ElectraNet Transmission Network Revenue Proposal 2008 - 2013

REVIEW OF ELECTRANET REVENUE PROPOSAL

- For the Australian Energy Regulator
- Final Report
- 23 November 2007

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Executive Summary

Introduction

ElectraNet is the principal Transmission Network Service Provider in South Australia, and owns and operates a high voltage transmission network. ElectraNet's current revenue cap decision made in 2002 expires on 30 June 2008, and it has made an application for a revenue cap decision to apply for 5 years from 1 July 2008.

The Australian Energy Regulator (AER) is responsible for economic regulation of transmission services, and is currently assessing ElectraNet's revenue application. The AER has engaged Sinclair Knight Merz (SKM) to undertake a review of ElectraNet's proposal, including capital governance, past and future capital expenditure, future operating costs, and service standards.

SKM has prepared this report based of its findings after investigating ElectraNet's application and supporting information. SKM would like to acknowledge the cooperation and openness of ElectraNet throughout this review.

ElectraNet proposal

ElectraNet submitted its revenue proposal on 31 May 2007 for 5 years from 1 July 2008. ElectraNet's proposal can be summarised as:

- An increase in controllable operating costs (opex) to reflect revised asset maintenance strategies that take into account the condition and ageing of its network, and to incorporate a number of scope changes such as new land tax obligations. ElectraNet has developed a zero-based budget for a number of operating cost areas, with significant increases on historical costs for some items. There are also a number of specific "opex projects" to maintain or refurbish items of equipment identified as requiring substantial works.
- Total capital expenditures over the period 2003 – 2008 within 1% of the capital budget proposed at its last determination although the mix of projects and expenditure under different categories is significantly different.
- Future capital expenditures to increase significantly, being some 75% (real) higher than the current period. This is largely driven by changes to the SA Electricity Transmission Code that require increased security of supply at a number of connection points including the Adelaide CBD, and a significant increase in replacement of ageing assets considered to be in poor condition.
- Service standard targets largely in line with the current targets.

Review Process

SKM has used the following process for this review:

- SKM has reviewed the proposal in detail, and identified a number of areas it considered particularly worthy of investigation.
- SKM has reviewed ElectraNet's capital governance processes, including:
  - Planning processes and criteria
  - Project management processes and systems
  - Procurement processes and systems

  These processes were assessed against the requirements of the NER, and SKM's experience of good industry practice in capital governance within Australian utilities.
- SKM in consultation with the AER selected a number of past and future capital projects to be reviewed on a sample basis. SKM reviewed in detail a sample of ten historical and thirteen future (ex-ante) projects, and all 17 contingent projects nominated by ElectraNet.
- SKM analysed the forecast opex requirements within the proposal including:
  - The historical level of opex
  - The efficiency of the expenditure in the nominated "base year"
  - The forecast escalation factors
  - A review of a sample of Asset Management documents
  - The application of the asset management practices
  - Application of capitalisation policy to the proposed opex budget items
- SKM analysed the service target performance parameters within the proposal including:
  - ElectraNet's historical performance, including the suite of parameters through which ElectraNet's performance is currently evaluated
  - The proposed suite of parameters, including all values, targets and thresholds
- A series of on-site meetings were made to ElectraNet's offices in Adelaide, including site inspections of a number of substations where capital projects have been undertaken or proposed. The AER also attended these on-site meetings, where detailed discussions were held with ElectraNet staff involved in various aspects of the proposal and ElectraNet's operations, and documents and data were reviewed.
- A formal request register was established to manage and track information requests. Some 240 information requests were made and information provided by ElectraNet.

The findings of this review are described in the following sections.

Capital Governance

ElectraNet's project management methodology follows projects through five stages of the process. The stages are:

(a) Concept

(b) Scope Definition

(c) Delivery Planning

(d) Delivery

(e) Finalisation

This process is based around common definitions of project stages, and is considered to be in accordance with good industry practice.

Good capital governance is provided by the documented requirements, reporting, documents and approvals within this project management and delivery framework. It includes elements such as ensuring projects are adequately justified, viable alternatives are considered, costs are managed, and through close-out reports and approvals gateways at each project stage.

SKM found ElectraNet's governance processes to be basic but adequate at the beginning of the current regulatory period. ElectraNet has invested substantial effort in developing its project management and capital governance arrangements over the current regulatory period, and it is now considered to be approaching best practice and appropriate for the larger capital program proposed. There is evidence it is being actively used, audited, and continuously improved.

ElectraNet's asset management approach has likewise undergone substantial development in recent years, and is considered to be in line with good industry practice. There is evidence of consistency and integration of policies, procedures and systems that SKM considers provides a solid framework for good management and informed decision making.

Overall SKM considers ElectraNet governance framework is in line with good industry practice, though its effectiveness should be reviewed after it has had more time to bed down and demonstrate its effectiveness in practice.

Demand Forecast

ElectraNet's demand forecasts are based on connection point demand forecasts provided by ETSA Utilities and direct connection customers. ETSA Utilities provides 10 year medium, low and high growth scenario forecasts for each connection point which form the basis of ElectraNet's demand forecasts. These forecasts have been reviewed by the independent Electricity Supply Industry Planning Council (ESIPC), which has found them to be reasonable and consistent with its econometric forecast for South Australia.

In order to calculate transmission backbone loadings, information on generators is required, and ElectraNet engaged ROAM consulting to undertake scenario based generation forecasts to take into account different assumptions regarding load growth, electricity imports to SA, and future greenhouse gas constraints on the generation sector.

On the whole, SKM considers the demand forecast used to derive the connection point and network augmentation projects is robust and in keeping with good industry practice. Assumptions used by ETSA Utilities and ElectraNet are considered to be reasonable and appropriate (modestly conservative) for planning a high reliability network. The use of scenario analysis in the development of the capital expenditure program is appropriate but of little consequence in this instance as it appears that the majority of the program is driven by local connection point demands and ETC changes.

Ex-Post Assessment of Historical Capex

ElectraNet's proposal includes capital projects implemented during the current regulatory period of $389.8M, or around 1% higher than the allowance for capex at the previous determination. In addition, $44.4M of "work in progress" is proposed to be capitalised at the end of the current period. This is shown in the table below.

Table 1 ElectraNet proposed Historical Capex

	Jan-Jun 2003	2003-04	2004-05	2005-06	2006-07	2007-08	Total
ACCC allowance ($2002-03)	9.7	68.2	87.8	78.6	68.6	45.4	**358.3**
ACCC allowance (CPI escalated)	9.7	70.5	92.6	84.4	76.2	52.0	**385.9**
ElectraNet Actual / forecast capitalisation	2.1	34.9	42.8	65.5	98.0	146.5	**389.8**
Work in progress (WIP) to be capitalised						44.4	**44.4**
Total							**434.2**
Variation from allowance (excl. WIP)	(7.6)	(35.6)	(49.8)	(19.3)	21.7	94.4	**3.9**

SKM's review of the past capital expenditure (ex-post) projects involved reviewing a selection of ElectraNet's capital projects from the current regulatory period. ElectraNet's previous determination was made under the Draft Regulatory Principles (DRP) released in 1999, with further guidance on the prudency test being provided by the Statement of Regulatory Principles (SRP) released in 2004. SKM has assessed the prudency of historical capex against the requirements of the DRP and SRP, and developed its own independent cost estimates of these projects for comparison. Causes of any variance between initial approved project cost and final cost were investigated.

In general, SKM observed that the projects reviewed were prudently scoped to meet the requirements of the planning horizon for ElectraNet. SKM has formed the view that ElectraNet has undertaken a reasonable review of project scopes and options, and selected the most efficient project for implementation, in accordance with good industry practice and in line with what would be expected from an efficient network operator.

In reviewing projects that appeared to have substantial cost or time over run or scope change, SKM found no instances of systemic problems or issues. It is common that the originally planned project scope will change during the course of a project, as issues such as site availability, detailed design considerations, line route planning and approvals, and additional information (such as new loads) act to constrain the options available for implementation. SKM found that ElectraNet generally acted in accordance with good industry practice, and generally implemented a project SKM considers to be efficient given the constraints and uncertainty that existed at the time the project was being implemented.

A number of projects exceeded their initial cost estimates, due in part to poor cost estimates in the early part of the current period. In these instances, SKM found the final delivered costs were generally reasonable and efficient. SKM notes that ElectraNet has adopted a new cost estimating system that it expects will deliver reliable cost estimates going forward.

Based on the project costs reviewed by SKM, there is only one project where SKM has not accepted ElectraNet's costs as reasonable. SKM recommends a ($34k) adjustment be made to the prudent capital expenditure for the *General Building Upgrades* project in 2004/05, as described in A.5. While this amount is negligible in the context of the overall capex budget, it is considered material for this particular project.

SKM notes that while the overall capex spend in the current period is within 1% of the previous decision, there are considerable variations in the categories of expenditure with augmentation underspent by 40% while replacement has overspent by 78%.

ElectraNet identified a number of reasons for this changing capex profile:

- Lower than forecast demand
- Conversion of Murraylink to regulated status
- A number of market benefits projects that have not proceeded
- Condition assessments conducted by ElectraNet that led to a decision to bring forward a number of replacements
- Unexpected increases in project costs
- Substantial expenditure on business and IT systems including SAP which should deliver ongoing operational improvements and efficiencies

In general SKM agrees with the reasons put forward by ElectraNet for the changing project mix. The projects reviewed were found to be adequately justified, and ElectraNet's asset management plan and replacement project prioritisation is considered to be robust and in line with good industry practice.

SKM reviewed the 8.3% allowance for Interest During Construction (IDC) and Work In Progress (WIP) amounts proposed by ElectraNet, and found these to be reasonable. SKM notes that ElectraNet has not added IDC to its accumulated WIP, and recommends a 4.2% IDC factor be added to ElectraNet's proposed WIP of $44 million.

Based on the findings of the reviewed projects, SKM has not identified any issues or problems it considers likely to be systemic, and found that projects were generally prudent and efficient. On this basis, SKM recommends that ElectraNet's Historical Capex be accepted as reasonable, per the table below:.

Table 2 SKM Recommended Historical Capex

	Jan-Jun 2003	2003-04	2004-05	2005-06	2006-07	2007-08	Total
ElectraNet Proposed	2.1	34.9	42.8	65.5	98.0	146.5	**389.8**
Work in progress (WIP)						44.4	**44.4**
SKM adjustment for inefficient project costs			(0.03)				**(0.03)**
SKM adjustment for IDC applied to WIP						1.9	**1.9**
Total	**2.1**	**34.9**	**42.8**	**65.5**	**98.0**	**192.8**	**436.0**

Note – Totals may not add due to rounding.

Capital Cost Escalation Factors

In their transmission network revenue proposal, ElectraNet have sought to establish various cost escalation factors aimed at taking into account risk and expected real price increases in capital costs over the upcoming regulatory period. These are shown in the table below:

- **Table 3 Application of capex escalators by ElectraNet**

Factor	Value	Total capex
Base cost estimates ($2006/07)	-	**$665.6M ($2006/07)**
2007/08 nominal cost escalator	5.02% for network projects 3.0% (CPI only) for non-network	$698.2M ($2007/08)*
2008/09 – 2012/13 weighted real cost escalator	6.6% for network projects 3.0% (CPI only) for non-network	$741.7M ($2007/08)
Portfolio risk factor	5.2% for network projects only	$778.1M ($2007/08)
Escalated total estimate ($2007/08)		**$778.1M ($2007/08)**
Total escalator impact (compound)	16.9%	$112.5M ($2007/08)

** expected cost if all projects were implemented in the 2007/08 year, not spread over 5 years*

ElectraNet has developed its cost escalators based on trend projections of Producer Price Index (PPI) measures for various inputs to its costs, but predominantly weighted towards the General Construction PPI. It has also used economic forecasts of wages growth developed by BIS Shrapnel.

SKM considers ElectraNet's non-labour cost escalators have not given adequate weight to the likelihood of significant price reductions, or at the least significantly lower growth than the trend of recent years. On this basis, SKM recommends the proposed cost escalators are not reasonable.

SKM has developed an alternate set of cost escalators specifically targeted at electrical infrastructure, and using weighted forecasts of input costs such as copper, steel and aluminium. These escalators were recently accepted by the AER in its Draft Decision for SP AusNet in Victoria.

- **Table 4 SKM Recommended Weighted Real Capital Escalation Index**

Weighted escalation factor	1 yr nominal	Cumulative real				
	2007-08*	2008-09	2009-10	2010-11	2011-12	2012-13
ElectraNet proposal	1.050	1.021	1.045	1.073	1.103	1.135
SKM Recommendation	1.036	1.007	1.017	1.031	1.045	1.060

SKM has projected future capex using its revised real cost escalators, and also recommends using annual escalators rather than an average escalator for the whole 5 year period. These recommendations are shown in the table below:

Table 5 Effect of using a uniform average inflator – ex-ante capex

Annual proposed capital ($2007-08 m)	2008-09	2009-10	2010-11	2011-12	2012-13	Total
ElectraNet Proposed	**200.2**	**218.2**	**164.6**	**129.5**	**65.6**	**778.1**
Recommended – SKM average inflator	191.0	207.6	156.7	123.3	62.6	741.2
SKM recommended - SKM annual inflators	**187.0**	**206.5**	**157.4**	**125.7**	**64.4**	**741.2**
Total recommended adjustment	-13.2	-11.7	-7.2	-3.8	-1.2	-36.9
Total recommended adjustment (%)	-6.6%	-5.3%	-4.4%	-2.9%	-1.8%	-4.7%

ElectraNet has also proposed a 5.2% portfolio risk adjustment factor to be applied to its network capital projects. This factor was based on a number of identified inherent and contingent risks that could be expected to occur even in a well managed and efficient portfolio of projects. SKM is of the opinion that, given the level of uncertainty and risk that exists in a large project portfolio such as ElectraNet's future capital works program that there is a real risk that on average costs will tend to increase more then decrease. The figure of 5.2% for overall portfolio risk adjustment is within the range SKM expects from industry experience and should be accepted.

ElectraNet has also included overhead costs of around 15% on average, to include factors such as detailed design, procurement and project management. On the whole SKM considers the overall allowance of 15% on average is comparable with a number of industry sectors (including electricity) and is considered reasonable.

Proposed Ex-Ante Forecast Capex

ElectraNet proposes a capital program of $778M (real $2007/08), as described in the table below.

Table 6 ElectraNet Proposed Ex-Ante Future Capex

Category	2008-09	2009-10	2010-11	2011-12	2012-13	Total
Augmentation	57.9	73.9	52.4	32.4	11.4	228.0
Connection	56.1	47.4	37.9	13.3	3.1	157.8
Replacement	46.9	66.7	36.8	59.6	30.4	240.3
Strategic land/ easements	6.5	4.4	7.7	2.6	2.7	23.9
Security/ compliance	9.8	16.6	20.3	13.1	10.6	70.4
Inventory/ spares	6.3	2.4	2.4	2.4	2.4	15.7
Total Network	**183.3**	**211.2**	**157.7**	**123.5**	**60.7**	**736.1**
Business IT	7.3	6.2	6.8	5.2	3.2	28.8
Buildings/ facilities	9.5	0.6	0.4	1.0	1.7	13.3
Total Non-Network	**16.9**	**6.8**	**7.2**	**6.2**	**4.9**	**42.0**
Total Capex	**200.2**	**218.2**	**164.6**	**129.5**	**65.6**	**778.1**

Source: ElectraNet Revenue Proposal

This represents an increase of around 75% real from the current period, driven largely by changes to the SA Electricity Transmission Code (ETC) requiring increased security of supply at a number

of connection points including the Adelaide CBD, and a substantial increase in replacement of aged assets.

SKM's review of the future capex was focussed on detailed review of a number of sample projects. The forecast capital expenditure projects reviewed by SKM were selected in consultation with the AER to address a broad spectrum of the capital expenditure categories, and covered around half of the proposed future capex.

SKM identified two instances where it considers there is material uncertainty in the scope of projects reviewed. These are:

- The transformer ballistics proofing project, where SKM considers the context and requirements of the project have not yet been adequately defined, and it is not possible to adequately define the project scope.
- The line and cable cost component of the Adelaide CBD Reinforcement project, where uncertainty regarding the line route and mix of overhead and underground construction leads to variations in possible costs by as much as $26 million.

In each of these instances SKM has recommended these items be removed from the ex-ante cap and into the contingent projects category, to be triggered when further development has led to a firm scope and where efficient costs can be accurately estimated.

Based on the projects reviewed and observations of ElectraNet's planning and governance processes, SKM has formed the view that ElectraNet has undertaken a reasonable review of project scopes and options, and selected the most efficient project for implementation, in accordance with good industry practice and in line with what would be expected from an efficient network operator.

On balance, SKM has formed the view that ElectraNet's governance and planning processes are in line with good industry practice, and support the development of projects that meet the prudency and efficiency requirements.

ElectraNet's procurement and project management policies were reviewed, and found to support efficient delivery of projects. ElectraNet has recently moved to a "two contractor" model for capital works, in order to ensure there is sufficient workload and certainty for its contractors to engage and retain the resources required to meet ElectraNet's capital works programme. This model appears to be working well, and ElectraNet has been able to significantly increase its capital works budget in recent years. Project management processes have been reviewed and updated, resulting in changes and improvements that should address the concerns SKM identified with project management early in the current regulatory period.

SKM prepared independent cost estimates for each of the projects selected for detailed review, and found ElectraNet's costs to be in line with what it would consider reasonable and efficient, within the level of uncertainty expected.

A number of changes to project costs are recommended:

- A $1.9 million reduction in the weather stations project to reflect what SKM considers to be the efficient costs of the project
- Correction of double counting of escalation on the Playford project of $4.2 million.
- Correction for use of an incorrect forecast for the TIPS 66kV replacement project of $2.8 million

SKM considers ElectraNet has adopted good industry practice in conducting condition assessments, and undertaking a rigorous risk assessment and ranking process to identify proposed replacement projects. ElectraNet's planned replacement project will retain the overall risk and average age of the network at a level consistent with the start of the upcoming regulatory period, which SKM considers to be a reasonable and prudent approach. Overall, SKM considers the proposed ranking and level of replacement projects to be reasonable.

From its review of ElectraNet's planning and governance processes and the selected ex-ante capex projects, SKM is of the view that ElectraNet's application for future capex is likely to be prudent and efficient.

Based on the findings of the reviewed projects, SKM has not identified any issues or problems it considers serious or likely to be systemic, and found that projects were generally prudent and efficient. On this basis, SKM recommends that ElectraNet's Forecast Capex be accepted as reasonable, subject to the recommended adjustments per the table below.

Table 7 SKM Recommended Ex-Ante Capex Adjustments

Item	Ref.	2008-09	2009-10	2010-11	2011-12	2012-13	Total
ElectraNet Proposed	**6.1**	**200.2**	**218.2**	**164.6**	**129.5**	**65.6**	**778.1**
Playford escalation correction	6.4.6	-0.6	-2.7	-0.9	-	-	**-4.2**
Weather stations efficient costs adjustment	6.4.11	-0.38	-0.38	-0.38	-0.38	-0.38	**-1.92**
TIPS 66kV incorrect forecast used	6.4.9	-	-	-0.4	-1.8	-0.6	**-2.8**
Subtotal – adjustments		*-0.98*	*-3.08*	*-1.68*	*-2.18*	*-0.98*	*-8.92*
SKM transfer of opex projects to capex	7.6.2.5	3.08	3.13	3.19	3.24	3.29	**15.93**
Subtotal – total change		*2.10*	*0.05*	*1.51*	*1.06*	*2.31*	*7.01*
SKM Recommended		**202.30**	**218.25**	**166.11**	**130.56**	**67.91**	**785.11**

SKM has also recommended the following amounts be removed from the ex-ante budget and into the contingent projects allowance.

- **Table 8 SKM Final Recommended Ex-ante Capex transfers to Contingent ($2007/08M)**

Item	Ref.	2008-09	2009-10	2010-11	2011-12	2012-13	Total
ElectraNet Proposed	**6.1**	**200.2**	**218.2**	**164.6**	**129.5**	**65.6**	**778.1**
CBD project uncertain OH/UG route costs	6.4.1	-21.9	-60.2	-21.9	-	-	**-104.0**
10809 Transformer Ballistics proofing	6.4.8	-4.6	-2.3	-4.6	-0.5	-5.7	**-17.7**
Total transfer to contingent		**-26.5**	**-62.5**	**-26.5**	**-0.5**	**-5.7**	**-121.7**

The impact of each of the adjustments outlined above have been applied individually to avoid confusion. The combined impact of all the adjustments is shown below.

- **Table 9 SKM Final Recommended Ex-ante Capex ($2007/08M)**

Ex-ante capex ($2007/08 million)	2008/09	2009/10	2010/11	2011/12	2012/13	Total
ElectraNet Proposed Total	**200.2**	**218.2**	**164.6**	**129.5**	**65.6**	**778.1**
Total SKM adjustment to project costs	-0.98	-3.08	-1.68	-2.18	-0.98	-8.92
Total SKM transferred to contingent	-26.5	-62.5	-26.5	-0.5	-5.7	-121.7
Total SKM adjustment for smoothed capital program	-52.7	-32.6	1.8	54.8	28.8	0
Total adjustments	*-80.2*	*-98.2*	*-26.4*	*52.1*	*22.1*	*-130.6*
SKM adjusted Total (EN escalators)	**120.0**	**120.0**	**138.2**	**181.6**	**87.7**	**647.5**
escalation adjustment (SKM annual)	-7.1	-6.6	-6.0	-5.8	-1.6	-26.9
SKM adjusted Total (SKM annual escalators)	**112.9**	**113.4**	**132.2**	**175.9**	**86.1**	**620.6**
Opex projects transferred to capex	3.1	3.1	3.2	3.2	3.3	15.9
Total recommended ex-ante	**116.0**	**116.5**	**135.4**	**179.1**	**89.4**	**636.5**

Contingent Projects

ElectraNet proposed 17 contingent projects in its Revenue Proposal. Those 17 projects could generally be categorised into one of three main project types. They are market benefit driven projects, new connection application driven (ETSA Utilities) or significant increases in network loads.

ElectraNet have briefly detailed each of the 17 contingent projects. For each of the 17 projects, ElectraNet have defined at a high level, the project requirement, project scope, the trigger event

that would be required to initiate the project, and the order of magnitude of the project cost. SKM supports this approach to defining the contingent projects.

ElectraNet identified four projects as being triggered by an application of the Regulatory Test that would demonstrate that the project would deliver net market benefits. SKM considers that all contingent projects in this category exceed the $10.4m threshold limit, and meet the other requirements for contingent projects.

ElectraNet identified six projects as being triggered by the receipt of a new connection application. SKM notes that the cost estimate for each of these projects exceed the threshold limit for a contingent project as part of ElectraNet's regulatory submission, and the other requirements for contingent projects. SKM also notes ElectraNet's comment that "A detailed project scope and cost estimate will be required before any amendment to the revenue determination is considered by the AER …". On this basis SKM recommends these projects be accepted as contingent projects.

ElectraNet identified seven contingent projects as being triggered by a quantum step load increase. SKM found that all contingent projects in this category exceed the $10.4m threshold limit, and that the load increases required to trigger these projects were credible but uncertain.

Two of the contingent projects, #14 "Parafield Gardens West" and #17 "Northern Transmission Reinforcement" (Olympic Dam), are likely to be largely negotiated transmission services, though it is possible there will be a prescribed deep connection component that provides a net market benefit, and hence SKM has not recommended they be rejected as contingent projects.

On balance, SKM recommends the contingent projects nominated by ElectraNet be accepted as reasonable, but notes ElectraNet bears some risk that some of these projects could subsequently fail to meet the $10M threshold value if triggered.

Operating expenditure

ElectraNet has sought a 31% real increase in its operating expenditure for the upcoming period, driven primarily by an increased maintenance effort on its assets due to improved information on condition and revision of its asset management policies.

Two general approaches have been taken in developing this forecast. The forecasts for some expenditure items have been based on expenditure in 2005/06 as the base year. This is the most recent year for which audited financial accounts were available. The second approach is referred to as "zero-based" where expenditure forecasts have been built up from the detailed program of physical works planned over the regulatory period. The application of these two approaches is discussed in more detail in later sections of this report.

ElectraNet's operating expenditure forecast is summarised below:

Table 10 ElectraNet Operating Expenditure Proposal (original) ($m 2007-08)

Opex category	2008-09	2009-10	2010-11	2011-12	2012-13	Total
Field Maintenance	23.6	24.2	25.3	26.4	26.4	125.9
Field Support	8.1	8.6	8.9	9.5	10.0	45.1
Operations	2.0	2.0	2.1	2.2	2.3	10.6
Asset Manager Support	6.4	6.5	6.6	6.8	6.9	33.1
Corporate Support	14.1	14.5	15.4	16.4	16.9	77.3
Total Controllable	**54.2**	**55.8**	**58.4**	**61.3**	**62.5**	**292.1**
Network Support	4.7	4.9	5.1	5.6	7.0	27.3
Debt Raising	0.6	0.7	0.8	0.8	0.8	3.7
Equity Raising	0.2	0.2	0.2	0.2	0.2	0.8
TOTAL	**59.6**	**61.5**	**64.4**	**67.8**	**70.5**	**323.8**

During its review SKM identified what it considered to be a number of errors in ElectraNet's opex collation spreadsheet. ElectraNet has acknowledged there were a number of summation and formula errors, and has issued a corrected version of the spreadsheet.

ElectraNet has advised it regards these as mathematical errors and had intended its opex application to be as per the corrected version of this spreadsheet, and that SKM should regard this corrected version to be ElectraNet's revised opex application.

Table 11 Corrections to ElectraNet original Opex Proposal (2007/08 $m)

	2008-09	2009-10	2010-11	2011-12	2012-13	Total
ElectraNet Proposal Opex forecast	**54.16**	**55.84**	**58.35**	**61.27**	**62.46**	**292.08**
Labour component of maintenance	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	(0.07)
Missing line routine tasks	0.29	0.29	0.29	0.29	0.29	1.45
Spreadsheet error in routine maintenance model	1.01	1.01	1.01	1.01	1.01	5.04
Application of maintenance efficiency factors	(0.22)	(0.24)	(0.26)	(0.28)	(0.30)	(1.30)
Spreadsheeting error in substation opex projects	(0.60)	(0.61)	(0.62)	(0.63)	(0.64)	(3.12)
Subtotal – total corrections	*0.45*	*0.41*	*0.39*	*0.35*	*0.31*	*1.91*
ElectraNet Revised Opex forecast with SKM and EN corrections	**54.61**	**56.25**	**58.74**	**61.62**	**62.77**	**293.99**

Note: Because of inter-relationship between a number of these adjustments, the combined impact is not equal to the sum of the individual components.

ElectraNet's application seeks a substantial increase in opex, following an underspend in opex in the current regulatory period. ElectraNet argues it has achieved ongoing efficiency improvements early in the current period, and is seeking to increase its maintenance spend due to a reassessment

of its operating and maintenance practices in light of a review of the ageing nature of its assets, and improved asset management and maintenance strategies that will improve the reliability and life of its assets.

SKM has reviewed ElectraNet's opex application in detail, and accepts ElectraNet's core argument that it's maintenance spend should be increased to reflect good industry practice. SKM also accepts ElectraNet's argument that corrective maintenance will also increase during the upcoming period as the additional inspection and routine maintenance activities will uncover defects requiring correction. However, once the first approximately 5 year cycle of increased maintenance is complete, SKM would expect the overall opex spend to reduce as corrective maintenance backlogs are eliminated and improved routine maintenance and inspection results in reduced defect rates. SKM recommends this be given scrutiny at the next revenue application review, and given consideration as a factor in assessing whether ElectraNet's revised maintenance practices are efficient as claimed by ElectraNet.

ElectraNet has invested considerable effort over the course of the current period to address deficiencies in some of its maintenance policies, and SKM considers these changes have been beneficial and necessary. As many of the changes are only now being implemented, it is difficult to say conclusively that all the policies and practices are efficient, however overall SKM has formed the view that ElectraNet's current asset management strategies and systems, and its operating practices and procedures are reasonably efficient and in line with good industry practice.

SKM has some concerns regarding the opex projects proposed by ElectraNet. Firstly in many instances the scope has not been fully developed and is subject to some uncertainty, and hence there is uncertainty in the cost estimates for these projects. Secondly, while SKM has formed the view that the projects are prudent and justified, they are in practice discretionary, at least in the short term. That is, it may be possible to defer some of these projects without incurring an immediate performance impact on the network. SKM recommends ElectraNet's spend on these opex projects be the subject of detailed review at the next revenue application review to ensure the requested amounts have indeed been spent, and the findings included in consideration of future opex requests from ElectraNet.

The combined impact of SKM's review of the forecast opex expenditure included in ElectraNet's revenue proposal is summarised in the following table.

- **Table 12 Impact of Review on Controllable Opex Forecast (2007/08 $m)**

	2008-09	2009-10	2010-11	2011-12	2012-13	Total
ElectraNet Proposal Opex forecast	**54.16**	**55.84**	**58.35**	**61.27**	**62.46**	**292.08**
ElectraNet Revised Opex forecast with SKM and EN corrections (see 7.1)	**54.61**	**56.25**	**58.74**	**61.62**	**62.77**	**293.99**
duplication of communication sites	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.36)
communication site maintenance	(0.22)	(0.22)	(0.22)	(0.22)	(0.22)	(1.12)
Detailed review of sample of line projects	0.00	0.00	(0.23)	(0.35)	(0.70)	(1.28)
adjustment to opex projects for quantum, scope, rationalisation	(0.54)	(0.60)	(0.59)	(0.57)	(0.50)	(2.80)
cost escalation applied to historic costs	(0.23)	(0.27)	(0.26)	(0.24)	(0.22)	(1.22)
transformer refurbishment	(0.54)	(0.54)	(0.54)	(0.54)	(0.54)	(2.70)
transfer of opex projects to capex	(3.08)	(3.13)	(3.19)	(3.24)	(3.29)	(15.93)
reductions in corrective maintenance	0.00	0.00	0.00	(0.45)	(1.01)	(1.46)
adjustment for sharing generator testing	(0.23)	(0.23)	(0.23)	(0.23)	(0.23)	(1.13)
labour costs in Skill Development program	(0.27)	(0.27)	(0.27)	(0.27)	(0.27)	(1.35)
alternative land value escalation	(0.14)	(0.24)	(0.34)	(0.49)	(0.64)	(1.84)
Subtotal –total recommended adjustment	*(5.34*	*(5.60*	*(5.98*	*(6.72*	*(7.70*	*(31.35*
SKM recommended Opex forecast	**49.27**	**50.65**	**52.76**	**54.90**	**55.07**	**262.64**

The total impact of the recommended modifications to the controllable opex forecast is a reduction of $31.4 million (07/08) over the five year regulatory period, or $29.4 million less than ElectraNet's original May 2007 opex application figure. SKM has recommended some $15.9m of opex projects be re-classified as capex.

The resulting recommended Opex forecast is summarised below.

- **Table 12 Summary of Recommended Opex Forecast (2007/08 $m)**

	2008-09	2009-10	2010-11	2011-12	2012-13	Total
Field Maintenance	19.4	19.8	20.5	21.0	20.1	100.7
Field Support	8.0	8.3	8.6	9.1	9.5	43.5
Operations	2.0	2.0	2.1	2.2	2.3	10.6
Asset Manager Support	6.1	6.3	6.4	6.5	6.7	32.0
Corporate Support	13.8	14.2	15.1	16.1	16.6	75.8
Total Controllable	**49.3**	**50.7**	**52.8**	**54.9**	**55.1**	**262.7**
Network Support	4.7	4.8	5.0	5.4	6.3	26.2
Debt Raising	0.6	0.7	0.8	0.8	0.8	3.7
Equity Raising	0.2	0.2	0.2	0.2	0.2	0.8
TOTAL	**54.7**	**56.3**	**58.7**	**61.2**	**62.4**	**293.3**

Note: Because of rounding, columns may not add.

Service Standards

ElectraNet has proposed the following PI Scheme parameters and targets to apply for the upcoming regulatory period, largely in line with its current targets.

- **Table 13 ElectraNet proposed PI Scheme parameters and targets**

Parameter	Transmission Circuit Availability			Loss of Supply Event Frequency		Average Outage
Sub Parameter	Transmission Circuit Availability (%)	Critical Circuit Availability Peak (%)	Critical Circuit Availability Non Peak (%)	Events > x System Minutes	Events > y System Minutes	Duration (minutes)
Performance target	99.47	99.75	99.94	5	1	84
Cap (upper limit)	99.75	99.80	99.97	3	0	39
Collar (lower limit)	98.56	99.53	99.90	6	2	147
Weighting	0.3	0.2	0	0.1	0.2	0.2

Notes: x = 0.2 and y = 1.0

Source: ElectraNet revenue proposal

The overall findings and conclusions of the service standards section of this review are:

- a review of past years results has shown strong annual performance by ElectraNet compared with original set of targets. ElectraNet suggest in their submission that they are "… *operating at or near 'best practice' levels for a network of its type*" with "*very limited opportunities for improvement*". SKM believes that to satisfy objectives and intentions of STPIS, the PI Scheme needs to be adjusted in order to lock in the significant improvements that ElectraNet achieved during the previous regulatory period;
- SKM did not agree with the percentile approach as presented by SAHA International as an appropriate method for setting cap and collar values, as it was considered to be effectively a measure of the range of performance of individual feeders, rather than the average performance of the transmission network as a whole as measured by the PI Scheme. SKM considers the range between the cap and collar should represent the "typical" range of variability in the performance from year to year;
- SKM adopted a curve-of-best-fit approach in analysing the transmission circuit availability and average outage duration data, and selected the caps and collars at the 95% and 5% cumulative probability values to reflect the intentions of recent determinations in setting cap and collar values, and give effect to a 1 in 10 year approach;
- SKM agreed with proposition to highlight critical circuit availability in line with STPIS;
- SKM considered selection of critical circuits as limited, and based on advice from other authorities, has increased the number of critical circuits from 6 to 14. The revised target shown for critical circuit availability target has been based on the increased number of circuits;

- SKM was not satisfied that the x and y thresholds presented for LOS were consistent with the objectives of STPIS to provide incentive for performance improvement, as neither adequately recognised the performance improvement achieved during recent years;
- the adjusted threshold values suggested in this review provide a sufficient number of events in order to allow for performance improvement;
- the slight adjustment to the Average Outage Duration target adopts the SAHA 2002-06 average in lieu of the 1996-2006 figure. Whilst SKM agreed that a larger sample often increases the statistical level of confidence in the result, including data between 1998 and 2001 based on a transmission system that has undergone subsequent reliability improvement slightly inflates the target for potential events that subsequent capital and operational work during the period 1998 to 2001 would have alleviated;
- SKM accepts the proposed weightings subject to advice from ElectraNet as to how these were established, and confirmation that weightings were consistent with requirements of STPIS.

SKM's recommended changes to the proposed PI Scheme parameters are:

- **Table 14 ElectraNet Proposal and SKM recommended PI Scheme parameters**

Parameter	Transmission Circuit Availability			Loss Of Supply Event Frequency		Average Outage
	Transmission Circuit (Total)	Critical Circuit Availability (Peak)	Critical Circuit Availability (Non-Peak)	Events > x system minutes	Events > y system minutes	Duration (minutes)
ElectraNet proposal						
Target	99.47	99.75	99.94	5	1	84
Cap	99.75	99.80	99.97	3	0	39
Collar	98.56	99.53	99.90	6	2	147
Weighting	0.3	0.2	0	0.1	0.2	0.2
x & y				0.20	1.0	
SKM recommendation						
Target	99.47	99.24	99.62	8	4	78
Cap	99.63	99.51	99.95	6	2	38
Collar	99.10	98.52	98.88	10	5	119
Weighting	0.3	0.2	0	0.1	0.2	0.2
x & y				0.05	0.20	

Other matters

SKM notes the capex and opex programs outlined in ElectraNet's proposal represent a significant increase on the current regulatory period. In the latter years of this period ElectraNet has substantially ramped up both its capex and opex, giving some confidence it will be able to deliver its proposed program. SKM also notes supporting letters from both ElectraNet's construction contractors providing a commitment to being able to resource the proposed program. While SKM considers it is likely ElectraNet will be able to deliver its capex and opex programs, it is concerned at the timing of the program, and weighting towards the front of the current period.

SKM has identified a number of projects it considers may be possible to defer. These are:

- Whyalla Terminal Rebuild and Transformer Capacity Increase
- Kadina East 2x60MV.A Transformer Capacity Increase
- Ardrossan West 132kV Substation Rebuild and Transformer Capacity Increase
- Wudinna 2x25MV.A 132/66kV Transformer Reinforcement
- RTU Replacement Program

The impact of these deferrals is shown below:

Table 15 SKM indicative smoothed capital program options

Ex-ante capex	2008/09	2009/10	2010/11	2011/12	2012/13	Total
Original	200.2	218.2	164.6	129.5	65.6	778.1
Deferred	147.5	186.3	167.3	183.6	93.5	778.1
Adjustment	-52.7	-31.9	2.7	54.1	27.9	0.0

Using original ElectraNet escalators

SKM has not undertaken detailed assessment of the viability of deferring these projects at this time, and there may be valid reasons why some of these projects cannot be reasonably deferred. However, this indicative program demonstrates that the future capex program can be considerably smoothed by adjusting the timing of a relatively small number of projects. In particular, those ETC driven projects where ESCOSA and ESIPC are in agreement[1], or lower priority replacement projects, would seem to be suitable candidates

[1] SKM notes that ESCOSA and ESIPC have indicated they would not be willing to consider deferral of the CBD project or a number of other ETC driven projects.

Contents

In preparing this report, SKM has relied in good faith on information provided by ElectraNet and others, in addition to independently gathered data and research. Various documents, data and reports provided by ElectraNet, AER and other third parties have been used as inputs to SKM's review and the views it has formed as expressed in this report. Except as otherwise stated in this report, SKM has not independenty verified or audited the accuracy or completeness of the information, and accordingly the validity of SKM's views and conclusions is contingent on the accuracy and completeness of the information provided.

SKM has formed its views based on the information available to it at the time, but cannot guarantee the accuracy or completeness of data, or that it is free from misinterpretation or errors.

Projects, costs, demand and other projections of future values are inherently uncertain. While SKM has endeavoured to review forecasts and the likelihood of future events in line with good industry practice and the data available, it cannot and does not guarantee any specific outcomes.

This report has been prepared for the Australian Energy Regulator to assist it in its consideration of the revenue application for ElectraNet, and should not be relied upon by any other party or for any other purpose. SKM will not be liable to any other person that relies upon or otherwise reaches conclusions based on the content or findings of this report. Without limitation this includes any negligent act or omission of SKM.

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1. Introduction

1.1 Background

ElectraNet is the principal Transmission Network Service Provider in South Australia, and owns and operates a high voltage transmission network of 275kV and 132kV lines and substations, with some 66kV assets. ElectraNet's current revenue cap decision made in 2002 expires on 30 June 2008, and it has made an application under the National Electricity Rules for a revenue cap decision to apply for 5 years from 1 July 2008.

The Australian Energy Regulator (AER) is responsible under the National Electricity Rules (NER) for economic regulation of Transmission Network Service Providers (TNSPs). The AER is currently assessing ElectraNet's revenue application.

The AER has engaged Sinclair Knight Merz (SKM) to undertake a review of ElectraNet's proposal, including capital governance, past and future capital expenditure, future operating costs, and service standards. SKM has undertaken this review focussing on the requirements of the NER, in particular Chapter 6A relating to TNSP revenues.

After extensive investigation, SKM has reached the views described in this report. Throughout this review ElectraNet have been cooperative and open, and have provided the substantial quantities of information and access to documents and data sought by SKM and the AER to conduct the review.

1.2 ElectraNet proposal

ElectraNet submitted its revenue proposal on 31 May 2007. ElectraNet's proposal can be summarised as:

- An increase in controllable operating costs to reflect revised asset maintenance strategies that take into account the condition and ageing of its network, and to incorporate a number of scope changes such as new land tax obligations. ElectraNet has developed a zero-based budget for a number of operating cost areas, with significant increases on historical costs for some items. There are also a number of specific "opex projects" to maintain or refurbish items of equipment identified as requiring substantial works.
- Total capital expenditures over the period 2003 – 2008 largely in line with the capital budget proposed at its last determination. While the overall capex spend is within around 1% of the previous proposal, the mix of projects and expenditure under different categories is significantly different. Augmentation and connections have been underspent, while replacements and IT have been overspent.

- Future capital expenditures to increase significantly, being some 75% (real) higher than the current period. This is largely driven by changes to the SA Electricity Transmission Code that require increased security of supply at a number of connection points including the Adelaide CBD, and a significant increase in replacement of ageing assets considered to be in poor condition.
- Service standard targets largely in line with the current targets.
- Both capex and opex proposals contain allowance for price escalation, continuing the trend seen in recent years of strong growth in wages and key commodity inputs to electrical equipment including copper, aluminium and steel.

1.3 Review Process

In reviewing ElectraNet's proposal, SKM has used the following process:

- SKM has reviewed the proposal in detail, and identified a number of areas it considered particularly worthy of investigation.
- SKM has reviewed ElectraNet's capital governance processes, including:
  - Capital governance framework, including project identification, scoping and approval
  - Planning processes and criteria
  - Project management processes and systems
  - Procurement processes and systems

  These processes were assessed against the requirements of the NER, and SKM's experience of good industry practice in capital governance within Australian utilities.
- SKM in consultation with the AER selected a number of past and future capital projects to be reviewed on a sample basis. These were selected based on factors such as:
  - The size of the project and level of expenditure, both in absolute terms and from SKM's expectations for a project of the type described;
  - Significant increases in project cost from earlier budgets or estimates
  - Projects where the scope or justification appeared unclear
  - Achieving a mix of project drivers, such as augmentation, replacement, and non-network

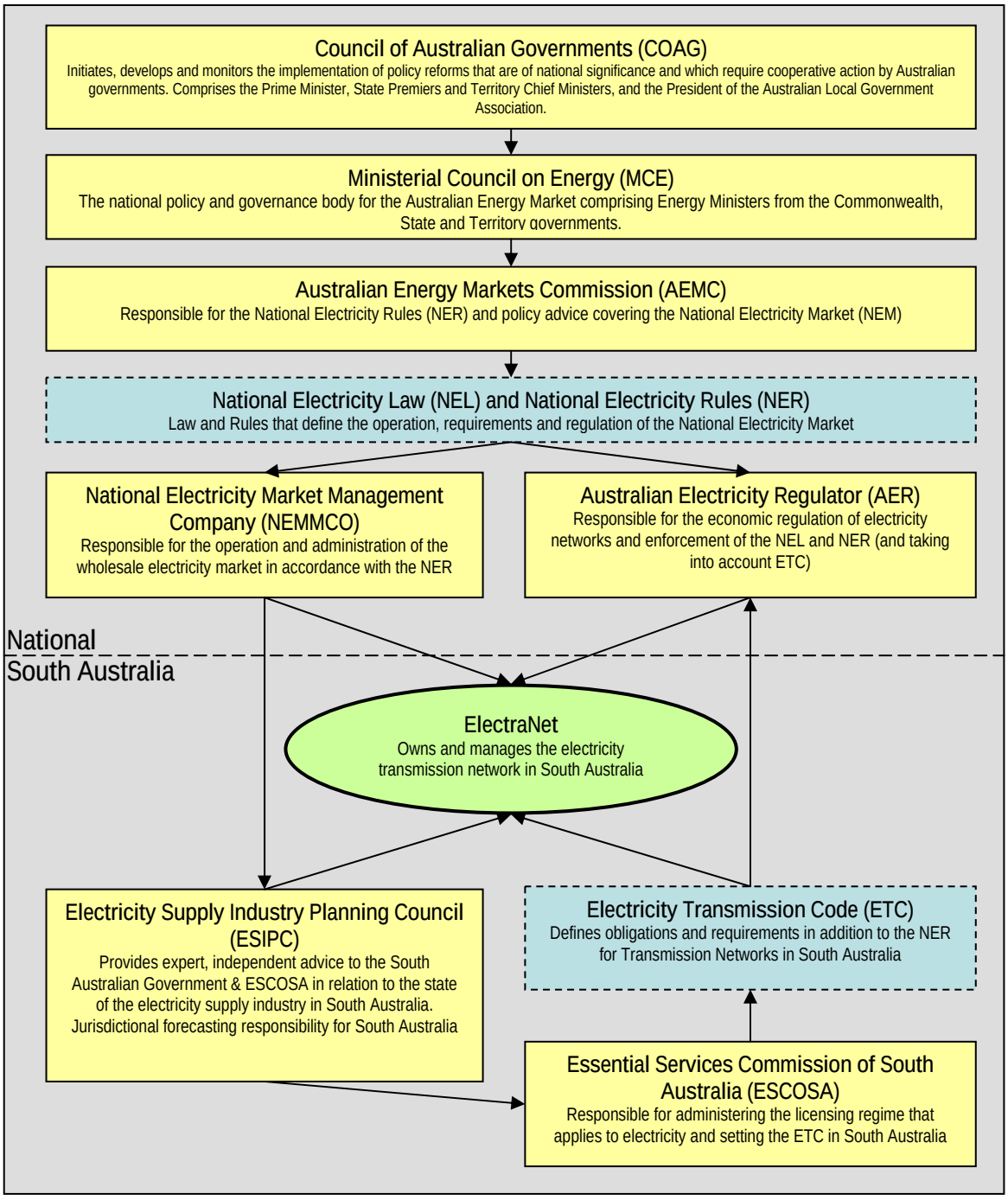
  SKM reviewed in detail a sample of ten capex projects each from the current (historical) and upcoming (ex-ante) revenue determination period, with a further three future capex projects added to include compliance and IT related expenditures. The list of nominated projects for review was agreed by the AER prior to the commencement of detailed reviews. All 17 contingent projects nominated for the upcoming period were also reviewed.

- SKM analysed the forecast opex requirements within the proposal including:
  - The historical level of opex;
  - The efficiency of the expenditure in the nominated "base year";
  - The forecast escalation factors;
  - A review of a sample of Asset Management documents:
  - The application of the asset management practices;
  - Application of capitalisation policy to the proposed opex budget items.
- SKM analysed the service target performance parameters within the proposal including:
  - ElectraNet's historical performance, including the suite of parameters through which ElectraNet's performance is currently evaluated;
  - The proposed suite of parameters, including all values, targets and thresholds.
- A series of on-site meetings were made to ElectraNet's offices in Adelaide, including site inspections of a number of substations where capital projects have been undertaken or proposed. The AER also attended these on-site meetings, where detailed discussions were held with ElectraNet staff involved in various aspects of the proposal and ElectraNet's operations, and documents and data were reviewed.
- A formal request register was established to manage and track information requests. Some 240 information requests were made and information provided by ElectraNet.

2. Regulatory framework and requirements

The industry framework that ElectraNet operates within is described in Figure 1.

- **Figure 1 Electricity Industry and Regulatory Framework**



2.1 Regulatory framework for assessing capital expenditure

2.1.1 Capital Expenditure Objectives

The capital expenditure objectives that ElectraNet is attempting to meet through its forecast capital expenditure are to:

1) *Meet the expected demand for prescribed transmission services over that period;*
2) *Comply with all applicable regulatory obligations associated with the provision of prescribed transmission services;*
3) *Maintain the quality, reliability and security of supply of prescribed transmission services; and*
4) *Maintain the reliability, safety and security of the transmission system through the supply of prescribed transmission services.*

2.1.2 Capital Expenditure Criteria

SKM's review of the future capital expenditure forecast addresses the requirement of the AER to accept the forecast of required capital expenditure if it is satisfied that the total of the forecast capital expenditure reasonably reflects:

1) *The efficient costs of achieving the capital expenditure objectives;*
2) *The costs that a prudent operator in the circumstances would require to achieve the capital expenditure objectives; and*
3) *A realistic expectation of the demand forecast and cost inputs required to achieve the capital expenditure objectives.*

2.1.3 Capital Expenditure Factors

In assessing and determining whether ElectraNet's forecast capital expenditure will reasonably meet the capital expenditure objectives and the capital expenditure criteria, SKM has had regard to the following capital expenditure factors as described in section 6A.6.7:

1) *the information included in or accompanying the Revenue Proposal;*
2) *submissions received in the course of consulting on the Revenue Proposal;*
3) *such analysis as is undertaken by or for the AER and is published prior to or as part of the draft decision of the AER on the Revenue Proposal under rule 6A.12 or the final decision of the AER on the Revenue Proposal under rule 6A.13 (as the case may be);*

4) *benchmark capital expenditure that would be incurred by an efficient Transmission Network Service Provider over the regulatory control period;*

5) *the actual and expected capital expenditure of the Transmission Network Service Provider during any preceding regulatory control periods;*

6) *the relative prices of operating and capital inputs;*

7) *the substitution possibilities between operating and capital expenditure;*

8) *whether the total labour costs included in the capital and operating expenditure forecasts for the regulatory control period are consistent with the incentives provided by the applicable service target performance incentive scheme in respect of the regulatory control period;*

9) *the extent to which the forecast of required capital expenditure of the Transmission Network Service Provider is referable to arrangements with a person other than the provider that, in the opinion of the AER, do not reflect arm's length terms; and*

10) *whether the forecast of required capital expenditure includes amounts relating to a project that should more appropriately be included as a contingent project under clause 6A.8.1(b).*

2.1.4 Regulatory Test

The regulatory test is an economic cost-benefit test used by transmission and distribution businesses in the NEM to assess the efficiency of network investment. New large network investments (i.e. those in excess of $10 million capital expenditure) are required to have the regulatory test applied to them.

The capital expenditure factors extracted from clause 6A.6.7 of the NER and listed in section 2.1.3 above do not refer to the regulatory test and there is no requirement that a project must have passed the regulatory test to be included in the capital expenditure forecast. However, clause 6A.6.7(b)(4)(ii) states that the revenue proposal must identify any forecast capital expenditure that is for an option that has satisfied the regulatory test.

The Regulatory Test has evolved over the years, with the most recent version being a proposed regulatory test in the AER document "Proposed Regulatory Test version 3 & Application Guidelines Explanatory Statement July 2007". Where an application of the Regulatory Test is required SKM has assessed it against the version in force at the time, or the likelihood of meeting the requirements of the most recent version for future capex projects where the Regulatory Test has not yet been conducted.

Where ElectraNet had already undertaken a regulatory test process prior to lodging its revenue proposal (particularly with respect to past capex) the applicable regulatory test for assessment purposes is the Regulatory Test versions 1 (issued 1999) or 2 (issued August 2004). In the AER's draft decision relating to the proposed regulatory test (version 3) issued in July 2007, there are transitional provisions which govern the transition between version 2 and version 3. The transitional provisions state that version 2 will be the applicable regulatory test where a TNSP has published an application notice under clause 5.5.5(b) of the NER, prior to the promulgation of version 3 of the regulatory test. Version 3 of the regulatory will apply from the date of its promulgation. Promulgation will be when the AER issues its final decision. The AER expects this will be sometime in late November, early December 2007.

2.2 Prudency Test

The Prudency Test was first published in the *Draft Statement of Principles for the Regulation of Transmission Revenues* ("Draft Regulatory Principles" or DRP) published in May 1999 by the ACCC. These regulatory principles were finalised in December 2004 when the *Statement of principles for the regulation of electricity transmission revenues* decision (the "Statement of Regulatory Principles" or SRP) was promulgated by the ACCC. In August 2005, the AER released a compendium of regulatory guidelines which was largely based on approaches developed by the ACCC. The compendium included the Statement of Regulatory Principles or SRP.

ElectraNet's current revenue cap decision was made under the DRP. The regulatory arrangements under the DRP provided for an ex post assessment of capex, undertaken during the regulatory period, at the next revenue reset. The ex post assessment requires a Prudency Test to be applied to determine actual prudent capex to be rolled into the regulatory asset base at the end of the regulatory period. The SRP provides details of the prudency test which is based on a three stage process: (*§B.3-4)*

> *First, assess whether there is a **justifiable need for the investment**. This stage examines whether the TNSP correctly assessed the need for investment against its **statutory and Code obligations**. At this stage, the assessment focuses on the need for investment, without specifically focussing on what the 'correct' investment to meet that need should be. An affirmation of the need for an investment does not imply acceptance of the specific project that was developed.*
>
> *Second, assuming the need for an investment is recognised, assess whether the TNSP proposed **the most efficient investment to meet that need**. The content of the assessment here is whether the TNSP **objectively and competently analysed the investment** to a standard that is **consistent with 'good industry practice'.***

Third, assess whether ***the project that was analysed to be the most efficient was indeed developed, and if not, whether the difference reflects decisions that are consistent with 'good industry practice'****. The analysis in this third step examines in detail the factors that caused changes in the project design and/or delivery and assesses* ***how the TNSP responded to those factors in comparison to what could be expected of a prudent operator.***

The ACCC will ***apply the prudency test to 'non-augmentation' and 'support the business' investment*** *by reviewing the processes conducted by the TNSP in assessing the need for investment, selecting the appropriate project and then delivering that project.*

Note – emphasis added by SKM

2.3 Regulatory framework for assessing operating expenditure

2.3.1 Operating Expenditure Objectives

The operating expenditure objectives that ElectraNet is attempting to meet through its forecast operating expenditure are to:

1) *Meet the expected demand for prescribed transmission services over that period;*
2) *Comply with all applicable regulatory obligations associated with the provision of prescribed transmission services;*
3) *Maintain the quality, reliability and security of supply of prescribed transmission services; and*
4) *Maintain the reliability, safety and security of the transmission system through the supply of prescribed transmission services.*

2.3.2 Operating Expenditure Criteria

SKM's review of the future operating expenditure forecast addresses the requirement of the AER to accept the forecast of required operating expenditure if it is satisfied that the total of the forecast operating expenditure reasonably reflects:

1) *The efficient costs of achieving the operating expenditure objectives;*
2) *The costs that a prudent operator in the circumstances would require to achieve the operating expenditure objectives; and*
3) *A realistic expectation of the demand forecast and cost inputs required to achieve the operating expenditure objectives.*

2.3.3 Operating Expenditure Factors

In assessing and determining whether ElectraNet's forecast operating expenditure will reasonably meet the operating expenditure objectives and the operating expenditure criteria, SKM has considered the following operating expenditure factors as described in section 6A.6.7:

1) *the information included in or accompanying the Revenue Proposal;*
2) *submissions received in the course of consulting on the Revenue Proposal;*
3) *such analysis as is undertaken by or for the AER and is published prior to or as part of the draft decision of the AER on the Revenue Proposal under rule 6A.12 or the final decision of the AER on the Revenue Proposal under rule 6A.13 (as the case may be);*
4) *benchmark operating expenditure that would be incurred by an efficient Transmission Network Service Provider over the regulatory control period;*
5) *the actual and expected operating expenditure of the Transmission Network Service Provider during any preceding regulatory control periods;*
6) *the relative prices of operating and capital inputs;*
7) *the substitution possibilities between operating and capital expenditure;*
8) *whether the total labour costs included in the capital and operating expenditure forecasts for the regulatory control period are consistent with the incentives provided by the applicable service target performance incentive scheme in respect of the regulatory control period;*
9) *the extent to which the forecast of required operating expenditure of the Transmission Network Service Provider is referable to arrangements with a person other than the provider that, in the opinion of the AER, do not reflect arm's length terms; and*
10) *whether the forecast of required operating expenditure includes amounts relating to a project that should more appropriately be included as a contingent project under clause 6A.8.1(b).*

2.4 Service Target Performance Incentive Scheme (STPIS)

The general principles governing the regulation of a Transmission Network Service Provider (TNSP) are defined in Chapter 6A of the National Electricity Rules (the Rules).

Clause 6A.7.4 of the Rules, requires the AER to develop and publish a service target performance incentive scheme. This scheme establishes a framework of performance standards by which the performance of a TNSP is able to be assessed. The Rules require that any service standards scheme developed provides the TNSPs with incentives to increase the reliability of their transmission systems.

Clause 6A. 4.2 of the Rules states that a revenue determination for a TNSP is required to include

> *"the values that are to be attributed to the performance incentive scheme parameters for the purposes of the application to the provider of any service target performance incentive scheme that applies in respect of the regulatory control period."*

2.4.1 Role of the STPIS

In January 2007, the AER published its "*First Proposed Electricity Transmission Network Service Providers Service Target Performance Incentive Scheme"*, which, consistent with the requirements of clause 6A.7.4 of the National Electricity Rules (NER), set out the AER's proposed framework for their Service Target Performance Incentive Scheme (STPIS). The AER's First Proposed STPIS prescribes the parameters, being the suite of measures each TNSPs performance is gauged against, and the amount of revenue at risk for achieving, to varying degrees, or not achieving the set targets within these parameters.

In August 2007, the AER published the "*Final Electricity Transmission Network Service Providers Service Target Performance Incentive Scheme*". However under clause 11.6.17 (a) of the Rules, this version does not apply to ElectraNet for its next regulatory control period. This transitional provision recognises that the AER had not published a final scheme before ElectraNet was due to submit its revenue proposal..

Clause 1.3(a) of the first proposed scheme states that it:

(1) defines the performance incentive scheme parameters which specify how a transmission network service provider's (TNSP) network reliability is measured;

(2) sets out the requirements with which the values to be attributed to the parameters must comply;

(3) will be used by the AER to decide the service standards financial reward or penalty component of a transmission determination; and

(4) provides guidance about the approach the AER will take in reviewing a TNSP's service standards performance and explain how this will affect a TNSP's maximum allowed revenue.

The STPIS was developed by reviewing the AER's previous s*ervice standards guidelines* (which were included in the "*Compendium of Electricity Regulatory Guidelines*") and making amendments to allow for the changes to the NER.

2.4.2 Objectives of the STPIS

In its STPIS, the AER outlines the underlying ideology of the scheme, through a statement of the scheme's objectives. In Section 1.4 of the AER's STPIS, the objectives of the scheme are defined as:

(a) Contribute to the achievement of the national electricity market objective;

(b) Are consistent with the principles in clause 6A.7.4(b) of the NER;

(c) Promote transparency in:

  (1) the information provided by a TNSP to the AER and

  (2) the decisions made by the AER;

(d) Assist in the setting of efficient capital and operating expenditure allowances in its transmission determinations by balancing the incentive to reduce actual expenditure with the need to maintain and improve reliability for customers.

The principles in clause 6A.7.4(b) of the NER are:

(1) provide incentives for each Transmission Network Service Provider to:

  (i) provide greater reliability of the transmission system that is owned, controlled or operated by it at all times when Transmission Network Users place greatest value on the reliability of the transmission system; and

  (ii) improve and maintain the reliability of those elements of the transmission system that are most important to determining spot prices;

(2) result in a potential adjustment to the revenue that the Transmission Network Service Provider may earn, from the provision of prescribed transmission services, in each regulatory year in respect of which the service target performance incentive scheme applies;

(3) ensure that the maximum revenue increment or decrement as a result of the operation of the service target performance incentive scheme will fall within a range that is between 1% and 5% of the maximum allowed revenue for the relevant regulatory year;

(4) take into account the regulatory obligations with which Transmission Network Service Providers must comply;

(5) take into account any other incentives provided for in the Rules that Transmission Network Service Providers have to minimise capital or operating expenditure; and

(6) take into account the age and ratings of the assets comprising the relevant transmission system.

3. Capital Governance

3.1 Capital Governance Process

ElectraNet's project management methodology follows projects through five stages of the process. The stages are:

1) Concept

2) Scope Definition

3) Delivery Planning

4) Delivery

5) Finalisation

This process is based around common definitions of project stages, and is considered to be in accordance with good industry practice.

Good capital governance is provided by various means within this project management and delivery framework. It includes elements such as ensuring projects are adequately justified, viable alternatives are considered, costs are managed, and through close-out reports and approvals gateways at each project stage.

The project governance process is supported by a number of strategic and asset management plans that provide a framework around initiating and prioritising projects. These include:

- Network 2025 Vision
- Regional Development Plans
- Asset Management Plan
- Critical Infrastructure Policy
- IS&T Strategic Plan
- Facilities Management Plan
- Strategic Land and Easements Acquisition Plan

ElectraNet has implemented a number of changes to its governance framework over the current regulatory period. These are discussed below.

3.1.1 Governance during the current regulatory period

At the start of the current regulatory period, ElectraNet's governance framework was largely paper based, with limited documentation and procedures. The processes were largely developed in 2000 and while the generally accepted elements of good governance were present, the overall system was relatively unsophisticated and had limited embodied controls.

Project initiation, concept and scoping phases were carried out by "resource managers" within the functional units (such as network planning), and were then passed over to a project manager for the delivery planning, execution and close-out phases. ElectraNet indicated they felt a shortcoming of this approach was a lack of continuity, as the project manager did not have the background or history of the project, but assumed responsibility just as it was entering the critical planning and delivery phases.

Cost estimating was conducted using processes and costs developed internally, and these early estimates have proven to be inaccurate in some instances. In its application ElectraNet notes a sample of projects exceeded their initial cost estimates by an average of 22%, due in part to poor cost estimates and scope definition.

Early in the process projects tended to be approved in stages, with early approvals for development and scoping, followed by detailed design and preliminaries, with the final project costs only approved late in the process. This made it difficult in some cases to identify the amount of the initial cost estimate and whether there were any over-runs, as the total project approval generally occurred later in the process. Approvals now cover the complete project budget, though with staged release of funds for various stages depending on milestone approvals.

Controls over some elements of projects and project costs did not always enforce a high level of discipline. For example, project contingency allowances were included within the project budgets and could be authorised by the project manager, which was found to have occurred on a number of projects. This may be partly due to the initial cost estimates being low, meaning the "base" budget was insufficient to deliver the project and the contingency allowance was required. While SKM generally found final delivered costs for projects to be reasonable, in some cases this was above the original project estimate amount, requiring additional approvals or expenditure of project contingency allowances.

Typical industry procurement processes were followed for projects, with a panel of 4 contractors bidding on each project. The projects SKM reviewed found evidence that appropriate tendering and selection processes were followed. While this arrangement provided market discipline around project costs, in practice ElectraNet found the relatively small size of the South Australian market was insufficient to support four contractors. With only a 1 in 4 chance of success on a given project, the uncertainty meant the contractors were unable to plan ahead and manage their

resources to match ElectraNet's program requirements, with delays and lack of staff continuity resulting. ElectraNet has recently moved to a dual contractor model for construction, using a tender process to select two contractors, thereby providing enhanced certainty and volume to support a strong commitment to resourcing future projects in a tight labour market.

Overall, SKM considers the overall governance process was adequate for a modest (<$50 million pa) annual capital program. The basic elements of good governance were present, but documentation, procedures and controls were not as comprehensive as in some larger utilities. From the projects reviewed there is evidence that the process was generally followed, with key documents and approvals in place for each of the projects reviewed.

SKM found ElectraNet had sought to improve its governance processes and procedures, as well as the way it implemented and managed projects, during the course of the current regulatory period. There is evidence it has learned from problems on some early projects (such as planning delays) and sought to improve its processes to ensure these issues are addressed (by commencing planning sooner, engaging in more community consultation, and seeking appropriate approvals mechanisms).

As ElectraNet's capital program increased over the current period from around $35M to almost $150M annually, its governance and project management systems have been improved, and are now in line with good industry practice.

3.1.2 Current Governance Framework

During the current period, ElectraNet has instigated a number of changes to its project management and capital governance framework. These include:

- Organisational re-structure clarified roles and responsibilities (2004)
- Process changes and improved cost tracking implemented with SAP (2004)
- Condition assessments and revised Asset management plans (from 2004)
- Major revisions, detailed procedures and standard documents developed (2005)
- Governance and project management processes applied to all (including non-network) projects (2005)
- Online intranet navigation tools and project server system implemented (2006)
- Enhanced auditing and management reporting of all projects and project health (2006)

As a result of these changes, SKM considers the governance processes are improved and more appropriate to the larger capex program, and approaching best practice. A project manager is appointed in Phase 1 that has carriage of the project until completion, ensuring continuity and avoiding problems of split accountability. Within each phase there are a between 6 and 17 discreet

steps, described by a flowchart methodology. Forms and policies are well documented for each of these steps.

ElectraNet has implemented a new cost estimating system developed by Powerlink that SKM considers to be sophisticated and robust. Cost estimates reviewed by SKM were found to be in line with our expected costs, and should resolve the earlier issues regarding accuracy and reliability of cost estimates.

Controls and approvals mechanisms have been tightened. For example, project managers are only able to authorise 5% of the project contingency, with staged approvals up to CEO level required before the full amount can be expended. Rigorous change control and approvals processes are in place to manage any scope or cost changes.

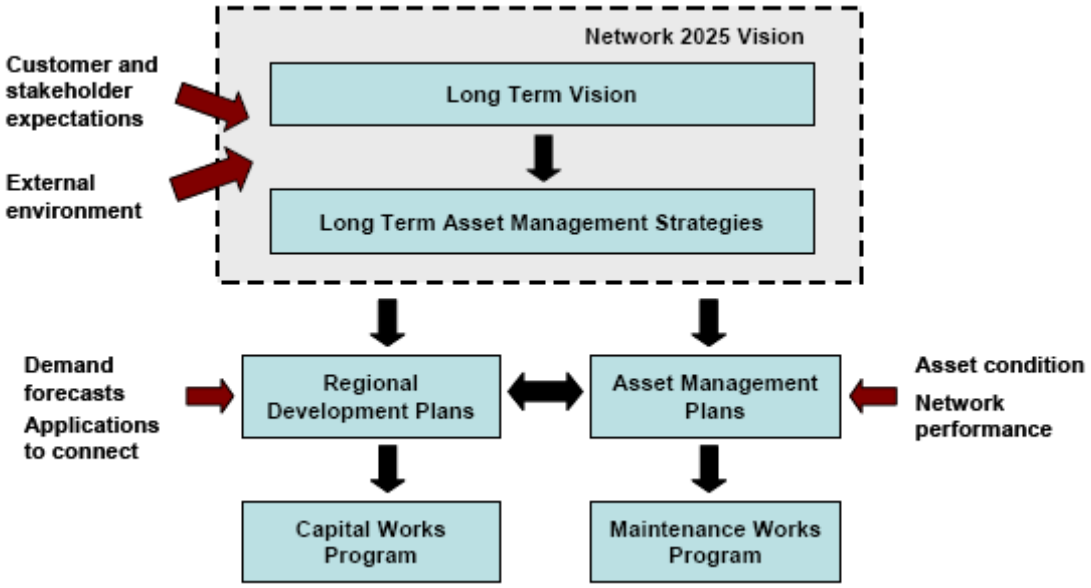
ElectraNet has recently moved to a two contractor model for the bulk of its construction work, giving certainty to the contractors to enable improved resource planning. The contractors were selected through a competitive tender process, with individual projects being run on an "open book" basis with agreed profit sharing arrangements in place. While this arrangement is relatively new, it appears to be delivering good results, though there is insufficient experience to make a definitive judgement. ElectraNet is confident this model will enable them to deliver a significantly increased capital program.

ElectraNet's asset management strategies and plans were basic but adequate at the start of the period, but have been significantly developed during the current regulatory period, and are considered to be in line with good industry practice. Detailed condition assessment of all plant has provided a robust means to assess equipment and system risks, and allocate project priorities accordingly. In light of this improved information on asset condition, ElectraNet has revised its asset management plans, triggering the increased maintenance effort evident from around the middle of the current period. The engineering, risk and economic analysis is robust and sophisticated, and supports good decision making and efficient outcomes.

