SA Power Networks

Supporting document 5.22

Angle Park North Business Case

2020-25 Revised Regulatory Proposal

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SA Power Networks

Angle Park North Business Case

Contents

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Executive Summary

Angle Park North is a very large 83,000m^2 industrial metropolitan multifunctional site, established in 1954, which provides a range of state-wide functions, including:

- our primary logistic hub;
- our sole stobie pole construction facility; and
- the base for our sub-transmission line field crew.

We have undertaken very little major refurbishment of the facilities at this site since its establishment.

Major refurbishment investment at this site is now justified based on reducing ongoing reactive repairs costs and reducing safety, operational and customer service risks.

We have developed a **$11.5 million** (real $June, 2020) capital forecast to refurbish and upgrade the facilities at our Angle Park North property over the next regulatory control period, 2020/21 to 2024/25, which can be considered in terms of:

- major works component; and
- minor works component.

The costs and benefits of the proposed investment over the longer term of 40 years are summarised in the table[1] below:

Angle Park North – Capital cost			
	Major works	**Minor works**	**Total ($)**
Capital investment cost	$10.9 m	$0.6 m	$11.5 m
Angle Park North – Benefits (Major works)[2]			
Benefit type	**Description**		**Benefit ($)**
Customer service – PRICE Ie. Benefit in reduced/avoided SA Power Networks costs – capital expenditure (**capex**) and operating expenditure (**opex**)	• This increase in our costs is driven by the higher capital costs of the major replacements compared to capital costs of continuing with the business-as-usual approach, which is **$5.9 million higher**; but • This increase in capex should be offset by a modest reduction in our operating expenditure of approximately **$4.2 million** over the same period.		– $1.7 m
Safety risks Ie. benefit in reduced/avoided economic cost of deaths and injuries	• Our cost benefit analysis has shown that these works should improve existing safety risks associates with the current state of the relevant facilities at Angle Park North. We estimate that, in total, the **$10.9 million** investment in these facilities will provide long term benefits in reduced safety risks of approximately **$5.7 million** compared to a business-as-usual approach.		+ $5.7 m
		Total NET benefit (relative to BAU)	**+ $4.0 m**

[1] Note – Values quoted within table may contain rounding errors/issues when summing to 1 decimal place.

[2] Minor works have not been quantified as they are largely small reactive works that occur each year and in-line with historical levels - We consider it reasonable to assume that ongoing minor works will be at least at the level of recent history – refer to section 3 for further detail.

The major works component

Our forecast allows for the investment of $10.9 million to enable us to undertake the **major replacement** of two facilities:

- $7.3 million is for the replacement of the logistic pavement, which covers a large area of approximately 34,000 m^2. The pavement is old and in poor condition, with extensive cracking and potholes, which we have been recently addressing through a piecemeal reactive repair strategy. Its existing layout is also not ideal for the current operations of the site.
- $3.6 million is for the replacement of the old logistic administration building, which is currently used as re-purposed indoor storage and the main base of the sub-transmission line field crew. The building is old and has a range of issues driving the need for replacement, including:
    - the poor condition of the building structure;
    - limitations in store layout due to it being a repurposed office;
    - limitations in the office arrangements for the sub-transmission team, requiring them to travel across the site to perform office duties;
    - the poor state of the sub-transmission team facilities; and
    - old design that is not energy efficient.

To develop this forecast we have:

- assessed the current issues with these facilities
- quantified the cost and risk associated with the issues
- developed various options for managing these issues, including continuing with a business-as-usual approach[3]; and
- for each facility, separately undertaken cost-benefit analysis to determine the options that maximises the net-benefit (in present value terms).

Our cost benefit analysis has shown that our proposed investment of $10.9 million for the replacement of these two facilities are the best options, providing a combined net benefit of $4.0 million over the longer term compared to continuing with the business-as-usual approach. Our analysis also shows that this best option is insensitive to reasonable changes in key assumptions, including the discount rate, capital cost, timing, and quantification of the issues.

The minor works component

Our forecast also allows for the investment of $0.6 million to enable us to continue with the **minor refurbishment and upgrade** of the remaining facilities at the site.

This component largely consists of the piecemeal reactive repair and upgrade of the other facilities, which is necessary to maintain the functionality of site as it ages and our operations and technology evolve.

The remaining facilities are also aged and similarly suffer from a range of age-related issues, which drive the needs for the minor works component of our forecast, including:

- the poor condition
- advanced age and risk of major failure
- inadequate facilities or lack of facilities appropriate for the current operations.

[3] The assessment and costing were undertaken by an external quantity surveyor, as discussed in our Original Proposal. However, we have reassessed the issues for the Revised Proposal.

To develop this forecast we have:

- assessed the current issues with these facilities and developed and costed the likely remediation approach[4]; and
- undertaken top-down analysis to compare the aggregate estimate for this component against recent historical levels of expenditure for the similar minor works component.

Our top-down analysis has shown that our proposed investment of $0.6 million is lower than the similar level for the current period. We consider this amount is reasonable given the age and complexity of the site, the limited level of major refurbishment we have undertaken at this site, and the number and extent of the issues at this site that we have currently identified.

Regulatory treatment

The Australian Energy Regulator's (**AER**) draft decision did not accept our forecast and made no allowance for any capex at this property, with its main concerns being that we had not sufficiently demonstrated the need for any property capital works to be undertaken and we did not provide rigorous option analysis and cost-benefit analysis to support the proposed expenditure.

We consider that we have address all the AER concerns in developing the forecast contained in this business case. We have included $11.5 million in the capital expenditure forecast in our SA Power Networks 2020-25 Revised Regulatory Proposal (**Revised Proposal**) to the AER to allow for refurbishments and upgrades at our Angle Park North site. This forecast is lower than the equivalent forecast in our SA Power Networks 2020-25 Regulatory Proposal (**Original Proposal**), $14.9 million, due to various scope items that we have excluded from this forecast, based on our further analysis.

We believe that the AER can have confidence that this forecast is in accordance with the National Electricity Rules (**NER**), given the methodology we have applied to determine the need for this project and its scope and cost.

We are not proposing to include any adjustments to other incentive mechanisms because of the forecast at this site. We recognize that the forecast at Angle Park North represents a significant increase from recent historical levels at this site, which should result in localised benefits (eg reductions in operating costs). However, these benefits will not offset the aggregate effects of the overall ageing of all our properties, given the reduced overall property forecast in our Revised Proposal.

Stakeholder feedback

We have also engaged with our Customer Consultative Panel (**CCP**) in developing our revised total property forecast, including providing them with a visit to some sites. While the Panel did not visit the Angle Park property it did visit our Marleston North site which has facilities of a similar age and condition as Angle Park. The Panel was broadly supportive of the need to undertake major refurbishment and upgrade works, and the approach we have adopted to develop our revised forecast.

[4] The assessment and costing were undertaken by an external quantity surveyor, as discussed in our Original Proposal. However, we have reassessed the issues for the Revised Proposal.

1 Introduction

Purpose statement

We have forecast the need for $11.5 million (real June $2020) in capex to refurbish and upgrade our Angle Park North property over the next regulatory period (ie 2020/21 to 2024/25).

The purpose of this document is to:

- set out our capex forecast of the refurbishment and upgrade works at our Angle Park North property;
- provide the justification for this forecast, including the needs it will address and the benefits it will provide; and
- explain how we consider this forecast should be treated in our Revised Proposal to the AER.

In addition to this document, the justification for the forecast capex at Angle Park North is also supported by the following:

- Angle Park North cost-benefit models, Supporting Document 5.22.1 - Angle Park North Building model, Revised Proposal (confidential) and Supporting Document 5.22.3 - Angle Park North Logistics Pavement model, Revised Proposal (confidential), which are spreadsheet models we have prepared to support our justification for the major project components at Angle Park North.
- The Angle Park North photographic evidence data pack, Supporting Document 5.22.2 - Angle Park North Photographs, Revised Proposal, which provides detailed high-quality photographic evidence of the major issues at Angle Park North that are driving the needs.
- "2020-25 Property Capex Forecast Regulatory Justification", which is Supporting Document 5.21 to our Revised Proposal and provides further justification for our overall property capex forecast.
- "Property Services Capital Expenditure 2020-2025", which was Supporting Document 5.31 - Property Services Capital Expenditure 2020-2025 to our Original Proposal and provides further information on our property strategy, including how we manage properties and external reviews and advice we sought to develop our property forecast.

Appreciation of AER concerns and how we have addressed these

In our Original Proposal to the AER, we included $14.9 million in our capex forecast to undertake refurbishment and upgrade works at our Angle Park North property over the next regulatory control period. We also provided supporting documents setting out the scope of the works and justification for these works.

The AER's Draft Decision did not accept our forecast and made no allowance for any capex at this property. The key concerns of the AER are:

- we did not sufficiently demonstrate the need for any property capital works to be undertaken; and
- we did not provide rigorous option analysis and cost-benefit analysis to support the proposed expenditure.

We have reviewed our previous supporting documentation and accept that this was deficient in a number of areas. In general, we accept the AER criticisms. To address these matters, we have undertaken extensive further work to reassess the Angle Park North forecast and prepare improved supporting documentation, including this business case and cost-benefit analysis models.

Evidence of the need

The AER has raised the lack of evidence of the 'need' in our Original Proposal as a significant matter in its rejection of our forecast. Evidence of these 'needs' are contained in:

- The appendices of our Property Services Capital Expenditure documents prepared by Rider Levett Bucknall (**RLB**), which was a supporting document to our Original Proposal[5]. RLB developed their forecast based upon their expert opinion of the needs at each site, and the appendices provide photographic evidence of the main issues at each site that were determined by RLB during its site inspections.
- Appendix B of this business case where we have provided further photographic evidence of the main issues at Angle Park North. This appendix also references some independent expert reports that we have commissioned that also serve as evidence of the specific issues at these sites.
- Supporting Document 5.22.2 - Angle Park North Photographs, which provides detailed high-quality photographic evidence of the needs.

In addition:

- The quantification of the need, which we have undertaken for the cost-benefit analysis provides a form of evidence of the materiality or scale of the needs.
- The overall need for our Revised Property capex forecast is evidenced through our top-down analysis, which is discussed in Supporting Document 5.21 - 2020-25 Property Capex Forecast Regulatory Justification.

Further details of how we have addressed the AER and other stakeholder concerns are provided in Supporting Document 5.21 - 2020-25 Property Capex Forecast Regulatory Justification.

Reassessing required works for Angle Park North has resulted in a number of changes from our original capex forecast for Angle Park North. This has resulted in a reduction in the capex forecast from $14.9 million in our Original Proposal to $11.5 million in this document and our Revised Proposal.

Classification of major and minor works components of our forecast

To aid in the explanation of our forecast, we have classified the forecast into two components:

- major capital works, which covers larger items of our forecast, which address major issues with certain facilities at Angle Park North; and
- minor capital works, which covers the remainder of our forecast.

This has been required to aid in classifying the "major" matters, which we have then re-assessed using a more extensive evaluation and formal cost-benefit analysis.

Importantly, the minor capital works classified here is more general than works that are identified as minor works in our financial systems. Therefore, some caution is needed when reconciling between this document and our financial system; the specific work orders defined as minor works in our financial system will only encompass a portion of the minor works discuss here.

[5] Section 8.2, Attachment 2, Supporting document SAPN - 5.31 - Property Services Capital Expenditure 2020-2025, SA Power Networks 2020-25 Regulatory Proposal, January 2019

Overview of Angle Park North

Angle Park North is a very large 83,000m^2 industrial metropolitan multifunctional site. The site was purchased in 1952, with establishment works commencing in 1954. The site includes facilities for three important functions:

- our primary logistics hub for the whole state, which consists of a warehouse and office building and a large external pavement area for loading/unloading, external storage and salvage;
- the location of our sub-transmission line field services teams (for the whole state), who are located in part of the old redundant logistics offices (this building has also been re-purposed as additional logistics storage); and
- our sole stobie pole construction facility.

Appendix A provide further relevant background information associated with the Angle Park North site and various facilities at this site, which are relevant to appreciating the significance of the issues at Angle Park North, the risks and costs driven by these issues, the range of credible options and the benefits of these options.

Regulatory obligations relevant to determining needs

There are range of regulatory instruments we must have regard to when managing our property portfolio and determine needs. These obligations cover a range of matters associated with building and site design, layout, construction and operation. For existing facilities, where strict compliance is not obligated, we tend to apply a risk-based compliance method. For new constructions and developments (including refurbishments and upgrades), we will always ensure that these are strictly compliant with all current obligations.

We have attempted to develop our forecast in this document to align with this risk-based process. However, the key needs of the major works at Angle Park North, which are summarized in Section 2 and explained in more detail in Appendix B, are not compliance issues. That said, the preferred solution will allow us to opportunistically ensure compliance with current obligations. Similarly, we would expect that some of the works allowed for in the minor works component will allow us to address some of the more significant non-compliances in other facilities.

Further details of our property obligations and how we manage these are provided in Supporting Document 5.21 - 2020-25 Property Capex Forecast Regulatory Justification.

Structure of document

This document is structured as follows:

- In *Section 2 (Major capital works components)*, we discuss our evaluation of the major issue at the site, including our development of credible options and option costs, the effect of these options on existing costs and risks, and our formal cost-benefit analysis of these options.

- In *Section 3 (Minor capital works components)*, we discuss our analysis and reasoning for the minor capital works component of our forecast, explaining how we have prepared and validated this forecast.

- *In Section 4 (Our preferred capital program and expenditure forecast)* we bring the major and minor components together to summarise our overall preferred option for Angle Park North, including the main benefits that will be achieved by this investment.

- The document concludes in *Section 5 (Regulatory treatment)* by discussing how we believe the costs and consequences of this program should be treated in our Revised Proposal to the AER.

- In *Appendix* A *(Overview of Angle Park North)*, we provide relevant background information associated with the Angle Park North site and various facilities at this site, which are relevant to appreciating the significance of the issues at Angle Park North and the risks and costs driven by these issues.

- We then set out the specific issues at Angle Park North in *Appendix B (the needs at Angle Park North)*, including the facilities affected by the issues, the causes of the issues, and the costs and risks due to the issues. In this section, we also identify the issues we are classifying as major and so assess using formal cost-benefit analysis.

2 Major capital works components

We have two facilities at Angle Park North where we consider the needs are enough to warrant consideration of a major replacement projects in the next regulatory period:

- the outdoor logistics pavement area (logistics pavement)
- the building we are currently using for logistics storage and providing amenities for the sub-transmission line field services team (logistics storage and sub-transmission field services building).

In this section, we focus on these two components and evaluate various approaches to manage their needs moving forward. Importantly, we will:

- identify various credible options and the cost of implementing those options, include continuing with the current approach (ie the business-as-usual option) and alternatives that address the issues using different approaches and time frames
- discuss how each option affects the current costs and risks associated with the issues; and
- present the results of cost-benefit analysis that we have applied to these options.

We have used the cost-benefit analysis to determine whether the benefits of the options will exceed their costs (in present value terms and relative to the business-as-usual option), and to identify which option will provide the greatest net benefit. We have also used the cost-benefit analysis to test key assumptions, in order to understand the sensitivity of the finding to these key assumptions.

