria for the purposes of determining the level of conforming capex under the NGR are set out below.

5.2 GGT's proposed conforming AA3 capex

5.2.1 Overall expenditure variance

120. The table and figure below compare GGT's initial, revised and actual/forecast[25] AA3 capex with the ERA's Final Decision.

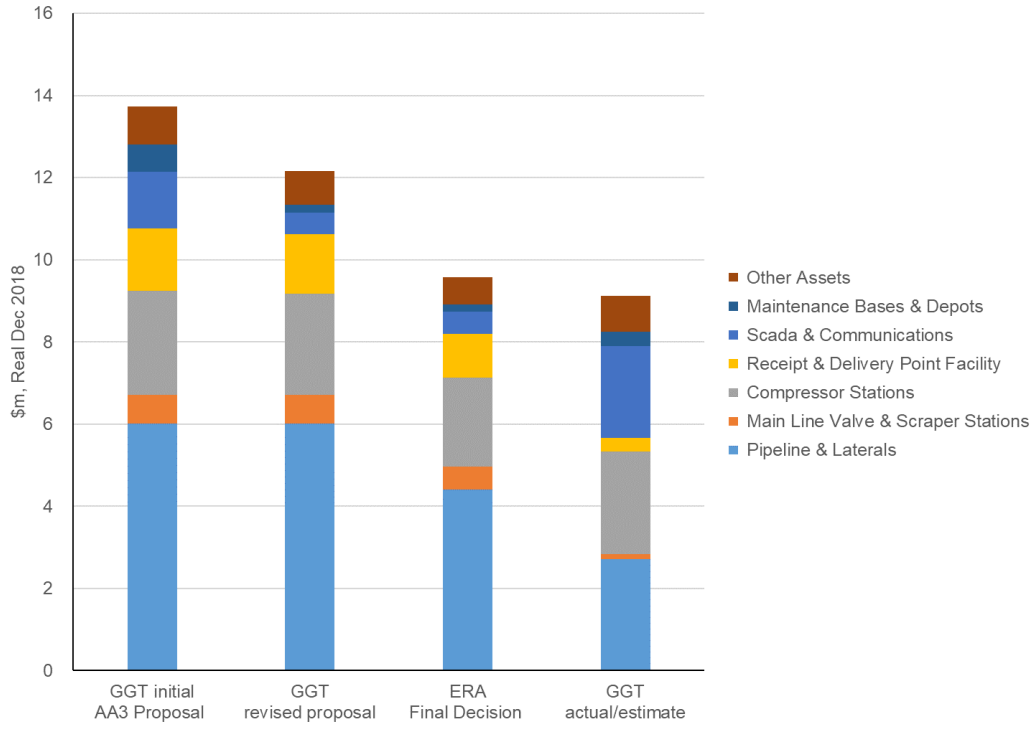
[25] The values for 2018 and 2019 were estimates in the information provided by GGT

Table 12: Comparison of actual AA3 capex with GGT forecasts and ERA allowance

Expenditure Category	GGT initial AA3 Proposal	GGT revised proposal	ERA Final Decision	GGT actual/estimate	Difference ERA vs GGT
Pipeline & Laterals	6.01	6.01	4.41	2.72	-1.69
Main Line Valve & Scraper Stations	0.70	0.70	0.56	0.12	-0.44
Compressor Stations	2.54	2.47	2.17	2.49	0.33
Receipt & Delivery Point Facility	1.51	1.44	1.06	0.34	-0.73
Scada & Communications	1.38	0.54	0.54	2.23	1.69
Cathodic Protection	0.29	0.25	0.25	0.07	-0.18
Maintenance Bases & Depots	0.68	0.18	0.18	0.35	0.18
Other Assets	0.91	0.82	0.65	0.87	0.22
Total	**14.01**	**12.41**	**9.82**	**9.19**	**-0.63**

Source: EMCa analysis derived from GGT's response to Information Request EMCa01

Figure 6: Comparison of actual AA3 capex with GGT forecasts and ERA allowance



Source: EMCa analysis referring to GGT's response to Information Request EMCa01

5.3 Our assessment

5.3.1 Compliance with capex criteria

121. Our assessment of the capex incurred and to be incurred in the AA3 period has been based on GGT's AAI and supporting information, though as noted earlier, this was limited. To a greater extent, we have necessarily based our assessment on our observations from the onsite meetings that we held with GGT, together with information supplied pursuant to EMCa information requests.

122. Importantly, for GGT's actual/estimated AA3 capex at a project/program level we have relied upon the information provided by GGT in response to Information Request EMCa01. We requested GGT to provide the spreadsheet model(s) to show the breakdown for AA3 (2015-2019) capex by project. GGT subsequently provided the spreadsheet 'EMCa 1 response_CAPEX 2015-2019 (20181221 Current AA capex) 12-Feb-19'.

123. Specifically, we have referred to the information in the 'Capex by project' worksheet, which applies to the Covered Pipeline.

124. Differences arise between the asset class view and the project view because:

- project view –the scope that makes up a Business Case is assigned to a single asset class; and
- asset class view – the scope of work in a Business Case can be allocated to several asset classes.

125. As an example of the difference between the two perspectives, Business Case O5 [BC05 - Compressor Station PLC Upgrades] is assigned to the Compressor Stations asset class in the Project view, however in the Asset Class view, BCO5 work is split between four Asset Classes: Compressor Stations, Receipt and Delivery Point Facility, SCADA & Communication, and Other Assets.

126. This creates different representations of expenditure between (i) our Project view-oriented assessment of AA3 capex reported in this section, and (ii) the Asset Class view presented in preceding sections.

127. We have also noticed apparent inconsistencies with project expenditure details in GGT's response to Information Request EMCa22 and the spreadsheet referred to above. GGT's response to Information Request EMCa22 focusses on GGT's explanations of variance between its forecast AA3 expenditure and its actual/estimated AA3 capex. We have not sought to resolve these apparent differences.

128. Our adjustments for AA3 capex arise directly from our assessment of projects and programs for which we consider that the expenditure does not satisfy the conforming capex criteria in rule 79(1), in accordance with Appendix A. Whilst we have taken a strict view of our obligations to advise the ERA based on the information that GGT has provided to us, we have applied a project-level materiality threshold of $0.10m, below which we give GGT the benefit of the doubt in the absence of detailed information.

5.3.2 Pipelines and laterals

129. GGT expects to spend $2.56m in the AA3 period on Pipelines and laterals, representing 27% of the AA3 capex program[26]. The projects/programs,[27] are shown in the table below.

[26] Based on the total capex of $8.96m

[27] In its response to Information Request EMCa22, GGT aggregated three separate projects identified in its AA3 submissions (16" Mainline in-line inspection, 14" Mainline in-line inspection, Newman Lateral in-line inspection) and named it 'Mainline ILI'. GGT also changed the wording of project descriptions and included expenditure for two projects that were not in its AA3 submission

Table 13: Summary of AA3 pipeline and laterals capex

Project/Program	GGT revised forecast	GGT actual/estimated	Variance Actual vs Revised
Mainline ILI	3.25	2.06	-1.19
Apache and DBP ILI	0.32	0.00	-0.31
Easement Upgrade	0.47	0.00	-0.47
Easement Upgrade for ILI	0.23	0.10	-0.14
ILI Verification Digs	1.68	0.36	-1.32
Pipeline protection repair	0.07	0.00	-0.07
GGT Gorgon Interconnect (33400)	0.00	-0.02	-0.02
Addi ional Capacity Feasibility Load FY18 (39009)	0.00	0.06	0.06
Southern Cross Pipeline Dig Ups (Parkeston) (39659)	0.00	0.00	0.00
Southern Cross Pipeline Dig Ups (Leinster Kambalda) (39662)	0.00	0.00	0.00
Rio Tinto Rail & Haul Crossing	0.00	0.00	0.00
Total	**6.01**	**2.56**	**-3.45**

Source: EMCa analysis referring to GGT's response to Information Request EMCa01 (Capex by project)

130. As shown in the table above, GGT underspent the $6.01m capex that it forecast in its revised AA3 Proposal by $3.45m or 57%, which is $1.85m below the ERA allowance of $4.41m. The reason for the negative adjustment for the GGT Gorgon Interconnect project was not explained.

131. According to GGT,[28] the variation of actual/estimated expenditure to the ERA allowance is primarily due to:

- changes in scope due to the necessary work on the pipelines and laterals being less than expected; and
- over-estimating the cost of the work and classifying some of the work done to opex.

132. For example, for the largest projects in GGT's initial and revised forecast, the reasons provided by GGT for the significantly lower actual costs are summarised as follows:[29]

- *Mainline In-line Inspection (ILI)* - cost estimates were based on historical costs, but the combination of a revised supplier contract, the contractor's familiarity with the terrain, no remobilisation costs, and lower than expected APA internal labour costs, led to the 37% underspend.
- *ILI Verification Digs* - GGT's cost estimate was based on six verification digs per section for a total of 72 digs at an average cost of $0.02m each. Instead, a combination of DCVG studies[30] and only 35 digs have been undertaken,[31] leading to an underspend of 79%.

133. We note that the AMP states in its pipeline integrity strategy that because of the '*ILI/digup process the GGP is not subject to DCVG surveys.*'[32] Despite this inconsistency between its strategy and reported practice, based on our experience we are satisfied that Direct Current Voltage Gradient (DCVG) surveys in conjunction with ILIs is consistent with GIP.

134. We are also satisfied that GGT has appropriately allocated the proportion of expenditure incurred to the Covered Pipeline.

[28] GGT response to Information Request EMCa22 and GGT AASI, Sections 5.4 and 5.5

[29] GGT response to Information Request EMCa22 and GGT AASI, sections 5.4 and 5.5

[30] Direct current voltage gradient studies assess the condition of the pipeline coating and are cheaper to undertake than verification digs

[31] More DCVG studies and verification digs are planned for 2019

[32] AMP Section 4.1.1, pg 20

135. On this basis, we consider that GGT's actual/estimated $2.56m expenditure on Pipelines and laterals in the AA3 period is correctly allocated to the Covered Pipeline and is likely to satisfy the capex criteria.

5.3.3 Mainline valve and scraper stations

136. GGT has spent $0.10m in the AA3 period in the Mainline valve and scraper station category, as shown in the table below.

Table 14: Summary of actual/estimate AA3 capex for mainline valve and scraper stations

Project/Program	GGT revised forecast	GGT actual/estimated	Variance Actual vs Revised
Install scaper station facilties on DBNGP interconnect pipeline	0.35	0.00	-0.35
Install scaper station facilties on Apache interconnect pipeline	0.35	0.10	-0.24
Total	**0.70**	**0.10**	**-0.59**

Source: EMCa table derived from GGT's response to Information Request EMCa01 (Capex by project)

137. GGT underspent the $0.70m forecast in its revised AA3 submission by 86% or $0.59m and its actual/estimated expenditure is $0.46m below the ERA allowance of $0.56m.

138. GGT advises that its cost estimates for the two projects were based on installation of scraper station facilities, however:

- for the DBNGP-GGP interconnect project, DCVG studies were used instead of ILIs, so the scraper station was not required; and
- for the Apache-GGP interconnect, parts were borrowed from another site.

139. The actual cost was significantly less than both GGT's forecast in its revised AA3 Proposal and the ERA's Final Decision. We are satisfied that GGT has appropriately allocated the proportion of expenditure incurred to the Covered Pipeline.

140. On this basis we are satisfied that the $0.10m actual expenditure in the Mainline valves and scraper station category for the AA3 period is correctly allocated to the Covered Pipeline and is likely to satisfy the capex criteria.

5.3.4 Compressor stations

141. GGT's actual/estimated capex in the AA3 period in the Compressor stations category is $2.66m across ten projects. This is $0.19m or 8% higher than the $2.47m forecast in its revised AA3 Proposal, as shown in the following table. GGT's actual/estimated capex is $0.49m above the ERA allowance of $2.17m.

Table 15: Summary of actual/estimate AA3 capex for Compressor stations

Project/Program	GGT revised forecast	GGT actual/estimated	Variance Actual vs Revised
Compressor Stations HA Upgrades	0.91	0.00	-0.91
Compressor Station PLC Upgrades	0.33	0.56	0.23
Yarraloola and Ilgarari lighting towers replacement	0.23	0.17	-0.07
GEA Major Servicing	0.26	0.00	-0.26
Paraburdoo unit 1 Turbine Echange(Major Servicing)	0.52	0.22	-0.30
Yarraloola fire protection system upgrade	0.11	0.00	-0.11
Yarraloola acommodation to workshop conversion	0.07	0.00	-0.07
Paraburdoo accomodation upgrade	0.00	0.01	0.01
Rotational spare DN 300 RA valve	0.03	0.00	-0.03
Krausz Aftercooler Upgrade ($35k ea unit)	0.00	0.11	0.11
Site Accommodation upgrade programme	0.00	0.31	0.31
West Angeles Project (YBP GGP Augmentation)	0.00	-0.03	-0.03
GGT Reference Meter Upgrade (33181)	0.00	-0.02	-0.02
Turee Creek & Newman Compression Project	0.00	0.03	0.03
Yarraloola Load Bank Installalation (38138)	0.00	0.02	0.02
Wiluna Compressor Controls Upgrade (38217)	0.00	1.23	1.23
Yaraloola Compressor Station Power Mgt SOW (38859)	0.00	0.04	0.04
Total	**2.47**	**2.66**	**0.19**

Source: EMCa table derived from GGT's response to Information Request EMCa01 (Capex by project)

142. Eight of the projects in the table above were not identified in GGT's Revised AA3 Proposal and:

- GGT initially forecast capex in five other projects, but will not incur any expenditure attributable to these projects in the AA3 period; and
- GGT has deducted small amounts of expenditure from two projects that were not included in its AA3 submissions.

143. GGT's revised AA3 Proposal was based on undertaking 16 projects. In its response to our information request, GGT has combined several of those projects into programs of work, as follows:[33]

- *Compressor Stations HA Upgrades* – combines all the hazardous area projects;[34]
- *Compressor Station PLC Upgrades* – combines four PLC projects;[35]
- *GEA Major Servicing* – combines three projects;[36] and
- *GEA PLC upgrades* – combines PLC upgrade projects at Yarraloola and Ilgarari.

144. Whilst the overall variance between the actual/estimated capex and the forecast in the revised AA3 Proposal in this asset category is relatively small, there are notable variations at the project/program level as follows:

- *Hazard area upgrades* – GGT advises that the work was done but the expenditure was either classified as opex or captured in other capital projects.[37]
- *Gas engine alternator major overhauls* – compressor usage was less than forecast so the major overhauls at the OEM-specified operating hours were not required.

