NZ TRANSPORT AGENCY
WAKA KOTAHI

Memorial Park Alliance

29 July 2014

NETWORK UTILITIES MANAGEMENT PLAN

Underpass and Memorial Park

UND-05-DES-RP Network Utilities Management Plan

Rev.	Status	Prepared by	Checked by	Date
1	FINAL	Scott Williamson	Carys Everett	29 July 2014

Name	Position	Date	Signature
Ed Breese	Environmental & Compliance Manager	20/7/14	
Duncan Kenderdine	Alliance Manager	30.7.2014	

Contents

1 Introduction

1.1 Background

This Network Utilities Management Plan (NUMP) outlines the methodologies that will be adopted to ensure that the enabling work, design, and construction of the Basin Reserve Bridge adequately takes account of (and includes measures to address), the safety, integrity, and protection of existing network utilities including relocation, where necessary.

This document follows on from the Memorial Park Alliance (MPA) NUMP adopted as part of the Temporary Road Enabling Works (Refer EW-05-DES-RP NUMP Rev 2.0 May 2013). Further progress of the Underpass and Memorial Park detailed design in coordination with extensive site investigations requires an updated NUMP.

This NUMP has been prepared in consultation with the relevant infrastructure providers which have existing network utilities that are directly affected by the Project.

1.2 Legislative Requirements

A NUMP is required by Condition No. NZTA 36, Schedule 3 and Condition Nos. 38 and 39, Schedule 2 of the National War Memorial Park Empowering (Pukeahu) Act 2012 ('the Act'). Table 1 identifies the requirements of the relevant conditions of those consents, and where these requirements are addressed in the NUMP.

Table 1: Summary of conditions in the Act relevant to the preparation of the NUMP

Condition	Summary of Requirements	Location
Conditions applying to Schedule 2: Condition Nos. 38 and 39		
38	A NUMP shall be prepared and adhered to, to ensure that existing network utilities are adequately protected or relocated.	Entire NUMP
39a	Relevant infrastructure providers have had input into the NUMP and its provisions meet their requirements	5
39b	Measures to be used to accurately identify the location of existing network utilities	6
39c	Measures for the protection, relocation and/or reinstatement of existing network utilities	4
39d	Measures which seek to ensure the continued operation and supply of infrastructure services	6.2
39e	Safe operation of plant and equipment, safety of workers, in proximity to live existing network utilities	6.3, 6.5
39f	Measures to manage potential induction hazards to existing network	6.1, 6.3
39g	Earthworks management, including depth and extent of earthworks, for works in proximity to existing network utilities	6.4
39h	Vibration management for works in close proximity to existing network utilities	6.7
39i	Emergency management procedures in the event of any emergency involving existing network utilities	6.6
Conditions applying to Schedule 3: Condition No. NZTA 36		
36	A NUMP shall be prepared and adhered to, to ensure that existing network utilities are adequately protected or relocated.	Entire NUMP

1.3 Underpass & Memorial Park Services Design

This NUMP summarises the work undertaken to date on the investigation, detailed design, co-ordination and construction of services affected by the Underpass & Memorial Park phase of the Wellington Inner City Improvements. The design of services and associated infrastructure for the current phase of works accommodates the previously installed infrastructure which was constructed as part of the enabling works to allow timely completion of the temporary road.

To ensure design of services affected by the Underpass and Memorial Park works satisfies the requirements of the MPA, New Zealand Transport Agency (NZTA), Wellington City Council (WCC), and service providers, a stringent design and review process has been set in place. This process is discussed in Section 3 of this report.

The services located within the extents of the Underpass and Memorial Park works are outlined in the drawings in Appendix B.

1.3.1 Affected Services

The construction of the Underpass and Memorial Park requires diversion of services running along and across Buckle Street (the old SH1). Major diversions have been carried out as part of the Underpass works and future service installations are proposed for the Memorial Park work. The dry and wet services requiring protection or diversion as part of the Underpass & Memorial Park works are listed below.

Dry Services

- Telecommunications
- Fibre Optics
- Traffic Signals
- Electricity (High and Low Voltage)
- Gas
- Streetlights

Wet Services

- Water Supply
- Stormwater
- Sewer

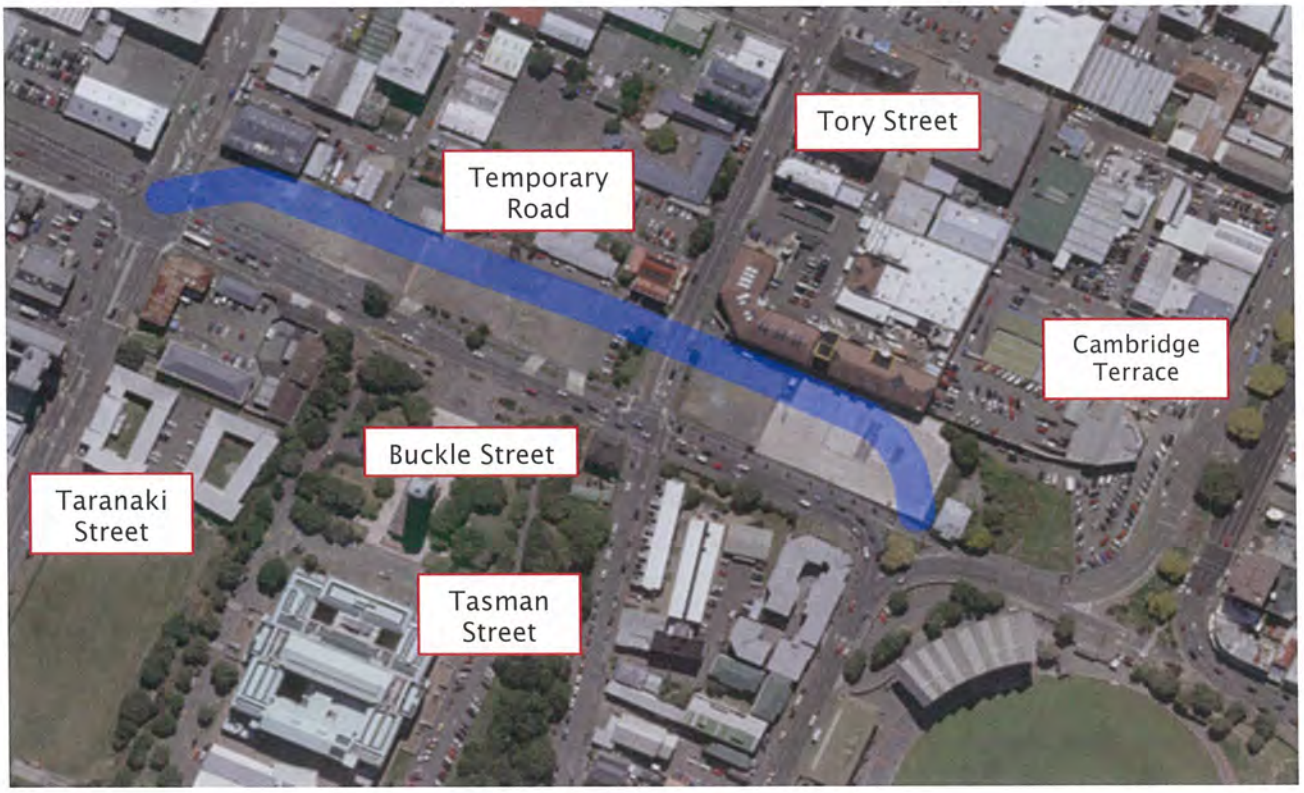
2 Project Location

2.1 Enabling Works

As part of the Underpass and Memorial Park project, enabling works in the form of a temporary road was required to divert SH1 traffic from the Underpass alignment. The temporary road is currently in operation as construction of the Underpass is underway. The temporary road is located north of the existing Buckle Street SH1. The basic alignment of the temporary road (SH1 diversion road) is shown in figure 2.1 below.

The management of utilities affected by these Enabling Works is covered in the NUMP for the temporary road dated May 2013.

Figure 2.1 Temporary Road/SH1 Diversion Alignment



2.2 Underpass

The construction of the Underpass commenced following the diversion of traffic from Buckle Street to the temporary road in late January 2013. The excavation of the cut and cover trench is the cause for the majority of service diversions within the Memorial Park project area. Service diversion alignments across the site are shown in figures 2.2, 2.3, and 2.4 below.