Importantly, through this analysis we have found that the planned replacement of both components over the next regulatory period should provide the greatest net benefits, compared to other alternative options. Further, this result is generally insensitive to reason changes in the key assumptions.

We discuss our analysis of the logistic pavement and logistics storage and sub-transmission field services building separately below.

Logistics pavement

Statement of the need

The logistics pavement covers a large area (approximately 34,000 m^2), which is used for various functions associated with our logistics and warehousing operations and encompasses:

- loading/unloading bays used by heavy goods vehicles transporting asset and equipment to and from the site
- various outdoor storage areas, which are used to store assets such as padmount transformers
- the salvage yard, which is used to salvage scrap and spares from old assets that are removed from our network
- various covered storage facilities.

There are two main issues with this pavement area driving its needs:

- **The poor condition of the pavement** - The current pavement was originally constructed in 1954 - 1958[6]. Since that time the volume and weight of the heavy vehicles transporting materials to and from this site has increased. Because of the age of the pavement and its heavy use, there has been an increasing volume and severity of areas of the pavement with significantly degraded condition. Recently we have been repairing the worst affected areas through a piecemeal reactive repair program.

[6] Site works and drainage commenced in 1956, with some initial roads in 1957 and the bulk of the pavement established in 1958.

- **The existing layout and traffic flow arrangements of the site** - The overall development of the site since its establishment, particularly the number and types of vehicles that now use the site, now means that the existing layout is not ideal and optimal and creates a number of issues with the functioning of the site, including less efficient operations and the greater possibility of accidents. The key issues are as follows:
    - outdoor storage areas are dispersed across the pavement areas (ideally, we would prefer a centralised storage area)
    - the turning circles for heavy vehicle are "tight", which tends to accelerate the decline of the pavement
    - there are various heavy and light vehicle interaction zone
    - the existing traffic flow arrangements require heavy vehicles to move in changing directions and through the centre of the pavement area (ideally, we would prefer heavy vehicles to move in a single forward clockwise direction on the outer edges of the site).

We have estimated the ongoing repair and refurbishment costs and quantified the risks due to these issues. These costs and risk are summarised in the table below (note, operating costs in this table do not include direct remediation costs, such as the preventative maintenance and reactive repair of the issues).

Table 1 Summary of logistics pavement costs and risks due to the issues

Cost category	Expected annual value ($)
Safety risk	$98,805
Operational inefficiency	$50,000
Operational risk	$6,500
Total	**$155,305**

Further details and explanations of the issues and needs of the logistics pavements and the quantification of the costs and risks are provided in Appendix B. This appendix also provides photographic evidence of the needs, and is further supported by Supporting Document 5.22.2 - Angle Park North Photographs.

Development of options

We currently implement a reactive "patched" repair approach to address these areas.

We have developed three credible options for managing these issues moving forward. The options range from continuing with a reactive approach to a planned replacement of the full pavement over different timeframes.

These options are summarized in the table below, which provides an overview of the scope of each option and qualitative overview its costs and its expected effect on current issues.

Table 2 Overview of logistics pavement options

ID	Option	Scope of option	Comments on option
1	**Business-As-Usual (do nothing)**	Continue with current maintenance and operational regime (ie largely reactive patching of the pavement as required, with controls as necessary to manage risks associated with areas of poor condition and the patching approach).	Low maintenance and capex costs in the short term, but no improvement to existing issue risks and costs. Patching costs and/or issue risks and costs would likely worsen as the pavement ages further. This option is considered a short-term solution, requiring higher capex later to fully refurbish the pavement. Note, however, for cost-benefit analysis, we have not assumed that a replacement will occur.

2	**Staged replacement (over medium/long period eg 10 year)**	Stage replacement of pavement, with approximately 50% portion replaced in the next regulatory period and remaining replaced in the following period. The first stage will focus on the highest risk areas, with continuation of limited reactive patching in other areas.	Modest capex and reduced opex in short term, and modest reduction in some issue costs and risks in short term with full removal within 10 years. This option will require higher capex (in absolute terms) in the longer term to fully replace the pavement and fully address existing issues due to the higher cost of a staged replacement.
3	**Replacement over next period**	Replacement of full pavement during next regulatory period.	High capex in short term, but reduced opex and removal of existing issue costs and risks.

During discussion with stakeholders, including the AER, they have raised other options as possible lower cost solutions associated with our pavement needs, including:

- using alternative forklift more suitable for the uneven surfaces of a degraded pavement; or
- lower cost solutions to repair areas of poor condition bitumen or concrete (eg resurfacing / releveling bitumen or concrete areas).

We do not consider that either of these options are credible options for Angle Park North.

With regard to alternative forklifts, we already use forklift types designed for outdoor logistics use, and in many circumstances, they can deal with the types of uneven surfaces that will arise as pavements degrade. Forklift selection is predominantly based on the type of load it needs to carry safety and efficiently, given the arrangements of the facility. And far less on being able to drive on degraded pavement. We do not believe there are credible alternative options that would provide significant improvement and would still be suitable for our logistics operations. Importantly, switching to an "all-terrain" tyre type would also contribute to significant accelerated degradation of the pavement as these tyres tend to grip into the surface when turning and if used on already degraded areas would exacerbate the problem further, making pedestrian movements more hazardous. Additionally, this would require us to make significant investment, that would need to be justified by allowing the pavement to degrade significantly (eg new all-terrain forklifts are typically between $10-$70k depending on size).

We do not believe this is a credible alternative: it would likely cause significant staff concerns that we would need to manage, introduce other safety risks to our operations, and more than likely, only provide some temporary deferment of the need to undertake a more significant replacement project.

With regard to the lower cost repair solutions, we fully acknowledge these are reasonable solutions to raise. But in many respects, these are the solutions we currently apply to manage the degradation of our pavements (and internal concrete floors). Our business-as-usual option allow for these types of repair to patches of pavement as an option for consideration in our cost-benefit analysis.

It is important to stress that these options are effectively repair options. That is, the pavement areas need to degrade (driving the cost and risks noted above), before these solutions are worthwhile applying. Furthermore, they are not usually long-term solutions. Importantly, Angle Park North is built on contaminated soil material imported from various SA Power Stations in the 1950' – 60's, predominantly slag and fly ash. This material and subsidence of the subgrade underneath the bitumen contributes to its ongoing cracking issues. Applying material over the top only provides a very short term fix, as a bitumen wear course is only as good as the sub-grade it is built upon. Our staged replacement of these pavements includes the cost of removal, treatment and disposal of this contaminated material under our Environment Protection Authority (**EPA**) obligations and replacement of the sub-grade to ensure an appropriate 20-30 year lifespan of the new pavement.

As such, we do not consider that an option that allows for some form of enhanced remediation, such as resurfacing or releveling significant sections of the pavement area above what will be allowed for in the business-as-usual option, is a credible option.

Options capital cost estimates

To develop our capital cost estimate for each option, we have:

- used the average actual historical patching costs (2015/16 to 2019/20) to estimate future reactive patching costs (on an average per annum basis)
- used the cost estimates prepared by RLB and detailed in our Original Proposal to the AER as the basis of planned replacement cost estimate.

Further details of the methodology and assumptions are provided in Appendix B and the logistics pavement cost-benefit analysis model in Supporting Document 5.22.3 - Angle Park North Logistics Pavement model (confidential).

Table 3 Logistics pavement option capital cost estimates

ID	Option	Capex ($'000)			
		Next regulatory period		Following regulatory periods	
		Reactive	Planned	Reactive	Planned
1	**Business-As-Usual (do nothing)**	$829	-	$872[a]	-
2	**Staged replacement**	$243	$4,034[b]	-	$4,034
3	**Replacement over next period**	-	$7,334		

a – for this option reactive costs will continue beyond this regulatory period

b – for this option, we assume a 10% uplift in costs allow for the increased cost to stage the project (see further discussion 5.22.1 - Angle Park North model (confidential))

Impact of options on existing issues and new issues

We have estimated how each option will impact the costs and risks caused by the major issues (Table 4). Key points to note here are as following:

- for the business-as-usual option, we have assumed that these costs and risks will not increase significantly with time; rather, we are assuming that reactive repair activity will increase and this will maintain these costs and risks around current level
- for the staged replacement option, we are assuming that the replacement of half of the pavement in the first stage can be targeted to remove a greater portion of the cost and risks; for the cost-benefit analysis, we are assuming that this will achieve a 70% reduction in existing costs and risks[7].

Table 4 - Summary of impact of options on costs and risks

ID	Option	Existing issues		
		Operational inefficiency	Safety risk	Operational risk
1	**Business-As-Usual (do nothing)**	Unchanged/worsening	Unchanged/worsening	Unchanged/worsening
2	**Staged replacement**	Improved/avoided	Improved/avoided	Improved/avoided
3	**Replacement over next period**	Avoided	Avoided	Avoided

[7] Although this first stage of replacement will be targeted to remove much of the current worst condition pavement, we anticipate that other areas will deteriorate during this time

Cost-benefit analysis of options

We have conducted cost-benefit analysis of the three options discussed above. Further details of the cost-benefit analysis model and assumptions are provided in Supporting Document 5.22.3 - Angle Park North Logistics Pavement model (confidential).

The key results of this analysis are summarized in Table 5 below. These results indicate that that the full replacement of the pavement in the next period should provide the greatest net benefit. Importantly, implementing that option should realise a net benefit of $1.7 million over continuing in the longer term with a business-as-usual approach of reactive patch repairs of the pavement.

Table 5 Summary of results of the cost benefit analysis of the logistics pavement options

		Present value ($ million)[a]		
ID	Option	Option costs	Issue costs and risks	Net benefit
1	**Business-As-Usual (do nothing)**	5.1	3.8	-
2	**Staged replacement**	7.7	0.3	0.9
3	**Replacement over next period**	**7.2**	**0.0**	**1.7**

a – discounting assumes our proposed pre-tax real WACC of 2.63%

Other important points to note from these results are as follows:

- The net benefit is driven by the avoided costs and risks due to the issues with the pavement area. As such, the majority of the benefit relates to avoiding the safety risks, which constitute 64% of these costs.
- All options have significantly higher option costs in the long term than the business-as-usual option. These higher costs reduce the overall net-benefit of these options. However, a business-as-usual approach over the long term is most likely an unrealistic solution, given the age and condition of the pavement. Therefore, the costs of this option are likely to be higher if one of the other solutions was required in say 10 to 20 years' time (which itself is probably an optimistic estimate).

The main finding that the replacement of the pavement over the next period provides the greatest net benefit tends to be insensitive to key assumptions in the model. Of most note here:

- This result is moderately insensitive to increases in the discount rate from the proposed WACC of 2.63% (noting, higher discount rates tend to favour deferring capex). The discount rate would need to increase to 4% before the business-as usual option would be a more economic option.
- This result is also moderately insensitive to the replacement cost. This cost would need to increase by approximately 24% (ie increasing to $9.1 million) before the business-as usual option would be a more economic option. Obviously, this insensitivity is related to the discount rate. However, the replacement cost could still increase by 10% if the discount rate was less than 3.0%.
- Related to the above result on option cost insensitivity, this result is also insensitive to the timing of the replacement (ie there is not a greater net benefit in delaying the replacement by say one year). In this regard, the reactive repair costs are approximately $162,000 per annum and current issue costs and risks are valued at $155,300 on average per annum. Therefore, the benefit of a one year delay in the capital costs of the replacement would be approximately $280,000[8], which is less than the benefits of avoiding these costs.
- Similarly, our estimate of the ongoing reactive repair costs and issue costs and risks could reduce by approximately 40% before there would not be a net benefit in avoiding these costs and risks by the replacement of the pavement.

[8] Assuming the life of the new pavement is at least 45 year.

Based on the above, we consider it reasonable to conclude that the option to replacement the logistics pavement in full over the next period should maximise the net benefits over reasonable ranges for the key assumptions.

Logistics storage and sub-transmission field services building

Statement of the need

To the north of the Angle Park North site is the old logistics offices (a building of approximately 1560m2 of office and warehouse and a 244m^2 building of amenities). This building was built in 1956 and was repurposed around 2000 into additional logistics storage and amenities for the sub-transmission line field services staff (the sub-transmission team). The other facilities (eg spares, workshop, Elevated Work Platform (**EWP**) parking) required by the sub-transmission team are also located in this portion of the site, and therefore, this location is ideal for their operations.

The building to a very large extent is no longer fit for human habitation, and hence, it is being utilised mostly for storage with limited amenities available for the sub-transmission team.

The major issues with this building and the operations of the sub-transmission team, driving its needs are as follows:

- **The poor condition of the building structure** - The building's key structural systems are acceptable. However, assessments we have commissioned have found the non-structural system and other elements of the building to be in very poor condition. Most notably, the floor, internal and external walls, and internal and external fixture and fittings have all been found to be in poor condition.
- **the limitations in store layout due to it being a repurposed office** – the current re-purposed storage arrangements introduce additional safety hazards and provide more limited movement and access for forklift vehicles than we would expect in a purpose-build storage facility. These issues are exacerbated by the poor condition of patches of the floor, which can provide uneven surfaces that forklifts must traverse.
- **the limitations in the office arrangements for the sub-transmission team** - the building does not have formal office facilities for the transmission team, and therefore, they use the logistics office facilities for formal meeting and general office activities. This results in sub-optimal operations and safety risk due to the need to frequently cross the main site roadway.
- **the poor state of the sub-transmission team facilities** - the facilities in the parts of the building used by the transmission team are in a very poor state and not fit-for-purpose in a contemporary business.
- **energy inefficiency** – the general building design, construction and in particular lighting system is of an old standard, which is significantly less energy efficient than modern designs.

We have quantified the costs and risks due to these issues. These costs and risk are summarised in the table below (note, operating costs in this table do not include direct remediation costs, such as the preventative maintenance and reactive repair of the issues).

Table 6 Summary of the building costs and risks due to the major issues

Cost category	Expected annual value ($)
Safety risk	134,394
Operational inefficiency	27,172
Operational risk	77,800
Total	**239,366**

Further details and explanations of the issues and needs of this building and the quantification of the costs and risks are provided in Appendix B. This appendix also provides photographic evidence of the needs and references other assessments of this building that we have commissioned that evidence the need. Evidence of the need is further supported by Supporting Document 5.22.2 - Angle Park North Photographs.

Development of options

We have developed six credible options for managing these issues moving forward, covering various short and long-term solutions, which include:

- continuing with the **business-as-usual approach** in how this building is used and assuming we continue with our current approach of applying minimal repair expenditure (note, for baseline cost-benefit analysis purposes, we have not assumed that the building will be replaced over the analysis timeframe)
- a **temporary deferment option**, involving a modest level of **piecemeal remediation** to repair and upgrade the most critical issues with this building, but continuing with the operation of the building as usual in the medium-term, with the full replacement of the building occurring 10 years later
- various immediate **long-term** solutions, which consider either discontinuing the use of the building, replacing the building with a new purpose-built building, or moving the whole transmission field services facility to a new location.

These options are summarized in the table below, which provides an overview of the scope of each option and qualitative overview its costs and its expected effect on current issues.

