WIP

Project Number: 3-AWE40

Queen Street Wastewater Diversion: Part 3 Works

August 2023

Assessment of Environmental Effects

wsp

150 YEARS IN AOTEAROA

Contact Details

Alisdair Simpson

WSP
Level 3 The Westhaven
100 Beaumont St
Auckland 1010
+64 9 355 9500
+64 27 896 4988
alisdair.simpson@wsp.com

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Prepared by
Emily Ireland; Renee Hanrahan; Harrison Fernandes-Burnard

Reviewed by
Alisdair Simpson

Approved for release by
Maree Drury

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Abbreviations and Definitions

AC	Auckland Council
AEE	Assessment of Environmental Effects
AT	Auckland Transport
AUP	Auckland Unitary Plan (Operative in Part)
CIA	Cultural Impact Assessment
CNVA	Construction Noise and Vibration Assessment
CNVMP	Construction Noise and Vibration Management Plan
DSI	Detailed Site Investigation
ESCP	Erosion and Sediment Control Plan
HAIL	Hazardous Activities and Industries List
HDD	Horizontal Directional Drilling
NES CS	National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health
mTMB	Micro-Tunnel Boring Machine
PSI	Preliminary Site Investigation
RMA	Resource Management Act
RPS	Regional Policy Statement
TIA	Traffic Impact Assessment
WSL	Watercare Services Limited
WSP	WSP New Zealand Limited

Executive Summary

Watercare Services Limited (Watercare) is undertaking an extensive programme of development and upgrades to improve Auckland wastewater collection network and reduce wastewater overflows to the environment.

This assessment of environmental effects ('AEE') has been prepared to support an application for resource consent to Auckland Council for Watercare to install a new trunk sewer line within the road reserve of Queen Street between the intersections with Mayoral Drive and Victoria Street. This application relates to the following proposed works:

- Installation of approximately 600m of 1200mm diameter trunk sewer line, constructed via a micro tunnel-boring machine ('mTBM');
- Installation of 3x construction shafts at the intersections of Queen Street with Mayoral Drive, Wellesley Street and Victoria Street; and
- Temporary installation of a primary Construction Support Area (CSA) at 36-38 Greys Avenue and 329 Queen Street, along with secondary CSAs at each shaft location.

The land use along Queen Street is a mixture of retail, commercial, hospitality, civic, residential, and represents a highly developed urban environment. For the most part, retail activity is provided at street level with other uses provided above. The buildings along Queen Street are multi-levelled with a mixture of heritage structure and more modern high-rises. Special features of the surrounding environment include a number of heritage-listed buildings, public open space, the piped Horotiu Stream beneath Queen Street and the City Rail Link construction site on Albert Street to west of the site.

Construction for the Project is currently estimated to take up to ten months, with an indicative start date of Q2 2024.

The statutory assessment considers the requirements for the installation and operation of the Project, including all enabling and accessory works. Relevant provisions of the Resource Management Act 1991 (RMA), National Environmental Standards, National Policy Statements and the Auckland Unitary Plan (AUP) have been considered.

Consent is required for the following land use activities (s9):

- **Rule D17.4.1 (A9):** Modifications to features of a scheduled historic heritage place (RD);
- **Rule E26.6.3.1 (A117):** Earthworks from 10m^2 to 2500m^2 and from 5m^3 to 2500m^3 within the Historic Heritage Overlay (RD);
- **Rule E26.6.3.1 (A117):** Earthworks from 10m^2 to 2500m^2 and from 5m^3 to 2500m^3 within the Sites and Places of Significance to Mana Whenua Overlay (D);
- **Rule E26.10.3.1 (A150):** Network utilities and electricity generation facilities not otherwise provided for where the site is identified as a site exception (Horotiu Stream)

Consent is required for the following regional activities (s14):

- **Rule E7.4.1 (A20):** Take and use of groundwater for dewatering (RD);
- **Rule E7.4.1 (A28):** Water permit (s14) – Temporary diversion of groundwater for dewatering (RD); and
- **Rule E14.4.1 (A52):** Medium combustion sources established from 1 May 2014 fuelled by diesel in an internal combustion engine/generator, with a total gross heat release of more than 500kW and not exceeding 10 MW (C);
- **Rule E30.4.1 (A6)**: Discharges of contaminants into air, or into water, or onto or into land not meeting permitted activity standards (C) at the CSA on Greys Avenue

Consent is also required under **Regulation 9** of the National Environmental Standard for assessing and managing contaminants in soil to protect human health (NES-CS) for disturbing soil as a Controlled Activity.

The overall bundled activity status for these consents is **Discretionary**.

The proposal also includes the following permitted activities:

- **Rule E7.4.1 (A27)**: Diversion of groundwater caused by any excavation (including trench) or tunnel
- **Rule E25.4.1 (A1)**: Construction noise and vibration;
- **Rule E26.2.3.1 (A49)**: Underground pipelines and ancillary structures for the conveyance of wastewater (including above ground ancillary structures associated with underground pipelines) in all zones;
- **Rule E26.2.3.1 (A57)**: Ventilation facilities, drop shafts and manholes;

- Rule E26.4.3.1. (A83): Tree trimming or alteration in road and public open spaces that comply with Standard E26.4.5.1 and Standard E26.4.5.3.
- Rule E26.4.3.1. (A87): Works within the protected root zone in road and public open spaces that comply with Standard E26.4.5.2.
- Rule E26.4.1 (A95): Earthworks up to 2500m^2 other than for maintenance, repair, renewal, minor infrastructure upgrading
- Rule E26.4.1 (A96): Earthworks up to 2500m^3 other than for maintenance, repair, renewal, minor infrastructure upgrading
- Rule E26.4.1 (A54): Infrastructure within roads or the Strategic Transport Corridor Zone in the 1 per cent annual exceedance probability (AEP) floodplain and overland flow paths
- Rule E36.4.1 (A28): Storage of goods and material in the 1 per cent annual exceedance probability (AEP) floodplain
- Rule E40.4.1 (A20): Temporary activities associated with building or construction, (including structures and buildings that are accessory activities), for the duration of the project, or up to 24 months, whichever is the lesser
- Rule E31.4.3 (A73) Hazardous facilities that store or use the listed hazardous substances (Toxic Class 6 Sub-class 6.1 C and 6.3-6.9) in the Business City Centre Zone (less than 6t)

An assessment against the relevant permitted standards of these activities is included in Appendix E.

Engagement has taken place prior to and throughout the development of the detailed design. Consulted parties include landowners and occupants within the Project area, local business associations and nearby residents. Engagement with the wider community has been undertaken by way of flier drops and in-person meetings.

Technical assessments have been prepared to understand the extent of any actual or potential effects and are attached as appendices to this application.

Key findings from the technical assessments are:

- Groundwater diversion and settlement effects have been considered from the construction of shafts, trenching works and from micro tunnel boring machine (mTBM) tunnelling, and settlement effects are assessed as being negligible.
- Construction works will have a temporary effect upon the operation of the road network within the City Centre. Temporary lane closures and diversions will be required to accommodate the construction of shafts and surface connections.
- Predicted noise and vibration levels have been assessed against relevant AUP performance standards. The AUP provides a general exclusion for planned works within the road reserve, while noise generated from the Greys Avenue CSA outside of the road reserve will comply with the relevant standards.
- No protected trees are required to be removed to enable the project. Minor trimming to one street tree on Queen Street is required to enable construction, which falls within permitted standards;
- Contaminated land has been identified at two sampling points in the project area.
- No known archaeological sites are present within the proposed area of works. As a precaution, an archaeological authority has been sought from Heritage New Zealand Pouhere Taonga for any unexpected discovery.
- 18 historic heritage places have been identified in the project vicinity; minor earthworks will be required within extent of place for 5 heritage structures.
- The use of a generator to power the mTBM is not expected to generate adverse air quality effects to surrounding properties.

The project works have been designed to avoid, where practicable, adverse environmental effects of the Project. In this regard, construction techniques and mitigation measures are recommended to ensure that potential effects from works are contained and measures to protect identified heritage and amenity values. Proposed mitigation and management measures include:

- Engagement.
- Construction hours will generally be restricted to 7am and 6pm, Monday to Friday and 8am – 6pm on Saturdays. Sunday and night work will only be carried out if deemed necessary by the contractors in special circumstance.
- The construction methodology has been carefully considered to reduce effects on adjacent property owners and occupants, including measures such as acoustic fencing, trenchless construction and construction sequencing to reduce road closures. Additional measures such as monitoring, building surveys and initial seismic assessments, will be undertaken where required.
- Each CSA site will be fitted with asphalt bunds to divert any wet weather flooding that may occur.

- Traffic Mitigation to be confirmed after meeting with AT.
- Protective fencing is to be installed around one Sweet Gum Tree near the project works.
- The generator will be serviced as recommended by the supplier and visually monitored to ensure the discharge of contaminants is minimised as part as practicable.
- Management plans will be provided to Council to certify before works commence, including a Construction Management Plan ('CMP'), Erosion and Sediment Control Plan ('ESCP'), Construction Traffic Management Plan ('CTMP'), a Soil Management Plan ('SMP'), Construction Noise and Vibration Management Plan ('CNVMP'), Groundwater and Settlement Monitoring Contingency Plan ('GSMCP') and Tree Protection Methodology ('TPM').

The overall environmental impact of the Project, with the proposed mitigation strategies in place, is expected to be minor. This includes disruptions to vehicular traffic and public transportation services.. AT has provided written support in accordance with s95E (3) of the RMA, and therefore limited notification of the application is not required. All other effects from the proposal have been assessed as less than minor.

Overall, this assessment finds that the Project is:

- consistent with the relevant objectives and policies of the Auckland Unitary Plan, including the Regional Policy Statement;
- will have positive effects (benefits) at a local level, as it will provide additional capacity and resilience to the capacity of the wastewater network in Auckland City Centre; and
- achieves the purpose of the RMA as it will safeguard the life-supporting capacity surrounding waterbodies, while providing for the social, economic and cultural wellbeing of the community through the provision of significant new infrastructure.

1 Introduction

Watercare Services Limited ('Watercare') is a lifeline utility providing water and wastewater services to a population of 1.7 million people in Auckland. Its services are vital for life, keep people safe and help communities to flourish. More specifically, Watercare is the council-controlled organisation of Auckland Council responsible for municipal water supply and wastewater treatment within Auckland, and the provider of bulk water and wastewater services to Pokeno and Tuakau in the Waikato District.

Watercare are proposing to upgrade the existing wastewater network of the upper (southern) catchment of Auckland City Centre. The current network has insufficient capacity to meet the future needs based on increased development in the area. Shown in Figure 1-1 below, the wider project works have been split into separate parts for the purpose of design, consenting and construction.

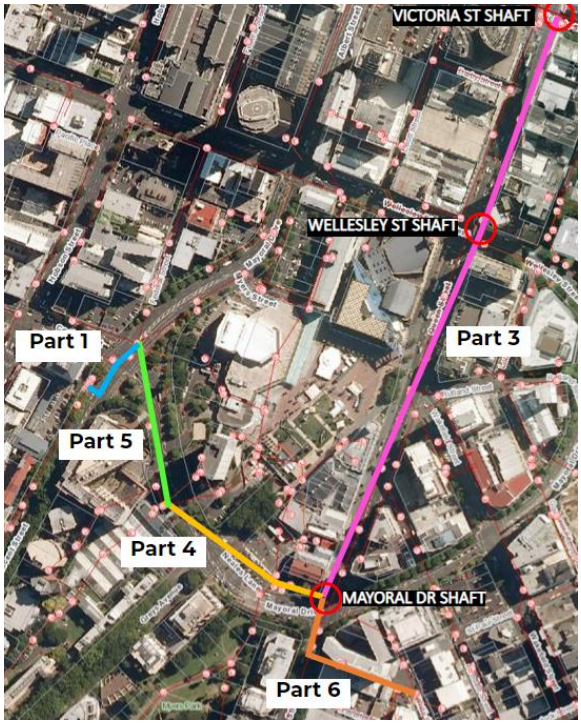


Figure 1-1 Queen Street Project works

This application is only seeking resource consent for the Queen Street Alignment (Part 3) component of the wider upgrade. **Error! Reference source not found.**-2 shows the proposed alignment, located between V ictoria Street and Mayoral Drive.

Figure 1-2: Aerial view of alignment along Queen Street

A new 1200mm wastewater pipe is proposed to be positioned under Queen Street, from the intersection at Mayoral Drive to the intersection at Victoria Street ('the Project'). Manholes for the new wastewater pipe will be provided at Mayoral Drive intersection, Wellesley Street intersection and Victoria Street intersection. During construction, these manhole locations will be used as construction shafts.

1.1 Purpose of this report

The purpose of this report is to assess the actual and potential effects upon the environment generated from the construction and operation of the proposed pipeline. Where adverse effects are likely to be generated, suitable mitigation methods are proposed to avoid adverse effects upon the receiving environment.

1.2 Resource Consent Sought

Based on the proposed works, the following reason(s) for consent have been identified from the Auckland Unitary Plan ('AUP') as being triggered.

- Activity Rule D17.4.1 (A9) provides for modifications to features of a scheduled historic heritage place as a Restricted Discretionary Activity.
- Activity Rule E7.4.1 (A20) Take and use of groundwater for dewatering as a **Restricted Discretionary Activity**;
- Activity Rule E7.4.1 (A28) provides for the diversion of groundwater caused by any excavation, (including trench) or tunnel that does not meet the permitted activity standard as a **Restricted Discretionary Activity.**
- Activity Rule E14.4.1 (A52) provides for medium combustion sources established from 1 May 2014 fuelled by diesel in an internal combustion engine/generator, with a total gross heat release of more than 500kW and not exceeding 10 MW as a **Controlled Activity**.
- Activity Rule E26.6.3.1 (A117) provides for earthworks from 10m^2 to 2500m^2 and from 5m^3 to 2500m^3 within the Sites and Places of Significance to Mana Whenua Overlay as a **Discretionary Activity.**
- Activity Rule E26.6.3.1 (A117) provides for earthworks from 10m^2 to 2500m^2 and from 5m^3 to 2500m^3 within the Historic Heritage Overlay as a Restricted Discretionary Activity.
- Activity Rule E30.4.1 (A6) provides for the discharge of contaminants into the air, water or land that does not meet the permitted activity standards as a **Controlled Activity** during earthworks.
- Activity Rule E26.10.3.1 (A150) Network utilities and electricity generation facilities not otherwise provided for where the site is identified as a site exception (Horotiu Stream) as a **Restricted Discretionary Activity.**

Under the provisions of the National Environmental Standard for assessing and managing contaminants in soil to protect human health ('NES-CS'), consent is also required under Regulation 9 for disturbing soil as a **Controlled Activity**.

Overall, resource consent is required from Auckland Council (AC) as a **Discretionary Activity**.

1.3 Supporting Technical Information

To support this application for resource consent, the following technical assessments and documents have been prepared:

Table 1-1: List of Appendices

Appendix	Name of Document	Corresponding Management Plan
Appendix A	Certificate of Title	
Appendix B	General Arrangement Drawings	
Appendix C	Design and Construction Statement	
Appendix E	Permitted Activities Assessment	
Appendix F	Assessment of Dewatering Effects	
Appendix G	Noise and Vibration Assessment	Construction Noise and Vibration Management Plan (CNVMP)

Appendix H	Detail Site Investigation	Contaminated Land Management Plan
Appendix I	Flood Hazard Assessment	
Appendix J	N/A	Erosion and Sediment Control Plan
Appendix K	Arboriculture Assessment	Tree Protection Methodology
Appendix L	Archaeological Assessment	Archaeological Management Plan
Appendix M	Traffic Impact Assessment	
Appendix N	Built Heritage Assessment	Built Heritage Management Plan
Appendix O	Consultation and Engagement Summary Report	
Appendix P	AUP Maps	
Appendix Q	Statutory Assessment	

2 Applicant and Property Details

Applicant	Watercare Services Limited
Site address	329 Queen Street, Auckland; part of Queen Street; part of Mayoral Drive; part of Wellesley Street; part of Victoria Street
Legal description	Road; Lot 1 DP 84867
Address for service	c/o Ayesha Hussain Resource Consent Planner Strategy and Planning Watercare Services Ltd Postal Address: Private Bag 92 521 Victoria Street West, Auckland 1142 Phone: 021 234 909 Email: Ayesha.hussain@water.co.nz

3 Existing Environment

The following provides a description of the existing environment applicable to the application within which the project will be constructed and operated.

3.1 Location and Physical Environment

The project is located within Auckland City Centre, on a section of Queen Street, between Victoria Street and Mayoral Drive. The project works will also temporarily occupy the property at 329 Queen Street and 36-38 Greys Avenue, currently a surface car park as a Construction Support Area ('CSA'), with vehicle access available from Greys Avenue.

The land use along Queen Street is a mixture of retail, commercial, hospitality, civic, residential, and represents a highly developed urban environment. For the most part, retail activity is provided at street level with other uses provided above. The buildings along Queen Street are multi-levelled with a mixture of heritage structures and more modern high-rises. The project area slopes down from south to north, following the alignment of the Queen Street Valley and piped Horotiu Stream.

Figure 3-1 shows the project area (yellow), however the physical footprint will be around intersections.

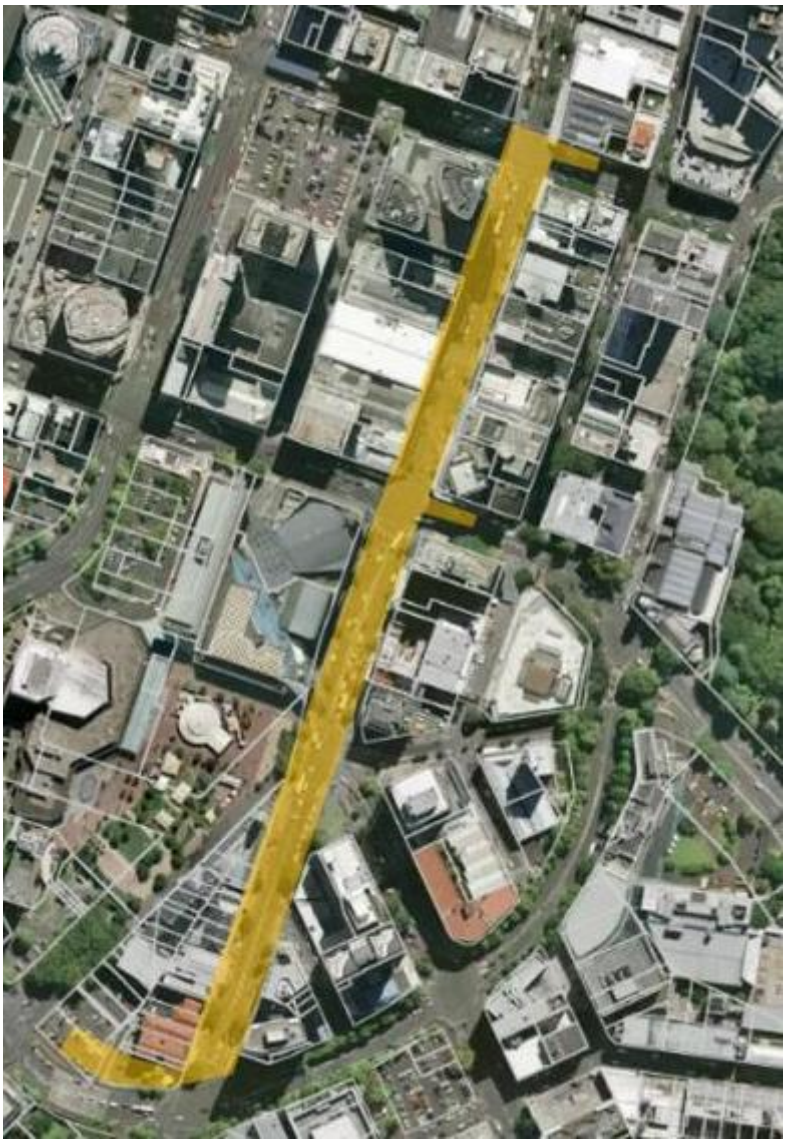


Figure 3-1: Project Area

3.2 Archaeology and Built Heritage

As mentioned within the Built Heritage Assessment (**Appendix N**), Queen Street is one of the most historically significant streets in Auckland. When the city was established by early European settlers in the 1840s, Queen Street was among one of the first established thoroughfares and commercial hubs. As a result of many destructive fires during the mid-1800s throughout nearby streets, the late 19th and early 20th centuries saw many imposing buildings built from more durable materials on Queen Street. These include the Smith & Caughey's building and the Auckland Town Hall which still stand today. As time has progressed, numerous historic buildings have been demolished to provide for larger and modern office buildings. Accordingly, the built fabric of Queen Street is now varied in age, size, architectural style, and scale.

Between Mayoral Drive and Victoria Street a number of built heritage places present. The Built Heritage Assessment has identified 18 items of built heritage along Queen Street. However, only five have AUP extents of place extend beyond the building footprint, into the pavement and/or road reserve, and will therefore be directly impacted by the proposed works.

Table 3-1 provides a list of the built heritage places within the project alignment that are scheduled in the AUP and are therefore considered sensitive receivers.

Table 3-1: Heritage within the project alignment.

Built Heritage Items within Project Alignment AUP Historic Heritage Overlay				
AUP ID	Address/ legal description	AUP Cat	Name of Heritage Place	HNZPT Listing No & Category
02037	210 Queen Street, Lot 2 DP 195649	Category A	Former John Courts Building	No. 2619 Category II
02040	269-285 Queen Street, Lot 1 DP 199399	Category A	Civic Theatre	No. 100 Category I
02041	291-297 Queen Street, Lot 2 DP 199399	Category B	Civic House and Ferguson Building	No. 4585 (CH) and 4573 (FB) Category II
02043	301-317 Queen Street, Allot 57 Sec 29 Auckland CITY etc	Category A	Auckland Town Hall	No. 549 Category I
02045	323-327 Queen Street, Part Allot 6 Sec 29 Auckland CITY etc	Category B	Auckland Sunday School Union Building	No. 2613 Category II

As outlined within the Archaeological Assessment (**Appendix L**), Tāmaki Makaurau (Auckland) has had a long history of Māori settlement prior to the arrival of Europeans. Queen Street was historically a valley where a stream, known as the Waihorotiu, ran and was at least partly navigable by canoe. Māori gardening was recorded in the Queen Street valley as late as c.1838-40, and the large village of Te Reuroa once covered what is now Albert Park. Another settlement named Horotiu was recorded in the vicinity of the Town Hall, and a settlement known as Ngā Wharau a Tako was located on the Swanson Street ridge with a track (Te Tarapounamu) leading down to the Queen Street valley. Throughout history, other settlements and pa were located throughout the Tāmaki Isthmus, notably on Auckland's volcanic cones (Macready et al. 2016, referencing Stone 2001, Simmons 1987, Kelly and Surridge 1990).

In regard to recorded archaeological sites, most of the recorded archaeological sites are beneath existing buildings either side of Queen Street and have either been destroyed during development or have been recorded on the basis of historical research, with their surviving extents unknown. The only recorded archaeological sites in close proximity to the Project Area with the potential for surviving archaeological remains are:

- R11/2017: European midden in Myers Park near the underpass, but likely to continue within the Greys Avenue CSA.

- R11/1936: the site of a number of 19th century businesses at 36-38 Greys Avenue, in the Greys Avenue CSA. The businesses included a harness maker, carpenter, government clerk, compositor, plumber, gasfitter and shipwright. The information is based on historical research and the extent of any surviving subsurface remains is not known.

