

# Transpower New Zealand Ltd North Island Grid Upgrade Project

## Notices of Requirement and Resource Consent Application Documentation

### Executive Summaries



## Executive Summary – Notices of Requirement

The purpose of the Notices of Requirement is to designate Transpower's proposed North Island Grid Upgrade Project between Pakuranga and Otahuhu substations and Whakamaru substation. This is a major electricity transmission project to ensure the growing need for electricity in the upper part of the North Island can be met.

Transpower's analysis shows that the project needs to be commissioned prior to the winter of 2011 and includes the following components:

- a new overhead transmission line from Whakamaru to Brownhill Road (near the South Auckland urban boundary), which will be 400 kV capable but operate initially at 220 kV;
- modifications to the existing substation at Whakamaru and a new substation at Whakamaru North;
- modifications to the existing substation at Pakuranga;
- modifications to the existing substation at Otahuhu;
- a transition station/substation near the South Auckland urban boundary at Brownhill Road, (where the overhead line will connect to underground cables); and
- 220 kV underground cable section from the transition station/substation to Pakuranga substation; and
- 220 kV underground cable section from the transition station/substation to Otahuhu substation (at a later stage).

Although the project has seven distinct components which are addressed through specific Notices of Requirement, it has been developed as a single concept and any one component of the project should not be considered without all the others.

A Notice of Requirement for a designation is the mechanism provided for in the Resource Management Act 1991 (RMA) by which provision is made for network utilities and some other types of projects or works within district plans. The RMA recognises that network utilities need to be continuous and connected, often over significant distances. It provides a specific means of undertaking planning and providing certainty for such projects, subject to environmental effects assessment, and consideration of such matters as alternative methods or routes and the context of national, regional and district policy statements and plans. Consideration and decisions are also subject to the sustainable management purpose of the RMA.

The proposed North Island Grid Upgrade Project covers a distance of approximately 200 kilometres, and crosses the areas of seven territorial authorities and two regional councils.

The Notices of Requirement documentation is divided into ten parts:

Parts I to IX contain from north to south:

- the forms and appropriate mapped information, and
- detailed information relating to the designations that are sought for the seven different components which make up the project,

Part X contains 20 documents (referred to as sections 1 to 20) which provide supporting information to the Notice of Requirement. This information has been compiled by Transpower New Zealand Limited (Transpower) and MWH NZ Limited (the principal consultants employed by Transpower), with assistance from expert specialists in fields such as noise, tourism, agriculture, and archaeology.

Preliminary engineering design has been undertaken to:

- provide the necessary information for the Notices of Requirement,
- contribute to the assessment of effects of the construction, operation and maintenance stages of the project; and
- to assist in determining appropriate restrictions and conditions.

A comprehensive description of the different components of the project and the effects of each is provided in the Notices of Requirement documentation. The detailed design for the project components will be undertaken in the context of a design-build contract, including detailed geotechnical testing and site investigations, and taking into account contract criteria and other requirements including operational, safety, maintenance, construction and RMA requirements. Sufficient design work has been carried out to enable the project to be assessed for RMA purposes.

This Executive Summary provides a brief outline of the contents of each document from Part I to Part X, and the outcome of the assessment of effects in terms of the RMA.

## 1. Part I

Part IA contains the Notices of Requirement forms (Resource Management Regulations Form 18) and other details needed from requiring authorities (in this instance Transpower) when requiring a designation. There are seven relevant territorial local authorities for this project. Part 1A sets out the forms for the Notices of Requirement as follows:

Section	Notice	Council
1	Pakuranga substation	Manukau City
2	Otahuhu substation	Manukau City
3	Brownhill substation	Manukau City
4	Pakuranga to Brownhill Underground Cable Route	Manukau City
5	Otahuhu to Brownhill Underground Cable Route	Manukau City
6	Overhead Line	Manukau City
7	Overhead Line	Franklin District
8	Overhead Line	Waikato District
9	Overhead Line	Matamata-Piako District
10	Overhead Line	Waipa District
11	Overhead Line	South Waikato District
12	Overhead Line	Taupo District
13	Whakamaru & Whakamaru North substation	Taupo District

In each section, the relevant form is followed by the relevant district planning maps which show the area Transpower is seeking to designate for the particular project or work within that district, and a listing of land affected by the designation, ownership information and legal descriptions.

Part IB contains the Certificates of Title (CT) for the properties that will be affected by the designation. The CTs are organised by each of the local authorities in north to south order.

## 2. Part II

Part II provides an introduction to the North Island Grid Upgrade Project. It contains:

- information that relates to the project as a whole and all of the Notices of Requirement. This includes the statutory context, Transpower's objectives, the alternatives considered, and the consultation undertaken and matters raised;
- the environmental risk assessment undertaken for the project as a whole, and aspects which apply to the various components of the project in a relatively consistent manner

The risk assessment was undertaken using a recognised process for major infrastructure. The project has a number of potential risks throughout its construction and operational stages. All these risks are able to be managed within acceptable levels through aspects of design, compliance with standards and best practices, risk mitigation measures such as management of construction processes, and information and education of the general public and particular groups.

The potential effects of electric and magnetic fields have been a controversial aspect of the project during the consultation stage. The information in Part II provides an overview and explains that the design of the different components of the project will meet the International Commission on Non-Ionizing Radiation Protection (ICNIRP) guidelines, as recommended by the World Health Organisation and the New Zealand Ministry of Health.

Potential effects relating to other electrical aspects are managed through the application of standards, or through ensuring that any risks are as low as reasonably practicable.

