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ASSESSMENT OF EFFECTS ON THE ENVIRONMENT Britomart Transport Centre Notice of Requirement Alteration to Designation 2501

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Document prepared by:

Aurecon New Zealand Limited

Level 4, 139 Carlton Gore Road
Newmarket Auckland 1023
PO Box 9762
Newmarket Auckland 1149
New Zealand

T +64 9 520 6019
F +64 9 524 7815
E auckland@aurecongroup.com
W aurecongroup.com

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Author signature		Approver signature	
			
Name	Helen McLean Hayley Martin	Name	Dean Ingoe
Title	Associate, Environment and Planning Consultant, Environment and Planning	Title	Director, Environment and Planning



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1 Introduction

1.1 Purpose of the Assessment of Effects on the Environmental

City Rail Link Limited (CRL) gives notice of a requirement (NoR), pursuant to section 181(1) of the Resource Management Act 1991 (RMA), for an alteration to the Britomart Transport Centre¹ (BTC) Designation 2501 to support the City Rail Link (CRL) construction.

The NoR is set out in this Assessment of Effects on the Environmental (AEE), appendices to the AEE and the accompanying Form 18.

1.2 City Rail Link Limited

The CRL project was originally an Auckland Transport (AT) project but is now being delivered by CRL, a Crown entity established on 1 July 2017 and jointly owned by the Crown and Auckland Council (AC) (the CRL project sponsors). CRL has governance, operational and financial responsibility for design and construction of the CRL project – including works within the BTC. On 10 August 2017, CRL was approved as a requiring authority for the purposes of the CRL project. Gazette notice 2017-go4110 states:

City Rail Link Limited is hereby approved as a requiring authority, under section 167 of the Resource Management Act 1991, for the construction, operation, maintenance, replacement, upgrade and improvement of its network utility operation, which is the City Rail Link in Auckland and its associated and ancillary structures, works and activities.

In carrying out CRL's function as the requiring authority responsible for the construction of the CRL and this NoR, the wider CRL project objectives are relevant and shown in Table 1-1.

Table 1-1 City Rail Link Project Objectives

Objective Number	Provision
1	Improve transport access into and around the city centre for a rapidly growing Auckland (a) Future proof for expected growth
2	Improve the efficiency and resilience of the transport network of urban Auckland (a) Improve journey time, frequency and reliability of all transport modes (b) Maximise the benefits of existing and proposed investment in transport (c) Release the rail capacity constraint at Britomart
3	Significantly contribute to lifting and shaping Auckland's economic growth (a) Support economic development opportunities (b) Provide the greatest amount of benefit for cost (c) Enable a more productive and efficient city
4	Provide a sustainable transport solution that minimises environmental impacts (a) Limit visual, air quality and noise effects (b) Contribute to the country's carbon emission targets
5	Contribute positively to a liveable, vibrant and safe city (a) Enhance the attractiveness of the city as a place to live, work and visit

¹ Designation 2501 is referred to as Britomart Transport Station within the Auckland Unitary Plan.

Objective Number	Provision
	(b) Protect our cultural and historic heritage for future generations
	(c) Help safeguard the city and community against rising transport costs

1.3 Background

Construction of the CRL is authorised and provided for by the following existing designations in the Auckland Unitary Plan (Operative in Part) (AUP):

- Designations 2500-1 - 6 (CRL Designations 1 – 6);
- Designation 2501 Britomart Station (CRL); and
- Designation 1556 Britomart Station (AT).

Designation 1556 was altered in 2015 to facilitate construction of the CRL project. The purpose of the alteration was described in section 2.6.1 of the AEE accompanying the 2015 NoR as follows:

AT has lodged the NoR to alter the Britomart Transport Centre Designation [1556] to enable the construction, operation and maintenance of works within the Britomart Transport Centre, which will support and enable the CRL in CRL [Designation 2500-1].

The project works enabled by the 2015 alteration were described in section 3 of the AEE and generally encompassed the activities referred to by CRL as the “Contract 1² works”. These works are also defined as “The Project” in the Designation 1556 definitions.

Those works included construction within the BTC, including the Chief Post Office (CPO) and Glasshouse buildings, use of Station Plaza to the rear of the CPO and Glasshouse for a temporary station building (Station Plaza Accommodation (SPA)), and a construction support area (CSA) in lower Queen Street. Designation 2501 was confirmed in 2018, authorising CRL as the requiring authority with financial responsibility for the CRL construction at the BTC. Designation 2501 is a duplicate of the AT Designation 1556 in all respects.

Designation 2501 is the subject of this NoR.

1.4 CRL Designation 2501 Britomart Station

The purpose of Designation 2501 is described in the AUP as follows:

This designation provides for the construction, operation and maintenance of a transport centre and the provision of a rail system. The centre comprises an underground Railway Station, attendant facilities and public access to the station through the main portal of the former Chief Post Office and at other access points. Above-ground features of the centre include the glazed annex to the Chief Post Office building, a series of skylights, ventilation stacks and other servicing plant and equipment.

The area over which the designation applies is further described by the following notation and diagram:

The following conditions apply to the construction of modifications associated with the ongoing operation and maintenance of the transport centre described as the Britomart Transport Centre for the area identified on Figure 1 below:

² CRL Contract 1 is the construction contract name for CRL works in the CPO and lower Queen Street.

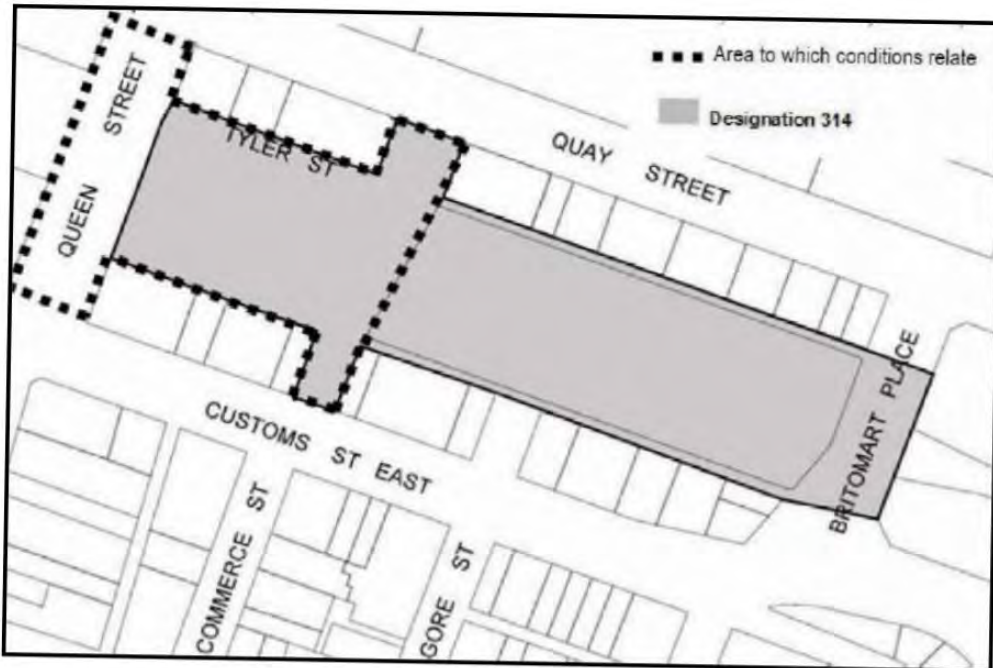


Figure 1: Area of Britomart Transport Centre Designation 314 to which the following conditions relate.

Designation 2501 contains a suite of definitions to assist in the application of the designation conditions and includes the following definition of The Project³:

The Project

The construction works and temporary accommodation of Station Plaza as described in section 3 of the NoR AEE.

The current Designation 2501 conditions only apply to the Project/Contract 1 works and only in the area identified in Figure 1 of Designation 2501.

In accordance with its purpose to provide “for the construction...of a transport centre and the provision of a rail system”, Designation 2501 provides for:

- The use of Station Plaza for construction activities over and above Contract 1 works required to enable the BTC to accommodate the CRL (subject to the outline plan and s177 processes of the RMA); and
- New building(s) to be erected in Station Plaza to facilitate construction activities required to enable the BTC to accommodate the CRL (subject to the outline plan and s177 processes of the RMA).

However, Designation 2501 does not provide for:

- The use of Station Plaza as a site or access portal to facilitate construction activities in the adjoining CRL Designation 2500-1 (i.e. works in the Wyndham Street to CPO tunnels); or
- New building(s) to be erected in Station Plaza to facilitate construction activities in the adjoining CRL Designation 2500-1 (i.e. works in the Wyndham Street to CPO tunnels).

In addition, Designation 2501 contains the following condition limiting the use of the SPA building to a specified time period in relation to completion of the Project works:

³ The Project covers the scope of works in CRLL Contract 1

3.2 The Station Plaza Accommodation shall be removed within one year of completion of the Project works.

The Project/Contract 1 works are soon to be completed and the scope of the Project as defined in Designation 2501 does not encompass the works that are the subject of this NoR.

1.5 Reasons for the Notice of Requirement

The NoR seeks to alter Designation 2501 for the following reasons:

- To facilitate the ongoing construction of the CRL works in the Wyndham Street to CPO tunnels (which are located in the adjoining CRL Designation 2500-1);
- To enable Designation 2501 to be used as a construction support area for works in CRL Designation 2500-1; and
- To enable the retention of the SPA longer than the period currently specified in condition 3.2 of Designation 2501.

1.6 Proposed Alteration to Designation 2501

This NoR proposes the following alterations to Designation 2501 (additions are in **bold underlined** and deletions ~~struck through~~):

- Amending the purpose of the designation as follows:
 - This designation provides for the construction, operation and maintenance of a transport centre and the provision of a rail system (**including the Works**). The centre comprises an underground Railway Station, attendant facilities and public access to the station through the main portal of the former CPO and at other access points. Above-ground features of the centre include the glazed annex to the CPO building, a series of skylights, ventilation stacks and other servicing plant and equipment.
- Inserting a definition of “The Works” after the existing definition of “The Project” in the definitions section as follows:
 - **Construction support works to enable construction in adjoining City Rail Link Designation 2500-1, including site office, worker accommodation and storage of materials in the Station Plaza Accommodation, receiving and pumping concrete from the Britomart Transport Centre into the Designation 2500-1 tunnels, establishing and operating ventilation equipment in Station Plaza, and providing access for workers and delivery of materials to the Designation 2500-1 tunnels via the Glasshouse and former Chief Post Office.**
- Amending Condition 3.2 as follows:
 - The Station Plaza Accommodation shall be ~~removed within one year of~~ **retained following completion of the Project works in order to enable the Works (and any other contemporaneous works permitted under this designation), but shall be removed on completion of the Works.**

Further details of the Works are described in section 2 to follow and the Constructability Report in **Appendix A**.

2 Project Description

2.1 Introduction

The following sections provide a summary of the Works that are the subject of this NoR and included in the proposed new definition of “the Works”, being various CRL construction activities in:

- The CRL tunnels (Wyndham Street to and including beneath the CPO building); and
- The BTC.

The most efficient and practical undertaking of these works necessitates the ongoing use of the SPA and surrounding Station Plaza area for construction support for the Works. The following sections provide a summary of the Works with further detail contained in the Constructability Report in **Appendix A**.

2.2 Location of the Proposed Works Within CRL Designation 2501

Figure 2-1 below identifies the location of the SPA and Station Plaza at Britomart Station.

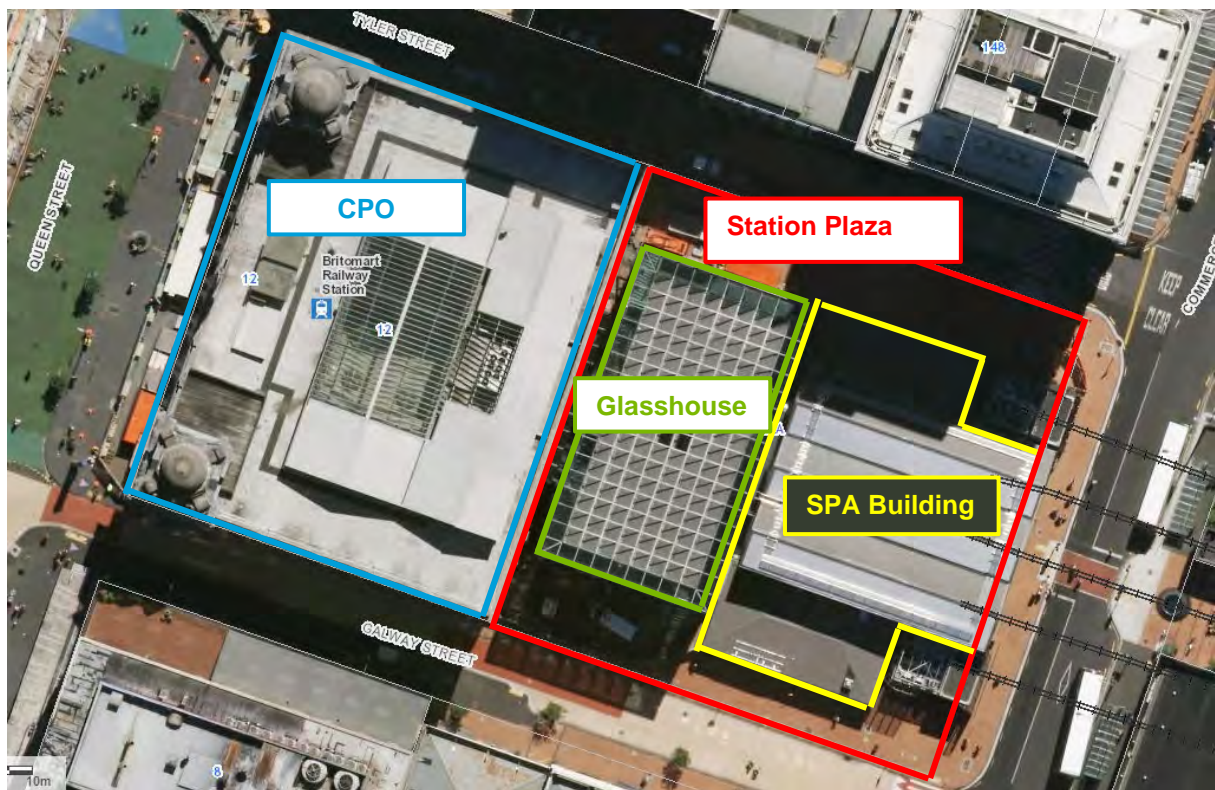


Figure 2-1 Station Plaza and Station Plaza Accommodation at BTC

The following activities are included in the definition of the Works, described in more detail in section 2.3:

- Site office, worker accommodation and some storage of materials within the Station Plaza Accommodation (SPA) building (refer to Figure 2-2 for the site compound layout);
- Establishing and operating ventilation equipment in the Station Plaza area (to provide ventilation for workers in the CRL tunnels to the west);

- Access for workers and deliveries of equipment and materials via the Glasshouse and CPO building; and
- Receiving and pumping concrete into the CRL tunnels (to construct the railway track bed) from the Station Plaza area alongside Tyler Street. Concrete pumping is required for two main activities. 'Stage 1' concrete refers to a pour of mass fill concrete to the tunnel invert, whereas 'Stage 2' refers to the pouring of concrete to complete trackform.

Regarding the receiving and pumping of concrete, where practicable Stage 1 tunnel concrete delivery will be predominately delivered from the CRL Aotea construction site in Albert Street; however, provision is sought for concrete delivery from the Britomart Station end as a secondary 'back up' option, with a worst case 50 / 50 split between the Aotea construction site and Britomart Station. Based on the worst-case scenario, concrete delivery from the Aotea construction site would occur within quarter four of 2021, while the delivery of concrete from Britomart Station would take place within quarter one of 2022. The delivery of concrete from the CRL Aotea construction site has previously been approved under the CRL Designation 2500-1, therefore it is not the subject of this NoR.

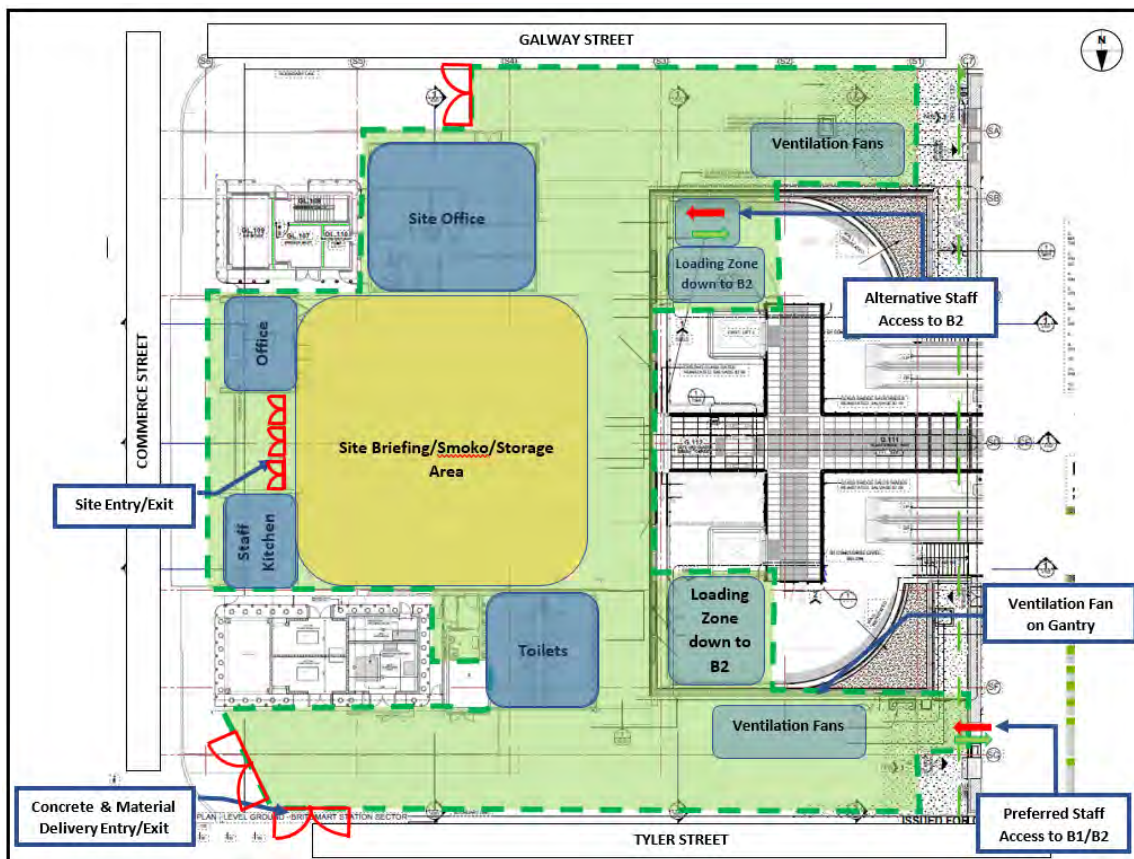


Figure 2-2 Site compound layout (highlighted in green)

2.3 Timing of the Proposed Works

The Works are estimated as taking place from late 2021 until late 2023. The current construction programme identifies the Works being undertaken in the following packages (some overlap of works will result). Work will commence on the Upmain tunnel (from Britomart to Wyndham Street) first, with work then repeated on the Downmain tunnel (from Wyndham Street to Britomart):

- Site establishment:

- quarter four of 2021
- Temporary ventilation:
 - Installation: quarter four 2021
 - Operation: quarter one 2022 until the end of quarter four 2023
- Concrete deliveries and track installation:
 - Stage 1: quarter four 2021 until quarter one 2022
 - Stage 2: quarter two 2022
- Decommissioning of the SPA:
 - The second quarter of 2023 until quarter four of 2023.

2.4 Activities Associated with the Proposed Works

The CRL construction programme identifies the proposed Works as commencing in late 2021 with completion expected in late 2023. The scale of activity will fluctuate during that period. The following is a summary of the activities at anticipated peak levels during that period:

- Site establishment:
 - Conversion of the existing SPA into office, staff facilities, briefing areas, delivery point for materials and storage spaces. Given the limited space available at the SPA and in Station Plaza delivery of materials will not be constant, but sufficient to supply the needs of the workforce at any one time;
 - Workforce access in and out of the CRL tunnels via the existing emergency stairs at the north eastern corner of the CPO (refer to Figure 2-3). This proposed access route would remove any interface between construction workers and public transport patrons for the duration of the Works.
- Temporary tunnel ventilation system:
 - Installation of two ventilation fans within an acoustic enclosure (such as noise blankets or within a container) located on a gantry at the Tyler and Galway Street frontages of Station Plaza, adjacent to the Glasshouse, with flexible ducting entering the Glasshouse on the north and south sides. Ducting is routed to the Wyndham Street to CPO tunnels at platform level using the existing access adjacent to the elevators. The temporary ventilation system will provide fresh air into the tunnels to dilute diesel emissions, improve thermal comfort in work areas, dilute and disperse dust and to generally maintain good working conditions. The ventilation system will operate 24 hours a day, seven days a week from quarter 1 of 2022 until the permanent tunnel ventilation system is operational in 2023. This will ensure a safe working environment at all times;
 - The ventilation fans will be powered by electricity.
- Concrete deliveries:
 - Concrete deliveries into the tunnel are required for two main activities, Stage 1 concrete and Stage 2 concrete. Where practicable it is proposed that the Stage 1 concrete will be predominately delivered from the CRL Aotea construction site; however, in the event of any difficulties or unforeseen events, Britomart Station will be used as a secondary option. Whereas, Stage 2 concrete will be solely delivered from Britomart Station.
 - Stage 1 concrete deliveries from Britomart Station will occur for 20 days in the first quarter of 2022.

- Stage 2 concrete deliveries will occur over 20 days, with concrete being delivered every second day during the second quarter of 2022.
- Concrete deliveries are planned to be undertaken from 6.30am until 9pm Monday to Saturday. However, in the event of delays or unforeseen events, concrete deliveries could be extended until 10.30pm.
- Concrete deliveries through the SPA will be on site via an existing concrete delivery point in Tyler Street (north east corner of the Glasshouse);
- Delivery of materials via hand or crane down to platform level through the Glasshouse delivery access point (north east corner of the Glasshouse); and
- A workforce of up to 50 people using the SPA for site access (at times this number could be reduced to 10-20 people). Onsite parking will not be provided for construction personnel.

The SPA building and Station Plaza will also be used to provide elements of construction support for other CRL works required at Britomart, that are not related to the tunnel works. However, these other CRL related works are within the scope of the existing BTC designation and not the subject of this NoR.

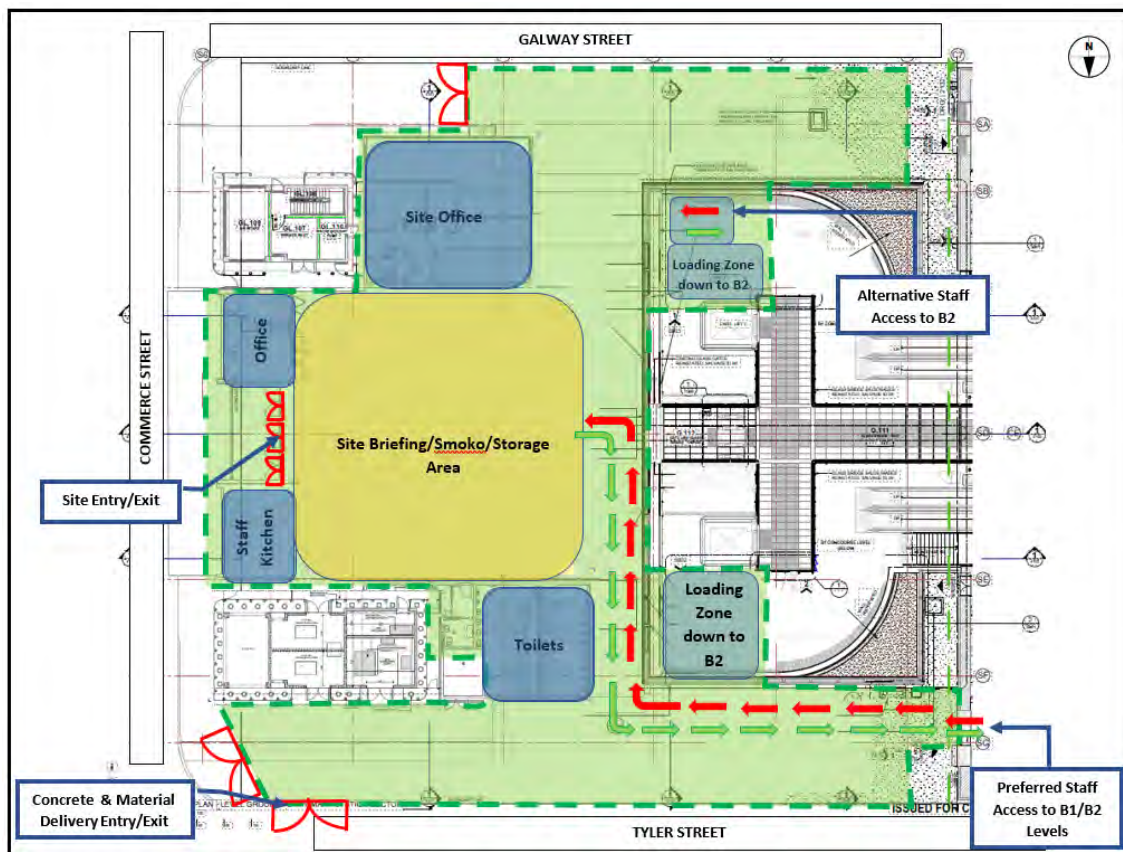



Figure 2-3 Workforce access routes in Britomart Station Levels B1 and B2

2.5 Equipment Associated with the Proposed Works

The Works will necessitate the use of the following equipment:

- Site establishment:
 - Utility and small goods vehicles.

- 
- Temporary ventilation:
 - The axial fans will be 55 kilowatt (kw) and controlled by a variable speed drive to allow adjustments to suit the requirements in the tunnels. The fans will also be supplied with noise attenuating silencers on each end of the fan;
 - Fans will be encased in an acoustic enclosure (either noise blankets or within a container) and located on a gantry 3-5 metres above ground at the Galway and Tyler Street frontages of Station Plaza; and
 - Utility and hiab delivery truck will be required for installation.
 - Concrete deliveries:
 - Up to 40 concrete trucks per day (with three to four trucks per hour) over each period of concrete delivery;
 - Where possible concrete will be delivered using an eight-wheeler 6m³ capacity truck;
 - The preferred methodology for concrete deliveries is to back the trucks into the site compound via Tyler Street from Commerce Street. Alternatively, during peak hours, trucks will drive into Tyler Street and undertake a three point manoeuvre prior to driving out of the site.
 - Concrete pump and hopper located on the north western corner of the Glasshouse, accessing the tunnels via the same location. The concrete will be pumped down into the tunnels via a truck mounted pump.
 - Construction support activities for the Works:
 - Utility and small goods vehicles; and
 - Mobile crane (up to 60T)/hiab located near the North East corner of the Glasshouse.
 - Up to 10 vehicle movements of minor equipment deliveries per day until completion of the Works to support the above activities.

3 Existing Environment

3.1 Introduction

The existing environment affected by the Works, including the site and immediate surrounds are described in the following subsections. The existing environment is relevant to the assessment of actual and potential effects associated with the alteration to the designation and the Works.

Briefly, the Works are located within the Auckland Central Business District (CBD) which is bounded by the Waitemata Harbour to the north, reclaimed land to the east and west, and the Queen Street valley to the south. The BTC Designation 2501 falls within this area.

3.2 Site Description

The SPA and Station Plaza are located at BTC (refer to Figure 3-1). The Station Plaza area is located east of the CPO building within Britomart Station and it encompasses the Glasshouse and the SPA building. These areas fall within the Britomart sub-precinct B and are zoned as 'Business City Centre Zone' under the AUP.



Figure 3-1 Station Plaza location including SPA building

The SPA was erected as part of the CRL Contract 1 works; however, Station Plaza was pre-existing and has been in place since the original construction of the BTC.

3.3 Surrounding Physical Environment

3.3.1 Land Use Activities

Auckland's CBD is a built-up urban environment and New Zealand's largest city centre and commercial / business area. It is a centre of business, art, culture, entertainment, recreation, education, tourism and residential living.

Land uses surrounding the Works include high density commercial buildings, residential and visitor accommodation, retail, restaurants and bars. Under the AUP, the immediate area is zoned as 'Business City Centre Zone'. Commercial offices intermingle with residential and visitor accommodation. These activities are incorporated within refurbished heritage and more recent mid to late 20th century buildings.

3.3.2 Road Network and Traffic Environment

The key streets directly affected by the proposed Works are Commerce Street, Tyler Street, Customs Street East and Quay Street. Due to the range of construction activities that have been and are currently occurring within Auckland's CBD, the existing environment includes heavy vehicle and construction traffic movements, as well as road closures and traffic detours in addition to traffic associated with central city urban activities.

Commerce Street to the east of Station Plaza is a non-arterial road as defined by the AUP and allows for traffic in both directions, with one lane northbound and one southbound lane connecting Quay Street to the north. It includes three bus stops and loading zones. Commerce Street operates as a key public (bus) corridor, while providing connections from Quay and Customs Streets to the broader Britomart businesses and residents.

Tyler Street is located to the north of Station Plaza and is an unmarked local road as defined by the AUP. Due to the existing CRL works the street is currently closed to vehicles, however it allows vehicle access for residents and CRL related vehicles. This access specifically allows residents and office occupants access to the carparking facilities for 152 and 148 Quay Street, from Tyler Street. Tyler Street also provides pedestrian connectivity to the newly completed Te Komititanga public space in Lower Queen Street, as well as to the Britomart Rail Station and local residential and business properties.

Customs Street East is located south of Station Plaza and is a non-arterial urban route as defined by the AUP. The street generally has two lanes in each direction with a number of bus stops, turning lanes and bus only turning lanes interspersed along the street. Pedestrians can use both footpaths on either side of Customs Street East.

Quay Street is located north of Station Plaza and is an arterial urban route as defined by the AUP. The street has considerably changed its configuration due to the Quay Street upgrades. The works have largely been completed and the road is in its final configuration. There is one traffic lane in either direction, as well as dedicated bus lanes in either direction. There is also a cycleway and pedestrian access along the footpath.

There are pedestrian footpaths around the BTC, including along Commerce Street. Since the completion of CRL Contract 1 works, pedestrians can access all of Tyler Street.

Refer to the Integrated Transport Assessment (**Appendix C**) for further detail.

3.3.3 Noise and Vibration

The sites surrounding the Works are zoned 'Business- City Centre' in the AUP. Furthermore, there are no construction noise standards relevant to the Works attached as conditions of BTC Designation 2501. This means that the construction noise levels from the AUP Table E25.6.28.2 apply.

Due to the built-up nature of the inner city, an elevated noise environment is anticipated within the CBD due to the density of buildings and infrastructure. There are a range of businesses and apartment buildings surrounding the Works location, with the adjacent buildings being 148 and 152 Quay Street.

The existing environment has been dominated by a range of construction activities including the CRL, Commercial Bay construction, Quay Street works and other significant developments. As such, the adjacent buildings and the surrounding area have been subjected to construction noise impacts for a considerable amount of time. This also means that the neighbours will be accustomed to a certain level of consultation and construction management.

3.3.4 Heritage and Cultural Environment

3.3.4.1 Built Heritage and Scheduled Sites

The Works sit within a highly developed urban environment, which includes structures of heritage value and importance. The Historic Heritage scheduled sites in the immediate vicinity of the Works are described in Table 3-1.

Table 3-1 Historic Heritage Places in the immediate vicinity of the Works

Location	Reference Number	Place Name	Protection Mechanism(s)	Category
2 Queen Street	4597	Edean's Building	Heritage NZ	2
	2769		AUP	B
12 Queen Street	101	CPO	Heritage NZ	1
	2021		AUP	A
10-12 Customs Street	7291	Barrington Building (Customs Street frontage only)	Heritage NZ	2
	1937		AUP	B
14-18 Customs Street	4576	Columbus House (form)/ Old Sofrana House (Customs Street frontage only)	Heritage NZ	2
	1938		AUP	B

3.3.4.2 Mana Whenua Values

There are no sites of significance to Mana Whenua identified by the AUP within 200 metres of the Works.

3.3.4.3 Archaeology

As the Works will not involve any land disturbance, there is no potential for the disturbance of archaeological remains.

3.4 Designations and Other Statutory Approvals

3.4.1 Designations

As described in section 2 of this AEE, there are existing designations that directly relate to the Works. These designations are detailed in Table 3-2.

Table 3-2 Existing Designations

Reference	Requiring Authority	Purpose of Designation	Location	Relationship with NoR
Designation 1556	AT	Construction, operation and maintenance of a transport centre and the provision of a rail system.	12 Queen Street to Britomart Place, Auckland Central	This is the underlying Britomart Transport Centre designation and no changes are proposed to that designation. A section 177(1)(a) approval under the RMA will be sought from AT.
Designation 2501	City Rail Link Limited	Construction, operation and maintenance of a transport centre and the provision of a rail system.	12 Queen Street to Britomart Place, Auckland Central	The designation is the subject of this NoR.
Designation 2500-1	City Rail Link Limited	Construction, operation and maintenance of the CRL, including two rail tunnels and Aotea Station.	BTC to Albert Street/Mayoral Drive	This NoR will facilitate the ongoing construction of the CRL works in the Wyndham Street to CPO tunnels, which are located in Designation 2500-1.

3.4.2 Surrounding Construction Activities

There is a range of ongoing construction in the area. These are the current activities occurring within the area that applicable to the Works:

- Cooper and Company is currently refurbishing its buildings known as Barrington and Sofrana located on the southern side of Galway Street opposite Station Plaza. A construction support area has been established in an adjoining part of Galway Street to facilitate the works. The refurbishment works are expected to be completed in July 2022.
- A complete refurbishment of the former HSBC building at 1 Queen Street has commenced.
- Other CRL works at Britomart Station include the following:
 - Relocation of equipment rooms and installation of new rail systems equipment;
 - Raising the western end of the station platform concourse;
 - Smoke curtain extension at the western end of the station;
 - Reconfiguration of the station platform layout, resulting in four operational tracks and four platforms instead of the current five platforms. The reconfiguration will require new track slab installation and OHLE works; and
 - Signal reconfiguration works.

4 Consideration of Alternatives

4.1 Statutory Requirement to Consider Alternatives

When considering an application for an NoR to alter a designation, the territorial authority is directed to have regard to whether adequate consideration has been given to alternative sites, routes or methods of undertaking the work, under sections 181 and 171(1)(b) of the RMA.

The territorial authority (in this case, AC) must, subject to Part 2 of the RMA, consider the effects on the environment of the requirement, having particular regard to whether adequate consideration has been given to alternative sites, routes, or methods of undertaking the work if:

- The requiring authority does not have an interest in the land sufficient for undertaking the work; or
- It is likely that the work will have a significant adverse effect on the environment.

AT is the freeholder of the land comprising the CPO and Station Plaza. The Britomart Group hold a registered leasehold interest (and two sublease interests) in the upper three levels of the CPO (which is a separate strata title). The term of the Britomart Group lease is 80 years and expires in 2084. On this basis it is appropriate to give consideration to alternative sites, routes, or methods of undertaking the works in terms of s171((1)(b).

Having explored different work methods for tunnel fit-out (e.g. the delivery and placement of concrete), the Link Alliance⁴ design and construction teams have considered several different options regarding access, logistical and site establishment arrangements for the Works. On the 10th of May 2021, a multidisciplinary workshop was held with a number of key members of the Link Alliance, CRL and subject matter experts, to discuss the feasibility of alternative options. The attendees included specialists in rail system delivery (track form requirements), concrete, construction management (including confined-space tunnel works), the logistics of materials and equipment delivery and programme management. Noise and vibration, traffic and resource consent planning specialists were also in attendance.

A particular focus of the workshop was to identify and understand the concrete works required in the CRL tunnels and what this means in terms of the logistics of concrete delivery. Alternative locations and methods for the delivery of concrete were discussed in detail.

The traffic effects of different options for delivering concrete and other materials and equipment to site have also been canvassed with AT.

The actual and potential effects of the Works are identified in section 6 of this AEE. The assessment of the Works against the tests of Section 171 of the RMA in relation to the alternative assessment is contained in section 7 of this AEE.

A number of alternative options have been considered for the Works which are summarised in section 4.2 below. Further detail is contained in the Constructability Report, **Appendix A** of the AEE.

4.2 Alternative Scenarios

Alternative scenarios have been considered for a range of construction activities, including site establishment, concrete deliveries and the delivery of materials. Each option was considered on a number of criteria including constructability, consenting, programme implications and cost.

⁴ The Link Alliance is a consortium of seven companies, including CRL Ltd, which are delivering the main stations and tunnels for the CRL project.



Four alternative options were considered for the Works, which included:

1. Option 1: Removal of the SPA building and establishment of alternative temporary accommodation in Station Plaza, with all concrete delivery and other CRL tunnel-fit out support activities from Britomart Station.
2. Option 2: Retention of the SPA building and site establishment within the SPA building and Station Plaza, with all concrete delivery and other CRL tunnel fit-out support activities from Britomart Station.
3. Option 3: Site establishment at some alternative location, with all concrete delivery and other CRL tunnel fit-out support activities via the Albert Street end of the tunnels.
4. Option 4: Retention of the SPA building and site establishment within the SPA building and Station Plaza, with concrete delivery and other CRL tunnel fit-out support activities split between Britomart and Albert Street.

In order to assess the above options, an alternative assessment was carried out for the key elements associated with the Works, including:

- Site accommodation / establishment location;
- Concrete delivery; and
- General materials delivery.

The options are summarised in Sections 4.2.1, 4.2.2 and 4.2.3 below. Further detail is contained in the Constructability Report attached as **Appendix A** to this NoR.

4.2.1 Site establishment

A number of options for the location of the site establishment and accommodation have been considered. The location of the site accommodation is key for the Work's ability to deliver in a timely and cost-effective manner.

In considering alternative locations, the Link Alliance has been mindful that suitable site establishment and workforce accommodation is also needed for the other CRL construction works required at Britomart.

The following alternative locations have been considered in relation to site accommodation and establishment:

1. Repurpose the SPA building and/or establish in Station Plaza
2. Temporary structures within the Britomart light rail tunnels
3. Ports of Auckland land
4. Downtown Carpark Level 8
5. Repurpose the Transdev Accommodation within Britomart Station
6. Old AT Operations Centre

The locations of these sites are identified in Figure 4-1 below.

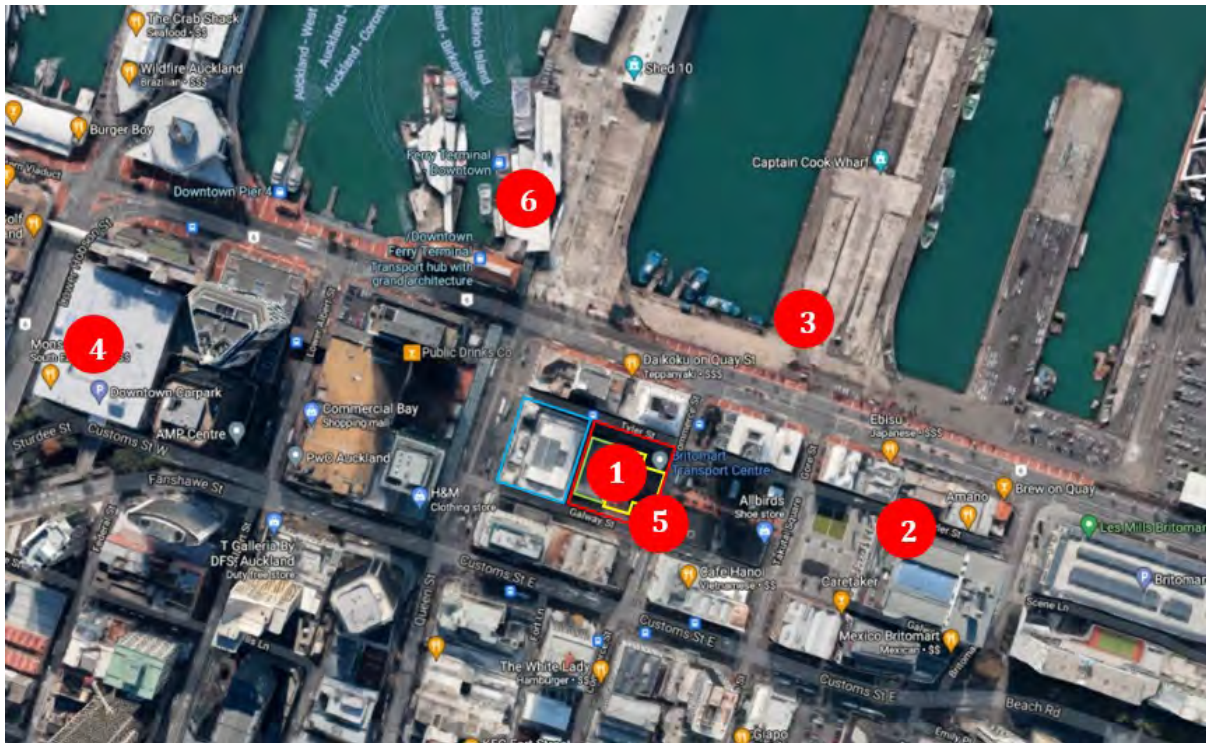


Figure 4-1 Alternative site establishment locations for the Works


After considering these different options, it was identified that the site establishment needed to be within close proximity to the SPA to ensure the Works could be delivered in a timely and cost-effective manner. As such, location one was assessed as the only viable option as it provides the most direct and safest route for the Works. It also provides the most cost-effective solution due to its use of the existing SPA.

4.2.2 Concrete deliveries

The Works will require a range of concrete deliveries for both Stage 1 tunnel concrete (tunnel invert) and Stage 2 tunnel concrete (trackform concrete). One issue associated with concrete deliveries is traffic impacts, as such a number of alternatives were assessed to ensure the most appropriate solution was selected.

As previously described, concrete deliveries were a significant focus of the interdisciplinary workshop that was held on the 10th of May 2021. Three options were discussed including the delivery of concrete from the CRL Aotea construction site in Albert Street, splitting the delivery between Britomart Station and the Aotea site, and delivery via the railway system. Each option was discussed and investigated in terms of traffic impacts, methodology, programme implications and cost.

During a review of the methodology for Stage 2 concrete delivery, it was identified that by delivering concrete from the CRL Aotea construction site, it could result in severe consequences to workers safety due to the need to pump concrete downhill from this location. International best practice is to always pump up-hill to reduce these risks, as it provides better control over the flow of concrete. However, the delivery of concrete for Stage 1 from the CRL Aotea construction site, was found to be appropriate. This is because Stage 1 concrete proposes to utilise a multi-service vehicle (MSV) equipped with a mixer truck. The MSV would be used to transport concrete within the tunnels and this avoids the need for concrete pumping over a long distance. The use of an MSV and mixer trucks is not viable for Stage 2 concrete delivery, because the Stage 2 concrete works involve concurrent



placement of the railway tracks and sleepers. The sequencing of works and physical space constraints within the tunnels makes the use of an MSV impractical for Stage 2.

In addition, the construction site at Aotea Station has significant physical space constraints that would not allow for prolonged concrete deliveries. The construction support area that has been established at the northern end of the Aotea construction site has a usable area of approximately 108m². This entire area is required to service construction activities at the Aotea construction site. Use of this same area for concrete delivery into the CRL tunnels would require a minimum footprint of at least 88m². Therefore, during the delivery of concrete the Aotea construction support activity would effectively have to cease. This would severely disrupt the Aotea construction works, resulting in delays to the overall CRL project programme.

Consideration and investigation into option three (delivery of concrete via the railway system) identified that it would require ordering specific railway equipment from Australia, which currently has a lead time of over 10 months. This would not be feasible as it would result in significant delays to the overall critical path of the CRL construction programme.

In addition, traffic management associated with the delivery of concrete has been extensively discussed with AT. Stop/go traffic management on Commerce Street has been discussed with the AT Corridor Access Team and due to the quantum of southbound bus movements on Commerce Street, AT considers this form of management unacceptable during peak periods; however it is permissible during off-peak periods. Subsequently, the interactions with AT have further defined the most appropriate solution for the delivery of concrete.

After investigating and workshoping the range of alternatives, splitting the deliveries between the SPA at Britomart Station and the Aotea construction site was identified as being the most appropriate in terms of health and safety, cost, programme implications and traffic impacts.