These recorded sites that are in close proximity to the project area are shown on the figure below:

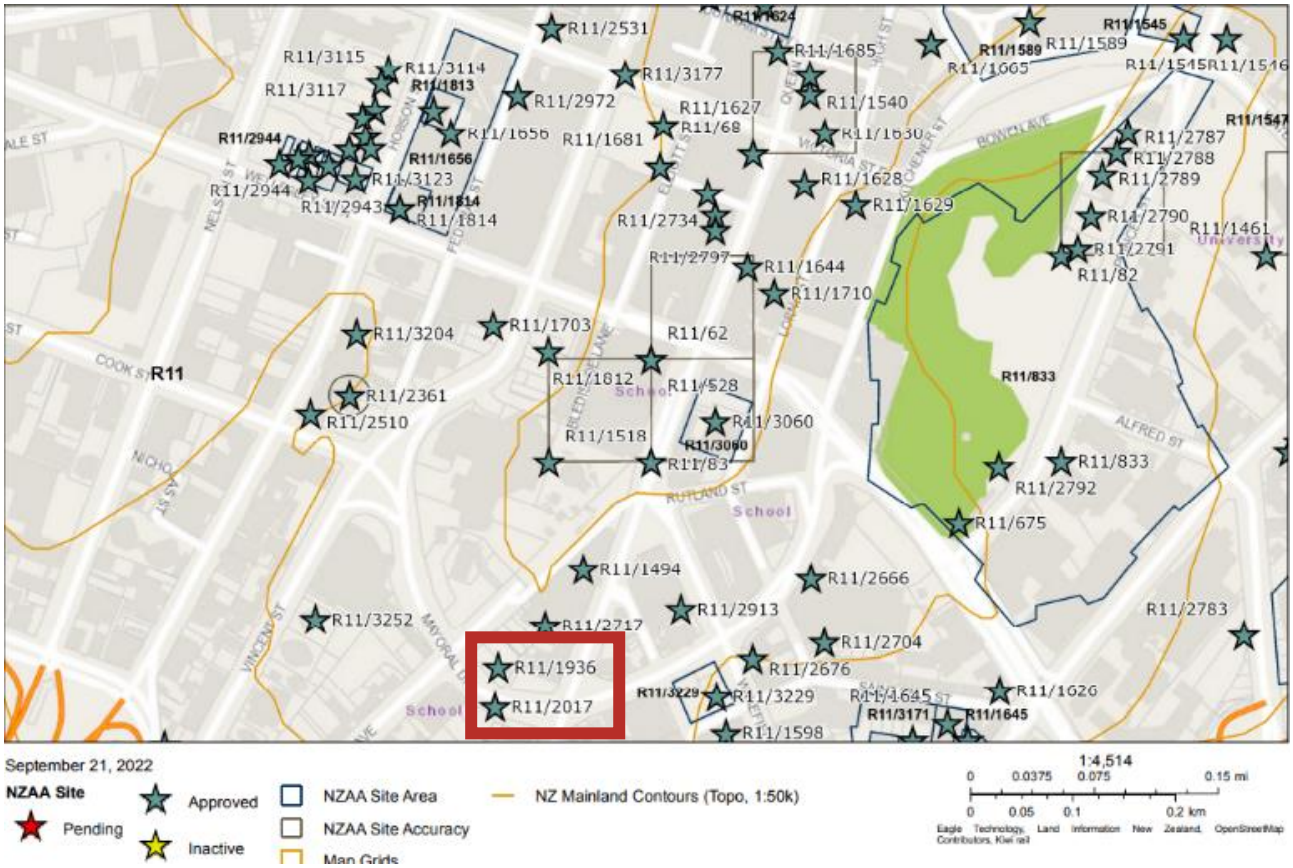


Figure 3-2: Previously recorded archaeological sites in proximity to the Project Area (source: NZAA ArchSite 2023).

No archaeological investigations of site R11/1936 in the Greys Avenue carpark, which is the historically recorded site of 19th century businesses, have been carried out. However, some geophysical testing using Infrared and Ground Penetrating Radar, followed by pothole testing, was carried out for Auckland Council in 2019 to identify subsurface voids beneath the carpark (Eggleton 2019). Potholes within the recorded location of R11/1936 adjacent to Greys Avenue found a build-up of fill consisting of brick and concrete demolition rubble. It is possible that pre-1900 remains have survived beneath the rubble and further downslope beneath the basecourse of the carpark (Archaeological Assessment, Clough, 2023).

Furthermore, over the past 30 or so years several archaeological investigations have been carried out in the City Centre which have demonstrated the potential for the survival of archaeological remains beneath buildings and city streets. Most recently, the City Rail Link's ('CRL') Te Waihorotiu Station (formally Aotea Station) which have exposed early building foundations, wells and infrastructure remnants (Low et al. 2021; Clough-Macready et al. 2022, from the Archaeological Assessment, Clough, 2023).

3.3 Transport Environment

The section of Queen Street within the project area, attracts regional, national, and international activity, and is a highly significant part of the strategic network with a high volume of street users. Over the years, Queen Street has been subject to layout changes with a reduction in the number of general traffic lanes provided and footpaths being extended. The Queen Street Valley precinct has a strong pedestrian focus and emphasis on public transport provision.

According to the City Centre Masterplan 2020, an Essential Vehicles Area (EVA) is set up on Queen Street between Wellesley Street and Wakefield Street, which allows public transport and good vehicles access

only. This forms the first stage of an eventual 'zero-emissions area' to be constructed along the Queen Street Valley.

As shown below, the area of road highlighted in red is currently a construction area for the CRL Project and is closed to general traffic. This includes parts of Victoria Street, Albert Street and Mayoral Drive. At present, entrances to Te Waihorotiu Station (formerly Aotea Station) are being constructed on Victoria Street and Wellesley Street as part of CRL Project. Furthermore, Victoria Street, Wellesley Street West, Mayoral Drive, and Albert Street are currently subject to temporary road alterations associated with the traffic management for the construction of CRL and the Te Waihorotiu Station located at the corner of Wellesley Street West and Albert Street.

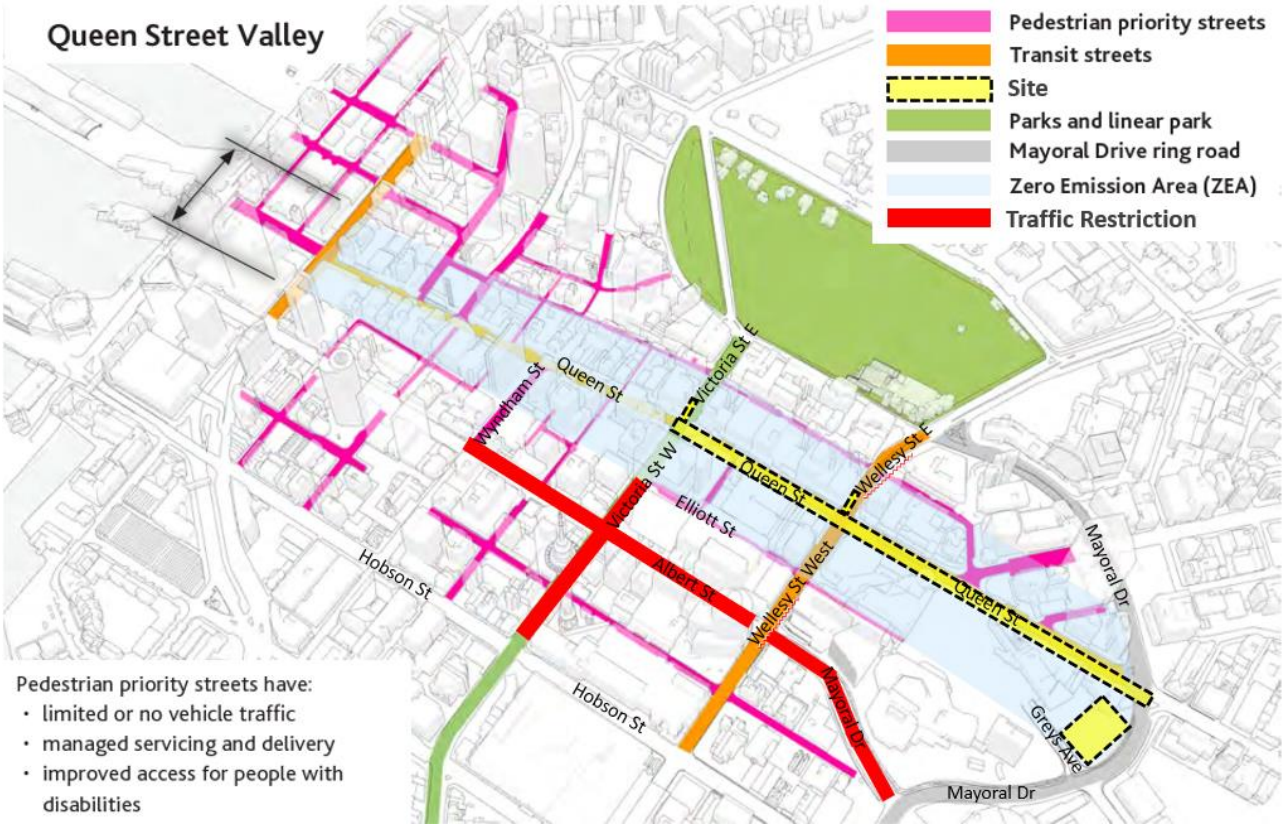


Figure 3-3: Queen Street Valley (Source: Auckland Council)

Further details on the surrounding transport network are provided within the Traffic Impact Assessment ('TIA') (**Appendix M**).

3.4 Protected Trees

A single protected 'Sweet Gum' tree is located within the road reserve of Queen Street a short distance from the proposed shaft at the intersection of Queen Street and Mayoral Drive. This tree is described within the Arboriculture Assessment, attached as **Appendix K**. Note that Auckland Council's aerial imagery currently shows another tree at a similar location to this shaft, however it is understood that this tree was removed at some point between December 2020 and April 2021[1] for unknown reasons.

A number of protected Tulip Trees within the road reserve of Mayoral Drive have been scheduled in the 'Notable Tree' overlay of the AUP, however none of these trees are within the project area. .

3.5 Hydrology and Stormwater Environment

The Project is located within the upper Waitemata Harbour catchment of the City Centre. The City Centre area is heavily built-up and virtually fully impervious, with extremely limited absorption capacity for rainwater. This area is served by an extensive stormwater network managed by the 'Healthy Waters'

[1] As shown on Google Streetview imagery

department that drains into the Waitematā Harbour. There are no natural watercourses within or downstream of the Project area.

Queen Street forms a distinct gully in the terrain, with 1% AEP overland flow paths (OLFPs) tracking along each side, and in some locations wide enough to meet in the middle of the road reserve on Queen Street.

The north area of the Victoria Steet construction compound is bisected by a 3.9ha OLFP and eventually joins a downstream OLFP of 21.2ha running north along Queen Street. A major overland flow path servicing approximately 7.9ha of upper catchment area bisects the Wellesley Street construction compound flowing westbound, eventually joining the Queen Street OLFP

Another major OLFP servicing approximately 11.1ha flows northbound through the Mayoral Drive construction compound. The Greys Ave CSA has a 10.6ha OLFP running through the middle of the site northbound.

Auckland Council's GeoMaps suggest the northern extent for all three construction compounds and the central part of the Greys Ave construction support area are within 1% AEP flood plains.

An assessment of the flooding hazards affecting the Project site is attached as **Appendix I**.

Figure 3-4 shows the flooding and hydrology information from Auckland Council GeoMaps. Based on GeoMaps, the project area is subject to overland flowpaths, flood prone areas and flood plains.

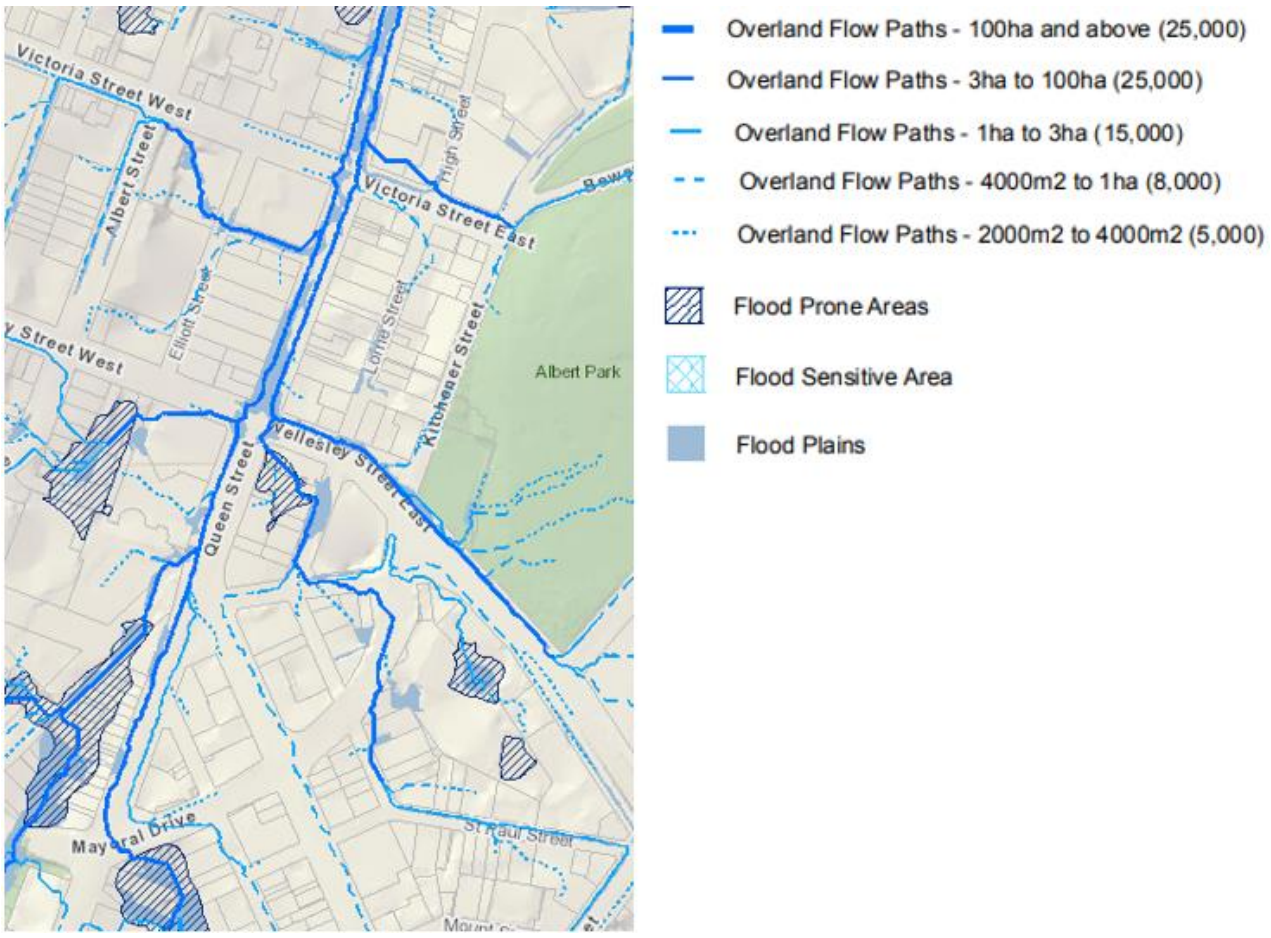


Figure 3-4: Flooding and Hydrology information

3.6 Geotechnical Environment

The geotechnical environment is described in **Appendix F** – Assessment of Dewatering Effects and in **Appendix Fa** – Geotechnical Investigation Report, and is summarised below.

3.6.1 Regional Geology

The published geological map information (GNS, 1992) indicates the central and south-western extent of the project alignment is underlain by the East Coast Bays Formation ('ECBF'), Waitematā Group (Mwe), comprising alternating sandstone and mudstone with variable volcanic content and interbedded volcaniclastic grits. This is typically considered the basement rock in the area.

The Puketoka Formation, Tauranga Group alluvium (^up) outcrops to the north and northwest of the site and comprises pumiceous mud, sand and gravel with muddy peat and lignite. Lithic tuff, unconsolidated ash and lapilli deposits of the Auckland Volcanic Field (AVF), Kerikeri Volcanic Group (Qva) outcrop along the north-eastern extent of the proposed wastewater pipe alignment

There are no faults mapped in the area.

3.6.2 Local Geology

Existing geological logs confirm that the area is mostly underlain by ECBF residual soils grading into competent and fractured ECBF. The logs also confirm the lithological change to the north indicated on the regional geology map, with volcanic tuff (Kerikeri Volcanic Group, Qva) in the shallow subsurface near the Wellesley Street Shaft.

Geotechnical investigations were undertaken between August 2022 and February 2023. During the geotechnical investigations nine bores were machine drilled and a further 6 shallow piezometers were wash-drilled and installed next to the deeper piezometers.

The geotechnical logs for the site-specific bores confirm the published regional geological mapping, which indicates that the bedrock formation along the formation towards the south is typically ECBF mudstone and sandstone. The lithology changes towards the northeast, with an increase in volcanics, and PZ09 intersects volcanic soils underlain by basalt.

3.6.3 Hydrogeology (Groundwater)

A dual groundwater system occurs in the City Centre, with a shallow perched system in the residual soils and a deeper, regional groundwater system within the basement ECBF. This has been noted in several of the geotechnical studies conducted for various construction projects, including the CRL project.

The monitored groundwater levels show some variation, with some erratic variations observed, in particular for shallow piezometer PZ07-S. This piezometer is essentially dry, and these are considered erroneous measurements.

The monitoring data shows consistently high groundwater levels for the period January to February. The monitoring period coincided with unseasonably high rainfall for the Auckland Region, and it is expected that groundwater levels would have been elevated as a result, similar to high seasonal levels observed. The groundwater levels for piezometer PZ07 shows groundwater level highs in December (which is considered the seasonal high after the winter rainfall season) and similar groundwater levels in January/February. This correlates well with the interpretation of longer-term monitoring on other projects in Auckland and the existing CRL monitoring sites, which shows that the highest groundwater levels are typically recorded September to December. This is thus considered to present a conservative case for high groundwater levels.

The high groundwater levels at each piezometer were used as the representative high groundwater levels and are as follows at the three shaft sites:

- Groundwater level at Victoria shaft: 6.50 m RL
- Groundwater level at Wellesley shaft: 12.04 m RL
- Groundwater level at Mayoral shaft: 24.80 m RL

3.7 Existing Utility Services

At this stage, only detailed surveys are available for the existing utility services at the Victoria Street/Queen Street intersection. However, a high-level summary of the known utilities within the Queen Street corridor is provided below in Table 3-2.

Table 3-2: Known Utilities within the Project Area

Utility	Operator	Comments
Water	Watercare	The watermain runs along Queen St from North to South, from Victoria St down to Mayoral Drive. It starts with a DN250 CI and turns to a DN300 CI (at Rutland St) and CLS pipe by the time it reaches Mayoral Drive, supplying all adjacent residential and business properties. Pipes range from 60-110 years old.
Wastewater	Watercare	The gravity wastewater main runs along Queen St from Mayoral Drive all the way down and connecting into the DN2300 Orakei Main Sewer (OMS) on Victoria St. The DN450 VC pipe starts at Mayoral Drive (crossing the suspended DN675 concrete sewer pipe), and transitions to a DN375 VC, DN300 conc before connecting into the DN2300 conc OMS. Lateral connections are picked up from adjacent residential and commercial buildings. Pipes are up to 110 years old
Stormwater	Auckland Council – Healthy Waters	The stormwater gravity main runs along Queen St from Mayoral Drive to Victoria St. The are a number of different sizes and materials of pipe starting with DN600 conc, and connecting to DN225/300450/750/1050/1200 conc. There is also a DN1027 brick chamber SW main connecting to Queen St from Wellesley St West. Along this alignment there are multiple drain connections from various adjacent residential and commercial buildings. The brick chamber is 110 years old, while the concrete pipes are 90 years old.
Power (Local)	Vector	There are approximately 6x LV Vector power cables at the Victoria/Queen St intersection following potholing – these are encased inside DN100 and DN150 ducts. At the Wellesley/Queen St intersection, there are 2x DN90mm HV (11kV) that runs East West along Northern side of Wellesley St, and 2x DN100mm LV cables running East West along Northern side of Wellesley St and turning North. On Mayoral Drive there are 3x DN64mm LV 400 V cables near the Queen St/Mayoral Dr intersection.
Power (Transmission)	Transpower	The Transpower transmission line runs all the way along Mayoral Drive and continues south to Upper Queen St. The design voltage is 220kV

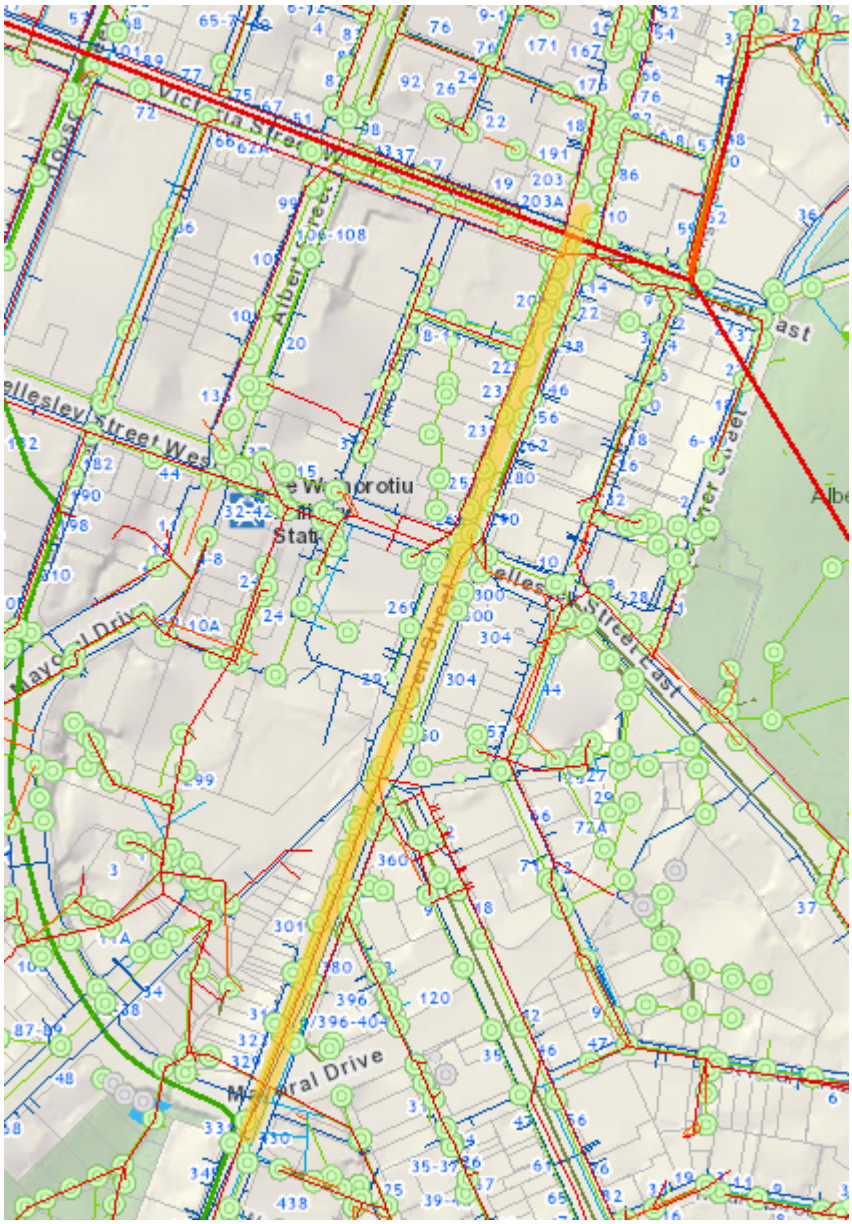


Figure 3-5: Existing Utilities Map (Source: Geomaps, AC)

4 Planning Provisions

Table 4-1 notes the AUP provisions that apply to the Project area.

