

TRANSMISSION GULLY PROJECT

ADDENDUM TO TECHNICAL REPORT #11

Transmission Line Relocation Project

August 2011



Boffa Miskell

Front Cover Photo:

Looking south down Horokiri Valley from Wainui Saddle. Existing towers 13 in foreground.

Bibliographic reference:

Boffa Miskell, 2011: Transmission Gully Project: Addendum to Technical Report # 11 (Appendix 11.N). Transmission Line Relocation Project, Prepared for NZ Transport Agency and Transpower by Boffa Miskell Limited. Report No: W09034F_007. 34 pp.

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Document Status: Final
Version: V.5. 8 August 2011

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EXECUTIVE SUMMARY

INTRODUCTION

- The relocation of the existing transmission lines running through Transmission Gully is a necessary consequence of the Transmission Gully highway project and will be part of enabling works for the wider project.
- Transpower is seeking land use consent under the National Environmental Standards for Electricity Transmission (NESET) for the necessary relocation as part of the wider NZTA project consent applications.

METHODOLOGY

- The process for identifying a preferred route followed the Transpower ACRE model, a progressive filtering of alignment options through increasingly detailed assessments. It included a number of team workshops and site visits. Options were assessed using a multi-criteria analysis.
- This assessment of potential ecological effects draws upon the various technical reports (see Section 2.1) and the Technical Report 11: Assessment of Ecological Effects developed for the Transmission Gully route. It considers only the preferred alignment in detail.

PROJECT DESCRIPTION

- In summary, this project involves the relocation of twenty-four 110kv transmission towers, located within the Te Puka valley, Horokiri East Valley and Ration Stream catchment. One existing tower is removed and ten towers will require strengthening.
- There will be a requirement for access roads to these towers for construction equipment and an ongoing need for vehicle access to each tower base for ongoing maintenance. For many towers access is available through existing farm tracks. For others a construction access tracks which is being consented as part of the TG Alignment will also provide direct access. For a few sites additional access roading may be needed.

EXISTING ENVIRONMENT

- The existing environment is described in detail in Technical Reports prepared for the Transmission Gully Project ecological impact assessment.
- In summary the vegetation within the Transmission Gully designation is dominated by pasture (60%), shrublands and scrub (14%), regenerating native bush (7%), mature native forest (7%), and plantation pine (9.5%). All of the native forest is contained within the Te Puka catchment.
- The greatest diversity of native birds is located within the Akatarawa forest which extends down the eastern slopes of the Te Puka and Horokiri Catchments. This forest may also contain native bats.
- No lizards of terrestrial invertebrates of conservation concern have been found within the vegetation of the designation, due primarily to the effects of pastoral farming. Some common species were located and their habitats described.
- The streams within the Te Puka and Horokiri are considered to be of high value. Ration Stream is considered to be of lower value.

PROJECT SHAPING

- A number of options for the line route were identified at the start of this project (as described above).

- A number of these options focused on Wainui Saddle which is a significant pinch point for the Transmission Gully project forcing the transmission corridor out of the valley floor. The range of options was refined to two using multi-criteria analysis.
- Each of these two options had environmental challenges, the eastern option would have potentially significant effects on remnant native forest and habitat for threatened wildlife, the western option would potentially have adverse effects on an outstanding landscape feature.
- The ACRE process ultimately determined that the western option was the preferred alignment.
- A detailed effects assessment was carried out for the preferred western alignment.

SUMMARY OF ECOLOGICAL EFFECTS ASSESSMENT

- Potential adverse effects are separated into Direct Effects and Indirect Effects of Construction and effects of Operation.

Direct Impacts of Construction

- We considered the potential loss of vegetation and habitat from the construction of new tower foundations, the upgrading of existing towers, the formation of access roading for construction, and vegetation clearance needed to maintain line clearance.
- We concluded that no indigenous vegetation would be affected by tower or access road formation and no mitigation was required.
- Some areas of pioneer shrubland and scrub dominated by gorse will be cleared. We concluded this would have no or negligible effects on the local ecology.
- Only two towers (13AW and 16AW) will require a temporary stream crossing for access. The streams are headwaters and we conclude that, assuming streams are remediated following culvert removal; temporary crossings will only have shorter term and minor effects.

Indirect Impacts of Construction

- We considered the potential for sediment discharge to streams from construction of the towers and associated access roading.
- The great majority of tower locations are on flat ground, either river terraces or downland, and almost all of these sites have existing access tracks to them. We concluded that there was no risk of erosion and sediment discharge from these works.
- Seven towers will be built on steeper slopes. Three of these are on high spurs and are removed from streams. The risk of significant sediment discharge to streams is considered low. Four are on slopes above streams and additional care is needed to minimise erosion.
- Overall, and given the modest scale of earthworks required, we conclude that the risk of significant effects from sediment discharge is low.

Operation Impacts

- The only potential effects of ongoing operation are vegetation removal to maintain line clearance and potential effects on avifauna.
- We conclude that due to the existing low structure of vegetation no vegetation clearance is likely to be necessary for a number of decades.
- The preferred western alignment moves three towers out of the valley and 200 to 300m west from the Akatarawa forest which is the prime habitat for native birds and bats. 2 towers move slightly closer and two do not change. Overall we consider the effect of these changes to be neutral.

Other

- All but 5 of the proposed tower relocations lie within the existing designation. The 5 new tower locations that occur outside the TG designation all lie on improved pasture and are

accessible by existing farm or forestry access tracks. No clearance of native vegetation or stream crossings will be required.

SUMMARY OF MONITORING & MITIGATION

- In summary we have concluded that no mitigation is required for the negligible effects that will occur. However, we recommend the following consent conditions to ensure recognition and protection of values:
 1. Conditions for the identification and protection during construction of four areas of valued vegetation (K224, K228, P172, and P199).
 2. Conditions that require best endeavours to minimise clearance of other native vegetation, in particular riparian vegetation.
 3. Conditions relating to the installation and removal of temporary culverts on construction access tracks.
 4. Conditions relating to sediment and erosion management.

CONCLUSIONS

- In conclusion, the works proposed are largely in pasture. Existing access roads to the current corridor, farm access tracks, and forestry tracks provide ready access to all but two sites where new and short access tracks will need to be formed.
- Over the length of the realignment only two temporary culverts will be required for access tracks. Assuming reinstatement of the stream following removal, we are satisfied that any effects will be short term and minor.
- No regenerating native bush or native forest will be affected by these works. We are further satisfied that the clearance of small areas of pioneer shrublands dominated by gorse will have negligible ecological effects.
- Three towers will be moved from Wainui saddle to western slopes, and away from Akatarawa forest. We conclude that effects on wildlife will be neutral.
- Indicative Site Specific Environmental Management Plans (SSEMPs) have been developed for the Transmission Gully Project. The Transmission Line Relocation is considered in these SSEMPs as a key part of enabling works, which also includes identification and protection of important areas of native vegetation, and of habitats of terrestrial fauna. This integration between the two projects will be important for ensuring protection of values identified by the Transmission Gully Project.
- We understand that resource consents for earthworks, access tracks and culverts for the Transmission Line Relocation will be sought following detailed design. These are discussed briefly in this report to demonstrate the likely scale of effects associated with these activities.
- The proposed conditions attached to the AEE address:
 - the identification and protection of several sites of ecological value that have been identified within the line route;
 - the management of vegetation clearance, trimming and disposal; and
 - consideration of sediment generation and discharge to streams during the design of towers.

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1. INTRODUCTION

1.1 BACKGROUND

The NZ Transport Agency (NZTA) has identified the need for a new inland state highway from Linden in Wellington City to MacKays Crossing in the Kapiti Coast District. This is known as the Transmission Gully Project and is part of the Wellington Northern Corridor Roads of National Significance (RoNS). The NZTA are progressing notices of requirement for designations and applications for resource consents for the Transmission Gully Project as a project of national significance under the Resource Management Act 1991 (RMA). NZTA's documentation that supports the notices of requirement for designations and applications for resource consents is contained in Volumes 1 to 5. These volumes contain a substantive description of the Transmission Gully Project.

In order to allow for the construction and operation of the Transmission Gully Project, parts of the existing electricity transmission line between the Pauatahanui substation at State Highway 58 and MacKays Crossing will need to be relocated. The Paekakariki-Takapu Road A (PKK-TKR A) 110kV transmission line is part of the National Grid and is owned and operated by Transpower New Zealand Limited (Transpower). This Line Relocation Project involves the relocation of sections of the PKK-TKR A between the Paekakariki and Pauatahanui Substations from Tower 1 to 49A. The line route generally follows the existing transmission line with the route design generally governed by the need to minimise crossings of the Transmission Gully Project cognisant of environmental, cultural, engineering and other factors.

Transpower is seeking the majority of the resource consents to enable the line relocation to occur under the regulations included in the Resource Management (National Environmental Standards for Electricity Transmission Activities) Regulations 2009 (NESETA). These resource consents are set out in detail in the AEE and in summary are:

- Restricted discretionary land use consent for the relocation of 6 towers in Kapiti Coast District in accordance with the NESETA; and
- Restricted discretionary land use consent for the relocation of 18 towers in Porirua City in accordance with the NESETA.

