

15. Network utilities

Overview

The Project will affect a number of existing network utilities within the Project area. This will require the protection and / or relocation of these utilities. The NZTA, in liaison with PCC, has worked closely with the relevant organisations and are jointly confident that all adverse effects on network utilities will be able to be managed appropriately.

15.1 Introduction

In this chapter the potential adverse effects of the Project on existing network utilities are considered. Potential adverse effects on utilities will be managed either by providing protection for the utility, or by relocating the utility. The process by which the NZTA, PCC and the relevant agencies will manage the protection and relocation works will be set out at a high level in the proposed Network Utilities Management Plan (NUMP).

Where practicable, the necessary mitigation works will be undertaken as enabling works to the main Project works.

15.2 Existing environment – Network utilities

There are a number of existing network utilities within the Project area relating to:

- electricity transmission;
- electricity distribution;
- gas transmission;
- gas distribution;
- water supply;
- water distribution;
- telecommunications; and
- railways.

15.2.1 Electricity transmission infrastructure

The Transmission Gully Project is named as such because the Main Alignment corridor generally follows the existing 110kV electricity transmission line between Paekakariki and Takapu Road (PKK-TKR-A). This 110kV double circuit line is carried on steel lattice towers. It runs most of the length of the Main Alignment, from MacKays Crossing at 0m to the Takapu Road Substation, which is located at

approximately 24,000m. The line also passes through the Pauatahanui Substation, which is located at approximately 17,500m along the Main Alignment.

In addition to the PKK-TKR-A line there are a number of other electricity transmission lines within the Project area. There are three other 110kV transmission lines which either start or terminate at the Takapu Road Substation, namely:

- the Takapu to Wilton A line (TKR-WIL-A) from the south;
- the Khandallah to Takapu A line (KHD-TKR-A) from the south; and
- the Haywards to Takapu A line (HAY-TKR-A) from the east.

The 220kV Bunnythorpe to Wilton A line (BPE-WIL-A) also runs in a general north-south direction on the eastern side of the Main Alignment in the vicinity of 23,100m.

15.2.2 Electricity distribution infrastructure

Throughout most of the Project area, electricity distribution assets are owned and operated by Vector (Wellington Electricity). The only exception to this is in the Kapiti Coast District where assets are owned and operated by Electra.

There are five key locations within the Project area where Wellington Electricity's assets are present:

- between approximately 12,800m and 14,300m there are four locations where separate 11kV overhead lines (including two (2) with pole mounted substations) cross the Main Alignment;
- at approximately 17,500 there are two (2) overhead lines which cross the Main Alignment as well as an 11kV underground cable and associated termination pole;
- at Warspite Avenue and James Cook Drive (where the Waitangirua Link Road and Whitby Link Road are proposed to connect to the Porirua road network, respectively) there are two (2) ground mounted substations and several 11kV underground cables;
- at approximately 24,000m there are two (2) twin circuit 33kV overhead lines crossing the Main Alignment; and
- at approximately 26,700m and Kenepuru Drive there are two (2) 33kV underground cables including overhead termination structures, one (1) twin circuit 33kV overhead line and one (1) 11kV underground cable.

Electra has a 33KV line, including a transformer and overhead switchgear, running along the existing SH1 north of Paekakariki which will be affected as a result of the Project.

Although not a major asset redesign, this line is the backbone of the Electra network and will require considerable planning to move (up to 1 year from start of planning to completion of mitigation works).

15.2.3 Gas transmission infrastructure

There are two high pressure gas transmission lines running most of the length of the Main Alignment corridor, from MacKays Crossing to approximately 24,000m. The two pipes are 12" (305mm) and 8" (203mm) in diameter.

15.2.4 Gas distribution infrastructure

There are four locations within the Project area where local gas distribution assets are in the vicinity of the Main Alignment corridor:

- just south of MacKays Crossing;
- at approximately 2,000m along the Main Alignment corridor (near existing SH1);
- at approximately 18,250m along the Main Alignment corridor; and
- at approximately 19,500m along the Main Alignment corridor.

These assets are owned and operated by Powerco (Gas).