Figure 2.2 Buckle Street West Service Diversions

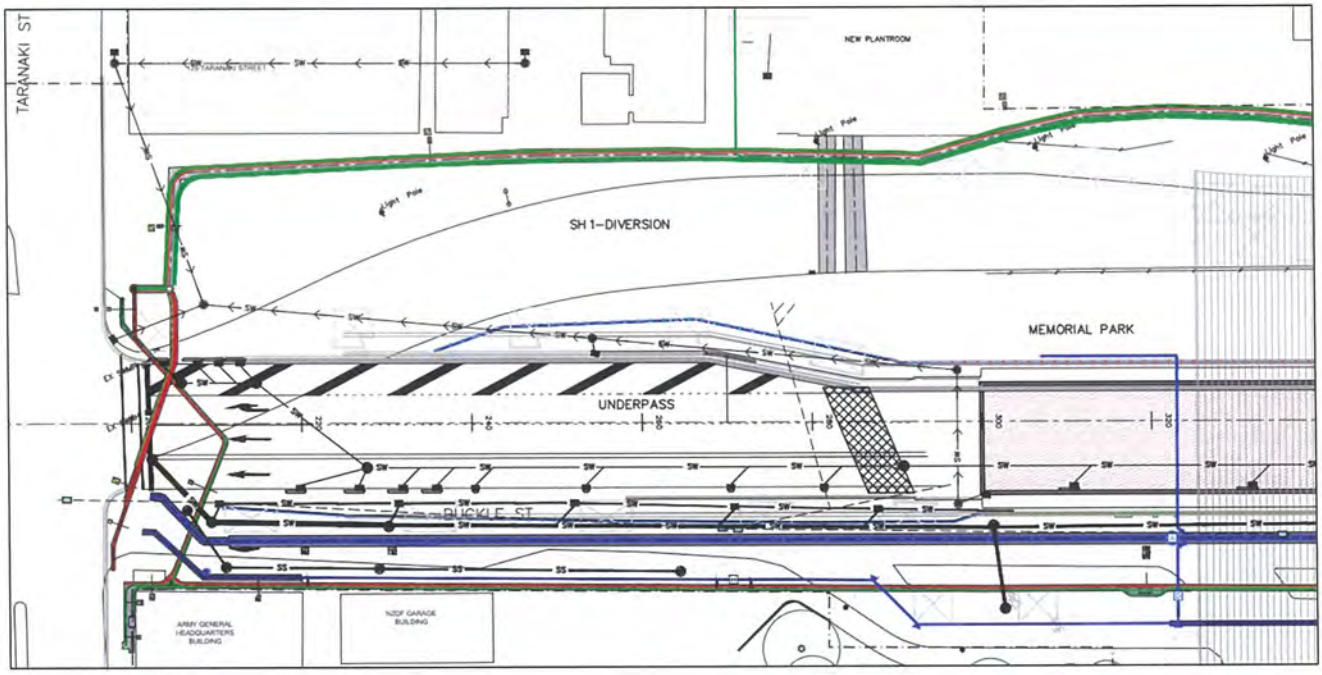


Figure 2.3 Tory/Tasman Street Service Diversions

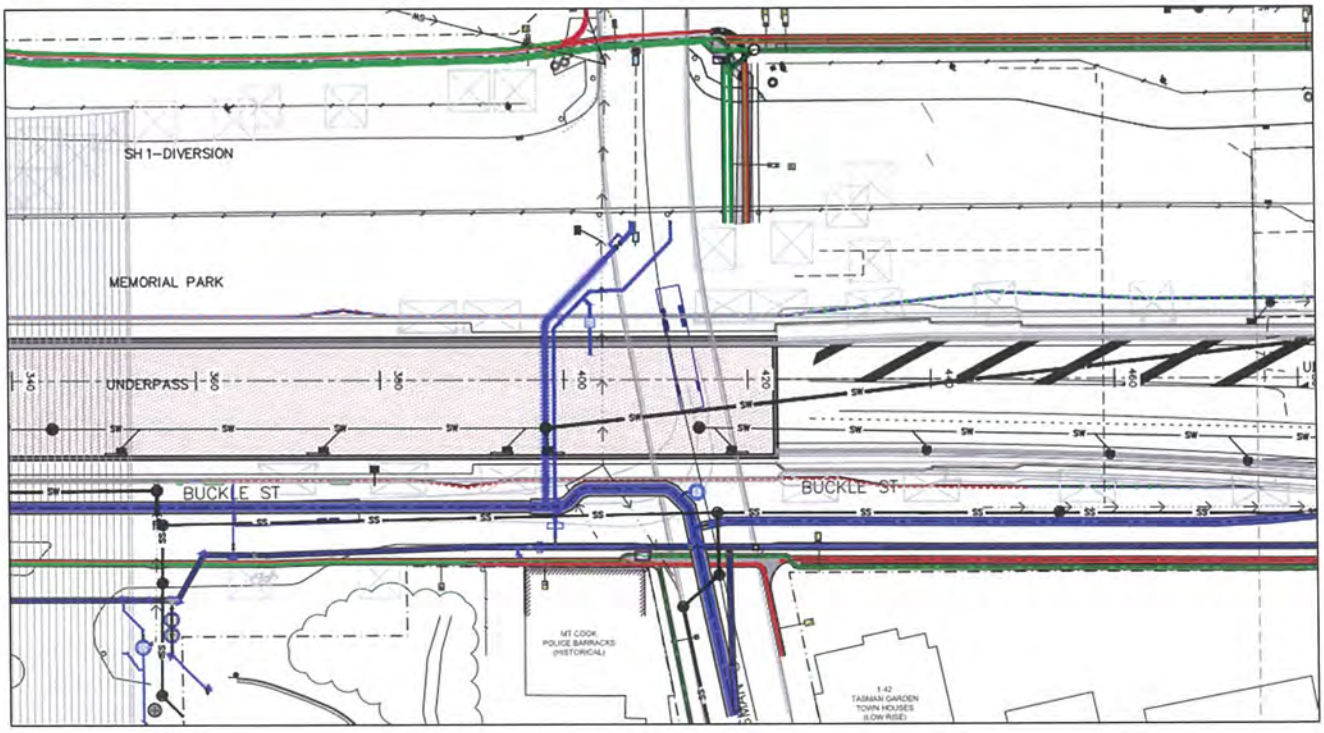
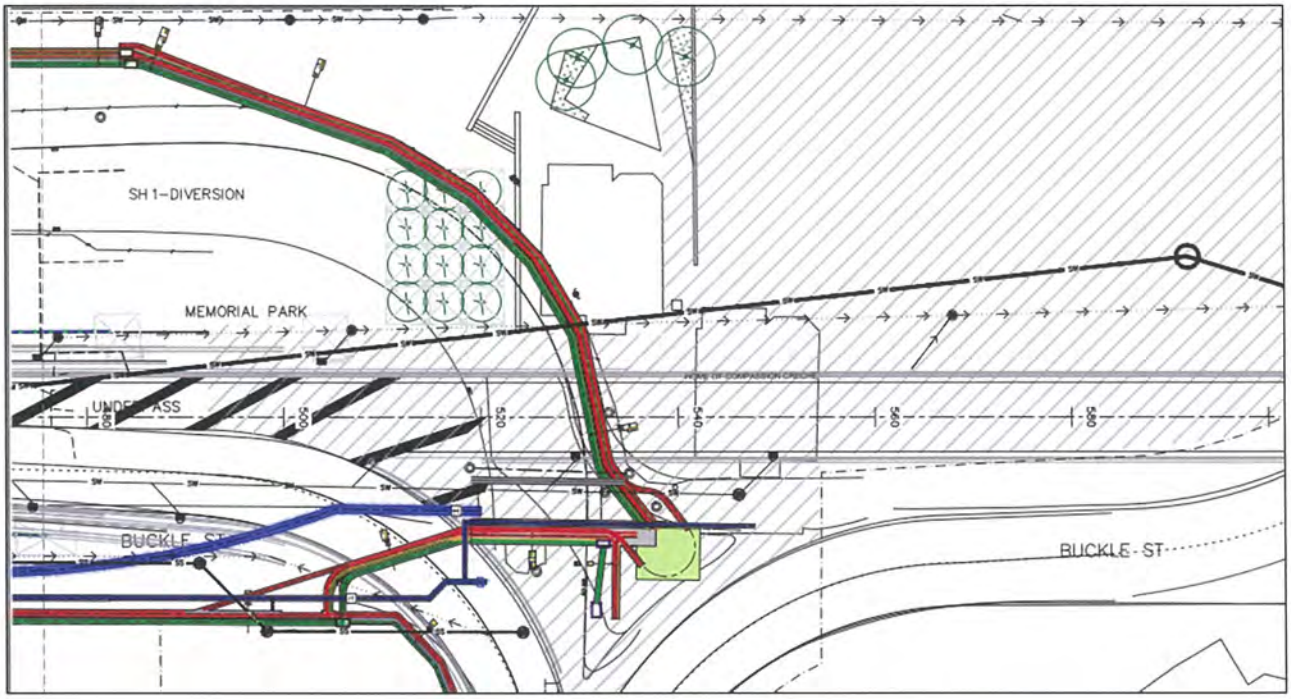
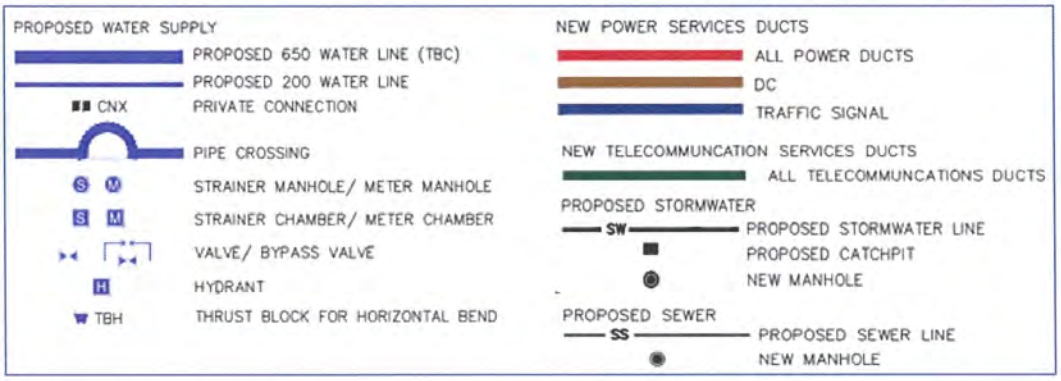


Figure 2.4 Buckle Street East Service Diversions



Legend:



2.3 Memorial Park

The formation of the Memorial Park structures and landscaping will follow on from the Underpass construction as SH1 traffic is diverted from the temporary road into the Underpass in late 2014. Plans showing the proposed layout of the Memorial Park and associated services required are shown in figures 2.5 and 2.6 below.

Figure 2.5 Memorial Park West

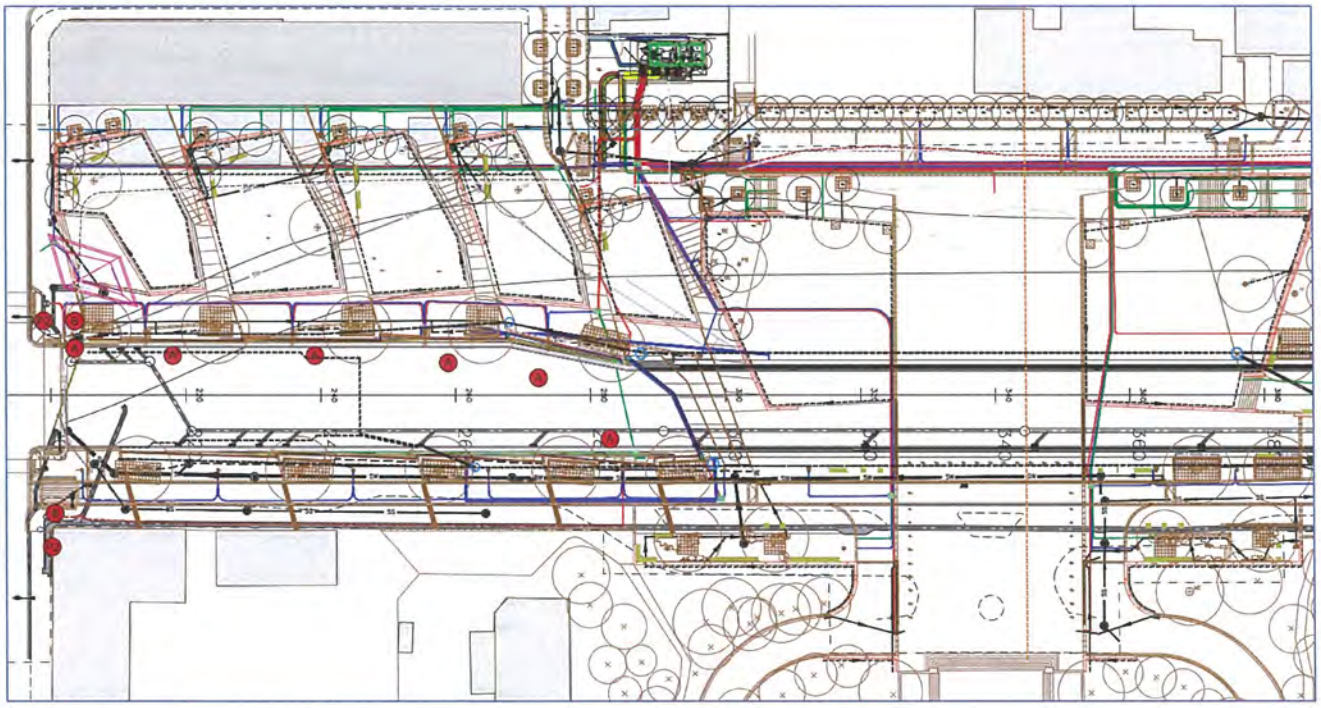
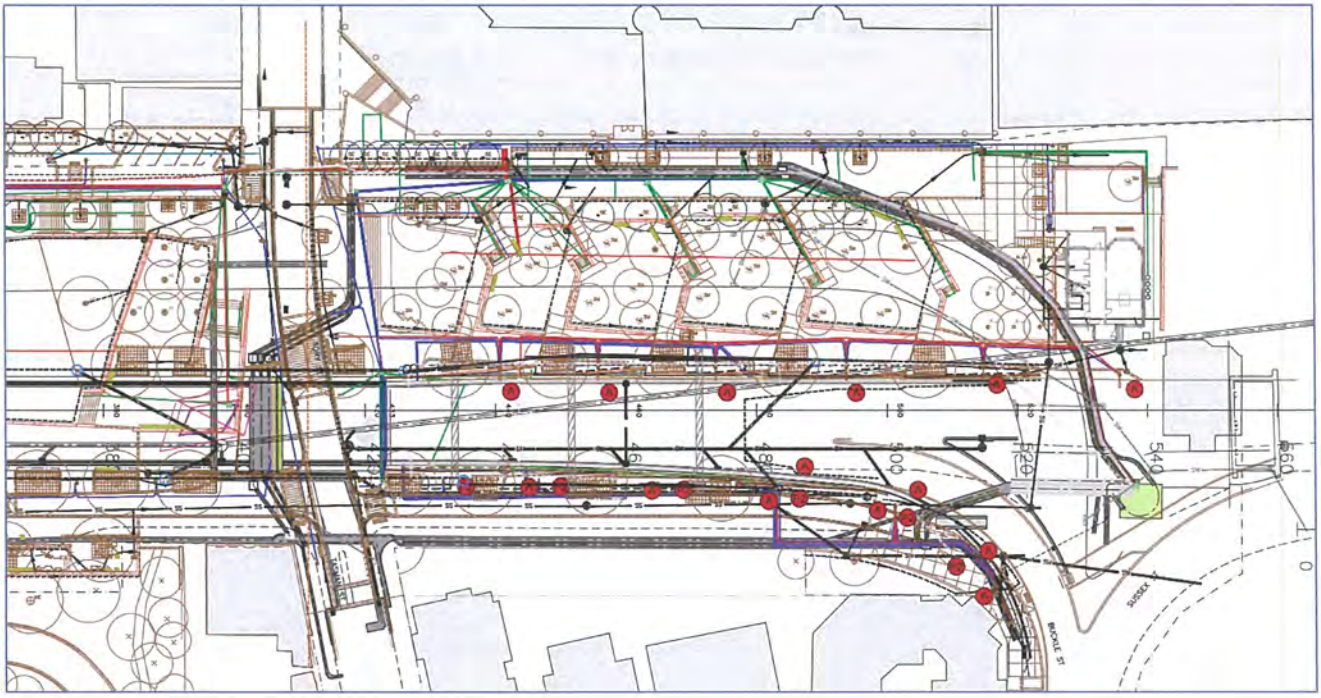