4.2.3 Material deliveries

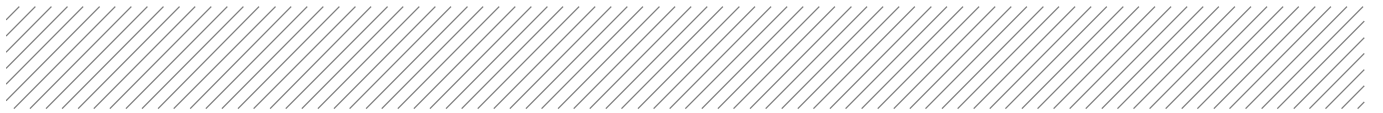
Alternative options for material deliveries was also considered in terms of location, environmental impact, programme and cost.

Similar to the delivery of concrete, three options were considered for the delivery of materials. The options included delivering all materials from the CRL Aotea construction site in Albert Street, splitting the deliveries between the SPA at Britomart Station and the Aotea construction site, and finally delivering the materials via the railway system.

A key focus of consideration during this investigation was ensuring there was sufficient space available to deliver and store materials. The CRL Aotea construction site is heavily space constrained so this option could result in programme delays to the construction of Aotea Station. After investigating the opportunity to deliver all materials during the night through the railway system, this option was deemed to be impractical and it could introduce significant cost and risk to the Works. This was due to current KiwiRail track restrictions and the additional personnel that would be required to deliver the materials during the night.

After considering a range of the options, the Link Alliance and CRL identified that option two (splitting deliveries between the SPA at Britomart Station and the Aotea construction site) was most appropriate as it would allow the delivery of materials during the day and it would utilise the existing site compound loading areas. The SPA would also have sufficient space to store the delivered materials.

As such, after taking into account the various operational drivers and constraints the preferred option is the most practical in terms of constructability, cost and programme implications.



4.3 Conclusion

The decision to undertake the Works in the described manner above has been the result of a careful evaluation of viable options. The constructability, cost, programme implications and other key factors have been considered for all options.

Significant effort has gone into confirming the preferred approach for the Works. It is considered that the chosen strategies for site establishment, concrete deliveries and material deliveries provides the greatest certainty, is the most efficient, and best manages the potential effects on owners, current occupiers and surrounding land uses, while ensuring that the CRL project objectives are met. It also provides the most appropriate and efficient use of resources due to its use of the SPA and its proximity to the CRL tunnels.

As such, as required under section 171 of the RMA, it is deemed that adequate consideration has been given to alternative sites, routes and methods for undertaking the Works.



5 Consultation and Engagement

5.1 Introduction

The following sections describe the engagement undertaken by CRLI with parties identified as stakeholders in relation to the NoR. CRLI considers these parties to be stakeholders for the following reasons:

- AC is the regulatory authority responsible for the administration of the AUP;
- AT is the requiring authority responsible for Designation 1556 (earlier designation for the BTC) and the operator of the BTC. AT is also the road controlling authority and is responsible for public transport (bus) services in relation to adjoining roads affected by the Works;
- Cooper and Company has substantial landholdings and commercial interests within the Britomart Precinct. Through the Britomart group of companies, it is party to a Development Deed with AC for the Britomart Precinct. In accordance with this Deed, Britomart Group has undertaken (and continues to undertake) significant redevelopment and improvement works throughout the Precinct since the early 2000s. Britomart Group has also entered into an agreement with AC for the management of public areas and public amenities within the Precinct. Under that agreement, AC granted management responsibility and control rights to Britomart Group regarding events and activities in the public areas of the Precinct. The public areas include footpaths, and Britomart Group also has maintenance responsibilities (e.g., litter collection and cleaning) for roads within the Precinct – including those roads affected by the Works; and
- The owners and occupants of properties directly adjoining the northern side of Tyler Street (148 Quay Street, 152 Quay Street, and Endeans Building at 2 Queen Street). These properties rely on Tyler Street for access and, being predominantly residential, are sensitive to environmental effects such as noise that are associated with the Works.

Engagement with these parties is ongoing.

5.2 Auckland Council


CRLI has been discussing the proposed Works with AC's Plans and Places team since the beginning of 2021. Having explained the purpose of the Works, initial discussions focused on whether or not the Works are provided for by Designation 2501. In February 2021, having concluded that an alteration to designation is necessary, CRLI described to AC its preferred approach for altering Designation 2501 to enable the Works – including proposed amendments to the wording of the designation and accompanying legal commentary. AC subsequently affirmed CRLI's approach to altering the designation.

At the end of March 2021 CRLI advised AC of its intention to seek direct referral of the NoR for alteration of Designation 2501 to the Environment Court. In early April Council officers advised that they were supportive of direct referral in principle, subject to receiving the NoR documentation and a formal request for referral setting out CRLI's reasons.

5.3 Auckland Transport

CRLI has been discussing the proposed Works with AT since late 2020, including presentations to relevant AT personnel in February and March 2021.

AT acknowledges the need for the Works and, in general, supports the proposed alteration to Designation 2501 to enable the Works.



AT has identified the following concerns:

- The construction support activities that comprise the Works have the potential to disrupt Britomart Station operations, including a consequent reduction in rail patronage (the latter having already suffered as a result of COVID-19);
- The Works will hinder the re-tenanting of the upper floors of the CPO building; and
- Commerce Street operates as a key public transport (bus) corridor. Reversing of trucks from Commerce Street into Tyler Street during the AM and PM peak periods would adversely affect bus services - increasing bus travel times and reducing bus reliability. This issue is addressed in the Integrated Transport Assessment and associated Construction Traffic Management Plan (refer Appendix C of this AEE).

5.4 Cooper and Company

CRL has been discussing the proposed Works with Cooper and Company since early 2021, including presentations in March and April.

Cooper and Company has identified the following concerns:

- There is a general concern regarding the effects of ongoing CRL construction, including the Works, on retail, hospitality and other business activities within the Britomart Precinct. Access disruption, loss of amenity and other construction related effects have an adverse impact on these activities and people's use and enjoyment of the Precinct;
- Cooper and Company is currently refurbishing its buildings known as Barrington and Sofrana, located on the southern side of Galway Street opposite Station Plaza. Until mid-2022 a construction support area has been established in an adjoining part of Galway Street to facilitate the refurbishment, and the Works must not hinder the use of this area. Once new retail outlets have been established in the refurbished buildings, patronage will amongst other things be reliant on unimpeded access through Galway Street – including from Britomart Station on the opposite side of the street. The Works therefore need to be undertaken in a way that has minimal impact on Galway Street; and
- Cooper and Company and AC must continue to fulfil their respective obligations under the agreements they have entered into (described in Section 5.1 above). The Works therefore need to be undertaken in a way that recognises these agreements and enables obligations to be met.

Cooper and Company acknowledges the need for further CRL construction activity at Britomart, but the way in which the activity is undertaken and environmental effects are managed is key. Good collaboration is required between Cooper and Company and CRL/Link Alliance, with a co-ordinated approach to the management of all construction activities and their effects.

5.5 Properties in Tyler Street

Initial engagement with the owners and occupants of properties along the northern side of Tyler Street has included the following:


148 Quay Street

- A site meeting was held with the building manager and a representative of the Body Corporate on 12 April 2021 to explain the Works. A presentation document was provided for discussion at a subsequent Body Corporate meeting and CRL is awaiting feedback from this meeting.

152 Quay Street

- A presentation document was provided to the chairperson of the Body Corporate on 3 May 2021. Initial feedback has been received.

Endeans Building

- 
- A Community Liaison Group meeting was held for the CRL Britomart works on 26 May 2021 and this was attended by residents from Endeans and 148 Quay Street. The meeting included a presentation on the Works and subsequent discussion on CRL's proposed alteration to Designation 2501.

Feedback to date can be summarised as follows:

- The need for further CRL construction activity at Britomart is generally recognised;
- However, the owners and occupants consider that they have experienced significant disruption, inconvenience and additional cost (including loss of business) as a result of CRL construction works being undertaken at Britomart since 2016. An additional two years of construction related activity in the vicinity of Station Plaza and the western end of Tyler Street, with construction traffic operating in an already constrained area, is generally considered undesirable;
- There is no appetite for the Works to continue into the evening; and
- Accordingly, there is a preference that alternative sites are identified for the Works – particularly for the delivery of concrete.

5.6 CRL Mana Whenua Forum

A CRL Mana Whenua Forum has been established for the purposes of undertaking kaitiakitanga responsibilities associated with the project. The forum comprises those mana whenua groups who expressed an interest in being involved in the project and its related activities. Eight mana whenua self-identified their interest in CRL and are currently part of the forum:

- Ngati Maru;
- Ngati Paoa;
- Ngai Tai Ki Tamaki;
- Ngati Te Ata Waiohua;
- Ngati Whatua o Orakei;
- Te AkitaiWaiohua;
- Te Kawerau a Maki; and
- Ngati Tamaoho.

The proposed Works were presented to the mana whenua forum at a hui on 4 May 2021.

The only issue of concern raised by the forum was whether any aspect of the Works would increase run-off, including the potential for contaminants (including from activities such as concrete delivery) to enter the nearby Waitemata harbour. It was explained that appropriate environmental controls (bundling, catch-pit protection etc.) will be implemented during concrete delivery.

6 Assessment of Environmental Effects

6.1 Introduction

This section of the NoR contains the assessment of actual and potential effects on the environment in relation to the Works which will be authorised by the alteration to Designation 2501. The purpose of the alteration is to facilitate the ongoing construction of the CRL works under CRL Designation 2500-1, while also enabling Designation 2501 to be used as a construction support area for the works in CRL Designation 2500-1. The alteration also proposes to retain the SPA longer than the period currently specified in condition 3.2 of Designation 2501. Altered Designation 2501 will provide the authorisation under the AUP for the Works notwithstanding anything contrary in the AUP.

The potential adverse effects of the Works have been considered in light of what works can be undertaken as either permitted activities under the AUP. It is noted that the AUP provides for the use of the Britomart Station Plaza for construction activities for up to 24 months as a Permitted Activity under Chapter E40 of the Unitary Plan, subject to compliance with permitted standards. It is understood that this includes structures accessory to construction, such as site offices, portaloos and fencing.


6.2 Positive Effects

The broader CRL project benefits and positive effects for the Auckland region were addressed in detail during the CRL NoR phase⁵. Once constructed and operational, the CRL which the Works are a component of, will provide or contribute to achieving a range of positive effects. These include:

- Realising the potential of the existing infrastructure and the unlocking of the Auckland rail network through Britomart becoming a through station rather than a terminus station and thereby providing for more train movements on the Auckland rail network.
- Enhancing the benefits of the existing resources already committed to electrification (the commitment to electrify the Auckland suburban rail network is underway, including the building and delivery of the new electric powered rolling stock (EMU's) to run on this network).
- Ability for people to better access the city centre area by train through the provision of the stations proposed along the CRL between Britomart and the North Auckland Line.
- Increases in rail patronage.
- Providing significant additional capacity to the passenger transport system, in order to meet sustainable mode share targets set by the NZTS and the Auckland RLTS 2010 – 2040.
- Providing a catalyst for inner city re-development by creating new major transport hubs around the existing and proposed underground rail stations, stimulating land use intensification and regeneration of central city areas.
- Increasing commuter access to the city centre which provides the opportunity to stimulate economic development.
- Assists in providing a sustainable transport system and in reducing greenhouse gases.

Specifically, the Works will also provide the following positive effects in relation to construction of the CRL. These include:

⁵ CRL NoR AEE (Beca, 2012).

- 
- The Works will provide the most efficient way to pump concrete into the CRL tunnels. This will result in an effective and efficient use of resources and time.
 - Through retaining SPA, unnecessary wastage of material will be avoided by not prematurely demolishing a building that has an ongoing practical use. In addition, unnecessary use of material and resources will also be avoided by not requiring new construction support buildings to be constructed in place of the SPA.
 - Use of the SPA as a construction support area allows for the internalising of potential adverse effects such as noise and the visual impact of materials storage.
 - The Works will be undertaken in the most appropriate way in terms of health and safety compared to alternative solutions.

6.3 Mana Whenua Values

During the preparation of the NoR to establish the CRL Designations 2500-1 – 6, Maori values assessments and cultural values assessments were provided by Mana Whenua groups.

While no formal update to the MVAs has been sought for this NoR, ongoing and regular feedback on the CRL is sought from Mana Whenua groups through the regular CRL Mana Whenua Forum hui.

In terms of Mana Whenua values and the proposed Works, feedback was provided by the Mana Whenua Forum at a hui on 4 May 2021. No new effects have been identified that require the insertion of conditions that relate to Mana Whenua.

6.4 Construction Vibration

There are no proposed activities that are expected to generate high vibration levels, and the Works are predicted to comply with all relevant cosmetic building damage and vibration amenity standards, including the Historic Heritage Overlay limits.


6.5 Construction Noise

A Noise Assessment prepared by Marshall Day Acoustics has been undertaken to determine the potential construction noise effects of the Works (refer to **Appendix B**). There are no construction noise standards relevant to the Works, attached as conditions of BTC Designation 2501. As such, the AUP construction noise standards are considered the relevant standard against which to assess construction noise.

It is predicted that all construction support activities will comply with the AUP permitted activity noise levels, with the exception of concrete pumping. This activity may marginally exceed the AUP permitted activity standards for construction noise levels when measured from approximately 2 – 4 apartments located in the 148 Quay Street apartments. These receivers are directly adjacent to the concrete pump and will look over the site hoarding proposed in the CNMP. Concrete pumping will occur within the hours (6.30am until 9pm, however in the event of onsite delays, deliveries could be extended until 10.30pm) specified by the AUP standard. Pumping associated with the Works will occur for approximately only 30 days out of the two-year period over which the Works will be undertaken over.

In addition, the Works include the use of ventilation fans, which will run 24 hours a day, seven days a week. The fans will be powered by electricity. The Noise Assessment concluded that the operation of the ventilation fans will comply with the AUP permitted activity noise levels, including night-time limits; however, attenuators for the ventilation fans will be installed as recommended by the mechanical engineer to mitigate any noise impacts.

A Construction Noise Management Plan (CNMP) will be implemented for the duration of the Works. The CNMP (Appendix A of the Construction Environmental Management Plan (CEMP) in **Appendix D**



of this AEE) sets out the mitigation and management framework to manage effects according to best practice measures. A range of mitigation measures are proposed within the CNMP, including staff training, appropriate selection of equipment, scheduling of noisy works during the day, effective communication with neighbouring sites and the establishment of a two metre site hoarding along Tyler Street to reduce noise impacts on the ground floors of adjacent buildings and for pedestrians. The CNMP also details the frequency of noise monitoring. Construction noise monitoring will be undertaken the first time a concrete delivery takes place and in response to noise complaints. The noise monitor attached to the exterior of 148 Quay Street will also remain in place for the duration of the Works to undertake this monitoring.

Consequently, through a range of mitigation measures and the implementation of the CNMP, it is considered that the noise impact from the Works will be less than minor.

6.6 Traffic, Access and Parking

The impacts of the Works on traffic, access and parking will be confined to the proposed construction period from late 2021 until late 2023. An Integrated Transport Assessment has been prepared by Flow Transportation on the proposed works and is attached at **Appendix C**.

6.6.1 Construction Vehicles


Construction vehicles accessing the site as part of the Works will include concrete deliveries, support work vehicles (delivery and storage of concrete blocks and steel work) and general deliveries (electrical and rail system related equipment). Daily truck movements are estimated to be between five to ten trucks per day, with an extra 40 trucks per day required during concrete pours.

Minor material deliveries will form the most movements to and from the site. It is estimated that these will be between five to ten movements per day and they will be undertaken by a utility 'Ute' or small goods vehicle. The vehicles will travel to the site via Quay Street and enter from Commerce Street, restricting the number of vehicles travelling through the city and busier streets. Due to the potential conflict points between construction traffic entering and exiting the site and pedestrians, a Site Traffic Management Supervisor (STMS) will be placed at access points. To further provide for the safety of pedestrians, a physical barrier will be installed to stop pedestrian movements through construction access locations.

In total, approximately 30 days out of the construction programme will result in truck movements associated with concrete pours. Due to space constraints and associated safety considerations, where possible trucks will be backed into Tyler Street from Commerce Street, with a full-time spotter accompanying each truck. This is subject to agreement with AT and outside of peak traffic periods. Alternatively, during the peak periods, trucks will enter Tyler Street from Commerce Street in a forward direction. They will then manoeuvre within Tyler Street to allow them re-enter Commerce Street in a forward direction.

A Site-Specific Transport Management Plan (SSTMP) will also be implemented after approval from AT. It will impose an appropriate temporary speed limit on the street for the duration of the Works. This will contribute to mitigating impacts from the construction traffic on users of Tyler Street.

Furthermore, a Construction Traffic Management Plan (CTMP) (Appendix B of the CEMP in **Appendix D** of this AEE) will be implemented for the duration of the Works. This will detail the specific mitigation measures for construction transport effects along Commerce Street, Galway Street and Tyler Street. It will demonstrate how the Works will be constructed, the timing of road closures, restrictions or diversions required, access to local properties and the routes for construction-related traffic.



Due to the mitigation measures discussed above, including the use of a STMS, physical barriers, stop-go traffic management, and the implementation of a CTMP, it is considered that the impacts of construction vehicles on the transport network will be less than minor.

6.6.2 Pedestrian Access and Flow

Pedestrian access to Britomart Station will be maintained at the existing entry points. The connection to public transport services will not be affected, with access to both rail and bus services remaining in place. Pedestrian access on Tyler Street will be generally unimpeded. However, some short-term access restrictions may be required for safety reasons. Typically, this may amount to a few minutes of restricted pedestrian movements while trucks are safely escorted to the site compound.

The pedestrian footpath and signalised pedestrian crossing across Commerce Street will be maintained throughout the Works. Appropriate wayfinding signage will also be implemented for the duration of the Works to ensure pedestrians are informed of diversions, minimising any confusion.

As such, pedestrian accessibility and safety will not be comprised by the Works. Overall, it is considered that any impacts to pedestrian access and flow as a result of the Works will be less than minor.

6.6.3 Property Access

The Works will not impact existing property access, car parking and loading areas connected to or located on Commerce Street. Similarly, access to properties on Tyler Street will also be maintained for the duration of the Works.

Those properties that will be directly affected by the Works include 148 Quay Street and 152 Quay Street as their parking facilities are accessed from Tyler Street. The road width on Tyler Street will provide sufficient manoeuvring space to access the car parks and loading docks associated with the properties 148 and 152 Quay Street. As such, for the duration of the Works, pedestrian access to the properties will be maintained, as well as vehicle access.

In addition, for the duration of the Works, courier and delivery access to properties on the northern side of Tyler Street would not be impacted. This will safeguard their maintenance and delivery requirements.


General public access to Britomart Station will also be retained during the Works through the new permanent station entry door at the north-eastern corner of the CPO building in Tyler Street.

Consequently, as pedestrian and vehicle access to properties and Britomart Station will be maintained, it is considered that any impacts will be less than minor.

6.6.4 Summary

Based on the analysis described in the Integrated Transport Assessment, it is considered that the proposed temporary traffic management associated with the Works is predicted to result in minimal adverse effects relating to the function, capacity and safety of the surrounding transport network.

The additional number of construction vehicles associated with the Works will not significantly impact the operation of the road network. Approximately 30 days out of the construction programme will result in a combination of truck movements associated with concrete pours (40 vehicles) and general deliveries (five to 10 vehicles). All vehicle movements will be managed through the implementation of the CTMP included in Appendix B of the CEMP (**Appendix D**). The CTMP will detail the specific mitigation measures for transport effects during each construction phase. The implementation of this management plan will mitigate the traffic related effects identified in the traffic assessment to an acceptable level and ensure a safe and accessible environment for workers, pedestrians, station users and occupants of the surrounding area.



Overall, it is considered the traffic, access and parking effects associated with the Works will be less than minor, subject to implementation of mitigation described in the sections above.

6.7 Historic Heritage

The area surrounding the Works is a heavily modified urban environment. As described in section 3.3.4 of this AEE, there are five scheduled Historic Heritage buildings located in the immediate vicinity of the Works. A Deed of Heritage Covenant and corresponding Conservation Plan (1995) protects the CPO building. The Works do not involve any modification of these scheduled buildings.

The proposed works are not high vibration generating activities and it is expected that the vibration levels will be compliant with the permitted activity standards in the AUP, including the limits for historic heritage buildings.

As the Works will not involve any land disturbance, there is no potential for the disturbance of archaeological remains related to the historic reclamation. It is considered that the actual and potential adverse effects on historic heritage from the Works is less than minor.


6.8 Amenity

The proposal includes leaving the SPA in place for the duration of the Works which is a longer period than that identified in Designation 2501. However, the SPA has been in place for a number of years. As such there would be no change to the visual amenity impacts from it remaining in place for the duration of the Works other than an additional period of existence for the building of approximately 21 months (once the 12 month removal period from the completion of the Project in existing condition 3.2 is compared against immediate removal on completion of the Works in the fourth quarter of 2023 under altered condition 3.2). As residents and nearby occupants would be expecting the removal of building in 12 months as the Project works have been completed (as required under condition 3.2 of Designation 2501) the extended lifespan of the SPA may result in a perceived extension of time visual impacts are experienced for affected individuals.

The addition of ventilation equipment located in acoustic enclosures in the Station Plaza area at the northern and southern ends of the Glasshouse will be the sole additional structures resulting from the Works that nearby occupiers and road users will experience. The ventilation equipment is required to supply oxygen into the CRL tunnels, dilute diesel emissions, improve thermal comfort, dilute and disperse any dust concentration and overall maintain good working conditions. The equipment will be in place for the duration of the Works. The Works will also require a range of other mobile equipment including cranes or hiab to convey materials down into the basement levels of Britomart Station. The containers and other equipment such as cranes, are similar in scale and appearance to what the AUP anticipates as occurring on any construction site, where storage and site offices of a similar scale are required.

In addition, the Works include receiving and pumping concrete into the CRL tunnels. The concrete delivery vehicles, as well as other construction vehicles associated with the Works will arrive and depart on existing public roads, as is currently undertaken by construction activities in the surrounding area. Users of Commerce Street in particular are familiar with heavy vehicles traversing the area given the use of that street by double decker buses. Concrete will be pumped from a single location in Station Plaza, directly into the basement levels of the transport centre and into the CRL tunnels. Deliveries will take place in two defined periods and only for the duration of those periods.

Materials delivered to the site will be stored inside the SPA or behind hoardings around the perimeter of Station Plaza. Other construction activities will take place in the tunnels below ground. Furthermore, construction delivery vehicles will only be accessing the site in an intermittent nature. The effects from these activities are for the duration of the Works only and by and large similar in nature and scale to other central Auckland construction sites.



Overall, it is considered that any impacts on amenity of the surrounding area will be less than minor.

6.9 Summary of Effects

The preceding assessment of potential adverse effects associated with the Works has been undertaken based on technical reports contained in **Appendices A to C**. The Works will occur from late 2021 until the end of 2023, with the main impacts occurring in two stages over a period of 30 days total within the two-year period. As such, the effects of the Works will be temporary and short term, and they are largely representative of the effects associated with an urban construction project and those anticipated by the AUP.

There will be no significant cumulative noise effects as the Works will generally occur within the permitted activity baseline. Construction activities generally will be managed through the implementation of a management plan with site specific plans focussed on any exceedances of noise standards. Furthermore, the Integrated Transport Assessment concludes the road network can manage the additional traffic movements from the Works. As such, there will be no significant cumulative traffic effects, subject to the implementation of appropriate construction traffic management.

Management of the potential effects identified in the preceding sections can be undertaken through the implementation of the management plans contained in the technical assessments accompanying this AEE and in the CEMP contained in **Appendix D**.

7 Statutory Assessment

7.1 Introduction

AC must have regard to the matters in section 171(1) of the RMA when considering the effects on the environment of allowing the NoR. This section of the AEE provides a summary of the statutory planning assessment undertaken for the Works NoR. Section 176A sets out the matters to be contained in an Outline Plan and the circumstances under which an Outline Plan is not required.

7.2 Recommendation on a Notice of Requirement by a Territorial Authority

The RMA directs a territorial authority to, subject to Part 2 of the Act, consider the effects on the environment of allowing a requirement, having particular regard to sections 171(1)(a) to (d). An assessment of the NoR against Part 2 is described at section 7.3.

7.2.1 Section 171(1)(a) - The relevant provisions of any policy statement or plans

The regional policy statement and AUP are discussed further below in section 7.4 and Appendix E of this AEE.

National environmental statements relevant to the consideration of the NoR are discussed at section 7.5.

7.2.2 Section 171(1)(b) - Whether adequate consideration has been given to alternative sites, routes, or methods of undertaking the works

Alternative construction methods and sites have been considered in section 4 of this AEE and in the Constructability Report in **Appendix A**. It is considered that adequate and robust consideration has been given to the reasonable alternatives.

7.2.3 Section 171(1)(c) - Whether the work and designation are reasonably necessary to achieve the objectives of the requiring authority (stated in Section 1 of this AEE)

The works associated with the NoR are reasonably necessary to enable the continued construction of the CRL project in accordance with the purpose of the requiring authority (CRL) and the CRL project objectives in section 1.2 above. In so doing the NoR will:

- Provide the flexibility to continue constructing the CRL within the BTC and CRL designations; and
- Enable the CRL work (inclusive of the Works) to be undertaken in a comprehensive, integrated and efficient manner.

7.2.4 Section 171(1)(d) - Relevant “other matters” that the territorial authority consider reasonably necessary in order to make a recommendation on the requirement

These include the Auckland Plan and other statutory and non-statutory planning policy documents which are discussed in Section 7.4 of this AEE.

7.2.5 Section 176A – Outline Plan

Section 176A(2) states an Outline Plan need not be submitted if one of the three following scenarios exists:

- (a) The proposed public work, project, or work has been otherwise approved under this Act; or
- (b) The details of the proposed public work, project, or work, as referred to in subsection (3), are incorporated into the designation; or
- (c) The territorial authority waives the requirement for an outline plan.

This NoR contains detailed information specific to the proposed Works. The relevant matters to be addressed through the Outline Plan process described at section 176A(3) (location, traffic, access and parking, and other matters being noise, amenity and historic heritage) have been discussed in this AEE and management methods provided in the CNMP and CTMP contained in the CEMP at **Appendix D**. The remaining matters in section 176A(3) (height, shape, bulk, finished contour and landscaping) are not relevant to the proposed Works given no permanent above ground structures or earth disturbing activities are proposed. Reinstatement of the Station Plaza area will be undertaken as a requirement of the existing Designation 2501 Condition 33B.1(b) which requires reinstatement of Station Plaza to the same or better standard as existed prior to the Project⁶ works being undertaken.

On this basis it is considered this NoR satisfies the requirements of section 176A(2)(b) and no Outline Plan is required for the Works.

7.3 Part 2 of the Resource Management Act 1991

Assessments under section 171(1) are subject to Part 2, which sets out the purpose (section 5) and principles (sections 6-8) of the RMA. Section 7.3 is the assessment of the NoR against the provisions of Part 2 RMA. This is followed by a summary assessment of the other provisions of sections 171, sub-sections (1)(a) to (d).

7.3.1 Purpose and Principles (Section 5)

The purpose of the RMA (as stated in section 5 of the Act) is “to promote the sustainable management of natural and physical resources”. Section 5(2) of the RMA defines sustainable management as:

“... 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 well-being 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.*

The Works promote the purpose of the RMA through the positive effects described in section 6.2 of this AEE.

As demonstrated in Section 6 of this AEE, the Works will incorporate a number of measures to mitigate potential adverse effects on the environment such that those effects are acceptable. These measures are contained in the management plans forming part of the CEMP contained in **Appendix D**.

⁶ The Project covers the scope of works in CRL Contract 1

7.3.2 Matters of National Importance (Section 6)

Section 6 of the RMA sets out 'Matters of National Importance' that are to be recognised and provided for in managing the use, development and protection of natural and physical resources. The following Matters of National Significance are relevant to the Works:

Section 6(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

The Works are located approximately 100 metres horizontally from the MWHS. This particular area of the coast has lost much of its natural character due to historic reclamation and development. The separation distance between the Works and the MWHS will avoid any adverse effects on the coastal environment.

Section 6(e) - the relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga

Engagement with Maori has been undertaken from the onset of the wider CRL project and is on-going via the Mana Whenua Forum. As described in Section 5, engagement with Mana Whenua continues on a regular basis, with the latest Mana Whenua Forum held on the 4th of May. Through the Forum Mana Whenua principles are identified, which will assist in recognising and providing for the relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga.

Summary

Overall the Works provides for and recognises the matters of national importance in section 6 of the RMA.

7.3.3 Other Matters (Section 7)

Section 7 of the RMA sets out other matters that are to be given particular regard in managing the use of natural and physical resources. The following matters are considered relevant to the Works:

Section 7(a) and (aa) – Kaitiakitanga and the ethic of stewardship

Measures to protect the environment from actual and potential effects associated with the Works are described in section 6 of this AEE and present environmental best practice. Consultation with Mana Whenua is on-going and will continue through the Mana Whenua Forum. Mana Whenua have emphasised the need for their on-going involvement in the CRL project as a whole, particularly to enable them to undertake their kaitiakitanga responsibilities.


Section 7(b) – the efficient use and development of natural and physical resources

The Works are a component of the CRL, which itself reinforces an efficient use of natural and physical resources (such as land and the existing transport network) because rail is a spatially efficient mode of transport for dense city centres such as the Auckland CBD.

Furthermore, the proposal includes the most efficient undertaking of the works in the CRL tunnels. The receiving and pumping of concrete (for Stage 2) into the CRL tunnels in the adjoining Designation 2500-1 from the Station Plaza area in Tyler Street is the most efficient use of resources to construct the required track bed compared to alternative sites and utilises part of the open Station Plaza area.

Section 7(ba) – the efficiency of the end use of energy

As previously described, the Works include the most efficient way of receiving and pumping of concrete into the CRL tunnels to create a track bed. This will provide for the efficient use of energy in both establishment outlay and ongoing operations.



In addition, the Works facilitate the extension of the electric train network through the BTC. Electric trains are an energy efficient mode of transport for moving large numbers of people around Auckland through supporting the construction of the CRL project.

Section 7(c) – the maintenance and enhancement of amenity values

As outlined in section 6 of this AEE, effects on amenity values during construction will be temporary in nature and only for the duration of construction. In addition, the option selected is more effective than other options in 'internalising' adverse effects within the existing SPA.

Section 7(f) – maintenance and enhancement of the quality of the environment

The Works will enhance and maintain the quality of the environment by:

- Helping to reduce greenhouse gas emissions by facilitating the construction of the CRL;
- Improving access to the CBD and other areas across Auckland through the construction of CRL; and
- Ensuring the quality of the urban environment is maintained through the retention of the SPA that is both functional and representative of good design.

Section 7(i) - the effects of climate change

The Works are a necessary component of the construction of the CRL, which itself will assist in combating the effects of climate change by improving the provision of a passenger transport link that is not subject to road congestion. The Works themselves will not significantly contribute to the adverse effects of climate change.

Summary

In summary, the Works have had particular regard to the relevant matters of section 6.

7.3.4 Treaty of Waitangi (Section 8)

Section 8 of the RMA requires those exercising powers or functions under the RMA to take into account the principles of the Treaty of Waitangi. A core principle of the Treaty is partnership. A collaborative working relationship with Mana Whenua has been occurring throughout the various stages of the CRL project, as document in Section 5 and 6 of this AEE. The consultation process with Mana Whenua has not been repeated here for the purpose of succinctness. The partnership with iwi throughout the various CRL projects, including the Works is considered to be consistent with section 8 of the RMA.


7.4 RMA Policies and Plans

7.4.1 Regional Policy Statement

The Auckland Regional Policy Statement (RPS) is contained within Chapter B of the AUP and it contains nine issues of regional significance of resource management in Auckland. Most applicable to this NoR is Chapters B3 and B6.

Chapter B3 relates to Infrastructure, Transport and Energy. The infrastructure section of Chapter B3 contains objectives which recognise the benefit of infrastructure including enabling economic growth, providing for public health, safety and wellbeing of people and communities. The associated policies seek to enable the development, operation, maintenance and upgrading of infrastructure, while avoiding, remedying and mitigating adverse effects on the environment.

The transport section of Chapter B3 contains objectives which aim to provide effective, efficient and safe transport modes that enable growth and enables efficient movement of people, goods and services. The supporting policies aim to ensure that transport infrastructure is designed, located and



managed to integrate with adjacent land uses and aims to avoid, remedy or mitigate the adverse effects associated with the construction or operation of transport infrastructure on the environment.

The Works will contribute to the construction of the CRL, which itself will provide an effective, efficient and safe transport infrastructure for Auckland. The mitigation measures described in section 6 of this AEE, will help to ensure any adverse effects associated with the Works will be less than minor.

The objectives and policies of Chapter B6 Mana Whenua recognise the role of Mana Whenua as kaitiaki and provides for the integration of mātauranga Māori and tikanga into resource management processes. The Chapter also seeks to protect Mana Whenua's cultural heritage. Of particular importance to the Works are Objective (1) and (2) and Policy (1) which recognise the principles of the Treaty of Waitangi and seek Mana Whenua participation and engagement in resource management processes, as well as the sustainable management of natural and physical resources.

As described in section 5 of this AEE, Mana Whenua have actively been engaged with for the duration of the CRL. Consequently, it is considered that the Works are consistent with Chapter B6 of the RPS.

On this basis, it is considered that the Works are consistent with the RPS.

7.4.2 Auckland Unitary Plan (Operative in Part)

The AUP contains a range of objectives and policies that are applicable to the Works. For instance, the footprint of the Works is not within a Historic Heritage Overlay; however, it is adjacent to scheduled buildings. Due to the nature of the works, including the establishment of ventilation systems and the pumping of concrete, it will not result in adverse effects on heritage values. In addition, the SPA and the ventilation equipment will only remain in place for the duration of the Works and will not result in any significant visual adverse effects to the surrounding historic heritage places.

The Works will facilitate and enable the construction of the CRL which itself will provide for an integrated public transport network for Auckland upon completion. CRL will increase accessibility to the city centre, provide for additional capacity, increase rail patronage and act as a catalyst for inner city development. Together, along with the high standard of amenity the SPA was designed to and the requirement for ventilation fans in order to provide safe working conditions, the Works are considered consistent with the objectives and policies within Chapters E25 Noise and Vibration, E27 Transport, I201 Britomart Precinct and H8 Business City Centre Zone.

Overall, the Works are consistent with the objectives and policies within the AUP. Further detail on the assessments of objectives and policies within the AUP can be found in **Appendix E**.

7.5 Other Matters

7.5.1 National Environmental Standard for Assessing and Managing Contaminants in Soil (NESsoil) 2011

The NESsoil relates to the assessment and management of health effects from exposure to contaminants in soil. Resource consents have been approved for activities prescribed in the NESsoil⁷. The assessment undertaken as part of the resource consent process confirmed that potential effects are acceptable and able to be appropriately managed. The Works are considered within the scope of these approved resource consents and as such will not contravene the NESsoil.

⁷ R/REG/2014/5430; R/REG/2014/5434; R/REG/2014/5437; R/REG/2014/5435; R/REG/2014/5432; R/REG/2014/5436; R/LUC/2014/5428; R/CER/2014/5441; R/CER/2014/5439; R/CER/2014/5447; R/CER/2014/5444; R/CER/2014/5440; R/CER/2014/5446

7.5.2 National Environmental Standards for Air Quality (NES-AQ) 2004

The NES-AQ is made up of 14 separate but interlinked standards. The 14 standards in the NES include standards banning activities that discharge significant quantities of dioxins and other toxics into the air and for ambient air quality. Resource consents have been approved for works associated with the construction of the CRL⁸. The assessment undertaken as part of the resource consent process confirmed that potential effects are acceptable and able to be appropriately managed. The Works are considered within the scope of these approved resource consents and as such will not contravene the NES-AQ.

7.5.3 Heritage New Zealand Pouhere Taonga Act 2014 (HNZPTA)

The purpose of this Act is to promote the identification, protection, preservation, and conservation of the historical and cultural heritage of New Zealand.

In addition to any heritage requirements under the RMA, HNZPTA protects all archaeological sites whether recorded or not, and they may not be damaged or destroyed unless an Authority to modify an archaeological site has been issued by Heritage NZ (section 42).

An Archaeological Authority from Heritage NZ for earthworks in the vicinity of the Britomart Transport Centre has previously been received by CRL as it is a site associated with pre 1900 human activity. As discussed in section 7 of this AEE, there is also a Deed of Heritage Covenant and corresponding Conservation Plan (1995) protecting the CPO building. The Works associated with the NoR will not involve any physical alteration of the CPO building and as such will not impact on the historic heritage of that building. As no land disturbing activities are included in the proposed Works no further authorisation for modification of an archaeological site is required.

The NoR is supportive of the purpose of the HNZPTA.

7.5.4 Summary


Overall the assessment of the Works against the relevant provisions of the RMA, including Part 2 and the policy statements and AUP, has concluded that the Works are generally consistent with the purpose and principles of the RMA and key policy documents including the AUP.

The proposed alteration to Designation 2501 and associated Works are necessary to achieve the wider CRL project objectives, and adequate consideration has been given to alternative sites, routes and methods. The potential adverse effects for the Works are associated with construction and are temporary in duration and can be managed and mitigated such that overall the Works meet the purpose and principles of the RMA.

The main conclusions of the statutory planning assessment are:

- The Works are consistent with and will give effect to (where required) the relevant objectives and policies of the RMA.
- The strategic importance of the wider CRL, which the Works will contribute to, is to unlock the potential of Auckland's rapid rail transit network by increasing the overall network capacity and accessing the city centre thereby improving resilience of the strategic transport network.
- The proposal includes the most efficient undertaking of the Works within the CRL tunnels, compared to alternative options.

8

- 
- The Works will facilitate the CRL and as a whole the project will provide for economic growth by supporting regional and national economic development opportunities, underpin development in the city centre and stimulate inner city development by providing new major transport hubs around the new underground rail stations.
 - The Works (in conjunction with the wider CRL) promotes the sustainable management of natural and physical resources.
 - Any potential adverse effects from the Works on the environment can be adequately avoided, remedied or mitigated.
 - The Works provide for, and will respond to matters in section 6, 7 and 8 of the RMA.

Finally, the Works are an essential component to the efficient construction of the CRL at Britomart and therefore give effect to the vision contained within the suite of relevant planning documents.

8 Proposed Alteration to Designation 2501

8.1 Introduction

The NoR to alter Designation 2501 introduces a new definition “the Works” to the definition section of the designation and subsequent amendments to the purpose and condition 3.2. These amendments are (additions are in **bold underlined** and deletions struck through):

- Amending the purpose of the designation as follows:
 - This designation provides for the construction, operation and maintenance of a transport centre and the provision of a rail system **(including the Works)**. The centre comprises an underground Railway Station, attendant facilities and public access to the station through the main portal of the former CPO and at other access points. Above-ground features of the centre include the glazed annex to the CPO building, a series of skylights, ventilation stacks and other servicing plant and equipment.
- Inserting a definition of “The Works” after the existing definition “The Project” in the definitions section as follows:
 - **Construction support works to enable construction in adjoining City Rail Link Designation 2500-1, including site office, worker accommodation and storage of some materials in the Station Plaza Accommodation, receiving and pumping concrete from the BTC into Designation 2500-1 tunnels, establishing and operating ventilation equipment in Station Plaza, and providing access for workers and delivery of some materials to the Designation 2500-1 tunnels via the Glasshouse and former Chief Post Office.**
- Amending Condition 3.2 as follows:
 - The Station Plaza Accommodation shall be ~~removed within one year of~~ **retained following completion of the Project works in order to enable the Works (and any other contemporaneous works permitted under this designation), but shall be removed on completion of the Works.**



9 Conclusion

The Works will facilitate the ongoing construction of the CRL in the Wyndham Street to CPO tunnels. It will also enable Designation 2501 to be used as a construction support area for works in the CRL Designation 2500-1, as well as allowing the retention of the SPA longer than the period currently specified within the designation. Overall, the Works will facilitate the construction and future operation of the CRL.

Matters that are considered relevant to the assessment of the NoR have been addressed within the Works NoR suite of documents, including this AEE. The documents attached to this NoR provide information on the construction methodology, consideration of alternatives and the actual and potential adverse effects associated with the Works. These matters have been considered in the preparation of the AEE which has included:

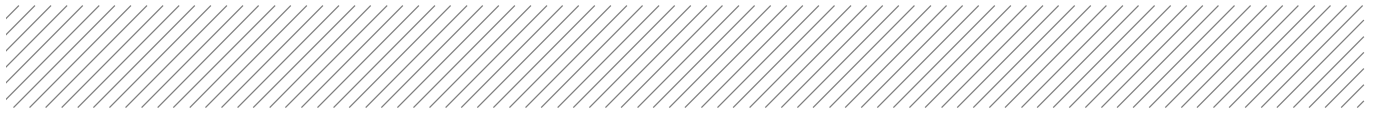
- Policy documents relevant to the Works.
- The consideration that has been given to alternative construction methodologies and concrete delivery locations.
- The consultation undertaken to date.
- An assessment of the environmental effects, including environmental assessments undertaken by technical experts.
- An assessment of planning legislation, statutory documents and the relevant non-statutory documents.

The actual and potential adverse effects will be temporary, occurring during the construction of the Works only. Construction effects will not be dissimilar to those resulting from other infrastructure projects in Auckland. These effects can be mitigated through the implementation of management plans provided with this NoR.

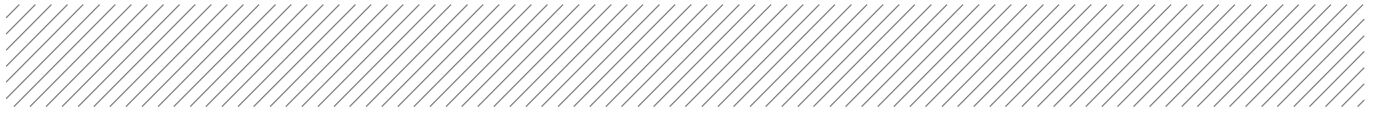
The Works will facilitate the construction and operation of the CRL and as such plays a key role in the wider CRL project.

Appendices





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Appendix A

Constructability Report



Constructability Report

CRL Construction Support Activities at Station Plaza – Britomart

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	Name/Title	Signature	Date
Prepared by:	Rudy Seller Cable and Installation Lead		25/06/2021
Reviewed by:	Kostas Kakis Construction North Manager	pp 	25/06/2021
	Murray Simon Track & OLE Package Manager		25/06/2021
	Nigel McCreight Construction Engineering Manager		25/06/2021
Approved by:	Jean-Phillippe Guillemenot Systems Director	pp 	25/06/2021
	Philippe Begou Civil Director	pp 	25/06/2021

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Glossary of Terms

Term /Abbreviation	Definition
AT	Auckland Transport
AUP	Auckland Unitary Plan (Operative in Part)
CPO	Former 'Chief Post Office' building
CRL	City Rail Limited
CRL	City Rail Link
DLV	Delivery Team
LV	Low Voltage
MEFH	Mechanical, Electrical, Fire and Hydraulics
OHLE	Overhead Line Equipment
NoR	Notice of Requirement
ROCB	Rigid Overhead Conductor Beam
SIG	Signalling
SPA	Station Plaza accommodation
TVS	Tunnel Ventilation System
VTS	Vertical Transport System

1 Introduction

This Constructability Report (report) forms part of the City Rail Link Limited (CRL) Notice of Requirement (NoR) to alter Designation 2501, Britomart Transport Centre, pursuant to section 181(1) of the Resource Management Act 1991 (RMA).

The purpose of the alteration is to provide for retention of the Station Plaza Accommodation (SPA) building at Britomart, so that the building and surrounding Station Plaza area can be used as a construction support facility for works in the CRL tunnels located within the adjoining CRL Designation 2500-1 to the west.

This report explains the proposed construction support works (hereafter referred to as 'the Works') and includes an assessment of alternative sites and methods that were considered for undertaking the Works. In summary the Works forming part of the NoR are:

- Site office, worker accommodation, and some storage of materials within the SPA building;
- Establishing and operating ventilation equipment in the Station Plaza area (to provide ventilation for workers in the CRL tunnels to the west);
- Access for workers and deliveries of equipment and materials via the Glasshouse and former Chief Post Office (CPO) building; and
- Receiving and pumping concrete into the CRL tunnels (to construct the railway track bed) from the Station Plaza area in Tyler Street.