No transmission lines will be relocated in Upper Hutt City or in Wellington City.

Regional consents for related works including earthworks and construction of culverts are not being applied for at this time. Where consents are required for these activities they will be applied for during detailed design.

This current assessment addresses the ecological effects associated with the Transmission Gully Line Relocation (hereafter referred to as 'the Line Relocation Project').

2. METHODOLOGY

2.1 TECHNICAL REPORTS

The ecological values of the study area are described and mapped in five Technical Reports (TR) that have been prepared for the Transmission Gully Ecological Impact Assessment. The six technical reports are:

- TR 6: Terrestrial Vegetation & Habitats: Description and Values
- TR 7: Herpetofauna & Terrestrial Macro-Invertebrates: Description and Values
- TR 8: Avifauna & Bats: Description and Values
- TR 9: Freshwater Habitat & Species: Description and Values.
- TR 10: Marine Habitat & Species: Description and Values
- TR 11: Ecological Impact Assessment

2.2 PROJECT SHAPING

The process for identifying a preferred route followed the Transpower ACRE model, a progressive filtering of alignment options through increasingly detailed assessments. It included a number of team workshops and site visits. Options were assessed using a multi-criteria analysis which considered geotechnical, landscape and visual, ecological, cultural and engineering assessments.

A number of route options were identified at the start of this project. Several of the options explored focused on Wainui Saddle which is a significant pinch point for the Transmission Gully project.

The range of options at Wainui Saddle was refined to two, east and west of the saddle. The eastern route would require the location of three towers (9A-E, 10A-E, and 11A-E) in tall native forest which is part of the Akatarawa / Whakatikei forest park. Tower 8 would also move upslope into pine forest. This option would require clearance of mature native forest for tower foundations, construction and maintenance access tracks, and to ensure line clearance. The ecological effects of this were assessed to be high. The potential locations of these towers are shown in photos 11.N-1 to 11.N-11.

In contrast the western option would require relocation of three towers (9A-W, 10A-W, and 11A-W) onto high spurs on the western slopes of Te Puka, which are currently in improved pasture. No clearance of native vegetation would be needed for this option. It did, however, have other issues which were explored by other members of the consenting team. The potential location of two of these towers is shown in Photo 11.N-12.

The ACRE process, after considering a range of issues of which ecology was one, determined that the western option was the preferred alignment and this option is the one that is assessed in this report.

Assessments for this analysis were developed both from the work already carried out for the Transmission Gully Project, with additional site investigations carried out to resolve specific issues.

This process is described in more detail in Section 5.

2.3 ADDITIONAL SITE VISITS

In addition to the field work carried out for the Transmission Gully project, three additional site visits were carried out during project shaping. The first on 23 September 2010 was with the wider consenting team and provided an overview of the route, the relationship of the transmission

corridor with the proposed Transmission Gully alignment, pinch points and potential relocation options.

A more focused site visit was held on 7 December 2010 looking at specific tower locations along the realignment.

A final site visit was conducted on 11 May 2011. It explored the two preferred options at Wainui Saddle, with a focus on the eastern option which would pass through the Akatarawa forest. These site visits helped to inform the project shaping process.

2.4 GENERIC TITLES AND TERMS:

“Transmission Gully Project” refers to the Transmission Gully roading project of which this assessment forms part.

“The Transmission Line Relocation” refers to The Transmission Gully Line Relocation Project which will be part of enabling works for the Transmission Gully Project.

“The line route” refers to the preferred line relocation route which was developed through the ACRE process and which is assessed here.

“Footprint” refers to the earthworks extent for the road including both the road surface and associated cuts and fills, but does not involve subsidiary works such as fill sites and sediment treatment devices which have not yet been designed. The Transmission Gully Footprint has an area of 172ha.

“Designation” refers to the designation being sought by NZTA for the Transmission Gully Project.

“Study Area” refers to all land, water bodies and receiving environments that could be potentially affected by the Project (also called **Zone of Influence**).

3. PROJECT DESCRIPTION

The Assessment of Environmental Effects report (AEE) accompanying the application for resource consent describes the Line Relocation Project in detail. This section is a summary of the Project.

3.1 LINE ROUTE

The PKK-TKR A line between the Paekakariki and Pauatahanui Substations is approximately 15 km long. The existing line is a 110 kV double circuit line consisting of lattice steel towers. There are 50 existing towers along this section of the line.

For assessment purposes, the line route is split into six route sections. The following summarises the relocation works for each section.

Route Section 1– McKays Crossing

This route section covers the line route between Tower 1 and Tower 4. In order to accommodate the Transmission Gully Project, two existing towers will be relocated, one to the west and the other slightly to the east of the existing line. No alterations are required to towers or lines located north of the existing state highway.

Route Section 2 and 3 - Wainui Saddle

This route section covers the line route between Tower 5 and 15. Through this section, the line route runs to west of the proposed road and then roughly two thirds of the way up the Te Puka valley at Tower 8, the line is proposed to be relocated to the west of the Saddle. This is required in order to navigate around the Wainui Saddle, which will be occupied by the Transmission Gully Project. Towers will be erected halfway up the main spur to the west of the Saddle and will skirt round the high point of the saddle and then crossing the Transmission Gully Project between Towers 11 and 12, before dropping back into the Horokiri Valley of the Saddle at roughly Tower 13. Minor relocations will be required to the remaining towers (including tower 13) in this section (as compared with current positions) in order to accommodate the proposed Transmission Gully Project with the line aligned roughly parallel and to the east of the existing line.

Route Section 3 - Horokiri Stream

This route section covers the line route between Tower 15 and 25. Minor relocations of towers (as compared with current positions) are required to accommodate the proposed Transmission Gully Project with the proposed line aligned roughly parallel and to the east of the existing line. Tower 23 is to be removed.

Route Section 4 - Battle Hill

This route section covers the line route between Tower 26 and 33. Relocation of towers is required to accommodate the proposed Transmission Gully Project with the proposed line aligned roughly parallel and to the east of the existing line. The proposed line crosses the Transmission Gully Project between Towers 32 and 33.

Route Section 5 – Golf Course

This route section covers the line route between Tower 34 and 42. Relocation of towers is required in order to accommodate the proposed Transmission Gully Project with the proposed line aligned roughly parallel and to the west of the existing line.

Route Section 6 - State Highway 58

This route section covers the line route between Tower 43 and 49A. Tower 43 is relocated to the west of the existing tower. No other tower relocations are needed in this section.

3.2 TOWER DESIGN AND ACCESS TRACKS

The proposal is to relocate 24 existing tower structures, to strengthen 10 towers, entirely remove an existing tower. Table 11.N-1 summarises the changes to each of the towers.

Table 11.N-1: PKK-TKR A Line Towers and proposed works

Description	Towers	Quantity
Replaced structures	2A, 3A, 8A, 9A, 10A, 11A, 12A, 13A, 14A, 15A, 16A, 17A, 18A, 22A, 24A, 25A, 26A, 31A, 32A, 33A, 40A, 41A, 42A, 43A	24
Structures to be strengthened*	1, 4, 7, 19, 21, 27, 30, 34, 39, 44	10
Structures to be removed entirely	23	1
Unaffected Structures (not moving or being strengthened)	5, 6, 20, 28, 29, 35, 36, 37, 38, 45, 46, 47, 48, 49, 49a	15
Total		50

* Involves foundation and/or tower strengthening.

The "A" in the tower reference denotes relocated/replaced tower.

The replacement towers are expected to range in height from approximately 29 m through to 39 m.

The towers will be steel lattice design, similar to existing towers.

