OPTIONS EVALUATION REPORT (OER)

FY24-28 - Replace capacitors end of life

OER- N2473 revision 3.0

Ellipse project no(s):
TRIM file: [TRIM No]

Project reason: Capability - Asset Replacement for end of life condition
Project category: Prescribed - Replacement

Approvals

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Change history

Revision	Date	Amendment
0	18/10/2021	Initial revision
1	10/11/2021	Minor wording updates
2	10/11/2021	Formatting updates
3	14/11/2021	Minor formatting updates

Executive summary

Capacitor banks are required to enable system voltage levels to be maintained within ±10% of nominal which is a requirement under the NER Clause S5.1.a.4. Many capacitor banks within the TransGrid network have exceeded their technical life and a selection of these are recommended for replacement during the 2023-2028 regulatory period. The capacitor banks under this OER are across a range of locations, voltage levels and ratings.

Spares support for the capacitor banks is minimal and acquiring spares is feasible but expensive and has a long lead time. If spares were available, the risk associated with failure of the asset is still significant. The replaced units will be retained as spares to support the sibling units throughout the wider network.

If a capacitor bank is not available at times of high load it will require load to be shed to ensure system voltage levels remain within ±10%. This need is based on economic benefits. The key economic benefit associated with addressing this need is a reduction of risk, valued as direct impact to TransGrid and consumers predominantly due to involuntary load shedding.

The assessment of the options considered to address the need appear in Table 1. Option A involves only replacement of the capacitor cans and option B includes the capacitor cans, detuning reactors, neutral unbalance current transformers and associated control and protection.

Table 1 - Evaluated options

Asset	Option	Description	Direct capital cost ($m)	Network and corporate overheads ($m)	Total capital cost[1] ($m)	Weighted NPV (PV, $m)	Rank
Kempsey No 1 Capacitor	A	Replace Capacitor Cans Only	1.38	0.12	1.50	0.01	2
	B	Renew Capacitor Bank Bay	2.23	0.22	2.45	1.91	1
Narrabri No 2 Capacitor	A	Replace Capacitor Cans Only	1.39	0.11	1.50	12.62	1
	B	Renew Capacitor Bank Bay	1.74	0.17	1.92	12.35	2
Narrabri No 3 Capacitor	A	Replace Capacitor Cans Only	1.74	0.15	1.89	37.58	2
	B	Renew Capacitor Bank Bay	0.23	2.38	2.61	152.97	1
Coffs Harbour No 1 Capacitor	A	Replace Capacitor Cans Only	1.60	0.14	1.74	-0.36	2
	B	Renew Capacitor	2.22	0.22	2.44	0.94	1

[1] Total capital cost is the sum of the direct capital cost and network and corporate overheads. Total capital cost is used in this OER for all analysis.

Asset	Option	Description	Direct capital cost ($m)	Network and corporate overheads ($m)	Total capital cost[1] ($m)	Weighted NPV (PV, $m)	Rank
		Bank Bay					
Beryl No 2 Capacitor	A	Replace Capacitor Cans Only	1.62	0.14	1.76	2.73	2
	B	Renew Capacitor Bank Bay	2.20	0.22	2.42	24.80	1
Wellington No 1 Capacitor	A	Replace Capacitor Cans Only	2.32	0.22	2.55	-1.45	2
	B	Renew Capacitor Bank Bay	2.66	0.27	2.93	-1.38	1

It is recommended to proceed with the renewal program with a total value of $11.42 million comprising:

- Option A for Narrabri No 2 capacitor
- Option B for Kempsey No 1, Narrabri No 3, Coffs Harbour No 1, and Beryl No 2 capacitor bank.

Wellington No 1 Capacitor bank is not recommended to proceed based on its negative NPV.

1. Need/opportunity

Capacitor banks are comprised of the components listed in Table 2 along with the typical issues that the components experience as they approach end of life.

Table 2 – Capacitor bank components and typical issues

Component	Description	Typical Issues
Capacitor cans	Unitised elements providing VArs as part of the overall capacitor bank rating.	Failures of individual cans. Expected depletion of remaining spares.
Detuning reactors	Reactors to tune the capacitor bank to manage switching current harmonics.	Deterioration of insulation, leading to treeing and flashover.
Neutral unbalance current transformers	Utilised to detect failures in the capacitor cans	Deterioration, leaks, corrosion
Control and protection systems	Utilised to detect failures in the capacitor cans and control energising of the capacitor bank based on voltage regulation.	Power supply failures, electronics failures. In ability to clear faults and energise capacitor bank when required.

