

## RECORD OF MEETING

**DATE:** 20<sup>TH</sup> December 2006

**ATTENDEES:** Residents: Randal and Melanie McKenzie, Mark Thompson, Mark Spring, Gary and Adrienne Holder  
 Transpower: Steven Taylor, Robert Deller, Rachel Foster, David Burns, Peter Phillips

**PLACE:** 149 Brownhill Road

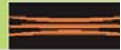
### 1 INTRODUCTIONS

After convening at 122 Brownhill Road the attendees transferred to the Transpower property at 149 Brownhill Road. The following records cover mainly the discussions as a group. They do not cover some of the separate conversations between the residents and Transpower representatives while walking round the site. Rachel Foster attended the meeting to discuss the noise report while David Burns attended to discuss the geotechnical investigations including the new "GIS3" site further up the valley on 149 Brownhill Road away from the homes of the Brownhill Road residents.

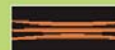
### 2 QUESTIONS AND ANSWERS

The site visit was undertaken in windy conditions which were used as the opening point for the discussions. Questions raised and responses (in outline) included the following:

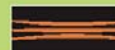
Question	Response
This is a high wind zone registered on the LIMs, can feel wind today and see in the shape of the tree. Why was 2.5 m/s used in the noise calculations?	Wind might be 7.5 m/s today. Noise from the transformers will travel further but background noise level will also rise with increasing wind speed. Can't separate rise in received and background noise. If background level is 30 dBA and transformers is 30 dBA then together result in 33 dBA ( <b>not</b> 30+30=60 because the scale is logarithmic). Typically become aware of change in volume with 3dBA difference although some people may hear change with a 2 dBA difference.
What frequency?	Results are total sum of all frequencies, using "A" weighted frequency scale. Transformers typically have a significant component of noise at 100 Hz. Noise is at all frequencies typically measured from 30-10,000 Hz.
But will we hear it?	May be some conditions under which you will hear it. Neutral meteorological conditions (less than 1 m/s) likely to be the worst situation for audibility.



Question	Response
What combination would make 2.5 m/s worst?	Have looked at 0 m/s, 2.5 m/s and 5 m/s for transformers (in the report). The difference in received level is about 1 dBA for the increase from 2.5 to 5 m/s.
3 dBA is a doubling in noise?	It's a doubling of the energy but a perceived doubling of the noise would require an increase of 10 dBA.
Modelled as "soft" ground?	Comparison of "soft" and "hard" is between paddock and road. With "soft" noise is absorbed while with "hard" it is reflected. The substation site is modelled as "hard", as is access road but paddocks are "soft". Typically the difference between "soft" and "hard" is more significant than the wind effect.
Mark Thompson estimated the wind as gusting to 30 knots. Blows like this for four to five months a year. Usually stops around now but can continue. Needs to be factored in.	Can model it but propagated noise likely to increase only by 1-2 dBA.
Experienced corona noise from towers. Winter conditions often include still air with fog in the valley. Have you made a humidity adjustment?	No, but would not expect to make a significant difference.
No leaves on trees in winter	Again, not significant
How can we know what it will sound like?	An office with people working quietly is typically around 45 dBA, a quiet board room might be 35-40 dBA.
A 747 passed overhead heading into AIA. Was measured at 68-70 dBA with a range of frequencies which were shown on the noise meter.	
What frequencies do the transformers produce	100 Hz is dominant noise in range but fairly well distributed. When transformers are heavily loaded will also have fan noise – "white" noise with no dominant frequencies
Is fan noise in the model	Data includes fan noise as far as know – will confirm. Have done measurements at Pakuranga. Not same set-up as Brownhill Road would be but fans made no significant difference, about 1 dBA.
Difference between AIS and GIS in terms of fan noise?	No, same. Both would have enclosures round the transformers.
Calculations done with four walls but no roof?	Modelled three and four walls but no roof.

