ESSENTIAL SERVICES COMMISSION

Level 2, 35 Spring St
Melbourne 3000, Australia
Telephone +61 3 9651 0222
+61 1300 664 969
Facsimile +61 3 9651 3688

FINAL DECISION

CBD SECURITY OF SUPPLY

FEBRUARY 2008

An appropriate citation for this paper is:

Essential Services Commission of Victoria 2008, *Final Decision CBD Security of Supply*, February

CONTENTS

EXECUTIVE SUMMARY

This final decision is about amending the Electricity Distribution Code (the Code) to impose an obligation on CitiPower to deliver an increased network security of supply to the Melbourne CBD. The Code amendments will entitle CitiPower to access the pass through provisions of the Electricity Distribution Price Review 2006-10 (EDPR 2006) to recover the costs of the project from its customers. In this paper, the Commission also expresses its preliminary views about issues that will be assessed in the pass through, when an application is received from CitiPower.

In the EDPR 2006, CitiPower proposed to upgrade the level of security in the Melbourne CBD area from N-1 to N-1 Secure. The improvement in security would enable the CBD to withstand a second contingency event without sustained interruptions within 30 minutes of a first event occurring.

The Commission did not allow the expenditure for the proposed works to be included in CitiPower's revenue requirement in the EDPR because of the large size of the proposed expenditure and concerns about whether the works would be undertaken as proposed. The Commission decided that the project could only proceed if CitiPower undertook the project subject to a change to the Electricity Distribution Code (the Code). Anticipating that a change to the Code might be made, a pass through provision was made in the EDPR specifically to provide for the CBD security of supply project. The Code change would be the trigger for CitiPower to apply to exercise the pass through provisions in the EDPR, to recover the costs of the project from its customers.

CitiPower subsequently submitted a revised application in September 2006, seeking the Commission's assessment for improved CBD security from N-1 to N-1 Secure on the 66kV subtransmission network. In its submission, CitiPower laid out two options for the upgrade to CBD security:

- re-development of an existing zone substation on the CBD's northern fringe to establish a new 220/66kV Terminal Station or
- additional transformation capacity at the existing Brunswick Terminal Station.

CitiPower's preferred option was to upgrade the Brunswick Terminal Station, which was supported by their advisor, Sinclair Knight Merz (SKM), as providing the best net benefits and efficiencies. CitiPower engaged NERA Economic Consulting, to assess both network options against the Australian Energy Regulator's (AER's) regulatory test. The outcome reaffirmed the SKM advice, that the upgrade to the Brunswick Terminal Station was the most cost effective means to deliver the proposed increase in security of supply to CBD customers and that the benefits to customers outweighed the costs of sustained widespread outages in the CBD.

The Commission's issues paper initiated the process of determining whether the Code should be changed and a pass through agreed, seeking comments from stakeholders on whether:

- there would be merit in changing the Code to oblige CitiPower to deliver a higher level of security to the CBD
- CitiPower's proposed works would deliver an N-1 Secure level of security and
- the proposed costs of the increased security should be met by CBD customers only or by all customers on CitiPower's network.

The Commission's own independent advisor Maunsell Australia (Maunsell), considered the project and concluded that CitiPower's proposal would be capable of delivering an N-1 Secure level of security to a majority of customers. However, Maunsell considered that under certain scenarios some CBD customers might not receive the required level of security. They recommended that, if some additional works were undertaken on the 11kV distribution network, CitiPower's proposal would ensure that CBD customers would receive an N-1 Secure level of security.

The Commission's draft decision supported the amendments to the Code to allow the project to proceed and in so doing anticipated an application from CitiPower to pass through the costs of the project to consumers in the CBD. The consultation on the draft decision raised no substantial issues affecting the decision on whether the Code should be changed. The discussion on the issues raised in the draft decision foreshadowed the matters that would be considered by the Commission when assessing the pass through application; for example, whether the costs should be recovered from CBD customers alone and the list of proposed works to be undertaken.

Having regard to the evidence provided in the consultation on both the issues paper and the draft report and from its own independent advice, the Commission has reached a final decision that the project would be able to deliver the required level of enhanced security to the CBD and that, as a consequence, it should amend the Distribution Code to require CitiPower to deliver the increased level of security of supply to its CBD customers.

Having reached that decision, the Commission has considered again a range of issues that will be important in making a final decision on the pass through application that will follow this decision. The Commission is concerned to ensure that there are sufficient future incentives to motivate CitiPower to complete the project, anticipated to be in 2012. The Commission restates its recommendation in the draft decision that the Australian Energy Regulator (AER) consider tightening the S-factor mechanism in its 2011-2015 distribution price decision to ensure that a double contingency event is not excluded from the S-factor penalties, in the event that poor network planning has led to a Melbourne CBD network outage.

The Commission also reaffirms its preliminary view that the costs of the project be recovered from CBD customers only, not being persuaded by CitiPower's arguments in favour of applying the charges to all its customers. The Commission's view, in advance of its consideration of the pass through is that it is both feasible

and desirable that CBD customers only bear the costs of the additional security from which they directly benefit.

The Commission's final decision

The Commission's final decision in relation to the first element of CitiPower's CBD security of supply proposal is:

- To amend the Electricity Distribution Code to oblige CitiPower to deliver a higher level of security to Melbourne CBD customers but without determining what that level of security should be (the amendment to the Code is contained in Appendix A).

To give effect to the decision to change the Code, the Commission will require that:

- CitiPower provide a list of proposed works, by year and the expenditure expected to be undertaken against those works, in a plan to the Commission.
- CitiPower separately report on the CBD security of supply work undertaken in its annual Regulatory Accounts.
- CitiPower, upon completion of the project, be required to certify to the Commission that N-1 Secure has been delivered to the Melbourne CBD at the 66kV subtransmission level.

The decision to change the Code also means that CitiPower may apply for a pass through of the $51.78 million associated with the CBD security of supply project once the Code has been changed and that from the regulatory period beginning 2011, CitiPower's actual expenditure on CBD security of supply will be rolled into the Regulatory Asset Base.

The Commission's final decision on the amendments to the Code are included at Appendix A. CitiPower's proposed security enhancement works which underpin the Commission's final decision to amend the Code are discussed in Chapter 5 of the report and details are set out in Tables 5.1 and 5.2.

Greg Wilson

Chairperson

1 INTRODUCTION

1.1 Overview

In September 2006, the Commission received a proposal from CitiPower to strengthen the security of supply in the Melbourne CBD area.[1] CitiPower subjected its proposal to the Australian Energy Regulator's (AER) regulatory test, referred to in the National Electricity Rules. This test assessed the economic costs and benefits of undertaking the project. CitiPower reported to the Commission in April 2007, on the outcomes of the regulatory test.[2]

CitiPower stated that implementation of its proposal would result in the security of the CBD network increasing from N-1 to N-1 Secure at the 66kV subtransmission level. CitiPower indicated that the current configuration of its CBD network is N-1; that is one network element in the CBD can fail without loss of supply to CBD customers.[3]

Under the N-1 Secure standard, the network can be re-configured to withstand the further loss of another element in the 66kV subtransmission network. However, during the anticipated 30 minutes it would take to reconfigure the network there is a risk of loss of supply to customers should the loss of a second network element occur. If the loss of the second element occurs more than 30 minutes after the loss of the first element, there would be no loss of supply to customers.

As part of its proposal to increase the standard of security to customers in the CBD, CitiPower proposed the following works:

- new interconnecting cables between zone substations to be installed to achieve improved transfer capacity and
- new switchgear to be installed to enable more flexible and remote transfer of load between zone substations.

