SA Power Networks

Supporting document 5.23

Marleston North Business Case

2020-25 Revised Regulatory Proposal

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SA Power Networks

Marleston North Business Case

Contents

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Executive Summary

Marleston North is a large 35,200m^2 industrial metropolitan site, established in 1952, which provides a range of functions including those associated with the management of all our zone substations (eg construction, maintenance and fault response). 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 repair and refurbishment costs and reducing safety, operational and customer service (including reliability performance) risk.

We have developed a **$3.5 million** (real $June, $2020) capital forecast to refurbish and upgrade the facilities at our Marleston 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:

Marleston North – Capital cost			
	Major works	**Minor works**	**Total ($)**
Capital cost	$2.1 m	$1.4 m	$3.5 m

Marleston 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 reduction in our costs is driven by the improved operation costs resulting from these works (which we estimate will provide benefits of approximately **$3.2 million** in the long term); but • This reduction is **offset** by an increase in the capital expenditure to undertake the major works (which we estimate will be approximately **$0.7 million <u>higher</u>** than the business-as-usual option in the long term).	+ $2.5 m
Customer service – QUALITY ie. benefit in reduced/avoided economic cost of supply reliability	• Additionally, we estimate that the major works reduce risks to the supply reliability we provide to our customers. We have estimated the value of this small improvements to be worth approximately **$0.4 million** over the long term	+ $0.4 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 Marleston North. We estimate that, in total, the **$2.1 million** investment in these facilities will provide long term benefits in reduced safety risks of approximately	+ $0.3 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.

	$0.3 million compared to a business-as-usual approach.	
	Total NET benefit (relative to BAU)	**+ $3.1 m**

The major works component

Our forecast allows for the investment of $2.1 million to enable us to undertake the **major refurbishment of four of the aged buildings** used by various groups involved in the management of our zone substations.

All these buildings, including their non-structural elements, including fixtures and fittings are old, resulting in a range of issues that we are currently managing, including:

- aged and poor condition non-structural elements and systems (eg rusting iron wall and roof cladding); and
- inadequate and aged facilities (eg toilets, changing facilities and lunchrooms).

Individually, many of these issues are not major, but together they represent a major issue for the ongoing operations within these building.

To develop this forecast we have:

- assessed the current issues with these buildings
- quantified the value of safety, operational and customer service risk associated with the issues
- estimated the avoided ongoing cost of preventative and reactive maintenance that would otherwise be attributed to these issues
- developed various options for managing these issues, including continuing with a business-as-usual reactive repair approach[3]; and
- undertaken cost-benefit analysis to determine the option that maximises the net-benefit (in present value terms).

Our cost benefit analysis has shown that our proposed investment of $2.1 million is the best option, providing an economic net benefit of $3.1 million over the longer term (40 years) over 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 rates, capital cost, timing, and quantification of the issues.

The minor works component

Marleston North has a large number of buildings (in addition to the four buildings above) and large pavement and external storage areas. Our forecast allows for the investment of $1.4 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 the site as it ages and our operations and technology evolve.

The remaining buildings and pavement areas 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:

- poor condition
- advanced age and risk of major failure

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

- inadequate facilities or lack of facilities appropriate for the current operations and available technology
- compliance to SA Environment Protection Authority (**EPA**) requirements
- ground subsidence in the heavy transformer storage area.

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 $1.4 million is only 20% higher than the similar level for the current period. We consider this modest increase is reasonable given the age and complexity of the 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 believe we have addressed all the AER concerns in developing the forecast contained on this business case. We have included a total of $3.5 million in the property capex forecast in our SA Power Networks 2020-25 Revised Regulatory Proposal (**Revised Proposal**) to allow for refurbishments and upgrades at the Marleston North site. This forecast is $0.5 million lower than the equivalent forecast in our SA Power Networks 2020-25 Regulatory Proposal (**Original Proposal**). We have removed various items that were included in our original 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 recognise that the forecast at Marleston North represents a significant increase from recent historical levels at this site, and this should result in reductions in reactive repair and refurbishment works in the next period. However, our overall property forecast is now significantly lower than our Original Proposal and the aggregated effects of the overall ageing of all our properties will be higher, given there will now be reduced capex in the next period. As a result of this, we are not proposing any adjustments to the incentive mechanisms for works at the Marleston North site.

Stakeholder Feedback

We have also engaged with our Customer Consultative Panel on our revised property forecast. This included the Panel visiting Marleston North to see the condition of the facilities at this site. The Panel was broadly supportive of the need to undertake major refurbishment and upgrade work at this site, and was comfortable with the approach we have adopted to develop our forecast.

[4] The assessment and costing was 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 $3.5 million (real June $2020) in capex to refurbish and upgrade our Marleston 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 Marleston 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 Marleston North is also supported by the following:

- Marleston North cost-benefit model, Supporting Document 5.23.1 - Marleston North model, Revised Proposal (confidential), which is a spreadsheet model we have prepared to support our justification for the major project components at Marleston North.
- The Marleston North photographic evidence data pack, Supporting Document 5.23.2 - Marleston North Photographs, Revised Proposal, which provides detailed high-quality photographic evidence of the major issues at Marleston North that are driving the needs.
- "2020-25 Property Capex Forecast Regulatory Justification", which is a 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, we included $4.0 million in our capex forecast to undertake refurbishment and upgrade works at our Marleston 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 Marleston 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 Marleston North.
- Supporting Document 5.23.2 - Marleston 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 the works to be undertaken at Marleston North has resulted in a number of changes to the scope of works to be undertaken and resulted in a reduction in the capex forecast from $4.0 million in our Original Proposal to $3.5 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 revised forecast, we have classified the forecast into two components:

- major capital works, which covers larger items of our forecast (ie items greater than $1 million) which address major issues with certain facilities at Marleston 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 are more general than works that are identified as minor works in our financial systems. Therefore, some caution is need 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 discussed 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 Marleston North

Marleston North is a large 35,200m^2 industrial metropolitan multifunctional site, established in 1952. The site includes facilities for the following important functions:

- the location of our various zone substation asset management groups, covering commissioning, maintenance and field services teams (for the whole state);
- the large transformer storage location (ie up to 65 Tonne)– including new transformers, network spares and the substation oil-filled transformers awaiting repair;
- the transformer workshop – repairing and refurbishing approximately 152 padmount and 221 pole top transformers each year[6];
- high voltage testing – testing and commissioning of vehicles, plant and equipment that work on live line assets (including earth leads, switching sticks, bus tap parking bars and high voltage ladders);
- oil testing and reclamation plant – provides the bulk storage, filtration and re-use of around 100,000L of transformer oil per year;
- the recloser and substation workshop – building switching cubicles and repairing and refurbishing switch gear and circuit breakers for substations;
- provides metropolitan logistics functions, supporting our main Angle Park North logistics hub; and
- provides supporting distribution testing and field services facilities (providing services associated with our Adelaide CBD customers).

Appendix A provides further relevant background information associated with the Marleston North site and various facilities at this site, which are relevant to appreciating the significance of the issues at Marleston North and the risks and costs driven by these issues.

Regulatory obligations relevant to determining needs

There is a 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 apply a risk-based compliance method. However, whenever any new construction or significant works (including refurbishments and upgrades) are undertaken, we will ensure that these are compliant with all current obligations.