Figure 2.6 Memorial Park East



3 Methodology

3.1 Services Design Procedure

An agreed design procedure has been adopted by the MPA for the development of services design from a Target Cost Estimate (TCE) design through to detailed design. The design review stages outlined below provide a tight control on design scope and budget while incorporating input from service providers, MPA designers in other disciplines, and early constructor involvement from the MPA site team. This design method is proving to provide efficient and constructible design solutions as the Underpass and Memorial Park develops.

3.1.1 Target Cost Estimate Design

A design package has been produced for each service provider with infrastructure affected by the project works. The design packages provide a scope of works based on 30% design stage and are used to produce a TCE for the individual services. Scoping for the TCE package involves consultation with each of the service providers who provide design requirements and constraints for the relative diversion/protections works within the extents of the project. Service providers are also presented with the option of incorporating betterment/future proofing to their network (at their expense) as part of the MPA works. Shared trenches and access chambers have been proposed for economic duct installation.

3.1.2 Technical Proposal

Following on from initial service provider consultations and TCE packages, technical proposals outlining the intended scope of works by MPA are sent to each service provider for sign-off agreement of the proposed works.

3.1.3 30% Design Review

The first review stage of detailed design is at 30% design. When the design has progressed to this stage, the design is reviewed by each of the MPA team leads, design manager, construction manager, other relevant designers, and site engineers. The method review process can be either in the form of a review meeting or individual mark-ups of the drawing master copy. Comments are discussed and agreed changes are incorporated into the design.

3.1.4 90% Design and Service Provider Review

When the design has progressed to a 90% design stage, the drawings are issued to service providers for review. Comments are received and incorporated into the design before being checked and signed off as construction issue. The purpose of the previous design stages is to avoid presenting any undesirable design features to the service providers at the 90% design review as all requirements should have been previously agreed and incorporated.

3.1.5 Construction Issue Design

At the completion of the above design procedure, construction drawings are issued to MPA constructors. The construction drawings may be revised at a later date due to a change in design requirement or unforeseen conditions on site.

3.2 Design Inputs

Electronic and hardcopy data has been provided by each of the service providers and included in the CAD and 3D modelling systems. The locations of services on site have been confirmed via trial pitting and survey. The information gathered from onsite is incorporated into the CAD system and 3D model to validate existing service locations in areas of design conflicts. This information is proving essential for all phases of the project. As-built information is also being surveyed and incorporated into the 2D and 3D models as construction progresses.

4 Proposed works

A summary of the physical works required to protect and divert services during the construction phase of the Underpass and Memorial Park works as well as for the final case is outlined in the sections below.

As this NUMP is a live document, the schedule of works below will be updated to refer to As-Built drawings and detail deviations from the original proposed design.

4.1 Electricity Services

The following Electricity services requiring protection/diversion have been identified:

- Existing 33kV services were identified along the old SH1 Buckle Street. These are to be protected as part of the works.
- Existing 11kV services were identified as running:
  - Beginning at Taranaki Street east along the south side of Buckle Street, transitioning north at the Buckle Street / Tory Street intersection and running north along the western side of Tory Street.
  - Beginning at the northern end of Tasman Street as it transitions to Tory Street; north along the eastern side of Tory Street from the Buckle Street / Tory Street intersection.
- Existing 400V services were identified as running:
  - West from Taranaki Street along Buckle Street.
  - North/south along Tory Street / Tasman Street.
- Existing DC services were identified as running:
  - Beginning at Sussex Street as it transitions to Buckle Street west along the middle of Buckle Street, transitioning north at the Buckle Street / Tory Street intersection and running north along the eastern side of Tory Street.
  - West from Buckle Street / Tasman Street intersection, along Buckle Street and down to Cambridge Terrace.

The proposed protection/diversion measures are detailed and referenced in Table 2 below:

Table 2: Protection and Diversion Measures for Electricity Services

Service	Location	Protection and / or Diversion Measures
Gas Filled 33 kV Cables	Buckle Street	No relocation works. Cables to be protected by a slab over an 8m section at Sussex Street.
11kV Cables (including Pilot cables)	Existing 11kV network at Taranaki Street	Joint made in new traffic island at Buckle/Taranaki intersection.
	Tasman-Tory Street cable ducts (including 100mm diameter pilot duct)	Diverted along Buckle Street (South East), crossing Temporary Road and running along Te Papa Archives access road back to Tory Street north in east footpath. Spare 150mm duct to be installed across underpass lid as part of Park construction.

Service	Location	Protection and / or Diversion Measures
Low Voltage (LV) Cables	Existing LV network at Taranaki Street	Joint made in new traffic island at Buckle/Taranaki intersection.
	Network either side of Tory Street north of Temporary Rd intersection.	Modified network to avoid requirement for ducts crossing Temporary Road.
	Tory Street to Sussex Street along Te Papa access road.	1 x 100mm duct installed for possible future Crèche power feed. Now spare as power feed is from the Sussex/Buckle Street intersection.
	Tasman-Tory Street cable duct	1 x 100mm duct installed along Buckle Street East, crossing Temporary Road and running along Te Papa Archives access road back to Tory Street north in east footpath.
DC Cables	Sussex Street to Tory Street	3 x 150mm diameter ducts installed around north east side of site, running along Te Papa Archives access road back to Tory Street north in east footpath.

4.2 Traffic Signals

The following Traffic Signal services requiring protection/diversion have been identified:

- Existing active services were identified as:
  - Running the length of Buckle Street (Taranaki Street to Sussex Street intersection)
  - Running along Tory Street (Tasman Street intersection to Te Papa buildings)

The proposed protection/diversion measures are detailed and referenced in Table 3 below:

Table 3: Protection and Diversion Measures for Traffic Signals

Service	Location	Protection and / or Diversion Measures
Stage 2 Traffic Signals	Taranaki Street to Tory Street	2 x new 100mm Traffic Signal ducts terminate either side of Tory Street (i.e. do not cross Tory Street). These run from the Sussex/Buckle Street intersection to Tory Street east side and from the Taranaki Street intersection with the new underpass to Tory Street west side.

4.3 Vodafone (including TelstraClear) Telecommunications

The following Vodafone services requiring protection/diversion have been identified:

- Existing active services were identified as:
  - An active chamber outside Te Papa buildings with an obsolete cable in a duct running south along Tory St, terminating at the Buckle Street / Tory Street intersection.

The proposed protection/diversion measures are detailed and referenced in Table 4 below:

Table 4: Protection and Diversion Measures for TelstraClear/ Vodafone Telecommunications

Service	Location	Protection and / or Diversion Measures
Final Stage	Tory Street north to Tasman/Buckle Street intersection	New 1200 x 600mm chamber installed at Tory Street north. New 100mm diameter Vodafone duct entering the south side of the chamber extends new Vodafone chamber just north of the underpass within the Park (yet to be constructed). Duct to continue across underpass roof adjacent Tory Street and extended to Tasman Street after Underpass roof installed.

4.4 Street Lights

The following Street Light services requiring protection/diversion have been identified:

- Running the length of Buckle Street (Taranaki Street to Sussex Street intersection)
- Running along Tory Street (Tasman Street intersection to Te Papa buildings)

The proposed protection/diversion measures are detailed and referenced in Table 5 below:

Table 5: Protection and Diversion Measures for Street Lights

Service	Location	Protection and / or Diversion Measures
Stage 1	Temporary Road crossing at Taranaki	Street light duct re-aligned to improve connection to new chamber at Taranaki Street - north east corner.
Stage 3 Phase A	Taranaki Street to Tasman Street	New 100mm street light duct installed from Taranaki Street to Tasman Street along Buckle south side.
Stage 4	Temporary Road Crossing Sussex Street	100mm ducts within 150mm duct sleeves used to cross Temporary Road, approx. 10m length.
		Temporary Street light duct from Tasman to Tory Street omitted - no longer required.
Stage 5	Cambridge Terrace	Duct route to Cambridge Terrace no longer required. Temporary route on inside edge (Basin side) of Sussex Street to become permanent and connect to existing network at original Sussex Street traffic island.

4.5 CityLink Fibre Optics

The following CityLink services requiring protection/diversion have been identified:

- Existing active services were identified as:
  - An existing Fibre Optic cable runs from Taranaki Street, under Buckle Street, then south under the Buckle Street / Tasman Street intersection and into Tasman Street
  - An existing Fibre Optic cable runs near the Basin Reserve, terminating near Sussex Street / Buckle Street
  - A duct running across the Tasman Street intersection and turning west to run along Buckle Street

The proposed protection/diversion measures are detailed and referenced in Table 6 below:

Table 6: Protection and Diversion Measures for Fibre Optics

Service	Location	Protection and / or Diversion Measures
Stage 1	Temporary Road Crossing at Taranaki Street	CityLink duct alignment and new chamber location modified (to footpath) to improve connection to existing network at Taranaki Street north east.
Stage 3 Phase A	Taranaki Street to Tasman Street	900mm ø chamber on south side Temporary Rd replaced with 1.0m radius bend (set out point TA12).
		Existing CityLink Chamber on Taranaki Street south east retained
		CityLink duct alignment modified outside Carillon - bends omitted.
		Proposed 900mm ø chamber on Buckle Street outside Carillon changed to 1200 x 600mm with Aluminium solid top lid.
		CityLink duct alignment connecting to existing Tasman Street chamber modified to avoid existing stormwater manhole.
Stage 4	Tory Street to Sussex Street	Proposed Tory Street chamber changed to 1200 x 600mm chamber with circular CI lid.
		Additional 1050mm ø transition chamber on Tory Street East - shared with CCTV & NZTA.
Stage 5	Sussex Street traffic island	CityLink duct alignment follows existing Temporary Rd footpath (north east of site) to Sussex Street. Duct capped and buried within existing traffic island.