---

[1] CitiPower is the Victorian distributor with responsibility for distributing electricity to customers in the CBD area (as well as areas in the surrounding inner suburbs of Melbourne).

[2] CitiPower's proposal and the outcome of the regulatory test are available on the Commission's website.

[3] Security levels are generally measured in terms of the level of redundancy to meet credible contingency events such as the failure of a network element. The level of network security typically makes references to the normal operating condition of the network and is expressed in terms of "N" ratings, where N means the number of elements that are required in the network to supply all customers. N-1 means that the network can operate without any loss of supply even without one of its elements.

CitiPower has sought to access the pass through provision created in Clause 5 of the EDPR 2006 to recover the costs of the proposed works to deliver an N-1 Secure level of security to the CBD in the current regulatory period. This would occur if CitiPower is obliged to deliver the project through a change to the Electricity Distribution Code (the Code).

CitiPower's proposal provides increased security for CBD customers fed from the 66kV subtransmission network currently supplied from the West Melbourne Terminal Station (WMTS) and Richmond Terminal Station (RTS).

Customers who are located in the CBD area south of the Yarra River and west of St. Kilda Road will not receive an N-1 Secure level of security as they are fed from a 22kV subtransmission network supplied from the RTS. There are no security related upgrades proposed for this part of the network in CitiPower's proposal. The same applies for customers north of the Yarra River in the CBD supplied by the 22kV network, including areas around the Bourke Street and Swanston Street intersections and King Street and Flinders Street intersections.

1.2 Distinguishing security from reliability

It is important to recognise that there is a difference between increased network security of supply and the actual level of reliability that customers will experience. Security of supply is largely concerned with the risk of network failure and the level of redundancy built into a network to mitigate that risk. Reliability relates to the actual outcomes experienced by customers; that is, whether electricity is available when required by customers connected to the network. An improvement in the security standard will lead to an improvement in the long term reliability of the network.

There is a high correlation between the reliability of supply experienced by customers and the level of security of supply built into the network. A network that is configured to have a higher level of security is most likely to deliver a higher level of reliability to customers.

Reliability measures generally focus on the extent of availability of electricity to customers. For example, the system average interruption frequency index (SAIFI) is a measure of the number of occasions when a customer has, on average, experienced a supply interruption (lasting up to or longer than one minute) in a year. The system average interruption duration index (SAIDI) is the total minutes, on average, that a customer has been without electricity in a year due to supply interruptions (of duration equal to or greater than one minute each).

These measures and their targets are set during distribution price reviews and form part of CitiPower's service standards to customers each year. CitiPower's annual network tariffs are adjusted according to its performance in meeting those service standards in any given year. All other things being equal, underperformance compared to the service standard will result in a reduction in distribution tariffs in subsequent years: better performance than the standard will enable CitiPower to achieve higher tariffs in subsequent years.

Security of supply, by contrast, is about the ability of the distribution network to continue to supply customers in the event of one or more elements of the network (such as a cable) being out of service.

The extent to which a distributor can re-direct electricity flow in the event of one or more outages, and still maintain supply to customers, determines a network's security level. The greater the level of network interconnectivity and the more capacity available across the network the higher the network's security rating is likely to be.

Under the National Electricity Rules there is no direct reference to planning by distributors for network security levels in terms of specific N ratings. However, in Victoria, the Code states that a distributor must include information regarding its planning standards in an annual Distribution System Planning Report. Also, the Code states that a distributor must seek to manage events which have a low probability of occurring but would have a substantial impact on customers.

Distributors are free to establish, in the circumstances applying to their networks, the most appropriate level of network security, based on a trade-off between the value customers place on minimising the risk and frequency of outages and the cost of investment required to strengthen security.

While CitiPower presently delivers an N-1 level of security to its customers, it lodged its proposal with the Commission because it concluded that the benefits of increasing security to N-1 Secure outweigh the costs of investment to deliver this level of security.

Clause 5 of the EDPR 2006-10 provides that if the Code is amended to require CitiPower to strengthen security of supply in the Melbourne CBD area, and that obligation has a material financial impact on CitiPower, then CitiPower may apply to the Commission to pass through the costs to its distribution customers.

CitiPower foreshadowed that, in its pass through application, it intends to request the Commission to approve recovery of the financing costs associated with incurring $42.9 million ($2006) in capital expenditure on the security upgrade over the remainder of the 2006-10 regulatory period. A further $9.5 million ($2006) will be expended in the regulatory period commencing 2011.

1.3 Purpose of this paper

This report sets out the Commission's final decision to change the Code to oblige CitiPower to deliver an improved level of network security. It explains the nature of the works that the amended Code obligation would require and that the works proposed by CitiPower are efficient. As a consequence of this decision to amend the Code the paper recognises that CitiPower will be granted access to the pass through provision created in the EDPR 2006 to recover the costs of the project and confirms the Commission's view that CitiPower's CBD customers should bear the additional costs of the investment.

1.4 Consultation process

The Commission received two submissions to the draft decision, from TRUenergy and CitiPower.

TRUenergy's submission was in the form of a letter from TREenergy to CitiPower in February 2007 that affirmed TRUenergy's understanding that CitiPower had used the market benefits limb of the regulatory test to assess if the upgrade to the Brunswick Terminal Station had merit.

CitiPower raised a number of issues associated with cost recovery, project timing, network pricing and future amendment to the S-factor by the AER. The Commission has addressed these issues in this final report and foreshadows that they will be addressed specifically in the Commission's final conclusion on the pass through application.

1.5 Structure of this paper

The remainder of this paper sets out the major issues considered by the Commission when evaluating CitiPower's CBD security of supply proposal and is structured as follows:

- Chapter 2 provides an overview of CitiPower's proposal and the regulatory test
- Chapter 3 sets out how the Commission will impose a regulatory obligation on CitiPower to deliver improved security for the CBD
- Chapter 4 contains an assessment of the works proposed by CitiPower
- Chapter 5 sets out an analysis of the costs of the works to deliver N-1 Secure and the pass through arrangements that could be implemented to enable CitiPower to recover costs associated with its CBD security of supply proposal and
- Chapter 6 sets out which customers will pay for the CBD security of supply upgrade.

2 CITIPOWER'S PROPOSAL

This chapter provides an overview of CitiPower's current and proposed network configuration as set out in its proposal to the Commission. The Commission engaged Maunsell Australia to assist it with analysing the CitiPower CBD security of supply network proposal compared to the current CBD network configuration.

2.1 Existing CBD network configuration

The majority of CitiPower CBD customers are supplied by subtransmission lines from two terminal stations — West Melbourne Terminal Station (WMTS) and Richmond Terminal Station (RTS) — and by a number of high voltage feeders from zone substation feeders near the edge of the CBD. There are seven CBD zone substations supplied from WMTS and RTS. It is for these seven substations that CitiPower wishes to increase the defined level of subtransmission security to N-1 Secure.

The WMTS supplies four zone substations — Victoria Market (VM), Little Queen St (LQ), Waratah Place (WA) and Little Bourke St (JA).

RTS supplies two zone substations — Flinders Ramsden (FR) and McIlwraith Place (MP).

The remaining substation at Waratah Place (W) is currently used as a switching station, to switch load between WMTS and RTS. The switching is currently carried out manually at W by a substation operator.