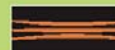


Question	Response
Should be done so we can understand effect	Have modelled Pakuranga with “wings” but not sure what would be done here.
Have lived with corona noise of pylons. Distinct “ringing” on foggy mornings. Can hear buzzing at 500 metres.	Line into substation could produce same corona noise. Using better insulators these days, tend to be less noisy.
More wiring with AIS. If have light drizzle or fog, would you get the same buzzing?	A 220 kV substation does have hisses and crackles but these tail off quickly with distance.
But this is bigger than your other stations and higher voltage	Have similar sized substations at Islington and Otahuhu. Voltage not an issue. Wiring noise would not be an issue with GIS where switching gear is enclosed.
More noise with GIS?	No difference in transformer noise <i>per se</i> , main difference is in the location. With AIS, transformers would be closer.
Have you decided on AIS or GIS?	Not yet, maybe in January. Need to decide before lodge the NoR (Notice of Requirement)
Circumstances changed with delay in Electricity Commission decision?	No. Decision will be based on consultation, not the decision of the Electricity Commission. Have had some input but more time yet to receive your comments.
Related to wind, we all collect rainwater. Two or three years of earthworks would create a lot of dust	Recognise AIS would be more disruptive with greater amounts of earth to be moved.
Have you done detailed budgets for AIS and GIS?	Not very detailed. AIS in the proposal to the Electricity Commission. Have done geotechnical assessment to assess costs of earthworks. Understand equipment costs. Present estimates plus or minus 20%. Not done a design costing (+/- 10%) but getting closer.
Could set up noise in a room to demonstrate?	Could do that, but will measure noise now (it was 48.5 dBA).
This is the prevailing wind up till about now. Previous two years finished a bit earlier. El Nino conditions.	Can get an idea of substation noise from Otahuhu. Listen from Bairds Road or Hellabys Road.
What are implications of (current noise level) of 48.5 dBA?	If predicted noise level is 30 dBA then you would not hear it. The closer the background noise level is to 30 dBA, the more likely you are to hear it. Above 35 dBA you are very unlikely to hear it.
Moved to small grove of trees above GIS2	

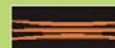


Question	Response
What height would the building be?	About 15-16 metres to peak of roof. Could get to GIS2 using only one tower, roughly 59m high. GIS3 is dubious. If keep clear of Carpenters Bush will need two towers. If over Carpenters Bush likely to need a taller tower. Visual effects from towers increase the further up the valley you go.
Worse for tower and station?	Further away is not better for visual as the station would be higher, but might help noise.
Visuals of GIS2 shown	
Can't believe still see whole station. Can tower go back?	If moved tower 5.
Would GIS3 be any different?	Not really, as elevation of substation platform is higher, even though the ridge is rising.
Location diagram for GIS3 shown	
	We would be pushing dirt into area of the creek to build the platform. Definitely one more tower unless realign over the bush.
This (GIS2) has substation and line noise issues as well as the visual effects. Will a third extra distance make much difference to the noise.	It is a trade-off in terms of visual and noise. There will be a reduction with distance but need to check exposure because of the greater height. May mean any shielding from the landform may be lost. Probably a reasonable reduction but would need to quantify.
Model all scenarios	
(To RMcK) Are the trees below your house at full height now?	Pittosporums, so probably grow a bit higher yet.
Could screen substation?	The spur would be left intact with GIS so could plant it to provide some screening.
How much difference would planting make to the noise?	None. The visual connection between noise and source would be lost but would need at least 50 metres of really dense trees to achieve any attenuation. If trees were close to the house then could add to noise in wind. All noise measurements calculated at 20 metres in front of the house, not inside.
What is the cost difference between GIS2 and GIS3?	More expensive and probably more difficult to balance the earthworks. <sup>1</sup>

<sup>1</sup> The cost difference has subsequently been checked. The earthworks costs for GIS3 are \$6 million more than GIS2. This reflects extra access road length, higher stabilisation costs and imported fill costs.