4.6 Chorus Telecommunications

The following Chorus services requiring protection/diversion have been identified:

- Existing active services were identified as:
  - Two 50mm ducts running from the Buckle Street / Tasman Street intersection in a loop to the east then south along Sussex St
  - Services running north / south along Taranaki Street
  - Services running north on the eastern side of Sussex Street then east onto Buckle Street (identified as key fibre optic infrastructure that must remain active through the duration of the works)
- Existing inactive services were identified as:
  - Two lines running east from Taranaki Street under/adjacent to Buckle Street to an abandoned site in the future Memorial Park
  - Two lines running south-west from Te Papa on Tory Street to abandoned sites in the future Memorial Park
  - One 50mm duct running east from Tory Street adjacent to Te Papa buildings
  - One 50mm duct running north from Tory Street under future Memorial Park and current Temporary Road

The proposed protection/diversion measures are detailed and referenced in Table 7 below:

Table 7: Protection and Diversion Measures for Chorus Telecommunications

Service	Location	Protection and / or Diversion Measures
Stage 3 - Phase 1	Taranaki Street - Tasman Street 2 x 100mm Chorus Ducts	Chorus duct alignment outside Carillon modified to bypass new CityLink chamber.
		(2 x 1.0m radius bends installed along 2 x 100mm Chorus duct alignment to avoid existing power cables feeding NZDF building exposed during excavations.
		Existing ducts modified to enter chamber new Chorus chamber on Taranaki Street south east.
		Existing Chorus chamber retained at Tasman/Buckle Street as requested by Chorus.
Stage 4	Tasman Street to Sussex Street (2 x 100mm & 1 x 50mm Chorus Ducts)	Trench arrangement narrowed to avoid root ball from existing Pohutakawa Tree exposed during excavations on Buckle Street between Tasman and Sussex Streets. Maintained 350mm separation to LV cables.
		2 x 100mm ducts with 150mm duct sleeves used to cross Temporary Road (approx. 10m length) and terminate in new chamber in Sussex Street chamber. 1 x 50mm duct continues from Buckle Street in to Sussex Street in west footpath where it is buried.
Betterment Ducts	Tasman Street - Tory Street	Ducts to be installed from existing Tasman / Buckle Street chamber to new Tory Street chamber after Underpass roof installed at later stage in project.

4.7 Gas

The following gas services requiring protection/diversion have been identified:

- Inactive 300 diameter main along Buckle Street west
- Inactive 100 diameter main along Buckle Street East and up Tory Street
- Active 100 diameter (low pressure) and 200 diameter (high pressure) mains running along Tory Street and Tasman Street north - south.

The proposed protection/diversion measures are detailed and referenced in Table 8 below:

Table 8: Protection and Diversion Measures for Gas Services

Service	Location	Protection and / or Diversion Measures
Active Gas Mains	Tory Street and Tasman Street (100mm & 200mm)	Capped at Tory Street just south of the temporary diversion road. Capped at Tasman Street at the Tasman/buckle Street intersection. Powerco modelling and testing has confirmed the network is stable and can remain capped for the duration of the underpass works. At the completion of the Underpass structure construction, the capped mains are to be re-connected across the roof of the underpass generally following Tory Street.
Inactive Gas Mains	Taranaki Street to Tory Street in northern services trench	Agreement from Powerco that this could be relocated to the north side of the underpass. New 150 diameter sleeve installed from Taranaki Street to Tory Street, along the northern services trench. The duct will remain unused initially until Powerco require it to form part of the gas network.

Service	Location	Protection and / or Diversion Measures
Inactive Gas Mains	Buckle Street East and Tory Street (100mm)	Capped at the extents of the Underpass works.

4.8 Water Supply

The following water supply services requiring protection/diversion have been identified:

- 450 diameter trunk main along Buckle Street west from Taranaki Street to Tory St
- 450 diameter trunk main from Tasman Street to Tory St
- 300 diameter trunk main along Buckle Street east
- Distribution network in Buckle St, southern end of Tory ST, northern end of Tasman Street and around the north-western side of Basin Reserve/Sussex St.

The proposed protection/diversion measures are detailed and referenced in Table 9 below:

Table 9: Protection and Diversion Measures for Water Supply Services

Service	Location	Protection and / or Diversion Measures
Trunk main (450mm diameter)	Buckle Street West (Taranaki Street to Tory Street) and connections into existing pipes on Tasman Street and Tory Street	Existing 450mm diameter pipe abandoned. New 667mm OD steel trunk main installed along Buckle Street West. New trunk main connected to existing 900mm diameter main on Tasman street with new 914mm OD steel pipe New trunk main connected to existing 450mm diameter main on Tory street with new 457mm OD steel pipe
Trunk main (300mm diameter)	Buckle Street East	Existing 300mm diameter pipe abandoned. New 375mm NB ductile iron trunk main installed along Buckle Street East. New trunk main connected to new 914mm OD steel pipe on Tasman Street
Distribution mains	Buckle Street (150mm diameter)	Existing 150mm diameter pipe abandoned. New 200mm NB ductile iron distribution main installed along Buckle Street.
	Buckle Street East (100mm diameter)	Existing 100mm diameter pipe abandoned. Replaced by new 200mm NB ductile iron distribution main installed along Buckle Street (refer above).
	Tory Street (180mm diameter)	Existing 180mm diameter pipe abandoned. New 200mm NB ductile iron distribution main connected to new 200mm NB ductile iron pipe on Buckle Street
	Northern end of Tasman Street (150mm diameter)	Existing 150mm diameter pipe abandoned. New 200mm NB ductile iron distribution main connected to new 200mm NB ductile iron pipe on Buckle Street
	North Western side of Basin Reserve / Sussex Street (150mm diameter)	Existing 150mm diameter pipe abandoned. New 150mm NB ductile iron distribution main connected to new 200mm NB ductile iron pipe on Buckle Street

The following lateral connections have also been provided as part of the works:

- Fire main connection to Massey University
- Domestic connection to Massey University
- Underpass fire hydrant mains
- Re-connection of existing small laterals (e.g. NZDF base, Carillon, old police barracks, Sussex Street apartments)
- New small lateral connections for Memorial park (e.g. irrigation supply, drinking fountains, toilet block)

4.9 Stormwater

The following stormwater services requiring protection/diversion have been identified:

- 300mm diameter pipe running North - South near Taranaki Street
- 225mm diameter pipe (increasing to 525mm diameter) along Buckle Street from Massey University to Taranaki Street
- 300mm diameter pipe along Buckle Street from Massey University to Tasman Street
- 375mm diameter pipe from Tasman Street to Tory Street
- 225mm diameter pipe from along Buckle Street East from Sussex Street Apartments to Cambridge Terrace
- 225mm diameter pipe from Te Papa Archives to Cambridge Terrace

The proposed protection/diversion measures are detailed and referenced in Table 10 below:

Table 10: Protection and Diversion Measures for Stormwater Services

Service	Location	Protection and / or Diversion Measures
300mm diameter	North - South near Taranaki Street	Existing pipe South of Buckle Street connected to new 500mm OD PE stormwater pipe at Buckle Street. Existing pipe North of Buckle Street abandoned.
225mm diameter increasing to 525mm diameter	Buckle Street from Massey University to Taranaki Street	Existing pipes abandoned. Stormwater conveyed by new 355mm OD PE stormwater pipe along Buckle Street from Massey University to Taranaki Street installed as part of Memorial Park drainage network.
300mm diameter	Buckle Street from Massey University to Tasman Street	Existing pipes abandoned. Stormwater conveyed by new 355mm OD PE stormwater pipe along Buckle Street from Massey University to Taranaki Street installed as part of Memorial Park drainage network (as above).
375mm diameter pipe	Tasman Street to Tory Street	Existing pipes abandoned. Stormwater to South of Buckle Street conveyed by new 300mm concrete pipe along Buckle Street from Tasman Street to Sussex Street

Service	Location	Protection and / or Diversion Measures
225mm diameter pipe	Buckle Street East from Sussex Street Apartments to Cambridge Terrace	Existing pipe crossing Sussex Street abandoned. New 375mm concrete pipe installed.
225mm diameter pipe	Te Papa Archives to Cambridge Terrace	Existing pipe abandoned. New 300mm concrete pipe installed.

The following new stormwater services have also been provided as part of the works:

- Catchpits, leads and collector pipes from the West (Taranaki St) and East (Sussex St) within the Underpass
- Collector manhole at the low point of the Underpass and 700 OD PE directionally drilled pipe to Cambridge Terrace stormwater main
- Stormwater treatment of Underpass first flush flows to capture pollutants
- Facility to allow isolate the Underpass pipeline to capture and suitably dispose wash down runoff and deluge during maintenance or accidents
- New stormwater drainage systems to collect and convey runoff safely from the Memorial Park to the Wellington City Council stormwater networks;
- New irrigation for lawn areas and garden beds within the Memorial Park which do not receive stormwater runoff from impervious surfaces.

4.10 Sewer

The following stormwater services requiring protection/diversion have been identified:

- 150mm diameter sewer along Buckle Street East
- 160mm diameter sewer along Buckle Street West
- 600mm x 900mm interceptor sewer on Tory Street

The proposed protection/diversion measures are detailed and referenced in Table 11 below:

Table 11: Protection and Diversion Measures for Stormwater Services

Service	Location	Protection and / or Diversion Measures
150mm diameter	Buckle Street East	Existing pipe abandoned. New 180mm OD PE pipe installed within abandoned 300mm diameter concrete stormwater pipe along Buckle Street between the Carillon and Tasman Street. New 180mm OD PE pipe installed by pipe bursting technique along existing sewer alignment on Buckle Street between Tory Street and Sussex Street
160mm diameter	Buckle Street West	Existing pipes abandoned. New 180mm OD PE pipe installed along Buckle Street West.
600mm x 900mm Interceptor Sewer	Tory Street	Protection slab constructed above sewer pipe to protect against construction loading. Monitoring for heave undertaken during excavation

The following new sewer services have also been provided as part of the works:

- New sewer drainage from Underpass stormwater treatment filter chamber to sewer at Cambridge Terrace
- Re-connection of existing small laterals (e.g. NZDF base, Carillon, old police barracks, Sussex Street apartments)
- New small lateral connections for Memorial park (e.g. drinking fountains, toilet block)

5 Communications

5.1 Service Provider Liaison

Service providers which have been identified as having infrastructure within the MPA project area have been consulted in relation to the temporary and permanent works. The schedule in Appendix A titled 'Network Utilities Service Tracker' is a live register detailing progress of individual service provider agreements.

Consultation with service providers is continuous as the design and construction of the Underpass and Memorial Park progresses. Service provider liaison is discussed in further detail in Section 16 of the Construction Management Plan.

6 Construction

A Construction Management Plan has been developed to define processes and organisation of resources that will be employed for the duration of the construction phase. This plan will help ensure that MPA meets all requirements set in the National War Memorial Park Empowering (Pukeahu) Act 2012 ('the Act').

Refer to PW-01-CON-MP Construction Management Plan for a full description. Parts of the plan relating to existing services are summarised in 6.1 - 6.3 below.

