Request for Information

Emerging Network Limitations

Supply to Brisbane CBD and Surrounding Suburbs

Joint Report by ENERGEX Limited & Powerlink Queensland
23 June 2003

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1.0 EXECUTIVE SUMMARY

ENERGEX and Powerlink have identified emerging limitations in the electricity network supplying the Brisbane CBD Area.

The analysis is based on assumptions about future electricity demand and anticipated generation patterns. It indicates that reinforcement of supply to the Brisbane CBD Area is required prior to late 2005 to avoid network overloads during intact conditions or loss of supply to customers during network contingencies.

Consistent with the National Electricity Code, Powerlink's transmission authority and connection agreement requirements, ENERGEX and Powerlink plan future network augmentations to the 275 and 110 kV network supplying the Brisbane CBD so that the reliability and power quality standards of Schedule 5.1 of the National Electricity Code can be met during the worst single credible fault or contingency (N-1 conditions).

ENERGEX and Powerlink seek comments on this discussion paper and information on solutions to the emerging limitations, which may be able to be provided by parties other than ENERGEX and Powerlink. Submissions are due by Monday 28 July 2003. A decision is required by late 2003 if any option involving significant construction is to be in place by the summer of 2005/06.

2.0 INTRODUCTION

2.1 General

ENERGEX and Powerlink have identified emerging limitations in the electricity network supplying the Brisbane CBD Area. Primary supply to the area, which includes the Brisbane CBD and surrounding inner city suburbs, is through five 110 kV circuits from Powerlink 275/110 kV substations at Belmont, South Pine, Rocklea and Swanbank.

Corrective action is required to avoid network overloads during intact conditions as well as avoiding load shedding during credible contingencies. This document seeks information on potential solutions that may be available. It is an integral part of ENERGEX's and Powerlink's approach to meeting National Electricity Code requirements that ensure adoption of the most cost-effective solution to future network limitations.

2.2 Purpose of the 'Request for Information'

The purpose of this paper is to:

- provide information about the existing electricity network in the relevant area;
- provide information about emerging network limitations and the expected time at which action must be taken to maintain system reliability;
- seek comments on the approach and assumptions adopted;
- seek information on solutions to the emerging limitations which may be able to be provided by parties other than ENERGEX and Powerlink;
- explain the process to be used to evaluate alternative solutions. This includes network augmentation options that are presently being scoped by ENERGEX and Powerlink.

2.3 Background

ENERGEX and Powerlink Queensland are responsible for ensuring their networks have sufficient capacity to provide network services to customers[1]. If technical limits of their electricity networks will be exceeded, ENERGEX and Powerlink are required to notify Code Participants within the time required for corrective action.

Before constructing any major network augmentation to satisfy reliability of supply obligations, ENERGEX and Powerlink must also meet the following regulatory requirements[2]:

- consult with Code Participants and interested parties regarding alternative solutions, including those which may be provided by parties other than ENERGEX and Powerlink. These may include local generation, demand side management (ie – initiatives by customers to manage or reduce demand), interconnectors and options involving other networks including market network services;

[1] Powerlink's transmission authority includes a responsibility "to ensure as far as technically and economically practicable, that the transmission grid is operated with enough capacity (and if necessary, augmented or extended to provide enough capacity) to provide network services to persons authorised to connect to the grid or take electricity from the grid." (Electricity Act 1994, S34.2). The connection agreement between ENERGEX and Powerlink includes obligations regarding the reliability of supply as required under clause 5.1.2.2 of the Code. Capacity is required to be provided to the CBD such that the forecast peak demand can be supplied with the most critical element out of service, ie. N-1. Powerlink's transmission authority requires Powerlink to plan and develop its network such that the power transfer available through the power system will be adequate to supply the forecast peak demand during the most critical single network element outage. ENERGEX's distribution authority includes a responsibility to "connect and supply electricity to a customer's electrical installation or premises within its distribution area". (Electricity Act 1994, S40D).

[2] As set by the ACCC and contained in Chapter 5 of the National Electricity Code

- demonstrate proper consideration of various market development scenarios, including variations in electricity demand growth rates, and the ability of reasonable options to satisfy emerging network limitations under these scenarios;
- ensure that the recommended solution meets reliability requirements at the lowest total net present value cost when compared with other feasible solutions.

This discussion paper is a critical step in fulfilling these regulatory obligations in relation to supply to the Brisbane CBD and surrounding suburbs.

3.0 EXISTING SUPPLY NETWORK FOR THE BRISBANE CBD AREA

3.1 Geographic Region

The geographic region covered by this 'Request for Information' is referred to in this document as the Brisbane CBD Area - see the shaded area in Figures 1 and 3. The area involved is the Brisbane CBD (ie. Central Business District) and surrounding inner city suburbs including Spring Hill, Fortitude Valley, Milton, Kelvin Grove, Newstead, New Farm, Herston, Bowen Hills, Newmarket, Wilston, Windsor, West End, Highgate Hill, South Brisbane, Woolloongabba, Kangaroo Point and East Brisbane.

It is basically the area supplied by the five 110 kV lines entering the shaded area in Figures 1 and 3, plus the area supplied by Wellington Road 33/11 kV substation.