15.2.5 Water supply infrastructure

The Main Alignment will cross the Kaitoke to Karori bulk water main, or branches off it, at the following four (4) locations:

- the 200mm diameter Brady Reservoir Rising Main at approximately 19,000m;
- the 400mm diameter Porirua Branch Mains at approximately 19,500m;
- the 750mm diameter bulk water main at approximately 20,850m; and
- the 750mm diameter bulk water main (in a tunnel) at approximately 23,150m.

At the northern end of the Main Alignment (at approximately 2,100m) there is a groundwater abstraction bore and an up-river surface water abstraction plant operated by KCDC supplying potable water for the Paekakariki township.

KCDC is currently in the process of replacing the up-river surface water abstraction plant, and associated filter tanks, with a second groundwater abstraction bore. The NZTA has worked closely with KCDC to ensure a viable alternative site for the second groundwater abstraction bore as the originally desired site was on the Main Alignment.

15.2.6 Telecommunications infrastructure

There are six (6) locations within the Project area where Chorus has underground copper and / or fibre lines:

- at approximately 1,800m along the Main Alignment, in the vicinity of existing SH1, north of Paekakariki;

- at approximately 14,300m along the Main Alignment, in the Flightys Road reserve;
- at approximately 17,450m along the Main Alignment, at existing SH58 east of Pauatahanui;
- at approximately 24,000m along the Main Alignment, feeding into the Takapu Substation;
- at approximately 27,000m along the Main Alignment, at existing SH1 at Tawa; and
- along Kenepuru Drive.

TelstraClear also has two underground single fibre cables within the Project area. One runs along SH58, providing a connection between the Hutt Valley and the Kapiti Coast and the other runs along Kenepuru Drive.

Vodafone NZ also has a cell tower located in State highway road reserve at approximately 27,000m along the Main Alignment, which will need to be relocated.

15.2.7 Rail infrastructure

The Project will be located in the vicinity of the North Island Main Trunk (NIMT) railway at the northern tie-in (MacKays Crossing). The Kenepuru Link Road will cross the NIMT at the southern (Linden) end (Bridge 28) and the design of the Link Road and bridge will need to provide the necessary clearance envelope for existing and future NZRC needs, and to prevent adversely affecting the associated transformers that exist at this location.

15.3 Assessment of effects on network utilities

The general design philosophy adopted for the Project has been to avoid potential adverse effects of the Project on existing network utilities, wherever practicable. However, not all potential impacts have been able to be avoided, due to the large scale of the Project and the considerable number of network utilities located within the Project area.

Areas where the Project will or may potentially result in adverse effects on utilities have been identified. Collaboration with the relevant network utility provider has been undertaken and through this process, concept solutions for each utility have been discussed, and where possible, developed. These solutions typically involve one or more of the following approaches:

- providing increased protection for the utility so that its operation is not adversely affected by the Project;
- providing access to the utility so that its operation and maintenance is not adversely affected by the Project;
- relocating or realigning part of the network utility to avoid or mitigate potential adverse effects; and
- other specific measures (e.g. dust management) to address potential physical adverse effects.

In some instances, works undertaken on existing network utilities are proposed to be above and beyond what is required purely to avoid, remedy or mitigate the potential adverse effects of the

Project. Generally this is proposed where the network utility operator has identified an opportunity to future-proof its infrastructure as part of the proposed works. Where practicable, the NZTA has sought to accommodate these requests.

The process for engaging with network utility operators (and for the NZTA's contractors undertaking the works in conjunction with the network utility operator's own contractors) will be set out in the NUMP. The NUMP will include the following information:

- protocols for liaison and information exchange between network utility providers and the NZTA during the Project's specimen design phase (Phase 4);
- process for network utility provider approval of proposed works on their utilities (where applicable / necessary);
- process for obtaining any supplementary authorisations (e.g. easements);
- protocols to undertake on-site works, including operating procedures and responsibilities for network utility operators contractors and the NZTA's contractors;
- protocols for utility provider design and supervision services; and
- protocols for inspection and final approval of works by network utility providers.

