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David Parker
Minister of Energy
Parliament
Parliament Buildings
Wellington

Dear Minister

As requested in your letter of 13 June, I am writing to report on our review of the power outage in Auckland on 12 June and to address points raised in your letter.

I will summarise the findings of our independent reports on the outage in this letter, and attach both the Sinclair Knight Merz (SKM) and PriceWaterhouseCoopers (PWC) independent reports for your information. As you will be aware the SKM report is an incident review and the PWC report is a review of our operational response to the incident.

We undertook to provide two reports because there are two parts to the story in respect of the events on the day; one report concerns the equipment failure causing the outage and the steps taken to repair our equipment (the SKM report) and the other report concerns the operation of our power supply to the Auckland region and how that was managed (the PWC report).

Our responses to both reports are attached, including our recommendations to reduce the vulnerability at the Otahuhu substation in the short term.

Also included is an outline of our proposed changes to planned upgrades in the medium term. These proposals, which we discussed briefly with you during our meeting on 21 June, are specific to the Auckland area and are additional to our 400kV proposal - as you will be aware that proposal is now being revised for re-presentation to the Electricity Commission.

There are key points I wish to make about the events of 12 June as well as about the future security and reliability of supply to Auckland.

The outage of 12 June was a rare and catastrophic event; but underlines the importance of having a robust, flexible National Grid to provide for the long term security of electricity supply, not only to Auckland but to all of New Zealand.

Transpower is proceeding quickly to undertake actions identified in reports on the outage, and these remedial actions will contribute to greater security of operations. Transpower managed this serious situation effectively, and with no loss of life, particularly within the challenging environment on the day.

However, the Otahuhu Substation is an old facility, with old technology. And it is the sole link leading to Auckland. There is much that needs to be done regarding this issue, and we need to proceed with urgency.

Transpower wishes to work consultatively with government and with regulators to achieve acceptable outcomes for plans to upgrade the national grid. As an integral part of that, it is Transpower's objective to provide greater reliability in the short term to Auckland and the surrounding area.

We look forward to working in partnership with all parties to resolve any issues in respect of these plans.

Yours sincerely

David Gascoigne
Chairman

1. Background

Set out below is an abbreviated timeframe of the events on 12 June, including an overview of conditions at the time. On the 12th of June severe weather conditions were experienced throughout the country and in the South Island in particular. These conditions were causing considerable additional management issues in both our National Co-ordination Centres (NCCs) and Regional Operational Centres (ROCs). While these issues had no direct bearing on the outage at Otahuhu, as they concern the supply of electricity throughout the grid and not the grid infrastructure itself, they added complexity to an already challenging operational environment.

2. Timeline

3 am	In the early hours of 12 June it became evident that heavy snow loads were causing an increase in line tripping in the South Island and that it would be a busy day to ensure adequate load control. Additionally, by early morning a Maui Gas contingency was declared, which essentially means that the adequacy of supply for generation was a key concern.
8:32 am	Major tripping at Otahuhu substation causes 1000 MW of supply lost and power outages in Auckland.
8:33 am	Transpower contractors dispatched to the site. Crews confirm two earthwires had broken, dropping onto three 110kV buses and one 220kV line below them. This resulted in the fault which contributed to disruption to the major portion of electricity supply to Auckland. Within 30 minutes lines maintenance contractors arrive to begin planning and recovery actions to remove fallen earthwires. Weather conditions were extreme and appropriate methods and timeframes were required to ensure that work could be carried out safely. Going up the tower to retrieve broken earthwire was difficult in high winds. The power supply continues to be maintained to West Auckland, North Shore and Northland, and also Takanini Wire and Otahuhu.
10:44 am to 1:40pm	Transpower reconfigures network to begin re-supply, which was progressively restored by Vector throughout the afternoon.

3. The SKM Incident Report

The SKM report finds that high winds triggered the failure of connection equipment at Otahuhu Substation that led to the failure of two earth wires and loss of load – this occurred because of poor condition of the connection equipment (shackles). Transpower's maintenance schedule and records have been checked and found to be adequate, but the report states that Transpower's maintenance contractors should have identified the poor condition of the shackles and replaced them. We note that in the contractors' assessment of the equipment, carried out in 2003, that these shackles did not show signs of corrosion sufficient to warrant replacement.