Based on the SKM report commissioned by CitiPower, the Melbourne CBD subtransmission network historically has been developed mainly on cost considerations. This has resulted in the deployment of a relatively small number of 66kV circuit breakers. Due to the sparing use of circuit breakers, the subtransmission network consists of transformer–ended feeders connecting the zone substations. Maunsell has reservations about this approach because the network has limited switching ability at 66kV subtransmission voltages.

Further, due to the transformer–ended feeder configuration, one single fault in the subtransmission network can trip up to three lines and four transformers. At present, the network can withstand such an event without any loss of supply to customers. However a second event will result in a loss of supply to a large portion of the CBD.

In addition, CitiPower contended, and Maunsell has confirmed, the present network configuration has the following constraining attributes:

- a lack of ability to quickly transfer load between zone substations by remote control in response to a system event

- a lack of ability to remotely transfer load between terminal stations and
- a lack of flexibility to deliver load switching, such as the use of double-bus bar configurations at critical zone sub stations.

From a security perspective, the transformer–ended feeder configuration puts a larger portion of customers at risk of losing supply for a second outage event compared to subtransmission networks that use a greater number of 66kV line circuit breakers.

2.2 Proposed new network configuration to deliver N-1 Secure

The SKM review made recommendations to CitiPower on how the current network configuration could be improved to deliver a higher level of security to customers.

In its September 2006 proposal, CitiPower submitted two network options for upgrading the level of security to the Melbourne CBD:

- option 1, which involves the re–development of an existing zone substation to establish a new 220/66kV terminal station on the northern fringe of the CBD and
- option 2, which involves the installation of additional 220/66kV transformation capacity at the existing Brunswick Terminal Station.

SKM evaluated the two network options, which both delivered an identical level of network security. SKM recommended option 2 as the least cost option.

The works associated with option 2, as described in the proposal from CitiPower includes the work referred to in Box 2.1.

Options 1 and 2 were then subjected to the regulatory test referred to in the National Electricity Rules (see section 2.3). Based on the outcomes of the regulatory test, CitiPower confirmed that option 2 — an upgrade of the Brunswick Terminal Station — was the preferred option for delivering an N-1 Secure level of security to the Melbourne CBD.

Box 2.1 **Summary of Upgrade to Brunswick Terminal Station**

- Establish a new 220/66kV facility at Brunswick Terminal Station (BTS).
- Redevelop Bouverie St zone substation (BQ) from 22/11kV to a 66/11kV substation.
- Upgrade Victoria Market zone substation (VM) to a fully-switched, double-bus-configured substation, including GIS switchgear.
- Upgrade Waratah Place zone substation (W) to a fully-switched station.
- Add two new 66kV circuits from BTS to BQ.
- Add two new 66kV circuits from BQ to VM.
- Add one new 66kV circuit from BTS to VM.
- Add two new 66kV circuits from BQ to W.
- The 66kV circuit currently running between VM-W is to be cutover from W to WA (it will become VM-WA).
- Transfer two existing subtransmission loops (presently connected to RTS) to BTS.

2.3 The regulatory test

After the release of its September 2006 proposal, CitiPower subjected both network options to the AER's regulatory test. The regulatory test is used by network service providers to determine appropriate new investment in the National Electricity Market and ensure that such investments are efficient.

The test requires that distributors must consult with affected participants, NEMMCO and interested parties on the possible options to overcome those constraints, by undertaking an economic analysis that satisfies the AER's regulatory test.

The regulatory test is an economic cost-benefit analysis used by electricity transmission and distribution businesses to assess the efficiency of potential network investments. Full details about the regulatory test's application are contained in the relevant AER publication.[4]

The regulatory test was undertaken for CitiPower by NERA Economic Consulting, who found that option 2 (as discussed in section 2.2) is preferable to option 1.

That analysis found that the project had a positive economic benefit in 17 of 27 scenarios tested by NERA, with a Net Present Value (NPV) of $4 million.

NERA's analysis of the regulatory test was provided to the Commission in April 2007, and made public through both the NEMMCO and CitiPower websites.

[4] Australian Energy Regulator 2005, Compendium of Electricity Transmission Regulatory Guidelines, August, pp. 31-38

TRUenergy's submission to the draft decision agreed that CitiPower had appropriately used the market benefits limb of the regulatory test to assess the economic benefit of the proposal.

As noted above, NERA evaluated the net benefits of the proposal at $4 million. They tested a range of sensitivities, including peak demand growth of between 2.13 per cent and 2.88 per cent, to ensure the project maintained a net benefit. The draft decision noted that on the basis of the information provided, the Commission considers that the regulatory test was appropriately carried out and that the project would pass the requirements of the test.

3 IMPOSING A REGULATORY OBLIGATION ON CITIPOWER

3.1 Changes to the Electricity Distribution Code

In the draft decision, the Commission decided that the Distribution Code would be changed to impose a regulatory obligation on CitiPower to improve the level of security of supply to the Melbourne CBD.

However, the Commission also stated that distributors should be responsible and accountable for the decisions they make in relation to investments on security and reliability. With the exception of New South Wales, the Commission noted other jurisdictions have moved away from determining planning standards. The Commission concluded it was inappropriate to achieve this through prescribing a specific N standard of security for distributors as it may potentially lead to inefficient investment.

As a consequence, the Commission's amendments to the Code allow CitiPower to determine the level of N security appropriate for the CBD.

CitiPower submitted that the draft decision's 31 December 2007 deadline for them to submit their CBD security of supply upgrade plan to the Commission was not achievable. This was due to uncertainty about the timing of the pass through, which in turn impacted on CitiPower's ability to begin detailed planning or negotiate with suppliers to obtain transformers and other necessary equipment to deliver N-1 Secure to the Melbourne CBD.

The Commission concurs and therefore it will amend section 3.1A2 of the proposed Code, such that the Commission will provide CitiPower with not less than 30 days written notice of the need for CitiPower to provide their CBD security plan to the Commission. The Commission is satisfied that the Code amendments will better protect the long term interests of Victorian customers by enhancing the security and reliability of the CBD distribution network.[5]

3.2 Transfer of the Electricity Distribution Code to the national regulatory framework

As a means of ensuring that CitiPower continues to undertake the project beyond the current regulatory period, the Commission consulted on whether the Code obligations should transfer to the national regulatory framework.

[5] See Essential Services Commission Act 2001 section 8(1).

In the draft decision, the Commission noted there was uncertainty as to the extent to which the Code will transfer to the national regulatory regime. The Victorian Department of Primary Industries is currently negotiating the transfer of economic and non-economic distribution functions to the national regulatory regime and so this uncertainty remains.

Nevertheless, the Commission does not consider this an impediment to the project proceeding. The Commission considers that the on-going incentives for CitiPower to continue to undertake the project during the next regulatory period and to construct the CBD network to an N-1 Secure level of security are most appropriately applied through the S-factor incentive regime, outlined further in section 3.3.

3.3 Incentive framework to address security of supply

A key element of incentive based regulation is to provide adequate incentives for distributors to achieve the level of service that is valued by customers.

The draft decision explained that one of the key aspects of the Commission's incentive mechanism, the S-factor, financially rewards or penalises a distributor for the change in its average reliability from one year to the next. It is designed to encourage distributors to exceed their respective target levels of reliability.

The financial incentive scheme operates to reward out-performance and penalise under-performance through changes to allowable tariff revenue. It acts on the gap between the actual performance and the targeted performance in the current year, less the gap between actual performance and the targeted performance in the previous year.

Therefore, changes in performance must be maintained in future years for rewards or penalties to continue. As the financial incentive scheme acts on long term performance changes only, a poor performance in any one year followed by a return to normal performance will result in a penalty for only one year.