Table 4-1 AUP Provisions

Zone	• Road • Business – City Centre Zone
Precinct	• Arts, Civic and Entertainment Precinct
Overlay	Natural Heritage: • Regionally Significant Volcanic Viewshafts and Height Sensitive Areas Overlay [rcp/dp] – E10, Mount Eden, viewshaft Mana Whenua: Sites and Places of Significance to Mana Whenua Overlay [rcp/dp]: • 084 – Horotiu Stream, 1 Historic Heritage and Special Character – Historic Heritage Overlay Extent of Place [rcp/dp]: • 2045 – Auckland Sunday School Union Building • 2729 – W. A. Thompson and Company Building (former) • 2728 – Citizens Advice Bureau (former) • 2043 – Auckland Town Hall • 2040 – Civic Theatre • 2041 – Civic House and Fergusson Building • 2037 – Johns Court's Building (former)
Controls	• Vehicle Access Restriction Control – General • Macroinvertebrate Community Index – Urban • Arterial Road
Designations	• Designation 8831 – Penrose to Hobson Street Tunnel and Penrose Portal, Vector Ltd • Designation 1567 – Road Widening (Neales Lane), Auckland Transport
Hydrology and Flooding	Overland Flow Paths Flood Prone Areas Flood Plains
Treaty Settlement – Statutory Acknowledgement	None
AUP Modifications	Plan Change 78 – intensification – proposed (18/08/2022)

A copy of the relevant AUP planning maps is provided in **Appendix P** with relevant extracts provided below.

4.1 AUP Zoning

Figure 4-14-1 shows the AUP zoning provisions for the wider area surrounding the project. Project works will be undertaken within the Road Zone (white) and with the Business – City Centre Zone.

Figure 4-1 AUP Zoning

4.2 AUP Precincts

Figure 4-2 identifies the precincts from the AUP. The project works will be located within Queen Street Valley Precinct and the Arts, Civic and Entertainment Precinct. Based on the nature of the works proposed, the provisions of the precincts are not applicable.

Figure 4-2 AUP Precincts

4.3 AUP Overlays

A number of AUP overlays are applicable within the Project area. These are detailed below.

4.3.1 Natural Heritage Overlay

Figure 4-3 provides the natural heritage overlay that apply to the area. Based on information, it is considered that natural heritage is not a matter for consideration as part of this application.

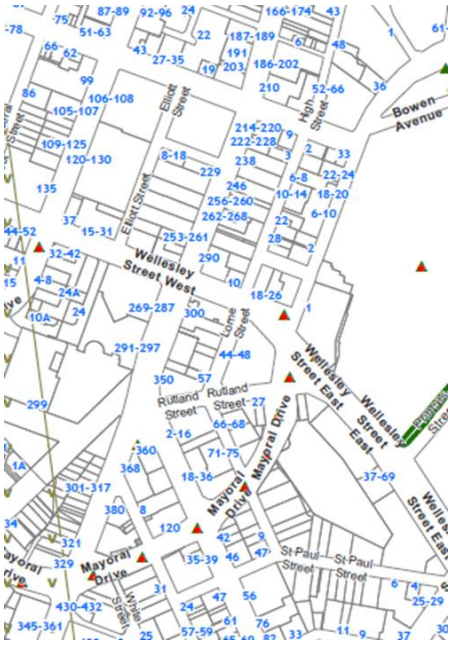


Figure 4-3 AUP Natural Heritage Overlay

4.3.2 Mana Whenua Overlay

The Sites and Places of Significance to Mana Whenua ('SPSMW') Overlay of the AUP identifies areas that are of significance to Mana Whenua. As shown in Figure 4-4, part of the project area is subject to the overlay (ID 84 – Horotiu Stream) and as such is a consideration for this application.

Figure 4-4 AUP Mana Whenua Overlay

4.3.3 Historic Heritage Overlay

Figure 4-5 identifies the Extent of Place for Historic Heritage. Protected historic heritage places considered relevant to the application are identified in Section 3.2 of this report. A full list of heritage places is provided in Appendix N – Built Heritage Assessment.

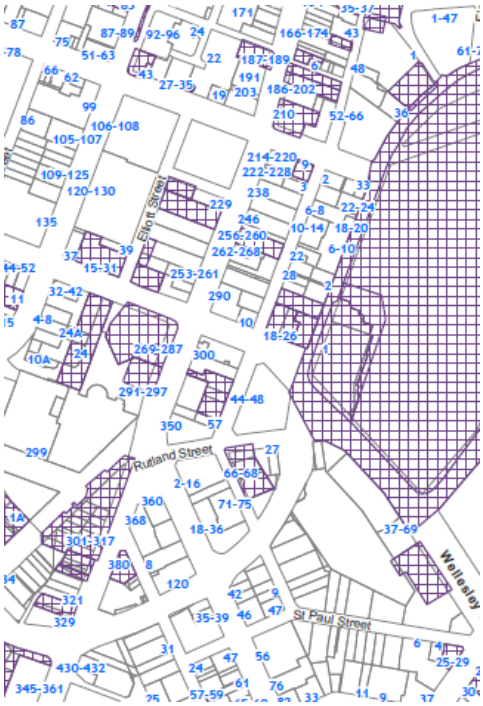


Figure 4-5 AUP Historic Heritage - Extent of Place Overlay

4.4 AUP Controls

Figure 4-6 shows the AUP controls that apply to the area. Due to the nature of the project works, none of the control are a relevant consideration to this application.

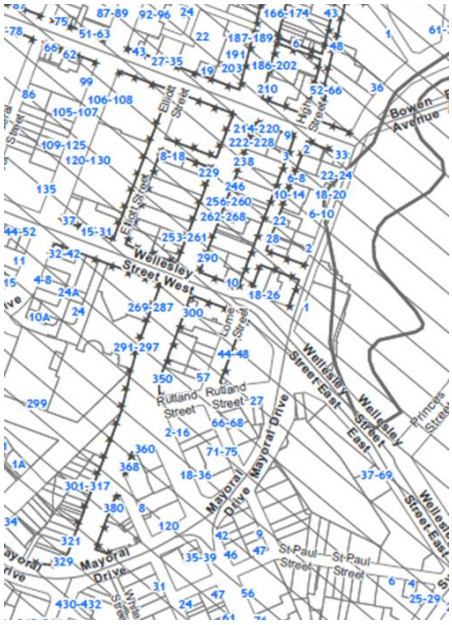


Figure 4-6 AUP Controls

4.5 AUP Designations

Figure 4-7 shows designations within the AUP in the area surrounding the project. The only designation of relevance to this application is the AT designation for a carpark (AUP ID 1567), which is proposed to be used to accommodate part of the CSA at Greys Avenue.

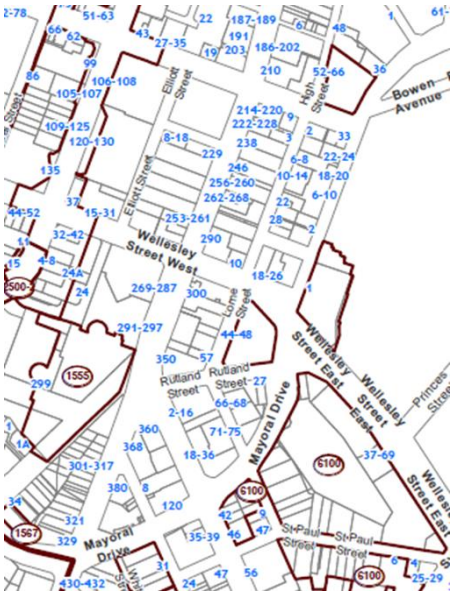


Figure 4-7 AUP Designations

5 Proposal and Activities

5.1 Project Background

Watercare are proposing to upgrade the wastewater network in the upper section of Auckland City Centre to accommodate the substantial and sustained urban growth from residential, municipal and commercial development.

The existing wastewater network in this part of City Centre is running at its maximum capacity, where the system currently overflows into the stormwater network at peak times. There is no spare capacity available in the wastewater network to accommodate ongoing and future development.

In addition to providing a new wastewater pipeline along Queen Street, another part of the project works will require a wastewater pipeline along Mayoral Drive, between Queen Street and Vincent Street. Resource consent for the Mayoral Drive alignment will be sought separately.

5.2 Project Overview

The project works comprises of two primary construction activities, being temporary shaft construction and tunnelling works via a micro Tunnel-Boring Machine ('mTBM'), along with supporting works (such as tie-ins to the existing wastewater network). These works will result in the installation of a 600m length of 1200mm diameter pipe along Queen Street, with an invert depth range of 14.3m at the Mayoral Drive shaft to 6.9m at the Victoria Street shaft. To support this application, a Design and Construction Statement ('DCS') has been developed which provides detailed information on the proposed methodology, see **Appendix C**.

Drawings of the proposed works are provided in **Appendix B**. An overview of the proposed works, including the construction methodology, is summarised in this section of the resource consent application.

5.3 Construction Duration

Construction works are to commence from early/mid 2024 to late 2024/ early 2025 (approximately 8 months). Table 5-15-1 shows the proposed breakdown of construction phasing at a high-level.

Table 5-1 Construction duration and phasing

Queen Street / Mayoral Drive Shaft	Queen Street/ Wellesley Street Shaft	Queen Street/ Victoria Street Shaft	Tunnelling Activity (including site establishment etc)
2 to 3 months to construct shaft (Q2 to Q3 2024)	2 to 3 months to construct shaft (Q2 to Q3 2024) Queen Street pipe work connections (x3) – 1 month (Q3 2024)	3 to 4 months to construct shaft (Q2 to Q3 2024)	Site Establishment: 2 months (Q2 2024) Tunnelling works: 4 months (Q3 to Q4 2024) Equipment Recovery Less than 1 months (Q4 2024)

Table 5-25-2 notes the proposed construction hours, however in special circumstances works may be required outside of the noted hours.

Table 5-2 Construction hours

Shaft Construction	Monday to Saturday – 0700hrs to 1800hrs Sunday and night work will only be caried out if required by traffic management restrictions or Watercare operational requirements for tie ins/ connections to existing network
Tunnelling works	Monday to Saturday – 0700hrs to 1900hrs (separation plant at Greys Ave will operate until 2000hrs)

5.4 Construction Support Areas (CSAs)

Four Construction Support Areas (CSAs) will be provided as part of the project, which are detailed in Table 5-3. This consists of the primary CSA at Greys Avenue, and the three secondary CSAs at each of the shaft construction sites. Figure 5-1 shows the position of the CSAs across the project area.

Table 5-3 Construction Support Areas

Construction Support Areas		
Name	Location	Additional info
Greys Ave CSA	Occupies land at 38 Greys Avenue and 329 Queen Street	Established from June 2024 to December 2024. Site area of 1255m^2 (approx.) Use/ equipment: • Support tunnelling works • Tunnelling support equipment • Site office • Pipe storage • Spoil removal during tunnelling • Minor surface excavations may be required to provide a level site • Generator for tunnelling activities (800kW) • Generator for office (60kW)
Mayoral Drive CSA	Occupies section of Queen Street, outside 323 Queen Street	Established April 2024 to December 2024. Site area of 720m^2 (approx.) Use/ equipment: • Shaft construction • Tunnel lunch site • Material inputs for tunnelling works • Crane • Short term material storage during tunnelling works • Generator for dewatering (90kW)
Wellesley Street CSA	Occupies section of Wellesley Street outside of 290 Queen Street.	Established April 2024 to December 2024. Site area of 400m^2 (approx.) Use/ equipment: • Shaft construction • Change mTBM cutter head
Victoria Street CSA	Occupies section of Victoria Street outside of 210 Queen Street.	Established April 2024 to December 2024. Site area of 540m^2. Use/ equipment: • Shaft construction • Retrieval of tunnelling equipment • Generator for dewatering (90kW)

Figure 5-1 Location of CSAs

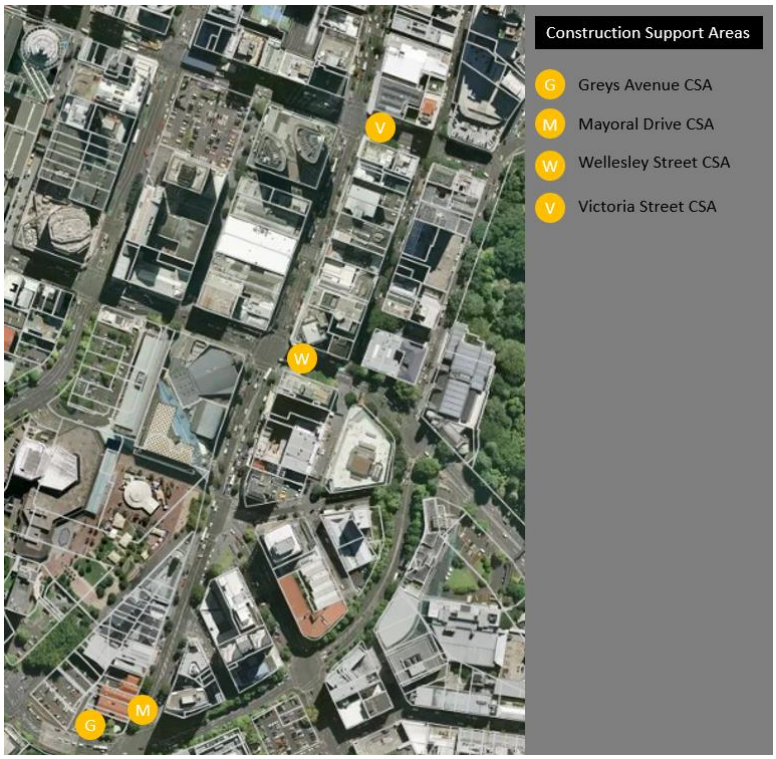


Figure 5-1 Location of CSAs

5.5 Shaft Construction

Three temporary shafts are to be constructed as part of the Project, located at the intersections of Queen Street with Mayoral Drive, Wellesley Street and Victoria Street. Table 5-4 below provides additional information on the proposed construction shafts, including earthworks requirements.

Table 5-4: Shaft details

Location	Internal Dimension		
	Width x length	Depth	Type
Mayoral Drive/ Queen Street	4.5m by 10m	16m	Post and Panel
Wellesley Street/ Queen Street	3.5m (circle)	10m	Secant
Victoria Street/ Queen Street	3m by 7m	7.5m	Post and Panel

Following the completion of tunnelling works, each shaft will be backfilled back and used as a manhole for access to the pipeline.

Additional information on each shaft is provided below.

5.5.1 Mayoral Drive Shaft

The shaft constructed at the intersection of Mayoral Drive and Queen Street will be 4.5m in width and 10m in length, with a total depth of 16m. The process of constructing this shaft is detailed in the Design and Construction Statement (**Appendix C**). A summary of these steps is included in Table 5-5 below.

Table 5-5 Mayoral Drive Shaft Construction

Mayoral Drive		
Stage	Activity	Equipment
Pre-tunnelling works		
1	The shaft extent is saw cut and excavated to remove pavement layers and shallow level obstructions.	• Concrete cutter • 8 to 14t Excavator

2	A piling rig will bore 400 to 600mm diameter holes 2m below the shaft base. If ground conditions require, the bores may be temporarily steel cased.	• Piling rig (GEAZ EX40/ 60)
3	Steel UC posts are lowered into each bore which is then backfilled with sand or pea gravel.	• 14t Excavator
4	The shaft depth is excavated using an excavator as well as workers with hand held tools when the excavator runs out of reach. A crane and skip will be used to remove hand excavated materials. Trucks with sealed bins will remove shaft spoil from the site.	• 5 to 20t Excavator • Hand held power tools • 25t Crane • Skip • 6 or 8 wheeler truck
5	As excavation progresses, timber lagging is installed between UC posts to retain the surrounding ground. Steel waler beams are installed and welded together within the shaft to support the UC posts.	• Timber lagging • Steel waler beams
6	The shaft is dewatered using a submersible pump to take the water to clarifying tanks for treatment. Note: Further detail on the requirements of the dewatering process is provided in Section 6.4.4 of this report.	• Submersible pump • Diesel generator (90kW) • Ventilation fan
Post-tunneling Works		
7	The shaft is backfilled using compacted GAP65 or low strength concrete create a manhole. A crane at road level is used to install precast concrete riser manhole sections.	• 25t crane • Concrete skip • Concrete pump
8	Temporary works are progressively removed as the shaft is backfilled.	• 5 to 20t Excavator
9	The road pavement is re-instated.	• 5 to 20t Excavator • Plate compactor

5.5.2 Wellesley Street Shaft

Wellesley Street		
Stage	Activity	Equipment
Pre-tunnelling works		
1	The shaft extent is saw cut and excavated to remove pavement layers and shallow level obstructions.	• Concrete cutter • 5 to 20t excavator
2	A concrete ring beam is poured and formed. Hydraulic jacks will be fixed to the top of the ring beam, if required by the design of temporary works.	• Hydraulic jack
3	Precast shaft rings will be sunk using a combination of excavator digging and hydraulic jacks. As the depth increases, workers will hand excavate the shaft into a skip lifted by a crane. Trucks with sealed bins will remove shaft spoil from the site.	• 8t Excavator • Hydraulic jacks • Hand held power tools • Skip • 25t Crane • 6 or 8 wheeler trucks
4	An in situ concrete foundation plug is poured using a concrete boom pump or skip.	• Concrete pump or skip.
Post-tunneling works		
5	The shaft is backfilled using compacted GAP65 or low strength concrete to create a manhole.	• 25t crane • Concrete skip

Wellesley Street		
Stage	Activity	Equipment
	A crane at road level is used to install precast concrete riser manhole sections.	• Concrete pump
6	Temporary works are progressively removed as the shaft is backfilled.	• 5 to 20t Excavator
7	The road pavement is re-instated.	• 5 to 20t Excavator • Plate compactor

As shown on the General Arrangement drawings, the footprint of the CSA for this shaft is required to be extended a short distance to the south to allow for piling activities. This is expected to occur for up to two weeks.

5.5.3 Victoria Street Shaft

Victoria Street		
Stage	Activity	Equipment
Pre-tunnelling works		
1	The shaft extent is saw cut and excavated to remove pavement layers and shallow level obstructions.	• Concrete cutter • 5 to 20t excavator
2	A piling rig will bore 400 to 600mm diameter holes 2m below the shaft base. If ground conditions require, the bores may be temporarily steel cased.	• Piling rig (GEAZ EX40/ 60)
3	Steel UC posts are lowered into each bore which is then backfilled with sand or pea gravel.	• 5 to 20t excavator
4	The shaft depth is excavated using an excavator as well as workers with hand held tools when the excavator runs out of reach. A crane and skip will be used to remove hand excavated materials. Trucks with sealed bins will remove shaft spoil from the site.	• 8 to 14t excavator • Hand held power tools • 25t crane • Skip • 6 or 8 wheeler truck
5	As excavation progresses, timber lagging is installed between UC posts to retain the surrounding ground. A minimum of two steel waler beams are installed and welded together within the shaft to support the UC posts.	• Timber lagging • Steel waler beams
6	Solid basalt will be found within this shaft at approximately 5.5m below road level. The basalt layer will be fractured using a stitch core line of holes to nominated lift depth in the basalt, adjacent and parallel to the OMS to provide a relief gap. Rows of holes will be drilled adjacent and parallel to the stitch cored row. Plug and feather wedges or expansive mortar will be used to fracture the basalt until the final excavation depth is achieved.	• Excavator • Rock diamond Drill • Plug and feather wedges • Crane
7	The shaft is dewatered using a submersible pump to take the water to clarifying tanks for treatment. Note: Further detail on the requirements of the dewatering process is provided in Section 6.4.4 of this report.	• Submersible pump • Diesel generator (90kW) • Ventilation fan
Post-tunneling works		
7	Once the mTBM has been extracted, an in situ concrete manhole will be poured and formed within the shaft.	• Concrete skip • 25t crane • Concrete pump

Victoria Street		
Stage	Activity	Equipment
	The shaft is backfilled using compacted GAP65 or low strength concrete to create a manhole. A crane at road level is used to install precast concrete riser manhole sections.	• Concrete truck • Trucks • 5t to 20t excavator • Submersible pump • Diesel generator (90kW) • Ventilation fan
8	Temporary works are progressively removed as the shaft is backfilled.	• 5t to 20t Excavator
9	The road pavement is re-instated.	• 5t to 20t excavator • Plate compactor

As shown on the General Arrangement drawings, the footprint of the CSA for this shaft is required to be extended a short distance to the south to allow for piling activities. This is expected to occur for up to two weeks.

5.5.4 Dewatering

Groundwater will be encountered during excavation of the Victoria Street and Mayoral Drive shafts. As such, ongoing dewatering will be required to allow excavation to continue in dry and stable conditions. Removal of this water will be facilitated by a submersible pump which will transfer water into clarifying tanks for treatment. This treated water will then be discharged into the local wastewater network.

If there is no suitable access available to the local power network, the submersible pump will be powered by a diesel generator. This would run continuously while the shaft is open at Victoria Street and Mayoral Drive. A fan at surface level and ducting into the shaft will provide forced air ventilation.

This continuous dewatering is the only activity planned to take place at night.

5.6 Tunnelling Works

Trenchless construction will be used to construct the 600m length of 1200mm diameter pipe under Queen Street between Mayoral Drive and Victoria Street. The trenchless method proposed to be used is pipe jacking because it is a non-disruptive method for the installation of utility tunnels. The method will balance ground pressures, with surface effects being negligible or nil. It is intended to power the mTMB using electrical mains power, however if this is not feasible then an 800kW diesel generator will be utilised within the Greys Avenue CSA.

Tunneling works on site are expected to take approximately 19 weeks to complete. This timeframe includes site establishment and separation plant removal.

The mTBM will be launched from the Mayoral Drive / Queen Street Shaft with ancillary equipment to support tunnelling works being located within the Greys Avenue CSA, as show in **Error! Reference source not found.**.