4. Actions

The purpose of the report and investigation of the incident is to apply learnings from the events of 12 June. Accordingly, actions we are completing in the short term include:

(completed)

- Inspection of all earthwire terminations at Otahuhu substation
- Inspection and replacement of all earthwire terminations on the Henderson Otahuhu 220kV transmission line
- Inspection of similar plant at Penrose substation
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(scheduled)

- All other Auckland substation earthwire attachments re-inspected, starting 26 June.
- All other New Zealand substation termination re-inspections starting 26 June
- All New Zealand sites re-inspected by the end of July 2006.

Transpower will review the maintenance schedule for aging equipment to determine if the maintenance regime is appropriate. This may require a move from a condition based assessment to a time based assessment for particular older equipment.

5. The PWC Operation Response Report

Transpower commissioned PWC to provide an independent assessment of the operational performance of Transpower in managing events leading up to, during and following the Auckland incident of 12 June.

This report enables Transpower to review our decision making processes and response performance and, in particular, our ability to manage these types of emergencies and continue to operate the power supply to the rest of New Zealand while ensuring minimal delays to the restoration of service to Auckland.

The key findings of the PWC report conclude that Transpower operational staff performed well throughout the unfolding situation on the day, particularly given extreme weather conditions in the South Island that resulted in a significant increase in operational activity.

Management and staff were able to overcome problems and continue to operate the Wholesale Electricity Market. Some of the delays in restoring power in Auckland were outside Transpower's control and also likely to be weather related.

However, there are learnings for Transpower, in the management of internal systems. Transpower will be taking further action to assess and apply the recommendations in the PWC report.

6. Security of Auckland Supply –Transpower Proposals

As you will be aware, Transpower's current upgrade proposals will improve reliability of supply to Auckland and Northland regions.

The 400kV project from Whakamaru to Auckland provides significant strengthening of supply into the Auckland region. This proposal has been rejected by the Electricity Commission and Transpower has indicated that we are now in the process of revising the proposal to operate initially at 220kV, migrating to 400kV over time.

Our concern with the amended staged proposal is the timeframe. We believe reliability of supply will be affected if Transpower's line is not built by the earliest possible date and favour

building the line by 2011. But even if we present our revised and rephased proposal on the basis of implementation in 2011 we do not believe our proposal will meet the requirements of the Grid Investment Test (GIT) as currently applied by the Electricity Commission.

7. Supplementary Proposals for Improved Reliability

Transpower has also developed supplementary proposals that specifically address reliability of supply into Auckland. These projects do assume, however, the completion of the initial phase of the staged 400kV project on time, that is, by 2011.

These include:

- 220kV projects currently under consultation through our Request for Information (RFI) that reinforce supplies into Penrose, the CBD, Wairau Road and Albany
- Projects to improve voltage control in the Auckland area, including provision of an SVC voltage controller at Albany and capacitor banks at various locations.

The following pages outline how these proposed projects could be advanced to achieve improved reliability in the shorter term.

8. Improve Reliability of Otahuhu Substation

Transpower is concerned about the heavy concentration of transmission lines and switching equipment at the Otahuhu substation. This issue was recognised in the proposal to develop a 400kV supply into Auckland. The 400kV proposal included:

- The development of a separate 220kV substation at Otahuhu
- Separation of the new 400kV plant from this new 220kV substation; and
- Adoption of industry best practice substation design for both the 220kV and 400kV equipment.

The options outlined below details how these plans could be advanced as separate proposals.

Option 1: The 220kV substation, as proposed in the 400kV project, should be built as soon as possible at the proposed site approximately 70m away from the existing Otahuhu substation. This substation would comprise:

- Reliable switching arrangements (1.5 circuit breakers per circuit – a significant improvement from the current substation design);
- Gas insulated switchgear (GIS); and
- Rearrangement of existing 220kV circuits to route at least half of the existing circuits through the new substation.