Following consultation during the issues paper, the Commission's draft decision was that the S-factor would remain the main incentive mechanism by which CitiPower would deliver an N-1 Secure level of security to the Melbourne CBD. CitiPower's submissions to the issues paper and draft decision stated the S-factor should not be dealt with by the Commission in the current regulatory period as the full benefits of N-1 Secure will not be available until project completion at the earliest, estimated to be 2012.

CitiPower argued that the S-factor should be dealt with during the regulatory reset for the 2011 distribution price review. The Commission agrees it cannot alter the existing S-factor applying to distribution services during the current 2006-10 regulatory period.

The Commission however concludes that the S-factor scheme could work for security related events. However, it is not clear that the present structure of the scheme, especially in relation to the exclusion criteria, would provide any incentive for CitiPower to deliver an N-1 Secure level of security to the Melbourne CBD. This

is because, if such a double contingency event did occur under the present S-factor scheme, it would be excluded from S-factor penalties.

The Commission considers it important to signal to the AER that an altered S-factor scheme be implemented from the 2011 regulatory period, to impose sufficient accountability on CitiPower to appropriately plan for network security and deliver the benefits of N-1 Secure to its CBD customers. For example, if poor planning results in an outage in the CBD, CitiPower should face S-factor penalties to compensate customers who have paid for the higher level of security yet did not receive the benefits associated with that level of security.

There are certain events that, if they occur, the distributor can apply for them to be excluded from the S-factor scheme. If approved, such events are excluded from calculation of S-factor penalties or rewards. The Commission's issues paper noted:

> *…where a supply interruption is on a day where the unplanned sustained interruption frequency, summed across all network types, exceeds set statistical thresholds it will also be excluded. The effect of this exclusion arguably removes the very incentive required to plan for low probability high impact events. The original intention of this exclusion was to establish a more administratively simple way of excluding rare and abnormal events outside the control of the distributors, not to protect businesses from poor planning.* [6]

The Commission believes it is inappropriate for customers to bear the costs of potentially poor planning by CitiPower. It considers that a future S-factor scheme should ensure that a double contingency event, of the type that N-1 Secure is designed to protect against, is not excluded from the S-factor penalties.

Such a scheme will have to address the 30 minute window under N-1 Secure in which the occurrence of a second contingency event can still cause a loss of power to the CBD. This would ensure that, in the event that poor planning leads to an outage on the CBD network, CitiPower will bear appropriate penalties for failing to deliver the level of security customers have paid for.

Although the Commission cannot bind a future regulator, its view is to recommend that the AER design an S-factor scheme from the 2011 regulatory period that does not exclude a double contingency event from S-factor penalties, of the type that N-1 Secure is designed to protect against.

[6] Essential Services Commission, Review of CitiPower's CBD Security of Supply Proposal Issues Paper, July 2007 page 20.

4 ASSESSMENT OF CBD SECURITY WORKS

An important issue throughout the review of CitiPower's CBD proposal was for the Commission to be satisfied that CitiPower would deliver an N-1 Secure level of security to its CBD customers through the program of works proposed in September 2006 and evaluated against the regulatory test in April 2007.

The Commission engaged Maunsell Australia to assist it to determine that the works proposed did not form part of the capacity related augmentations already funded through the EDPR price controls and whether or not the works would deliver an N-1 Secure level of security.

Maunsell undertook the following analysis to assess the security works proposed by CitiPower:

- An assessment of whether the proposed upgrades will provide a level of security of N-1 Secure to the different zone substations supplied by the subtransmission network.
- A desktop analysis was undertaken based on information provided by CitiPower in its September 2006 proposal and on further information provided by CitiPower. Maunsell did not undertake load flow studies of the network as this was outside their brief.
- Critical system events were selected and scenarios were evaluated in detail.
- An assessment of whether the upgrades can be classified as capacity upgrades or security upgrades was performed.

For the purpose of carrying out its assessment, Maunsell adopted the following approach:

- It used the maximum demands provided in CitiPower's 2006 Distribution System Planning Report.
- It used the circuit ratings provided in CitiPower's 2006 Distribution Planning Report in the evaluation.
- It used cyclic ratings where these were provided by CitiPower. This is the case for circuits supplying the substations at Little Queen Street (LQ), Waratah Place (WA) and McIlwraith Place (MP).
- As advised by CitiPower, it was assumed that 15MVA of load can be transferred away from each zone substation at the 11kV distribution level and that 20-25 MVA of load can be transferred away from LQ, WA and MP at the 11kV distribution level.
- It was assumed that there will be permanent load transfer from the existing zone substations to the Bouverie Street (BQ) zone substation once it is upgraded. The quantum of load permanently transferred to BQ is provided in table 4.1.

- System losses were ignored and
- Distribution network and transmission network capacity constraints (if any) were not considered (these being outside Maunsell's brief).

Table 4.1 **Load transferred to the upgraded BQ (Bouverie St) from existing zone substations**

Substation	*Load transferred*
	MVA
Victoria Market (VM)	21.0
Little Bourke Street (JA)	13.3
Waratah Place (WA)	12.5
McIlwraith Place (MP)	15.1
Flinders Ramsden (FR)	1.5

Source: Maunsell Australia, confidential report to the Commission, September 2007

Maunsell concluded that CitiPower's September 2006 security of supply proposal to upgrade the Brunswick Terminal Station would deliver a subtransmission security of supply of N-1 Secure for most CBD customers.

However, Maunsell determined that additional load transfers at the 11kV distribution level would be needed to deliver N-1 Secure in some scenarios. Further, they noted that a combination of emergency ratings for the cables within the distribution network and load transfers at distribution level would be used to achieve N-1 Secure for customers at zone substations Waratah Place (WA), Little Queen Street (LQ) and McIlwraith Place (MP).

CitiPower was asked to demonstrate that customers fed from zone substations WA, LQ and MP would receive a security of supply of N-1 Secure. The results of that analysis are found in Appendix B.1.8.

In Maunsell's opinion the works categorised in the September 2006 proposal as security enhancement are required to increase the level of security to N-1 Secure, with no double counting of normal capacity augmentations as security related works.

Maunsell's analysis of the works to be undertaken and the various substations and their impact in delivering an N-1 Secure level of security can be found in Appendix B.

In addition, throughout its proposal CitiPower has noted that a small group of customers — approximately 8 per cent — who reside within the CBD network area would not get an N-1 Secure level of security.

CitiPower stated that the CBD has two subtransmission networks — a 66kV network and a 22kV network — with the latter supplying 8 per cent of the CBD, mostly in the south-west of the CBD. CitiPower contends that it would be prohibitively expensive to upgrade this network to N-1 Secure. However, it is

CitiPower's intention to over time replace the 22kV network with a 66kV network, at which time the remainder of the CBD will be upgraded to N-1 Secure.

The Commission accepts CitiPower's conclusion in respect to those customers on the 22kV network not receiving N-1 Secure and therefore not obtaining the benefits of the project.

4.1 Additional augmentation works to deliver N-1 Secure

As noted above, Maunsell advised the Commission that their analysis found there were some instances in CitiPower's September 2006 plan where it could not confirm that an N-1 Secure level of security would be delivered to the Melbourne CBD as proposed by CitiPower. The Commission therefore gave CitiPower the opportunity to provide additional supporting evidence that its proposal did provide an N-1 Secure level of security in those instances.

In September 2007, CitiPower was asked to provide supporting evidence that the load transfers from the 11kV distribution network that Maunsell considered necessary to achieve N-1 Secure could be delivered.