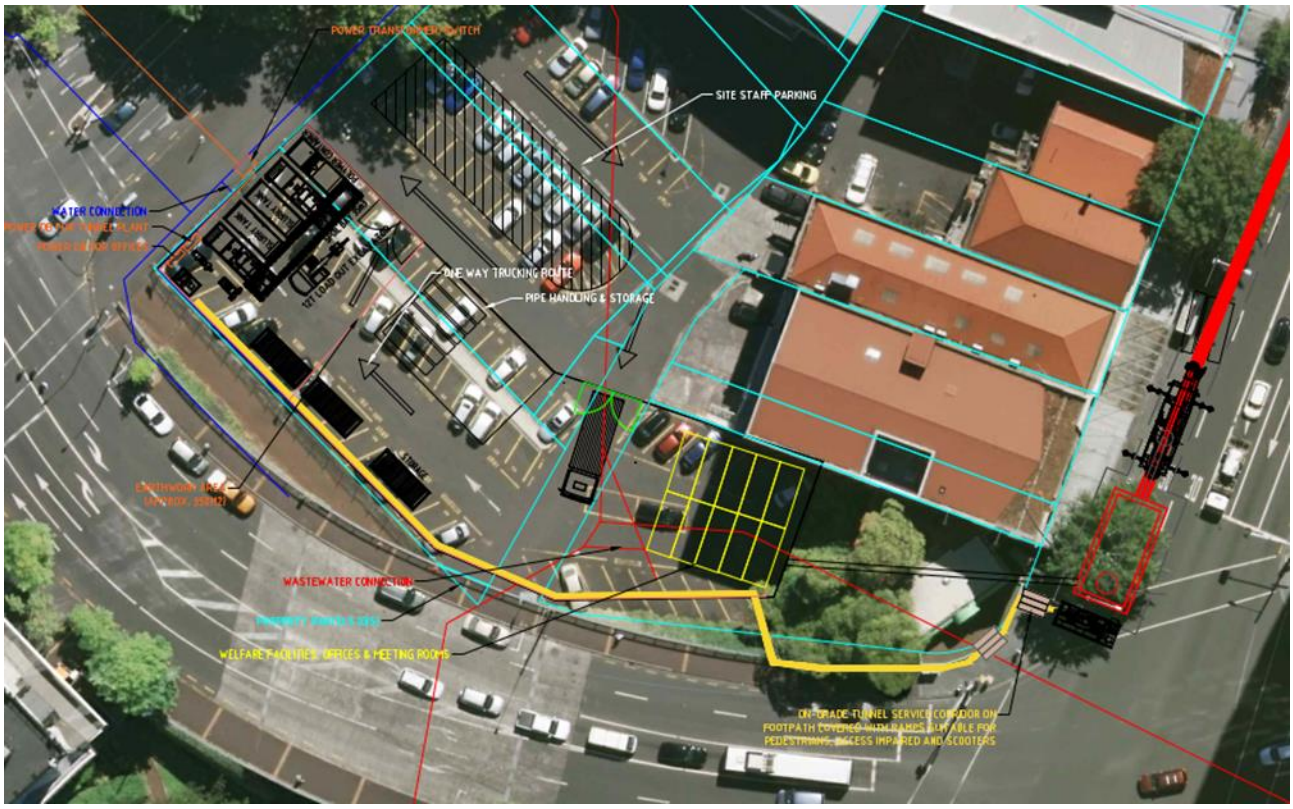


Figure 5-2 Greys Avenue CSA set up during tunnelling works

The equipment contained within the CSAs at Greys Avenue and Mayoral Drive during tunnelling works is noted below.

Table 5-6: Equipment requirements at the CSAs

CSA – Tunnelling Works Equipment and CSA set up	
Greys Avenue CSA	Mayoral Drive CSA
• Site office • Staff welfare facilities • 12t excavator (for removing spoil from site, loading onto trucks) • Separation plant • Slurry tanks • Electrical container • 800kW Generator, unless an electrical mains connection is established • Pumps • Site laydown area/ material storage area • Pipe fit out area	• Tunnelling control cabin • In-shaft jacking equipment • 50t mobile crane • Pipe laydown area

Between the two CSAs will be a 2m wide service corridor, connecting the operations at the two sites together. The services will be laid on the northern footpath of Mayoral Drive and covered with a walkway to maintain pedestrian access between Queen Street and Mayoral Drive.

5.7 Open Cut Pipe Laying for Local Connections

At the Wellesley Street shaft, local wastewater connections will be required. Table 5-7 below details the indicative open cut construction process, although this methodology is subject to change once detailed site surveys (such as potholing) have been completed. The excavations required to create these connections is estimated to 1m in width by 1.5m depth for each pipe.

Table 5-7: Open Cut Construction Methodology

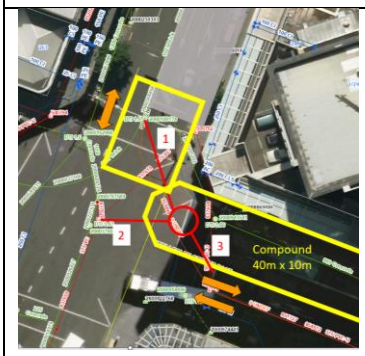
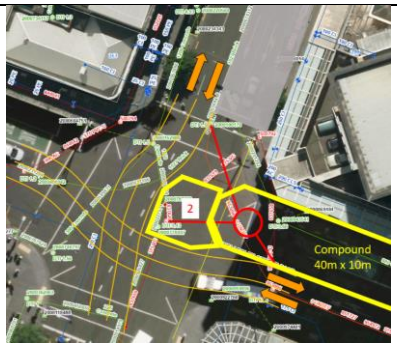
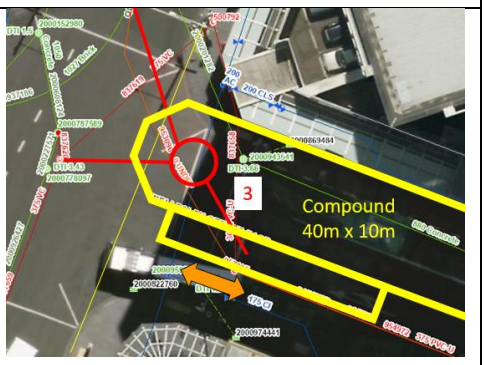
Open Cut Pipe Laying Queen Street/ Wellesley Street		
Stage	Activity	Equipment/ materials
1	• Temporary traffic management set up in accordance with approved Traffic Management Plans (TMPs). • TMPs will be staged, allowing only short sections of pipeline to be constructed at any one time.	• Traffic management equipment
2	• Approximately 20 to 30m of trenching will be open at any one time. Open earthworks would be up to 300m^3. • Depth of trenches are not known, however for any trench deeper than 1.5m, a trench shield will be used.	• Trench shield
3	• Pipe lengths and precast manholes will be delivered to site on flatbed trucks and unloaded within the site using HIAB or excavators.	• Flatbed truck • Excavator
4	• Excavator will be used to trench to the required depth and install trench shields as the excavations advance. • Wider trench boxes will be provided at manhole locations. • Excavated material will be cut to waste as clean, managed or contaminated fill subject on contamination testing results.	• Trench shield • Excavator
5	• If dewatering is required (subject to ground investigation outcome), a two-inch submersible pump and hole will be used to remove water from excavations. • Water will be pumped into clarifying tanks/ containers for treatment before discharge. • The pumps will be powered by a diesel generator which will run continuously while the trench is open, dependent on water ingress rates. • Dewatering is not anticipated to be required in a single location for more than three weeks.	• Submersible pump • Diesel generator (90kW)
6	• Pipe bedding material will be carted to the worksite directly from source in 6 or 8 wheeler trucks, spread into the trench using an excavator and compacted using 300kg plate compactors. • Excavators will be used to lift 2.4m pipe lengths into the trench.	• 6 to 8 wheeler truck • Excavator
7	• Side haunch, overlay bedding and hard fill to pavement level will be constructed as per pipe bedding material (refer above). • Pavement layer will be stepped out from trench excavation to provide key into the existing pavement layers. • Pavement aggregates will be spread using excavators and compacted using drum rollers.	• Excavator • Drum roller or plate compactor

These construction works will require some short-term temporary land closures and bus detours at the Wellesley Street / Queen Street intersection, as detailed in Section 7.5 of the TIA (Appendix M). Connection 1 will require the southbound lane on Queen Street to be closed, while Connection 3 will require the eastbound lane of Wellesley Street to be closed, see Table 5-8 below.

These connections are proposed to be constructed over long weekends or the Christmas shutdown (ie Christmas week and the first week of January) to minimise disruption on public transport services.

Table 5-8: Location and Length of Three Wastewater Connections

Connection 1	Connection 2	Connection 3
14.76m in length	10m in length	11.4m in length

Adjacent to the north approach on Queen Street	In the middle of the intersection	Adjacent to the east approach on Wellesley Street
		

5.8 Proposed Earthworks, and Erosion and Sediment Controls

The earthworks required for the construction of the project are summarised below:

Table 5-9: Summary of earthworks required

Location	Earthworks	
	Area (m^2)	Volume (m^3)
Mayoral Drive/ Queen Street	60.5	968
Wellesley Street/ Queen Street	12.6	126
Victoria Street/ Queen Street	32	240
Works within Greys Avenue CSA	370	840
Local network connections into shafts	37	55
mTBM excavations	804	970

An ESCP has been developed that will be implemented for the entirety of the works, see **Appendix J**.

The ESCP is consistent with the requirements of the Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region (known as 'GD05') and includes both general project controls and site-specific controls at the shaft and CSA locations.

The following measures are proposed:

- Mayoral Drive construction compound will consist of hot mix bunds as a control device and to divert flood flows around the compounds.
- Wellesley Street and Victoria Street construction compounds will consist of hot mix bunds and silt socks as a control device and to divert flood flows around the compounds.
- Greys Ave will consist of hot mix bunds to divide the site into two dirty water sections and a clean water section for the overland flow path to pass through the site.
- A constructed sump and potential turkey nest for each section
- Catchpit protection is applied to all on-site and immediate downstream stormwater inlets, as well as the sections between the compounds.

5.9 Tree Works

No major modifications to nearby vegetation are proposed within these works.

One Sweet Gum tree owned by Auckland Council stands in the vicinity of the project, adjacent to the shaft and CSA location at Mayoral Drive. Although some pruning of this tree may be necessary to enable delivery of materials as well as machinery delivery and operation, no actual construction or excavation works are proposed near this tree. Any pruning or minor works will be carried out by a suitably qualified professional in

accordance with permitted activity standards. Arboricultural effects of the project are further explained in Section 10.8 of this report.

Tree asset owner approval will be sought from Auckland Council to modify this Sweet Gum tree as required.

Details of the tree protection methodology to be implemented are contained within the Arboricultural Assessment (**Appendix K**).

5.10 Noise and Vibration

During construction, temporary noise and vibration exceedances may occur above AUP standards.

As the pipeline will be installed below street level in the road reserve, the majority of works are exempt from the AUP provisions for noise in the applicable zone, subject to the provision of a Construction Noise and Vibration Management Plan[2] ('CNVMP'), which has been included within **Appendix G**. However, this exemption does not apply to noise effects resulting from activities at the Greys Avenue CSA site, which lies outside of the road reserve in the Business – City Centre Zone.

The Construction Noise and Vibration Assessment ('CNVA') attached within **Appendix G** assesses the noise and vibration effects from all construction activities for the Project, including shaft construction, tunnelling, open cut works and any activities within the road reserve.

5.11 Temporary Traffic Management

For the duration of the works, temporary traffic management will be set up in advance of any construction taking place within the road corridor. The specific details are currently not known. The TIA (**Appendix M**) has been prepared and provides specific recommendations on key matters that need to be addresses as part of any future traffic management plan.

Any temporary traffic management set up will meet Auckland Transport requirements, provide access for public transport and retain pedestrian access along footpaths.

Traffic management will include diversions around the shaft locations and CSA sites at the intersection of Queen Street/Wellesley Street, Queen Street/Mayoral Drive and Queen Street/Victoria Street.

5.12 Temporary Storage of Hazardous Substances

During construction, temporary storage of some hazardous substances may be required for the continual operation of machinery.

A reliable power source is needed to operate the submersible pumps that will be used in the dewatering process at the Mayoral Drive and Victoria Street shafts. If this connection to power cannot be established via the national grid, a diesel generator will be utilised.

Table 5-10 below details the hazardous substances that will be stored on site.

Table 5-10: Hazardous substances to be stored on site

Substance	Classes	Volume	Weight (approx.)
Petrol	3.1A; 6.1E; 6.7B; 9.1B	50L	0.037t
Diesel	3.1D, 6.3B, 6.7B, 9.1B	Approx 3000-4000L,	2.55t

Any hazardous substances stored and used onsite will be managed to ensure compliance with the Health and Safety at Work (Hazardous Substances) Regulations 2017 and Hazardous Substances and New Organisms Act 1996. Generally, chemicals are to be delivered to site in intermediate bulk containers (IBCs), and stored in individual bunds that can contain up to 110% of the IBC's volume. The IBCs and their bunds will be kept undercover as shown in Figure 5-3 so the bunds will not collect rainfall.

[2] Refer to Standard E27.6.29 (2) and (4)

Figure 5-3 Example of an intermediate bulk container

All dose lines have double containment. Any spills will be managed in accordance with the site-specific Spill Response Plan, which will be contained within the Construction Management Plan. Should any moisture collect under the covers of the IBCs the water will be removed by hydrovac and discharged to a licenced facility.

6 Consultation and Approvals

Watercare has undertaken consultation and engagement in relation to the project work. A more detailed record of this work is provided in the Stakeholder Engagement Plan in **Appendix O**. The following is a summary.

6.1 Heritage New Zealand

A letter to Heritage New Zealand Pouhere Taonga ('HNZPT') was sent on 12th June 2023 providing details of the Project, including a summary of the following:

- The identified directly impacted historic heritage buildings are –
    - Former John Courts Building
    - Civic Theatre
    - Civic House and Ferguson Building
    - Auckland Town Hall
    - Auckland Sunday School Union Building
- Potential effects on historic heritage. Overall, the effects are considered to be neutral with recommended mitigation measures in place.
- Mitigation measures including vibration specialists, use of vibration monitors, pre and post condition surveys, etc.
- Inviting HNZPT for their feedback and a time to discuss these proposed works if they wish.

A meeting was held between the project planners, heritage specialists and Heritage New Zealand staff on 28th June 2023 to introduce the project, discuss the potential effects and provide recommendations for the works. The Built Heritage Assessment has been updated to incorporate recommendations from HNZPT.

6.1.1 Archaeological Authority

Following the archaeological assessment carried out by Clough and Associates in **Appendix L**, an Archaeological Authority will be sought from HNZPT as a precaution. This authority will cover the potential for exposure of subsurface remains as a result of potholing, trenching, shaft excavations and other earthworks at the Greys Avenue CSA site, and will be sought concurrently with the resource consent application

6.2 Mana whenua engagement

Watercare has an established process for engaging with mana whenua on projects and works within the Auckland region. This process includes early notification of works to be undertaken by Watercare which, or are likely to, require resource consent.

Watercare provide a "Kaitiaki Managers Projects List" on a monthly basis to nominated representatives of all 19 mana whenua groups recognised by Auckland Council, including:

Ngāi Tai Ki Tāmaki, Ngāti Maru, Ngāti Pāoa, Ngāti Rehua Ngātiwai ki Aotea, Ngāti Tamaoho, Ngāti Tamaterā Ngāti Te Ata, Ngāti Wai, Ngāti Whanaunga, Ngāti Whātua Ōrākei, Te Ahiwaru, Te Ākitai, Te Patukirikiri, Te Uri o Hau, Waikato Tainui, Te Kawerau ā Maki, Ngāti Whātua o Kaipara, Ngāti Manuhiri, Te Rūnanga o Ngāti Whātua.

A brief summary of each project is included in the Projects List. Mana Whenua are invited to indicate which projects they have an interest in. Further information on the identified project or projects is then provided to those parties, followed by further engagement depending on the responses received.

Initial notification of the Queen Street Wastewater Project to the Kaitiaki Managers Project list occurred in September 2020, however due to inactivity was re-notified again in February 2021 with intermittent project updates (such as notification of on-site testing and design changes) provided since this time.

Six iwi groups have expressed interest in the Project, being Ngāti Maru, Te Aakitai Waiohua, Ngaati Whanaunga, Te Rūnanga o Ngāti Whatua, Te Patukirikiri and Ngati Whatua Orakei.

While Watercare has engaged iwi throughout the project design and afforded each group the opportunity to provide feedback, to date, no determination has been provided to WSL as to whether any iwi wish to prepare and submit a CIA.

Watercare recognises the areas of interest to Mana whenua relating to this project has been identified being earthworks within an identified site of significance to mana whenua, groundwater and the corresponding discharges to the environment; the protection of Te Waitematā mana. Watercare is proposing to use best practice methods to ensure the receiving environment is not compromised by the proposed project, and note that the reduction of overflow events to Te Waitematā as being consistent with this objective.

Representatives from Ngati Whatua Orakei provided a site blessing in August 2022 to mark the start of the investigations programme, and will be invited to conduct another blessing when this programme has been completed in mid to late 2023.

6.3 Auckland Transport

Ongoing engagement has occurred with Auckland Transport ('AT') prior to the consent being lodged.

An initial meeting was held with various AT staff on the 29th of May 2023 to introduce to Project, discuss the key findings from the draft TIA and identify AT's position on a number of key matters, including bus detours, road closures and lane treatment at intersections.

A follow up meeting was held on the 14th of June 2023 to discuss the above matters in greater detail and to seek agreement from AT on the overall mitigation strategy. An updated TIA was provided to AT on the 11th of July 2023 which incorporated feedback and recommendations provided after the initial meetings.

Written support for the Project has been provided by AT and is attached as **Appendix R**.

6.4 Wider Community Engagement

In recognition of the highly populated area in which works will occur, engagement has been carried out with the wider community.

An information flyer has been created and given to local residents and business owners in the project vicinity, This flyer details the reason for improvements to the wastewater network in the City Centre and provides details on construction methodology and approximate timelines for consent approvals and construction.

Details on the mid town construction programme (including the Queen Street Project) were also published into the July 2023 City Centre Ratepayers Association newsletter.

6.5 S176 RMA Approvals

An approval under s176 of the RMA is required from Auckland Transport to occupy and make minor modifications to the designated site at 34 and 36-38 Greys Avenue. Note however that this designation (AUP ID 1567) relates to road widening, rather than for a public carpark.

A s176 request was submitted to AT on 20th June 2023 with the relevant approval form and a description of the proposed works.

7 Reasons for Consent

7.1 Auckland Unitary Plan (Operative in Part)

Resource consent requirements for the proposed works under the AUP (district and regional) are identified in Table 7-1 below. Overall, the activity status under the AUP is a Discretionary Activity.

Table 7-1 Reasons for Consent- Regional

Reasons for Consent – Auckland Unitary Plan – Regional		
Activity Rule	Status	Relevance to application
Activity Rule E7.4.1 (A20) Take and use of groundwater for dewatering	Restricted Discretionary	An assessment against the permitted activity standards of E7.6.1.6 is contained within Section 7.2 of **Appendix F**. Consent is required as the Victoria and Mayoral Drive shafts will require dewatering for greater than 30 days.
Activity Rule E7.4.1 (A28) Diversion of groundwater caused by any excavation, (including trench) or tunnel that does not meet the permitted activity standard	Restricted Discretionary	An assessment against the permitted activity standards of E7.6.1.10 is contained within Section 7.2 of **Appendix F**. Consent is required for a variety of infringements to these standards, including: • (2) All shafts will be below natural groundwater level and more than 6 m below natural ground level • (3) and (5) All shafts are in close proximity to buildings and structures and will drawn down the natural groundwater level by more than 2m • (6) Mayoral Drive and Victoria Street shafts are within 10m of historic heritage place
Activity Rule E14.4.1 (A52) Medium combustion sources established from 1 May 2014 fuelled by diesel in an internal combustion engine/generator, with a total gross heat release of more than 500kW and not exceeding 10 MW	Controlled	800kW diesel generator required for mTBM tunnelling works.
Activity Rule E30.4.1 (A6) Discharge of contaminants into the air, water or land that does not meet the permitted activity standard	Controlled	Disturbance of contaminated soils exceeding permitted standards at the Mayoral Drive shaft (refer to **Appendix H**)

Table 7-2: Reasons for Consent - District

Reasons for Consent – Auckland Unitary Plan – District		
Activity Rule	Status	Relevance to application

Activity Rule D17.4.1 (A9) Modifications to features of a scheduled historic heritage place	Restricted Discretionary	Modification (earthworks) required within the HH Overlay at the following locations: • Former John Courts Building, 210 Queen Street (ID 2037) • Civic Theatre, 269-285 Queen Street (ID 2040) • Civic House and Ferguson Building, 291-297 Queen Street (ID 2041) • Auckland Town Hall, 301-317 Queen Street (ID 2043) • Auckland Sunday School Union Building, 323-327 Queen Street (ID 2045)
Activity Rule E26.10.3.1 (A150): Network utilities and electricity generation facilities not otherwise provided for where the site is identified as a site exception (Horotiu Stream)	Restricted Discretionary	Development within a site where it has been identified as a site exception in Schedule 12 of the SPSMW Schedule (development within Horotiu Stream located in Queen Street/ Victoria Street Road Reserve).
Activity Rule E26.6.3.1 (A117) Earthworks from 10m^2 to 2500m^2 and from 5m^3 to 2500m^3 within the Historic Heritage Overlay	Restricted Discretionary	Earthworks required within the HH Overlay at the following locations: • Former John Courts Building, 210 Queen Street (ID 2037) • Civic Theatre, 269-285 Queen Street (ID 2040) • Civic House and Ferguson Building, 291-297 Queen Street (ID 2041) • Auckland Town Hall, 301-317 Queen Street (ID 2043) • Auckland Sunday School Union Building, 323-327 Queen Street (ID 2045)
Activity Rule E26.6.3.1 (A117) Earthworks from 10m^2 to 2500m^2 and from 5m^3 to 2500m^3 within the Sites and Places of Significance to Mana Whenua Overlay	Discretionary	Earthworks required within SPSMW Overlay (ID 84) for the Queens St / Victoria Street shaft (32m^2 and 240m^3).

Where an activity has been identified as controlled or restricted discretionary an assessment against the relevant matters of control / matters of discretion is provided in Section 12.

7.2 Permitted Activities

In addition to the above identified reasons for consent, a number of permitted activity provisions are relied upon to undertake the works as identified below:

- **Rule E7.4.1 (A27)**: Diversion of groundwater caused by any excavation (including trench) or tunnel
- **Rule E25.4.1 (A1)**: Construction noise and vibration;
- **Rule E26.2.3.1 (A49)**: Underground pipelines and ancillary structures for the conveyance of wastewater (including above ground ancillary structures associated with underground pipelines) in all zones;
- **Rule E26.2.3.1 (A57)**: Ventilation facilities, drop shafts and manholes;
- **Rule E26.4.3.1. (A83):** Tree trimming or alteration in road and public open spaces that comply with Standard E26.4.5.1 and Standard E26.4.5.3.
- **Rule E26.4.3.1. (A87):** Works within the protected root zone in road and public open spaces that comply with Standard E26.4.5.2.
- **Rule E26.4.1 (A95):** Earthworks up to 2500m^2 other than for maintenance, repair, renewal, minor infrastructure upgrading
- **Rule E26.4.1 (A96):** Earthworks up to 2500m^3 other than for maintenance, repair, renewal, minor infrastructure upgrading
- **Rule E36.4.1 (A54)**: Infrastructure within roads or the Strategic Transport Corridor Zone in the 1 per cent annual exceedance probability (AEP) floodplain and overland flow paths
- **Rule E40.4.1 (A20):** Temporary activities associated with building or construction, (including structures and buildings that are accessory activities), for the duration of the project, or up to 24 months, whichever is the lesser
- **Rule E31.4.3 (A73)** Hazardous facilities that store or use the listed hazardous substances (Toxic Class 6 Sub-class 6.1 C and 6.3-6.9) in the Business City Centre Zone (less than 6t)

An assessment against the relevant standards is provided in **Appendix E.**

7.3 NES for Assessing and Managing Contaminants in Soil

Table 7-3 below outlines the resource consent requirements for the Queen Street Wastewater Diversion works under the NES-CS, as identified in the DSI (**Appendix H**).

Table 7-3: Assessment against the NES-CS

Proposed activity	Activity Status	Relevance to Activity
Regulation 9 - Disturbing soil	Controlled	Consent is required for the disturbance of contaminated soil.

8 Statutory Considerations

The RMA sets out the statutory framework within which natural and physical resources are managed. Section 104 of the RMA sets out the matters for consideration when assessing a resource consent application.

A consent authority must, subject to Part 2 of the RMA, have regard to the following matters as per Section 104:

- Any actual and potential effects on the environment of allowing the activity;
- Any relevant provisions of a national environmental standard, other regulations, national policy statements, the coastal policy statement, regional policy statement and plans, and the district plan including any proposed plans or regional policy statements; and
- Any other matter the consent authority considers relevant and reasonably necessary to determine the application.
- Section 104B of the RMA also applies as this is an application for a Discretionary Activity. Section 104B states:

104B Determination of applications for discretionary or non-complying activities

(1) After considering an application for a resource consent for a discretionary activity or non-complying activity, a consent authority—

(a) may grant or refuse the application; and

(b) if it grants the application, may impose conditions under section 108.