[33] GGT response to Information Request EMCa01

[34] At Yarraloola, Paraburdoo, Ilgarari, and Wiluna compressor stations

[35] Yarraloola and Ilgarari PLC backplane upgrade projects and Yarraloola and Ilgarari GEA PLC upgrade projects

[36] Yarraloola GEA 2 major overhaul, Paraburdoo GEA 2 major overhaul, Ilgarari GEA 1 major overhaul

[37] GGT AASI, Section 5.4.9

- *Compressor station PLC upgrades* – this is one of the few programs in which GGT expects to overspend the forecast in its revised AA3 Proposal. GGT has not offered any explanation for the overspend in its response to our Information Request.[38] In the absence of an explanation, we do not consider the expenditure above the ERA allowance of $0.28m to satisfy the capex criteria – this equates to a 50% reduction in GGT's reported expenditure in relation to BC05. Note that when this project adjustment is reflected in asset classes, the adjustment is based on a 50% reduction of the BC05 expenditure across four asset classes.
- *Site accommodation upgrade programme* – in its response to Information Request EMCa03, GGT advised (i) that a feasibility study and design work for site accommodation at the Ilgarari and Wiluna Compressor Stations was provided for in the budget approved for 2017-18, and (ii) this led to budget approval for $0.31m to commence construction in 2019-20.[39] The work is continuing into the AA4 period (per Business Case 03).
- *Wiluna compressor controls upgrade* – this is a project that was not foreseen in GGT's revised AA3 Proposal. GGT advises[40] that it had been extending the life of the control system by replacing the defective and obsolete electronics 'cards' with second-hand cards sourced from the Northern Territory. However, this option ceased to be available and GGT replaced the control system. The explanation of the need for the project is reasonable, and, based on our experience, the incurred capex allocated to the Covered Pipeline is also reasonable.
- *Krausz aftercooler upgrade* – this is a new project with expenditure of $0.11m from 2018-2019. GGT provided no explanation for the expenditure in our request for information. Whilst the amount is relatively small, it exceeds our 'minor expenditure' threshold. We are not able to conclude that the estimated expenditure is likely to satisfy the capex criteria.

145. On this basis we are satisfied that all but $0.39m of GGT's actual/estimated $2.66m compressor station AA3 capex is correctly allocated to the Covered Pipeline and is likely to satisfy the capex criteria.

5.3.5 Receipt and delivery point facilities

146. GGT's actual/estimated capex in the AA3 period in the Receipt and delivery point facilities category is $0.65m, as shown in the table below. This is $0.79m or 55% less than the $1.44m forecast in its revised AA3 Proposal and $0.42m below the ERA allowance of $1.07m.

[38] GGT response to Information Request EMCa22

[39] A copy of the Authority for Expenditure, which allowed feasibility and design work to commence in 2017-18 was provided with the response

[40] GGT AASI, Section 5.4.3

Table 16: Summary of actual/estimate AA3 capex for receipt and delivery point facilities

Project/Program	GGT revised forecast	GGT actual/estimated	Variance Actual vs Revised
Hydrocarbon Dewpoint Monitoring	0.03	0.00	-0.03
Flow Computer Upgrade	1.05	0.48	-0.57
Leonora offtake battery upgrade	0.03	0.00	-0.03
Paraburdoo flow computer 1 (fuel gas) upgrade	0.00	0.00	0.00
Newman FC Install	0.00	0.07	0.07
Newman Reference Run USM install	0.00	0.07	0.07
Newman Maintenance Base -Crossover replacement	0.00	0.01	0.01
Newman Gas Lateral CPU Relocation	0.00	0.01	0.01
Flow Computer Software Upgrade (33199)	0.00	0.00	0.00
GGT DBNGP inlet Fliter Upgrade (33201)	0.00	0.00	0.00
Murrin Offtake Station Upgrade (35114)	0.00	0.01	0.01
DBNGP-GGP interconnect C9 gas chromatograph	0.16	0.00	-0.16
Apache-GGP interconnect C9 gas chromatograph upgrade	0.16	0.00	-0.16
Total	**1.44**	**0.65**	**-0.79**

Source: EMCa table derived from GGT's response to Information Request EMCa01 (Capex by project)

147. The Flow computer upgrade program in the table above represents six discrete projects[41] identified in GGT's revised AA3 Proposal and two flow computer upgrades that were not identified in its revised AA3 Proposal.[42] GGT only upgraded one of the 'original' six flow computers and both of the flow computers at the 'new' sites at an average unit cost of $0.18m of which 70% has been allocated to the Covered Pipeline. We consider the cost incurred to be reasonable.

148. As seen from the table above, GGT did not proceed with four projects. Two were very small and were not required, and the two gas chromatograph installations have been planned for the AA4 period and are discussed in Section 6.

149. GGT also introduced four other projects related to the Newman facilities with expenditure totalling $0.16m. The individual projects are relatively small. In accordance with our assessment principle, we accept that the expenditure is likely to satisfy the capex criteria.

150. On this basis we are satisfied that GGT's actual/estimated $0.65m capex in the Receipt and delivery point category is correctly allocated to the Covered Pipeline and is likely to satisfy the capex criteria.

5.3.6 SCADA and communications

151. GGT's actual/estimated capex in the AA3 period in the SCADA and Communications category is $1.97m. It is $1.43m or 365% more than the $0.54m forecast in its revised AA3 Proposal, as shown in the table below. The proposed capex is also $1.43m more than the ERA allowance of $0.54m.

[41] At Leonora, Murrin Murrin, Parraburdoo, Ilgarari, Wiluna, Jeedamya

[42] At Kalgoorlie South and Jundee

Table 17: Summary of actual/estimate AA3 capex for SCADA and communications

Project/Program	GGT revised forecast	GGT actual/estimated	Variance Actual vs Revised
BM 85 Replacement Program Phase 2	0.077	0.000	-0.077
Replace Quantum Station RTUs	0.150	0.000	-0.150
National satellite SCADA	0.211	1.969	1.758
Engineering PC in Gas Control Centre	0.000	0.000	0.000
GGT UPS Upgrade Phase 1 (32117)	0.000	0.000	0.000
Yarraloola SCADA Comms Upgrade (33184)	0.000	0.000	0.000
Paraburdoo SCADA Comms Upgrade (34124)	0.000	0.000	0.000
GGP Satellite Comms Upgrade	0.000	0.000	0.000
Wiluna Compressor Station AB PLC Upgrade	0.098	0.000	-0.098
Total	**0.537**	**1.969**	**1.432**

Source: EMCa table derived from GGT's response to Information Request EMCa01 (Capex by project)

152. The program 'Replace Quantum station RTUs' represents 15 discrete projects identified in GGT's revised AA3 Proposal. As can be seen for the table above, GGT did not proceed with any of the projects because *'[t]he Quantum units were not generally experiencing failures as they age and can remain in service.'*[43]

153. The only expenditure GGT incurred in this category was for the National satellite SCADA project. GGT explains that:[44]

> '*Speedcast, the vendor, was no longer supporting the previous SCADA system software used in Western Australia. The IT and communications equipment supporting the SCADA system was also experiencing failures. Upgrading was therefore required at 45 sites across the State. In addition, in 2016, the vendor of the satellite services used for SCADA data communications advised that the satellite (NSS6) used to transfer the data would cease to operate from December 2018. Satellite services were to be "repointed" to the Optus D2 satellite*.'

154. Based on the criticality of SCADA systems to pipeline operations, we are satisfied that the SCADA services needed to be retained.

155. GGT further advises that the reason for the overspend was:[45]

> '*The loss of both software and hardware supporting SCADA in Western Australia meant that the SCADA work carried out was of much greater scope than had been intended in the SCADA project proposed as part of the previous access arrangement revision proposal for the GGP.*'

156. GGT claims there are cost benefits to the GGP from its approach, including:[46]

- sharing the SCADA services across the APA pipeline portfolio (i.e. rather than a stand-alone GGP SCADA system); and
- IT support and cybersecurity are more effectively maintained for a single system operated across multiple pipelines.

157. According to GGT's response to Information Request EMCa22, $0.81m of $1.15m for the ClearSCADA system was allocated to the Covered Pipeline and $1.09m of $1.53m

[43] GGT's response to Information Request EMCa22

[44] GGT AASI, Section 5.4.2

[45] GGT AASI, Section 5.4.2

[46] GGT AASI, Section 5.4.2

was allocated to the Covered Pipeline for SCADA Satellite Intra Refresh (SSIR). The allocation ratio of 70% is consistent with the established allocation principle.

158. On this basis we are satisfied that GGT's actual/estimated $1.97m capex in the SCADA and communications category is correctly allocated to the Covered Pipeline and is likely to satisfy the capex criteria.

5.3.7 Cathodic protection

159. GGT's actual/estimated capex in the AA3 period in the Cathodic protection category is $0.07m. It is $0.18m or 71% less than the $0.25m forecast in its revised AA3 Proposal, as shown in the table below. The actual/estimated capex is also $0.18m less than the ERA allowance of $0.25m.

Table 18: Summary of actual/estimate AA3 capex for Cathodic protection

Project/Program	GGT revised forecast	GGT actual/estimated	Variance Actual vs Revised
CP insulation joint surge protection upgrade	0.02	0.00	-0.02
Wireless system interface for non-critical control	0.00	0.00	0.00
CPU Upgrade program	0.00	0.07	0.07
CP surge diverter upgrades	0.15	0.00	-0.15
CP telemetry for KP670	0.03	0.00	-0.03
CP Power supply requirements	0.05	0.00	-0.05
Total	**0.25**	**0.07**	**-0.18**

Source: EMCa table derived from GGT's response to Information Request EMCa01 (Capex by project)

160. The only expenditure in this category is at Wiluna to avoid power supply failure to the corrosion protection system. GGT has allocated 70% of the total expenditure to the Covered Pipeline.[47] The other projects were deemed not to be necessary once more detailed investigations were undertaken by GGT.

161. We are satisfied that GGT's actual/estimated $0.07m capex in the Cathodic protection category is correctly allocated to the Covered Pipeline and is likely to satisfy the capex criteria.

5.3.8 Maintenance bases and depots

162. GGT's actual/estimated capex in the AA3 period in the Maintenance bases and depots category is $0.30m. It is $0.12m or 67% more than the $0.18m forecast in its revised AA3 Proposal, as shown in the table below.

Table 19: Summary of actual/estimate AA3 capex for Maintenance bases and depots

Project/Program	GGT revised forecast	GGT actual/estimated	Variance Actual vs Revised
Karratha Maintenance Base	0.18	0.27	0.09
Leinster Base workshop recladding	0.00	0.02	0.02
Yaralloola Accomodation (33182)	0.00	0.00	0.00
Central Accommodaion Upgrade (Leonora) (38941)	0.00	0.01	0.01
Karratha Spart Parts Storage	0.00	0.00	0.00
Total	**0.18**	**0.30**	**0.13**

Source: EMCa table derived from GGT's response to Information Request EMCa01 (Capex by project)

163. The expenditure at Karratha maintenance base was allocated 70% to the Covered Pipeline and was more than forecast and more than the ERA allowance, but not excessively so. The cost of the unforeseen work at Leinster and Leonora is minor.

[47] GGT response to Information Request EMCa22

164. On this basis we are satisfied that GGT's actual/estimated $0.30m capex in the Maintenance bases and depots category is correctly allocated to the Covered Pipeline and is likely to satisfy the capex criteria.

5.3.9 Other assets

165. GGT's actual/estimated capex in the AA3 period in the 'Other assets' category is $0.87m. It is $0.05m more than the $0.82m forecast in its revised AA3 Proposal, as shown in the table below. Its actual/estimated capex is $0.21m more than the ERA allowance of $0.65m.

Table 20: Summary of actual/estimate AA3 capex for Other assets

Project/Program	GGT revised forecast	GGT actual/estimated	Variance Actual vs Revised
Condition-based replacement	0.31	0.21	-0.10
EAM	0.51	0.00	-0.51
SSIR - GGP Upgrade	0.00	0.02	0.02
On-line SIM	0.00	0.03	0.03
Leinster/Karratha Trucks (36660)	0.00	0.44	0.44
Newman Maintenance Base Concrete Cross Overs (39665)	0.00	0.02	0.02
Misc. Capital - GGT Tools, Gas Detectors etc	0.00	0.13	0.13
Total	**0.82**	**0.87**	**0.04**

Source: EMCa table derived from GGT's response to Information Request EMCa01 (Capex by project)

166. Whilst the total expenditure is commensurate with the forecast and the three 'new' projects represent minor expenditure, there are two projects that represent material variances:

- *EAM* – GGT advises that *'[a]t the time of preparation of AA revisions for AA3, costs of a planned Enterprise Asset Management system (incurred by APA) were to be allocated to individual business within the Group including the business based on the GGP. The costs, now incurred, have not been allocated in the way expected earlier; no cost had been allocated to the business based on the GGP.'...* [48] GGT also advises that GGP's share of the total cost of about $60m for developing the EAM system is recovered through the Operating Agreement.[49]
- *Leinster/Karratha trucks* - GGT advises that this was overlooked at the time of preparation of AA revisions for AA3.

167. Overall, we are satisfied that GGT's actual/estimated $0.87m capex in the Other assets category is correctly allocated to the Covered Pipeline and is likely to satisfy the capex criteria.

168. We note that in GGT's response to Information Request EMCa22, $0.73m AA3 capex for on-line simulation ('SIM') software is identified, of which 70% ($0.51m) is allocated to the Covered Pipeline. This project is not referred to in GGT's AA Supporting Information document nor in the reference AA3 capex spreadsheet we refer to in Section 5.3.1. We have not taken it into account in our AA3 capex assessment.

5.3.10 Aggregate adjustment assessment

169. Our assessed adjustment to GGT's AA3 capex has been applied to each capex category. We have made an adjustment for all or part of specific project or program

[48] GGT response to Information Request EMCa22

[49] GGT AASI, Section 5.5.1

expenditures, where we consider that the information GGT has provided for our assessment does not demonstrate that the expenditure satisfies the capex criteria.

170. In the absence of better information, we defaulted to the ERA's allowance where the project or program was previously considered by the ERA as part of its AA3 decision process. Where a relevant project or program was not proposed or considered by the ERA in its AA3 Decision, we have proposed an adjustment based on information provided in GGT's business case documentation.

171. We have produced our adjustments based on the timing of the projects and programs where possible and have sought to reflect any delays to the project against the capex allowance[50].