Table 7 Overview of logistics pavement options

ID	Option	Scope of option	Comments on option
1	**Business-As-Usual (do nothing)**	Continue with current maintenance regime, without significant remediation of issue (note, currently little remediation is being performed as was anticipated that the building will be replaced).	Low maintenance and capex costs, but high issue/risk costs. Note, in reality, this is a short-term solution that will require higher capex later to fully refurbish the facilities. However, for modelling purpose, we have not included these costs.
2	**Piecemeal remediation**	Continue with current maintenance regime, but undertake some piecemeal remediation of issues to maintain usage of the current building, largely in current form. The piecemeal remediation is assumed to provide some cosmetic improvements to the amenities of the sub-transmission team (eg toilets, showers, locker room, lunchroom), improvements for office-based personnel, and address some storage issues (eg lighting, poor floor surfaces).	Modest capex and ongoing opex, and small reduction in some issue costs and risks. This is assumed to be a short-term solution that will require higher capex later to replace the facilities. For modelling purposes, we have assumed that the building will be rebuilt in 10 years.
3	**Discontinue use of building**	Permanently move transmission field staff to warehouse offices and discontinue use of the storage facility (or only use in short-term as limited storage of non-essential equipment).	Low cost solution, addressing most current issues. But introduces new issues and costs associated with the movement of transmission field staff to warehouse office (see further discussion below). This considered to be a long-term solution, which avoids the need for further significant capex at a later date.
4	**Rebuild (preferred)**	Demolish existing building and rebuild a new storage facility, with dedicated office space and amenities for the transmission field services team.	High capital cost, but addresses all current issues without introducing new issues or costs.

			This is considered to be a long-term solution, which avoids the need for significant capex at a later date and is line with the current master plan for site.
5a	**Move transmission field services to new dedicate site and discontinue existing storage building**	Permanently move transmission field staff to a new facility at a new site and discontinue use of the existing storage building at Angle Park North.	Very high capital cost solution, which require purchase or lease of a new site and establishment of facilities required by transmission field services. It addresses current issue costs/risks associated with the existing building at Angle Park North. But introduces some new costs associated with relocating and storing existing items. This considered to be a long-term solution, which avoids the need for significant capex at a later date and is line with current master plan for site.
5b	**Move transmission field services to new dedicate site and rebuild storage facility at Angle Park North**	Permanently move transmission field staff to new facility at new site and rebuild a new storage facility at Angle Park North.	Very high capital cost solution, which require purchase or lease of new site and establishment of facilities required by transmission field services and rebuild of storage building at Angle Park North. But addresses all current issue costs/risks associated with the existing building at Angle Park North. This considered to be a long-term solution, which avoids the need for significant capex at a later date and is line with current master plan for site.

Options capital cost estimates

We have used various approaches to develop our capital cost estimate for each option. Further details of the methodology and assumptions are provided in Supporting Document 5.22.1 - Angle Park North Building model (confidential).

Key points on our methodology and assumptions, are as follows:

- current repair costs have been estimated as the average of our recent costs
- we have used the detailed cost estimates prepared by RLB and detailed in our Original Proposal to the AER as the basis of planned replacement cost estimate
- piecemeal remediation is a high-level estimate, based on the matters we are likely to address and our view of the costs
- the costs to purchase and establish a new site for the sub-transmission field services facility is a high level estimate, based on preliminary enquires of possible sites and cost to establish the facilities.

Table 8 Building option capital cost estimates

		Capex ($'000)	
ID	**Option**	**Next regulatory period**	**Following regulatory periods**
1	**Business-As-Usual (do nothing)**	-	-
2	**Piecemeal remediation**	$100	$3,574 (in 10 years' time)
3	**Discontinue use of building**	$100[a]	
4	**Rebuild (preferred)**	$3,574	
5a	**Move transmission field services to new dedicated site and discontinue existing storage building**	$4,000[a]	

ID	Option	Capex ($'000)	
		Next regulatory period	Following regulatory periods
5b	**Move transmission field services to new dedicated site and rebuild storage facility at Angle Park North**	$4,250	

a - these options include, $160k per annum expensed cost to lease storage, not shown in the table – see CBA model for further explanation of cost assumption

Impact of options on existing issues and new issues

We have estimated how each option will impact the costs and risks caused by the major issues (Table 9).

Further details of the methodology and assumptions are provided in Supporting Document 5.22.1 - Angle Park North Building model (confidential). A key point to note on our assumed changes is that for the business-as-usual option, we have assumed that these costs and risks will not increase with time; rather, we are assuming that reactive repair activity will increase and this will maintain these costs and risks around current level[9].

Table 9 Summary of benefits by option – to issues associated with transmission field services

ID	Option	Existing issues with transmission field services			
		Operational inefficiency - movement	Operational inefficiency - moral	Safety risk - movement	Operational risk - condition
1	**Business-As-Usual (do nothing)**	Unchanged	Unchanged / worsening	Unchanged	Unchanged / worsening
2	**Piecemeal remediation**	Unchanged	Improved (10%)	Unchanged	Improved (30%)
3	**Discontinue use of building**	Unchanged	Improved (50%)	Unchanged (as movement back to facility still required)	Avoided
4	**Rebuild (preferred)**	Avoided	Avoided	Avoided	Avoided
5a	**Move transmission field services to new dedicated site and discontinue existing storage building**	Avoided	Improved (90% as not preferred solution of team)	Avoided	Avoided
5b	**Move transmission field services to new dedicated site and rebuild storage facility at Angle Park North**	Avoided	Improved (90% as not preferred solution of team)	Avoided	Avoided

Table 10 Summary of benefits by option – to issues associated with storage

ID	Option	Existing issues with storage		
		Safety risk - movement	Operational risk - condition	Operating cost – energy efficiency
1	**Business-As-Usual (do nothing)**	Unchanged	Unchanged / worsening	Unchanged
2	**Piecemeal remediation**	Improve (30%)	Improved (30%)	Improved (70%)
3	**Discontinue use of building**	Avoided	Avoided	Avoided

[9] For base-line modelling, we have assumed that this will increase by 1% per annum as the building ages further.

ID	Option	Existing issues with storage		
		Safety risk - movement	Operational risk - condition	Operating cost – energy efficiency
4	**Rebuild (preferred)**	Avoided	Avoided	Avoided
5a	**Move transmission field services to new dedicated site and discontinue existing storage building**	Avoided	Avoided	Avoided
5b	**Move transmission field services to new dedicated site and rebuild storage facility at Angle Park North**	Avoided	Avoided	Avoided

Cost-benefit analysis of options

We have conducted a cost-benefit analysis of the six options discussed above. Further details of the cost-benefit analysis model and assumptions are provided in Supporting Document 5.22.1 - Angle Park North Building model (confidential).

The key results of this analysis are summarized in Table 11 below.

These results indicate that the rebuild option in the next period should provide the greatest net benefit. Importantly, implementing that option should realise a net benefit of $2.3 million over continuing in the longer term with the business-as-usual approach.

It is also worth noting that all options show a significant net-benefit compared to continuing in the longer term with the business-as-usual approach, other than the two options involving discontinuing the use of this building for storage[10].

Table 11 Summary of results of the cost benefit analysis of the storage and transmission field services building options

ID	Option	Present value ($ million)[a]		
		Option costs	Issue costs and risks	Net benefit
1	**Business-As-Usual (do nothing)**	*0.6*	*5.9*	-
2	**Piecemeal remediation**	3.4	1.9	1.2
3	**Discontinue use of building**	4.0	3.0	-0.5
4	**Rebuild (preferred)**	**4.2**	**0.0**	**2.3**
5a	**Move transmission field services to new dedicated site and discontinue existing storage building**	8.8	-0.1	-2.2
5b	**Move transmission field services to new dedicated site and rebuild storage facility at Angle Park North**	5.1	-0.2	1.6

a – discounting assumes our proposed pre-tax real WACC of 2.63%

Other important points to note from these results are as follows:

- The net benefit is driven by the avoided costs and risks due to the issues with the building and its operations. As such, the majority of the benefit relates to avoiding the safety risks associated with the movement of the transmission team to and from the logistics offices and the operation of forklifts in the storage facility, which represents 56% of these costs.

[10] This result is partly due to the costs in these options associated with leasing additional storage.

- All options have significantly higher option costs in the long term than the business-as-usual option. These higher costs reduce the overall net-benefit of these options. However, a business-as-usual approach over the long term is most likely an unrealistic solution, given the age and condition of the building. Therefore, the costs of this option are likely to be higher if one of the other solutions was required in say 10 to 20 years' time (which itself is probably an optimistic estimate).

The main finding that the rebuild option over the next period provides the greatest net benefit tends to be insensitive to key assumptions in the model. Of most note here:

- This result is largely insensitive to increases in the discount rate from the proposed WACC of 2.63% (noting, higher discount rates tend to favour deferring capex). The discount rate would need to increase to around 6.5% before the business-as-usual option would be the most economic.
- This result is moderately insensitive to higher rebuild costs, but the next best solution becomes the new transmission facility option and rebuild of the storage, which is a higher capital cost solution in the base case (ie $4.3 million compared to $3.6 million). Our analysis suggests an increase in rebuild cost over 21% ($4.3 million) changes the most economic option to the new transmission facility option 5b.
- This result is also insensitive to the timing of the rebuild (ie there is not a greater net benefit in delaying the rebuild by say one or more years). In this regard, the current issue costs and risks are valued at $239,000 on average per annum. Therefore, the benefit of a one-year delay in the capital costs of the rebuild would be approximately $145,500[11], which is significantly less than the benefits of removing the issues.
- Similarly, our estimate of the ongoing issue costs and risks could reduce by approximately 40% before there would not be a net benefit in avoiding these costs and risks through the rebuild option compared to continuing with the business-as-usual approach.

Based on the above, we consider it reasonable to conclude that the option to rebuild the existing building over the next period should maximise the net benefits over reasonable ranges for the key assumptions.

[11] Assuming a 40 year life of the building.

3 Minor capital works components

In the previous section, we discussed our development and evaluation of the major components of the capital works forecast for Angle Park North. In this section, we focus on the remaining portion of the capital works forecast, which we are classifying as minor capital works in this business case.

Minor capital works in this context covers the largely smaller reactive works that occur each year to address specific issues found at the site. This remediation work covers the larger refurbishment and upgrade items that will be capitalized due to their financial scale and life.

In this section, we will explain how we have:

- developed the minor capital works forecast via a bottom-up methodology; and
- validated this forecast using a top-down methodology.

Importantly, we will show that our minor works forecast is in line with recent historical levels of the equivalent types of work at this site, excluding the work items that would be addressed through the major capital works component. Given the age of the facilities at the site, and the limited level of major refurbishment and upgrade that has occurred at this site, we consider it reasonable to assume that ongoing minor works will be at least at the level of recent history.

Developing the forecast for the minor capital works components

Minor capital works forecasting methodology

We have used a detailed bottom-up methodology to develop the forecast of the capital minor works component. This methodology has involved the following:

- Consideration of site issues and needs
    - We have reviewed all the current issues that we have identified across the site to determine which of these we are likely to address through the minor works component over the next regulatory period.
    - In this process, we have excluded issues that will be addressed through the major works component and other issues that we considered are unlikely to be significant enough to warrant addressing in the next period.
- Development of solution and cost estimate
    - We engaged RLB to assess the set of existing site issues and advise on the high-level scope of likely best solution.
    - RLB developed the costs estimate based on this scope and their view of costs, including on-costs and professional fees (ie the costs we would need to pay to contractors and our own project managers to apply those solution).

It is important to note that the cost estimation process applied by RLB is the process described for our Original Proposal to the AER. The key difference is that we have reconsidered the issues and the interaction with the major component and removed the works components that we consider are unlikely to be addressed or we have already addressed in this period.

The key items we have excluded (which we included in our Original Proposal) are:

- the allowance for fire services upgrade to the logistics office – we have undertaken this work this period
- replacing the storage sheds on the logistics pavement – we do not consider this is likely to be necessary during the next period
- the new fit out of the logistics office and pole construction office – we do not consider this is likely to be necessary during the next period

- the refurbishment of the toilet facilities in the pole construction administration building – we have undertaken this work this period
- the construction of undercover EWP parking and washbay in the pole construction facility – we do not consider the need for these in this location is sufficient at this time, given we have allowed for similar items as part of the logistics pavement major replacement project
- the replacement of the pavement of the carpark of the pole construction facility – we do not consider that the current condition is sufficient to justify its replacement in the next regulatory period.

It is also important to note that this forecast methodology, particularly the reconsideration of the issues resulting the exclusions above, has been an iterative process with the top-down validation methodology, which is discussed later.

Statement of needs

The needs driving the minor works are specific to the scope items within the program, but broadly relate to issues due to the age of the facilities, including:

- the poor condition
- advanced age and risk of major failure
- inadequate facilities or lack of facilities appropriate for the current operations.

As with the major works components, these issues impose various costs and risks on our operations.

The specific needs are summarised in Appendix B with photographic evidence of the needs. Evidence of the need is further supported by Supporting Document 5.22.2 - Angle Park North Photographs.

Minor capital works forecast

Based on the methodology described above, we consider that $620,588 is a reasonable estimate of our minor capital works forecast for the next regulatory period.

The table below summarises the more significant items included in this forecast (items with a cost greater than $30,000).

Table 12 Summary of significant items in our minor capital works forecast (items >$30,000)

Facility	Component	Item Description	Total cost ($)
LOGISTICS	Office	Replace wall mounted split system air conditioner	$113,254
	Warehouse	Allowance for partial concrete slab remediation	$113,247
		Replace portable office including fit-out, access stair and ramp	$40,769
		Replace portable toilet including fit-out	$33,974
POLE CONSTRUCTION	Carpark	Allowance for Security Services (beams and cameras)	$45,323
	Pole Production Workshop	Replace evaporative air conditioning units	$45,997
	Welding Shop	Allowance to upgrade low bay lighting including sensors	$38,404
Grand Total (may not add up due to rounding)			**$430,969**

a – includes on costs and professional fees, but excludes corporate overheads

Validation of our minor capital works forecast

To validate our minor capital works forecast, we have compared it (in aggregate) to the recent historical level of capex at Angle Park North. In this regard, we consider it reasonable to assume that to maintain the safety, reliability and security of these facilities, the minor capital works component in the next period will need to be at similar to levels in the current period.

We consider that this assumption is reasonable, given:

- the old age of the facilities at this site
- the limited significant refurbishment and upgrade of these facilities since their construction
- the range of issues that we know still exist at this site (as discussed in Appendix B).

To produce the appropriate capex for comparison purposes, we have excluded the works items that relate to the major capital work component of our forecast (ie we have excluded the reactive repair works that have been undertaken on the logistics pavement[12]).

The figure below shows the comparison of our equivalent historical minor works capex against the average annual forecast amount of $124,118 (ie $620,588 / 5). Since 2015/16, our minor works capex has ranged between $98,000 in 2017/18 to $992,000 in 2019/20 (including the planned amount in 2019/20). The large amount in 2019/20 is due to the works to upgrade the fire system associated with the logistics warehouse and offices, which is currently being undertaken for compliance reasons. This need however reflects the type of larger items that could be addressed through this work component.