It is considered that the information and assessment provided in this report address the requirements of s.104 and s.104B RMA.

9 Assessment of Environmental Effects

The following is an assessment of the actual and potential effects on the environment from the proposed activities. The assessment has been prepared to meet the requirements of Schedule 4 of the RMA.

9.1 Permitted Baseline

As prescribed by section 104(2) RMA, when determining the extent of adverse effects of an activity, the consent authority 'may disregard an adverse effect if a rule or national environmental standard permits an activity with that effect'. Accordingly, the permitted baseline is described as those activities which could be legally established as a Permitted Activity.

A number of activities associated with Part 3 of the project are recognised as permitted activities under the AUP, subject to compliance with the appropriate standards. A table detailing these provisions and standards has been included in Appendix E of this assessment. In summary, these permitted activities include:

- Construction noise and vibration from planned works in the road reserve
- Discharging of treated contaminants for dewatering purposes.
- Construction works in the road including: wastewater pipe / manhole installation and service connections.
- Temporary establishment of signage and Construction Support Areas.
- Earthworks up to 2500m^2 and 2,500m^3 for network utilities in the road zone and City Centre Zone
- Works to trim trees and notable trees in the road reserve and works within the protected root zone of notable trees as part of trenchless installation methods.
- Storage of up to 6t of Hazardous Substances (Petrol & Diesel) in the Business - City Centre Zone.

In effect, the list of activities and standards described above constitute the permitted baseline for this project. These adverse effects may be discounted as the level of effect arising from these activities is provided for by the AUP. It is only any other or further adverse effects arising from the proposal over and above the permitted baseline which are to be assessed.

9.1.1 Works on Protected Trees

An arboricultural assessment has been carried to assess the impact of proposed works on trees and vegetation, refer to Appendix K.. A singular protected sweet gum tree that may be impacted which is located within the Queen Street road reserve; some pruning of this tree may be required to enable delivery of materials as well as machinery delivery and operation, although no actual construction or excavation works are proposed near this tree.

The arboriculture assessment assess the pruning and works within the protected root zone of this tree and confirms compliance can be met with the relevant permitted standards. Mitigation measures are proposed to the standards are complied with, including:

- A pre-construction meeting to be held.
- All heavy machinery and equipment is kept away from the root zone of all trees.
- Installation of protective fencing

As such, the works are deemed a permitted activity under Rules E26 (A83) and (A87), and form part of the permitted baseline.

9.2 Positive Effects

The proposed works enable Watercare to provide for the safe and efficient collection, and conveyance of wastewater which is key to supporting the existing and future well-being of the residents of Auckland.

The Project will increase the capacity and resilience of the wastewater system in the upper City Centre catchment and allow for increased development capacity in the area, as enabled by Plan Change 78. The proposed wastewater upgrades will enable people and communities to provide for their social, economic and cultural well-being and for their health and safety, consistent with the principles and purpose of the RMA.

By increasing the capacity of the wastewater network in the City Centre, the occurrence of wet weather overflows into the stormwater network will decrease. The works will reduce the amount of contaminants flowing into coastal waters during overflow events, thus improving the quality of receiving waterbodies.

Overall, the Project will generate positive effects by improving the existing wastewater network and providing for future population growth in the Auckland City Centre.

9.3 Groundwater Drawdown and Settlement Effects

9.3.1 Description

The abstraction of groundwater for dewatering causes a depression cone in the groundwater table. Groundwater levels generally decrease around the excavation and the area of the groundwater depression cone will extend outwards over time until dewatering ceases. Therefore, groundwater drawdowns may propagate outwards over time.

The Mayoral Drive and Victoria Street shafts will comprise post and panel construction, while the Wellesley Street shaft will comprise a caisson construction. The Mayoral and Victoria shafts will require continuous dewatering during the construction period of the shaft, mTBM tunnelling works and manhole construction. The maximum dewatering period for Mayoral Drive shaft is estimated at 12 months, while the maximum dewatering period for the Victoria Street shaft is estimated at 9 months.

The caisson pile shaft at Wellesley Street will be fully sealed with base slabs and eye seals and will only require dewatering during construction when the shafts are excavated and before the base is sealed with a 1 m concrete slab.

The assessment of dewatering effects is attached as Appendix F and considers the following:

- Effects on neighbouring bores
- Stream depletion effects
- Saltwater intrusion effects
- Settlement effects on neighbouring properties and utilities due to dewatering
- Surface flooding and water quality effects that may arise from the abstracted groundwater being diverted

9.3.2 Assessment Methodology

The interpretation of the geology is based on the Geotechnical Interpretive Report (GIR) and the Hydrogeology Factual and Interpretive Report. The hydraulic test data from the hydraulic tests (i.e., falling and rising head tests) on the site-specific bores and from various other literature sources was also reviewed to derive representative hydraulic parameters of the various geological formations.

Dewatering Modelling

Several cross-sectional numerical groundwater models were developed using SEEP/W to assess dewatering induced groundwater drawdown effects during construction of the wastewater diversion. SEEP/W is finite element numerical modelling software for groundwater flow in porous media, developed by Seequent (2021).

Three cross sectional models have been developed intersecting the Victoria, Wellesley and Mayoral shafts. All three models include a steady state model that simulates the current hydrogeological state prior to construction, followed by a transient model that calculates the groundwater drawdown effect over the duration of the dewatering.

The effect of dewatering to dry out the excavations was simulated by applying a seepage face boundary. This boundary will remove any groundwater that would seep out into the excavation from the model. The same boundary is applied to the entire ground level for the Mayoral shaft cross section to remove possible seepage to the surface at a local creek or permanent drainage system in the gully to the northwest of the Mayoral shaft.

A sensitivity analysis was undertaken to assess uncertainties in adopted hydraulic parameters and the lateral extent of the geological profile.

Settlement Modelling

At the location of each of the three shafts, settlement was calculated using the drawdown results generated for upper bound and low bound assumptions for the hydraulic conductivity of the soil, characterised as 'high' and 'low', respectively.

To assess the potential maximum settlement, the analyses used the maximum predicted drawdown at the location of each shaft, calculated for the assumption of 'high' hydraulic conductivity. The assessment of maximum gradient of differential settlement, the analyses used the drawdown data corresponding to 'low' hydraulic conductivity which yield the steepest cone of depression. All analyses were undertaken at distances of 5 m, 10 m, 20 m and 40 m away from the walls of the shaft for the drawdown values provided after 275 days of dewatering.

The analyses were undertaken using the software *Settle3*. The groundwater drawdown was modelled by introducing a uniform stress at the depth of the groundwater table before drawdown. Where appropriate, a sensitivity analysis was also undertaken assuming a range of modulus of elasticity in those layers most susceptible by the groundwater drawdown at each location.

9.3.3 Actual and Potential Groundwater Drawdown and Settlement Effects

Effects on Neighbouring Bores

Effects on neighbouring bores are estimated based on the level of groundwater drawdown from the dewatering at the location of the existing bore.

For the Mayoral Drive Shaft, the closest water take consent (WAT60152403) is approximately 110m from the edge of the shaft excavation. However, this consent is for groundwater diversion, with active dewatering likely to be occurring. As such, any effects of groundwater drawdown on this consent are likely to be positive as it will reduce the dewatering requirements.

There are no existing water take consents within the modelled drawdown cone of either the Wellesley Street or Victoria Street shafts.

Overall, there will be no adverse effects on neighbouring bores as a result of the groundwater drawdown for the proposed works.

Saltwater Intrusion Effects

Saltwater intrusion typically only establishes after a long period of time with groundwater levels reduced to below average sea level at or near the coast. This typically occurs only after years of groundwater levels reducing below sea level.

The maximum estimated drawdown extent associated with the dewatering of the Victoria shaft is 130 m, which is the maximum extent of the dewatering after 275 days of dewatering. The maximum drawdown level at the shaft location is 2.5 m RL, with the shaft located 690m from the coast. This level of drawdown still provides sufficient groundwater pressure to ensure the groundwater flow direction is not reversed to allow for saline intrusion. The drawdown does not extend below sea level at the shaft location and will thus not extend to below sea level further away from the shaft. The likelihood of saltwater intrusion is thus considered negligible.

Settlement Effects on Neighbouring Properties and Utilities

Potential settlement effects on neighbouring properties and utilities are assessed using the Burland Building Damage Assessment Classification.

Based on the settlement analysis, proximity of heritage buildings to the edges of the excavations and building foundations in terms of the assessment classification above, all settlement from the dewatering of the shafts along the pipe alignment and shaft locations, will result in building category damage of negligible and very slight. The following is noted:

- The maximum settlement is estimated to be 5 to 10 mm for the heritage building (Auckland Sunday School Union Building) on Mayoral Drive.
- The heritage building near Wellesley shaft (Civic Theatre) is 30 m from the edge of the excavation and outside of the zone of estimated settlement (10-20 m).
- The heritage building near the Victoria shaft (John Court's Building), <2 m from the shaft) has a deep basement, hence foundations are considered to be deeper than 6 m and below the sediments that are likely to settle.

With regards to utilities and services in proximity to the proposed works, specific investigation and management will be required where existing services are located within 10 m of the shafts.

Overall, effects from settlement on neighbouring properties and utilities will be less than minor.

Surface Flooding and Water Quality Effects

The dewatering water will be treated in clarifying tanks to required standards before discharge to the local wastewater network. The abstraction rates from the different shafts are very low:

- Mayoral Drive shaft – the dewatering rate is initially estimated to be 2.6 m^3/day, reducing to 1.5 m^3/day towards the end of the construction period.
- Wellesley Street shaft – the initial dewatering rate is estimated to be 7.2 m^3/day, gradually reducing to 4.4 m^3/day at the end of the dewatering period.
- Victoria Street shaft – the initial dewatering rate is estimated to be 2.6 m^3/day at the start of construction but will reduce to 1.5 m^3/day towards the end of the dewatering period.

The maximum daily discharge towards the start of the dewatering period is thus 12.4 m^3/day. This is a very low flow rate and would be equivalent to 1 mm of rainfall per day on the 580 m section of Queen Street Wastewater diversion. This will reduce to 3 m^3/day towards the end of the construction period.

The discharge rate is low and thus it is considered that flooding as a result of dewatering is unlikely.

9.3.4 Proposed Mitigation

While the assessment above has identified that effects from settlement are expected to be negligible, a number of mitigation measures are still proposed. It is proposed that a 'Groundwater and Settlement Management and Compliance Plan' ('GSMCP') will be prepared and certified by Council before works commence. The purpose of this plan is to identify groundwater and ground surface deformation monitoring requirements during the construction works.

Peizometers and survey markers will be deployed to monitor these effects; groundwater data is to be assessed every two weeks, while survey monitoring will be conducted every week during construction and continue for three months afterwards. The GSMCP will outline monitoring alert and alarm levels.

In addition, condition surveys of buildings assessed within the 'slight' data category will be conducted prior to construction works commencing and will be followed up with a post-construction survey no later than six months after construction has been completed.

Other mitigation measures for movement detected in the vicinity of the excavation might include:

- Reduced pumping rates/duration
- Installation of additional seep collars
- Use of sheet piling
- Staged excavation
- Grouting to seal localised seepage

The above measures will be addressed as part of the development of the GSMCP.

9.3.5 Summary of Groundwater Drawdown and Settlement Effects

The dewatering assessment considered it unlikely that the dewatering activity will result in adverse settlement effects on any of the heritage sites in proximity to the shafts. However, settlement might occur near the Auckland Sunday School Union Building next to the Mayoral Drive shafts and the former John Court's Building near the Victoria Street shaft. As such, groundwater level and ground surface deformation settlement monitoring will be undertaken adjacent to these shafts as a conservative measure, so that mitigation measures can be put in place, should groundwater drawdown be observed and prior to settlement effects developing.

Utilities and services in 10m proximity to the proposed works may require specific investigation and management.

Overall the effects generated from groundwater drawdown and settlement is considered to be less than minor.

9.4 Land Contamination Effects

9.4.1 Description

Land contamination relates to the disturbance and removal of soil that may have an adverse effect upon human health and the receiving environment.

9.4.2 Assessment Methodology

To understanding the potential of land contamination, a Detailed Site Investigation (DSI) has been prepared, and provided in **Appendix H**. The DSI has been prepared in accordance with a number of applicable guidelines[3] Background levels were also measured using two different guidelines[4].

A total of 16 soil samples were collected from eight sampling locations across the project site. All samples were submitted to Hill Laboratories for analysis, to determine the contaminants of concern, including heavy metals, PAH, PAT and BTEX. Figure 9-1 shows the sample locations for the project. Full details of soil sample results are provided in Appendix C of the DSI.

Figure 9-1: Soil sample locations

Based on the results of the soil sample analysed, the likely effect upon human health and receiving environment is provided.

9.4.3 Actual and Potential Land Contamination Effects

Earthworks can result in contaminated land being disturbed, with the potential for adverse effects for human health and the receiving environment.

In relation to human health criteria, concentrations of PAH and TPH were identified at the location of BH22/01. PAH were identified above the limit of detection (LoD) in samples from three depths (1.5m, 3m and 4m bgl), however, no exceedance of applied human health criteria were recorded.

Concentrations of TPH fractions C15-C36 above LoD at BH 22/01 (1.5m bgl, 210 mg/kg) and BH22/08 (0.2m bgl, 118 mg/kg) were recorded.[5]

[3] *Human Health Guidelines Used: Ministry for the Environment (2011). Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Publication number ME 1055, June 2011, National Environmental Protection Council (2013). National Environment Protection (Assessment of Site Contamination) Measure 1999 (April 2013). Included as NESCS does not have guideline values for the protection of human health for nickel and zinc, Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand 1999 (Revised 2011) & Ministry for the Environment Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand, 1999 - Module 4, Table 4.14 (TPH - Commercial/Industrial)*

[4] *Auckland Region Background Concentrations (ARC, 2001) & Auckland Unitary Plan Permitted Activity Criteria*

[5] Source: Detailed Site Investigation, section 6.3, 2023

From the samples, a comparison of heavy metals exceeding the laboratory LoD against both the Auckland Regional Background Concentrations for Volcanic Soils, and the Auckland Unitary Plan Permitted Activity Criteria was undertaken. Led, mercury, nickel, and zinc were each found to exceed background concentrations at BH22/01 in at least one sample.

Based on the analysis undertaken, contaminated soil has been detected in two locations, being BH22/01 and BH22/08. Taking a conservative approach, the delineation of land that is potentially subject to land contamination at BH22/01 and BH22/08 includes land halfway up to the next borehole location.

Therefore, without suitable mitigation or management measures being implemented, there is potential for adverse effects to be generated in relation to human health or upon the receiving environment.

Figure 9-2 shows the area of land considered to be potentially subject to contamination.

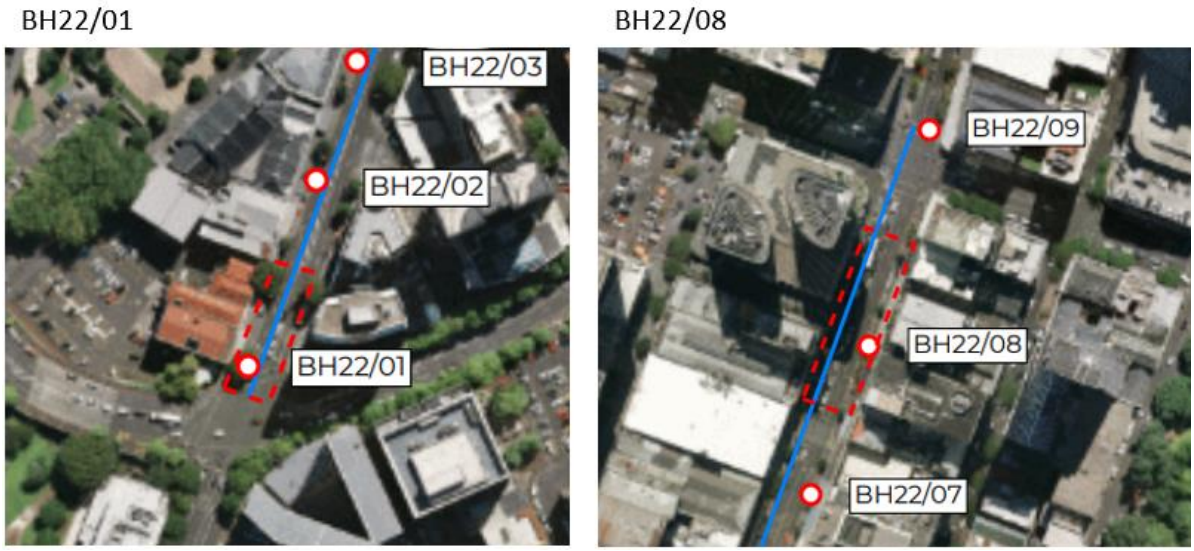


Figure 9-2 Identified contaminations sample locations and delineated area of land

9.4.4 Proposed Mitigation

The following mitigation measures are provided to manage adverse effects in relation to contamination land matters:

- Any soil to be removed off site will need to be disposed of at an appropriate licensed landfill facility; and
- A soil management plan ('SMP') will be developed to manage soil disturbance and disposal in the vicinity of BH22/01 and BH22/08m including an unexpected discovery protocol ('UDP') which outlines the procedures and processes to be undertaken should any ground conditions be encountered that are not anticipated.

9.4.5 Summary of Land Contamination Effects

A DSI has been prepared to identify potential land contamination within the project area. Based on soil sampling undertaken, two areas of contaminants have been identified, being at BH22/01 and BH22/08. To manage the potential adverse effects contaminated soils will be disposed offsite at an appropriate licensed landfill facility and disturbances will be managed in accordance with a SMP.

With the proposed mitigation measures implemented, it is considered that the adverse effects associated with land contamination is less than minor.

9.5 Land Disturbance Effects

9.5.1 Description

The proposed earthworks have the potential for a variety of effects upon the receiving environment including dust, noise, vibration, traffic, sediment laden water effects etc.

As mentioned in Sections 6.4 - 6.6 above, earthworks are required along the alignment of the Project via trenchless construction methods to construct the 600m length of pipe under Queen Street between Mayoral Drive and Victoria Street, along with the shafts and network connections.

9.5.2 Assessment Methodology

The matters of discretion for an infringement to the permitted earthwork standards of E26 are identified in Chapter E26 *Infrastructure*.

The matters within E26 include a consideration of the following relevant matters

- Compliance with the standards,
- Effects on cultural and spiritual values of Mana Whenua,
- Effects of noise, vibration, odour, dust, lighting and traffic (addressed above),
- Effects on the stability and safety of surrounding land and buildings (addressed above),
- Effects on flooding and natural hazards,
- Stockpiling,
- Staging, timing and duration,
- Effects on network utilities and road networks,
- Accidental discovery protocols, and
- Positive effects enabled through land disturbance.

9.5.3 Actual and Potential Land Disturbance Effects

As mentioned, the Project works include three shaft construction sites where earth will be exposed. The greatest risk is associated with exposed earth at a surface-level, specifically the excavated spoil from excavators or vehicles. On the other hand, spoil "down-hole" within the shaft is a much lower risk, as the soil cannot reach the surface unless it is pumped out (assuming extreme event flows are suitably managed).

Furthermore, all four CSAs have an overland flow path running through them. Three of the compounds contain significant portions of flood plains within their boundary (Wellesley Street, Victoria Street and Greys Ave).

9.5.4 Proposed Mitigation

To ensure that adverse effects on surrounding properties and the surrounding environment from these earthworks are avoided, a draft Erosion and Sediment Control Plan ('ESCP') has been prepared and is attached as **Appendix J**. The ESCP is consistent with the requirements of the Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region (known as 'GD05') and includes both general project controls and site-specific controls at the shaft and CSA locations.

The following measures are proposed:

- Mayoral Drive construction compound will consist of hot mix bunds as a control device and to divert flood flows around the compounds.
- Wellesley Street and Victoria Street construction compounds will consist of hot mix bunds and silt socks as a control device and to divert flood flows around the compounds.
- Greys Ave will consist of hot mix bunds to divide the site into two dirty water sections and a clean water section for the overland flow path to pass through the site.
- A constructed sump and potential turkey nest for each section
- Catchpit protection is applied to all on-site and immediate downstream stormwater inlets, as well as the sections between the compounds.

9.5.5 Summary of Land Disturbance Effects

Overall, it is considered that potential adverse effects associated with earthworks, including erosion, land instability and sediment runoff can be adequately remedied through the controls proposed in the ESCP, such that effects will be less than minor.

9.6 Noise and Vibration Effects

9.6.1 Description

Due to the nature of works, temporary noise and vibration effects will be generated. To understand the actual and potential effects, a CNVA has been prepared, and provided in Appendix G1. In addition to the CNVA, a Construction Noise and Vibration Management Plan (CNVMP, Appendix G2) has also been prepared and provided.

9.6.2 Applicable Noise and Vibration Standards

The CNVA has applied the AUP Standards in Chapter E25 when considering if an adverse effect has occurred in relation to noise and vibration. Due to the location of the works and the potential receivers, four sets of standards are applicable, being:

- Works within the road corridor
- Noise: Business – City Centre Zone and Business – Metropolitan Centre Zone
- Noise: All other Zones
- Vibration limits

The following sets out how the standards are applied.

Works within the road corridor

Standard E25.6.29 of the AUP sets out the noise provisions for works within the road. E25.6.29 (3) states that the noise levels specified in Standard E25.6.29 (1) of the AUP do not apply to unplanned repair or maintenance works or planned works in the road corridor between the hours of 7am and 10pm in circumstances where the nature of the work and the proximity of receivers the noise generated cannot be practicably made to comply with the relevant noise levels:

- Table E25.6.27.1 of the AUP – Construction noise limits for activities sensitive to noise in all zones except the Business – City Centre Zone and the Business – Metropolitan Centre Zone
- Table E25.6.27.2 of the AUP – Construction noise levels for noise affecting any other activity.
- Table E25.6.28.1 of the AUP – Construction noise levels for construction less than 15 consecutive calendar days duration in the Business – City Centre Zone and the Business – Metropolitan Centre Zone
- Table E25.5.28.2 of the AUP – Construction noise levels for construction of 15 consecutive calendar days or more duration in the Business – City Centre Zone and the Business – Metropolitan Centre Zone.

For planned works, a copy of the works access permit issued by Auckland Transport is provided to Auckland Council five days prior to works commencing, or for planned works than will take more than 8 hours to complete a CNVMP is provided to Auckland Council no less than five days prior to the works commencing in accordance with the applicable provisions of Standard E25.6.29(5).

In relation to vibration, the levels specified in E25.6.29(1A)(b) of the AUP do not apply to works within the road where a CNVMP is provided to Auckland Council no less than five days prior to the works commencing in accordance with the applicable provisions of Standard E25.6.29(5).

Respective of the above, Section 16 of the RMA, there is still a requirement for construction noise (and vibration) to not exceed a reasonable level.

As a CNVMP has been prepared for this project, the relevant noise and vibration limits set out in the AUP do not need to comply with for works within the road corridor (apart from vibration effects upon built heritage).

As such, the works within the road corridor can be undertaken as a permitted activity, with any potential effects generated being appropriately managed through a CNVMP as required by standard E25.6.29(5). The CNVA has assessed that noise generated within the road corridor to meet the general obligations to manage noise and vibration under Section 16 of the RMA through the implementation of the measures proposed in the CNVMP.