6.1 Site Investigations

As part of the early design stages, site investigations were carried out to identify the location of existing underground services in selected areas within the project. The locations of services were recorded in the form of trial pit logs. The information was cross-referenced with digital plans received from the service providers and collated into the 3D model. The combined service locations within the model will aid design and reduce the risk of striking services on-site.

6.2 Service Continuity

In order to minimise interruption to existing services during the construction phase, all reasonable efforts will be made to identify existing services during the design phase. Services will be identified using information from Network Utility Operators and pot-holing on-site to positively identify services.

As part of the construction planning process, consideration will be given to the proximity of the work to existing services. This will reduce the risk of any unplanned interruption to service. Contingency plans will also be developed for each Construction Pack to mitigate any unplanned interruption should it occur.

6.3 Standover

Due to the importance of some services located within the project site, some service providers require a standover for works within close proximity to their network. High priority services within the site include but are not limited to 33kV gas filled cables, 11kV cables, low pressure gas mains, water supply trunk mains, telecommunications and fibre optic communications.

6.4 Earthworks Management

Section 5.6 of the Construction Environmental Management Plan (CEMP) defines the procedure for Earthworks on site in relation to MPA's Erosion & Sediment Control Plan (ESCP). Section 7.1 and 7.3 of the CEMP provide contingency plans for excessive sediment discharge and air quality respectively.

6.5 Health & Safety

To help protect workers and existing underground services, intrusive works will only be carried out following careful consideration of all health and safety measures. A permit to dig system operates within MPA's Health & Safety procedures. A Safety Management Plan has been developed by MPA to help meet all requirements, refer PW-01-SAF-MP Safety Management Plan.

Prior to the cutting of any services on site, written permission from the service provider is required. This procedure is essential to protecting both the workers on site and the networks.

6.6 Emergency Management

The Safety Management Plan Section 15 provides the Emergency Procedure including contact details for Network Utility Operators in the case of a service strike. The Construction Management Plan also provides the contingency planning procedure for works close to existing services. The contingency plan considers nearby valves and containment areas.

6.7 Vibration Management

A Construction Noise and Vibration Management Plan (CNVMP2-U) has been prepared by MPA for the construction of the Underpass. This plan has been prepared in accordance with the Act (condition NZTA.27) specifically and does not refer to existing underground services.

The effect of vibrations on underground services was considered a risk during the installation of sheetpiles near the brick sewer only. A monitoring plan for the brick sewer was implemented and measurements taken during the installation of sheetpiles, refer to Memorandum 'South retaining wall piling vibration - measurement results up to 14 June 2013'. Measured vibration values were all below the acceptable guideline values adopted.

APPENDIX A
Network Utilities Service Tracker

Utility Company	Service	WICI Alliance Manager	Utility Company Contact	Number	Contact made	Initial meeting	Meeting 1	Meeting 2	Meeting 3	Service info Rec'd from Provider	Existing Services Identified	Affected Services Identified	Constaints Identified	Mitigation Options Identified	Sketches Produced	Design Memo Issued	Comments	Underpass Issues	Enabling Works Issues	IC Bypass Issues	Risks	CAD Layers
WCC	Sewer	JDG	John Boot	0212278125	30/08/12		24/09/12	08/10/12	15/10/12							22/10/12	17/9/12: Called Jetesh and left message. 19/9/12: Called Jetesh and left message. 20/9/12: Called Jetesh and left message. 24/9/12: Met John Boot. John will be managing SW and WW. Capacity will be managing potable water only, but should be copied on communicatons. 5/9/12: Met with Rob Jack from Capacity. Capacity have not started working on the information requested by WICI. 26/9/12: Capacity confirmed main point of contact will be Tim Strang (04 910 3862). 28/9/12: Met Tim Strang to reveiw Capacity progress and discuss north service corridor route. Capacity to comment. 2/10/12: GIS information rec'd.	WCC preference for diversion of WW sewer between Tory St and Sussex Street.			WW Interceptor. Lack of response from Capacity.	WCC-SS
WCC	Stormwater	JDG	John Boot	0212278125	30/08/12		24/09/12	09/10/12	16/10/12							23/10/12	17/9/12: Called Jetesh and left message. 19/9/12: Called Jetesh and left message. 20/9/12: Called Jetesh and left message.24/9/12: Met John Boot. John will be managing SW and WW. Capacity will be managing potable water only, but should be copied on communicatons. 5/9/12: Met with Rob Jack from Capacity. Capacity have not started working on the information requested by WICI. 26/9/12: Capacity confirmed main point of contact will be Tim Strang (04 910 3862).28/9/12: Met Tim Strang to reveiw Capacity progress and discuss north service corridor route. Capacity to comment. 2/10/12: GIS information rec'd.	2 rising mains identified.			Lack of response from Capacity.	WCC-SW
Capacity	Potable Water	JDG	Tim Strang	04 910 3862	30/08/12		25/09/12	27/09/12	04/10/12							11/10/12	17/9/12: Called Jetesh and left message. 19/9/12: Called Jetesh and left message. 20/9/12: Called Jetesh and left message. 25/9/12: Met with Rob Jack from Capacity. Capacity have not started working on the information requested by WICI. 26/9/12: Capacity confirmed main point of contact will be Tim Strang (04 910 3862).28/9/12: Met Tim Strang to reveiw Capacity progress and discuss north service corridor route. Capacity to comment. 2/10/12: GIS information rec'd.	450dia water main.			450 dia water main. Lack of response from Capacity.	C-W
Wellington Electricity	Electric	JDG	Chris Hancock	021770261	28/08/12	28/8/12	13/09/12	28/09/12		21/09/12	21/09/2012	21/09/2012	21/09/2012			05/10/12	12/9/12: Called Peter Robison. Arranged meeting for 2pm 13/9/12. 13/9/12: Met WE. WE agreed to scope mitigation works. 18/9/12. WE rec'd information and assessing internally 17/9/12. WE to issue sketches 18/9/12. 21/9/12: WE report identifying affected services rec'd. 24/9/12: WE dxf. of services received.26/9/12: WE advise the PM for WE will be Chris Hancock until Peter Robinson returns. Future correspondance to be directed to Chris Hancock. JDG requested meeting to reveiw information provided by WE. 27/9/12: JDG to meet Chris Hancock 28/9/12 at 1pm. 28/9/12: Met Chris Hancock. Reviwed report and information provided by WE. WE have no concerns about ICB works. Cables to remain. Local concrete protection may be required where adequate cover is not provided. WE noted that north service trench is acceptable to them. WE noted ducts can be isntalled and WE install cales at a leter date. WE estimate 4 weeks for proposal and 3 weeks to complete from signing of contract.	Relocation of 2x33KV cables from south side of Buckle Street = $1.5M and 6 months lead-in. Relocation of other services = $160K and 2 months lead-in.	North service trench acceptable.	No issues.	33kV.	WE-P
Wellington Cable Car	Electric	JDG	Andrew Cresswell	0274531354	13/09/12		19/09/12	09/10/12								11/10/12	13/9/12: Called Andrew Cresswell. Requested dwg, version of drawings. CD posted and dwg. Versions e-mailed. 17/9/12: Called Andrew. Left message. 19/9/12: WCC carrying out preliminary review of Buckle Street. Meeting with WCC at 2pm. 24/9/12: WICI information issue to WCC on CD on 24/9/12 and 25/6/12. 27/9/12: JDG called AC. AC noted everything going well. WCC have all information they require. WCC will issue costs and report 28/9/12. WCC happy to meet up to reveiw and issues. 28/9/12: WCC Buckle Street report received. One pole affected. Other reports to follow.		Relocation of 1 post. ($10K)	Changing bus lanes will be an issue. Replcament cables can take up to 6 months.		WCCAR-P
WCC	Street lights	JDG	Jack Morris	044994444	13/09/12		25/09/12	04/10/12								17/10/12	14/9/12: Spoke to Jack Morris. Details to be e-mailed to deven.singh@wcc.govt.nz and jack.morris@wcc.govt.nz. 20/9/12: Call Jack Morris and arranged meeting for 25/9/10 at 9am. 20/9/12. 25/9/12: Met with WCC. WCC could not confirm who would be managing works until 28/9/12 due to restructuring.	No major service issues.	No major service issues.	No major service issues.		WCC-SL
Powerco	Gas	ELB	Mark Morrison	0222627576 / 049780525	28/08/12	28/8/12	20/09/12	10/10/12		Buckle & ICB pdf only						17/10/12	24/9/12 Mark confirmed possible re-routing of gas services at Tory/Tasman - location of reinstated service to be confirmed. 26/9/12 Eg design memo, minutes 1 & meeting 2 invite sent. 02/10/12 Emailed Mark and requested .shp file	Replacement of cast iron service in north side. Removal of old duct on the south side. Tory/Buckle intersection - moderate press main can be removed & reinstated close to original location.		Relocation of main in Arthur St, relocation of duct in Karo Drive.	High pressure main (blue on dwgs) is not to be altered - standover required. Main at Tory/Buckle	PC-G
Vector	Telecoms	JDG	Graeme Norton	021 224 9979	25/09/12					25/09/2012 Underpass only. Awaiting info on ICB works.	25/09/2012 Underpass only. Awaiting info on ICB works.	25/09/2012 Underpass only. Awaiting info on ICB works.	25/09/2012 Underpass only. Awaiting info on ICB works.	25/09/2012 Underpass only. Awaiting info on ICB works.		16/10/12	12/9/12 Called Rachael Jacobs - wrong contact telephone no. Called Graeme Norton (second contact on list) and he does not know Rachael. Only Wellington contact is Mike Tribe (Total Communcations Ltd) who will know of Vector service locations - he will invoice for meeting time. Vector cables are generally laid in PowerCo lines. 21/9/12: Called Vaughan Evans. Requested Vector confirm who is correct contact for WICI works. 25/9/12: Vector confirmed no infrastructure affected by the proposed underpass works. Future infrastructure will be proposed some time in the future, subject to customer demand. JDG requested information for ICB areas. 27/9/12: JDG chased ICB information from GN.	No services.	No services.			V-T
City Link	Telecoms	ELB	Shane Jones	021873370	28/08/12	28/8/12	17/09/12	10/10/12		dwg file received. Dwg & pdfs sent for all works						12/10/12	24/9/12 Sent .dwg files and .pdf. 25/9/12 Eg design memo, meeting minutes & Meeting 2 invite sent. 28/9/12 Called Shane Jones, he's busy with other work as his manager's away this week. Will try and get something through for next week. 2/10/12 Called Shane, delayed Meeting 2 for a week so he can get a package of work together.	Temporary support of services at Tory/Tasman. Duct in north of Buckle needs relocating.	Chamber located at Taranaki road entrance - will need relocating to footpath if affected.	Chambers need to be moved to the footpath - upgraded for road use at least. Movement of aerial network (trolley poles) where required.	Temporary support of services	CL-T
Chorus	Telecoms	ELB	Jim Matthews	0274630511	28/08/12	28/8/12	18/09/12	05/10/12		* Chorus recommended to get from BeforeUDig						11/10/12	24/9/12 Sent pdf files. 25/9/12 Eg design memo, meeting minutes sent & Meeting 2 invite sent. 27/9/12 Discussed with Bill Chadwick (Downer designer) re Sussex / Buckle junction - $300k to relocate. Bill to visit chamber on 28/9 to inspect. 1/10/12 Called Bill Chadwick - hadn't visited site or looked at the package of works for estimates. Stressed we need info asap. 2/10/12 Called Jim Matthews & Bill C on conference call. Want more detailed dwgs. Will annotate the ICB works on dwgs and send through with any snapshots of Sussex/Buckle & Tasman/Buckle.	Junction of Taranaki/Buckle has main service conections. Support of Tory/Tasman services & relocation of chamber if required. MAJOR INTERSECTION AT SUSSEX/BUCKLE $300k to relocate.	Minor removal of abandoned ducts.	General relocation of service chambers. Must stay in footpath. If level changes, old manholes may require replacement with new adjustable lids.	Sussex/Buckle intersection. Manhole in traffic island - major infrastructure in place.	CS-T
Testra Clear	Telecoms	ELB	Stephen Martin	0299203074	28/08/12	28/8/12	14/09/12	04/10/12		Buckle & ICB .shp	26/09/2012	26/09/2012	26/09/2012	26/09/2012	Typical design details received 26/9/12	21/01/00	20/9/12 - Meeting minutes & eg design memo sent. 24/9/12 GIS data file (.shp) received. Meeting 2 confirmed.	Affected duct to be removed at the end of September 2012. Potential future duct from Tory to Sussex (more related to the bridge construction).	Temporary road may be located over a pavement chamber (Tory). Will require upgrading if to be in the road.	Upgrade of chambers from pavement to road use. Worst case - relocation of chambers.	No major risks.	TC-T
Vodafone	Telecoms	ELB	Sue King	021996456	14/09/12		26/09/12	14/01/00								07/01/00	25/9/12 Called Sue King again. No answer - left voicemail. 28/9/12 Called Sue, sent email with plans. To call again on Tuesday re assets in the area. 02/10/12 Called Sue - no answer.					VF-T
FX Networks	Telecoms	ELB	Steve Whittle		25/09/12					None	None	None	None	None	N/A	17/10/12	26/9/12 Email from Steve Whittle confirming no FX Network assets in the works area	None	None	None	None	FX-T
LINZ	Surveys	ELB	Kelvin Tait	044983835	14/09/12		28/09/12	08/10/12		.tif received of locations. .dwg/.shp not available						15/10/12	26/9/12 Called Kelvin. Meeting 1 confirmed. 28/9/12 Meeting 1 complete. Minutes in progress	Expect the datums to be saved (where possible) and reinstated once the works are complete. LINZ will provide datums and boxes free of charge. Need a chartered surveyor to install and positions.	See underpass issues	Datum positions are to be relocated where possible prior to works taking place. Same organisation as noted for underpass.	Note that there's a benchmark (fairly major) asset in the traffic island outside the Cambridge St Basin gates. This would require some planning to remove and a replacement must be in place prior to removal.	LINZ-Survey
CCTV	CCTV	ELB	John Wilkinson	021921094	24/09/12		24/09/12	08/10/12								21/01/00	24/9/12 .pdf of scheme sent. 28/9/2012 Meeting minutes sent. Foundation details and CCTV mast estimate received. Meeting 2 to confirm	CCTV in the underpass? CCTV in the park?	Mast, cabinet and fibre pit at Sussex/Buckle to be relocated (to a temporary road position then to a permanent position)	Masts, cabinets and fibre boxes to be altered as required.	Interuption of CCTV coverage. Preferable to keep to a minimum - hours only.	CCTV
WCC	Traffic signals	ELB	John Wilkinson	021921094	24/09/12		24/09/12	14/01/00								07/01/00		Relocation of fibre along Buckle Street. Traffic signals in underpass	Traffic signals at Tory/temp road intersection. Can move from Tory/Buckle if to new standard	Chambers to remain in footpath - add sweep bends in the fibre line? Traffic signals to be updated as required.	Careful public perception in traffic signal changes. Temp road junction S needed ASAP	WCC-TS
Transpower	Electric	ELB	Rebecca Mehrtens	095906093	26/09/12					None	None	None	None	None	N/a	15/10/12	26/09/2012 Called Andrew Harrison, he referred me to Rebecca Mehrtens - 09 590 6093. Called but no answer so emailed details. 28/9/12 Rebecca confirmed no services in the site area (underpass & ICB). 1/10/12 Confirmed no services via email	None	None	None	None	TP-E
WCC	Public Drainage	JDG	John Boot	0212278125	14/09/12		24/09/12	08/10/12		27/9/12. Buckle Street only.	27/9/12. Buckle Street only.	27/9/12. Buckle Street only.	27/9/12. Buckle Street only.			15/10/12	24/9/12: Met John Boot. John will be managing SW and WW. Capacity will be managing potable water only, but should be copied on communications. See comments on SW, WW and potable water above. 27/9/12: GIS information for Buckle Street rec'd.					WCC-DR-Public
Opus	Overall Services	JDG	Gareth McKay	0272026251						dwg files received containing most services												O

