IN THE MATTER OF	the Resource Management Act 1991
AND	
IN THE MATTER OF	Notices of requirement for designations under section 168 of the Act, in relation to Te Ahu a Turanga; Manawatū Tararua Highway Project
BY	**NEW ZEALAND TRANSPORT AGENCY** Requiring Authority

ADDENDUM TO STATEMENT OF EVIDENCE OF DAVID JOHN HORNE (EFFECTS ON AGRESEARCH BALLANTRAE SITE) ON BEHALF OF THE NEW ZEALAND TRANSPORT AGENCY

16 April 2019

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INTRODUCTION

1. My name is **David John Horne.**

2. I submitted a statement of expert evidence on effects on AgResearch Ballantrae site matters ("**EIC**") on behalf of the New Zealand Transport Agency ("**Transport Agency**") dated 8 March 2019.

3. I have the qualifications and experience set out in my EIC.

4. I repeat the confirmation given in my EIC that I have read the 'Code of Conduct' for expert witnesses and that my evidence has been prepared in compliance with that Code.

5. In this addendum I use the same defined terms as in my EIC.

RESPONSE TO HEARING PANEL REQUEST FOR ALTERNATIVE ALIGNMENT IMPLICATIONS ON THE BALLANTRAE SITE

6. I have identified the sampling sites (frames) at the Ballantrae trial site that are impacted under three scenarios; the current proposed construction footprint, a footprint associated with a more northern alignment and a footprint associated with a more southern alignment. The latter two options are described in the second addendum of Mr Andrew Whaley.[1]

7. At the request of the Panel, I have replicated the analysis provided by Dr Harold Henderson in his evidence for AgResearch. In doing so I have considered the impact of the three alignments.[2] Following the procedure outlined by Dr Harold Henderson, I have deemed a sampling site to be impacted or affected (essentially lost to any future monitoring) if it falls within the footprint under consideration or is less than 20 m from the footprint boundary. As indicated by Mr Whaley in his second addendum, restricting the impact to the construction footprint (plus a 20m buffer) makes a significant difference to the number of affected frames.[3]

8. The Project construction footprint, as currently proposed, will affect 15 sampling sites or frames, out of a total of 72. The position of these frames, as described by slope and aspect, are given in Table 1.

[1] Mr Whaley includes plans of the three alignments with his second addendum.
[2] As compared to Dr Henderson's analysis which assumes the loss of all frame sites within the entire designation corridor (plus a 20m buffer zone).
[3] As compared to 25 frame sites affected under Dr Henderson's analysis of the impact of the entire designation corridor.

9. As explained by Dr Henderson, each of the four farmlets has a 'pair' of frames in each of nine slope x aspect combinations.[4] Table 1 (and Tables 2 and 3) specify where one or both of each pair of frames will be affected.

Table 1. The sampling sites that will be affected by the construction of the road under the current proposed construction footprint

Sampling Sites impacted by the proposed construction footprint										
Slope	**1-12˚**			**13-25˚**			**≥26°**			**Total**
Aspect	**SW**	**E**	**NW**	**SW**	**E**	**NW**	**SW**	**E**	**NW**	
Farmlet										
LFNF	1						1			2
LFLF	1			1			2			4
HFNF	2		1	2	1	1	2			9
HFHF										0
Total	**4**	**0**	**1**	**3**	**1**	**1**	**5**	**0**	**0**	**15**

10. A road with a more northern alignment will likely impact 19 frames. The position of these frames, as described by slope and aspect, are given in Table 2.

Table 2. The sampling sites that will be affected by the construction of the road under northern alignment option.

Sampling Sites impacted by the northern alignment										
Slope	**1-12˚**			**13-25˚**			**≥26°**			**Total**
Aspect	**SW**	**E**	**NW**	**SW**	**E**	**NW**	**SW**	**E**	**NW**	
Farmlet										
LFNF	1						2	1		4
LFLF	1			1			1			3
HFNF	2	1	1	2	1	1	2			10
HFHF	1		1							2
Total	**5**	**1**	**2**	**3**	**1**	**1**	**5**	**1**	**0**	**19**

11. A road with a more southern alignment will likely impact 9 frames. The position of these frames, as described by slope and aspect, are given in Table 3.

[4] So, there are 36 combinations, with two frames each, making up the total of 72 frames.

Table 3. The sampling sites that will be affected by the construction of the road under the southern alignment option.

Sampling Sites impacted by the southern alignment										
Slope	**1-12˚**			**13-25˚**			**≥26°**			**Total**
Aspect	**SW**	**E**	**NW**	**SW**	**E**	**NW**	**SW**	**E**	**NW**	
Farmlet										
LFNF										0
LFLF							2			2
HFNF			1			1	2			4
HFHF	1		1			1				3
Total	**1**	**0**	**2**	**0**	**0**	**2**	**4**	**0**	**0**	**9**

12. The four farmlets would lose between 11% and 50% of the sampling sites, with an overall loss of 21%, under the current proposed construction footprint (Table 4).