172. The aggregate impact of our assessed adjustments would imply a reduction to GGT's AA3 capex of $0.39m, which represents 4% of GGT's actual/estimated capex of $9.19m. The adjustments shown in the table below represent those aspects of GGT's AA3 capex for which it has not provided evidence that satisfies us that the expenditure satisfies the capex criteria.

Table 21: Adjustments in AA3 period by capex category

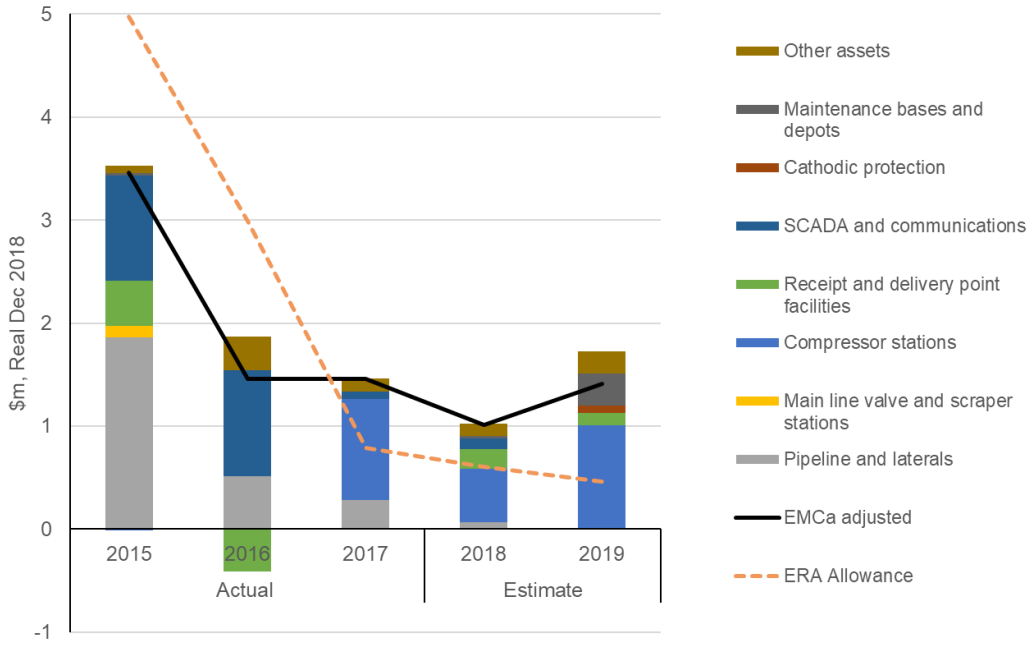
$m, Real Dec 2018	Actual			Estimate		Total AA3
	2015	2016	2017	2018	2019	2015-2019
Pipeline and Laterals	1.86	0.51	0.28	0.07	0.00	2.72
Main Line Valve & Scraper Stations	0.12	0.00	0.00	0.00	0.00	0.12
Compressor Stations	-0.02	0.00	0.98	0.52	1.01	2.49
less EMCa adjustment						
Compressor station PLC upgrade (BC05)	*0.00*				*-0.22*	*-0.22*
Krausz Aftercooler Upgrade				*-0.01*	*-0.09*	*-0.11*
Adjusted Compressor Stations	**-0.02**	**0.00**	**0.98**	**0.51**	**0.69**	**2.16**
Receipt & Delivery Point Facility	0.43	-0.41	0.00	0.19	0.12	0.34
less EMCa adjustment						
Thunderbox Offtake PLC Upgrade (BC05)	-0.01					*-0.01*
Adjusted Receipt & Delivery Point Facility	**0.43**	**-0.41**	**0.00**	**0.19**	**0.12**	**0.33**
Scada & Communications	1.02	1.03	0.07	0.11	0.00	2.23
less EMCa adjustment						
Yarraloola GEA PLC U (BC05)	*-0.01*					*-0.01*
Ilgarari GEA PLC Urgrade (BC05)	*-0.01*					*-0.01*
Ilgarari Unit Backplane Upgrade (BC05)	*-0.02*					*-0.02*
Adjusted Scada & Communications	**0.98**	**1.03**	**0.07**	**0.11**	**0.00**	**2.18**
Cathodic Protection	0.00	0.00	0.00	0.00	0.07	0.07
Maintenance Bases & Depots	0.03	0.00	0.00	0.02	0.31	0.35
Other Assets	0.07	0.33	0.13	0.12	0.22	0.87
less EMCa adjustment						
Yarraloola Unit PLC Back Plane (BC05)	*-0.01*					*-0.01*
Adjusted Scada & Communications	***0.06***	***0.33***	***0.13***	***0.12***	***0.22***	**0.86**
Total actual/estimate	**3.51**	**1.46**	**1.46**	**1.03**	**1.73**	**9.19**
EMCa adjustment	*-0.05*	*0.00*	*0.00*	*-0.01*	*-0.32*	*-0.38*
EMCa adjusted	**3.46**	**1.46**	**1.46**	**1.01**	**1.41**	**8.81**
Total EMCa adjustment (%)	*-1.42%*	*0.00%*	*0.00%*	*-1.41%*	*-18.31%*	*-4.15%*

Source: EMCa analysis derived from GGT responses to Information Request EMCa01

173. The following graph illustrates the effect of the assessed adjustments against GGT's proposed conforming AA3 capex.

[50] For example, the expenditure for the Jandakot redevelopment occurred two years later than was proposed in the capital allowance, and therefore the timing of the capital allowance has also been deferred.

Figure 7: GGT AA3 capex, ERA allowance and EMCa adjusted



Sources: EMCa analysis and GGT's response to Information Request EMCa01

6 Proposed AA4 Capex

6.1 Introduction

174. This section contains our assessment of the forecast capex allowance proposed by GGT for the AA4 period. We have undertaken the review using the assessment framework set out in Appendix A and with regard to the findings in Sections 3, 4, and 5 of this report.

175. The results of our review and our overall assessment of whether the proposed capex satisfies the capex criteria for the purposes of determining the level of conforming capex under the NGR are set out below.

176. The quoted adjustments in Sections 6.2 – 6.6 account for our adjustment of the escalation factor. Refer to the adjustment table in section 6.7 for the total adjustments.

6.2 GGT's proposed AA4 capex allowance

6.2.1 AA4 capex trend and drivers

177. In the table below, we show GGT's proposed expenditure in AA4 by capex category and by year. The major increase from the last five years of the AA4 period is the proposed $3.87m increase in Maintenance bases and depot capex. The proposed $1.97m reduction in Pipelines and Laterals capex is more than offset by increases in proposed SCADA and communications capex of $2.99m and Compressor station capex of $2.49m.

Table 22: AA4 forecast capex versus AA3 capex by capex category

$m, Real Dec 2018	Total AA3 Capex	Forecast 2020	2021	2022	2023	2024	Total AA4 Capex
Pipeline and Laterals	2.56	0.39	0.00	0.00	0.00	0.20	0.59
Main Line Valve & Scraper Stations	0.10	0.00	0.00	0.00	0.00	0.00	0.00
Compressor Stations	2.66	1.70	0.33	1.10	0.21	1.82	5.15
Receipt & Delivery Point Facility	0.65	0.00	0.00	0.00	0.00	0.00	0.00
Scada & Communications	1.97	0.95	1.60	0.61	1.04	0.76	4.96
Cathodic Protection	0.07	0.23	0.18	0.33	0.44	0.06	1.23
Maintenance Bases & Depots	0.30	3.85	0.32	0.00	0.00	0.00	4.17
Other Assets	0.87	0.00	0.00	0.00	0.00	0.00	0.00
Total	**9.19**	**7.12**	**2.42**	**2.03**	**1.69**	**2.83**	**16.09**

Source: EMCa table derived from GGT's response to Information Request EMCa01

6.3 Assessment of AA4 capex

6.3.1 Pipeline and laterals

178. GGT has forecast $0.59m capex over the AA4 period in the Pipeline and laterals asset category, as shown in the table below. The proposed AA4 expenditure is $1.98m (77%) less than GGT's AA3 capex actual/estimate of $2.56m in this category. GGT has proposed two projects, which we consider below.

Table 23: GGT's forecast AA4 capex in the Pipelines and laterals asset category

$m, Real Dec 2018	2020	2021	2022	2023	2024	Total AA4 Capex
ILI Verification dig-up program	0.39	0.00	0.00	0.00	0.00	0.39
Preparation for In-line-Inspection	0.00	0.00	0.00	0.00	0.20	0.20
Total	**0.39**	**0.00**	**0.00**	**0.00**	**0.20**	**0.59**

Source: EMCa table derived from GGT's response to Information Request EMCa01

ILI Verification dig-up program

179. GGT's Business Case 01 (BC01), describes the scope of work for this program as 'excavation and validation of 7 reported corrosion anomalies and 2 dents to confirm their condition and the measurement accuracy of the ILI tool. The work is to validate anomalies identified by the ILIs performed in 2015.[51]

180. The cost estimate in BC01 was derived from applying an average verification dig cost of [redacted]. However, we noted from GGT's proposed confirming AA3 capex for ILI verification digs that the average cost per verification dig was [redacted].[52] We asked GGT to explain the difference.[53]

181. In its response, GGT provided a revised BC01, for the same total expenditure but with the scope altered to include [redacted] verification digs and 15 DCVG studies. GGT advised that its revision was consistent with the scope of work required in the report 'Goldfields Gas Pipeline PL 24 ILI Verification Shortlist', 18 September 2018, which it also provided with its response. In our view, GGT did not satisfactorily explain:

[51] GGT, Access Arrangement Revision Proposal Supporting Information Attachment 1: CAPEX Business Cases, 1 Jan 2019, Business Case 01, page 2

[52] GGT, Access Arrangement Supporting Information, section 5.4.6, with the average unit cost converted to $Dec 2018 and allowing for 70% of the total cost allocated to the Covered Pipeline

[53] Information Request EMCa08

- why the broader scope of work was not included in the original BC01; and
- why the actual AA3 verification dig unit cost allocated to the Covered Pipeline of approximately [redacted] (in $Dec 18) is so much less than the [redacted] used in the revised BC01.[54]

182. Nonetheless, we are satisfied that:

- the scope of work in the revised BC01 is consistent with GIP;
- the unit cost of $6.7k per DCVG study is reasonable, based on our experience; and
- it is consistent with GIP to undertake the verification digs and for DCVG studies to be carried out at or about the midpoint between the mandated ILI cycle.[55]

183. However, we are not satisfied that GGT has based its cost estimate on a reasonable estimate of the verification dig unit cost given the recency of the historical costs and the lack of compelling arguments from GGT as to why the unit cost should be approximately double in the AA4 period (in real terms). We consider that a more reasonable per unit cost estimate for the verification digs is [redacted], representing an adjustment of -$0.15m.

Preparation for In-Line Inspection

184. The next ILI inspection is scheduled to be completed in 2025. GGP proposes $0.20m capex in 2024 for 'liaison, easement preparation, flow confirmation, procedure development, risk assessment and mitigation…'[56] GGT points out that the GGP '*easement can be subject to damage from regular cyclonic rains and other natural events. These events can cause significant degradation of access tracks and the right of ways from washaways and subsidence which can make the areas unpassable. This project will inspect and upgrade the easement as necessary to provide a safe place of work for the project team.'*

185. We note that a similar project was included in GGT's AA3 submission with forecast capex of $0.23m. The actual expenditure was $98k[57] and the work was undertaken in the same year as the ILI inspection.

186. Based on the AA3 approach by GGT, the information provided, and our experience, we consider that the ILI preparation work can all be done in the same year as the ILI inspection and moreover the easement grading is best done as close to the ILI work commencing as possible (to avoid rework). On this basis we consider that the work should be undertaken in 2025. Therefore, we consider that no capex on this project should be incurred in the AA4 period.

[54] GGT provided a vendor quote of 'about' $12.3k for digs on the Parmelia Gas Pipeline laterals, but noted that *'it is likely to understate the costs of accessing the far more remote GGT'*

[55] GGT has regulatory approval to inspect the GGP every 10 years via ILI

[56] GGT, Access Arrangement Revision Proposal Supporting Information Attachment 1: CAPEX Business Cases, 1 Jan 2019, Business Case 02, page 2

[57] GGT's response to Information Request EMCa01 – project BC12; note that AA4 Business Case 02 refers to the AA3 project costing $129k

6.3.2 Compressor stations

187. GGT has forecast $5.15m capex over the AA4 period in the Compressor stations asset category, as shown in the table below. The proposed AA4 expenditure is $2.49m (94%) more than GGT's AA3 capex actual/estimate of $2.66m in this category. GGT has proposed three projects, which we consider below.

Table 24: GGT's forecast AA4 capex in the Compressor stations asset category

$m, Real Dec 2018	2020	2021	2022	2023	2024	Total AA4 Capex
Gas Engine Alternator 60,00hrs overhaul program	0.00	0.23	0.00	0.11	0.12	0.45
GGP - Reliability Upgrades	1.50	0.00	0.90	0.00	1.50	3.90
Hazardous Areas rectification program	0.20	0.10	0.20	0.10	0.20	0.80
Total	**1.70**	**0.33**	**1.10**	**0.21**	**1.82**	**5.15**

Source: EMCa table derived from GGT's response to Information Request EMCa01

Gas Engine Alternator 60,000hrs overhaul program

188. GGP bases its Gas Engine Alternator (GEA) service and overhaul timing and scope on the OEM recommendations. In Business Case 04 (BC04), GGT forecasts that four GEA units[58] will reach or exceed 60,000 hours operation in the AA4 period, which is a trigger for engine replacement. GGT estimates an average of approximately [redacted] per unit to exchange the engine.[59]

189. In its initial and revised AA3 Proposals, GGT proposed [redacted] which it forecast would reach 60,000 hours operation, however the expenditure was not required in the AA3 period as the operational hours were much less than forecast.

190. In BC04, GGT presents alternatives to engine replacement at 60,000 hours, and concludes that given the criticality of the plant, following the OEM's recommendations minimises risk and cost.

191. We are satisfied that replacement of the GEAs at 60,000 hours is consistent with GIP and that engine exchange at a unit cost of about [redacted] is reasonable. We are also satisfied that the recommended GEAs for replacement are part of the Covered pipeline.

192. However, we are cognisant of GGT's significant over-estimation of running hours in the AA3 forecast and it has not provided sufficient information to give us confidence in its ability to forecast the GEA operational hours more accurately.

193. Nonetheless, we consider it is reasonable to assume that the three GEAs forecast to exceed 60,000 hours operation by April 2022 will do so by the end of the AA4 period. However, we consider it is more likely than not that GEA1 at Paraburdoo, will not reach 60,000hrs by November 2024, as forecast.