This chart shows that our forecast average annual amount is in accordance with equivalent recent historical levels. It is 61% lower than the 2015/16 to 2019/20 average of $317,000 and 16% lower than the 2015/16 to 2018/19 average of $149,000.

Given the rationale above, we consider that this demonstrates that our minor capital works forecast for the next regulatory period is reasonable.

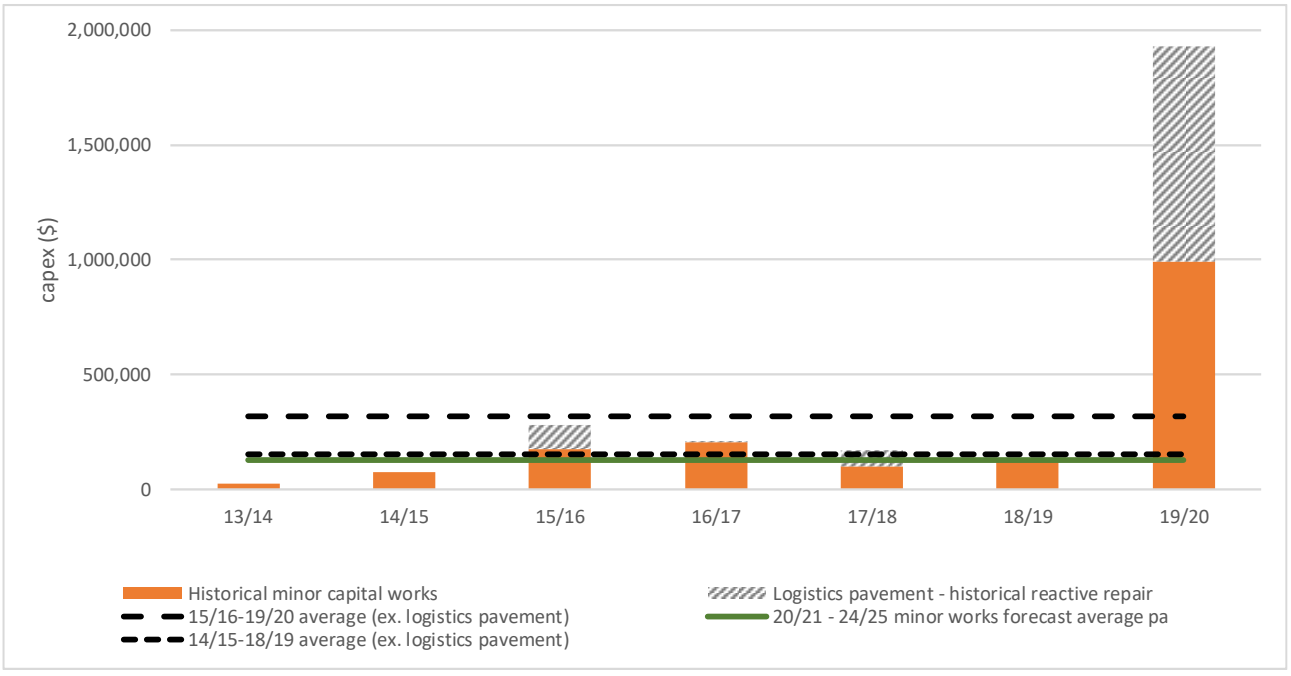


Figure 1 Comparison of minor capital works forecast to the equivalent historical expenditure

[12] There was not a need to exclude works on the store and transmission field service building as we have not undertaken significant capital works on this building recently.

4 Our preferred capital program and expenditure forecast

In the two previous sections, we have explained how we have developed and evaluated our major and minor capital works programs for the next regulatory period. In this section, we bring these two components together to summarise our overall preferred option for this location.

This section explains:

- our rational for selecting the preferred options;
- its overall scope and cost estimate; and
- the main benefits we expect to achieve through implementing this option.

Rationale for selecting the preferred program of capital works for Angle Park North

As set out in Section 2, for the major work components, we have undertaken cost-benefit analysis of a range of short and long-term options, including continuing with our current business as usual practices. For the preferred option summarised here, we have selected the option that provided the greatest positive net benefit. We have also shown in Section 2 that these options are relatively insensitive to reasonable changes in key assumptions.

This cost-benefit analysis has considered a range of issues and options associated with two facilities at Angle Park North. The two facilities and the selected option for these facilities are:

- the replacement of existing logistics pavement; and
- the demolishing and rebuild of the existing building that we currently use as logistics storage and the main amenities for the transmission field service team.

In addition to the benefits discussed in Section 2, these two options also align with our long-term master plan for this site, which should also allow us to rationalise the layout of the site in the future to further improve its operational efficiency and safety risks.

Our preferred option also includes the components we are classifying here as minor works. As set out in Section 3, we have developed a bottom-up forecast for these components based on identified issues. In developing this forecast, we have only included issues that we consider are significant enough to likely warrant attention over the next period. We have validated the scale of this program of works to ensure it is broadly in line with recent historical levels of expenditure at the site.

We consider that this is a reasonable approach to estimate the forecast for the minor works component, given the old age of the site and the limited amount of major refurbishment and upgrade we have undertaken at this site. Our view is that it is reasonable to assume that this level if expenditure is required to maintain the reliability, safety and security of the facilities at Angle Park North covered by this forecast, given the further ageing we can expect.

It is also important to note that, given the small scale of expenditure in the minor component and the range of unrelated issues it is addressing, we consider it would be unfeasible to undertake formal cost-benefit analysis across the items in the minor works program.

The preferred option scope and cost

Based on the above, we have estimated that the forecast capex at Angle Park North will be $11.5 million over the next regulatory period. The breakdown of this expenditure to the various facilities at that site is shown in

Table 13 below, which also indicates the key scope items cover by this forecast.

Table 13 Summary of capex forecast for Angle Park North

Component	Facility	Key scope items	Cost ($ millions)
Major works	Logistics pavement	Full pavement replacement plus other works	$7.33
	Store and transmission services building	Building demolition and rebuild	$3.57
Minor works	Logistics warehouse	Concrete slab remediation plus other works	$0.28
	Logistics office	Upgrade of air conditioning plus other works	$0.14
	Pole construction facility	Carpark remediations, washbay and undercover parking, plus other works	$0.20
	Control Centre	Minor sundry works	$0.01
Total			**$11.53**

The benefits achieved by the preferred option

A key purpose of the capital works in our preferred option is to ensure that the reliability, security and safety of the site does not deteriorate significantly, as the facilities continue to age. If this was to occur, then this could start to increase operational costs associated with the facility and in turn customer prices. Significant disruptions to the facilities (eg due to a major unexpected issue arising that significantly constrained operations) could also affect the timely delivery of some services (eg connection services to our transmission network).

That said, the major works components in this forecast involves two significant investments at this site, which should provide significant benefits, providing longer term improvements to the operations and risks associated with those two facilities.

We estimate that in total, the $10.9 million investment in these two facilities will provide economic benefits in the order of $4.0 million over the longer term (40 years).

Benefits summary

The costs and benefits of the proposed investment over the longer term of 40 years are summarised in the table[13] below:

Angle Park North – Capital cost			
	Major works	**Minor works**	**Total ($)**
Capital investment cost	$10.9 m	$0.6 m	$11.5 m

[13] Note – Values quoted within table may contain rounding errors/issues when summing to 1 decimal place.

Angle Park North – Benefits (Major works)[14]		
Benefit type	**Description**	**Benefit ($)**
Customer service – PRICE Ie. Benefit in reduced/avoided SA Power Networks costs - capex and opex	• This increase in our costs is driven by the higher capital costs of the major replacements compared to capital costs of continuing with the business-as-usual approach, which is **$5.9 million higher**; but • This increase in capex should be offset by a modest reduction in our operating expenditure of approximately **$4.2 million** over the same period.	– $1.7 m
Safety risks Ie. benefit in reduced/avoided economic cost of deaths and injuries	• Our cost benefit analysis has shown that these works should improve existing safety risks associates with the current state of the relevant facilities at Angle Park North. We estimate that, in total, the **$10.9 million** investment in these facilities will provide long term benefits in reduced safety risks of approximately **$5.7 million** compared to a business-as-usual approach.	+ $5.7 m
	Total NET benefit (relative to BAU)	**+ $4.0 m**

The customer service benefits

Regarding the price of our services, the program should ensure we can continue to provide services that reflect prudent and efficient costs.

Our cost-benefit analysis of the major pavement and building replacement suggests that our long-term costs associated with this property will be $1.7 million higher, compared to the business-as-usual approach (ie the aggregate present value of our costs over 40 year).

This increase in our costs is driven by the higher capital costs of the major replacements (over the longer term) compared to capital costs of continuing with the business-as-usual approach (which is $5.9 million higher assuming we could continue with the business-as-usual low capex level for the next 40 years, which is most likely unrealistic). But this increase in capex should be offset somewhat by a modest reduction in our operating expenditure of approximately $4.2 million over the same period.

Other economic benefits achieved by the program

Regarding other benefits, our program should ensure we can efficiently control safety and environment risks associated with the site.

Our cost benefit analysis has shown that our preferred options for the pavement and building replacement should significantly improve existing safety risks associates with those two facilities.

Replacing the logistics pavement should reduce safety risks associated with this facility by approximately $2.4 million over the longer term. In addition, the rebuild of the existing logistics store and transmission field service building will reduce safety risks associated with the operations of this facility by approximately $3.3 million over the longer term.

We consider our minor works component is acting to maintaining safety and environmental risks in the longer term in the face of further ageing of the relevant facilities (ie without this investment, these risks would increase).

[14] Minor works have not been quantified as they are largely small reactive works that occur each year and in-line with historical levels - We consider it reasonable to assume that ongoing minor works will be at least at the level of recent history – refer to section 3 for further detail.

Therefore, in total, we estimate that the total investment will provide long term benefits in reduced safety and environmental risks of approximately $5.7 million compared to a business-as-usual approach.

Comment on the safety risk

During discussion with the AER, they have questioned the relationship between the safety risk and insurance. In this regard, the AER has questioned whether our safety risk estimates can be reasonable as they would suggest a very high insurance value.

We believe that the safety risk we have estimated is appropriate for cost-benefit analysis. Importantly, we would expect this safety risk to be considerably higher than an insurance risk, for the following reasons:

- Firstly, from a corporate risk management point of view, the risks associated with specific site facilities is classified as low to medium risk in our corporate risk scale. Therefore, they are not specific risks being monitored and controlled through the corporate risk management protocols. For example, the assumed likelihood of fatalities associated with any of the studied facilities are very low ie longer than 1 in 125 year event for each facility.
- Secondly, this risk should in no way be interpreted as any recognition of some imprudent or negligent management by us of the pavement and its degradation up to this point or in the future.
- Thirdly, the assumed consequences are based on public information on the cost to the economy of deaths and injuries (ie the value of statistical life[15]). These values are prepared for cost-benefit analysis of the type we have applied. We also apply a 2x disproportional factor to these values, which aligns with how we understand these values should be applied when confirming decision are in accordance with our safety legislation. Importantly, the economic value (such as the value of statistical life) is known to be well above typical insurance values.

[15] Best Practice Regulation Guidance Note Value of statistical life, December 2014, Department of the Prime Minister and Cabinet

5 Regulatory treatment

We have included $11.5 million in the capex forecast in our Regulatory Proposal to the AER to allow for Angle Park North refurbishment project. We believe that the AER can have confidence that this forecast is in accordance with the NER, given the methodology we have applied to determine the need for this project and its scope and cost.

Given the old age and current condition of this property and its anticipated further ageing over the next regulatory period, we consider that the program's forecast capital expenditure is in accordance with the NER capex objectives as it is required to:

- maintain the safety of the distribution system through the supply of standard control services;
- maintain the quality, reliability and security of supply of standard control services; and
- continue to comply with regulatory obligations associated with the design, construction and operation of the Angle Park North property, and our broader safety and duty-of-care obligations.

We also consider that the program's forecast is in accordance with the NER capex criteria as it reflects the efficient cost that a prudent operator would require to achieve the NER capex objectives. Most notably, we have applied a rigorous approach to:

- assess the condition of the Angle Park North property and identify and quantify specific issues with that property
- determine the detailed scope of works and costs to address those issues
- undertaken comprehensive cost-benefit analysis on the major works components of the program of works, considering a range of short term and long term options, including continuing with a business-as-usual approach
- assessed the remaining minor works components to ensure that the overall scale of works is in line with historical levels, which we consider is reasonable given the advanced age of this site and the recent low levels of refurbishment expenditure.

Importantly, we have engaged various independent experts to assist us in these tasks. These experts have specific experience in assessing properties and developing scope and cost estimates, which should ensure that our cost estimates reflect prudent and efficient costs to address identified needs.

We are not proposing to include any adjustments to other incentive mechanisms because of this program. We recognize that the forecast at Angle Park North represents a significant increase from recent historical levels at this site. However, as we have demonstrated through our cost-benefit analysis, the major benefits achieved by this investment are reductions in safety risks and reductions, over the longer term, in reactive repair capex.

We do consider that the increased investment at this site will result in some improvements to the efficient operation of this property. This should produce benefits in terms of improved productivity associated with this facility. These have been important considerations in why we believe that this investment is necessary and should result in a net benefit. However, we consider that these localized improvements at the Angle Park North property (for example, in reduced opex or improved supply reliability) will be offset by the effects of the overall ageing of all our properties (and our network in general to some degree). Therefore, we do not consider that any other adjustments are appropriate in these circumstances.

A. Overview of Angle Park North

In this appendix, we provide an overview of the Angle Park North property, including:

- the facilities at this site and their role in providing services to our customers; and
- the historical development of this site and how we currently maintain this site.

The purpose of this appendix is to provide background information on Angle Park North. This understanding is relevant to appreciating the significance of the issues at Angle Park North and the risks and costs driven by these issues.

Importantly, this appendix explains:

- Angle Park North is a large site, providing various functions that are critical for us to continue to provide efficient services to customers across our entire network, such as our metropolitan customers.
- But Angle Park North is also an aged site that has had limited major redevelopment or refurbishment since its early development in 1954.

Angle Park North and its role in providing services to our customers

Angle Park North is one of our largest properties (by area), covering some 83,000 m^2. It is located in the Adelaide metropolitan area, 9.5km to the north west of the Adelaide CBD.