We have aligned our Marleston North major works forecast to this risk-based process.

To be clear, the works at Marleston North, which are summarised in Section 2 and explained in more detail in Appendix B, are not driven by compliance requirements. That said, the preferred solution will meet current compliance obligations.

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:

[6] We have recently started refurbishing regulators and to date have refurbished approximately 30 units with the vison to refurbish 50 per year.

- In *Section 2 (Major capital works components)*, we discuss our evaluation of the major issues 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 Marleston 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 Marleston North)*, we provide relevant background information associated with the Marleston North site and various facilities at this site, which are relevant to appreciating the significance of the issues at Marleston North and the risks and costs driven by these issues.

- We then set out the specific issues at Marleston North in *Appendix B (the existing needs at Marleston 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 a number of the key buildings and facilities used by the various zone substation groups where the various items warrant consideration of a major project in the next regulatory period to refurbish and upgrade these buildings.

In this section, we focus on this component of our forecast and evaluate various approaches to manage the issues with these buildings 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.

Through this analysis we have found that a major refurbishment and upgrade of these buildings over the next regulatory period should provide the greatest net benefits, compared to other alternative options. Further, this result is generally insensitive to reasonable changes in the key assumptions.

Zone substation group buildings refurbishments and upgrades

Statement of the need

There are a number of buildings used by the various zone substation asset management groups that operated out of the Marleston North site. There are four buildings where we considered the issues are significant enough that together they may warrant major replacement, refurbishment and upgrade of these buildings:

- the transformer workshop;
- the oil test lab;
- the substation workshop; and
- the substation store.

All these buildings, including their non-structural elements, including fixtures and fittings are aged, resulting in a range of issues that we are currently managing. Individually, many of these issues are not major, but together they represent a major issue for the operations within these buildings.

The major issues driving the needs are as follows:

- **Aged and poor condition non-structural elements and systems** – There are a range of non-structural elements and systems associated with these four buildings that are aged, in a poor condition and well below current standards – most notably:
    - **Transformer workshop and substation store external iron sheeting** – The main transformer workshop and substation store walls and some parts of their roof are original corrugated iron sheets and have extensive rusting and pitting through the full thickness of the sheets and need replacing. The roofs also have no hot air extraction or insulation.

- **Transformer workshop and substation workshop air-conditioning** – The evaporative air conditioning units are beyond useable life and some of the units are now tagged out and unable to be repaired any further and need replacing.
- **Substation workshop and substation store concrete floor** - The concrete floor/pavement areas are in poor condition, with significant cracks forming.
- **Oil test lab** – The existing office fit-out is aged and not within our existing internal standards.

- **Inadequate and aged facilities** – The toilet and lunchroom facilities of the transformer workshop are aged and inadequate for the staff numbers using these facilities – most notably:
  - **Lunchroom building** – The modular lunchroom building is over 30 years old and is in a significant state of degradation and needs replacing and upsizing for the amount of people now housed at this site.
  - **Toilets, showers and amenities** – These are the original toilets and showers from the early 1950's and are in a poor condition and in need of refurbishment. Cubicle doors and walls are original asbestos panels.

We have quantified the value of risks presented by these issues. The annualised values are summarised in the table below. Other savings such as lower future preventative maintenance costs and reactive repair costs are not shown in this table.

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

Risk category	Expected annual value ($'000)
Operational (risk + operational inefficiency)	$118.1
Safety	$12.0
Supply	$15.7
Total	**$145.8**

Further details and explanations of the quantification of these values are provided in Appendix B. This appendix also provides photographic evidence of the needs and is further supported by Supporting Document 5.23.2 - Marleston North Photographs.

Development of options

We currently implement a reactive repair approach to these buildings. These costs can be either operating or capital expenditure.

We have developed three credible options for managing these issues moving forward. The options range from continuing with a current approach to the full planned refurbishment and upgrade of the four buildings.

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

Table 2 Overview of zone substation group building remediation 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 repair as required, with controls as necessary to manage risks	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.

		associated with the poor condition).	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 any replacement will occur.
2	**Piecemeal remediation (to defer the need for the more major refurbishment and upgrade)**	Continue with current maintenance regime, but undertake some piecemeal remediation and repair to maintain usage of current site, largely in current form. The piecemeal remediation is assumed to address.	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 fully refurbish and upgrade the buildings. For modelling purposes, we have assumed that the pavement will be replaced in 10 years.
3	**Major refurbishment and upgrade over next period**	Undertake a major refurbishment and upgrade of the buildings in the next period, including: • roof and wall replacements for the transformer workshop and substation store • new office fit-outs for the oil test lab and substation store • AC replacement for the transformer workshop and substation workshop.	High capex in short term, but reduced opex and removal of existing issue costs and risks.

Options capital cost estimates

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

- assumed the business-as-usual reactive repair capital cost would be on average $55,540 per annum, based on an estimate of average reactive repair cost of these buildings between 2015/16 and 2018/19;
- assumed the reactive repair capital cost after the major refurbishment will be 20% of the current costs, assuming other elements of these aged building will develop issues that require repair; and
- used the cost estimates prepared by RLB and detailed in our Original Proposal to the AER as the basis of planned refurbishment and upgrade cost estimate.

Further details of the methodology and assumptions are provided in the building cost-benefit analysis model in Supporting Document 5.23.1 - Marleston North model (confidential).

Table 3 Zone substation group building remediation option capital cost estimates

ID	Option	Capex ($'000)			
		Next regulatory period		Following regulatory periods	
		Reactive	Planned	Reactive	Planned
1	**Business-As-Usual (do nothing)**	$283	-	$298[a]	-
2	**Piecemeal remediation**	$170	$500	$179[a]	$1,734[b]
3	**Major refurbishment and upgrade over next period**	$55	$2,134	$55[a]	

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

b – for this option, we assume a $100,000 uplift in costs allow for the increased cost for the major refurbishment (see further discussion in cost-benefit model)

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 followings:

- 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 piecemeal remediation option, we are assuming that works in the initial stage can be targeted to remove a greater portion of the operational costs and safety risks (see assumptions in the table below)[7].

Table 4 Summary of impact of options on costs and risks

		Existing issues			
ID	Option	Operational inefficiency	Safety risk	Operational risk	Supply reliability risk
1	**Business-As-Usual (do nothing)**	Unchanged / worsening	Unchanged / worsening	Unchanged / worsening	Unchanged / worsening
2	**Piecemeal remediation**	Improved (50%)	Improved (60%)	Improved (30%)	Improved (30%)
3	**Replacement over next period**	Avoided	Avoided	Avoided	Avoided

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 5.23.1 - Marleston North model (confidential).

The key results of this analysis are summarised in Table 5 below. These results indicate that the major refurbishment and upgrade of these four buildings in the next period should provide the greatest net benefit. Importantly, implementing that option should realise a net benefit of $3.1 million over continuing in the longer term with a business-as-usual approach of the reactive repair of the buildings.