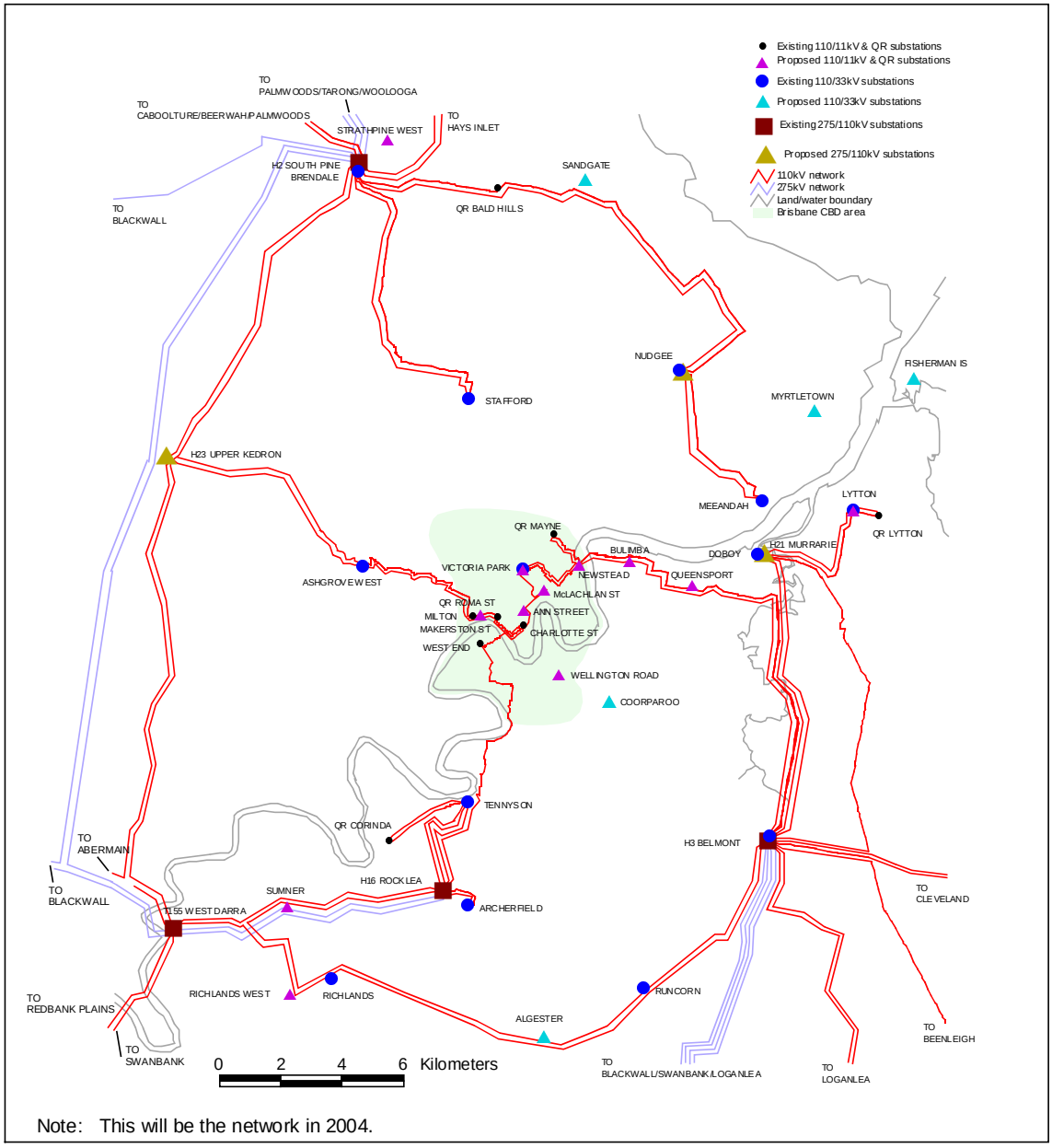
3.2 Existing Supply Network

3.2.1. Existing 275/110 kV Network

3.2.1.1 Description of the Network

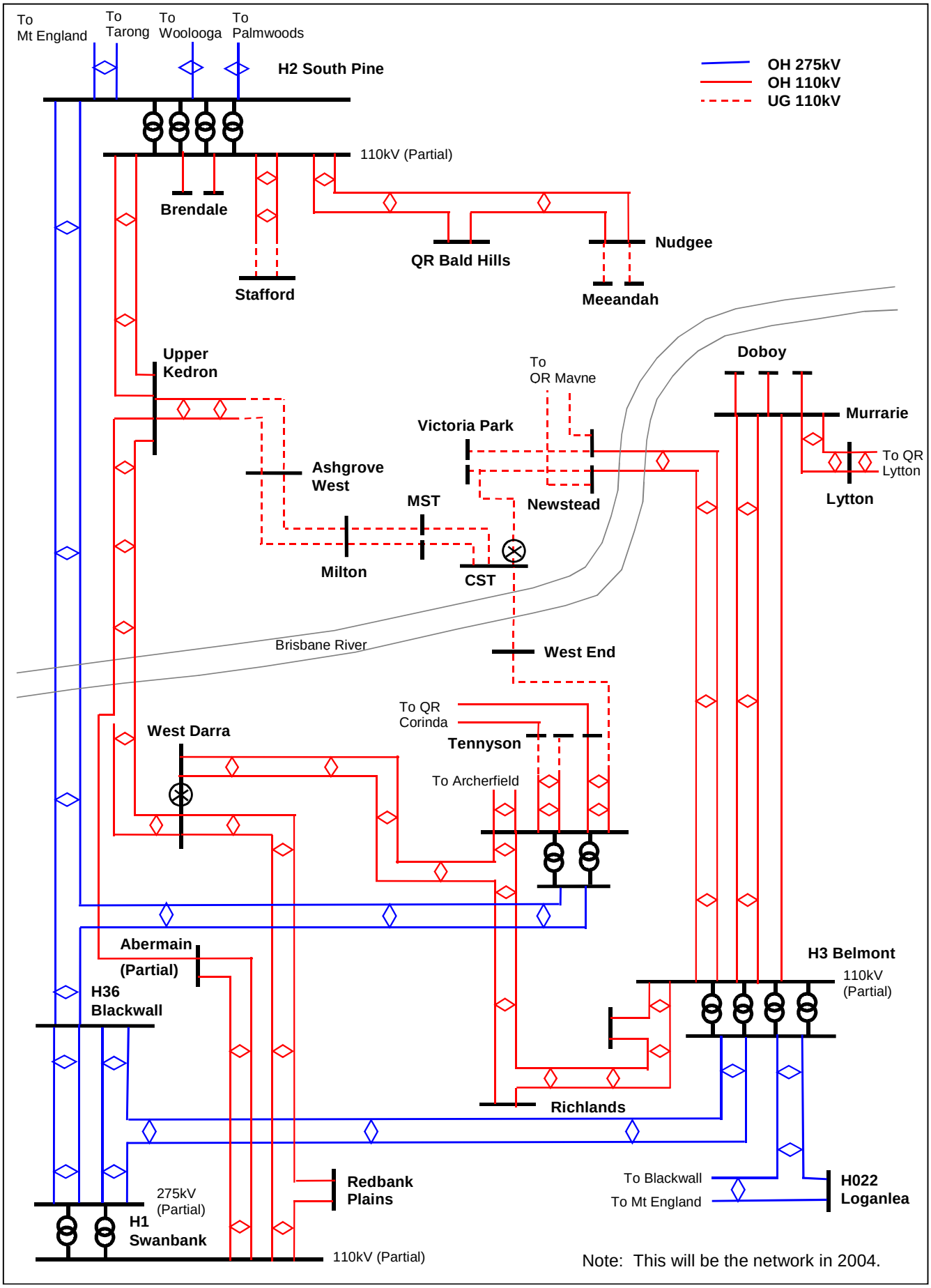
The Brisbane CBD Area is supplied from Powerlink 275/110 kV substations at South Pine, Belmont, Rocklea and Swanbank (refer to Figures 1 and 2).

Figure 1 – 275 kV and 110 kV Network
Supplying the Brisbane CBD Area in 2004



Note: This will be the network in 2004.

Figure 2 – 275 kV and 110 kV Network Schematic in 2004



Most of the load is supplied through the following 110 kV network:

(i). A double circuit overhead line/underground cable from Upper Kedron into the Brisbane CBD Area via Ashgrove West substation. Power flows into Upper Kedron substation from South Pine 275/110 kV substation in the north and Swanbank 275/110 kV substation in the south. South Pine 275/110 kV substation is equipped with 2 x 200 MV.A, 1 x 250 MV.A and 1 x 375 MV.A 275/110 kV transformers. It has 275 kV connections to several other substations including Tarong, Blackwall, Mt England, Palmwoods and Woolooga. Swanbank 275/110 kV substation is equipped with 2 x 250 MV.A 275/110 kV transformers. It has 3 x 275 kV connections to Blackwall, one connection to Belmont, as well as connections to local gas and coal-fired generation

(ii). A single circuit 110 kV overhead line/underground cable from Rocklea 275/110 kV substation into the CBD through West End. Rocklea 275/110 kV substation is equipped with 2 x 375 MV.A 275/110 kV transformers and is supplied by one double circuit 275 kV line. There is no spare space on the easement to construct any more 275 kV overhead lines into Rocklea substation.

(iii). A double circuit overhead line/underground cable from Belmont 275/110 kV substation into the CBD through Newstead and Victoria Park. (Note that there is a small powerflow into the CBD Area from Belmont 275/110 kV substation via the 33 kV network from Doboy 110/33 kV substation to Wellington Road 33/11 kV substation). Belmont 275/110 kV substation is equipped with 2 x 250 MV.A and 2 x 200 MV.A 275/110 kV transformers and is currently supplied by one double circuit 275 kV line. A second double circuit 275 kV line is currently under construction and is planned to be commissioned in late 2003.

The 110 kV network is run with the following normally open points to limit fault levels below equipment ratings and to regulate powerflows:

(i). At West Darra substation between the Rocklea and Swanbank/South Pine 110 kV networks;

(ii). At Charlotte Street substation between the Belmont and Swanbank/South Pine/Rocklea 110 kV networks

3.2.1.2 Technical Information

Ratings of 110 kV feeders relevant to supply to the Brisbane CBD Area are shown in Table 1.

Table 1– Ratings of 110 kV Circuits

110 kV Circuits	Rating (Applies to Each Circuit) – MV.A			
	Summer Normal	Summer Emergency	Winter Normal	Winter Emergency
South Pine – Upper Kedron	137	175	153	194
Upper Kedron – Ashgrove West (Both circuits in service)	184	226	213	325
Upper Kedron – Ashgrove West (One circuit in service only)	220	269	250	352
Ashgrove West – Milton (Both circuits in service)	167.5	295	178	342
Ashgrove West – Milton (One circuit in service only)	197.8	308.3	210	353.4

110 kV Circuits	Rating (Applies to Each Circuit) – MV.A			
	Summer Normal	Summer Emergency	Winter Normal	Winter Emergency
Milton – Makerston Street (Both circuits in service)	153.4	236.4	173	265.9
Milton – Makerston Street (One circuit in service only)	178.7	288.2	198.3	323
Makerston Street – Charlotte Street (Both circuits in service)	106	116	119	131
Makerston Street – Charlotte Street (One circuit in service only)	121	133	137	151
Charlotte Street – Victoria Park	186.3	413.1	198.3	466.4
Charlotte Street – West End	129	164	138	179
Rocklea – West End	124	156	132	176
Belmont – Newstead	177.1	221	269.1	269.1
Newstead – Victoria Park (Both circuits in service)	133.6	175.5	138.3	206.9
Newstead – Victoria Park (One circuit in service only)	154.3	211	161	236.7