In undertaking its project reviews, SKM found evidence the governance process was being used and followed, with each of the required reports and forms evident and authorised in accordance with the policies. Detailed monthly management reports are prepared for all active projects, outlining project health, progress, and any non-conformances.

3.1.3 Asset management

ElectraNet has invested significant effort in improving its asset management systems during the current regulatory period. The current framework is described below:



Source: ElectraNet revenue application 2007

ElectraNet's asset management approach is based around a number of interconnected elements:

- Network 2025 Vision – providing long term strategic guidance in the overall direction and approach to asset management, driven by high level customer, regulatory and environmental considerations.
- Regional development plans – reflecting the outcomes of optimised planning on a regional basis, driven externally by customer demand and connections, and internally by the Network 2025 strategy and characteristics of the existing network
- Asset management plans – using condition and performance information to drive asset management and maintenance programs, considering the constraints and opportunities provided by network development.

The outcome of this framework is the capital and maintenance programs. SKM has reviewed the documents and processes underpinning their development, and considers ElectraNet's overall asset management approach to be sophisticated and in line with good industry practice.

In reviewing the capital and operating budgets SKM found evidence of these programs being linked back to the regional development and asset management plans (for example, replacement projects were undertaken based on risk assessments in the asset management plan).

3.1.4 Governance conclusions

While there is limited experience with implementation of projects under the latest governance arrangements, SKM considers them to be well developed and is confident they will result in appropriately initiated projects and disciplined implementation.

Some areas where SKM has concerns or considers there is potential for improvement are:

- Procedures related to some critical governance areas are not as detailed and prescriptive as they could be. For example, detailed requirements for consideration of alternative project options, who should be involved in formulating and assessing these etc are limited.
- Separation between "governance" and "delivery" may be warranted to reduce the possibility of conflicts of interest. For example, a project manager who will be held accountable for delivery may not be motivated to drive down cost estimates at approval stage. Likewise the approving "project sponsor" is accountable from inception to delivery. SKM recognises these governance separation issues need to be balanced against the project delivery benefits of continuity and project ownership.
- Consultants certifying designs are engaged by the consultants that have prepared the designs, which could give rise to potential conflicts of interest. There is no requirement that verifiers be "rotated" or for independent appointment by ElectraNet.
- SKM was not convinced that non-network alternatives including demand management and network support are always actively pursued. While "obvious" alternative solutions are considered, ElectraNet appears to rely on the consultation process to identify such alternatives, which is not necessarily guaranteed to discover all options. There is little evidence that the hierarchy of solutions shown in page 51 in ElectraNet's submission is rigorously followed. Notwithstanding, SKM is generally satisfied that likely and reasonable options are considered, and that optimal projects are selected.

ElectraNet has invested substantial effort in developing its project management and capital governance arrangements over the current regulatory period. The intranet based system is at an advanced stage of development, and represents a significant improvement on previous practices. There is evidence it is being actively used, audited, and continuously improved.

ElectraNet's asset management approach has likewise undergone substantial development in recent years, and is now considered to be in line with good industry practice. There is evidence of consistency and integration of policies, procedures and systems (including SAP and Project Server) that SKM considers provides a solid framework for good management and informed decision making.

Overall SKM considers ElectraNet governance framework is in line with good industry practice, though its effectiveness should be reviewed after it has had more time to bed down and demonstrate its effectiveness in practice.

3.2 Demand Forecast

ElectraNet's demand forecasts are based on connection point (or bulk supply point) demand forecasts provided by ETSA Utilities and direct connection customers (DCC). ETSA Utilities provides 10 year medium, low and high growth scenario forecasts for each connection point which form the basis of ElectraNet's demand forecasts.

In order to calculate transmission backbone loadings, information on generator and other injections is required. ElectraNet has been assisted by ROAM consulting in the development of generation forecasts using a scenario based approach to take into account different assumptions regarding load growth, electricity imports to SA, and future greenhouse gas constraints on the generation sector.

This section reviews the ensuing demand forecasts and its application by ElectraNet in determining its forecast network capital projects over the regulatory period 1 July 2008 to 30 June 2013.

3.2.1 ETSA Utilities Connection Point Forecast

As in previous years, ETSA Utilities has provided to ElectraNet its peak demand forecast at each of its connection points (bulk supply points) to the ElectraNet transmission network. ETSA Utilities provides three forecasts at each of its supply points, a medium, low case and high case forecast. These can be generally characterised as being related to medium or base case, high and low case economic growth trends. ETSA Utilities currently do not provide probabilistic (eg 10% POE, 50% POE) forecasts, and hence the forecasts are based on actual recorded peak demands.

Demand is heavily temperature dependent and summer peak demand generally occurs after a few days of high temperatures. The 2007 peak did not exceed the 2006 peak due to the hottest days in 2007 happening to fall on weekends or holidays, and hence the 2007 ETSA Utilities forecasts are largely based on 2006 peaks.

The load forecast for each connection point is adjusted for embedded generation and load curtailment. Known output of generators including wind farms operating at the time of actual peak load is added to the recorded demand, as is known curtailed load[2]. This is done on the premise that embedded generator output and curtailed load cannot be assumed to be relied upon as secure capacity at the time of future peak demand. SKM considers this a reasonable assumption for planning purposes at individual connection points, where diversity between generators is low.

[2] Being the difference between the measured load that a large industrial customer normally exhibits at a time of summer peak and that measured at the 2006 peak.

SKM considers the ETSA Utilities connection point demand forecasts used by ElectraNet are developed using good industry practice. Corrections for embedded generation and load curtailment activities can be considered to be pragmatically conservative.

The contracted demand provisions in the TUOS tariffs used by ElectraNet provide financial incentives to ETSA Utilities and DCCs to accurately forecast demand.

3.2.2 ElectraNet system load forecast

In developing transmission system wide transmission exit point low, base case and high case peak demand forecasts, ElectraNet applies the following treatment to the ETSA Utilities connection point forecasts:

- connection point forecasts are reduced by applying a diversity factor of 4% to take account of diversity in the timing of peak demand at different connection points;
- all diversified connection point demand forecasts are summated;
- DCC loads are added and known committed growth in DCC load is included according to timing[3].

In developing a system wide load forecast ElectraNet makes no allowance for contribution made by existing or planned wind farms connected to the transmission system. This is at variance with the approach adopted by ESIPC that a firm capacity equivalent to 8 % of the wind farm generation capacity could be reasonably assumed when determining system wide forecasts, based on assumed diversity between windfarms meaning it is highly unlikely they will all be becalmed at the same time.

ElectraNet's approach is considered reasonable for transmission planning purposes, where connection point loads, and line flows between connection points, are more likely to experience coincident calm conditions at relevant windfarms due to reduced diversity in a local region (as compared to the whole of SA that ESIPC considers in its system wide forecasts for generation planning purposes).

3.2.3 Reconciliation of Connection Point Forecast with ESIPC forecasts

Since high temperature actual peak demands are used to underpin the ETSA Utilities connection point forecasts, they can be considered to be analogous to the 10% POE system wide forecasts produced by NEMMCO for low, medium and high case economic growth scenarios.

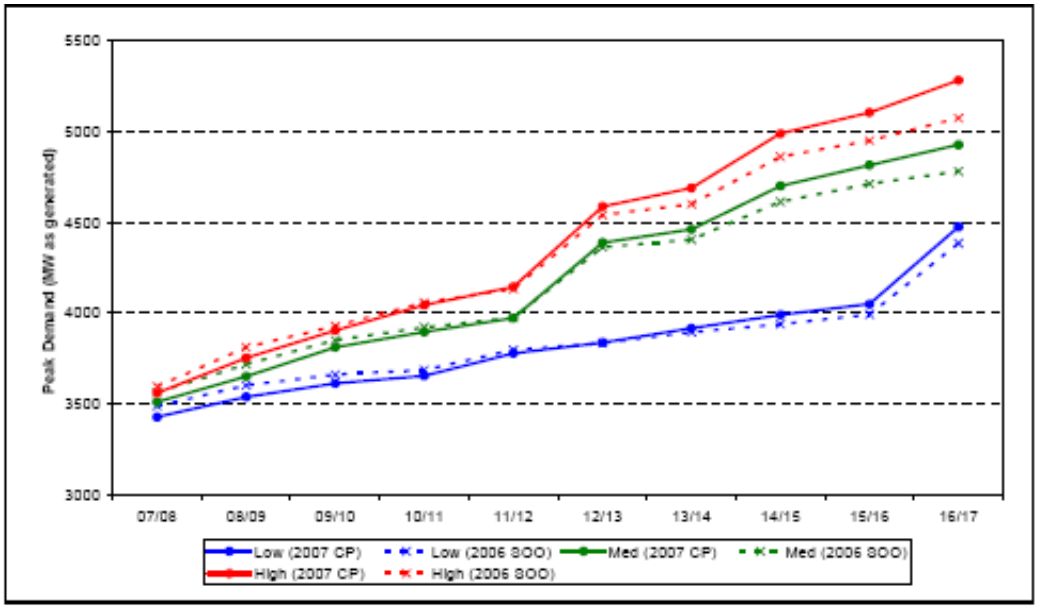
[3] Expected loads associated with the Olympic Dam and Prominent Hill mine projects were factored into the load growth scenarios.

To compare the system wide forecast developed by ElectraNet with the respected NEMMCO SOO forecasts, ESIPC has made a number of adjustments to each forecast to ensure they are on a common base with regards to treatment of embedded generation, load curtailment and losses.

The comparison undertaken by ESIPC between base case 10 % PoE forecasts and aggregate diversified connection point forecasts shows a high degree of consistency in the near term, with a difference of approximately 100 MW (2.5 %) during the latter part of the forecast horizon. And significantly less than this at the latter part of the regulatory period.

This reconciliation provides further confidence in the connection point forecasts used as the primary input to planning studies by ElectraNet. Overall SKM considers the load forecasts provided by ETSA Utilities and used by ElectraNet to have been developed in accordance with good industry practice, and reasonable for the purposes of transmission planning studies.

- **Figure 2 Comparison of Connection Point and SOO Forecasts**



Source: Appendix C ElectraNet Revenue Proposal

3.2.4 Generation Scenario Forecast

In developing its network augmentation plan, ElectraNet has engaged ROAM Consulting to conduct an assessment of potential generation and load developments for South Australia through the application of a 'probabilistic scenario analysis methodology'.

The analysis yielded eighteen plausible market development scenarios which ElectraNet used to model the transmission network and identify the need for load driven reliability augmentations and

distribution connection reinforcements. ElectraNet also used the predicated location of future generation to meet demand developed under the analysis for the purposes of modelling future network load flow limitations (i.e. constraints).

Different suites of projects and required timing under these 18 scenarios were weighted according to the assessed probability for each scenario to develop ElectraNet's probability weighted capital proposal under it's ex-ante cap.

The eighteen scenarios are based on eight different 'themes' as depicted in Table 13 below.

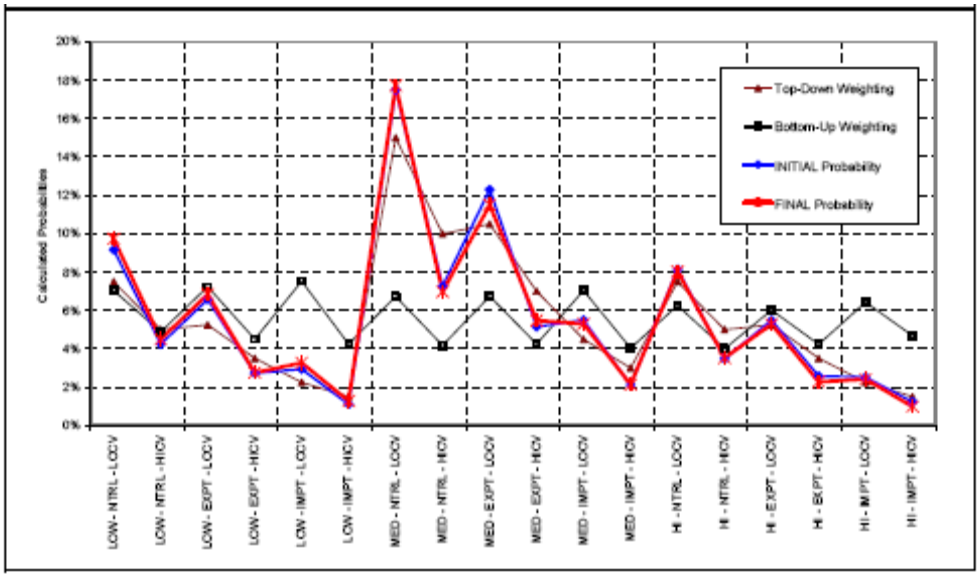
Table 13 Market Development Scenarios

Load Growth Theme		Inter-regional Trade Theme		Carbon Value Theme	
Low	Low load growth, with addition of occasional industrial loads and delayed expansion of Olympic Dam	Neutral	'As is' inter-regional trading	Low	'As is' carbon values/abatement schemes
Medium	Moderate load growth, with addition of further industrial loads (over low case), and forecast timing for expansion of Olympic Dam.	Export	Significantly higher average power export from SA	High	Significantly increased carbon value and roll out of carbon abatement schemes.
High	High load growth, with addition of further industrial loads (over medium case), and forecast timing for Olympic Dam	Import	Significantly higher average power import to SA		

ROAM has applied a percentage probability to each of these themes based on subjective analysis of current and future market conditions.

The relative likelihood of each of these 18 discrete development scenarios or development paths was assessed using a 'top down' theme based approach and a 'bottom up' individual project based approach and then a combination of both approaches to develop the final relative likelihood of each scenario occurring.

- **Figure 3 Final Scenario Probabilities**



The most likely scenario at approximately 18% probability has been classed as a 'business as usual' case, i.e. medium growth, neutral import/export movement, low carbon value. The next most probable at approximately 12 % is the medium growth, higher export and low carbon value scenario.

Using these scenarios and determining the required levels of generation for each, ROAM determined the likely future generation projects (predominantly) from known existing, proposed or planned generator developments.

Under all load growth scenarios, significant additional generation or interconnection capacity is required in the later years of the regulatory period (ranging from 152 MW in 2007-8 to 1,022 MW in 2012-13) over the current and committed generation capacity in South Australia. A significant proportion of likely generation in SA is predicted to be wind based generation, resulting in the need for supplementary thermal generation projects based or rapid response open cycle gas turbine plant.

SKM considers the methodology used in the development of the scenarios to be robust. SKM also shares the concerns expressed by ESIPC in its public submission that the selection of a probability of a particular theme and scenario is purely subjective, but considers this approach represents an improvement over traditional "single scenario" forecasts.

3.2.5 Application of Scenario Forecast

ElectraNet has used the scenario analysis as key inputs to its capital expenditure forecasting methodology, specifically in respect of:

- the location of future generation to meet demand growth for the purpose of modelling future network limitations; and
- use of the eighteen scenarios to model the transmission network and identify the need for load driven reliability augmentations and distribution connection reinforcements.

ElectraNet states in its Annual Planning Review that both connection point reinforcements and network augmentation projects are primarily driven by increasing connection point demand and that ElectraNet has relied on the connection point demand forecasts provided by ETSA Utilities in determining these augmentation projects.

Given this outcome the value of the probabilistic scenario analysis has been questioned. SKM considers this scenario analysis does have value and merit, and the similarity of the results in this instance is largely driven by current unique circumstances in SA. Firstly, the ETC changes put time constrained connection project requirements on ElectraNet that are driving a large proportion of its capex, and are by definition independent of load or generation outcomes. Secondly, as there are currently few major constraints on the backbone network at this time, no major new line developments are proposed which would be sensitive to generation development scenarios. Accordingly, given the current needs of the SA network, there are no major projects driven by generation developments or backbone constraints, and the capital requirements under each of the scenarios are very similar.

Given the above and the fact that ElectraNet has removed from its revenue proposal any projects which are uncertain, it is perhaps unsurprising that the capital expenditure forecast is 'largely independent' of the eighteen scenarios considered. Nevertheless SKM considers the analysis and results to be credible and reasonable as an input to the capital planning process.

3.2.6 Load forecast conclusions

On the whole, the demand forecast used to derive the connection point and network augmentation projects is robust and in keeping with good industry practice. Assumptions used by ETSA Utilities and ElectraNet are considered to be reasonable and appropriate (modestly conservative) for the purpose of planning a high reliability network. The use of scenario analysis in the development of the capital expenditure program is of little consequence in this instance as it appears that the majority of the program is driven by local connection point demands and ETC changes.

3.3 SA Electricity Transmission Code (ETC)

ElectraNet operates under both the National Electricity Rules (NER) and the South Australian Electricity Transmission Code (ETC). SKM formed a view that ElectraNet has a thorough understanding of the regulatory framework and the requirements this imposes on it as a TNSP. Recent amendments to the ETC have changed the security of supply criteria at a number of connection points requiring additional redundancy, driving a significant portion of the capex proposed by ElectraNet in the coming regulatory period, most notably the Adelaide CBD upgrade project which will cost some $138M alone.

SKM has been provided with an overview of the process and criteria by which ESCOSA developed the new ETC requirements in conjunction with ESIPC. While SKM has not reviewed the detailed workings and economic justification behind the ETC changes, the description provided by ESIPC of the process and the economic and technical justification criteria used to develop the new ETC requirements led SKM to the conclusion that the changes are reasonable and founded in good engineering and economic practice and analysis.

In some aspects the changes to the ETC can be regarded as bringing SA in line with other states in terms of transmission security, and SKM does not consider the proposed security arrangements it has reviewed to be excessive or notably in excess of industry practice.

4. Ex-Post Assessment of Historical Capex

ElectraNet's proposal includes capital projects implemented during the current regulatory period of $389.8M, or around 1% higher than the allowance for capex at the previous determination. In addition, $44.4M of "work in progress" is proposed to be capitalised at the end of the current period.

This is shown in the table below.

- **Table 14 ElectraNet Historical Capex spend compared to ACCC allowance**

	Jan-Jun 2003	2003-04	2004-05	2005-06	2006-07	2007-08	Total
ACCC allowance ($2002-03)	9.7	68.2	87.8	78.6	68.6	45.4	**358.3**
ACCC allowance (CPI escalated)	9.7	70.5	92.6	84.4	76.2	52.0	**385.9**
ElectraNet Actual / forecast capitalisation	2.1	34.9	42.8	65.5	98.0	146.5	**389.8**
Work in progress (WIP) to be capitalised						44.4	**44.4**
Total							**434.2**
Variation from allowance (excluding WIP)	(7.6)	(35.6)	(49.8)	(19.3)	21.7	94.4	**3.9**
Variation (%)	(78%)	(50%)	(54%)	(23%)	28%	181%	**1%**

SKM notes the actual profile of capital expenditure is heavily weighted towards the end of the current period. This in part reflects approval delays experienced in some projects early in the period, and the enhanced project management processes implemented during the period. The benefits of the improved capital governance and project management processes implemented by ElectraNet during the period are apparent in the increased capacity to deliver projects in the latter part of the current regulatory period. The incentive mechanisms in the regulatory framework provide an incentive to defer expenditure and this is one possible interpretation of the profile of expenditure shown above, however SKM has not found evidence of this in the projects it has reviewed.

SKM's review of the past capital expenditure (ex-post) projects involved reviewing a selection of ElectraNet's capital projects from the current regulatory period. ElectraNet's previous determination was made under the Draft Regulatory Principles (DRP) released in 1999. The DRP provided for a prudency test to be applied to past capex at the next review, with further guidance on the prudency test being provided by the Statement of Regulatory Principles (SRP) released in 2004. SKM has assessed the prudency of Historical Capex against the requirements of the DRP and SRP.

A cost benchmarking exercise was also undertaken where appropriate to determine the validity of ElectraNet's project scope and final project cost. Causes for any variance between initial approved project cost and final cost were investigated.

The ex-post projects reviewed as part of ElectraNet's Revenue Proposal review were jointly selected by the AER and SKM, and advised to ElectraNet. ElectraNet responded to this advice and provided the review team with project packs containing relevant project information.

4.1 Projects reviewed

SKM reviewed a selection of 10 ex-post projects in detail. The projects reviewed included both network and non-network projects, and projects that were both reported as being completed within budget and those that appeared to have substantial cost over run or scope change. Projects were also selected that were completed at various times during the regulatory cycle. All projects to be reviewed were agreed upon in advance with the AER. SKM's overall observations are detailed below. A detailed analysis of each of the projects reviewed can be found in the Appendices contained at the end of this report.

The ex-post projects shown in Table 15 below for detailed review were jointly selected by the AER and SKM, and advised to ElectraNet.

Table 15 Ex-Post Capex Projects Reviewed by SKM

Project ID	Project Description	Project Category	Project Final Cost
10337	Tungkillo Substation Stage 1	Reliability Augmentation	$28.275m
10396	Para – Mobilong Line Uprate	Refurbishment	$14.577m
10428	Whyalla – Yadnarie Line Monitoring	Reliability Augmentation	$0.705m
10453	Davenport – Brinkworth – Para line uprate	Refurbishment	$4.54m
10459	General Building Upgrade	Facilities Project	$0.154m
10694	Substation and Telecommunications Spares	Inventory / Spares	$7.783m
85013	Magill Aged Asset Replacement	Reliability Augmentation	$15.089m
10384	Bungama Substation Redevelopment Stage 1	Reliability Augmentation	$4.214m
85035	South East – Snuggery 132kV Line	Reliability Augmentation	$35.43m
10418	Project Streamline	Information Technology	$4.302m

Together these projects account for $115M or 29.5% of ElectraNet's total historical capex, and is considered by SKM to be a sufficiently large and varied sample to form a reasonable view of the prudency and efficiency of ElectraNet's historical capex.

4.2 Findings of project reviews

The overall findings of SKM's project reviews are outlined in the following sections. Detailed descriptions of the individual project reviews are contained in Appendix A.

4.2.1 Project Scope

In general, SKM observed that the projects reviewed were prudently scoped to meet the network or other requirements of the defined planning horizon for ElectraNet. We found a number of instances where, through the consultation phase or in direct communication with ESIPC or other interested parties, alternate project scopes were suggested to ElectraNet. On each of these occasions SKM formed the view that ElectraNet gave due consideration to the suggested alternatives, and selected the optimum project scope for development. In some cases, that resulted in implementing a project of lesser scope than was suggested by the interested party (including the ESIPC), but represented in SKM's view a more efficient investment decision.

Based on the projects reviewed and observations of ElectraNet's planning and governance processes, SKM has formed the view that ElectraNet has undertaken a reasonable review of project scopes and options, and selected the most efficient project for implementation, in accordance with good industry practice and in line with what would be expected from an efficient network operator.

4.2.2 Project Governance

In the first year or two of the current regulatory period SKM considers ElectraNet's governance and project management processes were relatively unsophisticated, and adequate for the modest capital program at this time.

SKM notes that during the present regulatory period, ElectraNet addressed project management and governance resulting in a system with greater rigor that is now in line with good industry practice and suitable for the larger capital program in recent years and going forward. The new regime is more consistent with a quality system and contains appropriate controls, checks, accountability, reviews and approval gateways.

4.2.3 Efficiency Gains

SKM noted that ElectraNet was actively seeking efficiency opportunities in both labour contracts and plant procurement. To this end, SKM understands that ElectraNet have successfully negotiated economic labour rates through the implementation of a collaborative dual contractor arrangement which will apply for the next several years. SKM also noted that ElectraNet took advantage of efficient plant purchases obtained by Powerlink to source 2 large power transformers.

4.2.4 Project Variations

In reviewing projects that appeared to have substantial cost or time over run or scope change, SKM found no instances of systemic problems or issues. Generally, the cause for the variation in time were issues outside of ElectraNet's control such as delays in obtaining approvals. These delays were not as a result of deficiencies in the application process but resultant from individual or Council objections to the application.

It is common that the originally planned project scope will change during the course of a project, as issues such as site availability, detailed design considerations, line route planning and approvals, and additional information (such as new loads) act to constrain the options available for implementation. How these issues are managed, and whether the evolving scope continues to be efficient, can have a material effect on overall project outcomes. Where project scopes changed, SKM found that ElectraNet acted in accordance with good industry practice, and generally implemented a project SKM considers to be efficient given the constraints and uncertainty that existed at the time the project was being implemented.

SKM notes that ElectraNet has since adopted a revised community consultation process and sought to streamline approvals in order to minimise delays in future projects. The new ETC also requires ElectraNet to seek approval for new line routes in advance of the project being required, which should further minimise the risk of project delays.

4.2.5 Project Costs

4.2.5.1 Project Budget / Estimate

SKM noted that in many cases, the estimated cost of a project increased from the initially approved project budget. The causes for these increases included a change of scope, a project delay which caused the project to incur significant inflationary increases, and poor initial project estimate. In one instance ElectraNet was provided with an opportunity to purchase equipment at reduced costs and was able to modify its project to incorporate the specific items available.

SKM considers that ElectraNet's cost estimating systems at the beginning of the regulatory period were often inaccurate, with ElectraNet noting cost increases of up to 22% on some projects due in part to shortcomings in its cost estimates. While final delivered costs were considered to be reasonable, poor initial estimates create difficulties in project management as increases are identified and approved. Over the course of the current regulatory period, ElectraNet has adopted a number of systems from Powerlink, including a project cost estimating package. ElectraNet has now integrated this package into its project planning and governance process, and expects this will significantly improve the accuracy of its cost estimates.

SKM found that in all instances, ElectraNet appeared to appropriately notify its Board of the cause and quantum of the cost variation and seek approval of the cost variation. SKM also noted that early in the current period project expenditure was approved in stages, making it sometimes difficult to identify where project costs increased from the original estimate or approval.

SKM also noted that all projects reviewed contained a contingency allowance generally of between 5% and 10% of the total project projected cost, and in virtually all instances, this contingency allowance was expended, though there was no information provided for any of the projects reviewed what the contingency monies were expended on. SKM suggests there should be greater rigor on the expending of contingency monies. We also understand that this has been addressed in ElectraNet's revised project management governance systems that have since been implemented. Under these revised arrangements, there is a hierarchy of approvals for release of contingency amounts, with only 5% of the contingency amount under the control of the project manager, with senior management approval up to CEO level required to release the full contingency amount.

Based on the projects reviewed by SKM, there is only one project where SKM has not accepted ElectraNet's costs as reasonable. SKM recommends a ($34k) adjustment be made to the prudent capital expenditure for the Project 10459 General Building Upgrades project in 2004/05, as described in A.5. While this amount is negligible in the context of the overall capex budget, it is considered material for this particular project.

On the basis that only one small adjustment was recommended to the ten projects reviewed, and based on the views formed of ElectraNet's procurement, design, project management and implementation practices, SKM has found no evidence of systemic cost inefficiencies.

4.2.5.2 SKM Comparative Estimate

Where appropriate SKM has estimated the cost for the supplied project scope by the application of current costs contained in SKM's standard asset valuation building block database. In comparing the ElectraNet estimate or actual project costs with the SKM estimate, it is important to understand the fundamental differences between the two estimates.

The SKM estimates are based on a normalised cost to establish an asset based on greenfield conditions with a modern equivalent asset. Where the project was clearly a brownfield site, we have applied an averaged scaling factor to take this into consideration.

The SKM unit rates are normalised against short term fluctuations in market prices, and do take into account local or short term variations in equipment and labour rates. In some instances it appears short term constraints and contractor pricing power have increased project costs above what SKM would consider to be an ideal cost, and in these instances we have given weight to

ElectraNet's competitive procurement processes in being able to achieve the lowest possible market price under the prevailing conditions.

SKM generally agreed with the final delivered project costs determined by ElectraNet. Where significant cost variations were initially identified, ElectraNet provided detailed explanations supported by contractor quotations and other supporting documentation for the variations. SKM accepted these explanations as being valid.

Variations in cost were, in some instances early in the regulatory period, due to incorrect initial project estimates, or due to unexpected issues encountered on site. SKM noted that in each instant of a significant variation, ElectraNet kept senior management informed of the variation and sought additional approvals to cover same. SKM did not identify any significant project variations that could be attributed to ineffective or inappropriate practices within ElectraNet.

4.3 Differences between forecast and actual programs

SKM notes that while the overall capex spend in the current period is within 1% of the previous decision, there are considerable variations in the categories of expenditure, as shown in the table below.

Table 16 Comparison of allowed and actual historical capex by category

Category	ACCC Decision	Actual/ Forecast
Augmentation	207.3	124.2
Connection	69.2	39.6
Replacement	95.0	169.1
Strategic land/ easements	0.0	6.5
Security/ compliance	0.0	1.9
Inventory/ spares	4.2	13.9
Business IT	6.5	31.2
Buildings/ facilities	3.8	3.5
Total	**385.9**	**389.8**

Source: ElectraNet revenue application, p34

In particular, augmentation has been significantly underspent (40%) while replacement has been significantly overspent (78%). SKM notes that a number of the projects classified as replacement are projects to maintain line clearances, and could arguably be considered to be compliance related.

These projects total $44.8M, making the revised replacement spend $124.2M (30% above the previous decision).

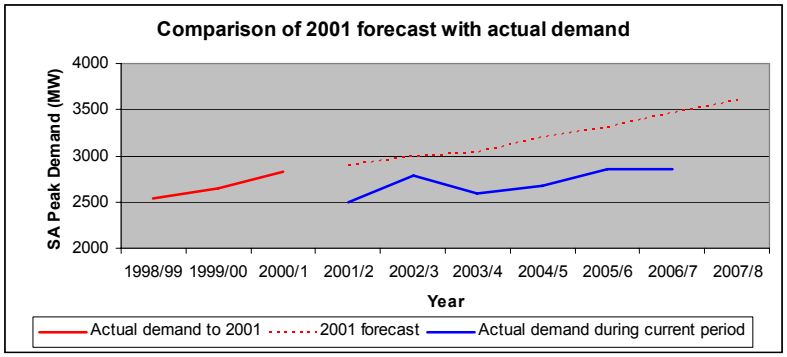
ElectraNet lists a number of reasons for this changing capex profile:

- Lower than forecast demand[4]
- Conversion of Murraylink to regulated status
- A number of market benefits projects that have not proceeded
- Condition assessments conducted by ElectraNet that led to a decision to bring forward a number of replacements
- Unexpected increases in project costs
- Substantial expenditure on business and IT systems including SAP which should deliver ongoing operational improvements and efficiencies

In general SKM agrees with these reasons given by ElectraNet for the changing project mix. The projects reviewed were found to be adequately justified, and ElectraNet's asset management plan and replacement project prioritisation is considered to be robust and in line with good industry practice.

SKM notes that despite being ranked as the highest priority replacement project and included in the proposed program for the current regulatory period, the Playford substation replacement project has been deferred to the next regulatory period. The cost included in the revenue proposal is $49.8M ($07/08) compared to the original estimate of $18.1M ($01/02). ElectraNet advise that this project was to have proceeded at the end of the current regulatory period, but was replaced in the program for the current period by the Cherry Gardens replacement project, and is now scheduled for the start of the next regulatory period.

[4] The following chart shows a comparison of the 2001 demand forecast (based on the NEMMCO SOO forecast) with actual demand during the current regulatory period.



SKM considers the decision to defer this project was reasonable, as bringing forward the Cherry Gardens project provided benefits and efficiencies when combined with the Tungkillo substation project. SKM notes ElectraNet's replacement project ranking approach assesses and ranks projects according to a risk score, but includes a second stage "filter" that considers augmentation projects and allows for re-prioritisation to allow for overall efficiencies. This process is considered reasonable and in line with good industry practice.

SKM has also reviewed the revised $49.8M cost estimate, and found it to be reasonable and in line with SKM's assessment of efficient scope and costs. The original estimate of $18.1 is understood to be poorly scoped and estimated, and there have also been material cost increases since the original estimate.

Given the high priority ascribed to this project, SKM considers there is a case that it could have been undertaken in the current period, in addition to the Cherry Gardens project. This would have resulted in a substantial overspend in ElectraNet's capex budget, which ElectraNet has explained it was seeking to avoid. Given the uncertainty regarding the remaining life of assets and hence optimum timing for replacement projects, the decision to defer this project for a few years is not considered unreasonable, and also reflects delayed timing of associated augmentation works resulting from lower-than-expected growth during the current regulatory period.

On this basis, SKM considers the deferral of the Playford project, and the revised costing, to be reasonable.

4.4 Interest During Construction

Interest during construction (IDC) is a capex consideration allowed for within the regulatory accounts of the TNSP to reflect the cost of working capital for projects under construction but not yet commissioned. Transmission network capital projects typically extend over a number of years, with the TNSP bearing a financing cost for accumulated project costs prior to commissioning.

In the current regulatory period ElectraNet's capital is only recognised in its revenue calculations on commissioning, and accordingly IDC is applied to the raw project costs in consideration of the finance costs incurred, and is capitalised with the project. In accordance with standard accounting practice, a network asset should be recognised in a TNSP's accounts only once it has been commissioned, or has become operational, and therefore is actively contributing to the TNSP's revenue. From the start of the next regulatory period, ElectraNet's capital expenditures will be recognised for regulatory purposes in its revenue calculations in the year they are incurred, and hence it will no longer be necessary to consider IDC.

ElectraNet have proposed the application of a blanket figure of 8.3% of the total capital value of projects as at their commissioned date, to allow for IDC. The 8.3% figure is based on ElectraNet's regulated WACC as established at the time of the ACCC South Australian Transmission Network Revenue Decision of 2002.

ElectraNet's application of a blanket 8.3% IDC factor has been applied to all historical network capex projects, regardless of the actual construction period for individual projects.

ElectraNet noted that this approach was different from the manner in which IDC amounts are typically calculated, but pointed out that the reason the approach employed had been taken, was that it was consistent with the approach undertaken within the ACCC's South Australian Transmission Network revenue cap decision in 2002.

SKM reviewed annual project expenditures for a range of sample projects across ElectraNet's capex portfolio, and modelled IDC using the period that each year's expenditures were incurred prior to being capitalised. The outcome of this remodelling process found that the ElectraNet methodology of applying a blanket 8.3% to individual infrastructure projects returned a similar result to the more detailed methodology.

As the calculation of IDC within ElectraNet's proposal was seen to have been undertaken in order to be consistent with the methodology employed during their previous revenue decision, and, as the two methodologies provided similar results, SKM considers the method and amount proposed by ElectraNet to be reasonable. IDC has already been included in the historical capex figures proposed by ElectraNet in its application.

4.5 Work in progress

ElectraNet is changing from an "as commissioned" to an "as incurred" framework for recognition of capex for revenue cap purposes. Accordingly, amounts incurred to the end of the current regulatory period for projects commenced but not completed (work in progress) will be capitalised at this time.

In future, interest during construction will no-longer be applied to projects as the capital will be included in the revenue calculations from the time it is incurred. ElectraNet has identified $44.4M in capex it expects to incur in the current regulatory period on projects that will not be complete and hence not capitalised by the end of the current regulatory period.

A number of the projects selected for detailed reviews as part of the future capex assessment have already commenced (for example the CBD, Coonalpyn West substation, Whyalla terminal rebuild) and hence have amounts included in the proposed WIP amount. Based on the findings of these projects, and the general finding that both the historical and future capex programs are prudent and

efficient, SKM considers the projects underway and hence the proposed WIP amount is likely to be reasonable and efficient.

In the course of its investigations, SKM has identified that ElectraNet has not applied IDC to its proposed WIP amount. As this amount will not be recognised for the purposes of revenue calculations for some time between expenditure and being rolled into the RAB, SKM considers IDC should apply as a matter of principle. However, because the WIP amount is all being "capitalised" at a specified date (1 July 2008) rather than at the actual commissioning dates for the various projects which would otherwise have been up to several years after this date, SKM considers the application of the blanket 8.3% IDC factor used by ElectraNet is not appropriate.

SKM has reviewed the actual timing of ElectraNet's estimated WIP amounts, and calculated an IDC factor of 4.2% as being appropriate. SKM recommends this amount be added to the WIP proposed by ElectraNet.

In line with the remainder of the historical capex, SKM recommends capex on projects not completed be accepted as reasonable. SKM has reviewed the calculation of future capex budgets proposed by ElectraNet and confirms that WIP has been correctly removed from the future capex budget on projects that will continue into the next regulatory period.

4.6 Conclusion and recommendations

From our review of the selected ex-post capex projects, SKM is of the view that during the present regulatory period, ElectraNet has consistently pursued only efficient design scopes and projects. We sighted a number of instances where less efficient and more expensive network solutions were presented to ElectraNet. In each instance ElectraNet deferred to a more prudent solution. In a number of instances, such as the uprating of transmission lines previously designed to a 49^{o} standard, ElectraNet undertook the most essential works and accepted an interim 65^{o} design and deferred the remainder of works that would have resulted in a full 80^{o} design being implemented. In other instances, cost effective line monitoring equipment was installed deferring all augmentation works.

SKM is also of the view that the reviewed projects were implemented following appropriate project management processes within ElectraNet at the time and a significant effort has been expended to improve the whole project governance process.

Based on the findings of the reviewed projects, SKM has not identified any issues or problems it considers likely to be systemic, and found that projects were generally prudent and efficient. On this basis, SKM recommends that ElectraNet's Historical Capex be accepted as reasonable, per the table below:.

Table 17 SKM Recommended Historical Capex

	Jan-Jun 2003	2003-04	2004-05	2005-06	2006-07	2007-08	Total
ElectraNet Proposed	2.1	34.9	42.8	65.5	98.0	146.5	**389.8**
Work in progress (WIP)						44.4	**44.4**
SKM adjustment for inefficient project costs			(0.03)				**(0.03)**
SKM adjustment for IDC applied to WIP						1.9	**1.9**
Total	**2.1**	**34.9**	**42.8**	**65.5**	**98.0**	**192.8**	**436.0**

Note – Totals may not add due to rounding.

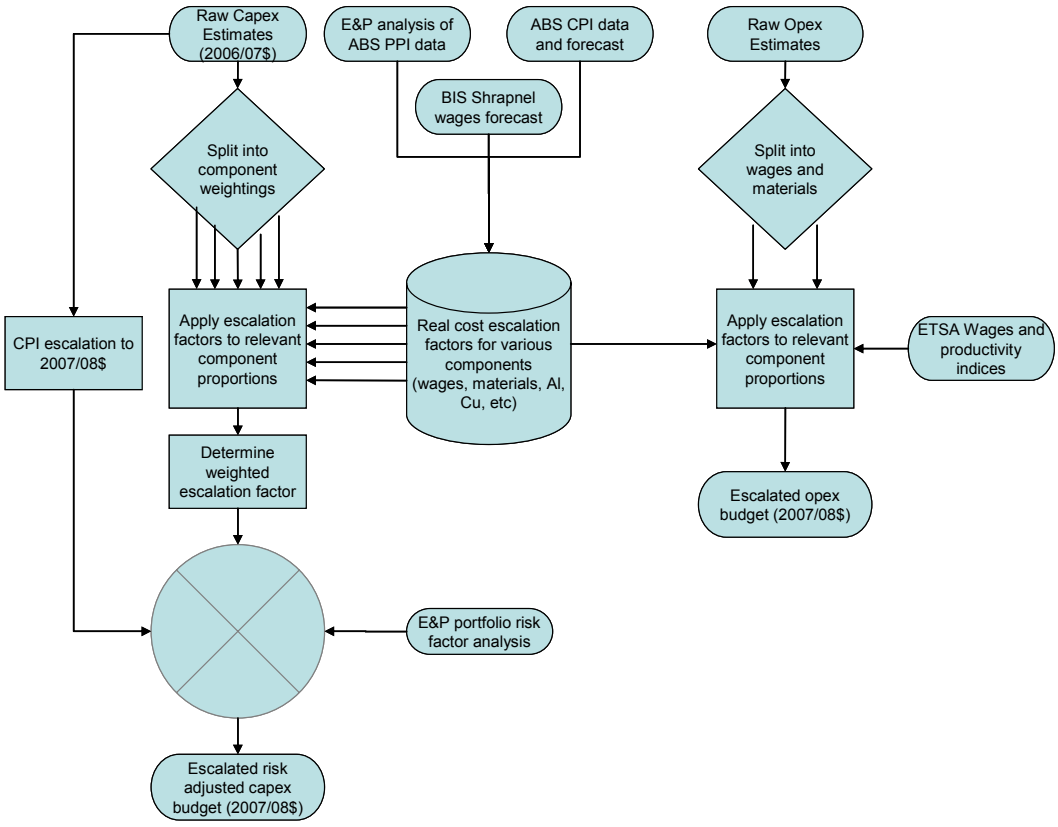
5. Capital Cost Escalation Factors

In their transmission network revenue proposal, ElectraNet have sought to establish various cost escalation factors aimed at taking into account expected increases in the range of individual costs that comprise the overall expenditure required in undertaking infrastructure projects within a capital works program.

Sections 5.7.8, 5.7.9, and 5.7.10 of ElectraNet revenue proposal present the methodologies employed by ElectraNet to develop alternative cost escalation factors to account for the forecast rise in the market wages, land and non-labour construction costs, that it is proposed will be experienced by ElectraNet whilst executing their capital works program during the upcoming regulatory period of July 2008 to June 2013.

ElectraNet have applied the various cost escalation factors to both its capex and opex forecasts, based on its view that costs will increase at a rate exceeding CPI and hence real costs will increase. The escalation factors have been applied as shown in Figure 4 below:

- **Figure 4 - ElectraNet cost escalation process**



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Historically, TNSPs have made use of expected movements in the Consumer Price Index (CPI) in order to allow for likely movements in the costs of future capital works. However, in more recent times, the rapid increase in commodity prices have, *inter alia*, caused many of the underlying costs of infrastructure projects to rise far more rapidly than corresponding movements in the Australian national CPI.

SKM has held for some time the belief that movements in the CPI do not accurately reflect the movements in costs associated with infrastructure projects, and therefore the CPI index is inappropriate for use as a basis upon which to develop cost escalation factors for use in forecasting movements in the costs of future capital works programs.

5.1 ElectraNet Capex escalators

ElectraNet has proposed three escalators it has applied to its raw cost estimates to arrive at the total capex figure used in its application. These escalators are:

- **2007/08 nominal cost escalator** to convert estimates using $2006/07 cost estimates into $2007/08 cost estimates
- **2008/09 – 2012/13 weighted real cost escalator** to account for expected real increases in capital project delivery costs over the upcoming 5 year regulatory period (all forecasts are presented in $2007/08)
- **Portfolio risk factor** to account for the likely result of contingencies and unplanned cost and scope increases on the total capex portfolio. ElectraNet has not included any contingency allowance in individual project cost estimates.

These escalation factors are shown in Table 18 below:

Table 18 Application of capex escalators by ElectraNet

Factor	Value	Total capex
Base cost estimates ($2006/07)	**-**	**$665.6M ($2006/07)**
2007/08 nominal cost escalator	5.02% for network projects 3.0% (CPI only) for non-network	$698.2M ($2007/08)*
2008/09 – 2012/13 weighted real cost escalator	6.6% for network projects 3.0% (CPI only) for non-network	$741.7M ($2007/08)
Portfolio risk factor	5.2% for network projects only	$778.1M ($2007/08)
Escalated total estimate ($2007/08)		**$778.1M ($2007/08)**
Total escalator impact (compound)	16.9%	$112.5M ($2007/08)

** expected cost if all projects were implemented in the 2007/08 year, not spread over 5 years*

The cumulative effect of these escalators is significant and SKM has reviewed the derivation and application of these escalation factors in detail.

5.2 ElectraNet derivation of cost escalators

The first two escalators were derived by ElectraNet, assisted by Evans & Peck consultants, based on the expected increase in the cost of a number of component inputs, weighted according to a breakdown of its total capex by these inputs (such as labour, land, materials, …).

The derivation of these escalators is according to the figures shown in Table 19 below:

Table 19 Derivation of ElectraNet cost escalators

Capex category	Capex weighting%	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
Aluminium	1.3%	1.044	1.042	1.043	1.045	1.046	1.047
Copper	1.3%	1.044	1.062	1.062	1.062	1.062	1.062
Land and Easements	5.0%	1.100	1.100	1.100	1.100	1.100	1.100
Other*	27.8%	1.044	1.042	1.043	1.045	1.046	1.047
Plant & Equipment	30.7%	1.044	1.042	1.043	1.045	1.046	1.047
Steel	5.0%	1.044	1.070	1.070	1.060	1.060	1.060
Labour	29.0%	1.056	1.056	1.060	1.063	1.059	1.056
Weighted Average Escalation – Annual	**100.0%**	**1.050**	**1.051**	**1.052**	**1.054**	**1.053**	**1.053**
Weighted Average Escalation - Cumulative			1.051	1.106	1.165	1.227	1.293
Cumulative Real Escalation (Less CPI)			**1.021**	**1.045**	**1.073**	**1.103**	**1.135**
Annual real cost increase				2.4%	2.7%	2.8%	2.9%
Proposed capex ($2007/08)			179.7	195.9	147.5	116.2	58.8
Weighted real cost escalator 2009-13			1.066				

** Buildings, materials, establishment costs, non labour overheads etc*

Source: Data provided by ElectraNet from models used to prepare its revenue application.

While SKM considers the approach taken is reasonable, it considers there are a number of shortcomings in its application:

- The individual escalators for a number of the capex categories are higher than expected, due principally to extrapolating recent cost increases without giving appropriate weight to economic forecasts predicting price reductions in the future (eg aluminium, copper).
- The capex categories used result in 60% of the capex falling into the "other" and "plant and equipment" categories for which there is no specific measure of historical cost increases, and hence no robust basis on which to forecast future escalation.

SKM's analysis and conclusions regarding the various escalators is discussed in the following sections.

5.3 Wages Growth

Section 5.7.8 and Appendix D of ElectraNet's revenue proposal present the findings of a BIS Shrapnel report commissioned by ElectraNet to establish an outlook for future wages growth over the upcoming revenue regulatory period.

In its recent Powerlink decision[5], the AER indicated a preference for state specific forecasts of labour costs that have been based on thorough macro economic modelling. The AER deemed that such modelling methodologies provide a sound basis upon which this component of a TNSP's future cost escalators is able to be calculated.

The Access Economics forecast labour cost indices[6], developed for the AER during the recent Powerlink decision provides state specific labour cost forecasts covering the period of the upcoming ElectraNet revenue determination, and includes a specific index for future movements in the utilities sector in South Australia.

ElectraNet have proposed an alternate wage escalation factor, and engaged BIS Shrapnel to develop an alternative set of State specific industry wage indices for the period to 2016/17 which includes ElectraNet's forthcoming revenue regulatory period of June 2008 to July 2013. It was noted that both the BIS Shrapnel report and the Access Economics report were dated April 2007, and were therefore considered by SKM to be comparable in terms of the relevance of the economic data used to develop the respective proposed escalation rates.

SKM noted that during the Powerlink Revenue decision process ElectraNet questioned whether the Access Economics forecasts took into account the need to attract and retain skilled staff in the current tight Queensland labour market.

During this review Econtech released an August 2007 wages growth forecast commissioned by the AER as part of the SP AusNet draft decision process[7].

SKM considers all three forecasts appears to be based on a robust methodology of developing state and industry specific wage forecasts, including consideration of the movements in the underlying drivers of wage growth within specific industries, and why, in the case of the electricity, gas, and water industry, the annual growth recorded has been higher than the wage growth in the economy as a whole in recent years.

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[5] AER, *Powerlink Queensland Transmission Network Revenue Cap: Decision*, 14 June 2007

[6] Access Economics, *Labour Cost Indices for the Energy Sector*, 12 April 2007

[7] Econtech 2007 "*Labour Costs Growth Forecasts"*, Available for download on the AER website.

An expectation of increased productivity growth appears within each report, although there are differences of opinion as to the magnitude of this component within the respective models. All three reports present a consideration that the ongoing tightness within the labour market will cause wages to escalate more than would have transpired due to CPI and productivity factors alone. This is thought to be exacerbated by the fact that many of the skills within the electricity, gas and water industry are common with the mining sector which continues to expand and exert pressure on utilities to attract and retain a skilled workforce. The reports generally describe a downturn in the rate of growth for the wages index occurring during the period involving ElectraNet's forthcoming regulatory period, though the timing and magnitude of the respective downturns differ.

SKM's analysis of the BIS Shrapnel report found it to be both industry and state specific and based on in-depth macro economic modelling, and therefore essentially aligned with the stated methodological preferences of the AER for such a process. BIS Shrapnel's report presents a view that Access Economics have underestimated nominal wage growth, and also overestimated productivity growth within the South Australian environment, over the period to 2016. BIS Shrapnel therefore believe the labour market will remain tighter for longer.

The Econtech report made use of the most current economic data in predicting movements in the underlying drivers of wage growth. This was seen in the comparatively lower Econtech forecast CPI inflation figures, which in turn related to Econtech's consideration of more recent movements in the underlying drivers of inflationary pressure, such as the Australian Dollar remaining above the 80 US Cents mark, a prediction that perhaps may not have been considered feasible at the time when the BIS Shrapnel and Access Economics reports were being compiled.

The Econtech report does not include a state specific forecast for the utilities industry in South Australia that would allow a direct comparison to the findings of the BIS Shrapnel report.

Table 20 provides a comparison of the findings of the three reports.

Table 20 Comparative Wage Growth Forecasts

		ElectraNet Revenue Determination Period						Average
Year ended June	2007	2008	2009	2010	2011	2012	2013	2008-13
Nominal								
BIS Shrapnel "Wages Growth SA"	6.2	5.6	5.6	6.0	6.3	5.9	5.6	5.83
Access "Composite SA"	5.2	6.3	4.9	3.8	4.4	5.2	5.2	4.97
Econtech "Utilities Australia"	4.3	5.2	5.7	7.6	7.0	6.3	6.0	6.3
Real								
BIS Shrapnel "Wages Growth SA" (CPI deflator)	3.1	2.6	2.7	3.7	3.4	2.7	2.5	2.93
Access "Composite SA" (GDP deflator)	0.7	4.3	4.5	1.6	1.7	3.0	2.9	3.00
Access "Composite QLD" (CPI deflator)	2.5	4.1	4.3	1.5	1.7	3	2.8	3.7

The average *nominal* BIS Shrapnel escalation rate at 5.83% lies between the Access figure of 4.97% and Econtech 6.3% (Australia) over the forthcoming regulatory period, illustrating subtle differences of opinion regarding issues of timing and magnitude of underlying market drivers. Conversely the average BIS Shrapnel *real* wage escalator is marginally lower than the respective Access and Econtech figures, due to the differences in the deflators utilised to bring the various nominal figures into real terms.

As such forecasts are dealing with uncertainties amongst a number of key underlying drivers, there will inevitably be a degree of uncertainty and a range of reasonable forecasts. Given the similarities in the forecasts, and the reasonableness of the apparent reasons for some of the differences, SKM considers the BIS Shrapnel wage forecast to be reasonable, noting that detailed macroeconomics and modelling are not part of SKM's normal course of business and as such it is unable to comment on the detailed assumptions and methods used in each of the reports.

SKM concluded that the forecast wage escalation rates presented within the ElectraNet proposal are reasonable in their intended use as a prediction of probable future costs, and SKM would therefore recommend their acceptance by the AER for inclusion within ElectraNet's revenue decision process.

5.4 Land Value Escalation

Section 5.7.9 of ElectraNet's revenue proposal briefly describes the methodology that ElectraNet suggests be employed to account for the affect, on its capital works program, of predicted escalations in the cost of land during their forthcoming regulatory determination period.

SKM noted that ElectraNet have chosen to develop their own escalation index for this particular cost component. The methodology employed by ElectraNet was to take Australian Bureau of Statistics (ABS) historical data for land values in South Australia, and to develop a forecast based on the trend in average movements in that index over the period June 2000 – June 2006. ElectraNet have chosen to use the combined average of the commercial and rural historic land indices for South Australia over this period, as a means to develop a cost escalation factor with which to forecast infrastructure project prices going forward.

SKM noted that although the index in question starts in 1989, ElectraNet have chosen to include only the historical data from June 2000 to June 2006. SKM is of the opinion that the period 1999 – 2006 is generally considered to have been part of a significant boom period in the growth of both land and property values throughout Australia, and may not be representative of long term growth.

Although ElectraNet's proposal infers that this period of rapidly increasing values will continue throughout their upcoming revenue period to 2013, SKM noted that there is mounting economic

commentary that Australian land and housing prices are becoming unaffordable, which would suggest that continued growth in line with recent trends was unsustainable in the longer term.

Table 21 below illustrates how taking only 1999 – 2006 data, compared to the entire set available, significantly affects the magnitude of the average increase presented for this cost escalator.

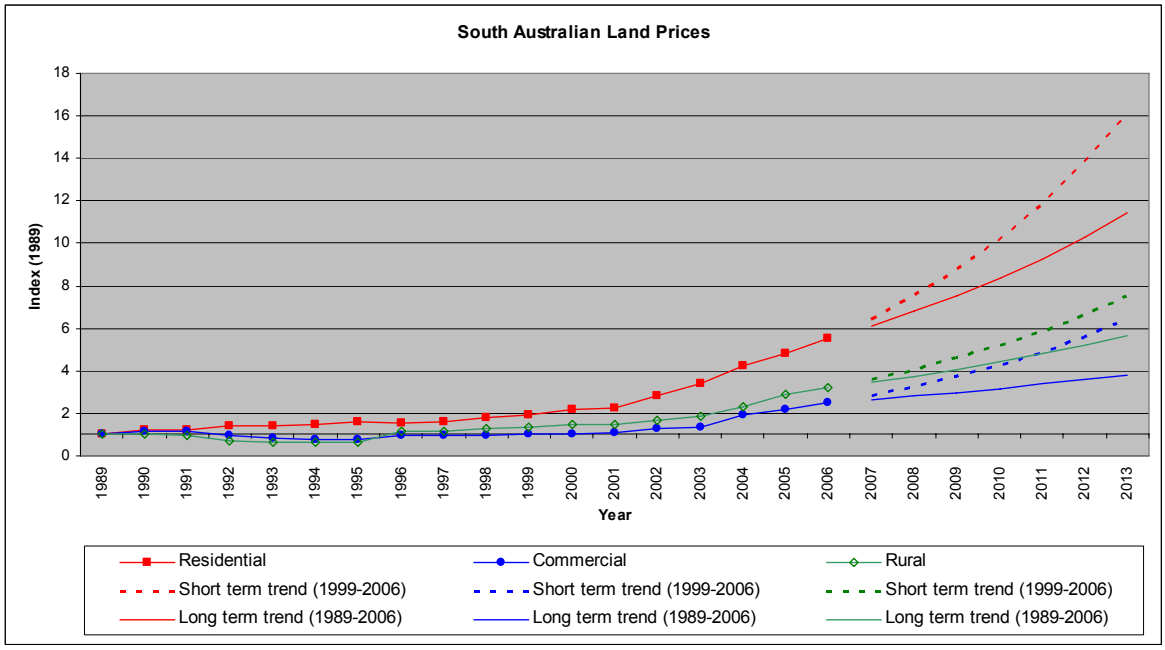
Table 21 Land Valuation Index in South Australia

Sector	ElectraNet 1999-2006	SKM 1989-2006	Weighting*
Commercial	14.4%	6.3%	52%
Rural	13.0%	8.6%	33%
Residential	16.5%	10.9%	15%
Weighted Average	**14.00%**	**8.17%**	**100%**
Simple Average (commercial + Rural)	13.7%		

** weighting derived from information provided by ElectraNet regarding breakdown of land by class*

As can be seen from the chart below, the differences in applying the short and long term trends over the forecast period are substantial.

Figure 5 – South Australian Land Prices



ElectraNet have accounted for CPI in its cost escalation calculations reducing the value of the escalator from 13.7% to 10%..

A correction in the market, as shown in the historical values recorded during the early 1990's, at some stage during ElectraNet's revenue determination period, is certainly a possibility, though a major correction is considered unlikely. On balance an overall average growth rate of 0% over the determination period could be considered as the lower bound of likely escalation expected over the period.

SKM is of the opinion that the proposed 10% annual cost escalator is based on a short period of high price growth, and is higher than the long term trend and probable cost escalation that is likely over the period 2008 – 2013, and therefore SKM recommends that this figure should not be accepted for inclusion within the final revenue decision.

In order to facilitate the input of a specific land value escalation rate for the purposes of Capex / Opex review requirements, SKM have assumed the longest available average growth rate trend within the historic data as the average land value escalation rate that could be considered likely to occur in South Australia over ElectraNet's forthcoming determination period. This figure amounts to 8.2% annual.

It was also determined that separate Rural, Commercial, and Residential land value escalation rates were required for consideration within the Opex section of this review as they relate to land tax costs going forward. SKM has used the long term average figures from Table 21 in its Opex assessment.

5.5 Non- Labour Construction Cost Escalation

Section 5.7.10 and Appendix E of ElectraNet's revenue proposal details the proposed calculation of escalation factors relating to the various elements of non-labour (materials, equipment and buildings) infrastructure project costs within ElectraNet's capital works program during the upcoming determination period.

In developing appropriate cost escalators within their report, Evans and Peck suggest that predicted movements in the Consumer Price Index (CPI), which ElectraNet have historically used to estimate increases in prices for projects going forward, do not accurately reflect the movement in underlying costs associated with infrastructure projects, and that the Producer Price Index (PPI) contains elements that are more relevant to costs associated with the electricity and construction industries.

As stated earlier, SKM concurs that movements in CPI do not accurately reflect the changes in costs associated with infrastructure projects, and therefore the CPI index is inappropriate for use as a basis upon which to develop cost escalation factors for the purpose of calculating movements in the costs of future capital works programs.

The methodology employed by Evans and Peck, was to construct a cost escalation model consisting of proposed future growth rates, based on historic PPI trends, and to assign these proposed future growth rates to discrete non-labour cost elements within infrastructure projects. The ElectraNet capital cost estimate was disaggregated into various components and used to weight the PPI trend escalators to determine an overall average escalator.

Using information derived from ElectraNet's cost estimating system the following categories of capex were developed as shown in Table 22.

Table 22 ElectraNet proposed Non-Labour capex escalator components

Individual Element	Weighted Contribution	ABS 6427 PPI Table assigned	Forecast escalation 2008-2013**
Aluminium	1.2%	Table 16 (General construction)	4.2 – 4.7%
Copper	1.7%	Table 47 (Copper)	6.2%
Steel	6.9%	Table 30 (Iron and Steel)	6.0 – 7.0%
Plant and Equipment	42.0%	Table 16 (General construction)	4.2 – 4.7%
Other*.	48.3%	Table 16 (General construction)	4.2 – 4.7%
Total	**100.0%**		

** buildings, clearing access and environmental, concrete poles, establishment and foundations*

*** annual nominal price increases*

Source: Adapted from ElectraNet Transmission Network Revenue Proposal, Appendix E, Table 6, Page16.

The development of the cost escalation model sought to identify an appropriate index from within the ABS 6427 PPI Indices upon which to align each of the individual cost elements. The copper and steel elements of ElectraNet's non-labour infrastructure costs were aligned to Tables 47 and 30 of the ABS 6427 indices, respectively. The remaining three non-labour construction cost elements were seen to align with Table 16, the General Construction table within the ABS 6427 PPI index.

Historical movements in the three applicable tables were then considered in order to derive proposed minimum, most likely, and maximum forecasts for the movements in annual average price levels associated with the individual cost elements now aligned to each of the three relevant ABS 6427 PPI tables. These minimum, most likely and maximum figures were then subjected to a process of Monte Carlo simulation, in order to establish a range of alternative future price movement levels, along with an understanding of the relative probability of each level of cost escalation.

While this approach is considered to be sophisticated and appropriate for trend-based forecasting, SKM considers it has a number of shortcomings:

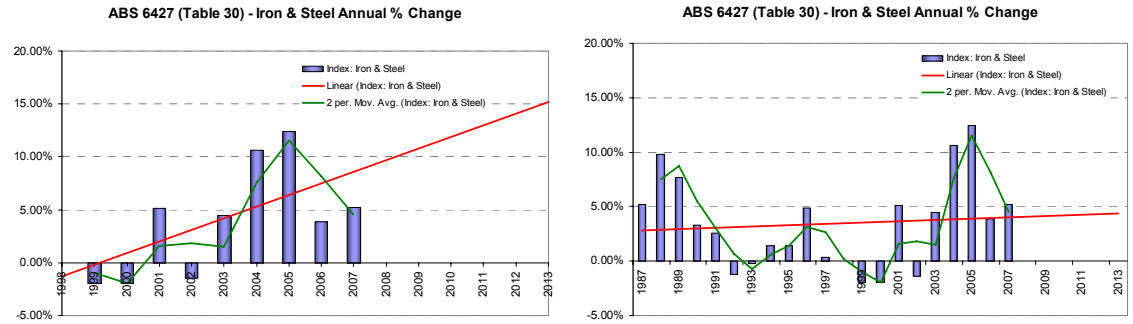
- It has relied on trends based on recent strong growth in commodity prices, and has not placed sufficient weight on a number of credible economic forecasts and indicators available that predict a fall in prices of key commodities (notably copper and aluminium).
- The capex categories selected are not conducive to analysis and comparison to known prices within the electricity industry.
- A large proportion (90%[8]) of the costs are allocated to "plant and equipment" and "other", placing a very high weighting on a single cost escalator.

Sections 5.5.1 to 5.5.3 discuss specific escalators where SKM considers economic and market forecasts vary materially to the PPI trends proposed by ElectraNet.

5.5.1 Iron and Steel Price Movements

In the case of the steel non-labour construction cost element, that was assigned table 30 "Iron and Steel" of the ABS 6427 Index, SKM noted that ElectraNet used data only from the most recent 9 years, although data was available from 1985. The trend modelled using 9 years of annual average movement data has been reconstructed in Figure 6, showing a comparison with the entire set of data available for the ABS 6427 Table 30 Iron and Steel Index, and clearly illustrates a significantly different long-term trend.

- **Figure 6 Iron & Steel Annual – comparison of 9 and 20 year trends**



When taking into consideration the entire data set available from 1985, as illustrated by Figure 6, it can be observed that although the long-term trend is still "… *moving in an upward direction*"[9] as

[8] 90% of "non labour" and land costs, or around 60% of total costs.

[9] ElectraNet, *Transmission Network Revenue Proposal*, 31 May 2007, Appendix E, section 7.2.1, pp 13

suggested in the Evans and Peck report. SKM notes the long term average annual movement in the complete index data set is 3.4%. Inspection of the long term data reveals prices are cyclical, and given several years of recent strong growth there must at least be consideration given to the likelihood of a downturn in prices over the short term.

The Evans and Peck report discusses they have "… *tempered the nine-year average with both the linear and two-year moving average trend lines"*[10] for the nine year period. This process then led to their establishment of projected minimum, most likely and maximum increase rates. SKM notes the minimum value used was 4%, which is above the long term trend growth in steel prices.

SKM considers this escalator does not give sufficient weight to the possibility of low or negative price growth, and hence may overstate the likely future growth in prices.

5.5.2 General Construction price movements

ElectraNet has used Table 16 "General Construction" of the ABS 6427 PPI index in order to develop likely future movements as inputs for their cost escalation model for.

- Aluminium;
- Plant and Equipment; and
- Other.

As per the methodology employed with respect to the steel element, the average annual movement in the historical data recorded for the past nine years was tempered with both the linear trend and two year moving average, in order to develop minimum, most likely and maximum levels for this index, as inputs to the Monte Carlo simulation process. In contrast to the methodology employed with respect to the steel element, the figures used to populate the minimum likely increase that was considered possible for this specific measure was 3%, less than the annual average increase of 4.2%. SKM is not aware of the specific reasoning for this tempering adjustment.

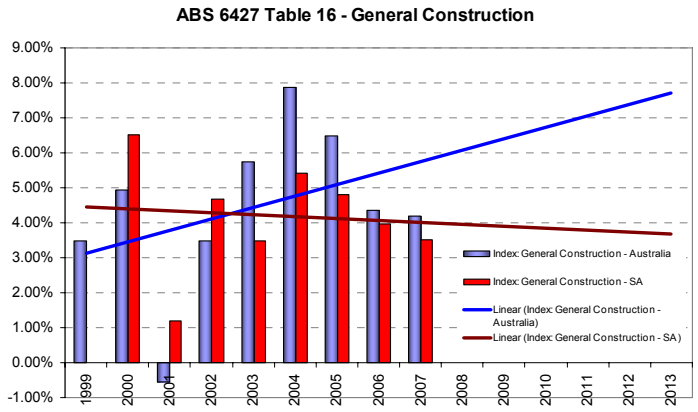
SKM notes there is a separate General Construction index specific to South Australia[11], whereas ElectraNet have used the Australia national series for this measure. SKM considers this is not unreasonable as ElectraNet would source a considerable amount of the items from outside of South Australia, though perhaps some weighting towards the South Australian specific data may have improved the results.

[10] ibid

[11] ABS PPI 6427 Table 16 General Construction (41) Index, series A2333730A: South Australia

Figure 7 compares the differences between the movements in general construction index for Australia as a whole, and that of South Australia alone, with linear trend lines shown as per the Evans and Peck report used within ElectraNet's proposal. SKM noted that the average increase in this South Australian specific PPI was 4.18% with a slight downwards trend, whereas the Australian overall index showed an average annual price increase of 4.36% and an upwards trend.

- **Figure 7 General Construction Index**



It appears the escalators developed for this component have placed greater weight on the likelihood of below trend cost increases over the coming regulatory period, and the figures lie within what SKM would consider to be a reasonable range.

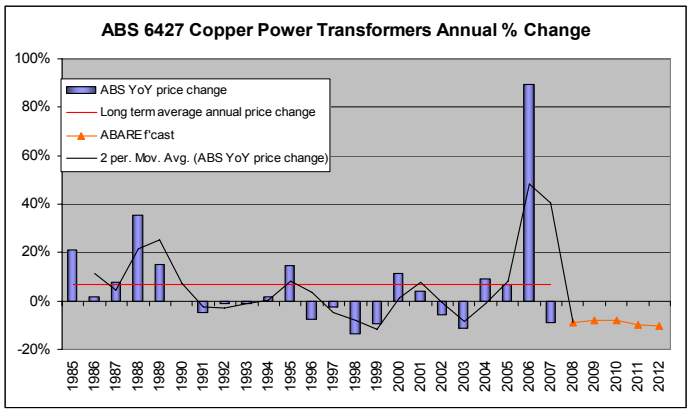
SKM also notes there is a separate Aluminium PPI table, but this has not been used. Recent ABARE commodity forecasts are for an average 6.6% annual fall in aluminium prices over the period to 2013. Consequently the use of the general construction index to apply to the aluminium component of ElectraNet's capex is not considered reasonable.

5.5.3 Copper Price Movements

For copper, Table 47 "Copper used in the manufacture of electrical equipment – Power Transformers" of the ABS 6427 PPI index was used.

SKM noted that due to recent volatility and recent extreme growth in copper prices, the long term average for the entire available set of data from 1983 was used to forecast likely movement in copper prices to populate the Monte Carlo simulation process. The figure derived amounted to 6.2% annual price increase.

- **Figure 8 Copper Annual % Movement since 1985**



Taking into account the movements in this index shown in Figure 8, SKM considers a further correction in copper prices is a possibility that should be given some weight in estimating future prices. A number of credible data sources lead to this conclusion:

- Current London Metal Exchange (LME) forward contracts show declines of 10-20% for the 15 and 27 month futures contracts.
- ABARE commodity price forecasts predict a 9% annual average decline in copper prices over the coming 5 years
- International Monetary Fund (IMF) analysis shows new supply coming online, and marginal costs of supply (2005) ranging from $1,200 to $2,200, showing 2006 market prices to be 2.8 times the least efficient producer cost. IMF forecasts are for a price drop in the order of 50% by 2010.