Table 5 Summary of results of the cost benefit analysis of the building options

		Present value ($ million)[a]		
ID	Option	Option costs	Issue costs and risks	Net benefit
1	**Business-As-Usual (do nothing)**	1.9	3.6	-
2	**Piecemeal remediation**	2.4	0.7	2.4
3	**Replacement over next period**	**2.4**	**0.0**	**3.1**

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 buildings. As such, the majority of the benefit relates to avoiding the operational inefficiencies and risks, which constitute 81% of these costs.
- All options have 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

[7] There is less of an assumed effect on operational risks and supply reliability risk as these are related to a major failure/incident occurring, which is less likely to be reduced by the piecemeal solution as this will not address some of the more costly major issues.

the buildings. 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 major refurbishment and upgrade of these buildings 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 approximately 8% before the piecemeal remediation option would be a more economic option, and increase to 15% before the business-as-usual option was more economic.
- This result is also insensitive to the major refurbishment cost. This cost would need to need to increase by 150% (ie increasing to $5.3 million) before the business-as usual option would be a more economic option. Obviously, this insensitivity is related to the discount rate. However, even with a discount rate of 4%, the replacement cost would need to increase by approximately 75% (ie approximately $3.7 million) before the piecemeal remediation options would be more economic, and by approximately 120% (ie 4.7 million) before the business-as usual option would be a more economic option.
- 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 current issue costs and risks are valued at $145,800 on average per annum. The benefit of a one-year delay in the capital costs of the major refurbishment option would be approximately $81,000[8], which is significantly less than the benefits of removing the issues.
- Similarly, our estimate of the issue costs and risks could reduce by nearly 85% before there would not be a net benefit in avoiding these costs and risks by the major refurbishment of the buildings.

Based on the above, we consider it reasonable to conclude that the option to undertake a major refurbishment of the four buildings over the next period should maximise the net benefits over reasonable ranges for the key assumptions.

[8] Assuming a life of 45 years for the building refurbishments.

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 Marleston 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 broadly 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 the 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 replacing the fencing of the external storage area – we considered that this issue was so significant that we will undertake this work this period
- the allowance for undercover elevated work platform (**EWP**) parking – we do not consider this is likely to be necessary at this site.

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

Marleston North is a large site, with many buildings and a large external pavement area. The major works component only covers four of these buildings – albeit, including some of the larger buildings. The remaining buildings and pavement areas 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.

The needs are specific to the scope items in the forecast, but broadly relate to:

- poor condition
- advanced age and risk of major failure
- inadequate facilities or lack of facilities appropriate for the current operations
- compliance to SA EPA requirements
- ground subsidence in the heavy transformer storage area.

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 5.23.2 - Marleston North Photographs.

Minor capital works forecast

Based on the methodology described above, we consider that $1.4 million is a reasonable estimate of our minor capital works forecast for the next regulatory period.

The table below summarises the cost to repair/refurbish more significant items included in this forecast (items with a cost greater than $20,000). More details on the need for these items is provided in Appendix B.

Table 6 Summary of significant items in our minor capital works forecast (items >$20,000)

Facility	Item Description	Total cost ($)[a]
SUBSTATION EXTERNAL STORAGE	Full depth pavement including asphalt wearing course	$113,509
	Replace pavement with concrete hardstand	$85,847
	Allowance to dispose of intermediate waste fill where replacing with asphalt pavements - assume 300mm deep	$52,159
	Allowance to dispose of intermediate waste fill where replacing with concrete pavements - assume 300mm deep	$22,438
CREATIVE SERVICES	Repair corrosion to column base plates externally	$113,697
	Replace high level windows	$43,205
CARPARK	Allowance for Security Services (beams and cameras)	$45,397
	Full depth pavement including asphalt wearing course	$38,073
	Replace pavement with concrete hardstand	$28,827
EXTERNAL STORAGE AREA	Replace asphalt strip bunding with concrete to transformer storage area	$58,207
	Full depth pavement including asphalt wearing course	$30,585
	Replace pavement with concrete hardstand	$23,132
WELDING WORKSHOP	Upgrade dust extraction system	$45,686
	Replace portable office including fitout, access stair and ramp	$27,412
	Replace evaporative air conditioning units	$22,843
OIL PLANT & STORAGE SHEDS	Replace pumps, cabling and control systems	$45,620
	New canopy to oil filtration plant and surrounds	$38,016
LUNCHROOM	Replace portable lunchroom including fit-out, kitchenette, access stair and ramp	$68,230

Facility	Item Description	Total cost ($)[a]
WHITE HOUSE	Replace carpet floor finish	$44,442
	Replace evaporative air conditioning units	$22,791
HV OFFICE/TEST CENTRE	Full depth pavement including asphalt wearing course	$36,183
	Replace pavement with concrete hardstand	$27,365
CRANE OPERATION AREA	Treat column corrosion and repaint	$45,873

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 Marleston 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 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 our estimate of works items that relate to the major capital work component of our forecast (ie we have excluded the major reactive repair and refurbishment works that could be associated with these four buildings).

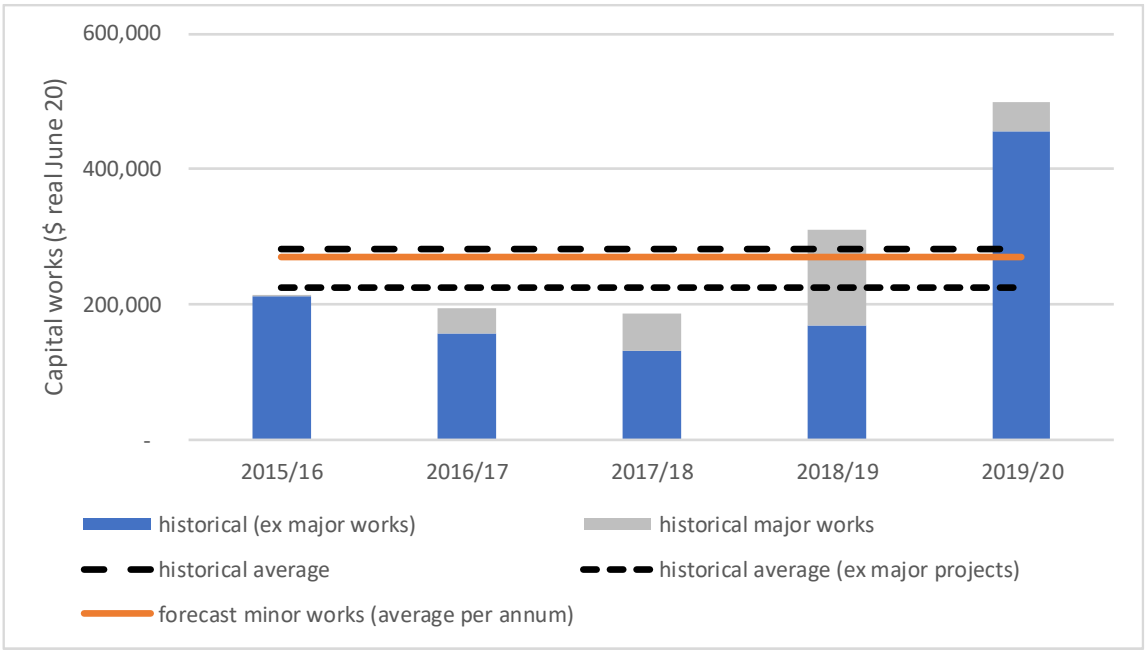

Figure 1 Comparison of minor capital works forecast to the equivalent historical expenditure

Figure 1 above shows the comparison of our equivalent historical capex amount of $281,000 including major works and $226,000 excluding these works against the average annual forecast of $271,000. Since 2015/16, our equivalent minor works capex has ranged between $132,000 in 2017/18 to $456,000 in 2019/20 (estimated).