APPENDIX B

Site Investigation Records

Reference	Description
UND-05-DES-DA Trial Pit Locations	Underpass Site Investigations Plan
UND-05-DES-DA TP A-F1	Log Sheet and Photos
UND-05-DES-DA Trial Pit B	Log Sheet, Trial Pit Cross Section and Photos
UND-05-DES-DA Trial Pit C	Log Sheet, Trial Pit Cross Section and Photos
UND-05-DES-DA Trial Pit D	Log Sheet, Trial Pit Cross Section and Photos
UND-05-DES-DA Trial Pit E	Log Sheet, Trial Pit Cross Section and Photos
UND-05-DES-DA Trial Pit F2	Log Sheet, Trial Pit Cross Section and Photos
UND-05-DES-DA Trial Pit G	Log Sheet, Trial Pit Cross Section and Photos
UND-05-DES-DA Trial Pit H	Log Sheet, Trial Pit Cross Section and Photos
UND-05-DES-DA Trial Pit K	Log Sheet, Trial Pit Cross Section and Photos
UND-05-DES-DA Trial Pit M	Log Sheet, Trial Pit Cross Section and Photos
UND-05-DES-DA Trial Pit N	Log Sheet, Trial Pit Cross Section and Photos
UND-05-DES-DA Trial Pit N (SW)	Log Sheet, Trial Pit Cross Section and Photos
UND-05-DES-DA Trial Pit P	Log Sheet, Trial Pit Cross Section and Photos
UND-05-DES-DA Trial Pit W	Log Sheet and Photos
UND-05-DES-DA Trial Pit X	Log Sheet, Trial Pit Cross Section and Photos
UND-05-DES-DA Trial Pits R	Log Sheet, Trial Pit Cross Section and Photos
UND-05-DES-DA Trial Pit CC	Log Sheet, Trial Pit Cross Section and Photos
UND-05-DES-DA Trial Pit DD	Log Sheet, Trial Pit Cross Section and Photos
UND-05-DES-DA Trial Pit EE	Log Sheet, Trial Pit Cross Section and Photos
UND-05-DES-DA Trial Pit GG	Log Sheet, Trial Pit Cross Section and Photos
UND-05-DES-DA Trial Pit HH	Log Sheet, Trial Pit Cross Section and Photos
UND-05-DES-DA Trial Pit JJ	Log Sheet, Trial Pit Cross Section and Photos
UND-05-DES-DA Trial Pit Locations-(Set2)	Underpass Site Investigations Plan - Set 2
UND-05-DES-DA Trial Pit B (Set2)	Log Sheet, Trial Pit Cross Section and Photos
UND-05-DES-DA Trial Pit C (Set2)	Log Sheet, Trial Pit Cross Section and Photos
UND-05-DES-DA Trial Pit D (Set2)	Log Sheet, Trial Pit Cross Section and Photos
UND-05-DES-DA Trial Pit G (Set2)	Log Sheet, Trial Pit Cross Section and Photos
UND-05-DES-DA Trial Pit H (Set2)	Log Sheet, Trial Pit Cross Section and Photos

Drawings listed above available upon request.

APPENDIX C

As-Built Information

As-Built Information Issued to Service Providers:

Service Provider	Document Reference	Rev
Wellington Electricity	UND-05-DES-CO Technical Proposal - Installed Infrastructure Wellington Electricity	2
WCC Traffic Signals	UND-05-DES-CO Technical Proposal - Installed Infrastructure Traffic Signals	2
Vodafone	UND-05-DES-CO Technical Proposal - Installed Infrastructure Vodafone	2
WCC Street Lights	UND-05-DES-CO Technical Proposal - Installed Infrastructure Streetlights	2
CityLink	UND-05-DES-CO Technical Proposal - Installed Infrastructure CityLink	2
Chorus	UND-05-DES-CO Technical Proposal - Installed Infrastructure Chorus	2

APPENDIX D

Drawing Register

Drawing Register:

DRAWING	TITLE
MP-05-001	DRY SERVICES DRAWING LIST
MP-05-010	DRY SERVICES - NOTES, KEY AND LEGEND
MP-05-020	DRY SERVICES - TYPICAL TRENCH DETAIL
MP-05-150	AREA 1 DRY SERVICES PLAN
MP-05-159	SETOUT TABLES - AREA 1
MP-05-250	AREA 2 DRY SERVICES PLAN
MP-05-259	SETOUT TABLES - AREA 2
MP-05-350	AREA 3 - PLANS EXISTING / NEW SERVICES PLAN
MP-05-351	AREA 3 - PLAN FUTURE DRY SERVICES WORKS
MP-05-359	SETOUT TABLES - AREA 3
MP-05-360	UAB AREA DRY SERVICES PLAN
MP-05-361	CONNECTION FROM C450-1 TO EXISTING DUCTS CROSS SECTION
MP-05-362	CHAMBER 350-3 TO 450-1 CROSS SECTION
MP-05-450	AREA 4 DRY SERVICES PLAN
MP-05-451	CHAMBER 450/1 CROSS SECTION
MP-05-452	CHAMBER 450/4 CROSS SECTIONS
MP-05-453	UAB PARK DUCTS SECTIONS
MP-05-454	NORTH DUCT BANK SECTIONS
MP-05-459	SETOUT TABLES - AREA 4
MP-05-550	AREA 5 DRY SERVICES PLAN
MP-05-559	SETOUT TABLES - AREA 5
MP-05-750	AREA 7 DRY SERVICES PLAN
MP-05-751	CHAMBER 750-6 CROSS SECTION
MP-05-752	CHAMBER 750-6 - DB2 LONG SECTION
MP-05-753	AREA 7 CROSS SECTIONS - SHEET 1
MP-05-754	AREA 7 CROSS SECTIONS - SHEET 2
MP-05-759	SETOUT TABLES - AREA 7
MP-05-850	AREA 8 DRY SERVICES PLAN
MP-05-859	SETOUT TABLES - AREA 8
MP-06-103	AREA 1 - PLANS EXISTING / NEW SERVICES PLAN
MP-06-104	NOTES AND LEGEND
MP-06-105	AREA 1 - AREA 8 SET OUT TABLES - SHEET 1
MP-06-106	SETOUT TABLES - SHEET 1
MP-06-107	SET OUT TABLES - SHEET 2