Based on these considerations, SKM does not consider the trend based forecast for copper to have given sufficient weight to credible economic forecasts pointing to significant declines in copper prices, and that it likely materially overestimates the future price path.

5.5.4 Conclusions

At times extrapolation of historical trends can serve reasonably well as a means of forecasting future behaviour, where conditions are relatively stable. However, the past few years have seen significant commodity price movements, due to unexpected and unsurpassed levels of demand increase, notably from rapidly developing economies such as China and India. SKM considers the application in this instance of trend based forecasts does not place due weight on economic considerations such as the impact of recent supply capacity increases, and the cyclical and volatile nature of commodity prices.

SKM is of the opinion that current information available at the time of this review at least casts doubt on the assumption of continuing trend growth in construction cost elements over the period

to 2013. Recent prices are a result of unprecedented growth in global demand for a number of commodities leading to supply imbalances that are being addressed through increases in production capacity that are now coming online.

The recent Powerlink Decision process included in-depth discussions regarding the forecasting of commodity prices and possible future movements in the costs of these raw materials. The AER introduced consideration for the movement in the projected medium term aluminium and copper prices published by ABARE to 2012[12] (refer Table 23) and the regulator also cited the consensus of credible and well established sources such as the IMF, World Bank, the International Iron and Steel Institute, and COMEX.

Table 23 Projected Aluminium and Copper Prices to 2012 ($US/ton, nominal)

	2007	2008	2009	2010	2011	2012	Average	Total
Aluminium	2350	2085	1975	1838	1763	1663		
% Change		-11.28%	-5.28%	-6.94%	-4.08%	-5.67%	-6.65%	-29.23%
Copper	5550	5050	4650	4275	3850	3450		
% Change		-9.01%	-7.92%	-8.06%	-9.94%	-10.39%	-9.07%	-37.84%

Source: Adapted from ABARE, Australian Commodities, vol. 14, no. 1, Mar Quarter 2007, page 133 – 146.

In the case of aluminium prices, the data from ABARE research suggests that world supply will increase more rapidly than consumer demand, creating an imbalance that would result in an average annual drop in the price of aluminium of 6.65% to 2012. The cost escalation model used by ElectraNet in utilising recent trends in the ABS 6427 Table 16 General Construction Index, suggests that the aluminium prices are most likely to increase by at least 4.2 % annually.

In the case of copper prices, ABARE research suggested that increased world supply of copper will surpass increasing levels of demand, resulting in the copper price falling on average by 9% annually. Over the same period, the methodology employed in the ElectraNet model by applying trends in the ABS 6427 Table 47 Copper used in the manufacture of "Electrical Equipment - Power Transformers Index" suggested the copper price increases annually by 6.2%.

In the case of the steel component, the AER has previously noted the considerations within the International Iron and Steel Institute (IISI) report of October 2006[13], which forecasts that world demand for steel for the periods to 2010 and 2015, will slow to 4.9% and 4.2% respectively. A more recent paper published by the IISI[14] reinforced this view of an expected decrease in the rate of

[12] AER, *Powerlink Queensland Transmission Network Revenue Cap: Decision*, 14 June 2007, pp 66

[13] AER, Powerlink Queensland Transmission Network Revenue Cap: Decision, 14 June 2007, pp 68

[14] International Iron and Steel Institute, *IISI Short Range Outlook for Apparent Steel Demand - 2007/08*, 27 March 2007

demand for steel, suggesting that growth in world demand for steel, relative to the growth in world steel production, has, and will continue to decrease from the high 8.5% growth experienced in 2006, to around 5.9% in 2007 and 6.1% in 2008.

ABARE's most recent commodities publication also included a statement that "… *increases to steel making capacity, particularly in China, India and Brazil, are expected to result in steel inventories rising and prices falling.*"[15]

SKM found that a recent IMF publication, which included the statement that "… *over the longer term, all base metals prices should weaken from their current highs as output continues to catch up with demand*" [16], depicted a continuation of the general consensus amongst industry experts, that increased world production in these commodities, will outstrip demand side growth rates in the medium term, resulting in lower market prices amongst the majority of base metals.

Given these considerations, on balance SKM considers ElectraNet's non-labour cost escalators have not given adequate weight to the likelihood of significant price reductions, or at the least significantly lower growth than the trend of recent years. The "general construction" index applied to "other" and "plant and equipment" categories may not adequately reflect the specialist nature of the electrical assets that constitute a significant portion of these categories. The high weighting ascribed to these "general" components has the effect of biasing the overall escalation for specialist electrical infrastructure towards a "general construction" index. On this basis, SKM recommends the proposed cost escalators are not reasonable.

5.6 SKM alternate capex breakdown and escalators

In its recent draft decision for the SP AusNet revenue determination, the AER has accepted specific electricity infrastructure escalators proposed by SP AusNet, with minor adjustments[17].

The capex escalators proposed by SP AusNet were derived from a study conducted by SKM[18], using several years of Australian industry cost data collected from a number of network service providers. This study found that prices had been increasing in excess of CPI for a number of years.

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[15] ABARE, *Australian Commodities*, vol. 14, no. 2, June Quarter 2007, pp 317

[16] IMF, *World Economic Outlook Spillovers & Cycles in the Global Economy*, April 2007, chapter 1, pp 44

[17] The AER considers "time lag" factor between commodity and manufactured equipment prices should be reduced from two years as proposed by SP AusNet (based on analysis by SKM) to one year.

[18] *Escalation Factors affecting Capital Expenditure Forecasts*¸ SKM 2007. Appendix C of the SP AusNet revenue proposal 2007. http://www.aer.gov.au/content/index.phtml/itemId/710249/fromItemId/710179

Table 24 Cost increases for the period 2002 - 2006

Item	2002	2003	2004	2005	2006
Substations (excluding power transformers)	1.000	1.011	1.058	1.095	1.171
Power Transformers	1.000	0.982	1.000	1.048	1.183
CPI actual	1.000	1.027	1.052	1.078	1.121

Source: SKM analysis as presented in SP AusNet revenue application

Forecast capex cost indices for a number of network capital items were also derived as part of this study. Research and interviews with networks and manufacturers was used to identify and weight a number of component inputs to electricity infrastructure, including:

- Fixed costs (such as manufacturing facilities)
- Labour
- CPI
- Exchange rate
- Aluminium, copper, steel
- Oil

SKM's analysis also indicated prices of manufactured equipment tended to lag key commodity inputs by 1 to 2 years. Escalation indices derived for SP AusNet were based on a 2 year lag.

SKM sought a number of credible economic forecasts for each of these cost input components, to produce a weighted consensus forecast to 2013. The results of this analysis were a set of escalators for various equipment categories, as shown below:

Table 25 Cost increases for the period 2006 – 2013 (cumulative nominal, 2006 base)

Item	2006	2007	2008	2009	2010	2011	2012	2013
Substations (excluding power transformers)	1.000	1.038	1.074	1.098	1.119	1.145	1.171	1.200
Power Transformers	1.000	1.058	1.215	1.197	1.139	1.105	1.087	1.083
CPI forecast	1.000	1.025	1.051	1.077	1.104	1.132	1.160	1.189

Source: SKM analysis as presented in SP AusNet revenue application (with 2 year time lags).

In its August 2007 draft decision on the SP AusNet revenue application[19] the AER has largely accepted this approach, though with one year lags in flow through to equipment prices.

SKM considers the use of specific electrical infrastructure escalators, taking account of economic forecasts of key inputs, to be more robust than the trend based approach based largely on general

[19] http://www.aer.gov.au/content/index.phtml/itemId/714612/

construction indicators proposed by ElectraNet. SKM proposes an alternate set of escalators for ElectraNet, consistent with the recent SP AusNet draft decision.

These results are presented in the table below:

Table 26 SKM alternate real cost escalation indices

Capex category	Capex weighting%	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
Labour	29.0%	1.056	1.056	1.060	1.063	1.059	1.056
Substation / primary equipment	25.4%	1.017	1.022	1.023	1.026	1.026	1.027
Protection & Control	20.3%	1.038	1.037	1.038	1.038	1.038	1.038
Civil	6.0%	1.042	1.042	1.042	1.042	1.042	1.042
Overhead Line	4.5%	1.006	1.006	1.004	1.018	1.022	1.023
Underground Cable	7.3%	0.997	0.991	1.005	1.017	1.024	1.026
Land	5.4%	1.082	1.082	1.082	1.082	1.082	1.082
Misc material (escalated at CPI)	2.2%	1.030	1.030	1.030	1.030	1.030	1.030
Weighted Average Escalation – Annual (nominal)l		**1.036**	**1.036**	**1.039**	**1.042**	**1.042**	**1.041**
Weighted Average Escalation – Cumulative Index (nominal)			1.036	1.077	1.122	1.169	1.217
Cumulative Real Escalation Index (Less CPI)			**1.007**	**1.017**	**1.031**	**1.045**	**1.060**
Annual real cost increase			0.68%	0.97%	1.37%	1.40%	1.42%

Source: SKM analysis, based on SP AusNet indices but using 1 year time lags.

In preparing these alternate indices, SKM has accepted ElectraNet's weightings for labour and land, and derived weighting factors for the other components from a breakdown of the remaining costs from analysis of ElectraNet's capital cost working spreadsheets.

ElectraNet's labour cost escalators were accepted, and the SKM weighted land cost escalator derived in section 5.4 was used, along with equipment escalators re-calculated using one year price lags to be consistent with the AER's SP AusNet Draft Decision.

SKM recommends consideration be given to adopting the alternate real cost escalators presented above.

5.7 Risk and contingency factor

This section discusses the analysis of Appendix F and section 5.7.11 of ElectraNet's Revenue Proposal, which presented the findings of the Evans & Peck Risk Review of Capital Works Program report ("the risk report"). The findings of this analysis is that there is a risk the efficient

and reasonable costs of ElectraNet's capex portfolio will be higher than the base forecasts, with a P50 [20] risk factor of 5.2%

Initial analysis of the risk report found that the modelling process itself was both methodologically and technically sound. SKM concur with ElectraNet and Evans & Peck's premise that risk within such a capital works program can never be completely eliminated and should therefore be quantified in order to be accounted for, and thereby properly managed. However, as with any modelling technique, the potential or inferred quality within the model's outputs was considered to be subject to the initial quality of the various inputs used to populate the model.

The inputs to the risk model developed by Evans & Peck were developed at a workshop attended by ElectraNet and Evans & Peck personnel. A number of risks were identified and the potential impacts estimated based on the experience and knowledge of workshop participants. While SKM has found few individual items within the list of identified risks and impacts that would appear questionable, it is also inherently difficult to verify and quantify estimates produced through this type of process. SKM understands ElectraNet has not sought to systematically capture and analyse examples of these risks manifesting themselves in recent projects, but rather relied on the consensus estimate produced in the workshop which drew primarily on recollections of such events and the collective experience present. This workshop approach is common industry practice for risk assessments, and is considered reasonable.

Evans & Peck conducted Monte-Carlo analysis on the risks identified, using probabilities and impacts derived from the workshop. SKM considers this analysis to be sound, but is ultimately reliant on the quality of the inputs. By adopting many possible risks and using a Monte-Carlo approach, the impact of inaccuracies in any individual input will be diminished.

SKM's review of the risk inputs generally found them to be within a range we would consider plausible, noting it is difficult to source comparative data and hence SKM's review was likewise primarily based on its collective knowledge and experience. Ultimately SKM has relied on comparisons of the final 5.2% risk adjustment figure with expected values, rather than each of the individual inputs, to reach its conclusion that the proposed risk adjustment is reasonable.

In this regard, SKM identified issues regarding a number of the inputs applied in constructing the risk model that has been presented.

[20] P50 is the 50% probability level, with the actual result equally likely to be higher or lower.

5.7.1 Issues Identified with Contingent Risks

SKM considered the inclusion of several of the "contingent" risks listed within the risk model had the potential to be regarded as a means of ElectraNet transferring typical operational business risks, usually regarded as being within the responsibility and therefore control of an organisation's management, to the customer. For example, in the case of the specific contingent risks used to populate the model listed as "*contractor non-performance*" and "*Relationship issues with new contractor*", SKM considered ElectraNet would need to demonstrate the extent of prudent management action already undertaken by way of sound procurement and contractual practices, aimed at mitigating such risks. SKM notes that even a prudent network operator acting in accordance with good industry practice will face risks and events that increase the costs of individual projects, and that such costs are to an extent inherent in any portfolio of large complex projects.

5.7.2 Conclusion

ElectraNet have reported experiencing a substantially higher rate of historic cost overrun, at 22%, based on an analysis of 29 of their capital works projects[21], and has offered this figure as a demonstration that the 5.2% risk adjustment factor proposed is conservative and reasonable. While SKM notes the 22% figure, it does not accept this figure has any direct comparison to the proposed risk adjustment figure of 5.2%, and should not be used to justify or imply the reasonableness of the proposed risk adjustment. Inherent within the 22% figure are significant cost estimating and escalation issues from a cost estimating process that has been completely replaced, and any project overruns due to project management which again has been completely overhauled within ElectraNet. The risk report does not indicate what proportion of the calculated historical underestimation of 22% was due to the "inherent" and "contingent" risks that have now been identified.

In conclusion, SKM is of the opinion that, given the level of uncertainty that still exists at the stage of a project portfolio estimation process such as ElectraNet's future capital works program that there is a real risk that on average costs will tend to increase more then decrease. From comparison with the Base Planning Objects (BPOs) used as the basis for ElectraNet's individual project cost estimates, and review of the Scope and Estimates (SAE) documents prepared by ElectraNet, SKM considers ElectraNet has not allowed for escalation, risk or contingency amounts in individual project estimates.

[21] ElectraNet, *Transmission Network Revenue Proposal*, 31 May 2007, pp 60

While SKM has some concerns with the ability to verify and quantify some of the inputs used and whether the complex methodology used was necessary, the resultant figure of 5.2% for overall portfolio risk adjustment is within the range SKM expects from industry experience and should be accepted by the AER for inclusion within ElectraNet's forthcoming revenue determination.

5.8 Project Delivery Costs (Overheads)

In preparing estimates for medium to long term capital works projects, ElectraNet have applied a project delivery allowance to level A (project budget) and level 1 (conceptual) estimates. This "overhead" cost is applied using a sliding scale of between 10% and 30% depending on project size, with an average of approximately 15% over the project portfolio.

This provision was benchmarked by Currie & Brown against project delivery costs for various engineering projects in different industry sectors around Australia and concluded that they " … *would agree that a blanket 15% mark-up on cost is an appropriate method and percentage to cover project delivery costs at level A and level 1 estimate stage.*"[22] This conclusion was based on an examination of base and project delivery costs used in the water, roads, petroleum and building sectors.

For the purposes of this review, project delivery costs were considered to be those non-base costs necessary to manage and support the delivery of the physical asset. The base cost is the cost of the physical asset including labour, plant, materials and equipment, supervisory support by the constructor together with their business overheads and profit.

The inclusions in the project delivery costs as applied by ElectraNet are summarised in Table 27.

Table 27 ElectraNet Project Delivery Allowances*

Cost Category	Inclusions	Percentage
Project management		2.5% to 4.0%
Network planning		2.0% to 3.0%
Construction management		3.0%
Procurement management	Contract management, administration, plant procurement	3.0% to 4.0%
Engineering services	Design management	2.0% to 3.0%
Operational costs	Systems planning, legal, switching, asset strategies	0.5%
Environmental management	Easements, development approvals	1.5% to 2.0%
Total		**14.5% to 19.5%**

** Source: Currie & Brown, Review of Project Delivery Cost Allowance*

[22] Currie & Brown, *Review of Project Delivery Cost Allowance*, 15 February 2007, pp 9

SKM noted that Detailed Design was not included, and that Currie & Brown had identified that ElectraNet had included detailed design within the direct costs and as such had the effect of " … *artificially lowering the project delivery cost when compared to the direct cost.*"[23]

Based on SKM's experience with project estimates and asset valuations in the electricity industry, SKM would concur with the findings of the Currie & Brown review that 15% is a reasonable allowance for engineering, procurement and construction management (EPCM) costs. The typical breakdown that SKM would consider for these EPCM costs is:

- 2% for planning and preliminary costs;
- 4% for design; and
- 9% for project management.

Based on the data shown in Table 27, SKM would translate the ElectraNet split into:

- 4.0% to 5.5% for planning and preliminary;
- 2.0% to 3.0% for design; and
- 8.5% to 11.0% for project management.

This split appears reasonable compared to the SKM breakdown, although the provision for design does appear smaller than expected, reflecting the inclusion of detail design in direct costs.

SKM is also of the opinion that the project delivery review was correct in suggesting that the detailed design costs vary significantly between substations and transmission lines. SKM has found that given 15% is a reasonable total allowance for EPCM or project delivery costs:

- Substations - design allowance is about 10% and the procurement & construction is 5%; and
- Transmission lines - design allowance is 6% to 7%, and procurement & construction 8% - 9%.

This is due to transmission lines generally requiring less design effort than substations, as there are only a finite number of tower types and a small number of different conductor sizes and stringing configurations. Most power authorities have very detailed and comprehensive drawings on transmission line construction. However, transmission lines generally incur higher procurement and construction management (PCM) costs than substations, essentially because transmission lines take significantly longer to build than substations. Also issues such as route allocation and easement acquisition add significantly to the total PCM.

[23] ibid, pp 4

As part of its review SKM also queried joint procurement arrangements between ElectraNet and Powerlink. ElectraNet's small in-house procurement team relies on support from Powerlink to provide a procurement service that includes buying strategies, plant specifications, document preparation and tender management, tender evaluation, contract administration and reporting. Powerlink charge a flat percentage[A (refer to confidential attachment to this report)] of materials cost for this service, which ElectraNet consider to be good value in terms of the service provided and also the increased leverage provided by partnering with a larger TNSP plus standardisation of equipment and common (SAP) enterprise systems.

Given the range of 3%-4% outlined above for typical procurement costs, and the range of other benefits ElectraNet is able to achieve through this arrangement SKM does not consider this cost to be unreasonable, though is likely at the upper range of reasonable.

On the whole SKM considers the overall allowance of 15% on average is comparable with a number of industry sectors (including electricity) and is considered reasonable. While the detailed design and procurement components are considered to be at the upper end of what SKM considers to be the reasonable range, the overall figure is in line with expectations, and SKM recommends this figure be allowed to be included in the approved capex.

5.9 Conclusion and recommendations

SKM has reviewed the various risk, overhead and cost inflation indices and allowances that ElectraNet has added to its raw project estimates to reach an overall delivered cost for its project portfolio. SKM has accepted the 5.2% risk factor and overhead cost allowances proposed.

It is SKM's conclusion that, based on the most recent and credible economic data available at the time of this review, the ElectraNet cost escalation figures proposed for the period 2008 – 2013, do not give sufficient weight to the likelihood of some cost components escalating at a rate significantly below recent trends, and in some cases prices falling materially from recent peaks. The result is that the proposed escalators are likely to be at or above the reasonable likely range.

SKM notes the results of previous studies it has undertaken into cost escalation of electrical network capital costs. While these results are not specifically for South Australia, they do take into account a range of factors including commodity and wage cost forecasts, and the weighted proportion of each of these components to the final capital cost of various types of equipment. SKM's studies found there was a lag between commodity price fluctuations being incorporated in equipment prices, and has given weight to credible economic forecasts predicting a softening in key commodity prices over the medium term.

SKM has developed and recommends the escalation factors shown below.

Table 28 SKM Recommended Weighted Real Capital Escalation Index

Weighted escalation factor	Capex weighting%	2007-08*	2008-09	2009-10	2010-11	2011-12	2012-13
ElectraNet proposal		1.050	1.021	1.045	1.073	1.103	1.135
SKM Recommendation		1.036	1.007	1.017	1.031	1.045	1.060

** 2007-08 is nominal 1 year figure to adjust 2006-07 base capital estimates. Figures for 2009 – 2013 are cumulative real escalators on a 2008/09 base year.*

SKM does not have access to the full working models necessary to calculate the impact of these changes on ElectraNet's overall capex program, but has made the following estimate:

Table 29 SKM Recommended capex adjustments to reflect cost escalator adjustment

Annual proposed capital ($M)	2008-09	2009-10	2010-11	2011-12	2012-13	Total
ElectraNet un-escalated ($06/07)	171.4	186.7	140.6	110.8	56.1	665.6
Escalated with EN inflators* ($07/08)	200.2	218.2	164.6	129.5	65.6	778.1
Escalated with SKM inflators* ($07/08)	191.0	207.6	156.7	123.3	62.6	741.2
Difference (adjustment) ($07/08)	-9.2	-10.6	-7.9	-6.2	-3.0	-36.9
Difference (%)	-4.6%	-4.9%	-4.8%	-4.8%	-4.6%	-4.7%

** Note – includes 5.2% risk adjustment. Both the EN and SKM figures use an average uniform inflator for all years (see below).*

ElectraNet has developed a detailed model that applies the annual inflators, but has then calculated a uniform overall average inflator to equalise the total spend over the 5 year regulatory period. The annual capex figures included in its application have been determined using this uniform average inflator. The effect of this approach is to simplify its calculations, but also to artificially inflate its apparent capex in the early years of the period and artificially understate its apparent capex in the later years of the period, with the result that if accepted the revenue calculations would deliver a windfall NPV benefit. This is demonstrated in the table below:

Table 30 Effect of using a uniform average inflator

Annual proposed capital	2008-09	2009-10	2010-11	2011-12	2012-13	Total
ElectraNet with uniform inflator	**200.2**	**218.2**	**164.6**	**129.5**	**65.6**	**778.1**
ElectraNet with annual inflator	192.3	215.5	166.2	134.5	69.7	778.1
Difference	-7.9	-2.7	1.6	5.0	4.1	0.0
SKM recommended total capex using adjusted escalators per the table above, with annual inflator	**187.0**	**206.5**	**157.4**	**125.7**	**64.4**	**741.2**
Total recommended adjustment SKM adjusted escalators, and annual inflator approach	-13.2	-11.7	-7.2	-3.8	-1.2	-36.9
Total recommended adjustment (%)	-6.6%	-5.3%	-4.4%	-2.9%	-1.8%	-4.7%

SKM recommends annual inflators be used to calculate the $2007/08 real capex, rather than a uniform average inflator.

6. Ex-Ante Assessment of Forecast Capex

6.1 Introduction

ElectraNet proposes a capital program of $778M (real $2007/08), as described in the table below.

Category	2008-09	2009-10	2010-11	2011-12	2012-13	Total
Augmentation	57.9	73.9	52.4	32.4	11.4	228.0
Connection	56.1	47.4	37.9	13.3	3.1	157.8
Replacement	46.9	66.7	36.8	59.6	30.4	240.3
Strategic land/ easements	6.5	4.4	7.7	2.6	2.7	23.9
Security/ compliance	9.8	16.6	20.3	13.1	10.6	70.4
Inventory/ spares	6.3	2.4	2.4	2.4	2.4	15.7
Total Network	**183.3**	**211.2**	**157.7**	**123.5**	**60.7**	**736.1**
Business IT	7.3	6.2	6.8	5.2	3.2	28.8
Buildings/ facilities	9.5	0.6	0.4	1.0	1.7	13.3
Total Non-Network	**16.9**	**6.8**	**7.2**	**6.2**	**4.9**	**42.0**
Total Capex	**200.2**	**218.2**	**164.6**	**129.5**	**65.6**	**778.1**

This represents an increase of around 93% (nominal, 75% real) from the current period, driven largely by changes to the SA Electricity Transmission Code (ETC) requiring increased security of supply at a number of connection points including the Adelaide CBD, and a substantial increase in replacement of aged assets. A comparison with the current period (in $m, real $2007/08) is shown in the table below:

Category	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13
Augmentation	7.5	10.2	32.5	38.0	35.0	57.9	73.9	52.4	32.4	11.4
Connection	26.7	10.0	16.4	6.2	12.0	56.1	47.4	37.9	13.3	3.1
Replacement	20.9	27.1	64.3	46.3	25.5	46.9	66.7	36.8	59.6	30.4
Strategic land/ easements	0.6	0.4	0.9	4.8	1.0	6.5	4.4	7.7	2.6	2.7
Security/ compliance	0.0	0.0	0.1	1.5	0.3	9.8	16.6	20.3	13.1	10.6
Inventory/ spares	0.4	7.0	3.3	2.4	2.5	6.3	2.4	2.4	2.4	2.4
Total Network	**56.1**	**54.7**	**117.4**	**99.3**	**76.3**	**183.3**	**212.2**	**157.7**	**123.5**	**60.7**
Business IT	19.5	4.3	4.5	3.4	3.4	7.3	6.2	6.8	5.2	3.2
Buildings/ facilities	0.1	0.9	1.6	0.6	0.6	9.5	0.6	0.4	1.0	1.7
Total Non-Network	19.6	5.2	6.1	4.0	4.0	**16.9**	**6.8**	**7.2**	**6.2**	**4.9**
Total Capex	**75.6**	**59.9**	**123.6**	**103.3**	**80.3**	**200.2**	**218.2**	**164.6**	**129.5**	**65.6**

The proposed expenditure of $778 million is 75% higher than current period real expenditure of $442 million. A list of ElectraNet's proposed projects greater than $10 million is shown in Table 31 below.

Table 31 Forecast Capex projects greater than $10 million

$ million, (real 2007/08)		Yearly expenditure by project					
Project ID	Project Description	2008/09	2009/10	2010/11	2011/12	2012/13	TOTAL
10161	CBD Reinforcement City West Kilburn Cable Option 1x300/360MV.A 275/66kV Transformer	23.0	32.1	32.1	4.6	0.0	91.8
85007	132kV Playford Replacement - Relocation to Davenport	7.5	31.4	11.0	0.0	0.0	49.8
10161	CBD Reinforcement City West Kilburn Cable Option 1x300/360MV.A 275/66kV Transformer	11.6	16.2	16.2	2.3	0.0	46.2
10509	Whyalla Terminal Rebuild (Reduced Brownfield at Whyalla + Cultana diameter) and 2x120MV.A Transformer Capacity Increase	27.0	14.6	0.0	0.0	0.0	41.6
11101	Cultana 275/132kV Augmentation	0.0	0.0	5.4	22.5	7.9	35.7
11204	Templers 275kV substation and 275/132kV transformation – St 1	19.0	8.2	0.0	0.0	0.0	27.2
11108	Mount Barker 275/66kV Injection	3.9	16.5	5.8	0.0	0.0	26.2
11302	Para 275kV Sec Systems Replacement + some primary	0.0	0.0	3.7	15.4	5.4	24.5
10371	Coonalpyn West - Option B	0.0	2.9	12.3	4.3	0.0	19.6
10370	Clare North 132/33kV Substation	10.6	7.6	0.0	0.0	0.0	18.2
11401	Kadina East 2x60MV.A Transformer Capacity Increase	12.6	5.4	0.0	0.0	0.0	18.0
10809	Transformer ballistics proofing includes 11352	4.6	2.3	4.6	0.5	5.7	17.7
11351	Substation Security Fencing	3.3	3.7	6.3	4.3	0.0	17.6
10503	Waterloo Substation Rebuild and 2x60MV.A Transformer Capacity Increase	0.0	0.0	2.6	10.9	3.8	17.3
11303	TIPS 275kV Section A Secondary Systems Replacement only	0.0	0.0	2.3	9.5	3.3	15.1
10336	SIM Stage 2 City West - 1x 300/360MV.A 275/66kV Transformer (Cost Included in 10161 above, note WIP for this project also included in 10161)	3.8	5.3	5.3	0.8	0.0	15.0
10716	Strategic Land Purchase RY 2 Medium Priority	2.6	2.6	2.6	2.6	2.6	12.9
11350	Unit Asset Replacements	2.5	2.5	2.5	2.5	2.5	12.3
10994	Inventory Purchases FY Reset 2	2.4	2.4	2.4	2.4	2.4	11.8
11304	TIPS 275kV Section B Secondary Systems Replacement + some primary	0.0	0.0	1.6	6.9	2.4	10.9
10615	Ardrossan West 132kV Substation Rebuild and 2x25MV.A Transformer Capacity Increase (Existing Site)	1.2	5.2	2.2	1.6	0.6	10.9
11109	TIPS 66kV Section Secondary Systems plus minor primary plant	0.0	0.0	1.6	6.7	2.3	10.7
11009	Substation Perimeter Electronic Security includes 11354	0.0	2.9	2.4	2.7	2.7	10.6
10394	Davenport Voltage Control also project 11355	5.2	0.0	0.0	0.0	5.2	10.3
10508	Hummocks Substation Aged Asset Replacement and 2x25MV.A Transformer Capacity Increase	0.4	2.5	4.0	1.6	1.6	10.0
	Projects <$10m	58.3	54.6	38.0	27.6	17.1	195.7
	Total	200.2	218.2	164.6	129.5	65.6	778.1

ElectraNet's revenue proposal lists the category driver for each project in the capital expenditure forecast in accordance with Schedule S6A.1.1. The drivers and relevant supporting documents used by ElectraNet in the revenue proposal are listed in Table 32 below.

Table 32 Drivers, Categories and Supporting Documents

Type	Category Driver	Supporting Documents
Load Driven	Augmentation	ETC, NER, ESCOSA correspondence
	Connection	ETC, Application to Connect, ETSA Utilities correspondence
	Easements	Strategic Land and Easements Acquisition Plan
Non-load Driven	Replacement	Asset Management Plan, Condition Assessment Reports / Asset Replacement Recommendation Reports
	Security/Compliance	Critical Infrastructure Report, Critical Infrastructure Policy
	Inventory/Spares	ETC Requirements, Asset Management Plan
Non Network	Information Technology	IS&T Strategic Plan
	Facilities	Facilities Management plan

SKM's review of the future capex was focussed on detailed review of a number of sample projects. The forecast capital expenditure projects reviewed by SKM were selected in consultation with the AER to address a broad spectrum of the capital expenditure categories. Those projects on the list above that were included for detailed review are shown shaded (plus a number in the "less than $10m" category).

Projects were selected to achieve a mix of drivers, types and project costs. A number were selected specifically because of high costs (particularly the CBD reinforcement) and where a review of the brief project descriptions identified potential issues.

The network projects reviewed by SKM fall into the augmentation, connection, replacement and security/compliance categories. SKM has also reviewed non-network projects in the IT and facilities categories.

SKM's review of each project considers the capital expenditure factors and applies the capital expenditure criteria to each project to determine whether the project is required to meet the NER capital expenditure objectives.

The fourteen projects reviewed are shown in Table 33 .

Table 33 Forecast Capital Expenditure Projects Reviewed by SKM

Project Id	Name / Description	Category	Cost ($M)
10161*	CBD Reinforcement City West	Augmentation	$139.2
10371*	Coonalpyn West Substation Establishment	Connection	$19.6
11101*	Cultana 275/132kV Augmentation	Augmentation	$35.7
10394*	Davenport Reactor Replacement	Replacement	$10.3
10638*	Morphett Vale to Cherry Gardens 275kV line up rating	Augmentation	$3.6
85007*	132kV Playford Replacement - Relocation to Davenport	Replacement	$49.8
10809	Transformer ballistics proofing	Security/Compliance	$17.7
11351	Substation Security Fencing	Security/Compliance	$17.6
11109	Torrens Island Power Station 66kV	Replacement	$10.7
11303	Torrens Island Power Station 275kV Section A Replacements	Replacement	$15.1
11304	Torrens Island Power Station 275kV Section B Replacements	Replacement	$10.9
10503*	Waterloo Substation Rebuild	Connection / Replacement	$24.1
11320	Weather Stations	Augmentation	$4.1
10509*	Whyalla Terminal Rebuild	Replacement / connection	$48.9
11022	Enterprise System (SAP)	Non-network	$4.3

The projects marked with an * in Table 33 commenced in the current regulatory period and as such, ElectraNet should have or should be in the process of applying the regulatory test to those projects for which a regulatory test is required.

The projects selected represent a total of $410M or 53% of the total proposed capex (excluding contingent projects) for the forthcoming regulatory period. SKM considers this is a sufficiently large sample and covers a range of categories as to provide a reasonably broad view of ElectraNet's overall future capex programme.

6.2 Review Process

The review process undertaken for the forecast capital projects identified above is described in section 2.1, which outlines the requirements as described in the National Electricity Rules for evaluating capital projects in terms of the capital expenditure objectives, capital expenditure criteria and capital expenditure factors. The capital expenditure objectives, criteria and factors were the foundations of the review process and were thoroughly and systematically addressed for each project.

The first stage of the review process was to assess whether the forecast capital project proposed by ElectraNet met the capital expenditure objective(s). ElectraNet's revenue proposal identified which of the objectives the project was attempting to meet. In determining whether the capital expenditure objective was met, the demand forecasts, Electricity Transmission Code (ETC), National Electricity Rules (NER) and Asset Condition Assessment Reports were used as the basis of the decision.

The second stage of the review was to determine whether the capital expenditure criteria had been met for each of the projects. The capital expenditure criteria are intended to address whether the project was the most economical and/or delivered the best market benefit from the alternative options. This required ElectraNet to demonstrate that they had considered the various options for meeting the capital expenditure objective and selected the project that was the most favourable option.

The third stage of the review was to address the capital expenditure factors, and most significantly, review and benchmark the scope and estimate for each project. Each project was benchmarked against SKM's internal Asset Valuation Database to determine whether ElectraNet's estimated cost for each project represented the costs of a prudent operator in the market and was comparable to the industry costs.

6.3 Review of Costs

ElectraNet's cost estimates are based on Base Planning Objects (BPOs) from the Transmission Estimating Manual 2006/07 Update. This document is produced by Powerlink and is generally consistent with the cost estimates used in its revenue proposal to the AER.

SKM has reviewed the BPOs contained in the Transmission Estimating Manual and is generally satisfied that the process used by ElectraNet to determine the project costs is suitable. The BPOs group material, equipment, labour and other costs into objects which can be added together and built upon to generate the project estimate. SKM uses a similar process to determine high level project cost estimates and this process is a commonly accepted practice within the industry.

The cost of a number of BPOs was reviewed in order to determine the order of accuracy of the BPOs used as the basis of ElectraNet's cost estimate. SKM is generally satisfied that the BPOs used by ElectraNet represent reasonable costs for the described objects.

After discussions and reviewing the scope and estimate documentation with ElectraNet, SKM determined that the majority of projects in ElectraNet's proposal are considered by SKM to be at a 'preliminary' stage of development where cost estimates would typically be in the range of between ±15% and ±25%.

More detailed costings have been developed by ElectraNet for Cherry Gardens to Morphett Vale East 275kV Line Up Rating and Playford 132kV relocation with estimates typically being in the ±10% range

In developing ElectraNet's Capex program a number of generic S-curves for particular project portfolio types have been used, as shown in Table 34 below.

Table 34 Capex S-curves for project portfolio

	Percentage Cumulative Expenditure			
Project Type	**Year 1**	**Year 2**	**Year 3**	**Year 4**
Line	5%	25%	80%	100%
Substation	-	15%	78%	100%
Telco	-	10	64%	100%
Other	-	33%	67%	100%
Minor Substation	-	0%	10%	100%
Land Acquisition	-	0%	0%	100%
Easements	-	20%	30%	100%

SKM consider the profiles used to be reasonable for the projects proposed.

6.4 Forecast Capex project reviews

6.4.1 CBD Reinforcement City West

Proposed Cost	Proposed commissioning	Category
$139.2M	2012	Connection (ETC) / Augmentation

The CBD Reinforcement City West project involves two projects, the CBD project and the Southern Suburbs project. The CBD project involves the construction of a new 275kV substation and transmission line / cable located on the western side of the Adelaide CBD. The Southern Suburbs project involves the installation of an additional transformer at the new CBD substation site.

The project is required to meet the Rules capital expenditure objective to:

- comply with all applicable regulatory obligations associated with the provision of prescribed transmission services.
- meet the expected demand for prescribed transmission services over the period; and

SKM considers that ElectraNet's proposed scope for the CBD and Southern Suburbs projects represents efficient and prudent consideration of the options available. However, during the course of investigations, SKM discovered that the scope and estimate documentation submitted for consideration was likely to be revised following changes to the proposed design. The revised documentation was not available at the time of this review. Given the likelihood that the transmission line and cable component of the CBD project will be revised, the AER may consider removing this component from the forecast capital expenditure and placing this into the contingent project category.

In particular SKM considers it is reasonable that a significant portion of the new circuit into the CBD be constructed from underground cables. Recent experience from transmission and distribution companies in Australia is that new overhead high-voltage powerlines are unlikely to be approved in densely populated areas, or at the least face significant delays in route selection and approval that would likely put ElectraNet in breach of the ETC. SKM notes that ElectraNet has sought to construct as much of the new circuit as possible using cheaper overhead construction, and is currently engaged in route selection and approvals.

ElectraNet is currently considering 4 possible route options, involving 2 separate routes and 2 OH/UG mix scenarios for each route. It is possible the final route may be different again. ElectraNet's cost estimates for the cable and line component of the project across these 4 options vary from around $70M to $96M, a variation of up to $26M (37% or around 18% on the total project cost).

Given the uncertainty regarding the line route and the substantial amount of capex potentially at risk, SKM believes consideration should be given to making this portion of the project a contingent project, triggered by the route being finalised and hence cost and scope uncertainty being reduced.

Table 35 CBD project asset class breakdown and recommended contingent amount

Item	2008/09	2009/10	2010/11	2011/12	2012/13	Total
Lines - Overhead	4.0	11.0	4.0	-	-	**19.0**
Lines - Underground	17.9	49.2	17.9	-	-	**85.0**
Substation - Primary	6.4	17.5	6.4	-	-	**30.3**
Substation - Secondary	0.7	1.9	0.7	-	-	**3.3**
Telecommunications	0.3	0.9	0.3	-	-	**1.6**
Total	**29.3**	**80.6**	**29.3**	**-**	**-**	**139.2**
Lines total (transfer to contingent)	21.9	60.2	21.9	-	-	**104.0**
Remaining total (remaining ex-ante)	7.4	20.4	7.4	-	-	**35.2**

Note – using ElectraNet proposed cost escalators.

6.4.2 Coonalpyn West Substation Establishment

Proposed Cost	Proposed commissioning	Category
$19.6M	2012	Connection

The Coonalpyn West Substation Establishment project involves the construction of a new substation at a greenfield site in the Coonalpyn district.

The project is required to meet the Rules capital expenditure objectives to:

- meet the expected demand for prescribed transmission services over the period; and
- comply with all applicable regulatory obligations associated with the provision of prescribed transmission services.

SKM has reviewed the project and is satisfied that the defined scope reasonably reflects the capital expenditure criteria. SKM's review of the cost estimate determined that ElectraNet's estimated cost of $19.6 million is reasonable.

SKM notes that ElectraNet's estimate did not include costs for line works that will be required to establish the substation. This may add an additional $100k or so to the project. The ElectraNet estimate also included a total of $919k for cut and fill, foundations in rocks and access roads which SKM considers represent a reasonable allowance for developing a site for the substation. SKM

also noted that cut and fill and digging in rock were items included within the risks analysed to derive the 5.2% risk adjustment allowance. ElectraNet explained the risk figure was an "allowance for *additional* excavation costs *that could not reasonably be foreseen at the time of the Level 1 estimate*, assuming the cost estimate includes reasonable allowance for these items where they are known to be present". SKM accepts this argument.

ElectraNet's proposed annual expenditure for the project is shown below. SKM has reviewed the expenditure profile and assessed it as satisfactory.

Item ($M)	2008/09	2009/10	2010/11	2011/12	2012/13	Total
Annual capex	0.0	2.9	12.3	4.3	0.0	19.6

Note – using ElectraNet proposed cost escalators.

6.4.3 Cultana 275/132kV Reinforcement

Proposed Cost	Proposed commissioning	Category
$35.7M	2013	Augmentation

The Cultana 275/132kV Reinforcement project involves augmentation and changes to the existing Cultana substation to reinforce supply.

The project is required to meet the Rules capital expenditure objectives to:

- meet the expected demand for prescribed transmission services over the period;
- comply with all applicable regulatory obligations associated with the provision of prescribed transmission services; and
- maintain the quality, reliability and security of supply of prescribed transmission services.

SKM has reviewed the project and is satisfied that the defined scope reasonably reflects the capital expenditure criteria. SKM's review of the cost estimate determined that ElectraNet's estimated cost of $35.7 million is reasonable.

SKM notes that ElectraNet's estimate includes $1.843 million for site establishment. The Cultana site is already established with provisions having been previously made for future expansion and as such, this represents an over scoping. During the review, it was discovered that the replacement of the existing secondary systems had not been scoped. The replacement is required in order to integrate the new equipment into the substation. The cost of the replacement is approximately $1.56 million. As a result, the errors due to over scoping in one area and under scoping in another do not have a significant impact on the total estimate for the project (less than 1%).

ElectraNet's proposed annual expenditure for the project is shown below. SKM has reviewed the proposed expenditure profile and assessed it as satisfactory.

Item	2008/09	2009/10	2010/11	2011/12	2012/13	Total
Annual capex ($M)	0.0	0.0	5.4	22.5	7.9	35.7

Note – using ElectraNet proposed cost escalators.

6.4.4 Davenport Reactor Replacement

Proposed Cost	Proposed commissioning	Category
$10.3M	2013	Replacement

The Davenport reactor replacement project involves the replacement of three 30MVAr oil filled reactors with two 50MVAr reactors.

The project is required to meet the Rules capital expenditure objectives to:

- maintain the quality, reliability and security of supply of prescribed transmission services.

SKM questioned the need for the project in the event that the contingent Olympic Dam Expansion project went ahead, and is satisfied that the reactors will still form part of the overall optimal solution if this project does proceed.

SKM has reviewed the project and is satisfied that the defined scope reasonably reflects the capital expenditure criteria. SKM's review of the cost estimate determined that ElectraNet's estimated cost of $10.3 million is reasonable.

ElectraNet's proposed annual expenditure for the project is shown below. SKM has reviewed the proposed expenditure profile and assessed it as satisfactory.

Item	2008/09	2009/10	2010/11	2011/12	2012/13	Total
Annual capex ($M)	5.2	0.0	0.0	0.0	5.2	10.3

Note – using ElectraNet proposed cost escalators.

6.4.5 Cherry Gardens to Morphett Vale East 275kV Line up Rating

Proposed Cost	Proposed commissioning	Category
$3.6M	2010	Augmentation

The Morphett Vale East to Cherry Gardens 275kV Line up Rating project involves the installation of 4 new structures to increase the ground clearances of the line in order to increase its thermal rating from 80 degrees Celsius to 120 degrees Celsius.

The project is required to meet the Rules capital expenditure objectives to:

- comply with all applicable regulatory obligations associated with the provision of prescribed transmission services; and
- maintain the quality, reliability and security of supply of prescribed transmission services.

During its review SKM identified some issues relating to timing and governance. The project was delayed after initially being approved in 2005 with expected completion by July 2007. Documentation formally outlining the change and reasons is minimal. It is possible the project could potentially be deferred for a few years, though it will ultimately be required by 2012 and any possible deferral would be minimal.

SKM has reviewed the project and is satisfied that the defined scope reasonably reflects the capital expenditure criteria. SKM's review of the cost estimate determined that ElectraNet's estimated cost of $3.6 million is reasonable.

Note the ElectraNet cost estimate spreadsheet includes a line item for "contingency" of $329k that was queried by SKM to determine if this amounted to double counting when combined with ElectraNet's portfolio risk factor. ElectraNet advise that is amount is incorrectly labelled in the estimate spreadsheet, and in fact represents CPI escalation from $2004/05 (when the project was originally estimated) to $2006/07 to put it on an equal base with other projects for escalation in line with that applied to the capex portfolio on the whole. Accordingly SKM accepts this item. SKM notes that there were only two projects estimated in this manner, and hence SKM does not consider this issue is likely to be systemic.

ElectraNet's proposed annual expenditure for the project is shown below. SKM has reviewed the proposed expenditure profile and assessed it as satisfactory.

Item	2008/09	2009/10	2010/11	2011/12	2012/13	Total
Annual capex ($M)	0.4	3.2	0.0	0.0	0.0	3.6

Note – using ElectraNet proposed cost escalators.

6.4.6 Playford 132kV Relocation

Proposed Cost	Proposed commissioning	Category
$49.8M	2011	Replacement & Connection

The Playford 132kV Relocation project involves the extension of Davenport 275kV substation, installation of two 160MVA transformers and two 60MVA transformers, construction of a new 132kV substation adjacent to the 275kV extension and making the necessary changes to the 132kV transmission lines linking Playford A to the new Davenport 132kV switchyard.

The project comprises of a replacement and connection component. The two 60MVA transformers are required for the connection component while the remainder is for the replacement component.

The project is required to meet the Rules capital expenditure objectives to:

- maintain the quality, reliability and security of supply of prescribed transmission services.
- meet the expected demand for prescribed transmission services over the period; and
- comply with all applicable regulatory obligations associated with the provision of prescribed transmission services.

The scope for the project in the 2003-2008 regulatory period was $18.1M in 2001/02 dollars. The revised scope and estimate is $49.8M in 2006/07 dollars. SKM understands that the project was poorly scoped and the revised scope now represents the actual cost of the relocation of Playford. SKM has not reviewed the original scope and estimate used for the 2003-2008 regulatory period.

SKM has reviewed the project and is satisfied that the defined scope reasonably reflects the capital expenditure criteria.

SKM's review of the cost estimate identified an error of $3.6M related to double counting of escalation for this project, which equates to $4.2M in the overall capex program after ElectraNet has applied its risk and escalation factors. SKM considers this amount to be material in the context of this project, and recommends the estimated cost of $49.8 million be rejected as being unreasonable. A revised cost of $45.6M is recommended per the following table.

	2008-09	2009-10	2010-11	2011-12	2012-13	Total
ElectraNet proposal	7.5	31.4	11.0	-	-	49.8
SKM adjustment	-0.6	-2.7	-0.9	-	-	-4.2
SKM Recommended amount	6.8	28.7	10.0	-	-	45.6

Note – using ElectraNet proposed cost escalators.

6.4.7 Substation Security Fencing

Proposed Cost	Proposed commissioning	Category
$17.6M Security Fencing	2013	Compliance

The substation security fencing project involves the installation of palisade fencing around substations within ElectraNet's network, plus additional intruder detection and monitoring equipment.

ElectraNet commissioned a security review of its substations, focussed on public safety and vandalism / theft issues, rather than terrorism and critical infrastructure. The report identified risks with current security arrangements, and recommended improved fencing and security (electronic monitoring) of substation sites. SKM agrees with this view, and supports the fencing project, on the basis that it meets the capital expenditures objectives to:

- comply with all applicable regulatory obligations associated with the provision of prescribed transmission services; and
- maintain the quality, reliability and security of supply of prescribed transmission services.

SKM has reviewed ElectraNet's cost estimates for this project, based on the actual cost of recent similar installations at other sites, and considers the costs are reasonable and efficient.

ElectraNet's proposed annual expenditure for the project is shown below. SKM has reviewed the proposed expenditure profile and assessed it as satisfactory.

Item	2008/09	2009/10	2010/11	2011/12	2012/13	Total
Annual capex ($M)	3.3	3.7	6.3	4.3	0.0	17.6

Note – using ElectraNet proposed cost escalators.

6.4.8 Transformer Security Measures

Proposed Cost	Proposed commissioning	Category
$17.7m	2013	Compliance

ElectraNet has identified a number of additional substation security measures in addition to perimeter security fencing[B] (refer to confidential attachment to this report).

SKM does not consider the need and scope for these items has been adequately demonstrated and defined, and hence it is not possible to assess whether the proposed costs are efficient. On this basis, SKM recommends this project be transferred to the contingent projects category, to be triggered by the conclusion of further investigation to clarify the need and scope of the project.

	2008-09	2009-10	2010-11	2011-12	2012-13	Total
ElectraNet proposal	4.6	2.3	4.6	0.5	5.7	17.7
Adjustment (transfer to contingent)	-4.6	-2.3	-4.6	-0.5	-5.7	-17.7

6.4.9 Torrens Island Secondary Systems and Primary Plant Replacement

Proposed Cost	Proposed commissioning	Category
$10.7M	2013	Replacement (66kV)
$15.1M	2013	Replacement 275kV A)
$10.9M	2013	Replacement (275kV B)
$36.7m	**2013**	**Total**

The Torrens Island secondary systems and primary plant replacement project involves the replacement of the entire secondary system at Torrens Island substation and replacement of four 275kV circuit breakers and ten sets of 275kV CVTs.

The project is required to meet the Rules capital expenditure objectives to:

- maintain the quality, reliability and security of supply of prescribed transmission services.

SKM has reviewed the project and is satisfied that the defined scope reasonably reflects the capital expenditure criteria. The scope does not include the replacement of power station related assets. SKM's review of the cost estimate determined that ElectraNet's estimated cost of $36.7 million is reasonable.

SKM notes that the decision to replace the assets is driven by the condition assessment reports prepared for ElectraNet by Transfield Services. It appears that in determining the assets that require replacement, ElectraNet has referred to the condition assessment reports and subsequently decided not to recommend the replacement of all the assets identified in the condition assessment report as requiring replacement. SKM considers this to be evidence of prudent management of costs, reflecting the risk prioritisation of aged assets in the Asset Management Plan.

ElectraNet's proposed annual expenditure for the project is shown below. SKM has reviewed the cost estimates for this project assessed it as satisfactory. However, SKM has identified a discrepancy between the project SAE cost estimate ($6.6M) and the figure used in the ElectraNet capex collation spreadsheet ($9.1M) for the 66kV replacement portion. When queried, ElectraNet explained this was due to an earlier (more expensive) option that was subsequently revised being used to populate the spreadsheet in error. Accordingly SKM recommends an adjustment as shown below to correct this error. With cost escalation and risk factors added, this error amounts to $2.8M in total.

SKM notes this was the only material instance of such an error identified by SKM, and is not considered to be a systemic issue that would affect SKM's confidence in the overall accuracy of ElectraNet's capex budget collation.

Item	2008/09	2009/10	2010/11	2011/12	2012/13	Total
66kV	-	-	1.6	6.7	2.3	10.7
275kV A	-	-	2.3	9.5	3.3	15.1
275kV B	-	-	1.6	6.9	2.4	10.9
Total	**-**	**-**	**5.5**	**23.1**	**8.0**	**36.7**
Adjustment for cost transposing error	-	-	-0.4	-1.8	-0.6	-2.8
SKM revised total	**-**	**-**	**5.1**	**21.3**	**7.4**	**33.9**

Note – using ElectraNet proposed cost escalators.

6.4.10 Waterloo Substation Rebuild

Proposed Cost	Proposed commissioning	Category
$24.1M	2013	Connection / Replacement

The Waterloo substation rebuild project involves the total rebuild of the Waterloo substation.

The project is required to meet the Rules capital expenditure objectives to:

- maintain the quality, reliability and security of supply of prescribed transmission services.
- meet the expected demand for prescribed transmission services over the period; and
- comply with all applicable regulatory obligations associated with the provision of prescribed transmission services.

SKM has reviewed the project and is satisfied that the defined scope reasonably reflects the capital expenditure criteria. SKM's review of the cost estimate determined that ElectraNet's estimated cost of $24.1 million is reasonable.

SKM initially identified a number of concerns with this project:

- The 2x 10MVA (nameplate) transformers at Waterloo are currently given a cyclical rating of 14MVA, which is just sufficient to meet the 25MVA load at Waterloo (on an "N" basis).
- The Clare North substation project will significantly offload Waterloo, reducing demand to around 12MVA. At the same time, ETC changes require Waterloo to be upgraded to N-1 security. ElectraNet contend that due to the condition of the transformers, they should be returned to 10MVA nameplate rating, and hence will be insufficient to meet the remaining load.
- SKM considers that if the transformers are currently able to supply 14 MVA each (on an N basis, ie they will both be loaded to this level on peak days), it may be feasible to retain a similar emergency rating on an N-1 basis. Each transformer would normally only "see" around 6MVA (12 / 2), and would only be loaded beyond 10MVA in the event of an outage coincident with peak demand.

- ESIPC has indicated it believes there may be 33kV solutions that could further relieve the load at Waterloo (note ESIPC submission). ETSA Utilities have indicated they require the 33kV supply point in the future, and do not consider 33kV upgrade options to be the best solution.
- Some uncertainty regarding timing / need for replacement. May be possible to at least defer for a few years, subject to condition of equipment at Waterloo. It is likely a replacement will ultimately be required, hence the issue it timing rather than the absolute need.

Based on an indication from ETSA Utilities that it requires this substation to be retained as a connection point, SKM considers the replacement is required during the 2008/09 – 2012/13 regulatory period due to the poor condition of the transformers. While the transformer nameplate rating issue may enable the replacement to be deferred for a short time, SKM accepts the transformers are old and in poor condition, and will need to be replaced in the next regulatory period. The detailed planning and regulatory test phase will be important, to ensure that all options, including ETSA Utilities 33kV options, are fully considered. On balance the inclusion of this project in the forecast is not unreasonable.

ElectraNet's proposed annual expenditure for the project is shown below. SKM has reviewed the proposed expenditure profile and assessed it as satisfactory.

Item	2008/09	2009/10	2010/11	2011/12	2012/13	Total
Replacement	-	-	2.6	10.9	3.8	17.3
Connection	-	-	1.0	4.2	1.5	6.7

Note – using ElectraNet proposed cost escalators.

6.4.11 Weather Stations

Proposed Cost	Proposed commissioning	Category
$4.1M	2013	Augmentation

ElectraNet's revenue proposal asserts that the weather stations project is required to meet the Rules capital expenditure objectives to:

- meet the expected demand for prescribed transmission services over the period; and
- maintain the quality, reliability and security of supply of prescribed transmission services.

The weather stations project involves the installation of weather stations at strategic locations across ElectraNet's network to allow the real-time thermal rating of transmission lines.

The economic benefits calculated in ElectraNet's Tailem Bend – Keith – Snuggery consultation appear to demonstrate a substantial market benefit, approximately 10 times the cost of the real-time

rating project. On this basis, it is likely at least some of the proposed projects will be able to pass a market benefits test.

SKM has a number of concerns with this project:

- Costs – we have previously valued weather stations at $60k each, while ElectraNet proposes costs of $50k at substations and $300k along lines. Consideration should be given to mounting weather stations on towers rather than remotely. We are satisfied it is not possible to share BOM data, though windfarm data should be suitable, and could be extrapolated for a considerable distance from the windfarms.
- Probability – all projects are included at effectively 100%, including those related to future windfarms not yet constructed.

On balance, SKM considers the projects are likely to proceed and pass a market benefits test, noting that there were other identified projects assigned a lesser priority that could take the place of any of those included in the budget amount that did not proceed.

SKM does not consider the proposed costs to be reasonable, and that the scope and cost of the "remote" weather stations could be significantly reduced. Based on practices at other TNSPs where weather stations are mounted on the transmission line towers, and the development of line-powered modular devices that can measure and transmit parameters such as line temperature and sag, SKM considers a cost of $300k to be excessive. SKM recommends an allowance of $150k, noting there are a number of such projects that should allow for some cost efficiencies and development of an optimal design and scope. In particular, SKM considers PV power supplies and GSM or other types of communication be considered that may reduce the overall cost, noting that the projects are market benefit rather than reliability or capacity projects, and that reliability of the real time ratings is not critical as the default line ratings will always be available as a backstop.

SKM recommends a revised budget for this project of $2.2m, based on the reduced cost of remote weather stations proposed, and the number of weather stations included in ElectraNet's estimate.

	2008-09	2009-10	2010-11	2011-12	2012-13	Total
ElectraNet proposal	0.82	0.82	0.82	0.82	0.82	4.12
SKM recommended capex	0.44	0.44	0.44	0.44	0.44	2.20
Adjustment	-0.38	-0.38	-0.38	-0.38	-0.38	-1.92

Note – using ElectraNet proposed cost escalators.

6.4.12 Whyalla Terminal Rebuild

Proposed Cost	Proposed commissioning	Category
$48.9M	2010	Connection / Replacement

The Whyalla terminal rebuild project involves the total rebuild of the Whyalla terminal and the rearrangement of lines between Whyalla and Cultana.

The project is required to meet the Rules capital expenditure objectives to:

- maintain the quality, reliability and security of supply of prescribed transmission services.
- comply with all applicable regulatory obligations associated with the provision of prescribed transmission services.

SKM has reviewed the project and is satisfied that the defined scope reasonably reflects the capital expenditure criteria. SKM's review of the cost estimate determined that ElectraNet's estimated cost of $48.9 million is reasonable.

ElectraNet's proposed annual expenditure for the project is shown below. SKM has reviewed the proposed expenditure profile and assessed it as satisfactory.

Item	2008/09	2009/10	2010/11	2011/12	2012/13	Total
Replacement	27.0	14.6	0.0	0.0	0.0	41.6
Connection	4.7	2.6	0.0	0.0	0.0	7.3

Note – using ElectraNet proposed cost escalators.

6.4.13 Enterprise system (SAP) - Upgrades and Support Packs

Proposed Cost	Proposed commissioning	Category
$4.3M	2010	Non-network (IT)

ElectraNet's current version of SAP 4.6cis a 2001 release that is currently incurring additional "extended maintenance" support costs, and ElectraNet has been advised there will be no vendor support available from 2009. ElectraNet have invested significant capital and training in SAP systems, and it is not considered practical or cost effective to change to a different platform.

ElectraNet propose to upgrade their existing SAP software to the current supported release and various support and reporting tools. ElectraNet has estimated the project costs based on a workshop to identify needs, conducted by a SAP service provider who provided cost estimates.

SKM considers this project to be prudent and efficient, and that the costs are reasonable.

6.5 Findings of Contingent project reviews

ElectraNet proposed 17 contingent projects in its Revenue Proposal. Those 17 projects can generally be categorised into one of three main project types. They are market benefit driven projects, new connection application driven (ETSA Utilities) or significant increases in network loads.

ElectraNet have briefly detailed each of the 17 contingent projects. For each of the 17 projects, ElectraNet have defined at a high level, the project requirement, project scope, the trigger event that would be required (or assumed) to initiate the project, and the order of magnitude of the project cost. SKM supports this approach to defining the contingent projects.

SKM did not review each of these projects in detail. We are of the view that there are too many uncertainties in load and network development that could occur in the intervening years, to allow a meaningful review of both project scope and estimate. Accordingly, SKM's review is a high level review of the project categories.

Each of these project categories shall now be analysed in more detail though still at a high level. It is worth noting that for each of the 17 projects, ElectraNet advised that the final scope of works and therefore an accurate estimate of project cost would not be determined until after the trigger event has occurred. In determining the final / actual scope of works, all actual network conditions would feed into the project scoping decisions. Further, ElectraNet notes that only after the detailed project cost estimate was determined based on the actual scope of the project at the time, would a variation to the revenue determination be considered – presumably also then taking into account whether the project cost exceeded the threshold limit. SKM supports this approach to contingent projects.

6.5.1 Market Benefits Projects

ElectraNet identified four projects as being triggered by an application of the Regulatory Test that would demonstrate that the project would deliver net market benefits. These projects are listed in Table 36, below.

Table 36: Contingent Projects – Net Market Benefits

	Project Description	Estimated Project Cost
Contingent Project 13	Tailem Bend to Tungkillo Reinforcement	$41m
Contingent Project 14	Parafield Gardens West	$14m
Contingent Project 15	Para – Brinkworth – Devonport 275kV lines	$12m
Contingent Project 16	Heywood Interconnection Capacity Upgrade	$80m

As described above, the project descriptions for the contingent projects are defined at a high level only, as are the trigger events. SKM has reviewed the project initiating events (trigger events) and

considers that for each contingent project they represent a credible event that could perceivably impact on the transmission network, though the timing of that event is uncertain.

Each of these projects is triggered by an application of the Regulatory Test that would demonstrate that the project would deliver net market benefits. SKM also understands that all South Australian electricity customers generally would benefit from these projects. Due to the similarities in the cost recovery and revenue regulation for the transmission and distribution systems, it is to some extent academic whether the costs associated with the project are assigned to the distribution or the transmission system, provided the solution implemented is demonstrably the optimum overall solution resulting from a joint planning process.

Contingent project 14 is slightly different however, as SKM understands that it would be a significant expansion in capacity by any of the Pelican Point, Torrens Island or Western Suburbs generation facilities that would trigger the project need. SKM expects costs associated with this project would normally be met by the generator that undertook the expansion as a negotiated transmission service, and as such would be outside the scope of the capital provisions for prescribed transmission services. SKM accepts there may be a "market benefits" portion of the project's deep connection costs that would fall under the provisions for prescribed services, but questions whether this component is likely to exceed the $10.4m contingent project threshold when the whole project is estimated to cost $14M. As it is difficult to determine what component is likely to be regarded as prescribed given the high degree of uncertainty at this stage of the project, SKM cannot categorically state it considers including this project as a contingent project is unreasonable. SKM does, however, recommend ElectraNet reconsider how it chooses to classify this project, bearing in mind that if triggered it would subsequently fail the contingent project test if the prescribed component was less than $10.4 million.

SKM notes that the timing of the projects are uncertain, and that being contingent may not occur during the next Regulatory determination period. SKM further notes that ElectraNet comments that "If the trigger event occurred, the proposed contingent project would be required to meet the Rules capital expenditure … and to comply with all applicable regulatory obligations associated with the provision of prescribed transmission services." SKM also notes that the trigger event includes the application of the Regulatory Test demonstrating that the project would deliver net market benefits. SKM supports this approach.

SKM considers that all contingent projects in this category exceed the $10.4 million threshold limit, and meet the other requirements for contingent projects.

6.5.2 New Customer Connections

ElectraNet identified six projects as being triggered by the receipt of a new connection application. These projects are listed in Table 37 below.

- **Table 37: Contingent Projects – New Customer Connection**

	Project Description	Estimated Project Cost
Contingent Project 8	Fleurieu Peninsular Reinforcement	$65m
Contingent Project 9	Murray Mallee Reinforcement	$34m
Contingent Project 10	Munno Para Reinforcement	$26m
Contingent Project 11	Lucindale West Reinforcement	$17m
Contingent Project 12	Western Suburbs Reinforcement	$15m
Contingent Project 17	Northern Transmission Reinforcement	$250m

As described above, the project descriptions for the contingent projects are defined at a high level only, as are the trigger events. SKM has reviewed the project initiating events (trigger events) and considers that for each contingent project they represent a credible event that could perceivably impact on the transmission network, though the timing of that event is uncertain. SKM notes that ETSA Utilities has advised ElectraNet of the potential need for these new connection points.

Each of these contingent projects is dependant upon an application for a new or increased capacity connection to the transmission network by a third party. The timing of the project is not under the influence of ElectraNet, and may not occur during the next Regulatory determination period. SKM further notes that ElectraNet comments that "If the trigger event occurred, the proposed contingent project would be required to meet the Rules for capital expenditure … and to comply with all applicable regulatory obligations associated with the provision of prescribed transmission services." SKM supports this approach.

Each of these projects are triggered by an application for a new connect point by ETSA Utilities and would be required to supply South Australian electricity customers. These triggers are considered credible events.

Contingent project 17 is different however, as SKM understands that it would be a connection application that would primarily serve one customer (Olympic Dam). While it is likely a considerable portion of this project would be considered as negotiated transmission service, it is also likely given the size of the load in proportion to the SA state load that there will be some deep connection costs that may be included in the regulated assets. Given this uncertainty regarding the final project scope and load, and treatment of final costs, SKM considers it reasonable this project be included as a contingent project, as there could conceivably be a $10.4m prescribed component in a project potentially up to $250M. The trigger is considered a credible event.

SKM notes that the cost estimate for each of these projects exceed the threshold limit for a contingent project as part of ElectraNet's regulatory submission, and the other requirements for contingent projects. SKM also notes ElectraNet's comment that "A detailed project scope and cost estimate will be required before any amendment to the revenue determination is considered by the AER …". On this basis SKM recommends these projects be accepted as contingent projects.

6.5.3 Significant Load Increases

ElectraNet identified seven contingent projects as being triggered by a quantum step load increase. These projects are listed in Table 38, below.

Table 38: Contingent Projects – Net Market Benefits

	Project Description	Estimated Project Cost
Contingent Project 1	Eyre Peninsular Reinforcement	$150m
Contingent Project 2	Riverland Reinforcement	$130m
Contingent Project 3	Yorke Peninsular Reinforcement	$41m
Contingent Project 4	South East Reinforcement	$33m
Contingent Project 5	Bungama Reinforcement	$12m
Contingent Project 6	Southern Suburbs	$16m
Contingent Project 7	Playford (Davenport) to Leigh Creek 132kV Transmission Line	$11m

As described above, the project descriptions for the contingent projects are defined at a high level only, as are the trigger events. SKM has reviewed the project initiating events (trigger events) and considers that for each contingent project they represent a credible event that would trigger credible constraints on the transmission network, though the timing of that event is uncertain. Each trigger represents a quantum increase in load, and are considered credible.

SKM notes that the timing of the project is uncertain, the scope of works described represents one of a number of possible solutions, and that being a contingent project, may not occur during the next Regulatory determination period. SKM further notes that ElectraNet comments that "If the trigger event occurred, the proposed contingent project would be required to meet the Rules capital expenditure … and to comply with all applicable regulatory obligations associated with the provision of prescribed transmission services." SKM supports this approach.

SKM notes that all contingent projects in this category exceed the $10.4m threshold limit.

SKM notes that the concept of specifying as a contingent, a project that would become required to accommodate a step function increase in load is supported by ESIPC[24].

6.5.4 Review of Contingent Project Cost Estimates

SKM notes ElectraNet's advice that a detailed scope for each contingent project would be developed only after the trigger event has occurred, and that a more precise project estimate would subsequently be developed.

For this review however, SKM has used our asset valuation data base to independently determine an estimated project cost based solely on the scope of works provided for the individual projects as detailed in Appendix H of ElectraNet's Revenue Proposal. As each project will be more accurately estimated after the trigger event occurs, SKM has estimated the project cost for the six projects whose estimate cost are close to the threshold value of $10.4m as listed in Table 39 below.

Table 39: Contingent Projects – Costs Reviewed

	Project Description	Estimated Project Cost
Contingent Project 5	Bungama Reinforcement	$12m
Contingent Project 6	Southern Suburbs	$16m
Contingent Project 7	Playford (Davenport) to Leigh Creek 132kV Transmission Line	$11
Contingent Project 12	Western Suburbs Reinforcement	$15m
Contingent Project 14	Parafield Gardens West	$14m
Contingent Project 15	Para – Brinkworth – Davenport 275kV lines	$12m

Within the accuracy that is provided by the project descriptions and the asset valuation data base, SKM's estimate for each of these projects was in reasonable agreement with the ElectraNet estimate, and in each instance, in excess of the threshold value for inclusion as a contingent project at this determination.

SKM notes, however, that a number of these projects are close to the $10.4m threshold for ElectraNet to classify a project as contingent. Based on SKM's understanding of the contingent projects provisions of the NER and SRP, there is an onus on TNSPs to demonstrate the requirements for contingent projects are met when an application is made for an adjustment, including demonstrating the trigger and cost threshold conditions are met. If a project is subsequently found to be below the threshold it would, under SKM's interpretation, be ineligible and hence no revenue adjustment would be available to the TNSP until the subsequent revenue

[24] ElectraNet Transmission Network Revenue Proposal – Vol 1, Appendix I – ESIPC letter dated 30 May 2007, page 2, contingent projects

determination. In SKM's opinion this potentially constitutes a perverse incentive for TNSPs not to seek the most efficient option if this would reduce the cost below the threshold. If this interpretation is correct, SKM recommends this matter be considered by AEMC and the AER to determine if it was the intention of the contingent projects provisions. ElectraNet may also wish to reconsider how it has defined some of these projects in light of this risk.