Part II also provides background on the project and processes (for example the application of the ACRE process<sup>1</sup>, and consultation with the public, affected landowners and stakeholders), that have been undertaken to determine the final location of the substations and the final alignment of the overhead line and underground cables. Accordingly, Part II should be read in conjunction with each of the Notices of Requirement.

A full summary of Part II information is:

- The structure and contents of the overall documentation for the Notices of Requirement;
- The statutory context and relevant national and regional policy;
- Transpower's objectives for the project and works for which designations are sought;
- Description of the project, including its staging;
- The need for the project and the alternatives considered;
- A general description of the ACRE process used by Transpower in determining the locations of the different parts of the designations;
- A brief overview of the consultation undertaken in respect of the project;
- An overall risk assessment;
- The benefits of the project in terms of the sustainable management purpose of the RMA;
- A description and commentary on electrical effects associated with the project;
- A glossary of terms used throughout Parts I to X for the Notices of Requirement; and
- A list of key reference documents.

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<sup>1</sup> Transpower's methodology for identifying alternative and final route options.

### 3. Part III

Part III relates to the Notice of Requirement for the Pakuranga substation components of the project. The substation is located on land owned by Transpower. While the substation at Pakuranga has existed for many years, it is not presently designated. Part III contains an assessment of effects relating to the proposed replacement of the existing 110 kV substation with a 220 kV AIS substation. The relevant actual or potential effects are considered to be:

- construction effects;
- visual impacts;
- noise;
- lighting; and
- archaeological effects

These are all evaluated to be minor given the context. Cultural effects will need to be mitigated through a protocol relating to accidental discovery of cultural material. The size and location of the designation provides sufficient land, landscaping opportunities and separation distances from adjoining activities to mitigate construction and operational effects.

Consents will be needed from Auckland Regional Council for earthworks associated with construction and stormwater discharges from the substation. These will be sought at a later date once detailed designs for the new substation components have been prepared. An outline plan will also need to be provided to Manukau City Council prior to undertaking any works within the designated area.

A full summary of Part III information is:

- Effect assessment of replacement substation;
- A map showing the location of the proposed works;
- A description of the works associated with the changes to the substation, including construction methodology;
- The changes to the existing environment as a result of the substation works;
- Measures to avoid, remedy or mitigate adverse effects on the environment;
- An evaluation of alternatives;
- An acknowledgement that Pakuranga substation works will be designed to accommodate an upgrade of the existing Pakuranga–Penrose and Otahuhu–Pakuranga lines;
- A detailed description of the consultation undertaken for the new equipment at the substation;
- A brief assessment of the Manukau District Plan and other relevant statutory documents; and
- An outline of possible conditions and restrictions for the designation.

### 4. Part IV

Part IV relates to the Otahuhu substation. The Otahuhu substation has also existed for many years, but is not presently subject to a designation. It is located on land owned by Transpower. The substation is the future termination point for one of the underground 220 kV cable circuits, so is considered an integral part of the North Island Grid Upgrade Project.

The existing substation site will provide for the installation of extensions to the existing 220 kV equipment, and for the continued operation of substation activities within the designated area. Works will also be required at the substation to facilitate the upgrade of the existing Otahuhu–Pakuranga transmission line. The entire substation site will be designated, and therefore the existing activities at the substation are also described in this document.

Extensions to the 220 kV equipment are necessary to strengthen Transpower's existing 220 kV network supplying Auckland and areas further north. Extensions will also be required as part of the Otahuhu diversity project currently awaiting Electricity Commission approval. These have also been included in the Notices of Requirement. Three likely development scenarios associated with the Otahuhu diversity project are outlined and an environmental management approach is promoted that enables any combination of the three options to be implemented at some stage in the future. The relevant potential effects are assessed and these are all considered to be minor.

As with the Pakuranga substation site, Part IV contains considerable information relating to the designation. It is also acknowledged that consents from the Auckland Regional Council will probably be needed in future once detailed plans are known, and that outline plans will need to be provided to Manukau City Council.

## 5. Part V

Part V relates to the Notice of Requirement for the new substation site at Brownhill which will accommodate the transition station/substation component of the project. The site is located near the end of Brownhill Road, south of Ormiston Road and east of Redoubt Road (within the Manukau City Council area). It incorporates the area required for:

- the transition station;
- the 220 kV switchyard (required when the 220 kV cable circuits to Otahuhu are installed), and
- the final 400/220 kV substation (required when the overhead line is energised to 400 kV).

The area within which the substation will be located was generally determined by investigations relating to both the overhead line and underground cable location. The site for the transition/substation was chosen only after careful analysis of several possible options.

Part V provides information on the construction, operation, and maintenance of the transition station and the substation that is relevant to the Notice of Requirement. The substation is an integral part of the Notices of Requirement that will make up the designation because it connects and enables electricity transfer between the underground cable (see Part VI and VII) and the overhead line (see Part VIII) components of the North Island Grid Upgrade Project. Part V provides an assessment of effects on the environment of the substation. This assessment describes the actual and potential effects associated with the change from the existing pastoral activity to the designated purpose of a substation. As mentioned previously, the substation will be part of the design-build contract and therefore has not been subject to detailed design. However, a comprehensive description of the equipment, based on either AIS or GIS substation technologies and associated effects is provided in Part V.

**[Note that in August 2007 Transpower determined that the designation would apply only in respect of the GIS option]**

The substation is located on land owned by Transpower. The assessment of substation effects has identified a range of effects related to the construction and operation of the substation. These are largely mitigated by maintaining appropriate distances from existing dwellings and roads. The potential visual impacts of the substation have been acknowledged and carefully considered, and, as a result, mitigation planting has been proposed. A noise limit has also been identified at the designation boundary. This limit is consistent with district plan noise limits at the nearest affected dwellings.