The location of the Works is shown in Figure 1.1.

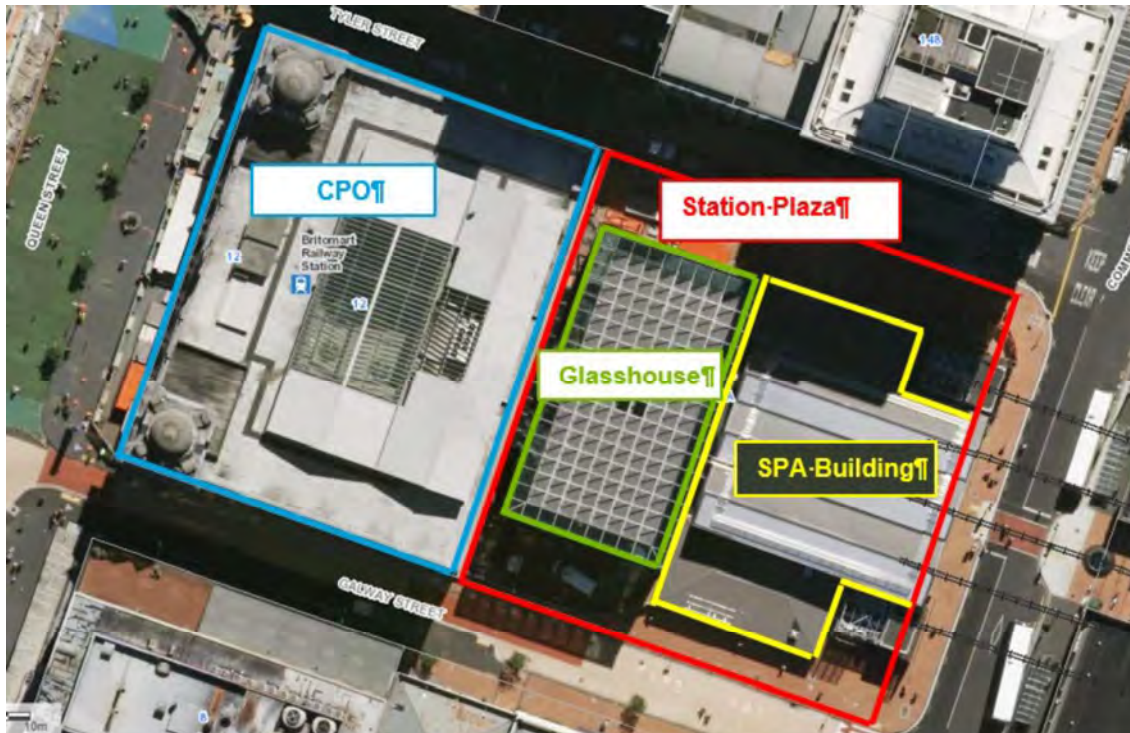


Figure 1.1 Station Plaza and Station Plaza Accommodation (SPA) building at Britomart Transport Centre

1.1 Fit-Out of CRL Tunnels

Two underground railway tunnels have already been constructed as part of earlier CRL project works. These tunnels extend beneath the CPO building, lower Queen Street, the new Commercial Bay development, and up Albert Street as far as Wyndham Street.

The extent of the tunnels is shown in green and blue ('C1 – DSC – C2') in Figure 1.2.

In order to complete the CRL project, it is necessary to fit out the tunnels with rail tracks, overhead catenary, signalling systems and all of the other infrastructure required for operation of an underground passenger railway.

For the purposes of fit-out, the sections of tunnel already constructed can now only be accessed from the Britomart Station or Albert Street ends.

At the Albert Street end, the tunnels connect with major construction works now being undertaken for the continuation of CRL up Albert Street – including construction of the new Aotea Station.

For the reasons outlined in this report, the majority of the construction support Works for tunnel fit-out are proposed to be undertaken at the Britomart Station end, but some of the Works (Stage 1 tunnel concrete delivery) will be undertaken from the Albert Street end.

Construction support activities at the Albert Street end are already provided for by CRL Designation 2500-1 and do not form part of the NoR for alteration to Designation 2501.



Figure 1.2 Extent of tunnels

2 Description of the Works

The following sections describe the Works and associated construction methodologies. An assessment of alternatives has been undertaken to establish the Works as the preferred option, and this assessment is described in detail in Section 4 of this report.

As previously described, the Works comprise the following activities:

- Site office, worker accommodation, and some storage of materials within the SPA building;
- Establishing and operating ventilation equipment in the Station Plaza area (to provide ventilation for workers in the CRL tunnels to the west);
- Access for workers and deliveries of equipment and materials via the Glasshouse and CPO building; and
- Receiving and pumping concrete into the CRL tunnels (to construct the railway track bed) from the Station Plaza area alongside Tyler Street. Concrete delivery will be undertaken in two stages – ‘Stage 1’ and ‘Stage 2’.

Where practicable it is proposed that the Stage 1 concrete will predominantly be delivered from the Albert Street end of the tunnels, but provision is sought for delivery from the Britomart end as a secondary option. The delivery of concrete from Albert Street is already provided for by CRL Designation 2500-1 and does not therefore form part of the Works for the purposes of the alteration to Designation 2501.

2.1 Site establishment

A ‘site compound’ will be established for the Works, incorporating the SPA building and surrounding Station Plaza area. Figure 2.1 shows the proposed layout of the site compound, with the full extent of the compound being delineated by the green-dotted envelope.

The site compound will be used for the following activities:

- Smoko and welfare facilities for construction workers;
- Site offices;
- Delivery point for all materials that will not be transported via rail from Quay Park;
- Storage area/holding area for equipment and materials such as:
 - Cable and cable containment
 - Low voltage (LV) distribution boards
 - Signalling equipment
 - Fire hydrant piping and ancillaries
- Access routes in and out of the CRL tunnels via emergency stairs at North Eastern corner of CPO building;
- Location for ventilation fans to provide fresh air into the CRL tunnels.

At the peak of construction activity during quarters 3 and 4 of 2022, it is estimated that a work force of approximately 50 people will be using the site compound as an access point.

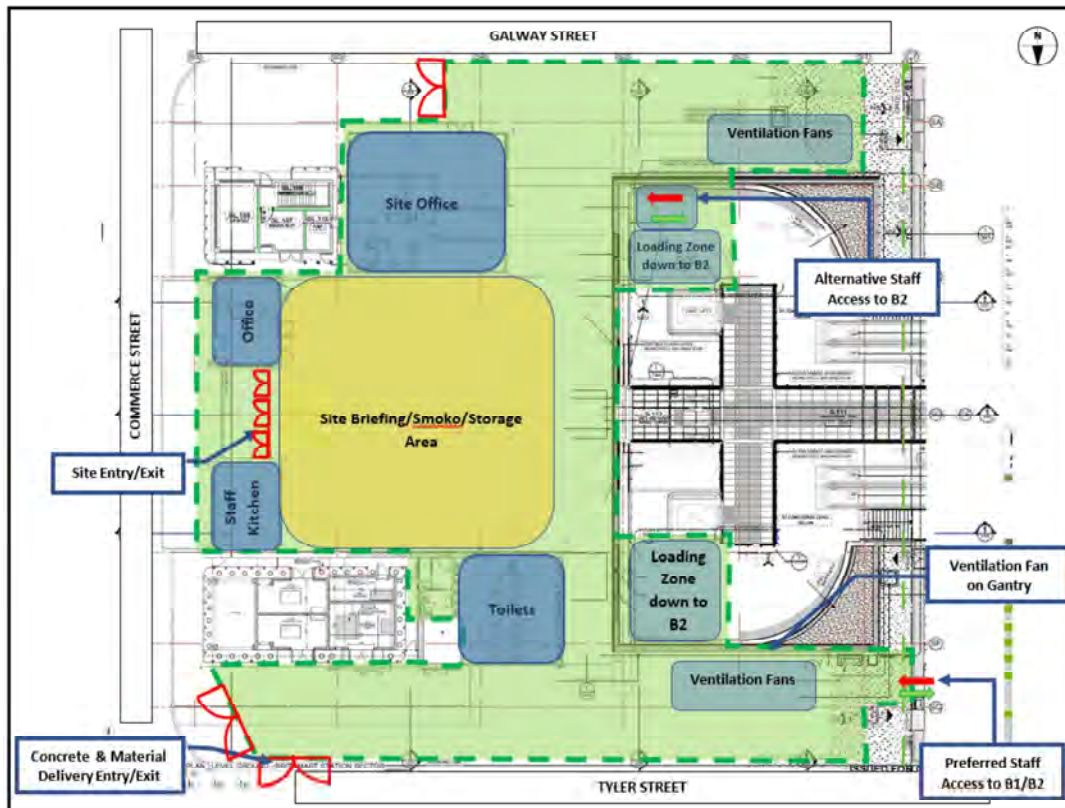


Figure 2.1 Site Compound Layout

2.2 Ventilation Equipment

In order to facilitate a safe working environment within the tunnels during construction, it is necessary to provide forced ventilation to remove any noxious fumes generated from the operation of construction vehicles and other fit-out activities in the tunnels.

The purpose of the temporary ventilation system is to:

- Supply oxygen (“fresh air”) into the tunnels;
- Dilute diesel emissions;
- Improve thermal comfort by removing heat from the working area; and
- Dilute and disperse any dust concentration.

A Britomart Ventilation Plan has been developed (**Appendix 1**) and this describes the proposed ventilation design for the tunnels. Fans located within the site compound will force fresh air down into the tunnels via flexible ducting, with air exhausting to the atmosphere at the Albert Street end of the tunnels (Figure 2.2).

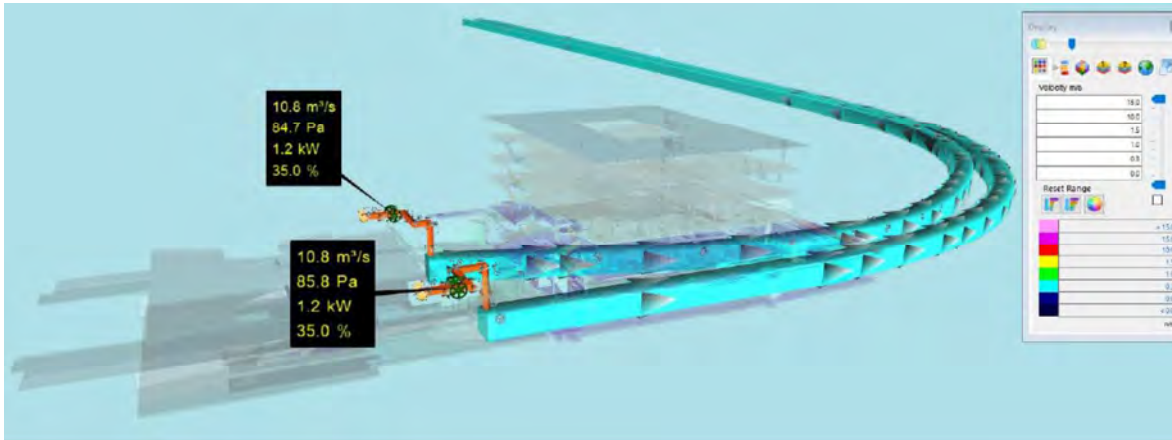


Figure 2.2 Forced Ventilation from Britomart to Albert Street end of CRL tunnels

Construction activities within the tunnels that are expected to create dust and/or diesel emissions include:

- Bolting and drilling
- Concrete pumping
- Haul truck operation
- Shunting
- Track welding

In order to generate the required level of ventilation, fans will be installed up on a gantry at the northern and southern ends of the 'Glasshouse', with a 1.3m diameter flexible duct protruding into the 'Glasshouse' and running down into the respective tunnels, as shown in Figures 2.3 to 2.5 below. The required airflow into the tunnels is 28 m³/s.

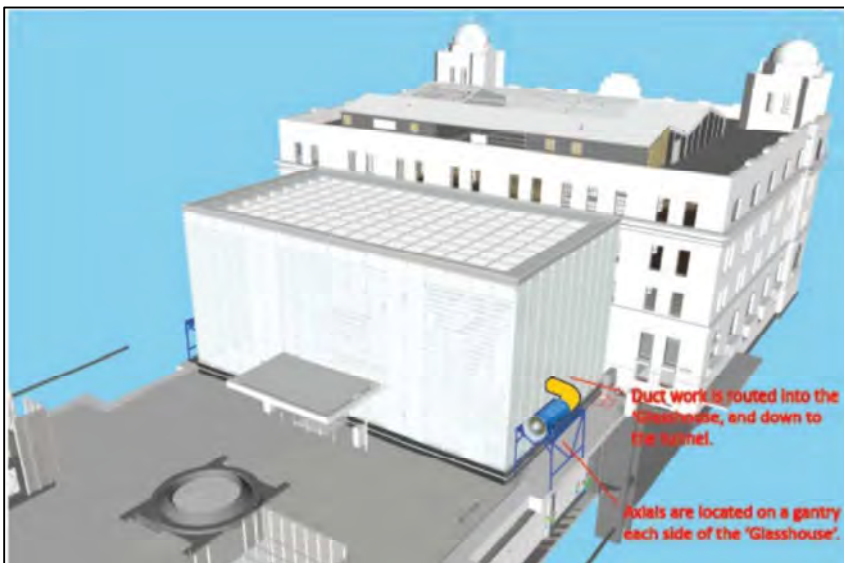


Figure 2.3 Fans positioned either side of the Glasshouse on a gantry

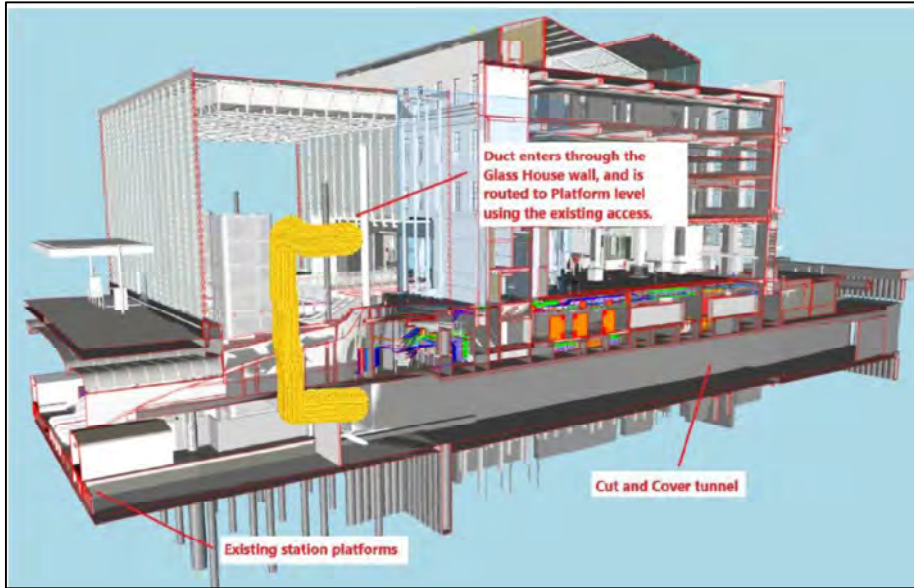


Figure 2.4 Ventilation ducting extending down into the tunnels on Tyler Street side

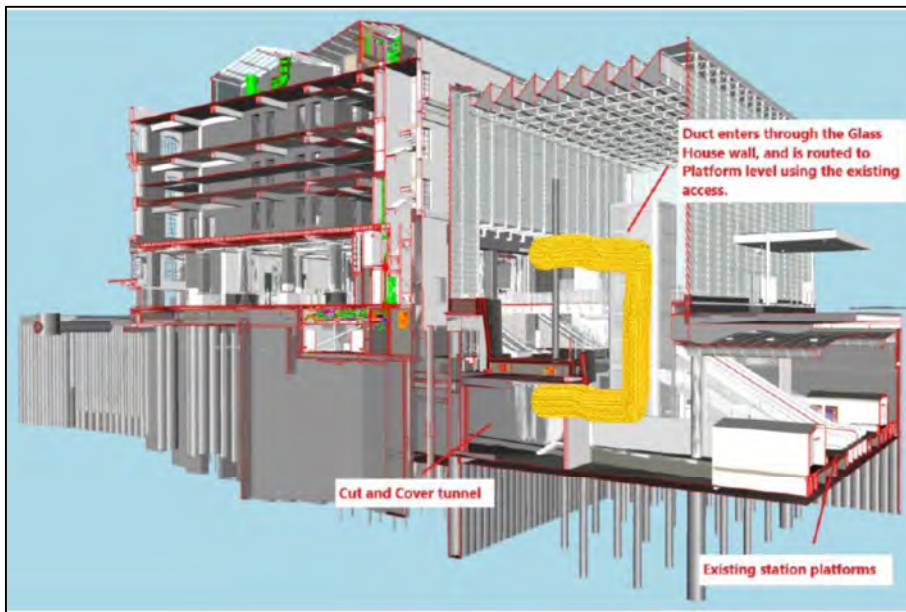


Figure 2.5 Ventilation ducting extending down into the tunnels on Galway Street side

The ventilation fans will either be housed with an acoustic enclosure, such as noise blankets or within a container (refer to Figure 2.6). Each fan it will also be fitted with an inlet attenuator. Due to space constraints within the site compound the currently proposed methodology is to position the fans on a gantry approximately 3-5m above ground. The ventilation fans will be powered by electricity via existing transformer located on corner of Tyler and Commerce Street.

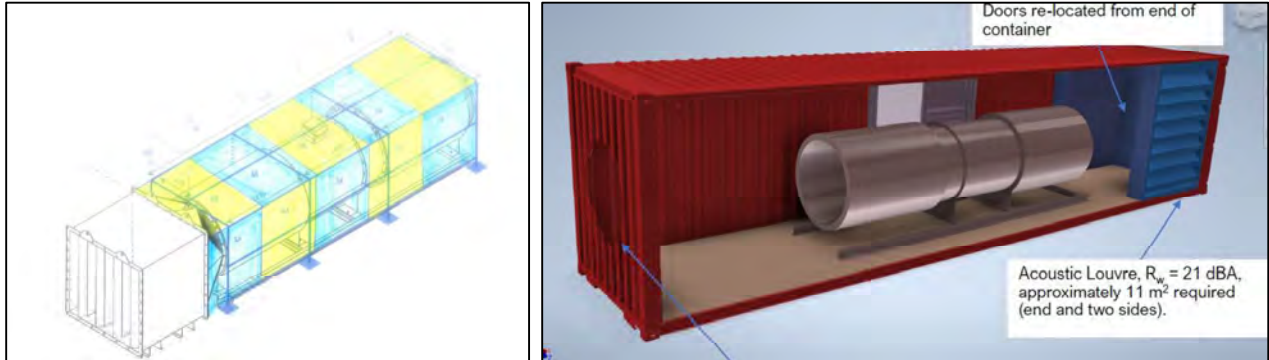


Figure 2.6 Potential enclosure options for the ventilation fans

The proposed operational timeframe for the fans is 24 hours, 7 days per week from Q1 2022 until the permanent tunnel ventilation system is operational in 2023. This will ensure a safe working environment at all times. Where possible the Link Alliance will aim to reduce the fan speed during non-working times to decrease the overall noise but also manage overall power consumption of the fans.

2.3 Access for workers

Within the site compound, Figure 2.7 shows the preferred construction workforce access route between the SPA building and the basement levels of Britomart Station. This would allow workforce access in and out of the CRL tunnels via the emergency stairs at the north eastern corner of the CPO building. This proposed access route would remove any interface between construction workers and public transport patrons (i.e. Britomart Station users) for the duration of the Works.

Use of this access route is subject to obtaining approval from AT and Fire and Emergency New Zealand. Should it not be approved, a temporary scaffold stair could be installed inside the Glasshouse, which will provide an alternative access route for workers (refer Figure 2.7).

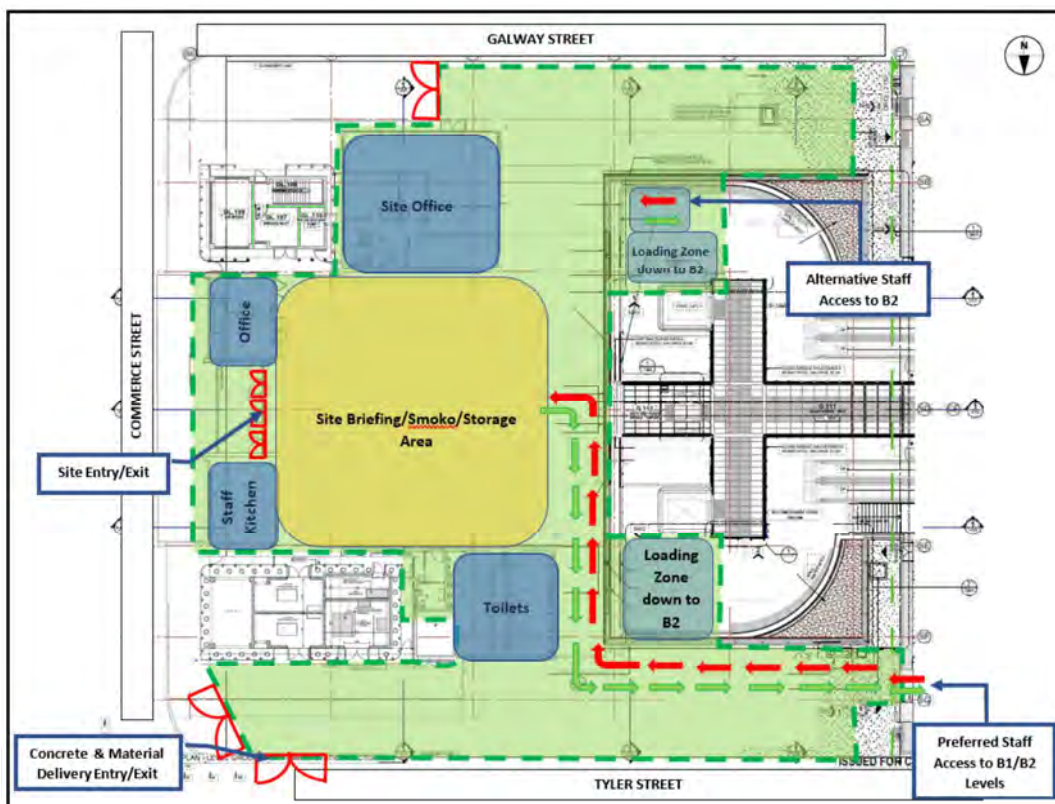


Figure 2.7 Workforce Access Routes into Britomart Station Basement Levels

2.4 Tunnel concrete delivery

Concrete delivery into the tunnels is required for two main activities, 'Stage 1' concrete (invert concrete) and 'Stage 2' concrete (track form concrete) (refer to *Figure 2.8*).

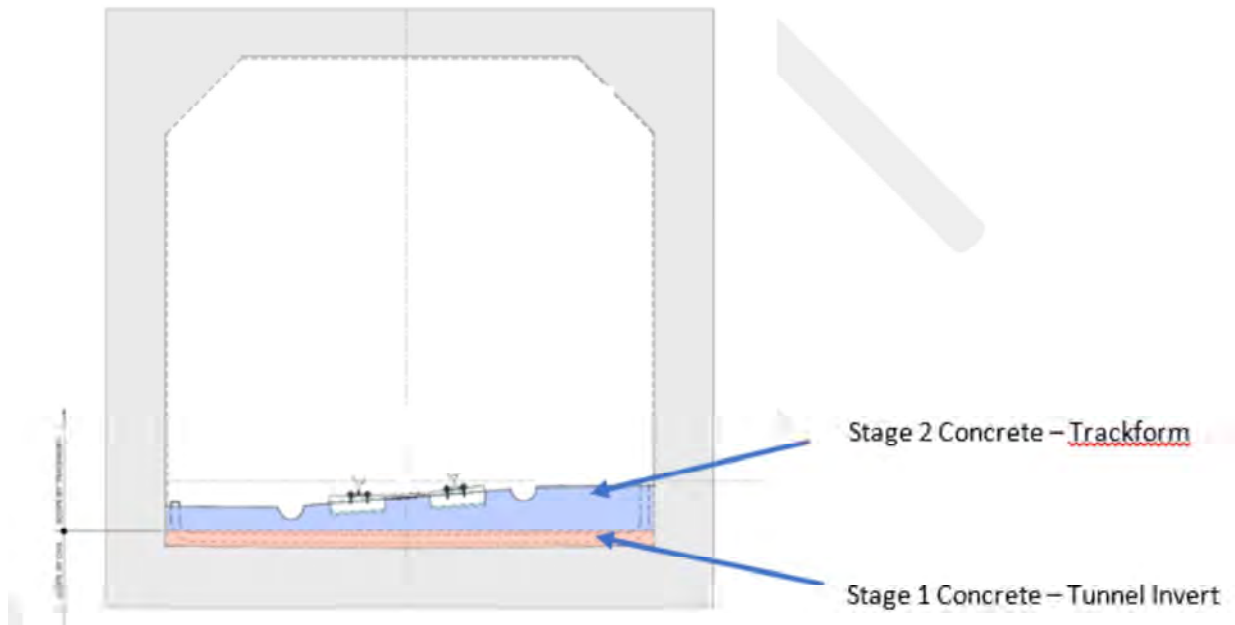


Figure 2.8 Tunnel section depicting Stage 1 and Stage 2 concrete

Stage 1 concrete

Where practicable it is proposed that the Stage 1 concrete will predominantly be delivered from the Albert Street end of the tunnels, but provision is sought for concrete delivery from the Britomart Station end as a secondary 'backup' option - with a worst case 50 / 50 split between Albert Street and Britomart Station.

If concrete delivery is required from the Britomart end, this will occur via a pump line located on the North Western corner of the Glasshouse alongside Tyler Street. Wherever possible (depending on the availability of larger trucks from the concrete supplier at certain times during the day), concrete deliveries will be undertaken using eight-wheeler, 6m³ capacity trucks. This will reduce the number of truck movements required. Deliveries would occur between the hours of 6:30am - 9pm, Monday to Saturday - however in the event of onsite delays, deliveries could extend until 10:30pm at night. Typical daily concrete pours would be 100m³ to 200m³ (20 to 40 truckloads).

Activity	Duration	Total Quantity	Programme
Stage 1 Concrete	15 days & 20 days	3500m ³	Q4 2021 from Albert Street & Q1 2022 from Britomart

Stage 2 concrete

Stage 2 concrete will be solely delivered from the Britomart Station end of the tunnels. Concrete delivery will be via a pump line located on the North Western corner of the Glasshouse alongside Tyler Street. The concrete pump and delivery truck will be positioned within the site compound as shown in Figure 2.9. Wherever possible, deliveries will be undertaken using eight-wheeler 6m³ capacity trucks, or otherwise using the largest truck size available in order to reduce vehicle movements. The concrete will be pumped down into the tunnels via a truck mounted pump. Concrete deliveries for Stage 2 would again occur between the hours of 6:30am – 9pm, Monday to Saturday – however in the vent of onsite delays, deliveries could extend until 10:30pm at night.

Activity	Duration	Total Quantity	Programme
Stage 2 Concrete	10 Days	1400m ³	Q2 2022 Stage 2 concrete delivery will have an overall duration of 20 days, but concrete will only be delivered every second day (i.e. 10 days of actual concrete delivery)

Concrete delivery route

Concrete trucks will access the site compound via Commerce Street and Tyler Street. Due to space constraints and associated safety considerations, as well as the need to stack concrete trucks in Tyler street, the preferred methodology, subject to agreement by Auckland Transport, is to back the trucks into Tyler Street from Commerce Street. Trucks will be escorted down Tyler Street by a full-time spotter.

Alternatively during the AM/PM Peak, trucks will drive into Tyler Street and undertake a 3 point manoeuvre, whereas during Off Peak trucks will back in from Commerce Street as explained above.

The current programme indicates peak vehicle movement of up to 40 trucks per day at 3-4 trucks per hour.

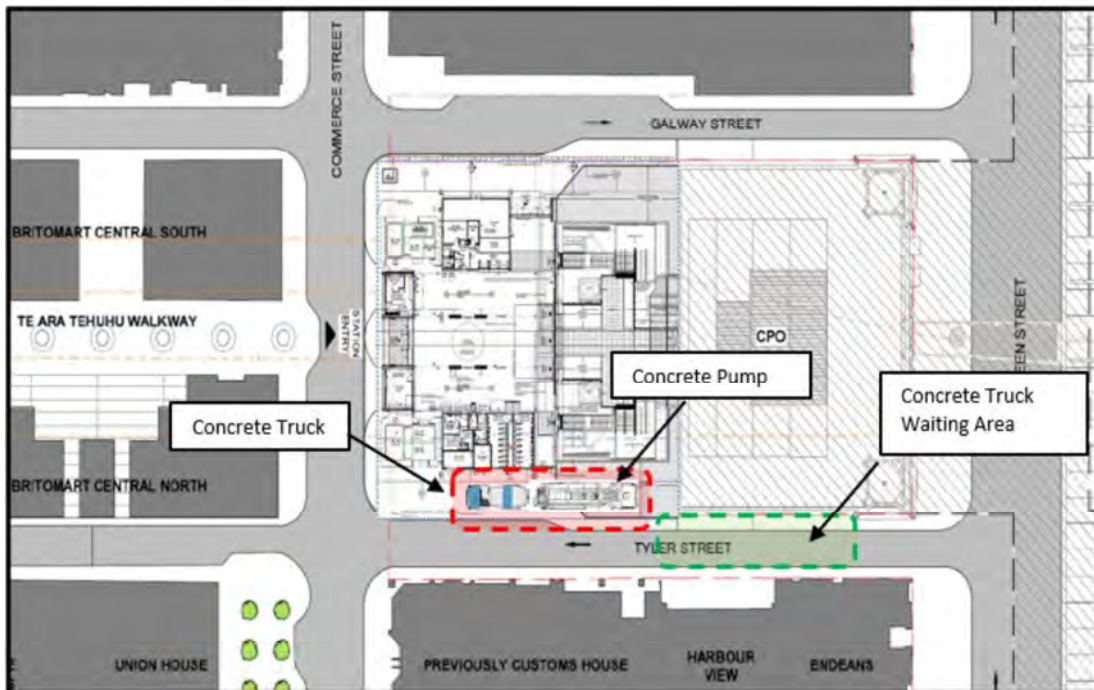


Figure 2.9 Proposed concrete truck/pump location

3 Management of the Works

The following sections describe how the Works will be managed.

3.1 Pedestrian and vehicle access

During the Works, access to the site compound and surrounding area will be managed as follows:

- The main site compound access will be off Commerce Street via the existing main entrance to the SPA building. This entrance will be manned during working hours.
- Public pedestrian access to Britomart Station will be maintained at all times, through the Western façade as well as the North Eastern and South Eastern Corners of the CPO building (refer to Figure 3.1), as is currently provided.
- The SPA building will be closed to the public.
- Public pedestrian access along Tyler and Galway Streets will be generally unimpeded, as shown in Figure 3.1. During major deliveries there will, however, need to be some temporary short-term access restrictions for pedestrian safety reasons. Typically this may amount to a few minutes of pedestrian restricted movement while we safely escort trucks to the site compound or undertake a delivery.
- General vehicle access along Tyler Street will mostly be unrestricted, with the exception of daily deliveries to the site compound via a loading bay and/or scheduled major deliveries under traffic management (refer to Figure 3.2).
- General vehicle access along Galway Street will be mostly unrestricted, however in exceptional circumstances Galway Street could be used as a secondary delivery access point, should Tyler Street not be suitable.

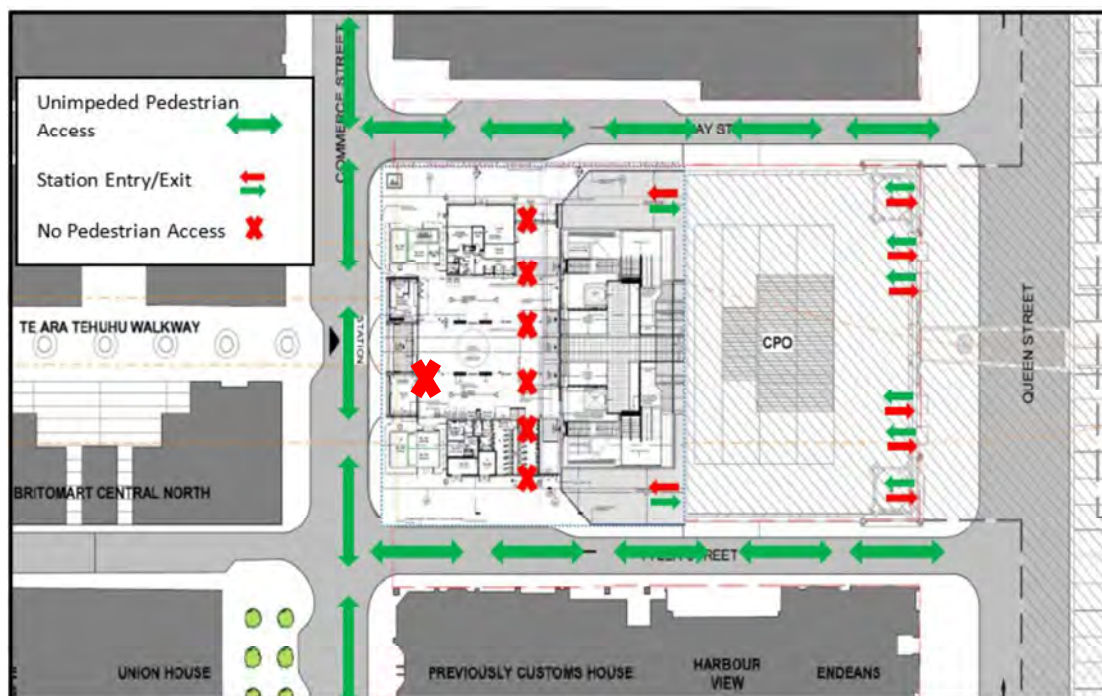


Figure 3.1 Pedestrian access routes

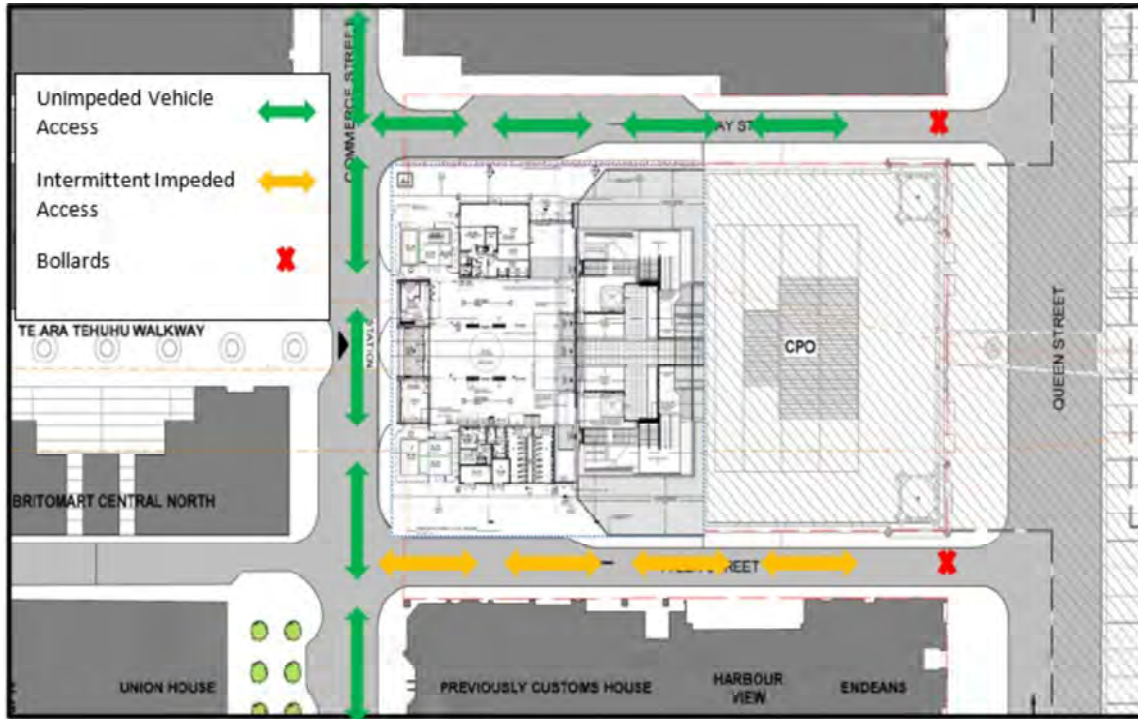


Figure 3.2 Vehicular access routes

3.2 Deliveries

In order to facilitate the Works, a range of deliveries need to occur. Material deliveries into the tunnels will be either carried out via rail from Quay Park, or by road and delivered via the north east corner of the Glasshouse on Tyler Street. Ideally all materials related to the tunnel fit-out would be delivered via rail. However, this is not possible due to the limited rail closure/isolation windows during which construction related rail deliveries could take place (i.e., only every second week), as well as limited space for underground storage (including in the tunnels). These constraints would significantly impede the construction programme if rail delivery was the only option.

Accordingly, it is proposed that material deliveries will be undertaken as per the schedule below:

Activity/Material	Road/Rail
Track and overhead line equipment (OHLE)	Rail as primary means of delivery, Road as secondary means of delivery (Glasshouse via Tyler Street)
Fire Hydrant Pipework	Rail as primary means of delivery, Road as secondary means of delivery (Glasshouse via Tyler Street)
Cabling	Road as primary means of delivery (Glasshouse via Tyler Street), Rail as secondary means of delivery where possible
Small Goods, i.e., LV Distribution boards, Mechanical Ducting, Mechanical Fans, Fire System equipment	Road (Glasshouse via Tyler Street)
Concrete (Stage 1 invert concrete and Stage 2 trackform concrete)	Road via Tyler Street and Albert Street (Stage 1 concrete)

Deliveries to the site compound via road can be classified as either 'minor' or 'major' deliveries. Minor deliveries will be deliveries that require limited or no traffic management, no major lifting equipment and can generally be carried by hand or by pallet lifters. Whereas major deliveries will require traffic management, temporary road closures and/or heavy lifting equipment. Minor and major deliveries are described in the sections that follow, and are in addition to the concrete delivery vehicle movements described in Section 2.4 of this report.

Minor deliveries

Minor deliveries of materials and equipment to the site compound will be required on a daily basis between 6:30am and 6:30pm to facilitate the tunnel fit-out works and other CRL related works at Britomart Station. Deliveries will be scheduled to minimise impacts on the surrounding local area.

It is not anticipated that there will be any minor deliveries during the night-time. Minor deliveries in most cases will be undertaken via the dedicated delivery area within the site compound accessed from Tyler Street. The location of this delivery area is shown in Figure 3.3 below.

The frequency of deliveries will be largely driven by the type of construction activity that is occurring on site, however it is expected that there will be 5-10 vehicle movements per day. These deliveries are likely to be undertaken by utility ('Ute') or other small goods vehicles. To ensure safe and efficient deliveries, all deliveries will be managed by a dedicated spotter.

Minor deliveries will include, but are not limited to:

- Cable and cable containment
- Mechanical ducting
- Mechanical ventilation fans
- Electrical LV distribution boards and transformers
- Signalling equipment, i.e., signal heads, balises, axle counters
- OHLE switchgear
- Signalling equipment room racks
- Comms room data racks and servers.

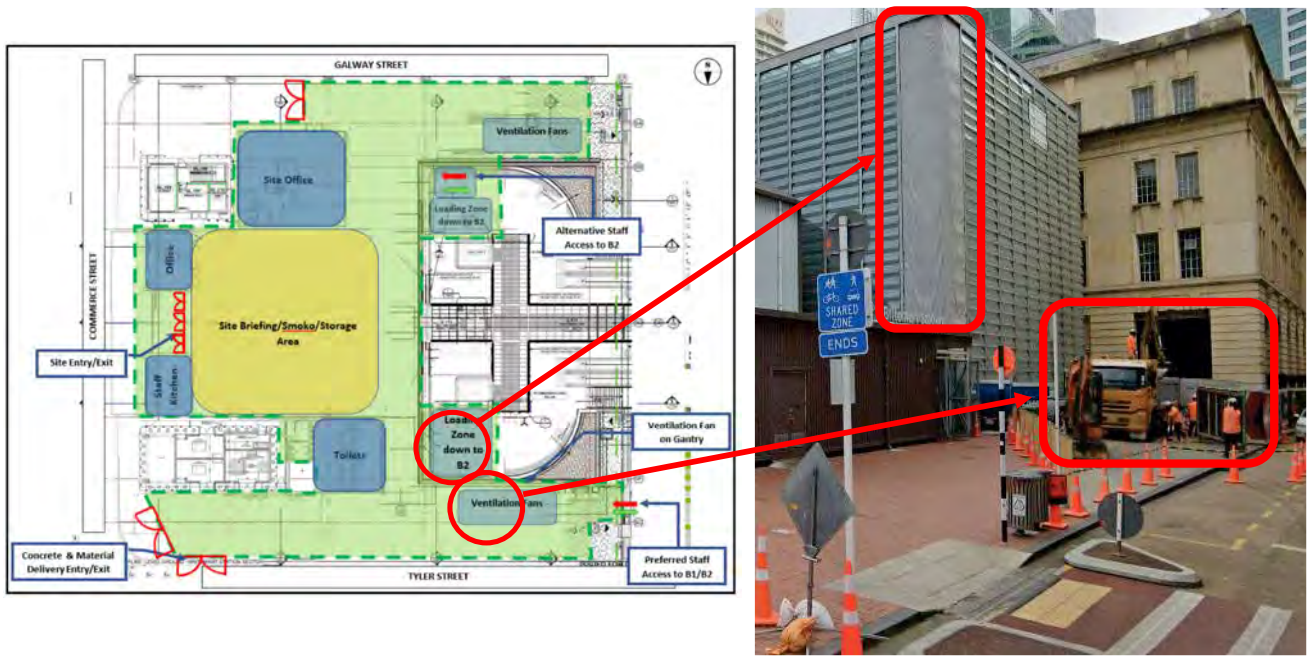


Figure 3.3 Delivery points at Station Plaza

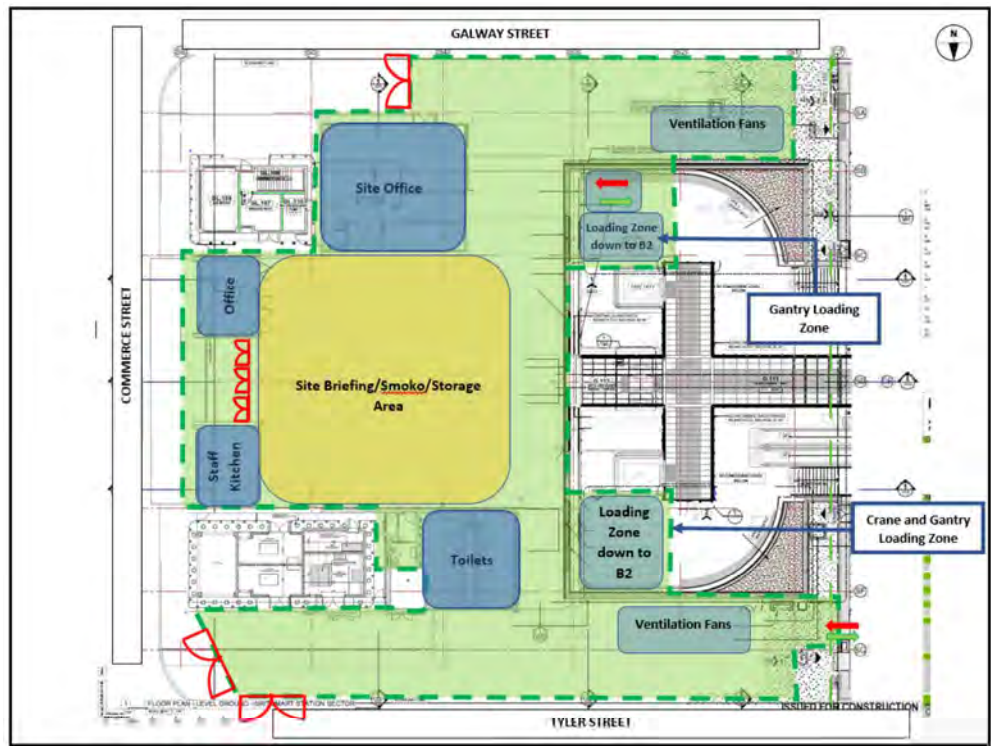


Figure 3.4 Possible gantry and crane loading areas

Major deliveries

Major deliveries will require heavy lifting equipment such as a crane or Hiab. These will be used to convey equipment and materials through the north-eastern corner of the Glasshouse and down into the basement (B2) level of Britomart Station (refer to Figure 3.5 and Figure 3.6). Traffic management will generally be required.