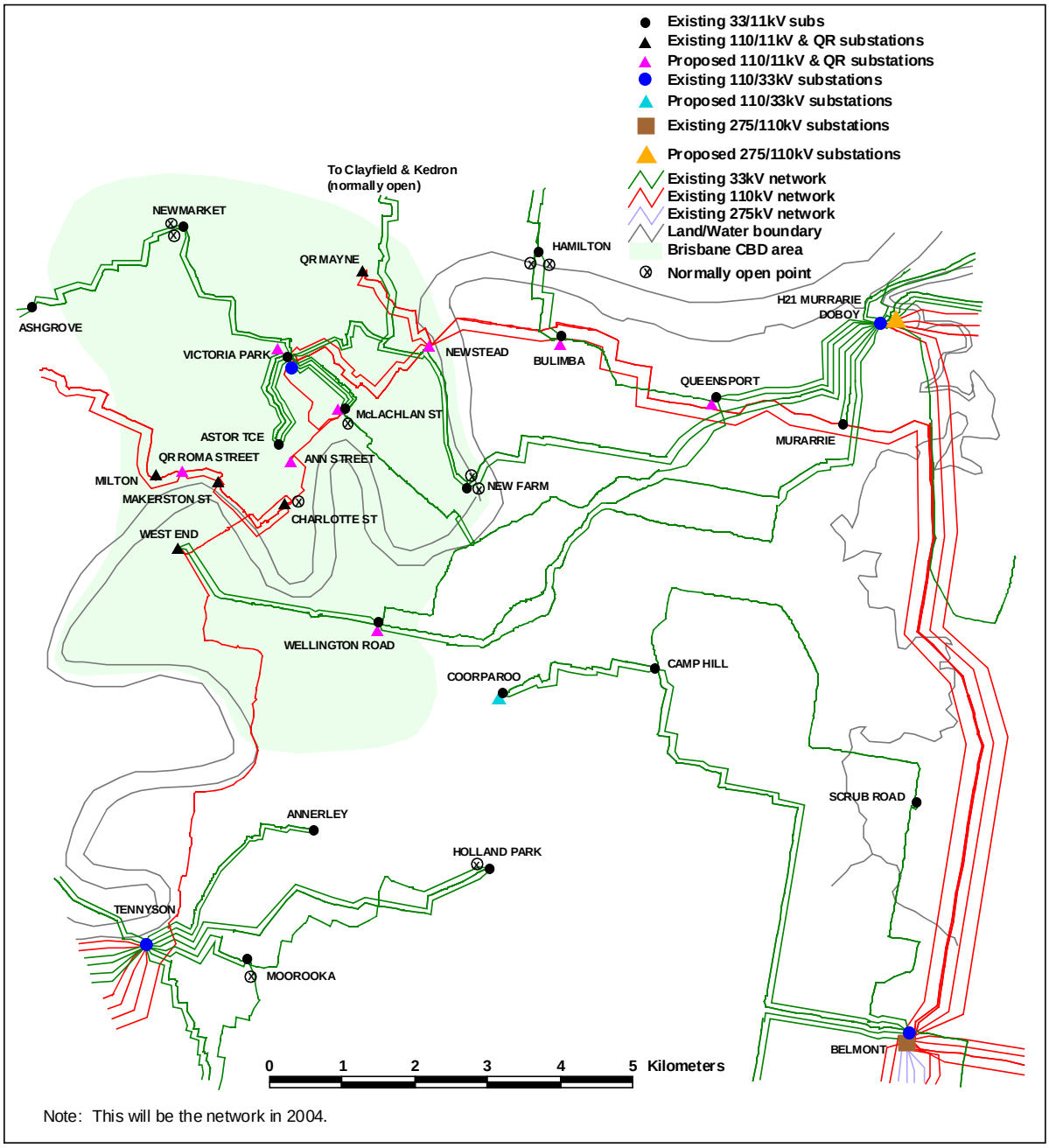
Note: Where two underground cables are installed in the same trench, their rating may be affected by mutual heating. Hence separate ratings have been given for both cables in service and one cable in service only.

3.2.2. Existing 110/33 kV and 110/11 kV Network

3.2.2.1 Description of the Network

The Brisbane CBD Area is supplied by an 11 kV distribution network, which is connected to a combination of newer 110/11 kV substations and older 33/11 kV substations – refer to Figure 3. The newer 110/11 kV substations at Makerston Street, Charlotte Street, West End and Milton are supplied directly from the 110 kV network described in Section 3.2.1. The 33/11 kV substations are supplied by a 33 kV network from 110/33 kV bulk supply substations at Victoria Park and Doboy. Victoria Park 110/33 kV substation supplies 33/11 kV substations at Victoria Park itself, Astor Terrace, McLachlan Street, Newmarket and New Farm. Doboy 110/33 kV substation supplies Wellington Road 33/11 kV substation. There are also 33/11 kV transformers at West End, however, these transformers are essentially decommissioned units at the end of their technical lives. They are retained for emergency use only during failures of other transformers and do not normally supply any load.

Figure 3 – Existing 110 kV and 33 kV Network
Supplying the Brisbane CBD Area



Note: This will be the network in 2004.

3.2.2.2 Technical Information

Ratings of 110/33 kV, 110/11 kV, and 33/11 kV substations relevant to supply to the Brisbane CBD Area are shown in Table 2.

Table 2 - Ratings of Substations

Substation Name	Substation Ratings in Summer (MV.A)			
	Voltage	Installed Transformers (Nameplate Rating)	Normal Cyclic Rating (Network Normal)	Emergency Rating (N-1)
Victoria Park	110/33 kV	2 x 120 MV.A	252	150
Wellington Road (See Note)	33/11 kV	2 x 25 MV.A and 2 x 12.5 MV.A	52.5	62.5
Astor Terrace	33/11 kV	4 x 20 MV.A	84	75

Note: The 2 x 12.5 MV.A transformers at Wellington Road do not normally supply any load and are essentially decommissioned units at the end of their technical lives retained for emergency use in case of transformer failures (see section 7.3.4.2). They cannot be operated in parallel with the two larger units due to uneven load sharing and fault level limitations.

3.2.3. Existing 33 kV Network Relevant to the CBD Investigation

3.2.3.1 Description of the Network.

Figure 3 shows the 33 kV network supplying the CBD and adjacent area. As discussed in Section 3.2.2.1, all but one of the 33/11 kV zone substations supplying the CBD area are connected to Victoria Park 110/33 kV bulk supply substation. The other 33/11 kV zone substation, Wellington Road, is supplied from Doboy 110/33 kV bulk supply substation. Other 33 kV networks relevant to the CBD investigation are supplied from Tennyson and Belmont 110/33 kV substations.

3.2.3.2 Technical Information

Ratings of 33 kV feeders relevant to the CBD investigation are shown in Table 3.

Table 3 – Ratings of 33 kV Circuits

33 kV Circuits	Rating (Applies to Each Circuit) – MV.A			
	Summer Normal	Summer Emergency	Winter Normal	Winter Emergency
Belmont – Scrub Road	21	25.1	25.9	29.9
Belmont – Camp Hill (Both circuits in service)	27.7	44.3	29.6	47.4
Belmont – Camp Hill (One circuit in service)	30.8	44.3	32.9	47.4
Scrub Road – Camp Hill	14.3	17	19.6	19.6
Camp Hill – Coorparoo	19.7	23.1	21.2	24.6
Tennyson – Holland Park (Both circuits in service)	15.3	18.3	16.6	20.7
Tennyson – Holland Park (One circuit in service)	16.8	19.3	18.2	21.8

33 kV Circuits	Rating (Applies to Each Circuit) – MV.A			
	Summer Normal	Summer Emergency	Winter Normal	Winter Emergency
Tennyson – Moorooka (Both circuits in service)	15.3	18.3	16.6	20.7
Tennyson – Moorooka (One circuit in service)	16.8	19.3	18.2	21.8
Moorooka – Holland Park	20.4	27.3	22.3	29.8

Note: Where two underground cables are installed in the same trench, their rating may be affected by mutual heating. Hence separate ratings have been given for both cables in service and one cable in service only.

3.3 Future Network and Generation Development

3.3.1. Committed Future Network Development

Powerlink is currently constructing a second double circuit 275 kV line into Belmont substation. It is also establishing a 110 kV bus at Murarrie substation. Reinforcement of supply capability to West End is also committed through installation of an additional circuit between Curzon Street (near Rocklea) and Tennyson. These have been included in Figures 1 to 3 as these show the network configuration as it will be in 2004.

Powerlink is currently considering augmentation of the transformer capacity at Loganlea due to forecast limitations on supply though the Belmont 275/110 kV transformers. This proposed augmentation is discussed further in Powerlink's 2003 Annual Planning Report.

Powerlink and ENERGEX are not aware of any other committed network augmentations in the target area.

3.3.2. Committed Future Generation Development

ENERGEX and Powerlink are not aware of any large committed generation development in the target area. There are some small standby generators. These are often installed in high rise buildings. Their operation may be limited by factors such as the following:

(i) They can not generally be operated in parallel with the ENERGEX electrical network for technical reasons;

(ii) There is often limited on-site fuel storage;

(iii) Operation for extended periods may cause environmental concerns due to emissions.

3.3.3. Committed Demand Side Management Development

ENERGEX has an extensive load control system which can switch curtailable loads such as hot water systems. This is achieved by injection of a 1,050 Hz signal on to the electricity network by special equipment installed at substations. Special receivers are installed at customers' premises to switch the loads. This equipment is currently installed at substations surrounding the CBD, but not in the CBD itself. There are technical problems associated with 1,050 Hz signal propagation in the CBD electricity network.