Consents will be needed from Auckland Regional Council for earthworks and discharges of stormwater, and possibly groundwater during the construction stage. Consents may also be needed for works in, and diversion of, a stream bed. These will be sought at a later date once detailed designs have been prepared. As with the other substations, detailed designs will be subject to an outline plan process.

A full summary of Part V information is:

- Effect assessment of new transition/substation at Brownhill;
- A map showing the location of the proposed substation;
- Description of the proposed substation stages (including the initial transition station) and the construction process;
- An explanation of the statutory framework;
- An explanation of the alternatives considered;
- A description of the existing environment;
- Measures to avoid, remedy or mitigate adverse effects on the environment;
- A description of the consultation undertaken and the outcomes;
- A brief assessment of the Manukau District Plan and other relevant statutory documents; and
- An outline of the preliminary terms, possible conditions and restrictions for the designation.

## 6. Part VI

Part VI relates to the Notices of Requirement for the 220 kV double circuit underground cable route between Pakuranga and Brownhill. The Pakuranga cable route extends from Pakuranga along the alignment of the existing 2.3km Transpower-owned Arapuni-Pakuranga cable tunnel, before following Point View and Caldwell's Roads. From there, there are two options, the first crosses rural land to rejoin with Ormiston Road, Redoubt Road and ultimately connect with the proposed Brownhill substation. A second option connects the Caldwell's Road section of the route with Brownhill substation via Sandstone, Whitford Park and Brownhill Roads. The overall distance of the Ormiston Road option is 9.4km, whereas the Brownhill Road option is 10.6km. One of the options will be selected during the statutory period. The entire cable route is located within Manukau City.

**[Note that in August 2007 Transpower determined that the designation would apply only to Option 2, the route which follows Sandstone, Whitford Park and Brownhill Roads]**

Part VI provides information on the installation, operation, and maintenance of the Pakuranga to Brownhill underground cable circuits that is relevant to the Notice of Requirement. The underground circuits are an integral part of the Notice of Requirement documentation because they link Pakuranga substation (see Part III) with the overhead line at the Brownhill substation site (see Part V). Part VI provides an assessment of the effects on the environment of the underground cable route.

The decision to underground the line through this area follows the decision to underground the Otahuhu cable route, and the use of underground cable is considered the most practicable option of getting the line through a built-up urban area. The cable route was identified after consideration of seven alternative cable routes, and was considered to have the least potential adverse environmental effects.

Construction effects will include traffic disruption and potential disruption to businesses and to people living along the route. These effects will be mitigated through using a construction management plan, and other methods. Transpower will work closely with affected people and the Manukau City Council to minimise effects during the construction period.

In some areas, the area sought for the designation is wider than that ultimately required for operating and maintaining the circuits. A larger area is initially needed to allow for cable installation and to provide flexibility in cable alignment. This area generally corresponds to the width of the legal road reserve. Effects have been assessed on the basis of the larger area. Once the circuits have been installed, the width of the designation will be reduced to only the width that is needed to contain the cable circuits and to allow access for inspection and any maintenance.

Consents will be needed from Auckland Regional Council for the crossing of the creeks and for land disturbance. An outline plan of the detailed works will be provided to Manukau City Council.

A full summary of Part VI information is:

- Effects assessment of underground cable route between Pakuranga and Brownhill;
- A map showing the exact location and extent of the underground cable route;
- A detailed description of the underground high voltage electricity cable system components including joints and ancillary equipment, and fibre optic cable;
- A description of the works associated with the construction stage, including installation methodology, construction management and special installation techniques;
- The statutory framework including a brief assessment of the Manukau District Plan and other relevant documents;
- An evaluation of alternatives considered;
- An explanation of the existing environment and neighbouring land uses;
- A description of tangata whenua, heritage and other values within the vicinity of the cable route;
- Measures to avoid, remedy or mitigate adverse effects on the environment;
- A description of the consultation undertaken for the underground cable options; and
- An outline of the possible conditions and restrictions for the designation.

## 7. Part VII

Part VII relates to the Notices of Requirement for the 220 kV double circuit underground cable route between Otahuhu and Brownhill.

The Otahuhu cable route extends from the Otahuhu substation through the suburbs of Flat Bush, East Tamaki and Otara to the urban edge of Manukau across a distance of 8.4 kilometres. It is also located entirely within the Manukau City Council area, and will be constructed at a later date.

Part VII provides information on the installation, operation, and maintenance of the underground cable circuits relevant to the Notice of Requirement. The underground circuits are an integral part of the Notices of Requirement documentation that will make up the designation, because they link Otahuhu substation (see Part IV) with the overhead line at the Brownhill site (see Part V).

The decision to underground the line through this area was made near the beginning of the project and the use of underground cable is considered the most practicable option of getting the line through a built-up urban area. Three possible cable route options were identified and considered before the final route was chosen. Wherever practicable, the cable utilises road reserve and public open space, however it also crosses some privately owned land near the southern end of the cable route. The route identified is considered to provide the most appropriate direct route between Otahuhu substation and the Brownhill substation site.

Part VII provides a description and assessment of the actual and potential effects on the environment of the underground cable section of the North Island Grid Upgrade Project. This assessment covers the installation, operation, and maintenance of the double circuit cable. In order to provide a comprehensive assessment of the effects, the cable route is described in terms of a number of sections. Each section is relatively homogeneous in terms of land use and has characteristics that distinguish it from adjacent sections.