TransGrid has 184 capacitor banks, including those associated with static var compensators (SVCs). By 2027/28, 60 capacitor banks will have reached or exceeded their expected life of 30 years. Of these, 49 are already past their expected life in 2020/21. The likelihood of capacitor can and reactor failure increases as these units continue to age.

The population under consideration to address the increasing risk have been in service for longer than 30 years as of 2020/21, as shown in the table below. The capacitor banks selected for consideration of replacement are across a range of voltages and capacities. Each capacitor bank is one of several similar units, with the capacitors cans and air core reactors to be retained to support the remaining units

The capacitor banks were selected to be considered for replacement on the basis that they include sibling units (capacitor cans, reactors or both), that they are among the oldest units in the network, while covering a range of voltages and capacities. Being one of several similar units, the original capacitor cans and air core reactors can be utilised as spares for the remainder of the group. As of 2020/21, there are two spare air core reactors, and insufficient capacitor cans to replace a complete capacitor bank. Retaining the used components from the replacement program will generate spares which can be utilised elsewhere.

Table 3 – Capacitor banks considered under this need

Capacitor bank	Ratings	Reactors installed	Age (2028)	Key issues	Remaining population details
Kempsey No 1 Capacitor	132kV 7.5MVAr	3	47	Limited spare cans 2 Spare Reactors	Capacitors: Coffs Harbour No 1, Beryl No 2 Reactors: Port Macquarie No 3 and Kempsey No 2

Capacitor bank	Ratings	Reactors installed	Age (2028)	Key issues	Remaining population details
Narrabri No 2 Capacitor	11kV 4.8MVAr	0	47	No spare cans	Narrabri No 1 Capacitor Bank
Narrabri No 3 Capacitor	66kV 12.4MVAr	3	47	Limited spare cans No spare reactors	Capacitors: None matching Reactors: Coffs Harbour No 1
Coffs Harbour No 1 Capacitor	66kV 8MVAr	3	47	Limited spare cans No spare reactors	Capacitors: Kempsey No 1, Beryl No 2 Reactors: Narrabri No 3
Beryl No. 2 Capacitor	66kV 10MVAr	6	45	Limited spare cans No spare reactors	Capacitors: Coffs Harbour No 1, Kempsey No 1 Reactors: Parkes No 2 Capacitor Bank
Wellington No 1 Capacitor	132kV 19.1MVar	6	45	Limited spare cans No spare reactors	Capacitors: Darlington Point No 1. Reactors: Nil.

For all capacitor banks assessed in this OER, modelling of the network has been performed to quantify the load shedding resulting from a capacitor bank failure. Insufficient capacitive capacity during high load conditions will lead to system volts dropping below the acceptable level. Load will need to be shed in order to maintain system voltage levels to within 10% of nominal volts as required by NER Clause S5.1.a.4. It follows that this project has an economics benefits need. The economic benefits for consumers arise from avoided risk of load shedding relative to the base case.

In assessing the ongoing viability of the capacitor banks, several factors have been considered. These factors include existing spares holdings, plus the ability to source more spares; general condition of the equipment and age. Spares support for old equipment of any variety is a challenge. Experience has shown that following a larger failure of multiple capacitor cans the replacement requires a special manufacturing run resulting in a significant expense with a long lead time. Similar issues have been identified across the cohort of older equipment.

Assuming that a complete capacitor bank and air core reactor were available, the restoration time is estimated at 1 week and this is the basis of the quantified risk costs in this OER. During this period, there is an amount of energy expected to be unable to be supplied. Replacing the capacitor banks and/or replacing all the associated equipment within the capacitor bank bay will significantly reduce the risk of unserved energy.

2. Related needs/opportunities

The following projects could interface with works in the capacitor bays:

- N2409 Kempsey Secondary Systems Renewal
- N2435 Narrabri Secondary Systems Renewal
- N2437 Coffs Harbour Secondary Systems Renewal
- N2213 Beryl Secondary Systems Renewal
- N2411 Wellington Secondary Systems Renewal

All these projects include the renewal of the protection and control elements associated with the capacitor banks in their scope. The outages associated with renewing the capacitor bank will need coordinating with the various secondary systems renewals. In addition, if the various secondary system renewal projects do progress, the scope overlap between the projects will need to be addressed.