Major deliveries within Tyler Street will generally be limited, and the majority of equipment used for the tunnel fit-out works will be classed as minor deliveries. As previously indicated, large items such as sections of rail track will otherwise be brought in by rail from Quay Park.

In addition, to further reduce the impact of major deliveries, the project is investigating the option of a temporary gantry structure located within the Glasshouse at the north east corner of the Glasshouse (refer Figure 3.4).

Major deliveries will generally be co-ordinated and arranged with AT and their Corridor Access Team under a defined traffic management plan. These deliveries will normally be established for longer periods (e.g., multiple days), however, actual work will be limited during working hours of 6:30am – 6:30pm, except for concrete delivery which will be between 6:30am and 9:00pm. The current programme indicates the peak vehicle movements of up to 40 trucks per day, at 3–4 trucks per hour.

Major deliveries will include, but not be limited to:

- Concrete (Covered in detail in Section 2.4)
- Fire hydrant piping (6m HDG 1500mm piping)
- Bulk cable containment deliveries
- Blockwork
- Steelwork
- Large Cable drums.

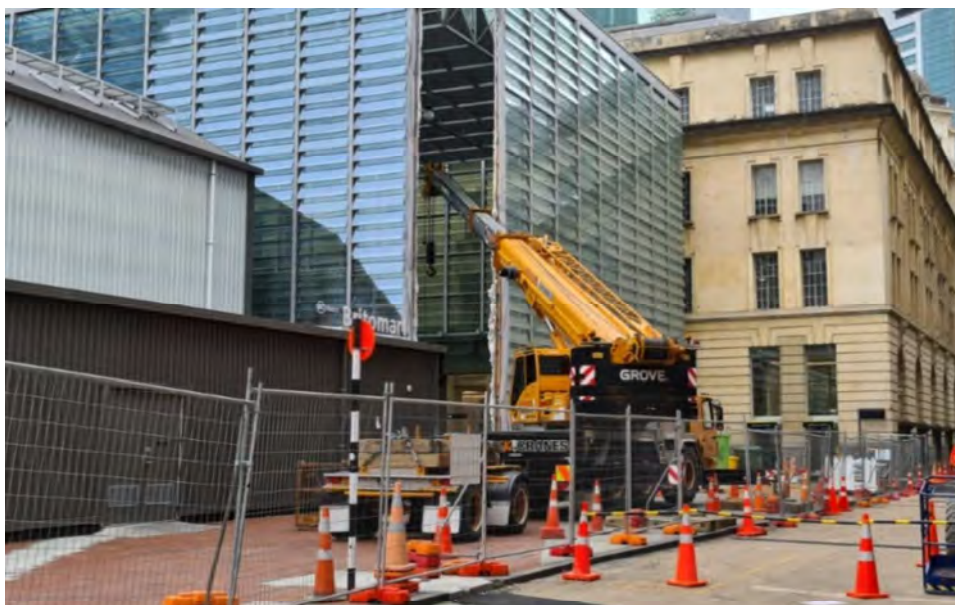


Figure 3.5 An example of a major delivery through the corner of the Glasshouse



Figure 3.6 An example of a major delivery through the corner of the glasshouse

Vehicle routes and traffic management

Deliveries and vehicle movements will be managed through an established Temporary Traffic Management Plan in and around Tyler and Commerce Streets. Figure 3.7 shows the proposed vehicle route for major and minor deliveries.

Where major and minor deliveries are planned within Tyler Street the following are required:

- Traffic Management Plans for the delivery trucks accessing the site from Tyler Street;
- A Site Traffic Management Supervisor and Traffic Controller(s), as well as signs and cones to manage daily minor deliveries; and
- Some night attendance will also be needed for deliveries, however these will be very limited. Night Time deliveries will be planned to take place between 6:30pm and 10:30pm.

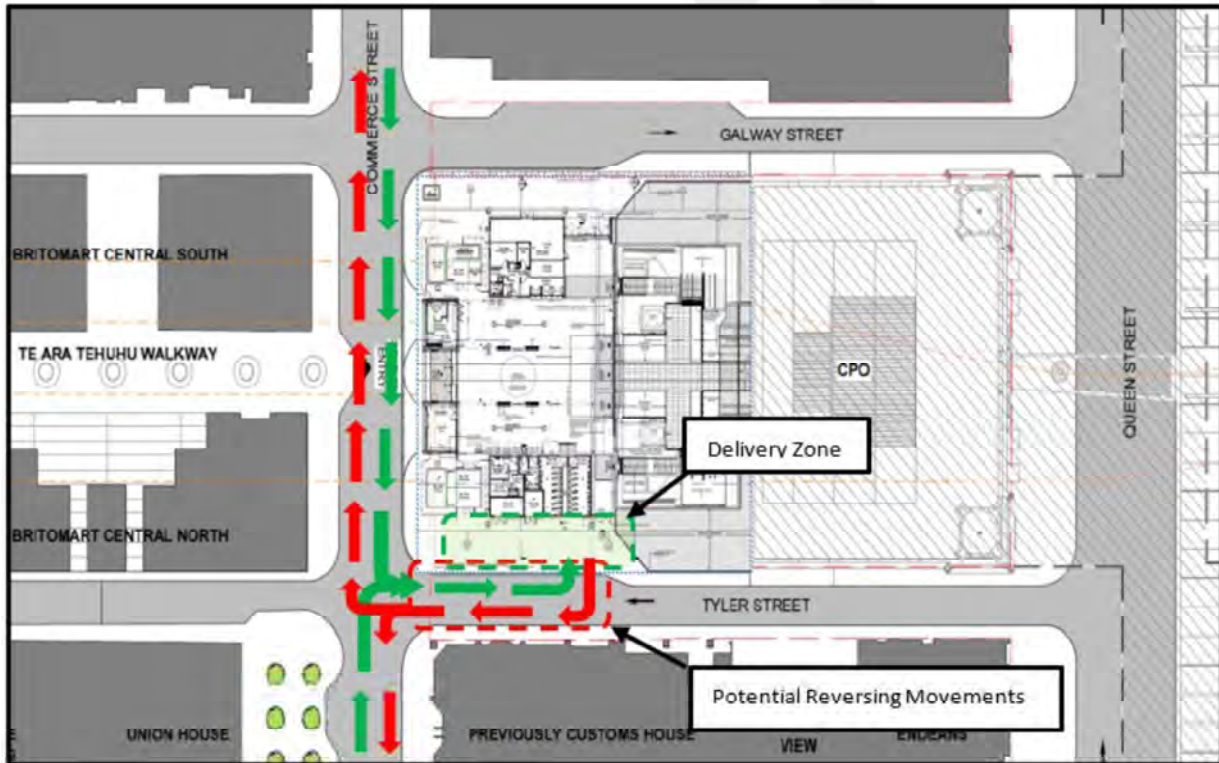


Figure 3.7 Proposed delivery route for major and minor deliveries

3.3 Construction hours

Generally, the Works will be undertaken Monday to Friday between 6.30am and 6.30pm, however infrequent activities may require works outside these hours. In addition, in some instances working on public holidays during a KiwiRail Block of Line will be the best practicable option. If work outside these times is required, it will be discussed with Auckland Council prior to works commencing.

In terms of the concrete delivery works, these are generally planned to be undertaken during 6:30am and 9:00pm Monday to Saturday due to the short duration of these works. Concrete deliveries have been discussed in Section 2.4 of this report.

3.4 Programme

The Works are anticipated to take place between late 2021 and late 2023. The current high level construction programme (Figure 3.8 below) identifies the indicative duration of the different activities that constitute the Works (some overlap of activities will occur).

Britomart Programme	2021		2022				2023			
	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Temporary ventilation installation										
Temporary ventilation operational										
AOT Concrete deliveries. Stage 1										
BRMT Concrete deliveries Stage 1										
Concrete deliveries. Stage 2										
Track install										
Tunnel fit-out										
SPA de-commissioning										

Figure 3.8 Draft high level programme

3.5 Concurrent CRL works at Britomart

In addition to the Works that are described in this report, and which are the subject of the alteration to Designation 2501, a range of other works are also required within Britomart Station to accommodate the CRL. These other works will be undertaken concurrently and are generally described below.

Other CRL works at Britomart Station include the following:

- Relocation of equipment rooms and installation of new rail systems equipment;
- Raising the western end of the station platform concourse;
- Smoke curtain extension at the western end of the station;
- Reconfiguration of the station platform layout, resulting in four operational tracks and four platforms instead of the current five platforms. This reconfiguration will require new track slab installation and OHLE works; and
- Signal reconfiguration works.

In addition, works are required to reconfigure the track layout at the eastern end of Britomart Station to enable trains to enter the station at higher speed. These works will require excavation within part of Britomart Place to strengthen the roof of the underlying railway tunnel, which will also require the relocation of network utilities within the road. This strengthening work will then enable part of an underlying support wall in the tunnel to be relocated – thus providing sufficient space for the track reconfiguration.

It is proposed to also use the SPA building and surrounding Station Plaza area as a construction support facility for these other works at Britomart Station.

4 Consideration of Alternatives

Alternative options have been considered for the different construction support activities that constitute the Works, including site establishment, concrete deliveries and the delivery of materials. Each option was assessed against a number of criteria including constructability, environmental effects, programme implications and cost.

4.1 Process

Having explored different work methods for tunnel fit-out (e.g. delivery and placement of concrete), the Link Alliance design and construction teams have considered several different options regarding access, logistical and site establishment arrangements for the Works. On the 10th of May 2021, a multidisciplinary workshop was held to discuss the feasibility of alternative options. The attendees included specialists in rail systems delivery (track form requirements), concrete, construction management (including confined-space tunnel works), the logistics of materials and equipment delivery, and programme management. Noise and vibration, traffic, and resource consent planning specialists were also in attendance.

A particular focus of the workshop was to identify and understand the concrete works required in the CRL tunnels and what this means in terms of the logistics of concrete delivery. Alternative locations and methods for the delivery of concrete were discussed in detail.

The traffic effects of different options for delivering concrete and other materials and equipment to site have also been canvassed with Auckland Transport.

4.2 Options considered

Four alternative options were considered for the Works, which included:

1. Option 1: Removal of the SPA building and establishment of alternative temporary accommodation in Station Plaza, with all concrete delivery and other tunnel fit-out support activities from Britomart Station.
2. Option 2: Retention of the SPA building and Site Establishment within the SPA building and Station Plaza, with all concrete delivery and other tunnel fit-out support activities from Britomart Station.
3. Option 3: Site Establishment at some alternative location, with all concrete delivery and other tunnel fit-out support activities via the Albert Street end of the tunnels.
4. Option 4: Retention of the SPA building and Site Establishment within the SPA building and Station Plaza, with concrete delivery and other tunnel fit-out support activities split between Britomart and Albert Street.

In order to assess the above options, an alternative assessment was carried out for the key elements associated with the Works, including:

- Site accommodation / establishment location;
- Concrete delivery; and
- General materials delivery.

The options are discussed in detail in Sections 4.3 to 4.5 below.

4.3 Site accommodation

A number of alternative site accommodation locations have been considered (refer to Figure 4.1). The location of site establishment/accommodation in relation to the respective construction work fronts is key to successfully delivering the CRL works in a timely and cost-effective manner. The fit-out works in the CRL tunnels require site establishment/accommodation within close proximity. In considering alternative locations, the Link Alliance has been mindful that suitable site establishment and workforce accommodation is also needed for the other CRL construction works required at Britomart (refer Section 3.5 of this report),

The Alliance has assessed the following alternative locations (Figure 4.1):

1. Repurpose the SPA building and/or establish in Station Plaza
2. Temporary structures within the Britomart light rail tunnels
3. Ports of Auckland land
4. Downtown Carpark Level 8
5. Repurpose the Transdev Accommodation within Britomart Station
6. Old Auckland Transport Operations Centre

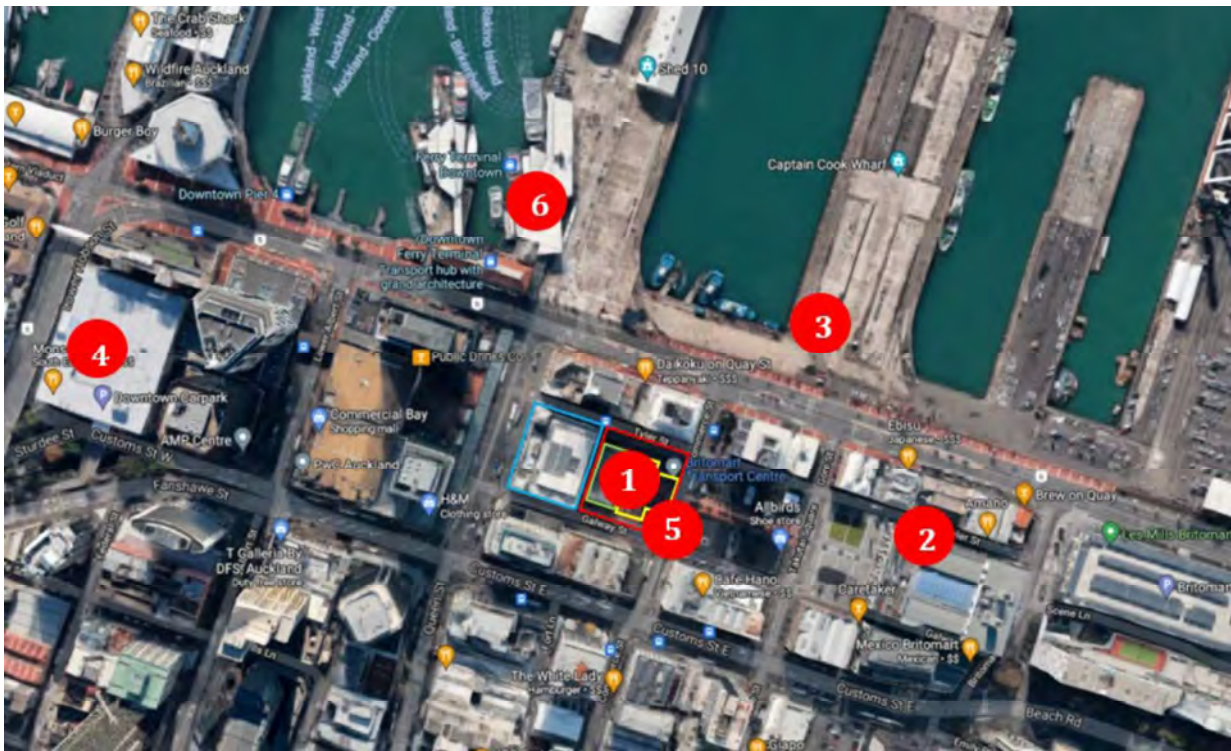


Figure 4.1 Alternative site establishment locations for the Works

The review of alternative locations concluded that site establishment/worker accommodation within close proximity to Station Plaza and the Glasshouse (where access down into the tunnels for people and materials is obtained) is critical, to ensure the timely and cost-effective delivery of the works.

Locations 3, 4 and 6 were assessed as too costly due to the potential loss in productivity. They were also assessed as being logistically impractical, because they would provide only limited options to safely store and transport materials to and from the actual construction site. Furthermore these locations would result in increased vehicle and pedestrian movements, and also increased traffic management requirements within Tyler Street to offload and move materials into Britomart via the Station Plaza. These alternative locations also

have health and safety implications for the Link Alliance workforce as they would require workers to constantly cross busy roads to access the site area.

Locations 2 and 5 were locations within Britomart Station “Light Rail” Tunnels. These locations were assessed and deemed unviable, due to location (being too distant from the work face), and the associated cost and programme to reconfigure the areas to accommodate site establishment.

The review identified that Location 1 presents the only viable option, as this provides the fastest and safest route to undertake the works, but also the most cost-effective solution with minimal traffic and environmental impact.

4.4 Concrete delivery

Concrete delivery is required for the Stage 1 and Stage 2 tunnel concrete works. As this activity poses the greatest risk for disruption to the local area (adverse environmental effects such as traffic disruption and noise), a number of alternative options for concrete delivery were assessed. Alternatives were assessed in terms of constructability, environmental effects, programme and cost.

Because of technical constraints, not all alternatives are viable. The alternatives below were considered as the most appropriate options to address the various technical requirements of each stage of concrete delivery:

- a) All concrete delivered from the southern end of the CRL tunnels via the CRL Aotea construction site in Albert Street (vicinity of Wyndham Street) (Stage 1 (3500m³) & Stage 2 (1700m³) Concrete Only)
- b) Split concrete delivery between the Britomart Station and Albert Street ends of the tunnels
- c) Concrete delivery via rail concrete train from Quay Park

These options are discussed in detail below.

Options assessment

(a) All concrete delivered from southern end of CRL tunnels via the CRL Aotea construction site in Albert Street (Stage 1 & Stage 2 Concrete Only)

This option was considered in order to reduce adverse environmental effects (traffic disruption and noise) in the Britomart area, which includes a number of residential apartments along the northern side of Tyler Street.

Physical constraints at the CRL Aotea construction site in Albert Street do not allow for prolonged concrete deliveries into the new tunnels to the north. The construction support area (construction deck) that has now been established at the northern end of the Aotea construction site has a usable area of approximately 108m². This entire area is required to service construction activities at Aotea (including loading out material from bulk excavation) . Use of this same area for concrete delivery into the CRL tunnels would require a minimum footprint of at least 88m². Therefore, during tunnel concrete delivery the Aotea construction support activity would effectively have to cease. This would severely disrupt the Aotea construction works, with a resultant delay to the overall CRL project programme.

A review of the methodology for Stage 2 concrete delivery highlighted significant health and safety risks associated with the pumping of concrete downhill from the Albert Street end, as the level difference and slope differential could result in concrete pump line blockages and potential line blowouts with severe consequences to worker safety. International best practice is always to pump uphill to reduce these risks, as better control over the flow of concrete is possible.

The review of this option concluded that it would only be appropriate for Stage 1 concrete delivery, as the methodology for Stage 1 proposes to utilise a multi-service vehicle (MSV) equipped with a mixer truck. The MSV would be used to transport concrete within the tunnels, and this avoids the need for concrete pumping over a long distance. The use of an MSV and mixer trucks is not viable for Stage 2 concrete delivery, because the Stage 2 concrete works involve concurrent placement of the railways tracks and sleepers (these are embedded in the concrete as part of a single construction operation). The sequencing of works for the

trackform concrete operation and physical space constraints within the tunnels makes the use of an MSV impractical.

(b) Split concrete delivery between the Britomart Station and Albert Street ends of the tunnels

Again this option was considered in order to reduce adverse environmental effects (traffic disruption and noise) in the Britomart area, with concrete delivery being split between the two ends of the tunnels.

The issues addressed in section (a) above, regarding concrete delivery from the CRL Aotea construction site, are equally applicable for this option.

In terms of Britomart Station, the delivery of concrete will be via an already installed pump line located on the edge of the Glasshouse off Tyler Street and/or through the corner of the Glasshouse. This could facilitate concrete deliveries for all activities.

The methodology for concrete delivery from Britomart Station will largely be via a pumped system, and does not pose the same Health and Safety risks as downhill delivery from Aotea Station.

The delivery of concrete would be undertaken between 6:30am and 9pm Monday-Saturday, with the possibility that deliveries could extend until 10:30pm the event of on-site delays. This would require access from Tyler Street for concrete trucks.

(c) Concrete delivery via Rail from Quay Park

This option was considered in order to avoid adverse environmental effects in either the Britomart and Albert Street areas, with concrete truck movements instead occurring in the railway yard at Quay Park.

Rail specific rolling stock equipment would need to be sourced from Australia, and further modified in order to be capable of transporting sufficient quantities of concrete for the CRL tunnel fit-out works. The current lead in time for obtaining the specialised rail vehicle is 10+ months. This delay is not viable and would result in a significant delay to the overall critical path construction programme.

In addition, KiwiRail currently has only bi-weekly isolations and Block of Line for Britomart Station, and this would have to change to a nightly event to accommodate rail delivery of concrete. Logistically this could prove difficult, due to limited KiwiRail resources to accommodate a nightly shutdown. Furthermore, there is an additional cost of approximately \$3000 a night to open the concrete batching plant for night-time concrete supply.

Decision of consideration of alternatives

After completing a review of the options, it was concluded that the delivery of concrete either completely from the Albert Street end of the tunnels (CRL Aotea construction site) and/or via rail from Quay Park would be impractical and introduce significant project risk. The preferred option for concrete delivery is to split the delivery between Albert Street and Britomart Station. This would assist in reducing adverse environmental effects at Britomart, whilst maintaining the construction programme.

4.5 General materials delivery

Alternative options considered for delivery of materials and equipment were similar to those for concrete delivery, and again were assessed in terms of location, environmental effects, programme and cost. Materials required for the CRL tunnel fit-out will largely be MEFH related equipment, as well as track related materials. As explained in section 3.2 of this report, materials delivery would be split between 'minor' and 'major' deliveries, which would dictate delivery plant requirements as well as temporary traffic management arrangements.

The alternative options considered include:

- (a) All materials delivered from the southern end of the CRL tunnels via the CRL Aotea construction site in Albert Street

- (b) Split material delivery between Britomart Station Plaza and southern end of CRL tunnels (Aotea construction site)
- (c) Materials delivery via rail from Quay Park

These options are discussed in detail below.

Options assessment

(a) All materials delivered from the southern end of the CRL tunnels via the CRL Aotea construction site in Albert Street

This option was considered in order to reduce adverse environmental effects in the Britomart area.

This option would seek to utilise the dedicated deck delivery area at the northern end of the CRL Aotea construction site. This area is heavily space constrained, and any further logistics load will pose a programme risk for the Aotea construction works.

Currently there is no storage space available at the Aotea construction site, and therefore all materials for the tunnel fit-out would have to be stored within the tunnels. There is limited space in the tunnels and this methodology could therefore impose constraints on other works being carried out in the tunnels, with consequent impacts on programme. In addition, storing materials in the tunnels is not favoured as it increases the plant / workforce crushing risk.

Materials would have to be transported up to 600m to reach the northern end of the tunnels, which is a significant distance to transport materials in a restricted space.

(b) Split material delivery between Britomart Station Plaza and southern end of CRL tunnels (Aotea construction site)

Again, this option was considered in order to reduce adverse environmental effects (traffic disruption and noise) in the Britomart area.

The issues addressed in section (a) above, regarding deliveries from the northern end of the Aotea construction site, are equally applicable for this option.

For the delivery of materials and equipment via Britomart Station, deliveries would be undertaken as a daytime activity utilising the site compound loading area and temporary traffic management, subject to the type and size of delivery. The loss of logistics room at the Aotea construction site would still present a programme issue.

Materials at Britomart would be delivered to the site compound loading area via Tyler street. Materials would then be moved and stored in the SPA until utilised.

Delivery of materials, split between Aotea and Britomart, would largely align with proposed methodology.

(c) Material delivery via Rail

This option was considered in order to avoid adverse environmental effects in the Britomart and Albert Street areas, with the focus of activity at Quay Park.

Delivery of materials via rail could be undertaken via Quay Park under rail Block of Line and associated isolation. Materials would be delivered during day time to a holding area at Quay Park, which would then be loaded and delivered during night shift. To facilitate this the project would need to introduce an additional night time team to manage the rail and delivery activities, along with associated specialised Hi-Rail vehicles.

KiwiRail currently has only bi-weekly isolations and BOL for Britomart Station, and this would have to be changed to a nightly event to accommodate CRL construction. Logistically this could prove difficult, due to limited KiwiRail resources to accommodate the nightly shutdown.

In addition, rail deliveries would incur additional double handling at Quay Park and complex small crane / Hiab movements in Britomart.

Decision on consideration of alternatives

The assessment of alternative options concluded that deliveries for day-day materials via rail would be impractical and introduce significant cost and programme risk to the project. Loading and offloading via Tyler Street was deemed to have manageable effects on the local traffic environment, as there is already a designated loading/offloading area for the station. As such, Option 4 has been assessed as the most practical in terms of constructability, cost and programme implications.

However, delivery via rail for specific material such as track and hydrant piping would be appropriate and would be arranged accordingly. Where rail deliveries are undertaken, the project will endeavour to optimise the opportunity and deliver additional equipment where possible.

4.6 Assessment of alternatives conclusion

Based on an assessment of constructability, environmental impact, cost, and programme implications for the different options, Option 4 has been identified as the preferred option for the Works.

It is considered that the chosen strategies for site establishment, concrete delivery and material deliveries provide the greatest certainty, are the most efficient and best manage potential effects on stakeholders, while ensuring the CRL cost and programme objectives are met.

5 Conclusion

This report has described the construction support activities for tunnel fit-out that constitute the Works. A range of alternative options have been assessed for undertaking the Works and a preferred option identified. Based on the preferred option, the report has described the construction management required to undertake the Works, including how pedestrian and vehicle access will be maintained, delivery requirements, construction hours and the programme for construction.

Appendix 1: Britomart Ventilation Plan





Britomart C7 Works Ventilation Management Plan.

Link Alliance Management Plan

Management Plan Number: CRL-BTE-CST-LKA-PLN-800000

Document Status: For Review/Approval

Revision: A00

Date: 22/01/2021



Britomart C7 Works Ventilation Management Plan.

Management Plan Number: CRL-BTE-CST-LKA-PLN-800000

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Revision History

Rev	Issue Date	Major Changes	Prepared By	Reviewed By	Approved By	SSE Approval
A00	22/01/2021	For review	Kevin Brighton	Dalong Ye-Lee Farai Chagonda John Balcome Paul Armand Rudy Seller Thomas Fenou Tony Avard	Florent Detraux	Ian Judd
A01						
A02						
A03						



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1 Introduction

1.1 Overview

City Rail Link CRL, Stage 7, will be delivered by Link Alliance, comprising a joint venture of Vinci Constructions, Downer NZ, Soletanche Bachy International, WSP Optus, AECOM NZ, and Tonkin Taylor Ltd. Completion is planned for 2024. Stage 7 of the project includes fit-out works, track and overhead live electrical (OHLE). These works commence at Britomart Station, and move along the TBM tunnels from Britomart.

Britomart is an existing station at the northern end of the CRL works, and will be converted from a station terminus to a through station and part of a loop, via two new tunnels built at the western end of the existing station. These connect to two new platforms in the station.

The Britomart to Aotea tunnels were constructed earlier, termed C1 and C2 works. The C7 program of works includes overhead line equipment (OHLE), traction power, signalling, earthing and bonding (E&B), communications, and the control system.

1.2 Plan Scope

This document will develop the ventilation plan of the Britomart C7 works, up to Aotea Station. Works are programmed to commence in September 2021, and be completed by November 2022. Figure 1 and Figure 2 below show the general arrangement of Britomart Station.

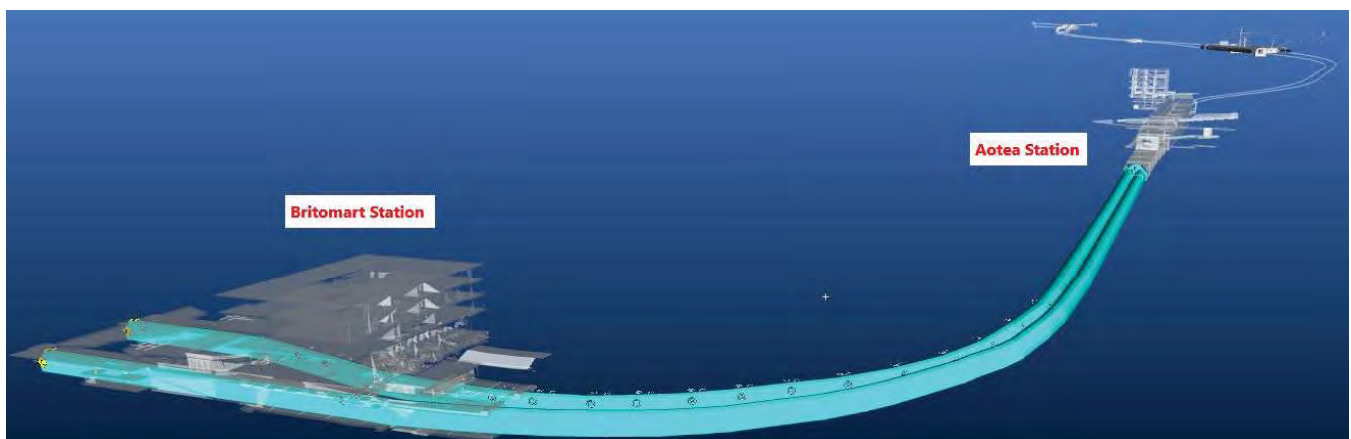


Figure 1 – Britomart General Arrangement

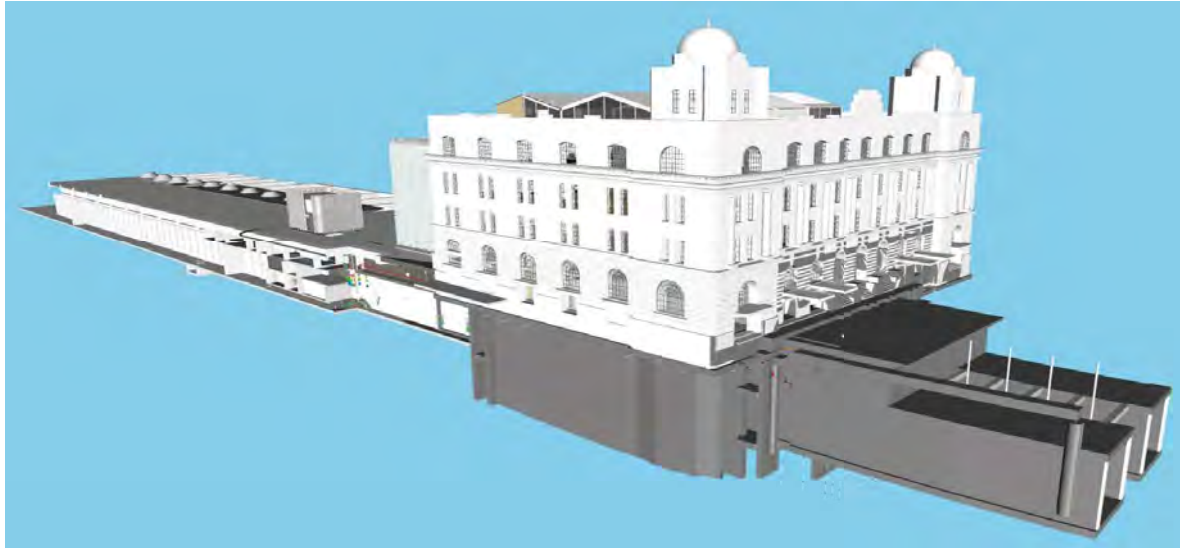


Figure 2 - Britomart Station

This document is subordinate to, and should be read in conjunction with:

- CRL-SYW-HSE-000-PLN-0001, Health and Safety Management Plan.
- CRL-SYW-HSE-LKA-PLN-800010, Principal Hazard Management Plan Air Quality.
- CRL-SYW-HSE-LKA-PLN-800015, Principal Control Plan Worker Health.
- CRL-SYW-HSE-LKA-PLN-800018, Principal Control Plan Ventilation.

1.3 Plan Purpose

The purpose of this plan is to:

- Describe the ventilation and management system to be used
- Detail the methodology to ensure that oxygen is available for respiration, atmospheric contaminants are removed from work areas, and cooling is provided to assist with thermal comfort.
- Describe the ventilation and atmosphere monitoring requirements that apply throughout the tunnel fit-out phase.

Note: This plan is not intended as a detailed design document.

2 Abbreviations

ABBREVIATION	MEANING
CRL	City Rail Link
dB	Decibel
DPM	Diesel Particulate Matter
HHGD	Hand-held Gas Detector

LEL	Lower Explosive Limit
PPE	Personal Protective Equipment
QOHA	Qualitative Occupational Hygiene Assessment
RCS	Respirable Crystalline Silica
RD	Respirable Dust
RPE	Respiratory Protective Equipment
STEL	Short Term Exposure Limit
WES	Workplace Exposure Standard

3 Definitions

TERM	DEFINITION
Air Quality	A measure with respect to national standards of the atmospheric contaminants of gas, dust, heat and diesel emissions and is generally controlled by the use of ventilation (airflow) and various suppression systems.
AS/NZS	Australia, New Zealand joint standards.
CH₄	Methane (gas)
Competent Person	A person who has acquired through training, qualification, observation, experience, or a combination of these, the knowledge and skills to carry out a particular task.
Contaminant	Any substance that may be harmful to health or safety, such as mists, fumes, dusts, vapours or gases.
Diesel Emissions	Diesel emissions contain Carbon Dioxide (CO ₂), Carbon Monoxide (CO), Oxides of Nitrogen (NO, NO ₂ , NOx), Sulphur Dioxide (SO ₂) and Diesel Particulate Matter (DPM).
Diesel Particulate Matter (DPM)	DPM is a component of diesel exhaust and includes diesel soot and solid aerosols such as organic carbon compounds, ash, metallic abrasion particles, sulphates and silicates. The majority of diesel exhaust particles are less than 1.0 µm in size. Diesel soot particles have a solid core mainly consisting of elemental carbon with a wide variety of other substances attached to the surface.
EWP	Elevated Work Platform
H₂	Hydrogen (gas)
H₂S	Hydrogen Sulphide (gas)
Inhalable Dust	Inhalable dust refers to the particle size entering the mouth and nose during normal breathing. These particles may be deposited in the respiratory tract. The term inhalable dust applies to both non-toxic and toxic dusts.

L_{Aeq}	The A-weighted, equivalent continuous sound pressure level in decibels of a noise fluctuating over a period of time T, expressed as the amount of average energy.
L_{AFmax}	The A-weighted, maximum sound pressure level during the measurement period.
LEL – Lower Explosive Limit	Relates to a flammable contaminant, the concentration of a contaminant in the air below which the propagation of a flame does not occur on contact with an ignition source.
L/s	Volumetric flow rate, in litres per second.
m/s	Velocity, in metres per second.
m³/s	Volumetric flow rate, in cubic metres per second.
Micron	One millionth of a metre, or one thousandth of a millimetre.
NH₃	Ammonia (gas)
O₂	Oxygen (gas)
QOHA	Qualitative Occupational Hygiene Assessment (QOHA) identifies and estimates the potential exposures to health hazards for workers on a specific project or task. The level of detail of a specific QOHA will depend on the nature and extent of the occupational hazards present and the nature of the work performed. The QOHA is performed prior to work commencing.
Respirable Dust	The inhalable fraction of dust entering the respiratory tract may be further divided into ‘respirable’ and ‘non- respirable’ fractions. The respirable fraction is composed of the fine dust, which is able to reach the lower bronchioles and alveolar regions of the lung. Dust particles in the 0.5 – 5.0 micron (approx.) (PM _{0.5} to PM ₅) range.
STEL	The STEL is the maximum average airborne concentration of a particular substance permitted over a 15-minute period. A STEL should not be exceeded at any time during a working day even if the eight-hour TWA average is within the exposure standard. Exposures at the STEL must not be longer than 15 minutes and not repeated more than four times per day with at least 60 minutes between successive exposures.
TWA	The TWA is an eight-hour time weighted average airborne concentration of a particular substance permitted over an eight-hour working day and a five-day working week. The 8-hour TWA exposure standard allows for short term excursions above the exposure standard provided they are compensated for by extended periods of exposure below the standard during the working day.
Tunnel	A tunnel is defined in the Health and Safety at Work Act 2015 as an operation involving extraction of fill with the purpose of creating a tunnel or shaft, or enlarging any tunnel or shaft.

	For the purpose of this plan, tunnelling activities include mined tunnel excavations.
WES	<p>The concentration of a particular substance or mixture that must not be exceeded as defined in the Workplace Exposure Standards and Biological Exposure Indices, 2019.</p> <p>The exposure standard is identified in two forms:</p> <ul style="list-style-type: none"> • Short Term Exposure Limit (STEL)(15 minutes); • Time Weighted Average (TWA)(8 hours per day, 5 days per week).

4 Legislation and Other Key Requirements

4.1 Legislation

- Health and Safety at Work Act 2015
- The Health and Safety at Work Mining Operations and Quarrying Operations Regulations 2016 (HSMOQO).
 - Reg 143: “the volume of air passing through an active working face, other than a longwall working face, is not less than 0.3 cubic metres per second for each square metre of normal development cross-sectional area”.
 - Reg 4: “Ventilation standards are to ensure that the tunnel environment is maintained as “fresh air”.
 - Reg. 154: Exposure to diesel emissions (1) (b) (i) and (ii) “Dilution of diesel emissions air quantity required has been calculated using 0.05m³/s/kW maximum engine power rating”.
 - Reg 145 1 (e): “The ventilation ducting will be installed and maintained for conducting a sufficient supply of air to and from the place to be ventilated.”.
 - Reg 145 1 (f): “The electric cable and electrical installation of ventilation devices used for any fan will be such that they are not creating anti-static electrical discharge”.
 - Reg 145 1 (b) (c): “The fan will be installed at least 5m away from the shaft or portal entrance to comply with the regulations”.
 - Reg 147 1 (a) (b): “An exclusion zone around the shaft will be established which will be clearly marked by signage to inform workers only authorised personnel are allowed to operate the fan”.

4.2 Codes

- New Zealand Approved Code of Practice for Air Quality in the extractives Industry, 2016.
- New Zealand Approved Code of Practice for Ventilation in Underground Mines and Tunnels, 2014.
- Health and Safety in Tunnelling in the Construction Industry – Code of Practice BS 6164:2019

4.3 Guides

- Health and Safety at Work – Quick Reference Guide, 2015.
- New Zealand Workplace Exposure Standards 11th Edition, 2019.

4.4 Standards

- AS/NZS 1269:2005 Occupational noise management
- AS 2985 - 2009: Workplace Atmospheres – Method for sampling and gravimetric determination of respirable dust', SAI Global.
- NZS 6803:1999 Acoustics – Construction

4.5 Reports

- Central Area District Plan, Auckland Council, Part 7, 2005.
- Peakall et. al, (2012), "City Rail Link, Noise and Vibration Assessment", Report 001 R07 2012068A, Marshall Day Acoustics.



4.6 Occupational Health Contaminant Levels

The workplace exposure limit (WES) for airborne contaminant limits¹ are listed below in Table 1.

Parameter	TWA ²		STEL		Category of Carcinogenicity ³
	ppm	mg/m ³	ppm	mg/m ³	
Diesel Particulate Matter (DPM)	N/A	0.1	N/A	N/A	C1
Inhalable Dust	N/A	10	N/A	N/A	N/A
Portland Cement	N/A	3	N/A	N/A	N/A
Respirable Dust (not otherwise classified)	N/A	3	N/A	N/A	N/A
Respirable Crystalline Silica (RCS)	N/A	0.05	N/A	N/A	C1
Welding Fume (not otherwise classified)	N/A	5	N/A	N/A	C2
Carbon Dioxide (CO ₂)	5,000	9,000	30,000	54,000	N/A
Carbon Monoxide (CO)	25	N/A	Ceiling 400 max 200 ppm 15 min 100 ppm 30 min 50 ppm 60 min	N/A	N/A
Hydrogen Sulphide (H ₂ S)	5	7	10	14	N/A
Nitric Oxide (NO)	25	31	N/A	N/A	N/A ⁴
Nitrogen Dioxide (NO ₂)	1	1.9	N/A	N/A	N/A

Table 1 - WES Airborne Contaminant Limits

¹ New Zealand Workplace Exposure Standards 11th Edition, 2019.

² Not to be exceeded in any one individual personal exposure sample

³ International Agency for Research on Cancer (IARC) Monographs on the Evaluation of Carcinogenic Risks to Humans

⁴ Measured monthly as part of diesel equipment emissions

5 Ventilation Management

5.1 Ventilation Methodology

The ventilation design for Britomart is based on forcing fans and flexible duct, exhausting to atmosphere through Zone 9 of Aotea Station. The design also utilises the fans to form the ventilation for Zone 9 of Aotea. The fans will be installed adjacent to the ‘Glass House’ at Britomart Station.

Equipment is specified for highest power/flow requirement with an upper performance operational buffer, to account for unknown flow restrictions. The fans can be run at reduced speed during works to reduce power consumption otherwise.

5.1.1 Positive Pressure Supply

Positive pressure supply is used for excavation operations. Activities expected to create dust and/or diesel emissions are:

- Bolting and drilling
- Concrete Pump
- Haul truck
- Shunt
- Hi-Rail excavation

The purpose of the temporary ventilation system is to:

- Supply oxygen (‘fresh air’) into tunnels
- Dilute diesel emissions
- Improve thermal comfort by removing heat from the working area
- Dilute and disperse any dust concentration
- Maintain good working conditions

5.2 Supply Air Requirements

Ventilation requirements for the tunnel works are as per The Health and Safety at Work Mining Operations and Quarrying Operations Regulation 2016 (HSMOQO). These are summarised in Table 2.

Source	Minimum requirement
Diesel	0.05 m ³ /s/kW
Velocity	0.3 m/s

Table 2 - Ventilation Requirements

5.2.1 Diesel Generation

Diesel generating activities within the works are concrete pumping, shunting, hauling, Hi-Rail excavation and EWP.

The three distinct work stages are:

1. Pre-track installation, consisting of concreting.
2. Track laying and OHLE
3. Post-track installations

The works are undertaken separately in MC20 and MC30, so diesel loads will vary between them. The expected equipment and resulting DPM dilution required vary over the course of the program, rising from approximately 200 kW at commencement to a peak of approximately 533 kW for post-track installation works by approximately July 2022. The axial fans will be controlled by VSD to allow adjustment to suit the requirements. The actual dates may be affected by variations in the program timeline.

MC30 Maximum	MC30	MC20
Total kW	465	200
Total m ³ /s	23.3	10

Table 3 - Maximum Diesel Load MC30 (Approximately June 2022)

MC20 Maximum	MC30	MC20
Total kW	68	533
Total m ³ /s	3.4	26.7

Table 4 – Maximum Diesel Load MC20 (Approximately July 2022)

The air flow requirement defined by the cross-sectional area is 9.8 m³/s, so in all cases the diesel load is the driver.

5.3 Air Acoustics

5.3.1 Acoustic Criteria

Various criteria for environmental noise are defined in the following:

- CRL-MTE-RME-LKA-PLN-800016 Construction Noise and Vibration Delivery Work Plan
- Central Area District Plan, Auckland Council, Part 7, 2005
- NZS 6803:1999 Acoustics - Construction

CRL-MTE-RME-LKA-PLN-800016, Condition 31.1, p8, lists the construction noise criteria as shown in Table 5:

Receiver Type	Monday to Saturday (0700 to 2200)	Sundays and Public Holidays (0700 to 2200)	At all other times (2200 to 0700)
Occupied commercial and industrial buildings (including offices)	75 dB L _{Aeq}	75 dB L _{Aeq}	75 dB L _{Aeq}
Sensitive noise and vibration receivers (excluding offices)	75 dB L _{Aeq}	65 dB L _{Aeq}	60 dB L _{Aeq}
	90 dB L _{AFmax}	80 dB L _{AFmax}	75 dB L _{AFmax}

Table 5 - Noise Limit Recommendations

5.3.2 Noise Abatement Measures

Axial fans will be supplied with noise attenuating silencers on each end of the fan. In addition, inlet attenuators and acoustic blanket, or acoustic enclosures may be required, depending upon the particular make/model of fan used for sensitive receptor locations.

5.4 Ventilation Requirements for all Fan and Ducting Setup

The ventilation shall not cause recirculation of air resulting in less than adequate air flow at the face (HSMOQO) Reg 145 1 (a).

Every fan installed shall be at least 5m away from the tunnel entrance or shaft edge. Fans installed in tunnels shall be established at least 5m away from any intersection to reduce the chances of recirculation. (HSMOQO) Reg 145 1 (b)(c).

The electric cable and electrical installation of ventilation devices used for the shaft, station box surface fan(s) will be such that they are not creating anti-static electrical discharge. (HSMOQO) Reg 145 1 (f)

The fan and ventilation ducting shall be earthed to minimise or eliminate static electricity build up. HSMOQO) Reg 145 1 (f)

Every fan installed on surface or underground must be barricaded off, so personnel have restricted access to the fan. Only authorised and competent personnel who have been trained can turn the fan on and off.