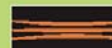


Question	Response
Are we talking \$10-15 million?	No probably 10-20% more on earthworks costs for slope stabilisation.
Would make a bid difference to AIS vs GIS?	The \$20 million difference is the total difference taking into account reduced earthworks for GIS2 compared with AIS.
What happening at other substations around the country?	All recent 220 kV substations such as Te Kowhai, Huapai and Silverdale are AIS. Have GIS at Bream Bay near Marsden Point and elsewhere (six GIS altogether).
Why GIS at Bream Bay?	Problem of salt pollution from the sea. Generally build AIS because of greater cost of GIS.
What is the difference in maintenance costs of AIS and GIS?	GIS has lower maintenance costs as switchgear is sealed and indoors, so there is no corrosion. Doubt difference in maintenance costs offsets higher capital costs. Will provide maintenance cost figures for typical AIS and GIS. Will also provide updated earthworks costs for all three GIS and the AIS.
Substation will only use 10% of site, what do with the rest?	No decision yet. Can't decide till have decided on installation and developed mitigation plans for both bottom and top of the block.
Will people on Redoubt Road see the GIS substations?	Will see GIS2, probably not GIS3, definitely the AIS
How far can GIS3 be cut down into the valley	The position of the site below the ridge limits the extent to which can cut down – threat of collapse. Tried to get as low as possible, gone as far as practicable. Might be 1-2 metres difference with full optimisation.
<p>Moved back to 122 Brownhill Road with discussion starting with handing over of visuals for individual properties and undertaking by Mark Spring to deliver to Ottaway and Randal McKenzie to Dodd. There was considerable dismay expressed at the images presented by the visuals as there had been an expectation that the landform would have at least screened GIS2 - <i>"looks like you could reach out and touch it"</i></p>	
Expecting to see only the roof or the substation to be hidden – can see full height of building.	Have dropped platform as low as practicable. Problem is that ridge is falling away and there is not much difference in height between the ridge and the platform.
<p>Plan for GIS3 handed over. Nomenclature on visuals explained. Requirement for one tower for GIS2 confirmed, with rise from approximately 52 metres to roughly 59 metres the result of removing one tower (noted that all dimensions are subject to detailed design).</p>	

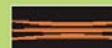


Question	Response
Are there any houses as close to a tower (in the overhead section) as proposed here	Have 65 metre wide easement to provide separation from noise. There are some houses close to towers but cannot give specific details now. Typical spans between towers are 300-500 metres.
You should take as given there would be four walls even though you are only showing three	Will put in as many as needed.
Cynic would say you have included the AIS to make the GIS look better. Expected to see less. Have you the visuals for GIS1?	No, have not pursued it because of the noise and closer to houses.
What is height of GIS building?	Around 15 metres to peak of roof.
What is the difference in elevation between GIS2 and GIS3?	74 metres at GIS3 and 62 metres at GIS2. <sup>2</sup>
What has happened with Hampton Park?	We are talking to Manukau City Council. Have had a preliminary look at topography. Seems entirely suitable for GIS. Now need to look at costs and cashflow implications (NPV).
What cashflow implications?	Various, including cable timing.
Do you take into account cashflow on capex but not opex?	Both capex and opex are included in the financial analysis. In Transpower's experience the maintenance cost differences for AIS and GIS are pretty low and does not affect the choice between them.
What is the economic life these assets are amortised over?	Typically 40 years.
\$200k over 20 years is a lot of money. Need the full costs, including the upgrade of Brownhill Road, with widening to standard of Whitford Park Road, culverts etc – more than \$20 million.	Don't incur costs till after 2030. Not a great cost when discounted to present value in 2010.
Have you costed the road upgrade?	Not looked at closely. Would also need earthworks at Hampton Park.
Rock underlying the site (Council thinks there is)?	No, but substantially less earthworks costs. May involve 50,000 m3 earthworks to establish 130x130 platform. Fall of five metres across site. Not difficult compared with Brownhill Rd.
What are current discussions with Manukau?	Met Chris Freke today. He is advocating it. Timing is problematic for us as can't confirm Manukau's position till has been to appropriate committee(s) in mid-February. We have requested various undertakings/assurances.