3. Options

3.1 Base case

In this scenario, the capacitor bank will run until it fails, which will necessitate the replacement of the complete capacitor bank and/or air core reactor. There is no additional maintenance or asset monitoring which will address the increasing risk of failure of these assets. There are insufficient spare cans, and only Kempsey has spare air core reactors to permit restoration following a failure.

Table 4 – Spares costing

Component	Approximate cost of spares per site ($ thousand)
Capacitor cans	150
Reactor	120
Neutral unbalance CT	30

The base case risks for each capacitor are outlined in the table below. This is the risk presented by the capacitor cans and reactors. The primary risk is load shedding, however safety, environment, financial and reputational risk are part of risk. The base risk assuming spares are held is the risk value used in the economic evaluation in this OER. The base risk if spares were not available is included for reference and represents the additional risk due to extended restoration times.

Table 5 – Base risk

Capacitor Bank Bay	Base Risk assuming spares are held ($ million)	Base risk if spares were not available ($ million)
Kempsey No 1 Capacitor	$0.07	$3.00
Narrabri No 2 Capacitor	$0.28	$7.14
Narrabri No 3 Capacitor	$3.16	$143.96
Coffs Harbour No 1 Capacitor	$0.05	$2.07
Beryl No 2 Capacitor	$0.21	$10.61
Wellington No 1 Capacitor	$0.002	$0.06

3.2 Options evaluated

Option A — Replace Capacitor Bank NOSA-N2473

For all capacitor banks, the scope of work for option A includes only the capacitor cans and associated steelwork.

Table 6 – Included components

Component	Included in Option

Component	Included in Option
Capacitor cans and steelwork	Yes
Air core reactor	No
Neutral unbalance current transformer	No
Protection and control	No

The risks associated with the air core reactors, neutral unbalance current transformers, and protection and control hardware are not addressed in this Option. This would leave some of the risks listed in Table 5 will not be mitigated under this option, primarily the risk associated with load shedding due to the other components failing.

For the same given rating, a new capacitor can is significantly smaller and lighter than those installed during the 1980s. New capacitor banks will utilise a new design provided by equipment manufacturers. As far as is practical, replacements align the design of components. This alignment has many advantages, including improved safety (due to the units being lighter), spare parts being available across a greater range of assets, the and new models being supported by the manufacturers, both technically and through spares. The cost difference between a true 'like for like' and transitioning to the newer design was assessed, and was found to be virtually indistinguishable cost wise.

All capacitor banks to be replaced are one of several similar installations, and as such all capacitor cans are to be retained as spares for those similar installations.

Table 7 – Overview for Option A

Capacitor Bank Bay	Project Time (months)	Construction Time (months)	Estimated Cost ($, million)	OFS link
Kempsey No 1 Capacitor	21	2	1.5	OFS-N2473_KS1_1_A
Narrabri No 2 Capacitor	21	2	1.5	OFS-N2473 NB2 2 A
Narrabri No 3 Capacitor	21	2	1.89	OFS-N2473 NB2 3 A
Coffs Harbour No 1 Capacitor	21	2	1.74	OFS-N2473-COF A
Beryl No. 2 Capacitor	21	2	1.76	OFS-N2473-BER A
Wellington No 1 Capacitor	21	2	2.55	OFS-N2473-WL1 A

Option B — Renew Capacitor Bank Bay NOSA-N2473

This option involves the renewal of all equipment associated with the capacitor bank capability. Thus, any air core reactors, neutral unbalance current transformers and associated protection and control would be replaced under this project. In line with Option A, air core reactors and capacitor cans would be retained as spares for the similar units. This option renews all equipment contributing to the risks listed in Table 5.

Table 8 – Included components

Component	Included in Option
Capacitor cans and steelwork	Yes

Component	Included in Option
Air core reactors	Yes
Neutral unbalance current transformer	Yes
Protection and control	Yes

A summary of this option is included in the table below:

Table 9 – Overview for Option B

Capacitor Bank Bay	Project Time (months)	Construction Time (months)	Estimated Cost ($, million)	OFS link
Kempsey No 1 Capacitor	24	3	2.45	OFS-N2473 KS2 1 B
Narrabri No 2 Capacitor	24	3	2.11	OFS-N2473 NB2 2 B
Narrabri No 3 Capacitor	24	3	2.61	OFS-N2473 NB2 3 B
Coffs Harbour No 1 Capacitor	24	3	2.44	OFS-N2473 COF B
Beryl No. 2 Capacitor	24	3	2.64	OFS-N2473 BER B
Wellington No 1 Capacitor	24	3	2.93	OFS-N2473 WL1 B

Both Option A and Option B will generate spare parts for the remaining sibling units thereby enabling their expedite return to service. This project would facilitate the rapid restoration of the sibling units. This benefit has not been modelled as part of the analysis. However, it should permit many of the similarly old units to be run through the regulatory period 2023-2028.