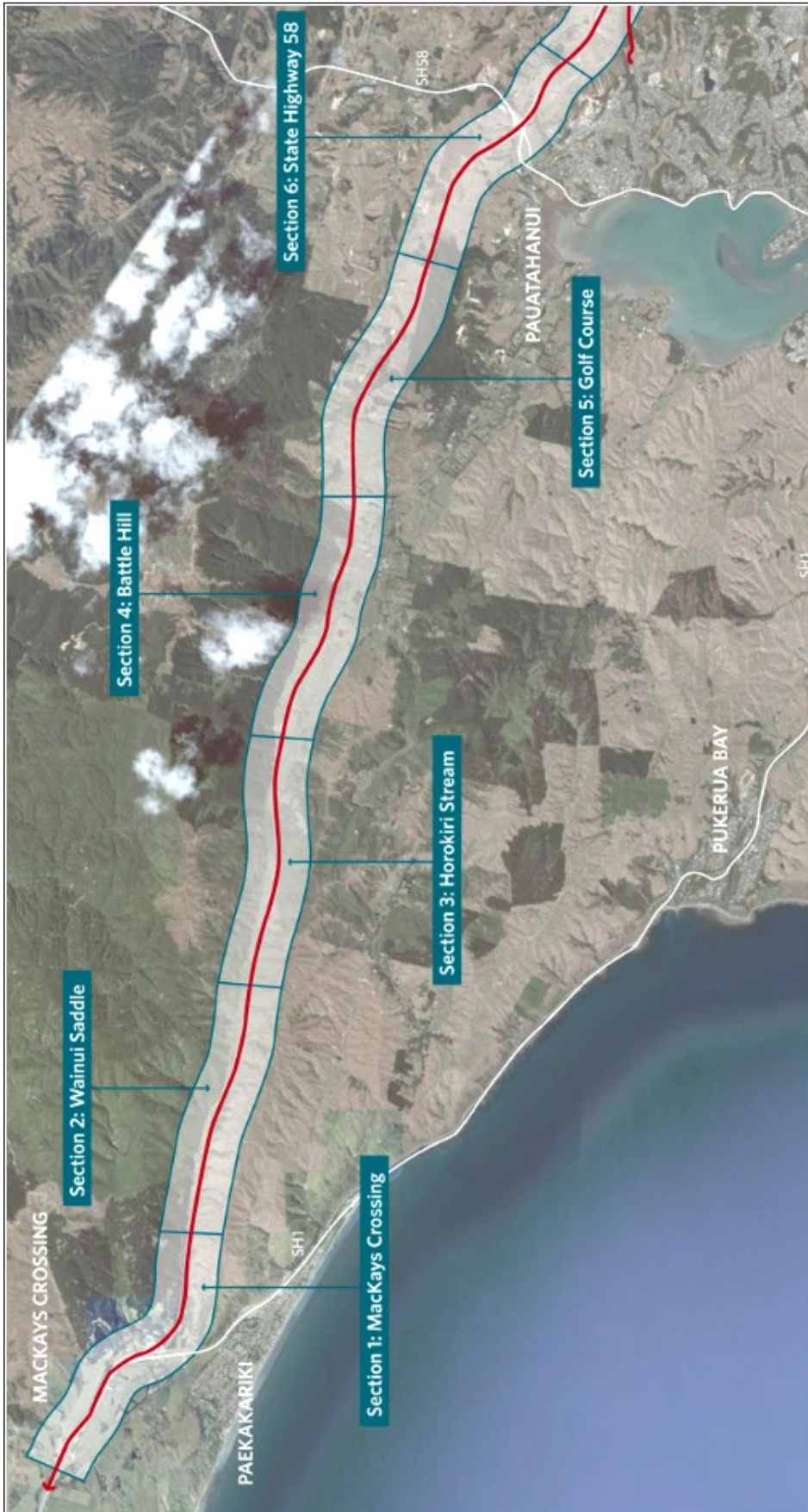
Tower foundations will be approximately 9m x 9m for a strain tower and for construction, an additional clearance buffer of approximately 3 m around each tower. In addition, generally an area of approximately 20 m x 25 m will be required to one side of each proposed tower for construction crane assembly purposes. This construction area will be able to reinstated following use.

Transpower has an existing access track along the line for maintenance purposes. This track is shown on the drawings contained in Volume 4: Plan Set. This existing access track and other existing tracks (including farm and forestry tracks) will be used for construction access to provide four wheel drive access to each tower. The tracks will be approximately 3.5m to 4.5m wide. At the Wainui Saddle, for the towers located outside the extent of works for the NZ Transport Agency's Transmission Gully Main Alignment (i.e. for towers 9A, 10A and 11A), access is likely to be taken off the existing access track that currently serves the farm and the gas pipeline owned by Vector. New tracks will be constructed off this to gain access to Towers 9A and 10A.

Table 11.N-2: PKK-TKR A Line Towers - Locations and Context

Activity	Tower Number	Catchment	Within Designation	Distance to Existing Tower (m)
Strengthen	1	Te Puka	Yes	0
New	2A	Te Puka	Yes	20
New	3A	Te Puka	Yes	19
Strengthen	4	Te Puka	Yes	0
No Change	5, & 6	Te Puka	Yes	
Strengthen	7	Te Puka	Yes	0
New	8AW	Te Puka	Yes	25
New	9AW	Te Puka	No	278
New	10AW	Te Puka	No	318
New	11AW	Te Puka	No	170
New	12AW	Horokiri	Yes	105
New	13AW	Horokiri	Yes	92
New	14AW	Horokiri	Yes	110
New	15AW	Horokiri	Yes	138
New	16AW	Horokiri	Yes	116
New	17A	Horokiri	Yes	104
New	18A	Horokiri	Yes	137
Strengthen	19	Horokiri	Yes	0
No Change	20	Horokiri	Yes	0
Strengthen	21	Horokiri	Yes	0
New	22A	Horokiri	Yes	64
Removed	23	Horokiri	-	-
New	24A	Horokiri	Yes	142
New	25A	Horokiri	Yes	119
New	26A	Horokiri	Yes	114
Strengthen	27	Horokiri	No	0
No Change	28, & 29	Horokiri	No	0
Strengthen	30	Horokiri	No	0
New	31A	Horokiri	Yes	15
New	32A	Horokiri	No	91
New	33A	Horokiri	No	10
Strengthen	34	Horokiri	No	0
No Change	35, 36, 37, & 38	Ration	No	0
Strengthen	39	Ration	No	0
New	40A	Ration	Yes	12
New	41A	Ration	Yes	80
New	42A	Ration	Yes	115
New	43A	Ration	Yes	26
Strengthen	44	Ration	No	0

Figure 11.N-1: Route Sections for the Transmission Gully Project



4. DESCRIPTION OF EXISTING ENVIRONMENT

4.1 INTRODUCTION

In this section, the findings of desktop and site surveys carried out as part of the Transmission Gully Project are summarised, with a focus on the values that are potentially affected by the proposed activities. The tower relocations occur within three of the nine catchments affected by the wider Transmission Gully Project. Those three are the Te Puka, Horokiri East and Ration.

4.2 SIGNIFICANT NATURAL AREAS

Within the line route lie 13 sites that have been identified as having important vegetation or habitat for indigenous species and which lie in part or whole within the designation of the Transmission Gully Project. Three of these are formally protected. The remaining ten are in private ownership. They are described in detail in Technical report #6.

4.2.1 Protected Natural Areas (PNAs)

Protected means either; a scenic reserve or conservation land protected under the Reserves Act (1977) including local purpose reserves and stewardship areas, a private or QEII National Trust Open Space Covenant attached to the title of the property, or public land which has a management plan (Regional Park).

Table 11.N-3: Protected Natural Areas beneath the Transmission Gully Designation.

Name (Sorted by Catchment and listed from North to South)	Rel ⁿ	Description and size	Ecological Value
Wainui Catchment			
Rowans Bush	D	Partially protected by QEII covenant (QE11 5/07/363). Kohekohe-titoki forest on lowland hill country. Part of a series of fragments that provides links between Kapiti Island and the Tararua Ranges. Eastern half of site is protected in part under QEII covenant. KCDC Ecosite K139: Regionally significant (2.8ha).	H
Te Puka Catchment			
Akatarawa/Whakatikei Forest Park	D	GWRC water collection area and regional forest park. Identified in BRWR ¹ as site 19b – Lowland to montane miro-rimu-rata/tawa-kamahi forest. Has a high diversity of native bird life and this area of vegetation has large corridor benefits and wider ecological habitat benefits (15,439ha).	H
Horokiri East Catchment			
Battle Hill Regional Park	F	Much of this park is open space and farmland. There are no indigenous plant communities within the designation. (502ha)	Nil
Ration Catchment			
No Sites			-

A = adjacent to Designation; D = all or part within Designation; F = falls beneath road footprint; DS = downstream of route.

1 Biological Resources of the Wellington Region. Wellington Regional Council 1984.

4.2.2 Unprotected Natural Areas (SNAs)

In addition to PNAs listed above, Table 11.N-4 lists 10 sites along the route that have been identified through district wide or regional survey as having ecological value, and which do not have formal protection such as covenant or reserve status. A number may be protected through rules and schedules in the District or Regional Plans.

Table 11.N-4: Unprotected sites of ecological value beneath the Transmission Gully Designation.

DESCRIPTION (listed North to South)	Rel ⁿ	Description	Ecological Value
Te Puka Catchment			
Paekakariki bush sites B to J.	F	KCDC Ecosite K222 – 229. Eight small fragments of kohekohe forest and scrub of varying sizes and conditions. All are unfenced and heavily browsed by stock. They are also typically too small to contain a healthy core. For these reasons the KCDC survey did not recommend them for protection.	L to M
Horokiri East Catchment			
Transmission Gully Saddle	D	Small forest remnant within farmland, PCC Ecosite 172 – SES ranking 6 (0.287 ha)	L
TG Riparian Area	D	Riparian areas within farmland, PCC Ecosite 199 – SES ranking 5 (1.877 ha)	L
Ration Catchment			
No Sites	-	-	

A = adjacent to Designation; D = all or part within Designation; F = falls beneath road footprint; DS = downstream of route.

4.3 TERRESTRIAL FLORA AND VEGETATION

4.3.1 Vegetation communities & habitats

The vegetation is described in detail in Technical Report 6 (Terrestrial Vegetation & Habitats: Description and Values) and only a summary is repeated here.

Table 11.N-5 lists the vegetation communities found within the Transmission Gully designation in each of the three affected catchments. All but five of the new tower locations lie within the designation.

Table 11.N-5: Vegetation communities within the proposed Transmission Gully designation by catchment.