Table 4. The number of sampling sites impacted by construction of the road under the proposed footprint.

Post Roadworks Sampling Sites - proposed construction footprint				
Farmlet	**Current**	**Post**	**Reduction**	**Reduction %**
LFNF	18	16	2	11
LFLF	18	14	4	22
HFNF	18	9	9	50
HFHF	18	18	0	0
Total	**72**	**57**	**15**	**21**

13. The four farmlets would lose between 11% and 56% of the sampling sites with an overall loss of 26% under a more northern alignment (Table 5).

Table 5. The number of sampling site impacted by a more northerly alignment.

Post Roadworks Sampling Sites - northern alignment				
Farmlet	**Current**	**Post**	**Reduction**	**Reduction %**
LFNF	18	14	4	22
LFLF	18	15	3	17
HFNF	18	8	10	56
HFHF	18	16	2	11
Total	**72**	**53**	**19**	**26**

14. The four farmlets would lose between 11% and 22% of the sampling sites with an overall loss of 13% under a more southern alignment (Table 6).

Table 6. The number of sampling site impacted by a more southerly alignment.

Post Roadworks Sampling Sites - southern alignment				
Farmlet	**Current**	**Post**	**Reduction**	**Reduction %**
LFNF	18	18	0	0
LFLF	18	16	2	11
HFNF	18	14	4	22
HFHF	18	15	3	17
Total	**72**	**63**	**9**	**13**

15. As noted by Dr Henderson, there are currently 8 sites (2 in each Farmlet) of each Slope x Aspect combination. Under the currently proposed construction footprint, only the frames on the SW aspect are affected to any great extent (Table 7). This adverse impact is consistent across all slope categories.

Table 7. Sampling sites as described by slope x aspect that are impacted under the current proposed construction footprint.

Post Roadworks Sampling Sites - current proposed construction footprint				
	Aspect			
Slope	**SW**	**E**	**NW**	**Total**
1-12˚	4	8	7	**19**
13-25˚	5	7	7	**19**
≥26°	3	8	8	**19**
Total	**12**	**23**	**22**	**57**

16. Under the northern alignment, four more frames (relative to the current proposed construction footprint) are impacted. Again under this alignment, the number of sampling sites with a SW aspect is significantly reduced across all slope classes (Table 8).

Table 8. Sampling sites as described by slope x aspect that are impacted under the northern alignment.

Post Roadworks Sampling Sites - northern alignment				
	Aspect			
Slope	**SW**	**E**	**NW**	**Total**
1-12˚	3	7	6	**16**
13-25˚	5	7	7	**19**
≥26°	3	7	8	**18**
Total	**11**	**21**	**21**	**53**

17. Under a southern alignment, fewer frames on SW aspects are impacted by the construction of the road (Table 9). Under this scenario, 50% of the steepest sampling sites with a SW orientation are lost, but the loss of sites with a less steep SW aspect is markedly reduced compared to the other alignments.

Table 9. Sampling sites as described by slope x aspect that are impacted under the southern alignment.

Post Roadworks Sampling Sites - southern alignment				
	Aspect			
Slope	**SW**	**E**	**NW**	**Total**
1-12˚	7	8	6	**21**
13-25˚	8	8	6	**22**
≥26°	4	8	8	**20**
Total	**19**	**24**	**20**	**63**

18. As seen above, the frames on the SW aspect are the most affected. Of these frames, 50% would be lost under the current proposed construction footprint (Table 10).

Table 10. Sampling sites as categorised by aspect that are impacted by the current proposed construction footprint.

Sampling Sites - current proposed construction footprint			
Aspect	**SW**	**E**	**NW**
Current	24	24	24
Post	12	23	22
Reduction	12	1	2
Reduction %	50	4	8

19. Under the northern alignment, 54% of the frames with a SW aspect will be impacted (Table 11).

Table 11. Sampling sites as categorised by aspect that are impacted by the northern alignment.

Sampling Sites - northern alignment			
Aspect	**SW**	**E**	**NW**
Current	24	24	24
Post	11	21	21
Reduction	13	3	3
Reduction %	54	13	13

20. Under the southern alignment, 21% of the frames with a SW aspect will be impacted (Table 12).

Table 12. Sampling sites as categorised by aspect that are impacted by the southern alignment.

Sampling Sites - southern alignment			
Aspect	**SW**	**E**	**NW**
Current	24	24	24
Post	19	24	20
Reduction	5	0	4
Reduction %	21	0	17

SUMMARY

21. For ease of comparison, I list the values mentioned in the 'Conclusion' section of Dr Henderson's submission alongside the corresponding values for the three scenarios considered here.

	Original designated area (Dr Henderson's evidence)	Current proposed Construction footprint	Northern alignment	Southern alignment
Number of lost frames	25 (35%)	15 (21%0	19 (26%)	9 (13%)
SW frames lost	16 (67%)	12 (50%)	13 (54%)	5 (21%)

David John Horne

16 April 2019