Ventilation ducting shall be installed such that minimal leakage is achieved, at least leakage to Class 3, EN 12237-2003, 5 mm²/m².

An exclusion zone around each fan will be established which will be clearly marked by signage to inform workers only authorised personnel are to operate the fan (HSMOQO) Reg 147.

5.5 Dust Control

High pressure water misting sprays can be used to minimise dust during drilling operations.

6 Ventilation System Sequence

The fit-out works Britomart are broken into multiple stages, which drive the ventilation design and configuration. These consist of pre-track works, track laying and OHLE, and post-track installation, and can occur simultaneously at different sections of a tunnel.

6.1 Work Zones

The Britomart to Aotea cut and cover tunnels are separated and form MC20 and MC30 drives, as shown in Figure 3.

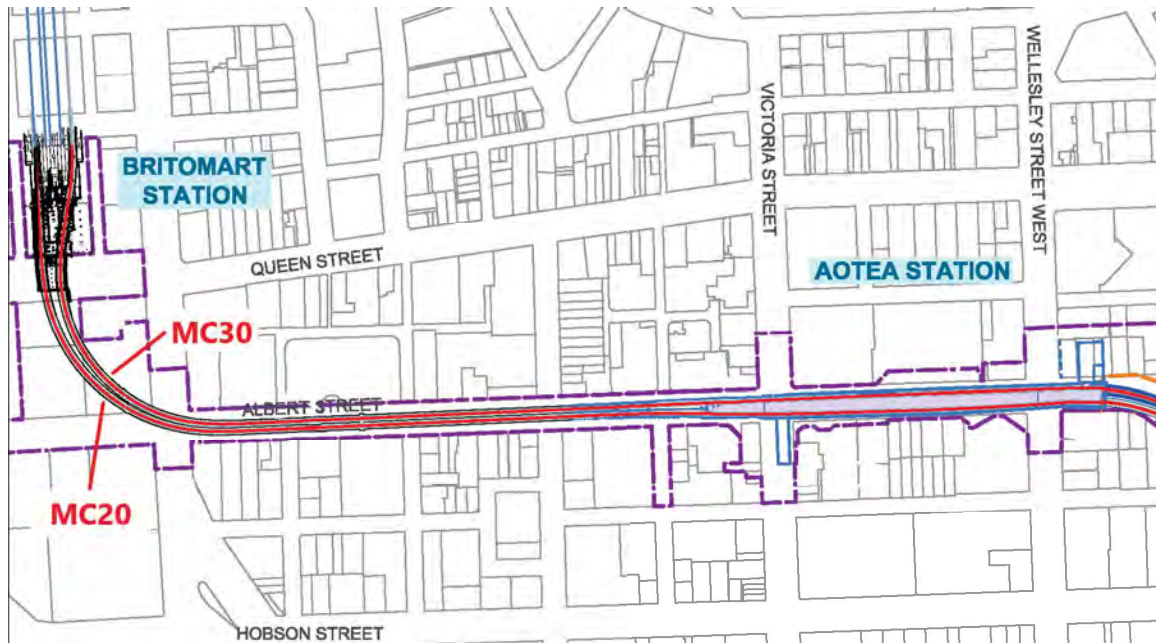


Figure 3 – Work Zones Britomart to Aotea

6.2 Installation

Lay-down and works space around the inner city Britomart works precinct is very limited. Therefore, to minimise the space impact of ventilation plant, two 55kw fans will be installed, one each side of the 'Glass House' mounted on a gantry, refer Figure 4.

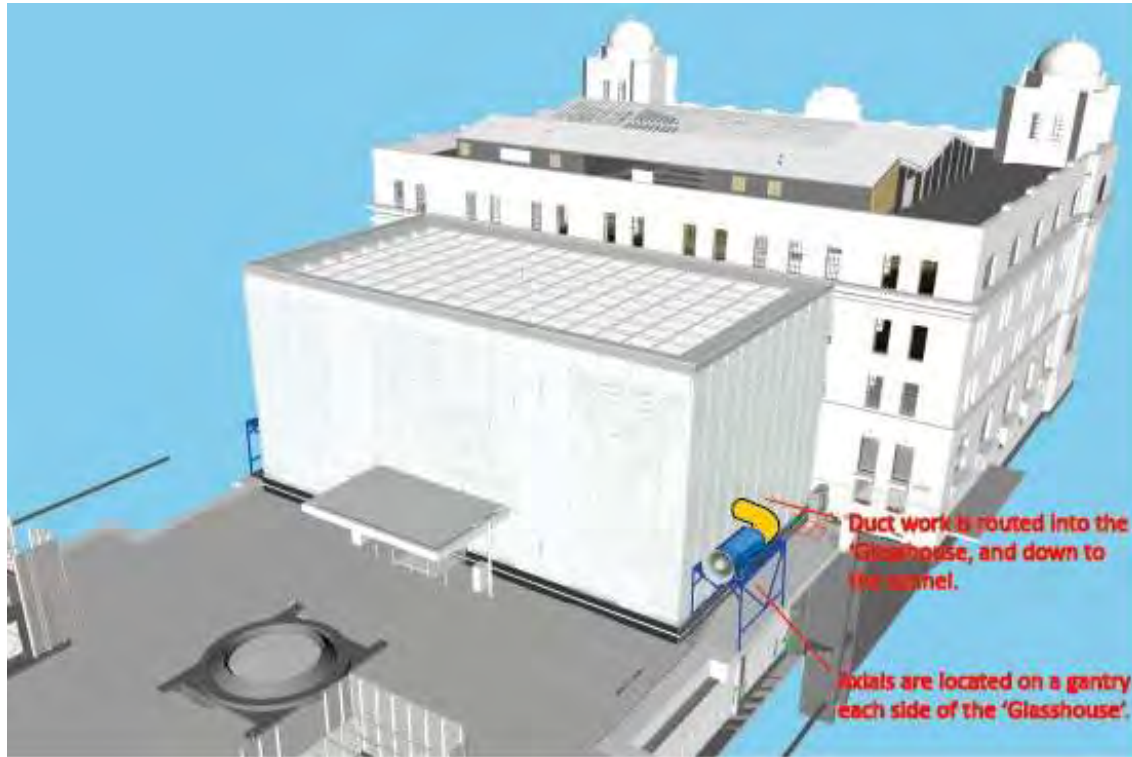


Figure 4 - Approximate Axial Fan and Gantry Location

6.3 Duct Layout

Ø1.3m flexible duct is routed from the axial fans first by removing some of the glass panels in the Glass House. It is then routed to the cut and cover tunnels below at Platform level, using the existing access adjacent to the elevators.

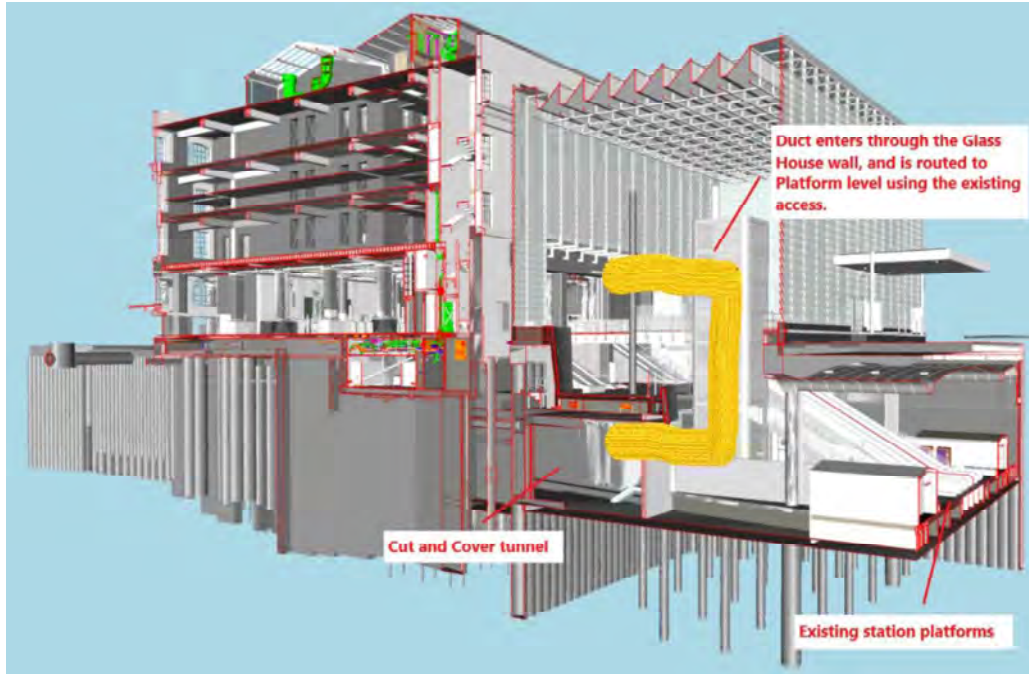


Figure 5 – Glass House North Side Duct Layout

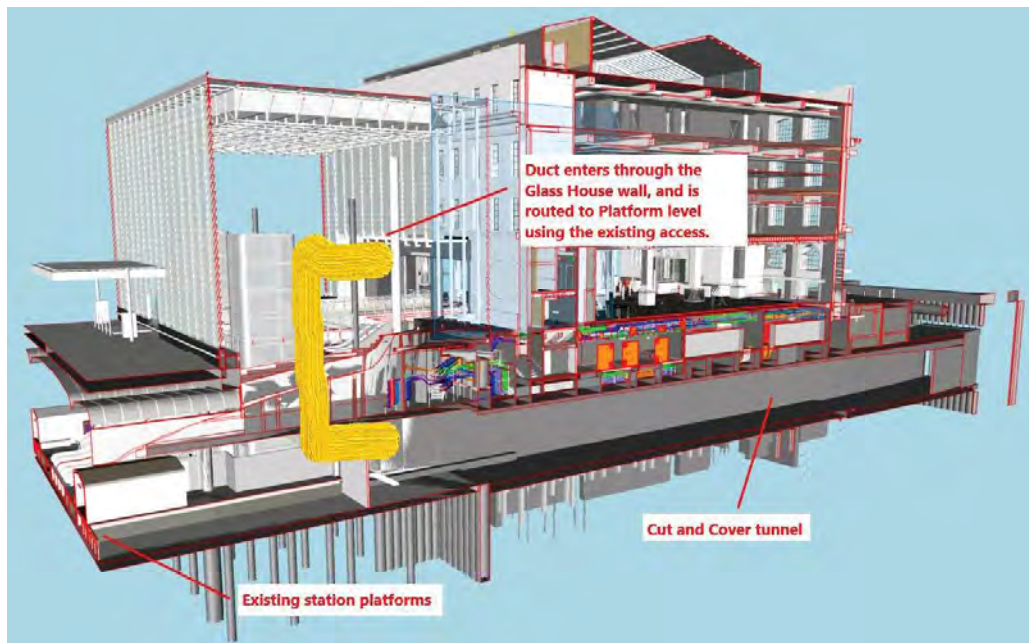


Figure 6 – Glass House South Side Duct Layout

6.4 Pre-track Activities

6.4.1 Overview

Two 55 kW fans are located at Britomart. Ø1.3m flexible duct is routed from the axial fans to the cut and cover tunnels below (refer Section 6.3).

Positive pressure air is supplied (10.8 m³/s) to both MC20 and MC30 Cut and Cover tunnels from Britomart, and exhausts to Aotea Zone 9. This allows alignment with the natural ventilation which will flow from Britomart to Aotea, and forms part of the ventilation system for Aotea.

6.4.2 Equipment required

Description	Length (m)	Number
55 kW, Ø1.25 m axial, 28 m³/s @ SP = 0.	N/A	2
Ø1.3 m flexible duct	≈30	1
Ø1.3 m semi-rigid elbow	N/A	8

Table 6 - Equipment Required for Pre-track Activities

If the fan fails to operate, a visual alarm will notify the operators.

6.4.3 Operating Point

Calculation estimates a similar fan operating point for both fans, of approximately 10.8 m³/s @ 85 Pa running at 35% of full speed via the VSD.

6.4.4 Flow Distribution

Figure 7 shows the resulting air flow through the cut and cover tunnels. This will vary according to the use of plant in the tunnel, which will increase flow resistance and

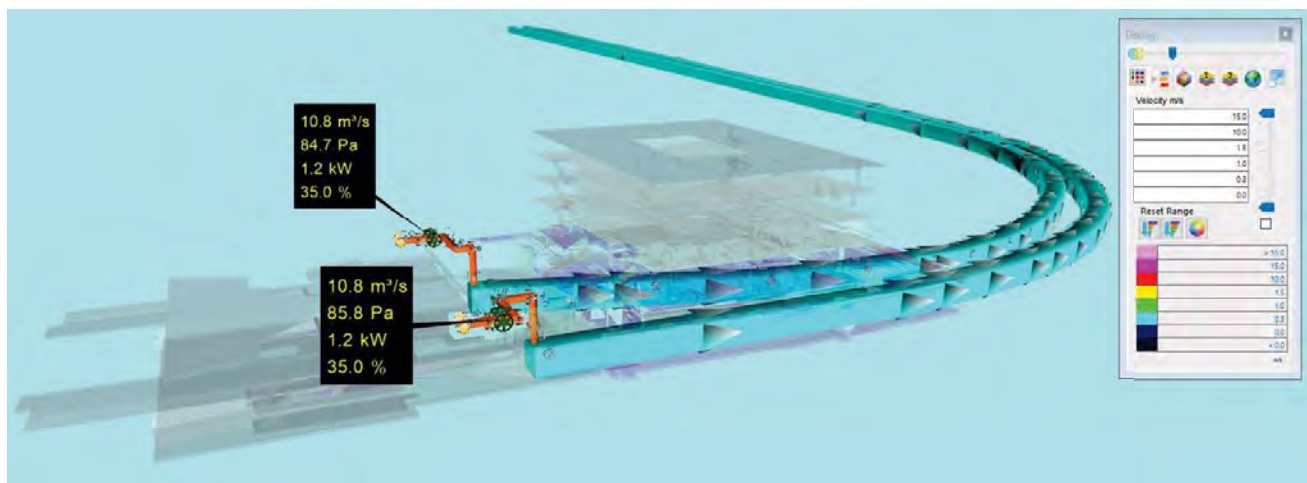


Figure 7 - Air Velocity ≥ 0.3 m³/s

reduce flow rate. The axial fan VSD can be used to compensate and increase the air flow.

6.5 Track and OHLE installation

6.5.1 Overview

Track and OHLE introduce further diesel equipment into the tunnels, so a higher air flow (26.7 m³/s) is required.

6.5.2 Equipment required

No additional equipment is required. The axial fan VSD's are used to increase power to the fans and increase the air flow.

If the fan fails to operate, a visual alarm will notify the operators.

6.5.3 Operating Point

Calculation estimates a similar fan operating point for both fans, of approximately 25 m³/s @ 565 Pa, running at 85% of full speed via the VSD.

6.5.4 Flow Distribution

Figure 7 shows the resulting air flow through the cut and cover tunnels. This will vary according to the use of plant in the tunnel, which will increase flow resistance and reduce flow rate. The axial fan VSD can be used to compensate and increase the air flow.

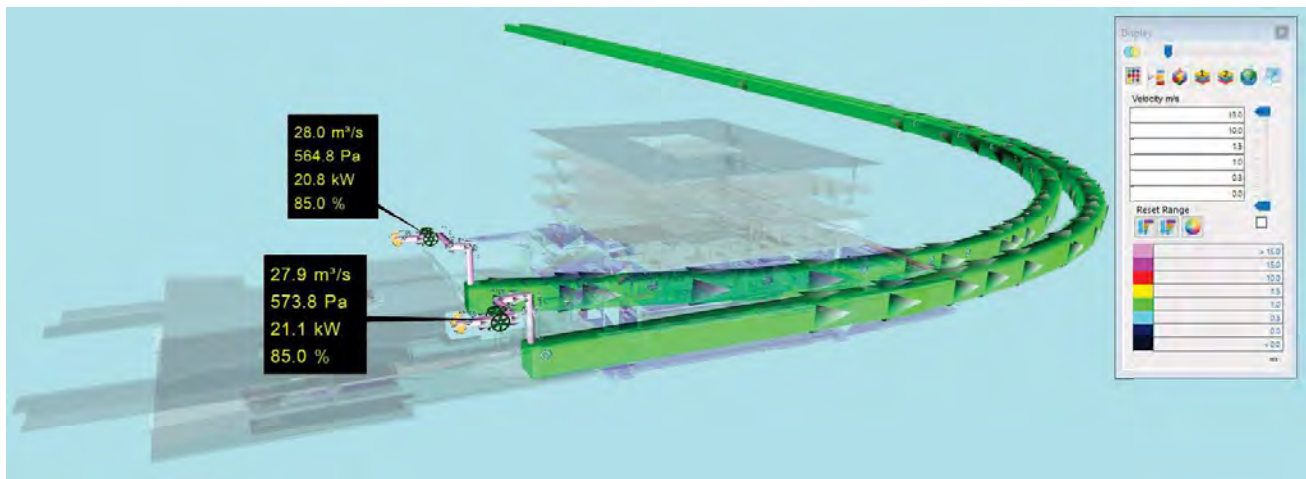


Figure 8 - Air Velocity ≥ 0.3 m³/s

7 Ventilation Control Devices

Fit-out works Britomart to Aotea will be controlled by VSD driven axial fans.

8 Air Quality Monitoring

8.1 Air Monitoring

Air monitoring of ventilated work areas will be undertaken by a competent and authorised person, to ensure that the mechanical ventilation remains effective in supporting a healthy and safe workplace.

Inspections of the ventilation will be conducted before start of each shift and at intervals during the shift not exceeding 4hrs by the supervisor of the section. Results of the inspections will be recorded on the daily shift reports, and communicated to the workgroup on the noticeboard as a weekly summary.

The ventilation officer will conduct a monthly ventilation audit of the ventilation system for the CRL project, and compile a report of the findings. The report will be made available to relevant management personnel as soon as possible. Any incidents or investigations which are related to ventilation in that period will be included in the report. Ventilation reports will be kept on file as part of company documentation.

8.2 Monitoring Instruments

The air monitoring system to be implemented is the use of hand-held gas detectors.

8.2.1 Hand-held gas detectors

Hand-held portable gas detectors will be used wherever workers are present in any area in the tunnels. The Handheld Gas Detectors will be bump tested at the start of each shift before they are put into service by the means of a Bump Test Station to verify that the audible and visual alarms are activated.

Any instrument that fails a bump test shall be withdrawn from service and sent to the original equipment manufacturer (OEM) or accredited agent for repairs.

The HHGD's will be calibrated by the original equipment manufacturer (OEM) or accredited agent on a 6 monthly basis.

For details:

- CRL-SYW-HSE-LKA-SWI-800007 Hand-held gas detector use
- CRL-SYW-HSE-LKA-SWI-800008 Hand-held Gas Detector Calibration document

CRL will use MSA hand-held gas detectors:

- MSA Altair 4XR

- MSA Altair 5X Multi-gas detector

These will be used to monitor:

- Oxygen
- Carbon Monoxide
- Hydrogen Sulphide
- Nitrogen dioxide
- Combustible gasses

CRL will also have a specially configured gas monitor which will monitor the following:

- Oxygen
- Carbon Dioxide
- Ammonia (NH₃)
- Nitrogen dioxide
- Methane gas

Bump test stations will be established at each site to test the instruments daily, and identify calibration when necessary.

Detectors will be carried by the Tunnel Manager/Supervisor and suitably trained personnel during their inspections.

The machine operator will have a detector with them while operating the machinery unless if the machine has fixed gas monitors mounted on the machine.

8.3 Diesel Particulate Emissions

- Air monitoring will target the diesel dilution load of 0.05 m³/s/kW
- Diesel equipment emissions, CO and NO₂, will be monitored at least twice per shift (4 hours apart), depending on the length of the shift. Handheld Gas Detectors (HHGD) will also be used by authorised persons, which include CO monitoring.
- Diesel plant exhaust emissions will be tested for undiluted gases monthly.
- Diesel Particulate Matter (DPM) produced from plant and machinery will be measured to ensure workplace exposure standard is not exceeded (8-hour average level below 0.1mg/m³).

The nature of the operation means there will be various diesel machines being utilised at different times and locations within the project. To better manage and control the diesel fumes are within limits, a diesel board will be established in every working district. The diesel board will show the amount of air in the working district, how many machines are working in the district, and if there are any ventilation restrictions during construction. See example of a diesel board in Appendix 9.1.

8.4 Gases

- Ensure gases are within the limits shown in Table 7 for TWA 8 hour shift.

Gas	TWA	STEL	A1	A2
Carbon monoxide CO (General body)	25ppm	50ppm	25ppm	50ppm
Carbon monoxide CO (Back of force fan or tunnel entrance)	25ppm	50ppm	25ppm	50ppm
Carbon dioxide CO ₂	0.5%	3%	0.5%	3%
Methane CH ₄ (LEL %)	5%	10%	5%	10%
Nitrogen dioxide NO ₂	1ppm	5ppm	1ppm	5ppm
Hydrogen Sulphide H ₂ S	5ppm	10ppm	5ppm	10ppm
Oxygen O ₂	19.5%		19.5%	22%

Table 7 - Gas Limits

8.5 Respirable Silica and other dust

- Using Dustrac or similar, check the level of Respirable Dust to confirm compliance with the WES of 0.05 mg/m³ (8hr TWA) for Respirable Crystalline Silica (RCS)
- For non-respirable but inhalable dust, ensure compliance with the WES of 10 mg/m³ (8 hr TWA).

The Ventilation Officer or Occupational Health Specialist will be responsible for organising dust sampling. This will be sent for laboratory testing to determine the composition/quantity of dust workers are exposed to.

8.6 Thermal Comfort

The primary contributor to heat load in the tunnel will be diesel plant, up to 533 kW. With the ventilation system specified in operation, there will be an increase of wet bulb temperature of between 3-4°C.

The Tunnel Supervisor will check the wet and dry bulb temperatures on a daily basis. If the effective temperature within the shaft/tunnel is found to be higher than 28 °C wet bulb, work in the station box will stop and the works continue to be ventilated until the temperature has dropped sufficiently. The ventilation design will be reviewed for installation quality and adequacy.

9 Appendices

9.1 Appendix A: Diesel board and tags


DIESEL VEHICLE BOARD


1. ALL VEHICLE OPERATORS WILL PLACE THE APPROPRIATE TAG BELOW BEFORE PASSING THIS POINT

2. REMOVE YOUR TAG WHEN EXITING THE SECTION

3. EMERGENCY VEHICLES EXEMPT

MACHINES NOT OPERATING



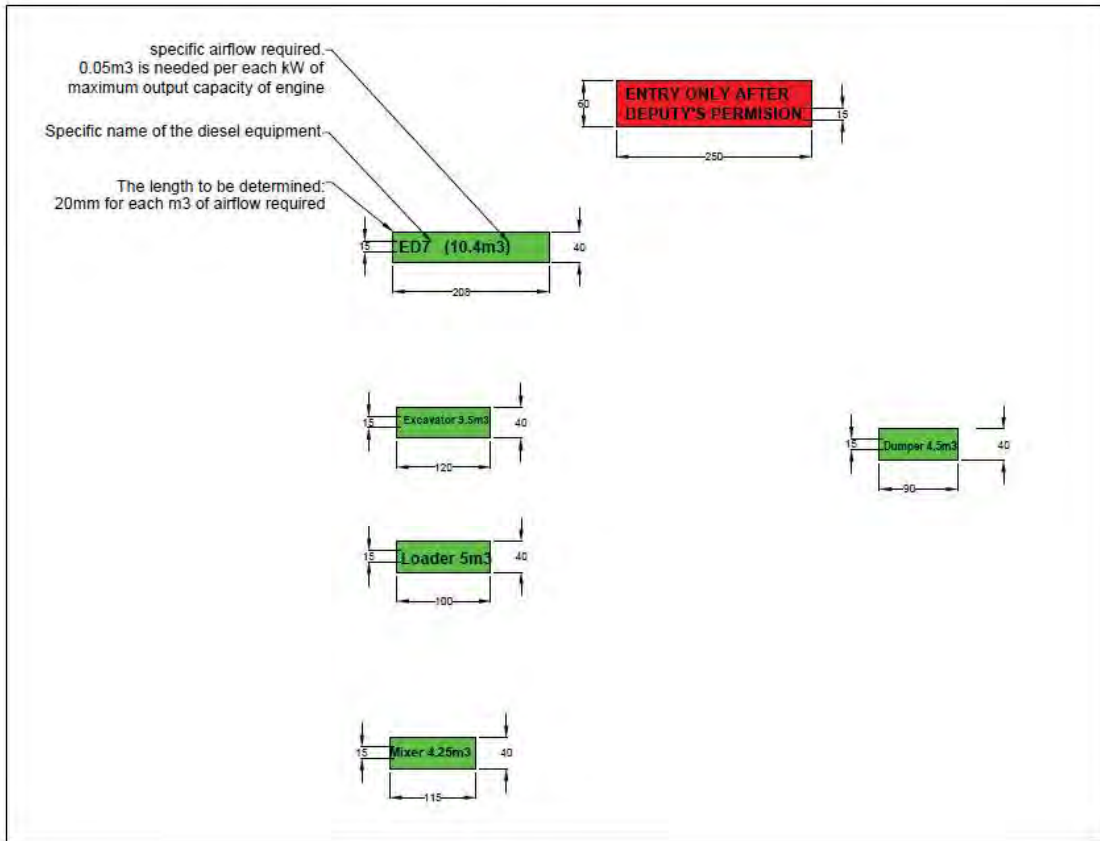


● AIR QUANTITY INTO SECTION m3/sec

● IF TAG BOARD FULL THE OPERATOR IS TO CONTACT SECTION DEPUTY ON TO ENSURE IF SECTION DIESELS AS INDICATED ARE OPERATING.

● IF NOT - THE OPERATOR IS TO PLACE HIS TAG ON THE BOARD AND PROCEED INTO SECTION.

● IF YES - THE OPERATOR IS TO WAIT UNTIL ANOTHER VEHICLE LEAVES THE SECTION



Appendix 2: Ventilation Cogemacoustic Report



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1. CONTEXT AND HYPOTHESES

The present document concerns the noise level of Cogemacoustic Axial Fans supplied for the Auckland CRL project.

In particular, a study of noise levels to be expected at the start of the project is detailed.

Indeed, the ventilation design of the project considered the use of baffles boxes on the fans.

However, at the start of the project, the fans will be operating while the baffles boxes are not installed yet.

Sound levels are therefore calculated without baffles boxes, with the following hypotheses:

- At the project start, the Ø1300mm duct length per fan is limited to 75 meters
- Fresh air considered to be supplied at the end of the duct per fan is:
 - o 20 m3/s for Beresford Fans
 - o 25 m3/s for Aotea and Mercury Lane Fans
- The fan VFDs are used in order to match these requirements regarding airflow

Calculations sheets for headlosses and sound data are given for each fan. Fan curves at adequate VFD frequencies are also given.

Sound levels are also calculated at Design Duty Point, with an Inlet Baffles Box 1600mm x 1600mm x 1500mm, spacing 200mm and calculations are provided along with Fan Curves

All sound data are calculated at the inlet, at 45°, at 10 meters, with a directivity value of 2.

2. RESULTS

Fan	Without baffles box, at project start				With Inlet Baffle Box 1600mm x 1600mm x 1500mm			
	Airflow (m3/s)	Pressure (Pa)	VFD Frequency (Hz)	Sound level at 10 m	Airflow (m3/s)	Pressure (Pa)	VFD Frequency (Hz)	Sound level at 10 m
Beresford Fans	20.0	580	38	58.9	20.4	1580	50	47.4
Aotea Fans	25.0	906	41	64.5	32.1	1343	50	50.3
Mercury Lane Fans	25.0	906	37	64.3	30	1810	50	51.2

3. BERESFORD FANS

3.1 WITHOUT INLET BAFFLES BOX

3.1.1 Headlosses Calculation Sheet

Project Beresford Fans
Subject Headlosses

Headloss and leakage prediction
 Following SIA 196 method

Air			
Altitude	m		0
Atmospheric pressure	Pa		101318
Average temperature	°C		20
Relative humidity	%		50
Air density	kg/m ³		1.20
Total airflow at face			20.00
Duct			
Number of ducts	-		1
Airflow rate per duct	m ³ /s		20.0
Length	m		75
Diameter	mm		1300
Duct class	A-B-S		A
Duct friction ratio	-		0.018
Duct leakage ratio	mm ² /m ²		10
Velocity pressure (end of duct)	Pa		136
Static pressure at duct outlet p0	Pa		0
Inlet airflow rate for each duct	m ³ /s		20.0
Velocity pressure (start of duct)	Pa		137
Static pressure at duct inlet p1	Pa		141
Miscellaneous Headlosses			
Elbow number	-		2
Elbow location		Middle of duct	
Elbow resistance	Pa		123
Diameter change / number of ducts	Pa		12
Fan			
Total airflow rate	m³/s		20.0
Number of unit in parallel	-		1
Fan airflow	m³/s		20.0
Fan diameter	mm		1250
Velocity pressure	Pa		160
Total pressure for the duct	Pa		412
Silencers	Pa		16
Grid	Pa		56
Inlet bell			No
Inlet loss	Pa		96
Total pressure	Pa		580
Axial Fan			
Number of unit in series	-		1
Unit pressure	Pa		580
Efficiency ratio	%		80
Total absorbed power	kW		15
Unit absorbed power	kW		15
Advised motor power	kW		55
Mains frequency	Hz		50
Number of poles	-		4
Nominal motor speed	rpm		1478
VFD frequency	Hz		38.0
Motor speed (VFD)	rpm		1123
Hub Diameter	-		C2
Number of blades	-		9
Fan type	-		T2.125.55.4

3.1.2 Sound Data Sheet (38Hz)

Sound Data

Fan	Ø1250 55 kW	Silencers	
Airflow	20.0 m ³ /s	Length	1.5D
Total Pressure	580 Pa	Pod	No
Number of stages	1	Inlet section	1.23 m ²
Nominal diameter	1250 mm	Inlet speed	16.3 m/s
Number of blades	9		
Fan/hub ratio	C2	Acoustic pressure mesurements	
Hub Diameter	355 mm	Distance	10 m
Frequency	38 Hz	Q	2
Rotational speed	1123 rpm	Lw - Lp	-28.0 dB

Fan

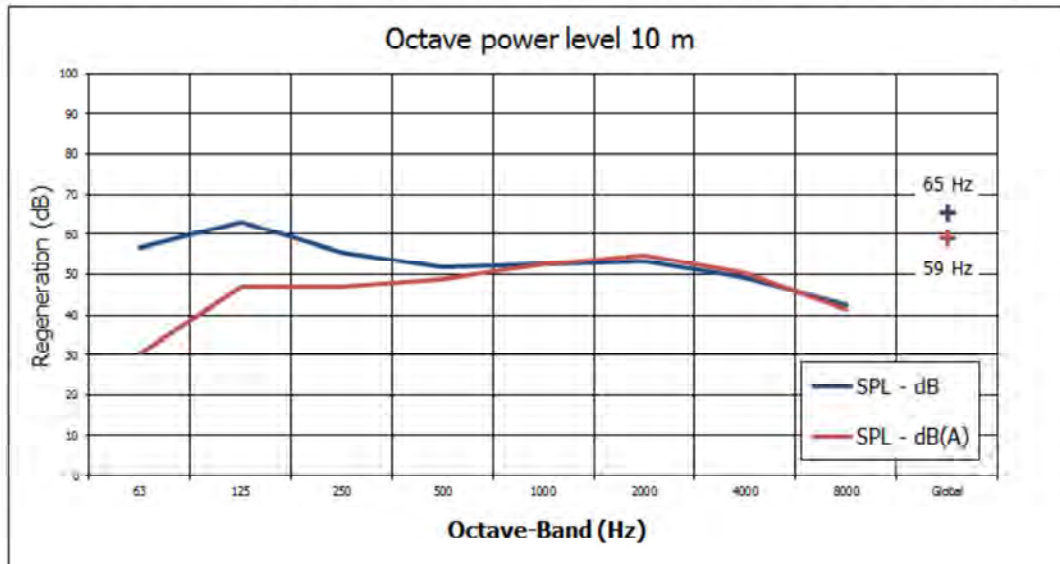
Basic Sound Power	dB	102								
Octave-Band	Hz	63	125	250	500	1000	2000	4000	8000	Global
A weighting	dB	-26	-16	-9	-3	0	1	1	-1	0
Blade frequency correction	dB	0	6.5	0	0	0	0	0	0	
Strouhal number	-	1.1	2.1	4.3	8.5	17	34	68	136	
Spectrum correction	dB	-17	-12	-9	-7	-8	-11	-16	-23	
Octave power level (stage)	dB	85	97	94	95	94	91	86	79	102
Octave power level (fan)	dB	85	97	94	95	94	91	86	79	102
Octave power level	dB(A)	59	81	85	92	94	92	87	78	98

Silencers

Attenuation	dB	-4.5	-6.0	-11.0	-17.5	-15.0	-10.0	-9.0	-8.5	-21.2
Regeneration	dB	83	80	77	77	76	72	66	56	86
Octave power level	dB	85	91	84	80	81	81	77	71	93

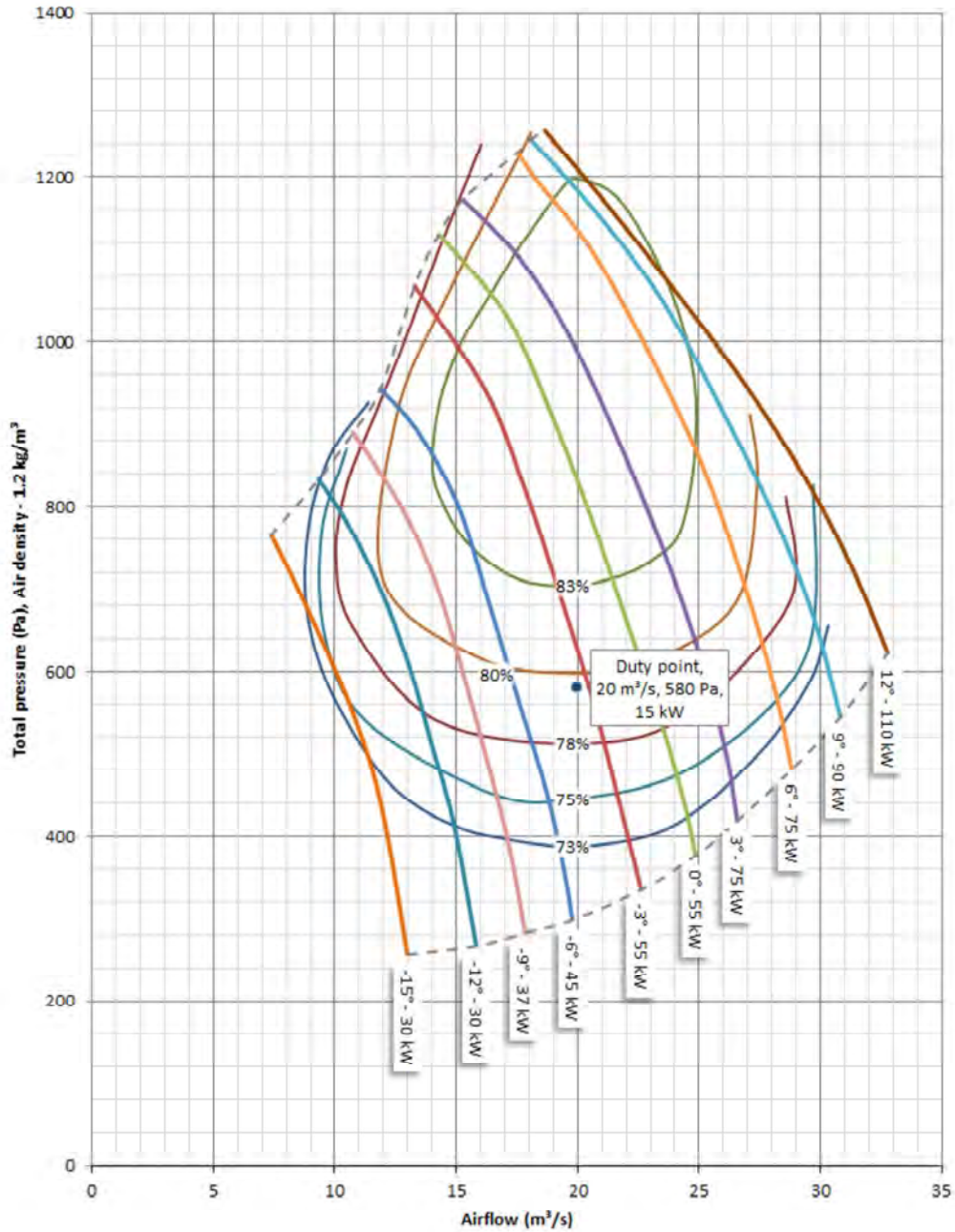
Regeneration

Octave power level 10 m	dB	57	63	56	52	53	53	49	43	65
Sound Pressure 10 m	dB(A)	30	47	47	49	53	55	50	41	59



3.1.3 Fan Curve – T2.125.55.4 (38 Hz)

1 Stage Fan, Ø1250 C2 - 9P (38 Hz)



3.2 WITH INLET BAFFLES BOX

3.2.1 Sound Data Sheet (50 Hz)

Sound Data

Fan	Ø1250 55 kW	Silencers	
Airflow	20.4 m³/s	Length	1.5D
Total Pressure	1580 Pa	Pod	No
Number of stages	1	Inlet section	1.23 m²
Nominal diameter	1250 mm	Inlet speed	16.6 m/s
Number of blades	9		
Fan/hub ratio	C2	Acoustic pressure measurements	
Hub Diameter	355 mm	Distance	10 m
Frequency	50 Hz	Q	2
Rotational speed	1478 rpm	Lw - Lp	-28.0 dB

Supplementary baffles

Height	1600 mm
Width	1600 mm
Depth	1500 mm
Spacing	200
Type	1.28 m²
Free section	15.94 m/s
Airspeed	94.83 Pa

Fan

Basic Sound Power	dB	111								
Octave-Band	Hz	63	125	250	500	1000	2000	4000	8000	Global
A weighting	dB	-26	-16	-9	-3	0	1	1	-1	0
Blade frequency correction	dB	0	0	6.5	0	0	0	0	0	
Strouhal number	-	0.8	1.6	3.2	6.5	13	26	52	103	
Spectrum correction	dB	-20	-14	-10	-8	-8	-10	-14	-20	
Octave power level (stage)	dB	91	97	108	103	103	101	97	91	111
Octave power level (fan)	dB	91	97	108	103	103	101	97	91	111
Octave power level	dB(A)	65	81	99	100	103	102	98	90	108

Silencers

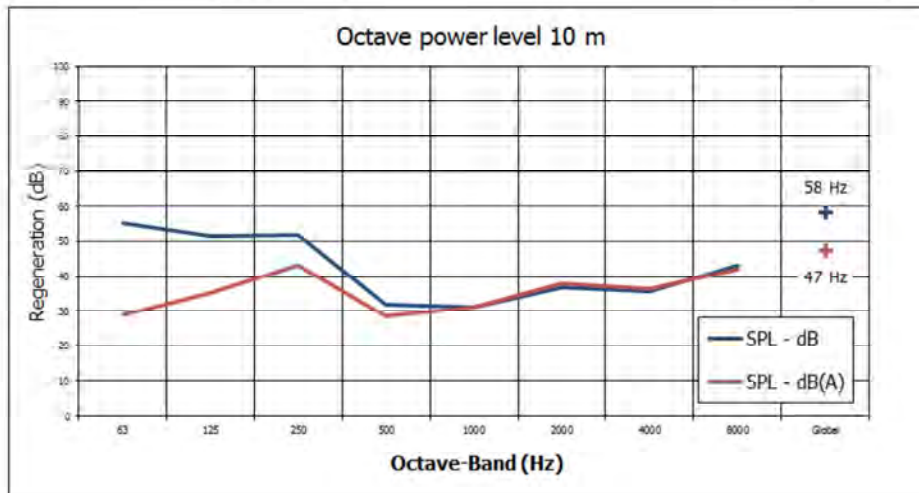
Attenuation	dB	-4.5	-6.0	-11.0	-17.5	-15.0	-10.0	-9.0	-8.5	-21.2
Regeneration	dB	83	80	77	77	76	72	66	56	87
Octave power level	dB	88	91	97	86	89	91	88	82	100

Baffles

Attenuation E1L'	dB	-5.0	-12.0	-17.0	-30.0	-32.0	-27.0	-25.0	-11.0	-35.4
Attenuation E2L'	dB	68	62	59	57	56	55	54	52	70
Attenuation	dB	83	80	80	60	59	65	64	71	86

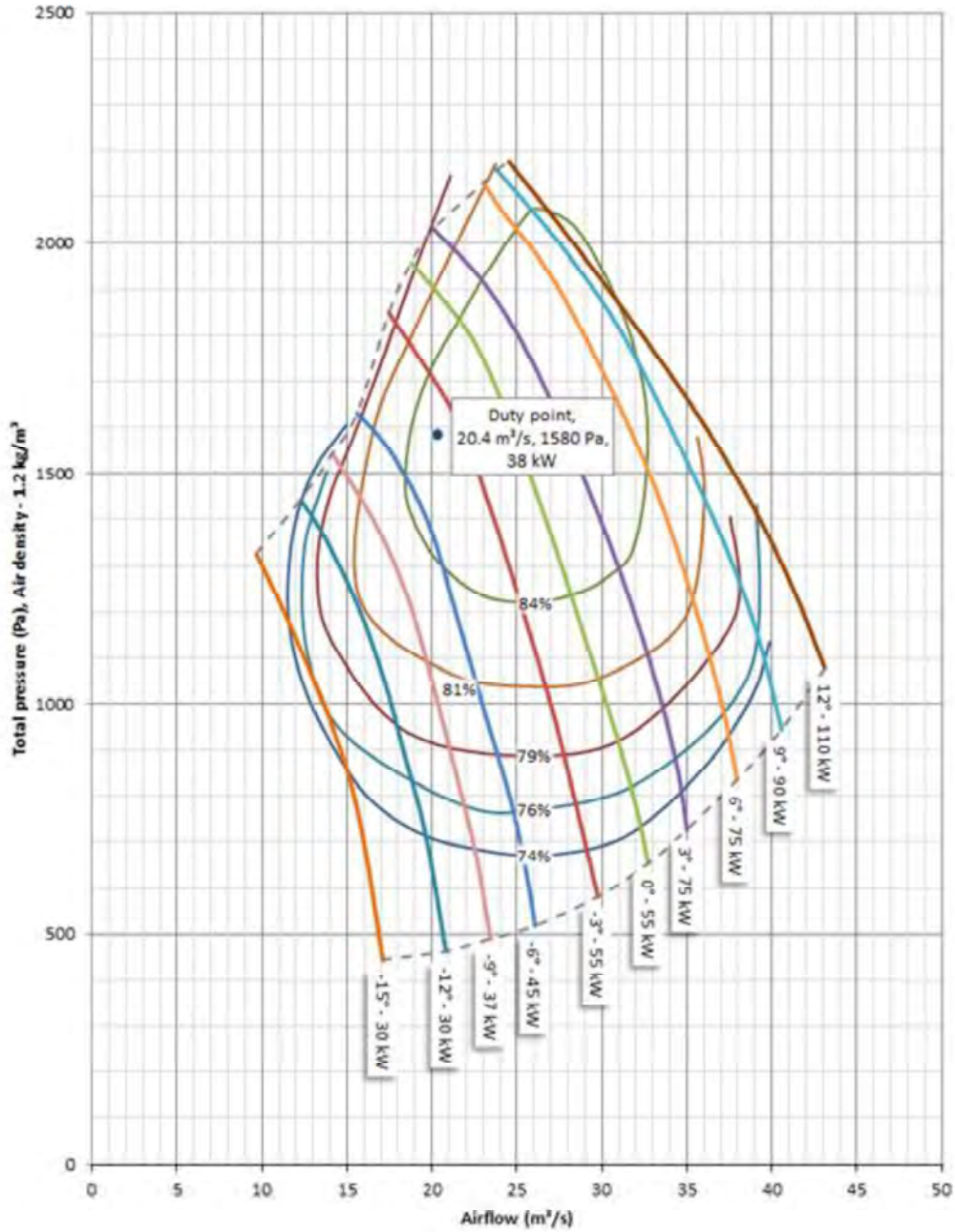
Regeneration

Octave power level 10 m	dB	55	52	52	32	31	37	36	43	58
Sound Pressure 10 m	dB(A)	29	35	43	29	31	38	37	42	47