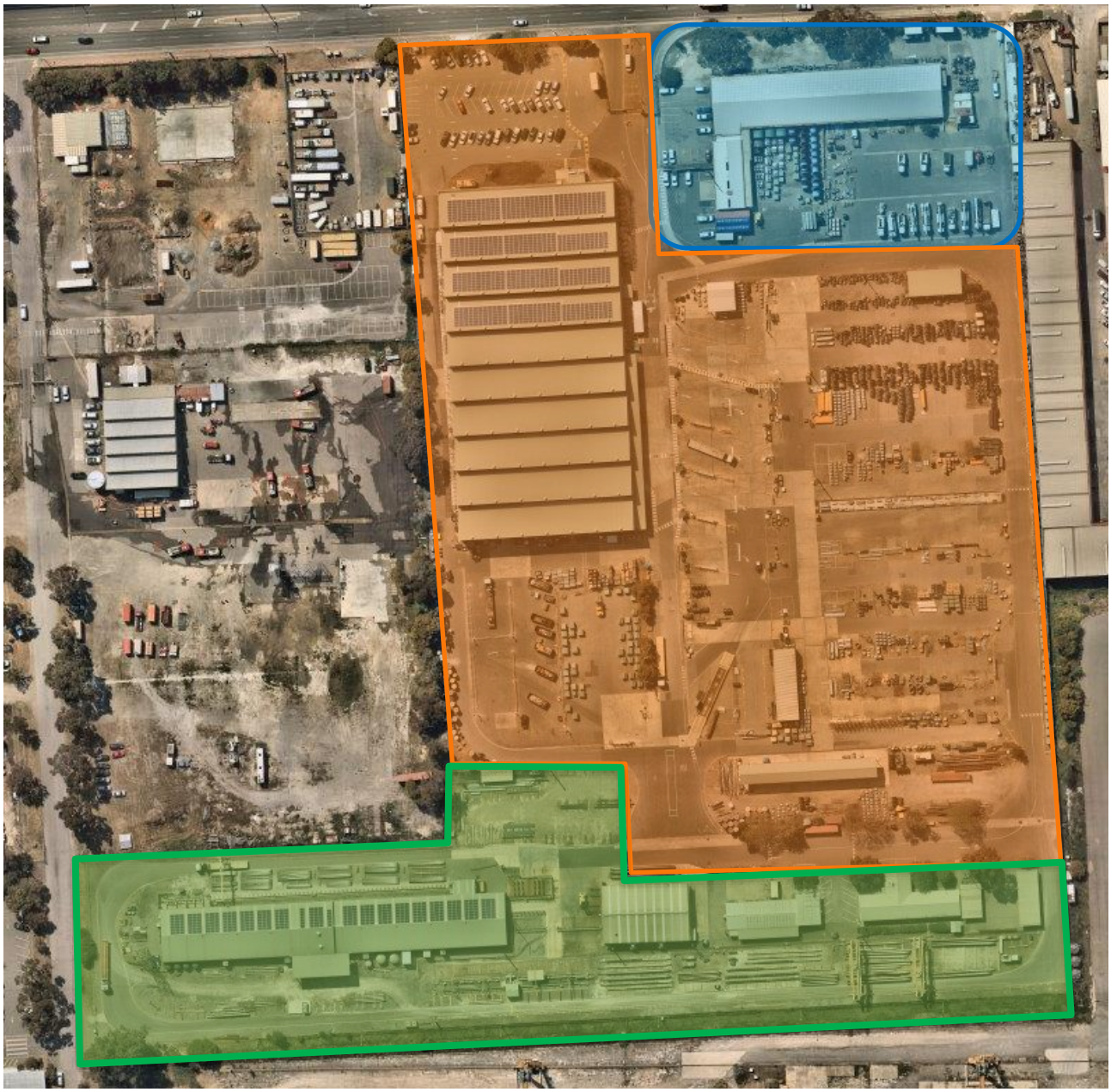
The site is used for three distinct functions, which are largely independent and different in their roles, as summarised in the table below. The diagram below shows the location of these three functions within the Angle Park North site.

Table 14 Overview of the main facilities at Angle Park North

Facility	Role and functions
Warehousing and logistics **(orange area in the diagram)**	Approximately 60% of the site is used as our warehousing and logistics metropolitan hub. This facility acts as our central storage point, servicing all 30 of our metropolitan and regional distribution depots. In this regard, the assets (including tools and equipment) required to maintain and develop the distribution network that serves all South Australian customers (895,000 customers) are delivered and stored in bulk here, ready to be transported to the various metropolitan and regional distribution depots as and when required. Old assets are also typically brought back to this facility in order to be salvaged for re-use or sold as scrap. The maintenance and operation of this facility is critical for us to continue to provide efficient costs for purchasing, salvaging and storing of distribution assets and ensuring that they are available as required to provide all customer services throughout South Australia. The main facility is located in the central portion of the site and consists of two main components: 1. A large 7800 m^2 purpose-built warehouse building, which provides indoor storage space and associated reception and office facilities. 2. A 34,000 m^2 outdoor pavement, which provides loading and unloading facilities for heavy vehicles, various outdoor storage locations and the salvage yard. In addition, part of an old redundant office building to the North of the site has been re-purposed as additional storage. This building was once used as

Facility	Role and functions
	the main offices of the warehouse and logistics team, prior to these offices being relocated to within the warehouse building.
Sub-transmission line field services depot[16] **(blue area in the diagram)**	Approximately 12% of the site is used as our sub-transmission line field services facility. Importantly, this facility acts as our sole sub-transmission powerline field services depot, servicing the needs of the sub-transmission powerline network and any customers connected directly to that network across the entire state. This facility houses the SA Power Networks personnel, their equipment and tools, vehicles, and network spares, which are required for the transmission field crew to perform office and field roles. Importantly, the sub-transmission field crew are responsible for all activities associated with the efficient operation and development of our sub-transmission powerline network, including establishing major connections to the transmission networks, augmenting the sub-transmission network, providing maintenance services, and providing response and repair services following faults to our sub-transmission network. The sub-transmission assets are typically much larger and heavier than ordinary distribution assets (ie, assets that are generally operating at lower voltages). Therefore, the transmission field crew tend to have specialist skills and equipment to transport and handle these types of asset. This requires them to have a dedicated team and facility. However, the team can also provide a type of "peaking" general field service, supporting the distribution field services when distribution works loads are high or some emergency response activities are required. The maintenance and operation of this facility is critical for us to continue to provide efficient costs and maintain the quality of supply, as the majority of our customers will have their supply provided "upstream" through our sub-transmission network. The facility is located to the north of the site and consists of three main components: 1. A "muster", kitchen, toilet and changing facility, which is located in part of the old redundant logistics office building (discussed above). 2. A pavement area that is used to store transmission spares (eg spare cable, switchgear, and transformers) and parking space for the dedicated transmission vehicles (eg the large elevated works platforms necessary for working on transmission poles). 3. A workshop building (ie simple steel shed construction).
Pole construction facility **(green area in the diagram)**	Approximately 28% of the site is used as our stobie pole construction facility. Importantly, this facility acts as the sole stobie pole manufacturing facility in SA and provides all the stobie poles we use on our network. Obviously, the continued maintenance and operation of this facility is critical for us to provide efficient costs and maintain the quality of supply to almost all of our customers (as the majority of our customers will have their supply delivered via our overhead network).

Facility	Role and functions
	The facility is located to the south of the site and consists of various components, covering the production building, various workshops, the administration building, and a carpark and outdoor material storage locations.



Blue - sub-transmission depot and old logistics administration building area, currently used as storage

Orange - main logistics facility, including warehouse and pavement area

Green - pole construction facilities

Figure 2 Diagram of Angle Park North showing the main facilities.

Importantly for the discussion in Appendix B on the major issues in Angle Park North, the diagram above shows the location of the old redundant logistics office, which is now used for storage and various amenities of the transmission field services team (the building in the blue area) relative to the warehouse (the main building in the orange area). It also shows that these two facilities are separated by the main internal road through the site, which is used daily by heavy vehicles that are transporting materials to and

from the warehouse and the pole construction facilities. Pedestrian movements between these two facilities requires our personnel to cross this road.

In total, approximately 120 SA Power Networks employees and contractors are located at Angle Park North, and typically during working hours there will be approximately 60-80 people on site at any time.

The age and historical development of Angle Park North

The Angle Park North site was originally established in 1954 and has always functioned as our main logistics hub and stobie pole construction facility. To a large degree, the original buildings and pavement areas remain as established at that time (ie they are over 60 years old).

There have been very few notable developments at the site since it was established. The only major improvement was the construction of the warehouse office facility, in the northern eastern corner of the logistics warehouse, which was developed around 20 years ago when the original logistics office and administration building was repurposed as storage.

Angle Park North recent expenditure and refurbishment activity

There has been little significant refurbishment or upgrade of the facilities at this site since its establishment. However, we have commenced a more significant refurbishment and upgrade program during the current regulatory period. Currently, this is very much a piecemeal reactive program focusing on addressing specific identified issues at the site.

Historical capex

In total, from 2013/14 to 2019/2020 (inclusive) our capitalised refurbishment and upgrade work at Angle Park North totaled $2.8 million (real June 2020). The annual profile of this expenditure is shown in the figure below, indicating the spend associated with the various facilities discussed above.

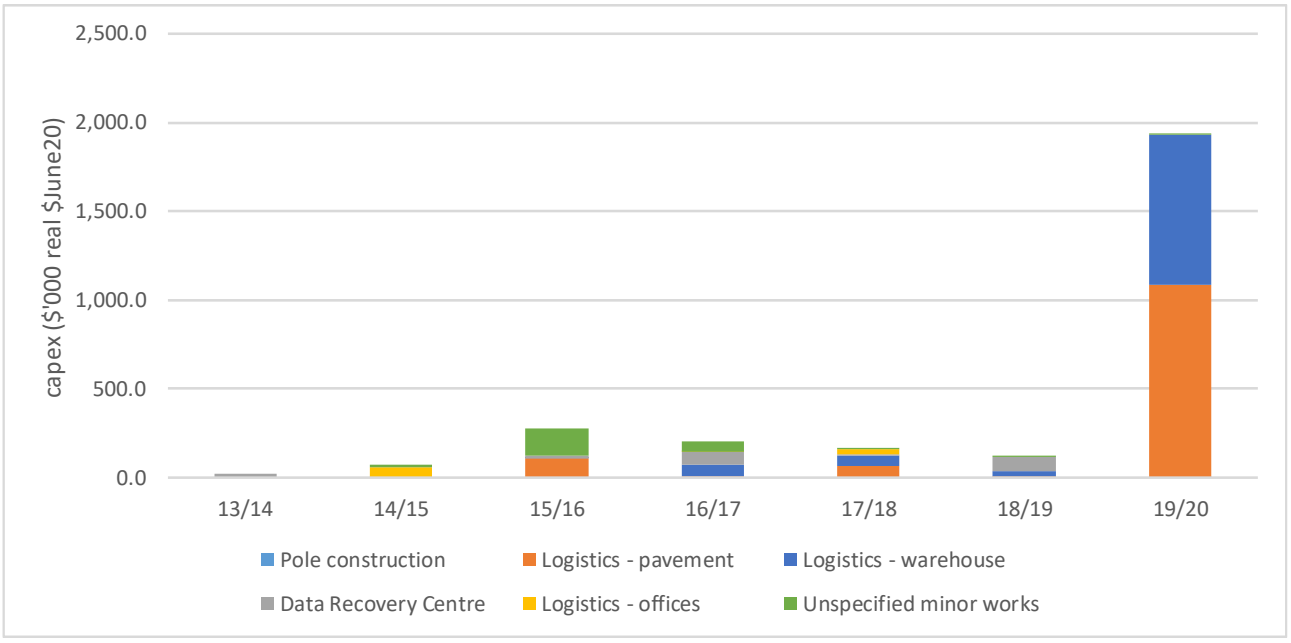


Figure 3 Profile of recent refurbishments and upgrade capex by facility

Significant pieces of work that are planned to be completed this period are summarised in the table below.

Table 15 Significant refurbishments and upgrades at Angle Park North this period

Work item	Description	Cost (nominal)
Warehouse fire system upgrade	Replacement of roof and rack sprinkler system to warehouse, including all water storage tanks, pumps and pipework to meet fire and insurance requirements.	$1,050,000
Logistics pavement refurbishments and upgrades	Replacement foundations for Cantilever Racking due to cracking of old foundations and ground subsidence. Concrete storage hard-stand areas (2,000m^2). Bitumen Repairs (Cracking and Subsidence).	$185,000 $595,000 $510,000
Logistics fence replacement	Replacement of original chain-mesh front fence with tubular steel, spear top fence and plinth due to continued break-ins and property damage.	$243,000
Air conditioner upgrade	Air-conditioner upgrade.	$118,000
Warehouse gutter refurbishment	Ongoing roof leaks and internal damage due to rusted box gutters.	$68,000
Warehouse office refurbishment	Workstations, carpet flooring, painting and services. Replacement of modular toilet block (old unit condemned).	$64,000 $29,000

Of most note with the recent capitalized refurbishments and upgrade:

- Nearly half of the capex over the current period has been associated with the logistics pavement, where we have undertaken a number of patched repairs to the pavement to address areas of poor condition, including replacing some pavement storage areas with hardstands. Importantly, as we will discuss in the next section, this has not addressed all areas of poor condition, and therefore, the condition of the pavement is an ongoing issue with this facility.
- The other major component of capex has concerned works on the logistics warehouse and office building. A major project has been to upgrade the existing fire system within the warehouse, which was not compliant with current standards and placed a significant safety and legal risk on our operations. We have also undertaken various minor refurbishments to address other aged fixtures, fittings and facilities associated with the warehouse.

Importantly, although there has been no significant works associated with the old logistics office building (now used for storage and by the sub-transmission field services facility), this is not because we do not consider there were significant issues with this facility. As we will discuss in the next section, we have significant concerns with the condition of this building and the standard of amenities. However, as this building is so aged and these issues are so extensive, we have not directed this piecemeal refurbishment funding to this facility until we have developed a longer-term solution for this facility – which is the purpose of this business case.

Historical maintenance expenditure

Over the current period, we will spend on average $41,300 per annum (real $June, 2020) on reactive maintenance across the site. This is typically minor expenditure to fix defects found at the site (eg repairing plumbing, air conditioning, doors, buildings, security systems, fire systems, and our electrical systems, etc).

The annual profile of this expenditure is shown in the figure below, indicating the spend associated with the various facilities discussed above. This chart indicates that reactive maintenance expenditure at this site has been rising recently, with reactive maintenance expenditure reaching almost $60,000 in 2018/19.

The major component of reactive maintenance is associated with the logistics warehouse and office building (53%) and the logistics pavement (28%). Only a very small component is associated with the the old logistics office building (3%). However, as with capitalized repairs discussed above, this is because we have paused as much repair works as feasible while we develop a longer-term solution for this facility.