194. We therefore consider $0.33m rather than the proposed $0.45m is likely to satisfy the capex criteria.[60]

[58] Paraburdoo GEA 2 (2021); Wiluna GEA B (2021), Wiluna GEA A (2022), and Paraburdoo GEA 1 (2024)

[59] GGT, Access Arrangement Revision Proposal Supporting Information Attachment 1: CAPEX Business Cases, 1 Jan 2019, Business Case 04, page 2

[60] This amount is consistent with the budget provision for GEA servicing in the AMP, Appendix B, page 40 although the GEA hours and service forecast do not appear to align with the information in Appendix A in BC04

GGP reliability Upgrades

195. The scope of work in Business Case 10 (BC10) is to replace six GEAs and control systems at three compressor stations[61] at a total cost of $3.9m. GGT advises that '*the compressor station power generation systems at these stations are old and are experiencing failures. Yarraloola, as an example, has experienced 10 on-line failures over the last 12 months which on six of the occasions shut down the compression station. Despite expedited responses the failure still resulted in a delivery shortfall on one occasion. The issues appear to simply relate more to the age of the overall generator system rather than a specific maintenance issue*.'[62]

196. GGT also advises that it has assessed the overall risk as 'Intermediate' and 'the more critical assets were mapped and are now undergoing initial reviews of the age, condition and maintenance history/requirements.'

197. GGT's AMP makes no reference to the need for control system upgrades, except at Wiluna in 2018 (i.e. in the AA3 period). The AMP does refer to installation of load banks to help reduce maintenance costs and improve reliability.[63] Aside from the quote above from BC10, no reliability statistics nor condition assessment information has been provided for the units. Furthermore, BC10 states that *'[i]t is anticipated that during 2019 further national planning will enable APA to gather a broad view and understanding of the asset risks now targeted by the criticality and reliability reviews to develop strategic upgrade plans for future years.'*

198. The cost estimates are based on a vendor quote, however GGT advises that 'the design and planning for the replacement project has not yet been scoped or estimated but is labour intensive with plant and contractor support'.[64]

199. Based on the information provided, we consider that:

- GGT does not have sufficient information to support the scope of work – rather it has put forward a 'provisional sum' pending further assessment of the need for the work;
- its options analysis is limited – for example it does not provide a cost-benefit analysis against the counterfactual ('maintaining the current system');[65]
- the cost estimate for the preferred option is very preliminary;
- based on the age of the compressor stations and the failures experienced at Yarraloola, it is reasonable to assume that some expenditure on the GEAs and control systems will be required in the AA4 period; and
- the proposed work is associated with the Covered Pipeline.

200. Taking GGT's propensity to significantly underspend its initial capex forecasts, we consider that only 50% of the proposed $3.9m capex is likely to satisfy the capex criteria.

[61] Yarraloola GEA A, B; Ilgarari GEA A, B and Wiluna GEA A, B

[62] GGT, Access Arrangement Revision Proposal Supporting Information Attachment 1: CAPEX Business Cases, 1 Jan 2019, Business Case 10, page 2

[63] GGP AMP FY17 – FY21, Section 4.6.2.6, page 27

[64] Consistent with its proposed work in BC04, GGT has excluded replacement of the GEAs from the scope of work at Wiluna

[65] Which was requested in Information Request EMCa03

Hazardous Areas rectification program

201. In Business Case 05 (BC05), GGT proposes auditing Ilgarari, Yarraloola, and Wiluna sites (as a priority) and an unspecified number of scraper and mainline valve stations at a total cost of $0.80m. GGT advises that:[66]

- all electrical equipment installed in a hazardous area must be recorded in a Hazardous Area Verification Dossier (HAVD) and that it is a requirement of AS60079 to inspect and demonstrate the continued compliance and safety of electrical installation within hazardous areas;
- the inspections may lead to rectification work for non-conformances;[67] and
- it assesses the compliance risk as low, but the overall risk is Intermediate.

202. We queried GGT's rationale for allowing either $0.10m or $0.20m per site for the compressor stations via two Information Requests, given:

- it reports that *'[c]ompletion of tasks on a current "punchlist" of work to make each station fully compliant during 2019 is expected to cost $20k per site…' and that '[a] further cycle of inspection is scheduled to commence in 2019 at approx. $40k for each of the 4 compressor stations.'*[68]; and
- its AMP recommends a rectification budget of approximately $50k per site.[69]

203. In its response to Information Request EMCa10, GGT advised that:

- *'during the period 2015-2019, hazardous area inspections were carried out at GGP mainline valve and scraper station sites (as well as at the compressor stations),*' and
- *'precise estimation of the costs of hazardous area inspection and rectification work is difficult before inspection has been carried out, and the extent of required rectification work is established. The extent of rectification work will also depend on the complexity of the facilities located at individual mainline valve and scraper station sites…[t]he cost estimate of $200,000 per site is based on the cost of inspection and rectification works at other APA sites where electrical components in the valve actuators did not meet the current hazardous area standards, and upgrading of the actuators was required at a cost of around $250,000 per unit.'*

204. Having considered the information provided by GGT, we consider that:

- GGT does not have a good understanding of the remedial work required at each mainline valve and scraper station, despite its inspection and rectification work in AA3 (including recent activity);
- the options analysis in BC05 is limited – for example, it does not include applying administrative controls to address hazards;

[66] GGT, Access Arrangement Revision Proposal Supporting Information Attachment 1: CAPEX Business Cases, 1 Jan 2019, Business Case 05, page 2

[67] GGT is aware of an issue arising from UV radiation damage to exposed cables, with a known issue at Ilgarari

[68] GGT response to Information Request EMCa22, in which it refers to HA rectification at Yarraloola, Paraburdoo, Ilgarari, and Wiluna

[69] GGP AMP FY17 – FY21, section 4.5.2.2, page 24

- GGT's BC05 cost estimate is based on very preliminary information and broad assumptions and is significantly higher on a per site basis than nominated in its AMP; and
- based on GGT's approach to the hazardous area work at Compressor stations in AA3, a significant portion of the work will be classified as opex (e.g. the audits themselves, creation of dossiers, and maintenance), or booked to other capex projects (see commentary in Section 5.3.4).

205. In summary, GGT does not appear to know what, if any work, and what type of work, is required at five of the six sites, and at Ilgarari, the cost estimate is preliminary.

206. Given GGT's propensity to underspend its initial forecast capex, the uncertainty regarding the scope and cost of work, and the likelihood that some portion of any work done will be classified as opex, we consider that a provision of $50k capex per site[70] or $0.20m[71] is likely to satisfy the capex criteria.

6.3.3 SCADA and communications

207. GGT has forecast $4.96m capex over the AA4 period in the SCADA and communications asset category, as shown in the table below. The proposed AA4 expenditure is $2.99m (252%) more than GGT's AA3 capex actual/estimate of $1.97m in this category.

Table 25: GGT's forecast AA4 capex in the SCADA and communications category

$m, Real Dec 2018	2020	2021	2022	2023	2024	Total AA4 Capex
Flow computer upgrade Programme	0.20	0.59	0.00	0.00	0.00	0.79
GC replacement program	0.20	0.49	0.20	0.00	0.00	0.89
Station RTU Upgrade Program	0.56	0.51	0.41	1.04	0.76	3.28
Total	**0.95**	**1.60**	**0.61**	**1.04**	**0.76**	**4.96**

Source: EMCa table derived from GGT's response to Information Request EMCa01

Flow computer upgrade programme

208. In Business Case 06 (BC06), GGT proposes pro-actively replacing four flow computers[72] in the AA4 period at cost of [redacted] per flow computer. The driver for the work is obsolescence, and the risk of failure of the flow computers in service is assessed by GGT to be Intermediate. GGT states that:[73]

> 'Failure of a flow computer is unsatisfactory and whilst there is [sic] no physical risks resulting, there are manual calculations required which might generate commercial issues should billing estimates of system used gas (SUG) be challenged and /or found to have imposed unfair or inappropriate charges on users. Any issues would not be financially severe, but could impact the integrity of GGP and ultimately lead to longer term consequences for the viability of the pipeline.'

[70] This is consistent with GGT's estimate in its AMP

[71] In BC05, GGT considers Scraper stations and Mainline valves as one site for the purposes of cost estimation – refer to the table on page 5

[72] One each at Parraburdoo, Ilgarari, and Wiluna compressor stations, and Jeedamya scraper station

[73] GGT, Access Arrangement Revision Proposal Supporting Information Attachment 1: CAPEX Business Cases, 1 Jan 2019, Business Case 06, page 2

209. GGT's options analysis only considers two alternatives – replace on failure or pro-active replacement.

210. We queried the unit cost estimate of [redacted] which appeared to be significantly higher than what we assumed to be the $0.08m per unit actual cost in the equivalent AA3 program. GGT advised that instead of the planned six flow computer replacements in AA3, only three were replaced (on the Covered Pipeline) at an average unit cost of [redacted] (which when escalated is close to the AA4 estimate).[74]

211. We also asked GGT to confirm that all of the flow computers were providing fuel gas measurements only to covered GGP assets. In its response, GGT advices that *'[t]he proposed replacement flow computer [at Parraburdoo] will, then, provide fuel gas measurement on both the Covered Pipeline and the uncovered GGP assets.'*[75]

212. Having considered the information provided by GGT, our view is that:

- although GGT has not provided any defect or failure analysis, we are satisfied that GIP is to proactively replace aged, obsolete flow computers - given the age of the nominated flow computers, which varies from 17-24 years at replacement, they are reasonable candidates for replacement in the AA4 period;
- the cost estimate is reasonable, however, whilst the full unit cost estimate can be applied to the other three sites, the full cost of the replacement flow computer at Parraburdoo should not be allocated to the Covered Pipeline; and
- GGT's track record of underspending its initial capex forecast indicates that it may not replace all four flow computers in the AA4 period – the 'youngest' unit, the flow computer at Parraburdoo will be 17 years old in 2021, could be a potential candidate for deferral into AA5. However, Parraburdoo is the most critical site for fuel measurement.

213. We therefore consider that only 70% of the Paraburdoo flow computer cost estimate should be attributed to the Covered Pipeline and that as a consequence it is likely that $0.73m will satisfy the capex criteria.

GC replacement program

214. In Business Case 07 (BC07) GGT proposes proactively replacing [redacted] of the six gas chromatographs[76] on the GGP in the AA4 period at an [redacted] per unit. GGT advise that '*all of the GGP GCs along the pipeline with the exception of Kalgoorlie South are aged and are due to be replaced. Kalgoorlie South is younger and currently acceptable. Whilst fully operational the GCs are an operational threat and support is limited. The units are no longer trouble free and are requiring additional response visits to deal with errors and alarm conditions (see Appendix).*'[77]

215. The chromatographs will be between 25 and 26 years old if replaced as planned in 2021 and 2022. GGT provided a log of maintenance jobs for gas chromatographs in BC07 which show that Kalgoorlie South experienced a fault of some sort on average every three months and Yarraloola (not at the other sites) on average experienced a

[74] GGT response to Information Request EMCa12

[75] GGT response to Information Request EMCa31

[76] At Newman (in 2020), Yarraloola A, Yarraloola B, Mount Keith and Leinster

[77] GGT, Access Arrangement Revision Proposal Supporting Information Attachment 1: CAPEX Business Cases, 1 Jan 2019, Business Case 07, page 2

fault every two months.[78] It is not clear from the information provided why GGT considers Kalgoorlie South's performance acceptable and the other sites, including Yarraloola, to be unacceptable.

216. GGT rate the 'untreated risk' as Low, despite stating in BC07 that: *'[r]edundant and unsupported equipment must be replaced before operational issues arise. The failure of the GC to provide the gas composition readings restricts the ability of GGP to accurately calculate the amount of energy in the gas delivered. This would lead to estimates of the energy which might exceed or understate that delivered.'*

217. GGT considers only two options: (1) repair the units upon failure and wait for On-line SIM;[79] and (2) the preferred option. It assesses option 1 as an unacceptable solution, due to the potential for device unserviceability, the potential for urgent replacement of field equipment, and the possibility that the proposed On-line SIM will be delayed or not proven. No details are provided about the On-line SIM in BC07 or in any other AA documentation.[80]

218. In response to our query regarding the basis for its cost estimate, GGT provided two detailed costing tables for recent gas chromatograph replacement projects and a more detailed explanation of the basis for the AA4 cost estimates.[81]

219. Having considered the information provided by GGT, our view is that:

- GGT has not provided sufficiently compelling information to justify adopting its preferred option rather than replacing on failure;
- GGT has not provided sufficiently compelling information to support the need for replacing [redacted] gas chromatographs in the AA4 period; and
- the proposed work is associated with the Covered Pipeline.[82]

220. Given this and GGT's track record of significantly over-estimating its capex requirements in its initial forecast, we consider that only [redacted] (for [redacted] gas chromatograph replacements) in the AA4 period is likely to satisfy the capex criteria.

Station RTU upgrade program

221. In its Business Case 08 (BC08), GGT proposes:

- changing all 16 Modicon Quantum RTUs over the period 2019-2024, with [redacted] to be replaced in the AA4 period with newer styles. GGT advises that *'[t]he existing units can't be reprogrammed or adjusted to suit APAs [sic] Windows 10 …'* The cost of this 'like-for-like' replacement is estimated at [redacted] or [redacted] per unit; and
- enable the Cathodic Protection systems to operate independently of the station controller – GGT argues that '*completing this work in association with the RTU upgrade is more efficient than as a standalone second program and would*

[78] The maintenance log comprises 21 items, almost half of which are classified as investigations ('FAILINV or INV)

[79] On-line simulation (SIM) software that we understand can derive gas measurements from one or more measurements from gas chromatographs, thereby avoiding the need for multiple gas chromatographs

[80] As noted in section 3.5.9, GGT does refer to the simulation software purchase in its response to Information request EMCa22 in the Other assets category

[81] GGT response to Information Request EMCa13

[82] Based on GGT's response to our Information Request EMCa13(a)

prepare the site for remote control of CP without compromising station security.' The cost of this work is estimated at $0.27m or $0.02m per unit.

222. GGT has included the installation of RTUs for cathodic protection in a separate project. Our assessment of the proposed capex is discussed in Section 6.3.4.