This chart shows that we are only forecasting the need for a 20% increase in average annual minor capital works from the current regulatory period ($226,000) to the next period ($271,000). We consider this modest increase is reasonable given the age and complexity of the site and the number and extent of the issues at this site that we have currently identified.

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 rationale 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 Marleston 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 a number of the buildings used by the zone substation asset management groups.

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 by ensuring it is broadly in line with recent historical levels of similar 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 Marleston North covered by this forecast, given the further ageing we can expect.

It 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 capital expenditure at Marleston North will be $3.5 million over the next regulatory period. The breakdown of this expenditure to the various facilities at that site is shown in Table 7 below, which also indicates the key scope items covered by this forecast.

Table 7 Summary of capex forecast for Marleston North

Component	Facility	Key scope items	Cost ($'000)
Major works	TRANSFORMER WORKSHOP & OFFICE (INCL. ADJACENT SHEDS)	Roof, wall, AC replacement, extension of lunchroom and toilet refurbishment, plus other works	$921.5
	OIL TEST LAB (TRANSCARE)	Office fit-out, plus other works	$478.1
	SUBSTATION WORKSHOP	AC and concrete pavement replacement, plus other works	$405.5
	SUBSTATION STORE	Office fit-out, roofing and pavement replacement	$329.3
Minor works	SUBSTATION EXTERNAL STORAGE	Pavement replacement	$274.0

Component	Facility	Key scope items	Cost ($'000)
	CREATIVE SERVICES	Various repairs and replacements	$156.9
	EXTERNAL STORAGE AREA	Pavement replacement	$146.7
	CARPARK	Pavement replacement and security systems	$144.8
	OIL PLANT & STORAGE SHEDS	Repairs/refurbish various systems, plus other works	$109.8
	WELDING WORKSHOP	Repairs/refurbish various systems, portable office fit-out	$103.6
	HV OFFICE/TEST CENTRE	Pavement and AC replacement	$96.4
	WHITE HOUSE	Flooring, pavement and AC replacement, plus other works	$80.6
	LUNCHROOM	New fit-out	$75.8
	CRANE OPERATION AREA	Various repairs and replacements	$57.6
	OUTPOST OFFICE		$43.7
	ADMINISTRATION OFFICE		$29.7
	SUBSTATION MAINTENANCE OFFICE		$17.8
	CONSTRUCTION OFFICE		$15.1
	FLAMMABLE STORE		$3.9
Total (may not add up due to rounding)			$3,490.7

In appreciating the significance of this forecast and the underlying needs, it is important that we stress that this site is very aged and complex, with a large range of issues.

Importantly, as we discuss in Appendix B, we have two recently emerging issues with the oil bunding and drainage of the pavement area, which are not specifically allowed for in the works program summarised above. However, both issues have the potential to be very significant matters that we will need to address in the next period, requiring a significant level of investment (ie greater than $1 million).

The reasonableness of the total forecast amount for Marleston North should be seen in this broader context.

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 would 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 services associated with our zone substations) and the reliability of supply to our customer across network.

The major works components in this forecast involves a significant investment at this site, which should provide significant benefits, providing longer term improvements to the operations and risks associated with this property.

We estimate that in total, the $2.1 million investment in the major works on the four zone substation group buildings will provide an economic benefit in the order of $3.1 million over the longer term of 40 years.

Benefits summary

The costs and benefits of the proposed investment over the longer term of 40 years are summarised in the table[9] below:

Marleston North – Capital cost			
	Major works	**Minor works**	**Total ($)**
Capital investment cost	$2.1 m	$1.4 m	$3.5 m

Marleston North – Benefits (Major works)[10]		
Benefit type	**Description**	**Benefit ($)**
Customer service – PRICE Ie. Benefit in reduced/avoided SA Power Networks costs - capex and opex	• This reduction in our costs is driven by the improved operation costs resulting from these works (which we estimate will provide benefits of approximately **$3.2 million** in the long term); but • This reduction is **offset** by an increase in the capital expenditure to undertake the major works (which we estimate will be approximately **$0.7 million higher** than the business-as-usual option in the long term).	+ $2.5 m
Customer service – QUALITY Ie. benefit in reduced/avoided economic cost of supply reliability	• Additionally, we estimate that the major works reduce risks to the supply reliability we provide to our customers. We have estimated the value of this small improvements to be worth approximately **$0.4 million** over the long term	+ $0.4 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 Marleston North. We estimate that, in total, the **$2.1 million** investment in these facilities will provide long term benefits in reduced safety risks of approximately **$0.3 million** compared to a business-as-usual approach.	+ $0.3 m
	Total NET benefit (relative to BAU)	**+ $3.1 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 works components suggests that our long-term costs associated with this facility will be $2.4 million lower, compared to the business-as-usual approach (ie the aggregate present value of our costs over 40 years).

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

[10] 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.

This reduction in future costs is driven by the improved operation costs resulting from these works (which we estimate will provide benefits of approximately $3.2 million in the long term)[11]. But this reduction is offset somewhat by an increase in the capex to undertake the major works (which we estimate will be approximately $0.7 million higher than the business-as-usual option in the long term[12]).

Additionally, we estimate that the major works reduce risks to the supply reliability we provide to our customers. We have estimated the value of this small improvements to be worth approximately $0.4 million over the long term[13].

Other economic benefits achieved by the program

The program will also ensure we can more efficiently control safety and environment risks associated with the site.

Regarding our major works, our cost benefit analysis has shown that these works should reduce existing safety risks associated with the current state of the relevant facilities at Marleston North. We estimate that, in total, the $2.1 million investment in these facilities will provide long term benefits in reduced safety risks of approximately $0.3 million compared to a business-as-usual approach.

Our other minor works should allow us to maintain the safety and environmental risk associated with the other facilities, in light of their further ageing.

Comment on the safety risk

During discussions with AER staff, they questioned the relationship between the safety risk and insurance. The AER questioned whether our safety risk estimates can be reasonable as they would suggest a very high insurance value.

The safety risk we have estimated is appropriate for cost-benefit analysis is 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, for Marleston North, we have not assumed any fatalities would occur due to the issues with the buildings being assessed through our cost-benefit analysis, and even for minor injuries, we have assumed that this is a 1 in 50 year event.
- Secondly, this risk should in no way be interpreted as any recognition of some imprudent or negligent management by us of this property 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[14]). These values are prepared for cost-benefit analysis of the type we have applied. We also apply a 2x disproportionality factor to these values, which aligns with how we understand these values should be applied when confirming decisions are in accordance with our safety legislation. The economic value (such as the value of statistical life) is known to be well above typical insurance values.

[11] It is important to note that a major component of this reduction is associated with future costs and risks in the business-as-usual approach, and as such, is not reflective of current operating costs.

[12] This assumes our current reactive repair approach will be sufficient to avoid the need for making these major investments at this site over the long term (ie next 40 years), which is unlikely.