3.3.4. Possible Future Development Strategies

ENERGEX has an ongoing strategy to replace 33 kV network at the end of its technical and economic life in the CBD Area with new, high capacity 110 kV network where economically justified. A major advantage of supplying high density loads with 110 kV cables is reduced trenching requirements, which reduces costs, traffic disruption, etc. As shown in Figures 1 and 3, this strategy involves possible future replacement of existing 33/11 kV equipment

with 110/11 kV equipment at the existing Wellington Road, McLachlan Street and Victoria Park 33/11 kV substation sites as well as replacement of existing 33/11 kV equipment at Astor Terrace substation with 110/11 kV equipment at the adjacent Ann Street substation site. (Some civil works at Ann Street substation have been completed as part of a multi storey building on the site).

In addition to future 110/11 kV substations in the CBD Area, Queensland Rail have foreshadowed a possible future need for another 110 kV connection point to their suburban electric rail network in the vicinity of Roma Street Station.

Powerlink has sites suitable for establishment of 275/110 kV substations at Upper Kedron, Murarrie and Nudgee. These may be required to meet the increased loads at existing 275/110 kV substations at South Pine, Swanbank, Rocklea and Belmont, as well as limiting the extent of future development of the 110 kV network.

Although it is outside the CBD Area, ENERGEX also has a tentative plan to establish a future 110/33 kV substation at Coorparoo to meet the forecast increased loads at the adjacent Tennyson and Belmont 110/33 kV substations as well as limiting the extent of future development of the 33 kV network required from the existing Tennyson and Belmont substations.

4.0 LOAD CHARACTERISTICS

4.1 Overview

The Brisbane CBD Area accounts for over 10% of the total ENERGEX electricity demand in South East Queensland. A major component of the load is the commercial high rise in the Brisbane CBD itself. Other important load in the surrounding area includes the following:

(i) Queensland Rail traction load (ie. part of the suburban electric rail network is supplied from a 110/25 kV intake substation at Mayne);

(ii) Three major hospitals (ie. Royal Brisbane, Princess Alexandra and Mater), as well as smaller hospitals such as St Andrews and Holy Spirit;

(iii) Queensland University of Technology campuses at Gardens Point, South Brisbane and Kelvin Grove;

(iv) Castlemaine Brewery at Milton.

There is also a component of residential load due to the following:

(i) Multi-unit dwellings and detached houses in the inner city suburbs surrounding the CBD;

(ii) Residential high rise in the CBD itself.

4.2 Pattern of Use

The pattern of electricity use in the CBD Area is driven by the large commercial component of the load. This results in a relatively constant demand profile during the day which then drops away at night – refer to Figure 4. The annual load duration curves for four of the CBD substations are shown in Figure 5.

Figure 4 – CBD Daily Load Curves

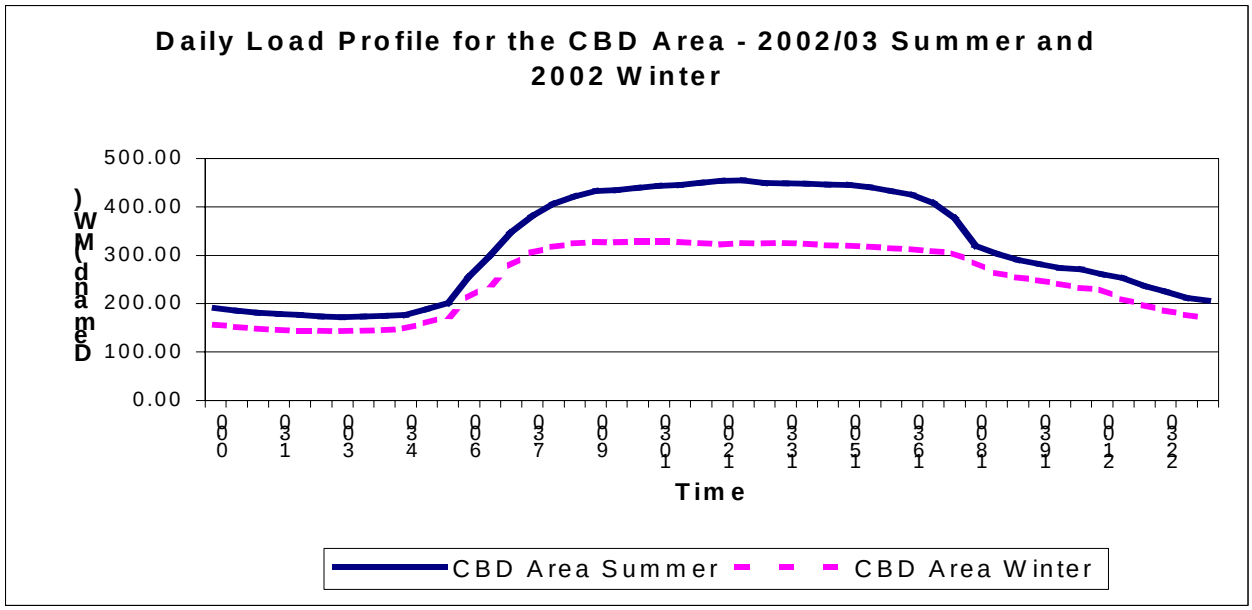
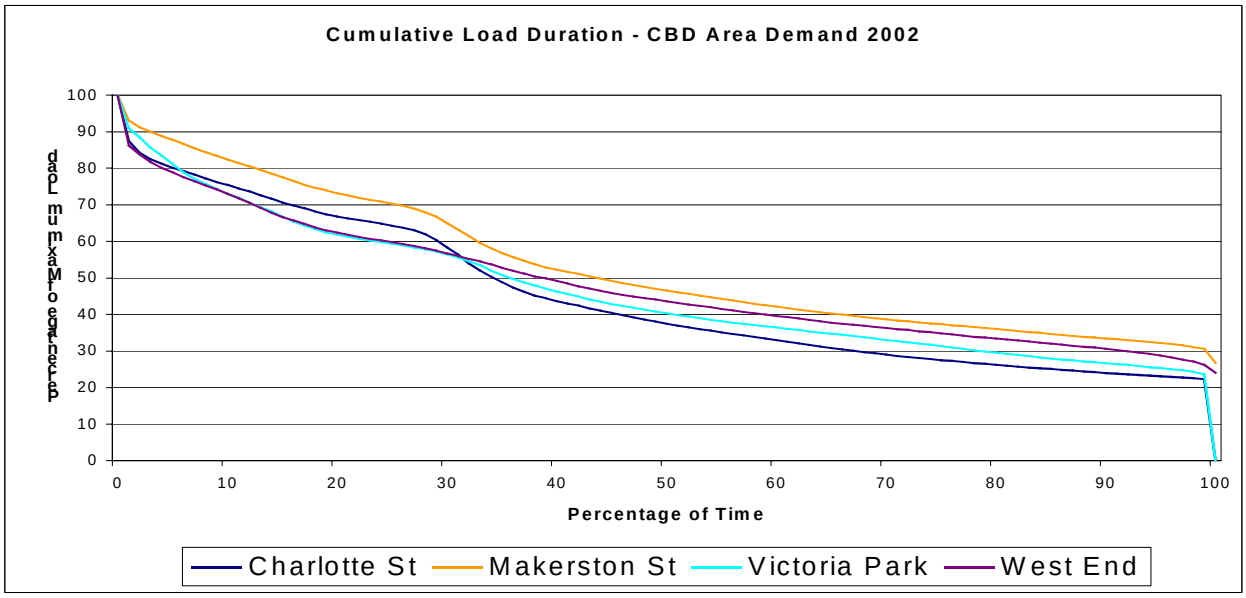


Figure 5 – CBD Load Duration Curves



4.3 Load Growth

Electricity demand growth in the Brisbane CBD Area is mainly dependent on commercial development and construction of high rise residential units. Although there are relatively few vacant sites in the CBD itself, older buildings continue to be demolished to make way for modern high rise buildings. Some recent examples of this are as follows:

(i) MacArthur Towers (in Edward Street between Queen and Elizabeth Streets, next to the GPO);

(ii) Queen Street Central; (in Edward Street between Queen and Adelaide Streets, next to David Jones);

(iii) Magistrates Courts (in George Street at the intersection of Turbot Street);

(iv) Riparian Plaza (near the intersection of Creek, Charlotte and Eagle Streets).

A recent trend within the Brisbane CBD itself is the construction of residential high rise. The Brisbane City Council has been encouraging this to relieve the pressure on transportation systems bringing workers into the CBD in the morning and taking them home again in the evening. Indications are that there is currently an oversupply of residential units in the CBD so construction of these has slowed. It has not totally stopped, however, and current developments include the following:

(i) Felix Apartments (corner of Mary and Felix Streets);

(ii) Casino Towers (141 George Street);

(iii) Lexicon Apartments (corner of Ann and Wharf Streets).