15.3.1 Electricity transmission infrastructure

There are three components of the National Grid that could potentially be adversely affected by the construction and operation of the Project: transmission lines, the Pauatahanui Substation and the Takapu Road Substation. A small substation exists at Paekakariki but the Project has been designed to avoid affecting this asset.

15.3.1.1 Transmission lines

As noted previously, the 110kV Paekakariki to Takapu Road A transmission line (PKK-TKR-A) currently runs for most of the length of the Main Alignment corridor between MacKays Crossing and Takapu Road. In a number of locations the proximity of the Main Alignment to existing towers and / or lines creates adverse effects for the operation and maintenance on the towers and / or lines. The Main Alignment has been designed to limit this. Potential adverse effects will be caused by:

- transmission towers being situated in locations that the formed carriageway will occupy;
- earthworks being required for the Project which will affect land the existing towers are located on, potentially undermining the integrity of the structures;
- required changes to line alignment required because of the Project may mean that strengthening of existing towers is required; and
- construction of the Project will mean that existing towers will be close to the side of the carriageway, thus creating both a potential safety hazard and a line integrity issue.

Where the location of existing towers and / or lines has been identified as creating a potential adverse effect, a number of different options have been considered. As a result of a design exercise by the

NZTA and Transpower, a preferred solution to accommodate the Main Alignment and the existing transmission line has been agreed by both parties. The preferred solution for the re-alignment of the transmission line has been designed to provide an acceptable design for the Project while allowing for the continued operation and on-going maintenance of the transmission line.

The Transmission Line Relocation Project and its environmental effects are described in resource consent applications to authorise this work (Volume 6). The proposed alignment of the relocated transmission line is shown in the plans **TR01- 12**. The key features of the proposed transmission line relocation are:

- the relocation and replacement of 24 towers and the removal of existing towers;
- the strengthening of 10 towers and / or tower foundations;
- the removal of one tower in its entirety;
- tracks for construction and maintenance access; and
- the installation of roadside protection (barriers) to protect some towers.

The proposed realignment of the transmission line will avoid any adverse effects of the Project on the line, with specific conditions being proposed to agree necessary dust management measures with Transpower, to be implemented during construction.

The Project is unlikely to affect any other transmission lines located in the vicinity. Earlier designs of the Main Alignment would have required the re-location of at least one (1) of the 220kV Bunnythorpe to Wilton A line (BPE-WIL A) towers but the design of the Main Alignment was altered to avoid affecting this line. Similarly, the design ensured that none of the many other transmission lines in the vicinity of the Takapu Substation will be affected by the Project.

As such, all adverse effects on existing electricity transmission lines will be able to be avoided or adequately mitigated

15.3.1.2 Pauatahanui Substation

The Pauatahanui Substation is located east of the Pauatahanui township and is currently accessed off SH58 (Haywards Road).

The proposed main construction compound for the Project will be located opposite the substation on the other side of the existing SH58. There are two potential adverse effects on the substation relating to access to the substation and dust from construction activities affecting substation equipment. Direct vehicular access to the substation will be maintained at all times during construction, although access arrangements may change throughout the construction period. Maintenance of access to the substation is covered in the Project MoU between Transpower and the NZTA and this will be implemented as part of the Construction Traffic Management Plan (CTMP).

Electrical components contained in the substation can be adversely affected by dust. Due to the close proximity of the substation to the proposed main site compound, there is the potential for dust to be

found at the substation location. The potential effects of dust from the site compound are not limited to the substation and will be managed through the Construction Air Quality Management Plan (CAQMP) and through agreement with Transpower. The primary focus of the CAQMP is to limit the generation of dust at the source using methods such as covering potential dust generating components, suppressing dust with water and washing of lines and / or substations. Implementation of the dust control methods in the CAQMP will ensure that the effects of dust on the substation are no more than minor.

Once constructed, the SH58 Interchange will sit directly to the east of the substation. This interchange will involve the realignment of the section of SH58 that the substation is currently accessed from. Access to the substation will be retained through the creation of a cul-de-sac road along the existing SH58 alignment. This road will only provide access to the substation and a small number of residential properties and will hence have a much lower traffic volume than the existing SH58. There will not be any other operational effects on the substation.