[13] It is important to note that this relates to the risk of major disruptions that could occur in the future with the business-as-usual approach, and as such, is not reflective of current reliability performance.

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

5. Regulatory treatment

We have included $3.5 million in the capex forecast in our Revised Proposal to the AER to allow for major refurbishments and upgrades at our Marleston North site. 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 capex 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 Marleston 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 Marleston North property and identify and quantify specific costs and risks of 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 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.

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 recognise that the forecast at Marleston North represents a significant increase from recent historical levels at this site.

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 the longer term of improved productivity associated with this facility and supply reliability to our customers in the metropolitan region. These benefits 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 localised improvements at the Marleston North property (for example, in reduced opex or improved supply reliability) are predominately future benefits. Furthermore, the smaller localised benefits to our current performance (eg current operating costs and supply reliability) will be offset by additional costs from the aggregate of 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.

Stakeholder feedback

We have also engaged with our Customer Consultative Panel on our revised property forecast. The Panel visited Marleston North to see the condition of the facilities at this site. The Panel was broadly supportive of the need to undertake major refurbishment and upgrade work at this site, and was comfortable with the approach we have adopted to develop our forecast.

A. Overview of Marleston North

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

- the functional groups and their 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 appendix is to provide background information on Marleston North. This understanding is relevant to appreciating the significance of the issues at Marleston North and the risks and costs driven by these issues, which are discussed in the next section.

Importantly, this appendix explains:

- Marleston North is a critical site for providing some of our services to our customers in the metropolitan region, including the Adelaide CBD and managing our network in this area, and managing our zone substations across our entire network.
- But Marleston North is also large, complex and aged site that has had limited major redevelopment or refurbishment since its development in 1952.

Marleston North and its role in providing services to our customers

The Marleston North property is located approximately 3.5km to the west of the Adelaide CBD. It is a metropolitan site, with a high staff density, covering a range of engineering/technical staff and field service crews.

The principal groups at this site are responsible for the asset management of all of our zone substations, among other things, across our whole network. These substations play a critical role in providing supply reliability security to our customers. Furthermore, our substations contain some of our largest and highest value assets (eg power transformers). Therefore, the effective management of these substations is critical to providing an efficient and reliability service to our customers.

There are various specialist groups located at Marleston North providing these services, covering:

- Zone substation transformer and switchgear groups, including the field crews and supporting site technical staff, responsible for the management of all our power transformers and switchgear in our zone substations, including inspections, condition assessments, predictive and reactive maintenance, emergency response and repair, and commissioning and testing.
- Oil testing and reclamation services, which perform the oil-based condition assessments of transformers and oil-based switchgear, and bulk storage, filtration and re-use of around 100,000L of transformer oil per year.

Marleston North also includes a number of other groups providing specialist in-house services, covering:

- The high voltage testing group, who are responsible for the testing of all vehicles, plant, equipment and tools used on live lines activities.
- The distribution transformer repair group, who are responsible for the repair and refurbishment of approximately 152 padmount and 221 pole top transformers each year[15].

Marleston North also play an important supporting role to some of our other sites.

- Marleston North provides some supporting facilities to the field service teams responsible for the Adelaide metropolitan region, including the Adelaide CBD. This field service crew is located at

[15] We have recently started refurbishing regulators and to date have refurbished approximately 30 units with the vison to refurbish 50 per year.

Marleston South and is responsible for the field management of our distribution network in this region, ensuring that security and reliability of customer supply is maintained.

- Marleston North provides logistics storage, supporting our primary logistics hub, which is located at Angle Park North. Most notably, Marleston North is used as a storage location for very heavy equipment (eg large power transformers), as it has the specialist crane facilities necessary to load, unload and move these very heavy loads.

Overview of the Marleston North site and its facilities

The Marleston North site is approximately 35,200m^2 in size and consists of a large number of buildings and large outdoor pavement area. Its layout and facilities can be considered in terms of principle functional groups discussed above. The buildings and facilities associated with these groups are summarised in the table below.

Table 8 Overview of the main facilities at Marleston North

Groups	Facilities and functions
Zone substation groups	A large portion of the site provides the facilities required by the zone substation groups, consisting of various buildings and large portion of the outdoor pavement. The main buildings, include: • The **substation workshop**, which is the largest building on the site. It is a single-story 2,400m^2 building of steel and steel roof construction. This building is primarily used by the substations operations group for construction, repair and refurbishment of substation components, and includes warehousing, offices, workshop floor, toilets and adjoining lunchroom. • The **transformer workshop**, which is the second largest building on the site. It is a single-story with mezzanine 1,400 m^2 building of steel frame and corrugated iron clad construction. This building is primarily used by the workshops group for transformer repairs/refurbishment, and includes workshop, offices, lunchroom, toilets and showers. • The **substation store**, which is a single-story 625m^2 building of steel frame and corrugated iron sheet construction. This building is primarily used by the substation operations group for storage of spares and plant, tools and equipment for working on substations, and includes warehousing, workshop and small office. • The **oil test lab**, which is a single-story 370m^2 building of double brick and steel roof construction. This building is primarily used by the oil test group for testing reclaimed transformer oil, and includes offices, lab space, kitchenette and toilets. • The **substation maintenance office**, which is a single-story 120m^2 building of ATCO Modular (transportable) construction. This building is primarily used by the substation maintenance group for substation maintenance and network asset inspection, and includes open plan office space only.

Groups	Facilities and functions
	• The **welding workshop**, which is a single-story 320m^2 building of steel frame and corrugated iron roof construction. This building includes welding workshop space and small amount of warehousing. • The **oil plant and storage shed**, which is a 35 m^2 carport and 450m2 bunded storage area. This area is primarily used to store bulk reclaimed oil. • The **High Voltage test shed** which is a single-story 427m^2 building of steel frame and steel cladding construction, which is a warehouse/workshop and contains a small two-story office construction inside and houses the high voltage test group. This building is used to test live-line working equipment. • The **HV office/testing centre**, which is a single-story 80m^2 shed of steel frame and steel roof construction and an ATCO modular style office building of 55m^2 which contains workstations. This building is primarily used by the substations operations group for testing equipment used on live lines. The pavement area provides various outdoor facilities, including: • The **crane operation area**, which is a 3,300m^2 zone of constructed of bitumen with concrete drains This zone has a special-purpose crane facility that is used to move our large power transformers and padmount transformers and is bunded with a small bitumen roll-over bund (see inset photo). • **Substation external storage**, which is a 2400m^2 zone constructed of bitumen hardstand and concrete driveway used to store substation equipment spares and new project material. • **External storage area** also utilised by the substation operations group for very old and very long term network spares such as circuit breakers, which is a 530m^2 zone constructed of bitumen with a very small bitumen roll-over bund.
Other groups and facilities	The remaining portion of the site provides other facilities required by the other groups and function located at Marston North. The other main buildings, include: • The **recloser workshop and warehouse**, which is a building of 2,500m^2 of steel frame and steel roofing construction and includes offices, warehousing, workshop areas, meeting room, lunchroom and toilet amenities. • The **distribution operations office**, which is an ATCO style modular building of 135m^2 functioning as open-plan office and workstations. • The **administration office**, which is a 1-story 96m^2 building of ATCO style modular construction. This building is primarily used for administration services and business support, and includes offices and open plan workstations. There are various other buildings on site, including various modular buildings, which are used by the various zone substation and other groups on site.