CitiPower responded that the 11kV transfer capability is most efficiently built in conjunction with on-going load growth related augmentations.[7] CitiPower advised there are numerous options available to achieve the required transfers, noted in Appendix B, with the final option chosen dependant on the nature, size and location of existing load growth and new customer loads.

However, the Commission is concerned about the need for customers to receive an N-1 Secure level of security to the Melbourne CBD and the benefits of this higher security standard as proposed by CitiPower. CitiPower is effectively relying on these works at the distribution level to ensure customers served by substations MP, WA and LQ do not suffer an outage for the loss of two network elements simultaneously.

Therefore, as part of its final decision, the Commission will require the projects noted in Appendix B.1.8 to be listed as additional to (and included in) CitiPower's CBD security of supply project plan, to be forwarded to the Commission as the security plan. It is noted that these works will not alter the security plan, as they are associated with normal augmentation works carried out as part of CitiPower meeting growth in demand and connection of new customers. However the Commission is aware that without these works, or a combination of them, being completed by CitiPower, an N-1 Secure level of security will not be entirely delivered to the CBD once physical construction is completed as proposed in CitiPower's September 2006 plan.

The Commission also observes the regulatory test has a net present value of $4 million noting that this would be reduced by an, as yet unquantified, allocation of costs allocated to growth and augmentation works.

[7] CitiPower Letter to Essential Services Commission's Craig Madden, 14 September 2007

Based on CitiPower's September 2006 proposal the project would deliver an N-1 Secure level of security to CBD customers with the inclusion of additional augmentation works in Appendix B.1.8. The Commission expects that these works must be completed at the same time as the security works and be included in the regulatory accounts update of progress against that plan.

To ensure that any future plan by CitiPower to deliver N-1 Secure does meet this objective, the Commission will require CitiPower to provide details in its regulatory accounts of work carried out to date and to certify, at project completion, that N-1 Secure has been delivered to the Melbourne CBD.

In addition, the Commission expects that actual works, including any at distribution level, will be reviewed by it at the completion of the project to ensure they meet the N-1 Secure level of security. This includes the Commission undertaking an inspection and audit process to ensure that all works have been carried out according to plan, to establish that customers are receiving an N-1 Secure level of security in the Melbourne CBD.

5 ASSESSMENT OF THE COST OF WORKS TO DELIVER N-1 SECURE

As part of its review of the CBD security of supply proposal, the Commission and its consultants have reviewed whether the expenditure proposed by CitiPower in its September 2006 proposal and evaluated under the regulatory test, is an efficient level of expenditure.

This section outlines the Commission's views on this matter.

5.1 Assessing CBD security of supply costs

As part of the review, only those costs associated with enhancing security were examined. The Commission notes that capacity related costs, associated with load growth, also form part of the CitiPower package to deliver an N-1 Secure level of security to the Melbourne CBD. However, CitiPower is not seeking recovery of these costs as they are already funded under the EDPR 2006-10.

In the draft decision, the Commission stated it would allow CitiPower to recover the costs associated with its actual expenditure on CBD up to a limit of $50.7 million.

CitiPower submitted that the costs associated with the project should not be capped, given the size and scope of the CBD project.

They contended that over 2008-12, there is expected to be considerable upward price pressure in base metals, crude oil, plastics and labour costs, and uncertainty on aluminium and copper, all of which are key inputs in physically constructing an N-1 Secure network in the Melbourne CBD. As such, CitiPower argued that it was inappropriate to place a cap on the level of expenditure.

The Commission is now of the view that the normal incentive framework applying to distribution services should continue to apply to this project and CitiPower's actual expenditure on the project will be rolled into its Regulatory Asset Base (RAB) at the 2011 regulatory reset.

To determine the efficiency of the proposed expenditure by CitiPower, the Commission engaged Maunsell Australia to undertake a review of CitiPower's forecast costs.

Maunsell assessed the costs based on the information provided in CitiPower's September 2006 submission to the Commission. Maunsell provided an independent estimate of the work based on the information available to it and obtained comparative prices for equipment and installation from manufacturers and suppliers which it used as the basis for its assessment. These estimates were based on 2007 dollars.

To determine costs on a like for like basis, Maunsell determined unit rates based on total security enhancement costs and compared these to CitiPower's cost estimates.

A summary of the cost comparison of the security enhancement works is set out in Table 5.1.

Table 5.1 **Security enhancement costs**
Comparison of CitiPower and Maunsell cost estimates

		CitiPower estimate			*Maunsell estimate*		
Site	*Works*	*Unit cost ($ 000)*	*Quantity*	*Total cost ($ 000)*	*Unit cost ($ 000)*	*Quantity*	*Total cost ($ 000)*
BTS	Install 1 x 66kV 120 MVA cable from BTS to VM	1 893.3	7.50	14 200.0	1 892.0	7.50	14 190.0
	Protection works at both ends of 66kV cable (BTS–VM)	210.4	1.00	210.4	180.0	2.00	360.0
BQ	Install 2 x 66kV 120 MVA cables from BQ to Sub VM	3 786.7	1.95	7 384.0	3 784.0	1.95	7 378.8
	Protection works at both ends of 2 x 66kV cable (BQ–VM)	210.4	2.00	420.7	180.0	2.00	360.0
VM	Replace 9 x 66kV isolators with 19 GIS CBS + isolators (double bus configuration)	736 .3	19.00	13 989.7	776.0	19.00	14 744.0
	Station refurbishment	1 051.9	1.00	1 051.8	787.0	1.00	787.0
W	Replace 7 x 66kV isolators with 7 GIS CBS + isolators (allow room for ultimate 18 x 66kV GIS CB's + isolators)	736.3	7.00	5 154.1	776	7.00	5 432.0
	Station refurbishment	1 051.9	1.00	1 051.9	787.0	1.00	787.0
	Install 2 x 66kV 120 MVA cables from BQ to W	3 786.7	2.00	7 573.4	3 784.0	2.00	7 568.0
	Protection works at both ends of 66kV cable (BQ–W)	210.4	2.00	420.7	180.0	2.00	360.0
WA	Redirect VM–W feeder to sub WA directly	210.4	1.00	210.4	180.0	1.00	180.0
FR	Install additional 1 x 66Kv switch link	368.1	1.00	368.1	325	1.00	325.0
MP	Install additional 1 x 66kV switch link	368.1	1.00	368.1	325.0	1.00	325.0
				52 403.4			52 616.8

Source: Maunsell Australia, confidential report to the Commission, September 2007

The draft decision excluded the refurbishment costs associated with upgrading substations VM and W from CitiPower's revenue requirement, on the grounds that they were not security related works and were already included in CitiPower's operating and maintenance revenue during the EDPR 2006-10.

Maunsell and the Commission undertook a physical examination of substation VM and switching station W to determine the extent of refurbishment works required.

In reviewing the works, the Commission had regard to additional obligations or functions placed on distributors at the time of the EDPR that would not necessarily

be reflected in historic recurrent expenditure. The Commission adjusted all distributors' 2006 base operating and maintenance expenditure arising from new or changed functions and legislative obligations (termed step changes) during the EDPR. For these purposes, reference to legislative obligations is intended to encompass all regulatory obligations, whether imposed by legislation or another regulatory instrument, for example a licence, code or price determination.

As the Commission is changing the Distribution Code to place an additional obligation on CitiPower, the Commission now considers that the refurbishment works can be regarded as a step change, in line with the framework developed in EDPR 2006-10 and therefore CitiPower is entitled to recover the refurbishment costs to upgrade substation VM and switching station W.