Construction effects will include traffic disruption and potential disruption to businesses and to people living along the route. Mitigation will be achieved through applying a construction management plan, and other methods. Transpower will work closely with affected people and the Manukau City Council to minimise effects over the construction period.

The area sought for the designation is wider than that ultimately required for operating and maintaining the circuits. A larger area is initially needed to allow for cable installation and to provide flexibility in cable alignment. This area generally corresponds to the width of the legal road reserve. The assessment of effects has been undertaken on the basis of the larger area. Once the circuits have been installed, the width of the designation will reduce to provide a one metre clearance on either side of the individual cable circuits. A larger area of designation is also being sought south of Orminston Road to provide access to the Transition Station.

One aspect of the cable route requiring a specific assessment of effects is where the cable route crosses Otara Creek between Franklyne Road and Johnstones Road, and a tributary of the Otara Creek near Te Irirangi Drive. The preferred option for crossing these creeks is to install the cable in ducts previously laid (excavation is likely to be to a depth of 1–2 metres) in the creek bed. The ducts will be suitably protected by either encasement in concrete or sand-cement filled bags, prior to reinstatement of the creek bed and banks. Neither creek has high aquatic ecology values due to the ongoing pollution of Otara Creek bed due to littering, and the heavy modification of the tributary of the Otara Creek.

Consents will be needed from Auckland Regional Council for the creek crossings and for land disturbance. An outline plan of the detailed works will be provided to Manukau City Council.

A full summary of Part VII information is:

- Effects assessment of underground cable route between Otahuhu and Brownhill;
- A map showing the exact location and extend of the underground cable route;
- A detailed description of the underground high voltage electricity cable system components including joints and ancillary equipment, and fibre optic cable;

- A description of the works associated with the construction stage, including installation methodology, construction management and special installation techniques;
- The statutory framework including a brief assessment of the Manukau District Plan and other relevant documents;
- An evaluation of alternatives considered;
- An explanation of the existing environment and neighbouring land uses;
- A description of tangata whenua, heritage and other values within the vicinity of the cable route;
- Measures to avoid, remedy or mitigate adverse effects on the environment;
- A description of the consultation undertaken for the underground cable options; and
- An outline of the possible conditions and restrictions for the designation.

## 8. Part VIII

Part VIII relates to the Notice of Requirement for the 400 kV-capable overhead line component of the project. The overhead line enables electricity to be transmitted over approximately 186 kilometres between Whakamaru and Whakamaru North substation (see Part VII) and the Brownhill substation site (see Part V). The overhead line will cross the districts of seven local authorities (Manukau City, Franklin District, Waikato District, Matamata-Piako District, Waipa District, South Waikato District and Taupo District).

Part VIII provides information on the construction, operation and maintenance of the overhead line; including towers, foundations, conductors, insulators, earth wires, communications facilities and ancillary activities relevant to the Notices of Requirement. In addition, the existing Arapuni to Pakuranga 110 kV overhead transmission line (the ARI-PAK A line) will be dismantled and removed. Transpower is seeking to designate a minimum 65 metre wide strip of land<sup>2</sup> between the Brownhill substation site and the western boundary of the Whakamaru North substation. The line will cross approximately 297 properties which are owned mostly by private individuals, partnerships or companies. The line will also cross local authority roads and State highways, the East Coast Main Trunk Railway Line, several streams and rivers including the Waikato River (Lake Karapiro), and small areas of land owned by the Crown. Transpower is seeking to obtain an interest in the privately-owned land via an easement which will provide for the construction, operation and maintenance of the power line under, on and over the alignment identified in the Notice of Requirement. The details of the easement and how Transpower will relate to the affected landowners is found in section 2.10 of Part VIII.

The designation covers all activities within the easement, However it does not cover activities that are associated with the project but are outside the easement area. This includes accesses and activities associated with the construction Where these activities require consent(s) from the district or regional council, they will be obtained prior to the project commencing. This is most likely to involve consents for earthworks, those relating to the crossing of watercourses, and consents to water discharges during the construction stage.

Part VIII provides a description and assessment of effects on the environment for the overhead line. This assessment covers the installation, operation, and maintenance of the overhead line, the towers which support the line and other ancillary structures, and the changes to the environment that will result from the proposed new line.

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<sup>2</sup> The designation sought will be a minimum of 65 metres wide, but the majority will be wider to allow for line swing, specific design components, or separation from forestry landuse.

As the overhead line is approximately 186 kilometres in length and traverses a wide variety of geography, it has been divided into fifteen route sections from north to south as shown in Section 19 of Part X. The route sections have a level of internal geographic unity and consistency, and have provided a more manageable way of describing and assessing the effects of the 400 kV capable line. The route sections have also been used in earlier reporting on the project.

The environmental setting of the line and the effects of the overhead line are firstly assessed in general terms for the whole line, and then in terms of each of the sections along the length of the line.

Generally, the assessment acknowledges that the construction stage will have effects on individual landowners which will range from minor to, in some cases, significant. Effects will be mitigated by developing a construction management plan and community liaison, along with other specific measures to be developed with landowners (for example new plantings, or reinstating topsoil). Once operational, the main effect of the line is assessed to be its visual impact.

On the basis of a conservative evaluation, there is assessed to be a high or very high visual effect on a number of existing dwellings along the full length of the overhead line. There are also visual impacts relating to landscape values and identified areas of outstanding landscape values. These latter effects are assessed to be moderate to minor.

Most archaeological sites are avoided by the alignment and where they are in proximity to the new line or the existing ARI-PAK A line, mitigation measures are proposed, including opportunities to involve appropriate tangata whenua organisations.

Ecological values are assessed as generally minor along the length of the line, with specific mitigation proposed wherever possible.