3.2.2 Fan Curve – T2.125.55.4 (50 Hz)

1 Stage Fan, Ø1250 C2 - 9P



4. AOTEA FANS

4.1 WITHOUT INLET BAFFLES BOX

4.1.1 Headlosses Calculation Sheet

Project Aotea Fans
Subject Headlosses

Headloss and leakage prediction
 Following SIA 196 method

Air		
Altitude	m	0
Atmospheric pressure	Pa	101318
Average temperature	°C	20
Relative humidity	%	50
Air density	kg/m ³	1.20
Total airflow at face		25.00
Duct		
Number of ducts	-	1
Airflow rate per duct	m ³ /s	25.0
Length	m	75
Diameter	mm	1300
Duct class	A-B-S	A
Duct friction ratio	-	0.018
Duct leakage ratio	mm ² /m ²	10
Velocity pressure (end of duct)	Pa	213
Static pressure at duct outlet p0	Pa	0
Inlet airflow rate for each duct	m ³ /s	25.0
Velocity pressure (start of duct)	Pa	213
Static pressure at duct inlet p1	Pa	221
Miscellaneous Headlosses		
Elbow number	-	2
Elbow location		Middle of duct
Elbow resistance	Pa	192
Diameter change / number of ducts	Pa	18
Fan		
Total airflow rate	m³/s	25.0
Number of unit in parallel	-	1
Fan airflow	m³/s	25.0
Fan diameter	mm	1250
Velocity pressure	Pa	250
Total pressure for the duct	Pa	644
Silencers	Pa	25
Grid	Pa	87
Inlet bell		No
Inlet loss	Pa	150
Total pressure	Pa	906
Axial Fan		
Number of unit in series	-	1
Unit pressure	Pa	906
Efficiency ratio	%	86
Total absorbed power	kW	26
Unit absorbed power	kW	26
Advised motor power	kW	75
Mains frequency	Hz	50
Number of poles	-	4
Nominal motor speed	rpm	1478
VFD frequency	Hz	41.0
Motor speed (VFD)	rpm	1212
Hub Diameter	-	C1
Number of blades	-	9
Fan type	-	T2.125.75.4

4.1.2 Sound Data Sheet (41 Hz)

Sound Data

Fan	Ø1250 75 kW	Silencers	
Airflow	25.0 m ³ /s	Length	1.5D
Total Pressure	906 Pa	Pod	No
Number of stages	1	Inlet section	1.23 m ²
Nominal diameter	1250 mm	Inlet speed	20.4 m/s
Number of blades	9		
Fan/hub ratio	C1	Acoustic pressure mesurements	
Hub Diameter	355 mm	Distance	10 m
Frequency	41 Hz	Q	2
Rotational speed	1212 rpm	Lw - Lp	-28.0 dB

Fan

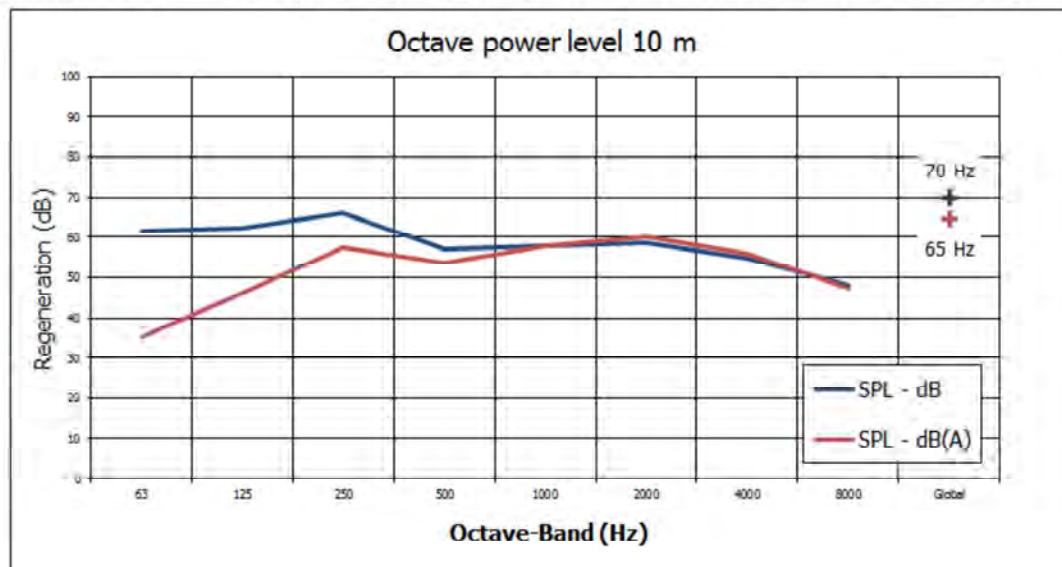
Basic Sound Power	dB	107								
Octave-Band	Hz	63	125	250	500	1000	2000	4000	8000	Global
A weighting	dB	-26	-16	-9	-3	0	1	1	-1	0
Blade frequency correction	dB	0	0	6.5	0	0	0	0	0	
Strouhal number	-	1.0	2.0	3.9	7.9	16	32	63	126	
Spectrum correction	dB	-18	-13	-9	-8	-11	-11	-16	-23	
Octave power level (stage)	dB	89	95	105	100	99	96	91	85	107
Octave power level (fan)	dB	89	95	105	100	99	96	91	85	107
Octave power level	dB(A)	63	79	96	96	99	97	92	83	104

Silencers

Attenuation	dB	-4.5	-6.0	-11.0	-17.5	-15.0	-10.0	-9.0	-8.5	-21.2
Regeneration	dB	88	85	82	82	81	77	71	61	92
Octave power level	dB	90	90	94	85	86	87	83	76	98

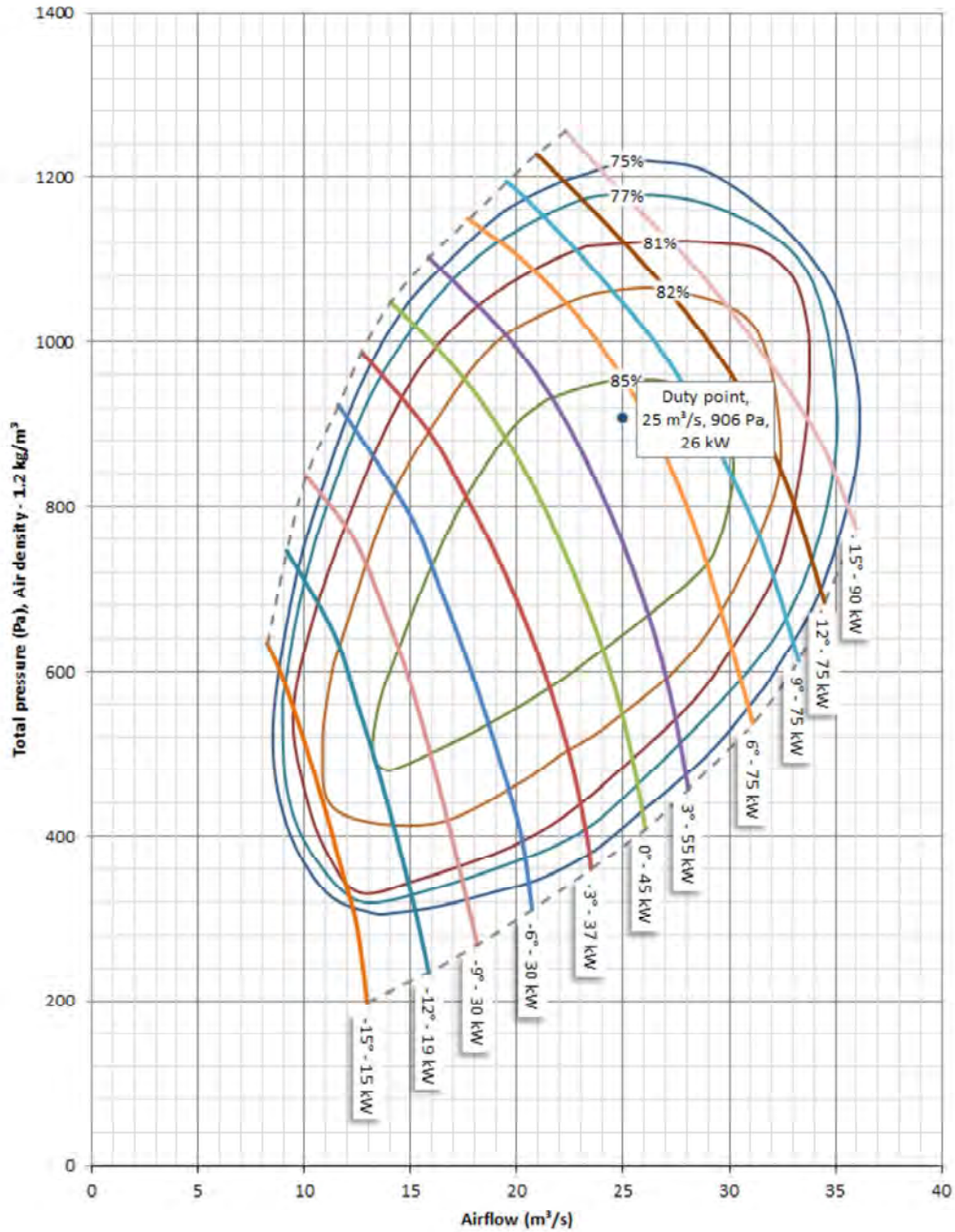
Regeneration

Octave power level 10 m	dB	62	62	66	57	58	59	55	48	70
Sound Pressure 10 m	dB(A)	35	46	57	54	58	60	56	47	65



4.1.3 Fan Curve – T2.125.75.4 (41 Hz)

1 Stage Fan, Ø1250 C1 - 9P (41 Hz)



4.2 WITH INLET BAFFLES BOX

4.2.1 Sound Data Sheet (50 Hz)

Sound Data

Fan	Ø1250 75 kW	Silencers	
Airflow	32.1 m ³ /s	Length	1.50
Total Pressure	1343 Pa	Pod	No
Number of stages	1	Inlet section	1.23 m ²
Nominal diameter	1250 mm	Inlet speed	26.2 m/s
Number of blades	9		
Fan/hub ratio	C1	Acoustic pressure measurements	
Hub Diameter	355 mm	Distance	10 m
Frequency	50 Hz	Q	2
Rotational speed	1478 rpm	Lw - Lp	-28.0 dB

Supplementary baffles

Height	1600 mm
Width	1600 mm
Depth	1500 mm
Spacing	200
Type	1.28 m ²
Free section	25.08 m/s
Airspeed	234.6 Pa

Fan

Basic Sound Power	dB	112									
Octave-Band	Hz	63	125	250	500	1000	2000	4000	8000	Global	
A weighting	dB	-26	-16	-9	-3	0	1	1	-1	0	
Blade frequency correction	dB	0	0	6.5	0	0	0	0	0		
Strouhal number	-	0.8	1.6	3.2	6.5	13	26	52	103		
Spectrum correction	dB	-20	-14	-10	-8	-8	-10	-14	-20		
Octave power level (stage)	dB	92	98	108	104	104	102	98	91	112	
Octave power level (fan)	dB	92	98	108	104	104	102	98	91	112	
Octave power level	dB(A)	65	82	100	101	104	103	99	90	109	

Silencers

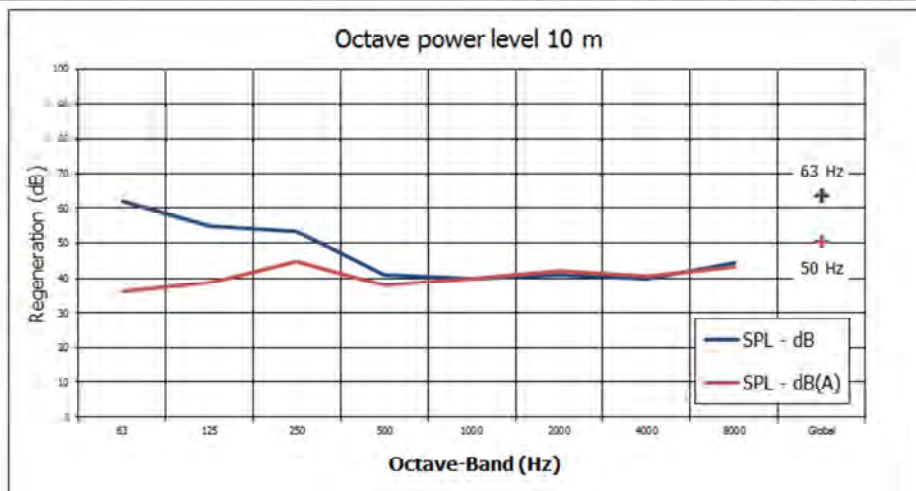
Attenuation	dB	-4.5	-6.0	-11.0	-17.5	-15.0	-10.0	-9.0	-8.5	-21.2
Regeneration	dB	94	91	88	88	87	83	77	67	97
Octave power level	dB	95	94	98	90	91	92	89	83	102

Baffles

Attenuation E1L'	dB	-5.0	-12.0	-17.0	-30.0	-32.0	-27.0	-25.0	-11.0	-35.4
Attenuation E2L'	dB	79	73	70	68	67	66	65	63	82
Attenuation	dB	90	83	81	69	68	69	68	72	91

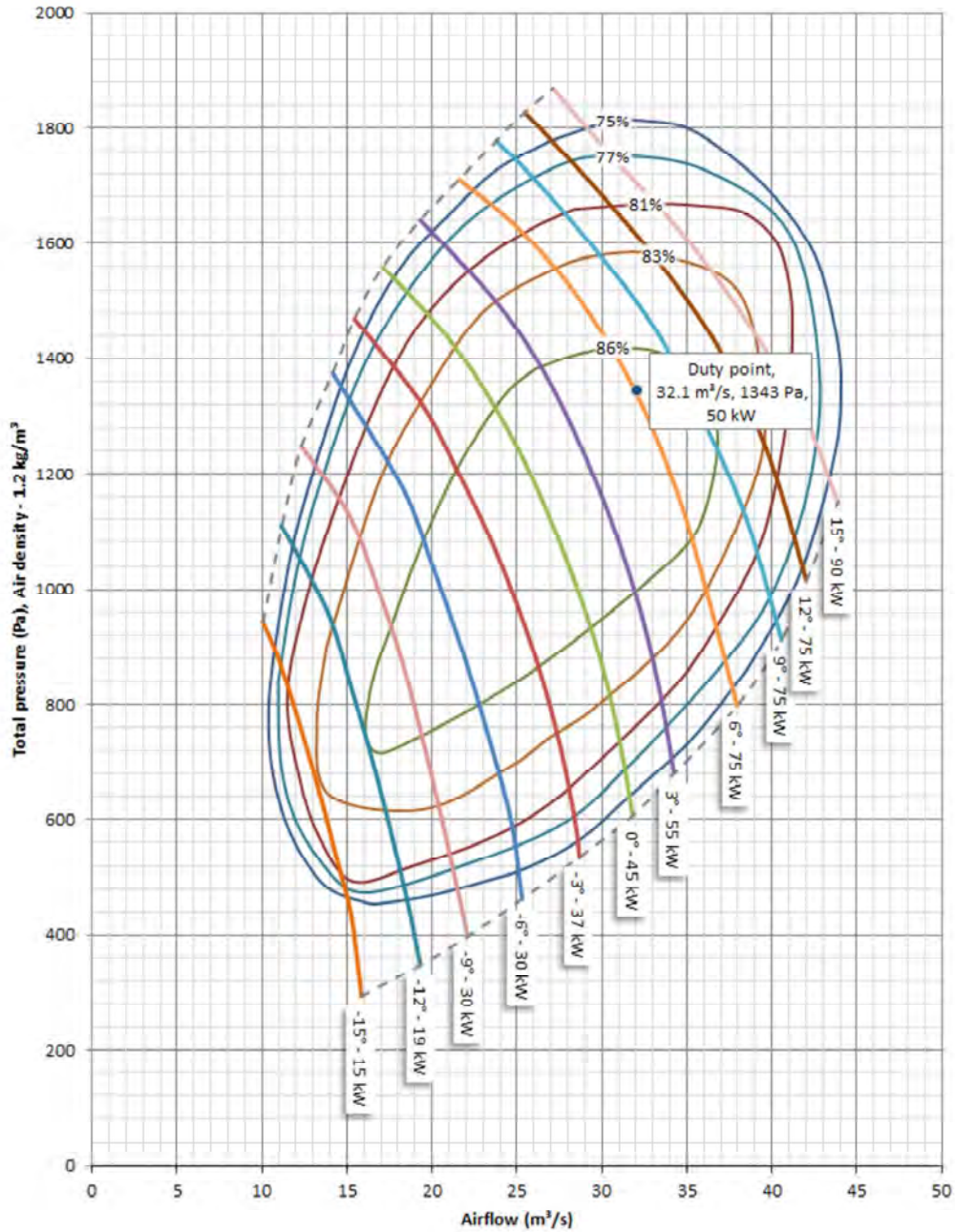
Regeneration

Octave power level 10 m	dB	62	55	53	41	40	41	40	44	63
Sound Pressure 10 m	dB(A)	36	39	45	38	40	42	41	43	50



4.2.2 Fan Curve – T2.125.75.4 (50 Hz)

1 Stage Fan, Ø1250 C1 - 9P



5. MERCURY LANE FANS

5.1 WITHOUT INLET BAFFLES BOX

5.1.1 Headlosses Calculation Sheet

Project Mercury Fans
Subject Headlosses

Headloss and leakage prediction
 Following SIA 196 method

Air			
Altitude	m		0
Atmospheric pressure	Pa		101318
Average temperature	°C		20
Relative humidity	%		50
Air density	kg/m ³		1.20
Total airflow at face			25.00
Duct			
Number of ducts	-		1
Airflow rate per duct	m ³ /s		25.0
Length	m		75
Diameter	mm		1300
Duct class	A-B-S		A
Duct friction ratio	-		0.018
Duct leakage ratio	mm ² /m ²		10
Velocity pressure (end of duct)	Pa		213
Static pressure at duct outlet p0	Pa		0
Inlet airflow rate for each duct	m ³ /s		25.0
Velocity pressure (start of duct)	Pa		213
Static pressure at duct inlet p1	Pa		221
Miscellaneous Headlosses			
Elbow number	-		2
Elbow location		Middle of duct	
Elbow resistance	Pa		192
Diameter change / number of ducts	Pa		18
Fan			
Total airflow rate	m³/s		25.0
Number of unit in parallel	-		1
Fan airflow	m³/s		25.0
Fan diameter	mm		1250
Velocity pressure	Pa		250
Total pressure for the duct	Pa		644
Silencers	Pa		25
Grid	Pa		87
Inlet bell			No
Inlet loss	Pa		150
Total pressure	Pa		906
Axial Fan			
Number of unit in series	-		1
Unit pressure	Pa		906
Efficiency ratio	%		80
Total absorbed power	kW		28
Unit absorbed power	kW		28
Advised motor power	kW		90
Mains frequency	Hz		50
Number of poles	-		4
Nominal motor speed	rpm		1478
VFD frequency	Hz		37.0
Motor speed (VFD)	rpm		1094
Hub Diameter	-		C1
Number of blades	-		12
Fan type	-		T2.125.90.4

5.1.2 Sound Data Sheet (37 Hz)

Sound Data

Fan	Ø1250 90 kW	Silencers	
Airflow	25.0 m ³ /s	Length	1.5D
Total Pressure	906 Pa	Pod	No
Number of stages	1	Inlet section	1.23 m ²
Nominal diameter	1250 mm	Inlet speed	20.4 m/s
Number of blades	12		
Fan/hub ratio	C1	Acoustic pressure mesurements	
Hub Diameter	355 mm	Distance	10 m
Frequency	37 Hz	Q	2
Rotational speed	1094 rpm	Lw - Lp	-28.0 dB

Fan

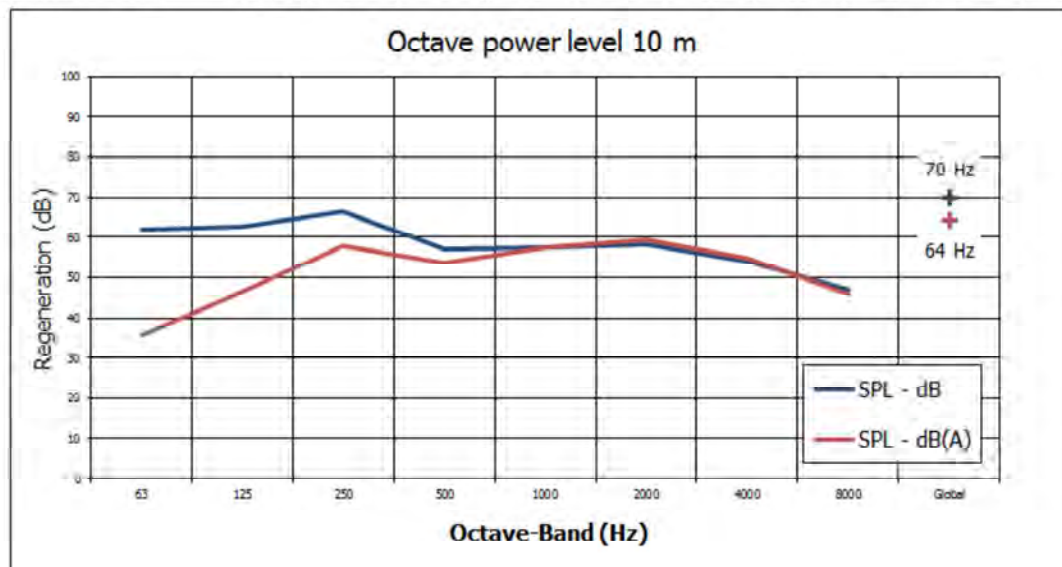
Basic Sound Power	dB	107								
Octave-Band	Hz	63	125	250	500	1000	2000	4000	8000	Global
A weighting	dB	-26	-16	-9	-3	0	1	1	-1	0
Blade frequency correction	dB	0	0	6.5	0	0	0	0	0	
Strouhal number	-	1.1	2.2	4.4	8.7	17	35	70	140	
Spectrum correction	dB	-17	-12	-9	-7	-8	-11	-17	-24	
Octave power level (stage)	dB	90	95	105	100	99	96	91	83	108
Octave power level (fan)	dB	90	95	105	100	99	96	91	83	108
Octave power level	dB(A)	64	79	96	96	99	97	92	82	104

Silencers

Attenuation	dB	-4.5	-6.0	-11.0	-17.5	-15.0	-10.0	-9.0	-8.5	-21.2
Regeneration	dB	88	85	82	82	81	77	71	61	92
Octave power level	dB	90	91	94	85	86	86	82	75	98

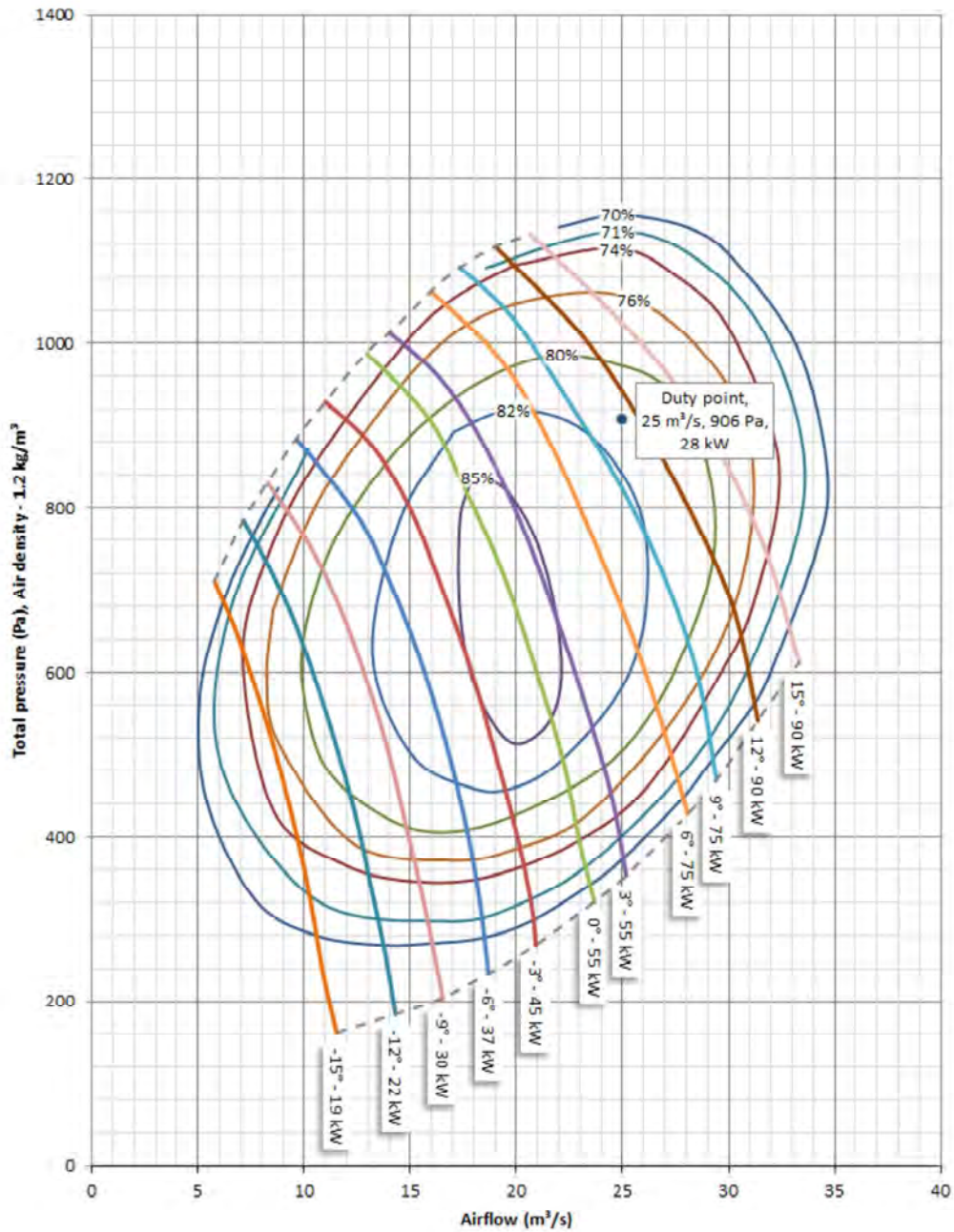
Regeneration

Octave power level 10 m	dB	62	63	66	57	58	58	54	47	70
Sound Pressure 10 m	dB(A)	36	47	58	54	58	59	55	46	64



5.1.3 Fan Curve – T2.125.90.4 (37 Hz)

1 Stage Fan, Ø1250 C1 - 12P (37 Hz)



5.2 WITH INLET BAFFLES BOX

5.2.1 Sound Data Sheet (50 Hz)

Sound Data

Fan	Ø1250 90 kW	Silencers	
Airflow	30.0 m³/s	Length	1.50
Total Pressure	1810 Pa	Pod	No
Number of stages	1	Inlet section	1.23 m²
Nominal diameter	1250 mm	Inlet speed	24.4 m/s
Number of blades	12		
Fan/hub ratio	C1	Acoustic pressure measurements	
Hub Diameter	355 mm	Distance	10 m
Frequency	50 Hz	Q	2
Rotational speed	1478 rpm	Lw - Lp	-28.0 dB

Supplementary baffles

Height	1600 mm
Width	1600 mm
Depth	1500 mm
Spacing	200
Type	1.28 m²
Free section	23.44 m/s
Airspeed	205 Pa

Fan

Basic Sound Power	dB	114								
Octave-Band	Hz	63	125	250	500	1000	2000	4000	8000	Global
A weighting	dB	-26	-16	-9	-3	0	1	1	-1	0
Blade frequency correction	dB	0	0	6.5	0	0	0	0	0	
Strouhal number	-	0.8	1.6	3.2	6.5	13	26	52	103	
Spectrum correction	dB	-20	-14	-10	-8	-8	-10	-14	-20	
Octave power level (stage)	dB	94	100	111	106	106	104	100	94	114
Octave power level (fan)	dB	94	100	111	106	106	104	100	94	114
Octave power level	dB(A)	68	84	102	103	106	105	101	92	111

Silencers

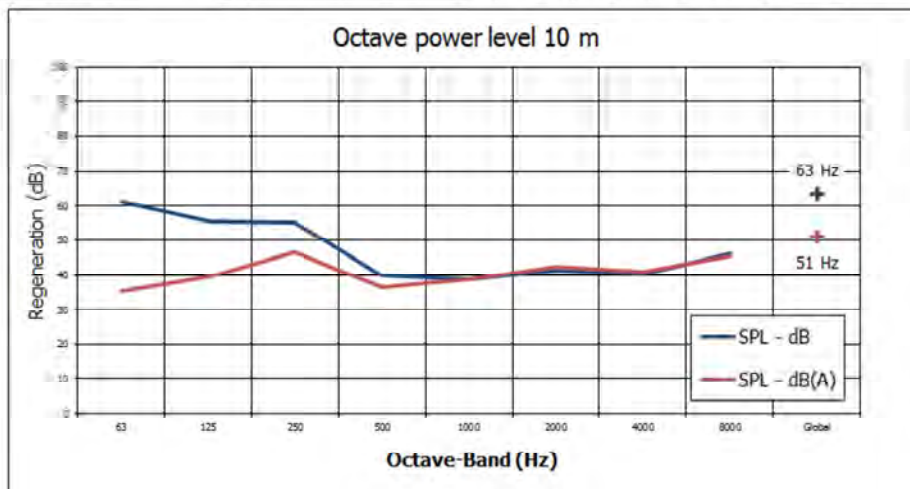
Attenuation	dB	-4.5	-6.0	-11.0	-17.5	-15.0	-10.0	-9.0	-8.5	-21.2
Regeneration	dB	92	89	86	86	85	81	75	65	96
Octave power level	dB	94	95	100	91	92	94	91	85	104

Baffles

Attenuation E1L'	dB	-5.0	-12.0	-17.0	-30.0	-32.0	-27.0	-25.0	-11.0	-35.4
Attenuation E2L'	dB	78	72	69	67	66	65	64	62	80
Attenuation	dB	89	84	83	68	67	69	68	74	91

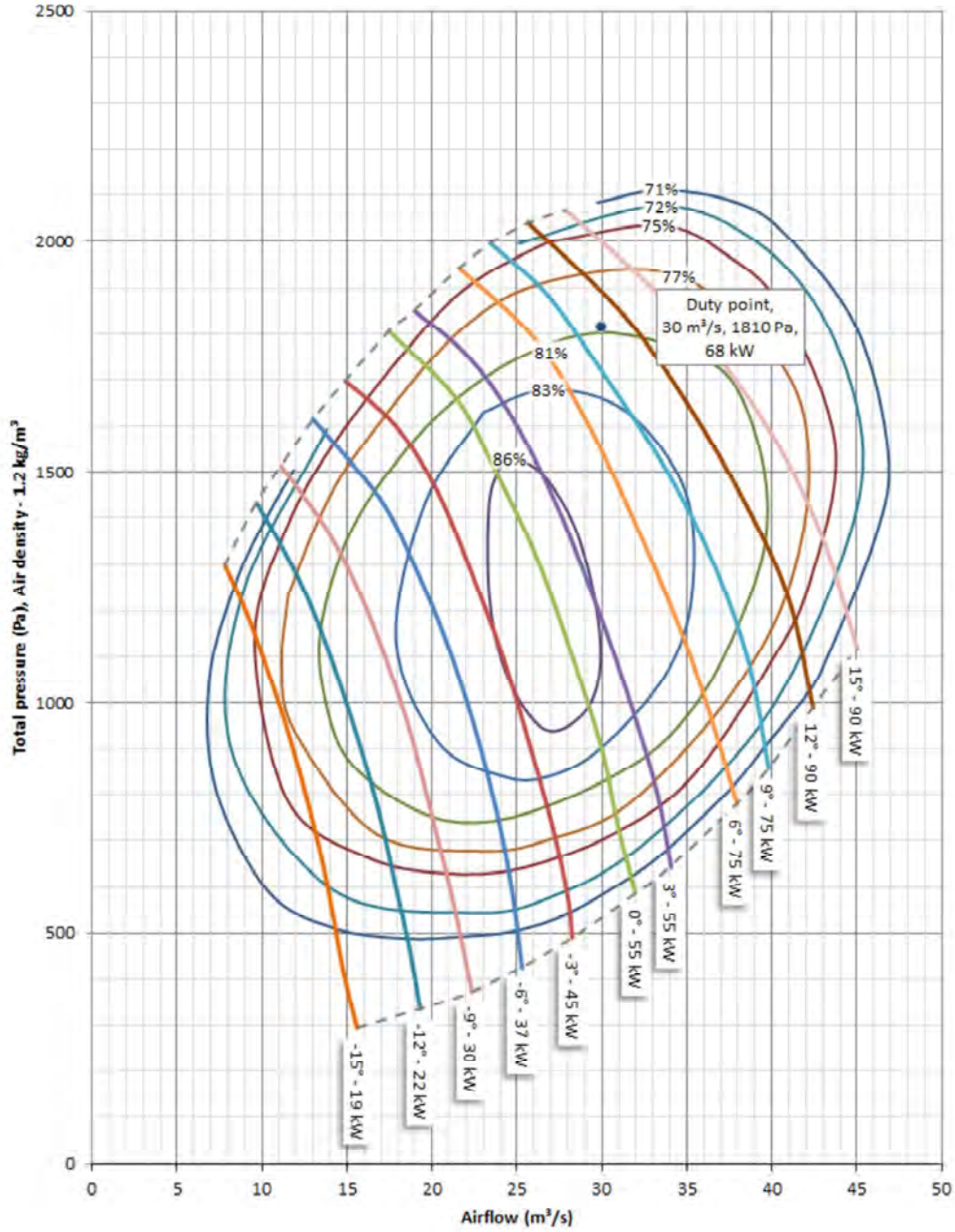
Regeneration

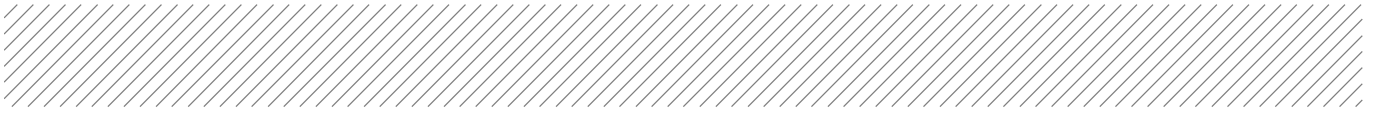
Octave power level 10 m	dB	61	56	55	40	39	41	40	46	63
Sound Pressure 10 m	dB(A)	35	39	46	36	39	42	41	45	51



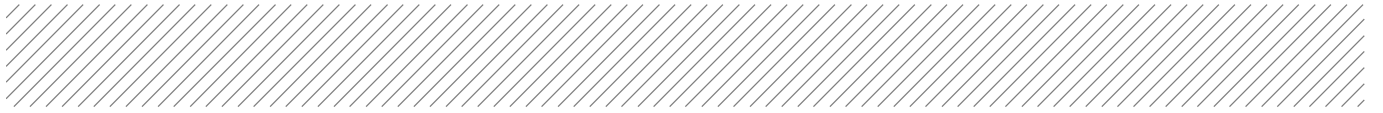
5.2.2 Fan Curve – T2.125.90.4 (50 Hz)

1 Stage Fan, Ø1250 C1 - 12P





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Appendix B

Construction Noise

Assessment



Project: CRL – BTC DESIGNATION ALTERATION NOISE ASSESSMENT

Prepared for: Aurecon
PO Box 9762
Newmarket
Auckland 1149

Attention: Helen McLean

Report No.: Rp 001 20210287

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Document Control

Status:	Rev:	Comments	Date:	Author:	Reviewer:
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Approved	r01	Following client review and methodology update	10 June 2021	James Whitlock	Consenting team
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APPENDIX A GLOSSARY OF TERMINOLOGY

APPENDIX B NOISE CONTOURS

1.0 SUMMARY

This noise assessment supports the City Rail Link Limited (CRL) Notice of Requirement (NOR) to alter CRL Designation 2501 at Britomart Station pursuant to section 181(1) of the Resource Management Act 1991 (RMA).

The purpose of the alteration is to provide for retention of the Station Plaza Accommodation (SPA) building, so that the building and surrounding Station Plaza area can be used as a construction support facility for works in the CRL tunnels located within the adjoining Designation 2500-1 to the west.

A full description of the activities associated with the NOR is contained in the Assessment of Effects on the Environment (AEE), Form 18 and Constructability Report (Appendix A to the AEE).

This report on construction noise forms part of a suite of technical reports that accompany and form part of the NOR. Its purpose is to assess the potential construction noise effects of the NOR works within and outside Designation 2501, and to recommend mitigation and management measures to address potential adverse effects.

We predict that all construction support activities will comply with relevant noise limits, except concrete pumping which may marginally exceed at 2 – 4 apartments in the 148 Quay St apartments overlooking the site. These potential exceedances will be managed by a Construction Noise Management Plan (CNMP).

None of the proposed activities generate high vibration levels, and we predict compliance with all relevant cosmetic building damage (including heritage limits for the AUP Historic Heritage Overlay) and vibration amenity standards. So, in this report we have only addressed construction noise.

2.0 PROPOSED CONSTRUCTION SUPPORT ACTIVITIES

2.1 Site

In summary, the construction support activities associated with the NOR ('the Works') are:

- Site office, worker accommodation and some storage of materials within the SPA building
- Establishing and operating ventilation equipment in the Station Plaza area (to provide ventilation for workers in the CRL tunnels to the west)
- Access for workers and deliveries of equipment and materials via the Glasshouse and former Chief Post Office (CPO) building
- Receiving and pumping concrete into the CRL tunnels (to construct the railway track bed) from the Station Plaza area in Tyler Street

The location of the Works associated with the NOR is shown in Figure 1 overleaf.

2.2 High noise activities

Of the Works listed in Section 2.1, only the concrete pumping and ventilation fans are high noise activities. All other activities are predicted to generally comply with the construction noise rules (refer Section 3.0).

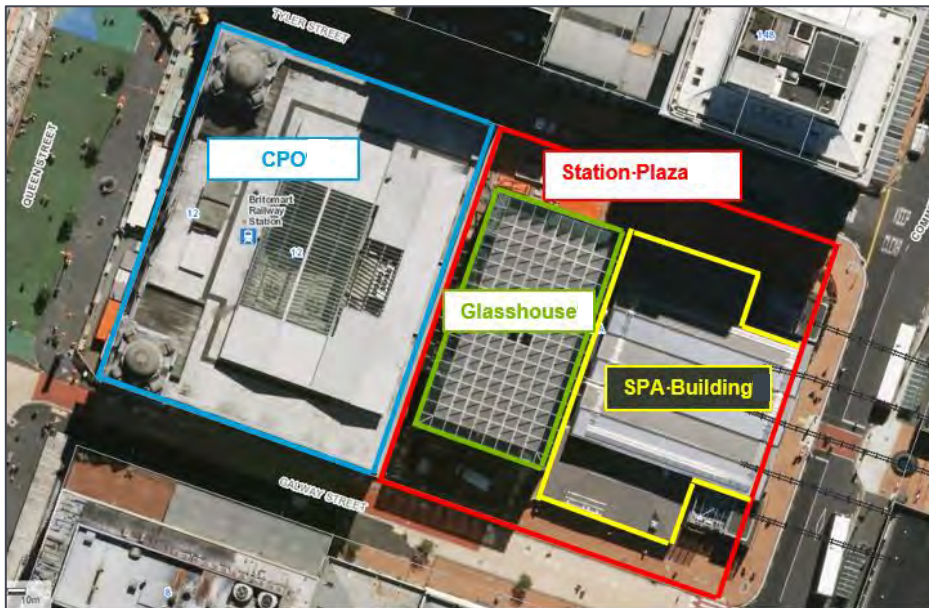
We sourced noise level data for concrete pumping from British Standard BS 5228-1:2009. The data includes a concrete truck, pump and agitator.

Noise level data for the ventilation fans were provided by the mechanical engineer. The fans are Cogemacoustic axial fans with an airflow of 28 m³/s, fitted with an acoustic attenuator (1.6m x 1.6m x 1.5m).

The engineer stated each fan would generate 52.4 dB L_{Aeq} at 10 metres. This is not a particularly high noise level, but we assessed it because the fans will operate 24/7.

The noise level data for these sources are shown in Table 2 (Section 4.0).

Figure 1: Station Plaza and Station Plaza Accommodation (SPA) building at Britomart Transport Centre



2.3 Works timeframe and hours of operation

We understand that, subject to the NoR being confirmed, the Works will follow on directly from the current CRL C1¹ project works in the area and extend through to Q4 2023.

Quiet work inside the SPA, Glasshouse, and down on track level will occur 24/7, as it does currently for the CRL C1 project. This work readily complies with the limits in Section 3.0, is generally inaudible for neighbours, and will continue as such.

The ventilation fans will also run 24/7, so must comply with the night-time limits in Table 1.

The concrete delivery will be in two stages, as follows:

- Stage 1 – 50/50 split between Aotea Station end of the tunnels (already provided for by CRL Designation 2500-1) and Britomart Station. Assuming a worst-case scenario, Aotea Station delivery (15 days) would be Q4 2021 and Britomart delivery (20 days) would be in Q1 2022
- Stage 2 – Britomart delivery only in Q2 2022. Delivery would occur over 20 days, with deliveries every second day i.e. 10 delivery days

On concrete delivery days, pumping will occur between 6.30am – 9pm Monday to Saturday, but in the event of on-site delays could extend to 10.30pm i.e. use the full extent of the AUP daytime hours (refer Table 1). We understand that a peak day would involve up to 40 concrete truck loads (3 – 4 trucks per hour).

Note that truck arrival and departure is quieter than the concrete pouring activity itself.

3.0 NOISE PERFORMANCE STANDARDS

The Britomart Designation 2501 construction noise and vibration conditions don't apply to the Works, so we have assessed noise according to the permitted activity levels in the Auckland Unitary Plan (AUP).

¹ CRL Contract 1 (C1) project is the construction contract name for CRL works in the CPO and lower Queen Street

The Station Plaza and all surrounding sites are zoned *Business – City Centre* in the AUP. This means that the construction noise levels from AUP Table E25.6.28.2 apply (at 1 metre from the façade of any neighbouring building) – refer Table 1 below. The most relevant limits are shown in bold font.

Table 1: Construction noise limits (from AUP Table E25.6.28.2)

Construction of 15 consecutive calendar days or more (total duration of works)		
Time	L _{Aeq(30 min)}	L _{AFmax}
Monday to Friday 6.30am – 10.30pm	75 dB	90 dB
Saturday 7am – 11pm	80 dB	90 dB
Sunday 9am – 7pm	65 dB	85 dB
All other times (night-time)	60 dB	75 dB

4.0 PREDICTED NOISE LEVELS

4.1 Noise source data

Table 2 shows the noise source data for concrete pumping and ventilation fans, predicted levels at various distances and the setback distances needed to comply with the limits.

Table 2: Data for high noise equipment

Equipment	Sound Power Level (dB L _{Aeq})	Noise Level (dB L _{Aeq})			Setback (m)	
		10 m	20 m	50 m	Daytime 75 dB L _{Aeq}	Night-time 60 dB L _{Aeq}
Concrete truck and pump discharging	103	68	62	53	14	N/A
Ventilation fan (with attenuator)	77	52	46	37	1	4

4.2 Noise levels at neighbouring receivers

Table 3 shows the predicted noise levels at 1 metre from the façades of neighbouring buildings. The potential exceedances are shaded grey.

We understand that a 2 metre site hoarding is proposed along the Tyler St footpath and we have included this in the model. It helps to mitigate noise levels to the ground floor of adjacent buildings, and for passing pedestrians.

Table 1: Predicted noise levels

Receiver	Predicted noise level (dB LAeq)		Compliant?
	Concrete pumping	Vent fan	
2 Queen St	63	36	Yes
152 Quay St	73	36	Yes
148 Quay St	76	41	No
8 Customs St East	59	36	Yes
10 Customs St East	59	40	Yes
2 Commerce St	64	< 35	Yes
25 Galway St	64	< 35	Yes

Appendix B shows indicative noise contour maps for each activity. The maps show how the sound propagates from source to receivers, and the neighbouring buildings are coloured according to the highest noise level incident on their façade. The insert in each plan shows a 3D ‘soundsplash’ of how the sound projects up the building façades.