Groups	Facilities and functions
	The pavement area provides various outdoor facilities, including: • The main **carpark area**, which is a 3,300m^2 zone of constructed of bitumen and concrete drains, providing approximately 98 light vehicle parking spaces and 12 Operational Van Parking Spaces. This carpark is used by all site personnel and visitors. • **Common Roadways**, which is approximately 5,700m^2 of bitumen with concrete spoon drains and is used by all site personnel to access buildings across the site.

11	**Marleston – 212 Richmond Road (North)**
11A	Oil Test Lab (Transcare)
11B	Oil Plant & Storage Sheds
11C	Outpost Office
11D	Crane Operation Area
11E	Transformer Workshop & Office (incl. adjacent sheds)
11F	External Storage Area
11G	Carpark
11H	Washbay
11I	White House
11J	Administration Office
11K	Substation Maintenance Office
11L	HV Office/Test Centre
11M	Creative Services
11N	Welding Workshop
11O	Substation Workshop
11P	Substation Store
11Q	Substation External Storage
11R	Construction Office
11S	Lunchroom
11T	Flammable Store

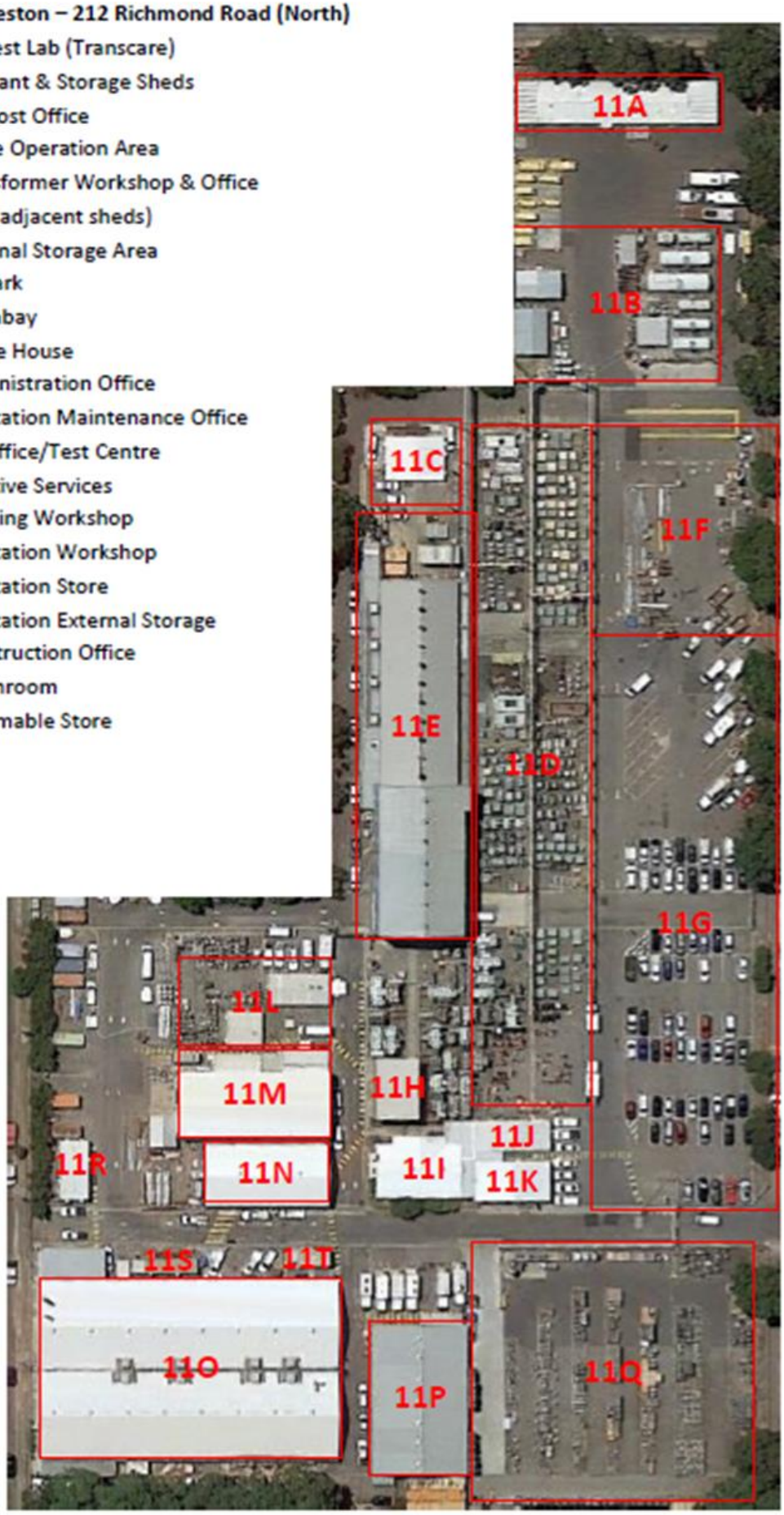

Figure 2 Diagram of Marleston North showing the main facilities.

The diagram above shows the location of the various facilities within the Marleston North site.

In total, approximately 269 SA Power Networks employees and contractors are located at Marleston North, and typically during working hours there will be approximately 217 people on site at any time. A large proportion of these personnel are associated with the zone substation groups, with approximately 150 associated with substation construction and maintenance groups.

The historical development of Marleston North

The Marleston North site was originally established in 1952 and has always functioned in its principle role (ie the location of the zone substation groups. To a large degree, the original buildings and pavement areas remain as those established around the time that the original site was developed.

Since around 2008, we have commence an refurbishment and upgrade program at the site, with the most notable minor developments including:

- between 2008-2011, two ATCO modular buildings were installed to function as the **administration office** and **substation maintenance office**
- in 2013-14, the recloser workshop was refurbishment
- in 2014, various repairs to the bitumen pavement and driveways were undertaken.
- in 2019, the HV testing offices and testing facility was refurbishment and upgraded

Marleston North recent expenditure and refurbishment activity

There has been no major refurbishment or upgrade of this site since its establishment. As noted above, we have commenced some modest refurbishments and upgrades of specific facilities. However, currently, much of our capital program is a piecemeal reactive program focusing on addressing specific identified issues of the various facilities at the site.

In total, from 2015/16 to 2019/2020 (inclusive, included planned 2019/20 projects) our capitalised refurbishments work at Marleston North totaled $1.4 million (real June 20), with an average spend of $281,000 per annum. The annual profile of this expenditure is shown in the figure below. This figure shows that capex in the current period has been around $200,000 per annum in the beginning of the period, but increased in 2018/19 and we currently plan to increase this further in 2019/20 to approximately $500,000. The increases in 2018/19 and 2019/20 was to undertake the refurbishments and upgrades to the HV offices and test facilities noted above and undertake further improvement works to the pavement areas (eg replacement of external fencing for security purposes).