3.3 Options considered and not progressed

The following options were considered but not progressed:

Table 10 – Options not progressed

Option	Reason for not progressing
Increased maintenance or inspections	The condition issues have already been identified and cannot be rectified through increased maintenance or inspections, and therefore is not technically feasible to address the need.
Elimination of all associated risk	This can only be achieved by retiring the assets, which is not technically feasible due to the requirement to maintain the existing network reliability.
Non-network solutions	It is not technically feasible for non-network solutions to provide the functionality of the equipment under this need.

4. Evaluation

4.1 Commercial evaluation methodology

The economic assessment undertaken for this project includes three scenarios that reflect a central set assumptions based on current information that is most likely to eventuate (central scenario), a set of assumptions that give rise to a lower bound for net benefits (lower bound scenario), and a set of assumptions that give rise to an upper bound on benefits (higher bound scenario).

Assumptions for each scenario for repex projects are set out in the table below.

Table 11 – Scenario assumptions

Parameter	Central scenario	Lower bound scenario	Higher bound scenario
Discount rate	4.8%	7.37%	2.23%
Capital cost	100%	125%	75%
Operating expenditure benefit	Not Applicable		
Risk cost benefit	100%	75%	125%
Other Benefits	Not Applicable		
Scenario weighting	**50%**	**25%**	**25%**

Parameters used in this commercial evaluation:

Table 12 – Commercial evaluation parameters

Parameter	Parameter Description	Value used for this evaluation
Discount year	Year that dollar values are discounted to	2020/21
Base year	The year that dollar value outputs are expressed in real terms	2020/21 dollars
Period of analysis	Number of years included in economic analysis with remaining capital value included as terminal value at the end of the analysis period.	25 Years
ALARP disproportionality (repex only)	Multiplier of the environmental and safety related risk cost included in NPV analysis to demonstrate implementation of obligation to reduce to ALARP.	Refer to section 4.3 for details.

The capex figures in this OER do not include any real cost escalation.

4.2 Commercial evaluation results

The commercial evaluation of the technically feasible options is set out in Table 13. Details appear in Appendix A.

Table 13 - Commercial Evaluation (PV, $ million)

Asset	Option	Capital Cost PV	Central scenario NPV	Lower bound scenario NPV	Higher bound scenario NPV	Weighted NPV	Ranking
Kempsey No 1 Capacitor	A	1.08	-0.13	-0.69	1.00	0.01	2
	B	1.61	1.46	-0.26	4.97	1.91	1
Narrabri No 2 Capacitor	A	0.91	10.93	4.45	24.20	12.62	1
	B	1.39	10.64	4.15	23.99	12.35	2
Narrabri No 3 Capacitor	A	1.1	32.74	14.46	70.36	37.58	2
	B	1.59	133.76	61.21	283.16	152.97	1
Coffs Harbour No 1 Capacitor	A	1.1	-0.48	-0.96	0.47	-0.36	2
	B	1.49	0.59	-0.75	3033	0.94	1
Beryl No. 2 Capacitor	A	1.1	2.22	0.28	6.19	2.73	2
	B	1.47	21.46	8.93	47.35	24.80	1
Wellington No 1 Capacitor	A	1.6	-1.51	-1.78	-0.99	-1.45	2
	B	1.78	-1.49	-1.93	-0.61	-1.38	1

The NPV is shown assuming that spares are procured, and the NPV would be higher for all sites if spares were not available, driven primarily by the extended outage durations should a failure occur. Having a viable set of spares significantly reduces the overall risk with any given site. The replacement and renewal program will generate spares for all the sibling sites.