MP-06-108	AREA 1 - AREA 8 SUMP INFORMATION
MP-06-120	AREA 1 - LONG SECTIONS RAIN GARDEN LONG SECTION 1
MP-06-121	AREA 1 - LONG SECTIONS RAIN GARDEN LONG SECTION 2
MP-06-140	AREA 1 - CROSS SECTIONS RAIN GARDEN
MP-06-160	AREA 1 - DETAILS SUBSOIL DRAINAGE DETAILS
MP-06-164	AREA 1 - DETAILS RAIN GARDEN DETAILS
MP-06-165	AREA 1 - DETAILS RAINGARDEN MANHOLE DETAILS - SHEET 1
MP-06-166	AREA 1 - DETAILS RAIN GARDEN LINER DETAILS
MP-06-169	AREA 1 - DETAILS RAIN GARDEN DETAILS
MP-06-171	PRECAST SLAB FOR CYCLE FRIENDLY GRATE
MP-06-179	DRAWING BASE LEGEND AND NOTES
MP-06-180	AREA 1 - IRRIGATION PLAN SHEET 1
MP-06-201	AREA 2 PLANS EXISTING / NEW SERVICES PLAN
MP-06-280	AREA 2 - IRRIGATION PLAN SHEET 2
MP-06-301	AREA 3 - PLANS EXISTING / NEW SERVICES PLAN - SHEET 1
MP-06-302	AREA 3 - PLANS EXISTING / TEMPORARY SERVICES PLAN
MP-06-303	AREA 3 - PLANS EXISTING / NEW SERVICES PLAN - SHEET 2
MP-06-322	AREA 1 - LONG SECTIONS RAIN GARDEN - LONG SECTION 3
MP-06-361	AREA 3 - DETAILS DRINKING FOUNTAIN DETAILS
MP-06-380	AREA 3 - IRRIGATION PLAN SHEET 3
MP-06-381	AREA 3 - TEMPORARY IRRIGATION PLAN SHEET 3
MP-06-401	AREA 4 - PLANS EXISTING / NEW SERVICES PLAN
MP-06-480	AREA 4 - IRRIGATION PLAN SHEET 4
MP-06-501	AREA 5 - PLANS EXISTING / NEW SERVICES PLAN
MP-06-520	AREA 5 - LONG SECTIONS RAIN GARDEN - LONG SECTION 4
MP-06-521	AREA 5 - STORMWATER LONG SECTIONS RAIN GARDEN - LONG SECTION 5
MP-06-560	AREA 5 - DETAILS DRINKING FOUNTAIN DETAILS
MP-06-580	AREA 5 - IRRIGATION PLAN SHEET 5
MP-06-581	PAVILION 2 - STORMWATER DRAINAGE GENERAL ARRANGEMENT PLAN
MP-06-601	AREA 6 - PLANS EXISTING / NEW SERVICES PLAN
MP-06-680	AREA 6 - IRRIGATION PLAN SHEET 6
MP-06-701	AREA 7 - PLANS EXISTING / NEW SERVICES PLAN
MP-06-720	AREA 7 - LONG SECTIONS RAIN GARDEN - LONG SECTION 6
MP-06-760	AREA 7 - DETAILS DRINKING FOUNTAIN DETAILS
MP-06-780	AREA 7 - IRRIGATION PLAN SHEET 7
MP-06-781	AREA 7 - IRRIGATION BACKFLOW PREVENTER AND METER
MP-06-801	AREA 8 - PLANS EXISTING / NEW SERVICES PLAN
MP-06-880	AREA 8 - IRRIGATION PLAN SHEET 8
UND-05-001	DRAWING LIST
UND-05-005	LEGEND & GENERAL NOTES
UND-05-200	COMBINED EXISTING SERVICES KEY PLAN

UND-05-201	COMBINED EXISTING SERVICES PLAN SHEET 1
UND-05-202	COMBINED EXISTING SERVICES PLAN SHEET 2
UND-05-203	COMBINED EXISTING ESRVICES PLAN SHEET 3
UND-05-231	SERVICES DUCTS DETAILED PLAN -TRENCH TYPE 1 - SETOUT
UND-05-232	SERVICES DUCTS DETAILED PLAN - NORTHERN TRENCH - EAST - SETOUT
UND-05-233	SERVICES DUCTS DETAILED PLAN - TRENCH TYPE 2 - SETOUT
UND-05-235	SERVICES DUCTS DETAILED PLAN - TRENCH TYPE 3 - SETOUT
UND-05-237	SERVICES DUCTS DETAIL PLAN - TRENCHES TARANAKI ST/BUCKLE ST - SETOUT
UND-05-238	SERVICES DUCTS DETAIL PLAN - TRENCHES TARANAKI ST/BUCKLE ST - DETAILS/SECTIONS
UND-05-239	SERVICES DUCTS DETAIL PLAN - TRENCHES TARANAKI ST/BUCKLE ST - DETAILS/SECTIONS
UND-05-240	SERVICES DUCTS DETAIL PLAN - TRENCHES TARANAKI ST/BUCKLE ST - SECTIONS
UND-05-241	SERVICES DUCTS DETAIL PLAN - TRENCHES TARANAKI ST/BUCKLE ST - SECTIONS
UND-05-242	SERVICES DUCTS DETAIL PLAN - TRENCHES TARANAKI ST/BUCKLE ST - SECTIONS
UND-05-243	SERVICES DUCTS DETAIL PLAN - TRENCHES TARANAKI ST/BUCKLE ST - SECTIONS
UND-05-244	SERVICES DUCTS DETAIL PLAN - TARANAKI ST/BUCKLE ST - SETOUT POINTS
UND-05-245	SERVICES DUCTS DETAIL PLAN - TRENCHES TASMAN ST/BUCKLE ST - SETOUT
UND-05-246	SERVICES DUCTS DETAIL PLAN - TASMAN ST/BUCKLE ST - DETAILS
UND-05-247	SERVICES DUCTS DETAIL PLAN - TASMAN ST/BUCKLE ST - DETAILS/SECTION
UND-05-248	SERVICES DUCTS DETAIL PLAN - TASMAN ST/BUCKLE ST - SECTIONS
UND-05-249	SERVICES DUCTS DETAIL PLAN - TASMAN ST/BUCKLE ST - SETOUT TABLE
UND-05-250	SERVICES DUCTS DETAIL PLAN - TRENCHES SUSSEX ST/BUCKLE ST - SETOUT
UND-05-251	SERVICES DUCTS DETAIL - SUSSEX ST/BUCKLE ST - SHEET 1
UND-05-252	SERVICES DUCTS DETAIL - SUSSEX ST/BUCKLE ST - SHEET 2
UND-05-253	SERVICES DUCTS DETAIL - SUSSEX ST/BUCKLE ST - SHEET 3
UND-05-254	SERVICES DUCTS DETAIL - SUSSEX ST/BUCKLE ST - SHEET 4
UND-05-255	SERVICES DUCTS DETAIL - SUSSEX ST/BUCKLE ST - SHEET 5
UND-05-256	SERVICES DUCTS DETAIL - SUSSEX ST/BUCKLE ST - SHEET 6
UND-05-257	SERVICES DUCTS DETAIL - SUSSEX ST/BUCKLE ST - SHEET 7
UND-05-258	SERVICES DUCTS DETAIL - SUSSEX ST/BUCKLE ST - SHEET 8
UND-05-259	SERVICES DUCTS DETAIL PLAN SUSSEX STREET/BUCKLE ST - SECTIONS
UND-05-260	SERVICES DUCTS DETAIL PLAN TRENCHES TORY STREET / SH1 DIVERSION - SETOUT
UND-05-261	SERVICES DUCTS DETAIL PLAN TORY STREET / SH1 DIVERSION - SHEET 1
UND-05-262	SERVICES DUCTS DETAIL PLAN TORY STREET / SH1 DIVERSION - SHEET 2
UND-05-265	TORY - TASMAN STREET SERVICE DUCTS - SETOUT
UND-05-266	TORY - TASMAN STREET GENERAL ARRANGEMENT PLAN
UND-05-267	TORY - TASMAN STREET DETAILS PLAN TORY/TASMAN ST SECTIONS SHEET 1
UND-05-268	TORY - TASMAN STREET DETAILS PLAN TORY/TASMAN ST SECTIONS SHEET 2
UND-05-269	TORY - TASMAN STREET DETAILS PLAN TORY/TASMAN ST SECTIONS SHEET 3
UND-05-270	TORY - TASMAN STREET DETAILS PLAN TORY/TASMAN ST SECTIONS SHEET 4
UND-05-271	TORY - TASMAN STREET DETAILS PLAN TORY/TASMAN ST SECTIONS SHEET 5

UND-05-272	TORY - TASMAN STREET DETAILS PLAN TORY/TASMAN ST SECTIONS SHEET 6
UND-05-273	TORY - TASMAN STREET LEGEND AND SETOUT INFORMATION
UND-05-300	EXISTING DRAINAGE KEY PLAN
UND-05-301	EXISTING DRAINAGE PLAN SHEET 1
UND-05-302	EXISTING DRAINAGE PLAN SHEET 2
UND-05-303	EXISTING DRAINAGE PLAN SHEET 3
UND-05-400	EXISTING POWER KEY PLAN
UND-05-401	EXISTING POWER PLAN SHEET 1
UND-05-402	EXISTING POWER PLAN SHEET 2
UND-05-403	EXISTING POWER PLAN SHEET 3
UND-05-410	R/C SLAB 33kV PROTECTION - SUSSEX STREET GA AND SETOUT PLAN - STAGE 2
UND-05-411	R/C SLAB 33kV PROTECTION - SUSSEX STREET GA AND SETOUT PLAN - STAGE 3
UND-05-412	R/C SLAB 33kV PROTECTION - SUSSEX STREET CROSS SECTIONS - SHEET 1
UND-05-413	R/C SLAB 33kV PROTECTION - SUSSEX STREET CROSS SECTIONS - SHEET 2
UND-05-415	R/C SLAB 33kV PROTECTION - SUSSEX STREET REINFORCING STEEL LAYOUT-SHEET 1
UND-05-416	R/C SLAB 33kV PROTECTION - SUSSEX STREET REINFORCING STEEL LAYOUT-SHEET 2
UND-05-417	R/C SLAB 33kV PROTECTION - SUSSEX STREET REINFORCING STEEL LAYOUT-SHEET 3
UND-05-420	CRECHE WATER SUPPPLY CONNECTION PLAN
UND-05-421	CRECHE WATER SUPPPLY DETAILS
UND-05-430	CRECHE SERVICES CONNECTION LOCATION PLAN
UND-05-432	CRECHE DRY SERVICES DETAILS
UND-05-500	EXISTING GAS KEY PLAN
UND-05-501	EXISTING GAS PLAN SHEET 1
UND-05-502	EXISTING GAS PLAN SHEET 2
UND-05-503	EXISTING GAS PLAN SHEET 3
UND-05-600	EXISTING TELECOMMUNICATIONS KEY PLAN
UND-05-601	EXISTING TELECOMMUNICATIONS PLAN SHEET 1
UND-05-602	EXISTING TELECOMMUNICATIONS PLAN SHEET 2
UND-05-603	EXISTING TELECOMMUNICATIONS PLAN SHEET 3
UND-05-710	200mm Ø WATER MAIN DETAIL PLAN BUCKLE ST WEST - SETOUT
UND-05-711	200mm Ø WATER MAIN DETAIL PLAN BUCKLE ST WEST - SETOUT
UND-05-712	200mm Ø WATER MAIN SETOUT PLAN SECTION 3
UND-05-713	200mm Ø WATER MAIN DETAIL PLAN - TASMAN STREET - SETOUT
UND-05-714	200 MM Ø WATER MAIN DETAIL PLAN SUSSEX STREET - SETOUT
UND-05-715	375 DI WATERMAIN DETAIL PLAN SETOUT
UND-05-716	457/200 WATERMAINS TORY SETOUT
UND-05-717	UNDERPASS HYDRANT FEEDER MAIN - WEST SETOUT
UND-05-718	UNDERPASS HYDRANT FEEDER MAIN - EAST SETOUT
UND-05-719	150 Ø WATERMAIN TASMAN LINK SETOUT
UND-05-721	200 DIA WATERMAIN LONG SECTION - SHEET 2
UND-05-722	200 DIA WATERMAIN LONG SECTION - SHEET 3