15.3.1.3 Takapu Road Substation

The Takapu Road Substation will sit just to the south of the Main Alignment at approximately 24,000m. The potential effects on the substation relate to vehicular access (both during construction and operation of the Project) and the effect of dust. Vehicular access is currently from Takapu Road. Although the Project requires a small area of the Takapu Road reserve from WCC, the formed road itself will not be altered and the substation will continue to be able to be accessed as it is currently. There may be times during construction of the Project when the use of Takapu Road is restricted (e.g. due to heavy machinery being transported onto site). The CTMP contains communication protocols so that the NZTA and Transpower can manage any potential disruption to the operation and maintenance of the substation.

The potential effects of dust from general construction activities in the vicinity of the substation also need to be considered. In general, there is a reduced potential for the generation of dust at this location, compared to the Pauatahanui Substation. Implementation of the dust control methods in the CAQMP will enable works to be managed such that the effects of dust on the substation will be able to be managed.

15.3.2 Electricity distribution infrastructure

Wellington Electricity and Electra both have assets within the Project area that will be affected by the Project. The NZTA has consulted with both organisations to identify a preferred process for the protection of these assets. This will typically involve the protection of the line where it needs to cross a road (e.g. by ducting under, or traversing over TG) or by re-aligning part of the line so that it is not affected. These solutions will be incorporated into the design of the Project and protection and / or re-alignment of lines will be undertaken in conjunction with the construction of the Project, wherever practicable as enabling works. Protocols for this process will be set out in the NUMP.

The other potential adverse effect on electricity distribution infrastructure is from construction dust settling on insulators, which can interfere with the lines. This potential effect will be managed through

the dust suppression measures as part of the CAQMP, as previously outlined. Implementation of these measures will ensure that any adverse effects from dust are no more than minor.

15.3.3 Gas transmission infrastructure

Vector Gas has completed a desktop review of the current proposed Project alignment (as provided by the NZTA) and determined the total length of impacted pipeline sections is approximately 6.3km and the impacts range from minor pipeline servitude encroachments to oblique State highway crossings with extensive cut and / or fill proposed. The affected pipelines are:

- the Kapuni Pipeline;
- the Kapuni – Wellington Duplication South Line Loop; and
- the Waitangirua to Belmont Lateral.

These pipelines service the greater Wellington region and gas flow to the Wellington region must be maintained at all times. Therefore, this critical constraint must be incorporated into any remedial project planning.

In their desktop review, Vector Gas considered that there appears to be at least one or more viable remedial options for each of the impacted pipelines. This may involve protection works but in many cases, gas pipeline realignment will be the only option.

No particular issues are anticipated with any gas pipeline realignment during construction (including during enabling works) of the Project. The NUMP will set out the process to be followed for Vector Gas and the NZTA to work together to during the detailed design and construction phases of the Project. The realignment of the gas pipeline will need to be carefully co-ordinated with the construction works for road construction to allow continuity of gas supply to the region which Vector Gas have identified as being critical. The NZTA will work closely with Vector Gas under the framework of the NUMP to manage potential adverse effects on the gas transmission network.

15.3.4 Gas distribution infrastructure

The NZTA has been in discussion with Powerco Gas and is confident that a design solution can be found at the four locations where the proposed road alignment will impact Powerco's gas pipeline. Any required protection or re-alignment of the gas distribution pipelines will be co-ordinated with the works for the Project as far as practicable, within the framework established through the NUMP. All potential adverse effects on Powerco's gas distribution infrastructure will be able to be adequately managed.

15.3.5 Water, wastewater and stormwater infrastructure

There are three water supply assets that are affected by the Project⁸⁷:

- water supply bore for Paekakariki township potable water supply (KCDC);
- bulk water supply mains (GWRC); and
- local Porirua water, wastewater and stormwater pipes (PCC).