Construction noise: Business - City Centre Zone and the Business – Metropolitan Centre Zone

Standard E25.6.28 of the AUP applies to construction activities within the Business – City Centre Zone and Business – Metropolitan Centre Zone, with the noise limits provided in the following tables being applicable:

- Table E25.6.28.1 Construction noise levels for construction less than 15 consecutive calendar days in the Business – City Centre Zone and Business – Metropolitan Centre Zone; and

- Table E25.6.28.2 Construction noise levels for construction of 15 consecutive calendar days or more duration in the Business – City Centre Zone and Business – Metropolitan Centre Zone

Standard E25.6.28 states that noise is to be measured for any 30-minute period 1m from the façade of any building in the Business – City Centre Zone and Business – Metropolitan Centre Zone that is occupied during the works. In circumstances where external measurements of construction noise is impractical or inappropriate, the upper limit for the noise measured inside the building will be 20dB less than the relevant levels.

Although construction works are only proposed Monday to Saturday, and therefore will always be less than 15 consecutive calendar days in duration, the CNVA has been prepared on a conservate basis, applying the noise limits from Table E25.6.28.2, which are reproduced in 10-1 below.

Table 9-1: AUP Construction noise limits in the Business - City Centre Zone

Construction Noise Assessment Criteria AUP Construction noise limits in the Business – Metropolitan Centre Zone, assessed 1m from the facade		
Time	$L_{Aeq,30\ min}$ (dB)	L_{AFmax} (dB)
Monday to Friday 6.30am – 10.30pm	75	90
Saturday 7am-11pm	80	90

The assessment has been prepared on the most stringent noise limits, being 75 dB $L_{Aeq(30mins)}$ / 90 dB L_{AFmax}.

Construction noise: All other Zones

The CNVA has identified properties that are not within the Business – City Centre Zone, being the buildings adjacent to Aotea Square. As such the noise limits provided in Table E25.6.27.1 of the AUP apply in relation to construction noise levels for all activities sensitive to noise when measured 1m from the façade of any building that contains an activity sensitive to noise that is occupied during the works.

As the construction works will occur for more than 20 weeks in some locations, under E25.6.27 (4) the relevant noise standards shall be reduced by 5 dB. The relevant noise limits (including the 5 dB adjacent) are reproduced in Table 9-2.

Table 9-2 Construction noise limits - zones outside of the City Centre Zone and Metropolitan Centre Zone

Construction Noise Assessment Criteria AUP Construction noise limits for sites outside of the Business – Metropolitan Centre Zone or Business – Metropolitan Centre Zone, assessed 1m from the facade			
Day	Time	$L_{Aeq,30min}$ (dB)	L_{AFmax} (dB)
Monday to Friday	6:30am – 7:30am	55	70
	7:30am – 6pm	70	85
	6pm – 8pm	65	80
Saturdays	6:30am – 7:30am	40	70
	7:30am – 6pm	70	85
	6pm – 8pm	40	70
Sundays and public holidays	6:30am – 7:30am	40	70
	7:30am – 6pm	50	80
	6pm – 8pm	40	70
Night-time	8pm – 6:30am	40	70

Construction Vibration Limits

Standard E25.6.30 of the AUP sets out the relevant vibration limits. The AUP states that construction and demolition activities must be controlled to ensure any resulting vibration does not exceed:

- The limits set out in German Industrial Standard DIN 4150-3 (1999): Structural vibration – Part 3 Effects of vibration on structures when measured in accordance with that standard on any structure not on the same site; and
- The limits in Table E25.6.30.1 of the AUP vibration limits in building in any axis when measured in the corner of the floor of the storey of ineptest for multi-storey buildings, or within 500 mm of ground level at the foundation of a single storey building.

The long-term vibration limits from DIN 4150-3 are outlined in Table 9-3.

Table 9-3 DIN 4150-3 long term guideline vibration limits

Construction Vibration Criteria DIN 4150-3 Guideline vibration limits used to assess the effects of long term-vibration on structures		
Line	Type of Structure	Guideline values for velocity, i_i, in mm/s, of vibration in the horizontal plane of the highest floor, at all frequencies.
1	Buildings used for commercial purposes, industrial buildings, and buildings of similar design.	10
2	Dwellings and buildings of similar design and/or use.	5
3	Structures that because of their particular sensitivity to vibration, do not correspond to those listed in Group 1 or 2 and have intrinsic values (e.g., buildings under a preservation order).	2.5

The AUP sets out vibration amenity limits in Table E25.6.30.1, which is reproduced below as Table 9-4.

Table 9-4 AUP vibration amenity limits

Construction Vibration Criteria Vibration limits in buildings from construction (E25.6.30.1)		
Receiver	Period	Maximum Peak Particle Velocity (PPV) Limit, mm/s
Occupied activity sensitive to noise	Night-time 10pm to 7am	0.3
	Daytime 7am to 10pm	2.0
Other occupied buildings	At all times	2.0

The vibration amenity limits set out in Table 9-4 are useful to consider if an adjacent resident / occupant is likely to have their amenity 'reasonably affected' by vibration, however these shouldn't typically be regarded as definitive thresholds. Surpassing these limits signals a need for the implementation of specific management measures

9.6.3 Assessment Methodology

Taking account of the noise and vibration limits outlined above, the following sets out the methodology that has been applied in preparing the CNVA for the project.

SoundPLAN computational noise modelling software has been used to develop a noise predication model, with a number of scenarios being developed and analysed to support the acoustic assessment. Modelling is based on the construction equipment likely to be used based on the construction methodology for the works.

The assessment has assumed 'worst-case' theoretical downwind conditions in all directions from all sources, which provides a conservative approach. Table 9-5 presents the noise modelling parameters adopted.

Table 9-5 Noise modelling parameters

Parameters for computational noise modelling

Property	Value	Source
Calculation method	ISO 9613	-
Terrain contours	0.25 m vertical heights	Auckland Council GeoMaps
Buildings	Outlines of Building footprints Heights set to 3.m for each story	Auckland Council GeoMaps, Heights via Google Street View.
Land parcels	Property land and road extent	Auckland Council GeoMaps
Ground Absorption Coefficient	0.1 – acoustically hard ground	Street View
Number of Reflections	3	-
Assessment location	1.0 metres from any façade	-

All equipment is assumed to be operating at the closest point to any adjacent site for the analysis. The L_{AFmax} was calculated using the maximum noise level generated by any piece during any phase when undertaken at the closest point from the site to the receptor building. This approach provides a 'worst-case' assessment of noise levels.

To predicate vibration, prorogation between the source equipment and receiving locations has been predicated based on the methodology outlined in the Waka Kotahi NZ Transport Agency's State Highway Construction and Maintenance Noise Vibration Guide (version 1.1, dated August 2019). This method assumes hard soil conditions, and slab-on-grade foundations type for all adjacent properties. This is a 'worst-case' assessment, and other foundation types are predicated to have a lower vibration transfer coefficient.

9.6.4 Actual and Potential Construction Noise and Vibration Effects

The proposed works will be undertaken in multiple locations and in different phases within the project area. The majority of the works are to be undertaken within the road corridor, however some construction activity will be located within the Business – City Centre Zone.

Construction noise from works within the road corridor

For the works being undertaken within the road corridor, the provisions of the AUP allow for relevant noise and vibration standards to be exceed as a permitted activity subject to the provision of a CNVMP. To support this application for resource consent, a CNVMP has been prepared, and as such the works within the road corridor are considered to be permitted, with the effects generated able to be appropriately managed. The only exception to this is in relation to vibration for buildings and structures within the Extent of Place Historic Heritage Overlay, for which vibration effects can be considered.

For clarity, the properties for which a noise exceedance has been predicated from works within the road corridor are noted in Table 9-6.

Table 9-6 Construction noise exceedance - works within the road corridor

Construction noise exceedance Works within the road corridor	
Property Address	Predicted maximum exceedance (dB)
Shaft Construction – Queen Street/ Mayoral Drive	
313 Queen Street	82
317 Queen Street	90
319 Queen Street	90
380 Queen Street	79
396 Queen Street	79
Shaft Construction – Queen Street/ Wellesley Street	
290 Queen Street	92
300 Queen Street	80
10 Wellesley Street	90
Shaft Construction – Queen Street/ Victoria Street	

Construction noise exceedance Works within the road corridor	
Property Address	Predicted maximum exceedance (dB)
59-67 High Street	96
2 Lorne Street	80
186 Queen Street	79
203 Queen Street	83
205-225 Queen Street	80
214 Queen Street	89
222 Queen Street	81
238 Queen Street	78
9 Victoria Street East	89
Open Trench Construction – Queen Street/ Wellesley Street	
290 Queen Street	80
300 Queen Street	77
Trenchless Construction (mTBM Operation) – Queen Street/ Mayoral Drive and Queen Street/ Victoria Street	
59-67 High Street	86
214 Queen Street	80
313 Queen Street	78
317 Queen Street	86
319 Queen Street	86
396 Queen Street	77
9 Victoria Street East	79

Although the exceedance predicated to occur can be undertaken as a permitted activity, the provisions of the CNVMP still apply, and as such measures are to be taken to reduce the effect of noise from the works.

Construction noise from works outside of the road corridor

Construction noise from equipment within the Greys Avenue CSA, which is located outside of the road reserve, has been modelled and compliance with the permitted standards of E25 is achieved.

Construction Vibration Effects

In regard to vibration, the limits specified in Standard E25.6.29(1A)(b) do not apply to works within the road where a CNVMP is provided to Auckland Council no less than five days prior to works commencing. As noted already, a CNVMP has been provided with the resource consent application (**Appendix G**). As such, exceedance of the vibration limits can occur as a permitted activity.

The vibration limits outlined in Section E25.6.30(1)(a) are required to be achieved regardless of location and if a CNVMP is adopted. An assessment of construction vibration effects confirms that compliance with these standards is achieved.

9.6.5 Proposed Mitigation

To manage effects from construction noise and vibration, mitigation measures have been identified within the CNVA.

A CNVMP is to be adopted for the duration of the construction works. A draft CNVMP has been prepared and provided within the application (**Appendix G**). The CNVMP is to be used by the project contractor and updated as required.

The CNVMP sets out how communication will be undertaken between the consent holder (and its contractors) and the neighbouring properties, particularly those which are predicated to exceed the noise and vibration limits. The CNVMP requires that neighbouring properties are provided with 10 days advance notice of works commencing which will exceed the noise and vibration limits.

In addition to the CNVMP, the following physical mitigation measures will also be undertaken:

- Installation of site hoardings around the construction sites around the perimeter of each of the construction areas,
- Where practicable, use of localised movable acoustic screens/ barriers/ hoardings around high noise-generating equipment (e.g. around below ground level equipment),
- Select construction equipment that generates low noise output, for example, generators and/or water pumps are to be selected that have acoustic enclosures to reduce noise output,
- Select equipment with the appropriate power for the use (i.e., not using more powerful equipment than needed).

The CNVMP sets out managerial mitigation measures that are also to be followed during construction works. The managerial measures will further help reduce the level of noise and vibration output upon surrounding receivers.

It is recommended that pre- and post-construction surveys are undertaken on 323-327 Queen Street, 210 Queen Street and 290 Queen Street due to their proximity to construction shafts. During construction works, continuous vibration monitoring is required for the aforementioned buildings. If an exceedance of 2.5mm/s is recorded, all works are required to stop until the vibration source is identified and all mitigation measures are implemented to reduce the received vibration levels within the building.

During the first operation of pipe installation via trenchless construction, vibration measurements are to be undertaken to confirm the vibration levels meet the required criteria.

9.6.6 Summary of Noise and Vibration Effects

To determine the potential and actual effects from construction noise and vibration for the project, A CNVA has been prepared. The CNVA has predicated the likely noise and vibration output that may be generated from the works, taking a conservative approach.

Under the provision of Chapter E25 of the AUP, noise and vibration generated from works within the road corridor can generally exceed the noise and vibration limits when a CNVMP has been prepared and adopted during the works. As such, the effects from works generated within the road corridor are 'permitted' and do not require further consideration.

Noise generated from equipment within the Greys Avenue CSA has been modelled and compliance with the related standards achieved.

In terms of vibration effects, compliance with the permitted standards is achieved. As a precaution it is recommended that a pre- and post-construction survey of these buildings is undertaken.

In addition, the mitigation measures outlined within the CNVMP are to be implemented to further manage any adverse effects from construction works.

Overall, construction noise and vibration will have less than minor effects.

9.7 Natural Hazards Effects (Flood Hazard Assessment)

9.7.1 Description

Stormwater and natural hazards have been assessed in accordance with the requirements of the AUP, see **Appendix I**. The desktop review of existing natural hazards within the Auckland City Centre catchment area suggests that several overland flow paths ('OLFPs') and flood plains pass through and around the project area, and will affect each of the CSA sites.

While the proposed works within flooding hazards are permitted activities under Chapter E36, mitigation measures are detailed below.

9.7.2 Proposed Mitigation

At the shaft construction sites, it is considered possible to configure on-site bunds (detailed in the ESCP) to divert flood flows around the CSAs and onto the other side of the street. In particularly extreme rain events

flow may overtop the diversion bunds and inundate the construction site, however the CSAs will be mostly sealed, and little sediment is expected to be mobilised.

It was found that the kerbline within the Wellesley Street compound is especially shallow and requires silt socks to raise the kerbline and provide some additional freeboard for when an activated OLFP runs through the kerb channel. The remainder of the site and the other shaft CSAs are to utilise the bunds to divert flows around the site.

The Greys Avenue CSA is located within a pronounces gully, and therefore it is considered important to manage the use of this site to ensure that only resilient activities occur within the OLFP passage and flood zone, such as no earthworks or stockpiling of spoil. Because this site is likely to involve the storage of goods and materials, and because the nature and location of those materials is still at a preliminary stage, it is proposed that this is addressed in further detail within the Construction Management Plan ('CMP').

9.7.3 Summary of Natural Hazard Effects

As the proposed activity is permitted under the AUP, there are no adverse effects to be considered.

9.8 Effects on Archaeology

9.8.1 Description

The Auckland City Centre has an extensive history of Māori and European occupation. As this project comprises of significant work below ground, an assessment of effects on archaeology has been carried out by Clough and Associates, refer to **Appendix L**.

In urban areas, archaeological sites are rarely identified prior to exposure during excavation or earthworks. As such, the approach of this assessment has been to identify historically recorded activities in this location and assess the potential for archaeological evidence to have remained despite later changes to the environment.

9.8.2 Assessment Methodology

This assessment comprised of a desktop review of local and national archaeological records. The databases include Auckland Council's Cultural Heritage Inventory (CHI), Auckland Unitary Plan (AUP), New Zealand Archaeological Association's (NZAA) site record database (ArchSite) and the HNZPT New Zealand Heritage List/ Rārangi Kōrero. These records were searched for any known archaeological or historic heritage sites in the immediate vicinity of the project works. This information was supported by relevant literature and preceding archaeological reports.

9.8.3 Actual and Potential Effects on Archaeology

The proposed works are predominantly located within the road reserve with a history of modifications due to service installations, roading construction and maintenance. This site location reduces the potential for discovery of subsurface archaeological remains. Although, this does not rule out the presence of archaeological features as previous works in the road reserve have exposed pre-1900 sites including the Ligar Canal and Queen Street Main Sewer.

Potential effects on archaeology during construction has been assessed at each of earthwork locations. This includes each shaft, as well as the Greys Avenue CSA site and network connections at Wellesley Street. It is unlikely that the general tunnelling will encounter any archaeology as these works are to occur at a depth below expected remains (i.e, approx. 7 - 14m deep). Deeply buried topsoils are an exception to this as discussed below, albeit confirmation of their existence would not be possible using this method of tunnel boring.

9.8.3.1 Victoria Street Shaft

Located in the northeastern corner of the Victoria/Queen Street intersection, this shaft will not have an effect on the Ligar Canal or Queen Street Main Sewer which is located on the northwestern corner of the intersection. However, the shaft is located in the Waihorotiu Stream valley where buried topsoils and artefacts related to Māori settlement have been encountered during previous unrelated excavations. As such, it is indeed possible this archaeology could be reached during shaft construction, but confirming the existence of these would not be possible during the chosen method of shaft construction.

9.8.3.2 Wellesley Street Shaft

Located on the eastern side of the Queen and Wellesley Street intersection, this shaft will not impact any known archaeological or heritage listed sites. As with all shaft sites, there is potential to discover unrecorded

artefacts and topsoil beneath the road surface. Although if so, the most suitable construction method of concrete ring beam installation would not allow a discovery to be confirmed.

9.8.3.3 Mayoral Drive Shaft

Located on the western side of Queen Street, the shaft at Mayoral Drive will not impact on any known archaeological sites. As with all shaft sites, there is potential to discover unrecorded artefacts and topsoil beneath the road surface.

9.8.3.4 Greys Avenue CSA

Minor excavations at the Greys Avenue CSA may be required to level the site for construction machinery and equipment. While any excavations are expected to be shallow, there is potential to discover unrecorded artefacts and topsoil beneath the paved surface of the carpark.

9.8.4 Proposed Mitigation

To ensure a cautious approach, an Archaeological Authority has been applied for under Section 44(a) of the HNZPTA to cover all project earthworks. Consequentially, as recommended by Clough and Associates' independent assessment, the conditions of this authority will form the basis of mitigation against any adverse effects on archaeology. In addition, the standard 'accidental discovery protocols' of the AUP will apply to all excavations.

9.8.5 Summary of Effects on Archaeology

No known archaeological sites have been recorded within the area of project works. However, there remains potential to encounter unrecorded subsurface remains during construction. The accidental discovery protocols will apply to all excavations to ensure that any discovered archaeological remains are appropriately recorded, and ensure that effects are less than minor.

9.9 Built Heritage Effects

9.9.1 Description

Queen Street is recognised as one of the most historically significant streets in the region for its early establishment as a hub of commercial activity in the 1840s. As the project works are to occur in this densely built area of Auckland's city centre, an Assessment of Built Heritage Effects has been commissioned and included as Appendix N.

9.9.2 Assessment Methodology

The assessment has identified 18 items of heritage significance, which consists of 17 buildings and one heritage area (Myers Park). Under rule D17.4.1. (A9) of the AUP, modification to features within the extent of place of a scheduled heritage item is a restricted discretionary activity[6]. As such, effects on built heritage have been considered against the relevant criteria and matters of discretion for restricted discretionary activities listed in Chapter D17. The below ratings have been used to evaluate the impact of these effects:

- Significant negative
- Moderate negative
- Minor negative
- Neutral or Insignificant
- Minor positive
- Moderate positive
- Significant positive
- Unknown (based on the available information)

9.9.3 Actual and Potential Effects on Built Heritage

The 18 heritage items around the project area hold a mixture of heritage protection such as scheduling within the AUP and listing with Heritage New Zealand Pouhere Taonga. Of these 18 items, five buildings have extents of place in the AUP extending beyond the building footprint into the footpath and road reserve. Consequentially, these properties are at a greater risk of being impacted by the proposed works. The buildings with encroaching extents of place are:

[6] Refer to Section 5 of the Heritage Effects Assessment in Appendix N.

- Former John Courts Building, 210 Queen Street (Item 1)
- Civic Theatre, 269-285 Queen Street (Item 7)
- Civic House and Ferguson Building, 291-297 Queen Street (Item 8)
- Auckland Town Hall, 301-317 Queen Street (Item 12)
- Auckland Sunday School Union Building, 323-327 Queen Street (Item 14)

The table below rates the severity of effect caused by the project works in relation to the assessment criteria listed in Chapter D17.8.1 of the AUP.

Table 9-7: Built Heritage Effects Assessment

Built Heritage Effects Assessment	
Criteria	Rating
Whether the proposed works will result in adverse effects (including cumulative adverse effects) on the heritage values of the place and the extent to which adverse effects are avoided, remedied, or mitigated.	Neutral with recommended mitigation in place.
Whether the proposed works will maintain or enhance the heritage values of the place, including by: • avoiding or minimising the loss of fabric that contributes to the significance of the place; • removing features that compromise the heritage values of the place; • avoiding significant adverse effects on the place, having regard to the matters set out in B5 Historic heritage and special character; • complementing the form and fabric which contributes to, or is associated with, the heritage values of the place; and • recovering or revealing the heritage values of the place.	Neutral with recommended mitigation in place
Whether the proposed works will compromise the ability to interpret features within the place and the relationship of the place to other scheduled historic heritage places.	Neutral as the works are taking place below ground.
Whether the proposed works, including the cumulative effects of proposed works, will result in adverse effects on the overall significance of the place such that it no longer meets the significance thresholds for which it was scheduled.	Neutral with recommended mitigation in place
Whether the proposed works will be undertaken in accordance with good practice conservation principles and methods appropriate to the heritage values of the place.	Significant positive if a heritage consultant is engaged.
Whether the proposal contributes to, or encourages, the long-term viability and/or ongoing functional use of the place.	Positive as the outdated wastewater system will be upgraded.
The evidence of history should be respected, and new work appropriately recorded.	N/A
The work does not alter, obscure, or remove significant heritage fabric and fixtures.	Neutral with recommended mitigation in place
Where a historic place has landmark values, the proposed activity should not be visually dominating or distract from the landmark qualities of the historic place. The relative scale of the activity is an important consideration.	N/A
The proposed activity should provide for an adequate setting for the heritage item, enabling its heritage significance to be maintained. The significance and integrity of the setting should be identified. Well	Neutral

Built Heritage Effects Assessment	
Criteria	Rating
preserved, authentic, essential, and substantial settings should be retained and protected.	
The proposed activity should provide for adequate visual catchments, vistas and sight-lines or corridors to the heritage item from major viewing points and from the item to outside elements with which it has important visual or functional relationships.	N/A

Due to the fragile nature of heritage building materials, historic buildings can be particularly prone to vibratory damage during construction works. Under the RMA, German Standard DIN 4150-3:1999 is the legal requirement of measurement for vibratory effects from construction. The standard identifies the maximum Peak Particle Velocity (PPV) for various buildings in various circumstances, including 'sensitive structures', in order to avoid 'cosmetic damage'.

The 18 heritage items identified in this assessment have been classified as 'sensitive structures' in Table 9-11 below.

Table 9-8: Maximum PPV for structures

Type of structure	Short-term vibration				Long-term vibration
	PPV at the foundation at a frequency of:			PPV at horizontal plane of highest floor (mm/s)	PPV at horizontal plane of highest floor (mm/s)
	1-10Hz (mm/s)	10-50Hz (mm/s)	50-100Hz (mm/s)		
Commercial / Industrial	20	20-40	40-50	40	10
Residential / School	5	5-15	15-20	15	5
Historic or Sensitive Structures	3	3-8	8-10	8	2.5

In light of the sensitivity to vibration, mitigation measures have been identified that are to be implemented as part of the project works. The proposed measures are detailed below.

9.9.4 Proposed Mitigation

The built heritage assessment recommends the following measures to mitigate any potential adverse effects on built heritage:

- Engage a vibration specialist and Heritage consultant for construction monitoring;
- Employ the use of vibration monitors;
- Commissioning of Initial Seismic Assessments ('ISAs') and both pre and post construction assessments for built heritage items close to the proposed shafts, being the buildings at 210, 307 – 319 and 323 – 327 Queen Street (Items 1, 7, 8, 11 and C in the report);
- Adapt construction methodologies to minimise vibration;
- Undertake photographic monitoring on identified heritage buildings before, during and after construction works; and
- Consult with HNZPT regarding effects on Heritage Listed properties.

9.9.5 Summary of Effects on Built Heritage

In summary, the effects upon historic heritage have been assessed by the specialist as neutral. Monitoring will occur during construction works to ensure that damage to heritage buildings is avoided, ensuring that built heritage effects are less than minor.

9.10 Traffic Effects

9.10.1 Description

To enable to the project works, sections of the road corridor will be occupied by construction sites at multiple locations along Queen Street. Due to the resulting temporary changes required to the road network, a Traffic Impact Assessment ('TIA') has been prepared, refer to **Appendix M**.