4.3 ALARP evaluation

TransGrid manages and mitigates bushfire and safety risk to ensure they are below risk tolerance levels or ‘As Low As Reasonably Practicable’ (‘ALARP’), in accordance with the regulation obligations and TransGrid’s business risk appetite. Under the Electricity Supply (Safety and Network Management) Regulation 2014 Section 5 ‘A network operator must take all reasonable steps to ensure that the design, construction, commissioning, operation and decommissioning of its network (or any part of its network) is safe.’ TransGrid maintains an Electricity Network Safety Management System (ENSMS) to meet this obligation.[2]

In its Network Risk Assessment Methodology, under the ALARP test with the application of a gross disproportionate factor[3], the weighted benefits are expected to exceed the cost. TransGrid’s analysis concludes that the costs are less than the weighted benefits from mitigating bushfire and safety risks. The proposed

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[2] TransGrid’s ENSMS follows the International Organization for Standardization’s ISO31000 risk management framework which requires following hierarchy of hazard mitigation approach

[3] The values of the disproportionality factors were determined through a review of practises and legal interpretations across multiple industries, with particular reference to the works of the UK Health and Safety Executive. The methodology used to determine the disproportionality factors in this document is in line with the principles and examples presented in the AER Replacement Planning Guidelines and is consistent with TransGrid’s Revised Revenue Proposal 2023/24-2027/28.

investment will enable TransGrid to continue to manage and operate this part of the network to a safety and risk mitigation level of ALARP.

Evaluation of the above options has been completed in accordance with As Low As Reasonably Practicable (ALARP) obligations. The Network Safety Risk Reduction is calculated as 6 x Bushfire Risk Reduction + 3 x other Environmental Risks + 3 or 6 x Safety Risk Reduction + 0.1 x Reliability Risk Reduction.

The ALARP test does not apply for this project, as the reliability risk associated with this project is greater than 50% of the risk saved.

4.4 Preferred option

The preferred option is Option B. This is due to being technically feasible and has the highest NPV in all cases, excepting Narrabri No. 2. Narrabri No 2 is recommended for Option A. Wellington is not recommended to proceed.

The preferred option for each capacitor bank is as follows:

Table 14 – Preferred Option for each site

Capacitor Bank Bay	Preferred Option
Kempsey No 1 Capacitor	B
Narrabri No 2 Capacitor	A
Narrabri No 3 Capacitor	B
Coffs Harbour No 1 Capacitor	B
Beryl No. 2 Capacitor	B
Wellington No 1 Capacitor	Do nothing

Capital and Operating Expenditure

There are no capital and operating expenditure trade-offs associated with the preferred option.

Regulatory Investment Test

The program and estimate allows for the appropriate regulatory approvals as required.

5. Optimal Timing

The test for optimal timing of the preferred option has been undertaken. The approach taken is to identify the optimal commissioning year for the preferred option where net benefits (including avoided costs and safety disproportionality tests) of the preferred option exceeds the annualised costs of the option. The commencement year is determined based on the required project disbursement to the meet the commissioning year based on the OFS.

The results of optimal timing analysis is:

- Optimal commissioning year: 2023/24
- Commissioning year annual benefit: $8.95 million
- Annualised cost: $0.68 million

Due to the long restoration time associated with any major failure, the optimal timing is 2023/24 for all capacitor banks in all cases being the earliest feasible date for completion. Based on the optimal timing, the project is expected to commence in the 2023-2028 Regulatory Period.

6. Recommendation

It is recommended to proceed with the renewal program with a total value of $11.42 million comprising:

- Option A for Narrabri No 2 capacitor bank
- Option B for Kempsey No 1, Narrabri No 3, Coffs Harbour No 1, and Beryl No 2 capacitor bank.

This program value includes an amount of $2.5 million to progress the program from decision gate 1 (DG1) to decision gate 2 (DG2).