(iv) 212 Mary Street.

Sites to be developed in the future include the old Trittons site (corner of Queen Street and North Quay), Festival Hall site, proposed Aurora Tower (corner of Queen and Wharf Streets), and 120 Charlotte Street (next to the ENERGEX building).

In addition to construction of new buildings within the CBD, existing buildings are being refurbished. This includes replacement of existing old air conditioning units.

Steady residential and commercial development is also occurring in the inner city suburbs surrounding the CBD as older detached houses, warehouses, etc. are replaced with low and medium rise offices and residential apartments. Some major sites that are being re-developed include the old Kelvin Grove Army Barracks site and the old James Hardie/gas storage site at Newstead.

Powerlink and ENERGEX are aware that many residential customers are retrofitting air conditioners into their houses. An additional growth factor has been allowed in the load forecast for substations that supply residential areas (with detached houses) to account for this.

4.4 Load Forecast

A peak load forecast for the CBD Area is shown in Table 4. This includes all load supplied by 110 kV substations at Charlotte Street, Makerston Street, Milton, West End, Victoria Park and QR Mayne as well as the 33/11 kV substation at Wellington Road.

Table 4 – Peak Load Forecast for the CBD Area (MW)

YEAR	PEAK LOAD IN THE CBD AREA	
	Summer	Winter
2002	454	328
2003	503	352
2004	536	385
2005	569	401
2006	584	413
2007	597	447
2008	611	458
2009	626	470
2010	642	482
2011	657	494
2012	672	507

Other peak load forecasts relevant to the investigation are as follows:

(i) Load forecasts for substations at Victoria Park (110/33 kV), Astor Terrace (33/11 kV), and Wellington Road (33/11 kV) – refer Table 5;

(ii) Load forecasts for 33/11 kV zone substations at Scrub Road, Camp Hill and Coorparoo – refer Table 6.

(iii) Load forecast for 33/11 kV zone substations at Holland Park and Moorooka – refer Table 7.

Note that in Tables 4 to 7, the year 2002 denotes 2002 winter and 2002/03 summer. Note also that there is a load transfer from Astor Terrace 33/11 kV substation to Charlotte Street 110/11 kV substation prior to 2003/04 summer to reduce loading on Astor Terrace substation.

Table 5 – Peak Load Forecast for CBD Substations
Relevant to the CBD Investigation (MW)

YEAR	Victoria Park 110/33 kV Sub		Astor Terrace 33/11 kV Sub		Wellington Road 33/11 kV Sub	
	Summer	Winter	Summer	Winter	Summer	Winter
2002	184	125	75	57	45	32
2003	183	134	67	60	47	34
2004	189	131	68	53	49	35
2005	196	136	70	55	51	36
2006	200	139	72	56	53	38
2007	205	142	73	57	55	39
2008	210	145	74	58	57	41
2009	215	149	76	59	59	42
2010	221	153	77	60	62	44
2011	226	156	78	61	64	46
2012	232	160	80	62	67	48

Table 6 – Peak Load Forecast for 33/11 kV Substations (Supplied from Belmont)
Relevant to the CBD Investigation (MW)

YEAR	Scrub Road 33/11 kV Sub		Camp Hill 33/11 kV Sub		Coorparoo 33/11 kV Sub	
	Summer	Winter	Summer	Winter	Summer	Winter
2002	26	22	16	23	12	12
2003	28	24	17	24	12	12
2004	29	25	18	25	13	13
2005	30	26	18	26	13	13
2006	31	27	19	27	13	13
2007	32	28	20	28	14	14
2008	33	29	20	29	14	14
2009	34	30	21	30	15	15
2010	35	31	22	31	15	15
2011	36	32	22	32	15	16
2012	37	33	23	33	16	16

Table 7 – Peak Load Forecast for 33/11 kV Substations (Supplied from Tennyson) Relevant to the CBD Investigation (MW)

YEAR	Holland Park 33/11 kV Sub		Moorooka 33/11 kV Sub	
	Summer	Winter	Summer	Winter
2002	21	22	17	18
2003	22	23	17	18
2004	23	24	17	19
2005	23	24	18	19
2006	24	25	18	20
2007	24	25	19	20
2008	25	26	19	20
2009	25	26	19	21
2010	26	27	20	21
2011	26	27	20	22
2012	27	28	20	22

5.0 DISTRIBUTION AND TRANSMISSION PLANNING CRITERIA

ENERGEX and Powerlink must comply with technical standards in the National Electricity Code because they are a Distribution Network Service Provider (DNSP) and Transmission Network Service Provider (TNSP) respectively. In particular, requirements relating to reliability and system security contained in Schedule 5.1 of the Code must be met. This schedule requires that the transmission and distribution networks be planned so that:

- the power frequency voltage is maintained within limits outlined in S5.1.4;
- voltage fluctuations do not exceed limits set out in S5.1.5;
- harmonic voltage distortion does not exceed limits set out in S5.1.6;
- voltage unbalance does not exceed limits set out in S5.1.7;
- the power system can operate in a stable state as defined in S5.1.8;
- faults can be cleared in times specified in S5.1.9;
- current rating of equipment is not exceeded as described in S5.1.12.

Schedule 5.1 also includes details of credible contingencies and levels of redundancy to be considered in planning and operating the transmission network.

Examples of differing levels of redundancy include:

- 'N-1': able to meet peak load with the worst *single* credible fault or contingency;
- 'N-2': able to supply all peak load during a *double* contingency; and
- 'System Normal' (or 'Network Normal'): the absolute minimum level of reliability required. Defined as the ability to supply all load with all elements of the electricity system intact (ie – loss of supply would occur if a single fault or contingency occurred at time of peak load).

Planning for augmentation of the interconnected 275 kV and 110 kV network is based on the N-1 reliability criterion. The connection agreement between ENERGEX and Powerlink includes obligations regarding the reliability of supply as required under clause 5.1.2.2 of the Code. Capacity is required to be provided to the CBD such that the forecast peak demand can be supplied with the most critical element out of service, ie. N-1. Powerlink's transmission authority requires Powerlink to plan and develop its network such that the power transfer available through the power system will be adequate to supply the forecast peak demand during the most critical single network element outage.

Sufficient capacity is required to be provided in the ENERGEX 33 kV network to meet the forecast peak demand under intact conditions. Although much of the ENERGEX 33 kV network is interconnected, it may not provide full 'N-1' capacity at time of peak load. Because peak loads usually only occur for a short period of time, the risk of a fault coinciding with peak loads is usually very small. This risk, although small, is managed in a variety of ways including provision of real time data acquisition and control systems, provision of plant overload protection software, preparation of suitable contingency plans, use of mobile substations, and use of spare transformers (kept specially for emergencies).

Because much of the ENERGEX 11 kV distribution network is radial, single contingencies will generally result in loss of supply until switching occurs or repairs are carried out.

6.0 BACKGROUND – NETWORK CAPABILITY

6.1 General

There are a range of technical factors which influence transmission and distribution network capability. Most important in relation to the network supplying the Brisbane CBD Area are thermal ratings of equipment. Another technical factor relevant to the investigation is the age-related deterioration of some elements of the network.

6.2 Thermal Ratings

The thermal rating of lines and other equipment refers to the safe maximum current carrying capacity. For overhead lines, these ratings are set at a level to avoid breaching statutory ground clearances. Normal ratings may be safely exceeded for very short periods, but extended operation above plant ratings will cause line conductors to sag below safe levels[3] and/or items of equipment to burn out. For transformers and underground cables, these ratings are generally set at a safe level to avoid failure of the electrical insulation systems. A Network Service Provider's licence requires it to protect its transmission and/or distribution network to ensure the safe transmission and/or distribution of electricity. Load shedding may be required to avoid exceeding thermal ratings.

6.3 Age Related Deterioration of Equipment

Most elements of transmission and distribution networks have an economic life of about forty to forty-five years. After about this timeframe, maintenance costs often become higher, failure rates often increase and spare parts often become very difficult to obtain.

[3] Operation above normal ratings is dependent on ambient conditions at the time.

7.0 EMERGING NETWORK LIMITATIONS

7.1 Overview

The electricity network supplying the Brisbane CBD Area is presently capable of supplying all of the area's power needs under intact network conditions. However, analysis by ENERGEX and Powerlink shows that during the period of the study the network will be unable to supply all of the load during intact network conditions due to overload at Wellington Road zone substation as well as the Rocklea to West End 110 kV cable.

Analysis also shows that if certain critical single contingencies occur at time of peak load, then the rest of the network will be unable to supply the remaining load and load shedding will be required.

As well as thermal limitations, some elements of the network are deteriorating due to age.