6.6 SKM Findings regarding future capex

Based on the detailed project reviews, and SKM's assessment of ElectraNet's governance and asset management systems, SKM has formed a view on the likely prudency and efficiency of the proposed capex program as a whole. The areas considered and the relevant findings are discussed below.

6.6.1 Project Scope

In general, SKM observed that the projects reviewed were prudently scoped to meet the network or other requirements of the defined planning horizon for ElectraNet. While there is still considerable uncertainty regarding the final scope of many projects given their current state of development, the options identified were generally found to be reasonable and there was evidence of a reasonable consideration of alternatives.

SKM found two projects where it considers there are significant issues with project scope proposed by ElectraNet. These are:

- The CBD reinforcement project, where uncertainty regarding the line route and mix between underground and overhead construction leads to variation in cost estimates for the project of up to $26 million. This amount is considered to be material and hence it is not possible to determine the efficient costs for this project.
- the transformer ballistic proofing project, where SKM considers the context and requirements of the project have not yet been adequately defined in terms of rigorously assessing the credible threats. On this basis SKM considers it is not possible to adequately define the project scope, but notes the scope selected by ElectraNet appears to be appropriate for the threats identified by ElectraNet.

This issue of scope uncertainty is not considered to be systemic, and only relates to these two projects, where SKM has made specific recommendations regarding making the projects contingent upon greater certainty in the project scope.

Based on the projects reviewed and observations of ElectraNet's planning and governance processes, SKM has formed the view that ElectraNet has undertaken a reasonable review of project

scopes and options, and selected the most efficient project for implementation, in accordance with good industry practice and in line with what would be expected from an efficient network operator.

6.6.2 Project Governance and Justification

The new capital governance regime ElectraNet has progressively introduced over the past few years is more consistent with a quality system and contains appropriate controls, checks, accountability, reviews and approval gateways. There is evidence it is being used and actively enforced, with the required documents and approvals in place for a number of projects sampled, and rigorous management reporting and compliance auditing is being undertaken. Aside from a few minor concerns detailed in §3.1 SKM considers the project management and governance processes recently developed and implemented to be in line with good industry practice.

ElectraNet's asset management approach has been reviewed and updated in recent years, and in SKM's view is sound and in line with good industry practice. Detailed asset inspections and condition assessments have been undertaken for all major items of equipment, and incorporated into a detailed Asset Management Plan. A long term "Network 2025 Vision" has been developed to address long term load growth, ageing assets, regulatory requirements and customer expectations. Regional Development Plans and Asset Management Plans are developed to support these asset and planning strategies, and feed into the capital and maintenance works programs.

Load forecasts used as the basis for planning were reviewed and found to be appropriate and reasonable. Connection point forecasts are provided by customers (ETSA Utilities and direct connect large users) with the "contracted demand" mechanisms providing a strong incentive to accurately forecast demand. As the jurisdictional planning body, ESIPC provides independent load forecasts that SKM considers are rigorous and represent best practice. ESIPC has reconciled connection point forecasts against its own system wide forecast, and found a high degree of consistency, providing further confidence in the load forecasts.

Additional generation forecasts and scenario modelling has been undertaken for ElectraNet by ROAM consulting. The basis of these forecasts was considered reasonable, and the scenario modelling process sound and in line with good industry practice.

ElectraNet's network analysis and planning processes were reviewed, as were the details of the need and technical justification of the projects selected for detailed review. In each of these instances SKM found the planning analysis and decisions to be sound, and in line with good industry practice. SKM notes that ESIPC has conducted a detailed independent review of upcoming network constraints and other issues, and in the whole supports ElectraNet's proposed suite of capital projects.

On balance, SKM has formed the view that ElectraNet's governance and planning processes are in line with good industry practice, and support the development of projects that meet the prudency and efficiency requirements.

ElectraNet's procurement and project management policies were reviewed, and found to support efficient delivery of projects. ElectraNet has recently moved to a "two contractor" model for capital works, in order to ensure there is sufficient workload and certainty for its contractors to engage and retain the resources required to meet ElectraNet's capital works programme. This model appears to be working well, and ElectraNet has been able to significantly increase its capital works budget in recent years. Project management processes have been reviewed and updated, resulting in changes and improvements that should address the concerns SKM identified with project management early in the current regulatory period.

6.6.3 Project Costs Estimates

Over the course of the current regulatory period, ElectraNet has adopted a project cost estimating system developed by Powerlink. ElectraNet has now integrated this package into its project planning and governance process, and expects this will significantly improve the accuracy of its cost estimates which were found to be inaccurate and systemically underestimating costs early in the current regulatory period..

SKM prepared independent cost estimates for each of the projects selected for detailed review, and found ElectraNet's costs to be in line with what it would consider reasonable and efficient, within the level of uncertainty expected.

6.6.4 Replacement expenditure

Management and replacement of ageing assets has been assessed using a risk assessment methodology in line with good industry practice, and supported by detailed condition assessments. Strategies have been developed to extend the reliable economic life of major plant. Candidates for replacement are identified using a condition and risk ranking approach, with a further "Asset Replacement Recommendation Report" assessment undertaken.

There is evidence that ElectraNet has sought to extend asset lives where possible, and SKM would expect further opportunities to defer replacements in subsequent regulatory periods will arise as a result of the increased condition assessment and maintenance opex activities.

It is difficult to assess individual replacement projects, as there will always be uncertainty regarding the condition and remaining life of assets, and hence the optimum timing for replacement. ElectraNet have adopted good industry practice in conducting condition assessments, undertaking a rigorous risk assessment and ranking process, and refining this where appropriate in

consideration of other factors such as augmentation projects. ElectraNet's planned replacement projects will retain the overall risk and average age of the network at a level consistent with the start of the upcoming regulatory period, which SKM considers to be a reasonable and prudent approach. SKM notes there is a substantial proportion of aged assets on the ElectraNet network, and allowing a significant increase in the number of "end of life" assets on the network would result in significant and unacceptable increases in the overall risk ranking of the network. Overall, SKM considers the proposed ranking and level of replacement projects to be reasonable.

6.6.5 Ex-ante project allowance

ElectraNet is seeking a significant increase in its capital budget under its ex-ante capital allowance for prescribed transmission services in the upcoming regulatory period. ETC changes are driving a significant proportion of the capex sought for the upcoming period, in particular the CBD Reinforcement project. Of the projects reviewed in this category SKM generally found the projects were justified, prudent and efficient.

ElectraNet has also proposed a substantial increase in its budget for replacement of aged assets. SKM found evidence that replacements are based on appropriate condition assessment and risk ranking, and that ElectraNet's "Asset replacement recommendation report" screening stage resulted in a number of instances where a decision was taken to *not* replace assets in the upcoming period (for example the Happy Valley substation).

SKM is satisfied the proposed projects relate to prescribed transmission services, and any negotiated component of projects has been excluded from the proposed ex-ante capex allowance for prescribed transmission services.

SKM has recommended a number of minor adjustments to the ex-ante capex allowance and based on the projects reviewed in detail has formed a view that the remainder of the projects are likely to be justified, prudent and efficient.

6.6.6 Contingent projects

SKM has reviewed the projects nominated by ElectraNet as contingent projects, and considers each of these meet the criteria for contingent projects, but notes that a number of these projects are close to the threshold value of $10.4m for ElectraNet and there is a risk they would subsequently fail to meet the requirements should a lower cost option be identified at the time they are triggered.

Two contingent projects (#14 "Parafield Gardens West" and #17 "Northern Transmission Reinforcement") are likely to be largely negotiated transmission services, though it is possible there will be a prescribed deep connection component that provides a net market benefit, and hence SKM has not recommended they be rejected as contingent projects. SKM notes, however, that for

Contingent project #14 in particular there is a strong chance the prescribed component may not meet the $10.4m threshold, and recommends ElectraNet discuss with AER how these projects should best be treated in light of the uncertainty and effect of the current regulations.

6.7 Conclusion and recommendations

From its review of ElectraNet's planning and governance processes and the projects reviewed, SKM is of the view that ElectraNet's proposed future capex is likely to be prudent and efficient.

Based on the findings of the reviewed projects, SKM has not identified any issues or problems it considers serious or likely to be systemic, and found that projects were generally prudent and efficient. On this basis, SKM recommends that ElectraNet's Future Capex be accepted as reasonable, subject to the recommended adjustments per the table below.

As part of its review of ElectraNet's opex application SKM identified a number of projects it considers should be regarded as capex rather than opex (see §7.6.2.5). These costs are added accordingly. Note that a separate recommended adjustment related to above CPI escalation in capital costs is covered in §5.9.

Table 40 SKM Recommended ex-ante capex adjustments ($2007/08M)

Item	Ref.	2008-09	2009-10	2010-11	2011-12	2012-13	Total
ElectraNet Proposed	**6.1**	**200.2**	**218.2**	**164.6**	**129.5**	**65.6**	**778.1**
Playford escalation correction	6.4.6	-0.6	-2.7	-0.9	-	-	**-4.2**
Weather stations efficient costs adjustment	6.4.11	-0.38	-0.38	-0.38	-0.38	-0.38	**-1.92**
TIPS 66kV incorrect forecast used	6.4.9	-	-	-0.4	-1.8	-0.6	**-2.8**
Subtotal – adjustments		*-0.98*	*-3.08*	*-1.68*	*-2.18*	*-0.98*	*-8.92*
SKM transfer of opex projects to capex	7.6.2.5	2.93	2.98	3.04	3.09	3.14	**15.18**
Subtotal – total change		*1.95*	*-0.1*	*1.36*	*0.91*	*2.16*	*6.26*
SKM Recommended		**202.15**	**218.1**	**165.96**	**130.41**	**67.76**	**784.36**

Note – Totals may not add due to rounding. All figures using ElectraNet original escalators.

SKM has also recommended two items where it considers the scope is uncertain and it is not possible to determine efficient costs accurately, and that should be transferred to contingent projects. These are shown in the table below.

SKM

- **Table 41 SKM Recommended Re-classification of projects as Contingent ($2007/08M)**

Item	Ref.	2008-09	2009-10	2010-11	2011-12	2012-13	Total
ElectraNet Proposed	**6.1**	**200.2**	**218.2**	**164.6**	**129.5**	**65.6**	**778.1**
With SKM changes		**202.15**	**218.1**	**165.96**	**130.41**	**67.76**	**784.36**
CBD project uncertain OH/UG route costs	6.4.1	-21.9	-60.2	-21.9	-	-	**-104.0**
10809 Transformer Ballistics proofing	6.4.8	-4.6	-2.3	-4.6	-0.5	-5.7	**-17.7**
Total transfer to contingent		**-26.5**	**-62.5**	**-26.5**	**-0.5**	**-5.7**	**-121.7**
SKM final recommended ex-ante		**175.65**	**155.6**	**139.46**	**129.91**	**62.06**	**662.66**

Note – Totals may not add due to rounding. All figures using ElectraNet original escalators.

Finally, SKM has estimated the impact of all recommendations relating to ex-ante capex, by applying its alternative escalation factors proposed in 5.6, as shown in the table below:

- **Table 42 SKM Final Recommended Ex-ante Capex ($2007/08M)**

Item	Factor	2008-09	2009-10	2010-11	2011-12	2012-13	Total
ElectraNet Proposed	*	**200.2**	**218.2**	**164.6**	**129.5**	**65.6**	**778.1**
SKM final recommended ex-ante	**	**175.65**	**155.6**	**139.46**	**129.91**	**62.06**	**662.66**
De-escalate (07-08, no real price increase)	6.62%	164.7	145.9	130.8	121.8	58.2	621.5
De-escalate (06/07)	5.02%	156.9	139.0	124.5	116.0	55.4	591.8
Re-escalate (07-08, no real price increase)	3.59%	162.5	144.0	129.0	120.2	57.4	613.1
SKM proposed escalators		1.007	1.017	1.031	1.045	1.060	
Re-escalate (07-08, with SKM real price increase)		**163.6**	**146.4**	**133.0**	**125.6**	**60.9**	**629.5**

** using ElectraNet original escalators.*

*** using ElectraNet original escalators. Includes recommended adjustments, transferred opex projects, and reduction due to projects transferred to contingent.*

SKM recommends the contingent projects nominated by ElectraNet be accepted as reasonable, but notes ElectraNet bears some risk that some of these projects could subsequently fail to meet the $10.4 million threshold value if triggered. In light of this consideration ElectraNet may wish to reconsider how it chooses to classify these projects.

7. Operating expenditure

7.1 ElectraNet's Opex Proposal

The ElectraNet Transmission Network Revenue Proposal provides ElectraNet's forecast operating expenditure (Opex) requirements for the forthcoming regulatory control period.

Two general approaches have been taken in developing this forecast. The forecasts for some expenditure items have been based on expenditure in 2005/06 as the base year. This is the most recent year for which audited financial accounts were available.

The second approach is referred to as "zero-based" where expenditure forecasts have been built up from the detailed program of physical works planned over the regulatory period. The application of these two approaches is discussed in more detail in later sections of this report.

The resulting forecast proposes a 31% real increase in controllable opex when compared with the forecast expenditure for the last 5 years of the current regulatory period (see Table 49 in section 7.3.3).

ElectraNet's operating expenditure forecast is summarised in Table 43:

Table 43 ElectraNet Operating Expenditure Proposal (original) ($m 2007-08)

Opex category	2008-09	2009-10	2010-11	2011-12	2012-13	Total
Field Maintenance	23.6	24.2	25.3	26.4	26.4	125.9
Field Support	8.1	8.6	8.9	9.5	10.0	45.1
Operations	2.0	2.0	2.1	2.2	2.3	10.6
Asset Manager Support	6.4	6.5	6.6	6.8	6.9	33.1
Corporate Support	14.1	14.5	15.4	16.4	16.9	77.3
Total Controllable	**54.2**	**55.8**	**58.4**	**61.3**	**62.5**	**292.1**
Network Support	4.7	4.9	5.1	5.6	7.0	27.3
Debt Raising	0.6	0.7	0.8	0.8	0.8	3.7
Equity Raising	0.2	0.2	0.2	0.2	0.2	0.8
TOTAL	**59.6**	**61.5**	**64.4**	**67.8**	**70.5**	**323.8**

Source: ElectraNet Revenue Proposal; Columns and rows may not add due to rounding

During its review SKM identified what it considered to be a number of errors in ElectraNet's opex collation spreadsheet. ElectraNet has acknowledged there were a number of summation and formula errors, and has issued a corrected version of the spreadsheet. ElectraNet has advised it regards these as mathematical errors and had intended its opex application to be as per the

corrected version of this spreadsheet, and that SKM should regard this corrected version to be ElectraNet's revised opex application.

- **Table 44 Corrections to ElectraNet original Opex Proposal (2007/08 $m)**

	2008-09	2009-10	2010-11	2011-12	2012-13	Total
ElectraNet Proposal Opex forecast	**54.16**	**55.84**	**58.35**	**61.27**	**62.46**	**292.08**
Labour component of maintenance	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	(0.07)
Missing line routine tasks	0.29	0.29	0.29	0.29	0.29	1.45
Spreadsheet error in routine maintenance model	1.01	1.01	1.01	1.01	1.01	5.04
Application of maintenance efficiency factors	(0.22)	(0.24)	(0.26)	(0.28)	(0.30)	(1.30)
Spreadsheeting error in substation opex projects	(0.60)	(0.61)	(0.62)	(0.63)	(0.64)	(3.12)
Subtotal – total corrections	*0.45*	*0.41*	*0.39*	*0.35*	*0.31*	*1.91*
ElectraNet Revised Opex forecast with SKM and EN corrections	**54.61**	**56.25**	**58.74**	**61.62**	**62.77**	**293.99**

Note: Because of inter-relationship between a number of these adjustments, the combined impact is not equal to the sum of the individual components.

ElectraNet's revenue proposal is presented under well accepted expenditure categories as listed in Table 45 below.

- **Table 45 Opex Cost Categories**

Opex Cost Categories		
Direct O&M	Field Maintenance	Routine
		Condition Based
		Corrective
		Opex projects
	Field Support	Field support
		Direct Charges
	Operations	Network Switching
		Asset monitoring
Other Controllable	Asset Manager Support	Grid Planning
		Project Support
		IT Support
		Customer & Regulatory Support
	Corporate Support	Insurance
		Corporate Support
Other Opex	Network Support	
	Debt Raising	
	Equity Raising	

SKM's review of each opex category considers the operating expenditure factors and applies the operating expenditure criteria to each category to determine whether the expenditure is required to meet ElectraNet's operating expenditure objectives.

As a general comment, SKM believes that the forecast methodologies adopted by ElectraNet are justified given the change in corporate asset management policy. SKM has some concerns with the apparent efficiency of the forecast opex over the regulatory period and these concerns are discussed more widely in this chapter of the report.

7.1.1 SKM Approach

In reviewing the ElectraNet proposed opex forecast, SKM considered a range of issues including:

- Efficiency of the opex spend in the base year and in the forecast years.
- Apparent under-expenditure in the current regulatory period.
- Escalation factors used in extrapolating from the base year to the forecast years.
- ElectraNet's adoption of a new asset management regime and its impact on routine maintenance costs.
- Basis and reasonableness of "zero-based" forecasts for relevant opex categories
- The scope of ElectraNet's proposed "Opex Projects".
- ElectraNet's capitalisation approach.
- A range of other scope changes within operations expenditure categories.

7.2 Historical Opex

Table 46 below details the actual opex through to 2005/06 and the forecast expenditure for the final two years of the regulatory period. Unaudited accounts for 2006/07 suggest that the actual expenditure for that year is very close to the forecast.

- **Table 46 Opex in current regulatory period by category ($m 2007-08)**

Opex category	Jan – Jun 2003	2003-04	2004-05	2005-06	2006-07	2007-08	Total
Field maintenance	5.8	11.2	10.2	18.0	21.0	21.4	87.4
Field Support	2.6	4.8	6.5	6.5	6.6	6.8	33.7
Operations	1.0	2.4	1.7	1.8	1.8	2.0	10.7
Asset Manager Support	4.1	5.8	5.9	5.4	5.4	5.5	32.2
Corporate Support	13.3	15.5	13.5	15.0	13.2	15.0	85.5
Total Controllable	**26.7**	**39.6**	**37.8**	**46.6**	**48.0**	**50.8**	**249.5**
Network Support	2.3	4.2	5.1	4.5	5.1	4.9	26.0
Debt Raising	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Equity Raising	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	**28.9**	**43.8**	**42.9**	**51.1**	**53.1**	**55.7**	**275.5**

Source: ElectraNet Revenue Proposal; Columns may not add due to rounding

Table 47 provides a comparison of the forecast Controllable Opex expenditure over the current regulatory period with the allowance provided in the ACCC's 2002 regulatory Decision.

Table 47 Comparison of Controllable operating expenditure in current regulatory period

	($m 2007-08)						
Controllable Opex	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	Total
ACCC allowance	24.0	48.1	48.0	48.4	49.0	49.3	266.9
Actual / forecast	26.7	39.6	37.8	46.6	48.0	50.8	249.5
Variation	2.6	-8.5	-10.1	-1.8	-1.0	1.5	-17.4

Source: ElectraNet Revenue Proposal; Columns may not add due to rounding

In total, ElectraNet is forecasting an under-expenditure in the current regulatory period of $17.4 million (2007/08 $). The majority of the under-spend results from lower expenditure in 2003/04 and 2004/05. This expenditure pattern of low expenditure in the early years of a regulatory period followed by a significant increase in the "base year" and subsequent years, creates a suspicion of gaming. This is a difficult issue to resolve.

The detailed expenditure categories used in the 2002 regulatory re-set were different to those in current use. Because of this, a direct mapping between the expenditure allowances in the 2002 Decision and the actual expenditure is difficult and open to interpretation. ElectraNet has provided a comparison map which suggests that direct maintenance expenditure (Field Maintenance, Field Support plus Operations) will slightly exceed the allowance provided in the 2002 Decision. Based on this mapping, the under-expenditure did not result from ElectraNet's failure to deliver expected maintenance effort. It is possible to develop alternate mappings which suggest other outcomes. This mapping issue should not be a problem in future revenue re-sets where it will be easier to confirm that under-expenditures relate to real efficiency improvements rather than failure to deliver forecast work.

To overcome this inconsistency, ElectraNet has provided a break-down of where the expenditure savings have been sourced, as shown in Figure 9 below.

Figure 9 Explanation of Efficiencies in Historical Opex

Category	Efficiency achieved	Comment
Restructure - Network Switching	5.1	Reduction of 5 employees Roster reduced to single person overnight and on weekends New processes / systems also achieved significant cost savings
Restructure - Finance	1.9	Reduction of 6 people Reduced treasury function due to fixing of loans Business planning function reduced from 2 to one SAP system simplified payroll admin Move to monthly pays reduced processing Move to SAP from separate Oracle Financials reduced finance IT admin
Restructure - Admin	4.7	Reduction of 10 people SAP system support part of application package from PLQ Automation of goods and services contracting function (aligned with requester not overhead) Compliance and internal audit restructured and consolidated to business risk role Reduction in executive management team by 2 (and associated support staff)
Restructure - Tel	1.2	Reduction of 3 people Efficiencies achieved with purchase of consolidated standards including telecommunications
Restructure - IT	0.3	Reduction of 1 person SAP system allowed reduction of 1 IT admin function
Restructure - monitoring	1.5	Reduction of 6 people Monitoring functions automated Monitoring equipment specified as part of new asset build. Retrofit program reduced
Restructure - Project support	1.3	Reduction of 4 people New drawing management system allowing contractor access to drawings via IT Engineering support restructured
Accommodation	1	Reduced employee numbers allowed cessation of lease arrangements at 212 Frome Rd
IT services	1	Restructure and rebid of IT services from legacy government arrangement with EDS
Workcover	1.5	Workcover exempt status retained despite business size not meeting normal conditions for being exempt
Total	**19.5**	

Source: ElectraNet response to SKM query

Although there are a range of sources for the expected under-expenditure, a significant proportion appears to have resulted from reductions in staffing in Asset Management and Corporate Support areas early in the current regulatory period. It is noted that staffing numbers have since grown to approximately 173, now exceeding the number in place at the beginning of this regulatory period. ElectraNet notes some of this increase in staffing is due to growth in the capital program, and costs associated with these additional staff are capitalised.

Regardless of the source of the expected under-expenditure of opex in the current regulatory period, there is some concern that this has not been directed to asset maintenance given that ElectraNet has now flagged their concern with the general age and condition of the network and is requesting large increases in maintenance expenditure requirements over the forthcoming regulatory period.

7.3 Efficiency Measures

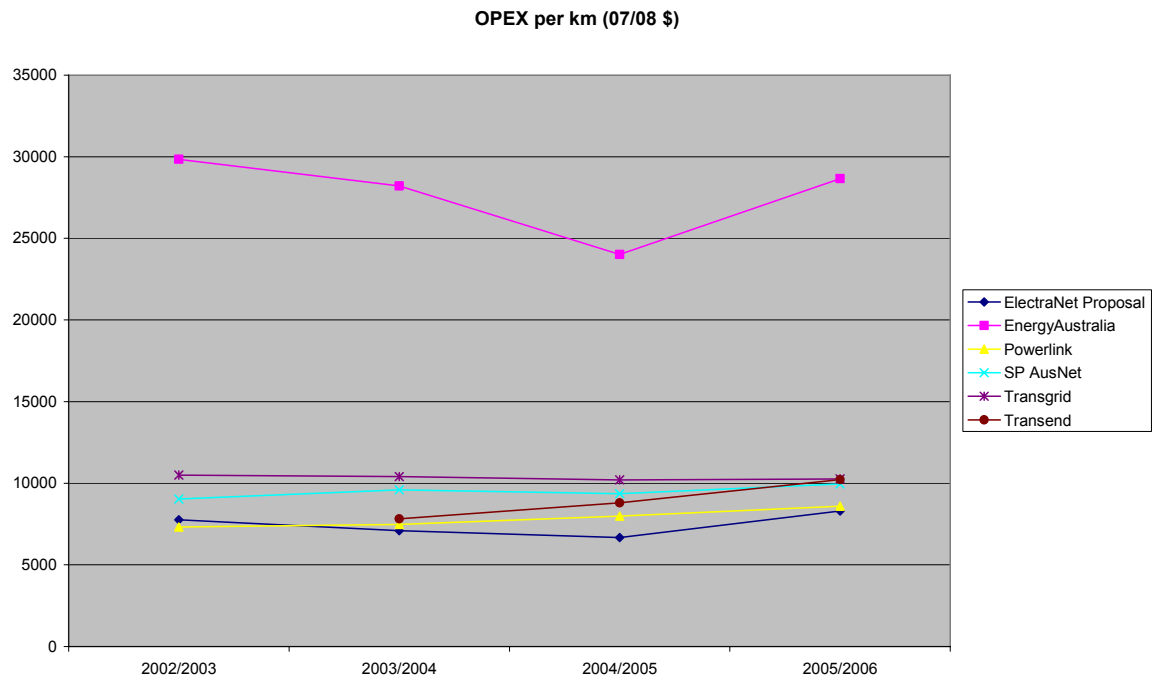
The primary drivers for the operating and maintenance components of the opex are the number and types of assets in service and the condition of those assets. Age is often used as a defacto measure of asset condition. The link between opex and output measures such as energy supplied, system demand or customers serviced is relatively weak. Benchmarking opex against these measures provides limited insight into the efficiency of a transmission entity. Benchmarking against the Regulated Asset Base (RAB) also provides misleading, even contrary, signals. RAB declines as the average age of the assets in service increases while opex would be expected to increase with aging assets. Opex as a percentage of Replacement Cost (RC) is considered a better (though still limited) indicator of overall efficiency but it is a more difficult measure to access in the public domain.

SKM has chosen to use opex per kilometre of line, opex per MVA of installed transformer capacity and opex per transformer (number) to provide some historical comparison between ElectraNet and other Australian transmission entities (see section 7.3.1). Opex as a percentage of Replacement Cost (RC) is used to gauge expected movements in efficiency by asset group over the forecast period for ElectraNet alone.

7.3.1 Comparison with Australian TNSPs

A comparison of Controllable Opex per kilometre of line over recent years (Figure 10) indicates that ElectraNet has been the lowest cost operator on this measure.

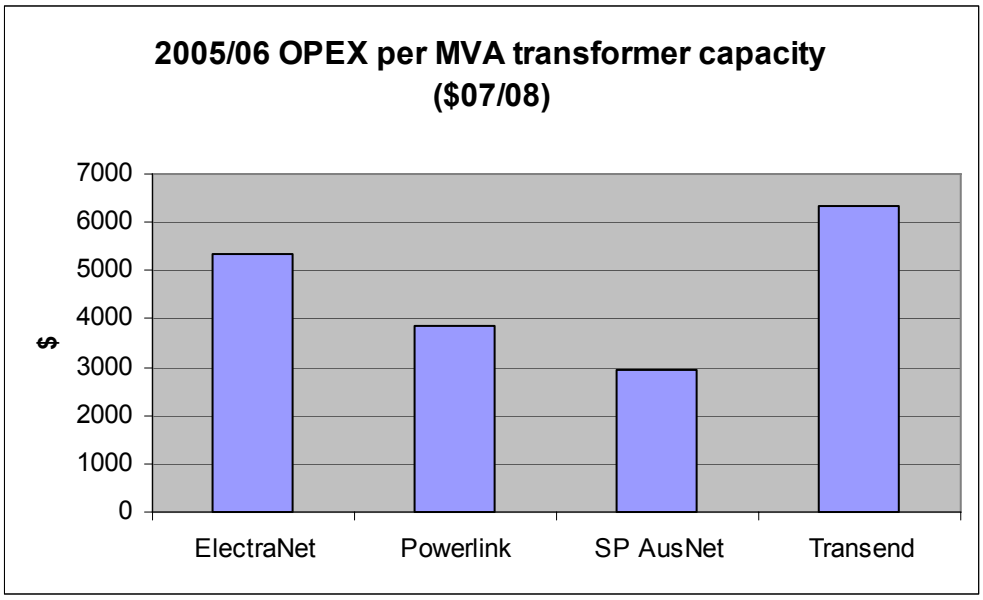
- **Figure 10 Comparison of Opex per kilometre**



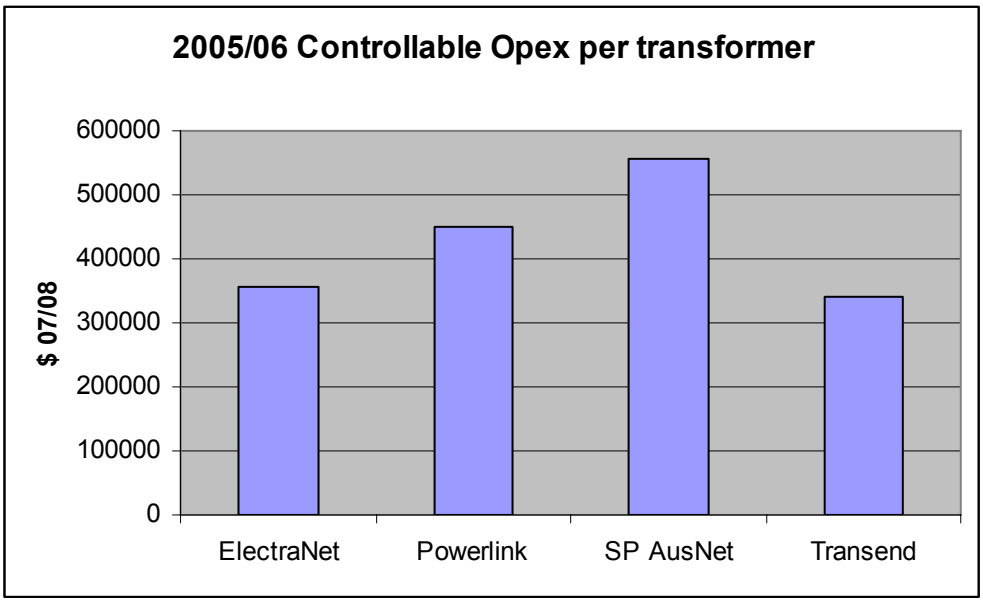
Data for Figure 10 (and following charts) has been sourced from AER's "Transmission Network Service Providers Electricity Regulatory Report 2005/06", ESAA's publication Electricity Gas Australia 2007 and ElectraNet's Transmission Network Revenue Proposal.

An alternate comparison compares opex per MVA of installed transformer capacity. On this measure ElectraNet compares a little less favourably but remains in an acceptable band. However, comparing opex per transformer favours both ElectraNet and Transend because they have a relatively large number of smaller capacity transformers.

- **Figure 11 Comparison of Controllable Opex per MVA**



- **Figure 12 Comparison of Controllable Opex per transformer**

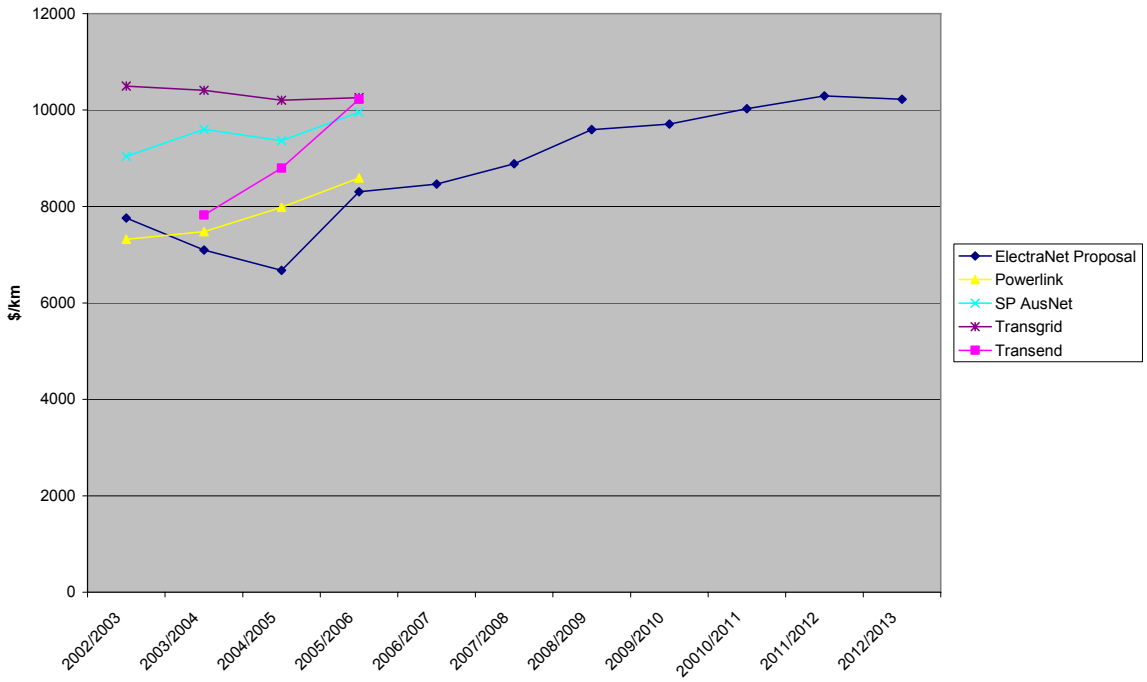


These results indicate that benchmarking needs to be considered with care. However, the results of these high level comparisons are within expectations. ElectraNet operates a geographically extensive network with relatively low total load. With these characteristics in mind, the measure of opex per kilometre is considered to be the most suitable comparator. In the base year of 2005/06

ElectraNet's opex expenditure compared favourably with peer organisations, presenting as the lowest cost operator on this measure.

The impact of the forecast expenditure in ElectraNet's proposal on this measure is shown in the following figure.

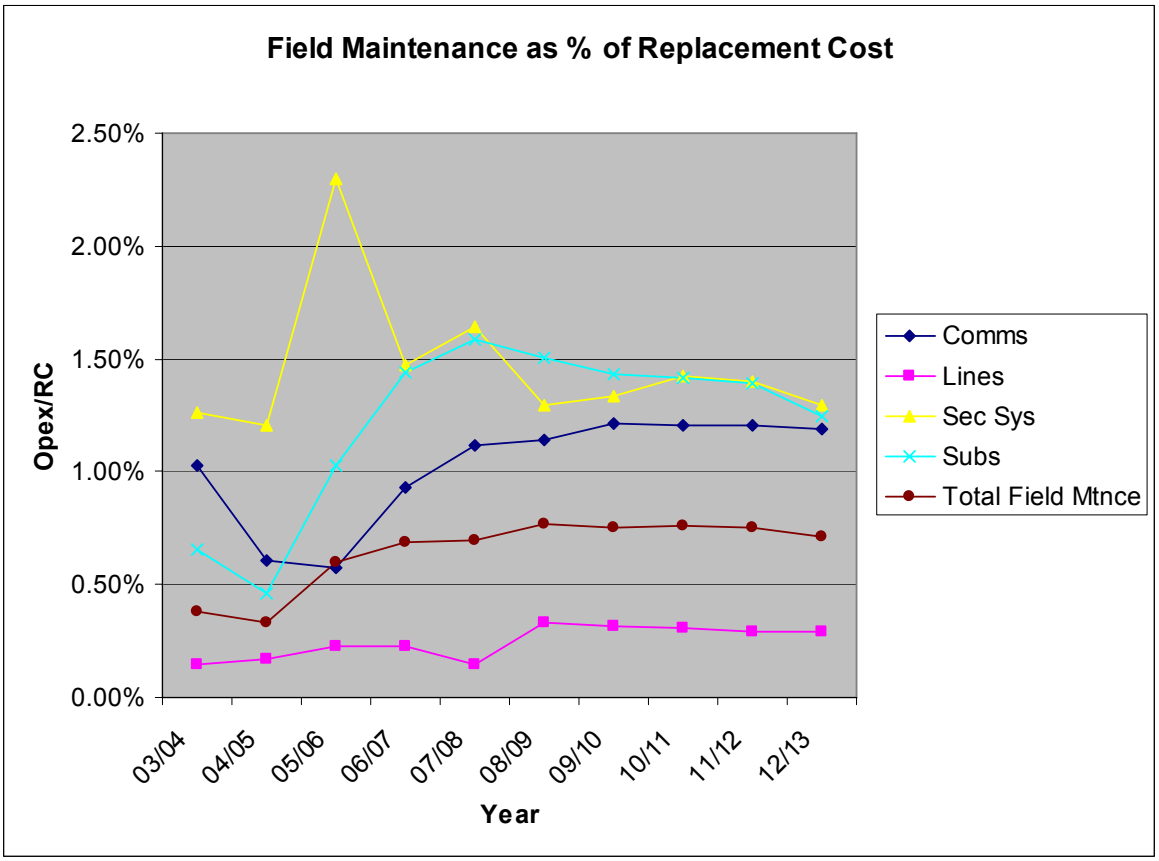
- **Figure 13 Controllable Opex per kilometre over forecast period**



This curve suggests deterioration in relative efficiency over the next regulatory period but the measure remains in the band of comparable entities (subject to any efficiency improvements realised by the comparison organisations over the same period).

It is interesting to consider the field maintenance costs by asset category as a ratio of the replacement cost of the relevant asset category. This removes the impact of asset growth. Replacement cost data is not readily available in the public domain. The figure below tracks the expected movement in these measures for ElectraNet only.

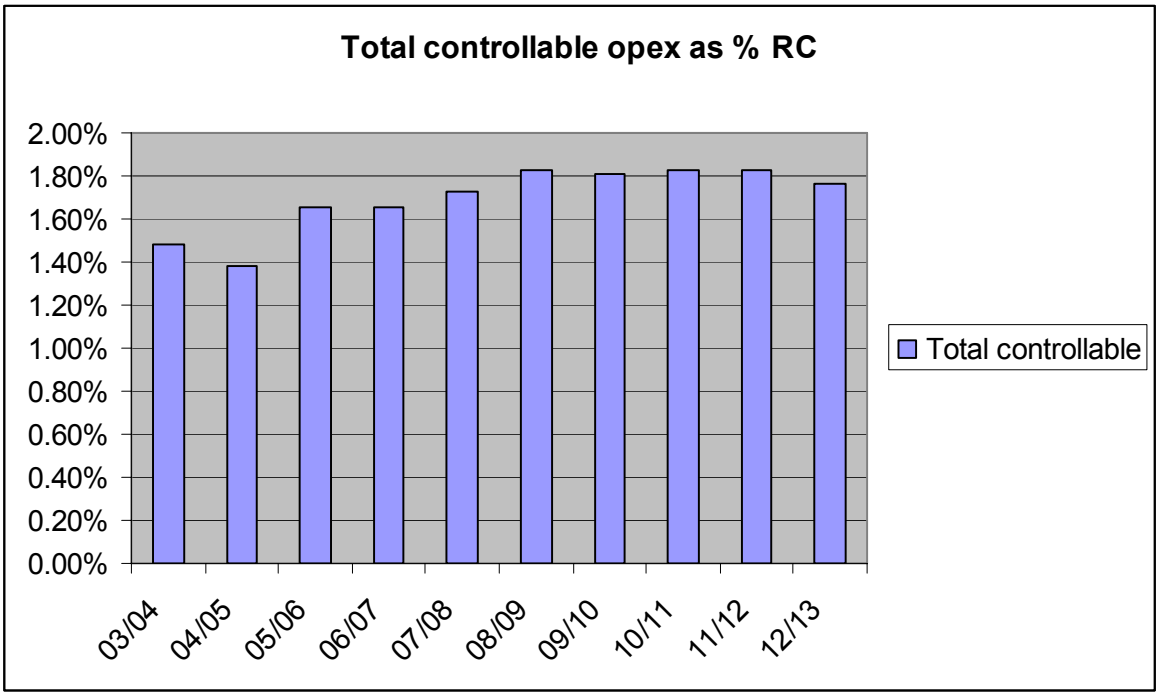
- **Figure 14 Field Maintenance Opex by Asset Category (% of Replacement Cost**



Total field maintenance opex increases from a level of approximately 0.6% of replacement cost in the base year to 0.75% in the longer term. This represents a reduction in ElectraNet's relative competitiveness. The largest increase occurs in substation maintenance which rises from 1.03% in the base year to approximately 1.24% in the longer term but with a peak in 2007/08 of 1.59%. The very low expenditure in 2003/04 and 2004/05 suggests that substation maintenance has been seriously under funded by ElectraNet over recent years. This view is reinforced by Substation Condition Assessment reports provided by ElectraNet and discussed later in this report (section 7.6).

Total controllable opex increases from a level of approximately 1.65% of replacement cost in the base year to 1.8% in the longer term (see Figure 15 below). An efficient level of opex will depend on the mix of assets in service but in SKM's experience this forecast would lie at the top end of a typical range of 1.5-1.8%.

- **Figure 15 Controllable Opex as percentage of Replacement Cost**

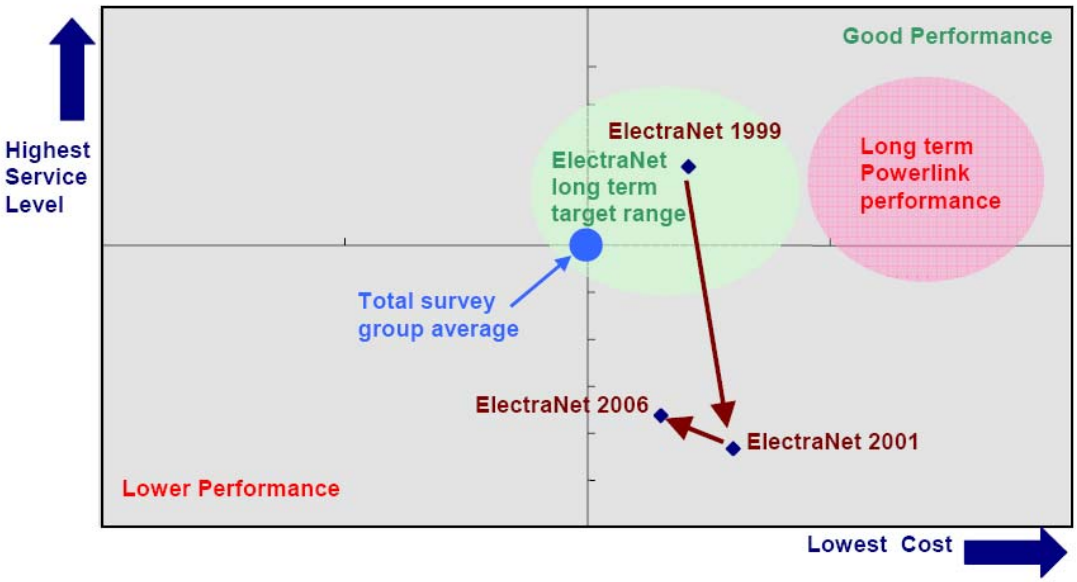


7.3.2 International Comparisons

The International Operations and Maintenance Study (ITOMS) is an international benchmarking study conducted by consultants UMS Group Inc (UMS). It compares at a detailed level the costs and performance of participant organisations across a wide range of Operations and Maintenance (O&M) functions.

ElectraNet participated in this study in 1999, 2001 and 2006. Although ElectraNet was not prepared to share the detailed results of this benchmarking exercise, due to the ITOMS confidentiality agreement, a summary chart was provided and included in the figure below.

- **Figure 16 ITOMS – ElectraNet Performance**



*Long term Powerlink performance sourced from 2001. 2006 revenue proposals

Clearly the best performing entities will map into the upper right quadrant, lowest cost and highest service level. As indicated in Powerlink's revenue proposal, Powerlink has consistently benchmarked well in this comparison and this was at least part of the consideration that led to ElectraNet adopting Powerlink's asset management practices and procedures. ElectraNet's performance suggests a deterioration in result since 1999 particularly in service level. Expenditure has been lower than the average for the survey group and may not have been at a sufficient level to support a sustainable position in terms of service levels.

7.3.3 Comparison of Forecast and historical operating expenditure

A comparison of the forecast and historical opex from ElectraNet's proposal is shown in the following table.

- **Table 48 Historical and forecast opex ($m 2007/08)**

Category	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13
Field maintenance	11.2	10.2	18.0	21.0	21.4	23.6	24.2	25.3	26.4	26.4
Field support	4.8	6.5	6.5	6.6	6.8	8.1	8.6	8.9	9.5	10.0
Operations	2.4	1.7	1.8	1.8	2.0	2.0	2.0	2.1	2.2	2.3
Asset manager support	5.8	5.9	5.4	5.4	5.5	6.4	6.5	6.6	6.8	6.9
Corporate support	15.5	13.5	15.0	13.2	15.0	14.1	14.5	15.4	16.4	16.9
Total controllable	**39.6**	**37.8**	**46.6**	**48.0**	**50.8**	**54.2**	**55.8**	**58.4**	**61.3**	**62.5**
Other opex	4.2	5.1	4.5	5.1	4.9	4.7	4.9	5.1	5.6	7.0
Debt raising costs	0.0	0.0	0.0	0.0	0.0	0.6	0.7	0.8	0.8	0.8
Equity raising costs	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.2	0.2	0.2
Total	**43.8**	**42.9**	**51.1**	**53.1**	**55.7**	**59.6**	**61.5**	**64.4**	**67.8**	**70.5**

Source: ElectraNet Revenue Proposal; columns and rows may not add due to rounding

ElectraNet has provided the following summary of movement in controllable opex.

- **Table 49 Comparison of forecast and historical controllable opex ($m 2007/08)**

Category	Forecast	Historic Spend	Percentage Movement	Explanation of significant variation
Field Maintenance	126	82	54%	Change in asset maintenance regime for aging asset
Field Support	45	31	45%	Additional land tax obligation
Operations	11	10	9%	No significant change
Asset Manager Support	33	28	18%	Additional generator testing obligation
Corporate Support	77	72	7%	Skill development program (offset by efficiencies gained)
Total Controllable	292	223	31%	

Note: historic spend is over the last 5 years of the 5.5 year regulatory period for comparison purposes

These cost categories are considered in more detail in subsequent sections of this report.

Over 60% of the real increase in expenditure requested is directed to Field Maintenance. Within Field Maintenance, the largest increases are in routine maintenance and in opex projects. Other

Controllable Costs (corporate support and other non-direct operations and maintenance expenditure) become a diminishing proportion of the total controllable opex, falling from 53.8% in 2003/04 to 38.1% in 2012/13. This is considered to be a positive trend. The base year (2005/06) is the first year in which Direct O&M exceeds 50% of the total controllable opex.

7.4 Forecast Methodology

7.4.1 Opex Categories

Two quite distinct forecast approaches have been taken within ElectraNet's proposal. Some elements have been escalated from the base year 2005/06, while others have been developed disregarding historical expenditures (zero based). The table below summarises the forecast methodology applied to the various components of the opex forecast.

Table 50 Forecast Methodology applied

Opex Cost Categories			Methodology Applied
Direct O&M	Field Maintenance	Routine	Zero base
		Condition Based	Base year
		Corrective	Base year
		Opex projects	Zero base
	Field Support	Field support	Base year
		Direct Charges	Base year (zero base – Land Tax)
	Operations	Network Switching	Base year
		Asset monitoring	Base Year
Other Controllable	Asset Manager Support	Grid Planning	Base year (zero base – Generator Testing)
		Project Support	Base year
		IT Support	Base year
		Customer & Regulatory Support	Base year (zero base – reset costs)
	Corporate Support	Insurance	Zero base
		Corporate Support	Base year (zero base – skills development and re-set)
Other Opex	Network Support		Zero base
	Debt Raising		Zero base
	Equity Raising		Zero base

7.4.2 Base Year Methodology

The base year forecasting methodology includes:

- Recognition of an efficient base year from which forecasts can be developed. ElectraNet believes that the 2005/06 operating expenditure represents an efficient base level for forecasting purposes – see section 7.5.
- Removing any costs included in the base year which will not be applicable in future years.
- Add costs associated with any new or changed scope of activities expected over the forecast period. Costs associated with new activities would be developed as per the zero base elements of the forecast.
- Escalating costs for increases in equipment and labour inputs plus other cost drivers such as increases in the assets in service.
- Application of relevant efficiency factors.

7.4.3 Escalators

Operating material costs have been escalated at the forecast increase in the Consumer Price Index (CPI). SKM's experience suggests that this is a conservative but reasonable approach. Materials used in operating and maintenance are predominantly consumable inventory items rather than specialised capital equipment. SKM believes this justifies the application of different material escalators for opex and capex.

ElectraNet engaged BIS Shrapnel to provide advice on future movements in labour rates. BIS Shrapnel provided a forecast of average weekly ordinary time earnings (AWOTE) growth in the South Australian utilities sector. SKM has accepted this forecast – refer section 5.3.

The BIS Shrapnel forecast has been applied in the ElectraNet proposal to general labour components (including internal labour costs and the vegetation management contract). However, ElectraNet has applied a higher labour growth factor in the routine maintenance area to represent expected higher growth in wages and other employment conditions under the ETSA Utilities enterprise bargaining negotiations. This higher labour escalator is mitigated by the application of a productivity improvement factor built into the service provider maintenance contracts (see 7.4.4). SKM is of the opinion that both the EBA escalator and the contracted productivity improvement are high but accepts the net result of their application for the maintenance contract. This delivers a forecast growth in labour costs for the ETSA Utilities maintenance contract over the regulatory period which is approximately 7% lower than the expected growth contained within the BIS Shrapnel forecast.

The quantity and types of assets in service are cost drivers for operations and maintenance. Cost will be expected to increase as the assets in service increase. However, ElectraNet has recognised that costs will not increase in direct proportion to the increase in assets – some economies of scale will apply. These are discussed briefly below. Replacement assets are not included in the application of this escalator – only additional assets are considered.

An escalation factor has been applied to land. SKM has considered this factor in section 5.4 of this report. This escalator impacts on the land tax component in the opex budget (see section 7.7.1).

7.4.4 Efficiency Factors

The service provider contracts for routine maintenance and vegetation management include productivity improvement guarantees which are delivered as discounts in the wage increments applicable under the contracts. Existing contracts do not extend for the full regulatory period. However, these productivity factors have been included for the full forecast period on the assumption that similar conditions will apply[C (refer to confidential attachment to this report)].

An error in the application of the productivity factor in the ETSA Utilities contract for the 2007/08 year was identified in the ElectraNet opex model. The correction of this error results in a decrease in the maintenance forecast of approximately $1,300,000 (2007/08 $) over the regulatory period.

ElectraNet has proposed economy of scale factors for the impact of asset growth on operating expenditure. Although the scale factors are based on ElectraNet experience, they mirror those adopted by AER in the Powerlink Determination. SKM accepts the proposed economy of scale factors for asset growth.

7.4.5 Scope Changes

One-off costs have been deleted from the base year prior to the application of relevant escalation factors for those items where the base year approach has been employed. The major item removed was a superannuation top up component within Corporate Support. SKM is of the general opinion that the scope changes included in ElectraNet's proposal are justified and only applied where the relevant expenditure in the base year is not indicative of expected future expenditure.

Line items that are forecast using the zero base approach are similarly deleted from the base year.

Additions to the scope are estimated using a zero base approach – see section 7.4.6.

7.4.6 Zero Base Methodology

For some opex items the historical expenditure trends do not provide an indication of future expenditure needs. For these areas, ElectraNet has developed cost estimates using a zero base methodology.

The zero base methodology requires the physical work tasks required over the regulatory period to be forecast, and cost estimates to be developed for each task so that the forecast expenditure is developed from first principles rather then by extrapolating past trends.

SKM is of the general opinion that the zero base methodology has only been applied by ElectraNet where the base year expenditure has not been indicative of future expenditure requirements.

The zero base approach has been applied to routine maintenance and opex projects. In 2005/06 ElectraNet adopted the asset management strategies, procedures and practices of Powerlink. These practices are still being introduced so the historical expenditures do not reflect the new approach. Costs have been developed by applying maintenance cycles and associated tasks to the existing and future assets to produce a full list of routine maintenance activities over the forecast period. Under the existing service contracts, each task has a negotiated resource requirement in terms of "Work Units" (WU). This produces a forecast of WU requirements. The value of a WU is included in the service provider contracts.

Opex projects have been forecast from condition assessment reports covering a range of ElectraNet's asset base. The analysis of the condition reports allows the quantity of work to be estimated. An analysis of the criticality of the proposed works generates a program of maintenance and refurbishment works. Estimates for these works have been developed using historical experience.

The zero base approach has also been used for estimating insurance and self-insurance allowances, and network support. The same approach has been applied to scope changes such as the requirement for ElectraNet to pay land tax and National Electricity Rules requirement for transmission entities to ensure the currency of parameters used in generator models.

SKM believes that there is always a tendency to over-estimate costs when using a zero base approach. This is especially the case where the quantum of work activities and the scope of each task is uncertain, and average historical costs have been used. This concern is particularly applicable to the opex projects.

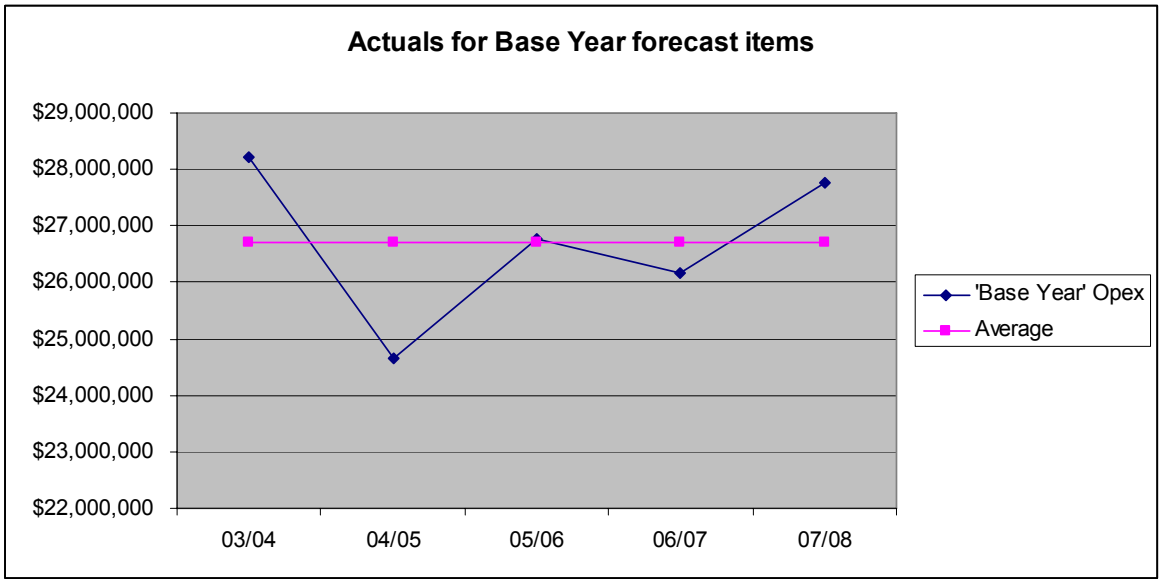
Zero base forecasts would not be appropriate going forward at the next re-set for the majority of opex categories. The exception may be opex projects (see 7.6.2).

7.5 2005/06 Base Year

In previous sections of this report, SKM has benchmarked ElectraNet's opex against other Australian transmission entities and considered the international benchmarking available via the ITOMS. SKM is of the view that the total operating expenditure in 2005/06 was insufficient to provide a sustainable and efficient operation. However, SKM believes that the shortfall in allowance/expenditure was in Direct O&M, particularly Field Maintenance. Going forward, the major cost categories in this area have been forecast from a zero base rather than using historical expenditures.

SKM has examined the expenditure in 2005/06 with a focus on those line items which ElectraNet has forecast using a base year methodology. Figure 17 indicates that the expenditure on these items in 2005/06 is very close to the average annual expenditure over the current regulatory period.

- **Figure 17 Opex in current regulatory period for items forecast using 'Base Year' methodology (2007/08 $)**



SKM believes that ElectraNet's actual opex for these line items in 2005/06, after adjustments for scope changes, represents an efficient and appropriate basis from which to forecast opex requirements for the future regulatory period.

7.6 Field Maintenance

ElectraNet out-sources all field maintenance. ETSA Utilities is the prime maintenance contractor for the ElectraNet network. The maintenance contract was tendered competitively and won by ETSA Utilities in 2002. It has been extended by negotiation since the original awarding.

ElectraNet is confident that the ETSA Utilities contract delivers market based pricing for maintenance services. The ElectraNet/ETSA Utilities relationship is similar to the relationship that exists between Powerlink and Ergon Energy in Queensland. The distribution business offers access to a workforce that provides similar services to their own network and is well distributed throughout the area of supply. ETSA Utilities provide depot and stores facilities throughout the area of supply. The contract relationship between the two entities clearly offers economic advantages to both parties.

The current ETSA Utilities contract runs until December 2011[D (refer to confidential attachment to this report)].

The vegetation management contract is competitively sourced. Other specialty maintenance functions are provided by other contracting organisations such as Aeropower, Tennix and Consolidated Power.

ElectraNet believes that their relationship with Powerlink allows the delivery costs of maintenance services to be compared with Queensland costs. ElectraNet advises that this comparison supports their belief that costs are competitive, although the evidence provided to SKM is anecdotal. As discussed previously in section 7.3.1, benchmarking recognises Powerlink as a low cost transmission network operator. SKM believes that Powerlink costs would be a reasonable comparator for ElectraNet.

ElectraNet has recognised Powerlink as an industry leader in asset management. Powerlink's Asset Management (AM) policies, procedures and strategies have been progressively introduced into ElectraNet since 2005/06. The movement to this new AM approach means that there is no relevant history of maintenance costs on which to base the forecast expenditure. For this reason a zero base approach has been taken for routine maintenance and opex projects, while condition based and corrective opex have been escalated from the base year.

During the early years of the 2003-2008 regulatory period, ElectraNet's focus was on better understanding the assets in service and the condition of those assets. It was during this period that they concluded that their historic maintenance practices would not address the increasing risks associated with their ageing asset base. The maintenance expenditures in 2003/04 and 2004/05 should not be considered as sustainable.

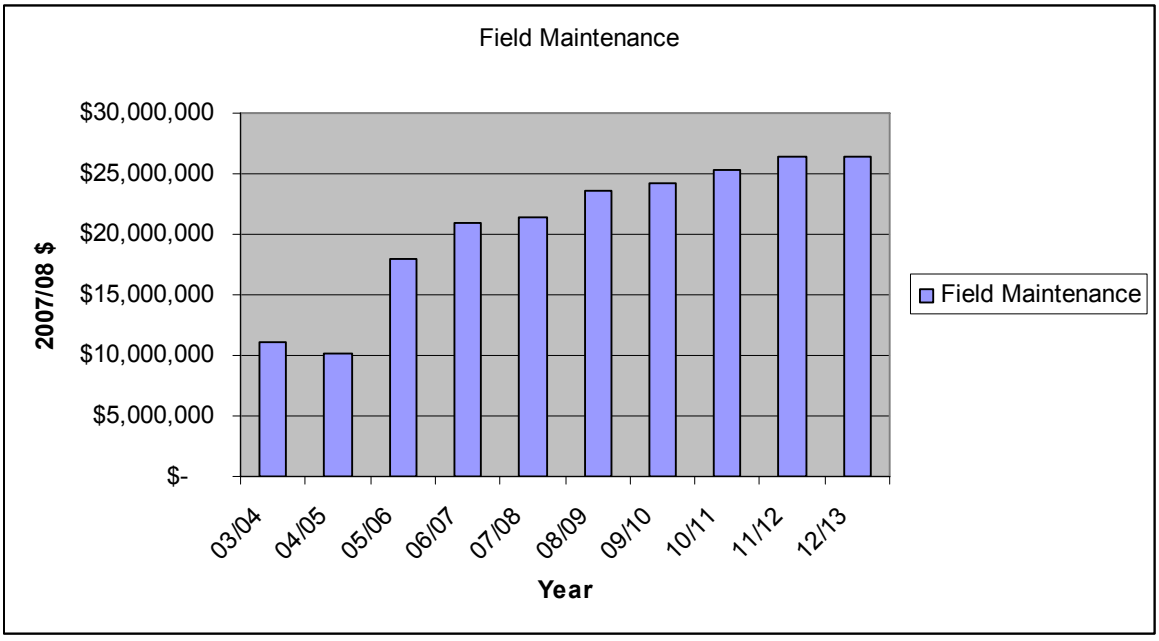
■ **Table 51 Summary of ElectraNet's Forecast Field Maintenance Opex (2007/08 $m)**

Field Maintenance	2008-09	2009-10	2010-11	2011-12	2012-13	Total
Routine Maintenance	7.6	8.1	8.5	9.0	9.2	42.3
Condition Based Maintenance	0.1	0.1	0.1	0.2	0.2	0.7
Corrective Maintenance	4.8	5.2	5.5	6.0	6.6	28.2
Opex Projects	11.1	10.8	11.1	11.2	10.4	54.7
Total	**23.6**	**24.2**	**25.3**	**26.4**	**26.4**	**125.9**

Source: ElectraNet Opex model; columns may not add due to rounding

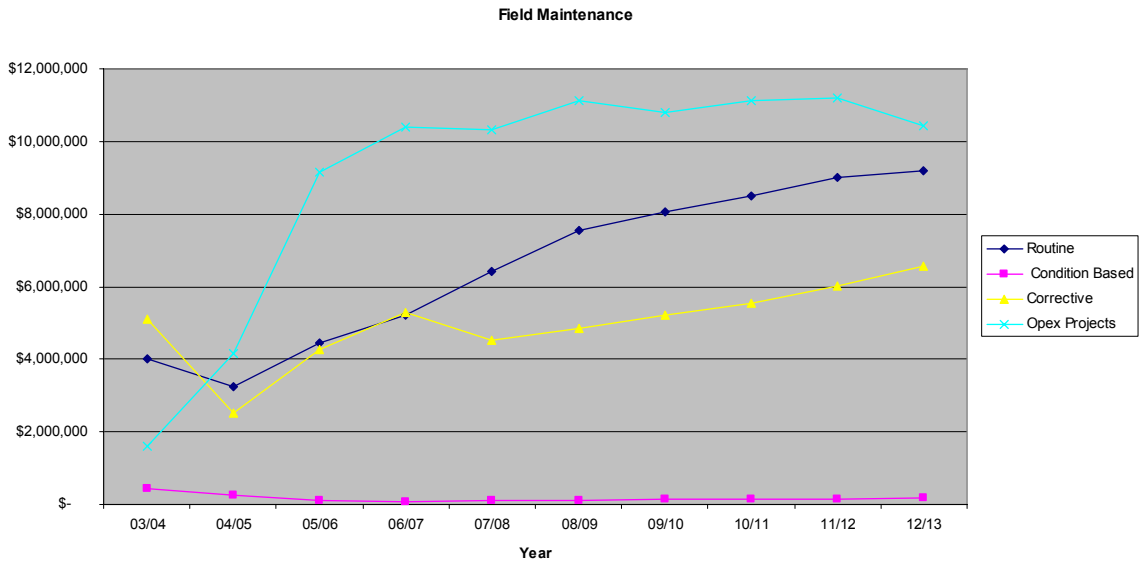
As indicated previously, ElectraNet has proposed a 54% real increase in average annual expenditure (over the average annual expenditure in the current period).

■ **Figure 18 Actual and Forecast Field Maintenance Expenditure**



The components of this maintenance expenditure are shown in the following figure.

■ **Figure 19 Components of Field Maintenance**



It is apparent that the major increments in expenditure are forecast to occur in routine maintenance and in opex projects. Each component is discussed further in the following sections.

It is difficult for SKM to comment on the effectiveness of ElectraNet's operating practices and procedures because of the major change in asset management strategy recently adopted. SKM does have concerns with the level of maintenance delivered by ElectraNet in the early years of the current regulatory period and believes that a change of approach is justified. SKM also believes that the Powerlink model provides a sound basis for ElectraNet going forwarded. The documented procedures and practices appear theoretically appropriate; however there is insufficient history of the application of these policies and practices for SKM to make a definitive assessment of the effectiveness of their application.

7.6.1 Routine Maintenance

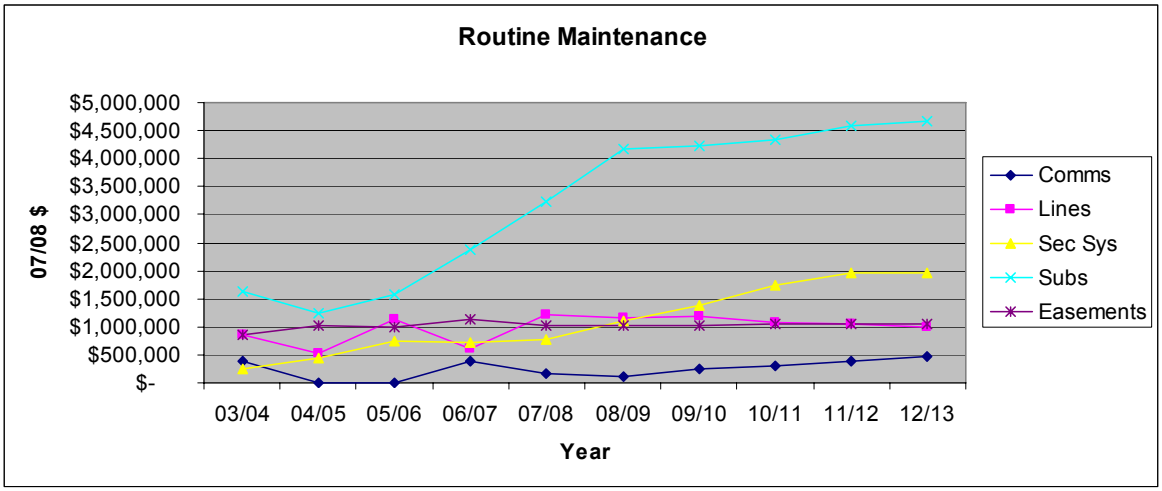
ElectraNet adopted Powerlink's asset management strategies in 2005/06. To develop forecasts of routine maintenance costs, ElectraNet has applied the adopted maintenance cycles and maintenance tasks to existing and future additional assets to develop a full program of routine maintenance over the next regulatory period. The expenditure forecast for the resulting program of tasks has been generated by applying labour hours or Work Units per task, as negotiated with the service providers. This process results in many thousands of tasks over the regulatory period.

SKM has reviewed sample maintenance policy, procedure and strategy documents.

The maintenance and inspection cycles proposed align with Powerlink practices and appear to be reasonable.

The unit costs associated with each routine maintenance task included in the forecast generally appear to be reasonable.

- **Figure 20 Historical and Forecast Routine maintenance (2007/08 $)**



Large increases in substation and secondary systems expenditure confirm anecdotal reports that substation maintenance has been under-funded over recent years. ElectraNet justifies this increase on two grounds – the results of detailed condition assessment reports for all of ElectraNet's substation sites and adoption of Powerlink's best-practice maintenance regime. The three-fold increase in substation routine maintenance, however, demonstrates that previous levels of maintenance spend were unsustainably low..

As part of the new asset management regime many of the routine maintenance tasks have changed in frequency and scope. There is a focus now on condition monitoring in addition to defect identification. New tasks include power transformer insulation condition monitoring, infra-red scanning, power quality monitoring, pollution monitoring, increased safety tests, fire protection system testing etc.

ElectraNet has identified a minor error in the allocation of routine maintenance between labour and other costs. Correction of this error will result in a small decrease in routine maintenance costs of approximately $70k (2007/08 $) over the period.