15.3.5.1 Existing Paekakariki water supply bore

An existing ground water abstraction bore is located immediately west of the Main Alignment at approximately 2,100m. This bore provides approximately half of the potable water supply for Paekakariki. KCDC identified that the Project could adversely affect this bore. Its concern was that the bore will be located close to the Main Alignment towards the bottom of a reasonably steep descent from Wainui Saddle. KCDC officers were concerned that there was the potential for out of control vehicles to run off the road and impact with the bore or surface run-off (including liquid containers ruptured in a crash) infiltrating the aquifer. The NZTA agreed that the potential effects on the bore did need to be considered and consequently have sought to reduce the likelihood of such events by:

- increasing the height (over-sizing) of the western bund to provide additional protection from out-of-control vehicles;
- providing an arrestor bed in the northbound (descending) carriageway so out-of-control vehicles have an opportunity to stop safely before they reach the bottom of the Te Puka valley; and
- providing a positive surface water catchment system so surface liquids 'upstream' of the bore are contained and deposited away from the bore.

These three measures are adequate to mitigate the potential risk of damage to the existing bore.

15.3.5.2 Proposed second Paekakariki water supply bore

As KCDC is currently in the process of replacing the up-river surface water abstraction plant, it will likely have been decommissioned by the time construction of the Project commences. As such, potential effects on this existing abstraction plant have not been considered but the focus has been on potential effects on the proposed replacement bore.

As the originally proposed second Paekakariki water supply bore would have been located beneath the Main Alignment, NZTA and KCDC have worked closely to secure an alternative site to ensure that the KCDC water supply programme is not adversely affected by the Project. The new site is 'upstream' of

87. This section only covers the potential physical effects on water supply infrastructure. Effects on water supply areas are discussed in water quality (Chapter 20) and in Chapter 32 in terms of compliance with the NES for Sources of Human Drinking Water.

the Main Alignment thus avoiding any crash and / or contamination related issues potentially associated with the proposed water supply bore.

15.3.5.3 Bulk water supply mains

The Main Alignment will cross GWRC's existing bulk water supply mains in four (4) separate locations. GWRC has indicated its preference is for the three (3) non-tunnel mains to be protected as follows:

- sleeving the 200mm diameter Brady Reservoir Rising Main within a 450mm pipe;
- ducting the twin 400mm diameter Porirua Branch Mains within parallel service ducts;
- housing the 750mm diameter bulk water main within box culvert allowing continuous 24-hour maintenance vehicle access.

In all three instances this can be achieved. The fourth tunnel main does not require additional protection.

The existing bulk water main tunnel at approximately 23,150m is not directly impacted by the Project. In discussion with GWRC the risk of tunnel integrity can be maintained by pre-construction inspection and on-going monitoring during the works in the vicinity of the tunnel.

In some cases, re-alignment of a section of the water main is proposed, generally because it will provide a better design outcome for the Project and / or the water main. In all instances, the re-alignment can be undertaken within the construction footprint of the Project. Generally, re-alignment will involve the construction of a parallel main with water being switched from the old to the new pipe once commissioned. GWRC has indicated that the importance of the bulk water main in the supply of potable water for much of the region means that switch over times must be minimised. The effects of any disruption will be minor.

15.3.5.4 Porirua water, wastewater and stormwater pipes

Existing water, wastewater and stormwater services will be affected at the following two locations:

- at Warspite Avenue, where the Waitangirua Link Road will connect to the local road network; and
- at Kenepuru Drive, where the Kenepuru Link Road will connect to the local road network.

In both locations the stormwater system for the Project will connect to the existing PCC stormwater system.

The existing stormwater system at Waitangirua (Warspite Avenue) is under-capacity and will require upgrading as part of the PCC Project to accommodate the current design flows and the additional flows from the Waitangirua Link Road. This will result in the Project having an overall positive effect on stormwater infrastructure in the Warspite Avenue area.

No particular issues are anticipated with any minor re-alignment of these services during construction of the Project. The NUMP sets out the process to be followed for construction in the vicinity of existing utilities and following the procedures and measures set out in the NUMP will facilitate the management of effects such that any adverse effects on the local water, wastewater and stormwater system will be no more than minor.