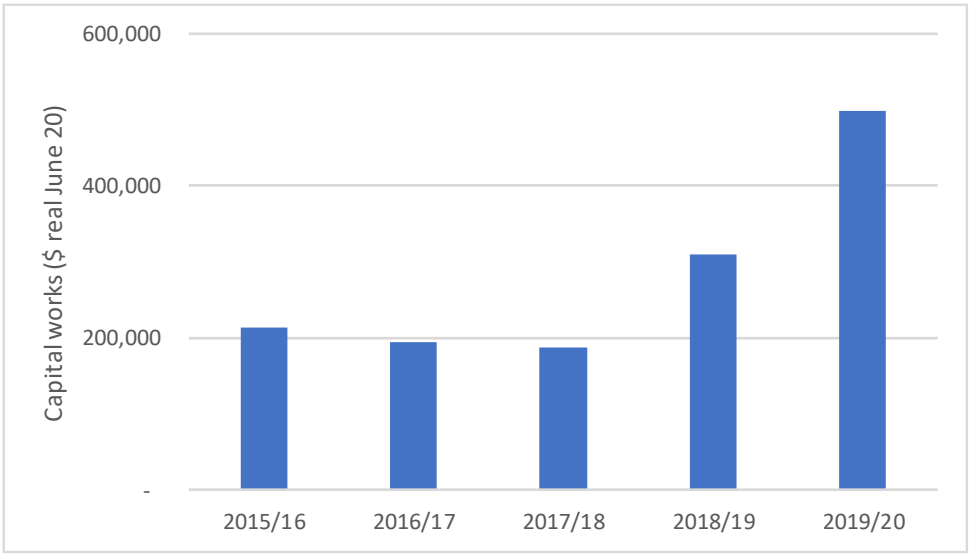

Figure 3 Profile of recent refurbishments and upgrade capex at Marleston North

With regard to maintenance expenditure, over the current period we spend on average $54,000 per annum 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 only a small portion of the reactive maintenance expenditure at this site has been addressing issues found with the main buildings used by the various zone substation groups. Importantly, this is because the main issues with these buildings are so significant that they require major repairs and refurbishments, of which the justification for is the purpose of this business case.

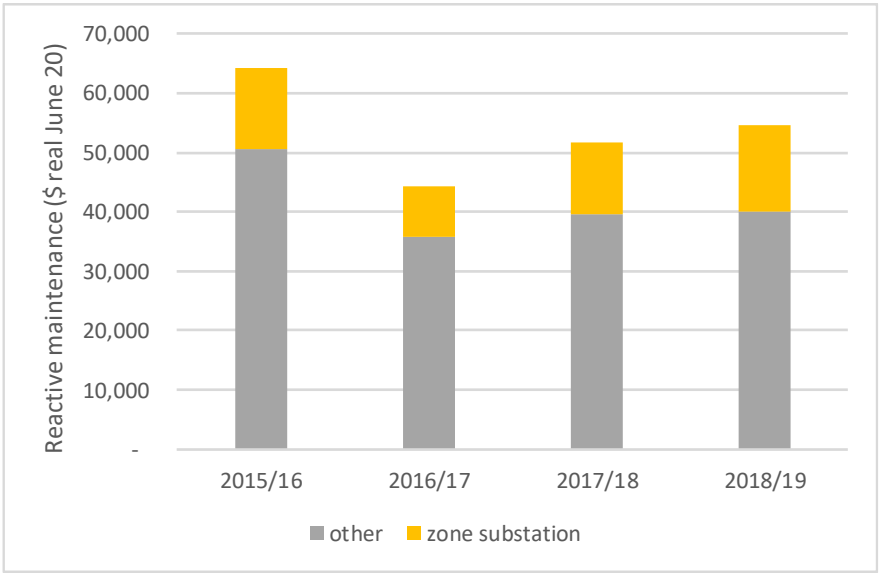

Figure 4 Profile of recent reactive maintenance by facility

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

B. The 'needs' at Marleston North

In this section, we summarise the current issues with the Marleston 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 the next section (Section 5); and
- summarise the more minor issues, some of which will be addressed through the minor work forecast, which is discussed in Section 6.

Importantly, this appendix explains that there are four of the main buildings used by the zone substation groups, where we consider that the issues are so significant that major refurbishment projects may be necessary to provide long term solutions to the issues.

The buildings are old with many non-structural elements and systems in poor condition and other aspects of the buildings are inadequate for their current operations.

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 5.23.2 - Marleston North Photographs, which provide more comprehensive photographic evidence.

Assessment methodology

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 Proposal.

Over the last 10 year, we have also commissioned a range of investigations into the issues at this site and possible solutions. However, many of these are not specifically relevant to the major issues discussed in this section and therefore, we have not referenced these investigations here.

Building issues

Major building issues

Context

As noted in Appendix A, the Zone substation groups use a number of buildings at Marleston North, a number of which are the largest buildings at this site.

All these buildings, including their non-structural elements, including fixtures and fittings are aged, resulting in a range of issues that we are currently managing. Individually, many of these issues are not major, but together they represent a major issue, particularly for four of the buildings:

- the transformer workshop;
- the oil test lab;
- substation workshop; and
- substation store.

The buildings and their issues are discussed separately below, in terms of the four buildings with major issues and the other buildings with minor issues.

The transformer workshop issues

The transformer workshop building was constructed in 1952-1954. It was built of steel frame, concrete floor and corrugated iron clad roof and walls using materials and techniques appropriate for that time. The building contains offices, toilets/showers, workshop, internal crane-way and transformer ovens.

Structurally, the building remains as constructed and has had no major refurbishment.

The main building issues associated with its condition and compliance with current obligations are summarized in the two tables below.

Table 9 Summary of issues with the transformer workshop building

Issue	Explanation of issue
Wall cladding	Original corrugated iron sheets have structural rust and are beyond repair.
Roof sheeting	Roof sheets are in reasonable condition, but they are aged and it would be opportunistic to repair and upgrade these during any major refurbishment of the building.
Airconditioning	The air conditioning is aged resulting in several units now being irreparable and tagged out-of-service.
Lunchroom	Very old fit-out and in need of refurbishment to provide adequate facilities that align with modern standards.
Toilets/showers	Very aged, original 1950's facilities and in need of refurbishment to align with modern standards (eg cubicles build using asbestos material).
Floor	Delamination to areas of the concrete floor at the Heavy Transformer end and rail run-way
Heating	There is no heating in this building. Additionally, the roof and walls are uninsulated.

The substation store issues

The substation store building was constructed in 1952-1954. It was built of steel frame and corrugated iron sheet roof and walls using materials and techniques appropriate for that time. The building contains warehousing, pallet shelving and a small office area.

Structurally, the building remains as constructed and has had no major refurbishment.

The main building issues associated with its condition and compliance with current obligations are summarized in the two tables below.

Table 10 Summary of issues with the office building

Issue	Explanation of issue
Wall cladding	Very old original corrugated iron sheets, starting to rust through.
Roof	Very old original corrugated iron sheets, starting to rust through.
Pavement/concrete	Aged poor condition pavement area with general bitumen and concrete cracking .
Office fit-out	The office area is aged and not within our current internal standards. On its own, the state of the office may not warrant refurbishment next period. However, it is likely to opportunistic to refurbish the office if other major refurbishments are being undertaken.