ElectraNet has also identified routine line maintenance tasks that were not included in their revenue proposal. The omitted tasks relate to pre-dawn patrols and line insulator washing. These tasks are required to manage the risk of feeder faults due to the build up of dust, salt and other pollution on

insulators during long dry spells. The program targets particular regions where this risk is recognised. These tasks have been part of ElectraNet's program in the past. The expected cost of this work over the regulatory period is an additional $1,450,000 in 2007/08 $. A similar amount has already been included in the substation routine maintenance forecast for substation equipment at similar risk.

ElectraNet has advised of a spread-sheeting error in the substation, secondary systems and communications routine maintenance model. An incorrect summation formula excluded a range of routine maintenance tasks predominantly at communication sites. The impact of this correction increases the routine maintenance forecast by an additional $5,037,000 over the regulatory period. This represents an increase in routine maintenance at communications sites from a forecast expenditure of $169,000 in 2007/08 to over $1 million in 2008/09. SKM considers the magnitude of the forecast increase in communication site maintenance to be unreasonable, and that ElectraNet has not sufficiently justified the need for such an increase.

A review of this correction showed a double count of 15 sites included in both the 12 month and 6 month routine inspection cycles. Correcting for this error resulted in a reduction of $360k over the regulatory period.

Despite ElectraNet's assurances, SKM believes that a detailed review of the communication site routine inspection tasks has identified a number of sub-tasks that should already be included in substation routine maintenance tasks or in specialised task groups such as air-conditioner maintenance, weed control etc. SKM also notes that this program of site visits has yet to commence, with trials proposed to validate the task estimates. Because of these concerns, SKM recommends a reduction in the estimate for the average routine communications site inspection task from 10.3 to 5 Work Units. This recommendation would result in a reduction to these routine inspection costs of $1.12m (2007/08) over the regulatory period to bring them in line with efficient costs.

The correction to the application of the maintenance contract efficiency factor discussed in 7.4.4 also affects this expenditure item.

- **Table 52 Summary of Routine Maintenance Forecast (2007/08 $m)**

Routine Maintenance	2008-09	2009-10	2010-11	2011-12	2012-13	Total
ElectraNet Initial Proposal	7.6	8.1	8.5	9.0	9.2	42.3
Recommended Forecast	8.4	8.9	9.3	9.8	10.0	46.5

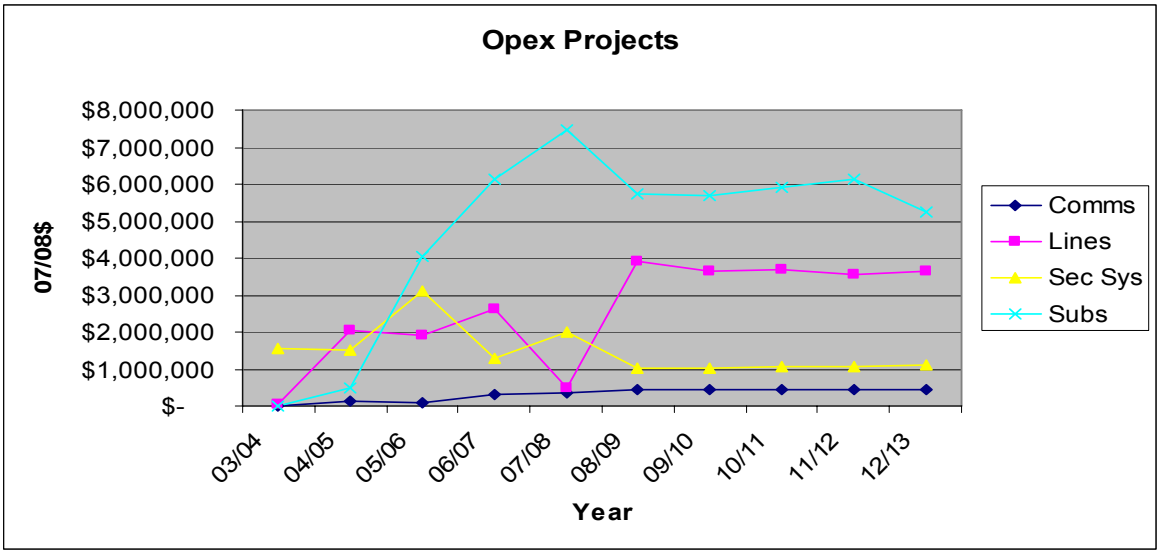
7.6.2 Maintenance Projects

The largest area of growth in the forecast budgets is in opex projects. These represent a mix of condition based and refurbishment projects. ElectraNet (or their consultants) have conducted Condition Assessments of all substations and a selection of lines. All substations were visited and inspected to prepare the condition reports. The transmission line assessments were generally paper-based reviews. Hence SKM has more confidence in the scope of works developed from the substation reports than from the line assessments, though reservations remain for all asset classes and are discussed in more detail below.

These condition assessments have identified areas of defects which need further assessment or corrective maintenance. These works have been prioritised to determine the required timing. The process of prioritisation has been developed from condition assessment reports which cover all substation assets and most transmission lines. This asset condition information was then considered in conjunction with qualitative assessments of the criticality, serviceability, consequences of failure and compliance with standards to provide a risk matrix and risk rating for major assets. No projects addressing a low asset risk have been included in the ElectraNet forecast. Projects addressing medium asset risks have been included in the forecast but programmed over a ten year period. The medium risk substation projects represent an expenditure of approximately $8 million over the regulatory period. Assets classed as high risk have been targeted for completion over 5 years during the next regulatory period. The high risk substation projects represent an expenditure of $8.4 million over the regulatory period.

SKM accepts the processes and procedures that ElectraNet has used to prioritise these works. Project scopes have been estimated and costs allocated based on historical experience with similar works.

- **Figure 21 Historical and forecast opex project expenditure (2007/08 $)**



The annual expenditure requirement in ElectraNet's proposal for opex projects over the next regulatory period is over $10 million. In the early years of the current regulatory period, expenditure in this opex category was approximately $1m. It has grown rapidly over the regulatory period and is expected to exceed $10 million pa in 2006/07 and 2007/08.

SKM is of the opinion that this large increase in expenditure includes a "catch-up" component for maintenance that would have been addressed earlier under a more sustainable asset management regime. Expenditure at this level should not be carried through into subsequent regulatory periods. While other expenditure categories may be able to be forecast on a "base-year" basis in future regulatory re-sets, this area will need to be forecast on "zero-base" approach for the foreseeable future. Certainly, this cost category should experience a significant reduction in the post 2013 regulatory period.

Consistent with the forecast routine maintenance, the largest increases are in the substation area.

SKM's concerns with the opex project program provided in the ElectraNet Proposal and supporting documents can be summarised under the following areas:

- Errors in the compilation of the opex projects.
- Uncertainty regarding the quantum of the assets to be addressed.
- Uncertainty regarding the scope of works to be undertaken on each asset identified.
- Level of detail available in the project estimates.
- Scope to rationalise timing and bundling of projects to obtain economies.
- The extent to which some opex projects could be capitalised.

7.6.2.1 Corrections

The proposal document and supporting documents and spreadsheets contain a number of errors. Some of the substation programs were based on a time period of less than five years but modelled in the opex spreadsheets over the full five years. Adjusting for this error results in a reduction in opex project forecast expenditure of approximately $3,116,000 over the 2008-13 regulatory period.

In the lines projects, a more detailed review of a small number of projects identified an inconsistency between a defined project and the relevant condition assessment report. This was discovered to be an identification error, referencing the wrong feeder. On correction it was found that the revised project included works that were already included in the program in other years. Another project was found to be listed twice. Adjusting for those errors identified, results in a reduction in opex project forecast expenditure of approximately $1,277,000 over the regulatory period.

7.6.2.2 Uncertainty

The condition assessment reports do not always provide guidance on the quantity of work required. Many of the opex projects include an assessment of the scope or quantity of work as part of the project itself. ElectraNet has estimated the quantity of work in each project. This is particularly the case for lines projects. For example, a project may be based on an estimate that 40% of structures will need maintenance works. Such estimates will not be confirmed until the assessment component of the project is complete. Any errors in the estimate of the quantity of assets included will have a direct impact on the project cost.

There is also uncertainty about the amount of work required. Until the assessment stage of each project has been completed, the full scope of work required for each asset will not be clear. This concern applies to many of the line projects but also applies to the transformer refurbishment program.

The timing of opex projects must be considered to be discretionary. SKM suspects that there is capacity to rationalise the timing of some projects so that works could be combined (or combined with routine maintenance tasks) to limit visits to the same site and reduce overall costs. For example, feeder F1813 has a line earthing assessment project and a signage assessment project both programmed for 2009/10 (total value $609,000). In addition routine maintenance planned for 2010 includes footing resistance tests in addition to routine groundline inspections and ground patrol. This is followed by opex projects in 2010/11 (conductor corrosion assessment) and in 2011/12 (line footing refurbishment). There would appear to be scope to combine some of these projects to improve efficiency and deliver some economic advantage.

For these reasons, SKM believes that a simple summation of individual project costs will result in an unreasonably high total estimate. While SKM believes that the efficiency of ElectraNet's maintenance delivery will improve when full project details are available and subjected to rigorous project management discipline, it is difficult to estimate the quantum of the likely improvement. SKM has proposed a nominal adjustment. A smaller reduction for substation projects compared to lines seems warranted given that more detailed condition assessment reports are available for substations.

SKM proposes to reduce opex project costs by 5% in substations, secondary systems and communications (excluding transformer refurbishment, which is discussed below) and by 10% for lines to off-set for concerns with uncertainty in the quantity and scope of works, and opportunities for rationalisation and cost efficiencies as discussed above. The impact of this recommendation would reduce forecast expenditure over the regulatory period by approximately $2.8m (2007/08).

7.6.2.3 Estimates

Given the uncertainties expressed above in quantum and scope of work required, cost estimates per project task are understandably at a very high level and based on historical experience where this is available. ElectraNet considers the estimates to be at a +/- 20% accuracy level consistent with initial capital cost estimating. SKM considers that this is a very optimistic assessment of the likely accuracy of the opex project estimates. Average historical costs for transmission line opex projects have been escalated by a factor of 20% to convert historical cost to 2006/07 $ before further escalation to year of forecast expenditure.

ElectraNet has justified this global escalator on the basis that the average historical cost is 5 years old, with a nominal escalation factor of 4% pa. The assumed annual escalation factor seems reasonable given the mix of labour and materials. However, the assumption that the average historical cost is 5 years old appears unreasonable. This suggests that the historical costs are evenly distributed over the last 10 years. Given the ramp up in expenditure in this area over recent years, SKM is of the view that historical costs are likely to be more recent and that a lower escalation factor should be applied. A 10% global escalator has been proposed representing historical projects evenly spread over the last five years. This is consistent with alternate escalators used by ElectraNet when reviewing some of the lines projects highlighted in SKM's review.

The impact of this lower escalator for transmission lines opex projects would reduce the opex expenditure forecast for the regulatory period by approximately $1.22m (2007/08).

7.6.2.4 Transformer Refurbishment

Transformer refurbishment costs have been based on 40% of procurement costs for a detailed internal and external refurbishment and applied to transformers between 35 and 45 years of age where a reasonable remaining life could be expected. For transformers over 45 years of age, an external refurbishment only has been planned and the cost estimated to be one-third of the full refurbishment cost. SKM considers ElectraNet should be encouraged for their pro-active approach to handling the growing issue of ageing transformers. However, SKM has a number of concerns regarding the proposed program.

The transformers identified for refurbishment are referred to as "candidates". The asset management plan makes the point that transformers in the target age range need to undergo detailed condition assessments to determine the economic justification for each individual project. Discussions with transformer specialists within the industry suggest that the refurbishment will be of benefit to only those transformers that meet some quite specific conditions. The scope of refurbishment that can be justified is also very dependent on the condition of the transformer in question. In short, a detailed assessment may find that not all transformers nominated would benefit from the refurbishment or that the extent of refurbishment proposed is inappropriate. The full extent of the refurbishment may not be confirmed until the specific refurbishment commences. It appears that experience with transformer refurbishment and comfort in the resulting benefits is limited within the transmission industry. An industry driven pilot project approach may be a more practical approach rather than committing to a program of refurbishment as included in ElectraNet's revenue proposal.

While the estimated refurbishment cost of 40% of procurement cost may be reasonable for transformers of a certain size, SKM is of the view that refurbishment costs will not rise in direct proportion to the replacement cost of the transformer. For example the labour resource required for tasks such as switching to provide High Voltage access, provision of physical access to the transformers and internals and to replace bushings will not vary significantly with transformer size and replacement cost. The replacement cost of bushings, themselves, will not vary significantly between transformers of the same voltage. On this basis and considering the degree of uncertainty surrounding these projects, SKM believes that the estimates for refurbishment of the larger transformers are excessive and should be reduced. The table below suggests an alternate cost proposal based on reducing marginal costs for the larger units.

- **Table 53 Alternative cost estimates for Transformer Refurbishment (2006/07 $)**

Substation	Age	ElectraNet Estimate	Alternate Estimate
Neuroodla	54.7	86,267	86,267
Leigh Creek South	54.7	86,267	86,267
Leigh Creek South	53.7	86,267	86,267
Mount Gunson	53.7	86,267	86,267
Leigh Creek Coalfield	46.7	95,467	95,467
Leigh Creek Coalfield	46.7	95,467	95,467
Morgan/Whyalla #3	46.3	95,467	95,467
Yadnarie	41.7	346,800	325,000
Yadnarie	41.7	346,800	325,000
Morgan/Whyalla #3	41.3	258,800	258,800
Morgan/Whyalla #4	41.3	286,400	286,400
Morgan/Whyalla #4	41.3	258,800	258,800
Happy Valley	39.7	1,434,400	692,000
Cultana	39.7	1,434,400	692,000
Robertstown	38.7	1,434,400	692,000
Berri	37.1	584,000	473,000
Angas Creek	36.9	388,400	350,000
Mount Gambier	35.7	584,000	473,000
Blanche	35.3	584,000	473,000
Tailem Bend	34.7	286,400	286,400
TOTAL		**8,859,069**	**6,216,869**

This table provides the complete list of transformer refurbishments proposed by ElectraNet over the forecast regulatory period. The impact of the recommended reduction in transformer refurbishment forecasts would reduce opex expenditure by approximately $2.7m ($2007/08) over the regulatory period.

7.6.2.5 Capitalisation of Opex Projects

SKM believes that a number of the opex projects and programs could be considered to be capital projects. This applies particularly to the transformer refurbishment projects (7.6.2.4), where an extension of life seems to be crucial in the economic justification of the work.

The figures below demonstrate the results of economic analysis undertaken by SKM to show the net present value (NPV) benefit of refurbishment compared to earlier retirement without refurbishment, based on ElectraNet's cost estimates for a range of possible failure timings. The figures are "per unit" (PU) based on transformer procurement costs. Figure 22 assumes a life extension of 10 years and indicates that a ten year life extension beyond the nominal 45 year life results in a positive NPV for refurbishment between 35 and 45 years of age. If refurbishment of a transformer at age 35 (left hand column) extends the life of that transformer from 45 years nominal

life (top row) to 55 years, then the project would show a positive NPV equal to 5% of the procurement cost of a transformer. If the transformer would have survived until age 50 without refurbishment, then refurbishment at age 35 to extend the life from 50 years to 60 years results in a negative NPV of 7% of the procurement cost of a transformer.

- **Figure 22 Economic Benefit of Refurbishment (10 year life extension)**

Age at failure without refurb

Age at refurb	0.021767	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55
30		0.05	0.02	0.00	-0.03	-0.05	-0.07	-0.09	-0.11	-0.13	-0.14	-0.16	-0.17	-0.18	-0.19	-0.20	-0.21
31		0.08	0.05	0.02	0.00	-0.03	-0.05	-0.07	-0.09	-0.11	-0.13	-0.14	-0.16	-0.17	-0.18	-0.19	-0.20
32		0.11	0.08	0.05	0.02	0.00	-0.03	-0.05	-0.07	-0.09	-0.11	-0.13	-0.14	-0.16	-0.17	-0.18	-0.19
33		0.15	0.11	0.08	0.05	0.02	0.00	-0.03	-0.05	-0.07	-0.09	-0.11	-0.13	-0.14	-0.16	-0.17	-0.18
34		0.18	0.15	0.11	0.08	0.05	0.02	0.00	-0.03	-0.05	-0.07	-0.09	-0.11	-0.13	-0.14	-0.16	-0.17
35		0.22	0.18	0.15	0.11	0.08	0.05	0.02	0.00	-0.03	-0.05	-0.07	-0.09	-0.11	-0.13	-0.14	-0.16
36		0.27	0.22	0.18	0.15	0.11	0.08	0.05	0.02	0.00	-0.03	-0.05	-0.07	-0.09	-0.11	-0.13	-0.14
37		0.31	0.27	0.22	0.18	0.15	0.11	0.08	0.05	0.02	0.00	-0.03	-0.05	-0.07	-0.09	-0.11	-0.13
38		0.36	0.31	0.27	0.22	0.18	0.15	0.11	0.08	0.05	0.02	0.00	-0.03	-0.05	-0.07	-0.09	-0.11
39		0.42	0.36	0.31	0.27	0.22	0.18	0.15	0.11	0.08	0.05	0.02	0.00	-0.03	-0.05	-0.07	-0.09
40		0.47	0.42	0.36	0.31	0.27	0.22	0.18	0.15	0.11	0.08	0.05	0.02	0.00	-0.03	-0.05	-0.07
41		0.54	0.47	0.42	0.36	0.31	0.27	0.22	0.18	0.15	0.11	0.08	0.05	0.02	0.00	-0.03	-0.05
42		0.60	0.54	0.47	0.42	0.36	0.31	0.27	0.22	0.18	0.15	0.11	0.08	0.05	0.02	0.00	-0.03
43		0.67	0.60	0.54	0.47	0.42	0.36	0.31	0.27	0.22	0.18	0.15	0.11	0.08	0.05	0.02	0.00
44		0.75	0.67	0.60	0.54	0.47	0.42	0.36	0.31	0.27	0.22	0.18	0.15	0.11	0.08	0.05	0.02
45		0.83	0.75	0.67	0.60	0.54	0.47	0.42	0.36	0.31	0.27	0.22	0.18	0.15	0.11	0.08	0.05
46		0.92	0.83	0.75	0.67	0.60	0.54	0.47	0.42	0.36	0.31	0.27	0.22	0.18	0.15	0.11	0.08
47		1.02	0.92	0.83	0.75	0.67	0.60	0.54	0.47	0.42	0.36	0.31	0.27	0.22	0.18	0.15	0.11
48		1.12	1.02	0.92	0.83	0.75	0.67	0.60	0.54	0.47	0.42	0.36	0.31	0.27	0.22	0.18	0.15
49		1.23	1.12	1.02	0.92	0.83	0.75	0.67	0.60	0.54	0.47	0.42	0.36	0.31	0.27	0.22	0.18
50		1.35	1.23	1.12	1.02	0.92	0.83	0.75	0.67	0.60	0.54	0.47	0.42	0.36	0.31	0.27	0.22

The Figure 23 is based on a life extension of 5 years. This indicates that the benefit becomes more marginal, and is only economically attractive for older transformers (effectively where failure is imminent).

- **Figure 23 Economic Benefit of Refurbishment (5 year life extension)**

Age at failure without refurb

Age at refurb	-0.13087	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55
30		-0.11	-0.13	-0.15	-0.16	-0.17	-0.19	-0.20	-0.21	-0.22	-0.23	-0.24	-0.24	-0.25	-0.26	-0.26	-0.27
31		-0.10	-0.11	-0.13	-0.15	-0.16	-0.17	-0.19	-0.20	-0.21	-0.22	-0.23	-0.24	-0.24	-0.25	-0.26	-0.26
32		-0.08	-0.10	-0.11	-0.13	-0.15	-0.16	-0.17	-0.19	-0.20	-0.21	-0.22	-0.23	-0.24	-0.24	-0.25	-0.26
33		-0.06	-0.08	-0.10	-0.11	-0.13	-0.15	-0.16	-0.17	-0.19	-0.20	-0.21	-0.22	-0.23	-0.24	-0.24	-0.25
34		-0.04	-0.06	-0.08	-0.10	-0.11	-0.13	-0.15	-0.16	-0.17	-0.19	-0.20	-0.21	-0.22	-0.23	-0.24	-0.24
35		-0.01	-0.04	-0.06	-0.08	-0.10	-0.11	-0.13	-0.15	-0.16	-0.17	-0.19	-0.20	-0.21	-0.22	-0.23	-0.24
36		0.01	-0.01	-0.04	-0.06	-0.08	-0.10	-0.11	-0.13	-0.15	-0.16	-0.17	-0.19	-0.20	-0.21	-0.22	-0.23
37		0.04	0.01	-0.01	-0.04	-0.06	-0.08	-0.10	-0.11	-0.13	-0.15	-0.16	-0.17	-0.19	-0.20	-0.21	-0.22
38		0.07	0.04	0.01	-0.01	-0.04	-0.06	-0.08	-0.10	-0.11	-0.13	-0.15	-0.16	-0.17	-0.19	-0.20	-0.21
39		0.10	0.07	0.04	0.01	-0.01	-0.04	-0.06	-0.08	-0.10	-0.11	-0.13	-0.15	-0.16	-0.17	-0.19	-0.20
40		0.14	0.10	0.07	0.04	0.01	-0.01	-0.04	-0.06	-0.08	-0.10	-0.11	-0.13	-0.15	-0.16	-0.17	-0.19
41		0.17	0.14	0.10	0.07	0.04	0.01	-0.01	-0.04	-0.06	-0.08	-0.10	-0.11	-0.13	-0.15	-0.16	-0.17
42		0.21	0.17	0.14	0.10	0.07	0.04	0.01	-0.01	-0.04	-0.06	-0.08	-0.10	-0.11	-0.13	-0.15	-0.16
43		0.25	0.21	0.17	0.14	0.10	0.07	0.04	0.01	-0.01	-0.04	-0.06	-0.08	-0.10	-0.11	-0.13	-0.15
44		0.30	0.25	0.21	0.17	0.14	0.10	0.07	0.04	0.01	-0.01	-0.04	-0.06	-0.08	-0.10	-0.11	-0.13
45		0.35	0.30	0.25	0.21	0.17	0.14	0.10	0.07	0.04	0.01	-0.01	-0.04	-0.06	-0.08	-0.10	-0.11
46		0.40	0.35	0.30	0.25	0.21	0.17	0.14	0.10	0.07	0.04	0.01	-0.01	-0.04	-0.06	-0.08	-0.10
47		0.46	0.40	0.35	0.30	0.25	0.21	0.17	0.14	0.10	0.07	0.04	0.01	-0.01	-0.04	-0.06	-0.08
48		0.52	0.46	0.40	0.35	0.30	0.25	0.21	0.17	0.14	0.10	0.07	0.04	0.01	-0.01	-0.04	-0.06
49		0.58	0.52	0.46	0.40	0.35	0.30	0.25	0.21	0.17	0.14	0.10	0.07	0.04	0.01	-0.01	-0.04
50		0.65	0.58	0.52	0.46	0.40	0.35	0.30	0.25	0.21	0.17	0.14	0.10	0.07	0.04	0.01	-0.01

The implications of this economic analysis is that a life extension is required to justify the refurbishment project. ElectraNet has indicated it considers these items to be operating costs, in that they do not extend the life of the asset, but rather the *period for which it can be considered reliable*, which SKM considers to be akin to a definition of economic life. If the transformer refurbishment projects do not extend the (economic) life of the transformers then SKM considers the projects are not economically justified. If they do, SKM considers them to be capital.

Under ElectraNet's capitalisation policy, power transformers are considered capital assets in their own right and SKM believes that any expenditure which aims to extend the life of the capital asset should be capitalised. This would move approximately $6.8m from opex to capex, including allowance for real cost increases..

SKM disagrees with ElectraNet's application of section 6.8 of ElectraNet's capitalisation policy to opex projects targeting substation auxiliary supplies and secondary systems. In addition to the transformer refurbishment projects, SKM believes that both of these opex projects could also be considered to be capital projects, as discussed below.

In ElectraNet's policy, both these asset types are considered as capital assets. The opex project description provided for auxiliary supplies states "$200k per site to bring auxiliary supplies up to current standards." Further information provided suggests these projects will increase security of low voltage supply, improve redundancy and AC changeover facilities. The projects include for substantial components of the auxiliary supply systems including upgraded wiring, the installation of substation transformers or generating sets etc. This work will definitely increase functionality and should certainly increase the life of the auxiliary supply system. On these tests, this expenditure should be capitalised. This would move approximately $5.1m from opex to capex.

The opex project description provided for Control and Protection refers to "$200k (per site) for replacement of large numbers of electro-mechanical relays" with digital relays. Further advice suggests that the relays to be replaced would be expected to fail within the regulatory period. SKM believes that the relays are major components of the secondary systems. Electronic relays offer increased functionality over electro-mechanical. By replacing components that are expected to fail, ElectraNet is extending the useful life of the secondary system. This would certainly apply where the secondary system age exceeds the technical or economic asset life adopted in ElectraNet's asset management plan. This is expected to be the case for all 19 sites where this work is planned. On these tests, this expenditure should be capitalised. This would move approximately $4.0m from opex to capex.

There are benefits to the TNSP to shift expenditure forecasts from capital to operating. These benefits include the immediate recovery of forecast expenditure in the year of forecast and any under-expenditure (perhaps due to overstatement of either quantity of work or costs per task) is

retained. The shift of transformer refurbishment, upgrading auxiliary supplies and replacement of secondary systems reduces the opex project expenditure forecast by approximately $15.9m over the regulatory period, with an equivalent increase in the capital expenditure forecast.

The combined impact of the errors, issues, proposed changes and transfers discussed above is summarised in the table below:

Table 54 Proposed reductions in Opex projects (2007/08 $m)

Opex Projects	2008-09	2009-10	2010-11	2011-12	2012-13	Total
ElectraNet Initial Proposal	11.1	10.8	11.1	11.2	10.4	54.7
Recommended Forecast	6.1	5.6	5.7	5.6	4.5	27.5

Note: Because of rounding, rows may not add.

The reductions in opex projects are off-set by proposed increases in capex projects.

Table 55 Proposed increases in Capex projects (2007/08 $m).

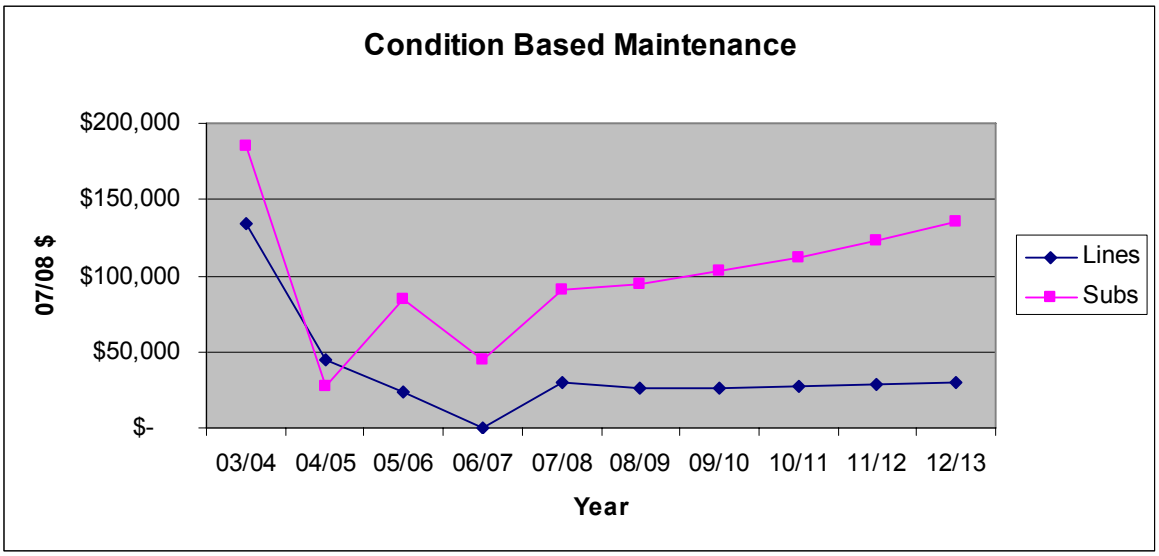
Capital	2008/09	2009/10	2010/11	2011/12	2012/13	Total
Proposed Increase	3.08	3.13	3.19	3.24	3.29	15.93

Note: Because of rounding, rows may not add.

7.6.3 Condition Based Maintenance

The forecast for this opex category is based on the condition based maintenance expenditure in 2005/06. Although it shows some growth over the forecast regulatory period, the level of condition based maintenance has fallen as the expenditure on opex projects has increased. The forecast recognises condition based maintenance for lines and substations only. No particular issues have been identified. SKM considers that both the forecast methodology and the resulting forecast opex are reasonable.

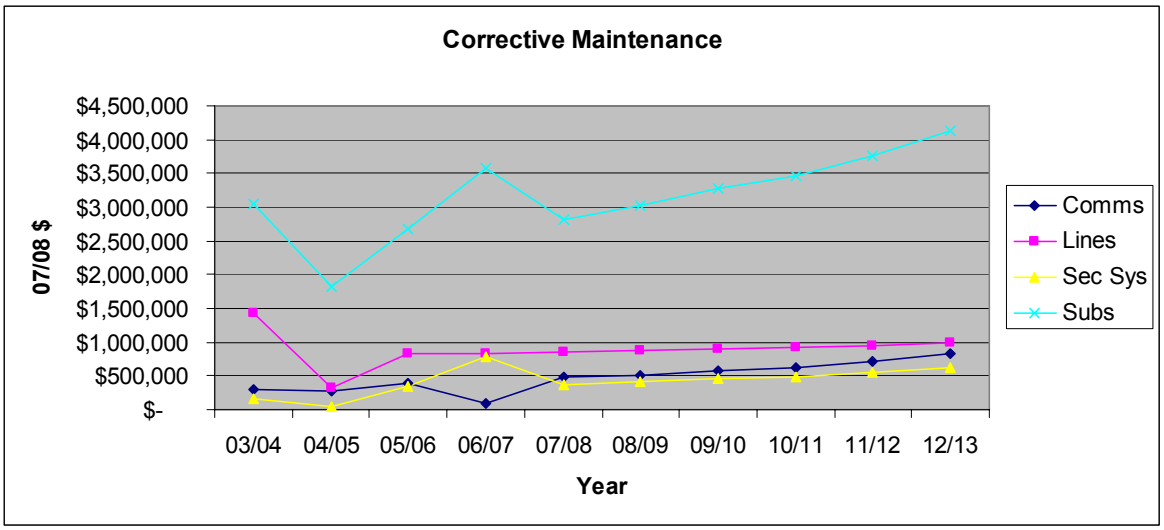
- **Figure 24 Historical and forecast condition based maintenance (2007/08 $)**



7.6.4 Corrective Maintenance

The forecast for this opex category is based on the corrective maintenance expenditure in 2005/06.

- **Figure 25 Historical and forecast corrective maintenance (2007/08 $)**



The forecast does not recognise any beneficial impact on corrective maintenance due to the large increases in routine preventive maintenance and the large expenditure on opex projects. Maintenance is performed on a cyclic basis and the benefits might be expected once the first full maintenance cycle has been completed. On this basis some benefits should be apparent by 2010/11 affecting the level of corrective maintenance expenditure in the last three years of the forecast period.

ElectraNet advises that the average age of the network is not decreased by the level of replacement capex proposed and that corrective maintenance is a function of the age and quantity of the assets in service. SKM's estimation of the impact of capital projects on average system age agrees with ElectraNet's view but SKM is of the opinion that asset condition rather than age is the key driver of corrective maintenance. While age is an indicator of asset condition, the large increases proposed in opex projects should address at least some of the higher failure risks of concern, impacting on the relationship between age and condition. For these reasons, SKM believes that the continued extrapolation of past expenditure for corrective maintenance provides an unreasonable forecast of future opex requirements.

SKM proposes to remove any real growth in corrective maintenance expenditure forecast over the last years of the forecast regulatory period to reflect some benefit from the proposed opex projects. The impact of this proposed modification is a reduction in forecast corrective maintenance

expenditure over the regulatory period of approximately $1,500,000. The correction to the application of the maintenance contract efficiency factor discussed in 7.4.4 also affects this expenditure item.

As a result of the significant increase in inspection and routine maintenance proposed by ElectraNet for the upcoming regulatory period. ElectraNet assert that this increased activity in the short term will result in a higher rate of defects identified and hence corrected, and correspondingly for the first maintenance cycle there will be no decrease in corrective maintenance associated with the additional routine maintenance. SKM would expect corrective maintenance costs to decrease in subsequent regulatory periods.

Table 56 Summary of Corrective Maintenance (2007/08 $m)

Corrective Maintenance	2008-09	2009-10	2010-11	2011-12	2012-13	Total
ElectraNet Initial Proposal	4.8	5.2	5.5	6.0	6.6	28.2
Recommended Forecast	4.7	5.1	5.4	5.4	5.4	26.1

Note: Because of rounding, rows may not add.

7.6.5 SKM Comments

The very large increase in total maintenance requirements is not supported by regulated network performance measures. ElectraNet believes that network performance is a poor and lagging indicator of the condition of the network. To wait until performance is impacted before increasing the maintenance expenditure would introduce unacceptable delays in addressing the growing risks associated with ageing network elements.

SKM accepts that the historic expenditure on field maintenance appears to have been low and that an increase in maintenance is justified. However, there are incentives for NSPs to over-state operating expenditure requirements. As noted earlier, much of the maintenance expenditure is discretionary. Although there are limits, often, where costs exceed forecasts, projects can be deferred or re-scoped. Where costs are lower than forecast, the revenue allowances are retained. For these reasons, SKM believes that ElectraNet needs to be encouraged in their decision to adopt more sustainable maintenance strategies and practices but the increased expenditure requirements need to be tempered to be consistent with the level of uncertainty inherent particularly in the opex projects.

7.7 Field Support

7.7.1 Land Tax

Land tax is a statutory requirement and is levied on the land valuation current at the time. This is a relatively recent requirement and the full impact is not shown in the base year expenditure. ElectraNet has forecast this on a "zero based" approach.

Land tax is calculated by deterministic application of a formula to the land valuation. SKM has confirmed the formula applied in the ElectraNet forecast.

The land valuation has been escalated using an historic growth factor. SKM's view is that the growth rates used for land values are unsustainable in the longer term and a discussion of this topic is included in section 5.4 of this review. SKM has applied a revised growth rate for land values based on a longer data series.

Table 57 Land price escalation

Land Category	ElectraNet Proposal	SKM Recommendation
Residential	16.5%	10.9%
Commercial	14.4%	6.3%
Rural	13.0%	8.6%

The impact of the revised land escalation rate on the land tax imposition provides a reduction in forecast expenditure on this item over the regulatory period of approximately $1.8m (2007/08).

Table 58 Summary of Land Tax forecast (2007/08 $m)

Land Tax	2008-09	2009-10	2010-11	2011-12	2012-13	Total
ElectraNet Initial Proposal	1.15	1.36	1.52	1.84	2.07	7.93
Recommended Forecast	1.01	1.12	1.18	1.35	1.43	6.09

Note: Because of rounding, rows may not add.

7.7.2 Other Field Support Costs

This is forecast by escalating base year costs. No issues have been identified. SKM considers that both the methodology and the resulting forecast are reasonable.

7.8 Operations

The forecast for operations expenditure has been generated by escalating base year costs using the escalators previously discussed. No issues have been identified. SKM considers that both the methodology and the resulting forecast are reasonable.

7.9 Asset Manager Support

7.9.1 Generator Testing

ElectraNet has seen this as a new imposition under the National Electricity Rules. The forecast expenditure for this work has been developed as a zero based estimate.

ElectraNet commissioned a consultant to review their obligation under the new rules and to propose a response to the rule change. ElectraNet adopted a lower cost approach than that recommended by their consultant.

SKM considers that the obligations under the NER are twofold. The NSP may require (or be directed to require) a generator to conduct tests of generators or generator control systems of any generator connected to the network in order to determine parameters for modelling purposes. Secondly, the NSP must take the results of these tests to develop generator system models to assess the performance of the generator on the network.

The forecast costs developed by ElectraNet include all costs associated with the testing service provider. ElectraNet believes that this is necessary to specify, direct and control the testing and results.

SKM believes that this is an unreasonably conservative approach. SKM's interpretation of the section 5.7.6 of the National Electricity Rules is that the externally sourced test costs should be carried by the owner of the generator rather than by the NSP. This does not necessarily result in the NSP losing control of the process. Rather it becomes an issue of cost recovery. Informal discussions with NEMMCO officers have not altered SKM's assessment.

NEMMCO is unable to provide advice regarding the likely number of requests for such testing. There is some risk that the number of tests requested could exceed ElectraNet's estimate.

However, using ElectraNet's estimate of the number of tests required, the SKM approach would reduce the forecast expenditure on this item by approximately $1,127,000 over the regulatory period.

■ **Table 59 Summary of Generator Testing Expenditure Forecast (2007/08 $m)**

Generator Testing	2008-09	2009-10	2010-11	2011-12	2012-13	Total
ElectraNet Initial Proposal	0.65	0.65	0.65	0.65	0.65	3.2
Recommended Forecast	0.43	0.43	0.43	0.43	0.43	2.1

Note: Because of rounding, rows may not add.

7.9.2 Other Asset Manager Support Costs

The forecast for Other Asset Manager Support expenditure has been generated by escalating base year costs using the escalators previously discussed. No issues have been identified. SKM considers that both the forecast methodology applied and the resulting forecast expenditure on this item are reasonable.

7.10 Corporate Support

7.10.1 Insurance

A zero based cost forecast has been developed by insurance actuaries for both insurance premiums and self insurance costs.

Although developed on a "zero base" approach, the amounts included in the forecast are consistent with the costs incurred over the current regulatory period. This approach provides a lower forecast than the application of escalation to the "base year" expenditure.

7.10.2 Reset Costs

A zero based cost forecast has been developed based on effort and expenses incurred in the current revenue determination process. These costs are included from 2010/11 through to 2012/13. SKM considers that the forecast expenditure is reasonable.

7.10.3 Skills Development

The skills development plan consists of three cost elements – graduate development program, an accelerated power engineer development program and recruitment costs.

The expenditure forecast included in ElectraNet's proposal includes the salaries of the participants in these programs. SKM does not consider this assumption to be reasonable and efficient. SKM is of the view that a large proportion of these labour costs should already be accounted for under other opex expenditure items and increases in graduate numbers covered in the asset growth escalators applied to the support areas.

On this basis, the labour component included in these costs has been reduced from 100% to 30%. The resulting decrease in opex forecast over the regulatory period is approximately $1,300,000.

Table 60 Summary of Skills Development Forecast (2007/08 $m)

Skills Development	2008-09	2009-10	2010-11	2011-12	2012-13	Total
ElectraNet Initial Proposal	0.71	0.71	0.71	0.71	0.71	3.5
Recommended Forecast	0.44	0.44	0.44	0.44	0.44	2.2

Note: Because of rounding, rows may not add.

7.10.4 Other Corporate Support Costs

The forecast for other Corporate Support expenditure has been generated by escalating base year costs using the escalators previously discussed. No issues have been identified.

7.11 Other Opex

7.11.1 Network Support

Network support forecasts are zero based and developed from the draft network support contract in place at Port Lincoln on the Eyre Peninsular. This service provision results from a competitive tender process and allows the deferral of a second transmission line to Port Lincoln with an estimated capital cost of $150 million.

ElectraNet has reviewed the forecast costs and their modified forecast is provided below.

Table 61 Summary of Network Support forecast (2007/08 $m)

Network Support	2008-09	2009-10	2010-11	2011-12	2012-13	Total
ElectraNet Initial Proposal	4.7	4.9	5.1	5.6	7.0	27.3
ElectraNet Revised Forecast	4.7	4.8	5.0	5.4	6.3	26.2

This cost element is a pass through cost. Note that the largest component of these costs is a fixed annual Service Charge. The forecast provided is consistent with the expenditure through the current regulatory period.

7.11.2 Debt and Equity Raising

SKM was not required to assess ElectraNet's forecast debt and equity raising costs.

7.12 Cost Allocation

SKM has reviewed ElectraNet's cost allocation methodology for attributing costs between prescribed services and other business functions.

Where possible all costs are allocated directly by identifying costs centres on time sheets, invoices etc. Most overheads are incorporated into standard labour rates where this is practical and directly allocated to cost centres through the time sheet system.

Corporate overheads that are not able to be directly attributed to a category of Transmission Services are allocated on a causal basis such as unit of plant, maximum demand or percentage of asset base employed.

95% of ElectraNet's revenue is earned from the provision of prescribed services. SKM considers that the allocation of costs between regulated and unregulated business is well defined, controlled and audited.

7.13 Conclusions and Recommendation

ElectraNet's application seeks a substantial increase in opex, following an underspend in opex in the current regulatory period. ElectraNet argues it has achieved ongoing efficiency improvements early in the current period, and is seeking to increase its maintenance spend due to a reassessment of its operating and maintenance practices in light of a review of the ageing nature of its assets, and improved asset management and maintenance strategies that will improve the reliability and life of its assets.

Others, in particular users groups, have suggested some of this underspend and subsequent request for additional opex allowance has the effect of maximising profits under the provisions of the incentive mechanisms in the revenue regulations. SKM has sought to identify whether the underspend in the current period is due to efficiencies or under-investing in necessary maintenance, but has not been able to find conclusive evidence and has not formed a conclusive position. Either way, we would be concerned that this pattern was not repeated again, and recommend ElectraNet's opex for the upcoming regulatory period be subject to detailed scrutiny at the next revenue application.

SKM notes the revised opex incentive mechanisms in the AER Guidelines will act to discourage annual fluctuations in opex spend in the future. SKM recommends that this signal could perhaps be reinforced by changing the definition of an "efficient base" for opex reviews from the most recent year to the average over the period being reviewed, or possibly even the lowest cost year.

SKM has reviewed ElectraNet's opex application in detail, and accepts ElectraNet's core argument that it's maintenance spend should be increased to reflect good industry practice. SKM also accepts ElectraNet's argument that corrective maintenance will also increase during the upcoming period as the additional inspection and routine maintenance activities will uncover defects requiring correction. However, once the first approximately 5 year cycle of increased maintenance is complete, SKM would expect the overall opex spend to reduce as corrective maintenance backlogs are eliminated and improved routine maintenance and inspection results in reduced defect rates. SKM recommends this be given scrutiny at the next revenue application review, and given consideration as a factor in assessing whether ElectraNet's revised maintenance practices are efficient as claimed by ElectraNet.

ElectraNet has invested considerable effort over the course of the current period to address deficiencies in some of its maintenance policies, and SKM considers these changes have been beneficial and necessary. As many of the changes are only now being implemented, it is difficult to say conclusively that all the policies and practices are efficient, however overall SKM has formed the view that ElectraNet's current asset management strategies and systems, and its operating practices and procedures are reasonably efficient and in line with good industry practice.

SKM has some concerns regarding the opex projects proposed by ElectraNet. Firstly in many instances the scope has not been fully developed and is subject to some uncertainty, and hence there is uncertainty in the cost estimates for these projects. Secondly, while SKM has formed the view that the projects are prudent and justified, they are in practice discretionary, at least in the short term. That is, it may be possible to defer some of these projects without incurring an immediate performance impact on the network. SKM recommends ElectraNet's spend on these opex projects be the subject of detailed review at the next revenue application review to ensure the requested amounts have indeed been spent, and the findings included in consideration of future opex requests from ElectraNet.

The combined impact of SKM's review of the forecast opex expenditure included in ElectraNet's revenue proposal is summarised in the following tables.

- **Table 62 Impact of Review on Controllable Opex Forecast (2007/08 $m)**

	2008-09	2009-10	2010-11	2011-12	2012-13	Total
ElectraNet Proposal Opex forecast	**54.16**	**55.84**	**58.35**	**61.27**	**62.46**	**292.08**
ElectraNet Revised Opex forecast with SKM and EN corrections (see 7.1)	**54.61**	**56.25**	**58.74**	**61.62**	**62.77**	**293.99**
SKM adjustment for duplication of communication sites	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.36)
SKM adjustment for communication site maintenance	(0.22)	(0.22)	(0.22)	(0.22)	(0.22)	(1.12)
Detailed review of sample of line projects (EPL replacements)	0.00	0.00	(0.23)	(0.35)	(0.70)	(1.28)
SKM adjustment to opex projects for quantum, scope, rationalisation	(0.54)	(0.60)	(0.59)	(0.57)	(0.50)	(2.80)
SKM adjustment for cost escalation applied to historic costs	(0.23)	(0.27)	(0.26)	(0.24)	(0.22)	(1.22)
SKM adjustment transformer refurbishment estimates	(0.54)	(0.54)	(0.54)	(0.54)	(0.54)	(2.70)
SKM transfer of opex projects to capex	(3.08)	(3.13)	(3.19)	(3.24)	(3.29)	(15.93)
SKM reductions in corrective maintenance	0.00	0.00	0.00	(0.45)	(1.01)	(1.46)
SKM adjustment for sharing generator testing costs	(0.23)	(0.23)	(0.23)	(0.23)	(0.23)	(1.13)
SKM adjustment for labour costs in Skill Development program	(0.27)	(0.27)	(0.27)	(0.27)	(0.27)	(1.35)
SKM adjustment for alternative land value escalation	(0.14)	(0.24)	(0.34)	(0.49)	(0.64)	(1.84)
Subtotal – SKM total recommended adjustments	*-5.34*	*-5.60*	*-5.98*	*-6.72*	*-7.70*	*-31.35*
SKM recommended Opex forecast	**49.27**	**50.65**	**52.76**	**54.90**	**55.07**	**262.64**

Note: Because of inter-relationship between a number of these adjustments, the combined impact is not equal to the sum of the individual components.

The total impact of the recommended modifications to the controllable opex forecast is a reduction of $31.4 million (07/08) over the five year regulatory period, or $29.4 million less than ElectraNet's original May 2007 opex application figure. The capex forecast would be increased by works (estimated at approximately $15.9m over the regulatory period) that were classed as opex projects in ElectraNet's revenue proposal (see Table 55)

The resulting recommended Opex forecast is summarised in Table 63 below.

Table 63 Summary of Recommended Opex Forecast (2007/08 $m)

	2008-09	2009-10	2010-11	2011-12	2012-13	Total
Field Maintenance	19.4	19.8	20.5	21.0	20.1	100.7
Field Support	8.0	8.3	8.6	9.1	9.5	43.5
Operations	2.0	2.0	2.1	2.2	2.3	10.6
Asset Manager Support	6.1	6.3	6.4	6.5	6.7	32.0
Corporate Support	13.8	14.2	15.1	16.1	16.6	75.8
Total Controllable	**49.3**	**50.7**	**52.8**	**54.9**	**55.1**	**262.6**
Network Support	4.7	4.8	5.0	5.4	6.3	26.2
Debt Raising	0.6	0.7	0.8	0.8	0.8	3.7
Equity Raising	0.2	0.2	0.2	0.2	0.2	0.8
TOTAL	**54.7**	**56.3**	**58.7**	**61.2**	**62.4**	**293.3**

Note: Because of rounding, columns may not add.

The comparison between the recommended forecast and historical expenditure is presented in Table 64 below.

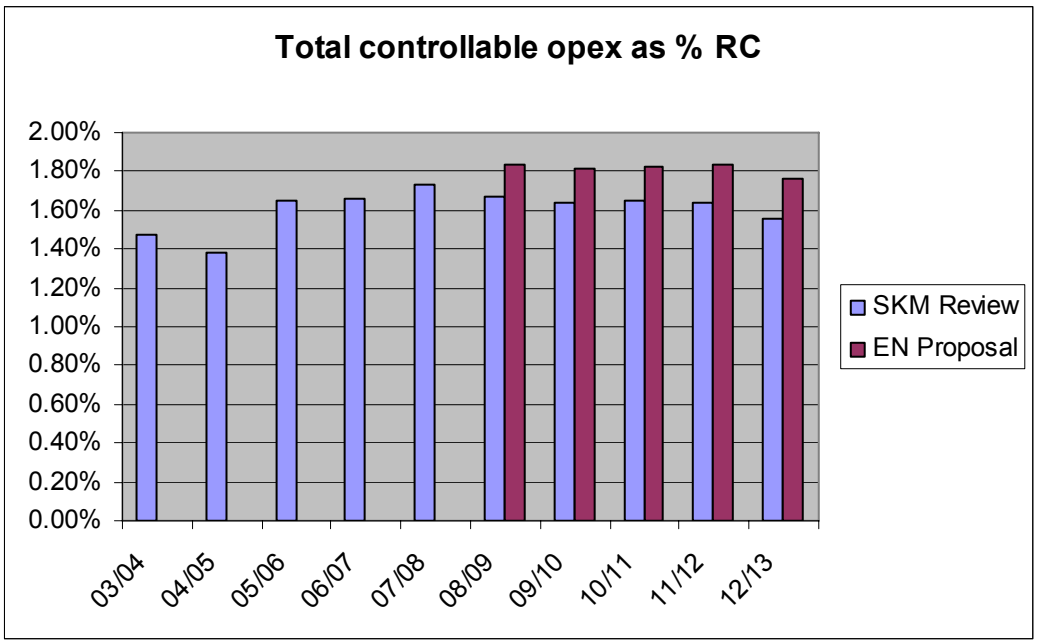
Table 64 –Comparison of Recommended Forecast and Historical Controllable Opex (2007/08 $m)

Category	Forecast	Historic Spend	Percentage Movement
Field Maintenance	101	82	23%
Field Support	44	31	40%
Operations	11	10	9%
Asset Manager Support	32	28	14%
Corporate Support	76	72	5%
Total Controllable	**263**	**223**	18%

Note: historic spend is over the last 5 years of the 5.5 year regulatory period for comparison purposes

The chart below demonstrates the impact of the proposed revised forecast on the apparent efficiency of the operating expenditure.

- **Figure 26 Controllable Opex as % of Asset Replacement Cost**



SKM believes that the recommended controllable opex forecast provides a more reasonable level of expenditure as a percentage of asset replacement cost.

- **Figure 27 Controllable Opex per kilometre of Line (2007/08 $)**

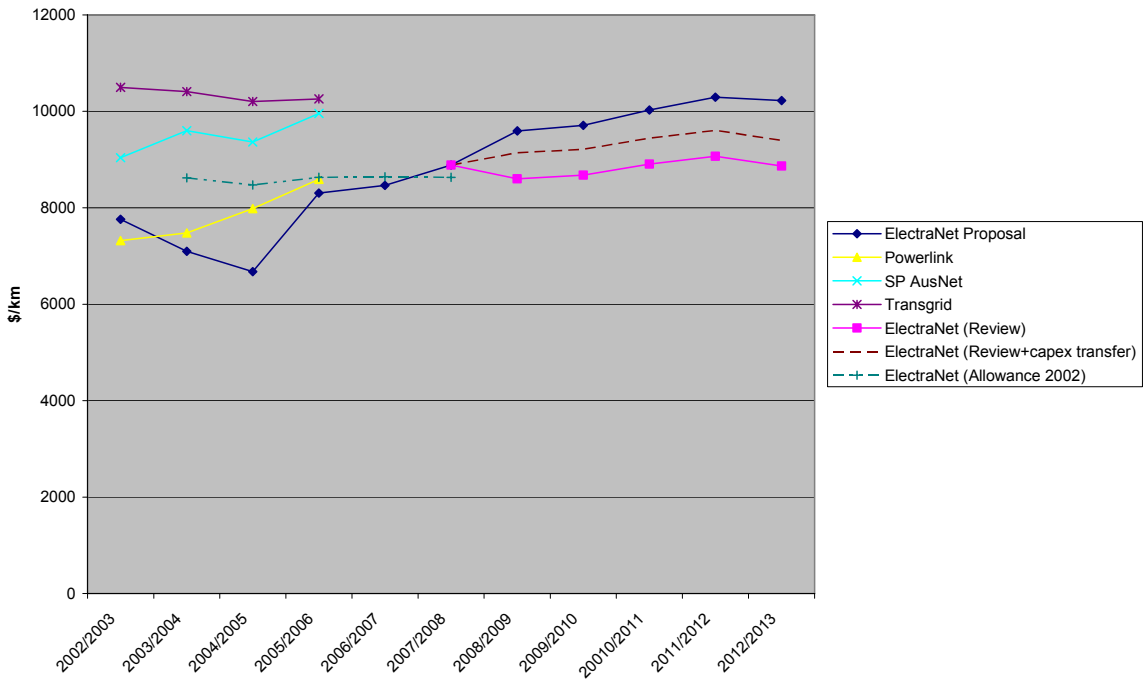


Figure 27 suggests that the recommended opex forecast represents a relatively efficient level of expenditure when compared with other TNSPs. SKM believes that this forecast provides an efficient level of opex for each year of the regulatory period with limited scope for efficiency improvements.

8. Service Standards

8.1 Introduction

This section of the SKM review focuses on ElectraNet's Performance Incentive (PI) Scheme to be applied to the TNSP during the next regulatory period.

To develop a conclusion regarding the suitability of the various elements within ElectraNet's proposed suite of performance parameters, this review examined the parameters in line with the provisions of the AER's "*First Proposed Electricity Transmission Network Service Providers Service Target Performance Incentive Scheme*" (STPIS) of January 2007, and the National Electricity Rules (NER)[25].

ElectraNet has proposed the following PI Scheme parameters and targets to apply for the upcoming regulatory period.

Table 65 - ElectraNet proposed PI Scheme parameters and targets

Parameter	Transmission Circuit Availability			Loss of Supply Event Frequency		Average Outage
Sub Parameter	Transmission Circuit Availability (%)	Critical Circuit Availability Peak (%)	Critical Circuit Availability Non Peak (%)	Events > x System Minutes	Events > y System Minutes	Duration (minutes)
Performance target	99.47	99.75	99.94	5	1	84
Cap (upper limit)	99.75	99.80	99.97	3	0	39
Collar (lower limit)	98.56	99.53	99.90	6	2	147
Weighting	0.3	0.2	0	0.1	0.2	0.2

Notes: x = 0.2 and y = 1.0

Source: ElectraNet revenue proposal

SKM has analysed ElectraNet's historical performance, including the suite of parameters through which ElectraNet's performance is currently evaluated, to ascertain whether the objectives and desired outcomes of the performance incentive scheme had been met. The proposed suite of parameters, including all values, targets and thresholds, suggested for the next regulatory period,

[25] The AER published the "Final Decision - Electricity Transmission Network Service Providers - Service Target Performance Incentive Scheme" in August 2007. However, as this version does not provide the mandated period of notice to ElectraNet, the version released in January 2007 applied .NER version 14 as at 31 May 2007.

was assessed against SKM's analysis of the historical performance data made available for this review by ElectraNet.

8.2 Existing Performance Incentive Scheme

During the current regulatory period 2003 - 2007/08, ElectraNet has been subject to an annual review of their service performance, as per stipulations within the then ACCC's 2002 revenue determination[26].

The existing Performance Incentive (PI) Scheme for ElectraNet is based on four (4) parameters:

- Circuit Availability (Total);
- Loss of Supply Event Frequency Index - number of events > 0.2 system minutes;
- Loss of Supply Event Frequency Index - number of events > 1.0 system minute; and
- Average Outage Duration

In addition, the PI Scheme made reference to 2 undefined market constraint based parameters which could potentially be included in the calculation of ElectraNet's annual performance in future years.

[26] ACCC, *South Australian Transmission Network Revenue Cap: Decision*, 11 December 2002

8.2.1 Past Annual Performance

Table 66 summarises the annual performance for ElectraNet against the 4 parameters shown in section 8.2, with the corresponding S-factor and financial results shown in Table 67.

Table 66 Historical Annual Performance Results

No.	Parameter	Annual Target	Annual Performance			
			2003	2004	2005	2006
1	Circuit Availability (Total)	99.25%	99.59%	99.38%	99.57%	99.42%
2a	Loss Of Supply > 0.2 system mins	5	2	7	0	4
2b	Loss Of Supply > 1.0 system mins	2	1	0	0	0
3	Average Outage Duration	100 mins	70.13	48.92	110.35	88.46

Table 67 Historical Annual Financial Results

No.	Parameter	Cap/Collar %MAR[27]	S-factors (%MAR)			
			2003	2004	2005	2006
1	Circuit Availability (Total)	±0.40	0.340	0.101	0.323	0.171
2a	Loss Of Supply > 0.2 system mins	±0.15	0.075	(0.020)	0.100	0.025
2b	Loss Of Supply > 1.0 system mins	±0.30	0.150	0.300	0.300	0.300
3	Average Outage Duration	±0.25	0.249	0.250	(0.001)	0.096
	Total	±1.00	0.814	0.631	0.721	0.592
	Bonus/(Penalty) $M		$1.238	$1.005	$1.196	$1.028

As illustrated by Table 67, ElectraNet has demonstrated solid performance against each of the 4 parameters during the current regulatory period, compared to the annual targets.

8.3 Current AER Determination

8.3.1 Transmission Constraints (Intra and Inter- Regional)

In the 2002 determination, the ACCC noted that a number of submissions from consumer groups highlighted the need for market impact parameters. These suggestions varied from non-descript market parameters to those designed to target interconnections.

The ACCC concurred with these sentiments but concluded it would be impossible to include parameters relating to transmission constraints at that time, as there were issues regarding "…

[27] For the current regulatory period, the amount at risk was set at 1% of the Maximum Allowable Revenue for the calendar year

unavailability of data and difficulties in establishing a causal connection between outage and TNSP actions", but added that it would revisit the idea of implementing parameters gauging performance in respect of transmission constraints "… *when the current scheme comes up for review"*. [28]

The AER's June 2007 MITC Issues Paper[29], discussed the AER's rationale and proposed process of applying parameters relating to market congestion, but according to NER Rule 6A.7.4(f)[30], this scheme will not be promulgated in time to be applied to ElectraNet during the next regulatory period.

8.4 Reliability and Accuracy of Data

SKM has conducted the annual audit of performance reporting by ElectraNet since the introduction of the service standards, with the first audit being conducted in April 2004. During these audits, SKM has reviewed the data system used by ElectraNet for capturing and categorising events, together with any subsequent incident investigations that have been conducted as a result.

Since the initial audit, ElectraNet have continued to improve their data systems, with the development of electronic logs for the Switching Operation Centre operators, and an on-line system for the control and accountability of planned outages. SKM has periodically conducted extensive testing of the recording system, including random sample testing of the main Events Database, and is satisfied that each event has been correctly recorded with date, time and other details intact, and an appropriate explanation and categorisation of each event.

Therefore, SKM is satisfied that the performance data used in developing targets, caps and collars for the performance parameters is accurate and reliable.

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[28] ACCC, *South Australian Transmission Network Revenue Cap: Decision*, 11 December 2002, section 8.7.3

[29] AER, *Service Target Performance Incentive Scheme - Developing Incentives Based on the Market Impact of Transmission Congestion*, June 2007

[30] The provisions of this Rule are: "The AER may, from time to time and in accordance with the transmission consultation procedures, amend or replace any scheme that is developed and published under this clause, except that no such amendment or replacement may change the application of the scheme to a Transmission Network Service Provider in respect of a regulatory control period that has commenced before, or that will commence within 15 months of, the amendment or replacement coming into operation."

8.5 Prescribed Suite of Performance Parameters

The STPIS prescribes that ElectraNet's performance will be evaluated against the following set of six parameters (including sub-parameters):

- Transmission Circuit Availability;
  - Total Transmission Circuit Availability
  - Critical Circuit Availability – Peak
  - Critical Circuit Availability – Non-Peak
- Loss of Supply Event Frequency;
  - Events > x System Minutes
  - Events > y System Minute

    where x and y are to be established in the transmission determination
- Average Outage Duration.

8.5.1 SAHA International Report

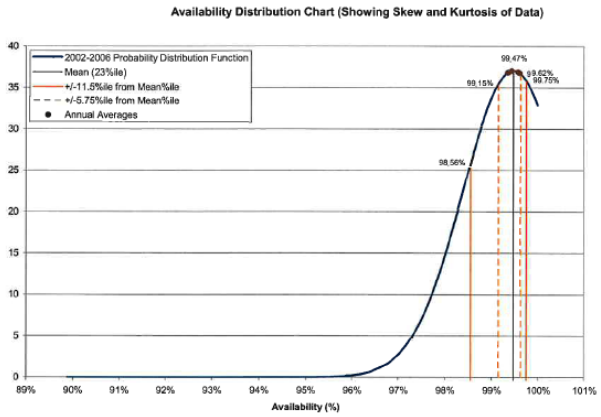
ElectraNet sought the advice of SAHA International in deriving appropriate values to be attributed to the parameters within the TNSP's PI Scheme. The scope of the SAHA International report was listed as having the following deliverables;

- a strictly sound analysis of the historical data;
- technical review of ElectraNet models;
- recommend a methodology for setting performance targets, caps and collars; and
- assess the impact of statistical outliers, changes in the capex and opex works programs and material changes to regulatory obligations on the targets, caps and collars set, using Monte Carlo modelling exercise or other appropriate statistical methods.

SKM acknowledges the comprehensive and rigorous manner with which SAHA International undertook the statistical analysis, and that SAHA International had sought to employ a robust methodology which attempted to identify the intrinsic nature of distribution within the historical performance data available, prior to any deliberation regarding the selection and application of an appropriate statistical model with which to explore the data presented. SKM considered this approach preferable to any contemplation of seeking to make historical performance data fit into a pre-supposed standard or normal distribution type statistical model, without prior consideration for the fundamental nature of latent probability distribution within the data itself.

However, upon examination of the results presented, SKM had reservations about the appropriateness of the percentile approach used by SAHA International in developing targets, caps and collars for the transmission circuit availability parameters.

SAHA International used all of the individual transmission circuit availability results for past 5 years which were represented by 537 data points, and plotted these on a probability distribution shown at right.[31] This graph clearly demonstrated how heavily skewed the circuit availability performance data is towards 100% end, as well as illustrating the kurtosis, or peakiness, of the data set.



The methodology for dealing with this data was outlined as identifying the percentile in which the mean or average value was to be found, and then allocating the cap and collar values at half the mean's percentile either side of the mean. This was based on a consideration of how the cap and collars values would have been determined had the data set fitted a normal distribution.[32]

SKM is of the opinion that this analysis, whilst robust, does not analyse the relevant measure required for setting the cap and collar values under the PI Scheme. The curve and statistical analysis represent the variance in performance of individual circuits, with the variance a measure of the range of "good performing" and "poor performing" individual circuits. The PI Scheme uses the average of all feeders, which statistically would be expected to show a smaller range of variance due to the diversity between the approximately 107 circuits. This is demonstrated by the much smaller range over which historical actual annual average result, as used in the PI Scheme, varies. In effect, the cap and collar recommended through this method would be appropriate if one individual circuit were selected each year at random by which to measure performance, and would give an equal likelihood of a positive or negative result. This results in a range of performance between the cap and collar that is much larger than the variance experienced in the total average parameter used in the PI Scheme, with the effect of significantly dulling the financial impact of this parameter.

As a result, SKM recommends the cap and collar values proposed for the circuit availability parameters not be accepted, as they do not satisfy the PI Scheme objective of providing a sufficient

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[31] SAHA International, *Service Target Incentive Scheme Review*, May 2007, section 3.1, pp 8

[32] ibid, section 3.2, pp 9

incentive for improved performance. As an alternative approach, SKM used the past 5 years of historical performance data and plotted best fit curves. Whilst the statistical confidence in the best fit curves generated is somewhat limited by the small data set, it does allow for an analysis of the data to be conducted that considers the nature of the distribution of the historical data.

SKM notes that in recent determinations, the cap and collar values have been selected as a number of standard deviations either side of the mean, with some adjustments required to avoid establishing circuit availability cap values above 100%. To achieve the equivalent result, SKM chose the 5% and 95% values from the cumulative probability distributions generated by the curves-of-best-fit.

As a matter of consistency, SKM adopted a similar curve-of-best-fit approach for reviewing the Loss of Supply Event Frequency (LOS) parameters and Average Outage Duration, as the target, cap and collar values for these parameters have been similarly based on 5 data points from the period 2002 to 2006. SKM considered it would be inconsistent to set the cap and collar values using the percentile approach suggested by SAHA International for these parameters, as this would simulate using the 25% and 75% values for a normal distribution. The cap and collars for the LOS and Average Outage Duration parameters were set at the 5% and 95% values from the cumulative probability distributions similar to the transmission circuit availability parameters.

Therefore, the approach adopted by SKM has reflected the need identified by SAHA International to use a probability distribution that best fits the data set, and reflects the inherent skewness and kurtosis, whilst incorporating the setting of the cap and collar values to simulate the effect of 2 standard deviations either side of the target to include the range of historical results.

8.6 Framework for SKM Review

SKM examined the relevant documentation in order to develop a suitable framework with which to structure their review of the STPIS section of ElectraNet's Revenue Proposal.

8.6.1 PI Scheme Elements not subject to SKM Review

The STPIS is prescriptive about two specific elements of the PI Scheme, and as such, SKM was not required to review or recommend alternatives. These elements were:

- Parameters to be used - The parameters that have been prescribed for ElectraNet's PI Scheme are defined in the AER's STPIS document[33] (refer Appendix C of this report). Section 2.4 of

[33] AER, *First Proposed - Electricity Transmission Network Service Providers - Service Target Performance Incentive Scheme*, January 2007, Appendix B

the STPIS outlines the procedure by which a parameter may be added, removed or varied The AER has specified timeframes for such amendments, including a requirement that the TNSP must make its submission for any proposed amendments at least 22 months prior to the commencement of the next regulatory period.

- Revenue at risk - the STPIS stipulates that the"*… level of revenue at risk attached to a TNSP's performance against its parameters and values is 1 per cent of the maximum allowed revenue for the relevant calendar year*"[34].

As a consequence, the parameters to be included in the PI Scheme for the next regulatory period are those listed in section 8.4. Whilst the NER makes provision for the AER performance scheme to "*… ensure that the maximum revenue increment or decrement as a result of the operation of the service target performance incentive scheme will fall within a range that is between 1% and 5% of the maximum allowed revenue [MAR] for the relevant regulatory year*"[35], the STPIS establishes the level at risk to be 1% of MAR.

8.6.2 PI Scheme Elements subject to SKM review

Section 2.3 of the STPIS discusses how the "other elements" relating to the prescribed parameters are to be proposed by a TNSP during the transmission determination process. These other elements include the definition/formula, unit of measure, source of data, exclusions, and inclusions relating to the parameter. This section of the STPIS also clarifies how a TNSP is obliged to make a proposal regarding exactly what the TNSP believes these "other elements" should be. The STPIS states that such a proposal will either be accepted by the AER, or substituted by alternative "other elements" which, in the AER's opinion, better satisfy the objectives of the scheme.

Section 2.5 of the STPIS outlines how a TNSP is obliged to propose values for the parameters applicable within the scheme, and that these values included a performance target, a cap and a collar. Section 2.5 goes on to state that the AER "*… must accept these proposed values if they comply with the requirements specified … and this scheme."* This section also clarifies that a TNSP may propose the inclusion of a deadband around the performance target value.

Section 2.7 of the AER's STPIS document sets forth an obligation, on the part of a TNSP, to propose weightings for each of the TNSP's parameters, and prescribes an additional obligation that the TNSP are required to "*… demonstrate how these proposed weightings are consistent with the objectives listed in clause 1.4.*".