Social and cultural effects, and effects on land uses, farming activities, and future development, are also assessed to be generally minor.

To assist with an understanding of the effects on the environment of the overhead line section, tower locations and heights have also been determined. This information is provided in detail in Section 20 of Part X, and tower locations are also mapped on the planning maps in Part I. Tower locations at main angle points have been determined, but Transpower seeks flexibility to move other towers up to 40 metres within the confirmed easement centreline shown and to increase the tower heights<sup>3</sup> in some circumstances in case of specific site difficulties such as foundations or if a new archaeological site is discovered. No such tower height increases will result in a tower greater than the 70 metre maximum, and no increase will be considered where tower height is constrained by Auckland International or Ardmore airport height limits.

A full summary of Part VIII information is:

- Effects assessment of overhead line between Whakamaru and Brownhill;
- A description of the 400 kV capable overhead line component;
- An explanation of the processes involved in the construction and operational stages of the overhead line;
- An outline of the statutory framework;
- An explanation of the alternatives considered in terms of the alignment of the line and for tower design;

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<sup>3</sup> While the designation incorporates this opportunity, it is equally or more likely that tower heights will reduce.

- A description of the existing environment;
- A description of the methods and processes of removal of the existing ARI-PAK A line, which is an associated part of the project;
- Commentary on measures to avoid, remedy or mitigate adverse effects on the environment;
- A brief description of the consultation undertaken; and
- An outline of the possible conditions and restrictions for the designation.

The assessment also notes the positive effects on the environment from the removal of the existing ARI-PAK A line over parts of the alignment. This in part offsets the effects of the new line, and in areas where it is not replaced, comprises a positive benefit from the project.

It is considered that the level of detailed design information provided with this part of the Notices of Requirement is sufficiently detailed to comprise an outline plan, and further outline plans will not be needed.

## 9. Part IX

Part IX relates to the Notice of Requirement for the Whakamaru and Whakamaru North substation component of the project. The land is owned by Transpower. The existing designated Whakamaru substation does not have sufficient space to accommodate the necessary equipment for the proposed North Island Grid Upgrade Project, and there are system security reasons to achieve a separation if possible. While the existing substation will be upgraded to accommodate the early stages of the project development, a new substation is required which will become the southern termination point for the new overhead line at a later date (see Part VIII). The site on which the new substation will be located is owned by Transpower and is to the north of the existing designated substation. It is located within the Taupo District Council (TDC) boundaries.

Part IX provides information relevant to the Notice of Requirement for designating the existing substation and for the construction, operation, maintenance and upgrading of additions to the existing Whakamaru substation and a new 400 kV and 220 kV substation at the Whakamaru North substation site. The entire site will be designated even though the structures directly associated with the new substation will occupy only a small part of the total area. Existing substation equipment and 220 kV transmission lines occupy part of the remainder of the site and will be included in the designation. The designation will replace the existing smaller designation of Whakamaru with a larger designation that encompasses both sites.

Part IX provides an assessment of effects on the environment for the Whakamaru and Whakamaru North substation. This assessment covers:

- the construction of the new substation and its continued operation, maintenance and upgrading,
- additions to the existing substation;
- the connection between the existing and new substations;
- and the changes to the environment that will result from the proposed works.

While the site is currently largely rural land, it is already affected by the existing substation and five overhead lines which are incorporated into the designation. These existing facilities, and other electricity generation and transmission facilities in the area, assist in mitigating the effects of the new substation equipment and lines. The surrounding land is largely in pastoral and other agricultural use, and this will continue on the designated land in accordance with the underlying zoning. The size of the designation will provide sufficient land and separation distances from adjoining activities to enable future connections and upgrades to be undertaken in

response to growing demand for electricity without adversely impacting on the neighbouring properties. The effects of the substation, including construction impacts, and visual and noise impacts, are considered to be no more than minor.

The additions to the existing Whakamaru substation and the new Whakamaru North substation will be developed on the basis of a design-build contract and therefore they have not been subject to detailed design. However, a comprehensive description of the equipment and associated effects of the additions is provided in Part IX. Part IX does not contain detailed information and detail about the design or foundations of the new substation and therefore outline plans will need to be provided in the future.

Consents will be needed from Environment Waikato for earthworks, and stormwater discharge from the substation site. These will be sought at a later date once detailed designs have been prepared.

A full summary of Part IX information is:

- Effects assessment of substation work at Whakamaru and new substation at Whakamaru North;
- A map showing the location and extent of the proposed works;
- A description of the Whakamaru North substation component;
- A description of the proposed works at the existing Whakamaru substation;
- An explanation of the processes involved in the construction and operational stage of the substation;
- An outline of the statutory framework;
- An explanation of the alternatives considered;
- A description of the existing environment;
- A brief description of the consultation undertaken;
- Measures to avoid, remedy or mitigate adverse effects on the environment; and
- An outline of the possible conditions and restrictions for the designation.

## 10. Part X

Part X provides specialist reports, mapped information and other information which relates variously to the individual Notices of Requirement. The table below sets out the contents of the sections of Part X documentation.

Section	Report	Description
1	Gazette Notice of Requiring Authority Status	Transpower's approved requiring authority status
2	Consultation Report	The consultation report covers the phases of consultation undertaken for the North Island Grid Upgrade Project. The report sets out the matters raised by the communities in public meetings, submissions, and discussions with landowners and groups.
3	Evaluation of Risk	This document assesses the major social, environmental, cultural and economic risks that could arise from the construction, operation and maintenance of the North Island Grid Upgrade Project. This document demonstrates that all significant risks have been identified and effective measures have been put in place to ensure that these are managed to within

acceptable levels throughout the life of the grid infrastructure.