	Te Puka Stream (ha)	% of total area	Horokiri Stream (ha)	% of total area	Ration Stream (ha)	% of total area	
Grassland, shrublands, rushland and wetlands							
1.01	Improved pasture	22	33.8%	73	58.9%	21	47.7%
1.02	Rough pasture and shrublands	4	6.2%	13	10.5%		
1.03	Cropland						
1.04	Stony streambed in pasture	2	3.1%	5	4.0%		
1.05	Riparian margins in rushland					1	2.3%
1.06	Indigenous wetland			1	0.8%		
Pioneer shrublands and low scrub							
2.01	Gorse dominated scrub (closed canopy)			10	8.1%	3	6.8%
2.02	Tauhinu scrub (closed canopy)	8	12.3%	8	6.5%		
2.03	Riparian margins with low scrub			2	1.6%	1	2.3%
Regenerating kanuka scrub & forest							
3.01	Secondary native forest (kanuka)	1	1.5%				
Regenerating broadleaved scrub & forest							
4.01	Transmission Gully restoration planting					7	15.9%
4.02	Secondary native forest (broadleaf)	1	1.5%	2	1.6%	1	2.3%
4.03	Riparian margins with 2° native forest	1	1.5%	3	2.4%		
Mature or maturing indigenous forest							
5.01	Lowland tawa forest	1	1.5%				
5.02	Coastal kohekohe forest	11	16.9%				
5.03	Remnant sub-montane hardwood forest	1	1.5%				
5.04	Riparian margins with indigenous forest	3	4.6%				
Exotic vegetation							
6.01	Plantation pine	8	12.3%	3	2.4%	7	15.9%
6.02	Plantation pine - harvested						
6.03	Exotic trees (shelterbelts, gardens)	1	1.5%	1	0.8%	1	2.3%
6.04	Riparian margins with exotic trees			1	0.8%		
Undefined							
7.01	Built-up area						
TOTAL		65	100.0%	124	100.0%	44	100.0%

Note: Areas are rounded up to the nearest hectare and may not total precisely.

In summary:

- The designation within Te Puka valley contains a mix of grasslands (43%), pioneer shrublands (12%), regenerating native bush (5%) and mature or maturing native forest (25%), and plantation forestry (14%). It is also the only one of these three catchments that contains mature native forest within the designation.
- The designation within Horokiri Valley is dominated by pasture (74%), with lesser amounts of pioneer shrublands (16%), regenerating forest (4%), and exotic forestry (4%). It is the only one of the three catchments that contains wetland habitat, a small area of cattle pugged pasture on a river terrace with some indigenous wetland communities.
- The designation within Ration Stream catchment contains a mix of grasslands (50%), pioneer shrublands (9%), regenerating native bush (18%), and exotic forest (18%). Of note is that the majority of regenerating native bush is made up of early retirement plantings carried out by NZTA as a requirement of the original Transmission Gully designation decision.
- Five towers that are being relocated will lie outside the Transmission Gully Designation; three in the Te Puka Valley and two in the lower parts of the Eastern Horokiri Valley. The three in the Te Puka (9AW, 10AW, 11AW) will move from the valley floor to western slopes which are in pasture. The two in the Horokiri (32A & 33A) will move short distances across paddocks in improved pasture.

4.3.2 Plants of conservation concern

Only one plant of conservation concern is known to occur in the designation within these three catchments. *Leptinella tenella* was located in an area of heavily grazed, sphagnum dominated wetland within the Horokiri Valley. This wetland is otherwise unremarkable; however, the presence of this species elevates its significance slightly.

Leptinella tenella is classified as At Risk – Declining (de Lange et.al. 2010). It is endemic to the North Island and northern South Island. It is a lowland species whose habitat is usually on stream margins where they enter estuaries, on lake margins or on the margins of freshwater swamps and wetlands bordering saltmarsh. This species is sometimes found on cattle pugged swampy ground bordering saltmarshes (as in the Transmission Gully Project location).

A number of other species that are considered to be locally uncommon are located within the wider study area, the majority within the lowland podocarp/tawa forest and sub-montane podocarp broadleaf forest of the Akatarawa Forest Park. None were found within the project designation.

The five towers that are being relocated outside the designation will all lie on improved pasture and no plants of conservation concern will be present

4.4 BIRDS/AVIFAUNA

The avifauna is described in detail in Technical Report 8 (Avifauna & Bats: Description and Values) and only a summary is repeated here.

4.4.1 Habitat values

The majority of habitat along the line route is pasture and farmland. The greatest number of species (16) was recorded in this habitat type, and 75% of these were introduced species.

In comparison, the forest provides primary habitat for fewer species, but all of these were native species and include the Threatened bush falcon (Miskelly et.al. 2008). The freshwater habitats are utilised by introduced, native, Threatened and At Risk species.

Thus in terms of ecological values, the forest, scrub and freshwater habitats are of greater value than the farmland in terms of providing feeding and nesting resources for native species, including Threatened and At Risk species. Forest, scrub and freshwater habitat types are poorly represented within the Transmission Gully Designation. Only one At Risk species recorded during the avifauna surveys utilises farmland as its primary habitat (the New Zealand pipit).

Specific habitats and areas of importance for birds along the line route are:

- Ration Stream: the high mean bird abundances and species diversity per count recorded are likely to be due to the variety of land-uses within this area (rural residential, hobby farms, exotic plantation) rather than a reflection of high habitat quality.
- Te Puka Stream: the habitat with the highest ecological value was found here, notably the forest remnants within the Te Puka catchment. The occurrence of large trees (including emergent podocarps) together with important fruiting species within these remnants provides suitable nesting and feeding habitat for a variety of native, Threatened and At Risk species.

The five towers that are being relocated outside the designation will all lie on improved pasture.

4.4.2 Species of conservation concern

Overall, introduced species made up the greatest proportion (68.6%) of all birds recorded during the point counts along the alignment. Of the 37 bird species recorded during the avifauna survey period, 21 were native with the following classifications:

- 16 are not threatened,
- Three are “Threatened” (bush falcon, kaka and pied shag) and
- Two are “At Risk” (black shag and New Zealand pipit) (Miskelly, et al., 2008).

The kaka and bush falcon were both seen in the upper Horokiri

4.5 BATS

Bats studies are described in detail in Technical Report 8 (Avifauna & Bat studies: Description and Values) and only a summary is repeated here.

While there were no confirmed recordings of bats, one recording of interest was detected from the bat box located in the upper Te Puka site in kohekohe forest. This record could potentially be either a short- or long-tailed bat. This will be confirmed as part of the ongoing Transmission Gully Project.

The only habitat with sufficiently large area of old growth native forest likely to contain the long-tailed bat is the Akatarawa Forest which extends into the upper Te Puka and upper Horokiri.

4.6 HERPETOFAUNA

The herpetofauna is described in detail in Technical Report 7 (Herpetofauna & Terrestrial Macro-Invertebrates: Description and Values) and only a summary is repeated here.

4.6.1 Distribution & abundance

The Transmission Gully Designation provides habitat for at least three endemic lizard species: common gecko, copper skink and common skink. They are present in very low numbers, only four individuals being recorded along the Transmission Gully Route over the course of the study.

4.6.2 Species of conservation concern

No species of conservation concern were located during the survey. It is possible that additional lizard species occur along the Designation but were not detected. However, given the variety and intensity of the surveys, if any species were missed they are unlikely to be present in any abundance.

While this study did not detect any uncommon or threatened species of lizard, the suite of three common native lizard species present has ecological value; it is most probably representative of the lizard communities occurring across much of the inland Wellington Region – especially in agricultural landscapes with remnants/patches of forest and shrubland and/or deep scree slopes.

4.6.3 Habitat values

Much of the habitat within the designation represents poor to marginal (low value) herpetofauna habitat, in particular the grazed pasture. Where lizards were recorded in grazed pasture, they were usually found sheltering beneath rocks, logs, and debris in the pasture and represent a relict (as opposed to thriving) population.

The highest quality herpetofauna habitat within the designation is the stone fields and scree slopes located towards the northern end of the alignment.

The native forest in the Wainui Saddle area (also located within the northern end of the Project footprint) may provide habitat for arboreal gecko species such as forest gecko and Wellington green gecko. However, the survey programme revealed no herpetofauna occurring within the native forest habitats. They may be present but undetected due to the inherent difficulties in surveying for gecko and/or low population densities.

The five towers that are being relocated outside the designation will all lie on improved pasture some distance from likely habitat of native lizards.

4.7 TERRESTRIAL INVERTEBRATES

The terrestrial invertebrate fauna is described in detail in Technical Report 7 (Herpetofauna & Terrestrial Macro-Invertebrates: Description and Values) and only a summary is repeated here.

4.7.1 Habitat values

A wide variety of common terrestrial invertebrates were detected, though none of conservation concern. However, the area around Wainui Saddle appears to be a stronghold for *Peripatus novaeseelandiae* which was located in a variety of habitats beneath logs and within boulderfields. While this species does not currently have a threat status, their taxonomy is under review.

4.8 FRESHWATER HABITATS AND SPECIES

Freshwater habitats and fauna are described in detail in Technical Report 9 (Freshwater Habitat & Species: Description and Values) and only a summary is repeated here.