These additional costs will be added to the project costs which CitiPower may recover through a pass through application.

In its review of CitiPower's costs, Maunsell determined that the costs for protection works for new circuits were double counted by CitiPower as these costs were already counted as part of Victoria Market upgrade costs.

CitiPower argued in its submission to the draft decision that the protection costs for substation VM related to protection of new cables, where current differential protection is required at each end of the cable, including fibre communications between both ends of the cable.

The Commission considers that the estimates for the substation works were at a very high level and there was no detail provided on the protection schemes that were to be used. Maunsell's view was that the protection works were not required at both ends of the cables and therefore this double counting should be removed from CitiPower's estimated expenditure. Table 5.2 shows the protection works Maunsell excluded from its expenditure analysis.

On this basis, the Commission considers that the protection works have been double counted by CitiPower in its September 2006 proposal and therefore has excluded them from CitiPower's approved expenditure.

Table 5.2 **Maunsell security cost estimates**
Adjusted to excluded specified items

	Cost ($ 000)
Gross estimate	*52 616.8*
Excluded items	
Protection works at both ends of the 66kV cable (BTS–VM)	180.0
Protection works at both ends of 2x 66kV cable (BQ–VM)	360.0
Protection works at both ends of 66kV cable (BQ–W)	360.0
Final Maunsell security enhancement cost estimate	*51 716.8*

Source: Maunsell Australia, confidential report to the Commission, September 2007

5.2 Pass through arrangements

In the draft decision, the Commission noted that the pass through application would be subject to separate review and consultation.

However, CitiPower submitted that the final decision should simultaneously address both changes to the Distribution Code and the pass through arrangements. The Commission agrees in principle and therefore considers that in the final decision the two issues should be addressed together. That is, there is a net benefit to the project and that the Code should be changed to allow the project to proceed.

The Commission foreshadows that it will allow CitiPower to apply for the pass through once the change to the Code is implemented. This will involve CitiPower applying to the Commission to recover $51.78 million in costs associated with delivering an N-1 Secure level of security to the Melbourne CBD. This is the cost show in Table 5.2 plus an additional $66 000 on IT expenditure associated with CitiPower altering its internal billing arrangements to accommodate the pass through requirement that the CBD security of supply charges be separately itemised on distribution customers (retailers) billing statements, discussed further in the next section.

While there will be a separate decision by the Commission on the pass through, it is considered that the public consultation process has effectively taken place during the issues paper and draft decision stage. As a consequence, the pass through application will now involve a largely administrative review by the Commission, with a shortened public consultation period addressing the extent and incidence of the CBD security of supply component charge.

Based on the CBD project costs being $51.78 million (see section 5.1) the Commission's final decision is that CitiPower should be entitled to recover depreciation and a weighted average rate of return (WACC) on that amount for the life of the assets. For these purposes, the Commission's view is that the life of the CBD distribution security assets is 40 years, based on a 40 year life for transformers and a 60 year life for cables.

From the regulatory period beginning 2011, CitiPower's actual expenditure on CBD security of supply will be rolled into the RAB and CitiPower will no longer have to separately show the impact of the CBD costs on distribution customers' bills.

The Commission expects that, as part of its CBD security plan, CitiPower will provide a list of proposed works, by year and the expenditure expected to be undertaken against those works. Such a list should look similar to the list provided in Table 5.1.

CitiPower will also be required to report actual expenditure on the CBD security of supply project in its regulatory accounts.

6 ASSESSMENT OF WHICH CUSTOMERS SHOULD PAY FOR N-1 SECURE

6.1 Assessment of which customers will pay for N-1 Secure

The Commission sought the views of stakeholders about whether only CBD customers or CitiPower's entire distribution customer base should bear the costs of the higher level of security to the Melbourne CBD.

In the draft decision, the Commission considered that only CitiPower's CBD customers should pay for the upgrade of CBD security to N-1 Secure.

This was based on the view that:

- CitiPower already offers bulk tariffs that apply to residential and non-residential customers. These tariffs provide a signal to reflect the difference in network cost between those customers taking supply in bulk and providing their own connections to the bulk supply points — typically in the CBD and surrounding high rise buildings — and those customers taking individual network supply through individual service connections along poles and wires to the bulk supply point which may be some distance away, such as the suburban residential areas of CitiPower.
- Tariff structures should provide a signal to customers as to how their use of the network contributes to the costs of its provision. This is consistent with the pricing principle established during the 2006-10 price review that prices take into account future investment requirements; that demand should be more responsive to price signals and that the effectiveness of the signal inherent in the allocation of CBD project costs would be lost if those costs were allocated to the entire CitiPower distribution customer base.

CitiPower's submission to the draft decision contended that its entire distribution customer base should pay for an N-1 Secure level of security to the Melbourne CBD because:

- All network tariffs are presently averaged and that applying a small incremental signal — through a CBD only tariff — would not invoke any customer behavioural response.
- Incremental CBD costs added to existing average network costs might distort price signals.
- Postage stamp pricing is used throughout distribution network pricing and that applying an incremental component to that price would be problematic.
- Imposing the CBD costs on all customers will still ensure tariffs fall within the stand alone and avoidable costs window.

- There will be additional information technology costs borne by CitiPower to alter their billing systems to accommodate a CBD only pricing regime. CitiPower claims the costs would be at least $66 000.
- Retailers will face additional costs, as they attempt to factor in a new set of CBD only network tariffs into their billing systems.
- Future investments made by CitiPower which are large and "lumpy" in nature would also require their own separate review and implementation of incremental tariffs.
- Where only CBD customers paid for the N-1 Secure, CitiPower would be required to reassign those customers to a new tariff but the tariff reassignment rules would not permit this to be done until project completion, at the earliest.

The Commission has considered CitiPower's submission about who should pay for an N-1 Secure level of security to the Melbourne CBD.

CitiPower submitted that a change to CBD customers' tariffs would require a tariff reassignment under the EDPR 2006. Tariff reassignments can occur when customers load or connection characteristics change, allowing the distributor to place that customer on a new tariff. CitiPower argued that as customers would not receive N-1 Secure until the expected 2012 project completion date, their load and connection characteristics would not change until then. As a consequence, they could not be reassigned to a new (higher) tariff until 2012 at the earliest.

It is a requirement of Clause 5.5.3 of the EDPR 2006 that the pass through amount be shown separately on each distribution customer's invoice.[8] The Commission's view is that the pass through represents a separate component on customers' existing tariffs and not a change in tariff and CitiPower will be required to separately show on a customer's invoice (that is, CitiPower's invoices to retailers) the amount of the pass through associated with the CBD security of supply project.

Therefore, no tariff reassignment is necessary and CitiPower would still be required to amend their billing arrangements to show the CBD charge component separately on invoices, whether to CBD customers only or all CitiPower customers.

The Commission also notes under clause 5.6.1 of the pass through provisions that the pass through amount is not included within the price control arrangements that apply to distributors' revenues, tariff's or tariff components under the distribution, transmission and metering price controls nor subject to the procedures for within calendar year changes to tariffs and for the introduction or withdrawal of tariffs.

From the 2011 regulatory reset, all the costs associated with the CBD project will be rolled into CitiPower's RAB and CitiPower will no longer be required to separately show the CBD security of supply pass through amount on customers' invoices.

From then, CitiPower will be entitled to alter their customers' tariffs to recover the costs associated with the project.

[8] Essential Services Commission of Victoria 2005, Electricity Distribution Price Review 2006-10 Final Decision Volume 2, clause 5.5.3(i), p64.