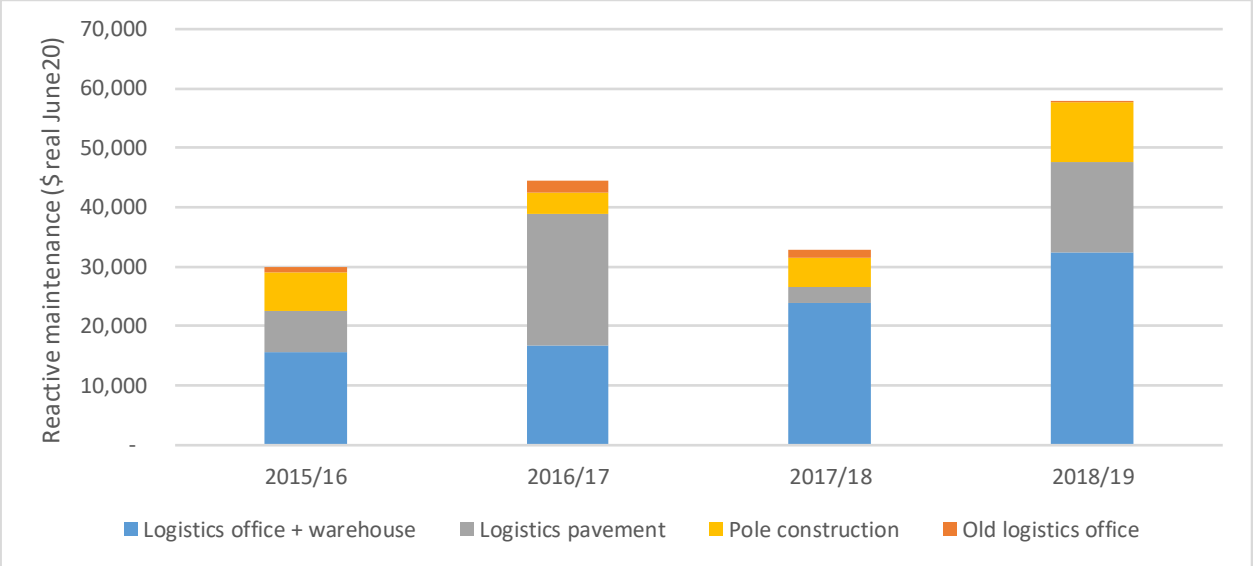


Figure 4 Profile of recent reactive maintenance by facility

In addition to this reactive maintenance, we also spend on average approximately $40,000 per annum on preventative maintenance at Angle Park North.

B. The 'needs' at Angle Park North

In this appendix, we summarise the current issues with the Angle Park North property that are driving the 'needs' of this property, including:

- the facilities and locations affected and causes of the issues (eg age, condition, compliance, etc); and
- the implications that these issues have on the risks and operational costs associated with this property.

The appendix is structured to:

- provide details of the major issues, which we are evaluating through our cost benefit analysis, discussed in Section 2; and
- summarise the more minor issues, some of which will be addressed through the minor work forecast, which is discussed in Section 3.

Importantly, this appendix explains that there are two locations, where we consider that the issues are so significant that major replacement projects may be necessary to provide long term solutions to the issues:

- the **logistics pavement**, which has had increasing areas of poor condition and a sub-optimal layout for our current operations, impacting safety risks and operational costs, and resulting in a recent program of reactive piecemeal repair; and
- the **old redundant logistics offices**, which is now used partly as storage and partly providing amenities to the transmission field services team. This building very old and has a range of issues affecting its continued use, resulting in safety risks and operational costs and risks.

There are also a range of issues with other facilities at the site predominantly due to their old age, which will be addressed through our minor works program.

This appendix provides photographic evidence of the main issues and is supported by Supporting Document 5.22.2 - Angle Park North Photographs, which provide more comprehensive photographic evidence.

Assessment methodology and evidencing the need

We continually inspect and assess our properties. The issues discussed in this section have been developed from our own inspection processes and the inspections undertaken by RLB, which was discussed in our original regulatory proposal.

Additionally, in the subsections below, we reference other assessments that we have commissioned recently on specific facilities at Angle Park North, which are most relevant to the issues discussed here[17].

Logistics pavement and associated external works

Context

As noted in Appendix A, the logistics pavement covers a large area (approximately 34,000 m^2), which is used for various functions associated with our logistics and warehousing operations.

[17] It is worth noting that we have commissioned numerous investigations and assessments of this site, including development options. However, we are only referencing those that are

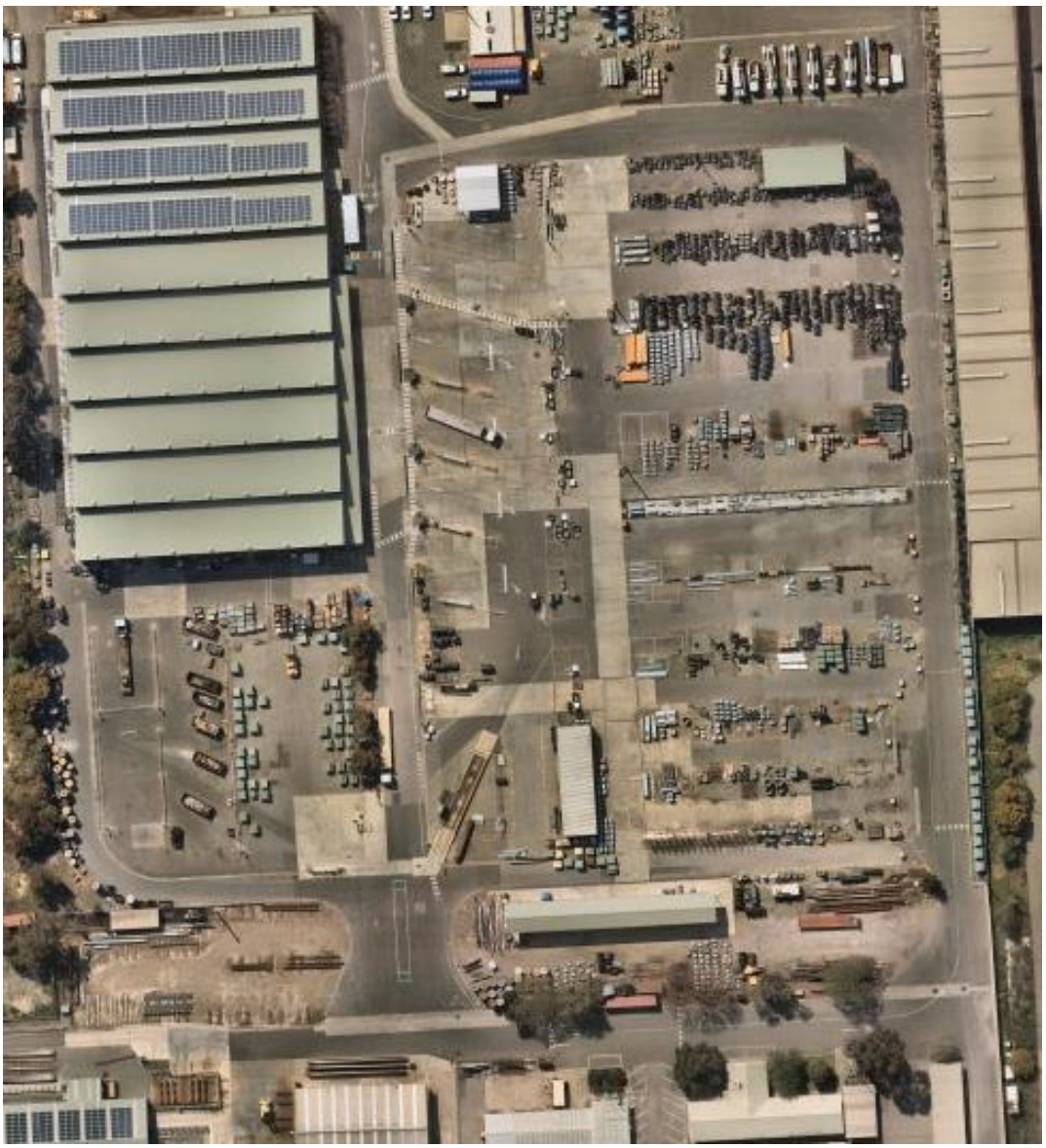


Figure 5: Diagram indicates logistics pavement and key features

below provides a diagram of the site, indicating the logistics pavement and key features of this pavement, including:

- the loading unloading bays, which can be used by heavy goods vehicles that are transporting asset and equipment to and from the site
- various outdoor storage areas, which are used to store assets such as conductor cable, transformers, circuit breakers and other Network equipment.
- the salvage yard, which is used to salvage scrap and spares from old assets that are removed from our network
- various covered storage facilities, which are used to store equipment not suitable for storage in the main warehouse, but which still require some weather protection or enhanced environmental controls (eg winches, brakes, new transformer components)

Importantly, during working hours there will typically be numerous vehicles entering and leaving this area, personnel working on foot within this areas, and other personnel moving material using forklift vehicles.

Figure 5: Diagram indicates logistics pavement and key features

Major issues with the pavement

The poor condition of the existing pavement

The current pavement was originally constructed in 1954-1958. Since that time the volume and weight of the heavy vehicles transporting materials to and from this site has increased. Because of the age of the pavement and its heavy use, there has been an increasing volume and severity of areas of the pavement with significantly degraded condition. As we have noted in the previous section, recently we have been repairing the worst affected areas through a piecemeal reactive repair program.

The poor condition of the pavement develops in various ways depending on the pavement material and its use.

Concrete areas are typically laid in block-like tile sections, with a filling material between the blocks. The surface of the blocks can degrade and wear, producing areas of sunken and uneven surface, or significant cracks can form. Alternatively, the joining edges of the blocks can get worn, chipped or the block can subside, such that an uneven step-change occurs between blocks.

The bitumen areas have similar issues with degradation and wear causing potholes and areas of sunken or uneven surface. The bitumen areas can also be affected during times of the extremely high temperature where the weight of the heavy vehicles, particularly at turning points, can cause ruts and uneven surfaces to form. Further, some of our heavy moveable storage and bins can leave deep spot indentations when left on bitumen for extended periods.

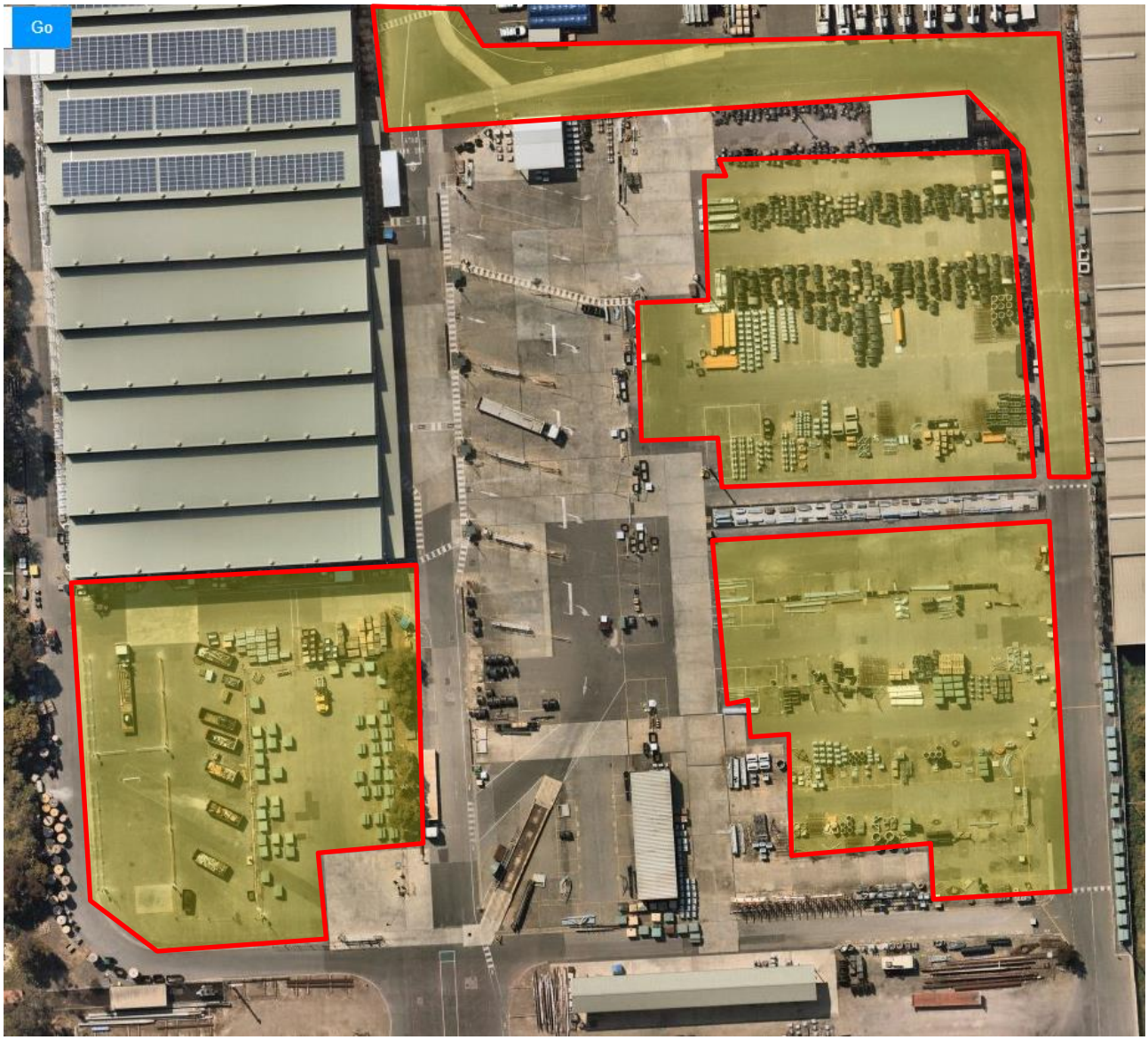


Figure 6 Diagram indicating areas of pavement in poor condition

The diagram above indicates the areas across the pavement in the worst condition, including the salvage area, the various outdoor storage zones and the main roadway into the logistics facility. These areas of very poor condition affect various activities on the pavements, including:

- the movement of heavy vehicles
- the functioning of the outdoor storage zones, forklift movement and equipment storage
- the loading and unloading of very large 9m salvage bins, including associated forklift movements
- pedestrian movements in these areas.

Importantly, because of its age and the historical degradation we have seen over the last 15 years, we are expecting further areas to degrade over the short term (ie we anticipating an ongoing need to repair the pavement if we continue with a business-as-usual reactive repair strategy).

The sub-optimal layout of the pavement for the current operations

The overall development of the site since its establishment, particularly the number and types of vehicles that now use the site, has resulted in the layout being sub-optimal for our current operations. This creates a number of issues with the functioning of the site, including less efficient operations and the greater possibility of accidents.

The key issues with the arrangements are as follows:

- the outdoor storage areas are dispersed across the pavement areas (ideally, we would prefer a centralised storage area)
- the turning circles for heavy vehicle are "tight", which tends to accelerate the decline of the pavement in these locations
- there are various heavy and light vehicle interaction zone
- the existing traffic flow arrangements require heavy vehicles to move in changing directions and through the centre of the pavement area (ideally, we would prefer heavy vehicles to move in a single forward clockwise direction on the outer edges of the site).

Example photographic evidence of logistics pavement issues

Example photographic evidence of the major issues with the logistics pavement is shown below. More comprehensive photographic evidence is provided in Supporting Document 5.22.2 - Angle Park North Photographs.

Figure 7 Example of extensive full-thickness bitumen cracking to salvage bin storage, loading and unloading areas (9m storage bins can be over 3 tonne in weight).

Figure 8 Further examples of cracking and potholing and subsidence of sub-grade to logistics salvage area.

Figure 9 Example of significant full-thickness crack and subsidence to main driveway route for heavy vehicles.

Figure 10 Examples of significant bitumen damage to semi-trailer route and turning circles and Transmission Heavy Vehicle Parking and Storage areas

Figure 11 Examples of cracking and damage to pedestrian walkways, thoroughfares and concrete drainage areas. Also showing previous glue repair failures.