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[34] AER, *First Proposed - Electricity Transmission Network Service Providers - Service Target Performance Incentive Scheme*, January 2007, section 2.6, pp6

[35] AEMC, *National Electricity Rules*, May 2007, chapter 6A, clause 6A.7.4(3)

SKM has reviewed the values, weightings and (where possible) the definitions of the proposed parameters in terms of their compliance with the requirements of the STPIS in providing sufficient incentive for performance improvement.

8.7 Framework for Review

SKM's review of the proposed PI Scheme was divided into the following sections:

- Other Elements of the STPIS – being the definition/formula, unit of measure, source of data, exclusions and inclusions etc., relating to the various parameters;
- Values of the parameters - being the performance target, collar, and cap proposed as well as any consideration of including a deadband; and
- Weightings assigned to parameters.

8.8 Other Elements of the STPIS

Each of the three parameters, and their various sub-parameters, may be subject to a review in terms of the proposed "other elements", being the definition/formula, unit of measure, source of data, and exclusions and inclusions relating to the parameter, where Appendix B of the STPIS allows.

For ElectraNet, the other elements that are available for review are:

- the list of critical circuits, depending upon the definition of what constitutes a critical circuit;
- the time period considered to be the peak period;
- source of data used in calculations; and
- the upper and lower threshold values to be used in counting Loss of Supply events.

All other factors have been specified and accepted in the STPIS, and as such have been set for the next regulatory period.

8.8.1 Transmission Circuit Availability

In the proposed suite of performance parameters, the prescribed parameter of transmission circuit availability has been divided into three sub-parameters:

- Total Transmission Circuit Availability;
- Critical Circuit Availability – Peak; and
- Critical Circuit Availability – Non-Peak.

In all three sub-parameters of the Circuit Availability parameter, the source of data utilised was found to have been taken from 2002 – 2006. As this was seen to align with the AER's source of data rule, being the most recent five years of performance data, as depicted in Section 2.5(g) of the STPIS, SKM found the proposed source of data for this parameter to be reasonable.

SKM also reviewed ElectraNet's proposal regarding what were deemed "critical" circuits, and the time period that has been proposed as ElectraNet's "peak" period for circuit availability within the South Australian transmission system.

8.8.1.1 Critical Circuits

Within ElectraNet's revenue proposal, the selection of circuits for inclusion under the definition of "critical circuits", is listed as the "… *275kV transmission lines making up the Heywood interconnector between South Australia and Victoria"*. ElectraNet suggested this selection of circuits because "… *these transmission lines are the most critical transmission lines in determining spot prices"*[36]

Table 68 summarises the lines nominated by ElectraNet as the "critical circuits".

Table 68 ElectraNet Nominated Critical Circuits

Line No.	Voltage	Circuit Name	Length (km)
1904	275kV	Para - Tailem Bend no. 2	105.4
1921	275kV	Para - Tailem Bend no. 1	101.6
1922	275kV	Tailem Bend - South East no. 1	308.2
1923	275kV	Tailem Bend - South East no. 2	308.2
1930	275kV	South East - Heywood no. 1	12.0
1931	275kV	South East - Heywood no. 2	12.0
Total			**847.4**

The total of 847.4 km represents approximately 14.54% of the total length of the transmission network.

This selection of transmission circuits is consistent with a performance indicator that ElectraNet has reported to the State based regulator ESCOSA since 2001. This parameter was intended to reflect the performance of the Heywood interconnector, and included measuring the circuit availability of the 275kV double circuit lines between Para substation and the SA-Victoria border. One of the main drivers for this parameter was the ability of the interconnector "… *to transport*

[36] ElectraNet, *Transmission Network Revenue Proposal*, 31 May 2007, section 10.3.2, pp 115

electricity as an important factor in the determination of electricity prices to SA customers."[37] At the time of the introduction of this parameter, South Australia was heavily reliant on the Heywood interconnector, and therefore the parameter in this form, with the selection of circuits shown in Table 68, was appropriate at that time and for the reporting requirements of SAIIR and ESCOSA.[38]

In reviewing the list of critical circuits appropriate to this additional parameter under the PI Scheme, SKM is of the opinion that a wider consideration is required to include the core network transfer corridors in South Australia.

There are four network corridors in the ElectraNet network:

- north distributor, which provides a power transfer corridor between the Adelaide metropolitan area and the northern areas of the State, particularly the power stations near Port Augusta. There are four 275kV lines in this corridor, with numerous tap off points to areas such as Riverland, Yorke Peninsula and the Barossa. The capability to transfer power along the northern distributor is becoming an issue due to the increasing amount of wind generation in the State's north. The loss of significant capability on this corridor is considered likely to have an impact on the market;
- south corridor, which provides a power transfer corridor between the Adelaide metropolitan area and the lower south east areas of the State, and primarily includes the 275kV lines linking the SA and Victorian networks via the Heywood interconnector. These lines comprise those shown in Table 68, and are important to electricity prices in South Australia;
- port distributor, which is a power transfer corridor from power stations in the vicinity of Port Adelaide to Para substation in the northern metropolitan area of Adelaide.; and
- central distributor, which carries most of the State's consumer load by providing a corridor between the northern and southern regions of metropolitan Adelaide through the Mt Lofty ranges. Unlike the others, the role of the central distributor is to channel the power sourced from the other three in any combination.

Advice provided to SKM by ESIPC suggested that constraints on the northern and southern corridor are occurring from time to time, and these circuits are the most likely to have impacts on the market and integrity of the SA system. Accordingly these circuits most probably constitute what could be considered a "critical circuit" for the purposes of this parameter.

SKM noted that there is no definitive classification for "critical circuits" within either the STPIS or the NER. Within the NER, a definition of "critical", in terms of which circuits a TNSP could include under such a parameter, is potentially implied through consideration that the service target

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[37] SAIIR, *Performance of Regulated Electricity Businesses in South Australia 2000-2001*, Nov 2001, pp 69

[38] The Office of the **S**outh **A**ustralian **I**ndependent **I**ndustry **R**egulator (SAIIR) became the **E**ssential **S**ervices **C**ommission **o**f **S**outh **A**ustralia (ESCOSA) on 12 September 2002.

performance incentive scheme should provide incentives for each TNSP to "… *improve and maintain the reliability of those elements of the transmission system that are most important to determining spot prices*"[39]

Within a recent transmission congestion issues paper, the interpretation of the term "critical circuits" may be related to the rationale in establishing measures of market constraint, to which a TNSP's performance can be evaluated, in order *"… to promote more efficient operation of the transmission system by linking service standards incentives more directly to market outcomes"*[40]

Although South Australia has historically been heavily reliant on inter-regional interconnectors within the NEM, circuits connecting the bulk of the South Australian generation capacity to the bulk of the load have been omitted from inclusion in ElectraNet's proposed list of critical circuits. The recent publication of the AER's "State of the Energy Market" discussed South Australia's moves to reduce in its reliance on imports over the NEM interconnectors. Since 1999, through new investment in generation, South Australia's reliance on imported energy has reduced from 25% of annual consumption to approximately 7% in 2006-07. In discussing influences on market spot prices, the AER stated that significant price separation may occur if an interconnector is congested, which would support ElectraNet's inclusion of the circuits connecting the Heywood interconnector.

However, the AER also noted that transmission congestion may be exacerbated through the availability of generation plant and the bidding behaviour of generators. As this section of the AER's "State of the Energy Market" report made specific reference to the "… *significant investment in peaking capacity*" that has occurred in South Australia in direct response to spot price activity, SKM is of the opinion that circuits connecting these areas of generation to the South Australian network should also be considered critical in determining spot prices, and therefore included within a parameter that seeks to assist in measuring the performance of critical circuits.

In Section 3.2 of their report, SAHA International noted that "… *as there are only six identified critical circuits an outage duration on any one of the circuits due to capital expenditure programs will impact on the performance parameters for the critical circuit. Therefore if it is known that this work will impact on the line availability of a critical circuit it would be recommended to reduce the weighting attributed to this parameter"*. SKM considers that structuring the parameter to be based on a small number of circuits with potentially a volatile annual result, the impact of which is tempered by a reduction in weighting when it relates to availability of critical circuits, does not align with the objectives of the STPIS in seeking to provide incentives for TNSP performance

[39] NER clause 6A.7.4(b)(1)(ii)

[40] AER, *Service Target Performance Incentive Scheme - Developing incentives based on market impact of transmission congestion*, Issues Paper, June 2007, section 1.2

improvement. The list of circuits included should encompass those which can impact the market price through effecting both interconnector and power transfer capability from the State's generation.

Based on these considerations, SKM does not consider the list of circuits to be included in the Critical Circuit Availability Parameter proposed by ElectraNet to be reasonable. SKM proposes that the expanded list of lines shown in Table 69 be considered as critical circuits with regards to both the market impact and reliability and integrity of the network.

Table 69 Proposed Critical Circuits

Line No.	Voltage	Circuit Name	Length (km)
1904	275kV	Para – Tailem Bend no. 2	105.4
1910	275kV	Davenport - Brinkworth (east circuit)	147.4
1911	275kV	Brinkworth - Para (east circuit)	133.8
1918	275kV	Davenport - Para (west circuit)	265.5
1919	275kV	Davenport - Canowie	212.5
	275kV	Canowie - Robertstown	
1920	275kV	Davenport - Robertstown	212.5
1921	275kV	Para – Tailem Bend no. 1	101.6
1922	275kV	Tailem Bend - South East no. 1	308.2
1923	275kV	Tailem Bend - South East no. 2	308.2
1930	275kV	South East - Heywood no. 1	12.0
1931	275kV	South East - Heywood no. 2	12.0
1938	275kV	Robertstown - Cherry Gardens no. 1	163.7
1939	275kV	Robertstown - Cherry Gardens no. 2	163.7
Total			**2146.5**

This revised total of critical circuits represents approximately 36.83% of the total length of the transmission network. SKM notes that a number of these lines are to be split as a result of capital works, and the number of circuits (and denominator in the availability calculation) will change accordingly as these splits occur.

8.8.1.2 Peak / Off Peak definition

ElectraNet have proposed a change to the standard definition of "peak period" from the standard 7:00am to 10:00pm weekdays mentioned in the STPIS to 8:00am to 8:00pm weekdays.

Figure 28 and Figure 29 illustrate that in the case of ElectraNet, South Australian demand exhibits comparatively little variation throughout a typical day (summer or winter), compared with other mainland State networks. For each of these figures, the grey shaded area represents the period

from 7:00am to 10pm nominated by the AER as the peak period, whilst the yellow for the period 8:00am to 8:00pm shows the peak period as included in the ElectraNet submission.

- **Figure 28 Summer Maximum Demand Profiles for NEM Regions**

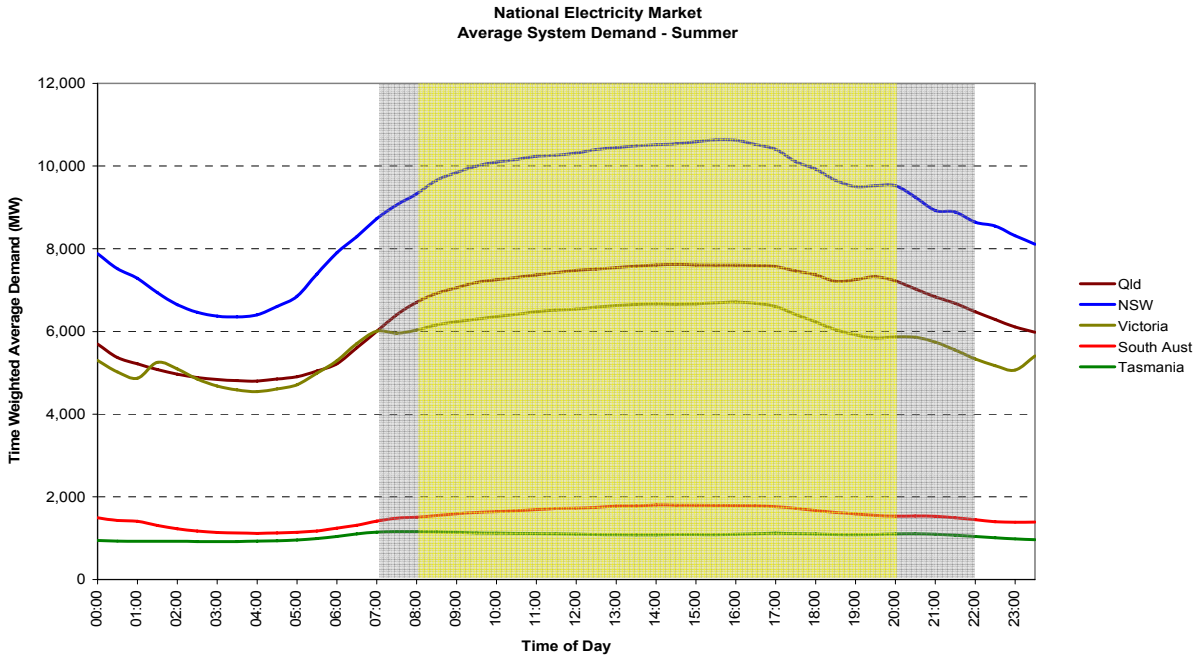
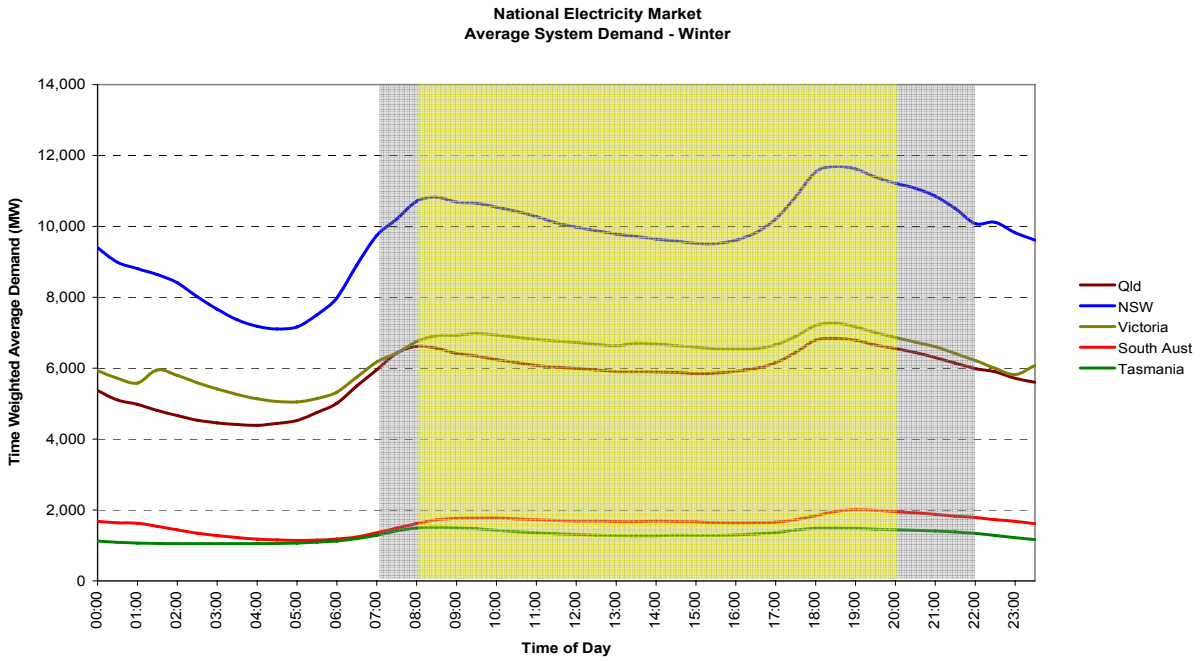


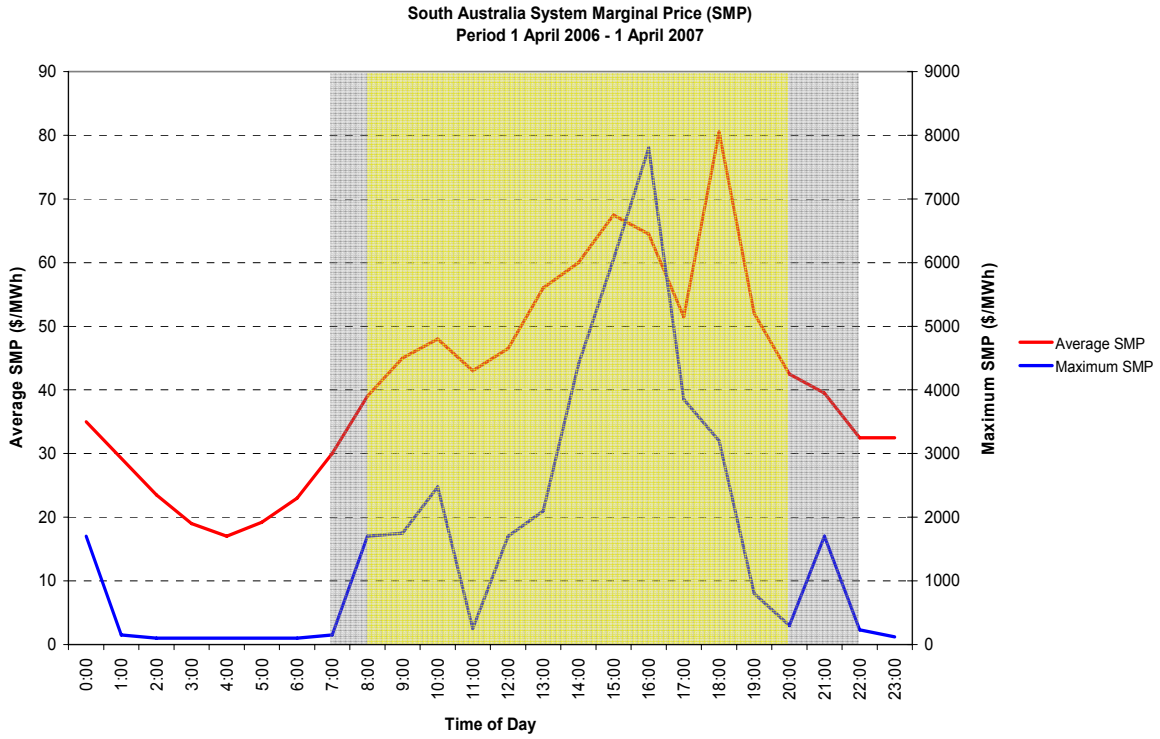
Figure 29 Winter Maximum Demand Profiles for NEM Regions



Source: ESAA Electricity Gas Australia 2007 report

ElectraNet suggested during the review that the nominated peak period of 8:00am to 8:00pm was determined in consultation with operational staff based on when it could be reasonably expected for TNSP outages to impact on South Australia pool prices. This was supported by an analysis of SA system marginal price (pool price) for the 12 month period prior to the ElectraNet submission, which showed that the average pool price exceeded $40 per MWh between 8:00am and 8:00pm. High pool prices during the 12 month period were almost entirely contained in the period 8:00am to 8:00pm (refer Figure 30).

■ **Figure 30 South Australia Pool Price**



SKM agreed with the ElectraNet proposition that 8:00am to 8:00pm appeared reasonable on the basis of capturing those times which are most likely to impact on the pool price. SKM also noted and accepted the ElectraNet suggestion that the nominated 8:00am to 8:00pm peak period provided some scope for short duration work to be conducted in the early morning (6:00am to 8:00am) in daylight without significant risk of price impact, as SKM considered such work practices are in accordance with the objectives of the STPIS.

Accordingly, while SKM is reluctant to introduce a different definition of "peak" within the STPIS, it does not consider the ElectraNet proposed definition to be unreasonable.

8.8.2 Loss of Supply Event Frequency Index

In ElectraNet's current PI Scheme, the prescribed parameter of Loss of Supply Event Frequency Index has been divided into two sub-parameters;

- Events > 0.2 system minutes
- Events > 1.0 system minute

ElectraNet has proposed to retain the current thresholds (1.0 and 0.2) for these parameters, with targets based on 11 years of historical data.

SKM does not consider ElectraNet's proposed targets for this parameter to be reasonable, as performance of ElectraNet in the early portion of the 11 year period is substantially worse than the most recent 5 years. Accordingly setting targets based on a longer period does not satisfy the PI Scheme objective of improving performance, as the targets would be higher than recent performance. SKM's consideration of this issue is discussed below.

Further, SKM considers the thresholds of 1.0 and 0.2 system minutes are too high, and do not provide sufficient resolution to enable this parameter to be effectively and fairly applied. For the 1.0 system minute threshold, 4 of the past 5 years have resulted in zero events, with only 1 event in the other year. SKM recommends these thresholds be lowered to provide improved resolution, in concert with revised targets based on the past 5 year's performance.

8.8.2.1 Source of Data

Clause 2.5 of the STPIS outlines the AER's determination of how a TNSP is to develop the various values for parameters within a proposed suite of performance parameters. Clause 2.5(g) stipulates that a "… *proposed performance target must be equal to the TNSP's average performance history over the most recent five years*" with 2.5(h) adding that the "… *AER may approve a performance target based on a different period if it is satisfied that the use of a different period is consistent with the objectives of clause 1.4 of this scheme* [the STPIS]*.*"

While discussing the Loss of Supply Event Frequency Index and the determination of the proposed values within this parameter, SAHA International stated that the"… *historical information provided beyond the 5 year period is also important as the data is limited to a single value for each year and five data points is not statistically significant, therefore it is important to increase the sample size to the maximum available historical data that contains reliable data.*".[41]

Expressed mathematically, the confidence that a result is or is not able to be attributed to random chance is given by Equation 1 below:

- **Equation 1 Confidence Level**

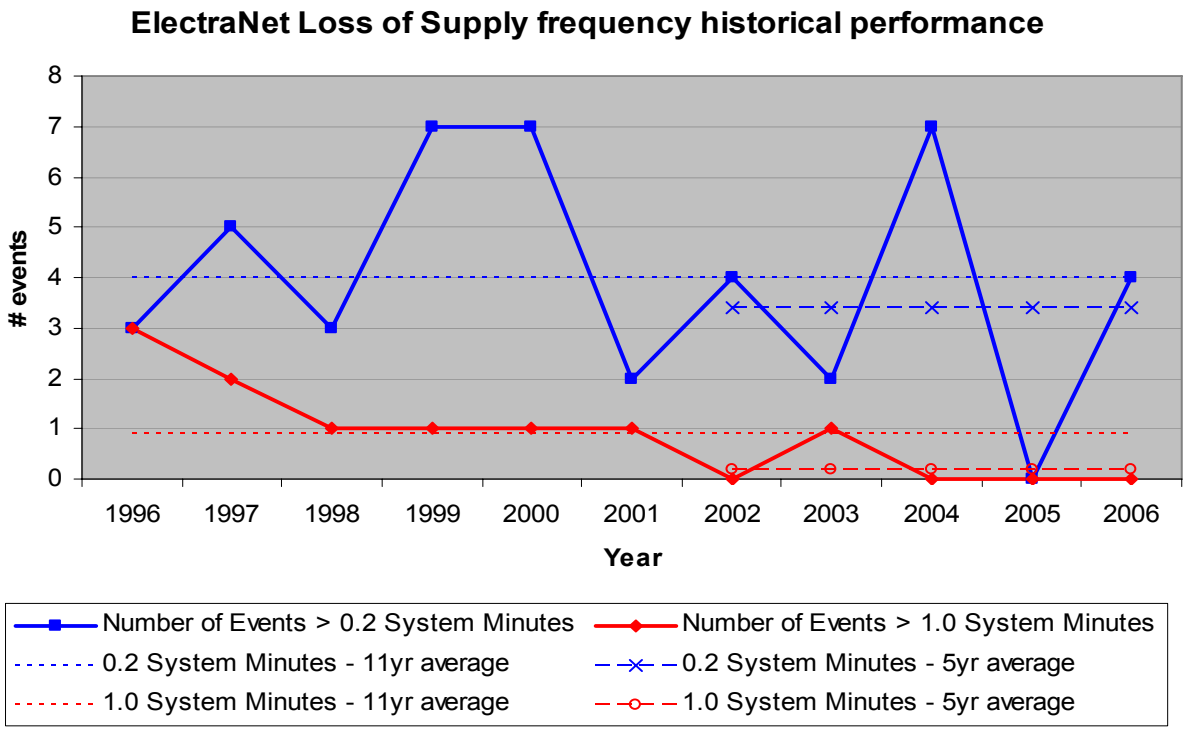
$$\text{confidence} = \frac{\text{signal}}{\text{noise}} \times \sqrt{\text{sample size}}$$

[41] SAHA International, *Service Target Incentive Scheme Review*, May 2007, section 4, pp 15

According to this equation an increase in the sample size will improve the confidence in the data, while the underlying reliability of the data, or its "signal-to-noise ratio" [42] also affects the confidence. That is, increased confidence levels are not always achieved by increasing the sample size.

ElectraNet's performance against the 1.0 and 0.2 system minute parameters is shown in the chart below.

- **Figure 31 – Long term Loss of Supply frequency performance**



From Figure 31 it can be seen that recent performance is significantly better than the performance in the earlier years of the period. SKM has doubts that the historical data derived from years prior to the 5 year period suggested by the AER in clause 2.5(g) can be considered indicative of ElectraNet's current transmission system environment, as adjustments have not been made to take into account substantial differences in the transmission system that may have occurred due to capital and operational spend since 1996, or new and improved operational and maintenance regimes implemented subsequent to the time at which the data was recorded.

[42] Signal-to-noise ratio is the ratio between the amount of meaningful information ("signal") to the amount of background unrelated data ("noise"). The higher the ratio, the greater the confidence in the data.

SKM acknowledges the statistical consideration presented with regards to the increased data population and the level of confidence in the result, but considers that this is only appropriate where all of the data in the larger data set is comparable. SKM is of the opinion that it is not appropriate to use reliability data from the late 1990s as part of the basis in establishing targets for the regulatory period 2009-14, particularly when the transmission network has undergone reliability improvements during the past decade.

ElectraNet has expressed its concern that 5 data points does not represent a sufficient number to produce a statistically sound figure, and considers the additional 6 years data is warranted on this basis. SKM has considered this argument, but reasons that the parameters are calculated from hundreds of events (548 loss of supply events since 2002, noting that only a small proportion of these meet the threshold value and are counted) and that this is sufficient to produce a robust target. SKM considers the concerns regarding comparability of the earlier data outweigh the benefits of additional data points, and that the proposed 5 year data set satisfies the NER principle to *improve and maintain the reliability* of the network. Including earlier data when reliability was not as good would result in a target that does not take account of the reliability improvements that have been achieved over the last 5 years.

Therefore, SKM recommends that an average value based on the past 5 years, as recommended in the STPIS, be adopted for establishing performance targets during the next regulatory period.

8.8.2.2 Definitions of the "X" and "Y" thresholds

ElectraNet have proposed that the definitions of "X" and "Y" for the two sub-parameters within this parameter should be maintained "*… at the existing 0.2 and 1.0 system minute levels.*"[43]

SKM considers that an evaluation of the proposed definitions for the "X" and "Y" thresholds requires a review to ensure that the values remain consistent with the objectives of the STPIS. The findings and recommendations for threshold values are included in section 8.9.2.

8.8.3 Average Outage Duration

In establishing the target for Average Outage Duration, ElectraNet have relied upon data extending back to 1998. Similar to the discussion outlined in section 8.8.2.1, SAHA International were provided with data beyond the 5 year period recommended in the STPIS, as a means of increasing the number of data points used in the review.

[43] ElectraNet, *Transmission Network Revenue Proposal*, 31 May 2007, section 10.3.3, pp 116

SKM noted that the data set was "truncated" to exclude "… *an exceptionally high outage that occurred in 1997 as this is considered an outlier year"*[44] as permitted within section 2.5(k)(1) of the STPIS. However, as discussed in section 8.8.2.1, SKM is of the opinion that historical performance data taken prior to the most recent five years is not comparable as it pertains to system performance that has since demonstrably improved. The figures show significant improvements in performance in the last 5 years compared the previous years, most likely the result of the PI Scheme, improved O&M practices, and aged asset replacements which cannot or should not be reversed.

8.9 Values of the Parameters

Each of the three parameters, and any sub parameters, prescribed for inclusion within the ElectraNet PI Scheme were reviewed in terms of ElectraNet's proposed values for the performance target, collar, and cap, as well as any consideration of deadbands.

8.9.1 Transmission Circuit Availability

In the proposed PI Scheme, the prescribed parameter of transmission circuit availability has been divided into three sub-parameters;

- Total Transmission Circuit Availability
- Critical Circuit Availability – Peak
- Critical Circuit Availability – Non-Peak

8.9.1.1 Total Transmission Circuit Availability

SKM noted that the calculation of the transmission circuit availability for the entire network was based on availability data for each feeder during the past 5 years, or 537 data points. As stated in section 8.5.1, SKM did not agree with the use of percentiles in this instance, as the calculated values relate to the range of performance of individual transmission circuits rather than relating to the annual performance of the entire transmission network as defined by the PI Scheme.

SKM adopted a Weibull distribution as the curve-of-best-fit, and in keeping with the objectives of recent determinations in establishing the caps and collars at 2 standard deviations from the mean assuming a normal distribution for the data set, the cap was set at the 95% point in the cumulative probability distribution, and the collar at 5%. Table 70 shows the proposed SKM values and those originally presented by ElectraNet.

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[44] ibid, Appendix W, section 5, pp 22

- **Table 70 Total Transmission Circuit Availability Values**

	Target	Cap - Bonus Limit	Collar - Penalty Limit	Period for Average
Current PI Scheme	99.25%	99.60%	98.50%	-
ElectraNet proposed	99.47%	99.75%	98.56%	2002 - 2006
Recommended Value	**99.47%**	**99.63%**	**99.10%**	**2002 - 2006**

8.9.1.2 Critical Circuit Availability - Peak

In establishing the values for this parameter, SKM revised the list of feeders to be included as "critical circuits", in contrast to the six (6) lines nominated in the ElectraNet submission (as discussed in section 8.8.1.1). SKM has based this review on the nominated peak period of 8:00am to 8:00pm.

SKM determined the target by taking the average of the recorded availability for each of the 14 critical circuits nominated by SKM across each of the years 2002 to 2006.

In reviewing this data set, two points were considered to be outliers - the annual availability figures for 2003 and 2004 for line 1918 (Davenport - Para). The availability for this line was below 90% for these years and can be attributed to major capital work. The Davenport - Para line underwent an upgrade in a number of phases:

- the 2003 Annual Review highlighted the completion of Phase 1 which involved condition monitoring and hardware procurement to increase the operating temperature of the line;
- the 2004 Annual Review listed a hybrid live line and de-energised installation up-rating strategy (described as Phases 2 and 3 in the 2003 Annual Review) which was completed ahead of schedule in March 2004.

As these major works are completed, SKM considered that the availability results for this line in 2003 and 2004 would distort the target for the next regulatory period, and have therefore modified the availability percentages in line with the accepted exclusions for the ElectraNet availability parameter.[45]

SKM used a Weibull distribution as the curve-of-best-fit, and setting the caps and collars at 95% and 5% values of the cumulative probability distribution. These results are summarised in Table 71.

[45] AER, *First Proposed - Electricity Transmission Network Service Providers - Service Target Performance Incentive Scheme*, January 2007, Appendix B. These events have been capped at 14 days for consistency with the treatment they would receive in the forthcoming regulatory period.

■ **Table 71 Critical Circuit Availability - Peak Values**

	Target	Cap - Bonus Limit	Collar - Penalty Limit	Period for Average
ElectraNet proposed*	99.75%	99.80%	99.53%	2002 - 2006
Recommended Value	**99.24%**	**99.51%**	**98.52%**	**2002 - 2006**

** based on 6 critical circuits only*

8.9.1.3 Critical Circuit Availability - Non-Peak

Based on the proposed critical circuits listed in section 8.8.1.1, and the nominated non-peak period of 8:00pm to 8:00am, the values for target, cap and collar have been calculated using the Weibull distribution as the curve-of-best-fit (refer section 8.5.1 for preferred methodology). The results are summarised in Table 72.

■ **Table 72 Critical Circuit Availability - Non-Peak Values**

	Target	Cap - Bonus Limit	Collar - Penalty Limit	Period for Average
ElectraNet proposed*	99.94%	99.97%	99.90%	2002 - 2006
Recommended Value	**99.62%**	**99.95%**	**98.88%**	**2002 - 2006**

** based on 6 critical circuits only*

As discussed previously, there was significant upgrade capital work undertaken on the Para-Davenport line in 2003 and 2004, which resulted in annual performances that were considered as outliers and were therefore modified in accordance with the accepted ElectraNet exclusions.

ElectraNet has proposed to place a zero weighting on this parameter as the historical data does not include a significant amount of interconnector related work programmed during the off-peak hours. SKM would agree that the historical data has not been influenced by work on the Heywood interconnector, and the objective of the Scheme is to encourage capital work on the critical circuits to be undertaken during off-peak times. The historical trend across the past 5 years shows a decreasing availability during off-peak period, and SKM considers that establishing a potentially high target for non-peak availability may send a signal contrary to the main objectives of the PI Scheme.

Therefore, SKM accepts that this parameter should be reported during the next regulatory period, but carry no weighting.

8.9.2 Loss of Supply Event Frequency

The prescribed parameter of Loss of Supply Event Frequency has been divided into two sub-parameters;

- Events > 0.2 system minutes
- Events > 1.0 system minutes

SKM undertook analysis and modelling of loss of supply data, supplied by ElectraNet, for the period January 1996 to December 2006. SKM sought to better understand whether patterns within this data would allow conclusions to be drawn regarding the significance of the respective thresholds and targets proposed by ElectraNet for these 2 specific performance parameters.

8.9.2.1 Adjustment for anticipated load increases

ElectraNet have made mention of significant demand increases that are "… *anticipated on the Playford – Pimba 132kV line and at the new Kanmantoo and Middleback connection points"*[46], which require the adjustment of historical performance data for these three connection points, by the ratio of their new to old load, in order to facilitate a more accurate forecast of the likely impact that such increases would have on performance during the next regulatory period.

While the STPIS appears to allow for such adjustments[47], in order to recognise the impact of forecast changes in customer load on the historical data used to derive a TNSP's forecast performance values, SKM reviewed the specific adjustments suggested by ElectraNet, in order to verify that they were both appropriate and accurate.

During discussions with ElectraNet, SKM were advised that the adjustments to historical performance data for the Woomera (Playford – Pimba 132kV line), Kanmantoo and Middleback connection points entailed the modification of the historical performance data recorded during events involving a loss of supply at these connection points, by a "scale factor" that had been calculated through consideration of the ratio of the current load to the 'anticipated" load.

The results of the adjustment process undertaken by ElectraNet are illustrated in Table 73.

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[46] ibid, section 10.3.3, pp 116

[47] clause 2.5(j)(2) provides for reasonable adjustments to allow for the expected effects of the TNSP's planned capital program

Table 73 Adjusted Connection Point Loads

Connection	Current AMD	Adjustment (Additional Demand)	Anticipated AMD	Scale factor
Woomera	3,200	45,000	48,200	15.0625
Kanmantoo	1,200	7,000	8,200	6.8333
Middleback	1,800	18,000	19,800	11.0000
Total	**6,200**	**70,000**	**76,200**	**12.2903**

Source: ElectraNet connection point data

However, SKM considered that this adjustment to this historical loss of supply data was too simplistic, as it did not consider two important issues. These issues related to the accepted calculation of "system minutes".

The following equation box depicts the accepted formula to be applied when calculating system minutes.

Equation 2 Calculation of System Minutes

System Minutes are calculated for each supply interruption by the "load integration method" using the following formula:

$$\frac{\Sigma \text{ (MWh unsupplied x 60)}}{\text{MW peak demand}}$$

where:

MWh unsupplied is the energy not supplied as determined by using NEM metering and substation load data. This data is used to estimate the profile of the load over the period of the interruption by reference to historical load data.

Period of the interruption starts when a loss of supply occurs and ends when ElectraNet offers supply restoration to the customer

MW peak demand means the maximum amount of aggregated electricity demand recorded at entry points to the ElectraNet transmission network and interconnector connection points during the financial year in which the event occurs or at any time previously.

In the first instance, the application of the scale factor, which represents the proportional adjustment to the load at each of the 3 connection points in question, only took into account the affect of the anticipated increase in load on the numerator of the accepted system minutes formula, and fails to allow consideration for the fact that the total MW peak demand, found in the denominator could also subsequently increase. Taking a conservative approach to this adjustment, the denominator in the data adjusted scenario should have also increased by approximately 70 MW.

As a result, the adjusted number of system minutes for each of these connection points was higher than they should have been.

To illustrate the effect, consider the following example:

> Assume the present load at connection point A is 10MW, and that the total system demand from four connection points A, B, C and D is 100MW
>
> A's existing share of the total system is:
>
> 10/100 = **0.1**
>
> Now assume that the load at point A increases from 10MW to 20MW (ie. a ratio of 2:1).
>
> A's adjusted share of the total system is:
>
> 20/110 = **0.182**
>
> Not 0.2, as would have been the case through employing the simple scale factor method.

The second consideration was that the affect of an increase in the maximum annual peak demand, due to the substantial increase in load at these three connection points, was not taken into consideration in terms of the corresponding influence it would have had over historical events that occurred at connection points other than the three nominated.

A review of the historical data, with consideration of these two issues, resulted in one historical loss of supply event no longer breaking the proposed 0.2 system minute threshold[48], and therefore not being recorded as a Loss of Supply Event for the purposes of calculating a target for the next regulatory period.

Table 74 illustrates the calculation of the duration of system minutes loss of supply when taking into account the increased maximum peak demand for the system from the previous 2837MW, and adding the 70MW for the anticipated maximum peak demand of 2907MW.

Table 74 System Scale Factors

	A ∑ (MWh unsupplied x 60)	B Peak MW Demand	A ÷ B System Minutes
Current Peak Demand	579.459	2837	0.204251
Adjusted Peak Demand	579.459	2907	0.199332

[48] The event occurred at the Mannum connection point on 20 November 2004

Whilst the adjusted results vary marginally from the unadjusted, and the calculated target values are unchanged, it is important that the validity of these adjustments to historical load data be confirmed.

Clause 2.5(j) of the STPIS outlines the legitimate reasonable adjustments that can be made to historical data as part of target setting for the next regulatory period. For the suggested amendments from ElectraNet, SKM would offer the following:

- Sub-clause (2) allows for amendments due to the expected effects due to capital works planned during the upcoming regulatory period compared with the previous period used in target setting.
- SKM considers it reasonable to change connection point loads where these changes reflect actual increases or decreases that have been recorded during the past regulatory period. In doing so, SKM is of the opinion that any target for the next 5 years should be based on network conditions that will exist during the next regulatory period. SKM considers this would be consistent with clause 2.5(j)(3) where adjustments due to "… *material changes to an applicable regulatory obligation*" can be made.

  SKM believes that the adjustments suggested by ElectraNet in their submission reflect committed increases in connection point loads, and therefore in accordance with these provisions.

In its submission ElectraNet also notes that if the Olympic Dam project proceeds, it has the potential to materially change the risk profile for this parameter. ElectraNet has not proposed an adjustment to the target at this time, but proposes an exclusion for any outage associated with works on its network associated with expansion to supply Olympic Dam.

As a matter of principle, SKM would offer the following observations:

- SKM would not agree with any change in historical data associated with a contingent project. Such adjustments could potentially create a target that is not relevant to the actual network performance should the contingent project either fail to eventuate, or be triggered very late during the next regulatory period. Any target created in these circumstances would likely be lower than may have otherwise been set, and fail to provide sufficient incentive for performance improvement.

- SKM agrees in principle that limited, defined event based exclusions are an appropriate way to treat an extraordinary event such as the major works that are likely to be required to meet the significant additional demand proposed. However, SKM considers that such exclusions be agreed as part of the contingent project application if and when this occurs. Further, SKM recommends any agreed exclusions should be based on a "best practice" programme of works set out by ElectraNet that seeks to minimise disruption and outages on the network, rather than a blanket exclusion for any outage associated with the works.

Therefore, SKM accepts that ElectraNet has not sought to adjust historical data to allow for the contingent Olympic Dam project. However, SKM does not accept the ElectraNet proposal to immediately exclude any portion of an outage associated with Olympic Dam project, and instead recommends that any proposed exclusions associated with the project should be agreed with the AER prior to the commencement of the work.

8.9.2.2 Loss of Supply > 0.2 System Minutes

Table 75 shows the figures that would be applicable to the targets for this data when taking into account the effect of an increase in the total aggregate peak MW demand on the historical data.

Table 75 Number of 0.2 System Minute Events

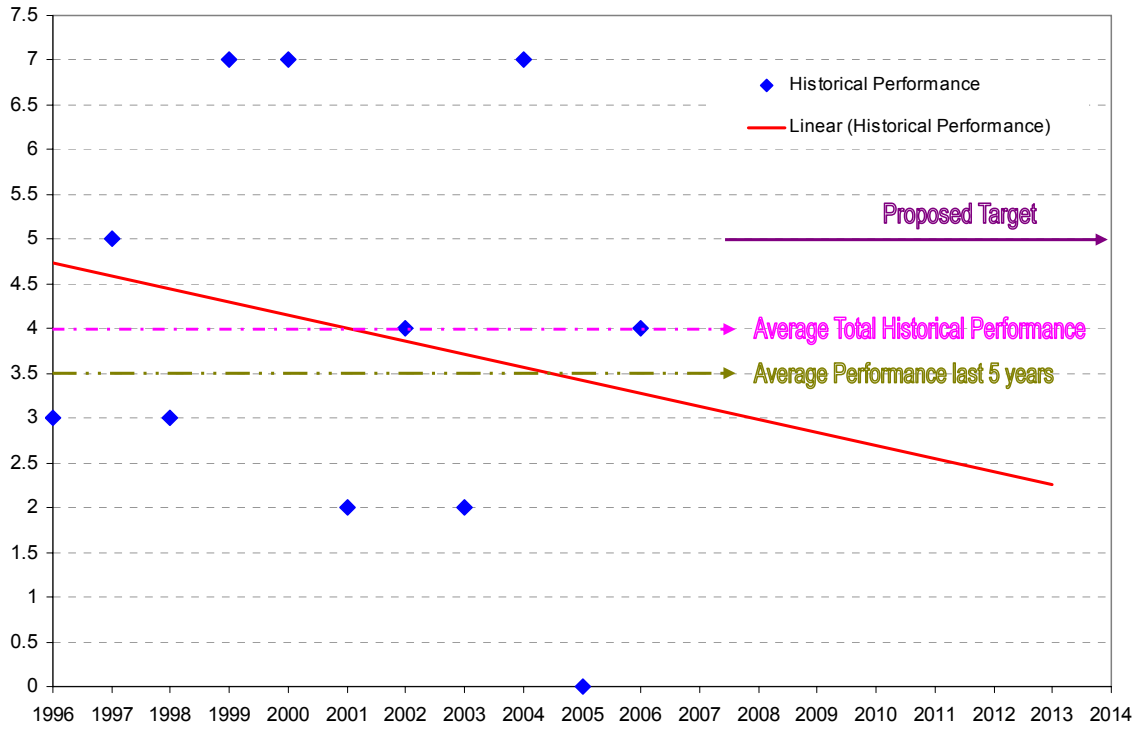
Year	Unadjusted data	Data adjusted per ElectraNet method to account for change in load	Data adjusted per SKM method to account for change in load
1996	3	3	3
1997	5	5	5
1998	3	3	3
1999	7	8	8
2000	7	7	7
2001	2	2	2
2002	4	6	6
2003	2	2	2
2004	7	7	6
2005	0	2	2
2006	4	5	5
Average 1996 - 2006	4.00	4.55	4.45
Average 2002 - 2006	3.40	4.40	4.20

SAHA International noted that "… *the appropriate target is still the expected value of the relevant summary statistic in the relevant future year.*"[49] The proposed target should consider the reliability improvements achieved through capital or operational works, as opposed to being the simple historical average.

Figure 32 illustrates the trend towards continuous improvement that ElectraNet have achieved since 1997.

[49] SAHA International, *Service Target Incentive Scheme Review*, May 2007, section 2.2, pp 5

- **Figure 32 – LOS > 0.2 System Minute Historical Performance (unadjusted for changes in connection point demand)**



From an analysis of the unadjusted historical data, there has been a trend for improved performance.

SKM considered that the existing target of 5 events does not provided sufficient incentive for improvement, as required by the STPIS. Taking the average historical performance for the past 5 years, with consideration of the amended adjustment for anticipated load growth at three connection points (refer section 8.9.2.1), and rounding to the nearest integer, SKM is of the opinion that the target for this parameter should be 4 events.

SAHA International calculated the caps and collars by taking a 50% probability band around the mean in a Poisson distribution. In line with the approach used for reviewing the transmission circuit availability data for consistency (refer section 8.5.1), SKM employed a chi-squared distribution as the curve-of-best-fit approach which generated similar results. Table 76 shows the recommended values.

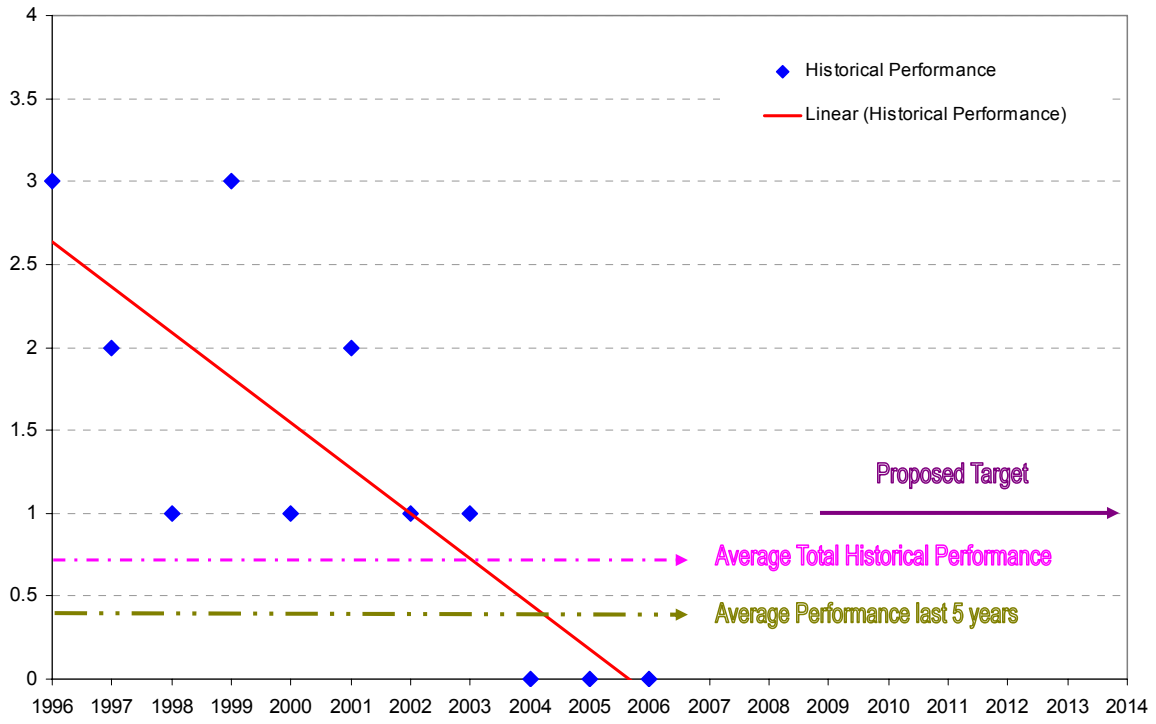
- **Table 76 LOS > 0.2 System Minute Values**

	Target	Cap - Bonus Limit	Collar - Penalty Limit	Period for Average
ElectraNet proposed	5	3	6	1996 - 2006
Recommended Value	**4**	**2**	**5**	**2002 - 2006**
Cumulative Poisson Probability	58.98%	21.02%	75.31%	

8.9.2.3 Loss of Supply > 1.0 System Minute

In their submission, ElectraNet proposed the retention of the 1.0 system minute parameter, with a target of 1 event. The historical performance for this parameter is shown in Figure 33.

- **Figure 33 – LOS > 1.0 System Minute Historical Performance (unadjusted for changes in connection point demand)**



The performance of the ElectraNet network has shown considerable improvement over the past 5 years, with only two events occurring during this period, and none since 2004. During the review, SKM was advised that any event of more than 1 system minute is subject to considerable internal reviews, reflecting the abnormality of the occurrence.

SKM acknowledges that a TNSP should not be punished for improving their performance, but was concerned that the binary nature of the proposed parameter created an "all-or-nothing" scenario, with the incentive for ElectraNet to maintain the performance level of the past three years, rather than identifying potential areas for improvement, in line with the objectives of the STPIS. Therefore, SKM is of the opinion that ElectraNet have demonstrated solid improvement in reducing the number of major system minute events to 0, and that the parameter in its current form is no longer valid in terms of the PI Scheme.

It is recommended that the threshold value be changed.

8.9.2.4 Proposed Loss of Supply threshold values

As discussed, SKM is satisfied that the 0.2 system minute threshold remains a suitable value for one of the Loss of Supply parameters, but that the existing 1.0 system minute no longer provides incentive for performance improvement as required by the STPIS.

Analysis of a number of scenarios, utilising a consideration of alternative thresholds for this parameter was undertaken, in order to investigate whether an adjustment would allow for a sufficient increase in the number of events that were now likely to occur, which in turn would allow for a more suitable, non-binary, target for the parameter, and more relevant cap and collar values to be determined. It was thought that this would present the opportunity to provide ElectraNet with a greater incentive towards performance improvement, and thereby ensure alignment with the objectives of the STPIS.

- **Table 77 – Event Counts for System Minute Thresholds (adjusted values for changes in connection point demand)**

Threshold Value	Average 1996-2006	Average 2002-06
1.0	1.3	0.4
0.9	1.4	0.8
0.8	1.6	0.8
0.7	1.6	0.8
0.6	2.1	1.2
0.5	2.1	1.2
0.4	2.5	1.8
0.3	3.4	2.6
0.2	4.4	4.2
0.1	6.7	6.4

Threshold Value	Average 1996-2006	Average 2002-06
0.09	7.4	6.6
0.08	7.4	6.8
0.07	7.5	7.0
0.06	7.7	7.4
0.05	8.2	8.2
0.04	8.6	8.4
0.03	8.8	9.0
0.02	9.2	9.6
0.01	9.9	10.8

Based on this review, the threshold values chosen for the Loss of Supply parameters are 0.2 and 0.05 minutes. As for the Loss of Supply > 0.20 system minutes, comparing the caps and collars

calculated by SAHA International that took a 50% probability band around the mean in a Poisson distribution, with the SKM selected chi-squared distribution as the curve-of-best-fit approach (refer section 8.5.1) generated similar results. Table 78 shows the values for the two Loss of Supply parameters.

Table 78 Recommended LOS Parameter Values

Threshold Value		Target	Cap - Bonus Limit	Collar - Penalty Limit
0.05 system minute (X)	**Recommended Value**	**8**	**6**	**10**
	Cumulative Poisson Probability	56.47%	28.96%	79.56%
0.2 system minute (Y)	**Recommended Value**	**4**	**2**	**5**
	Cumulative Poisson Probability	58.98%	21.02%	75.31%

8.9.2.5 Consideration of ETC requirements

As per STPIS clause 2.5(j)(2), the performance targets proposed by a TNSP may be reasonably adjusted to bring into consideration the effect that increases or decreases in the volume of capital works, planned for during an upcoming revenue determination period, would have on the network, when compared to the network from which the historical data examined in order to calculate proposed performance targets was taken.

SKM was of the opinion that an opportunity existed to assess a potential future movement toward improved reliability performance within the South Australian Transmission System, through consideration of ElectraNet's response to ETC requirements of enhancing system reliability. The ETC requirements in question involved the upgrading of various sections of the network to n-1 status. These planned augmentation projects were included within ElectraNet's capital works program for the upcoming determination period.

SKM sought to understand what effects such augmentation would have had on historical loss of supply incidents, where such improvements were present at the time that these historical incidents occurred. This would allow for suitable adjustments to the historical loss of supply event figures, and the subsequent recalculation of more appropriate performance targets that took the planned reliability improvements into account.

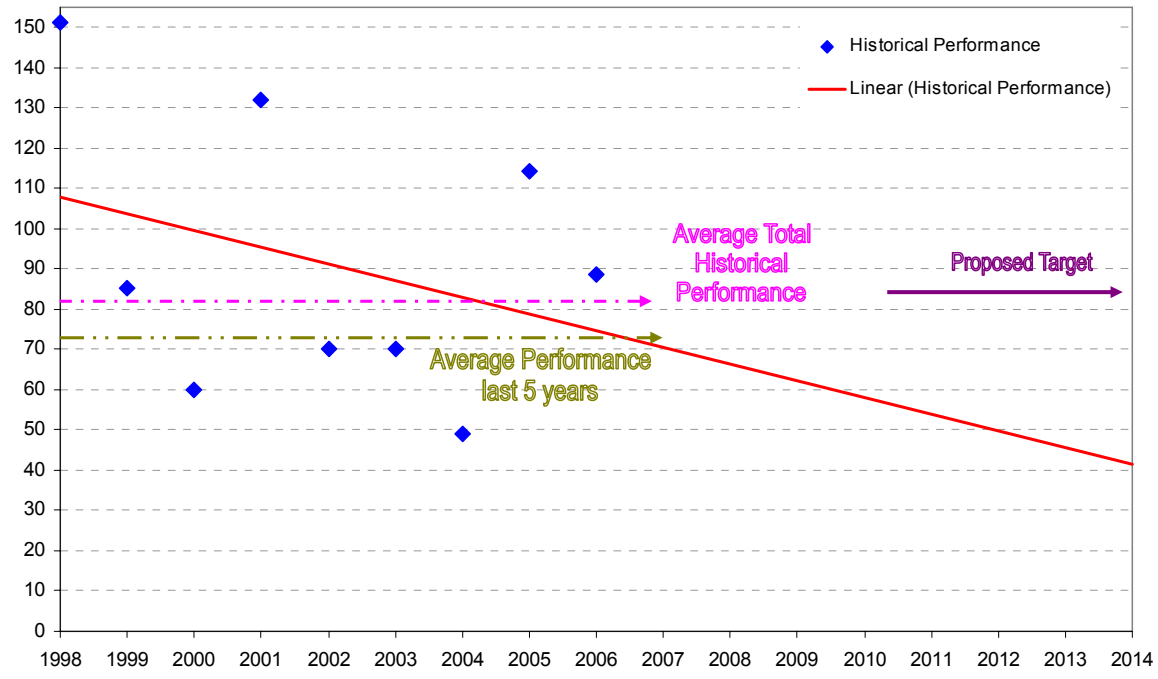
Unfortunately the historical loss of supply event data available for analysis was found to contain insufficient information, at the level of individual transformer performance during historical loss of supply events, in order to allow for a fair and accurate assessment of the effects that future improvements in reliability at such levels might have on the proposed network performance targets.

Despite the lack of data on which to base any robust analysis SKM is of the view that the ETC enhanced connection point security (redundancy) and other projects, aimed at improving the security and reliability of supply within the network, will exert downward pressure on the number of loss of supply incidents recorded. SKM considers this adds further weight to the SKM view that the 2 performance targets within this performance parameter require tightening.

8.9.3 Average Outage Duration

In section 8.8.3, it was concluded that it would be more appropriate to use the past 5 years of historical performance data in establishing the target for the next regulatory period, in lieu of the 9 years used in the submission. Whilst SKM agrees with the statistical principle that a larger data set provides a greater level of confidence in the analysis, and accepts that the data provided by ElectraNet is very reliable, SKM is of the opinion that using performance results from 1998 to 2001 do not adequately reflect the trend in performance improvements achieved by ElectraNet during the past 5 years (refer Figure 34).

- **Figure 34 Average Outage Duration Historical Performance**



As discussed elsewhere, SKM considers that the average performance over the last 5 years is an appropriate figure by which to develop the target for the next regulatory period. Figure 34 illustrates that the average outage duration performance for ElectraNet has an overall improving

trend, although the past two years (2005 and 2006) have had longer outages. SKM believes the 5-year historic average represents a reasonable target for the next regulatory period, by taking account of performance improvements that have been achieved in the last 5 years.

In lieu of the percentile approach used by SAHA International that selected cap an collar values at percentiles distributed either side of the mean, SKM used a Weibull distribution as the curve-of-best-fit (refer section 8.5.1), and setting the caps and collars at 95% and 5% values of the cumulative probability distribution, with the values shown in Table 79.

Table 79 Average Outage Duration Values (in minutes)

	Target	Cap - Bonus Limit	Collar - Penalty Limit	Period for Average
ElectraNet proposed	84	39	147	1998 - 2006
Recommended Value	**78**	**38**	**119**	**2002 - 2006**

8.10 Deadbands

SKM noted that the SAHA International analysis included an argument for the retention of deadbands as a means of eliminating the possibility of punishing or rewarding a TNSP for performance that possibly occurred within the natural variation of the parameter around the target. This is consistent with the purpose for including deadbands in the original scheme to provide a cost neutral range either side of the target to allow for variability in performance around the target for a parameter that is not directly attributable to the performance of, or improvements by, a TNSP.

In recent determinations, there has been some opinion that deadbands had the effect of smearing the target, and thereby reducing the sharpness of the parameter. However, the STPIS suggests that deadbands remain an acceptable option for setting values for parameters as "… *a proposed performance target may take the form of a performance deadband.*"[50]

ElectraNet have chosen to omit deadbands from their proposed parameters, although the reasoning for this is not apparent from their submission. SKM recognises that ElectraNet are prepared to accept the volatility and its consequences in the selected parameters, as a review of recent historical performance suggests that there would have been little effect on the annual results.

[50] AER, *First Proposed - Electricity Transmission Network Service Providers - Service Target Performance Incentive Scheme*, January 2007, clause 2.5(c). Note that a performance deadband is defined as a performance target which is set over a range of values within which a TNSP neither receives a financial penalty or financial reward in the regulatory year.

8.11 Weightings Assigned to Parameters

Each of the three parameters, and any sub parameters, prescribed for inclusion within ElectraNet's STPIS was subjected to a review in terms of ElectraNet's proposed weightings.

As each individual parameter's proposed weighting by default affects the relative weighting applied to the other parameters within the STPIS suite, SKM's consideration of the various weightings that have been proposed has been discussed in a combined section.

8.11.1 Proposed Weightings

Section 2.7 of the STPIS states the following requirements for the setting of weightings for parameters within the PI Scheme:

(a) A TNSP must, in its revenue proposal, propose weightings for each of the TNSP's parameters listed in Appendix B and demonstrate how these proposed weightings are consistent with the objectives listed in clause 1.4.

(b) The sum of the weightings for a TNSP's parameters must equal the level of revenue at risk prescribed in clause 2.6.

(c) Subject to clause 2.7(d) below, the weighting for a parameter can be zero.

(d) The AER must be satisfied that the proposed weightings are consistent with the objectives listed in clause 1.4.

Table 80 shows the changes to the weightings for the parameters.

Table 80 Proposed Weightings

Parameter	Circuit Availability*	LOS >X System Min	LOS >Y System Min	Average Outage Duration
Current Weighting	35%	10%	30%	25%
Proposed Weighting	50%	10%	20%	20%
Difference	+15%	0%	-10%	-5%

** The proposed Circuit Availability Parameter is to be split into 3 sub-parameters*

In proposing these changes, ElectraNet suggested that in the absence of guidance from the STPIS or the NER, the weightings were chosen based on those applying under the existing scheme with some variations to incorporate the additional critical circuit availability parameter. The existing scheme was taken to have reasonably balanced the objectives of the scheme.

In particular, SKM reviewed the effective weighting given to critical circuits. The proposed weighting of 0.2 for 6 circuits, compared to a weighting of 0.3 for 107 circuits, gave an effective weighting of 12.9 for critical circuits [51]. That is, the overall S-Factor or financial impact of an outage on a critical circuit would have 12.9 times larger impact than the same outage on a non-critical circuit. While there are no guidelines for what this weighting should be, SKM considers a figure in the range of 5 – 10 would be reasonable, and that higher figures could lead to an unreasonably strong focus on critical circuits to the detriment of other circuits.

With SKM's recommended list of 14 critical circuits, this effective weighting becomes 6.5, which is within the range of comfort for SKM. Should SKM's recommendation for an expanded list of critical feeders not be adopted, SKM recommends giving consideration to the weighting of the critical circuits bearing in mind the strong impact of this measure on such a small set of feeders.

SKM concurred that the weightings proposed by ElectraNet are reasonable and reflect the intentions and focus of the STPIS, and recommend their adoption for the next regulatory period.

[51] 0.2 / 0.3 * 107 / 6 = 11.9 + 1 (as it will be included in the overall availability measure as well) = 12.9

8.12 SKM Conclusions

The overall findings and conclusions of the service standards section of this review are:

- a review of past years results has shown strong annual performance by ElectraNet compared with original set of targets. ElectraNet suggest in their submission that they are "… *operating at or near 'best practice' levels for a network of its type*" with "*very limited opportunities for improvement*". SKM believes that to satisfy objectives and intentions of STPIS, the PI Scheme needs to be adjusted in order to lock in the significant improvements that ElectraNet achieved during the previous regulatory period;
- Whilst SKM agreed with the approach taken by SAHA International in applying a statistical approach that is relevant to the data sets available, SKM did not agree with the percentile approach as applied by SAHA International for transmission circuit availability as an appropriate method for setting cap and collar values, as it was considered to be effectively a measure of the range of performance of individual feeders, rather than the variation from year to year in the average performance of the transmission network as a whole as measured by the PI Scheme. SKM considers the range between the cap and collar should represent the "typical" range of variability in the performance from year to year, with the values set to moderate only extreme outcomes, say 1 in 10 year;
- SKM adopted a curve-of-best-fit approach in analysing the transmission circuit availability, loss of supply event frequency and average outage duration data, and selected the caps and collars at the 95% and 5% cumulative probability values to reflect the intentions of recent determinations in setting cap and collar values, and give effect to a 1 in 10 year approach;
- SKM agreed with proposition to highlight critical circuit availability in line with STPIS;
- SKM considered selection of critical circuits as limited, and based on advice from other authorities, has increased the number of 275kV critical circuits from 6 to 14;
- the revised target shown for critical circuit availability has been based on the increased number of 275kV lines;
- SKM was not satisfied that the x and y thresholds presented for LOS were consistent with the objectives of STPIS to provide incentive for performance improvement, as neither adequately recognised the performance improvement achieved during recent years;
- the adjusted threshold values suggested in this review provide a sufficient number of events in order to allow for performance improvement;
- the slight adjustment to the Average Outage Duration target adopts the SAHA 2002-06 average in lieu of the 1996-2006 figure. Whilst SKM agreed that a larger sample often increases the statistical level of confidence in the result, including data between 1998 and 2001 based on a transmission system that has undergone subsequent reliability improvement slightly inflates the target for potential events that subsequent capital and operational work during the period 1998 to 2001 would have alleviated;

- SKM was prepared to accept proposed weightings subject to advice from ElectraNet as to how these were established, and confirmation that weightings were consistent with requirements of STPIS.

Table 81 summarises the recommended changes to the proposed PI Scheme parameters.

- **Table 81 ElectraNet Proposal and SKM recommended PI Scheme parameters**

Parameter	Transmission Circuit Availability			Loss Of Supply Event Frequency		Average Outage
	Transmission Circuit (Total)	Critical Circuit Availability (Peak)	Critical Circuit Availability (Non-Peak)	Events > x system minutes	Events > y system minutes	Duration (minutes)
ElectraNet proposal						
Target	99.47	99.75	99.94	5	1	84
Cap	99.75	99.80	99.97	3	0	39
Collar	98.56	99.53	99.90	6	2	147
Weighting	0.3	0.2	0	0.1	0.2	0.2
x & y				0.20	1.0	
SKM recommendation						
Target	99.47	99.24	99.62	8	4	78
Cap	99.63	99.51	99.95	6	2	38
Collar	99.10	98.52	98.88	10	5	119
Weighting	0.3	0.2	0	0.1	0.2	0.2
x & y				0.05	0.20	

9. Other matters

9.1 Deliverability of capital program

SKM notes the capex and opex programs outlined in ElectraNet's proposal represent a significant increase on the current regulatory period. In the latter years of this period ElectraNet has substantially ramped up both its capex and opex, giving some confidence it will be able to deliver its proposed program. SKM also notes supporting letters from both ElectraNet's construction contractors providing a commitment to being able to resource the proposed program.

While SKM considers it is likely ElectraNet will be able to deliver its capex and opex programs, it has a number of concerns, particularly relating to the capex program:

The profile of capex is particularly "lumpy", with expenditures in the early years up to ~3x expenditures in the final years. This does not meet ElectraNet's objective of providing certainty for its construction contractors, and may pose additional problems in the subsequent regulatory period if capex is again increased.

While SKM accepts much of the project timing is driven by the ETC timing requirements, it considers it may be possible to seek an extension of time for some of the "lower priority" ETC projects. SKM understands ESIPC may be willing to support an approach to ESCOSA with such a proposal.

Smoothing the capex would have an additional benefit of deferring some of the capex, delaying some of the cost increases to consumers.

SKM has identified a number of projects it considers may be possible to defer. These projects, and indicative capital program impacts, are shown in the table and chart below.