As noted above, the Commission observes that CitiPower already has bulk tariffs that apply to residential and non-residential customers. Similarly a differential in network prices reflecting the Melbourne CBD's improved level of network security will be taken into account by customers considering location decisions or other opportunities to manage their energy consumption or security.

The Commission maintains its view that it is economically desirable that tariffs are set correctly to reflect the costs of providing services to the relevant customers.

The Commission does not accept CitiPower's contention that the regulatory regime is predicated on an assumption that postage stamp pricing was intended by policy makers to be a permanent feature of network pricing. The regulatory regime, regulatory instruments and determinations have left considerable flexibility, and incentives, for distributors to move towards greater cost reflectivity in prices.

In this instance, the Commission believes that tariff structures should provide a signal to customers as to how their use of the network contributes to the costs of its provision. For the CBD security of supply project, the Commission's view is that it is both appropriate and important that CBD customers be given a price signal about the additional costs involved in delivering a higher level of network security to them than to the rest of the CitiPower distribution network. The effectiveness of the signal inherent in the allocation of CBD project costs would be lost if those costs were allocated to the entire CitiPower distribution customer base.

The Commission does not agree with CitiPower's contention that its capital works are lumpy in nature and that, using the CBD security project as a guide, any future major projects will be subject to a separate review process and a new set of incremental tariffs. The Commission notes that most lumpy investments will not require a separate review process or a new set of incremental tariffs, as most lumpy projects do not impact on the long run marginal cost of distribution services. The CBD security of supply project represents a step change in standards and therefore permanent change in the underlying long run marginal cost of delivering the higher standard of security for CBD customers.

Therefore, the Commission retains its preliminary view that CitiPower should recover the costs of the project from its CBD customers and that these costs should be shown separately and identified as a CBD security related component on distribution customers' invoices. The Commission will allow CitiPower to recover its estimated expenditure of $66 000 on upgrades to IT systems via the pass through provisions, to accommodate the new billing arrangements so that only CBD customers pay for an N-1 Secure level of security to the Melbourne CBD.

APPENDIX A –DISTRIBUTION CODE AMENDMENTS

Box A.1 **Amendments to the Victorian Electricity Distribution Code**

Insert a new clause 3.1A:

3.1A Melbourne CBD Security of Supply

3.1A.1 Without limiting clause 3.1, the Melbourne CBD distributor must take steps to strengthen the security of supply in the Melbourne CBD in accordance with this clause 3.1A.

3.1A.2 A Melbourne CBD distributor must not more than 30 days after receiving a notice from the Commission, submit to the Commission a plan that:

(a) specifies strengthened security of supply objectives for the Melbourne CBD and a date or dates by which those objectives must be met;

(b) specifies the capital and other works proposed by the Melbourne CBD distributor in order to achieve the security of supply objectives for the Melbourne CBD that are specified in the plan; and

(c) meets the regulatory test.

3.1A.3 If the Commission:

(a) is satisfied that a plan submitted under clause 3.1A.2 meets the requirements of clause 3.1A.2, that plan shall be the CBD security of supply upgrade plan;

(b) is not satisfied that a plan submitted under clause 3.1A.2 meets the requirements of clause 3.1A.2, the Commission may require the Melbourne CBD distributor to submit a revised plan within a reasonable period advised by the Commission, in which case clause 3.1A.2 and this clause 3.1A.3 will apply to that revised plan.

3.1A.4 The Melbourne CBD distributor may amend the CBD security of supply upgrade plan:

(a) without the approval of the Commission if the amendment does not prejudice the achievement of the security of supply objectives, or result in a reduction of the standard of works, that are specified in the CBD security of supply upgrade plan in effect immediately before that amendment; or

(b) in any other case, only with the prior written approval of the Commission.

3.1A.5 The Melbourne CBD distributor must:

(a) carry out the capital and other works specified in the CBD security of supply upgrade plan in accordance with that plan;

(b) ensure that the Melbourne CBD distribution system meets the security of supply objectives specified in the CBD security of supply upgrade plan on and from the dates specified in the CBD security of supply upgrade plan; and

(c) otherwise implement the CBD security of supply upgrade plan in accordance with its terms.

Insert a new clause 3.1(c):

3.1(c) develop, test or simulate and implement contingency plans (including where relevant plans to strengthen the security of supply) to deal with events which have a low probability of occurring, but are realistic and would have a substantial impact on customers.

Continued next page

Box A.1 continued

Amend clause 3.5.1 by adding a new paragraph (c) as follows:

(c) in the case of the Melbourne CBD distributor only, to implement any CBD security of supply upgrade plan.

Insert a new clause 3.5.3A:

3.5.3A In fulfilling the requirements of clause 3.5.1(c) (if applicable), the report must include the following information:

(a) an outline of the capital and other works carried out in the preceding year in implementing the CBD security of supply upgrade plan;

(b) an evaluation of whether the relevant security of supply objectives specified in the CBD security of supply upgrade plan have been achieved in the preceding year and

(c) an outline of the capital and other works connected with the security of supply objectives proposed to be carried out in the following 5 years.

Clause 19 - insert the following new definitions:

Melbourne CBD distributor means a distributor whose distribution system includes the Melbourne CBD.

CBD security of supply upgrade plan means a plan approved under clause 3.1A.3(a) as amended from time to time in accordance with clause 3.1A.4.

Regulatory test means the regulatory test developed and published by the Australian Energy Regulator from time to time pursuant to clause 5.6.5A of the National Electricity Rules.

APPENDIX B – ASSESSING NETWORK SECURITY

B.1 Assessing Network Security to N-1 Secure

B.1.1 Security of Supply to McIlwraith Place and Flinders-Ramsden

In CitiPower's existing network, customers on the eastern side of the CBD are supplied from McIlwraith Place (MP) and Flinders-Ramsden (FR) zone substations. These zone substations are currently supplied from the Richmond Terminal Station (RTS) by three 66kV cables. The normal rating of these cables is such that an outage on one cable will cause the remaining two cables to exceed their normal rating at times of high demand. Maunsell concluded that the extent of overloading the cables over their normal rated capacity will increase into the future with load growth. Nevertheless, cables can safely carry loads above their normal rating for short periods of time and cables are given limited cyclic ratings and emergency ratings to reflect this situation.

CitiPower is currently managing the excessive loads caused by outages by using the limited cyclic rating and emergency rating of the cables between RTS to FR. To reduce the loading of the cables below their cyclic rating, load must be moved away from these substations either by transfers on the distribution network — 11kV network — or alternatively by manual switching of isolators at switching station W.

Under CitiPower's proposed network upgrades, the introduction of circuit breakers at W, switch links at substations FR and MP and new cables into W will enable CitiPower to quickly switch load away from substations FR and MP and will provide improved security to this part of the CBD network. CitiPower claims that a number of different configurations of the network will be possible with the proposed upgrades and Maunsell conformed that this will be the case.

For example, for a loss of a circuit between RTS and FR and in order to prevent the overload of the remaining two RTS-FR circuits, the network can be switched so that part of the load at FR and MP can be supplied from W. For a loss of a second RTS-FR circuit, the network can be further reconfigured so that the load supplied from RTS is further reduced, offset by an increase in load supplied from BTS via W.

As noted above, the security of supply to substations FR and MP currently has a security level of N-1, if the overload rating of the RTS-FR circuits is used. With the proposed upgrades by CitiPower, the standard of security will increase to N-1 Secure.