223. GGT allowed $0.34m in its initial AA3 Proposal to replace [redacted] Quantum Station RTUs (i.e. [redacted] per unit). Instead of replacing the units, it replaced the electronic cards in the units.[83] GGT advises that: (1) the RTU vendor '*indicated*' that the units would be obsolete in 2018; (2) purchase of new cards will no longer be possible; and (iii) one-off repair services are being implemented to extend the remaining life where possible.[84]

224. GGT considers the risk of station RTU failure to be Intermediate and considered two options in BC08: (1) repair on failure; and (2) its preferred option. Option 1 was deemed to be unacceptable because of the potential for device unserviceability and the potential for urgent response demands for field equipment.

225. We asked GGT to explain why its AA4 average unit cost for station RTU replacement (like-for-like) is 10 times higher than the AA3 unit cost, given the same scope. In its response, GGT contended that the scope of work was significantly different and reiterated that the current estimates were prepared for each site by Electro80, the equipment supply vendor.[85]

226. We note that GGT's AMP allows for [redacted] pa for replacing obsolete RTUs through to 2025, i.e. [redacted] in the AA4 period.

227. Having considered the information provided by GGT, our view is as follows:

- GGT has not provided compelling information to support the need to replace 13 RTUs in the AA4 period with either like-for-like units nor the extra work associated with the cathodic protection system;
- As discussed in Section 6.3.4, we are not convinced that the introduction of cathodic protection RTUs has been adequately justified by GGT and so therefore the additional $0.27m included in BC08 is not justified;
- GGT's option analysis is inadequate – for a significant capital project, more options should have been considered and a cost-benefit analysis is warranted; and
- GGT's explanation of the difference between its AA3 and AA4 estimates is not credible – however from our experience and the Electro80 documentation, we consider the actual unit cost will be closer to the AA4 estimate than the AA3 estimate.

228. Given this and GGT's track record of significantly over-estimating its capex requirements in its initial forecast, we consider only $1.92m in the AA4 period is likely to satisfy the capex criteria. This equates to a reduction of 36%, which is equivalent to GGT's underspend of its initial AA3 forecast.

[83] Refer to our discussion in Section 5.3.6

[84] GGT, Access Arrangement Revision Proposal Supporting Information Attachment 1: CAPEX Business Cases, 1 Jan 2019, Business Case 08, page 2

[85] GGT response to Information Request EMCa14, which included more detailed costing information in document No. GGP.2373-SOW-J-0001

6.3.4 Cathodic protection

229. GGT has forecast $0.59m capex over the AA4 period in the Pipeline and laterals asset category, as shown in the table below. The proposed AA4 expenditure is $1.98m (77%) less than GGT's AA3 capex actual/estimate of $2.56m in this category.

Table 26: GGT's forecast AA4 capex in the Cathodic protection asset category

$m, Real Dec 2018	2020	2021	2022	2023	2024	Total AA4 Capex
CPU Upgrade program	0.23	0.18	0.33	0.44	0.06	1.23
Total	**0.23**	**0.18**	**0.33**	**0.44**	**0.06**	**1.23**

Source: EMCa table derived from GGT's response to Information Request EMCa01

CPU Upgrade program

230. In Business Case 09 (BC09), GGT proposes proactively upgrading 26 cathodic protection systems at 14 locations to provide remote access communication capability. GGT's drivers for the work are technology obsolescence '…*due to the age of the units, this creates difficulty in sourcing compatible auxiliary equipment especially for communication'* and to *'… enable remote monitoring, fault finding, switching and routine adjustment where necessary.'*[86]

231. GGT has not provided any failure statistics or any other information sufficient to support the need to replace the 26 CPU systems in the AA4 period, noting that GGT rates the risk of CPU failure to be low.

232. Despite the low risk rating, GGT considered the 'Do nothing' option to be unacceptable because of: (i) lack of good communication capability, (ii) risk of ineffective CP protection; and (iii) long term integrity damage if not rectified.[87]

233. GGT's cost estimate is based on replacing the 26 CPU systems at an average cost of [redacted] per system. This is significantly more than the [redacted] per unit allowed for in the AMP,[88] so we assume that the cost increase is attributable to the additional communications functionality in the proposed systems. There is also conflicting information in GGT's AMP which indicates that as at early 2017, there are only 10 more CPU systems to be replaced and that the work would be completed by 2021.[89]

234. Having considered the information provided by GGT, and cognisant of GGTs consistent pattern of significantly underspending its initial capex forecasts, our view is that:

- GGT has not provided a compelling case for proactively replacing the CPU systems nor for upgrading the CPU system with remote communication capability - instead, GGT should revisit the replace on failure option (i.e. its 'Do nothing' option);
- a more appropriate unit cost is [redacted] in the absence of better information about the cost of 'like-for-like' replacement; and

[86] GGT, Access Arrangement Revision Proposal Supporting Information Attachment 1: CAPEX Business Cases, 1 Jan 2019, Business Case 09, page 2

[87] GGT, Access Arrangement Revision Proposal Supporting Information Attachment 1: CAPEX Business Cases, 1 Jan 2019, Business Case 09, page 3

[88] GGP AMP FY17 – FY21, Section 4.4.2.2, page 23

[89] GGP AMP FY17 – FY21, Section 7.3, page 33

- in the absence of any failure data or adequate options and cost-benefit analysis from GGT, we have pro-rated the CPU replacement capex forecast in the AMP, leading to our assumption that it is likely that [redacted] CP system replacements will be required at a unit cost of [redacted]).[90]

235. On this basis, we consider only $0.06m of the proposed $1.23m is likely to satisfy the capex criteria.

6.3.5 Maintenance bases and depots

236. GGT has forecast $0.59m capex over the AA4 period in the Pipeline and laterals asset category, as shown in the table below. The proposed AA4 expenditure is $1.98m (77%) less than GGT's AA3 capex actual/estimate of $2.56m in this category.

Table 27: GGT's forecast AA4 capex in the Maintenance base and depts asset category

$m, Real Dec 2018	2020	2021	2022	2023	2024	Total AA4 Capex
Site Accommodation upgrade program	3.70	0.32	0.00	0.00	0.00	4.02
Karratha maintenance base rebuild	0.15	0.00	0.00	0.00	0.00	0.15
Total	**3.85**	**0.32**	**0.00**	**0.00**	**0.00**	**4.17**

Source: EMCa table derived from GGT's response to Information Request EMCa01

Site accommodation upgrade program

237. GGT's Business Case 03 (BC03) proposes spending approximately [redacted] each on upgrading accommodation at Wiluna and Ilgarari compressor stations, stating that:

> '…[t]he operating philosophy behind the compressor facilities has changed since the original accommodation was constructed around 2000. As a result of these changes more beds and additional manning is required at various locations, which will enable workers to stay on site rather than travel to hotel accommodation alleviating safety issues associated with repeated driving before and after work in remote areas.'[91]

238. GGT rates the risk as Intermediate and presents three options to address the risk in BC03: (1) maintain current circumstances ('Do nothing'); (2) carry out minor maintenance; and (3) the preferred option. There is no cost-benefit analysis. We asked GGT what accommodation was available at Wiluna, having satisfied ourselves that the nearest suitable accommodation from Ilgarari compressor station was about 80km away at Newman. GGT advised that there is no suitable accommodation at Wiluna.

239. BC03 states that '*a detailed design has yet to be finalised so cost estimates are based on previous experience at other locations.'* It has however received indicative pricing from two vendors and included the cheapest price in developing its cost estimate.

240. We note that GGT spent approximately $1.44m in the AA2 period to upgrade Yarraloola accommodation, which was driven by the same arguments. Based on the applicable ratio for allocation of the shared asset to the Covered Pipeline, the capex was $1.15m.

241. Based on the information available, our view is that:

[90] In accordance with the AMP, replacing two per annum in 2020 and 2021 at a unit cost of $15k ($Dec 2016) or approximately $16k ($Dec 2018)

[91] GGT, Access Arrangement Revision Proposal Supporting Information Attachment 1: CAPEX Business Cases, 1 Jan 2019, Business Case 03, page 2

- despite the rudimentary options analysis (including the lack of a cost-benefit analysis), we consider that there is a reasonable case for upgrading the accommodation at Wiluna and Ilgarari (as it has done at Yarraloola) and that the work is deliverable within the AA4 period;
- GGT's cost estimate is preliminary and even with a possible premium for construction in remote locations, the cost seems excessive compared to the Yarraloola actual cost; and
- only 70% of the proposed capex should be allocated to the Covered Pipeline because the facilities will be used as a base for workers on the Covered Pipeline and uncovered assets.

242. Given this and GGT's track record of significantly over-estimating its capex requirements in its initial forecast, we consider only $2.25m capex in the AA4 period is likely to satisfy the capex criteria. To derive this amount, we have reduced GGT's cost estimate by 20% to account for the preliminary nature of the estimate and then allocated 70% of that cost to the GGP Covered Pipeline.

Karratha maintenance base rebuild

243. In Section 5.4.11 of its AA Supporting Information document, GGT advises that:
    - Karratha Maintenance Base supports field operations for the northern end of the GGP and the office walls at the Karratha Maintenance Base had cracked to an extent that suggested the foundations had failed and some settlement had occurred; and
    - remedial action was deferred for a number of years but GGT plans to start remediation work in 2019, which is expected to be completed in 2020. The proposed remediation and expenditure address a safety risk to employees and visitors if the building continues to deteriorate.

244. The total cost of the project is estimated to be $0.42m which is approximately 40% less than GGT's initial AA3 forecast.

245. On the basis of the information provided, we consider the proposed $0.15m AA4 capex is likely to satisfy the capex criteria.

6.4 EMCa adjustment assessment

6.4.1 Compliance with capex criteria

246. Our assessment of GGT's proposed AA4 capex is based on GGT's AAI and supporting information. To a significant extent, our assessments are based on our observations from the onsite meetings that we held with GGT, together with information supplied pursuant to EMCa information requests.

247. We have taken a strict view of our obligations to advise the ERA based on the information that GGT has provided us. It is possible therefore that further information from GGT may lead us to different conclusions.

6.4.2 Aggregate adjustment assessment

248. Our assessed adjustments to GGT's proposed AA4 capex allowance have been applied to each capex category. For the most part, we have adjusted proposed capex for all or part of specific proposed projects or programs, where we consider that the information GGT has provided for our assessment does not demonstrate that the expenditure is likely to satisfy the capex criteria. For some categories, we have made adjustments based on systemic issues that we have identified and described, and which tend to reflect the preliminary nature of justification as currently presented, or generic issues.

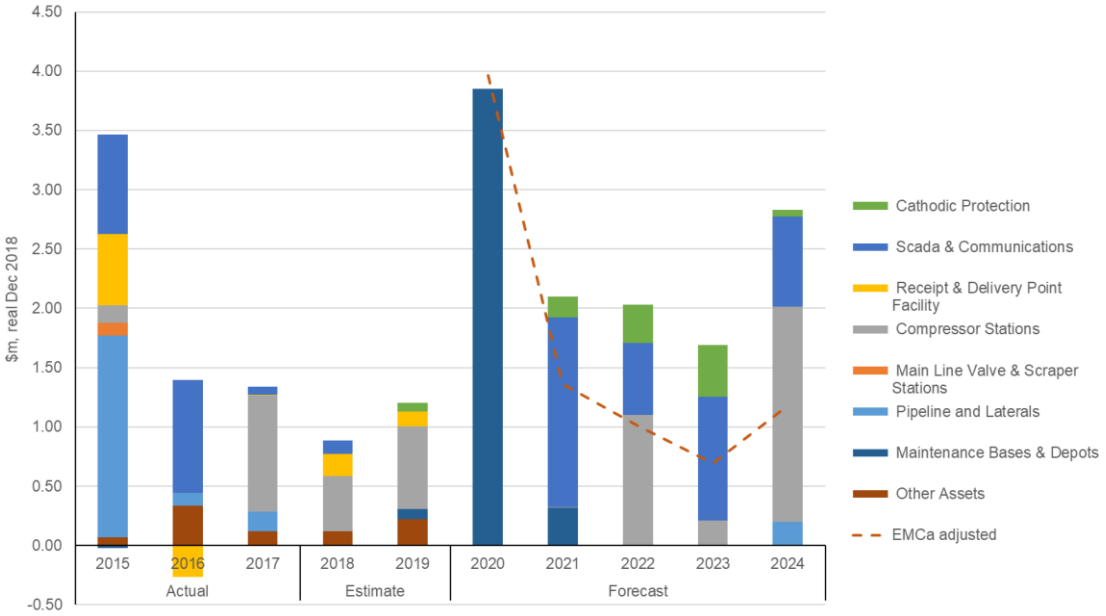
249. The aggregate impact of our assessed adjustments is a reduction to the proposed AA4 capex of $7.85m, which represents 49% of GGT's estimated capex requirement of $16.09m. The adjustments over 5 years are shown in the table and figure below.