SKM

- **Table 82 SKM indicative smoothed capital program options**

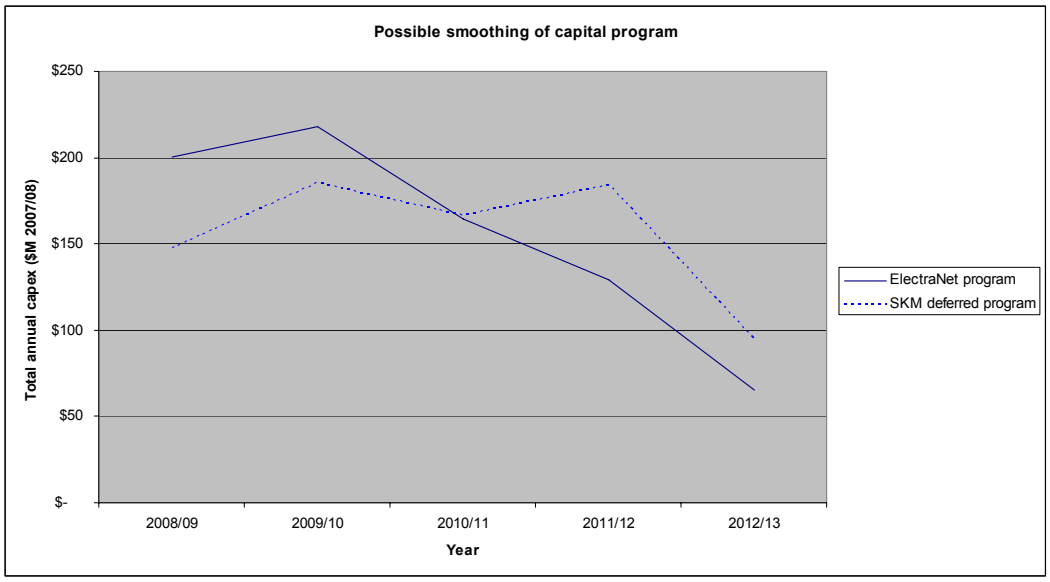
Project	2008/09	2009/10	2010/11	2011/12	2012/13	Total
10509 - Whyalla Terminal Rebuild and Transformer Capacity Increase						
Original	31.8	17.1	0.0	0.0	0.0	48.9
Deferred	0.0	0.0	0.0	31.8	17.1	48.9
Adjustment	-31.8	-17.1	0.0	31.8	17.1	0.0
11401 - Kadina East 2x60MV.A Transformer Capacity Increase						
Original	12.6	5.4	0.0	0.0	0.0	18.0
Deferred	0.0	0.0	0.0	12.6	5.4	18.0
Adjustment	-12.6	-5.4	0.0	12.6	5.4	0.0
10615 - Ardrossan West 132kV Substation Rebuild and Transformer Capacity Increase						
Original	2.0	8.3	3.5	2.6	0.9	17.3
Deferred	0.7	4.3	6.5	3.2	2.6	17.3
Adjustment	-1.2	-4.0	3.0	0.6	1.6	0.0
11102 - Wudinna 2x25MV.A 132/66kV Transformer Reinforcement						
Original	6.4	2.8	0.0	0.0	0.0	9.2
Deferred	0.0	0.0	0.0	6.4	2.8	9.2
Adjustment	-6.4	-2.8	0.0	6.4	2.8	0.0
10519 - RTU Replacement Program						
Original	0.6	2.7	0.9	0.0	0.0	4.2
Deferred	0.0	0.0	0.6	2.7	0.9	4.2
Adjustment	-0.6	-2.7	-0.3	2.7	0.9	0.0
Total ex-ante capex (original ElectraNet real cost escalators)						
ElectraNet base program total	200.2	218.2	164.6	129.5	65.6	778.1
SKM deferred total	**147.5**	**186.3**	**167.3**	**183.6**	**93.5**	**778.1**
Adjustment total	-52.7	-31.9	2.7	54.1	27.9	0.0
Total ex-ante capex (SKM recommended uniform real cost escalators)						
ElectraNet base program with SKM uniform escalator	191.0	207.6	156.7	123.3	62.6	741.2
SKM deferred program with SKM uniform escalator	140.9	177.3	159.3	174.7	89.1	741.2
Adjustment total	-50.1	-30.3	2.6	51.4	26.5	0
Total ex-ante capex (SKM recommended annual real cost escalators)						
ElectraNet base program with SKM annual escalator	187.0	206.5	157.4	125.7	64.4	741.2
SKM deferred program with SKM annual escalator	137.9	176.5	160.0	178.0	91.8	744.1
Adjustment total	-49.1	-30.0	2.6	52.3	27.4	3.1

SKM has not undertaken detailed assessment of the viability of deferring these projects at this time, and there may be valid reasons why some of these projects cannot be reasonably deferred. However, this indicative program demonstrates that the future capex program can be considerably

smoothed by adjusting the timing of a relatively small number of projects. In particular, those ETC driven projects where ESCOSA and ESIPC are in agreement[52], or lower priority replacement projects, would seem to be suitable candidates.

SKM recommends consideration be given to options available to defer some projects. Any proposal would require analysis and agreement from ElectraNet who have the detailed knowledge of the project drivers and likely impacts of deferring these projects.

- **Figure 35 SKM indicative smoothed capital program**



[52] SKM notes that ESCOSA and ESIPC have indicated they would not be willing to consider deferral of the CBD project or a number of other ETC driven projects.

9.2 Asset lives

In reviewing the ElectraNet revenue proposal, SKM has identified an issue relating to asset lives that is not covered under the capex or opex sections of this report.

ElectraNet commissioned a review of asset lives, which it has proposed to incorporate into its depreciation schedules. SKM is concerned by the 3 year life ascribed to SCADA and control systems. SKM would generally regard a 10-15 year life to be appropriate for such assets, and would have grave concerns at any system that was procured with the expectation of a 3 year life. While we are unconcerned with taxation depreciation, the effect on MAR of such short depreciation, and the economic justification of projects with such short lives are of concern.

In addition, SKM has recommended a number of transformer refurbishment projects proposed by ElectraNet as opex be reclassified as capex. For depreciation purposes, SKM recommends these projects have a 12.5 year life (average of 35-40 year current age, plus 10 year life extension from 45 to 55 years, taking the average of the expected additional life between 45 and 55).

10. Conclusion and Recommendations

10.1 Historical capex

SKM has formed a view that ElectraNet's capex during the current determination period has in general been prudent and efficient. Based on the findings of the reviewed projects, SKM has not identified any issues or problems it considers likely to be systemic, and found that projects were generally prudent and efficient. On this basis, SKM recommends that ElectraNet's Historical Capex be largely accepted as reasonable, noting the recommended adjustments in the table below.

Table 83 SKM Recommended Historical Capex

	Jan-Jun 2003	2003-04	2004-05	2005-06	2006-07	2007-08	Total
ElectraNet Proposed	**2.1**	**34.9**	**42.8**	**65.5**	**98.0**	**146.5**	**389.8**
Work in progress (WIP)						44.4	**44.4**
SKM adjustment for inefficient project costs			(0.03)				**(0.03)**
SKM adjustment for IDC applied to WIP						1.9	**1.9**
Total	**2.1**	**34.9**	**42.8**	**65.5**	**98.0**	**192.8**	**436.0**

Note – Totals may not add due to rounding.

10.2 Future capex

From its review of ElectraNet's planning and governance processes and the selected ex-ante capex projects reviewed, SKM has formed the view that ElectraNet's application for future capex is likely to be prudent and efficient. Based on the findings of the reviewed projects, SKM has not identified any issues or problems it considers serious or likely to be systemic, and found that projects were generally prudent and efficient. On this basis, SKM recommends that ElectraNet's Forecast Ex-ante Capex be accepted as reasonable, subject to the recommended adjustments per the table below.

Table 84 SKM Recommended ex-ante Capex adjustments ($2007/08M)

Item	Ref.	2008-09	2009-10	2010-11	2011-12	2012-13	Total
ElectraNet Proposed	**6.1**	**200.2**	**218.2**	**164.6**	**129.5**	**65.6**	**778.1**
Playford escalation correction	6.4.6	-0.6	-2.7	-0.9	-	-	**-4.2**
Weather stations efficient costs adjustment	6.4.11	-0.38	-0.38	-0.38	-0.38	-0.38	**-1.92**
TIPS 66kV incorrect forecast used	6.4.9	-	-	-0.4	-1.8	-0.6	**-2.8**
Subtotal – adjustments		*-0.98*	*-3.08*	*-1.68*	*-2.18*	*-0.98*	*-8.92*
SKM transfer of opex projects to capex	7.6.2.5	3.08	3.13	3.19	3.24	3.29	**15.93**
Subtotal – total change		*1.95*	*-0.1*	*1.36*	*0.91*	*2.16*	*6.26*
SKM Recommended		**202.30**	**218.25**	**166.11**	**130.56**	**67.91**	**785.11**

Note – Totals may not add due to rounding.

Table 85 SKM Recommended Re-classification of projects as Contingent ($2007/08M)

Item	Ref.	2008-09	2009-10	2010-11	2011-12	2012-13	Total
ElectraNet Proposed	**6.1**	**200.2**	**218.2**	**164.6**	**129.5**	**65.6**	**778.1**
With SKM adjustments (above)		**202.30**	**218.25**	**166.11**	**130.56**	**67.91**	**785.11**
CBD project uncertain OH/UG route costs	6.4.1	-21.9	-60.2	-21.9	-	-	**-104.0**
10809 Transformer Ballistics proofing	6.4.8	-4.6	-2.3	-4.6	-0.5	-5.7	**-17.7**
Total transfer to contingent		**-26.5**	**-62.5**	**-26.5**	**-0.5**	**-5.7**	**-121.7**
SKM final recommended ex-ante		**175.8**	**155.8**	**139.6**	**130.1**	**62.2**	**663.4**
SKM final recommended ex-ante (with SKM escalators)		**163.8**	**146.6**	**133.2**	**125.8**	**61.1**	**630.3**

SKM recommends the contingent projects proposed be accepted as reasonable, but notes ElectraNet bears some risk that some of these projects could subsequently fail to meet the $10.4 million threshold value if triggered and may wish to reconsider how it chooses to classify these projects.

10.3 Cost escalation

SKM's analysis of ElectraNet's cost escalation methodology has concluded the overall approach adopted is reasonable, though SKM does not accept all of the escalators proposed by ElectraNet.

SKM recommends changes to the escalators for land and the components to the non-labour cost index to reflect its belief that the ElectraNet forecasts placed too high a weighting on recent high growth rates, and did not adequately reflect longer term trends or econometric forecasts predicting falls in some commodity prices. SKM has made the following estimate of the recommended adjustment:

Table 86 SKM Recommended capex adjustments to reflect cost escalator adjustment

Annual proposed capital ($M)	2008-09	2009-10	2010-11	2011-12	2012-13	Total
ElectraNet un-escalated ($06/07)	171.4	186.7	140.6	110.8	56.1	665.6
Escalated with EN inflators* ($07/08)	200.2	218.2	164.6	129.5	65.6	778.1
Escalated with SKM inflators* ($07/08)	191.0	207.6	156.7	123.3	62.6	741.2
Difference (adjustment) ($07/08)	-9.2	-10.6	-7.9	-6.2	-3.0	-36.9

** Note – includes 5.2% risk adjustment. Both the EN and SKM figures use an average uniform inflator for all years (see below).*

ElectraNet has applied a uniform average "above-CPI" inflation factor to its future capital program, rather than using annual inflation factors. This has the effect of artificially inflating the capex in the early years of the determination period, or "front end loading" the apparent capex. SKM recommends actual annual cumulative inflation factors be used to more accurately reflect the actual costs and eliminate the NPV windfall gain that would result from the uniform average approach.

Table 87 Effect of using a uniform average inflator (unadjusted ex-ante capex program)

Annual proposed capital	2008-09	2009-10	2010-11	2011-12	2012-13	Total
ElectraNet with uniform inflator	200.2	218.2	164.6	129.5	65.6	778.1
ElectraNet with annual inflator	192.3	215.5	166.2	134.5	69.7	778.1
Difference	-7.9	-2.7	1.6	5.0	4.1	0.0
SKM recommended total capex using adjusted escalators per the table above, with annual inflator	**187.0**	**206.5**	**157.4**	**125.7**	**64.4**	**741.2**
Total recommended adjustment SKM adjusted escalators, and annual inflator approach	-13.2	-11.7	-7.2	-3.8	-1.2	-36.9
Total recommended adjustment (%)	-6.6%	-5.3%	-4.4%	-2.9%	-1.8%	-4.7%

10.4 Deliverability

SKM's considers ElectraNet's capex and opex programs are deliverable, and notes significant improvements to ElectraNet's governance and project management framework in recent years to support project delivery. SKM also notes assurances by ElectraNet's two main construction and maintenance contractors that they are able to resource the capex and opex programs anticipated in ElectraNet's application.

SKM considers, however, that the capex program is excessively weighted towards the early part of the upcoming regulatory period, and should be smoothed where possible. This will support ElectraNet's stated strategy of maintaining steady and reliable stream of work to its construction contractors, and will also reduce the price impacts of the substantial capital works programs.

SKM's recommended "deferred" capex program is shown in the table below, as derived in section 9.1. This program defers five ETC Connection projects and low priority replacements by 1-3 years to the end of the upcoming regulatory period.

Table 88 SKM indicative smoothed capital program options

Ex-ante capex	2008/09	2009/10	2010/11	2011/12	2012/13	Total
Original ElectraNet proposal	200.2	218.2	164.6	129.5	65.6	778.1
SKM Deferred profile	147.5	186.3	167.3	183.6	93.5	778.1
Adjustment	-52.7	-31.9	2.7	54.1	27.9	0.0

Note – using original ElectraNet cost escalators

10.5 Total capex adjustments

The impact of each of the adjustments outlined above have been applied individually to avoid confusion. The combined impact of all the adjustments is shown below.

Table 89 SKM Final Recommended Ex-ante Capex

Ex-ante capex ($2007/08 million)	2008/09	2009/10	2010/11	2011/12	2012/13	Total
ElectraNet Proposed Total	**200.2**	**218.2**	**164.6**	**129.5**	**65.6**	**778.1**
Total SKM adjustment to project costs	-0.98	-3.08	-1.68	-2.18	-0.98	-8.92
Total SKM transferred to contingent	-26.5	-62.5	-26.5	-0.5	-5.7	-121.7
Total SKM adjustment for smoothed capital program	-52.7	-31.9	2.7	54.1	27.9	0.0
Total adjustments	-80.2	-97.5	-25.5	51.4	21.2	-130.6
SKM adjusted Total (EN escalators)	**120.0**	**120.7**	**139.1**	**180.9**	**86.8**	**647.5**
escalation adjustment (SKM annual)	-7.1	-6.6	-6.0	-5.7	-1.6	-27.0
SKM adjusted Total (SKM annual escalators)	**112.9**	**114.1**	**133.1**	**175.2**	**85.3**	**620.5**
Opex projects transferred to capex	3.1	3.1	3.2	3.2	3.3	15.9
Total recommended ex-ante	**116.0**	**117.2**	**136.3**	**178.4**	**88.6**	**636.5**

Note – Opex projects were not re-escalated using SKM escalators as they are based on ElectraNet's opex escalation model using BIS Shrapnel for wages (which SKM has accepted) and CPI for materials (which SKM considers conservative).

10.6 Opex

ElectraNet's application seeks a substantial increase in opex, following an underspend in opex in the current regulatory period. SKM has reviewed ElectraNet's opex application in detail, and accepts ElectraNet's core argument that it's maintenance spend should be increased to reflect good industry practice. SKM also accepts ElectraNet's argument that corrective maintenance will also increase during the upcoming period as the additional inspection and routine maintenance activities will uncover defects requiring correction.

While SKM has largely accepted ElectraNet's opex application, a number of errors and areas where SKM considers the proposed costs were not efficient have been identified. The combined impact of SKM's review of the forecast opex expenditure included in ElectraNet's revenue proposal is summarised in the following tables.

Table 90 Impact of Review on Controllable Opex Forecast (2007/08 $m)

	2008-09	2009-10	2010-11	2011-12	2012-13	Total
ElectraNet Proposal Opex forecast	**54.16**	**55.84**	**58.35**	**61.27**	**62.46**	**292.08**
ElectraNet Revised Opex forecast with SKM and EN corrections (see 7.1)	**54.61**	**56.25**	**58.74**	**61.62**	**62.77**	**293.99**
SKM adjustment for duplication of communication sites	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.36)
SKM adjustment for communication site maintenance	(0.22)	(0.22)	(0.22)	(0.22)	(0.22)	(1.12)
Detailed review of sample of line projects (EPL replacements)	0.00	0.00	(0.23)	(0.35)	(0.70)	(1.28)
SKM adjustment to opex projects for quantum, scope, rationalisation	(0.54)	(0.60)	(0.59)	(0.57)	(0.50)	(2.80)
SKM adjustment for cost escalation applied to historic costs	(0.23)	(0.27)	(0.26)	(0.24)	(0.22)	(1.22)
SKM adjustment transformer refurbishment estimates	(0.54)	(0.54)	(0.54)	(0.54)	(0.54)	(2.70)
SKM transfer of opex projects to capex	(3.08)	(3.13)	(3.19)	(3.24)	(3.29)	(15.93)
SKM reductions in corrective maintenance	0.00	0.00	0.00	(0.45)	(1.01)	(1.46)
SKM adjustment for sharing generator testing costs	(0.23)	(0.23)	(0.23)	(0.23)	(0.23)	(1.13)
SKM adjustment for labour costs in Skill Development program	(0.27)	(0.27)	(0.27)	(0.27)	(0.27)	(1.35)
SKM adjustment for alternative land value escalation	(0.14)	(0.24)	(0.34)	(0.49)	(0.64)	(1.84)
Subtotal – SKM total recommended adjustments	*(5.34*	*(5.60*	*(5.98*	*(6.72*	*(7.70*	*(31.35*
SKM recommended Opex forecast	**49.27**	**50.65**	**52.76**	**54.90**	**55.07**	**22.64**

Note: Because of inter-relationship between a number of these adjustments, the combined impact is not equal to the sum of the individual components.

The total impact of the recommended modifications to the controllable opex forecast is a reduction of $32.4 million (07/08) over the five year regulatory period, or $30.5 million less than ElectraNet's original May 2007 opex application figure. Some $15 million of this reduction is for operating projects SKM considers to be capital items and has recommended transferring to the capital cost budget, rather than cutting altogether.

10.7 Service standards

ElectraNet's performance against the service standards over the current regulatory periods has been strong, with reported performance better than target for each of the years. SKM's review of the proposed service standards found the analysis undertaken by ElectraNet and its consultants SAHA to be rigorous and sound, but SKM has in some instances recommended tighter targets to better reflect recent performance and "lock in" improvements that have been achieved over the past 5 years. These changes are shown in the tables below:

Table 91 summarises the recommended changes to the proposed PI Scheme parameters.

Table 91 ElectraNet Proposal and SKM recommended PI Scheme parameters

Parameter	Transmission Circuit Availability			Loss Of Supply Event Frequency		Average Outage
	Transmission Circuit (Total)	Critical Circuit Availability (Peak)	Critical Circuit Availability (Non-Peak)	Events > x system minutes	Events > y system minutes	Duration (minutes)
ElectraNet proposal						
Target	99.47	99.75	99.94	5	1	84
Cap	99.75	99.80	99.97	3	0	39
Collar	98.56	99.53	99.90	6	2	147
Weighting	0.3	0.2	0	0.1	0.2	0.2
x & y				0.20	1.0	
SKM recommendation						
Target	99.47	99.24	99.62	8	4	78
Cap	99.63	99.51	99.95	6	2	38
Collar	99.10	98.52	98.88	10	5	119
Weighting	0.3	0.2	0	0.1	0.2	0.2
x & y				0.05	0.20	

Appendix A Ex-Post Capex Project Reviews

A.1 Project 10337: Tungkillo Substation Stage 1

Approved budget	Actual Cost	Category	Commissioning Date
$29.2M	$30.6M	Augmentation	6/2007

Note – Project budgets may differ from the cost estimates reviewed, due to factors such as timing and overheads.

This project establishes a 275kV switching station at the point where the two Tailem Bend – Para 275kV lines and the two Robertstown – Cherry Gardens 275 kV lines intersect, with associated line modifications to cut the four 275 kV transmission lines into and out of the new substation.

A.1.1 Justifiable Need

This project was established in response to identified thermal rating limitations in the vicinity of the Magill substation during the 2006/07 summer. These thermal ratings were expected to be exceeded in an N-1 situation. ETC specify that N-1 reliability must be maintained for supply to 100% of the load to Category 4 and 5 loads which are applicable in this situation.

SKM has reviewed the results of load flow studies provided by ElectraNet. In these load flow studies, ElectraNet has used the diversified system peak loads for the summer 2006/07 (10%POE). Whilst the actual loads for the summer 2006/07 were more representative of a 50%POE, SKM is of the view that ElectraNet correctly used the 10%POEloading to determine the scope and timing of the project.

It is note worthy that ESIPC also identified this project in the 2005 APR.

A.1.2 Regulatory Test

This project was subject to a Regulatory Test assessment. In considering alternate solutions to address the issue, SKM considers that and a broad suite of reasonable generation, DSM, embedded generation and distribution augmentation alternatives were considered, as well as alternate network augmentation options.

The project was submitted for public comment on two separate occasions. From these two rounds of public consultations, only one submission was received (second round). That submission was received from the ESIPC, who fully supported the need for and timing of the project, but suggested possible scope modifications.

SKM is of the view that these scope modifications were duly considered by ElectraNet, and a suggested modification for part of the project, that resulted in a more economical solution whilst still meeting the necessary requirements of the project was adopted.

A.1.3 Prudency Test

SKM has reviewed the criteria of the prudency test and is of the view that this project meets the criteria of this test. This view was formed on the basis that:

- There was a justifiable need for the investment. SKM is of the view that ElectraNet correctly assessed the need for investment against its statutory obligations
- SKM is of the view that ElectraNet proposed the most efficient investment to meet the network requirements In coming to this view, SKM notes that ElectraNet considered an extensive number of reasonable network and non-network solutions. ElectraNet also consulted extensively with ETSA Utilities and twice sought public consultation regarding the project. As a result of this consultation, the proposed project scope was revised to form a more efficient investment than was originally considered. The final project scope (network investment) was consistent with good industry practice, resulting in the most economically efficient project being selected for implementation.
- SKM understands that the efficient project scope as discussed above was the project actually developed.

A.1.4 Cost Benchmarking

The cost estimate provided for this project is a project estimate only. The project is yet to be implemented, but ElectraNet has awarded tenders for the bulk of the substation and transmission line works.

SKM produced an independent estimate of the project cost, using standard unit rates and based on the scope listed in the Phase 2 Approval Report and the Final Report. The SKM estimate is $24.1m, inclusive of overhead and contingency. This may be compared with the ElectraNet phase 2 approval of $29.5m.

SKM's estimate includes a $3.1m allowance for foundations in solid rock as compared to favourable soil conditions. This is in comparison with ElectraNet's $5.1m increase between phase 1 and phase 2 because of newly discovered soil conditions.

SKM notes that the construction of both the transmission line works and the substation construction works were both competitively tendered with four competitive tenders were received for each package of work. Splitting the work into two packages of work is a logical undertaking as different skill sets are required for each work package.

SKM notes the significant price variation amongst competing tenderers indicative of a competitive market. SKM accepts that this process would have resulted in a cost efficient result to ElectraNet.

SKM notes and commends ElectraNet for the high level of cost correlation between the ElectraNet estimation of works and the final accepted tender price.

A.1.5 Conclusion

This project appears to have been prudently planned and scoped to meet system security and reliability criteria as defined in the ETC and forecast load increases of the existing 275kV transmission network. The project was twice subject to public consultation which resulted in suggested scope changes which were considered and accepted by ElectraNet as appropriate, resulting in an efficient transmission investment

The project was evaluated against the regulatory test and the prudency test and met the criteria in both cases. The project seems to have been well managed and is expected to be completed with in budget.

A.2 Project 10396: Para – Mobilong Line Uprate 1

Approved budget	Actual Cost	Category	Commissioning Date
$15.7M`	$15.8M	Compliance	5/2006

This project uprated the 132 kV transmission line between Para and Mobilong via Paracombe, Angas Creek, Northfield and Mannum from an old 49°C design to an 80°C design or better (120 °C where it could be achieved at no additional cost) thereby increasing the thermal rating of the circuit (or increasing conductor clearance at the alleged rating of the circuit).

A.2.1 Justifiable Need

This project was established in response to identified conductor clearance limitations. The circuit was designed and constructed to a now superseded British standard. This standard was universally accepted and applied in Australia some 40 or more years ago, however it was found to be unsatisfactory in Australia due to our more extreme climate. The old standard was designed for British weather conditions and provided for a maximum conductor temperature of 49°C. This was found to be unacceptable in Australia, where for the same power throughput, conductors could be operating at 80°C or more. This higher operating temperature resulted in excessive conductor sag, for the same power throughput (or a considerable reduction in power transfer capability to maintain clearances).

In this instance a reduction in transfer capacity was not practicable and statutory clearance were not being maintained.

SKM acknowledges that it has been an accepted design requirement in Australia to design (or redesign) circuits to 80°C or more, in order to achieve the required rating from a circuit.

A.2.2 Regulatory Test

The Regulatory Test is required for all augmentation projects with an estimated cost greater than $1m. The Regulatory Test public consultation for this project was undertaken via the ESIPC's Annual Planning Report.

A.2.3 Prudency Test

SKM has reviewed the criteria of the prudency test and is of the view that this project meets the criteria of this test. This view was formed on the basis that:

- *There was a justifiable need for the investment*. SKM is of the view that ElectraNet correctly assessed the need for investment against its statutory obligations

- SKM is of the view that ElectraNet proposed the most efficient investment to meet the network requirements In coming to this view, SKM notes that ElectraNet considered a number of reasonable network solutions.

  The final project scope (network investment) was consistent with good industry practice, resulting in the most economically efficient project being selected for implementation.

- Cost variations encountered during the implementation of the project would have applied to all alternate options considered. The cause of the cost increases would also have likely applied also to the uprate of the Para – Northfield - Paracombe line segment, thereby causing option 2 to be even more expensive.

  SKM is of the view that the cost variations experienced on this project did not impacting on the price relativity of the chosen solution.

- SKM understands that the efficient project scope as discussed above was the project actually developed.

A.2.4 Cost Benchmarking

SKM estimated this project based on the scope in the board memo *Financial Authority Revision – Para – Mobilong 132kV Line Up-rating – Project No. 10396, 27 May 2005.* We also drew on data in the *Phase 2 Scope and Estimate Report*, where it was not superseded by the board memo. The SKM estimate for this project is $12.6m. This compares with the approved budget of $15.7m for this scope. As this is a brownfield refurbishment project, there is significant uncertainty, and the match between our estimate and ElectraNet's is reasonable.

The SKM estimate is based on historical Australian costs for the dates during which the line was constructed. Hence it includes an allowance for material and labour price increases identified by ElectraNet in the Financial Authority Revision.

The board memo lists the justification for the increase from the original $9.8m budget to $15.7m. SKM is of the view that the percentage increase is commensurate with the listed scope changes and unforeseen price increases.

SKM recognises that the revised budget is indicative of competitive tenders, and that the increased cost reflects prevailing market conditions at the time.

A.2.5 Conclusion

This project appears to have been prudently planned and scoped to meet system security and reliability criteria as defined in the ETC and forecast load increases of the existing 132kV transmission network. As the project was considered a refurbishment project, there was no requirement for it to be subjected to a regulatory Test assessment, however SKM is of the view that the project passes a Prudency Test assessment.

A.3 Project 10428: Whyalla – Yadnarie Line Monitoring

Approved budget	Actual Cost	Category	Commissioning Date
$1.3M	$0.7M	Reliability	2/2006

This project provided for the installation of line monitoring equipment at Middleback and Mangalo substations with communications back to Yadnarie substation.

A.3.1 Justifiable Need

This project was established in response to identified conductor clearance limitations. The circuit was designed and constructed to a now superseded British standard. This standard was universally accepted and applied in Australia some 40 or more years ago, however it was found to be unsatisfactory in Australia due to our more extreme climate. The old standard was designed for British weather conditions and provided for a maximum conductor temperature of 49^{o}C. This was found to be unacceptable in Australia, where for the same power through put, conductors could be operating at 80^{o}C or more. This higher operating temperature resulted in excessive conductor sag thereby reducing ground clearances, for the same power throughput (or a considerable reduction in power transfer capability to maintain clearances).

In this instance a reduction in transfer capacity was practicable when statutory clearance were being approached, as stand by (contracted) gas turbines cold be dispatched at Port Lincoln, there by deloading the system downstream of Yadnarie.

A.3.2 Regulatory Test

Due to the scope of this project, there was no requirement to undertake a Regulatory Test, and SKM can not identify any evidence that a Regulatory Test analysis was undertaken.

A.3.3 Prudency Test

SKM has reviewed the criteria of the prudency test and is of the view that this project meets the criteria of this test. This view was formed on the basis that:

- *There was a justifiable need for the investment*. SKM is of the view that ElectraNet correctly assessed the need for investment against its statutory obligations
- SKM is of the view that ElectraNet proposed the most efficient investment to meet the network requirements In coming to this view, SKM notes that ElectraNet proposed and implemented a relatively low cost solution that provided more accurate locational real time weather monitoring. This information was used to better determine when line design limits were likely to be encroached. This information was in turn used to make use of generation capacity

already contracted to ElectraNet. As the generation capacity was already contracted to ElectraNet, firing of the GT's only incurred Short Run Marginal Costs (SRMC) to ElectraNet.

Greater precision in understanding the locational real time weather conditions should have resulted in firing the standby generators less frequently, not more frequently.

The final project scope (network investment) was consistent with good industry practice, resulting in the most economically efficient project being selected for implementation.

- The cost estimate provided for this project as stated on the project summary sheet, was based on a worst case communications requirement. These worse case requirements were not encountered resulting in the project being completed significantly under budget ($0.705m compared with $1.304m).
- SKM understands that the efficient project scope as discussed above was the project actually developed.

A.3.4 Cost Benchmarking

The initial ElectraNet estimate, based on "worst case" communications requirements was $1.304m.

The data available to SKM was not adequate to recreate the "worst case", so the SKM estimate is instead based on an "average case" communications requirement. We estimate this project at $0.606m, comprising $0.292m for the weather stations and $0.314m for the communications.

SKM is of the view that budgeting for the worst case communications requirements was reasonable given the small size of the project and the high level of detail required to accurately estimate the project. As the worst case conditions did not eventuate, the project was completed under budget, at $0.705m. This figure is consistent with the SKM estimate, and the "average case" conditions.

SKM notes that 3 competitive quotes were called for the design and construction of the two radio systems and the installation of a weather monitoring station with an ISDN link. Whilst two of the three bids were comparable in quantum, the third bid was considerably cheaper though of perceived equally high standard. ElectraNet chose the cheaper of the bidders, whom, SKM understands performed to expectations.

A.3.5 Conclusion

This project appears to have been prudently planned and scoped to meet system security and reliability criteria as defined in the ETC and forecast load increases of the existing 132kV transmission network.

The project was evaluated against the prudency test and met the criteria. The project seems to have been well managed and was completed greatly under budget.

A.4 Project 10453: Davenport – Brinkworth – Para 275kV line Uprate

Approved budget	Actual Cost	Category	Commissioning Date
$4.5M	$4.9M (projected)	Compliance	3/2008 (expected)

This project augmented the Davenport – Brinkworth – Para 275kV transmission line from a 49°C design / line rating to a 65°C design / rating. Whilst the field implementation of this project has not yet commenced, the project is expected to be completed within the current regulatory period, with completion scheduled for March 2008.

A.4.1 Justifiable Need

This project was established in response to identified conductor clearance limitations. The circuit was designed and constructed to a now superseded British standard. This standard was universally accepted and applied in Australia some 40 or more years ago, however it was found to be unsatisfactory in Australia due to our more extreme climate. The old standard was designed for British weather conditions and provided for a maximum conductor temperature of 49°C. This was found to be unacceptable in Australia, where for the same power throughput, conductors could be operating at 80°C or more. This higher operating temperature resulted in excessive conductor sag thereby reducing (statutory) ground clearances, for the same power throughput (or a considerable reduction in power transfer capability to maintain clearances).

In this instance, during the detail design and assessment phase it was determined that by uprating the line to 65 °C by lifting the conductors, all requirements were met for the medium term. ElectraNet advise that any tower that required modifications to be made, were modified to the ultimately required 80°C design. SKM concurs with this approach.

A.4.2 Regulatory Test

The Regulatory Test is required for all augmentation projects with an estimated cost greater than $1m. The Regulatory Test public consultation for this project was undertaken via the ESIPC's Annual Planning Report in 2005 and 2007.

A.4.3 Prudency Test

SKM has reviewed the criteria of the prudency test and is of the view that this project meets the criteria of this test. This view was formed on the basis that:

- *There was a justifiable need for the investment*. SKM is of the view that ElectraNet correctly assessed the need for investment against its statutory obligations;

  SKM is of the view that ElectraNet proposed the most efficient investment to meet the network requirements In coming to this view, SKM notes that ElectraNet proposed and implemented a

solution that did not deliver the ultimate desire of an 80°C rated line but observer that a 65 °C rated line met present and short term requirements. The rating increase was achieved by lifting the strung height of the conductors above the ground. SKM commends ElectraNet for this solution noting that ElectraNet was encouraged to upgrade to the full 80°C design by ESIPC.

ElectraNet has advised that any tower that required modifications was uprated to an 80°C design. SKM commend ElectraNet for this prudent approach to a stepped project implementation and notes that a project to uprate the line to a full 80°C design is listed as a contingent project in the submission for the upcoming regulatory period.

The final project scope (network investment) was consistent with good industry practice, resulting in the most economically efficient project being selected for implementation.

- SKM understands that the efficient project scope as discussed above is the project being developed.

A.4.4 Cost Benchmarking

The cost estimate provided for this project is a project estimate only. The project is yet to be implemented, but ElectraNet has accepted tender submissions which indicate that the project will far exceed the initial estimate.

SKM has produced an independent estimate based on the schedule of work in the RFT. This consists of tower lifts for 116 structures and insulator replacements at 85 structures.

SKM's estimate using this schedule for the 65 °C design is $7.6m. This is much greater than ElectraNet's original 65 °C design, phase-2 estimate of $4.5m. The SKM estimate is consistent with advice we have received that the project is anticipated to exceed the $4.5m budget.

We understand that the scope of work in the RFT is more detailed than the information used for the original ElectraNet 65 °C design, phase-2 estimate. However we found no evidence of a significant scope change to justify the difference between the estimate and the tender prices. It would appear that the project was originally underestimated.

A.4.5 Conclusion

This project appears to have been prudently planned and scoped to meet system security and reliability criteria as defined in the ETC and forecast load increases of the existing 275kV transmission network. As the project was considered a refurbishment project, there was no requirement for it to be subjected to a regulatory Test assessment, however SKM is of the view that the project passes a Prudency Test assessment.

A.5 Project 10459: General Building Upgrade

Approved budget	Actual Cost	Category	Commissioning Date
$120k (+$40k air-conditioning)	$154k (+ airconditioining)	Non network	6/2003

This project increased the amount of office accommodation at The Rymal Park offices.

A.5.1 Justifiable Need

Due to growth in the organisation, there was a need to establish additional office accommodation in the Rymal Park offices. This was achieved by converting a previous video and storage areas for office accommodation.

A.5.2 Regulatory Test

Due to the scope of this project, there was no requirement to undertake a Regulatory Test, and SKM can not identify any evidence that a Regulatory Test analysis was undertaken. For a project of this cost, SKM would not expect a Regulatory test to be applied.

A.5.3 Prudency Test

SKM has reviewed the criteria of the prudency test and is of the view that this project likely does not meet the criteria of this test, on the basis that costs were not efficient. This view was formed on the basis that:

- *There was a justifiable need for the investment.* SKM is of the view that it is likely that ElectraNet correctly assessed the need for this facilities investment (additional office accommodation), however it is unclear if accommodation at other locations was considered;

  SKM is of the view however that ElectraNet may not have proposed the most efficient investment to meet this facilities requirements In coming to this view, SKM notes the apparent sudden and urgent need for the office accommodation. Documents provided detail the project originally being approved on 10 December 2003 at an estimated cost of $80k, and with a required completion date of end February 2004. On 18 December 2003, after detailed designs were received from an architect, the project was estimated to cost $120k, and a revised approval was obtained. An additional $40k related to air conditioning was included with other works in project 10248 (Rymal Park air conditioning upgrade).

  The building industry Australia wide traditionally enjoys an annual shut down for 1 month commencing just prior to Christmas. Calling tenders and requiring this work to be undertaken during this shut down period would normally incur additional costs. SKM is of the view that ElectraNet likely incurred a premium cost due to a desire to have this work undertaken during a traditional shut down period in the building industry, and that improved planning and project

management could have avoided the need to undertake the works quickly over a shutdown period when costs can be expected to be higher.

Consistent with this argument, ElectraNet state that "tenders revealed significant cost increases due to higher subcontractor charges, and increased air conditioning and lighting costs". The final cost of this project is recorded as being $154k.

SKM has sighted the offices resultant from this project. The offices accommodate a number of personnel and provide for an additional entrance to the building. SKM is of the view that the scope of the project was reasonable.

- SKM understands that the project scope as discussed above was the project developed.

A.5.4 Cost Benchmarking

SKM notes that 2 competitive tenders were called for this work and that the cheaper of the two tenders was accepted, however as discussed above, we are of the view that calling tenders and requiring this work to be undertaken during the traditional Christmas shutdown period likely incurred a premium to ElectraNet. After sighting the resultant additional office accommodation, SKM considers the costs to be in keeping with the scope, however the unreasonably short project deadline has likely resulted in an increase in costs of some $34k (28%).

A.5.5 Conclusion

Whilst SKM is of the view that it is likely that ElectraNet correctly assessed the need for this facilities investment we are not clear that the investment required the urgency that seemed to be assigned to it. There was no evidence provided of alternate office accommodation or less expensive alternatives being considered. Further we are of the view that calling tenders and requiring this work to be undertaken during the traditional Christmas shutdown period likely incurred a premium cost to ElectraNet of around $34k or 28% of the original budget. While this is insignificant in the context of ElectraNet's overall capital budget, it is considered material for this individual project.

A.6 Project 10694: Substation and Telecommunication Spares

Approved budget	Actual Cost	Category	Commissioning Date
$6.1M, increased to $7.5M	$8.4M	System Spares	6/2007

This project sources four transformers of differing ratings that will be held in stock as system spares in accordance with new South Australian Electricity Transmission Code (ETC) requirements. While the ElectraNet project name refers to telecommunication spares, SKM understands the project actually related only to power transformer spares.

A.6.1 Justifiable Need

Revisions to the ETC which come into effect on 1 July 2008, require ElectraNet to hold in stock (or have immediate access to) spare power transformers of each size rating in use. Specifically the ETC requires that ElectraNet use its best endeavours to repair/replace failed transformers as soon as possible. Further, section 2.14.1 requiring ElectraNet to carry enough spares to meet this requirement. Section 2.15 requires ElectraNet to prepare implement and comply with an emergency Transformer Replacement Plan, which sets out ElectraNet's strategy for ensuring that spare transformers are available to meet the ETC requirements.

A.6.2 Regulatory Test

This project is categorised as an Inventory / Spares project and is not required to be assessed under a Regulatory Test.

A.6.3 Prudency Test

SKM has reviewed the criteria of the Prudency Test and is of the view that this project meets the criteria of this test. This view was formed on the basis that:

- *There was a justifiable need for the investment*. SKM is of the view that ElectraNet correctly assessed the need for investment against its statutory obligations

  SKM is of the view that ElectraNet proposed the most efficient investment to meet the network requirements In coming to this view, SKM notes that ElectraNet assessed the population of transformers installed in the network and determined the minimum investment required to meet the ETC requirements. Consideration was given to asset ages and likely failure rates, with this being addressed through a risk management approach.

- *The capital expenditure was undertaken in a manner consistent with good industry practice:* The revised cost estimate provided for this project as stated on the project summary sheet, was determined by competitive tender and is reflective of the best available market price available at the time. The price does however reflect substantive increases in the price of raw materials necessary for the construction of the transformers. The impact of these increases in raw

material costs is not unique to ElectraNet. Utilities world wide are experiencing similar increases in the price of primary plant. SKM's research suggests that these higher plant costs are expected to continue to increase for another few years.

- The efficient project scope discussed above was the project being implemented.

A.6.4 Efficient Investment

As stated above, the revised cost estimate provided for this project as stated on the project summary sheet, was determined by competitive tender and is reflective of the best available market price available at the time. The price reflective of substantive increases in the price of raw materials necessary for the construction of the transformers. The impact of these increases in raw material costs is being experienced world wide.

A.6.5 Cost Benchmarking

The cost estimate provided for this project is a project estimate only. The project is yet to be implemented, but ElectraNet has accepted tender submissions and increased the budget accordingly.

The project was originally approved by the board in December 2005 for $6.1m. Based on tenders received this was increase to $7.5m, just 5 months later.

SKM noted an average 12% increase in the price of power transformers between 2005 and 2006, driven by increases in the price of steel and copper. The large transformers are more sensitive to raw material costs and increased in price by more than 12%. This increase was much higher than predicted at the time and justifies the increase in the ElectraNet budget.

SKM estimated the project based on the scope listed in the original board financial approval, independently of the received tenders. We estimated the cost of this project at $7.3m, using the SKM database of 2006/07 prices.

The vast majority of the expense for this project is the supply of power transformers. The scope is clearly defined and has not changed since the initial board approval. Hence we expect a close match between our estimate and the most recent ElectraNet budget, and this is the case.

A.6.6 Conclusion

This project appears to have been prudently planned and scoped to meet reliability criteria as defined in the ETC. As the project was considered an Inventory / Spares project, there was no requirement for it to be subjected to a regulatory Test assessment, however SKM is of the view that the project passes a Prudency Test assessment.

A.7 Project 85013: Magill Aged Asset Replacement

Approved budget	Actual Cost	Category	Commissioning Date
$8.8M, revised to $16.3M with scope change (replacement of secondary systems)	$15.1M	Replacement	6/2006

This project resulted in the replacement aged and likely to fail equipment at Magill substation, and associated remote end works. The project also resulted in the reconfiguration of the 275kV switchyard resulting in a more flexible and potentially more reliable system configuration.

Specifically, this project resulted in the replacement of two 117MVA 275kV transformers with a single new variable tap 225MVA 275kV transformer, replacement of the air blast 275kV CBs with new SF6 units, and the addition of an extra 275kV diameters – 1 ½ CB design.

The scope of work also extended to the replacement of the aged secondary systems inclusive of associated remote end works at Happy Valley, Torrens Island, Para and East Terrace substations.

A.7.1 Justifiable Need

SKM has sighted equipment test results for the equipment that was replaced at the Magill substation and test results for similar equipment of the same age. We are of the view that ElectraNet was justified in making the investment decision that it did and that it had been operating the network under a risk management philosophy virtually since the failure of the third transformer in 1993.

A.7.2 Regulatory Test

As this project was considered a replacement of aged assets with in an existing substation site, there was no requirement for ElectraNet to undertake a Regulatory Test assessment. SKM has not sighted any evidence to suggest that a Regulatory Test assessment was undertaken. SKM considers this appropriate given the scope of the works.

In making this assessment, SKM notes it considers the additional circuit breaker to be a “modern equivalent asset” design, and not significant in the overall cost of the project. The cost of these assets is well below the threshold required for a Regulatory Test.

A.7.3 Prudency Test

SKM has reviewed the criteria of the Prudency Test and is of the view that this project meets the criteria of this test. This view was formed on the basis that:

- *There was a justifiable need for the investment*. SKM is of the view that ElectraNet correctly assessed the need for investment against its statutory obligations.

  SKM is of the view that ElectraNet proposed the most efficient investment to meet the network requirements In coming to this view, SKM notes that the transformers and associated switchgear were some 50 or more years old. One transformer had previously failed and the remaining two units had only limited voltage control (tap changing) functionality. Tests on the failed unit and subsequent test on the remaining units all were consistent with the remaining transformers rapidly approaching failure mode.

  The air-blast switchgear was of a similar vintage to the transformers, and exhibited operational constraints and maintenance challenges representative of aged and potentially unreliable equipment.

  SKM has sighted numerous documents associated with determining the actual asset condition assessment for the major plant items at Magill substation. We are satisfied that the assets were replaced due to appropriately determined asset condition and not based on asset age alone.

  Other porcelain insulated items associated with the switchyard had an established explosive failure mode and represented a safety hazard to both electricity workers in the vicinity of the switchgear and also to the general public.

  The previously failed transformer failed in 1993. Since that time ElectraNet has operated the substation applying a risk management approach. SKM does not consider that it would have been appropriate for ElectraNet to continue to operate the substation in this manner. Indeed, SKM considers that ElectraNet was fortunate to have not experienced further major equipment failures in the substation in recent years.

  SKM also notes that the decision to install the additional 2 diameters and reconfigure the 275kV switchyard was influenced by reliability considerations and operational constraints identified by NEMMCO

- *The capital expenditure was undertaken in a manner consistent with good industry practice:*

  The scope for this project increased as the condition of additional assets at the Magill substation site became better known. Replacement of the secondary systems, for example were not originally scoped, but were include in stage 2 works when the condition of the older secondary systems became known. Also, due to the nature of the loads supplied by the Magill substation, it was necessary to stage the works to avoid critical peak load periods.

  When the increase in project scope was determined and prior to the expenditure of the stage 1 approved budget, ElectraNet reverted to its Board seeking approval for an increase in project

budget (as opposed to establishing a second and separate project for the secondary systems works). SKM commends this approach.

SKM is of the view that the staggered staging of works and the containment of all works in the one project are each appropriate actions for a prudent network operator to take.

- SKM notes that ElectraNet considered 5 replacement strategies for each of the asset types to be replaced. These were short listed with an NPV analysis undertaken for the most highly ranked alternatives. SKM is of the view that ElectraNet appropriately considered replacement options and proposed a replacement strategy consistent with good industry practice.
- SKM understands that the efficient project scope as discussed above was the project developed and implemented.

A.7.4 Efficient Investment

As stated above, SKM is of the view that ElectraNet appropriately identified the need for the investment, deferred the investment as long as was reasonable and practicable, and for each asset class requiring replacement, considered appropriate replacement strategies, undertaking NPV studies as appropriate.

The staging of works for operational and reliability considerations SKM considers to be consistent with prudent industry practice.

SKM is of the view that the replacement of the 2 x 117MVA transformers with a single 225MVA transformer represent a prudent (efficient) investment decision, consistent with good industry practice.

A.7.5 Cost Benchmarking

SKM estimated the cost of this project at $14.9m, comprising $4.2m for stage 1 and $10.7m for stage 2, which compares favourably with actual project cost of $15.1m and the revised project budget (inclusive of secondary systems works) of $16.3m.

The original budget for the project was $8.8m, but did not include the replacement of secondary systems. SKM is of the view that the progressive changes in budgets are commensurate with the scope expansion, and the redistribution of works into the two project stages.

The costs incurred for the replacement of Magill's secondary systems are high when compared to the cost in a new, equivalent substation. We feel this is justified due to high engineering costs of working in brownfield site. The replacement of field wiring during this project should reduce the cost of the next secondary system replacement.

A.7.6 Conclusion

SKM considers that the need for this project was well defined, both in terms of aged plant and in terms of network reliability configuration considerations, and that ElectraNet deferred the project, operating the Magill substation on a risk management approach, for as long as could reasonably have been expected. The replacement of the 2 aged 117MVA transformers with a single 225MVA unit is consistent with good industry practice as was the staging of the works to avoid peak load periods.

The project was completed with in the approved budget and at a price that SKM considers reasonable.

A.8 Project 10384: Bungama Substation Redevelopment Stage 1

Approved budget	Actual Cost	Category	Commissioning Date
$5.1M	$4.2M	Replacement	12/2004

This project was the first stage of a multi staged project to replace aged assets in poor condition and augment the Bungama substation and associated transmission lines. This project was approved in January 2003 to undertake preliminary works for the project such as development applications, easement and land acquisitions, and preparation of a Regulatory Test for the full replacement of the Bungama substation in Stage 2.

In December 2003 (at Application Notice consultation stage of the regulatory test for the full Stage 2 redevelopment) an opportunity arose to purchase 2 new 275 kV, 225MVA transformers that due to other reasons had become surplus to Powerlink's requirements. The project scope was varied to allow the pre-purchase of these transformers sooner than was otherwise required, but resulting in an overall cost saving, on the basis that the full Stage 2 replacement project appeared likely to pass the Regulatory Test.

A subsequent transformer failure at the Brinkworth substation resulted in one of these transformers being installed there, resulting in further adjustments to the project.

Projects EC.10510, EC.10376 and EC85002 (which later became EC.10510) also relate to the Bungama substation redevelopment.

Justifiable Need

A.8.1 Regulatory Test

This project was not assessed against the Regulatory Test, but provided for the cost of undertaking the Regulatory Test and other approvals processes to be applied to the Bungama Substation redevelopment Stage 2. The Final Report for the Stage 2 project regulatory test was published in January 2004, and the project implemented as described.

SKM considers a Regulatory Test was not required for Stage 1, as it encompassed only the preliminary works including the development of the Regulatory Test for the full Stage 2 redevelopment. The opportunity to pre-purchase the transformers at a reduced price was time-limited, and considered reasonable given the cost savings and the advanced stage of the Regulatory Test for Stage 2 which had been subject to public consultation and was only a month away from completion.

A.8.2 Prudency Test

SKM has reviewed the criteria of the prudency test and is of the view that this project meets the criteria of this test. This view was formed on the basis that:

- *There was a justifiable need for the investment*. SKM is of the view that ElectraNet correctly assessed the need for investment against its statutory obligations;

  Whilst the scope of works proposed for the Stage 2 Bungama substation was the replacement of aged assets that had been proven to be in poor condition, the scope of works was not merely the like for like replacement of assets. It also included the establishment of a 275kV section, rebuilding the 132kV section and reinforcing the distribution connection points. Although the project was largely Asset Replacement, ElectraNet erred on the side of caution and treated the project as a network augmentation project requiring a Regulatory Test.

  This project to undertake the Regulatory Test was well advanced and at the Application Notice consultation stage when ElectraNet became aware that Powerlink had two new 275kV, 225MVA transformers of suitable configuration, that had become surplus to their requirements, and were being offered to ElectraNet at a price more competitive than they believed they could source themselves.

  The recommended final scope of works for this project included the replacement of the existing 275kV transformer at each of Bungama and Brinkworth substations. No objections to the replacement of these transformers were expected as a result of the public consultation, nor were any ultimately received. SKM is of the view that there was a justifiable need to purchase the transformers from Powerlink, even though it required the short term storage of the unit designated for the Bungama substation.

- *Efficient Investment*: SKM is of the view that this project as varied, represented an efficient investment as it took advantage of an opportunity to purchase 2 large power transformers of suitable configuration, rating and voltage at a price cheaper than ElectraNet believe they could have acquired through their competitive tendering process.

  At about the time that Powerlink offered the transformers to ElectraNet, the transformer that had been identified as in need of replacement at Brinkworth actually failed. (To some extent this could be seen as further justification that the transformers were correctly identified as being in need of replacement). It was to ElectraNet's advantage to be positioned to accept the Powerlink transformers and reduce procurement times for the replacement transformer. This further supports the decision being an efficient investment

- SKM understands that the efficient project scope as discussed above was the project developed.

A.8.3 Efficient Investment

As stated above, SKM is of the view that this project as varied, represented an efficient investment as it took advantage of an opportunity to purchase 2 large power transformers of suitable configuration, rating and voltage at a price cheaper than ElectraNet believe they could have acquired through their competitive tendering process.

A.8.4 Cost Benchmarking

The original budget of $0.250m was increased to $5.1m to include the transformer procurement. The project was delivered within this revised budget, at $4.214m.

SKM produced two estimates for the cost of this project using market transformer prices. Both estimates included the transformer procurement and installation of the Brinkworth transformer.

For the project as constructed, including 2 off 275/132kV 200MVA transformers, we estimate the total cost at $5.9m.

However, the substations in question only required minimum 160MVA transformers. For an alternative option, including 2 off 275/132kV 160MVA transformers we estimate the total project cost at $5.2m.

The actual project expenditure is less than both of our estimates. Hence SKM are of the opinion that the transformers were indeed well below market rates and efficient investment.

A.8.5 Conclusion

SKM is if the view that ElectraNet were justified in applying the Regulatory Test to this project (and would likely have been required to in any case). The acceptance of the two 225 MVA transformers from Powerlink represented a prudent investment decision that proved to also be quite timely, given the failure of the transformer at the Brinkworth substation.

A.9 Project Description 85035: South East – Snuggery 132kV Line

Approved budget	Actual Cost	Category	Commissioning Date
$15.1M, increased to $36.5M	$37.1M (forecast)	Reliability	11/2007 (expected)

This project, inclusive of associated project 85035z provided for the approval process (inclusive of a Regulatory Test) and establishment of a new single circuit 132kV transmission line between the South East substation and Snuggery substation in South Australia's south east.

A.9.1 Justifiable Need

In accordance with the requirements of the ETC, the 132kV transmission system in the South East of South Australia is required to meet N-1 reliability of the transmission lines. Previously, the capacity of the transmission lines has been supplemented by sufficient contracted generation from the generators at Snuggery to meet this requirement.

Load growths resulted in the contracted generation capacity being insufficient for ElectraNet to meet its statutory obligation under the ETC. Note that the 132kV transmission network supplies the towns of Millicent, Snuggery and Mount Gambier. It also supplies a tissue and paper manufacturing plant connected to the distribution system at Snuggery.

This project was required to ensure that N-1 reliability standards were maintained. The project has been classified as reliability augmentation.

Based on the information that has been provided to SKM, we are of the view that the project was justified and correctly identified as reliability augmentation and that it was correctly identified as being needed to meet 2003/04 summer loads.

A.9.2 Regulatory Test

As this project was identified as reliability augmentation, and due to the nature of the works to be undertaken, it was required to be assessed under the Regulatory Test as defined in the National Electricity Code (NEC) and now the NER.

SKM has sighted sufficient evidence to form the view that the Regulatory Test was appropriately applied to this project in 2002/03 and that the submissions received from the public consultation process were appropriately considered. In this instance, 2 submissions were received, one from ESIPC and one from Synergen. Both submissions were considered and rejected after consultation with the authors. SKM is of the view that non-acceptance of the submissions was the correct response upon application of the Regulatory Test and discussions with the respondents.

ElectraNet advised that due to delays in gaining approvals in the Grant District, it would be re-applying the Regulatory Test to the project commencing with a revised Application Notice which would be published on its web site in early 2006. SKM has found no evidence of the Regulatory Test being reapplied to this project, nor of a revised Application Notice being posted.

SKM is of the view that ElectraNet correctly identified at the time that the project should have been re-assessed by application of the Regulatory Test and public consultation following the initial delays, and likely again and when the estimated costs of the project were found to have increased from $15.1m to $36.56m.

It is noted that ElectraNet received a legal opinion which stated that the new Regulatory Test that came into effect on 19 August 2004, contained no legal obligation to consult publicly again on a project that changed in scope or cost. SKM would challenge this view as being inconsistent with the intent of the Regulatory Test process.

SKM accepts that the causes for the significant cost increase, namely:

- Initial underestimation of work unit rates;
- Increases in the costs of primary plant and base labour rates;
- Increased easement acquisition costs;
- Increased undergrounding of ETSA Utilities assets;
- Increased number of deviations to the transmission line;
- Increased tower foundation costs;
- Increased telecommunications costs;
- The addition of 10 kms of double circuit construction from the original single circuit construction; and
- Increased substation costs

would have applied almost equally to all three network solutions considered and would not have affected the ranking of the network solution options or the selection of the most efficient option.

A.9.3 Prudency Test

SKM has reviewed the criteria of the prudency test and is of the view that this project likely does meet the criteria of this test. This view was formed on the basis that:

- *There was a justifiable need for the investment*. SKM is of the view that ElectraNet correctly assessed the need for investment against its statutory obligations;

  As discussed above, there is a statutory requirement for 132kV transmission system in the South East of South Australia to meet N-1 reliability of the transmission lines.

Load growths had resulted in the contracted generation capacity (which supplemented the transmission capacity) being insufficient for ElectraNet to meet this statutory obligation.

This project was required to ensure that N-1 reliability standards were maintained. The project had been classified as reliability augmentation.

Based on the information that has been provided to SKM, we are of the view that the project was justified and correctly identified as reliability augmentation. SKM is satisfied that the project was correctly identified as being required for the 2003/04 summer. Delays to the implementation of this project has resulted in the network being potentially non-code compliant since that time.

- *Efficient Investment*: SKM has extensively reviewed network reliability and operational requirements, the scope of works for this project, and considered the impact of the somewhat drawn out approvals process the project experienced. We concur with ElectraNet's position that the network solution proposed for this project likely represents the most efficient solution option in the given planning horizon.

  In coming to this solution, we have taken note of the commentary provided by ESIPC and Synergy during the public consultation, and the geographic separation of the two substations. We have also given careful consideration to possible DSM solutions and other non-network solutions. We are of the view that, due to the diversified load profiles of the ETSA Utility's loads connected at Snuggery, Mount Gambier and Blanche and noting the magnitude of the tissue mill connected at the Snuggery substation, it is most unlikely that a non-network solution could be identified that would economically address the network needs, and also be compliant with the ETC.

  SKM notes that no Demand Side, generation nor Distribution System support options were identified during the public consultation undertaken as part of the initial Regulatory Test assessment.

  SKM is also of the view that the various factors that contributed to the significant cost variance between the initial project estimate and the most recently notified project final cost estimate, would have equally applied to all of the short listed options assessed. Further, SKM is of the view that the price increases could have applied proportionally more to the other considered network solutions.

- SKM understands that the project scope as identified in 2002, is the project being developed.

A.9.4 Cost Benchmarking

This project is yet to be implemented, and the costs reviewed are project estimates only. The project has undergone a series of budget increases with only minor changes in scope.

Discussions with ElectraNet have established that this project was one of the first new transmission line projects that ElectraNet had undertaken since it had become a separate entity from ETSA, and that ElectraNet's in house estimating expertise was likely to have been in a developmental rather than in a refined status.

Accordingly, the initial project estimates have generally been accepted as being less than accurate. The ElectraNet budget in the Application notice and phase 1 final report was $15.1m.

SKM produced an independent estimate for this scope, using 2007/08 prices. Our estimate was $26.2m.

Since the application notice, the budget has increased to $36.53, whilst ElectraNet have advised that the total cost to completion is forecast to slightly exceed this figure.

The increases in budget are for a variety of reasons.

There have been some changes to the scope, such as the provision of two sections of double circuit structures.

The largest cost increase is due to a 72% increase in the base rate per kilometre of line, attributed to labour cost increases and metal price increases. Increases were also attributed to the addition of a locality allowance, increased easement acquisition costs, increased undergrounding of ETSA Utilities assets, and increased risk allowance.

SKM is of the view that the most recent estimate is a reasonable reflection of the current prices and noted construction difficulties. Our estimate is based on normalised prices which are not reflective of supply/demand pressures which are presently being experienced in the Australian market. The SKM estimate for this project is reflective of a regulatory valuation escalated to the year of expenditure.

However we also find that some of the costs increases between the application notice and the current budget were foreseeable. Specifically, the costs associated with locality allowance, risk allowance and 'per km' line cost escalation were vastly underestimated.

A.9.5 Conclusion

SKM is of the view that this project appropriately identified and classified as a reliability augmentation likely passes the Prudency Test at its forecast cost of $35.432m for reasons discussed above. SKM accepts that the project was sufficiently justified to be included in the Regulatory Rate base

A.10 Project Description 10418: Project Streamline

Approved budget	Actual Cost	Category	Commissioning Date
$2.9M, increased to $4.8M	$4.3M	Non-network (IT)	12/2004

This is a non-network project, which provides for the installation of a SAP business system and associated applications. The project provided for data cleansing and conversion, acceptance testing, user training and other associated tasks.

The project scope was changed during the implementation of the project to secure ownership of the infrastructure and software licenses by ElectraNet (as opposed to Powerlink).

A.10.1 Justifiable Need

In this project there is not a requirement to justify the acquisition of the software package. That was explored in projectEC.10425 Shared Services. This project simply provides for the installation of the SAP business system and its population and implementation.

Given that the business system had been purchased, the justification for its implementation would seem implicit.

A.10.2 Regulatory Test

As this project is the population and implementation of a previously purchased SAP business system, there is no requirement for a Regulatory Test analysis.

A.10.3 Prudency Test

- *There was a justifiable need for the investment*. SKM is of the view that ElectraNet correctly assessed the need for investment;

  As discussed above, ElectraNet had previously justified the purchase of a SAP business system under a different project (EC.10425 Shared Services). Given that the business system had been purchased, the justification for its implementation would seem implicit.

- *Efficient Investment*: SKM notes that there were several changes in scope that impacted the price for this project. The project was first approved for budget of $2.9m in March 2002. In September 2002 the project budget was increased by $0.7m to provide for in-house training in the system. SKM concurs with this transfer of funds from a general training budget to correctly align it training task to the SAP system.

  The project was further increased by an additional $0.12m associated with additional training associated with the shift of functions from Powerlink to ElectraNet. Again SKM concurs with this cost allocation alignment with the project.

Final scope changes brought the final approved budget for the project to $4.82m with the project being completed and capitalised at $4.3m.

SKM is of the view that ElectraNet likely gained a very efficient investment by levering of the SAP system that had been developed and implemented by Powerlink. SKM is also of the view that it was a prudent decision to secure ownership of the infrastructure and software licenses by ElectraNet (as opposed to Powerlink).

A.10.4 Cost Benchmarking

SKM notes that the scope and cost of this project was increased to allow for in-house ownership of software rather than external service provision. Furthermore we note that the project has been delivered within the amended budget.

A.10.5 Conclusion

SKM is of the view that ElectraNet likely gained a very efficient investment by levering of the SAP system that had been developed and implemented by Powerlink. SKM is also of the view that it was a prudent decision to secure ownership of the infrastructure and software licenses by ElectraNet (as opposed to Powerlink).

Appendix B Ex-Ante Capex Project Reviews

B.1 Project 10161 - CBD Reinforcement City West

Proposed Cost	Proposed commissioning	Category
$142.2M	2012	Connection (ETC) / Augmentation

Note – The Proposed Costs for projects may differ from the cost estimates reviewed, due to factors such as timing, escalation and overheads.

The CBD Reinforcement City West project involves two projects, the CBD project and the Southern Suburbs project. The CBD project involves the construction of a new 275kV substation and transmission line / cable located on the western side of the Adelaide CBD. The Southern Suburbs project involves the installation of an additional transformer at the new CBD substation site.

B.1.1 Assessment of Capital Expenditure Objective

ElectraNet's revenue proposal asserts that the CBD project is required to meet the Rules capital expenditure objective to:

- comply with all applicable regulatory obligations associated with the provision of prescribed transmission services.

ElectraNet's revenue proposal asserts that the Southern Suburbs project is required to meet the Rules capital expenditure objective to:

- meet the expected demand for prescribed transmission services over the period; and
- comply with all applicable regulatory obligations associated with the provision of prescribed transmission services.

As a condition of ElectraNet's licence, it must comply with the Electricity Transmission Code (ETC) as specified by The Essential Services Commission Of South Australia (ESCOSA). The current version of the ETC (TC/04) commenced on 1st July 2003 and will be replaced by TC/05 on 1st July 2008.

Clause 2.4.1 of the ETC (TC/05) contains a table listing the allocation of exit connection points to categories. The Adelaide CBD is defined as a category 6 connection point.

Clause 2.10 of the ETC (TC/05) defines the requirements for a category 6 connection and in particular, part 2.10.1 and 2.10.2 specify the requirement for transmission line and transformer capacity of N-1 into Adelaide CBD for at least 100% of agreed maximum demand and that the transmission line and transformer capacity must be located west of King William Street.

SKM is satisfied on the basis of the ETC (TC/05) that the CBD project is required to meet capital expenditure objective to comply with all applicable regulatory obligations associated with the provision of prescribed transmission services.

Clause 2.4.1 of the ETC (TC/05) defines Magill as part of a group of category 5 connection points. Happy Valley and Morphett Vale East are defined as a group of category 4 connection points.

Clause 2.8 of the ETC (TC/05) defines the requirements for a category 4 connection and in particular, part 2.8.1 and 2.8.2 specify the requirement for transmission line and transformer capacity of N-1 for at least 100% of agreed maximum demand.

ETSA Utilities issued Request for Proposals RFP 002/06 "Projected Network Limitations Adelaide Central Region South Australia" in October 2006. Final proposal submissions to the RFP closed in April 2007. The final recommendation Evaluation Report issued by ETSA Utilities supports the development of the Southern Suburbs project as included in ElectraNet's revenue proposal.

SKM is satisfied on the basis of reviewing the demand forecasts and final recommendation Evaluation Report provided by ETSA Utilities and the ETC (TC/05) that the Southern Suburbs project is required to meet the expected demand for prescribed transmission services over the period and to comply with all applicable regulatory obligations associated with the provision of prescribed transmission services.

B.1.2 Assessment of Capital Expenditure Criteria

SKM's assessment of the compliance of ElectraNet's revenue proposal to the capital expenditure criteria had regard to the capital expenditure factors described in clause 6A.6.7 of the NER as referred to in section 2.1.3.

ElectraNet provided the following documents in support of the CBD project:

- Scope and Estimate Report
- Request for Information (ETSA Utilities Reference: Request for Proposals RFP 002/06) Projected Network Limitations Adelaide Central Region South Australia October 2006
- PB Power Report – Adelaide CBD Transmission Network Options
- PB Power / QED Report – Substation Selection Report

ElectraNet is in the process of conducting a regulatory test on the CBD and Southern Suburbs project in accordance with the NER. The regulatory test should be completed in late 2007. ElectraNet and ETSA Utilities have prepared a report titled "Projected Network Limitations: Adelaide Central Region South Australia (RFP 002/06) October 2006" as part of the public consultation requirements.

Submissions received in the course of consulting on the revenue proposal demonstrated that ElectraNet had considered the options available and involved the key stakeholders in order to arrive at the optimal solution. The preferred option being developed by ElectraNet, and on which its cost estimates are based, is considered reasonable, however SKM notes there is still considerable uncertainty regarding the final line route selection and approval.

The timing of the CBD and Southern Suburbs projects are dictated by the requirements of the ETC. The ETC requires that for category 5 loads, the transmission entity use its best endeavours to ensure the required standard is met within 12 months and in any case, ensure that the requirement is met within 3 years. The requirement for category 6 loads is that until 31 December 2011, the capacity is provided for at least 100% of agreed maximum demand and after 31 December 2011, N-1 capacity is provided for 100% of agreed maximum demand. ElectraNet's proposed timing for these projects is in accordance with their requirements to meet the ETC and can not be delayed.

SKM considers that ElectraNet's proposed scope for the CBD and Southern Suburbs projects represents efficient and prudent consideration of the options available. However, during the course of investigations, SKM found that the scope and estimate documentation submitted for consideration was likely to be revised following changes to the proposed design. The revised documentation was not available at the time of this review. Given the likelihood that the transmission line and cable component of the CBD project will be revised, SKM considers there is considerable uncertainty in the scope of the line component of the project, and hence it is not possible to accurately determine the efficient costs for this component of the project. As this component is likely to cost in the range of $70 – 96 million, with possible variance of $26 million or possibly more depending on the final route and mix of overhead and underground, SKM is unable to accurately determine the efficient costs for this project. SKM recommends consideration be given to removing this component from the forecast capital expenditure and placing this into the contingent project category, until the line route is finalised.

SKM has reviewed the scope and estimate report and is satisfied that the defined scope of the substation and connection components reasonably reflects the capital expenditure criteria.

B.1.3 Cost Benchmarking

A benchmark of capital expenditure was undertaken on the project to determine whether the estimate produced by ElectraNet represented the efficient costs that a prudent operator would incur.

In particular SKM considers it is reasonable that a significant portion of the new circuit into the CBD be constructed from underground cables. Recent experience from transmission and distribution companies in Australia is that new overhead high-voltage powerlines are unlikely to be approved in densely populated areas, or at the least face significant delays in route selection that

would be unacceptable on this project given the time constraints imposed on ElectraNet by the ETC. SKM notes that ElectraNet has sought to construct as much of the new circuit as possible using cheaper overhead construction, and is currently engaged in route selection and approvals.

SKM has considered the switchyard costs and the transmission line costs separately for the CBD project. This has been done due to the uncertainty of the transmission line route and therefore the associated costs.

SKM notes that construction of major new transmission circuits into CBD areas are relatively rare occurrences, with costs being project and location specific. There current cost estimate attempts to reflect the likely costs of this project by applying a number of factors to standard line rates, however these are difficult to quantify accurately. These adjustments are:

- the cost the underground cable has been escalated by 50%;
- the cost of the overhead line has been escalated by 185% using factors listed in the Transmission Estimating Manual to account for short line lengths; and
- a further 40% escalation to the line cost has been added to account for piled footings.

While these factors appear plausible, SKM is not confident that the line costs can be determined with reasonable accuracy until the line route has been finalised and competitive tender prices are received. SKM notes the line works component equates to approximately 60% of the total capital expenditure forecast for the CBD project.

The estimate with the line works removed is as follows:

ElectraNet Estimate (SAE)	$45.941M
SKM Estimate	$40.384M
Difference	-$5.557M

This difference is within the level of accuracy SKM expects for this level of estimate, and SKM notes the constraints on site and construction in a CBD location are quite likely to result in higher project costs. On this basis, SKM considers the ElectraNet cost estimate to be reasonable.