7.2 Thermal Overloads

7.2.1. General

This section discusses thermal overloads on sections of the network relevant to the CBD augmentation. Although some of the thermal overloads are on sections of the network outside the CBD area, these may impact on the capability of the network supplying the CBD area. The thermal overloads will be discussed under the headings of network normal (intact) overloads and overloads during contingencies.

7.2.2. Network Normal Overloads

7.2.2.1 General

The following sections of the network are forecast to experience flows in excess of the normal thermal ratings for intact system conditions during the period of the study:

(i). The 110 kV cable between Rocklea and West End substations from the summer of 2005/06 onwards.

(ii). The 33/11 kV transformers at Wellington Road from the summer of 2006/07 onwards.

(iii). The 33/11 kV transformers at Astor Terrace zone substation from the summer of 2010/11 onwards.

(iv). Some elements of the Belmont and Tennyson 33 kV networks from the summer of 2007/08 onwards.

7.2.2.2 Overload of the Rocklea to West End 110 kV Cable

This cable is of 300 mm² copper XLPE single core construction. It has a normal rating of 124 MV.A in summer[4].

Table 8 shows the forecast powerflow through the Rocklea to West End 110 kV cable during intact network conditions in summer. Flows in excess of normal rating are highlighted.

Table 8 – Powerflow through the Rocklea to West End 110 kV Cable in Summer

Summer Years	2004/05	2005/06	2006/07
Powerflow (MV.A)	119	**132**	**140**

[4] This rating has been confirmed in a joint study with QUT, which involved detailed investigations including temperature monitoring at selected points along the cable and assessment of soil thermal resistivity along the cable route.

7.2.2.3 Overload of the 33/11 kV Transformers at Wellington Road Zone Substation

Wellington Road is equipped with two new 15/25 MV.A and two old 10/12.5 MV.A 33/11 kV transformers as well as four 5 Mvar 11 kV capacitors. The two 10/12.5 MV.A 33/11 kV transformers are energised but do not normally supply any load[5].

It is forecast that the normal rating of the two 15/25 MV.A transformers will be exceeded during intact network conditions in 2006/07 summer by 1.6 MV.A.

7.2.2.4 Overload of the 33/11 kV Transformers at Astor Terrace Zone Substation

Astor Terrace is equipped with four 15/20 MV.A 33/11 kV transformers and six 5 Mvar 11 kV capacitor banks. To limit 11 kV fault levels, three of the four transformers are run in parallel and one is run separately. Because of unequal load sharing, the normal rating of the transformers is 80 MV.A with all four units in service. It is forecast that required powerflow will exceed this rating during intact network conditions by 0.8 MV.A in 2010/11 summer. Note that a load transfer from Astor Terrace to Charlotte Street substation is planned prior to October 2003 to prevent network normal overload in 2003/04 summer. (This transfer is included in the load forecasts in this report[6]).

The following should be noted regarding further load transfers from Astor Terrace substation:

(i). No further load transfers from Astor Terrace can be achieved without augmentation works.

(ii). With augmentation works, the load transfers from Astor Terrace substation would be to adjacent substations at Makerston Street (existing 110/11 kV), Charlotte Street (existing 110/11 kV) or Ann Street (proposed future 110/11 kV on an existing ENERGEX site). These load transfers would increase loading on the Rocklea to West End 110 kV cable thereby exacerbating other limitations.

7.2.2.5 Overload of 33 kV Networks from Belmont and Tennyson 110/33 kV Substations

As discussed in Sections 3.2.3.1 and 3.3.4, although these networks are not in the Brisbane CBD Area, they are still relevant to the CBD investigation.

It is forecast that the rating of the 33 kV underground cables between Tennyson and Holland Park will be exceeded under intact network conditions from summer 2007/08 onwards.

It is forecast that the rating of the 33 kV underground feeders between Belmont and Camp Hill will be exceeded during intact network conditions from summer 2010/11 onwards.

7.2.3. Thermal Overloads During Contingencies

7.2.3.1 Contingencies on the 110 kV Network

Table 9 lists 110 kV feeders which would experience powerflows above their emergency rating and the magnitude of overloads for various outages on the 110 kV network in 2005/06 summer before available emergency load transfers are implemented.

[5] See section 3.2.2.2.
[6] see section 4.4.

Table 9 – Overloaded 110 kV Feeders and Magnitude of Overload for Various 110 kV Feeder Outages in 2005/06 Summer - Before Load Transfers

110 kV Feeder Outage	Overload Above Emergency Rating	
	Overloaded Feeder	Overload (MV.A)
South Pine – Upper Kedron	Rocklea – West End	5
Upper Kedron – Ashgrove West	Rocklea – West End	12
Ashgrove West - Milton	Nil	
Milton – Makerston St	Makerston St – Charlotte St	25
Milton – Charlotte St	Nil	
Rocklea – West End	Makerston St – Charlotte St	7
Newstead – Victoria Park	Newstead – Victoria Park Belmont – Newstead	3 4
Belmont - Newstead	Belmont – Newstead	6

Prior to 2005/06 summer, overloads for the outages listed in Table 9 also occur but can be satisfactorily managed by various operational strategies. These include transferring load on the 33 kV and 11 kV networks and making use of the normally open 110 kV tie cable between Charlotte Street and Victoria Park substations. For the summer of 2005/06 onwards the magnitude of overloads can no longer be managed by operational strategies and corrective action is required, to avoid sustained load shedding during outages coincident with time of peak load.

7.2.3.2 Contingencies at Victoria Park 110/33 kV Bulk Supply Substation

Table 10 lists loads above the N-1 summer emergency capacity for Victoria Park 110/33 kV substation ie. overloads that would occur if a single transformer outage occurred at time of peak load. These loads are before available emergency load transfers are implemented.

Table 10 – Load Above N-1 Emergency Capacity for Victoria Park110/33 kV Substation in Summer (Before Load Transfers) – MV.A

Summer Year	Victoria Park (150)
2002/03	48
2003/04	42
2004/05	50
2005/06	57
2006/07	63

Note: The number in brackets after the substation name is the N-1 Emergency Capacity of the substation in summer.

Table 10 shows that load on Victoria Park 110/33 kV bulk supply substation already exceeds the N-1 emergency capacity of the substation. This overload is managed by operational strategies such as emergency load transfers. Examples of available load transfers include moving Newmarket and New Farm 33/11 kV zone substation load to adjacent 110/33 kV bulk supply substations.

Up until 2006/07 summer, overload for an outage of a 110/33 kV transformer at Victoria Park bulk supply substation can be satisfactorily handled by operational strategies. For the summer of 2006/07 onwards the magnitude of overloads can no longer be managed by operational strategies and corrective action is required, to avoid sustained load shedding during outages coincident with time of peak load.

7.2.3.3 Contingencies on the 33 kV Network

Table 11 lists 33 kV feeders which would experience powerflows above their emergency rating and the magnitude of overloads for various outages on the 33 kV network in 2007/08 summer before available load transfers are implemented.

Table 11 – Overloaded 33 kV Feeders and Magnitudes of Overload for Various 33 kV Feeder Outages in 2007/08 Summer - Before Load Transfers

33 kV Feeder Outage	Overload Above Emergency Rating	
	Overloaded Feeder	Overload (MV.A)
Belmont – Scrub Rd	Scrub Rd – Camp Hill Belmont – Camp Hill	23.3 1.8
Belmont – Camp Hill	Belmont – Scrub Rd Belmont – Camp Hill	6.4 1.4
Camp Hill – Scrub Rd	Belmont – Scrub Rd	12.2
Tennyson – Moorooka	Tennyson – Moorooka	4.9
Tennyson – Holland Park	Tennyson – Holland Park	11.4

Note: For a cable outage between Tennyson and Holland Park, the normally open cable between Moorooka and Holland Park is brought into service.

Up until 2007/08 summer, the overloads listed in Table 11 also occur but can be satisfactorily handled by operational strategies. For the summer of 2007/08 onwards the magnitude of overloads can no longer be managed by operational strategies and corrective action is required, to avoid sustained load shedding during outages coincident with time of peak load.

7.2.3.4 Contingencies at 33/11 kV Zone Substations

Table 12 lists loads above N-1 summer emergency capacity for Wellington Road and Astor Terrace 33/11 kV substations ie. overloads that would occur if a single transformer outage occurred at the time of peak load. These loads are before available emergency load transfers are implemented.

Table 12 – Load Above N-1 Emergency Capacity for Zone Substations in Summer (Before Load Transfers) – MV.A

Summer Year	Wellington Road (62.5)	Astor Terrace (75.0)
2002/03	Nil	3
2003/04	Nil	Nil
2004/05	Nil	Nil
2005/06	Nil	Nil
2006/07	Nil	Nil
2007/08	2	1
2008/09	4	3

Summer Year	Wellington Road (62.5)	Astor Terrace (75.0)
2009/10	7	4
2010/11	10	6
2011/12	13	7
2012/13	16	9

Note: The number in brackets after the substation name is the N-1 Emergency Capacity of the substation in summer.