4.8.1 Hydrology

There are two watersheds affected by this proposal. They are:

- The Wainui watershed which discharges to the Kapiti Coast through Queen Elizabeth Regional Park. It includes Wainui Stream and Te Puka Stream, both of which would be crossed by this proposal. This watershed has a combined area of 670 ha (6.7 km²).

- The Pauatahanui watershed. This includes six named sub-catchments, Kakaho Stream, Horokiri Stream West Branch, Horokiri Stream East Branch, Ration Stream, Pauatahanui Stream (including Collins Stream), and Duck Creek, all of which discharge into Pauatahanui Inlet. Of these the Horokiri East Branch, Ration, Pauatahanui, and Duck catchments would be traversed by this proposal. This watershed has a combined area of 10,640 ha (106 km²).

4.8.2 Waterway system descriptions

Te Puka Stream

- Te Puka Stream has a catchment area of 3.7 km² (372 ha). It drains through a very steep gradient from above and to the north of the Wainui saddle over 3 km to the South under the state highway and across the coastal plain through the Queen Elizabeth Park Reserve to the coast.
- The waterway in its headwaters in the Wainui Saddle area is a poorly defined cobble and boulder base stream under a full forest canopy, or a narrow channelised, intermittent creek. The larger perennial true right branch represents a very natural aquatic habitat type with sub-surface flows, appropriate organic matter and complex and simple habitat areas. These are ideal habitat for koaro and banded kokopu but less so for shortjaw kokopu.
- Below the headwater and out of the forest the stream widens and becomes semi-braided on a coarse cobble base with a relatively undefined channel set in wide banks. The habitat is very simple and relatively uniform. As the stream reaches the lower-middle portion it cuts through an old ridge and this cut forms a deep and enclosed gorge section (around 500 m). This adds substantively to the habitat diversity of the creek. Below the gorge the stream falls a further 500 m to the State Highway where the gradient falls to the coastal plain. This lower stream section is narrower, single channel and provides greater evidence of disturbance by farming activities.
- Average velocities in the middle to upper reaches range from 0.3 to 0.5 ms⁻¹ with water depths typically around 0.05 to 0.1 m (very shallow). These are in undefined wetted channels of around 3 to 4 m, often in two channels and a bank to bank width of 9 to 15 m.
- Riffle habitat makes up around 40% of the aquatic habitat with cascades, stepped riffles, and stepped pools making up equally the remaining general aquatic habitat types, all represent relatively shallow “fast” water habitat.

Horokiri Stream

- Horokiri Stream has a catchment area of 34 km² (3,380 ha) and drains from north to south from a high point above Wainui Saddle (at around 560 m a.s.l) down into the Pauatahanui Inlet at sea level.
- The upper headwater/catchment of the East Branch of the Horokiri is largely in rough pasture with the larger, eastern tributaries in native regenerating shrublands. The typical water velocity in the headwaters is around 0.2 ms⁻¹ but around 0.5 m⁻¹ in some of the steeper reaches. The water is clear, the substrate cobble and relatively clean but the riparian areas largely exotic pasture species and unprotected from stock.
- The upper-middle reaches are characterised by a narrowing of the valley and an increase in native shrubland riparian vegetation (mahoe) on steep banks and small terraces over an incised stream. Despite the vehicle and stock crossings, the substrate and general form of the stream in this upper-middle section is relatively unmodified, but with little evidence of former forest habitat.
- The middle and lower-middle reach is deeply incised with native herbs and grasses on the steep, high banks and pastoral grasses on the bank tops. The water generally runs clear in a wide deep set channel as a shallow run and riffle system. The lowest reaches are much flatter and the river is larger and deeper with frequent pools and long runs. Here, the water

is often slightly coloured by sediment, and sands and sediment are common on the benthos. The banks are largely exotic and mixed weeds (willow), shrubs and grasses.

- In the lower reaches the waterway runs along an alluvial flat between steep and unstable hills for most of its 12.9 km length. As the alluvial plain opens into the Battle Hill Regional Park the surrounding hills recede. The East Branch meets the West branch at about the Paekakariki Hill Road, doubling the size of the waterway. Downstream the river flows to the Pauatahanui Inlet as a relatively slow and large lowland river type.

Ration Stream

- The Ration system is one of the shorter waterways of the eight affected. It has a total catchment area of around 6.13 km² (nearly 20% of that of the Horokiri), originates at around 260 m .a.s.l. and is only 4.8 km long. It discharges into Pauatahanui Inlet off Ration Point through a small oioi reed land.
- This is a generally flatter catchment than others in the study area. The majority of the upper reaches are in beef and sheep pasture, the middle reach in plantation forestry (which is likely to be having an adverse effect on the hydrology of the system), and the lower reaches in life style farming.
- The system has numerous intermittent or ephemeral tributaries that are largely covered in macrophytes (monkey musk, watercress, water pepper) and/or rushes and sedges in pasture (*Juncus effusus*, *Carex* sp). Water in this system is not always flowing and often only found underneath long grass swards and wetland plants. An open channel with water flow is only obvious in the middle to lower reaches under pine plantation or through the farmlands near the inlet.
- The water is often clouded, and nutrient and recorded sediment levels are very high. Unlike the Horokiri, there is a relative consistent and slow velocity of water (~0.2 ms⁻¹).

4.8.3 Freshwater fish

Seventeen species of fish have been recorded in the New Zealand Freshwater Fish Database (NZFWFDB) from seven of the catchments found within the Transmission Gully study area.

Four of these species are tidal and only found in the lowest reaches (smelt, flounder, mullet, triple fin). Of the remaining 13 species, the sampling programme for the Transmission Gully Project recorded nine.

Table 11.N-6: Summary of fish species caught within each river system sampled by EFM.

Catchment	Fish species
Te Puka	Koaro*, red fin bully*, long fin eel*
Horokiri	Banded kokopu, koaro*, red fin bully*, common bully, long fin eel*, short fin eel
Ration	Giant kokopu*, long fin eel*, short fin eel, white bait (?)

The presence of these species requires consideration of stream crossings, diversions and culverting.

5. PROJECT SHAPING

5.1 ROUTE SELECTION PROCESS

Transpower and NZTA have investigated options for the relocation of the transmission line. The methodology adopted for the route selection process is based on the Transpower ACRE model – an acronym for Area-Corridor-Route-Easement investigations. The general ACRE process involves a progressive filtering approach, where increasing and more specialised detail is provided on technical, environmental and property constraints and features throughout the process to enable the identification of a preferred easement for the line.

The route selection process has involved the following steps:

- The identification of an indicative area of study centred on the Transmission Gully Project route and the existing transmission line.
- The initial identification of possible line routes.
- A desktop and site investigation of opportunities and constraints in the area that will influence the identification of possible line routes. This included engineering, environmental and property features. More detailed assessments were undertaken of features likely to have the greatest influence on the selection of routes for the line relocation. These features were agreed at a multi-disciplinary workshop in October 2010 and included assessments by specialists for landscape/visual, cultural, ecological values and geotechnical/ geology.
- The relevant experts assigned ratings to each of the features as a method for assessing the relative importance, significance or extent of an issue. The ratings ranged from no constraint through to major constraint.
- The initial mapping of rated opportunities and constraints to identify constrained and unconstrained areas.
- A workshop on 26 November 2010 with Transpower and NZTA planners, engineers and specialists to discuss the initial constraints assessment, constraints ratings and mapping of features. This workshop identified areas and also identified the areas of greatest constraint. This workshop identified the Wainui Saddle as the area of greatest constraint for the line relocation route.
- The further refinement of specialist assessments for landscape/visual, ecological values and geotechnical/ geology and changes to mapped constraints based on this refinement.
- A visit to the Wainui Saddle by planners, engineers, geotechnical, ecological and visual specialists to identify whether a line route is possible through this section.
- A workshop with Transpower and NZTA planners, engineers and specialists on 22 February 2011:
 - summarise the detailed constraints investigation;
 - to consider as a team the route options within the Area of Study, looking for opportunities to streamline routes;
 - to assess agreed route options through multi-criteria analysis (MCA); and
 - to identify a preferred route option to take forward for further investigation.
- The workshop identified the preferred route as that which generally follows the existing transmission line and then the western bypass through the Wainui Saddle.
- Further site visits and investigations by engineering, ecological and landscape specialists to confirm route feasibility and refine tower siting and design at the Wainui Saddle.
- Confirmation of a preferred route being the route that generally follows the existing transmission line route with a western bypass at Wainui Saddle.

The AEE will describe the route selection process. For this specialist reports, only the chosen line route is discussed.

6. ASSESSMENT OF EFFECTS

6.1 INTRODUCTION

Potential effects of this proposal can be grouped into the following:

6.1.1 Direct effects of construction

- Vegetation clearance and habitat loss associated with forming a tower foundation;
- Vegetation clearance and habitat loss associated with forming an access track for machinery and operation;
- Vegetation removal to maintain line clearance; and
- Temporary or permanent stream crossings.

6.1.2 Indirect effects of construction

- Erosion and discharge of sediment from earthworks to streams.

6.1.3 Direct effects of operation

- Potential effects on avifauna.