Table 28: AA4 adjustment by capex category

$m, real Dec 2019	AA4 Forecast					Total AA4
	2020	2021	2022	2023	2024	
Pipeline and laterals						
GGT proposed	0.39	0.00	0.00	0.00	0.20	0.59
less EMCa adjustment						
ILI Verification dig-up program	-0.14	0.00	0.00	0.00	0.00	-0.14
Preparation for In-line-Inspection	0.00	0.00	0.00	0.00	-0.20	-0.20
Labour escalation adjustment	0.00	0.00	0.00	0.00	0.00	0.00
EMCa Adjusted	**0.24**	**0.00**	**0.00**	**0.00**	**0.00**	**0.24**
Compressor stations						
GGT proposed	1.70	0.33	1.10	0.21	1.82	5.15
less EMCa adjustment						
Gas Engine Alternator 60,000hrs overhaul program	0.00	0.00	0.00	0.00	-0.12	-0.12
GGP - Reliability Upgrades	-0.75	0.00	-0.45	0.00	-0.75	-1.95
Hazardous Areas rectification program	-0.15	-0.05	-0.15	-0.05	-0.20	-0.60
Labour escalation adjustment	0.00	0.00	0.00	0.00	-0.01	-0.02
EMCa Adjusted	**0.80**	**0.27**	**0.50**	**0.16**	**0.74**	**2.47**
SCADA, communications and electronic equipment						
GGT proposed	0.95	1.60	0.61	1.04	0.76	4.96
less EMCa adjustment						
Flow computer upgrade Programme	-0.06	0.00	0.00	0.00	0.00	-0.06
GC replacement program	0.00	-0.49	0.00	0.00	0.00	-0.49
Station RTU Upgrade Program	-0.21	-0.21	-0.10	-0.52	-0.31	-1.35
Labour escalation adjustment	0.00	0.00	0.00	-0.01	-0.01	-0.02
EMCa Adjusted	**0.69**	**0.89**	**0.50**	**0.52**	**0.44**	**3.03**
Cathodic protection						
GGT proposed	0.23	0.18	0.33	0.44	0.06	1.23
less EMCa adjustment						
CPU Upgrade program	-0.22	-0.16	-0.31	-0.43	-0.06	-1.17
Labour escalation adjustment	0.00	0.00	0.00	0.00	0.00	0.00
EMCa Adjusted	**0.01**	**0.01**	**0.01**	**0.01**	**0.00**	**0.06**
Maintenance bases and depots						
GGT proposed	3.85	0.32	0.00	0.00	0.00	4.17
less EMCa adjustment						
Site Accommodation upgrade program	-1.63	-0.14	0.00	0.00	0.00	-1.77
Karratha maintenance base rebuild	0.00	0.00	0.00	0.00	0.00	0.00
Labour escalation adjustment	0.00	0.00	0.00	0.00	0.00	0.00
EMCa Adjusted	**2.22**	**0.18**	**0.00**	**0.00**	**0.00**	**2.40**
TOTAL						
GGT proposed	7.12	2.42	2.03	1.69	2.83	16.09
less EMCa projects/progrtam adjustment	-3.15	-1.05	-1.01	-1.00	-1.63	-7.85
less Labour escalation adjustment	0.00	-0.01	-0.01	-0.01	-0.02	-0.04
Total EMCa Adjusted	**3.96**	**1.36**	**1.01**	**0.69**	**1.18**	**8.20**
Total adjustment ($)	-3.16	-1.06	-1.02	-1.00	-1.65	-7.89
Total adjustment (%)	-44%	-44%	-50%	-59%	-58%	-49%

Source: EMCa analysis

Figure 8: GGT Proposed AA5 capex allowance and EMCa adjusted



Sources: EMCa analysis

7 Proposed AA4 Opex

7.1 Introduction

250. In this section, we first summarise GGT's proposed AA4 opex allowance and the basis on which GGT has sought to justify its proposed expenditure. We then assess the elements of GGT's proposed opex, including its forecasting methodology and assumptions. We consider that some elements of GGT's proposed forecast are not reasonable and, consistent with our brief, we provide an adjusted forecast which we consider provides a reasonable allowance.

7.2 GGT's proposed AA4 opex allowance

7.2.1 Proposed AA4 opex

251. GGT has proposed an AA4 opex allowance of $103.32m (in nominal terms), which compares with $92.1m (in nominal terms) actual/estimated spend in AA3[92]. In $2018 real terms, this represents a proposed AA4 allowance of $95.88m, which compares with $93.89m actual/estimated in AA3.

[92] AAI tables 2 and 11.

Table 29: GGT AA3 actual/estimate and AA4 proposed opex (by category)

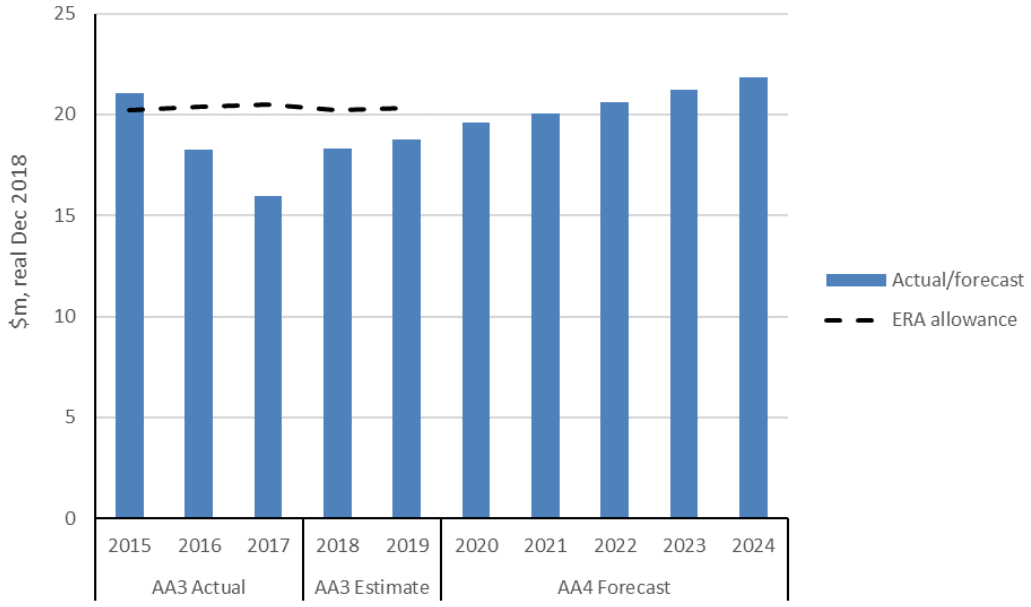
$m, real 2018	Total AA3	Forecast AA4					Total AA4
		2020	2021	2022	2023	2024	
Pipeline Operation	61.27	11.74	11.79	11.99	12.44	12.54	60.51
Major Expenditure Jobs	1.81	0.56	0.68	0.67	0.40	0.50	2.81
Commercial Operation	3.65	0.59	0.59	0.60	0.63	0.63	3.04
Regulatory costs	3.29	1.21	1.09	1.09	1.09	1.09	5.58
Corporate Cost	23.87	4.79	4.79	4.79	4.79	4.79	23.94
Total	**93.89**	**18.89**	**18.94**	**19.15**	**19.34**	**19.55**	**95.88**

Source: GGT AA SI Att. 4 Forecast Opex

252. In real terms, GGT has proposed $2.29m (69%) higher expenditure on Regulatory Costs, and $1.00m more on Major Expenditure Jobs. While GGT's proposed expenditure on Pipeline Operations and Commercial Operations is $1.37m less (in real terms) than for AA3, care needs to be taken with interpreting this as our inspection of GGT's workings shows that these two category figures result from GGT having applied an allocation process to its overall opex forecast.

253. The following graph illustrates how GGT's annual opex has reduced through to 2017, which is the most recent year's 'actual' costs provided. GGT has estimated an increase from its 2017 expenditure in the remaining two years of AA3, with a further upward trend proposed for AA4.

Figure 9: GGT AA3 actual/estimate and AA4 proposed opex



Source: ERA Decision and GGT AA SI Att. 4 Forecast Opex

7.2.2 Basis on which GGT has sought to justify proposed AA4 opex

254. GGT has developed its opex forecast using a 'base-step-trend' (BST) method, with 2017 as its base year. GGT has adjusted this base year expenditure to remove three components (Major Expenditure Jobs, Corporate Costs and Regulatory Costs) which it considers 'irregular' and for which it has prepared separate forecasts. GGT has produced a trended forecast from this adjusted base, to account for its forecast of real labour cost escalation.

255. For the three separate forecasts, GGT has based its proposed Regulatory Cost and Corporate Cost allowances on estimates contained in a report which it commissioned from KPMG. Its forecast for Major Expenditure Jobs (MEJ) comprises specific identification and costing for eight programs of work.

7.3 Assessment of GGT's proposed opex

7.3.1 Base year opex

256. GGT's 2017 actual opex was $15.99m (nominal) and it has used this figure to represent its 'efficient base year' expenditure. To establish its starting base year opex, GGT has deducted from this its actual expenditure of $3.51m (nominal) in that year for the three components which it has separately forecast, being (all nominal):

- MEJ projects: $0.32m;
- Regulatory Costs: $0.31m; and
- Corporate Costs: $2.88m.

257. This results in a base year value of $12.48m, which GGT has converted to a figure of $12.70m in real terms for the purpose of its base-step-trend forecast.

258. We consider it reasonable to forecast MEJ projects separately because of their 'bespoke' nature. We also consider it reasonable to forecast Regulatory Costs separately, because they are cyclical, and the base year actual costs are not representative of costs for each year in the next period. It is less clear to us why GGT has not retained its base year Corporate Costs in its BST forecast, and we return to this in discussing this component of its forecast.

259. We have reviewed the trend of the cost components which make up this base year figure and we find that they have declined in real terms and are less than the equivalent components in the ERA's AA3 allowance. Putting aside the question of which components are included in base opex, GGT has taken a 'pure' approach in using its 2017 actual cost as its base and we consider this to be a reasonable figure for this purpose.

7.3.2 Step changes

260. GGT has not proposed any 'step' changes and on the information presented to us, we consider this to be reasonable.

7.3.3 Trending - labour escalation

What GGT has proposed

261. The only 'trend' factor that GGT has proposed is for its forecast for real labour cost escalation.[93] For this, GGT claims to have used a method that is consistent with the ERA's Final Decision on Western Power.[94] GGT has adopted WA Treasury forecasts for general Wages Price Index (WPI) growth and has added a premium of 0.48% per year

[93] GGT has not proposed any real cost escalation for materials

[94] GGT AAI, Table 41

for wages growth in its sector. After deducting its forecast inflation rates, this results in its proposed real wage growth index as shown in the table below.

Table 30: GGT calculation for its real wages' growth escalation factors

	2018	2019	2020	2021	2022	2023	2024
Treasury Forecast WPI growth (1/2 year lag)	1.50%	1.75%	2.75%	3.00%	3.25%		
plus Premium of EGWWS WPI over Australian All industires	0.48%	0.48%	0.48%	0.48%	0.48%		
Equals Nominal Labour Escalation Forecast per annum	1.98%	2.23%	3.23%	3.48%	3.73%		
Less forecast inflation/cpi per annum	1.87%	1.87%	1.87%	1.87%	1.87%		
Equals Authority consistent Labour Escalation Factor	0.11%	0.36%	1.36%	1.61%	1.86%		
Labour Escalation Factor	0.11%	0.36%	1.36%	1.61%	1.86%	1 86%	1.86%
Index	1.0011	1.0047	1.0184	1.0348	1.0541	1.0737	1.0937

Source: GGT AA SI Att. 4 Forecast Opex

262. GGT estimates that labour comprises 54% of its total opex, and it has therefore escalated its forecast opex by 54% of the escalation implied by its real labour escalation index.[95]

EMCa assessment

263. Before assessing GGT's method, we first note that the relevant table shown in its AA Supporting Information[96] does not reflect the assumptions that we observe in its opex model.[97] It appears that GGT has shifted all data in its AA Supporting Information table forward by two years – that is, the assumptions which it shows for 2020 are in fact the assumptions which in its modelling it has applied in 2018, and so on for the years shown through to 2024. In its modelling, GGT has extrapolated to use its 2022 derived real labour cost escalation factors for that year and for 2023 and 2024.

264. We have based our assessment on the real cost escalation factors and their derivation shown in GGT's opex model, which tallies with the overall opex amounts shown in its regulatory submission.

265. ERA's Western Power decision applies to the years 2018 to 2022 and is for an average real labour cost escalation rate of 0.8%.[98] GGT has proposed rates which average 1.7% per year, noting that this is for the period 2020 to 2024. The main differences lie in two of GGT's assumptions:

- GGT has assumed a premium of 0.5% per year for 'EGWWS' component of a WPI index, against the Australian all industries WPI. In its Western Power decision, ERA used a premium of 0.2%; and[99]

[95] We observe that GGT has applied real labour cost escalation to all components of its proposed allowance (i.e. including those that it has 'separately forecast'), however this total escalation amount is manifest only in those components that GGT has forecast using a BST approach, and which are shown as Pipeline Operations and Commercial Operations in its summary tables. This is because it has calculated these categories through a residual allocation method, after first deducting the (non-escalated) separately forecast items from its (escalated) total opex forecast. This is a matter of presentation only and does not affect GGT's overall opex forecast or our assessment of it.

[96] GGT AA Supporting Information, table 41

[97] GGT opex model, INPUT / FORECAST tab

[98] ERA Final Decision, table 50

[99] Ibid, table 50

- GGT has extrapolated WA Treasury's 2022 WPI forecast (of 3.25%) while using a considerably lower CPI forecast of 1.87% that appears to be derived from figures for an earlier period as is not the same as Treasury's CPI forecast.[100]

266. It is inconsistent to forecast real labour cost escalation rates by combining WPI forecasts from one source with CPI forecasts from another source. WA Treasury has forecast both CPI and WPI to 2022, in its latest Economic Forecasts. These are shown in the table below. Extrapolating Treasury's 2022 forecast to 2024 and averaging over the period 2020 to 2024 results in a real labour cost escalation forecast of 0.70% per year.

Table 31: WA Treasury CPI and WPI forecasts, with extrapolation to 2024

	2018	2019	2020	2021	2022	Extrapolated 2023	2024	average 2020-2024
CPI	1.00%	1.50%	2.00%	2.50%	2.50%	2.50%	2.50%	*2.40%*
WPI	1.50%	1.75%	2.75%	3.00%	3.25%	3.25%	3.25%	*3.10%*
Real wages growth	0.50%	0.25%	0.75%	0.50%	0.75%	0.75%	0.75%	*0.70%*

Source: https://www.treasury.wa.gov.au/Treasury/Economic_Data/Economic_Forecasts/ Accessed 16th April 2019

267. The April 2019 Commonwealth Budget provides forecast CPI and WPI to 2021, as shown below, and which imply a real labour cost escalation rate of 0.63% to that year. Extrapolating the Commonwealth Government's 2021 forecast to 2024 produces an identical real labour cost escalation forecast to that of the WA Treasury (despite some slight differences in inputs), with an average 0.70% per year for the period 2020 to 2024.

Table 32: Commonwealth Government CPI and WPI forecasts (to 2021)

	2018	2019	2020	2021	average 2020-2021
CPI	2.10%	1.50%	2.25%	2.50%	*2.38%*
WPI	2.10%	2.50%	2.75%	3.25%	*3.00%*
Real wages growth	0.00%	1.00%	0.50%	0.75%	*0.63%*

Source: 2019 Commonwealth Budget

268. We consider that the WA Treasury forecasts for CPI and WPI, taken together, provide a reasonable forecast of real general labour cost escalation for WA, and the values are further reinforced by their consistency with values derived from the recent Commonwealth government budget forecasts.

269. This then leaves us to consider GGT's proposed electricity gas water and waste-water services (EGWWS) premium of 0.48% above the general WPI rate.

270. While we have been unable to find GGT's reference source, we assume (by its reference to the Western Power decision) that GGT has sourced its proposed EGWWS premium from a report by Synergies Consulting, where a similar premium can be seen.[101] A slightly lower figure of 0.43% can be seen in an updated Synergies report for

[100] For example, it is close to the CPI average of 1.84% that ERA shows in Table 50 of its Final Decision on Western Power

[101] For example, in Western Power Access Arrangement Supporting Information, Attachment 24: *Wage price index (WPI) and consumer price index (CPI) forecasts*, Synergies Economic Consulting (May 2017), Table 12. These figures are shown only to one decimal place, but the differences appear to average around 0.5%. This report

Western Power,[102] while Synergies also provided a report to ATCO Gas which includes a premium of 0.5%[103] .