4	Regional Policy	This section identifies the objectives and policies of the Auckland and Waikato Regional Policy Statement and plans that are relevant to the Project. These include objectives and policies on tangata whenua, heritage, water and soil conservation, energy and infrastructure, esplanade reserves, and hazardous substances.
5	District Plan Provisions	This section identifies the relevant objectives and policies to the Project from the seven district plans. The objectives and policies relate to the activities involved in the construction of the project, as well as the specific zones or policy areas through which the 400 kV capable overhead line and 220 kV underground cables will pass, and within which the substations and the transition station/substation are located.
6	Cultural Impact Assessment	The cultural impact assessment summarises the cultural impact and associated issues of the North Island Grid Upgrade Project on Maori within the area of the project. The most important issue was the identification of waahi tapu, with the concern being to ensure that the project does not encroach upon them. The report concludes that most of the cultural issues that have been identified can be provided for and that the Notice of Requirement can proceed in terms of the cultural values of tangata whenua.
7	Social Impact Assessment	The report identifies the general concerns about social impacts that were identified by landowners during consultation, and from other sources, and the specific impacts that might be expected during the construction phase and the operation of the line.
8	Visual Impact Assessment	The landscape and visual impact assessment report describes and quantifies the visual effects of the overhead line and other project components on the landscape. This is done by identifying and evaluating the effects for each section of the alignment, and the substations and transition station.
9	Archaeological Assessment	This report assesses the effects of the North Island Grid Upgrade Project on known and potential archaeological sites. The report concludes that the impact of the project on archaeological sites will be minimal, and that with appropriate mitigation measures and archaeological monitoring, the impacts will not compromise the archaeological record or landscape.
10	Terrestrial Ecology Assessment	The ecology report focuses primarily on the overhead line and the extent to which indigenous vegetation, amenity plantings and shelterbelts/woodlots will be affected by the overhead line and other project components. The report identifies a range of measures to mitigate the adverse effects of vegetation clearance required for the project. Effects on fauna are also considered. Information is also provided on the substation sites and the underground cable sections.
11	Aquatic/ Marine Ecology Impact Assessment	The assessment of effects on aquatic ecology identifies the effects of the underground cables, between the Otahuhu substation and Brownhill substation site. This report also identifies measures to mitigate adverse effects.

12	Electric and Magnetic Fields Effects Papers	The first paper discusses the International Commission on Non-Ionising Radiation Protection (ICNIRP) and the exposure guidelines for electric and magnetic fields to protect human health. The second paper refers to potential effects on animals.
13	Substation Noise Management	This report presents the noise prediction contours for the existing 220 kV substation equipment at Otahuhu, new 220 kV substation at Pakuranga, and proposed 400 kV substation equipment to be installed at Brownhill and Whakamaru North substations. The report concludes that noise levels from the new transformers and other substation equipment will be within acceptable limits.
14	Noise Effects Associated with Proposed 400 kV Capable Overhead Line	This report assesses the audible noise associated the 400 kV capable line, including wind-induced and electrically-induced noise from the transmission line. The report concludes that the noise will comfortably meet all district plan standards, and will be lower than the NZ Standard guidance
15	Effects on Farming and Rural Uses	This report addresses the construction and operation effects of the North Island Grid Upgrade Project on agricultural practices. Effects are considered generally to be minor; however, they could be significant on individual properties and so ongoing consultation will be required throughout the construction phase of the project.
16	Effects on Tourism and Recreation	This report assesses the impacts of the North Island Grid Upgrade Project on tourism and recreation. The alignment has been chosen to have least impact on tourism and recreation features and activities, and the report concludes that the line has largely avoided impacting on recreation and tourism in the two regions. Due to the limited impacts of the project no significant mitigation measures are proposed.
17	Traffic/ Transport Impacts	The traffic impact assessment addresses the effects of the various aspects of the North Island Grid Upgrade Project on traffic, particularly during the construction stage. These aspects include the Pakuranga substation, the underground cables, the Brownhill substation, the overhead line, and Whakamaru and Whakamaru North substation. Mitigation measures are proposed for each of these aspects.
18	Overhead Line Analysis	This is an extract from the Easement Report and provides a detailed analysis of the overhead line.
19	Issues/ Constraints Maps	These maps overlay district plan information and other important details onto aerial photographs of the route of the overhead line and the cables to assist in identifying the issues and constraints for the project.
20	Plans and Profiles for Overhead Line Section	These aerial-photographic based drawings show the indicative centreline of the 400 kV capable line and details of the profiles of the towers and conductors.

## 11. Conclusion

The Notices of Requirement documentation sets out the basis for the designations, their context and the need for the project. The alternatives considered and the processes by which the location of the different components of the designation have been identified, have resulted in a project which is assessed in general terms to have minor effects. Further mitigation of effects is possible during the construction stage and beyond. Effects which are assessed to be more than minor, on a permanent basis, relate only to the visual impact of the overhead line component of the project, and the AIS option for the Brownhill substation.

The project has positive benefits of:

- providing a new connection and enhanced capacity to serve the electricity needs of the people and the economy of the upper part of the North Island;
- strengthening the overall national grid and allowing efficient transmission of existing and new sources of electricity generation, including renewable energy sources;
- removing an existing lower capacity (110 kV) line that presents follows parts of the proposed overhead alignment and further to the north; and
- providing a new transmission line that will meet the needs of the country on an efficient and effective staged basis for the next several decades.