Table 12 shows that loading on Wellington Road and Astor Terrace 33/11 kV substations does not exceed the N-1 emergency capacity until 2007/08 summer, and even then, the overload is only marginal. The normal cyclic capacity for Wellington Road substation (for the intact network) is actually exceeded in the summer of 06/07 before the N-1 emergency capacity is exceeded[7].

7.3 Ageing Equipment Limitations

7.3.1. General

The Brisbane CBD Area is supplied by a combination of newer 110/11 kV substations and older 33/11 kV substations.

The older 33/11 kV substations are supplied from 110/33 kV substations at Victoria Park and Doboy.

This section discusses ageing equipment in substations as well as ageing 33 kV cables that are relevant to the Brisbane CBD investigation,

7.3.2. Victoria Park 110/33 kV Substation

Victoria Park 110/33 kV substation was established in the late 1960's with two 120 MV.A 110/33 kV transformers.

An assessment of insulation in these transformers in the 1990's showed that the insulation was in very poor condition and probability of transformer failure was very high. To mitigate the risk of failure of one transformer, resulting in failure of the other transformer due to the increased loading, the transformer in the worst condition was replaced with a new 120 MV.A unit that was manufactured in 1999.

The old unit that was replaced has been left on site as a "cold" standby unit, to be used in an emergency if the other old unit fails.

7.3.3. Ageing 33 kV Cables

Cables supplying Astor Terrace 33/11 kV substation are just over 30 years old and are expected to last in excess of ten years.

Wellington Road 33/11 kV substation is supplied by three 33 kV feeders which are comprised of a combination of underground cable and overhead line. The oldest feeder is a double circuit underground cable that was installed in 1956. These cables are nearly fifty years old, and their condition is such that they are reaching the end of their life. The other two feeders are partially overhead and partially underground construction. Some sections of these have been replaced, but there are still some sections that are nearly fifty years old.

The only other ageing 33 kV cables relevant to the investigation are those supplying Moorooka and Holland Park 33/11 kV substations. All these cables were installed in the 1950's so they are all approximately 50 years old and nearing the end of their life.

[7] see section 7.2.2.3.

7.3.4. Astor Terrace and Wellington Road 33/11 kV Substations

7.3.4.1 Astor Terrace 33/11 kV Substation

Astor Terrace substation was established in about 1970 with three 33/11 kV 15/20 MV.A transformers. A fourth 15/20 MV.A transformer was installed in about 1974. Two of the three transformers that were installed in about 1970 failed in 1998. Following these failures, all three transformers that were installed in about 1970 were rewound and had new tapchangers fitted.

The transformer that was installed in about 1974 has been assessed as having a remaining life of at least five to ten years, depending on loading and whether it is subject to high current through faults.

7.3.4.2 Wellington Road 33/11 kV Substation

Wellington Road substation was established in about 1951 with two 10/12.5 MV.A 33/11 kV transformers. Since then, two 15/25 MV.A transformers have been installed, one manufactured in 1995 and one manufactured in 2000.

The existing two 10/12.5 MV.A transformers (manufactured in 1951) have been left on the site in “hot standby” mode. Although they are energised, they do not normally supply any load. They will be placed in service to supply load if one of the new 15/25 MV.A units fail. Because they are so old and in such poor condition, they are assessed as having a high probability of failure if they are required to supply load.

8.0 FACTORS IMPACTING TIMING OF REQUIRED CORRECTIVE ACTION

8.1 Summary of Major Drivers for Corrective Action

Section 7.2.2 identified that without corrective action, the existing network supplying the Brisbane CBD and surrounding area will be unable to maintain supply due to thermal overloads during intact network conditions as follows:

(i) Rocklea to West End 110 kV cable – by late 2005.

(ii) Wellington Road 33/11 kV substation - by late 2006.

(iii) Tennyson to Holland Park 33 kV cables – by late 2007.

In addition to the forecast intact network normal overloads, Section 7.2.3 identified that there were several single contingencies in various parts of the network where full supply may not be able to be maintained during outages at time of peak load. When outages do occur, loading above emergency equipment ratings is managed by a number of operational strategies. As loads increase, these operational strategies can no longer satisfactorily manage the overloads. The following have been identified as the time when loadings become too high to be satisfactorily managed by operational strategies and corrective action is therefore required:

(i) Outages on the 110 kV network supplying the Brisbane CBD Area – before 2005/06 summer.

(ii) Outages at Victoria Park 110/33 kV substation – before 2006/07 summer.

(iii) Outages on the Tennyson and Belmont 33 kV networks – before 2007/08 summer.

8.2 Assumed Electricity Demand

The primary driver for the thermal limitations summarised in the previous section is the forecast growth in electricity demand in the CBD Area. This is based on typical weather conditions and medium economic growth. Changes to these assumptions can alter the required timing for corrective action as follows:

(i) Very Hot, Humid Conditions: The measured loads in the CBD itself, which form the "starting values" for the load forecast, are "weather corrected" to a temperature of 35° C and a humidity of 66%. If there are extremely hot, humid days in summer, then loads will be higher than forecast. The network normal overloads on the Rocklea to West End 110 kV cable and Wellington Road 33/11 kV transformers may occur one year earlier than forecast (ie. 2004/05 summer and 2005/06 summer respectively). If this occurs, it will have to be managed by load transfers.

(ii) Mild Weather Conditions: Milder summer conditions reduce forecast demand on the electricity network. If there is a really mild summer, forecast network normal overload on the Rocklea to West End 110 kV cable and Wellington Road 33/11 kV transformers may not occur until one year later. Also, it is possible that no outages in 2005/06 summer will result in load shedding.

(iii) New Large Scale Commercial and Residential Developments: Known large block loads have been included in the demand forecast where developers have notified ENERGEX of their proposed developments. Some of these have been mentioned in Section 4.3. Due to lead times for large scale developments, it is considered unlikely that there will be any large block loads that have not been included in the load forecasts up to 05/06. If some developments are "fast tracked", loading may have to be managed by operational strategies such as load transfers. If some of the developments are delayed, then it is possible that the network normal overloads on the Wellington Road 33/11 kV transformers and Rocklea to

West End 110 kV cable will also be delayed. It is also possible that no outages in 2005/06 summer will result in load shedding. Action is still required prior to 2005/06 summer however, to avoid possible intact network overload on the Rocklea to West End 110 kV cable.

(iv) New Small Scale Commercial and Residential Developments: New small scale developments in the CBD itself have been allowed for with a general growth rate of about 2%. A slightly higher growth rate has been used for substations around the CBD to account for the large number of air-conditioners being retrofitted into domestic premises. If demand growth is higher than forecast, then network normal overloads may occur a year earlier. These will have to be managed by load transfers. If demand growth is lower than forecast, it is possible that network normal overloads may occur a year later and also that no outages in 2005/06 summer will result in load shedding. Action is still required prior to 2005/06 summer however, to prevent possible intact network overload of the Rocklea to West End 110 kV cable.

8.3 Other Factors

There are no other factors, given the existing electricity supply network and committed augmentations, which have been identified to influence the timing of network limitations in the CBD Area.

8.4 Conclusions

Without corrective action, the following intact network normal limitations are forecast to occur in the network supplying the Brisbane CBD and surrounding area:

(i) Rocklea to West End 110 kV cable – by late 2005.

(ii) Wellington Road 33/11 kV substation – by late 2006.

(iii) Tennyson to Holland Park 33 kV cables – by late 2007.

There are also several critical contingencies where full supply will not be able to be maintained during outages at time of peak load. The following have been identified as the time when loadings become too high to be satisfactorily managed by operational strategies and corrective action is therefore required:

(i) Outages on the 110 kV network supplying the Brisbane CBD Area – before 2005/06 summer.

(ii) Outages at Victoria Park 110/33 kV substation – before 2006/07 summer.

(iii) Outages on the Tennyson and Belmont 33 kV networks – before 2007/08 summer.

In view of the above factors, ENERGEX and Powerlink consider that, at the latest, corrective action is required for the 110 kV network supplying the CBD Area prior to the summer of 2005/06, Wellington Road 33/11 kV substation by October 2006, Victoria Park substation by October 2006, and the Tennyson/Belmont 33 kV networks by October 2007.

9.0 ASSESSMENT OF ALTERNATIVE SOLUTIONS

9.1 Identifying Solutions

As outlined in Section 7.0, it is essential that corrective action be taken prior to the summer of 2005/06 to maintain a reliable electricity supply to the Brisbane CBD Area. This action may involve network augmentation or the implementation of local generation and/or demand side management (DSM) options which reduce, defer or eliminate the need for new network investment. If possible, these solutions should take into account some or all of the emerging network limitations mentioned in this report.