9.10.2 Assessment Methodology

Prior to undertaking an assessment, an existing environment baseline scenario was established and has been discussed with Auckland Transport. The existing scenario takes account of the existing transport environment within the project area. The existing scenario has been created by SIDRA with recognised data sources from SCATS.

For the purpose of the assessment, the existing scenario differs from the existing environment on site, as it includes additional matters that must be maintained to provide the minimal acceptable outcome on the transport network. Therefore, the existing scenario is based on the following:

- Two vehicle lanes provide for in both directions.
- Traffic lanes cannot be below standard widths, with each lane being a minimum of 3.5m
- Traffic flows must accommodate for general traffic on Victoria Street (operational section)
- Eastbound traffic flows must accommodate general traffic on Wellesley Street West
- Two-way bus movements to be provided at the intersection of Wellesley Street and Queen Street for east-west movements.

For each construction location, construction scenario(s) have been prepared, to understand the potential effect caused by construction works. For an intersection that has a dedicated bus lane on approach and will have a reduction in exit lanes due to construction works, two construction scenarios have been created. One scenario retains the bus lane with dedicated bus phasing, with another scenario removing the bus lane, requiring buses to merge with general traffic, using the general traffic lane.

In preparing the assessment, the following assumptions have been relied upon:

- The intrusive works will largely occur in the carriageway (kerb to kerb) rather than on footpaths.
- Construction works are to commence from Q1 2024 and would be finished around Q1 2025 (approximately 15 months)
- Three shaft compounds will likely be in place and active at the same time (Q2 2024)
- Temporary traffic management (TTM) will require a yet to be determined taper on approach and departure from the shaft compounds. The actual impacted area associated with the shaft compounds are therefore likely to be longer than the size sites noted in the Design and Construction Statement (DCS) (**Appendix C**)

For the SIDRA modelling analysis, the following assumptions have been made:

- The 'worst case' scenarios will be undertaken to assess peak conditions as option scenarios.
- For intersections with data missing, the data collected comes from other intersections in corresponding direction, which have been adjusted to reflect the construction works.
- The Peak Flow Factor has been assumed as 95% for all traffic movements.
- The model was calibrated using updated signal phasing and the phase time was optimised using SIDRA model, however, the average Barnes Dance pedestrian phase time from SCATS was retained at intersection. The optimised base model and traffic delay are reflective of the current operation observed on site.

9.10.3 Actual and Potential Traffic Effects

The following considers the actual and potential traffic effects upon the road network from the construction works.

Intersection Operations - Queen Street/ Mayoral Drive Shaft

The proposed Mayoral Drive shaft will be located on Queen Street, just north of the intersection with Mayoral Drive. As a result, the number of available traffic lanes on Queen Street will be reduced. Under the existing scenario, two northbound lanes are available on Queen Street, one being a bus lane, another a general traffic lane.

Under Construction scenario 1, the bus lane on approach to the intersection would be retained, with a separate bus phase provided. Under Construction Scenario 2, the bus lane on approach to the intersection is removed, with buses having to use the general traffic lane to cross the intersection northbound. Figure 9-3 shows the intersection layout for the existing scenario and the two construction scenario options.

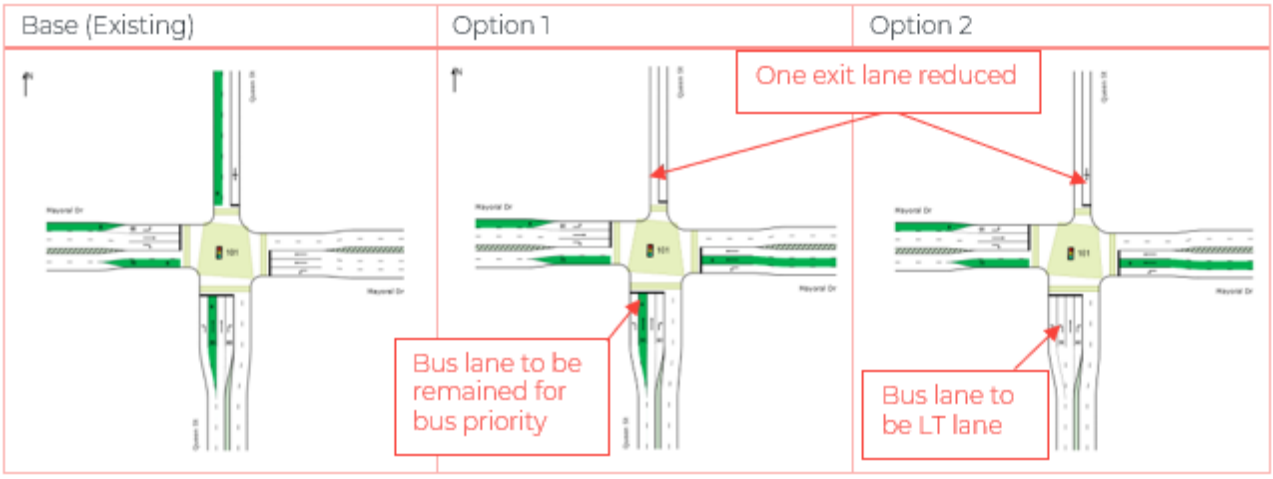


Figure 9-3 Mayoral Drive/ Queen Street intersection - layout options

The phasing and timing in Option 1 has been adjusted and optimised. In Option 1, it has been confirmed that adding a bus phasing will likely result in moderate delays to traffic through the intersection. The result shows that during the AM and PM peaks, the average delay through the intersection is increased by 11 seconds to 54-55 seconds which contributes to a D Level of Service (LOS) in both peaks.

In Option 2, It has been confirmed that without bus lane will likely have similar result to traffic through the intersection with the LOS of "D". However, the average delay time on public transport service will be longer than Option 1 due to no bus priority in this option.

Modelling result demonstrates that acceptable LOS D would be remained in both options by adjusting phasing and timing. Option 1 requires dedicated B phase function for buses on bus lane to avoid the potential conflict between bus lane and general lane, however previous feedback from AT has confirmed that this is their preferred scenario. AT will be required to implement this proposed mitigation and coordination with ATOC to ensure the phasing and traffic operation are closely monitored at this intersection during the proposed works.

Overall, with the proposed mitigation strategies, effects on general vehicle movements will be less than minor.

Intersection Operations - Queen Street/ Wellesley Street Shaft

To the east of the intersection is the proposed location of the Wellesley Street Shaft. Due to the location of the shaft and construction compound, the number of vehicle lanes will be reduced along Wellesley Street East. At present two lanes are provided in each direction, however with the construction compound in place, this will be change to one lane in each direction.

One construction scenario for Wellesley Street has been modelled, noting that the Wellesley Street Bus Improvements project is due to start construction in 2024, and will therefore reduce the carriageway to one

lane in each direction. Sensitivity tests were carried out by adjusting traffic signal phases and reducing traffic volume.

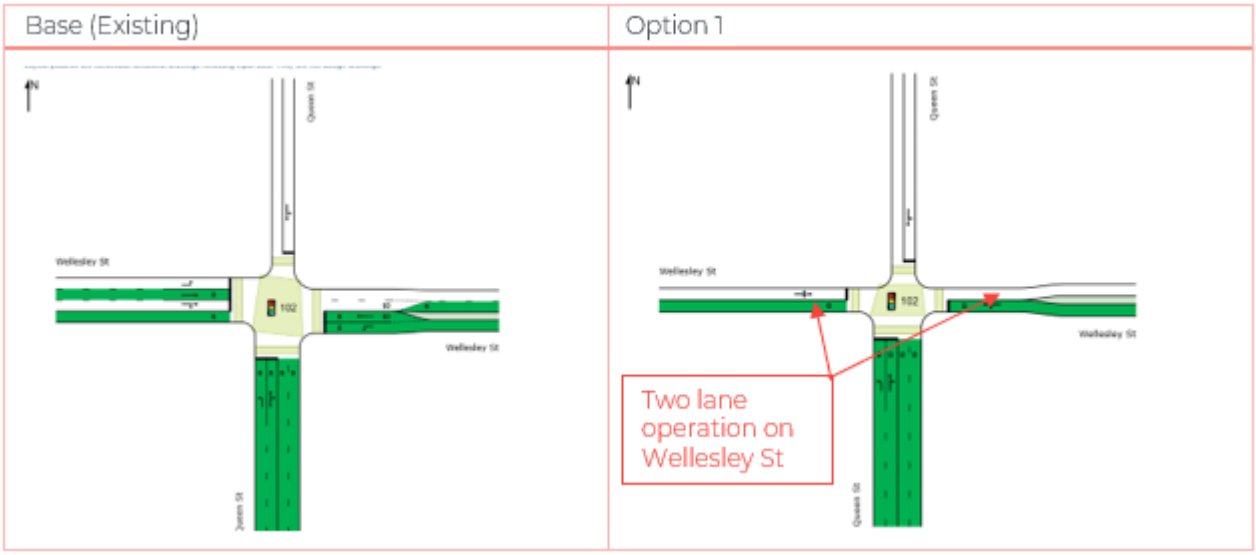


Figure 9-4 Queen Street/ Wellesley Street – layout options

The modelling results for the three scenarios is provided in Table 9-9 below.

Table 9-9 Queen Street/ Wellesley Street intersection modelling output

Scenario	AM			PM		
	Ave Delay (s)	DOS (v/c)	LOS	Ave Delay (s)	DOS (v/c)	LOS
Base/Existing	83	0.99	F	84	0.97	F
Option 1	168	1.18	F	190	1.18	F

Option 1 shows during AM peak the average delay through the intersection is increased by 84 seconds to 168 seconds, and the PM peak will be the worst case as the average delay time will reach to 190 seconds.

- To reduce the traffic delay to a more acceptable level and minimise travel disruption to transport network, a sensitivity analysis has made based on the assumption below: .Average Barnes Dance pedestrian phase time of 43 seconds reduced to 33 seconds.

Table 9-10 provides the results of the sensitivity analysis undertaken.

Table 9-10 Queen Street/ Wellesley Street Intersection - sensitivity analysis results

Scenario	AM			PM		
	Ave Delay (s)	DOS (v/c)	LOS	Ave Delay (s)	DOS (v/c)	LOS
Option 1	114	1.05	F	115	1.04	F

The results of the sensitivity analysis shows that signal phasing optimisation will contribute a reduction to the average delay times, being reduced by approximately 54 seconds in the AM peak, and 75 seconds in the PM peak. However, it is still expected that the reduction of lanes on Wellesley Street from four lanes down to two will cause notable traffic delays at this intersection.

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Overall, the effects on general traffic movements at the Queen Street / Wellesley Street intersection will be minor

Intersection Operations - Queen Street/ Victoria Street Shaft

The proposed shaft and compound location on Victoria Street East will result in a reduction in the number of vehicle lanes available. At present, two lanes are provided in each direction, with an additional turning lane provided at the intersection with Queen Street. With the shaft and compound in place, only one lane in each direction will be provided along Victoria Street East. Figure 9-5 shows the proposed intersection layout for the existing and construction scenarios.

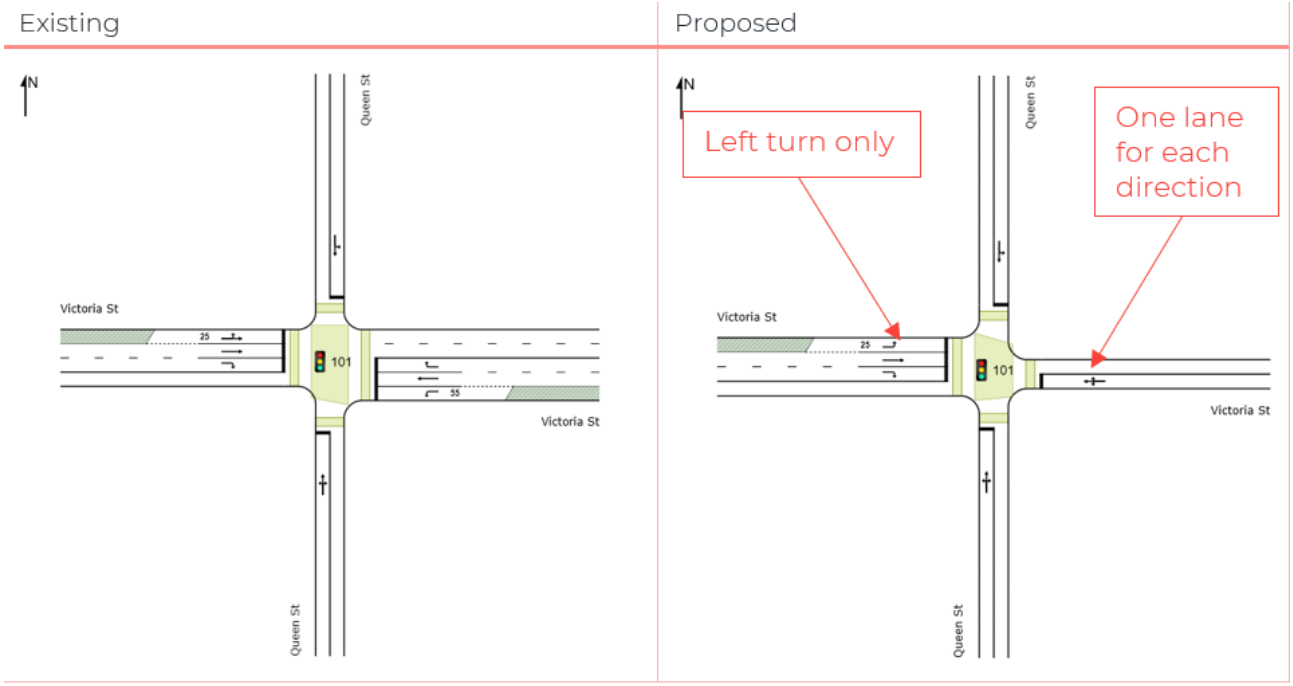

Figure 9-5 Queen Street/Victoria Street – layout options

The modelling results for the intersection are provided in Table 9-15. This includes the assumption that left turn from Queen Street to Victoria Street and right turn from Victoria Street to Queen Street will occur in different phases due to limited manoeuvring space.

Table 9-11 Queen Street/ Victoria Street intersection modelling output

Scenario	AM			PM		
	Ave Delay (s)	DOS (v/c)	LOS	Ave Delay (s)	DOS (v/c)	LOS
Base	59	0.86	E	58	0.87	E
Option	94	0.98	F	94	0.99	F

The result shows the increasing traffic volume will create delay by 35 seconds in both peaks which contributes to an overall drop in Level of Service (LOS) from “E” to “F”.

Sensitivity analysis has been undertaken for both construction scenario option, with the following assumptions:

- Reduction of the average Barnes Dance pedestrian phase time, from 37 seconds to 33 seconds.

Table 9-12 provides the results of the sensitivity analysis undertaken.

Table 9-12 Queen Street/ Victoria Street Intersection - sensitivity analysis results

Scenario	AM			PM		
	Ave Delay (s)	DOS (v/c)	LOS	Ave Delay (s)	DOS (v/c)	LOS
Option	81	0.94	F	81	0.94	F

The results of the sensitivity analysis show that the optimisation of the signal phasing will contribute to a minor reduction in the average delay at the intersection. The reduction is around 7 seconds for the AM Peak and 11 seconds for the PM Peak. The LoS remains at an F, but delay is reduced by 13 seconds.

With this mitigation, it is considered that the effects on general vehicle movements at the Queen Street / Victoria intersection will be minor.

The proposed Victoria Street shaft compound is expected to encroach the Queen Street/Victoria Street intersection. The vehicle tracking analysis shows that the proposed lanes would comfortably accommodate one vehicle and bus to go through while it is slightly constrained for vehicles (11m in length) turning left from Queen Street to Victoria Street. However, the possibility of large trucks turning left from Queen Street to Victoria Street is low due to the restriction of construction vehicles movements on Queen Street.

Furthermore, this potential conflict can be addressed by setting back the Victoria Street East approach's stop lane about 5m to the east to provide sufficient manoeuvre spaces. The separated phasing setting can avoid the potential conflicts that when vehicles turn left from Queen Street to Victoria Street East

Public Transport

The City Centre contains a number of key public transport corridors, with multiple bus services operating within the project area. As such, the TIA has considered the potential effect upon public transport operations. The following considers the effects at each construction site location/ compound.

Queen Street/ Mayoral Drive Shaft

The construction compound will result in the removal of 60m of bus lanes from Queen Street, just north of the intersection with Mayoral Drive. As such buses moving along this section of Queen Street will need to merge/ use the general traffic lane, potentially resulting in a reduction in the efficiency and reliability of bus services along this section of road.

Two bus stops (Stops ID 7059 and 7060) will need to be relocated or altered to maintain bus operations. The changes to the bus stops are not considered to negatively influence bus operations or the experience of users of bus services for the two stops.

Overall, effects on the public transport network at this location will be minor.

Queen Street/ Wellesley Street Shaft

Around 40m length of bus lane on the north side of Wellesley Street will be removed, with buses merging with general, resulting in bus services along Wellesley Street having reduced efficiency and reliability.

Two bus stops will also need to be relocated to accommodate the Wellesley Street shaft and construction compounds, being Bus Stop ID 1094 and ID 7006. Bus Stop ID 1094 will be relocated to a new location, which is either directly adjacent to or part of the existing loading bay at 18 Wellesley Street.. The proposed relocation of Bus Stop ID 1094 is shown in Figure 9-6.

Figure 9-6 Relocation of bus stop ID 1094

For Bus Stop ID 7006, located on the south side of Wellesley Street, it has been assessed that this stop can remain in place and will retain the same level of services required for bus operations.

In addition to the effects on the network from the proposed CSA, short-term lane closures and bus detours will be required at this intersection during the construction of open cut network connections, as noted above in Section 5.7.

This will require short-term lane closures and bus detours for the construction of two of the three connections, which are proposed to be undertaken over long weekends and the Christmas shutdown period (Christmas week and first week of January). The proposed bus detours have been workshopped with AT Metro and approval in principle provided. Advanced notice of at least 20 working days will be given to the AT to ensure that the detours can be implemented.

Overall, from a public transport perspective, it is considered that the proposed works and service diversions will have a minor effects on the network..

Walking, Cycling and Micro-mobility

For all construction locations, it is considered that the effect upon walkers will be less than minor. Footpaths are to be retained; however, they may be some changes to how pedestrian crossing points are accessed. The TIA recommends that Watercare consult with the local blind/ low vision community about the works and ensure they feedback is incorporate into any temporary layout changes.

For people on bicycles and users of micro-mobility devices, the effects from the construction works are less than minor. The proposed works will not alter any existing share-spaces or reduce any existing facilities.

Loading Facilities

Due to parts of the road corridor being occupied, existing on street loading facilities will need to be modified or relocated. . Table 9-18 identifies the affected loading zones.

Table 9-13: Effects on Loading Zones

Project works location	Loading Zone	Proposed changes
Queen Street/ Mayoral Drive	Located at 321-327 Queen Street	This loading zone will be occupied by the shaft/ construction compound. Alternative loading zone is available 60m away located at 380 Queen Street.
Queen Street/ Wellesley Street	Located at 10 Wellesley Street Located at 18 Wellesley Street	As noted above, one of or part of a loading zone may be used by a bus stop during construction works. Alternative provisions for loading zones are available nearby, located further east on Wellesley Street, Lorne Street and Queen Street.
Queen Street/ Victoria Street	Located on Victoria Street East	This loading zone will be occupied by the shaft/ construction compound. Three other loading zones are available around 50m away.

9.10.4 Proposed Mitigation

The TIA has set out mitigation measures that can be implemented to reduce adverse effects on the transport network during construction works. The initial findings of this report have been shared with AT across two meetings, as detailed in Section 6.4 above, and the proposed mitigation strategies have been adapted following their feedback.

In relation to the Queen Street/ Mayoral Drive Shaft location, the following is recommended:

- Introduce a separate bus phase to allow priority for buses travelling northbound on Queen Street
- Relocate bus stop ID 7059 17m to the north along Queen Street to provide safe manoeuvring distance for buses using the stop;
- When bus stop ID 7060 is occupied by a bus, the other bus travelling southbound gives way to northbound travelling buses to avoid potential conflict;

- Inform the bind community about the proposed works, to inform members and apply any additional mitigation that may be recommended;
- Construction vehicles should stage movements to avoid peak hour traffic periods; and
- Liaise with ATOCs to adjust traffic signal phases at intersections to optimise traffic operations

In relation to the Queen Street/ Wellesley Street Shaft location, the following is recommended:

- Relocate bus stop ID 1094 to the loading zone outside 18 Wellesley Street.
- Bus drivers using the relocated bus stop at 18 Wellesley Street should move forward if they are parked at the back bus bay and the front bus leaves the stop. This is to assist incoming buses in manoeuvring safely into the bus stop. This will require reassigning the kerb side lane to a bus stop to avoid double-decker buses hitting the tree branches which are located close to the kerb.
- Consider providing a temporary hard stand area at this proposed temporary bus stop.
- Close the loading zone at 18 Wellesley Street and inform users to use alternative loading zones such as Lorne Street.
- Inform the blind local community about works going to happen to inform members and apply any additional mitigation as requested by these groups; and
- Only undertake open cut construction works at this location over the Christmas shutdown period and over long weekends. AT are to be given at least 20 working days notice before any works are to proceed.

In addition to these specific measures, it is recommended that Watercare undertake a public information campaign prior to works commencing to identify alternative routes to the public and reduce traffic volumes at the affected intersections.

9.10.5 Summary of Traffic Effects

Construction works will have an effect upon the operation of the transport network within the City Centre. Analysis has been undertaken at key intersections to understand the actual and potential effects, and what measures can be used to reduce adverse effects.

The proposed works are temporary in nature, and suitable mitigation is proposed to ensure that effects on the public transport and active transport networks are minimised. Overall, it can be considered that the effects of the works range from less than minor to no more than minor.

9.11 Cultural Heritage Effects

9.11.1 Description

Sites and places of significance to Mana Whenua have tangible and intangible cultural values in association with historic events, occupation, and cultural activities. The Project has the potential to generate effects to a site of cultural significance to Mana Whenua, being the covered Horotiu Stream (AUP ID 084), due to excavations to create the shafts and utility connections.

9.11.2 Assessment Methodology

As described in Section 7.2 above, proactive engagement with iwi representatives has occurred to understand the potential for any effects on cultural heritage. Watercare's standard engagement process includes early notification of works to be undertaken to the "Kaitiaki Managers Projects List" on a monthly basis.

The Project was first notified to this list in September 2020 and was re-notified in 2021 after a period of inactivity. All iwi representatives that have registered an interest in the Project have received regular updates on design evolutions and early investigation works, and have been afforded the opportunity to provide feedback. To date, no iwi has requested to provide a Cultural Impact Assessment or similar.

9.11.3 Actual and Potential Cultural Heritage Effects

To date, Iwi have not identified any cultural heritage effects resulting from the proposal, due to its location within a road reserve. Queen Street is within a long-established, highly modified urban environment, and therefore any tangible values associated with the Horotiu Stream site have been effectively destroyed. Further, each of the construction shafts will be reinstated with a manhole, ensuring that any ongoing effects are minimised.

9.11.4 Proposed Mitigation

As noted above, representatives from Ngati Whatua Orakei undertook a blessing on the site in August 2022 to mark the beginning of the investigations programme, and will be invited to return to bless the site at the conclusion of this programme in mid to late 2023.

In addition, the accidental discovery protocol will be applicable to all excavations within the Project area. Any cultural artefacts, human remains / kōiwi or archaeological remains that are uncovered by the works will be subject to the protocol and all relevant parties will be informed.