As stated above, SKM is confident that the project is required by the start of 2012 to meet the requirements of the ETC.

B.1.4 Conclusion

SKM supports the need for this project and have assessed that ElectraNet has selected the most efficient option to implement the project. Based on an order of accuracy of ±15% to ±25% ElectraNet's estimate for the substation works appears to represents the efficient costs a prudent operator would incur to undertake the project.

Given the uncertainty regarding the line route and the substantial amount of capex potentially at risk, SKM believes consideration should be given to making this portion of the project contingent on a route being finalised.

- **Table 92 - ElectraNet's proposed annual expenditure ($m, $2007/08)**

Year	2008 / 09	2009 / 10	2010 / 11	2011 / 12	2012 / 13	Total
Line	21.9	60.2	21.9	0.0	0.0	**104.0**
Substation	7.4	20.4	7.4	0.0	0.0	**35.2**
Total	**29.3**	**80.6**	**29.3**	**0.0**	**0.0**	**139.2**

Source: ElectraNet capital project breakdowns in capex model spreadsheet

- **Table 93 – SKM recommended transfer from ex-ante to contingent ($m, $2007/08)**

Year	2008 / 09	2009 / 10	2010 / 11	2011 / 12	2012 / 13	Total
Line	21.9	60.2	21.9	0.0	0.0	**104.0**

B.2 Project 10371 - Coonalpyn West Substation Establishment

Proposed Cost	Proposed commissioning	Category
$19.6M	2012	Connection

The Coonalpyn West Substation Establishment project involves the construction of a new substation at a greenfield site in the Coonalpyn district.

B.2.1 Assessment of Capital Expenditure Objective

ElectraNet's revenue proposal asserts that the Coonalpyn West Substation Establishment project is required to meet the Rules capital expenditure objectives to:

- meet the expected demand for prescribed transmission services over the period; and
- comply with all applicable regulatory obligations associated with the provision of prescribed transmission services.

Based on ETSA Utilities' moderate load growth forecasts of 2.9% per annum, ETSA Utilities expects customer voltage levels to be below the Electricity Distribution Code limits on the Tailem Bend to Narrung supply network during peak load times in 2011/12. Coonalpyn is located on the supply network between Tailem Bend and Narrung.

ETSA Utilities issued Request for Proposals RFP 003/06 "Projected Distribution Network Constraint: Electricity Supply to the Tailem Bend to Narrung 33kV Supply Network" in October 2006. Final proposal submissions to the RFP closed in April 2007. ElectraNet and ETSA Utilities investigated an alternative network option to construct 33kV lines and reinforce transformer capacity at Tailem Bend. No viable DSM or local generation alternatives were identified. It is expected that the final recommendation Evaluation Report issued by ETSA Utilities will support the development of the Coonalpyn West substation establishment.

SKM is satisfied on the basis of the demand forecast and the anticipated Evaluation Report supplied by ETSA Utilities that the Coonalpyn West substation establishment project is required to meet capital expenditure objective to meet the expected demand for prescribed transmission services over the period.

B.2.2 Assessment of Capital Expenditure Criteria

SKM's assessment of the compliance of ElectraNet's revenue proposal to the capital expenditure criteria had regard to the capital expenditure factors described in clause 6A.6.7 of the NER as referred to in section 2.1.3.

ElectraNet provided the following documents in support of the Coonalpyn West substation establishment project:

- Scope and Estimate Report
- Request for Proposals RFP 003/06 - Projected Distribution Network Constraint: Electricity Supply to the Tailem Bend to Narrung 33kV Supply Network October 2006
- ETSA Utilities letter "Revenue Reset Transmission – Distribution Connection Point Planning dated 12th April 2007
- ElectraNet letter "Reliability Standards for New Transmission Connection Points" dated 16th April 2007
- ESCOSA letter "New Connection Points at Coonalpyn West and Clare North" dated 31st May 2007

ETSA Utilities conducted a preliminary regulatory test on the projected network distribution constraint in accordance with the Rules. The preliminary regulatory test compared the transmission solution to a comparable distribution solution. ETSA Utilities have advised that there were no generation or DSM alternatives identified as part of the RFP process. ETSA Utilities formally advised ElectraNet in a letter dated 12th April 2007 that the Coonalpyn West substation establishment project should be included in the revenue proposal for the next period.

The ESCOSA letter confirmed ElectraNet's assessment of the new connection points as category 4 loads. The timing of the project is therefore dictated by the requirements of the ETC. The ETC requires that for category 4 loads, the transmission entity use its best endeavours to ensure the required standard is met within 12 months and in any case, ensure that the requirement is met within 3 years. ElectraNet's proposed timing for the project is in accordance with the requirements of the ETC and therefore can not be delayed.

SKM has reviewed the scope and estimate report and is satisfied that the defined scope reasonably reflects the capital expenditure criteria.

B.2.3 Cost Benchmarking

A benchmark of capital expenditure was undertaken on the project to determine whether the estimate produced by ElectraNet represented the efficient costs that a prudent operator would incur.

SKM's review found that ElectraNet's estimate did not include for line works that will be required to establish the substation. This may add approximately $100k to the project cost.

ElectraNet's estimate also included a total of $919k for cut and fill, foundations in rocks and access roads. SKM considers that the estimate in the SAE report represents a reasonable allowance for developing a site for the substation. With regard to the cut and fill and additional foundation cost

due to rock, SKM considers that the SAE report is a "best estimate" based on knowledge of the proposed site. Appendix F of ElectraNet's proposal contains the Evans and Peck Risk Review of Capital Works Program. Page 23 of the report identifies the uncertainties in civil works and mentions:

- variances in soil type from the typical soil type assumed in the Base Planning Objects;
- variances in topology, different from the level ground assumed in the Base Planning Objects, potentially requiring cut and fill;
- geotechnical risk; and
- risk that sub-contractors will require additional funds (variations) in order to complete construction works.

The cut and fill and additional costs for foundations in rocks account for $518k. SKM considers the risk identified in the Evans and Peck report to be deviation from the "best estimate" and as such does not account for foreseeable costs such as known poor soil conditions and uneven terrain. SKM considers that ElectraNet has not been unreasonable in accounting for these costs in the estimate.

The estimate for the project is summarised as follows:

ElectraNet Estimate (SAE)	$16.596M
SKM Estimate	$16.127M
Difference	-$0.442M

ElectraNet's estimate for the project is 3% more than the SKM estimate.

ElectraNet's proposed annual expenditure for the project is shown below. SKM has reviewed the expenditure profile and assessed it as satisfactory.

Table 94 - ElectraNet's proposed annual expenditure

Year	2008 / 09	2009 / 10	2010 / 11	2011 / 12	2012 / 13	Total
$M	0.0	2.9	12.3	4.3	0.0	19.6

As stated above, SKM is confident that the project is required by the start of 2012 to meet the requirements of the ETC.

B.2.4 Conclusion

SKM supports the need for this project and has assessed that ElectraNet has selected the most efficient option to implement the project. Based on an order of accuracy of ±15% to ±25% ElectraNet's estimate for the project appears to represents the efficient costs a prudent operator would incur to undertake the project.

B.3 Project 11101 - Cultana 275/132kV Reinforcement

Proposed Cost	Proposed commissioning	Category
$35.7M	2013	Augmentation

The Cultana 275/132kV Reinforcement project involves the augmentations and changes to the existing Cultana substation to reinforce supply.

B.3.1 Assessment of Capital Expenditure Objective

ElectraNet's revenue proposal asserts that the Cultana 275/132kV Reinforcement project is required to meet the Rules capital expenditure objectives to:

- meet the expected demand for prescribed transmission services over the period;
- comply with all applicable regulatory obligations associated with the provision of prescribed transmission services; and
- maintain the quality, reliability and security of supply of prescribed transmission services.

The information that ElectraNet provided to support the revenue proposal states that under all demand forecasts provided by ETSA Utilities and direct connect customers, the power system performance and quality of supply standards in schedule 5.1 of the Rules cannot be met by the current infrastructure from 2009. ElectraNet is negotiating a generation network support agreement that should defer the voltage limitations by a number of years.

ElectraNet has provided a PSS/E loadflow output showing the loading on lines under N-1 conditions with summer 2013/14 loadings assuming the Port Lincoln generation backs off the loading of the radial 132kV network to within its thermal rating. The PSS/E loadflow shows 132kV voltage depressions in the vicinity of Whyalla Terminal and Middleback and quality of supply limit breaches at Whyalla Terminal.

The Port Lincoln generation provides additional capacity to off-load the radial 132kV line below its thermal limit however this support can only meet the requirements until 2012/13 after which the Cultana reinforcement will be required.

SKM is satisfied on the basis of the demand forecast that the Cultana reinforcement project is required to meet capital expenditure objective to meet the expected demand for prescribed transmission services over the period, comply with all applicable regulatory obligations associated with the provision of prescribed transmission services and maintain the quality, reliability and security of supply of prescribed transmission services.

B.3.2 Assessment of Capital Expenditure Criteria

SKM's assessment of the compliance of ElectraNet's revenue proposal to the capital expenditure criteria had regard to the capital expenditure factors described in clause 6A.6.7 of the NER as referred to in section 2.1.3.

ElectraNet provided the following documents in support of the Cultana reinforcement project:

- Scope and Estimate Report
- Forecast Capital Project Investment Needs July 2007 Report

ElectraNet considered alternative options to address the capital expenditure objective including do nothing, permanent or rapid automatic distribution load shift, demand side management, load side power factor improvement, generation and alternative transmission. The selected option is considered to be the only option capable of addressing the emerging limitations.

SKM has reviewed the scope and estimate report and is satisfied that the defined scope reasonably reflects the capital expenditure criteria.

B.3.3 Cost Benchmarking

A benchmark of capital expenditure was undertaken on the project to determine whether the estimate produced by ElectraNet represented the efficient costs that a prudent operator would incur.

SKM notes that ElectraNet's estimate includes $1.843 million for site establishment. The Cultana site is already established with provisions having been previously made for future expansion and as such, this represents an over scoping.

During the review, it was discovered that the replacement of the existing secondary systems had not been scoped. The replacement is required in order to integrate with the new equipment into the substation. The cost of the replacement is approximately $1.56 million.

As a result, the errors due to over scoping in one area and under scoping in another do not have a significant impact on the total estimate for the project (less than 1%).

ElectraNet Estimate (SAE)	$29.726M
SKM Estimate	$29.062M
Difference	-$0.664M

ElectraNet's estimate for the project is 2% more than the SKM estimate.

ElectraNet's proposed annual expenditure for the project is shown below. SKM has reviewed the proposed expenditure profile and assessed it as satisfactory.

- **Table 95 - ElectraNet's proposed annual expenditure**

Year	2008 / 09	2009 / 10	2010 / 11	2011 / 12	2012 / 13	Total
$M	0.0	0.0	5.4	22.5	7.9	35.7

As stated above, SKM is confident that the project is required by the summer of 2013 to meet the demand forecast.

B.3.4 Conclusion

SKM supports the need for this project and have assessed that ElectraNet has selected the most efficient option to implement the project. Based on an order of accuracy of ±15% to ±25% ElectraNet's estimate for the project appears to represents the efficient costs a prudent operator would incur to undertake the project.

B.4 Project 11355/10394 - Davenport Reactor Replacement

Proposed Cost	Proposed commissioning	Category
$10.3M	2013	Replacement

The Davenport reactor replacement project involves the replacement of three 30MVAr oil filled reactors with two 50MVAr reactors.

B.4.1 Assessment of Capital Expenditure Objective

ElectraNet's revenue proposal asserts that the Davenport reactor replacement project is required to meet the Rules capital expenditure objectives to:

- maintain the quality, reliability and security of supply of prescribed transmission services.

ElectraNet's condition assessment report H426 of June 2005 recommended that all three reactors should probably be replaced or refurbished within the next four years due to their poor condition and the likelihood of failure.

The reactors are required to control voltage levels due the capacitive effect of long transmission lines and low loads. ElectraNet has proposed to install Point On Wave (POW) circuit breakers to enable the switching of the reactor banks that is not possible in the current configuration.

SKM is satisfied on the basis of the condition assessment report that the reactors need replacing. The POW circuit breakers allow a greater deal of flexibility in the control of the network and therefore give the potential for reliability and security of supply improvements. Based on the condition assessment report, the capital expenditure objective has been satisfied for this project.

B.4.2 Assessment of Capital Expenditure Criteria

SKM's assessment of the compliance of ElectraNet's revenue proposal to the capital expenditure criteria had regard to the capital expenditure factors described in clause 6A.6.7 of the NER as referred to in section 2.1.3.

ElectraNet provided the following documents in support of the Davenport reactor replacement project:

- Scope and Estimate Report
- Condition Assessment Report – Davenport Substation – H426 – June 2005
- Transmission Network Asset Replacement Recommendation Davenport Reactors January 2007

ElectraNet considered alternative options to address the capital expenditure objective including do nothing and replacing the reactors with three identical units. The option selected was assessed as having the lowest PV cost of the options considered.

SKM investigated the requirement for the replacement reactors in the event that contingent Olympic Dam project goes ahead. There is a reference in the Playford 132kV Relocation Scope Phase (2) document that the "*planned expansion by BHP of the Olympic Dam site is likely to require substantial works at Davenport Substation, including the installation of reactive plant and connection of one or two transmission lines.*" ElectraNet confirmed to SKM's satisfaction that in the event that the Olympic Dam project proceeds, the reactors provided under this project would support the reactive capacity required at Davenport.

SKM has reviewed the scope and estimate report and is satisfied that the defined scope reasonably reflects the capital expenditure criteria.

B.4.3 Cost Benchmarking

A benchmark of capital expenditure was undertaken on the project to determine whether the estimate produced by ElectraNet represented the efficient costs that a prudent operator would incur.

ElectraNet's estimate includes a civil loading on the BPO for poor ambient civil conditions totalling $151k. SKM considers that the SAE report is a "best estimate" based on knowledge of the proposed site. Appendix F of ElectraNet's proposal contains the Evans and Peck Risk Review of Capital Works Program. Page 23 of the report identifies the uncertainties in civil works which specifically mentions:

- variances in soil type, different from the typical soil type assumed in the Base Planning Objects;
- risk that sub-contractors will require additional funds (variations) in order to complete construction works.

SKM considers that the risk identified in the Evans and Peck report to be deviation from the "best estimate" and as such does not account for foreseeable costs such as knowledge of poor soil conditions. SKM considers that ElectraNet has not been unreasonable in accounting for these costs in the estimate.

ElectraNet Estimate (SAE)	$8.807M
SKM Estimate	$9.041M
Difference	$0.234M

ElectraNet's estimate for the project is 5% less than the SKM estimate.

ElectraNet's proposed annual expenditure for the project is shown below. SKM has reviewed the proposed expenditure profile and assessed it as satisfactory.

- **Table 96 - ElectraNet's proposed annual expenditure**

Year	2008 / 09	2009 / 10	2010 / 11	2011 / 12	2012 / 13	Total
$M	5.2	0.0	0.0	0.0	5.2	10.3

B.4.4 Conclusion

SKM supports the need for this project and have assessed that ElectraNet has selected the most efficient option to implement the project. Based on an order of accuracy of ±15% to ±25% ElectraNet's estimate for the project appears to represents the efficient costs a prudent operator would incur to undertake the project.

Project 10638 - Cherry Gardens to Morphett Vale East line up-rating

Proposed Cost	Proposed commissioning	Category
$3.6M	2010	Augmentation

The Morphett Vale East to Cherry Gardens 275kV Line up Rating project involves the installation of 4 new structures to increase the ground clearances of the line in order to increase its thermal rating from 80 degrees Celsius to 120 degrees Celsius.

B.4.5 Assessment of Capital Expenditure Objective

ElectraNet's revenue proposal asserts that the Morphett Vale East to Cherry Gardens 275kV Line up Rating project is required to meet the Rules capital expenditure objectives to:

- comply with all applicable regulatory obligations associated with the provision of prescribed transmission services; and
- maintain the quality, reliability and security of supply of prescribed transmission services.

The project was included in ElectraNet's regulated revenue cap decision for the 2003-2008 regulatory period. The SIM1 project undertaken in the current regulatory period addressed emerging 275/66kV transformer capacity limitations changed the transmission line loadings by installing a transformer at Magill. This off-loaded the line as both Happy Valley and Morphett Vale East substations were off-loaded and therefore deferred the need for the project.

The regulatory test has been applied to this project and the final report recommended the up-rating of the line for 120 degree Celsius operation by addressing the low spans identified.

SKM is satisfied on the basis of the regulatory test recommendation report and demand forecast that the Morphett Vale East to Cherry Gardens 275kV Line up Rating project is required to meet capital expenditure objective to comply with all applicable regulatory obligations associated with the provision of prescribed transmission services and maintain the quality, reliability and security of supply of prescribed transmission services.

B.4.6 Assessment of Capital Expenditure Criteria

SKM's assessment of the compliance of ElectraNet's revenue proposal to the capital expenditure criteria had regard to the capital expenditure factors described in clause 6A.6.7 of the NER as referred to in section 2.1.3.

ElectraNet provided the following documents in support of the Morphett Vale East to Cherry Gardens 275kV Line up Rating project:

- Project Approval Report
- Forecast Capital Project Investment Needs July 2007 Report

ElectraNet identified the only alternative option was to construct a new transmission line. This option would be far more expensive than the up-rating project and was not fully costed by ElectraNet. Given that the project has passed a regulatory test, SKM is satisfied that it meets the capital expenditure criteria.

SKM has reviewed the scope and estimate report and is satisfied that the defined scope reasonably reflects the capital expenditure criteria.

B.4.7 Cost Benchmarking

SKM has reviewed the project and is satisfied that the defined scope reasonably reflects the capital expenditure criteria. SKM's review of the cost estimate determined that ElectraNet's estimated cost of $3.6 million is reasonable.

ElectraNet's proposed annual expenditure for the project is shown below. SKM has reviewed the proposed expenditure profile and assessed it as satisfactory.

- **Table 97 - ElectraNet's proposed annual expenditure**

Year	2008 / 09	2009 / 10	2010 / 11	2011 / 12	2012 / 13	Total
$M	0.4	3.2	0.0	0.0	0.0	3.6

Note the ElectraNet cost estimate spreadsheet includes a line item for "contingency" of $329k that was queried by SKM to determine if this amounted to double counting when combined with ElectraNet's portfolio risk factor. ElectraNet advise that is amount is incorrectly labelled in the estimate spreadsheet, and in fact represents cost escalation from $2004/05 (when the project was originally estimated) to $2006/07 to put it on an equal base with other projects for escalation in line with that applied to the capex portfolio on the whole. Accordingly SKM accepts this item. SKM notes that there were only two projects estimated in this manner, and hence SKM does not consider this issue is likely to be systemic.

B.4.8 Conclusion

SKM considers this project is justified, prudent and efficient.

B.5 Project 85007/10283 - Playford 132kV Relocation

Proposed Cost	Proposed commissioning	Category
$49.8M	2011	Replacement & Connection

The Playford 132kV Relocation project involves the extension of Davenport 275kV substation, installation of two 160MVA transformers and two 60MVA transformers, construction of a new 132kV substation adjacent to the 275kV extension and making the necessary changes to the 132kV transmission lines linking Playford A to the new Davenport 132kV switchyard.

The project comprises of a replacement and connection component. The two 60MVA transformers are required to for the connection component while the remainder is for the replacement component.

B.5.1 Assessment of Capital Expenditure Objective

ElectraNet's revenue proposal asserts that the Playford 132kV Relocation (replacement component) project is required to meet the Rules capital expenditure objectives to:

- maintain the quality, reliability and security of supply of prescribed transmission services.

ElectraNet's revenue proposal asserts that the Playford 132kV Relocation (connection component) project is required to meet the Rules capital expenditure objectives to:

- meet the expected demand for prescribed transmission services over the period; and
- comply with all applicable regulatory obligations associated with the provision of prescribed transmission services.

The project was included in ElectraNet's regulated revenue cap decision for the 2003-2008 regulatory period. The Cherry Gardens replacement project was given a higher priority than Playford because of the amount of load at risk and to co-ordinate works with the Tungkillo development.

The regulatory test was not applied to this project at the time as the rules only required projects with augmentation components greater than $1 million to have the regulatory test applied. As the project now involves augmentation/connection works greater than $1 million, the regulatory test will need to be applied before the project proceeds.

ElectraNet's condition assessment report H404 of June 2005 recommended that the Playford A substation required total replacement.

SKM is satisfied on the basis of the condition assessment report, the fact the project has commenced in the current regulatory period and the demand forecasts that the Playford 132kV

relocation project (including replacement and connection components) is required to satisfy the capital expenditure objectives to maintain the quality, reliability and security of supply of prescribed transmission services, meet expected demand for prescribed transmission services over the period and to comply with all applicable regulatory obligations associated with the provision of prescribed transmission services.

B.5.2 Assessment of Capital Expenditure Criteria

SKM's assessment of the compliance of ElectraNet's revenue proposal to the capital expenditure criteria had regard to the capital expenditure factors described in clause 6A.6.7 of the NER as referred to in section 2.1.3.

ElectraNet provided the following documents in support of the Playford 132kV relocation project:

- Project Approval Report
- Forecast Capital Project Investment Needs July 2007 Report
- Transmission Network Asset Replacement Recommendation Playford A H404 132kV Substation January 2006

ElectraNet considered alternative options to address the capital expenditure objective however no viable alternatives were identified.

The scope and estimate for the project in the 2003-2008 regulatory period was $18.1M in 2001/02 dollars. The revised scope and estimate is $49.8M in 2006/07 dollars. SKM understands that the project was poorly scoped and the revised scope now represents the actual cost of the relocation of Playford. SKM has not reviewed the original scope and estimate used for the 2003-2008 regulatory period.

SKM has reviewed the scope and estimate report and is satisfied that the defined scope reasonably reflects the capital expenditure criteria.

B.5.3 Cost Benchmarking

A benchmark of capital expenditure was undertaken on the project to determine whether the estimate produced by ElectraNet represented the efficient costs that a prudent operator would incur.

ElectraNet Estimate (SAE)	$51.8M
SKM Estimate	$48.5M
Difference	$3.3M

ElectraNet's estimate for the project is 7% more than the SKM estimate.

SKM's review of the cost estimate identified an error of $3.6M related to double counting of escalation for this project, which equates to $4.2M in the overall capex program after ElectraNet has applied its risk and escalation factors. SKM considers this amount to be material in the context of this project, and hence recommends the estimated cost of $49.8 million be rejected as unreasonable. A revised cost of $45.6M is recommended per the following table.

	2008-09	2009-10	2010-11	2011-12	2012-13	Total
ElectraNet proposal	7.5	31.4	11.0	-	-	49.8
SKM adjustment	-0.6	-2.7	-0.9	-	-	4.2
SKM Recommended amount	6.8	28.7	10.0	-	-	45.6

B.5.4 Conclusion

SKM supports the need for this project and have assessed that ElectraNet has selected the most efficient option to implement the project. The revision to ElectraNet's estimate above represent the efficient costs a prudent operator would incur to undertake the project.

B.6 Project 11351 - Substation Security Fencing

Proposed Cost	Proposed commissioning	Category
$17.6M	2013	Compliance

The substation security fencing project involves the installation of palisade fencing and associated security measures at substations within ElectraNet's network.

B.6.1 Assessment of Capital Expenditure Objective

ElectraNet commissioned GHD to undertake a substation security assessment study which ElectraNet used to identify risks and security levels required at substations. This study identified a number of risks and shortcomings in the existing security arrangements, including measures to prevent entry, detect and monitor intruders.

It is SKM's experience that substation security is being enhanced by most network operators in Australia, and that the proposed solutions are in line with good industry practice. Further impetus to improve security comes from public safety obligations including a coroners finding that network operators owe a duty of care to the public to ensure access is prevented as far as is reasonable, and from the requirements of the SA Police and NEMMCO regarding security arrangements they consider acceptable.

SKM has assessed this project and considers it is required to meet the Rules capital expenditure objectives to:

- Maintain the quality, reliability and security of prescribed transmission services; and
- Maintain the reliability, safety and security of the transmission system through the supply of prescribed transmission services..

SKM is satisfied on the basis of its review of the security report and policies at ElectraNet, and its understanding of current practice used by other utilities in Australia, that the substation security fencing project is required to satisfy the capital expenditure objectives to maintain the security of the system and supply.

B.6.2 Assessment of Capital Expenditure Criteria

SKM's assessment of the compliance of ElectraNet's revenue proposal to the capital expenditure criteria had regard to the capital expenditure factors described in clause 6A.6.7 of the NER as referred to in section 2.1.3.

ElectraNet provided the following documents in support of the substation security fencing project:

- Critical Infrastructure Report (viewed during site visit only)
- Further information requested in relation to this project
- Details of the basis of its cost estimate

ElectraNet considered alternative options and designs to address the capital expenditure objective, and SKM considers an efficient scope and design have been selected.

SKM has reviewed the scope and estimate report and is satisfied that the defined scope reasonably reflects the capital expenditure criteria.

B.6.3 Cost Benchmarking

SKM has reviewed ElectraNet's cost estimates for this project, based on the actual cost of recent similar installations at other sites, and considers the costs are reasonable and efficient.

ElectraNet's proposed annual expenditure for the project is shown below. SKM has reviewed the proposed expenditure profile and assessed it as satisfactory.

- **Table 98 - ElectraNet's proposed annual expenditure**

Year	2008 / 09	2009 / 10	2010 / 11	2011 / 12	2012 / 13	Total
$M	3.3	3.7	6.3	4.3	0.0	17.6

B.6.4 Conclusion

This project is reasonable and in line with current industry practice, and meets the capital expenditure objectives and criteria. The costs estimates appear to be reasonable.

B.7 Project 10809 - Transformer Ballistics Proofing

Proposed Cost	Proposed commissioning	Category
$17.7M	2013	Compliance

The transformer ballistics proofing project involves the installation of protective devices around transformers to reduce or eliminate the risk of damage due to attacks on transformers.

B.7.1 Assessment of Capital Expenditure Objective

SKM supports the project objective[E] (refer to confidential attachment to this report) to protect critical infrastructure, and considers it is likely to meet the capital expenditure objectives once the process and structure applied to determining the requirements of the security projects and the planning with the relevant authorities has been sufficiently documented and discussed. SKM does not consider this has been adequately demonstrated at the time this project was reviewed.

B.7.2 Assessment of Capital Expenditure Criteria

SKM's assessment of the compliance of ElectraNet's revenue proposal to the capital expenditure criteria had regard to the capital expenditure factors described in clause 6A.6.7 of the NER as referred to in section 2.1.3.

ElectraNet provided the following documents in support of this project:

- Critical Infrastructure Report
- Scope and estimate report for this project
- Additional information requested

As discussed in section B.7.1, SKM considers this project will likely meet the capital expenditure criteria related to security and meeting regulatory obligations, but is not sufficiently satisfied that the threat assessment process has been adequately conducted at this time, and as ElectraNet has not been formally advised by the relevant authority (SA Police) of the relevant credible threats the regulatory need has not yet been established.

Until this assessment process has been completed, SKM considers it is not possible to determine with confidence the credible threats to be mitigated, and hence there is uncertainty regarding the necessary project scope and design.

The proposed solution is an "off the shelf" solution to a different issue (transformer noise). It may well be excessive compared to what is required to protect against credible threats, and SKM

considers a least cost solution should be engineered to meet defined events (once this is advised by the Police), rather than adopting a solution that may well be excessive.

SKM notes ElectraNet's has sought to develop a scope that is efficient given its assessment of the threats, however as SKM considers some of these threats are not credible or likely, the scope is excessive.

B.7.3 Cost Benchmarking

SKM considers the proposed scope and designs are excessive compared to the likely assessment of credible threats in this situation, based on its experience in threat and security assessments in Australia and overseas. On this basis it is likely the costs are not efficient.

B.7.4 Conclusion

SKM supports the project objective to protect critical infrastructure, however, the process and structure applied to determining the requirements of the security projects and the planning with the relevant authorities has not been sufficiently documented and discussed.

SKM recommends this project be made a contingent project, subject to an instruction from the SA police regarding the need to undertake the project, and detailing what it considers to be credible threats. Once this is done the proposed solution can be engineered around protecting against these credible threats only at least cost.

SKM recommends the following amount be transferred from the ex-ante capital amounts proposed to the contingent capital.

	2008-09	2009-10	2010-11	2011-12	2012-13	Total
Transfer from ex-ante to contingent	4.6	2.3	4.6	0.5	5.7	17.7

B.8 Project 11109/11303/11304 Torrens Island Secondary Systems and Primary Plant Replacement

Proposed Cost	Proposed commissioning	Category
$36.7M	2013	Replacement

The Torrens Island secondary systems and primary plant replacement project involves the replacement of the entire secondary system at Torrens Island substation and replacement of four 275kV circuit breakers and ten sets of 275kV CVTs.

B.8.1 Assessment of Capital Expenditure Objective

ElectraNet's revenue proposal asserts that the Torrens Island secondary systems and primary plant replacement project is required to meet the Rules capital expenditure objectives to:

- maintain the quality, reliability and security of supply of prescribed transmission services.

ElectraNet's condition assessment report H255 (Torrens Island A) of June 2006 recommends whilst the secondary equipment is generally in a reasonable condition, all remaining electromechanical relay based protection schemes, control and low voltage A.C. systems be replaced within the next five years in accordance with the current ElectraNet design standards. The condition assessment report also recommends the replacement of 275kV and 66kV gantry foundation bolts within the next six months.

ElectraNet's condition assessment report H254 (Torrens Island B) of June 2005 recommended that the Torrens Island B secondary systems, control and low voltage A.C. be replaced within the next three to five years in accordance with the current ElectraNet design standards. The condition assessment report also recommends the replacement of the 275kV Sprecher & Schuh HGF minimum oil circuit breaker over the next one to five years.

Whilst the condition assessment reports recommend the replacement of the assets that ElectraNet is proposing to replace in the 2008-2013 regulatory period, a significant number of other assets are also recommended for replacement in the same period. ElectraNet has decided not to replace all the assets recommended for replacement in the condition assessment reports. This is due to some assets already being replaced, and ElectraNet's process of risk ranking and screening replacement projects, and is considered reasonable.

SKM is generally satisfied on the basis of the condition assessment reports that the Torrens Island secondary systems and primary plant replacement project is required to satisfy the capital expenditure objectives to maintain the quality, reliability and security of supply of prescribed transmission services.

B.8.2 Assessment of Capital Expenditure Criteria

SKM's assessment of the compliance of ElectraNet's revenue proposal to the capital expenditure criteria had regard to the capital expenditure factors described in clause 6A.6.7 of the NER as referred to in section 2.1.3.

ElectraNet provided the following documents in support of the Torrens Island secondary systems and primary plant replacement project:

- Scope and Estimate Report (TIPS 66kV Section Replacement, TIPS 275kV A Section Replacement, TIPS 275kV B Section Replacement)
- Condition assessment report H254 (Torrens Island B) of June 2005
- Condition assessment report H255 (Torrens Island A) of June 2006
- H255 TIPS 66kV Substation Asset Replacement Report May 2007
- H255 TIPS A 275kV Substation Asset Replacement Report May 2007
- H254 TIPS B 275kV Substation Asset Replacement Report May 2007

ElectraNet considered alternative options to address the capital expenditure objective including do nothing and rebuilding the entire substation. Both options were not viable alternatives due to asset condition and cost respectively.

SKM notes that the decision to replace the assets is driven by the condition assessment reports prepared for ElectraNet by Transfield Services. It appears that in determining the assets that require replacement, ElectraNet has referred to the condition assessment reports and subsequently decided not to recommend the replacement of all the assets identified in the condition assessment report as requiring replacement. SKM considers this to be evidence of prudent management of costs, reflecting the risk prioritisation of aged assets in the Asset Management Plan.

ElectraNet has noted that connection assets that require replacement will be paid for by the generator in accordance with the Rules for prescribed transmission pricing.

SKM has reviewed the scope and estimate report and is satisfied that the defined scope reasonably reflects the capital expenditure criteria.

B.8.3 Cost Benchmarking

A benchmark of capital expenditure was undertaken on the project to determine whether the estimate produced by ElectraNet represented the efficient costs that a prudent operator would incur.

Torrens 66kV	ElectraNet Estimate (SAE)	$7.021M
	SKM Estimate	$6.632M
Torrens 275kV A	ElectraNet Estimate (SAE)	$12.771M
	SKM Estimate	$13.648M
Torrens 275kV B	ElectraNet Estimate (SAE)	$9.379M
	SKM Estimate	$10.517M
Total	ElectraNet Estimate (SAE)	$29.2M
	SKM Estimate	$30.8M

ElectraNet's estimate for the Torrens 66kV, 275kV A & B and projects are +6%, -6% and -4% respectively compared to the SKM estimate. Overall ElectraNet is 5% lower than SKM.

ElectraNet's proposed annual expenditure for the project is shown below. SKM has reviewed the proposed expenditure profile and assessed it as satisfactory. However, SKM has identified a discrepancy between the project SAE cost estimate ($6.6M) and the figure used in the ElectraNet capex collation spreadsheet ($9.1M) for the 66kV replacement portion. When queried, ElectraNet explained this was due to an earlier (more expensive) option that was subsequently revised being used to populate the spreadsheet in error. Accordingly SKM recommends an adjustment as shown below to correct this error. With cost escalation and risk factors added, this error amounts to $2.8M in total.

- **Table 99 - ElectraNet's proposed annual expenditure**

Year	2008 / 09	2009 / 10	2010 / 11	2011 / 12	2012 / 13	Total
66kV	0.0	0.0	1.6	6.7	2.3	10.7
275kV A	0.0	0.0	2.3	9.5	3.3	15.1
275kV B	0.0	0.0	1.6	6.9	2.4	10.9
Total	**0.0**	**0.0**	**5.5**	**23.1**	**8.0**	**36.7**
Adjustment for cost transposing error	-	-	-0.4	-1.8	-0.6	-2.8
SKM revised total	**0.0**	**0.0**	**5.1**	**21.3**	**7.4**	**33.9**

B.8.4 Conclusion

SKM supports the need for this project and have assessed that ElectraNet has selected the most efficient option to implement the project. ElectraNet's estimate appears to represent the efficient costs a prudent operator would incur to undertake the project.

B.9 Project 10503 - Waterloo Substation Rebuild

Proposed Cost	Proposed commissioning	Category
$24.1M	2013	Connection / Replacement

The Waterloo substation rebuild project involves the total rebuild of the Waterloo substation originally constructed in 1953. This project is driven by a change in the categorisation of the Waterloo connection points to Category 4 under the ETC, requiring an increase from "N" to "N-1" supply security. The transformers and regulators are also considered by ElectraNet to be reaching the end of their life and require replacement.

The new Clare substation being established will relieve the load at Waterloo in the short term, however ElectraNet consider that given the age of the transformers at Waterloo they should be rated at nameplate rating only, and by 2013 the firm capacity of the substation will be exceeded by growing demand. ElectraNet proposes to rebuild the substation, replacing the two 10MVA transformers with two 25 MVA transformers to meet the new ETC requirements.

B.9.1 Assessment of Capital Expenditure Objective

ElectraNet's revenue proposal asserts that the Waterloo substation rebuild (replacement component) project is required to meet the Rules capital expenditure objectives to:

- maintain the quality, reliability and security of supply of prescribed transmission services.

ElectraNet's revenue proposal asserts that the Waterloo substation rebuild (connection component) project is required to meet the Rules capital expenditure objectives to:

- meet the expected demand for prescribed transmission services over the period; and
- comply with all applicable regulatory obligations associated with the provision of prescribed transmission services.

ElectraNet's condition assessment report T378 indicates that Waterloo substation requires total replacement due to the condition of the assets. In addition, the Waterloo connection point categorisation changes from category 1 to category 4 when the new ETC comes into effect on 1st July 2008. Category 4 connection points require N-1 equivalent line and transformer capacity to 100% agreed maximum demand.

The demand forecast provided by ElectraNet shows a maximum of 29.5 MVA up to 2009/10, dropping to 11.2 MVA, 11.6 MVA and 11.9 MVA for 2010/11, 2011/12 and 2012/13 respectively. The reduction is due to the offloading of Waterloo as a result of the proposed new Clare substation which is included in ElectraNet's forecast capex for the 2008-2013 regulatory period. The two existing transformers at Waterloo have a nameplate rating of 10 MVA. A theoretical emergency

cyclic rating of 14.6 MVA has been applied. Due to the condition of the transformers, ElectraNet has determined that the transformers be derated to their name plate rating. As such, they will not be able to provide N-1 capacity. SKM has reviewed the condition assessment report specifically prepared for the Waterloo transformers and are generally satisfied with the findings that based on the poor condition of the transformers, they will need to be replaced.

SKM is generally satisfied on the basis of the condition assessment reports, the demand forecast and the ETC requirements that the Waterloo substation rebuild project is required to satisfy the capital expenditure objectives to maintain the quality, reliability and security of supply of prescribed transmission services, meet the expected demand for prescribed transmission services over the period and comply with all applicable regulatory obligations associated with the provision of prescribed transmission services.

B.9.2 Assessment of Capital Expenditure Criteria

SKM's assessment of the compliance of ElectraNet's revenue proposal to the capital expenditure criteria had regard to the capital expenditure factors described in clause 6A.6.7 of the NER as referred to in section 2.1.3.

ElectraNet provided the following documents in support of the Waterloo substation rebuild project:

- Scope and Estimate Report
- Forecast Capital Project Investment Needs Report July 2007
- Condition assessment report T378 of June 2006
- Transmission Network Asset Replacement Recommendation Waterloo T378 April 2007
- Report A070502 Condition Assessment on Transformers and Regulators at Waterloo Substation based on Oil Test Results June 2007

ElectraNet considered alternative options to address the capital expenditure objective including do nothing, permanent or rapid automatic distribution load shift, demand side management, load side power factor improvement, generation and alternative transmission. All options were not viable alternatives due to the asset condition and cost.

ElectraNet has advised that there are no 33kV options that would relieve the Waterloo transformers at a lower cost.

Two transformer options were considered, 2 x 60 MVA and 2 x 25 MVA. Appendix G of ElectraNet's revenue proposal states that the 2 x 25 MVA transformer option was selected.

SKM has a number of concerns with this project:

- The 2x 10MVA (nameplate) transformers at Waterloo are currently given a cyclical rating of 14MVA, which is just sufficient to meet the 25MVA load at Waterloo (on an "N" basis).

- The Clare Nth substation project will significantly offload Waterloo, reducing demand to around 12MVA. At the same time, ETC changes require Waterloo to be upgraded to N-1 security. ElectraNet content that due to the condition of the transformers, they should be returned to 10MVA nameplate rating, and hence will be insufficient to meet the remaining load.
- SKM considers that if the transformers are currently able to supply 14 MVA each (on an N basis, ie they will both be loaded to this level on peak days), it may be feasible to retain a similar emergency rating on an N-1 basis. Each transformer would normally only "see" around 6MVA (12 / 2), and would only be loaded beyond 10MVA in the event of an outage coincident with peak demand.
- ESIPC have indicated it believes there may be 33kV solutions that could further relieve the load at Waterloo (note ESIPC submission). ETSA Utilities have indicated they require the 33kV supply point in the future, and do not consider 33kV upgrade options to be the best solution.
- Some uncertainty regarding timing / need for replacement. May be possible to at least defer for a few years, subject to condition of equipment at Waterloo. It is likely a replacement will ultimately be required, hence the issue it timing rather than the absolute need.

Based on an indication from ETSA Utilities that it requires this substation to be retained as a connection point, SKM considers the replacement is required during the 2008/09 – 2012/13 regulatory period due to the poor condition of the transformers. While the transformer nameplate rating issue may enable the replacement to be deferred for a short time, SKM accepts the transformers are old and in poor condition, and will need to be replaced. The detailed planning and regulatory test phase will be important, to ensure that all options, including ETSA Utilities 33kV options, are fully considered. On balance the inclusion of this project in the forecast is not unreasonable.

SKM has reviewed the scope and estimate report and is satisfied that the defined scope reasonably reflects the capital expenditure criteria.

B.9.3 Cost Benchmarking

A benchmark of capital expenditure was undertaken on the project to determine whether the estimate produced by ElectraNet represented the efficient costs that a prudent operator would incur.

ElectraNet Estimate (SAE)	$19.789M
SKM Estimate	$21.663M
Difference	$1.874M

ElectraNet's proposed annual expenditure for the project is shown below. SKM has reviewed the proposed expenditure profile and assessed it as satisfactory.

- **Table 100 - ElectraNet's proposed annual expenditure**

Year	2008 / 09	2009 / 10	2010 / 11	2011 / 12	2012 / 13	Total
Replacement	0.0	0.0	2.6	10.9	3.8	17.3
Connection	0.0	0.0	1.0	4.2	1.5	6.7

B.9.4 Conclusion

SKM supports the need for this project and have assessed that ElectraNet has selected the most efficient option to implement the project. ElectraNet's estimate appears to represent the efficient costs a prudent operator would incur to undertake the project.

B.10 Project 11320 - Weather Stations

Proposed Cost	Proposed commissioning	Category
$4.1M	2013	Augmentation

The weather stations project involves the installation of weather stations at strategic locations across ElectraNet's network to allow the real-time thermal rating of transmission lines.

B.10.1 Assessment of Capital Expenditure Objective

ElectraNet's revenue proposal asserts that the weather stations project is required to meet the Rules capital expenditure objectives to:

- meet the expected demand for prescribed transmission services over the period; and
- maintain the quality, reliability and security of supply of prescribed transmission services.

SKM is generally satisfied on the basis of demand forecasts and line ratings that the weather stations project is required to satisfy the capital expenditure objectives to maintain the quality, reliability and security of supply of prescribed transmission services, meet the expected demand for prescribed transmission services over the period and comply with all applicable regulatory obligations associated with the provision of prescribed transmission services.

B.10.2 Assessment of Capital Expenditure Criteria

SKM's assessment of the compliance of ElectraNet's revenue proposal to the capital expenditure criteria had regard to the capital expenditure factors described in clause 6A.6.7 of the NER as referred to in section 2.1.3.

ElectraNet provided the following documents in support of the weather stations project:

- Future Weather Station Requirements Report July 2007

Justification – the economic benefits calculated in ElectraNet's Tailem Bend – Keith – Snuggery consultation appear to demonstrate a substantial market benefit, approximately 10 times the cost of the real-time rating project. On this basis, it is likely at least some of the proposed projects will be able to pass a market benefits test.

SKM has a number of concerns with this project:

- Costs – we have previously valued weather stations at $60k each, while ElectraNet proposes costs of $50k at substations and $300k along lines. Consideration should be given to mounting weather stations on towers rather than remotely. We are satisfied it is not possible to share BOM data, though windfarm data should be suitable, and could be extrapolated for a considerable distance from the windfarms.

- Probability – all projects are included at effectively 100%, including those related to future windfarms not yet constructed.

The alternatives considered by ElectraNet to address the capital expenditure objective were to do nothing and therefore continue to and potentially constrain the transmission network or construct additional transmission line infrastructure. ElectraNet selected the weather station option on the basis that is has the lowest PV costs of the options considered capable of addressing the limitation.

B.10.3 Cost Benchmarking

A benchmark of capital expenditure was undertaken on the project to determine whether the estimate produced by ElectraNet represented the efficient costs that a prudent operator would incur.

Costs for remote weather stations appear high and are considered unreasonable. Given new equipment and communications, remote power supplies, and the practice of other TNSPs to mount remote stations on the towers, we consider the cost of individual weather stations can be reduced from $300k to $150k. Based on these revised costs SKM has estimated the total project cost to be $2.2M.

B.10.4 Conclusion

SKM considers this project to be justified, but does not consider the proposed costs to be reasonable on the basis that the scope is not efficient leading to higher costs than is necessary. SKM recommends the budget be reduced from $4.1M to $2.2M, and that ElectraNet's proposed capital program be adjusted as follows:

	2008-09	2009-10	2010-11	2011-12	2012-13	Total
ElectraNet proposal	0.82	0.82	0.82	0.82	0.82	4.12
SKM recommended capex	0.44	0.44	0.44	0.44	0.44	2.20
Adjustment	-0.38	-0.38	-0.38	-0.38	-0.38	-1.92

B.11 Project 10509 - Whyalla Terminal Rebuild

Proposed Cost	Proposed commissioning	Category
$48.9M	2010	Connection / Replacement

The Whyalla terminal rebuild project involves the total rebuild of the Whyalla terminal and the rearrangement of lines between Whyalla and Cultana.

B.11.1 Assessment of Capital Expenditure Objective

ElectraNet's revenue proposal asserts that the Whyalla terminal rebuild (replacement component) project is required to meet the Rules capital expenditure objectives to:

- maintain the quality, reliability and security of supply of prescribed transmission services.

ElectraNet's revenue proposal asserts that the Whyalla terminal rebuild (connection component) project is required to meet the Rules capital expenditure objectives to:

- comply with all applicable regulatory obligations associated with the provision of prescribed transmission services.

ElectraNet's condition assessment report T134 indicates that the Whyalla terminal substation requires very significant improvements for many components in the short and medium terms. The Whyalla connection point categorisation changes from category 3 to category 4 when the new ETC comes into effect on 1st July 2008. Category 4 connection points require N-1 equivalent line and transformer capacity to 100% agreed maximum demand.

The demand forecast provided by ElectraNet shows a maximum of 96.6 MVA up to 2009/10, increasing by approximately 0.5 MVA per year thereafter. The two existing transformers at Whyalla have a nameplate rating of 50 MVA. A theoretical emergency cyclic rating of 66.5 MVA has been applied.

SKM is generally satisfied on the basis of the condition assessment reports, the demand forecast and the ETC requirements that the Whyalla substation rebuild project is required to satisfy the capital expenditure objectives to maintain the quality, reliability and security of supply of prescribed transmission services and comply with all applicable regulatory obligations associated with the provision of prescribed transmission services.

B.11.2 Assessment of Capital Expenditure Criteria

SKM's assessment of the compliance of ElectraNet's revenue proposal to the capital expenditure criteria had regard to the capital expenditure factors described in clause 6A.6.7 of the NER.

ElectraNet provided the following documents in support of the Waterloo substation rebuild project:

- Scope and Estimate Report
- Forecast Capital Project Investment Needs Report July 2007
- Condition assessment report T134 of June 2006
- Transmission Network Asset Replacement Recommendation Whyalla 132kV Terminal Substation T134 June 2007

ElectraNet considered alternative options to address the capital expenditure objective including do nothing, permanent or rapid automatic distribution load shift, demand side management, load side power factor improvement, generation and alternative transmission. All options were not viable alternatives due to the asset condition and cost.

SKM has reviewed the scope and estimate report and is satisfied that the defined scope reasonably reflects the capital expenditure criteria. SKM's review of ElectraNet's cost estimate is detailed in section B.1.3.

B.11.3 Cost Benchmarking

A benchmark of capital expenditure was undertaken on the project to determine whether the estimate produced by ElectraNet represented the efficient costs that a prudent operator would incur.

ElectraNet Estimate (SAE)	$42.567M
SKM Estimate	$41.927M

ElectraNet's proposed annual expenditure for the project is shown below. SKM has reviewed the proposed expenditure profile and assessed it as satisfactory.

- **Table 101 - ElectraNet's proposed annual expenditure**

Year	2008 / 09	2009 / 10	2010 / 11	2011 / 12	2012 / 13	Total
Replacement	27.0	14.6	0.0	0.0	0.0	41.6
Connection	4.7	2.6	0.0	0.0	0.0	7.3

B.11.4 Conclusion

SKM supports the need for this project and have assessed that ElectraNet has selected the most efficient option to implement the project. ElectraNet's estimate appears to represent the efficient costs a prudent operator would incur to undertake the project.

B.12 Project 11022 – Enterprise system (SAP) upgrades and support

Proposed Cost	Proposed commissioning	Category
$4.3M	2010	Non-network (IT)

ElectraNet propose to upgrade their existing SAP software to the current supported release and various support and reporting tools.

B.12.1 Assessment of Capital Expenditure Prudency

ElectraNet advise that they currently have SAP 4.6c, which was released in Australia in 2001 and installed at ElectraNet in 2003. ElectraNet have a number of SAP modules installed, and it is integral to a number of operational and capital planning processes including asset strategy and performance, maintenance planning and tracking, project management, procurement, and a number of corporate and finance functions. ElectraNet have invested significant capital and training in SAP systems, and it is not considered practical or cost effective to change to a different platform.

SAP has advised ElectraNet that Version 4.6c is no longer covered by "mainstream support", and only limited "extended maintenance" support is available. From December 2009 this support will be withdrawn and ElectraNet's SAP installation will no longer be supported by the vendor.

On the evidence provided by ElectraNet SKM considers this project to be prudent and in line with the practices of an efficient TNSP.

B.12.2 Cost Benchmarking

ElectraNet has estimated the project costs based on a workshop to identify needs, conducted by a SAP service provider who provided cost estimates.

B.12.3 Conclusion

SKM considers this project to be prudent and efficient, and that the costs are reasonable.

Appendix C Performance Parameters Definitions

Parameter 1	**Transmission circuit availability**
This definition applies instead of the standard definition	
Sub-parameters	Transmission Circuit Availability Critical Circuit Availability Peak Critical Circuit Availability Non Peak
Unit of measure	Percentage of total possible hours available
Source of data	To be established in transmission determination (including definitions of critical circuits and plant, peak, and non-peak periods)
Definition/formula	Formula: $\frac{1 - \Sigma \text{ (number of interrupted circuit hours)}}{\text{total possible circuit hours available}}$ where: Number of interrupted circuit hours means in relation to each circuit, the number of hours during each reporting period in which that circuit was unavailable to provide transmission services. Total possible circuit hours available is the number of circuits multiplied by 8760 hours.
Inclusions	Circuits include regulated overhead lines and underground cables (each with a designated ElectraNet transmission segment identification number). Transformers, reactive plant and other primary plant are excluded from the performance parameter. Subject to the exclusions specified below, outages on all parts of the regulated transmission system from all causes including planned, forced and fault events.
Exclusions	Unregulated transmission assets. Any outages shown to be caused by a '3rd party system' eg intertrip signals, generator outage, customer installation, customer request or *NEMMCO* direction. Outages to control voltages within required limits, both as directed by *NEMMCO* and where *NEMMCO* does not have direct oversight of the network (in both cases only where the element is available for immediate energisation if required). The opening of only one end of a transmission line where the transmission line remains energised and available to carry power. The number of interrupted hours related to a single transmission line redevelopment project or substation redevelopment project is capped at 336 hours (14 days). *Force majeure events*

Parameter 2	Loss of supply event frequency
This definition applies instead of the standard definition	
Sub-parameters	Frequency of events where loss of supply exceeds x system minutes Frequency of events where loss of supply exceeds y system minutes
Unit of measure	Number of events per annum
Source of data	To be established in *transmission determination*
Definition/formula	Number of events greater than x system minutes per annum Number of events greater than y system minutes per annum The magnitude of x and y are to be established in the *transmission determination* For the avoidance of doubt, y will be greater than x. System minutes are calculated for each supply interruption by the "Load Integration Method" using the following formula: $\frac{\Sigma \text{ (MWh unsupplied x 60)}}{\text{MW peak demand}}$ where: MWh unsupplied is the energy not supplied as determined by using NEM metering and substation load data. This data is used to estimate the profile of the load over the period of the interruption by reference to historical load data. Period of the interruption starts when a loss of supply occurs and ends when ElectraNet offers supply restoration to the customer. MW peak demand means the maximum amount of aggregated electricity demand recorded at entry points to the ElectraNet transmission network and interconnector connection points during the financial year in which the event occurs or at any time previously. The performance parameter applies to exit points only. An interruption >Y system minute(s) also registers as a >X system minute(s) event. Interruptions affecting multiple connection points at exactly the same time are aggregated (i.e. system minutes are calculated on the basis of events rather than connection point interruptions).
Inclusions	Subject to the exclusions specified below, all unplanned customer outages on all parts of the regulated transmission system.

	Forced outages where notification to affected customers is less than 24 hours (except where *NEMMCO* reschedules the outage after notification has been provided).
Exclusions	Successful reclose events (less than 1 minute duration). Unregulated transmission assets. Any outages shown to be caused by a '3rd party system' eg intertrip signals, generator outage, customer installation, customer request or *NEMMCO* direction. Planned outages. For supply outages resulting from an interconnector outage, the Period of the Interruption is capped at half an hour. This is done to include the impact of automatic under-frequency load shedding, but to exclude the impact of any market failure to respond and restore load within required timeframes (i.e. excluding factors outside of ElectraNet's control). Pumping station supply interruptions. These interruptions were excluded from historical data used for target setting due to the highly irregular nature of these loads, which makes accurate estimation of load profiles unreliable. *Force majeure events*. Where ElectraNet protection operates incorrectly ahead of 3rd party protection, the portion of customer load that would have been lost had ElectraNet protection not operated is removed from the total lost load. Where ElectraNet protection operates correctly due to a fault on a 3rd party system no lost load is recorded.

Parameter 3	**Average outage duration**
This definition applies instead of the standard definition	
Unit of Measure	Minutes
Source of Data	ElectraNet
Definition/Formula	$\frac{\text{Aggregate minutes duration of all unplanned outages}}{\text{Number of connection point events}}$ The cumulative summation of the outage duration time for the period, divided by the number of connection point outage events during the period. where: Outage duration time for a connection point starts when a loss of supply occurs and ends when ElectraNet offers supply restoration to the customer. The performance parameter applies to exit points only. Outage duration extends to the point at which supply restoration is offered to the customer.
Inclusions	Subject to the exclusions specified below, customers supply outages on all parts of the regulated transmission system. Forced outages where notification to affected customers is less than 24 hours (except where *NEMMCO* reschedules the outage after notification has been provided).
Exclusions	Successful reclose events (less than 1 minute duration). Unregulated transmission assets. Any outages shown to be caused by a '3rd party system' eg intertrip signals, generator outage, customer installation, customer request or *NEMMCO* direction. Planned outages. For supply outages resulting from an interconnector outage, the duration is capped at half an hour. This is done to include the impact of automatic under-frequency load shedding, but to exclude the impact of any market failure to respond and restore load within required timeframes (i.e. excluding factors outside of ElectraNet's control). *Force majeure events*. Where ElectraNet protection operates correctly due to a fault on a 3rd party system no outage duration is recorded.

Appendix D Terms of Reference

Capital governance framework

1. The consultant is required to review whether or not the capital governance framework of ElectraNet allows for the consideration of all relevant issues related to investment projects, and whether the information is effectively coordinated across the organisation. The consultant will need to assess whether the capital governance framework provides confidence that both the historical and future capex programs for ElectraNet are based soundly and are in accordance with its capex strategies, policies and procedures.

2. The consultant will need to:

    a) review the capital governance framework, including capex strategies, policies and procedures in place

    b) review the demand forecasts, methodology and information flow which feed into ElectraNet's capex program.

3. The review should include an assessment of:

    a) long term network development strategies

    b) policies and procedures for:

        i. identifying network constraints, replacement of assets and non-network needs

        ii. developing investment proposals once a need is established

        iii. analysing alternative investment options and identifying the most cost effective option

        iv. ensuring that investment projects take place on a timely basis, with minimum network disruption and at least cost.

    c) the integration and consistency of policies and procedures across investment categories.

4. The assessment of whether the capital governance framework and capex strategies, policies and procedures are applied in practice should be informed by the consultant's detailed reviews of a sample of investment projects for ElectraNet discussed in the past and forecast capex sections of this document.

Past capex

5. The consultant is required to assess the prudence of the capex undertaken by ElectraNet during 2003 to 2007–08 (the current regulatory period). ElectraNet's current revenue cap was

determined in accordance with the ACCC's 1999 *Draft statement of principles for the regulation of transmission revenues* (DRP). The regulatory arrangements provided for an ex post assessment of capex undertaken by a transmission network service provider (TNSP) to determine if these expenditures were prudent. The DRP outlines the test for prudent investment as '…the amount that would be invested by a prudent TNSP acting efficiently in accordance with good industry practice'. The AER understands that ElectraNet's past capex program includes around 60 projects.

6. Further guidance on the process for reviewing past capex is contained in the 2004 *Statement of principles for the regulation of electricity transmission revenues* (SRP) and the AER's 2006 Powerlink revenue cap draft decision. Appendix B of the SRP sets out the prudency test for revenue caps operating under the DRP. The prudency test involves a systematic examination of the critical decisions made when selecting and delivering investments. The purpose of the examination is to establish whether the TNSP made decisions at each stage of the investment process consistent with good industry practice. The examination consists of three consequential stages:

    a) assess whether there is a justifiable need for the investment

    b) assuming the need for an investment is recognised, assess whether ElectraNet proposed the most efficient investment to meet that need

    c) assess whether the project that was judged to be the most efficient was developed, and if not, whether the difference reflects decisions that are consistent with good industry practice.

7. The prudency test is to be applied to projects regardless of whether they have or have not been assessed under the regulatory test.[53] In consultation with the consultant, the AER will choose a suite of network and non-network (including augmentations, replacements, IT and support the business) projects that the consultant must review in detail and apply the prudency test.

8. The consultant is also required to apply the prudency test to a sample of work-in-progress projects. These are projects which involve assets under construction in the current regulatory period but will not be commissioned until the next regulatory period. The regulatory tests, business cases and any other supporting documentation associated with these projects should enable the consultant to complete steps a) and b) of the prudency test as outlined in paragraph 14 of this document, and make an assessment as to whether the investment was the most efficient to meet the need as identified by the TNSP.

9. In undertaking the ex post prudency assessment of projects, and having regard to the information/analysis available to ElectraNet at the time it made the decisions to invest, the consultant's task is to assess and comment on whether a prudent TNSP would have made the same decisions. If the consultant determines that different decisions would have been made by a prudent TNSP than those which were actually made by ElectraNet, then the consultant is

[53] The regulatory test is an economic cost-benefit test used by transmission and distribution businesses in the NEM to assess the efficiency of network augmentations.

required to provide the AER with the quantified prudent level, and justification for this variance.

10. The consultant is also required to review:

    a) the investment processes and procedures adopted by ElectraNet for past capex and consider whether they have ensured only prudent capex was undertaken;

    b) any capex efficiency savings claimed by ElectraNet and provide a recommendation on its reasonableness. This may include a review of individual projects; and

    c) the reasonableness of finance during construction costs applied to past capex.

Forecast capex

11. The consultant will review ElectraNet's proposed forecast capex over the next regulatory period to ensure that it is in accordance with the requirements established under clause 6A.6.7 of the NER.

12. ElectraNet has advised that it will adopt a probabilistic approach to determine its forecast capex requirement as a result of the uncertainties involved in forecasting future customer demand and generation developments. It will develop a number of theme sets representing possible variations in the key drivers for the development of ElectraNet's network over the next regulatory period. The outcome of this forecasting approach is a probability weighted average capex requirement for each year of the regulatory period.

13. The consultant is required to assess the adequacy and appropriateness of ElectraNet's probabilistic forecasting approach by:

    a) determining the reasonableness of the assumptions and inputs used for the theme sets (for example, economic growth expectations, load growth forecasts, generation scenarios and expected customer connections)

    b) assessing the resulting scenarios and their probabilities to determine if they are reasonable and appropriate

    c) undertaking a review of the transmission plans resulting from probabilistic scenarios to determine whether they are reasonable and appropriate.

14. The consultant must critically analyse and comment on the adequacy of ElectraNet's capex program taking into account:

    a) the existing network capacity;

    b) asset utilisation;

    c) asset lives;

d) asset conditions;

e) demand growth;

f) trade-offs between capex and opex;

g) information on historical and forecast capex trends; and

h) any other internal or external factors that may be relevant.

15. The consultant should also determine whether the capex program is deliverable for the regulatory period.

16. Included in the review of the capex program will be the proposed non-network capex. The consultant is also required to undertake a detailed review of a suite of network and non-network projects (including augmentations, replacements, IT and support the business) chosen by the AER in consultation with the consultant. This review will include a critical evaluation of whether or not:

    a) ElectraNet has adequately assessed the need for the project in accordance with its regulatory and statutory obligations

    b) there is a need for the project

    c) ElectraNet has considered the complete range of investment alternatives, their feasibility, costs and timing

    d) the proposed costs are reasonable

    e) the timing of the project is reasonable

    f) the project aligns with ElectraNet's strategic plans, governance arrangements, and capex policies and procedures

    g) the information provided by ElectraNet is accurate

    h) the value and timing at which the project should be included in the ex ante cap are appropriate.

17. The consultant will need to analyse information prepared by ElectraNet, such as business cases including decision making documentation, and planning studies.

18. In making its recommendation on the capex program, the consultant must take into consideration the review of the capital governance framework discussed in paragraphs 9 to 12 of this document.

19. In the event the consultant disagrees with any element of a project proposed by ElectraNet, the consultant is required to outline why the proposal is not in accordance with the

NER, and provide the AER with an alternative proposal that satisfies the relevant criteria in the NER, outlining an alternative cost and timing for that project.

20. If the consultant considers that the capex program should be altered, the consultant is required to provide the AER with the quantified efficient capex level, and justification for this variance.

Contingent projects

21. The consultant is required to examine any contingent projects proposed by ElectraNet and assess them in accordance with clause 6A.8.1 of the NER. The consultant is to assess whether each contingent project is reasonably required to be undertaken during the regulatory period in order to achieve any of the 'capital expenditure objectives' as outlined at clause 6A.6.7 of the NER.

22. The consultant is also required to assess:

    a) whether the contingent project should be included in the ex ante cap and, if so, determine the efficient cost and timing given ElectraNet's use of a probabilistic model for forecasting capex

    b) whether the proposed trigger events are appropriate and, if not, what the trigger events should be

    c) whether there are investments in the ex ante cap that would be more appropriately classified as contingent projects and recommend appropriate trigger events for these projects; and

    d) the likelihood of the proposed contingent project commencing in the next regulatory period.

23. In the event the consultant disagrees with any element of a contingent project proposed by ElectraNet, the consultant is required to outline why the proposal does not accord with the NER.

Forecast opex

24. The consultant is required to review ElectraNet's proposed opex program that it considers is reasonably required to meet its obligations set out under clause 6A.6.6 of the NER. The consultant's review will analyse and comment on the following matters in relation to the contribution of opex forecasts to ElectraNet's delivery of prescribed transmission services:

    a) the efficiency of ElectraNet's forecast opex for each year of the next regulatory period and whether there exists any scope for efficiencies

    b) the appropriateness of ElectraNet's allocation of opex costs to specific activities, including the distinctions between regulated and non-regulated activities; routine maintenance and refurbishments/renewals; and the treatment of joint and common costs such as corporate administration expenses, financing charges and depreciation

c) the effectiveness of ElectraNet's operating practices and procedures and asset management system in ensuring only necessary and efficient opex occurs

d) the key internal and external factors that may affect the level of efficient opex required by ElectraNet over the next regulatory period

e) the appropriateness of ElectraNet's methodology to forecast its opex requirements

f) the appropriateness of any trade-off between capex and opex.

25. This review will require an assessment of ElectraNet's past opex, including giving consideration to its historical actual opex. The purpose of this is to identify any long term trends in opex as well as determining an efficient starting opex for the next regulatory period. As part of the analysis, the consultant is required to:

    a) analyse and explain any variations between forecast and actual opex for the current regulatory period

    b) identify any trends (by category and in total) and explanations as to possible drivers of the trends

    c) provide its view on an efficient opex level at the start of the next regulatory period.

26. When reviewing ElectraNet's forecast opex, the consultant is required to:

    a) explain reasons for, and the reasonableness of, any difference between historical opex levels and the forecast level of opex at the start of the next regulatory period;

    b) identify and analyse any trends (by category and in total) and explanations as to possible drivers of the trends in the forecast opex proposal

    c) compare past opex information to forecast opex proposal

    d) recommend an efficient opex allowance (by category and in total), including whether an efficiency target should apply.

27. The consultant should assess its recommendation against current available indicators and benchmarks.

28. The consultant may be required to review ElectraNet's proposed grid support allowance and comment on whether it is reasonable. The consultant will need to ensure that there is no overlap between this allowance and the forecast capex program.

29. If the consultant considers that any of ElectraNet's proposed opex is not efficient, the consultant is required to provide the AER with the quantified efficient opex level, and justification for this variance.

Service standards

30. The consultant must recommend appropriate performance targets, caps and collars to be applied to ElectraNet over the upcoming regulatory period.

31. The AER's *Service target performance incentive scheme* contains the framework which the AER applies service standards incentives to its revenue cap decisions. The consultant must assess the service target performance incentive scheme values proposed by ElectraNet against both the principles outlined in the AER's *Service target performance incentive scheme* and clause 6A.7.4 of the NER.

32. The consultant will also review the recording and reporting systems and processes used by ElectraNet to record service standards performance. When conducting this review, the consultant will assess ElectraNet's systems and procedures with the aim of identifying:

    a) the accuracy and reliability of the performance data

    b) the appropriateness of the recording processes in terms of collecting service standards performance data

    c) any systemic weakness in these processes or systems.

33. In order to determine ElectraNet's future performance targets, the consultant must have regard to its past performance, as outlined in the service target performance incentive scheme, as well as the impact that the capex and opex programs allowed for in the revenue cap may have on its performance.

Timing and outcomes

34. ElectraNet will submit its revenue cap proposal and negotiating framework by 1 June 2007. The AER must release its draft decision no later than 30 November 2007.

35. In accordance with the timeline set out in paragraph 7, the consultant will be required to meet the following deadlines:

    a) preliminary meetings with the AER and ElectraNet during June and July 2007, including public consultations

    b) provide draft written reports on its findings, accompanied by a presentation to the AER, by 31 August 2007

    c) provide final written reports on its findings, accompanied by a presentation to the AER, by 30 September 2007.

36. The consultant's final report will be published in conjunction with the AER's draft decision. The consultant must make itself available for follow-up questions from the AER as well as responding to any issues raised in submissions.

37. The consultant's final report must be of a publishable quality.

38. The consultant must be available for a public forum relating to the AER's draft decision which will be held in South Australia.

Consultation process

39. During the course of the reviews, the consultant is expected to liaise extensively with ElectraNet. These consultations will include:

    a) meetings with ElectraNet at its South Australian offices

    b) meetings with the Electricity Supply Industry Planning Council at its South Australian offices

    c) possible written requests for additional information and documentation

    d) presentations on key findings and conclusions.

40. The consultant will also be required to liaise extensively with AER staff and provide regular updates on:

    a) progress towards achieving deliverables

    b) any impediments that have arisen to achieving those deliverables

    c) significant issues that have been identified.

Key background material

41. In undertaking these reviews, the consultant must have regard to the following documents including:

    a) NER (in particular, chapter 6A)

    b) the previous 2003 to 2007–08 revenue cap decision for ElectraNet[54] and associated consultants reports

    c) DRP

    d) SRP

    e) relevant AER guidelines

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[54] ACCC, *South Australian Transmission Network Revenue Cap 2003–2007/08: Decision*, 11 December 2002.

f) the revenue cap decisions for EnergyAustralia[55] and TransGrid[56] and Powerlink[57] and associated consultants reports

g) South Australian transmission licenses.

[55] ACCC, *NSW and ACT transmission network revenue cap EnergyAustralia 2004-05 to 2008-09: Decision*, 27 April 2005.

[56] ACCC, *NSW and ACT transmission network revenue cap TransGrid 2004-05 to 2008-09: Decision*, 27 April 2005.

[57] AER, *Powerlink Queensland transmission network revenue cap 2007–08 to 2011–12: Draft Decision*, 8 December 2006.