The new line is not contemplated by the district plans for the seven local authority areas which it crosses. Nevertheless, the project is found to be generally in accordance and consistent with plan objectives and policies for utilities, although at a larger scale than permitted by the plans. The project is not always consistent with other objectives and policies of the district plans, and must therefore be evaluated in the context of all the considerations provided for in the RMA for notices of requirement for designations. In terms of these, it is considered that the project as a whole, and each of its component parts, is consistent with matters set out in Sections 6 and 8 of the RMA; is generally in accordance with matters in Section 7 of the RMA; and is in accordance with the sustainable management purpose of Section 5 of the RMA by which people and communities are enabled to provide for the social, economic and cultural wellbeing and for their health and safety, subject to appropriate avoidance, remedying or mitigation of adverse effects on the environment.

## Executive Summary – Resource Consent Applications

Transpower has issued Notices of Requirement for designations under the Resource Management Act 1991 (RMA) relating to the proposed North Island Grid Upgrade Project. The project involves a range of transmission cables and lines between Pakuranga and Otahuhu substations and Whakamaru substation, additions and improvements at these existing substation sites, and new substations at Brownhill Road in south Auckland, and north of the existing substation at Whakamaru.

The Notices of Requirement for designations provide for land use activities such as the construction and operation of the cables, lines and substations, in terms of the areas of seven territorial authorities (Manukau City Council and six district councils) within the relevant District Plans. However, under the RMA, resource consents for a range of activities associated with the Grid Upgrade Project are also needed from the two regional councils – Auckland Regional Council and Environment Waikato. These activities relate to the RMA responsibilities of the two regional councils and are set out and described below.

The resource consents that are being sought are discussed and assessed in three documents:

- Applications for Resource Consent, Underground Transmission Cable between Pakuranga Substation and Brownhill Road – Auckland Regional Council, August 2007
- Resource Consent Applications within the Designated Area – Auckland Regional Council
- Resource Consent Applications within the Designated Area – Environment Waikato

This executive summary provides a brief outline of the contents of each of the documents.

Not all the consents that will eventually be needed are being sought at present. In particular, consents which relate to substation earthworks and foundations, installation of the underground cable between Otahuhu Substation and Brownhill Substation, and most accesses to towers, are not being applied for.

### 1. Applications for Resource Consents – Underground Transmission Cable between Pakuranga Substation and Brownhill Road

Resource consents are needed from Auckland Regional Council in relation to the construction, installation, use, operation and maintenance of a proposed 220 kV double circuit cable along a 9.5 kilometre route in south Auckland which largely follows either the existing 110 kV underground cable “tunnel” route through Dannemora, and roads (or unformed paper roads) near Whitford. The cable crosses several minor water courses.

Preliminary engineering design has been undertaken to provide sufficient detail to describe the project and assess the anticipated effects on the environment. The cables will be installed at depths of between 1.1 metres and 2.3 metres in a trench which is backfilled with suitable material and then covered with a protective cover. Alongside the transmission circuits, polythene pipes will be laid for future water cooling. Optic fibre communication cables will also be laid.

Construction and installation will be undertaken under a single contract applying standard best practice methodology. A Construction Management Plan will be developed to ensure that effects on the environment are avoided, remedied or mitigated, with detailed provisions relating to each location and each type of potential effect during the construction stage.

The cables will cross Turanga Creek near the end of Brownhill Road on a cable bridge; the Mangemangeroa Stream either on a cable bridge or a culverted fill embankment; a small unnamed watercourse near Dunvegan Rise on a cable bridge or fill embankment; and two stormwater management areas close to Pakuranga substation by trenching through these areas.

Once the cable is in operation, routine inspections and any necessary maintenance will be undertaken. These activities will be localised and will have no more than minor environmental effects.

Consents are needed under the proposed Auckland Regional Air, Land, and Water Plan and the Sediment Control Plan. These include consents for:

- earthworks within and outside sediment protection control areas
- discharges of waterborne contaminants to land (such as sediment-laden water from trenching, vehicle washing, drilling and rock-breaking)
- groundwater diversion during and following construction
- a range of bridging and culverting activities, and minor filling of water courses

The resource consent application document includes a description of the environment for the various areas that the cable will pass through, including their vegetation, land uses, heritage values, tangata whenua values, roading and utility systems, and the characteristics of the various watercourses. It describes the processes of construction, and the likely contents of the construction management plan.

An assessment of effects on the environment has been undertaken in relation to the different aspects of the project where consents are required. Measures to avoid, mitigate or remedy any actual or potential adverse effects are described. For the construction and installation period, a range of effects have been identified and evaluated. These include the potential effects associated with earthworks and sediment management and control; dust effects; possible effects on land stability; effects relating to any contaminated land that may be identified during trenching; effects on groundwater and stormwater management areas; effects on recreational use of the area; effects on vegetation and aquatic ecology; effects on property access; effects of traffic; effects on existing utilities, and effects on cultural values. Effects associated with operation and maintenance of the cables are also identified and assessed.

Overall, while it is recognised that the construction and installation activities will affect the immediate environment over a period of some months, effects can be managed so that the natural, physical and human environments are not adversely affected to a significant extent. The Construction Management Plan is seen as a significant mitigation method, and will be subject to review and approval by both Auckland Regional Council and Manukau City Council.

The application document also outlines the extensive consultation undertaken and the issues raised by the public and affected persons. It also describes the benefits of the project. It sets out in detail the statutory context of policies and rules relating to the regional planning documents. It also describes possible conditions that could be attached to any consents.