The results show that concrete pumping may marginally exceed the construction noise limit at one building (148 Quay Street) and that operation of the ventilation fans will readily comply 24/7.

The exceedance at 148 Quay Street is limited to the lower two floors (not including ground floor) at the western end of the building – refer the soundsplash insert. These receivers (perhaps 2 – 4 apartments) are directly adjacent the concrete pump, and look over the 2m site hoarding.

5.0 RECOMMENDATIONS

We predict that proposed Works activity will comply with the AUP permitted noise standards except concrete pumping. This activity may marginally exceed the AUP permitted construction noise levels at a few apartments on Tyler Street that overlook the site.

Concrete pumping will only occur during the daytime, and for a few weeks at a time, so despite the potential exceedances we consider that the effects will be reasonable.

The neighbours adjacent to these activities are the same as for the CRLL C1 project. The scale of construction activity, and therefore the noise levels, from the proposed Works will generally be less than from CRL C1.

However, the neighbours will be accustomed to a certain level of consultation and construction management. We understand that during the C1 works, the neighbours identified communication and consultation as a key measure for managing construction effects and expectations. So, despite likely changes in construction personnel and activity types, and lesser noise effects, we recommend transitioning to the proposed Works with the following mitigation and management measures in place:

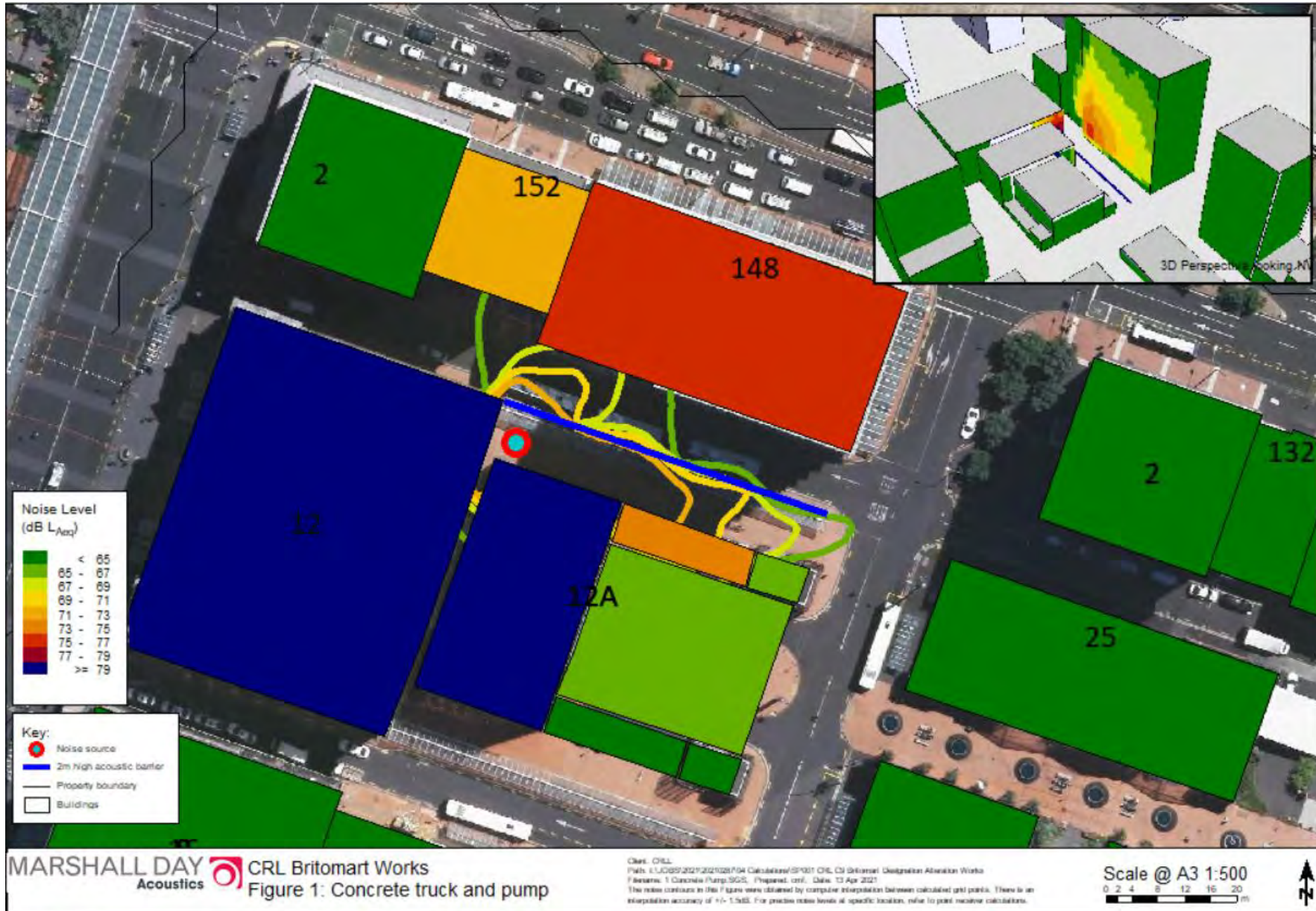
- A CNMP that sets out the mitigation and management framework to manage effects according to the best practicable option (BPO). A draft CNMP (dated 10 June 2021) accompanies the NoR (contained within the Construction Environmental Management Plan which is Appendix D to the AEE)
- Consultation with the south-facing occupants of 148 Quay Street, so they are aware of the proposed Works, their timeframes and potential noise levels. This will be particularly crucial if concrete pumping extends to 10.30pm on some nights because of on-site delays (refer Section 2.3)

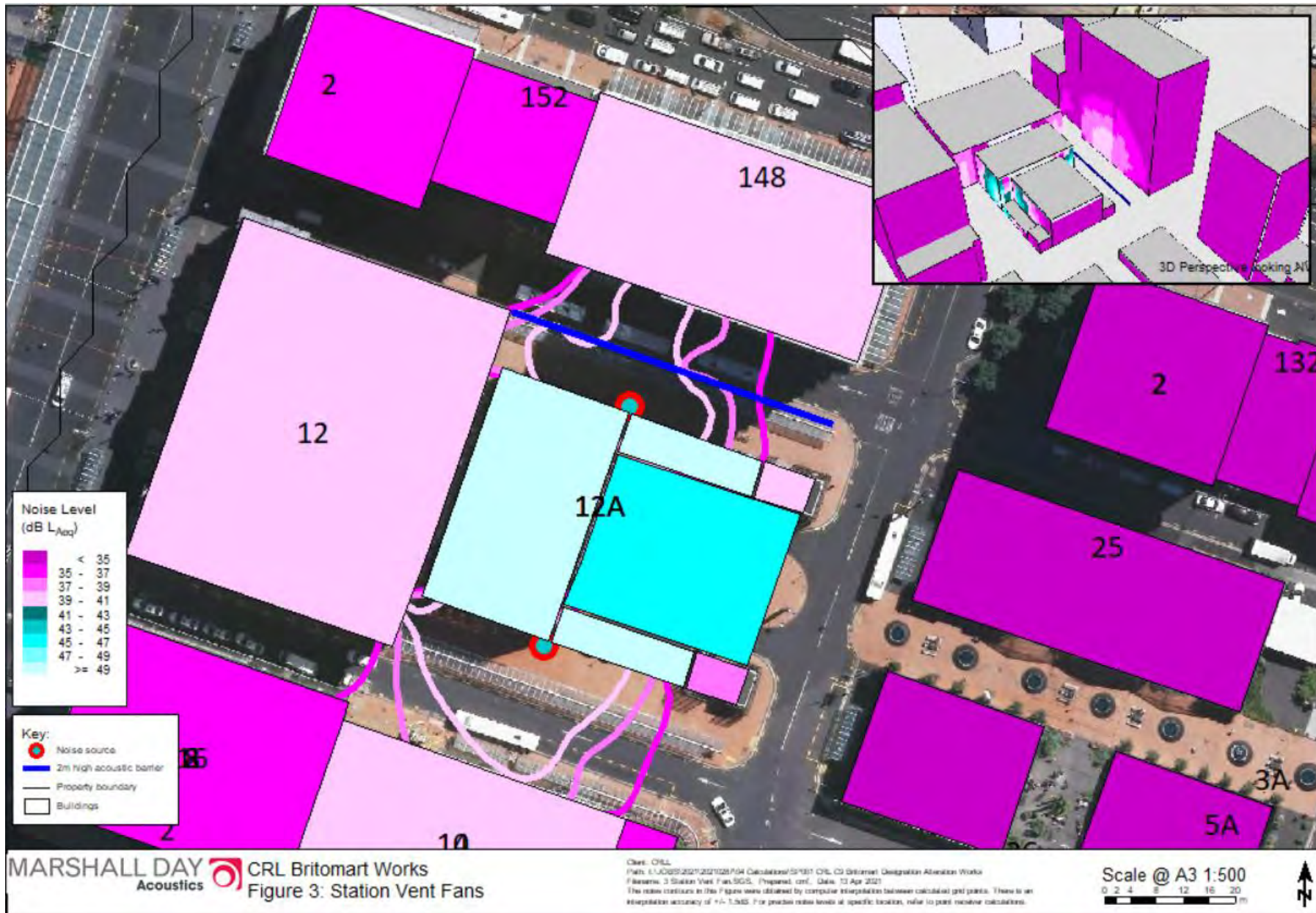
- Written communication to other building occupants within 50 metres of the worksite, including:
 - Details of the overall Works, its timing and duration
 - Contact details and names of personnel whose job is to receive complaints and enquiries
 - Acknowledge that some activities (listed in this document) are predicted to generate high noise levels and may result in disturbance for short periods
- Physical mitigation as described in this report. Specifically:
 - A 2-metre site hoarding along Tyler Street
 - The attenuators recommended by the mechanical engineer for operation of the ventilation fans
- Install a fixed noise monitor at the same location on the first floor of 148 Quay Street as used to monitor the CRL C1 works. This is an ideal location for the key receivers identified in our assessment.

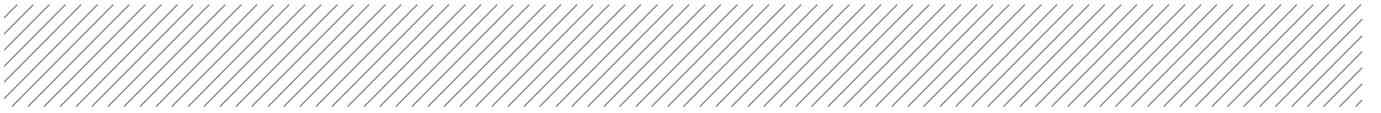
It measures noise levels continuously and automatically uploads them to cloud software, and alerts contractor personnel of any exceedances

APPENDIX A GLOSSARY OF TERMINOLOGY

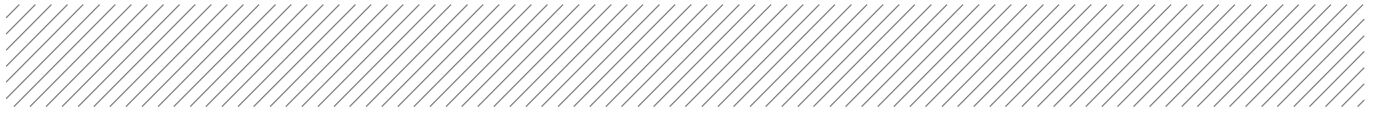
Noise	A sound that is unwanted by, or distracting to, a receiver.
dB	Decibel (dB) is the unit of sound level. Expressed as a logarithmic ratio of sound pressure (P) relative to a reference pressure (Pr), where $dB = 20 \times \log(P/Pr)$.
dB(A)	The unit of sound level which has its frequency characteristics modified by a filter (A-weighted) to more closely approximate the frequency bias of the human ear. A-weighting is used in airborne acoustics.
L_{Aeq}(t)	The equivalent continuous (time-averaged) A-weighted sound level commonly referred to as the average level. The suffix (t) represents the period, e.g. (8 h) would represent a period of 8 hours, (15 min) would represent a period of 15 minutes and (2200-0700) would represent a measurement time between 10 pm and 7 am.
L_{AFmax}	The A-weighted maximum noise level. The highest noise level which occurs during the measurement period.
NZS 6803:1999	New Zealand Standard NZS 6803: 1999 “Acoustics - Construction Noise”
Sensitive Noise and Vibration Receivers	Receivers that may be disturbed during rest, concentration, communication or prayer. These include (but are not limited to): <ul style="list-style-type: none"> • Dwellings • Offices • Schools, including Child Care Centres and tertiary facilities • Libraries • Hospitals • Rest Homes • Marae and other Cultural Centres • Churches • Hotels or other accommodation facilities







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Appendix C

Traffic Access and Parking Assessment

**City Rail Link: Britomart
Transport Centre**

Integrated Transport
Assessment

June 2021

flow

TRANSPORTATION SPECIALISTS

Project: City Rail Link: Britomart Station
Title: Integrated Transport Assessment
Document Reference: P:\aure\017 CRL Britomart NoR\Reporting\R1D210622 ITA Britomart Station.DOCX
Prepared by: Andrew Mein
Reviewed by: Ian Clark

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18 June 2021	Draft	R1C210618	I Clark	
22 June 2021	Final	R1D210622	I Clark	

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EXECUTIVE SUMMARY

This Report supports the City Rail Link Limited (CRL) Notice of Requirement (NOR) to alter CRL Designation 2501 at Britomart Station pursuant to section 181(1) of the Resource Management Act 1991 (RMA).

The purpose of the alteration is to provide for retention of the Station Plaza Accommodation (SPA) building within the Britomart Transport Centre (BTC), so that the building and surrounding Station Plaza area can be used as a construction support facility for works in the CRL tunnels located within the adjoining Designation 2500-1 to the west.

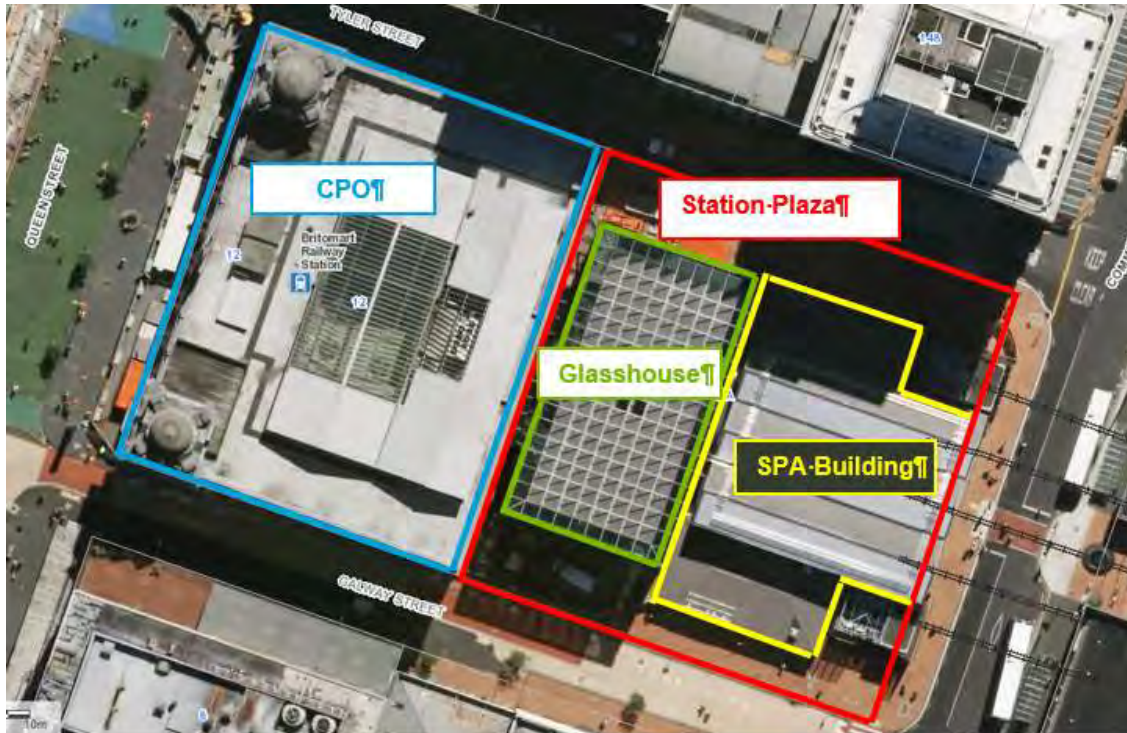
A full description of the activities associated with the NOR is contained in the Assessment of Effects on the Environment (AEE), Form 18 and Constructability Report (Appendix B to the AEE).

In summary, the works associated with the NOR are:

- ◆ Site office, worker accommodation and some storage of materials within the SPA building
- ◆ Establishing and operating ventilation equipment in the Station Plaza area (to provide ventilation for workers in the CRL tunnels to the west)
- ◆ Access for workers and deliveries of equipment and materials via the Glasshouse and former Chief Post Office (CPO) building; and
- ◆ Receiving and pumping concrete into the CRL tunnels (to construct the railway trackbed) from the Station Plaza area adjoining Tyler Street.

The location of the Works associated with the NOR is shown in Figure ES1.

Figure ES1: Station Plaza and Station Plaza Accommodation (SPA) building at Britomart Transport Centre



This report on transport forms part of a suite of technical reports that accompany and form part of the NOR. Its purpose is to assess the potential traffic and transport effects of the NOR Works within and outside Designation 2501, and to recommend mitigation and management measures to address potential adverse effects.

Based on the analysis described in this report, it can be concluded that the proposed temporary traffic management associated with the Works is predicted to result in minimal adverse effects relating to the function, capacity, and safety of the surrounding transport network. The adverse effects consider general vehicle delays and pedestrian and public transport delays, providing an overall representation of potential effects for all users of each street and services they provide for.

The following summarises the conclusions for each of the main effects:

Conclusion on Public Transport

Prohibiting reversing of trucks from Commerce Street into Tyler Street (or from Tyler Street onto Commerce Street) during peak periods will maintain bus travel times and bus reliability. Bus stop locations will be maintained in their existing positions to reduce confusion and to maintain patronage throughout the Works period. No reductions in bus layover facilities on Commerce Street are envisaged with the Works.

The effects on public transport are deemed to be less than minor with regards to traffic and transport.

Conclusion on Pedestrians

Pedestrian accessibility will be maintained throughout the Works, with appropriate levels of service provided to ensure safety and access to public transport and adjacent properties. Access to the Britomart station via the recently reopened CPO building will be maintained.

The effects pertaining to pedestrians are deemed to be minor with regards to traffic and transport.

Conclusion on Property Access

Access to properties in close proximity to the Works (along Tyler Street) will be maintained throughout for both pedestrians and vehicles.

It is considered the effects pertaining to property access are minor with regards to traffic and transport.

Conclusion on General Traffic

Vehicle capacity through the Works site will be maintained to existing capacities. This will reduce the probability of traffic transferring to alternative routes which are already experiencing delays. It is predicted that some temporary queueing of general traffic and buses will occur along Commerce Street during the implementing of a stop/go arrangement, although this is only to occur outside of the weekday peak periods. However, in general, vehicle delays will be acceptable, with changes in delays considered relatively minor.

It is considered the effects pertaining to general vehicle travel times and queueing are minor with regards to traffic and transport.

Conclusion on Construction Support Activity

The Works will not shift in location during the construction period, thus consistency in the layout will result in efficiency, and minimise confusion to users of Commerce and Tyler Streets. Construction traffic associated with the Works is considered minimal, with 5-10 vehicles per day (generally utes/small goods vehicles) predicted to be generated over the majority of the period of the works. Greater volumes are expected during the two periods of concrete pours, and a maximum of forty trucks per day expected over 20 days with Stage 1, during the first quarter of 2022, and a similar number of trucks per day over 10 days with Stage 2, during the second quarter of 2022. These vehicles are to utilise Quay Street to gain access to Commerce Street.

It is considered the effects pertaining to construction vehicles are minor with regards to traffic and transport.

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APPENDIX A CONSTRUCTION TRAFFIC MANAGEMENT PLAN

GLOSSARY OF TERMS

Table 1: Glossary of Terms

Term / Acronym	Meaning
AADT	Annual Average Daily Traffic
AAWT	Annual Average Weekly Traffic
AC	Auckland Council
AEE	Assessment of Environmental Effects
AT	Auckland Transport
AUP-OIP	Auckland Unitary Plan – Operative in Part
BTC	Britomart Transport Centre
CBD	Central Business District, now generally referred to as the Auckland city centre
CEMP	Construction and Environmental Management Plan
CMP	Construction Management Plan
COPTTM	Code of Practice for Temporary Traffic Management
CTMP	Construction Traffic Management Plan
CRL	City Rail Link
EMP	Environmental Management Plan
LOS	Level of Service
NOR	Notice of Requirement
SH	State Highway
SPA	Station Plaza Accommodation
STMS	Site Traffic Management Supervisor
TTM	Temporary Traffic Management

1 INTRODUCTION

1.1 Purpose of this Report

This Report supports the City Rail Link Limited (CRL) Notice of Requirement (NOR) to alter CRL Designation 2501 at Britomart Station pursuant to section 181(1) of the Resource Management Act 1991 (RMA).

The purpose of the alteration is to provide for retention of the Station Plaza Accommodation (SPA) building within the Britomart Transport Centre (BTC), so that the building and surrounding Station Plaza area can be used as a construction support facility for works in the CRL tunnels located within the adjoining Designation 2500-1 to the west.

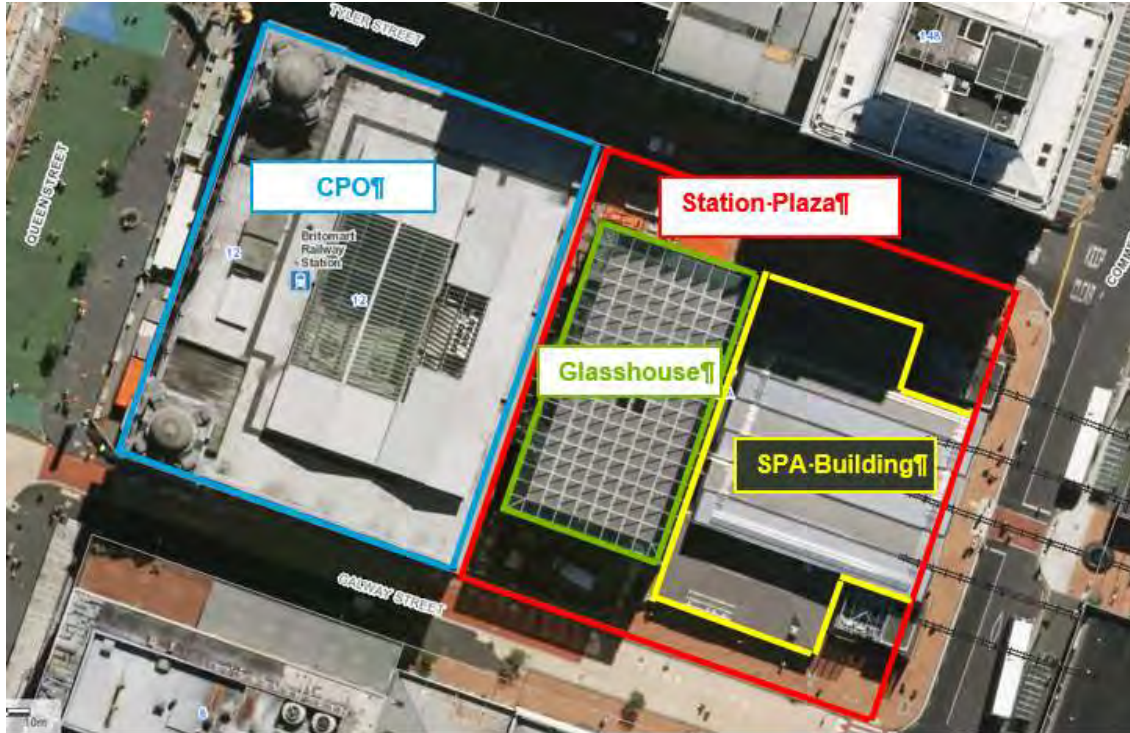
A full description of the activities associated with the NOR is contained in the Assessment of Effects on the Environment (AEE), Form 18 and Constructability Report (Appendix B to the AEE).

In summary the activities associated with the NOR are:

- ◆ Site office worker accommodation and some storage of materials within the SPA building
- ◆ Establishing and operating ventilation structures in the Station Plaza area (to provide ventilation for workers in the CRL tunnels to the west)
- ◆ Access for workers and deliveries of equipment and materials via the Glasshouse and former Chief Post Office (CPO) building
- ◆ Receiving and pumping concrete into the CRL tunnels (to construct the railway track bed) from the Station Plaza area in Tyler Street.

The location of the Works associated with the NOR is shown in Figure .

Figure 1 Station Plaza and Station Plaza Accommodation (SPA) building at Britomart Transport Centre



This report on Transport forms part of a suite of technical reports that accompany and form part of the NOR. Its purpose is to assess the potential traffic and transport effects of the NOR Works within and outside Designation 2501 and to recommend mitigation and management measures to address potential adverse effects.

2 EXISTING ENVIRONMENT

This section of the report sets out the existing transport environment by mode type. It provides information concerning the Britomart Station area, current public transport facilities and pedestrian desire lines, where data is available. In terms of streets, the main focus is on Commerce Street and Tyler Street, although references are also made to Galway Street, where limited effects associated with the NOR amendment are also proposed.

It is important to note that the local environment is in the process of transformation, due to a variety of projects currently under construction.

2.1 Tyler Street, Galway Street and Commerce Street Overview

Tyler Street and Galway Street form east-west local access roads and are classified under the Auckland Unitary plan – Operative in part (AUP-OIP) as a non arterial roads¹.

Commerce Street is a north-south local road and is also classified under the AUP-OIP as a non arterial road.

¹ The AUP- OIP classifies roads only as arterial, or non arterial

Tyler Street connects Lower Queen Street with Britomart Place, with Commerce Street running between Quay and Fort Streets.

The vehicle connection between Tyler Street and Lower Queen Street has recently been severed, with Lower Queen Street now inaccessible, with bollards separating each street. Tyler Street currently serves as vehicle access for properties on the northern side and access for maintenance vehicles associated with the Britomart Station. East from Commerce Street to Britomart Place, Tyler Street serves eastbound traffic only.

Similarly, Galway Street connects Lower Queen Street with Britomart Place, although the vehicle connection between Galway Street and Lower Queen Street has also recently been severed. From Britomart Place to Commerce Street, Galway Street serves westbound traffic only.

Commerce Street operates as a key public transport (bus) corridor, while providing connections from Quay and Customs Streets to the broader Britomart precinct businesses and residents.

The following sections provide evidence of each function of these streets.

2.2 Pedestrian Activity

East-west pedestrian connectivity along Tyler Street and Galway Street is provided through to the newly completed Te Komititanga public space in Lower Queen Street. It also serves to access the Britomart Station via the CPO and local residential and business properties.

Commerce Street provides pedestrian connections to bus services arriving and departing on the eastern side, between Galway and Tyler Street, and a general through street connecting Customs Street with Quay Street.

Table 2 below sets out pedestrian volumes along Commerce Street for a typical weekday, Saturday and Sunday during April 2021, both for the peak hour and daily totals. This is the closest available count and whilst not directly adjacent to the site it shows the trend for the area, i.e. a significant number of pedestrians in the area during a typical weekday with reduced volumes over a typical weekend.

Table 2: Commerce Street - Pedestrian volumes (April 2021)²

Location	Period	Peak Hour	Daily
Commerce Street (south of Galway, west side)	Typical weekday	760	6,750
	Typical Saturday	230	2,750
	Typical Sunday	210	2,030

Figure 2 presents the pedestrian volume profile across a typical weekday, Saturday and Sunday in March 2021. This indicates 3 peaks during a typical weekday (morning and evening commuter peak periods and a lunchtime peak period). Saturday and Sunday pedestrian profiles have less pronounced and lower peaks.

² Source: Heart of the City pedestrian counts (www.hotcity.co.nz, 8 June 2021)

Figure 2: Pedestrian volume profile – Commerce Street, south of Galway Street (April 2021)



Significant numbers of pedestrians have been observed crossing Commerce Street in the vicinity of the existing mid-block pedestrian crossing. Many of these pedestrians will have been traveling between the SPA through Te Ara Tāhuhu to Gore Street and beyond, and public use of the SPA has recently ceased.

Furthermore, significant numbers of pedestrians have been observed waiting at two bus stops on the eastern side of Commerce Street opposite the SPA.

2.3 Public Transport Overview

While the existing public transport services can be presented and described, one must be cognisant that public transport in the wider CBD is evolving with various stages of construction undertaken in relation to various projects, such as City Rail Link and the Quay Street/Downtown project. It is important to note that services are anticipated to change during the ongoing CRL construction period at Britomart.

The existing services are described in the following sections.

2.3.1 Effects of wider CBD construction on public transport

The movement of people and buses, in the area surrounding the Britomart Station has changed in recent months, as a result of the completion of the Lower Albert bus interchange and the reopening of the Britomart station at the former CPO building and the resulting closure of the temporary Station Plaza. Alterations have been made to the bus network, bus stop locations, and bus routes.

2.3.2 Commerce Street Operation

Commerce Street provides for the movement of through bus services, bus stops, and bus layover and will continue to do so for the duration of the Works.

The eastern bus terminus, Commerce Street (eastern side between Quay Street and Customs Street) serves terminating services from the east (Tamaki Drive and Ellerslie-Panmure Highway/ AMETI) and South (i.e., Mt Eden Road and hospitals).

Two bus set down/ pick up stops are located on the eastern side, either side of the mid-block pedestrian crossing, with a further bus layover located between Quay and Tyler Streets, again on the eastern side.

The following points are noted concerning the Commerce Street operation:

- ◆ A total of **32 bus routes** run in the vicinity and these use 6 different bus stops, as shown in Figure 3
- ◆ Approximately **66 buses per hour** currently travel along Commerce Street in the peak periods
- ◆ Approximately **530 passengers per hour**, per peak period, utilise the bus stops to the north and south of the pedestrian crossing
- ◆ Buses turning left into Commerce Street from Quay Street can be observed to **slow significantly** to make the tight turn. The proximity of the bus layover immediately south is also noted to further slow bus movements, with difficulties accessing the stop noted. Buses frequently track over the opposing northbound right turn lane
- ◆ Approximately **50% of pedestrians** can be observed crossing Commerce Street via the existing mid-block signalised pedestrian crossing, with the remainder crossing on a more ad-hoc basis along the length of Commerce Street.

The current operation of Commerce Street is strained and beyond its practical capacity, with pedestrians, buses and general traffic struggling for space during the morning and evening commuter peak periods. This has been emphasised during various discussions with AT Metro, where significant concerns about pedestrian safety have been raised, with pedestrian and bus interactions in addition to general traffic the central issues.

Figure 3 presents the existing bus routes that stop on the eastern side of Commerce Street, where a significant number of buses loop via Tangihua Street west on Quay Street, entering Commerce Street from the north. The total number of buses circulating on Commerce Street is higher than that shown below. Not all bus services use the Commerce Street bus stops, and some circulate to commence other services, as indicated in Figure 3 below.

Figure 3: Existing Eastern Bus routes and bus stop locations

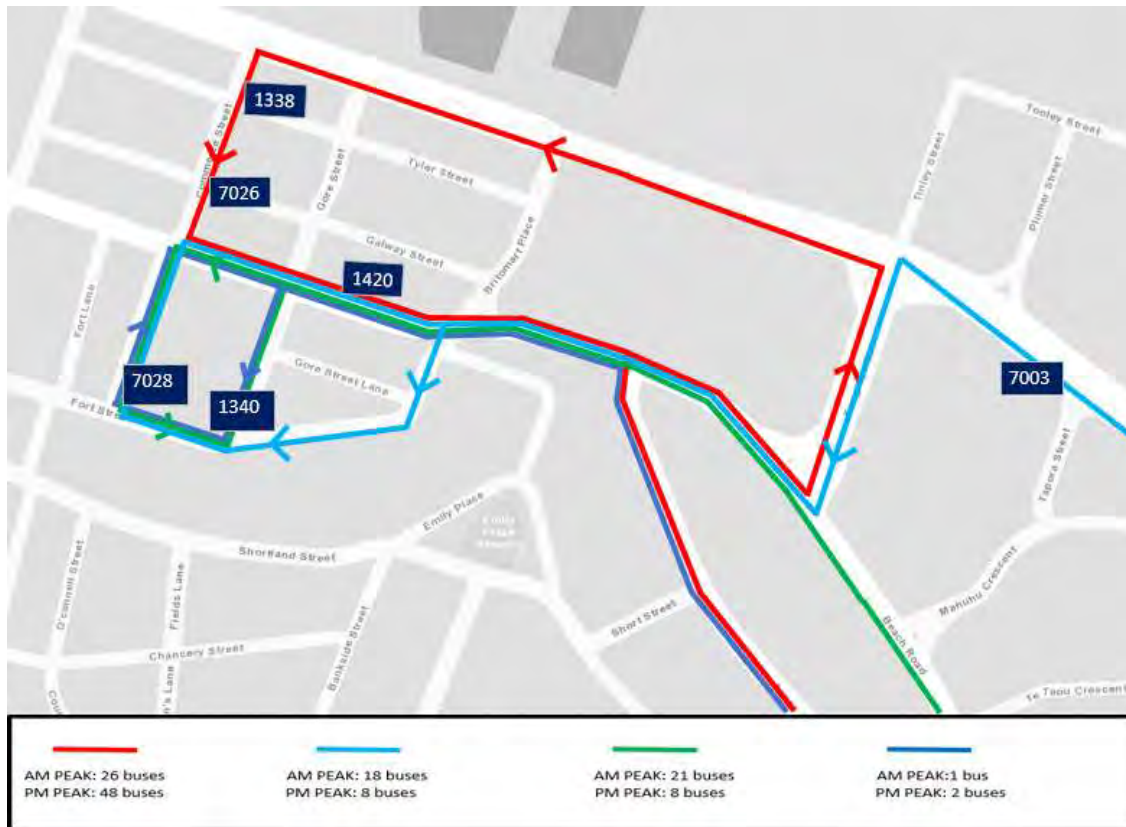


Table 3 presents the bus totals at each of the stops by location, to indicate the number of scheduled bus movements. These are only those buses that utilise the bus stops. The total number of bus movements, including repositioning and out of service, is between 70 and 80 per hour (southbound) through Commerce Street.

Table 3: Bus numbers through Commerce Street, by bus stop

Bus stop	Bus Routes	Direction	8-9 AM Peak	4-5 PM Peak
7026 - Commerce St Near Galway St	274, 277	Outbound	7	21
1338 – Commerce St between Quay St and Tyler St	321, 322	Outbound	4	4
1420 – 50 Customs St East	505, 515, 525, 532, 595, 70, 70H, 72X, 50X, 52X	In+out	15	23
Total			26	48

2.4 Britomart Station

Rail passengers’ access to the Britomart Station is located on Lower Queen Street (currently restricted to access points at the intersections with Tyler Street and Galway Street) with additional accesses on both Tyler Street and Galway Street themselves.

Until very recently, the temporary CRL works required the use of the SPA fronting Commerce Street to access Britomart Station at its western end. However, the main Britomart building (the former CPO building) has recently been returned to use.

The Britomart Station attracts peak period passenger numbers of approximately 6,600 passengers per peak hour. This equates to some 44,700 passengers per day.

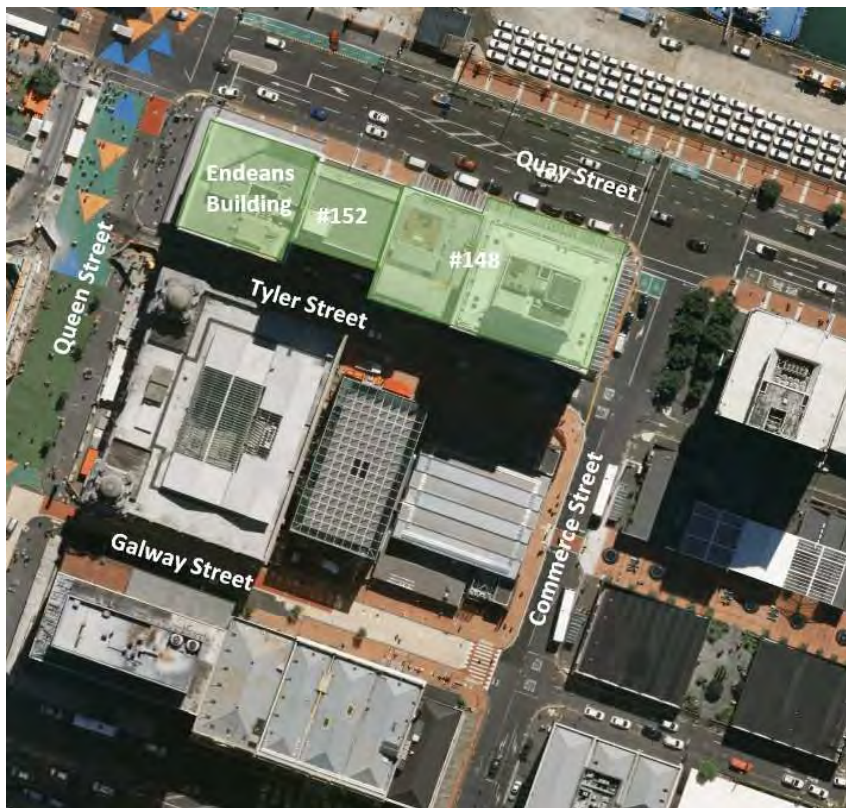
2.5 Property Access

The following Table 4 and Figure 4 identify the properties on Tyler Street that, from a transport perspective, would likely be directly affected by the Works.

Table 4: Affected Properties

Road	Location	Properties
Tyler Street	Commerce St to Queen St	Access and egress for 148 Quay Street parking Access and egress for 148 Quay Street loading dock Access and egress for 152 Quay Street parking Access and egress for Endeans building for deliveries

Figure 4: Affected Properties



2.6 General Vehicles

2.6.1 Observations – Commerce, Galway and Tyler Street

Commerce Street currently accommodates general two-way traffic, with one northbound lane and one southbound lane connecting Quay Street to the north.

Traffic volumes on Commerce Street have recently changed. With the incremental reopening of Quay Street upon completion of the Streetscape works, the ability to turn right from Quay Street into Commerce Street, which had been prohibited for the best part of two years, has recently been restored.

Recent traffic count data for Commerce Street shows volumes in the morning period of **250 per hour in the morning peak**, with approximately **380 per hour during the evening peak**.

The function of Tyler Street and Galway Street, west of Commerce Street, enables property access only, and with this, traffic volumes along both streets are very low.

Figure 5 below presents the directional traffic movements in the vicinity of the Works.

Figure 5: Existing Vehicle Access



2.7 Couriers, Deliveries and Taxis

There are significant numbers of courier and delivery vehicle movements throughout the city centre. It is difficult to quantify the exact number of individual paths utilised, given the somewhat random nature of these movements.

However, the ability for couriers and delivery vehicles to access Commerce Street, Tyler Street and Galway Street will be considered throughout the Works period to reasonably minimise adverse effects on deliveries to adjacent businesses.

The closest loading zone is located on the north-western side of Commerce Street. The proposed traffic management does not seek to alter this and use of the loading zone will be maintained throughout the Works period.

As with courier vehicles, it is difficult to quantify the number of taxi movements within the area, particularly with the recent popularity of Uber. Nevertheless, every effort will be made to enable ease of access through the Works relating to the NOR amendment. It is noted that no taxi parking is provided on either Commerce or Tyler Street. However, we note that this does not stop areas being used for this purpose.

2.8 Crash Data

2.8.1 Tyler and Commerce Street Overview

This section summarises historical crash data on Commerce and Tyler Street between Quay Street and Customs Street, and Queen Street and Commerce Street for the five-year period from 2016 to 2020 inclusive (the most recent, complete year period).

The crash data was obtained from NZTA Crash Analysis System (CAS).

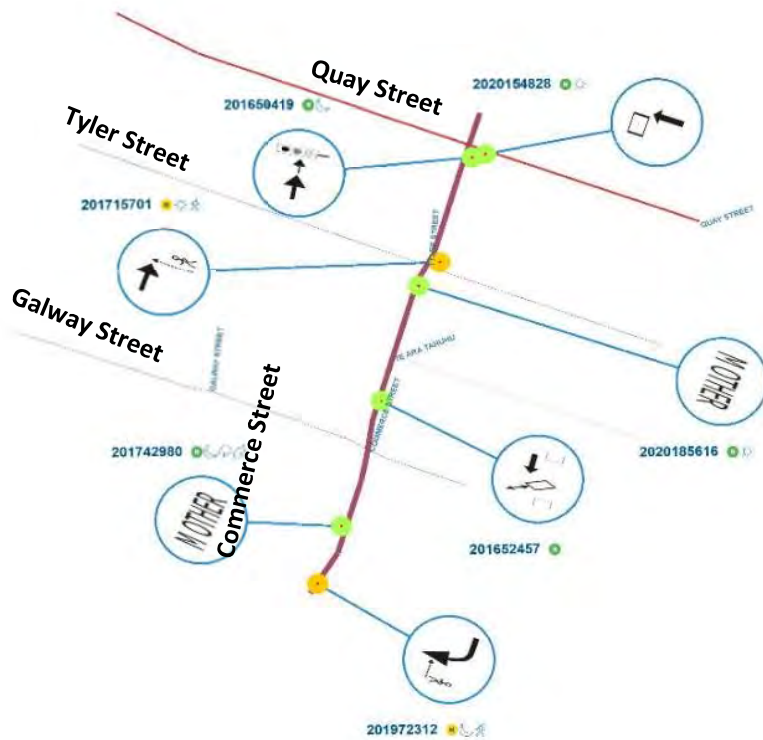
As shown in Figure 6, there was a total of 7 crashes recorded. These consisted of 2 minor and 5 non-injury crashes in the previous five-year period. No fatalities or serious injury crashes were recorded.

The most common crash type, 71% of the total, was attributed to rear end/obstructions.

The common factor was attributed to poor driver observation and wrong lane/position (43% and 29% respectively).

In total, 2 crashes (29%) involved pedestrians.

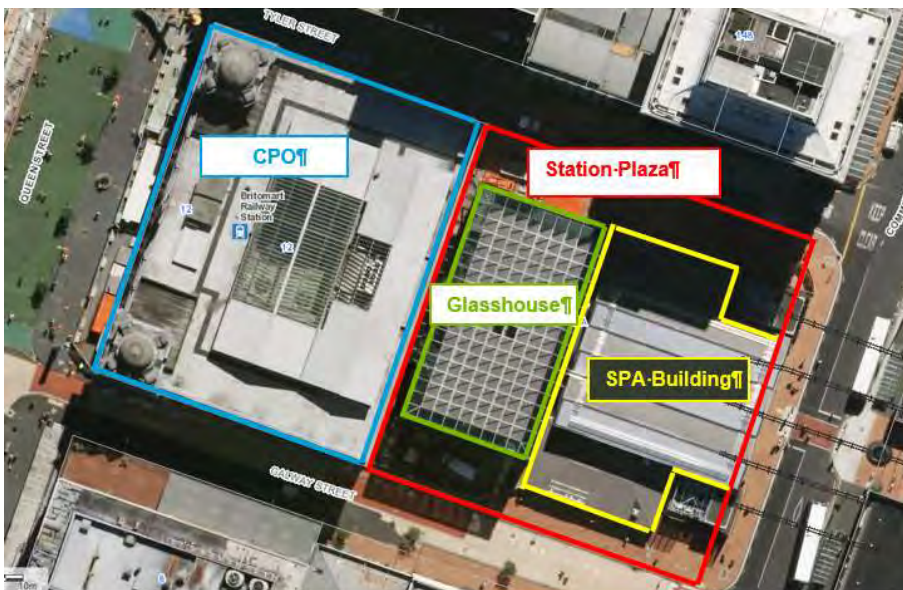
Figure 6: Collision Diagram of Commerce and Tyler



3 PROPOSED TEMPORARY TRAFFIC WORKS

The location of the proposed Works is shown in Figure 7.