UND-05-723	200 DIA WATERMAIN LONG SECTION - SHEET 4 RESERVED SECTION 1
UND-05-724	200 DIA WATERMAIN LONG SECTION - SHEET 5 RESERVED SECTION 2
UND-05-725	200MM Ø WATERMAIN LONGSECTION - SECTION 4 - SHEET 1
UND-05-726	200MM Ø WATERMAIN LONGSECTION - SECTION 4 - SHEET 2
UND-05-727	200MM Ø WATERMAIN LONG SECTION - SECTION 5
UND-05-728	100MM Ø WATERMAIN LONG SECTION - SECTION 5
UND-05-729	375 DI WATERMAIN LONG SECTION
UND-05-730	STEEL WATERMAIN DETAIL PLAN BUCKLE ST WEST - SETOUT SHEET 1
UND-05-731	STEEL WATERMAIN DETAIL PLAN BUCKLE ST WEST - SETOUT SHEET 2
UND-05-732	STEEL WATERMAIN DETAIL PLAN BUCKLE ST WEST - SETOUT SHEET 3
UND-05-733	STEEL WATERMAIN GENERAL ARRANGEMENT - SHEET 1
UND-05-734	STEEL WATERMAIN GENERAL ARRANGEMENT - SHEET 2
UND-05-735	STEEL WATERMAIN GENERAL ARRANGEMENT - SHEET 3
UND-05-736	STEEL WATERMAIN LONG SECTION - SHEET 1
UND-05-737	STEEL WATERMAIN LONG SECTION - SHEET 2
UND-05-738	457 / 200 WATERMAINS TORY 457 LONG SECTION
UND-05-739	STEEL WATERMAIN 457 OD WATERMAIN DETAILS AT TARANAKI ST
UND-05-740	STEEL WATERMAIN AIR VALVE DETAILS
UND-05-741	STEEL WATERMAIN 914 OD WATERMAIN DETAILS
UND-05-742	457 / 200 WATERMAINS TORY 475 OD WATERMAIN DETAILS
UND-05-743	STEEL WATERMAIN SCOUR VALVE
UND-05-744	STEEL WATERMAIN CONNECTION TO 375 DI
UND-05-746	STEEL WATERMAIN WELDING DETAILS SHEET 1
UND-05-747	STEEL WATERMAIN WELDING DETAILS SHEET 2
UND-05-748	457 / 200 WATERMAINS TORY 200 DI WATERMAIN DETAILS
UND-05-749	457 / 200 WATERMAINS TORY AIR VALVE DETAILS
UND-05-750	THRUST BLOCKS DETAILS - SHEET 1
UND-05-751	200mm Ø WATERMAIN STANDARD THRUST BLOCKS DETAILS - SHEET 2
UND-05-752	200mm Ø WATERMAIN DESIGN THRUST BLOCKS DETAILS -SHEET 3
UND-05-753	200mm Ø WATERMAIN STANDARD THRUST BLOCKS DETAILS - SHEET 3
UND-05-754	200mm Ø WATERMAIN SECTION 3 THRUST PILE TYPES 1 & 2
UND-05-756	100 PE APARTMENTS PROPERTY CONNECTION - SECTION DETAILS
UND-05-757	450 Ø DECOMMISSION - TARANAKI STREET - THRUST BLOCK DETAILS
UND-05-758	375 DI WATERMAIN - THRUST BLOCK DETAILS SHEET 1
UND-05-759	375 DI WATERMAIN - THRUST BLOCK DETAILS SHEET 2
UND-05-761	200MM WATER MAIN DETAIL PLAN SECTION 2 - SHEET 2
UND-05-763	200mm Ø WATER MAIN DETAIL PLAN SECTION 4
UND-05-764	200mm Ø WATER MAIN SUSSEX STREET - GENERAL ARRANGEMENT
UND-05-765	375 DI WATERMAIN GENERAL ARRANGEMENT
UND-05-766	457 / 200 WATERMAINS TORY GENERAL ARRANGEMENT
UND-05-767	457 / 200 WATERMAINS TORY 200 DI UNDERPASS CROSSING DETAILS

UND-05-768	UNDERPASS HYDRANT FEEDER MAIN - WEST GENERAL ARRANGEMENT
UND-05-769	UNDERPASS HYDRANT FEEDER MAIN - EAST GENERAL ARRANGEMENT
UND-05-770	MASSEY FIRE CONNECTION DETAILS SHEET 1
UND-05-771	MASSEY FIRE CONNECTION DETAILS SHEET 2
UND-05-772	MASSEY DOMESTIC CONNECTION SHEET 1
UND-05-773	MASSEY DOMESTIC CONNECTION SHEET 2
UND-05-775	EXISTING WATER SUPPLY DECOMMISSIONING TORY STREET 450 CI PLAN AND DETAILS
UND-05-776	EXISTING WATER SUPPLY DECOMMISSIONING TORY STREET 450 CI DETAILS
UND-05-777	200mm Ø WATER MAIN DETAILS SECTION 4
UND-05-778	EXISTING WATER SUPPLY DECOMMISSIONING TORY STREET 180 PE PLAN AND DETAILS
UND-05-779	508 OD STEEL MAIN 45 DEGREE BEND AT TORY ST DETAIL
UND-05-780	200 MM Ø WATER MAIN DETAILS SHEET 1
UND-05-781	200 MM Ø WATER MAIN DETAILS SHEET 2
UND-05-782	375 DI WATERMAIN AIR VALVE DETAILS
UND-05-783	376 DI WATERMAIN SCOUR VALVE
UND-05-784	375 DI WATERMAIN PILED THRUST BLOCK 22.5 DEG BEND
UND-05-787	150 Ø WATERMAIN TASMAN LINK LONG SECTION
UND-05-788	150 Ø WATERMAIN TASMAN LINK GENERAL ARRANGEMENT AND DETAILS
UND-05-789	UNDERPASS HYDRANT MAINS DETAILS - SHEET 1
UND-05-790	457 / 200 WATERMAINS TORY 200 LONG SECTION
UND-05-791	UNDERPASS HYDRANT MAIN (W1) - WEST LONG SECTION
UND-05-792	UNDERPASS HYDRANT MAIN (W2) - WEST LONG SECTION
UND-05-793	UNDERPASS HYDRANT MAINS DETAILS - SHEET 2
UND-05-794	457 / 200 WATERMAINS TORY 200 DI DETAILS
UND-05-795	UNDERPASS HYDRANT MAIN (E1) - EAST LONG SECTION
UND-05-796	UNDERPASS HYDRANT MAIN (E2) - EAST LONG SECTION
UND-05-797	457 / 200 WATERMAINS TORY CROSS SECTIONS SHEET 1
UND-05-798	457 / 200 WATERMAINS TORY CROSS SECTIONS SHEET 2
UND-05-799	457 / 200 WATERMAINS TORY CROSS SECTIONS SHEET 3
UND-05-806	ANCILLARY BUILDING INTERIM DUCT DETAILS
UND-05-807	ANCILLARY BUILDING SECTIONS SHEET 1
UND-05-808	ANCILLARY BUILDING SECTIONS SHEET 2
UND-05-821	STAGE 2 - COMBINED SERVICES PLAN
UND-06-106	TARANAKI STREET/UNDERPASS LAYOUT PLAN - SHEET 1
UND-06-107	UNDERPASS CENTRAL / EAST LAYOUT PLAN
UND-06-110	TARANAKI STREET/UNDERPASS LONG SECTION SHEET
UND-06-111	UNDERPASS CENTRAL / EAST LONG SECTION SHEET
UND-06-115	ANCILLARY BUILDING LAYOUT PLAN
UND-06-130	TARANAKI STREET/UNDERPASS DETAILS - STORMWATER SHEET 1
UND-06-131	TARANAKI STREET/UNDERPASS DETAILS - STORMWATER SHEET 2

UND-06-132	UNDERPASS CENTRAL / EAST DETAILS - STORMWATER
UND-06-133	UNDERPASS CENTRAL / EAST UNDERPASS LOW POINT DETAILS
UND-06-200	DIRECTIONAL DRILL LAYOUT PLAN SHEET 1 OF 2
UND-06-210	DIRECTIONAL DRILL LONG SECTION
UND-06-230	DIRECTIONAL DRILL DETAILS - STROMWATER MAINHOLE 200/1-1
UND-06-300	CAMBRIDGE TERRACE - LAYOUT PLAN EXISTING GROUND CONDITIONS
UND-06-301	CAMBRIDGE TERRACE - LAYOUT PLAN FINISHED GROUND CONDITIONS
UND-06-310	CAMBRIDGE TERRACE - LONGSECTION
UND-06-330	CAMBRIDGE TERRACE - CONNECTION INTO EXISTING S.W. SYSTEM
UND-06-331	CAMBRIDGE TERRACE - OVERFLOW BYPASS CHAMBER AND FILTER
UND-06-332	CAMBRIDGE TERRACE - VALVE CHAMBER 300/1-3
UND-06-401	BUCKLE STREET WEST - PLAN SHEET 1
UND-06-402	BUCKLE STREET WEST - PLAN SHEET 2
UND-06-403	BUCKLE STREET WEST/EAST BUCKLE STREET EAST PLAN - SHEET 1
UND-06-404	BUCKLE STREET WEST/EAST BUCKLE STREET EAST PLAN - SHEET 2
UND-06-405	BUCKLE STREET WEST/EAST BUCKLE STREET EAST PLAN - SHEET 3
UND-06-406	BUCKLE STREET WEST/EAST BUCKLE STREET EAST PLAN - DETAILS
UND-06-410	NEW STORM WATER DESIGN - LONG SECTION BUCKLE STREET (WEST) SHEET 1
UND-06-411	NEW STORM WATER DESIGN - LONG SECTION BUCKLE STREET (WEST) SHEET 2
UND-06-412	BUCKLE STREET WEST/EAST LONG SECTION - SHEET 1
UND-06-413	BUCKLE STREET WEST/EAST LONG SECTION - SHEET 2
UND-06-435	CRECHE STORMWATER CONNECTION PLAN
UND-06-436	CRECHE STORMWATER CONNECTION DETAILS
UND-06-440	MANHOLE SUMP & INSPECTION EYE DETAILS
UND-06-450	CRECHE STORMWATER BASE SLAB LEVELS
UND-07-200	ENABLING WORKS TORY STR/ BUCKLE ST SEWER REALIGNMENT LONG SECTION
UND-07-300	ENABLING WORKS TORY STR/ BUCKLE ST SEWER REALIGNMENT SANITARY SEWER DETAILS 1-3
UND-07-400	BUCKLE STREET WEST PLAN
UND-07-401	BUCKLE STREET WEST LONGSECTION
UND-07-408	SADDLE CONNECTION AND TRENCH DETAILS
UND-07-410	BUCKLE STREET EAST PLAN - SHEET 1
UND-07-411	BUCKLE STREET EAST PLAN - SHEET 2
UND-07-412	BUCKLE STREET CENTRAL/EAST PLAN - SHEET 3
UND-07-420	BUCKLE STREET CENTRAL - EAST LONG SECTION - SHEET 1
UND-07-421	BUCKLE STREET CENTRAL - EAST LONG SECTION - SHEET 2
UND-07-422	BUCKLE STREET CENTRAL - EAST LONG SECTION - SHEET 3
UND-07-450	CRECHE WASTEWATER PLAN
UND-07-451	CRECHE WASTEWATER DETAILS - SHEET 1
UND-07-452	CRECHE WASTEWATER DETAILS

Drawings listed above available upon request.