## **2. Resource Consent Applications within the Designated Area – Auckland Regional Council**

The designated area is the area which is subject to Transpower's Notices of Requirement. It is a minimum of 65 metres wide, and contains the overhead line part of the North Island Grid Upgrade Project. In the Auckland

Regional Council's area it runs from the Brownhill Substation site to the regional boundary north of Paparimu Road.

The applications for activities which may require consents from Auckland Regional Council within the designated area relate largely to the foundations for the towers; to some localised earthworks to ensure sufficient ground separation for the overhead transmission line conductors in south Auckland, (around tower 9 and between towers 14 and 16); vegetation clearance and disposal; and access track preparation.

Preliminary engineering design has been undertaken relating to these activities, sufficient to enable a description and assessment of effects on the environment. However, exact tower locations and the foundation designs to be used at each site will depend on the outcomes of ground proofing and geotechnical investigations. The resource consent application document describes the processes of construction for the towers and the various tower foundation options which may be employed. These include cast in-situ bored concrete piles; driven pile foundations; concrete raft foundations; pad and chimney concrete foundations; grouted rock anchor foundations; and screw anchor foundations. Most of the foundations will be of the cast in-situ bored concrete pile type, with other types being used only when ground conditions require.

A Construction Management Plan will provide approved measures to ensure any potential adverse environmental effect or situation can be addressed/mitigated. The Construction Management Plan will also require that a site-specific Site Works Plan be developed for each tower site.

Consents are required under the Auckland Regional Sediment Control Plan and the proposed Auckland Regional Air, Land and Water Plan. These include consents for:

- Earthworks inside and outside any sediment protection control area
- Earthworks in High Risk Erosion Areas
- Discharges of waterborne contaminants to land
- Drilling of tower foundations below the water table
- Composting of vegetation from trimming and clearance

Most of the activities associated with tower foundations, accesses, earthworks and tree removal or trimming, at most sites within the designation area are permitted activities under various rules. However, comprehensive consents have been applied for to ensure that all possible eventualities are covered.

An assessment of the actual and potential effects on the environment has been undertaken in relation to the different aspects of the project where consents may be required within the designation area. Measures to avoid, remedy or mitigate any adverse effects are described. Effects associated with site preparation, and foundation and tower construction are described and evaluated, including the potential effects associated with vegetation clearance; earthworks and modification of site topography; geotechnical drilling; pile driving; blasting and drilling; control, management and discharge of stormwater; dust; discharge of fluids and contaminants; and construction noise.

Overall, it is considered that the effects associated with activities requiring consents within the designation area will be both temporary and minor. A full range of mitigation measures relating to the various activities are proposed through the use of a Construction Management Plan and Site Works Plans.

### 3. Resource Consent Applications within the Designated Area – Waikato Regional Council

In Environment Waikato's regional area the designated area also primarily relates to the overhead line component of the project. It is a strip ranging from 65 metres in width to 120 metres in some small areas towards the southern end. It runs from the northern boundary between of the region near Hunua to the vicinity of Whakamaru substation, north of Taupo.

The applications for activities which require consents from Environment Waikato within the designated area relate largely to the foundations for the towers; vegetation clearance; earthworks and access track preparation.

Preliminary engineering design has been undertaken relating to these activities, sufficient to enable a description and assessment of effects on the environment. The exact tower locations and the foundation and tower designs to be used at each site will depend on the outcomes of ground proofing and geotechnical investigations. The resource consent application document describes the processes of construction for the towers and the various tower foundation options which may be employed. These include cast in-situ bored concrete piles; driven pile foundations; concrete raft foundations; pad and chimney concrete foundations; grouted rock anchor foundations; and screw anchor foundations. Most of the foundations will be of the cast in-situ bored concrete pile type, with other types being used only when ground conditions require.

A Construction Management Plan will provide approved measures to ensure any potential adverse environmental effect or situation can be addressed/mitigated. The Construction Management Plan will also require that a site specific Site Works Plan be developed for each tower site.

Consents are required under the proposed Waikato Regional Plan. These include consents for:

- Earthworks and vegetation clearance in High Risk Erosion Areas
- Discharges of waterborne contaminants to land
- Drilling of tower foundations below the water table
- Composting of vegetation from trimming and clearance

Most of the activities associated with tower foundations, accesses and vegetation management at most sites within the designation area will be permitted activities under various rules. However, comprehensive consents have been applied for to ensure all possible eventualities are covered.

An assessment of effects on the environment has been undertaken in relation to the different aspects of the project where consents may be required within the designation area. Measures to avoid, remedy or mitigate any adverse effects are described. Effects associated with site preparation, and foundation and tower construction are described and evaluated, including the potential effects associated with soil disturbance; roading and tracking and vegetation clearance in high risk erosion areas; composting; drilling below the water table; discharge of drilling fluids, and various associated activities.

Overall, it is considered that the effects associated with activities requiring consents within the designation area will be both temporary and minor when undertaken in accordance with standard industry practices and best practice management guidelines. A full range of mitigation measures relating to the various activities are proposed through the use of a Construction Management Plan and Site Works Plans.

## 4. Conclusion

The resource consent applications cover activities associated with Transpower's North Island Grid Upgrade Project which require resource consents from Auckland Regional Council and Environment Waikato. The application documentation provides a description and assessment of the potential environmental effects associated with the activities for which consents are sought at this time.

In summary, it is considered that the activities described in each of the consent applications will have adverse effects on the environment primarily during the construction stages. Mitigation measures set out in the Construction Management Plan will mitigate and remedy these effects, along with specific measures in Site Works Plans. Once in place, ongoing maintenance and repair will involve minor activities with very limited effects on the environment.

The current applications relate to activities associated with a major project which has substantial positive benefits as described in the Notices of Requirement documentation for the project.