Appendix A – Option Summaries

Project Description	**Replace Capacitors at End of Life**		
Option Description	A. Replace Capacitor Bank Cans Only (Narrabri No 2)		
Project Summary			
Option Rank	[Option Rank] *2*	*Investment Assessment Period*	[Project Useful Life] *25 years*
Asset Life	[Asset Useful Life] *30*	*NPV Year*	[NPV Year] *2021*
Economic Evaluation			
NPV @ Central Benefit Scenario (PV, $m)	[Net Present Value (Standard - OER)] 10.91	Annualised CAPEX ($m)	Annualised Capex - Standard (Business Case) 0.10
NPV @ Lower Bound Scenario (PV, $m)	[Net Present Value (Upper Bound)] *4.45*	Network Safety Risk Reduction ($m)	Network Safety Risk Reduction *0.06*
NPV @ Higher Bound Scenario (PV, $m)	[Net Present Value (Lower Bound)] *24.20*	ALARP	ALARP Compliant? Not Applicable
NPV Weighted (PV, $m)	[Net Present Value (Weighted)] *12.62*	Optimal Timing	Optimal timing (Business Case) *2023/24*
Cost			
Direct Capex ($m)	*1.39*	Network and Corporate Overheads ($m)	*0.12*
Total Capex ($m)	*1.50*	Cost Capex (PV,$m)	*1.08*
Terminal Value ($m)	*0.20*	Terminal Value (PV,$m)	*0.04*
Risk (central scenario)	Pre	Post	Benefit
Reliability (PV,$m)	Reliability Risk (Pre) *11.82*	Reliability Risk (Post) *0.09*	Pre – Post *11.73*
Financial (PV,$m)	Financial Risk (Pre) *0.15*	Financial Risk (Post) *0.00*	Pre – Post *0.15*
Operational/Compliance (PV,$m)	Operational Risk (Pre) *0*	Operational Risk (Post) *0*	Pre – Post *0*
Safety (PV,$m)	Safety Risk (Pre) *0.05*	Safety Risk (Post) *0.00*	Pre – Post *0.05*
Environmental (PV,$m)	Environmental Risk (Pre) *0.03*	Environmental Risk (Post) *0.00*	Pre – Post *0.03*
Reputational ($m)	Reputational Risk (Pre) *0.00*	Reputational Risk (Post) *0.00*	Pre – Post *0.00*
Total Risk Benefit (PV,$m)	Total Risk (Pre) *12.04*	Total Risk (Post) *0.10*	Pre – Post 11.95
OPEX Benefit (PV,$m)			OPEX Benefit *0*
Other benefit (PV,$m)			Incremental Net Benefit *0*
Total Benefit (PV,$m)			Business Case Total Benefit *11.95*

Project Description	**Replace Capacitors at End of Life**		
Option Description	B – Renew the Capacitor Bank Bay (Beryl, Narrabri No 3, Coffs Harbour, Kempsey)		
Project Summary			
Option Rank	[Option Rank] *1*	Investment Assessment Period	[Project Useful Life] *25 years*
Asset Life	[Asset Useful Life] *30*	NPV Year	[NPV Year] *2021*
Economic Evaluation			
NPV @ Central Benefit Scenario (PV, $m)	[Net Present Value (Standard - OER)] *157.11*	Annualised CAPEX ($m)	Annualised Capex - Standard (Business Case) *0.63*
NPV @ Lower Bound Scenario (PV, $m)	[Net Present Value (Upper Bound)] *68.96*	Network Safety Risk Reduction ($m)	Network Safety Risk Reduction *0.84*
NPV @ Higher Bound Scenario (PV, $m)	[Net Present Value (Lower Bound)] *338.64*	ALARP	ALARP Compliant? Not Applicable
NPV Weighted (PV, $m)	[Net Present Value (Weighted)] *180.45*	Optimal Timing	Optimal timing (Business Case) 2023/24
Cost			
Direct Capex ($m)	*8.74*	Network and Corporate Overheads ($m)	*0.88*
Total Capex ($m)	*9.92*	Cost Capex (PV,$m)	*7.15*
Terminal Value ($m)	*1.32*	Terminal Value (PV,$m)	*0.30*
Risk (central scenario)	Pre	Post	Benefit
Reliability (PV,$m)	Reliability Risk (Pre) *163.87*	Reliability Risk (Post) *1.33*	Pre – Post *162.54*
Financial (PV,$m)	Financial Risk (Pre) *0.88*	Financial Risk (Post) *0.01*	Pre – Post *0.87*
Operational/Compliance (PV,$m)	Operational Risk (Pre) *0.00*	Operational Risk (Post) *0.00*	Pre – Post *0.00*
Safety (PV,$m)	Safety Risk (Pre) *0.20*	Safety Risk (Post) *0.00*	Pre – Post *0.20*
Environmental (PV,$m)	Environmental Risk (Pre) *0.04*	Environmental Risk (Post) *0.00*	Pre – Post *0.04*
Reputational ($m)	Reputational Risk (Pre) *0.31*	Reputational Risk (Post) *0.00*	Pre – Post *0.31*
Total Risk Benefit (PV,$m)	Total Risk (Pre) *164.99*	Total Risk (Post) *1.34*	Pre – Post *163.65*
OPEX Benefit (PV,$m)			OPEX Benefit 0
Other benefit (PV,$m)			Incremental Net Benefit *0*
Total Benefit (PV,$m)			Business Case Total Benefit *163.95*