The following table provides a description of each new tower location, the type of landform, the vegetation at each tower location, the vegetation along the likely access routes, and the vegetation that lies under the swing of the new line location.

Table 11.N-7: Vegetation and habitats potentially affected by construction and operation

Activity: R = relocated tower, S = strengthen, NA = not affected

In/Out: I = within designation, O = located outside designation.

Note vegetation codes from Table 11.N-5 are used in the following descriptions.

Tower N°	Activity	In / Out	Description of Tower Location	Vegetation beneath each tower	Construction Access	Vegetation beneath line from this tower to next
1	S	I	Adjacent SH1.	Industrial site (sealed)	SH1 immediately adjacent.	Pasture (1.01) and plantation pine (6.01)
2A	R	I	Broad elevated river terrace above Te Puka Stream. Lies 95m west of Rowans Bush, 50m east of K223.	Improved pasture (1.01). No change from current.	Existing farm track nearby, over improved pasture.	Line will cross pasture. Line passes east of K223 but does not cross. No change from current.
3A	R	I	Broad elevated river terrace above Te Puka Stream. 80m west of site K224.	Rough pasture (1.02) and gorse (2.01). No change from current.	Existing farm track nearby, through plantation pine.	Line will cross Te Puka stream gorge with regenerating mahoe & kohekohe forest (4.02, 5.02). Will cross (Site K224). No change from current.
4	S	I	Narrow elevated river terrace above Te Puka Stream. Lies east of K225.	Improved pasture	Existing access over pasture	-
5 & 6	NA	-	-	-	-	-
7	S	I	Steep spur above Te Puka Stream	Improved pasture	Existing access over pasture.	Small gully in scrub (2.03) and then pasture
8AW	R	I	Steep eastern slopes above Te Puka Stream. Lies 50m east of K228. Lies 30m west of Akatarawa Forest.	Improved pasture. No change from current.	Existing farm track, over improved pasture.	Will cross Te Puka stream to western slopes then will pass over margin of site K228 in kohekohe forest (5.02). Currently crosses pasture and regenerating bush (4.01).
9AW	R	O	High spurs on western side of Te Puka. Lies 130m west of K228.	Improved pasture. No change from current.	From ridgeline over improved pasture. Existing farm tracks nearby.	Will cross improved pasture. Currently crosses regenerating bush (4.01) and rough pasture.
10AW	R	O	High spurs on western side of Te Puka Lies 160m west of K228.	Improved pasture. Currently regenerating bush (4.01) and rough pasture.	From ridgeline over improved pasture. Existing farm tracks nearby.	Will cross improved pasture. Currently crosses regenerating bush (4.01) and rough pasture.

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Tower N°	Activity	In / Out	Description of Tower Location	Vegetation beneath each tower	Construction Access	Vegetation beneath line from this tower to next
11AW	R	O	High spurs on western side of Te Puka Lies 95 west of K228.	Improved pasture. Currently tauhinu scrub (2.02)	From ridgeline over improved pasture. Existing farm tracks nearby.	Will cross slopes and gullies with tauhinu shrubland and scrub (2.02 & 2.03). Currently crosses pasture.
12AW	etc	I	Moderately steep slopes to east of Horokiri Stream.	Improved pasture. No change from current.	From existing farm track (55m) over improved pasture.	Mostly improved pasture. Will cross some gullies in secondary native mahoe forest (2.03, 4.03). Lies 35m west of Akatarawa Forest. Line will cross riparian forest (5.01) of site P172. Currently over improved pasture and boggy stream (1.05).
13AW	R	I	Moderately steep slopes to east of Horokiri Stream.	Improved pasture. No change from current.	From existing farm track (95m) over improved pasture. Will require temporary crossing of Horokiri Stream.	Mostly improved pasture and some rough pasture with shrubs (1.02). No change from current.
14AW	R	I	High terrace adjacent to Horokiri Stream (eastern side)	Improved pasture. No change from current.	From existing farm track (68m) over improved pasture. Will require temporary crossing of Horokiri Stream.	Mostly improved pasture. Will cross Horokiri Stream - stony stream bed in pasture (1.04). No change from current.
15AW	R	I	High terrace adjacent to Horokiri Stream (eastern side)	Improved pasture. No change from current.	From existing farm track (10m) over improved pasture.	Mostly improved pasture. Will cross Horokiri Stream in area of secondary native mahoe forest (2.03, 4.03) associated with site P199. No change from current.
16AW	R	I	Terrace on eastern slopes above Horokiri Stream.	Improved pasture. No change from current.	Sidling track across toe slopes from existing farm track over rough pasture (180m).	Over gorse scrub on slopes (2.01) and over regenerating forest in Horokiri Stream (4.03) associated with site P199. No change from current.
17A	R	I	High terrace above Horokiri stream (western side)	Rough pasture (1.02). No change from current.	Existing farm track across pasture (5m).	Predominantly over improved pasture and rough pasture (1.02) with some stony streambed (1.04) and gorse scrub (2.01). Currently over scrub (2.02) and pasture.
18A	R	I	Low terrace above Horokiri stream (eastern side)	Improved pasture. No change from current.	Extend from existing farm track across pasture (± 40m).	Predominantly over improved pasture and stony streambed (1.04) with some areas of gorse scrub

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Tower N°	Activity	In / Out	Description of Tower Location	Vegetation beneath each tower	Construction Access	Vegetation beneath line from this tower to next
						(2.01). Currently over riparian forest (4.02), scrub (2.01) and pasture.
19	S	I	River terrace to east of Horokiri Stream	Improved pasture	Existing over pasture.	-
20	NA	-	-	-	-	-
21	S	I	Moderately steep slope above stream (east)	Gorse scrub (2.01)	Existing track through gorse scrub.	Predominantly dense gorse scrub 2.01, and scrub and regenerating forest in gullies (2.03, 4.03)
22A	R	I	Broad river terrace above to Horokiri Stream (eastern side)	Gorse scrub (2.01). No change from current.	From existing farm track over improved pasture (50m).	Improved pasture and areas of gorse (2.01) and pine (6.01). No change from current.
23A	D		deleted	-	-	-
24A	R	I	Eastern slopes above Horokiri Stream.	Plantation pine (6.1). Currently improved pasture.	From existing farm track over pasture and pine (130m).	Across plantation pine (6.01) with some gorse scrub (2.01) and improved pasture. Currently over improved pasture.
25A	R	I	Broad river terrace above to Horokiri Stream (eastern side)	Improved pasture. No change from current.	Across improved pasture from existing farm track (5m).	Predominantly improved pasture with a crossing of Horokiri. No change from current.
26A	R	I	On low river terrace above Horokiri Stream (East side)	Improved pasture. No change from current.	From existing farm track over improved pasture (5m).	Traverses a section of meanders of Horokiri stream. Typically stony stream bed in pasture (1.04) and boggy rushland (1.05). Currently over improved pasture.
27	S	O	On low river terrace above Horokiri Stream (West side)	Improved pasture	Existing track over pasture.	-
28, 29	NA	-	Crosses Battle Hill Farm Park	-	-	-
30	S	O	On low river terrace above Horokiri Stream (West side). Crosses Battle Hill Farm Park	Improved pasture	Existing track over pasture.	Improved pasture
31A	R	I	Spur above Horokiri Stream (west side)	Improved pasture. No change from current.	Existing farm road across Improved pasture (10m).	A mix of improved pasture, plantation pine (6.01), exotic treeland over streambed (6.04) and

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Tower N°	Activity	In / Out	Description of Tower Location	Vegetation beneath each tower	Construction Access	Vegetation beneath line from this tower to next
						a small stream with regenerating mahoe forest (4.03). No change from current.
32A	R	O	Gentle spur east of Horokiri Stream.	Improved pasture. No change from current.	Existing farm road across Improved pasture (10m).	Half improved pasture and half plantation pine. Currently over gorse (2.01) and pasture.
33A	R	I	Rolling downlands on eastern side Horokiri stream	Improved pasture. No change from current.	Existing farm road across Improved pasture (5m).	Improved pasture and damp gullies with rushland (1.05). No change from existing.
34	S	I	Rolling downland in Ration stream catchment	Improved pasture	Existing over pasture.	-
35, 36, 37, 38	NA	-	-	-	-	-
39	S	O	Rolling downland in Ration stream catchment	Improved pasture	Existing over pasture.	Predominantly improved pasture, with some shrubland (2.01) and regenerating native bush (4.02) including and area of Transmission Gully planting (4.01)
40A	R	O	Rolling downland in Ration stream catchment	On Rough pasture. Currently on improved pasture.	Existing farm road across improved pasture (10m).	Mostly improved pasture with some damp gullies in rushland (1.05), and an area of Transmission Gully planting (4.01)
41A	R	I	Rolling downland in Ration stream catchment	Improved pasture. No change from current.	Existing farm road across improved pasture (10m).	Mostly improved pasture with some damp gullies in rushland (1.05).
42A	R	I	Rolling downland in Ration stream catchment	Improved pasture. No change from current.	Existing farm road across improved pasture (20m).	Mix of improved pasture and plantation pine (6.01) with some gullies containing regenerating bush (4.03)
43A	R	I	Rolling downland in Ration stream catchment	In pine forest (6.01.). Currently in gorse.	Existing forestry roads (10m) through plantation pine.	Predominantly plantation pine, with some gorse (2.01) and improved pasture.
44	S	O	-	Improved pasture	Existing over pasture	-

6.2 DIRECT EFFECTS OF CONSTRUCTION

6.2.1 Vegetation clearance and habitat loss associated with forming a tower foundation

The following table sorts tower locations by the vegetation that will be affected. In summary, no towers are or will be located in native forest or native shrubland and scrub. Two are located in plantation pine, three in gorse scrub, and the remainder in pasture. None of the species of conservation concern recorded during this study were found in these plant communities.