<sup>2</sup> From memory this was stated to be 65 metres at the meeting



Question	Response
Is Hampton Park an irritant or are you now seriously considering it	We are investigating as an opportunity. Has implications for position of transition station - either back on the Tuck property or at Brownhill Road.
Could be further down road! Have cost saving with Hampton Park as only one set of 400 kV cables to Hampton Park and then go north and south to Pakuranga and Otahuhu. Would have to split earlier if here (at Brownhill Road).	May need four 400 kV cable from transition station as line capacity now raised to 2700 MVA to match the overhead line capacity. Was lower when designed route with two sets of cables to Otahuhu. Could possibly put in two sets of cables first and two more sets later.
We need budgets for earthworks for GIS2 and GIS as part of full costings for GIS2 and 3 at Brownhill Road and Hampton Park.	Will provide.
Benefits of Hampton Park include less earthworks, no need for Brownhill Road upgrade, accessibility, no neighbour problems	
If end up buying four or five homes for say \$6 million, where factored into costs?	Not included.
What is the overall cost difference between substations at the two sites (Brownhill Road and Hampton Park)?	Still to do cost differential.
If put overhead lines through (149 Brownhill Road), you would be able to sell land to offset – maybe \$4-6 million	
Hampton Park is valued at \$6 million – what did you pay for (149) Brownhill Road?	Not sure, not my field.
If you were starting today, would you by Hampton Park or Brownhill Road?	From a substation engineering point of view probably would choose Hampton Park.
Isn't your wish to put it here driven by your purchase of 149 Brownhill Road?	No, talked to the Council six months ago about it and the East Tamaki Road site was not available to us then.
Hampton Park is a win-win. Council can't use it for the purpose it was bought for and you don't get the hassle of trying to build here. Chris Freke suggested it to me.	
Raised issue on 4 <sup>th</sup> December of Manukau telling Transpower that it was willing to subsidise some of the cable cost to take it further out. The issues of paying for some cable was raised with senior managers.	Will check but have not been told. This is in the context of moving the transition station further south?
Yes, we don't want that either!	What if the transition station moves back to its previous position on the Tuck property?

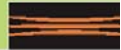


Question	Response
Transition station is better for me personally but worse for the others.	
It is a win-win if Manukau subsidises the land. You can put the money into moving the transition station further back to the land you own in Twilight Road. Will have impact on 10,000 future residents in the Brookby area, check the draft Rural Plan.	
Summarising, we need to know costs; need the visual for GIS3; noise modelling on GIS3 and for you to check with Ralph Craven/David Laurie about the subsidy from Manukau.	
When we met on 4 <sup>th</sup> December you mentioned both compensation and property purchase but Peter Port is only talking about purchase	(ST) Will facilitate discussion with Peter Port on compensation.
When get visual for GIS3?	Travis is away so visuals may be delayed. Cross sections would allow to assess inter-visibility between substation site and homes. Don't need to extend consultation further because this has not yet been supplied.
Recognise can't be too aggressive but need to get platform as low as possible.	Not as much difference in elevation as you might imagine.
There was then a discussion about whether the	visuals were of GIS1 or GIS2
Why can't you cut deeper and build retaining walls?	Problem is volume of fill. Can be engineered at a cost but can't drop 10 metres. Would mean a basement, pumping etc – a completely different objective.
Have you assessed the engineering degree of difficulty of Hampton Park?	Not yet.
Check the visuals!	

### 3 ACTIONS

During the course of the meeting Transpower undertook to:

- provide noise calculations at wind speeds of 10 m/s, and 20 m/s from a westerly direction;
- determine whether calculations include fan noise;
- provide maintenance cost data for typical AIS and GIS;
- provide updated geotechnical report with earthworks costs for all three GIS sites and the AIS;
- confirm that the visuals represent GIS2 not GIS1;



- check the state of discussions with Manukau City Council in terms of possible subsidy of cable costs;
- undertake noise assessment for GIS3 as appropriate;
- facilitate interactions with Peter Port over compensation discussions
- supply cross-sections from GIS2 and GIS3 to homes in Brownhill Road .

In addition, Transpower will keep residents up-to-date on any changes/more information in relation to the site at 383 East Tamaki Road.

Notes prepared by Dr Peter Phillips

**“COPYRIGHT © 2006 TRANSPower NEW ZEALAND LIMITED. ALL RIGHTS RESERVED**

This draft is produced for review by the parties to the meeting. It seeks to capture the principal matters raised and information shared and is not intended to be a verbatim record of the meeting. It does not yet incorporate input from internal review and represents work in progress.