This new substation would reduce the reliance on the existing, less reliable, outdoor substation and would reduce the number of circuits that cross over other circuits or the substation.

Time to complete: 18-24 months from approval

9. Reinforcement of supplies to Penrose, the central business district and Wairau Road

These projects are not part of the 400kV proposal but are separate proposals that are currently published in the Request for Information (RFI) that was circulated in late May 2006. This project comprises two sequential stages:

- Reinforcement of Penrose from the south – currently the options being looked at are via Otahuhu; and
- Establishing a new 220kV cable link between Penrose and Albany via the CBD and Wairau Road.

Much of the preparatory work for the second stage of this project has been completed and ducts have been installed along most of the route, ready to take the cables.

Option 2: Both the reinforcement of Penrose from the south and the establishment of the new 220kV cable link between Penrose and Albany, could be accelerated. Selecting the Otahuhu-Penrose reinforcement option that is routed via Pakuranga would fit in with other proposals to establish an eastern corridor into Auckland via Penrose. This would involve:

- Establishing a 220kV gas insulated substation at Pakuranga (see next section);
- Converting the existing 220kV capable transmission line between Otahuhu and Pakuranga to operate at 220kV;
- Installing 220kV cables between Pakuranga and Penrose; and
- Establishing a high reliability 220kV substation at Penrose.

Once the substation is established at Penrose, the first section of 220kV cable could be installed to the CBD, allowing the development of a 220kV CBD substation. The next sections of the cable from the CBD to Wairau Road and Albany could then be implemented as required.

Time to complete: 24-36 months from approval

10. Provide diversity by means of an 'eastern' corridor into Auckland

At present all major transmission circuits supplying Auckland come into Otahuhu. Best practice for critical loads such as Auckland would be to have multiple supply points with physical diversity. In the event of a major failure in one corridor, the alternative corridor would have the capacity to meet a substantial proportion of the total load, preferably with full backup capability.
Transpower originally considered developing an alternative corridor via Pakuranga to the east of Otahuhu. Otahuhu was ultimately selected as the preferred site because of:

- Costs associated with developing Pakuranga;
- Location of Pakuranga in a residential area.

Transpower is currently revising the Pakuranga option as it could, together with the 400kV project, provide a separate corridor into Auckland from Whakamaru.

Transpower feels that this option is desirable from a diversity standpoint and achievable at a reasonable cost, although costs will be higher than the original option of taking the 400kV into Otahuhu.

Option 3: If an eastern corridor is required, for reasons of security, Transpower could proceed to establish the 220kV switchyard at Pakuranga.

Time to complete: 2012, possibly earlier if designation and consenting processes are accelerated.