Table 11.N-8: Tower locations by dominant vegetation.

Code	Vegetation Description	Tower Numbers
1.01	Improved pasture	2A, 4(E), 7(E), 8AW, 9AW, 10AW, 11AW, 12AW, 13AW, 14AW, 15AW, 16AW, 18A, 19(E), 25A, 26A, 27(E), 30(E), 31A, 32A, 33A, 34(E), 39(E), 41A, 42A, 44(E)
1.02	Rough pasture and shrublands	3a, 17A, 40A
2.01	Gorse dominated scrub (closed canopy)	3A, 21(E), 22A,
6.01	Plantation pine	24A, 43a
7.01	Built-up area - residential	1(E)

Notes: (E) = existing tower – strengthened

We conclude that there will be no measurable adverse ecological effects associated with the clearance of vegetation for the formation of new tower pads or from works associated with strengthening existing towers. Almost all vegetation is pasture or plantation pine, which does not contain rare or threatened plants or plant communities, and does not provide habitat for identified fauna of conservation concern.

6.2.2 Vegetation clearance and habitat loss associated with forming an access track for machinery and operation

The following table sorts access roading locations by the vegetation that will be affected. In summary, no access roads cross native forest or scrub. Three will pass through plantation pine and one will cross areas of gorse-dominated scrub. The remainder can be reached via access roads that are located entirely within improved pasture. None of the species of conservation concern recorded during this study were found in these plant communities.

Table 11.N-9: Access road locations by dominant vegetation.

Code	Vegetation Description	Tower Numbers
1.01	Improved pasture	2A, 4(E), 7(E), 8AW, 9AW, 10AW, 11AW, 12AW, 13AW, 14AW, 15AW, 16AW, 17A, 18A, 19(E), 22A, 24A, 25A, 26A, 27(E), 30(E), 31A, 32A, 33A, 34(E), 39(E), 40A, 41A, 42A, 44(E)
2.01	Gorse dominated scrub (closed canopy)	21(E)
6.01	Plantation pine	3A(E), 24A, 43A
7.01	Built-up area	1(E)

Notes: (E) = existing tower - strengthened

We conclude that there will be no measurable adverse ecological effects associated with the clearance of vegetation for the formation of access roads associated with these works. Almost all vegetation affected will be pasture or plantation pine, which do not contain rare or threatened plants or plant communities, and does not provide habitat for identified fauna of conservation concern.

6.2.3 Vegetation removal for line clearance

The following table summarises the types of vegetation that will lie beneath the line corridor, with the intention of identifying potential vegetation clearance requirements.

Table 11.N-10: Vegetation types beneath the line corridor.

Code	Vegetation Description	Tower Spans
1.01	Improved pasture	1(E)-2A, 2A-3A, 3A-4(E), 7(E)-8AW, 8AW-9AW, 9AW-10AW, 10AW-11AW, 12AW-13AW, 13AW-14AW, 14AW-15AW, 15AW-16AW, 17A-18A, 18A-19(E), 22A-23A, 24A-25A, 25A-26A, 26A-27(E), 30-31A, 31A-32A, 32A-33A, 33A-34(E), 39(E)-40A, 40A-41A, 41A-42A, 42A-43A, 43A-44(E).
1.02	Rough pasture and shrublands	13AW-14AW, 17A-18A.
1.04	Stony streambed in pasture	14AW-15AW, 17A-18A, 18A-19(E), 25A-26A, 26A-27(E),
1.05	Riparian margins in rushland	26A-27(E), 33A-34(E), 40A-41A, 41A-42A,
1.06	Indigenous wetland	Nil
2.01	Gorse dominated scrub (closed canopy)	16AW-17A, 17A-18A, 18A-19(E), 21(E)-22A, 22A-23A, 24A-25A, 39(E)-40A, 43A-44(E).
2.02	Tauhinu scrub (closed canopy)	7(E)-8A, 11AW-12AW, 17A-18A.
2.03	Riparian margins with low scrub	7(E)-8A, 11AW-12AW, 12AW-13AW, 15AW-16AW, 21(E)-22A
4.01	Transmission Gully restoration planting	39(E)-40A, 40A-41A,
4.02	Secondary native forest (broadleaf)	3A-4(E), 18A-19(E), 31A-32A, 39(E)-40A
4.03	Riparian margins with 2° native forest	8AW-9AW, 12AW-13AW, 15AW-16AW, 16AW-17A, 21(E)-22A, 42A-43A,
5.01	Lowland tawa forest	Nil
5.02	Coastal kohekohe forest	3A-4(E), 8AW-9AW.
5.03	Remnant sub-montane hardwood forest	Nil
5.04	Riparian margins with indigenous forest	Nil
6.01	Plantation pine	1(E)-2A, 22A-23A, 24A-25A, 31A-32A, 32A-33A, 42A-43A, 43A-44(E).
6.03	Exotic trees (shelterbelts, gardens)	
6.04	Riparian margins with exotic trees	31A-32A.
7.01	Built-up area	1(E)-2A

Notes: (E) = existing tower – strengthened

In summary almost all lines traverse low vegetation, improved or rough pasture, streambeds in pasture or rushland, and pioneer shrubland and scrub. Seven spans will also cross pine plantation.

Twelve spans traverse regenerating native bush, two of which are advanced mitigation planting. However, in all situations the bush is low in stature and lies within gullies. It will not be affected.

Two spans cross mature native forest. The span between Tower 3A and Tower 4 crosses Te Puka stream and the ecological site K224. The span between Tower 8AW and Tower 9AW also crosses Te Puka Stream and the ecological site K228. The kohekohe forest of these two sites lies in this bed and lower slopes of the valley. This forest will not need to be trimmed or cleared to provide for the line installation.

Overall, no vegetation clearance is required for the installation of the proposed line relocation, and is unlikely to be necessary for the foreseeable future for line operation.

6.2.4 Stream crossings

Two relocated towers will require crossing of streams where no existing ford or culvert is located. They are towers 13AW and 14AW. All other new towers lie in close proximity to existing Transpower access tracks, or farm access tracks, or logging tracks, and can be accessed over pasture without crossing streams.

Both of the proposed towers 13AW and 14AW are in the headwaters of the Horokiri Stream. They lie on terraces on the eastern side of the stream, with the current access tracks on the opposite side of Horokiri Stream. At these locations Horokiri stream is quite small and lies in grazed pasture with little riparian vegetation. Temporary culverts are required to allow stream crossing by a range of heavy vehicles during tower installation and wiring. Following installation, we believe that annual inspections of towers by 4WD can be accommodated, with less risk of stream effects, by a ford as is the current practice.

We suggest that use of temporary culverts for installation of these towers and lines will have little or no ecological effect on freshwater habitat, and is unlikely to affect fish passage. However, conditions that cover installation, removal and stream reinstatement are recommended.

6.2.5 SNA and PNA's

The following table correlates SNA sites with tower locations and line traverses.

Table 11.N-11: SNA sites and potential tower and line effects.

Code	Site Name	Tower locations	Lines traverse ...	Potential Effects
K139	Rowans Bush	Lies to east of tower 2 (95m).	Lies to east of lines (\pm 50 m)	Not affected
K222	Paekakariki Bush C	Lies to north of tower 2 (68m)	Lies to east of lines (\pm 35m)	Not affected
K223-	Paekakariki Bush C	Lies to west of tower 2 (40m)	Lies to west of lines (\pm 10 m)	Not affected
K224	Paekakariki Bush D	Lies to west and south of tower 3 (80m)	Crossed by line between towers 3A and 4.	Line elevated and unlikely to require vegetation loss in medium to long term.
K225	Paekakariki Bush E	Lies to west of tower 4 (35m)	Lies to west of line.	No change – not affected
K226	Paekakariki Bush F	Lies 180m west of any towers,	Lies to west of line on opposite side of stream.	No change – not affected
K227	Paekakariki Bush G	Lies to west of tower 7 (60m)	Lies to west of line on opposite side of stream.	No change – not affected
K228	Paekakariki Bush H	Lies to west of tower 8 (50m)	Crossed by line between towers 8AW and 9AW	Line elevated and unlikely to require vegetation loss in medium to long term.
K229	Paekakariki Bush I	Lies down slope to east of towers: 9AW (130 m) 10AW (160 m) 11AW (95m)	Lies to east of lines (100+ m)	Not affected
K230	Paekakariki Bush J	Lies 200m or more from any tower.	Lies to east of lines (\pm 20 m)	Not affected
GWRC	Akatarawa Regional Forest	Six towers to west of forest: 8AW 30m (from 10m) 9AW 280m (from 40m) 10AW 375m (from 70m) 11AW 205m (from 45m)	Line varying distances to east of forest. No less than 30 m (8AW) Up to 375 m (10AW)	Not affected

		12AW 36m (from 65m) 13AW 60m (from 120m)		
P172	Transmission Gully Saddle	Lies 80 south of 12AW and 40 m north 13AW	Crossed by lines between towers 12AW and 13AW	Line elevated and unlikely to require vegetation loss in medium to long term.
P199	Transmission Gully Riparian Bush	Towers lie in close proximity to bush: 15AW (15m) 16AW (20m) 17A (10m)	Crossed by lines between towers 15AW, 16AW, 17A.	Line elevated and unlikely to require vegetation loss in medium to long term.