271. In our review of ATCO's Access Arrangement submission, we note that there was little if any aggregate premium over the first 20 years that Synergies has analysed. We further state that:

> *'The premium that Synergies has calculated has largely arisen from the lag in EGWWS sector wages falling in the second decade of the data, relative to wages in 'all industries'. We consider this to be only a weak indicator that such a premium will develop again and persist over AA5.'*[104]

272. While retaining premiums of around 0.5% in its forecasts, Synergies Economic Consulting has made similar observations in its reports. For example, in its May 2017 Supporting Information report to Western Power, Synergies states that '*…wages growth for EGWWS has slowed roughly in line with wages in other sectors*'[105] and shows two years of recent data that demonstrates that EGWWS wage rises have been similar to or, in some cases, less than, general wage increases.[106]

273. We consider that the same arguments that we described in our ATCO report apply for GGT and, accordingly, in our adjustment we have not added an 'EGWWS' premium.

274. The result of applying the EMCa adjusted escalation rate is to escalate the labour component of proposed opex by indices which conclude at a 4.3% increase by 2024, rather than 9.4% that GGT has assumed.

7.3.4 Regulatory Cost allowance

275. In place of its base year regulatory cost opex of $0.32m, GGT has proposed an allowance of $1.21m in 2020, and then $1.09m per year in each of the following four years. GGT has claimed its proposed regulatory costs based on estimates contained in a report which it commissioned from KPMG[107] and, in response to EMCa Information Request IR28, GGT provided the derivation of its proposed allowance, comprising the KPMG estimate, together with an allowance for ERA costs.

276. KPMG has estimated a cost for a regulatory function for a business such as GGT ranging from $0.57m to $0.93m with a median of $0.75m[108]. KPMG has arrived at this estimate by considering the resource requirements for such a function. In our

and others relating to the Western Power and ATCO Gas Access Arrangements are publicly available on the ERA website.

[102] Western Power Revised Proposed Access Arrangement Information Supporting Information, Attachment 4.2: *Updated WPI forecasts for Western Power's AA4 regulatory period*, Synergies Economic Consulting (June 2018). The premium can be inferred by subtraction from data in Table 2.

[103] ATCO Gas Access Arrangement Supplementary Information, Attachment 12.9: *Consumer price index and wage price index forecasts,* Synergies Economic Consulting (April 2018). The premium of 0.5% is stated on page 35 and its derivation from 20-year data average is shown on page 23 (3.8% compared to 3.3%).

[104] Review of Technical Aspects of the Proposed Access Arrangement (by ATCO Gas); Report to ERA, EMCa March 2019

[105] Synergies bid (May 2017), page 26

[106] Ibid, page 27

[107] *Corporate cost benchmarking*, KPMG. Report to APA Group (December 2018)

[108] Ibid, table 15

assessment for GGT's AA3 Proposal, we estimated an allowance of $0.70m per year, in part based on our consideration of a KPMG assessment that GGT provided at that time. Converted to $2018, this would equivalent to $0.76m and would therefore be very close to KPMG's current estimate.

277. GGT's average estimate of ERA charges in its proposed allowance is $0.37m per year. This compares with an average for the five years to 2017, of $0.46m.

278. We have also reviewed GGT's actual regulatory costs during AA3. We accept that it would be unreasonable, given the cyclical nature of regulatory costs, to base the allowance on GGT's 2017 actual costs of $0.32m. However, over a complete regulatory cycle of 5 years, the cyclical effect should average out. GGT's regulatory cost over AA3, including ERA charges, averages $0.66m per year in $2018 real terms. Excluding ERA charges, GGT's regulatory costs average $0.23m per year.

279. Although GGT's proposed allowance is similar to the allowance that EMCa considered reasonable for AA3, we cannot accept that GGT's proposed AA4 regulatory cost allowance is reasonable, absent explanation of the differences between its proposed allowance and its average of actual regulatory costs over the current period.

280. Consistent with a preference for 'revealed cost', we tend towards relying on GGT's actual costs as a reasonable estimate of the required allowance, taking an average over the period to allow for cyclical variation. This leads to an adjusted allowance of $0.66m per year, including the allowance for ERA charges.

281. While there would be reason to 'sculpt' this amount to account for cyclical variation, GGT has not done so in its proposal and we therefore have no basis for sculpting the adjusted allowance.

7.3.5 Corporate cost allowance

Should corporate costs be separately forecast?

282. GGT has proposed an AA4 corporate cost allowance of $4.79m per year. GGT's 2017 'base year' corporate costs were $2.94m.

283. GGT states that its corporate costs are derived from APA Group corporate costs, which are allocated to GGT based on relative revenues within the APA Group further allocated to the Covered Pipeline services using pipeline capacity (TJ/day).[109]

284. GGT states that it has separately forecast its corporate costs, because they are 'irregular'.[110] However it is unclear why corporate costs should be considered to be irregular and GGT has provided no further information to support this claim. We observe that GGT's Covered Pipeline-related Corporate costs reduced from 2014 to the most recent actual cost (2017) but it is unclear from the information provided to what extent this results from APA Group cost efficiencies, changes in allocation parameters or possibly changes to the allocation methods used.

285. We sought further information on GGT's allocation methods generally and which we reasoned might help to explain the historical reduction in corporate costs. In its

[109] GGT Access Arrangement Supporting Information, page 85

[110] Ibid, page 78

response[111], GGT referred to tables 4, 5 and 6 of its AA Supporting Information. However, these tables describe the allocation of all costs except corporate costs. On page 3 of its response, having described its accounting treatment of other cost categories, GGT states that '*corporate costs are not costs incurred under the GGT JV arrangements and are not reported.*' We infer that it is for this reason that GGT has not described an allocation method for this.

286. In its response to Information Request IR26, GGT further asserts that the historical corporate costs are not '*relevant to the estimates of …….corporate costs included in the OPEX forecast' and that* 'GGT has not examined the ways in which (they have) been calculated, and has not examined the ways in which they have changed over time.'

Reasonableness of GGT's KPMG-based allowance

287. We then turned to the GGT's proposed allowance, based on its advice from KPMG. KPMG describes its report as aiming to '…*ascertain the efficient level of corporate overheads incurred by an entity with the same characteristics of GGP operating on a stand-alone basis*.' KPMG provides a range estimate for GGT overall of $6.9m to $12.4m per year, with a median of $9.6m. This figure includes its allowance for regulatory costs, which are covered separately as above. GGT arrives at its proposed allowance of $4.79m per year after deducting the regulatory costs component, and after allocating the resulting amount to Covered Pipeline services (based on capacity).[112]

288. KPMG's 2018 median assessment of $9.6m is 36% higher than its equivalent assessment for GGT for AA3.

289. KPMG notes that it has '…*not sought to address the explicit requirements of the National Gas Rules (NGR) for developing prudent and efficient expenditure forecasts'* and that '…*this would require further assessment (e.g. assessment of historical corporate support costs, assessment of corporate support functions, comparison with previous regulatory decisions etc.)…..*'. Consistent with its forecasting method for the majority of its proposed opex, we consider that GGT's most recent revealed cost of $2.94m represents the most reasonable base for its forecast requirements.

7.3.6 MEJ project allowance

290. GGT has proposed eight MEJs which result in an average annual proposed allowance of $0.56m per year.[113] This compares with average AA3 expenditure of $0.36m per year.

291. GGT has listed and described each of the proposed programs in its Supporting Information and provided further information on these programs at our onsite meeting.

292. One of GGT's proposed allowances is for an annual program of 'easement line of site maintenance', at $200,000 per year. This is claimed to be based on its historical costs,[114] however, in reviewing its historical expenditure we observe that it has

[111] GGT response to EMCa Information Request IR25

[112] GGT's workings for this are in a spreadsheet which it provided as part of its response to EMCa's information request IR25

[113] GGT Access Arrangement Supporting Information, table 40

[114] GGT AA Supporting Information, page 82

conducted the work only every second year. We consider this to be an appropriate regime.

293. Noting that GGT records having last undertaken this in 2018, we have allowed for the program again in 2021, 2022 and 2024 and have adjusted out of the MEJ allowances the proposed amounts for 2021 and 2023. This reduces the overall MEJ allowance by $400,000, or an average equivalent of $0.08m per year.

294. While the proposed and adjusted amounts are still greater than its AA3 expenditure, we consider that there is reasonable justification for these programs. Of further relevance in forming our view, we observe that in both AA2 and in AA3 GGT's MEJ expenditure was similar to its forecast. For example, its AA3 estimated expenditure of $1.81m (nominal) compares with its proposed expenditure of $1.94m.[115]

7.4 EMCa adjustment assessment

295. Our assessment of adjustments results from:

- reducing GGT's proposed regulatory costs from its proposal of $1.21m in 2020 and $1.09m per year thereafter, to an average of $0.66m per year;
- reducing GGT's proposed corporate cost allowance from its proposal of $4.79m per year, to $2.94m per year;
- reducing its overall opex forecast to account for a lower real labour cost escalation rate, as described in Section 7.3, and
- reducing GGT's MEJ allowance by $0.40m overall.

296. The adjusted forecast opex allowance is shown in the table and figure below.

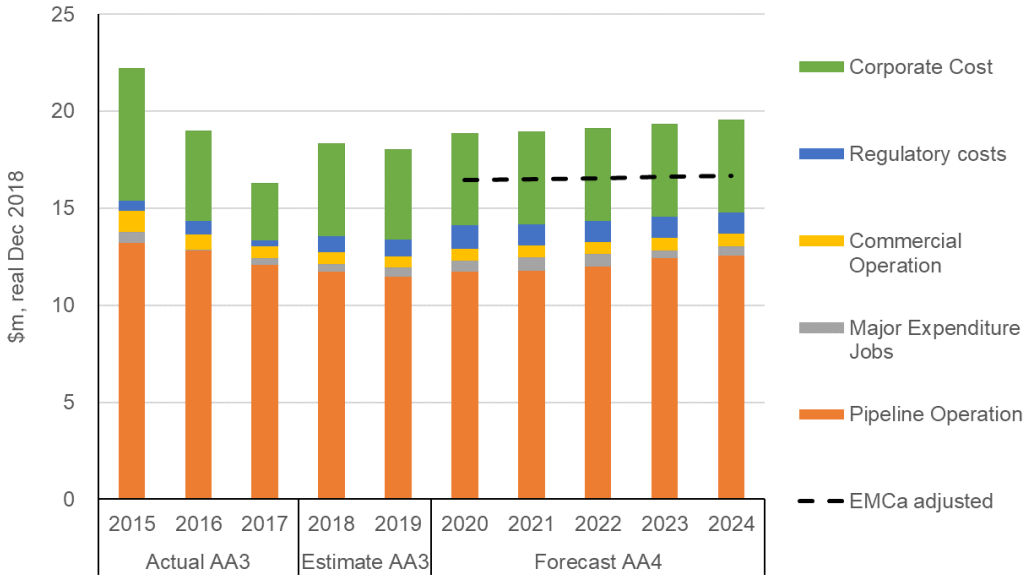
[115] As referred to in EMCa's December 2014 report, at paragraph 193

Table 33: GGT proposed opex allowance and EMCa adjustments

$m, real 2018		Forecast AA4 2020	2021	2022	2023	2024	Total AA4
Pipeline Operation							
	GGT proposed (BST)	11.74	11.79	11.99	12.44	12.54	60.51
less	EMCa escalation adjustment	0.02	0.07	-0.22	-0.25	-0.53	-0.91
	EMCa Adjusted	11.77	11.86	11.77	12.18	12.01	59.59
Major Expenditure Jobs							
	GGT proposed (Separate)	0.56	0.68	0.67	0.40	0.50	2.81
less	EMCa program adjustment	0.00	-0.20	0.00	-0.20	0.00	-0.40
	EMCa Adjusted	0.56	0.48	0.67	0.20	0.50	2.41
Commercial Operation							
	GGT proposed (BST)	0.59	0.59	0.60	0.63	0.63	3.04
less	EMCa escalation adjustment	0.00	0.00	-0.01	-0.01	-0.03	-0.05
	EMCa Adjusted	0.59	0.60	0.59	0.61	0.60	3.00
Regulatory costs							
	GGT proposed (Separate)	1.21	1.09	1.09	1.09	1.09	5.58
less	EMCa program adjustment	-0.55	-0.43	-0.43	-0.43	-0.43	-2.29
	EMCa Adjusted	0.66	0.66	0.66	0.66	0.66	3.29
Corporate Cost							
	GGT proposed (Separate)	4.79	4.79	4.79	4.79	4.79	23.94
less	EMCa inclusion in BST	-1.93	-1.91	-1.93	-1.83	-1.87	-9.47
	EMCa Adjusted (BST)	2.86	2.88	2.86	2.96	2.92	14.47
TOTAL							
	GGT proposed	18.89	18.94	19.15	19.34	19.55	95.88
less	EMCa adjustments	-2.46	-2.47	-2.60	-2.73	-2.86	-13.11
	Total EMCa adjusted	**16.43**	**16.48**	**16.55**	**16.61**	**16.69**	**82.77**
	Total adjustment (%)	*-13%*	*-13%*	*-14%*	*-14%*	*-15%*	*-14%*

Source: EMCa analysis derived from GGT AA SI Att. 4 Forecast Opex

Figure 10: GGT historical and proposed opex allowance, and EMCa adjusted opex forecast



Source: EMCa analysis derived from GGT AA SI Att. 4 Forecast Opex

Appendix A Review Framework

297. In this appendix we firstly provide a summary of the requirements of the National Gas Law (NGL)[116] and the National Gas Rules (NGR)[117], and describe the review framework (based on the requirements of the NGL and NGR) that we have applied in our assessment of the capex and opex proposals included in GGT's revised access arrangement.

298. We have not been requested by the ERA to document compliance of the capex and opex proposals with the individual rules and tests included in the NGR as a part of our assessment.

National Gas Law and National Gas Rules

299. As the owner (service provider) of a covered pipeline, GGT is required to submit a full AA to the ERA and to obtain its approval for the price and non-price terms and conditions of access to the reference service(s) GGT provides through the GGP. The current AA expires on 31st December 2019.

300. When assessing the AA, the ERA is required to have regard to:

- the access arrangement provisions set out in Part 8 of the NGR;
- the price and revenue regulation provisions set out in Part 9 of the NGR; and
- the National Gas Objective (NGO) and the revenue and pricing principles (RPP) set out in sections 23-24 of the NGL.