The oil test lab issues

The oil test lab building was constructed in 1952-1954. It was built of double brick and steel roof construction. The building contains includes offices, lab space, kitchenette and toilets.

Structurally, the building remains as constructed. Much of the existing fit-out of this building is aged and not within our existing internal standards.

The substation workshop issues

The substation workshop building was constructed in 1952-1954. It was built as a storage warehouse of steel frame and corrugated iron roof and wall cladding using materials and techniques appropriate for that time.

We commenced the piecemeal refurbishment of this building in 2008. Nonetheless, elements of this building still remain in poor condition and below modern standards, particularly the pavement areas and air conditioning.

Impact of issues on operational costs and risks

The poor condition and compliance issues with these four buildings result in a range of increased costs and risks associated with our zone substation group operations.

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 is provided in Supporting Document 5.23.1 - Marleston North model (confidential).

In total, we estimate that the value of the main costs and risks associated with these issues is currently approximately $145,801 per annum, with the major components of this value being operational inefficiencies.

Importantly, given the age of these buildings and their recent history of degraded condition, we expect these issues to worsen if we continue for any extended period with our recent approach of undertaking no significant reactive repair. 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 do not undertake repairs and improvements.

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 11 Summary of the major costs and risks due to the issues with the pavement

Cost/risk category	Description	Expected annual value ($)
Safety risks[16]	Accident in a building caused by its poor condition and/or compliance resulting in a fatality or injury.	$12,000
Operational risks	An unexpected and rapidly evolving poor condition issue or unexpected major compliance issue occurring that significantly affects the operations in one of the buildings until it is repaired or addressed.	$12,500
Operational inefficiency	Increased costs associated with longer operating times and other constraints (ie poorer productivity) due to the existing poor condition of the facilities. For modelling purposes, this predominantly relates to the aged air conditioning and aged and inadequate facilities.	$26,000

[16] It is worth noting that although this safety risk is high in the context of these buildings, 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.

	The continuing poor condition of the buildings resulting in low morale and with an expected higher rate of staff turn-over, resulting in increased hiring and training costs.	$79,587
Supply reliability risk	The economic value (via VCR type calculation) of the increased fault response and restoration times due an unexpected and rapidly evolving poor condition issue occurring that significantly affects the operations of the zone substation field crews. Note, this is being considered a high impact low probability (HILP) risk event, whereby the issue at the site affects the response times for a major zone substation outage.	$15,745

Other zone substation building issues

In addition to the issues with the four buildings discussed above, there are also a number of other more minor issues with the other buildings used by the zone substation groups. These issues mainly relate to the age, condition and compliance of the buildings, engineering systems and 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 (similar to those discuss in Section 3).

Issues with other buildings at Marleston North

In addition to the issues with the buildings used by the zone substation groups, there are also a number of other more minor issues with a number of the other buildings at Marleston North. These issues mainly relate to the age and condition the buildings, including the engineering systems and fixtures and fittings. Most notably, a number of the buildings are old ATCO-style modular buildings, which were original intended as temporary arrangements. This includes HV office/test centre, lunchroom, outpost office, administration office, and construction office.

That said, 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 (as discuss in Section 3).

Example photographic evidence of building issues

Example photographic evidence of the major issues with the buildings is shown below. More comprehensive photographic evidence is provided in Supporting Document 5.23.2 - Marleston North Photographs.

Figure 5 Example of rusted corrugated iron sheets to the rear wall of the transformer workshop – original 1950's sheets.

Figure 6 Example of rusted corrugated iron sheets to the rear wall of the transformer workshop – original 1950's sheets.

Figure 7 Ladies toilets and shower – Transformer Workshop. Original 1950's fit out in very poor condition with asbestos cubicle panels.

Figure 8 Substation Construction Modular Lunchroom – Very Poor Condition – Beyond Repair.

Figure 9 Example of deep cracking to concrete forklift loading ramp. Bitumen cracking to transformer workshop truck loading bay

Marleston North pavement and associated external works

Context

The pavement covers a large area (approximately 21,000m^2), which is used for various functions associated with the sites various roles. There are four areas where we considered the issue are significant as shown in the Figure 10 below, namely:

- external transformer storage areas (blue area)
- substation external storage area (orange area)
- carpark (yellow area)
- roadways and drainage lines (green area).

These issues mainly relate to the age and condition the pavement and associated external works. That said, we do not consider that these will require any major refurbishment or upgrades and so will be addressed through minor works in the capital works program (as discuss in Section 3).

Figure 10 Diagram of main areas of Marleston North pavement

Main issues with the pavement

The poor condition of the existing pavement

The current pavement was original constructed in 1952-1956. Since that time the volume and weight of the vehicles using the paved areas has increased, particularly the two storage areas. 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. Historically, we have been repairing the worst affected areas through a piecemeal reactive repair program. However, as was discussed in the previous section, we have only undertaken minor patched repair work in the current period.

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.

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 a ongoing need to repair the pavement if we continue with a business-as-usual reactive repair strategy).

See below for example photographs of the poor condition of the pavement area.

Other issues with the pavement

In addition to the poor condition of the pavement, there are also a number of other issues with the external structures and fixtures associated with these paved areas.

The most significant issue concerns the existing security systems, where the existing beams and cameras are inadequate compared to modern available systems. This deficiency 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.

There are also some issues associated with the crane operation area, including the level of lighting and some corrosion with the crane structures.

Note on recently emerging issue

The issues discussed above are those that are most significant on the 'needs' driving the anticipated work program that forms the basis of our forecast capex at Marleston North for the next regulatory period, and which is summarised in section 4.

In addition to these, we have two recently emerging issues that have the potential to be major issues that we will need to address in the next period. Moreover, both matters could require a significant level of investment (ie greater than $1 million). Because the potential significance of these has only recently been uncovered and we are currently investigating these matter and possible solutions, we have not allowed for these in our forecast. However, these are examples of the types of major unexpected issues that can arise when managing sites of this age and complexity.

The two issues are as follows:

- **Oil containment bunding** - The oil containment bunding associated with the external transformer storage area was constructed to the requirements at that time in the 1950's (ie besser block, unmortared and small bitumen roll-over bunds). These arrangements are not

compliant to current standards. Critically, we have found these to be in a very poor condition and leaking oil, which is in breach of our EPA requirements.

- **Concrete drainage lines** – We have full-thickness cracking through the concrete drainage lines (Spoons and Swales) which allows water to leach through into the soil below the ground. This is in breach of both our EPA and Storm Water Pollution Prevention requirements.

Example photographic evidence of pavement issues

Example photographic evidence of the issues with pavement area is shown below. More comprehensive photographic evidence is provided in Supporting Document 5.23.2 - Marleston North Photographs.

Figure 11 Example of full-thickness cracking and potholing to main driveway and Car park area

Figure 12 Example of deep cracking and movement to concrete spoon drain, full-thickness cracking to bitumen pavement, area of previous repair.

Figure 13 Examples of full-thickness bitumen cracking and subsidence, recent repair patches and previous repair patch cracking

Figure 14 Heavy Transformer containment bund (besser block) – cracking, movement and leaking transformer oil through bund wall

Figure 15 Heavy Transformer containment bund (besser block) – cracking, movement and leaking transformer oil through bund wall; Previous bund repair section.