B.1.2 Security of Supply to McIlwraith Place Only

CitiPower customers on the eastern side of the CBD are supplied by the McIlwraith Place zone substation (MP). There are three circuits supplying MP — one circuit is supplied from Waratah Place (WA) and two circuits are supplied from Flinders-Ramsden (FR).

Under the current network configuration, the loss of two of the circuits supplying MP will overload the remaining circuit. Maunsell noted however that even with permanent and temporary load transfer from MP to an adjacent zone substation and the use of limited cyclic cable ratings, the level of security to MP does not meet a security level of N-1 Secure.

CitiPower provided further information upon request, stating that it will use cable emergency ratings along with transfer capacity which will be made available in the future, to ensure that N-1 Secure is maintained at substation MP. Maunsell advised the Commission that 41 MVA would have to be transferred via the distribution network to meet N-1 Secure.

Maunsell could not conclude whether MP has a level of security of N-1 Secure based on the information provided. CitiPower was therefore asked to provide sufficient information regarding the emergency ratings of the cables or the load transfer capacity in order to meet N-1 Secure at the McIlwraith Place zone substation. The subsequent information provided is assessed in section 4.1.

B.1.3 Security of Supply to Bouverie Street, Victoria Market and Waratah Place

CitiPower customers on the north-western side of the CBD are supplied from Victoria Market (VM) and Waratah Place (WA) zone substations. Some of the load from these substations will be permanently transferred to the Bouverie St (BQ) substation once it is upgraded. Substations VM, WA and the proposed BQ will be supplied from the Brunswick Terminal Station (BTS) after the proposed 66kV upgrades.

With the new proposed configuration, substations BQ, VM and WA will normally be supplied from BTS. The substations will be supplied by three circuits from BTS — two circuits to BQ and one circuit to VM. Substation WA is in turn supplied from Substation VM (see B.1.4 below).

All three circuits from BTS are required to provide a security level of N-1 under normal operation to supply substations BQ, VM and WA.

To meet a security standard of N-1 Secure, after the loss of one of the three circuits from BTS, CitiPower proposed that switching will take place in order to transfer substations BQ, VM and LQ to the West Melbourne Terminal Station (WMTS). The new double bus bar configuration at VM enables this flexible transfer of load to WMTS.

Maunsell determined that the load can be effectively transferred between the terminal stations and therefore N-1 Secure is achieved.

B.1.4 Security of Supply to Waratah Place (WA) Only

There are three circuits supplying the Waratah Place (WA) zone substation from the Victoria Market (VM) zone substation. Each cable is rated at 38 MVA. To achieve N-1 Secure the network must be able to cater for the loss of two cables that supply substation WA within half an hour of each other.

Maunsell found that up to 30.4 MVA of load is required to be transferred following a loss of two of the circuits into substation WA.

CitiPower advised Maunsell and the Commission that it will use cable emergency ratings along with any future transfer of load to other zone substations to ensure that N-1 Secure is maintained at substation WA. However, CitiPower did not provide the emergency cable ratings and load transfer capacity information. Therefore Maunsell could not conclude that substation WA would have a standard of security of N-1 Secure under CitiPower's proposal.

Additional information was therefore requested of CitiPower by Maunsell and the Commission to demonstrate that N-1 Secure could be delivered into substation WA. The work proposed by CitiPower to deliver this level of security is discussed further in section 4.1.

B.1.5 Security of Supply to Little Queen Street and Little Bourke Street (for outages on WMTS-VM circuits)

Under CitiPower's proposed configuration, Little Queen Street (LQ) and Little Bourke Street (JA) zone substations will be supplied from WMTS via the Victoria Market (VM) zone substation. Maunsell found that a substantial quantum of capacity will be made available on these circuits once load is permanently transferred to BQ as proposed by CitiPower.

With temporary load transfers from LQ, Maunsell found that the level of security meets N-1 Secure. For the years beyond 2012 this level of security will not be available due to load growth and CitiPower will have to undertake network augmentation in order to maintain this level of security given the expected load growth.

Maunsell agreed with CitiPower's analysis that the supply to substations VM and JA achieves N-1 Secure for loss of cables from WMTS.

B.1.6 Security of Supply to Little Queen Street only

CitiPower has proposed that Little Queen Street (LQ) will be supplied from Victoria Market (VM) and Little Bourke Street (JA) substations.

There are three circuits supplying LQ — two circuits from VM and one circuit from JA. The circuit from JA is only used during emergencies.

Maunsell found that after the loss of one circuit, even with temporary load transfer from LQ and the use of the limited cable cyclic ratings, the level of security to LQ does not meet the N-1 Secure standard. The load that would have to be transferred equates to 49.7 MVA.

CitiPower advised that it will use cable emergency ratings along with future transfer of load to other zone substations to ensure that N-1 Secure is maintained at LQ. Additional information supplied by CitiPower to Maunsell and the Commission to meet N-1 Secure is contained in section 4.1.

B.1.7 Security of Supply to Little Bourke Street only

There are four circuits supplying the Little Bourke Street zone substation (JA). In the event that one circuit trips followed immediately by another, Maunsell found that there is sufficient capacity within the remaining two circuits to supply the load at JA. Maunsell concluded therefore that the security level at JA would achieve N-1 Secure as proposed by CitiPower.

B.1.8 Additional Distribution Level Works to deliver N-1 Secure

The Commission and Maunsell gave CitiPower the opportunity to provide additional supporting evidence that its proposal did meet N-1 Secure in those areas where Maunsell found there was a potential deficiency, notably within the distribution network.

CitiPower advised that options to assist it deliver N-1 Secure can include the following scenarios:

1. In co-ordination with load growth, augmenting the capacity of the new BQ zone substation with a third 55 MVA transformer, thus allowing significant permanent load transfers. It is anticipated that pre-contingency or permanent load transfers of up to 20 and 30 MVA will be available from WA and MP respectively.
2. In co-ordination with load growth, reconstruction of the existing Tavistock Place (TP) zone substation to cater for growth in the south-west CBD load will allow pre-contingency or permanent transfer of up to 35MVA of load from LQ.
3. In co-ordination with load growth projects, the following feeders can be constructed to allow the necessary post-contingency transfers:

- To maintain N-1 Secure at WA after a loss of one circuit, an additional load in the order of 15MVA needs to be transferred away (over and above the available 15 MVA transfer capacity). This is achieved by the installation of 2 new, 7MVA rated11kV feeders — one from WA to MP and the other from WA to FR. If required, a third feeder from WA to BQ can be installed.
- To maintain N-1 Secure at LQ after a loss of one circuit, an additional load in the order of 35 MVA needs to be transferred away (over and above the available 15MVA transfer capacity). This is achieved by the installation of 3 new, 12MVA rated 11kV feeders — 2 between LQ and MP and one from LQ to JA. The 2 feeders between LQ and MP will supplement each other for a contingency situation at either of these stations. In the future, a fourth feeder between LQ and the proposed TP will be installed.
- To maintain N-1 Secure at MP after a loss of one circuit, an additional load in the order of 26MVA needs to be transferred away (over and above the available 15MVA transfer capacity). This is achieved by the installation of 3 new, 12MVA rated 11kV feeders — 2 between LQ and MP (installed above) and one from MP to JA. The 2 feeders between LQ and MP will supplement each other for a

contingency situation at either of these stations. In the future, a fourth feeder between MP and the proposed TP will be installed.

CitiPower states that any one of the above combinations of projects is feasible to undertake at the same time as the security works are being undertaken. CitiPower has not costed these works within the distribution network to deliver the required load transfers from substations WA, VM and LQ.