9.11.5 Summary of Cultural Heritage Effects

Overall, any actual or potential cultural heritage effects generated by the Project will be negligible.

9.12 Air Quality Effects

9.12.1 Description

As noted above, the preferred method to power the mTMB is using electrical mains power, however if this is not feasible then an 800kW diesel generator will be utilised within the Greys Avenue CSA. The location of the generator will be near the corner of Mayoral Drive and Greys Avenue, away from the boundaries of adjacent properties.

9.12.2 Actual and Potential Air Quality Effects

The emission of contaminants from the combustion of the diesel generator is not anticipated to generate adverse air quality effects. The use of a generator is standard for a construction project of this nature, and will result in a temporary discharge only. As noted above, the generator will be located away from the boundary of any neighbouring properties to reduce potential effects on the health of surrounding residents and businesses.

The generator is not anticipated to give rise to offensive of objectionable odour.

9.12.3 Proposed Mitigation

Standard construction management techniques will be employed to ensure that the discharge of contaminants to air from the generator is minimised as far as practicable. The generator will be subject to a prestart check before it is commissioned on site, and will be serviced by the constructors are per the supplier's recommendations. Any malfunctions will be repaired within 24 hours of detection. Emissions from the generator will be visually monitored for particulate matter to ensure the fuel is combusting efficiently.

If unexpected odour is detected during construction works then operation of the generator will cease and measures to address the odour will be investigated and implemented.

9.12.4 Summary of Air Quality Effects

Overall, any actual or potential effects on air quality generated by the proposed discharge of contaminants to air will be less than minor.

9.13 Summary of Actual and Potential Effects

Overall, the effects of the Project will be no more than minor.

10 Environmental Mitigation Measures

Based on the assessment of environmental effects, mitigation and management measures have been identified and recommended to avoid or reduce adverse effects upon the receiving environment. Table 10-1 below provides a high-level overview of the key recommended environmental mitigation measures for the Project.

Table 10-1 Recommended environmental mitigation and management measures

Mitigation and management measures	
Topic	Proposed measures
Groundwater and Settlement	Provision of a GSMCP, which will outline the groundwater and settlement monitoring requirements for the Project and be certified by Council before works commence. Condition surveys of buildings assessed within the 'slight damage' category will be undertaken before and after the construction works.
Land Contamination	All soil removed from site shall be disposed of at an appropriately licensed facility.
	Works are to be carried out in accordance with the Site Management Plan (**Appendix H2**)
Land disturbance	Hot mix asphalt bunds are to be constructed around the perimeter of each CSA site in the proposed works as a control device to divert flood flows. Construction details for each bund are available in **Appendix J**.
	Access points and entrances at each CSA site are to be stabilised in accordance with GD05 to minimise generation of sediment and dust.
	Collect and discharge sediment-laden water offsite as per the Dewatering Assessment in **Appendix F**.
Noise and Vibration	Works are to be carried out in accordance with the Construction Noise and Vibration Management Plan (**Appendix G2**).
	Undertake vibration monitoring at all shaft construction sites
	Undertake pre and post-construction condition surveys on all buildings identified in the vibration assessment.
Arboriculture	A pre-construction meeting is to be held to discuss relevant tree protection.
	Ensure any arboriculture conditions of consent are monitored by a qualified arborist.
	Avoid damage to trees by employing protective fencing and storing machinery outside the root zone.
Archaeology	To be taken from Archaeological Authority.
Built Heritage	Engage a vibration specialist/ heritage consultant to monitor construction.
	Commissioning of ISAs and both pre and post construction assessments for the identified built heritage items close to the proposed shafts
	Undertake photographic monitoring of all heritage buildings identified in the Built Heritage Assessment before, during and after construction works.
	Engagement with HNZPT
Air Quality	The generator will be serviced as recommended by the supplier and visually monitored to ensure the discharge of contaminants is minimised as part as practicable.
Traffic	Introduction of phasing changes to the intersections of Queen Street with Mayoral Drive, Wellesley Street and Victoria Street
	Relocate bus stops ID 1094, 7059 & 7060 and consider providing temporary hardstand
	Open-cut construction works at the Wellesley Street shaft restricted to public holiday weekends and the Christmas statutory shutdown period.
	Watercare to undertake consultation and a public information campaign prior to works commencing to reduce traffic volumes in the area.

Further details of the full list of conditions of consent (including specific wording) can be agreed between Council and Watercare once a s92 request has been issued.

11 Affected Parties and Notification Assessment

11.1 Section 95A – Determining Public Notification

The process set out in section 95A of the RMA for determining public notification is summarised in Table 11-1, together with an assessment of the current application against each step.

Table 11-1: Step by Step Process for Public Notification

	Description of Process	Assessment
STEP 1	Mandatory public notification in certain circumstances. An application must be publicly notified if: • the applicant requests public notification • public notification is required under section 95C (which relates to notification after a request for further information or report) • the application is made jointly with an application to exchange recreation reserve land.	• The applicant does not request notification • Section 95C is not relevant as no further information has been requested at the time of lodgement • No reserve land is involved or being exchanged PROCEED TO STEP 2
STEP 2	If not required by step 1, public notification is precluded in certain circumstances. An application cannot be publicly notified if: • a rule or national environmental standard (NES) precludes notification • the application is for one or more of the following, but no other, activities: 1. a controlled activity 2. a restricted discretionary, discretionary, or non-complying activity, but only if the activity is a boundary activity If the application is for multiple activities, public notification is only precluded for the application as a whole if each individual activity is precluded from public notification. If public notification is precluded under this step, then step 3 doesn't apply but consideration under step 4 is required (special circumstances).	There are no rules or national environmental standard that precludes notification of this application. The application is not for a controlled activity or boundary activity. PROCEED TO STEP 3
STEP 3	If not precluded by step 2, public notification is required in certain circumstances. Other than for those activities in step 2, public notification is required if: • a rule or NES requires public notification • the assessment under section 95D determines that the activity will have, or is likely to have,	There are no rules or provisions under the NES-CS or NES-FW which require public notification. The assessment of effects at Section 9 found that the adverse effects of the Project on the environment are avoided, remedied or mitigated to an acceptable level.

	Description of Process	Assessment
	adverse effects on the environment that are more than minor. If the application is for multiple activities, and any part of that application meets either of the above criteria, the application must be publicly notified in its entirety.	A summary of the key findings above notes: • Groundwater drawdown and settlement effects on adjacent buildings is assessed to be negligible. Groundwater and settlement monitoring will occur during construction to ensure unexpected effects do not occur; • Engagement with AT has been undertaken to agree suitable mitigation for construction effects on the transport network and public transport services; • Mitigation measures for potential noise and vibration effects are outlined in the NNVMP; • Further construction management plans are proposed to manage construction effects, including an ESCP, CTMP, GSMCP etc; • Engagement with the public has occurred, as outlined in Section 6 Due to these mitigation measures, for the purposes of s95D, the actual and potential effects of the Project are not considered to be more than minor (being assessed as minor or less than minor). PROCEED TO STEP 4
STEP 4	Public notification in special circumstances. If notification is precluded under step 2, or isn't required under step 3, consideration must be given to whether special circumstances exist that warrant public notification of the application. The presumption for special circumstances has changed so that, if the consent authority determines special circumstances exist, the council must notify the application (i.e. it is not discretionary).	There are no special circumstances which are relevant to this application. The application proposes a new wastewater main sewer, which is provided for in the AUP as a critical piece of public infrastructure. As such, there is nothing unusual or exceptional about the proposal. PUBLIC NOTIFICATION NOT REQUIRED.

11.2 Section 95B – Determining Limited Notification

An assessment of the application against Section 95B of the RMA is not required as the applicant has requested public notification.

The process set out in section 95B of the RMA for determining limited notification and potentially affected persons is summarised in Table 11-2, together with an assessment of the current application against each step.

Table 11-2: Step by Step Process for Limited Notification

	Description of Process	Assessment
STEP 1	Certain affected groups and affected persons must be notified. If the consent authority determines that certain people or groups are affected, these persons/groups must be given limited notification: • affected protected customary rights groups • affected customary marine title groups (in the case of an application for a resource consent for an accommodated activity) • whether the proposed activity is on or adjacent to, or may affect, land that is the subject of a statutory acknowledgement and whether the person to whom the statutory acknowledgement is made is an affected person under section 95E	There are no customary rights groups or customary marine title groups affected by the Project. The location of the Project area is not affected by a statutory acknowledgement as identified in Appendix 21 of the AUP. PROCEED TO STEP 2
STEP 2	If not required by step 1, limited notification is precluded in certain circumstances. An application cannot be limited notified if: • a rule or NES precludes limited notification of the application • the application is for a controlled activity (but no other activities) that requires a resource consent under a district plan (other than a subdivision of land) If the application is for multiple activities, limited notification is only precluded for the application as a whole if each individual activity is precluded from limited notification. If limited notification is precluded under this step, then step 3 doesn't apply but consideration under step 4 is required.	There are no rules or NES provisions which preclude limited notification. The application is not for a controlled activity under a district plan. PROCEED TO STEP 3

	Description of Process	Assessment
STEP 3	If not precluded by step 2, certain other affected persons must be notified. Except for boundary activities and any activities prescribed under the regulations relating to notification of consent applications (section 360G(1)(b)), the consent authority must notify any other person they determine to be affected under section 95E. For boundary activities, only those persons whose written approval would have been required under new section 87BA are eligible to be notified. These eligible persons must be notified if they are determined to be affected persons under section 95E.	The application is not for a boundary activity or any other prescribed activities. The assessment in Section 9.11 above notes that effects on the transport network will be minor due to disruption to vehicle movements and public transport services. AT are identified as the affected party in their role as the regulator of the road network and operator of public transport services. Engagement with AT has occurred prior to lodgement, and AT have provided written support for the project under S95E (3) of the RMA. As such, Limited Notification of the application is not required to AT. A copy of the written approval from AT is attached to this application as **Appendix R**. PROCEED TO STEP 4
STEP 4	Further notification in special circumstances. The determination of special circumstances is new to limited notification. If the consent authority determines special circumstances exist that warrant limited notification of the application to any other persons not already determined to be eligible for limited notification (excluding persons assessed under Section 95E as not being affected persons), the council must give limited notification to those persons (i.e. it is not discretionary).	As discussed above, there are no special circumstances which are relevant to this application. LIMITED NOTIFICATION IS NOT REQUIRED

11.3 Summary of Notification

As assessed above, the application can proceed without public or limited notification.

12 Statutory Assessment

Section 104 of the RMA sets out the matters to which a consent authority must have regard to, subject to Part 2 of the RMA, when considering an application for resource consent. These are:

- Any actual and potential effects on the environment of allowing the activity (refer Section 9 above);
- Any measure proposed or agreed to by the applicant for the purpose of ensuring positive effects on the environment to offset or compensate for any adverse effects on the environment that will or may result from allowing the activity;
- Any relevant provisions of:
    - a national environmental standard;
    - other regulations;
    - a national policy statement;
    - a New Zealand coastal policy statement (not applicable);
    - a regional policy statement or proposed regional policy statement;
    - a plan or proposed plan; and
- Any other matter the consent authority considers relevant and reasonably necessary to determine the application.

12.1 National Environmental Standards (NES)

12.1.1 NES for Assessing and Managing Contaminants in Soil to Protect Human Health (CS)

The NES-CS is the only National Environmental Standard relevant to this application. The NES-CS provides national planning controls that direct the requirement for consent, or otherwise, for activities on contaminated or potentially contaminated land. All territorial authorities are required to give effect to and enforce the requirements of the NES-CS in accordance with their functions under the RMA relating to contaminated land.

The effects of the disturbance of contaminants have been addressed in Section 9.4 above.

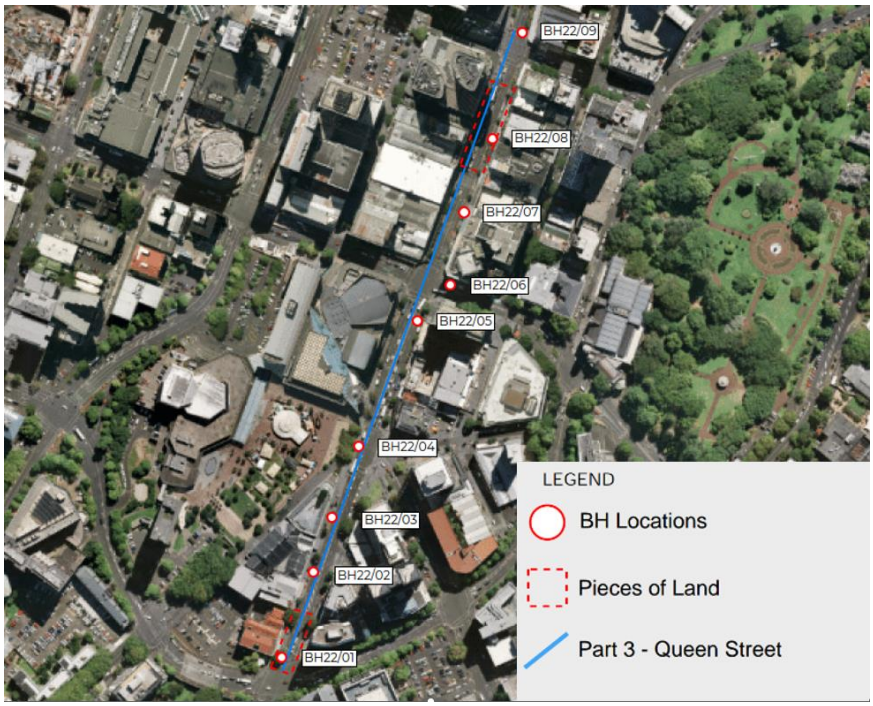

Figure 12-1: Soil Sampling Results from the DSI

12.2 National Policy Statements

12.2.1 National Policy Statement on Urban Development

The National Policy Statement on Urban Development (NPS-UD) came into force in 2020 to allow for intensified urban development in areas with growth capacity. As the project area is located within the city centre zone, Policy 3 of the NPS-UD seeks to enable '*as much development capacity as possible*' in this '*tier 1*' environment. In the Policy Statement, the definition of development capacity directly relates to the '*provision of adequate development infrastructure*'. As such, this project is aligned with the NPS-UD as it will provide the necessary wastewater capacity to service an increasing residential population in Auckland's city centre.

12.3 Regional Policy Statement

The AUP (OP) Regional Policy Statement (RPS) recognises the importance of the management of and investment in infrastructure (B3 Ngā pūnaha hanganga, kawekawe me ngā pūngao - Infrastructure, transport and energy).

The RPS recognises the importance of natural resources, in particular the value of indigenous biodiversity and the importance of integrated management between development (including infrastructure) and freshwater as well as manging adverse effects from wastewater discharges to freshwater (B7 Toitū te whenua, toitū te taiao – Natural resources). As discussed in this report, the Queen Street project has been designed to minimise its impact on the natural environment while providing a vital service to the upper City Centre catchment.

In light of the above and the detailed assessment provided in **Appendix Q**, the proposed works are considered to be consistent with the relevant provisions of the RPS.

12.4 Relevant AUP Objectives and Policies

The proposed works have been assessed against the relevant objectives and policies of the AUP, from the following chapters:

- E7 Taking, using, damming and diversion of water and drilling
- E12 Land Disturbance – District
- E14 Air Quality
- E16 Trees in Open Space Zones
- E26 Network Utilities
- E25 Noise and Vibration
- E30 Contaminated Land
- E31 Hazardous Substances
- E36 Natural Hazards and Flooding

A detailed assessment of the project works against the relevant objectives and policies is provided in **Appendix Q**. In summary, the proposed works are considered to be in accordance with AUP for the following reasons:

- Upgrading the wastewater network will reduce the current occurrence of overflows into the stormwater network and create a higher-quality urban environment for a greater population. At present, these wastewater overflows can disturb the City Centre with odour and exposure to contaminants.
- As the project site crosses the covered Horotiu Stream, Mana Whenua have been engaged with by Watercare and informed of the Project's limited impact on the underground stream. To date, Mana Whenua have not identified any cultural effects on the mauri of the water resulting from the project, due to its location in the road reserve of a highly urban area.
- The trenchless construction methodology has been selected for its minimised disturbance of activities at street level compared to open-cut alternatives. An ESCP has been prepared to ensure any adverse effects caused by land disturbance have been appropriately mitigated.
- A comprehensive management plan for construction noise and vibration is included within **Appendix G2** of this report. This CNVMP details physical and managerial mitigation measures to be implemented in order to protect people from unreasonable levels of noise, including: equipment

selection prioritising quieter technologies, physical barriers and implementation of a TMP to minimise reversing truck movements.

- A PSI and DSI have been completed to establish locations where soil containing contaminants may exist. An SMP will be developed as a condition of consent which will outline the procedures and processes to be undertaken to manage soil disturbance and disposal near any recorded contaminated sites.
- The use of the generator to power the mTBM tunnelling works will minimise adverse air quality effects by using the best practice management practices for emission control, including locating it away from adjacent properties and undertaking monitoring as appropriate.

12.5 Relevant AUP Standards and Assessment Criteria

Based on the identified reasons for consent, the AUP provides standards and assessment criteria that are relevant to the project works. Within Appendix Q is an assessment of these standards which demonstrates the project's ability to meet the requirements of the AUP.

For avoidance of confusion, standards relating to the permitted activities in these works have been detailed in **Appendix E** and are not recorded here.

Although the overall activity status of the application is Discretionary, a number of activities are Controlled or Restricted Discretionary. An assessment is provided in **Appendix Q** against the relevant assessment criteria.

Overall, the assessment supports the project's alignment with the applicable AUP standards and assessment criteria as Specified Management Plans have been completed by specialists to ensure the works continue to comply with applicable standards throughout construction. The management plans include: Site Management (contaminated land), Construction noise and Vibration, Erosion and Sediment Control and Traffic.

12.6 Other Matters

There are no other matters relevant to this application.

13 Part 2 Considerations

Part 2 of the RMA sets out the purpose and principles of the Act. The purpose of the RMA is to promote the sustainable management of natural and physical resources.

The Court of Appeal decision in *RJ Davidson Family Trust v Marlborough District Council* has clarified that if a plan "has been competently prepared" then a decision maker may well "feel assured" in taking the view that there is no need to refer to Part 2 because "doing so would not add anything to the evaluative exercise". While the decision maker in relation to this resource consent application may determine that the AUP has been competently prepared, and therefore deem reference to Part 2 unnecessary. However, for completeness the matters set out in Part 2 have been assessed in this resource consent application.

13.1 Section 5

The purpose of the RMA is to promote the sustainable management of natural and physical resources. Section 5 goes on to elaborate on the definition of sustainable management, noting:

(2) In this Act, "sustainable management" means managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural wellbeing and for their health and safety while -

> (a) Sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and
>
> (b) Safeguarding the life-supporting capacity of air, water, soil, and ecosystems; and
>
> (c) Avoiding, remedying, or mitigating any adverse effects of activities on the environment.

Considering the above, the proposed works as described in Section 5 of this report are required to facilitate the construction of the new wastewater trunk line within the road reserve of Queen Street in Auckland City Centre. The proposed works will take pressure off the existing wastewater system by providing additional capacity and reduce the volume and frequency of overflows by diverting combined flows during adverse weather events, thereby safeguarding the life-supporting capacity of the coastal environment.

Overall, though avoiding overflows and increasing the capacity of the network for intensification, the works will enable people and communities to provide for their social, economic and cultural well-being for their health and safety consistent with the purpose of the RMA.

The assessment of effects in Section 9 of this report has demonstrated that long term adverse effects on the environment can be avoided, remedied or mitigated. Short term construction impacts have been avoided where possible and management and mitigation measures are suggested where they have been unable to be avoided. Given this, the proposal is broadly consistent with the purpose of the RMA.

13.2 Section 6

The matters of national importance which are relevant to this Project are:

> (a) the preservation of the natural character of the coastal environment (including the coastal marine area), wetlands, and lakes and rivers and their margins, and the protection of them from inappropriate subdivision, use, and development:
>
> (e) the relationship of Maori and their culture and traditions with their ancestral lands, waters, waahi tapu and other taonga.
>
> (f) the protection of historic heritage from inappropriate subdivision, use and development
>
> (h) the management of significant risks from natural hazards

These matters are addressed in Section 9 of this report and are summarised below.

As noted above, the Project will reduce the frequency and volume of overflow events to the Waitematā Harbour, which will improve the existing character of the coastal environment and reducing odour.

Whilst the works will require ground disturbance associated with the excavation for the pipeline, overland flow paths will be maintained during construction and the ground will be restored to its natural level upon completion of works and will not alter the contours of the site or increase flood risk following construction.

The archaeological assessment did not identify any historic heritage that would be affected by the construction, however if unidentified artefacts are discovered the accidental discovery protocols will be implemented.

It is noted in terms of the relationship of Māori and their culture and tradition with waters, that the overall project alleviates existing capacity constraints within the wastewater network, thereby reducing the frequency and volume of overflow discharges to Waitematā Harbour and aligning with cultural values.

The works are considered to be consistent with Section 6 of the RMA.

13.3 Section 7

Section 7 sets out other matters to be considered. Of particular relevance to this Project are:

(a) kaitiakitanga:

(b) The efficient use and development of natural and physical resources

(f) the maintenance and enhancement of the quality of the environment:

The objective of the proposed works is to enable upgrades to the existing wastewater network in Auckland's City Centre, which will provide additional capacity to the existing system and reduce the risk of potential overflows during flooding events. This will in turn support the maintenance and enhancement of the quality of the environment, particularly within Waitematā Harbour, while providing for future development within the City Centre. The works will be installed below ground and so is considered efficient use of natural resource. Considering this, the works are consistent with Section 7 of the RMA.

13.4 Section 8

Section 8 states: "In achieving the purpose of this Act, all persons exercising functions and powers under it, in relation to managing the use, development, and protection of natural and physical resources, shall take into account the principles of the Treaty of Waitangi (Te Tiriti o Waitangi)". The wording "shall take into account" requires decision makers to consider the principles of the Treaty with all other matters.

The proposed works will not occur within land subject to a treaty settlement, however Watercare has engaged with their Kaitiaki Managers Projects List, as the Project is partially located within the SPSMW overlay. No effects on cultural values or heritage from the Project have been identified by mana whenua.

14 Conclusion

The proposed works are part of Watercare's programme of works to upgrade the existing wastewater network of the upper catchment of the Auckland City Centre. The purpose of this Project is to increase the capacity of the network to enable future development in the area by installing a new wastewater main in the road reserve of Queen Street. This project forms Part 3 of a wider programme of work.

Consent is required under Chapters E7, E14, E26, and E30 of the AUP, along with the NES-CS. The overall activity status of the application is Discretionary.

The key potential adverse effects of the proposal relate to land settlement from the diversion and take of groundwater, disruption from road detours and construction traffic, effects on a place of cultural significance to mana whenua and construction noise and vibration on private properties. It is assessed that any adverse effects associated with the works are temporary and will be avoided, remedied or mitigated through the implementation of mitigation measures such as the ESCP, CNVMP, SMP, TPM, GSMCP and CTMP, and appropriate construction methodologies.

As discussed above, effects on the transport network due to disruption to vehicle movements and public transport services will be minor, however AT has provided written support in accordance with s95E (3) of the RMA, and therefore the application does not require limited notification. All other effects from the proposal will be less than minor.

The proposed works are considered consistent with the purpose of Part 2 of the RMA in that it allows for the management of natural and physical resources in a way that enables people and communities to provide for their social, economic and cultural well-being and for their health and safety. The proposal is also consistent overall with the objectives and policies of the relevant statutory documents, as it is public infrastructure and can be constructed, operated and maintained in a manner which avoids, remedies or mitigates adverse effects on the environment.

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