This discussion paper and subsequent consultation, provides an opportunity for alternative solution providers to submit details of their proposals for consideration. The information provided in this document on limitations in the network supplying the Brisbane CBD Area is intended to enable interested parties to formulate and propose feasible and definitive local generation, network and DSM solutions.

9.2 Criteria for Solutions

As discussed in Section 7.0, there are substation and 33 kV network limitations as well as 110 kV network limitations in the network supplying the Brisbane CBD Area. The criteria discussed in this section generally pertain to solutions to the 110 kV network limitations. There are a similar set of criteria for each of the other limitations mentioned.

To assist solution providers understand the technical and other requirements, ENERGEX and Powerlink have identified the following criteria which must be satisfied if solutions are to meet the underlying need for augmentation of supply to the Brisbane CBD and surrounding area:

(i) Size: Feasible options must be large enough, individually or collectively, to overcome the identified thermal limitations. In 2005/06, this may require 50 – 100 MW of capacity to be supplied by alternative means (eg. a local generator, DSM program, etc.). The capacity required depends on the interaction between the location of the generator or other solution and local load levels. In subsequent years, required capacity would need to increase by approximately 10 – 20 MW each year to keep pace with load growth, again dependent on the location of the option.

(ii) Time of Year: Options must, at a minimum, be capable of meeting demand during peak summer months. Thermal limitations are more of a problem during summer than winter, because peak loads in the CBD Area are approximately 40% higher in summer than winter and thermal ratings are lower in summer than winter.

(iii) Location: To be a viable, “standalone”, non-network solution, an option must reduce the electricity that has to be transferred via the 110 kV network during network intact and contingency conditions. This implies that any “standalone” local generation or DSM option must be located so as to reduce load at 110 kV connection points in the CBD Area. Because the 110 kV connection points are not connected in parallel, it may be necessary to provide load relief at more than one connection point.

(iv) Operation: If it is recommended that a new local generation option is the most appropriate solution to overcome the network limitations, this generator will be required to operate “on demand” at certain times to satisfy reliability criteria as well as avoiding network intact overloads. Such operation will be required regardless of the pool price at the time as the National Electricity Code prevents a generator that is providing network support from setting the market price.

Generation will need to be operational during all peak load periods in summer to prevent network intact overloads. Following a contingency during non peak periods, ENERGEX may have a limited period (eg. one to two hours) to reduce network power flows below

normal equipment ratings. The generation would need to come on line during this time frame to avoid load shedding.

Demand side programs must reduce load below equipment ratings during network intact conditions in summer. They must also be capable of further reductions following contingencies. These reductions need to operate as follows:

(a) The load needs to be reduced very quickly (ie. less than one minute) to the emergency rating of the network (eg. emergency rating). Any customers agreeing to provide this load reduction would not be able to have any warning as the load reduction would need to be automated.

(b) Further load reductions are required within one to two hours so loads are reduced below the normal rating of the network. Customers agreeing to provide this load reduction would have some warning that load reduction was required.

The load reduction may be for an extended period depending on the type of contingency, ie. a 110 kV cable fault may take some weeks to locate and repair, whilst a faulty 275/110 kV transformer may take some weeks to install a spare unit if available or months to replace.

(v) Timeframe: All options must be operational by October 2005. As outlined, the required timing for corrective action to address network limitations is prior to the summer of 2005/06.

(vi) Reliability: Options must be capable of reliably delivering electricity under a range of conditions and, if a generator, must meet all relevant National Electricity Code requirements related to grid connection.

(vii) Certainty: Options must be committed by the end of 2003 using proven technology and have funding and project management to deliver within the required timeframe. Corrective action is critical to the reliability of electricity supply to the Brisbane CBD Area. It is not considered appropriate to rely on uncommitted development that may or may not proceed.

9.3 Assessment of Solutions

The ACCC's Regulatory Test and Chapter 5 of the National Electricity Code require ENERGEX and Powerlink to consider local generation, DSM, inter-regional and network options on an equal footing.

The Regulatory Test also specifies the assessment methodology to be used:

"In the event an augmentation is proposed to meet an objectively measurable service standard linked to the technical requirements of Schedule 5.1 of the Code, the augmentation satisfies the Regulatory Test if it ***minimises the net present value of the cos****t of meeting those standards having regard to a number of alternative projects, timings and market development scenarios".*

An augmentation proposed to meet an objectively measurable service standard linked to the technical requirements of Schedule 5.1 of the Code, or other statutory requirements, is referred to as a 'reliability augmentation'.

Any regulated augmentation proposed as a consequence of addressing the network limitations in supply to the Brisbane CBD Area as outlined in this report will be a 'reliability augmentation' because:

- there is a clear need for the augmentation based on the limitations identified in this report;
- the limitations are based on an objectively measurable service standard linked to the technical requirements of Schedule 5.1 of the Code as set out in this report.

This means that the assessment of solutions will be based on minimising the net present value of the cost of meeting the service standard.

A public process is required, with disclosure of project costs and comparison of alternatives. As the outcome of the economic analysis could be a recommendation to proceed with a regulated solution, it is important that all feasible options are considered in the process.

If a non-network option satisfies technical requirements, is committed and can be implemented for a lower cost than a network augmentation, it will be necessary for ENERGEX and/or Powerlink to enter into a network support agreement with the proponents of the alternative project to ensure supply reliability can be maintained. If regulated funding is required from ENERGEX and/or Powerlink, it is necessary that network support arrangements satisfy the Regulatory Test in terms of both economics and disclosure of relevant costs to the market.

10.0 REQUEST FOR INFORMATION

10.1 General

ENERGEX and Powerlink invite submissions and comments in response to this discussion paper from National Electricity Market participants, solution providers and any other interested parties.

Submissions should be presented in a written form and should clearly identify the proponent of the submission including contact details for subsequent follow-up if required. If parties prefer, or require additional information they may request to meet with ENERGEX and Powerlink ahead of providing a written response.

10.2 Submissions from Solution Providers

This is not a tender process – submissions are requested so that ENERGEX and Powerlink can fulfil their regulatory obligations to compare the net present value cost of alternatives to the option of augmenting the electricity network to maintain supply reliability.

If your submission proposes a solution, it should contain the following information:

- Details of the party making the submission (or proposing the solution);
- Technical details of the project (capacity, proposed connection point if relevant, etc.) to allow an assessment of the likely impact on supply capability;
- Sufficient information to allow the costs of the solution to be incorporated in a net present value cost comparison in accordance with ACCC Regulatory Test guidelines;
- An assessment of the ability of the proposed solution to meet the technical requirements of the National Electricity Code;
- Timing of the availability of the option, and whether it is a committed project;
- Other material that would be relevant in the assessment of the proposed solution.

As the submissions may be made public, any commercially sensitive material, or material that the party making the submission does not want to be made public, should be clearly identified. It should be noted that ENERGEX and Powerlink are required to publish the outcomes of the Regulatory Test analysis. If solution providers elect not to provide specific project cost data for commercial-in-confidence reasons, ENERGEX and Powerlink may rely on cost estimates from independent specialist sources.

10.3 Timetable for Submissions

Please provide information by Monday 28 July 2003 to either of the following:

Network Strategic Planning Manager
ENERGEX Limited
GPO Box 1461
BRISBANE QLD 4001
bevanholcombe@energex.com.au
Tel: (07) 3407 4061
Fax: (07) 3407 4144

Manager Network Assessments
Powerlink Queensland
P O Box 1193
VIRGINIA QLD 4014
agray@powerlink.com.au
Tel: (07) 3860 2300
Fax: (07) 3860 2388

10.4 Assessment and Decision Process

ENERGEX and Powerlink intend to carry out the following process to assess what action, if any, should be taken to address the identified network limitations.

Part 1	Initial Information Request (this paper). Submissions (responses to this paper).	June. July.
Part 2	Review and analysis. Likely to involve further consultation with Code participants and interested parties. Additional data may be requested to allow ENERGEX and Powerlink to carry out the economic assessment process as required by the National Electricity Code and the ACCC Regulatory Test.	July to September.
Part 3	Presentation of draft report and recommendation of solution which satisfies the Regulatory Test. Submissions on draft report. Presentation of final report and recommendation.	September. October. November.
ENERGEX and Powerlink Queensland reserve the right to amend the timetable at any time. Amendments to the timetable will be made available on the ENERGEX website (www.energex.com.au) and the Powerlink website (www.powerlink.com.au).		

The consultation timetable is driven by the need to make a decision by late 2003 if any option involving significant construction is to be in place by the summer of 2005/06. At the conclusion of the process, ENERGEX and Powerlink intend to take immediate steps to implement the recommended solution to ensure that the reliability of the network can be maintained. For example, if the preferred solution is a network augmentation, it is anticipated that construction will need to begin in 2004.