In summary, no towers or their associated access tracks are located within significant natural areas.

Four sites will be traversed by lines, K224, K228, P172 and P199. In the case of K224, P199 these sites are currently traversed by the existing line route in generally the same locations. There will therefore be no new effects.

In the case of K228 and P172 the proposed line route will traverse sites that currently lie outside the existing line route.

In all cases the sites are located in gullies and the vegetation is of low stature. No vegetation trimming will be needed for line installation and it is unlikely that any trimming of vegetation will be needed for maintenance in the foreseeable future.

We would however, recommend that these sites (K224, K228, P172, and P199) be identified prior to construction commencing and protection mechanisms identified as part of CEMP development.

6.2.6 Terrestrial Fauna

The locations of towers and access roads appear to avoid sites identified as important which are native scrub and forest and scree slopes and boulderfields.

We would however, recommend that as part of enabling works any sites near works that are likely to be potential habitats, be identified prior to construction commencing and protection mechanisms identified as part of SSEMP development.

6.3 INDIRECT EFFECTS OF CONSTRUCTION

6.3.1 Erosion and discharge of sediment to streams

The following table sorts tower locations by the landform that they will be located. In summary two sites lie on steep spurs, one of which is existing (Tower 7).

Table 11.N-12: Tower locations by dominant landform and slope (relocated and strengthened towers only)

Landform	Tower Numbers [CHECK]
Flat to Rolling River Terrace	2A, 3A, 4(E), 14AW, 15AW, 16AW, 17A, 18A, 19(E), 22A, 25A, 26A, 27(E), 30(E), 32A,
Flat to Rolling Downland	33A, 34(E), 39(E), 40A, 41A, 42A, 43A, 44(E).
Broad Spurs	9AW, 10AW, 11AW, 31A, 32A,
Moderately Steep Slopes	8AW, 12AW, 13AW, 21(E), 24A,
Steep spurs	7(E),
Other	1 (industrial)

One site is located on a steep spur, Tower 7(E), in the mid Te Puka Valley. This tower will be strengthened but not relocated so there will not be any roading or bulk earthworks.

Five sites lie on moderately steep toe slopes above stream terraces. One of which (Tower 21) will not be moved. Accessing these sites will require care to manage potential erosion.

Fives sites lie on broad spurs with wide separation from streams. At these sites, management of sediment should be straightforward.

All remaining tower sites lie on flat to rolling terraces and downland and it is unlikely that erosion and sediment control will cause adverse effects.

6.4 EFFECTS OF OPERATION

6.4.1 Vegetation removal to provide line clearance

The Te Puka and Upper Horokiri valleys will be retired and revegetated as mitigation for effects of the wider Transmission Gully project. Ultimately this will mean that native forest will develop beneath the line route from tower 1 to tower 22.

Considering the current age and successional status of the vegetation along the line route, and the challenging growing conditions, we suggest it will be several decades before there is any need for trimming of regenerating forest. We do not consider this is an adverse effect requiring mitigation.

6.4.2 Potential effects on avifauna & bats

There is a potential but undefined risk of bird strike or electrocution on transmission lines and towers. However, given this is not a new route, but the relocation of towers along an existing line, we believe any effects will be neutral.

In particular we note that the towers at Wainui Saddle and upper Te Puka Valley will be moved away from the Akatarawa forest, which has been identified as the most important bird habitat along the Transmission Gully alignment. Therefore, any effects will be at the least neutral, and there could be a minor positive outcome from the proposed works.

6.5 MITIGATION AND MONITORING

No mature or regenerating native forest or pioneer native shrublands will be directly affected by tower installation or access roading. All vegetation that will be affected is pasture, gorse or pine. It is our view that no mitigation or monitoring is required for the proposed works.

Several areas of native forest will be traversed by the line locations, but due to the low stature of the vegetation and the terrain, no vegetation clearance is needed to maintain clearance, and no mitigation or monitoring is required.

Several sites of ecological value (SNA's) are located along the line route. These sites should not be directly affected, but they need to be identified prior to earthworks commencing and protection mechanisms identified via the SSEMP process. Consent conditions to this effect would be appropriate.

Two temporary crossings of the Horokiri Stream headwaters are required to reach two of the tower locations. However, given the modified state of the stream and the short term nature of the

crossings, we believe any ecological effects will be negligible and no mitigation is required. Consent conditions to ensure fish passage is considered and to manage culvert installation and disestablishment would be appropriate.

Most sites are located on flat to rolling land and management of erosion should be straightforward. A few sites lie on steeper ground and greater attention to the minimisation of sediment discharge to streams will be needed. Consent conditions to this effect would be appropriate.

7. SUMMARY & CONCLUSIONS

In summary the works proposed are largely in pasture. Existing access roads to the current corridor, farm access tracks, and forestry tracks provide ready access to all but two sites where short access tracks will need to be formed.

Over the length of the realignment only two temporary culverts will be required in two small streams. These will not have any long term effects on these streams.

No regenerating native bush or native forest is required to be cleared for constructions. Four areas of valued vegetation lie in close proximity to towers or access roads. With care these can be avoided.

Some areas of scrub and shrubland dominated by gorse will be cleared to provide access roads to three towers. This vegetation clearance does not need to be mitigated.

Most towers and associated access roads lie on flat ground (river terraces or downland) and there are unlikely to be any issues around the prevention of erosion or management of sediment control discharge to streams. Of the seven towers that lie on steeper slopes two only require strengthening, and three lie on high spurs some distance from streams. Two lie in closer proximity to streams and will require care during construction to minimise erosion.

Three towers will be moved from Wainui saddle and the valley floor of upper Te Puka Stream to the adjacent western slopes, and away from Akatarawa forest. We conclude that effects on wildlife will be neutral or potentially this shift could provide a minor benefit.

The 5 new tower locations that lie outside the TG designation all lie on improved pasture and are accessible by existing farm or forestry access tracks, which also lie entirely on pasture or within plantation pine.

Several conditions of consent are proposed to provide certainty of care over issues of the management of erosion and sediment control, and the monitoring and protection of sites of ecological value.

Overall we consider that the proposed transmission line relocation can be undertaken without adverse effects on the ecology values or indigenous biodiversity.

8. APPENDICES

Appendix 11.N-A Site Photos of the East and West options for Wainui Saddle

Photo 11.N-1: Looking south up Te Puka valley. Tower 10AE of the eastern option for the Wainui Saddle lies on the high forested ridge centre right. Existing towers T8 and T9 visible. Existing access track visible to left.



Photo 11.N-2: Photo from the base of the forested ridge. Tall rimu, miro, and rewarewa visible on spur. Wainui Saddle lies at the head of the gully to the right. For the eastern option a tower would be placed on this spur.



Photo 11.N-3: Looking east to the ridgeline for the eastern Wainui Saddle option. Proposed tower 11AE would lie in this bush and an access road would sidle across these slopes to reach tower 10AE, requiring clearance of an area of this vegetation. Existing tower T12 is in the foreground.



Photo 11.N-4: Dense undergrowth beneath the canopy of the forest shown above.



Photo 11.N-5: At the location of one of the proposed eastern towers (10AE), looking north down Te Puka Valley. Kapiti Coast in the distance. Young rimu in the foreground.



Photo 11.N-6: A second potential tower location further down the eastern ridge. Te Puka valley below. A large miro to the left and rewarewa to right. Kohekohe forest on the slopes to right, pine forest in distance.



Photo 11.N-7: Beneath a tawa forest canopy typical of the forest on the main ridgeline and of the wider Akatarawa Forest.



Photo 11.N-8: Near the bottom of the eastern ridge looking down Te Puka Stream. Tower T9 is visible on the valley floor. The large trees to the left are mature rimu and miro.



Photo 11.N-9: At the base of one of the large remnant rimu seen in the previous photo. If the eastern option had been chosen, several large trees like this may have had to be removed to provide cable clearance between tower 10AE on this spur and tower 9AE as shown below.



Photo 11.N-10: Looking from the eastern ridgeline across to kohekohe forest where one of the proposed towers (9AE) would be located in the eastern option. Approximate location shown.



Photo 11.N-11: Beneath the canopy of the kohekohe forest seen in the previous photo. A sidling access road would be needed through this forest to reach tower 9AE in the eastern option for Wainui Saddle.



Photo 11.N-12: Looking across to the western ridgeline where the preferred option is located. Proposed towers 9AW and 10AW would lie on the far spurs (approximate locations shown).