[116] The National Gas Access (WA) Act 2009 adopts a modified version of the National Gas Law (National Gas Access (Western Australia) Law).

[117] Under the National Gas Access (Western Australia) Law, the National Gas Rules applying to Western Australia is version 1 of the National Gas Rules, as amended by the AEMC in accordance with its rule making power under section 74 of the National Gas Access (Western Australia) Law.

301. Of particular relevance in this context are the provisions the ERA is required to consider when assessing the capex and opex elements of GGT's AA4 Proposal, which are set out in Part 9 of the NGR. An overview of these provisions is provided below.

Capex provisions

302. By virtue of the operation of rules 77(2)(b) and 78(b)[118], the ERA is required to carry out both:

- an ex post assessment of the capex incurred (or to be incurred) by GGT in AA3 to determine whether it satisfies the conforming capex criteria in rule 79(1); and
- an ex ante assessment of the capex GGT proposes to incur in AA4 to determine whether it is likely to satisfy the conforming capex criteria in rule 79(1).

303. Conforming capex is defined in rule 79(1) as capex that satisfies the following criteria:

- the capex 'must be such as would be incurred by a prudent service provider acting efficiently, in accordance with good industry practice, to achieve the lowest sustainable cost of delivering pipeline services' (the 'prudent service provider test') (r. 79(1)(a)), and
- the capex must be justifiable on one of the following grounds (r. 79(1)(b)):
  - (a) the overall economic value of the expenditure is positive (the 'economic value test') (r. 79(2)(a))[119]; or
  - (b) the present value (PV) of the expected incremental revenue exceeds the PV of the capex (the 'incremental revenue test') (r. 79(2)(b))[120]; or
  - (c) the capex is necessary to:
    - (i) maintain and improve the safety of services (r. 79(2)(c)(i)); or
    - (ii) maintain the integrity of services (r. 79(2)(c)(ii)); or
    - (iii) comply with a regulatory obligation or requirement (r. 79(2)(c)(iii)); or
    - (iv) maintain the service provider's capacity to meet levels of demand for services existing at the time the capex is incurred (r. 79(2)(c)(iv)); or

[118] Rule 77(2) sets out how the opening value of the capital base at the commencement of a new AA period is to be calculated, while rule 78 sets out the value of the capital base during the AA period is to be calculated. In short, these two rules only allow conforming capex to be rolled into the value of the capital base.

[119] Rule 79(3) sets out the matters to be considered when applying the economic value test. In short, this rule only allows consideration to be given to the economic value directly accruing to the service provider, gas producers, users and end-users when determining whether the overall economic value of the capex is positive.

[120] Rule 79(4) sets out what is to be considered when applying the incremental revenue test. In short, this rule requires:

- a tariff to be assumed for the incremental services based on (or extrapolated from) prevailing reference tariffs, or an estimate of the reference tariffs that would have been set for comparable services if those had been reference services; and
- incremental revenue to be taken to be the gross revenue to be derived from the incremental services less incremental opex; and
- the discount rate is to be based on the rate of return implicit in the reference tariff.

(d) the capex is divisible into two parts, with one part referable to incremental services and justifiable under 79(2)(b) and the other part referable to a purpose under 79(2)(c) and justifiable on this basis (r. 79(2)(d)).

304. In accordance with rule 79(6), the ERA's discretion under rule 79 is limited. It cannot therefore withhold its approval of the capex incurred by GGT in AA3 or the capex it proposes to incur in AA4, if it is satisfied the capex complies with:

- the criteria set out above;
- rule 74(2), which states that any forecast or estimate must be arrived at on a reasonable basis and represent the best forecast or estimate possible in the circumstances; and
- any other relevant provision in the NGL and/or the NGR.

305. Finally, in determining whether capex is efficient and complies with other criteria prescribed in the rules, rule 71 states that the ERA may, without embarking on a detailed investigation, infer compliance from the operation of an incentive mechanism or any other basis the ERA considers appropriate. It must, however, consider, and give appropriate weight to, submissions and comments received.

Conforming capex vs non-conforming capex

306. Where the capex proposed by GGT (in whole or in part) is found to:

- satisfy rule 79, it will be considered conforming capex for the purposes of rules 77(2) and 78 and rolled into the capital base (i.e. it will be included in the derivation of the reference tariff(s)); or
- not satisfy rule 79, it will be considered non-conforming capex and excluded from the capital base (i.e. it will be excluded from the reference tariff(s)).

307. In this context that while non-conforming capex cannot be recovered through the reference tariff(s), GGT may still undertake this form of capex and either:

- recover that expenditure, or a portion thereof, through a surcharge (r. 83) or a capital contribution (r. 82); or
- include the investment in a notional fund, referred to as the 'speculative capital expenditure account', which may be rolled into the capital base at a later date if the capex is found to satisfy the conforming capex criteria (r. 84).

Opex provisions

308. The criteria the ERA is required to consider when assessing GGT's proposed opex for AA4 are set out in rule 91 of the NGR, which is reproduced below:

> *Operating expenditure must be such as would be incurred by a prudent service provider acting efficiently, in accordance with accepted good industry practice, to achieve the lowest sustainable cost of delivering pipeline services.*

309. The ERA's discretion under this rule is limited (r. 91(2)), which means the ERA may not withhold its approval, if it is satisfied GGT's proposal complies with:

- the criteria set out in rule 91(1);

- rule 74(2), which states that any forecast or estimate must be arrived at on a reasonable basis and represent the best forecast or estimate possible in the circumstances; and
- any other relevant provisions in the NGL and/or the NGR.

310. In a similar manner to capex, rule 71 states that in determining whether opex is efficient and complies with other criteria prescribed in the rules, the ERA may, without embarking on a detailed investigation, infer compliance from the operation of an incentive mechanism or any other basis the ERA considers appropriate. It must, however, consider, and give appropriate weight to, submissions and comments received.

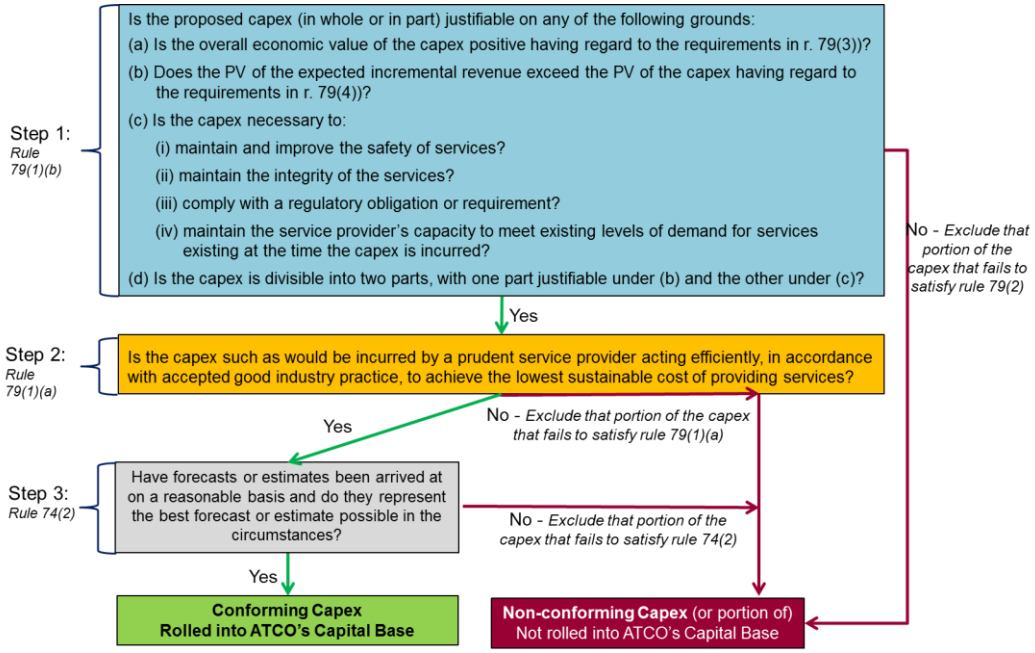
Assessment framework

311. An overview of the frameworks we have used to assess GGT's capex and opex proposals is provided below.

Capex assessment framework

312. The framework we have used to assess whether the capex incurred (or to be incurred) by GGT in AA3 and its proposed capex for AA4 can be considered conforming capex is depicted in the figure below.

Figure 11: Capex assessment framework



313. As the figure above highlight highlights, the framework consists of three steps, which are based on the specific requirements set out in rules 79 and 74(2). Where there is discretion as to which ground is relevant under rule 79(2), we have based our assessment on the grounds that GGT has identified, and we have reviewed the evidence GGT has provided in support of this ground. Further detail on the matters we have considered in each step is provided below.

Step 1: Is the expenditure justifiable on a ground set out in rule 79(2)?

314. The first matter we have considered when assessing GGT's capex proposal is whether the expenditure can be justified on any of the grounds set out in rule 79(2).

315. For those capex projects (or a portion thereof) that GGT has claimed the economic value is positive (r. 79(2)(a)) or that the expenditure satisfies the incremental revenue test (r. 79(2)(b)), we have had regard to a range of matters, including:

- rules 79(3) and 79(4), which set out how the economic value of a project and the present value of incremental revenue are to be calculated; and
- the analysis GGT provided in support of its claim and its underlying assumptions.

316. For those capex projects (or a portion thereof) where GGT has claimed the expenditure is necessary to maintain the safety or integrity of the services, comply with a regulatory obligation and/or maintain the capacity to meet existing levels of demand (r. 79(2)(c)), we have, amongst other things, had regard to:

- GGT's Asset Management Plan (AMP);
- GGP's Safety Case (Safety Case) and the formal safety assessments (FSA) carried out by GGT;
- the Gas Standards (Gas Supply and System Safety) Regulations 2000;
- Australian Standard AS2885 (Pipelines – Gas and Liquid Petroleum Pipelines);
- other regulatory requirements that GGT is required to comply with; and
- the analysis GGT provided in support of its claim and its underlying assumptions.

317. As the figure above indicates, if the capex project in whole, or in part, is found to:

- be justified under rule 79(2), we have then considered whether it satisfies the prudent service provider test in rule 79(1)(a) (Step 2); and
- not be justified under rule 79(2), then we have deemed the expenditure to be non-conforming capex.

Step 2: Does the capex satisfy the prudent service provider test in rule 79(1)(a)?

318. The second matter we have considered is whether the proposed expenditure on capex projects that are justified under rule 79(2) is 'such as would be incurred by a prudent service provider acting efficiently, in accordance with good industry practice, to achieve the lowest sustainable cost of providing the service'.

319. In conducting this assessment, we have considered a range of matters (some of which are more or less relevant to particular projects or programmes of work), including:

- the project governance framework employed by GGT, the key elements of which are GGT's: business planning process; AMP and Safety Case; investment governance arrangements; IT strategy and AMP; forecasting methodology; procurement policies; and risk management plan;
- the project management and procurement processes employed by GGT on particular projects and the nature of any outsourcing arrangements it has entered into (e.g. competitive tender or related party transaction);
- GGT's capability to deliver the proposed projects efficiently in the time proposed;

- the extent to which GGT has adequately assessed and accounted for any benefits from productivity or efficiency enhancing programs (benefits realisation);
- the actual costs incurred by GGT in AA3 relative to what it has proposed for AA4;
- GGT's compliance with Australian standard AS2885; and
- benchmarking of approaches and/or costs against other gas pipelines and/or regulated businesses provided by GGT.

320. As the figure above indicates, where the expenditure in whole, or in part, is found to:

- satisfy the prudent service provider test, we have considered whether the proposed expenditure satisfies rule 74(2) (Step 3); and
- not satisfy the prudent service provider test, then we have excluded that portion of the expenditure that is deemed to fail this test.

Step 3: Do any forecasts or estimates comply with rule 74(2)?

321. The final matter we have considered is whether the forecasts or estimates underlying those capex projects that are justifiable under rule 79(2) and satisfy the prudent service provider test, have been arrived at on a reasonable basis and represent the best forecast or estimate possible in the circumstances, as required by rule 74(2).

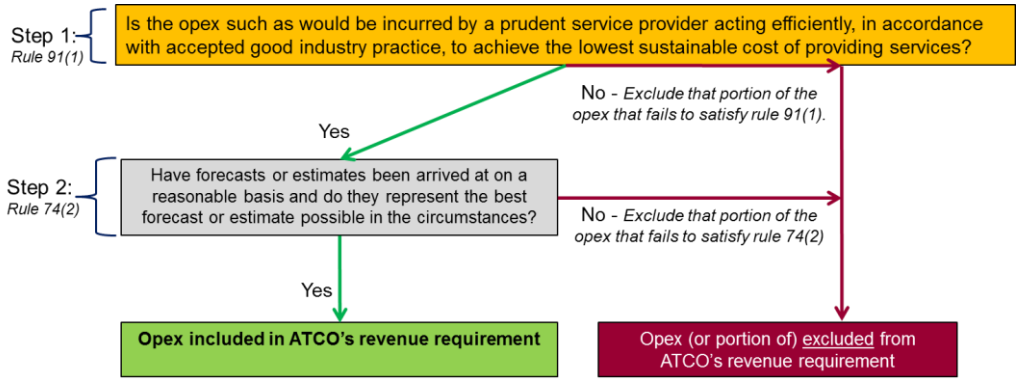
322. As the figure above highlights, where the forecasts and/or estimates are found to:

- satisfy this rule, the proposed expenditure has been deemed to comply with the conforming capex criteria; and
- not satisfy this rule, then we have excluded that portion of the expenditure that fails to satisfy this rule, on the grounds that a prudent service provider would not expect to incur this expenditure (r. 79(1)(a)).

Opex assessment framework

323. The figure below sets out the framework we have used to assess GGT's proposed AA4 opex.

Figure 12: Opex assessment framework



324. The questions considered under steps 1 and 2 of this framework are broadly the same as those considered under steps 2 and 3 of the capex assessment framework. The matters that we have considered when applying this framework are therefore largely the same as those set out in the earlier section of this Appendix, albeit focused on opex rather than capex.

325. The only additional matters that we have considered under Step 1 of this framework, which are not relevant to capex are:

- the methods used by GGT's parent company (the APA Group) to allocate corporate overheads to the GGP and the extent to which:
  - the APA Group provides services that justify this as an expenditure item recoverable through regulated tariffs; and
  - there is any overlap in services provided by GGT and the APA Group; and
- the nature of any discretionary opex projects proposed by GGT (e.g. business development and marketing) and the extent to which these projects are expected to yield a net economic benefit for consumers.