Impact of poor condition and layout on operational costs and risks

The poor condition of the pavement, its layout, and our existing reactive repair practices result in a range of increased costs and risks associated with the logistics operations at Angle Park North.

The table below summarises the most significant costs and risks we have identified and provides our estimated value for these costs and risks. Further details of the methodology, assumptions and basis for these estimates are provided in Supporting Document 5.22.3 - Angle Park North Logistics Pavement model (confidential).

In total, we estimate that the main costs and risks associated with the poor condition of the pavement is currently approximately $155,305 per annum, with a major component of this due to safety risks caused by the need for multiple forklift movements per day across areas in poor condition[18].

Importantly, given the age of the pavement and its recent history of degraded condition, we expect these issues to worsen if we continue with our current reactive repair approach. This will either increase the need for reactive repair to maintain the costs and risks at around current levels, or these costs and risks will increase if we maintain the volume of reactive repair at current levels.

[18] It is worth noting that although this safety risk is high in relative terms to other risks at this site, it is only classified as a low to medium risk in our corporate risk scale. Therefore, it is not a specific risk being monitored and controlled through the corporate risk management protocols.

Note, the table below only details the incremental costs and risks resulting from the issues, which we consider would not arise if the issue did not exist. It does not detail all costs and risks for this facility.

Table 16 Summary of the major costs and risks due to the issues with the logistics pavement

Cost/risk category	Description	Expected annual value ($)
Safety risks	The tipping over of a forklift vehicle or other serious forklift accident caused by its movements over the uneven ground surfaces caused by the areas of poor condition and resulting in a fatality or injury.	$95,472
	An injury, resulting in lost time, due to a staff trip or other accident caused by foot movements over the uneven ground surfaces caused by the areas of poor condition.	$3,333
Operational risks	An accident involving a heavy vehicle resulting damage to our infrastructure or the vehicle due to it altering course to avoid patches of poor condition.	$2,500
	An unexpected and rapidly evolving patch of poor condition occurring that significantly affects the operations of the logistics facility until it is repaired.	$4,000
Operational inefficiency	Initiation and application of temporary workaround arrangements or other constraints on usual practices associated with operating on the logistics pavement in areas of poor condition. Note, this include the risk controls that are necessary to ensure that events associated with the safety risk should have a very low likelihood.	$10,000
	Initiation and application of temporary workaround arrangements or other constraints on usual practices associated with operating on the logistics pavement while the reactive repairs of the pavement are occurring.	$10,000
	Existing sub-optimal layout for current operation causing increased logistics and salvage costs.	$30,000

Other issues with the logistics pavement

In addition to the poor condition of the pavement, there are also a range of other more minor issues with the external structures and fixtures associated with the pavement area. These issues do not drive the need to replace the pavement, but some will be able to be addressed opportunistically if the pavement is undergoing a major planned replacement. Otherwise, these issues would be addressed either through the reactive maintenance program, or more likely minor works in the capital works program (similar to those discussed in Section 3).

The table below lists the most notable issues, providing a brief explanation of each issue and how it affects costs and risks (note, for these more minor issues, we have not tried to quantify the costs and risks).

Table 17 Summary of minor issues with logistics pavement

Issue	Explanation of issue	Impact on operational costs and risks
Security services	The existing beams and cameras (old analog video cameras) have been assessed to be inadequate resulting in break-ins to the facility.	This increases the possibility that there could be either theft or damage of site equipment, with the resultant additional costs to our business associated with that event.

Elevated Work Platform (EWP) parking	There is a lack of undercover parking for the EWP vehicles.	We currently have up to 12 EWP vehicles parked at this location. These are expensive vehicles; for example, we have large EWP vehicles required by our sub-transmission line field crew, which are valued at up to $500,000 each. The current arrangements expose these vehicles to weather (eg high UV, rain and hail). This can accelerate their ageing, increasing maintenance costs and reducing their effective lives. It is also worth noting that historically, we had undercover parking at the site. However, this had to be dismantled because the newer EWP vehicles were too high for the structure.
Wash bays	There are no wash bays at this site.	Due to the nature of the works we perform in regional agricultural areas, our EWP fleet represent a major risk to biosecurity and pest and disease spread in cropping and grazing areas. As such, these need to be washed regularly, and particularly following any field use.
Bollard	Poor condition (damaged) bollard including footing, which are required to protect buildings and provide safety refuge areas for pedestrians and drivers.	This increases the possibility of an accident resulting in building damage, and associated costs, and increases safety risks.
Storage sheds	Poor condition. As noted in Appendix A, we have a number of small storage sheds located on the pavement. These are old steel sheds, constructed around 1954-1960. These structures are showing signing of ageing, including structural rust, holes and pitting.	This increases the risks of an unexpected major failure and associated costs and safety risks.

Logistics storage and transmission field services building

Context

As noted in Appendix A, to the north of the Angle Park North site is the old logistics offices (a building of approximately 1560 m^2), which has been re-purposed into additional logistics storage and amenities for the sub-transmission line field services staff (the sub-transmission team). The sub-transmission team have been located in this building since the early 2000s, as the other facilities required by this team are also located in this portion of the site (eg network spares, workshop, EWP parking). As such, this location is ideal for their operations.

Figure 12 below provides a diagram of this building in the broader context of the new warehouse offices and the other transmission field service facilities required by the sub-transmission team. This diagram shows the location of the various current functional areas of the existing building, including:

- the various storage locations (noting, the original female toilets are now used as storage)
- the toilets, showers and changing facilities used by the transmission team
- the "muster" point used by the transmission team for informal gatherings, which also includes (very limited) kitchen facilities.

This diagram also shows the route used by the sub-transmission team for formal office work and meetings, which are currently performed in the warehouse offices. Of most note, this diagram indicates the internal road crossed by the transmission team, which is the road used by the heavy vehicles that enter the site to load and unload logistics materials.

Figure 12 Diagram of logistics storage and transmission field services building

The building was constructed in 1954 and acted as purpose-build offices for staff. Around 2000, partly because of the deteriorating condition of these offices, new offices and facilities were constructed in the warehouse building and the logistics staff moved to this new location[19]. At this time, much of the building was re-purposed for storage. This included decommission the office fixtures and fitting, adding supporting steel columns and ensuring the floor and entries and exits were suitable for forklift traffic.

As noted in Appendix A, the building has been known for some time to be in a poor condition and not fit-for-purpose in the long term. Because it has been our intention to decommission this building for some time, it has received very little preventative or reactive repair or refurbishment since it was re-purposed. This is clear from the historical expenditure discussed in Appendix A, where we have shown there has been very little capital or maintenance expenditure on this building compared to the rest of the site.

We have commissioned a number of assessments of this building to determine its issues and its continuing viability in its current roles.

Of most note, in 2012 we commissioned the architectural firm, Parade Studios, to undertake an assessment of the building. The scope of this assessment covered a range of matters, including assessment of

- the condition of the structure, including the floor, external and internal walls, and fixtures and fittings
- the building services (eg air conditioning, electrical systems, fire systems), including their condition and compliance with current standards
- the building design, including access and egress, health and amenity and energy efficiency.

Parade Studios engaged FMG Engineering to assess the building structure and Lucid Consulting Engineers to assess the building services.

[19] On site logistics staff moved to the new warehouse offices. Other staff (eg procurement and metro operations) moved to our main Keswick offices.

Major issues with existing building and arrangements

The poor condition of the building structure

Structurally, the assessments have found the buildings structural system to be acceptable. Importantly, this means that there is a low risk of a catastrophic failure of the building. As such, without other issues, we could continue to use this facility. This acceptable state is due to the type of original construction, which used heavy gauge steel as its supporting structure. Although this is degrading due to its age and environment, the degradation it not enough to cause it to be structurally deficient.

However, the assessments have found the non-structural system and other elements of the building to be in very poor condition. A range of issues were raised through the Parade Studio assessment, which have been corroborated through subsequent assessments and align with our view of the building. Most notably, the floor, internal and external walls, and fixture and fittings have all been found to be in poor condition.

A key issue raised through the assessment driving the deteriorating condition is rising damp, which is likely due to construction deficiencies. This is affecting areas of the concrete floor and the brickwork of various walls. The walls are also cracking in places, which is likely due to building settlement.

Additionally:

- the gutters and downpipes are in poor condition and leak water down the walls during period of heavy rain
- the air conditioning system is considered to have exceeded the typical design life
- the internal roofing is collapsing
- there is significant termite damage to timber sub-structure
- there is significant concrete cancer to walls and floors
- there is major structural cracking to concrete floor.

The limitations in store layout due to it being a repurposed office

As noted above, the store arrangements have occurred through repurposing the building, which was originally designed as offices. Although this has provided a functionable storage area, suitable for forklift operations, it is not ideal. The arrangements provide more limited movement and access for forklift vehicles than we would expect in a purpose-build storage facility. Furthermore, the large number of structural streel columns that are used to support the roof and the low ceiling height, also provide multiple hazards to forklift movements.

These issues are exacerbated by the poor condition of patches of the floor, which can provide uneven surfaces that forklifts must traverse.

The limitations in the office arrangements for the sub-transmission team

The current arrangements for the office-based work of the sub-transmission team are not ideal. As noted above, the building does not have formal office facilities for the sub-transmission team, and therefore, they use the logistics office facilities for formal meeting and general office activities.

This results in two main issues:

- The sub-transmission team manager is now permanently based in the logistics offices and separated from the main sub-transmission team.
- The sub-transmission team are required to walk to the logistics office, crossing the main internal road, each time formal meetings or office-based work is necessary. Typically, this requires the 25-30 person team to travel to and from the logistics office 2 to 3 times a week. We have estimated that on average there are approximately 6,500 person movements to or from the warehouse every year.

The poor state of the transmission team facilities

Related to the poor condition of the building, the facilities in the parts of the building used by the transmission team are in a very poor state and not fit-for-purpose in a contemporary business. We consider these to be well below what would be acceptable standard.

Of particular note here:

- the building does not have purpose-build kitchen and dining area;
- the existing "muster" point used by the transmission team for informal meetings and kitchen facilities is too small for the size of the team and is in a very poor state; and
- the shower, toilets and changing facilities are aged (this facility was last refurbished in 1960), and currently at a standard well below what we would typically provide to our employees.

Energy inefficiency of building

The general building design and construction, particular the lighting system, is of an old design and standard, which is significantly less energy efficient than modern equivalents. The current annual cost of electricity supply to this building is $20,230.00.

Modern equivalents would reduce this cost considerably. For example, replacing the lighting with modern low energy lights would reduce costs by approximately 30%.

Other issues

Also related to the overall age of this building and the very limited level of refurbishment it has received over an extended period, are a number of other issues associated with the standard of the building construction and the building services, which are noticeably deficient compared to modern designs and current obligations.

On their own, these issues would not be sufficient to drive the need to replace the building. Ordinarily, issues such as these with our buildings would be addressed either through the reactive maintenance program, or more likely minor works in the capital works program (similar to those discuss in Appendix A). However, the replacement of the building would allow these matters to be addressed opportunistically.

The table below list the most notable issues, providing a brief explanation of each issue and how it affects costs and risks.

Table 18 - Summary of other minor issues with the building

Issue	Explanation of issue	Impact on operational costs and risks
Electrical services	The existing electrical system has a number of issues: • inadequate fluorescent lights • inadequate exit and emergency lights	Safety risk There is a possibility of electrocution or accidents due to poor lighting, plus the possible penalty costs if we are found to be at fault because of our non-compliant systems.
Fire services	The existing fire system has some minor non-compliances with sprinklers, hose reals, and portable fire extinguishers	Safety and operational risk There is a possibility of a fire being more extensive because of non-compliant systems, plus the possible penalty costs if we are found to be at fault because of our non-compliant systems.

Example photographic evidence of old logistics administration building issues

Example photographic evidence of the major issues with the old logistics administration building is shown below. More comprehensive photographic evidence is provided in Supporting Document 5.22.2 - Angle Park North Photographs.

Figure 13 Gutters and down-pipes in very poor condition, rising damp and concrete cancer to floor and wall foundations, timber rot to roofing beams.

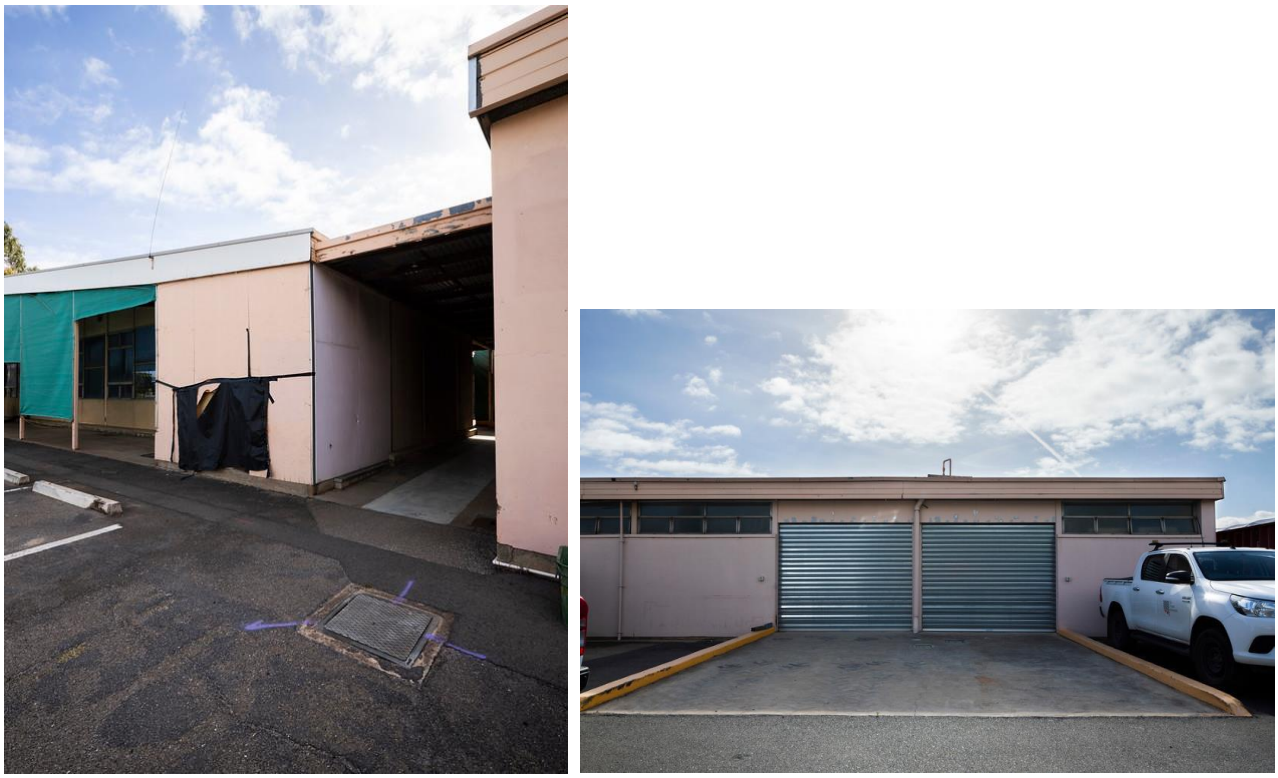


Figure 14 Cement fibre cladding in various states of rot and disrepair and damage.