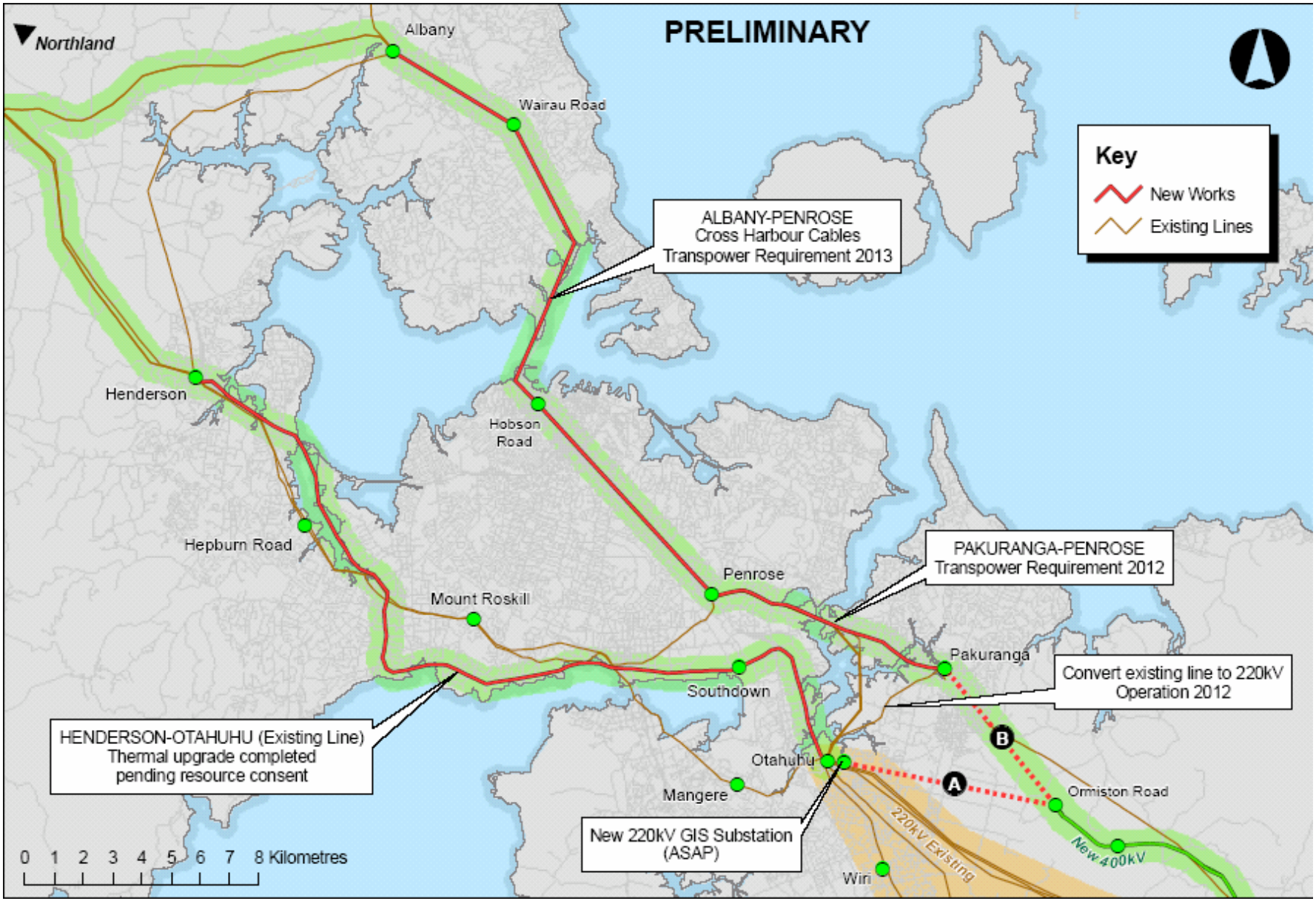
Preferred Options – Auckland Short Term Proposals

The reliability of supplies into Auckland could be improved significantly in 2-3 years from project approval by:

- Addressing the substation reliability issues at Otahuhu as soon as possible by creating a new 220 GIS substation at an adjacent site. This substation is part of Transpower's 400kV proposal. (Option 1);
- Advancing currently proposed projects, namely the reinforcement project from Otahuhu to Albany via Penrose (Option 2); and
- Modifying the proposed 400kV project to route it via Pakuranga, thus establishing an eastern corridor for supplies into Auckland (Option 3).

A diagram of these proposals is attached.

The above projects are examples of what can be done and will require further development and refinements. However, it is our view that these projects and options are reasonable and feasible. It is our plan to continue to develop these projects for presentation to the Electricity Commission for approval.


PRELIMINARY
Northland
Albany
Wairau Road
Key
New Works
Existing Lines
ALBANY-PENROSE
Cross Harbour Cables
Transpower Requirement 2013
Henderson
Hobson
Road
Hepburn Road
Mount Roskill
Penrose
PAKURANGA-PENROSE
Transpower Requirement 2012
Pakuranga
Convert existing line to 220kV
Operation 2012
Southdown
HENDERSON-OTAHUHU (Existing Line)
Thermal upgrade completed
pending resource consent
Otahuhu
Mangere
Ormiston Road
New 220kV GIS Substation
(ASAP)
220kV Existing
New 400kV
Wiri
0 1 2 3 4 5 6 7 8 Kilometres