15.3.6 Telecommunications infrastructure

TelstraClear and Chorus (Telecom) both have fibre optic cables in the Project area that will be affected by the Project. Chorus also have some copper lines. The NZTA has consulted with both organisations to identify a preferred process for the protection of these assets. This will typically involve the protection of the cable where it needs to cross a road (e.g. by ducting under the State highway) or by re-aligning part of the line so that it is not affected. These solutions will be incorporated into the design of the Project and protection and / or re-alignment of lines will be undertaken in conjunction with construction of the Project. Protocols for this process will be set out in the NUMP.

Vodafone NZ (VNZ) has a cell tower located at the southern end of the Project area in Linden. The land this tower is on is owned by the Crown and leased to VNZ. This lease is on the understanding that if the land is required for State highway purposes (i.e. the Project), VNZ will be required to relocate the cell tower at its own cost. The NZTA are assisting VNZ with potential sites.

Any adverse effects on telecommunications infrastructure will be appropriately mitigated.

15.3.7 Rail infrastructure

The Project has the potential to adversely affect the operation of the NIMT. Two key types of effect have been identified:

- construction of the Project involving works within, and in close proximity to the rail corridor; and
- the erection of a permanent structure (Bridge 28 on the Kenepuru Link Road) across the NIMT.

15.3.7.1 Construction effects

Where works occur within, or in close proximity to, the rail corridor there is the potential for adverse effects on the operation of the rail corridor. Potential effects can include disruption to rail services, compromised safety of workers, dust and changes in ground conditions etc.

At MacKays Crossing, the works will be located a sufficient distance from the rail corridor such that there will be no adverse effects. The MacKays Crossing Project, completed approximately four years ago, was designed to incorporate a new alignment to the south (sometime in the future) and no modification of the carriageway (other than possibly some new line markings) is required for the Project.

At Kenepuru, construction of the Kenepuru Link Road, Bridge 28 and the realignment of existing SH1 will involve works being located in close proximity to the rail corridor. Working within the rail corridor

requires a permit to enter from the New Zealand Railways Corporation (NZRC). This permit will be obtained prior to any works commencing in the rail corridor. The permit process will involve NZTA preparing a detailed construction schedule for the bridge and outlining protocols to minimise disruption to rail services, maintain the safety of workers and minimise all other potential adverse effects on the rail corridor. This permit is subject to approval by the NZRC and hence, the NZTA will need to satisfy the NZRC that protocols have been established to cover all potential issues.

Construction of road bridges across the rail corridor is relatively commonplace around the country and the NZRC and the NZTA have well-established protocols for this type of work. Clearances and overhead contact line protection measures, plus suitable design solutions to address any impacts on associated rail substation and transformer infrastructure, will have to meet NZRC requirements to obtain NZRC approval. All potential adverse effects on the rail corridor will be able to be managed, including potential effects of dust from construction.

It should also be noted that the NZRC is the requiring authority with a designation over the land (i.e. designation of the NIMT, K0101 in the PCDP). Accordingly the NZTA will need to obtain written approval from the NZRC pursuant to section 177(1)(a) of the RMA (this would also fulfil the requirements of written approval under section 176(1)(b) of the RMA). The NZRC will not provide its approval unless it is satisfied that all potential issues have been addressed. This document provides further assurance that any adverse effects on the rail corridor will be no more than minor.

15.3.7.2 Operational effects

As a permanent structure across the NIMT, Bridge 28 has the potential to adversely affect the operation of this railway line. The key issue is that the height and width of the bridge structure must provide adequate horizontal and vertical clearance for trains and rail maintenance activities. These requirements⁸⁸ were considered and have been incorporated into the bridge design. As such, the original position of the bridge piers was revised to provide at least 6m horizontal clearance. A vertical clearance of at least 6m has also been provided, which meets NZRC's requirements.

In summary, the bridge meets the NZRC's design specifications and hence there will be no adverse effects on the operation of the rail corridor at Kenepuru as a result of the proposed bridge structure.

88. Set out in the NZRC's "Clearance Envelope for Future for Future Development" and "Obstacle Clearances (prEN50122-1 2008 Annex A (1500v DC Typ Obstacles))".