Figure 15 Transmission area in the rear of the old admin guttering and timbers in very poor condition.

Figure 16 Examples of extensive rising damp and concrete cancer to wall foundations and damage to amenities block brick work and foundations

Figure 17 Collapsed ceiling sections, wall damage and floor condition inside storage area of old admin building.

Figure 18 Example of significant termite damage to internal timberwork in old admin building.

Figure 19 Example of extensive floor cracking, rising damp and concrete cancer throughout interior of the old admin building.

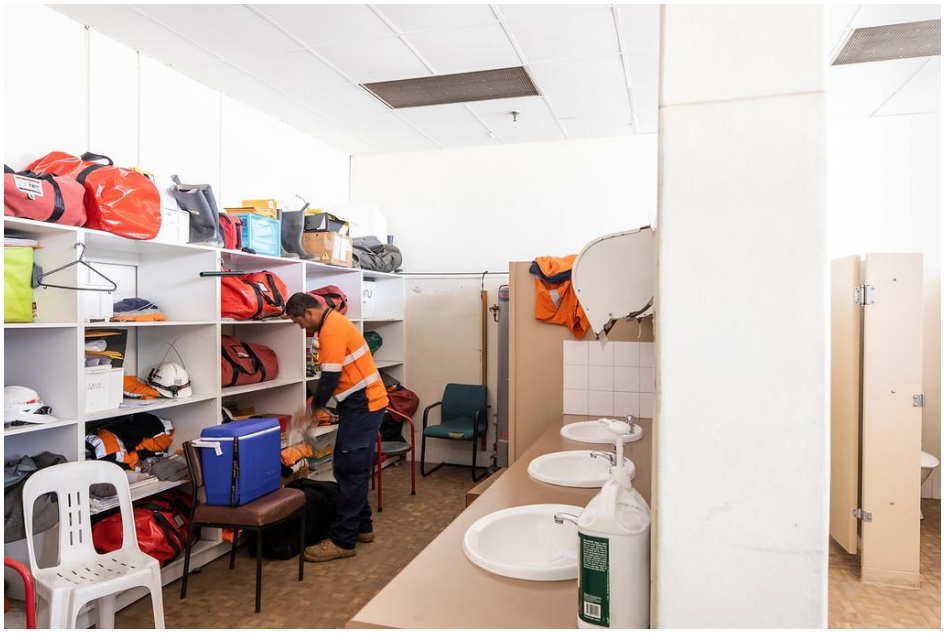


Figure 20 sub-transmission group amenities, locker Rooms and break out areas, including transmission breakout area, bag storage and toilets all in the same area with no dedicated female facilities. All aged and in poor condition.

Figure 21 Toilet and shower cubicles all original 1950's fit-out in very poor condition.

Impact of these issues on operational costs and risks

The issues discussed above result in a range of increased costs and risks associated with the continued use of the building in its it present state.

The table below summarises the most significant costs and risk that we have identified and provides our estimated value for these cost and risk. Further details of the methodology, assumptions and basis for these estimates is provided in the store and transmission fields services building cost-benefit model in Supporting Document 5.22.1 - Angle Park North Building model (confidential).

In total, we estimate that the main costs and risks associated with these issues are currently approximately $239,366 per annum. A major component of this is due to safety risks caused by the movements of the transmission team between this building and logistics office and forklift movements in the main storage area[20].

Importantly, given the age of the pavement and its recent history of degraded condition, we expect these issues to worsen if we continue with our current reactive repair approach. This will either increase the need for reactive repair to maintain the costs and risks at around current levels, or these costs and risks will increase if we maintain the volume of reactive repair at current levels.

Note, the table below only details the incremental costs and risks resulting from the issues, which we consider would not arise if the issues did not exist. It does not detail all costs and risks for this facility.

Table 19 Summary of the major costs and risks due to the issues with the building

Cost/risk category	Description	Expected annual value ($)
Safety risks	Sub-transmission - An accident occurring due to movement of the sub-transmission team to and from the warehouse offices, which requires staff to cross main site road resulting in a fatality or injury.	$75,000
	Store - The tipping over of a forklift vehicle or other serious forklift accident caused by the repurposed layout of the store and forklift movements over the uneven ground surfaces caused by the areas of poor condition and resulting in a fatality or injury.	$59,394
Operational risks	Sub-transmission - An unexpected and major issue arising that significantly affects the operations of the sub-transmission team until it is repaired.	$20,000
	Store - An unexpected and major issue arising that significantly affects the operations of storage facility until it is repaired.	$10,000
Operational inefficiency	Sub-transmission – The continuing poor condition and standard of the transmission team facilities, including the lack of dedicated office facilities, is resulting in low morale and with an expected higher rate of staff turn-over.	$47,800
	Sub-transmission – The need for the transmission team to move between their facility and the logistics office is causing lost-time. Although the time for individual movements is small (eg approximately 3 minutes). Due to the number of staff movements required over a year, the lost time is considered to be material in terms of its long-term effect.	$19,103

[20] It is worth noting that although these safety risks are high in relative terms to other risks at this site, they are only classified as a low to medium risk in our corporate risk scale. Therefore, they are not specific risks being monitored and controlled through the corporate risk management protocols.

	It is also worth noting that this time could increase if more significant controls are put in place to reduce the safety risks associated with crossing the internal road.	
	Incremental energy costs due to older inefficient designs and systems	$8,069

Warehouse and warehouse offices

Context

The logistics warehouse building is one of the largest buildings on the site. It is approximately 7,500 m^2, steel frame construction, with corrugated steel cladding, saw-tooth glass windows of and concrete floor. It was a purpose-built warehouse facility constructed in 1956. But, as noted above, in around 2008 the north eastern section of the building was re-purposed into the warehouse administration offices.

The warehouse section is a single-story design, which contains the indoor storage bays, with suitable arrangements for forklift movements. The office portion is a two-story design, which includes areas for open plan office desks, meeting rooms, the site reception areas, kitchen and dining, and toilet and changing facilities. Figure 22 below provides a diagram of the warehouse and offices.

Figure 22 Diagram of logistics warehouse (blue is warehouse area and yellow is administration and amenities).

We have commissioned several assessments of this building to determine its issues and its continuing viability in its current roles, including the RLB assessment noted above. Of most note, in 2017 we commissioned the engineering consulting firm, GHD, to undertake an assessment of the warehouse concrete slab. The purpose of this assessment was to identify areas poor condition and recommend remediation approaches.

Warehouse issues

There are a range of issues associated with the warehouse portion of this building, mainly related to the age and condition of the building and its fixtures and fittings. However, these are relatively minor, and we do not consider that these will require any major refurbishment or upgrades.

As such, these issues will be addressed either through the ongoing reactive maintenance program, or more likely minor works in the capital works program (Section 3).

The table below lists the most notable issues, providing a brief explanation of each issue and how it affects costs and risks (note, for these more minor issues, we have not tried to quantify the costs and risks).

Table 20 Summary of minor issues with warehouse

Issue	Explanation of issue	Impact on operational costs and risks
Architectural fixtures and fittings	Age/condition Various fixtures and fittings, covering internal doors, wall finishes, floor finishes, fitments, are aged and in a deteriorated condition.	Operational risk Unexpected failure could result in higher operational costs to allow for temporary arrangements while part of the facility is not functioning and being repaired or replaced, plus higher unplanned repair or replacement costs.
Concrete floor	Age/condition Various locations where floor is in poor condition.	Safety risk Possible forklift accident due to traversing over uneven floor surface. Operational inefficiency due to constraints in operations to work around worst areas.
Electrical services	Compliance and inadequate Inadequate exit and emergency lights.	Safety risk Possible accident due to poor lighting, plus possible penalty costs if we are found to be at fault because of our non-compliant systems.

Warehouse office issues

The last (partial) office fit-out was undertaken in 2014. The current arrangements are showing some signs of ageing and do not meet our current internal office design standards. The Original Proposal to the AER included the for the new fit-out of the office, to upgrade its layout and design and bring it up to this design standard.

However, following further review, we consider that the existing arrangement will be adequate for at least this regulatory period and so have removed the need for a fit-out from our forecast presented later.

Some minor issues with the poor state of various fixtures will remain, but we do not anticipate any will require major refurbishment or replacement activities, and so these will be addressed where necessary through the reactive maintenance program or minor capital works program.

Pole construction facility

Context

The pole construction facility covers approximately 21,000 m^2 to the south of site. It was purpose-built in 1954 at the time that the site was established.

The facility consists of various components, including:

- the pole production workshop, which is a 2,500 m^2 building use to make the stobie poles
- the welding workshop, which is a 650 m^2 building
- the maintenance workshop, which is a 410 m^2 building

- the administration building, which is a 400 m^2 building housing the reception, offices and staff amenities for the pole construction facility
- carpark; and
- outdoor material storage locations.

Pole construction facility issues

There are a range of issues associated with the pole production facility. However, these are relatively minor and we do not consider that these will require any major refurbishment or upgrade to address. As such, these issues will be addressed either through the ongoing reactive maintenance program, or more likely minor works in the capital works program (similar to those discuss in Section 3).

It is also worth noting that the original proposal to the AER included a new fit-out of the administration office and upgrade of the toilet facilities. The toilet facilities have been addressed this period and following further review, we consider that the existing office arrangements will be adequate for at least the next regulatory period. Therefore, we have removed these items from our forecast presented later.

The table below list the most notable remaining issues, providing a brief explanation of each issue and how it affects costs and risks (note, for these more minor issues, we have not tried to quantify the costs and risks).

Table 21 Summary of minor issues with warehouse

Issue	Explanation of issue	Impact on operational costs and risks
Carpark - security services	Compliance or design issue The existing beams and cameras have been assessed to be inadequate (old analog cameras), given the available new technology.	Operational risk This increases the possibility that there could be either theft or damage of site equipment, with the resultant additional costs to our business associated with that event.
Welding and production workshops - lighting	Inadequate design and compliance Lighting levels too low for work activities and below current standards.	Safety risk Possibility of accidents due to poor lighting, plus the possible penalty costs if we are found to be at fault because of our non-compliant systems.
Production workshop - air conditioner	Age/condition The system has passed its design life and is considered to be in its end-of-life phase. Also, because of it vintage, it is considered to less efficient that modern systems.	Operational risk An unexpected failure could result in higher operational costs to allow for temporary arrangements while system is not functioning and being repaired or replaced, plus the unplanned repair or replace costs. Operational inefficiency Current costs to operate will be higher than new systems.

Example photographic evidence of the issues with other facilities at Angle Park North

Example photographic evidence of the major issues with the other facilities at Angle Park North is shown below. More comprehensive photographic evidence is provided in Supporting Document 5.22.2 - Angle Park North Photographs.

Figure 23 Pole Construction Locker Room – Original 1950's fit-out

Figure 24 Pole construction showers all in very poor condition and original fit-out

Figure 25 Pole construction toilets all in very poor condition and original fit-out

Figure 26 Pole Construction Ladies Toilet – No Female Shower, rising damp and concrete degradation

Figure 27 Example concrete cracking and de-lamination to large areas of the logistics warehouse floor.

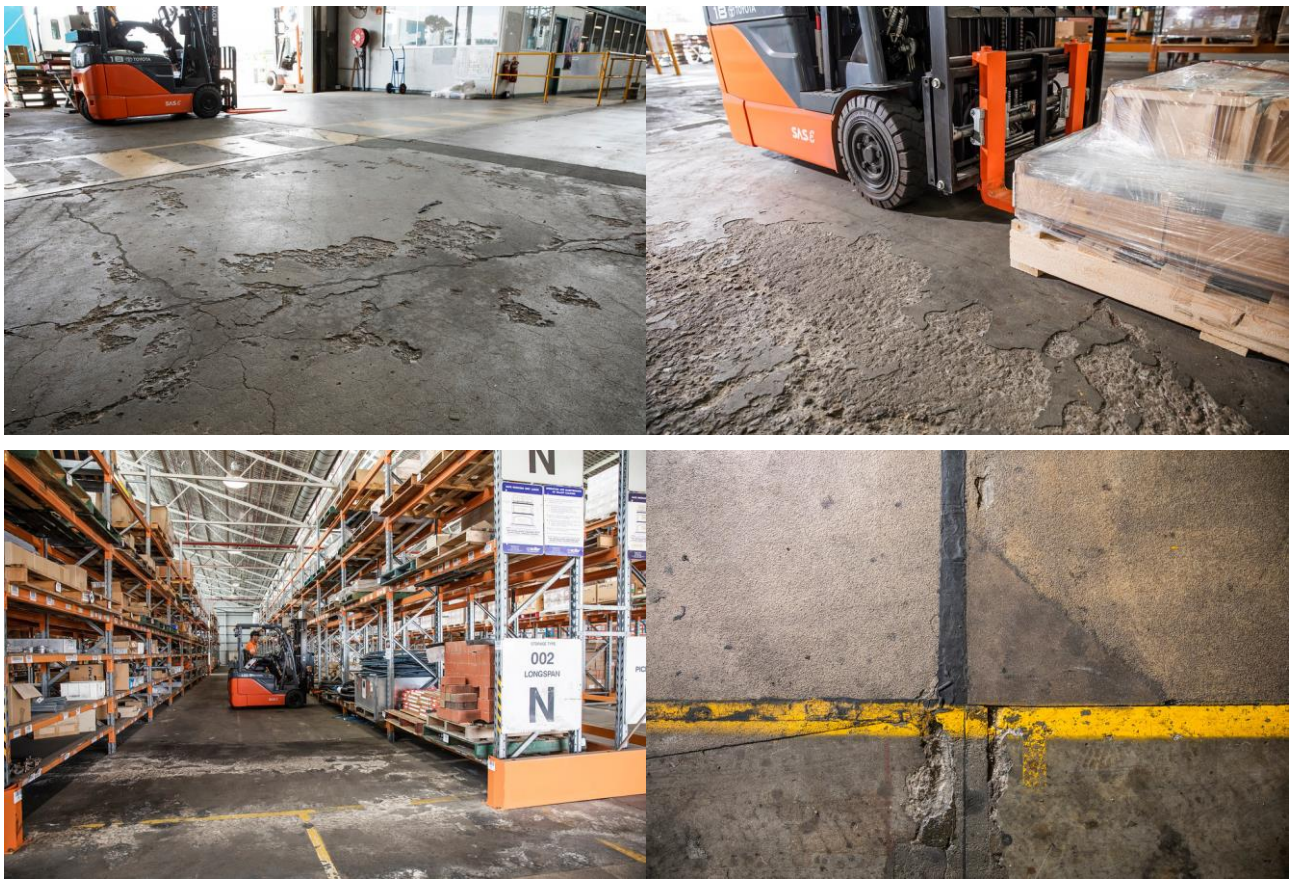


Figure 28 Detailed views of cracking and de-lamination of the logistics warehouse floor, including previous repairs with levelling compounds and epoxy/composite coverings