Figure 7: Britomart Transport Centre – Site Extent



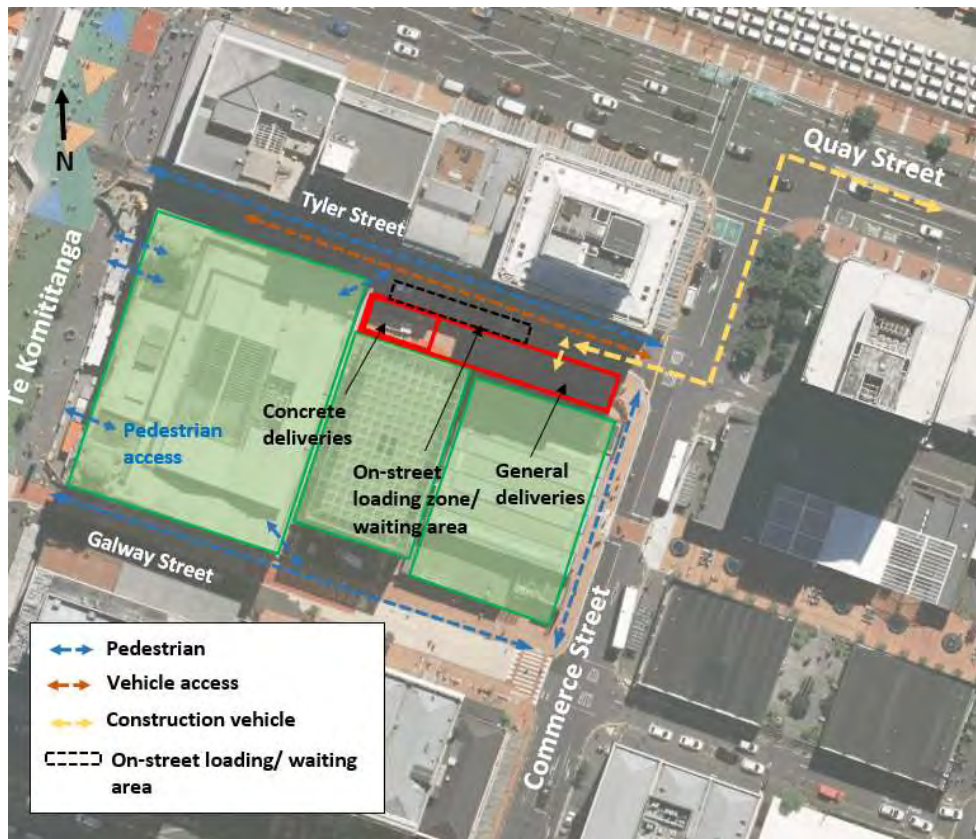
The Works forming part of the NOR are proposed to be as follows:

- ◆ Site office, worker accommodation, and some storage of materials within the SPA building
- ◆ Establishing and operating ventilation equipment in the Station Plaza Area (to provide ventilation for workers in the CRL tunnels to the west)
- ◆ Access for workers and deliveries of equipment and materials via the Glasshouse and former Chief Post Office (CPO) building and
- ◆ Receiving and pumping concrete into the CRL tunnels (to construct the railway track bed) from the Station Plaza area in Tyler Street (further detail of Tyler Street site shown following figures).

3.1 Construction Works Access

The site access point is to be provided on the north-eastern side of the Works shown in Figure 8.

Figure 8: Site access



An internal access lane is to be supplied for trucks to manoeuvre to the appropriate location within the site, although as noted below, reversing into this access from Commerce Street is only to take place outside the morning and evening periods. This access will be maintained appropriately by the Site Traffic Management Supervisor and traffic controllers. The STMS will be located on Commerce Street, controlling traffic, buses and maintaining pedestrian safety when vehicles enter and exit the site. This set-up has been operating for a couple of years on Commerce/ Tyler Street.

3.2 Construction Vehicle Movements

The numbers of construction vehicles accessing the site are based on each of the main stages of the Works. These are:

- ◆ **Support Works:** Works to support the initial buildings works within the Britomart Station (delivery and storage of concrete blocks, steelwork etc.)
- ◆ **General Deliveries:** Deliveries of electrical and rail system-related equipment
- ◆ **Concrete Deliveries:** Delivery of concrete, to be pumped down into the tunnels.

3.2.1 General Deliveries

General construction deliveries relate to initial site set-up, deliveries for the tunnel's fit-out and supporting infrastructure.

It is estimated that there will be between 5-10 vehicles per day, outside the periods of the concrete pours (see section 3.2.2 below). These will be mainly utes and other small delivery vehicles, which may use either Tyler Street or Galway Street. These movements will be focussed on the inter peak period as far as possible (between 9.30am and 3.30pm) in order to minimise traffic effects.

Delivery trucks will travel via Quay Street and enter the site from Commerce Street, as shown in Figure 8. This will provide reasonable access from the State Highway network and restrict the number of construction vehicles passing through the city and busier streets.

Vehicles exiting the site will do so from the east of the site, turning left onto Commerce Street. The egress will be maintained appropriately by an STMS.

Cognisant of potential conflict points between construction traffic entering and exiting the site and pedestrians, an approved STMS will be stationed at access points. To further provide safety for pedestrians, a physical barrier (gate or similar) will be installed to stop pedestrian movements through the construction access locations as and when vehicles are required to enter and or exit.

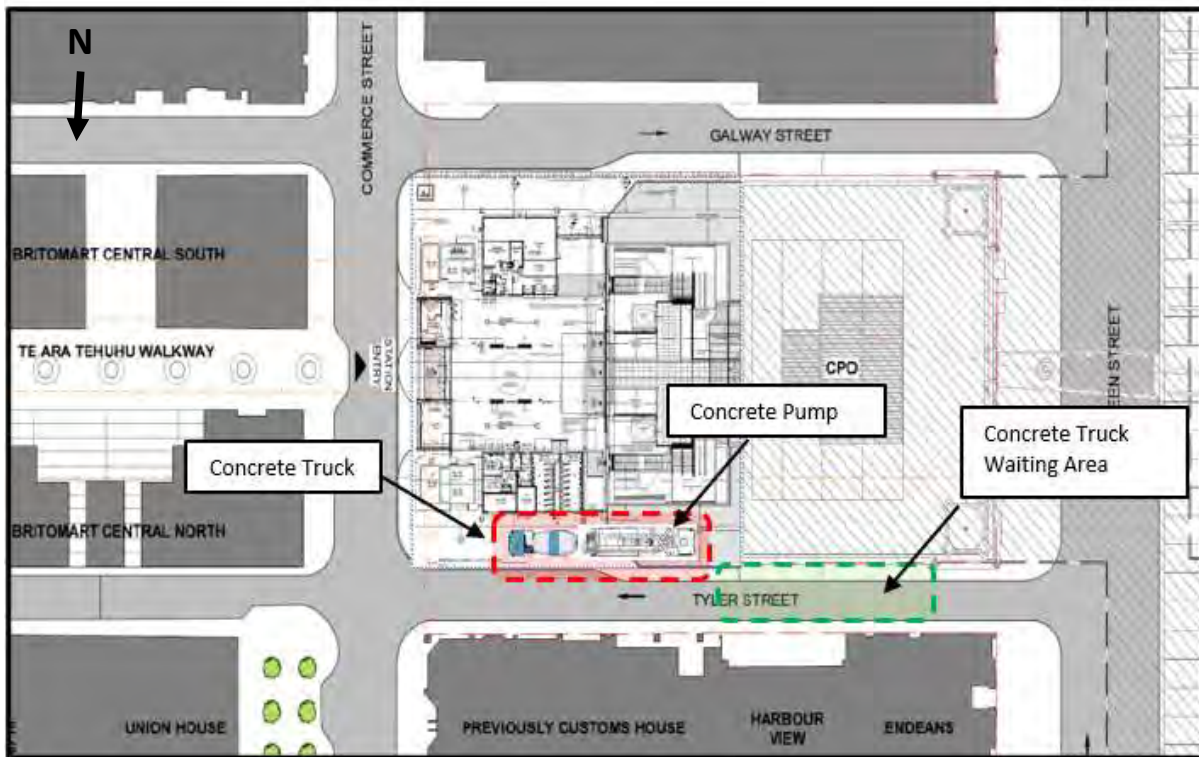
As an example of this gate system being employed, it is comparable to those used on the (now completed) Commercial Bay site works across the pedestrian footpath on Quay Street/ Queen Street, as part of the Commercial Bay/ CRL temporary works. This was seen to work well and efficiently, incurring minimal delay to all modes while maintaining safety.

We understand that the current construction works on Quay Street will be completed in June 2021, prior to when the Works commence in late 2021. However, there will be some works associated with the redevelopment of 1 Queen Street, which will require some traffic management on Quay Street.

3.2.2 Concrete deliveries

Figure 9 indicates the proposed concrete truck and pump station location within the site.

Figure 9: Proposed Concrete truck/pump station



There are expected to be two periods of time when concrete is to be delivered to the site:

- ◆ The first period will occur during the first quarter of 2022, and deliveries will take place over 20 days
- ◆ A second pour is programmed to take place during quarter 2 of 2022. Concrete will be delivered for 10 days, every second day.

In total then, 30 out of the construction program will result in truck movements associated with these concrete pours. Deliveries are to take place between 6.30am and 9.30pm, on Mondays through to Saturdays. However, in the event of on site delays, deliveries could extend to 10.30pm. These movements will take place using eight wheeler delivery trucks capable of delivering 6m² of concrete.

We are advised that the two periods of concrete pours will lead to the following numbers of trucks:

- ◆ Quarter 1 in 2022: up to 40 truckloads per day. These movements are expected to take place at a fairly consistent rate throughout the day (within the hours set out above), meaning that a conservative maximum frequency is likely to be up to 10% of the daily total within a single hour
- ◆ Quarter 2 in 2022: up to 40 truckloads per day, every second day. Again these deliveries are likely to take place throughout the day, meaning that a maximum frequency may be 10% of the daily flow, within a single hour.

During concrete pours, truck movements will be expected to travel from Commerce Street into Tyler Street.

We have discussed implementing a stop/go traffic management set-up on Commerce Street with Auckland Transport's Corridor Access Team. Given the quantum of bus movements southbound on Commerce Street, Auckland Transport considers a stop-go set-up would be unacceptable during the weekday peak periods, but permissible during other periods. The weekday peak periods, where reversing of vehicles would unlikely be permitted, have been identified as the periods between **7 AM and 9:30 AM, and 3 PM and 6 PM**.

Therefore, with the concrete pump to be located to the west of the site (closest to the CPO building), the following arrangements are proposed:

- ◆ During the weekday peak periods, trucks will enter Tyler Street from Commerce Street in a forward direction. They will manoeuvre within Tyler Street either before or after unloading, then will re-enter Commerce Street in a forward direction. This manoeuvre has been tested on site (under STMS control) using the type of concrete truck proposed to be used during the Works, and it can be achieved, although it requires a series of forward and reverse manoeuvres within Tyler Street to achieve a U turn
- ◆ During the other periods, trucks will reverse into the site from Commerce Street, which will require implementing a stop-go arrangement on Commerce Street. The stop-go would hold all traffic and pedestrians at suitable locations to enable the truck to reverse into the site. This is not an uncommon practice, particularly for concrete deliveries, and can be appropriately managed through standard traffic management protocols.

This requirement will form part of the Construction Traffic Management Plan (CTMP) for the works.

Construction traffic is to comply with the posted speed limit. An approved site-specific Transport Management Plan (SSTMP) will impose an appropriate temporary speed limit on the street through the works. This speed will need to be approved by Auckland Transport

3.3 Construction Offices and Staff

The site office will be located within the SPA building with no car parking provided for staff or visitors. A maximum of 50 staff working at the site at any one time is expected. All staff will be encouraged to use public transport, walk or cycle to enter the city to reduce traffic further.

3.4 Construction Effects

Tyler Street, Galway Street and Commerce Street bound the Works site. As noted previously, each street has a unique transport requirement.

The Commerce Street corridor is an important route for bus services in the Downtown area, and it enables pedestrian access to rail services and general vehicle access to businesses and residential properties. Tyler Street provides direct vehicle access to properties that front onto Quay Street.

Without appropriate mitigation in place, there is potential for adverse traffic and transport effects during the construction phasing associated with the Works, in terms of effects on public transport vehicles and users, pedestrians (and other active mode users) and effects on property access along Tyler Street. It is primarily these influences that need to be mitigated, and this mitigation is put forward in a variety of means.

The first and primary mitigation of effects during construction is through the construction methodology. The Works are proposed to be undertaken from the southern side of Tyler Street. This methodology mirrors the existing worksite extent for the CRL Contract 1 works, providing consistency and reducing the need for any shifts in the existing approved Temporary Traffic Management (TMP) layout during the ongoing construction period.

The following priority is assumed for traffic movements along Commerce Street, Galway Street and Tyler Street during the Works:

- ◆ **Pedestrian and public transport** would be afforded the highest priority, along with other essential movements, including emergency services
- ◆ **Essential vehicle access to properties** within or adjacent to the Works area, such vehicles would include service and delivery vehicles
- ◆ **Private car** travel during off-peak periods given the lowest priority, particularly extraneous vehicles, which should be encouraged to avoid passing through the area.

3.5 Construction Traffic Management Plan

The construction effects along and across Commerce Street, Galway Street and Tyler Street are to be mitigated by developing and implementing a detailed CTMP. Specifics of the management of transport effects during the construction phase are outlined in the CTMP. However, general concepts for the works are:

- ◆ **Movement is to be retained along Commerce Street** throughout the Works period, with the retention of one general traffic in each direction, pedestrian movement areas, pedestrian crossings and bus movements
- ◆ **Local access is to be retained along Tyler Street**, with access to properties on the northern side, including appropriate vehicle manoeuvring area to access car parking, and loading docks
- ◆ **Pedestrian Connections** will be maintained from Tyler Street and Galway Street through to the Te Komititanga public space and to the recently reopened accesses to the Britomart station through the CPO building. This should be assisted by wayfinding measures
- ◆ **Construction Access from Commerce Street** is to be restricted with any vehicle requiring reversing into site limited to periods outside the weekday peaks, reducing potential adverse effects on the bus services and north-south traffic movements.

The CTMP demonstrates:

- ◆ **How the Works are to be constructed**, including how essential movements (pedestrian, public transport and other movements) are to be retained

- ◆ **The timing of closures, restrictions, diversions**, or other street works, and how the timing relates to other aspects of the broader CBD construction projects
- ◆ How **access to local properties** adjacent to the Works zone is to be maintained and
- ◆ Which routes are to be used by **construction-related traffic** (with particular reference to concrete truck movements).

The CTMP is provided at Appendix A.

3.6 Planning and Policy Assessment

3.6.1 Auckland Unitary Plan

Section E27 of the AUP-OIP does not contain any details and/or requirements regarding temporary traffic management.

3.6.2 Performance Standards

Temporary Traffic Management (TTM) is governed by New Zealand legislation, in particular, the Land Transport Act 1998. Land Transport Rules made pursuant to the act, which relate to TTM, include:

- ◆ Land Transport (Road User) Rule 2004
- ◆ Land Transport Rule: Traffic Control Devices 2004
- ◆ Land Transport Rule: Setting of Speed Limits 2003.

The project shall adopt the following standards and guidelines insofar as they are relevant:

- ◆ NZTA Code of Practice for Temporary Traffic Management (COPTTM)
- ◆ NZTA Traffic Control Devices Manual (TCD).

This integrated transport assessment and the CTMP will be consistent with the applicable version of COPTTM.

4 ASSESSMENT OF TRANSPORT EFFECTS OF THE WORKS

This section considers the temporary effects during the construction phase. It should be noted that the overall period of the Works could be approximately two and a half years, from site establishment in mid 2021 to decommissioning of the SPA in late 2023. However, as noted in Section 3, the main traffic effects are expected to relate to the two periods of the delivery of concrete, which are expected to occur for 20 days for Stage 1 and for 10 days over a 20 day period for Stage 2.

4.1 Transport related risks during construction to be mitigated

The following potential adverse effects could impact transport users and operators in and around Tyler/Commerce Street area during the Works phase.

- ◆ **Reduced bus reliability** with increased congestion and delays on Commerce Street reducing the attractiveness of bus services for existing customers

- ◆ **Reduced pedestrian connectivity** to bus stops along Commerce Street, leading to unusual crossing points being utilised and with safety compromised. We note that Auckland Transport would be especially concerned with any adverse effects on the operation of the Britomart Station and any effects on public transport patronage
- ◆ **Impact on private property access** with works blocking or restricting access to car parks/ loading areas
- ◆ **Exacerbation of existing safety concerns/ issues** with further constraints to infrastructure
- ◆ **Confusion and reduced mobility** concerning the reduced pedestrian amenities on the southern side of Tyler Street
- ◆ **Increased construction vehicles** along Commerce Street.

Each of the above adverse effects are to be mitigated where possible, as discussed below.

4.2 Public Transport

The mitigation strategy focuses on bus reliability, ensuring bus patronage and safety is maintained.

Any works requiring a stop-go on Commerce Street will be limited to times outside the weekday peak periods or unless agreed with the corridor access team at Auckland Transport.

4.3 Pedestrians

The Works are anticipated to maintain a good level of service for pedestrians. The connection to public transport services will not be affected, with accesses to both rail and bus services maintained.

Pedestrian access will be maintained along Tyler Street. We note that Tyler Street is a shared zone, and as such, the full width will be available and more than capable of accommodating the quantum of pedestrians described in Table 2 previously. During major deliveries there will, however, need to be some temporary short-term access restrictions for pedestrian safety reasons. Typically this may amount to a few minutes of pedestrian restricted movement while trucks are escorted to the site compound or undertake a delivery.

Pedestrian access to and from Britomart Station will be discussed and agreed upon with Auckland Transport, with any decisions forming part of the CTMP.

The pedestrian footpath and signalised pedestrian crossing across Commerce Street will be maintained throughout the Works duration.

Appropriate wayfinding signage will be implemented to ensure pedestrians are informed of diversions required, minimising confusion throughout the Works.

Overall, pedestrian accessibility and safety should not be compromised by the Works.

4.4 Property Access

4.4.1 Commerce Street

The Works will not impinge on Commerce Street. Existing property access, car parking, and loading areas connected to or located on Commerce Street will remain operational for the Works duration.

4.4.2 Tyler Street Northern Side

Access to properties on Tyler Street will be maintained during the Works period. It is not proposed to close access for vehicles and/or pedestrians at any stage during the Works – either onto or from Tyler Street.

General vehicle access will be maintained by way of entry and exit onto Commerce Street, as is currently the case.

The road width on Tyler Street will provide sufficient manoeuvring space to maintain vehicle access to the car parks and loading docks associated with properties 152 and 148 Quay Street. Tyler Street will also be clear of construction vehicles unless in the loading zones identified.

Concrete trucks will be able to use the existing on-street loading bay and access will be maintained in and out of parking areas within buildings on the northern side of Tyler Street.

In relation to properties at the western end of Tyler Street, access will be maintained to safeguard their maintenance and delivery requirements.

Pedestrian access to all properties will always be maintained.

4.4.3 Tyler Street Southern Side

As noted earlier, the recent use of the temporary Britomart station has ceased, and passengers can once again use the former CPO building. During the Works period, direct access to the Britomart Station will be retained via the new permanent station entry door at the north-eastern corner of the CPO Building in Tyler Street.

Table 5: Properties Affected

Road	Location	Properties	Mitigation
Tyler Street	Commerce St to Queen St	Access and egress for 148 Quay Street parking Access and egress for 148 Quay Street loading dock Access and egress for 152 Quay Street parking Access and egress for Endeans building for deliveries	Pedestrian access is to be maintained. Vehicle access will be retained for all properties on the northern side, with a suitable manoeuvring area to enter and exit the car park safely.
Commerce Street	Quay St to Customs St	N/A	No changes to access are required

4.5 Couriers, deliveries, and Taxis

During the Works, courier and delivery access to properties on the northern side of Tyler Street would not be impacted. We further note that two loading areas have been reinstated on Quay Street directly fronting properties at 148 and 152 Quay Street. The reinstatement should ease the quantum of deliveries occurring on Tyler Street.

With no taxi stands on this section of Commerce or Tyler Street, taxis would only be indirectly affected by the Works.

4.6 Emergency Services

Emergency service access to properties along Tyler Street will be maintained during the Works period. Similarly, emergency services bound for other locations may use Commerce Street. The proposed Works site and traffic management will not adversely impact the ability to travel through Commerce Street.

However, as part of the CTMP, Emergency services will be notified of the Works, as is standard with any traffic management plans. Any recommendations will be reflected in the Construction Traffic Management Plans, and more importantly, the Traffic site set-up.

5 CONCLUSIONS

The proposed mitigation interventions will maintain bus reliability, pedestrian connectivity, and property access for the duration of the planned Works.

Based on the analysis described in this report, it can be concluded that the proposed temporary traffic management associated with the Works is predicted to result in minimal adverse effects relating to the function, capacity, and safety of the surrounding transport network. The adverse effects consider general vehicle delays, pedestrian, public transport delays, providing an overall representation of potential effects for all users of each street and services they provide for.

The following summarises the conclusions for each of the main effects:

5.1 Conclusion on Public Transport

Prohibiting reversing of trucks from Commerce Street during peak periods will maintain bus travel times and bus reliability. Bus stop locations will be kept in their existing positions to reduce confusion and to maintain patronage throughout the Works period. No reductions in bus layover facilities are envisaged during the Works.

The effects on public transport are deemed to be less than minor with regards to traffic and transport.

5.2 Conclusion on Pedestrians

Pedestrian accessibility will be maintained with appropriate levels of service provided, ensuring safety and access to public transport and properties is maintained throughout the Works.

The effects pertaining to pedestrians are deemed to be minor with regards to traffic and transport.

5.3 Conclusion on Property Access

Access to properties in close proximity to the Works will be maintained throughout for both pedestrians and vehicles alike.

It is considered the effects pertaining to property access are minor with regards to traffic and transport.

5.4 Conclusion on General Traffic

Vehicle capacity through the Works site is to be maintained to existing capacities, reducing the probability of traffic transferring to alternative routes that are already experiencing delays. It is predicted that some vehicle queueing will occur during the implementation of a stop-go on Commerce Street, although this will take place only outside the weekday peak periods. However, the vehicle delays will be maintained to an acceptable level with delays arising for a short period and considered relatively minor in general.

It is considered the effects pertaining to general vehicle travel times and queueing are minor with regards to traffic and transport.

5.5 Conclusion on Construction Activity

The Works will not change their location during the construction period. Thus, consistency in the layout will result in efficiency and minimise confusion to users of Commerce and Tyler Streets.

Construction traffic associated with the Works is considered minimal, with 5-10 vehicles per day (generally utes/small goods vehicles) predicted to be generated over the majority of the period of the works. Greater volumes are expected during the two periods of concrete pours, and a maximum of forty trucks per day expected over 20 days with Stage 1, during the first quarter of 2022, and a similar number of trucks per day over 10 days with Stage 2, during the second quarter of 2022. These vehicles are to utilise Quay Street to gain access to Commerce Street.

It is considered the effects pertaining to construction vehicles are minor with regards to traffic and transport.

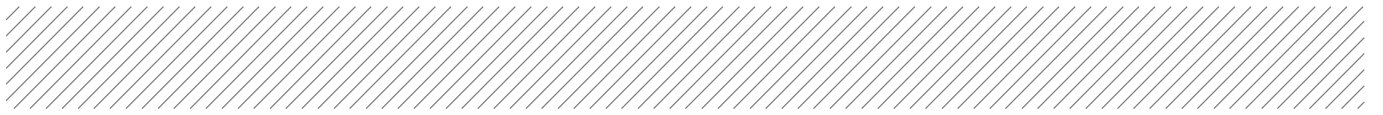
6 CONSTRUCTION TRAFFIC MANAGEMENT PLAN

The CTMP is provided as Appendix A. The objectives of the CTMP are, as far as reasonably practicable to, avoid, remedy or mitigate adverse effects of the Works on transport, public transport and property access. This is to be achieved by:

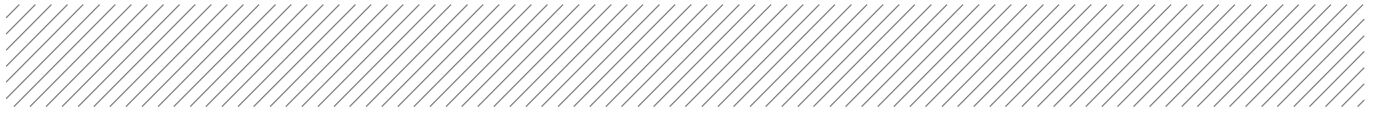
- ◆ Providing a general traffic lane of at least of 3.0 m wide along the northern side of the construction zone on Tyler Street

- ◆ Maintaining pedestrian access to private properties on the northern side of the of Tyler Street. This includes 148 and 152 Quay Street and the Endeans building at 2 Queen Street, with a minimum of 1.5 m provided
- ◆ Maintaining pedestrian access to the rail station to the satisfaction of Auckland Transport
- ◆ Restricting any traffic management requiring implementing a stop/go on Commerce Street to off-peak hours, or to times approved by the corridor access team at Auckland Transport.

APPENDIX A Construction Traffic Management Plan



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Appendix D

Construction Environmental Management Plan

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CONSTRUCTION SUPPORT ACTIVITIES AT STATION PLAZA – BRITOMART Construction Environmental Management Plan

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Document prepared by:

Aurecon New Zealand Limited

Level 4, 139 Carlton Gore Road
 Newmarket Auckland 1023
 PO Box 9762
 Newmarket Auckland 1149
 New Zealand

T +64 9 520 6019
F +64 9 524 7815
E auckland@aurecongroup.com
W aurecongroup.com

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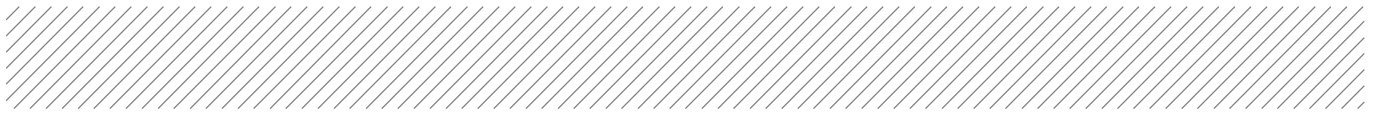
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Name		Name	
Hayley Martin Helen McLean		Dean Ingoe	
Title		Title	
Consultant, Environment and Planning Associate, Environment and Planning		Director, Environment and Planning	



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Construction Noise Management Plan

Appendix B

Construction Traffic Management Plan

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Glossary of Terms

Abbreviation	Definition
AT	Auckland Transport
AUP	Auckland Unitary Plan (Operative in Part)
AC	Auckland Council
CEMP	Construction Environmental Management Plan
CNMP	Construction Noise Management Plan
CPO	Former 'Chief Post Office' building
CRL	City Rail Link
CRL	City Rail Link Limited
NoR	Notice of Requirement
OHLE	Over Head Line Equipment
SPA	Station Plaza Accommodation
TTMP	Temporary Traffic Management Plan

1 Introduction

1.1 Introduction

The City Rail Link (CRL) project comprises the construction, operation and maintenance of a 3.4 km underground passenger railway, running between Britomart Station and the North Auckland Rail Line (NAL) in the vicinity of Mt Eden Station (refer to Figure 1-1). The design and construction of the CRL infrastructure is being delivered by the Link Alliance¹.



Figure 1-1 CRL Route and Location

1.2 Construction Support Activities at Station Plaza – Britomart

This Construction Environmental Management Plan (CEMP) relates to a particular component of the CRL project works at Britomart Transport Centre.

It is proposed to retain the Station Plaza Accommodation (SPA) building at Britomart, so that the building and surrounding Station Plaza area can be used as a construction support facility for the fit-out of two underground railway tunnels that have already been constructed as part of earlier CRL project works. These tunnels extend beneath the former Chief Post Office (CPO) building, lower Queen Street, the new Commercial Bay development, and up Albert Street as far as Wyndham Street.

- The construction support activities (hereafter referred to as 'the Works') include: Site office, worker accommodation, and some storage of materials within the SPA building;
- Establishing and operating ventilation equipment in the Station Plaza area (to provide ventilation for workers in the CRL tunnels to the west);
- Access for workers and deliveries of equipment and materials via the Glasshouse and CPO building; and

¹ The Link Alliance is a consortium of seven companies, including CRL Ltd, which are delivering the main stations and tunnels for the CRL project

Receiving and pumping concrete into the CRL tunnels (to construct the railway track bed) from the Station Plaza area alongside Tyler Street. The location of the Works is shown in Figure 1-2.

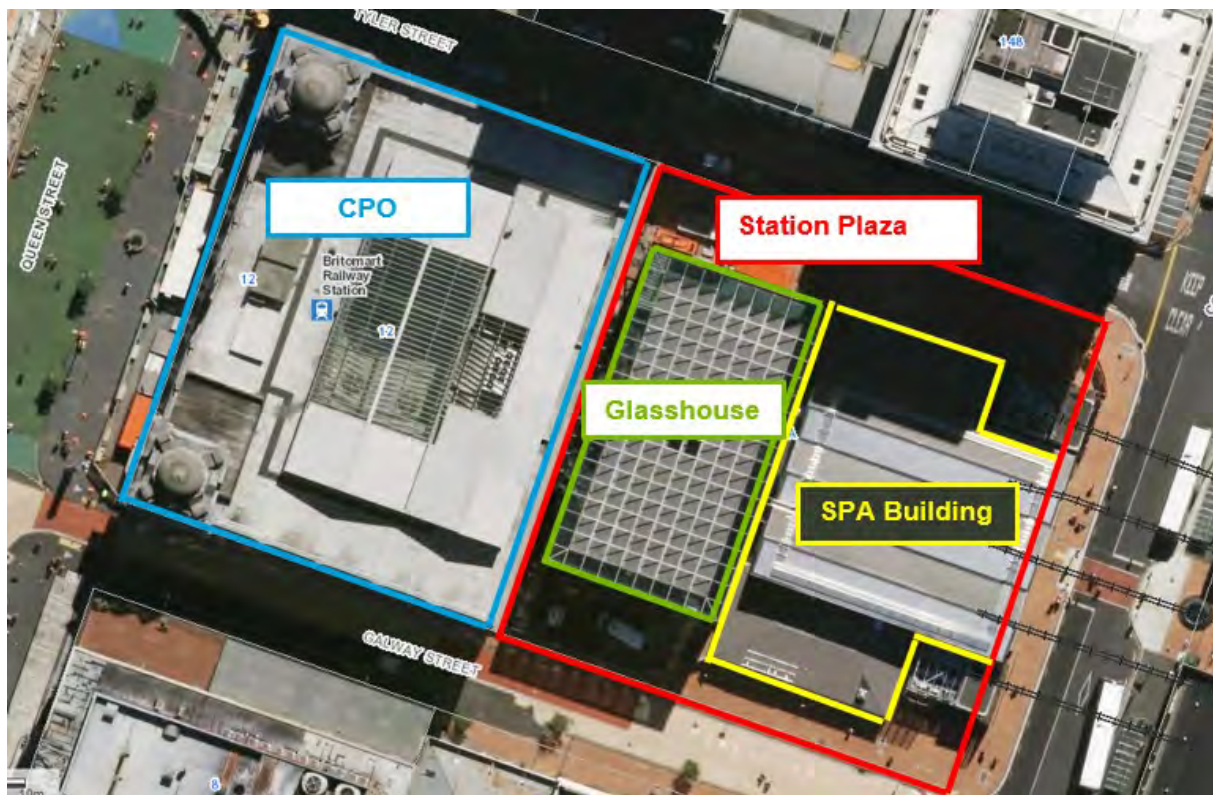


Figure 1-2 Location of the Works

More details of the Works are provided throughout this CEMP.

This CEMP will be implemented by the Link Alliance throughout the course of the Works. The CEMP provides the overarching framework for the management of construction effects associated with the Works.

1.3 Purpose of the CEMP

The purpose of the CEMP is to confirm the details of the Works, including staging, and to set out how the construction support activities will be carried out and managed as far as reasonably practical to avoid, remedy or mitigate adverse effects on the environment.

This CEMP demonstrates that the Works remain within the limits of Designation 2501 for the Britomart Transport Centre (as altered to provide for the Works). The CEMP will ensure that appropriate environmental management practices are followed during the Works. The CEMP will be implemented throughout the entire construction period (late 2021 to late 2023) and updated as necessary.

Overall, implementation of this CEMP will ensure:

- Appropriate management of adverse environmental effects associated with the Works;
- Compliance with environmental legislation; and
- Achievement of the CRL project's environmental and sustainability objectives.

The CEMP will be reviewed at least annually or as a result of a material change to the Works, or to address unforeseen adverse effects arising from construction or unresolved complaints.

1.4 CEMP Structure

The CEMP is structured as follows:

- Section 1: explains the Works, outlines the purpose and scope of the CEMP, and environmental sub-plans attaching;
- Section 2: provides a description of the different components of the Works and includes the Works programme, site layout, pedestrian and vehicle access;
- Section 3: describes the social and environmental management context of the Works and further discusses the activities associated with the Works and environmental receivers;
- Section 4: details the implementation and operation of the CEMP. This section covers roles and responsibilities and training requirements;
- Section 5: describes environmental monitoring requirements, environmental inspections, environmental auditing, corrective and preventive action, reporting requirements, document control and CEMP review.

1.5 Environmental Sub-Plans

The CEMP is an overarching document that outlines how the Link Alliance will manage the environmental, social, cultural and economic effects of the Works. The principles and general approach to managing the effects are set out in the CEMP, with detailed management methods described in the sub-plans that form part of the CEMP.

The management of specific environmental effects during the Works is addressed through the development and implementation of Management Plans (MP).

The MPs applicable to the Works are identified in Table 1-1 and from appendices to the CEMP.

Table 1-1 Plans attached to the CEMP


Plan	Acronym	Purpose	Section of CEMP
Construction Noise Management Plan	CNMP	To provide for the development and implementation of identified best practicable options to avoid, remedy or mitigate adverse effects on receivers of noise resulting from construction effects.	Section 5.1 & Appendix A
Construction Traffic Management Plan	CTMP	To manage the adverse effects of construction on the transport network (including parking and access)	Section 5.2 & Appendix B

1.6 Development of CEMP and MPs

This CEMP and associated MPs have been developed by relevant subject matter experts and were reviewed by the Link Alliance construction team to ensure that they accurately reflect methodologies for undertaking the construction support activities and are commensurate with the scale of environmental effects associated with the Works.

1.7 Mana Whenua

We are all descended from Ranginui, our Father Sky and Papatuanuku, our Mother Earth. Ngā mana whenua o Tāmaki Makaurau have a special relationship with Ranginui, Papatuanuku, and their



resources. Acting as kaitiaki, they endeavour to protect their whānau, hapū and Iwi and encourage all people to act as protectors of the earth.

Kaitiakitanga includes:

- Protecting, restoring, enhancing the mauri (life supporting capacity) of resources
- Fulfilling spiritual, emotional and inherited responsibilities to the environment
- Maintaining mana over resources
- Ensuring the welfare of the people those resources support

In Tamaki Makaurau it is Mana Whenua who are Kaitiaki.

The aspiration of the CRL project to be exemplary in the practice of sustainability – encompassing the four well-beings (environmental, cultural, social and economic) – aligns and supports kaitiakitanga.

In meeting their sustainability commitments City Rail Link Limited (CRL), the Link Alliance and others involved in the project are also supporting kaitiakitanga and Mana Whenua as kaitiaki. Furthermore, they are also improving the state of the environment that we pass on for future generations.

The CRL sustainability framework is informed by tikanga tiaki and mātauranga.

A CRL Mana Whenua forum has been established for the purposes of undertaking kaitiakitanga responsibilities associated with the project. The forum comprises those Mana Whenua groups who expressed an interest in being involved in the CRL project and its related activities. Eight Mana Whenua self-identified their interest in CRL and are currently part of the forum:

- Ngāti Maru
- Ngāti Paoa
- Ngāi Tai Ki Tāmaki
- Ngāti Te Ata Waiohua
- Ngāti Whātua o Ōrākei
- Te Akitai Waiohua
- Te Kawerau a Maki
- Ngāti Tamaoho

CRL and the Link Alliance work collaboratively with the Mana Whenua forum on all aspects of the CRL project. The forum's role includes cultural induction for Link Alliance, assistance with discovery procedures, monitoring, and ongoing provision of mātauranga Māori input.

1.8 Sustainability

This section provides detail about the sustainability practices implemented as part of the CRL project and the Works. It includes a description of the rating scheme chosen to measure sustainability of the project.

1.8.1 Infrastructure Sustainability

The Link Alliance shares CRL's objective for the CRL project, which is to set the benchmark for designing, building and operating sustainable infrastructure in New Zealand and to optimise environmental, social, economic, and cultural outcomes over the long term. Optimising outcomes involves more than simply minimising impacts and complying with consent conditions but reflects the 'quadruple bottom line'.

The context for environmental and sustainability targets for the CRL has been established through a comprehensive review of local and national targets. The Infrastructure Sustainability Council of Australia's (ISCA) Infrastructure Sustainability (IS) rating scheme² has been chosen to measure the sustainability performance of the project.

The CRL project is targeting certified Design and As-built ratings against the IS rating scheme, specifically, an 'Excellent' rating.

The CRL project performance will be assessed in the categories outlined in Table 1-2. Details regarding the management of the IS Rating Scheme are included in the project's Sustainability Rating Management Plan³.

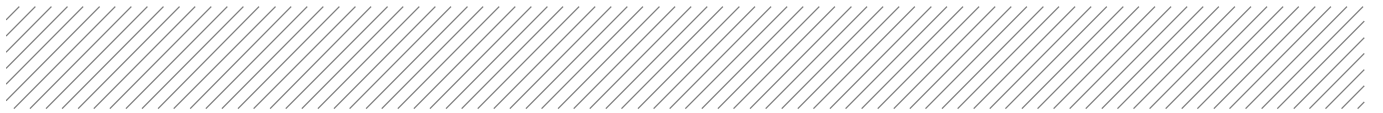
In some cases, the IS requirements are additional to the project's designation and resource consent requirements and effectively enhance the designation and consent requirements. It is essential that the IS requirements are met to achieve the project's sustainability goals, however they are not designation or resource consent requirements that require certification by Auckland Council.

Table 1-2: ISCA Rating Categories

Themes	Categories	Abbreviation
Management and Governance	Management Systems	Man
	Procurement and Purchasing	Pro
	Climate Change Adaptation	Cli
Using Resources	Energy & Carbon	Ene
	Wai (Water)	Wat
	Materials	Mat
Emissions, Pollution & Waste	Discharges to Air, Land & Water	Dis
	Whenua (Land)	Lan
	Waste	Was
Ecology	Ecology	Eco
People & Place	Community Health, Wellbeing & Safety	Hea
	Heritage	Her
	Stakeholder Participation	Sta
	Urban & Landscape Design	Urb
Innovation	Innovation	Inn

² Refer to www.isca.org.au for background information about the scheme.

³ Link Alliance Sustainability Management Plan, Revision A00, 13 September 2019, CRL-SYW-SUS-LKA-PLN-800000



1.9 Designation Conditions

The Works relate to Designation 2501. Designation 2501 contains a range of conditions that relate to the CRL “Project” works as defined in Designation 2501.⁴ There are no construction related conditions that are relevant to the Works⁵ as defined by Designation 2501.

⁴ The “Project” works are described in section 3 of the AEE accompanying the 2015 NoR to alter Designation 1556 (AT) and generally encompassed the activities referred to by CRL as the “Contract 1 works”. CRL Contract 1 is the construction contract name for CRL works in the CPO and lower Queen Street.

⁵ Construction support works to enable construction in adjoining City Rail Link Designation 2500-1, including site officer, worker accommodation and some storage of materials in the Station Plaza Accommodation, receiving and pumping concrete from the Britomart Transport Centre into the Designation 2500-1 tunnels, establishing and operating ventilation equipment in Station Plaza, and providing access for workers and delivery of materials to the Designation 2500-1 tunnels via the Glasshouse and former Chief Post Office.

2 Works Description

2.1 Overview of the Works

The complex nature and substantial size of the CRL project has meant that the construction works have been broken up into a number of different packages. This CEMP specifically relates to construction support activities (the Works) to be undertaken in the Station Plaza area at Britomart. The following activities are included in the Works:

- Site office, worker accommodation and some storage of materials within the SPA building;
- Establishing and operating ventilation equipment in the Station Plaza area (to provide ventilation for workers in the CRL tunnels to the west);
- Access for workers and deliveries of equipment and materials via the Glasshouse and CPO building; and
- Receiving and pumping concrete into the CRL tunnels (to construct the railway track bed) from the Station Plaza area alongside Tyler Street. Concrete pumping is required for two main activities. 'Stage 1' concrete refers to a pour of mass fill concrete to the tunnel invert, whereas 'Stage 2' refers to the pouring of concrete to complete trackform.

The Works are described in more detail in sections 2.2 below.

2.2 Construction Support Activities

2.2.1 Timing of the Works


The Works are estimated as taking place from late 2021 until late 2023. The current construction programme identifies the Works being undertaken in the following packages (some overlap of works will result). Work will commence on the Upmain tunnel (from Britomart to Wyndham Street) first, with work then repeated on the Downmain tunnel (from Wyndham Street to Britomart):

- Site establishment:
 - Quarter four of 2021
- Temporary ventilation:
 - Installation: Quarter four 2021
 - Operation: Quarter one 2022 until the end of quarter four 2023
- Concrete deliveries and track installation:
 - Stage 1: Quarter four 2021 until quarter one 2022
 - Stage 2: Quarter two 2022
- Decommissioning of the SPA:
 - The second quarter of 2023 until quarter four of 2023.

2.2.2 Construction Support Activities

The following is a summary of the activities at anticipated peak levels during the Works:

The CRL construction programme identifies the Works as commencing in late 2021 with completion expected in late 2023. The scale of activity will fluctuate during that period. The following is a summary of the activities at anticipated peak levels during that period:

- 
- Site establishment:
 - Conversion of the existing SPA into offices, staff facilities, briefing areas, and a delivery point for materials and storage spaces. Given the limited space available at the SPA and in Station Plaza delivery of materials will not be constant, but sufficient to supply the needs of the workforce at any one time;
 - Workforce access in and out of the CRL tunnels via the existing emergency stairs at the north eastern corner of the CPO (refer to Figure 2-1). This access route removes any interface between construction workers and public transport patrons for the duration of the Works.
 - Temporary tunnel ventilation system:
 - Installation of two ventilation fans within an acoustic enclosure (such as noise blankets or within a container) located on a gantry at the Tyler and Galway Street frontages of Station Plaza, adjacent to the Glasshouse, with flexible ducting entering the Glasshouse on the north and south sides. Ducting is routed to the Wyndham Street to CPO tunnels at platform level using the existing access adjacent to the elevators. The temporary ventilation system will provide fresh air into the tunnels to dilute diesel emissions, improve thermal comfort in work areas, dilute and disperse dust and to generally maintain good working conditions. The ventilation system will operate 24 hours a day, seven days a week from quarter 1 of 2022 until the permanent tunnel ventilation system is operational in 2023. This will ensure a safe working environment at all times;
 - The ventilation fans will be powered by electricity.
 - Concrete deliveries:
 - Concrete deliveries into the tunnel are required for two main activities, Stage 1 concrete and Stage 2 concrete. Where practicable it is proposed that the Stage 1 concrete will be predominately delivered from the CRL Aotea construction site; however, in the event of any difficulties or unforeseen events, Britomart Station will be used as a secondary option. Whereas, Stage 2 concrete will be solely delivered from Britomart Station.
 - Stage 1 concrete deliveries from Britomart Station will occur for 20 days in the first quarter of 2022.
 - Stage 2 concrete deliveries will occur for 10 days, with concrete being delivered every second day (overall duration of 20 days) during the second quarter of 2022.
 - Concrete deliveries are planned to be undertaken from 6.30am until 9pm Monday to Saturday. However, in the event of delays or unforeseen events, concrete deliveries could be extended until 10.30pm.
 - Concrete deliveries through the SPA will be on site via an existing concrete delivery point in Tyler Street (north east corner of the Glasshouse);
 - Delivery of materials via hand or crane down to platform level through the Glasshouse delivery access point (north east corner of the Glasshouse); and
 - A workforce of up to 50 people using the SPA for site access (at times this number could be reduced to 10-20 people). Onsite parking will not be provided for construction personnel.

The SPA building and Station Plaza will also be used to provide elements of construction support for other CRL works required at Britomart, that are not related to the tunnel fit-out works. These other CRL related works at Britomart are the subject of a separate CEMP.

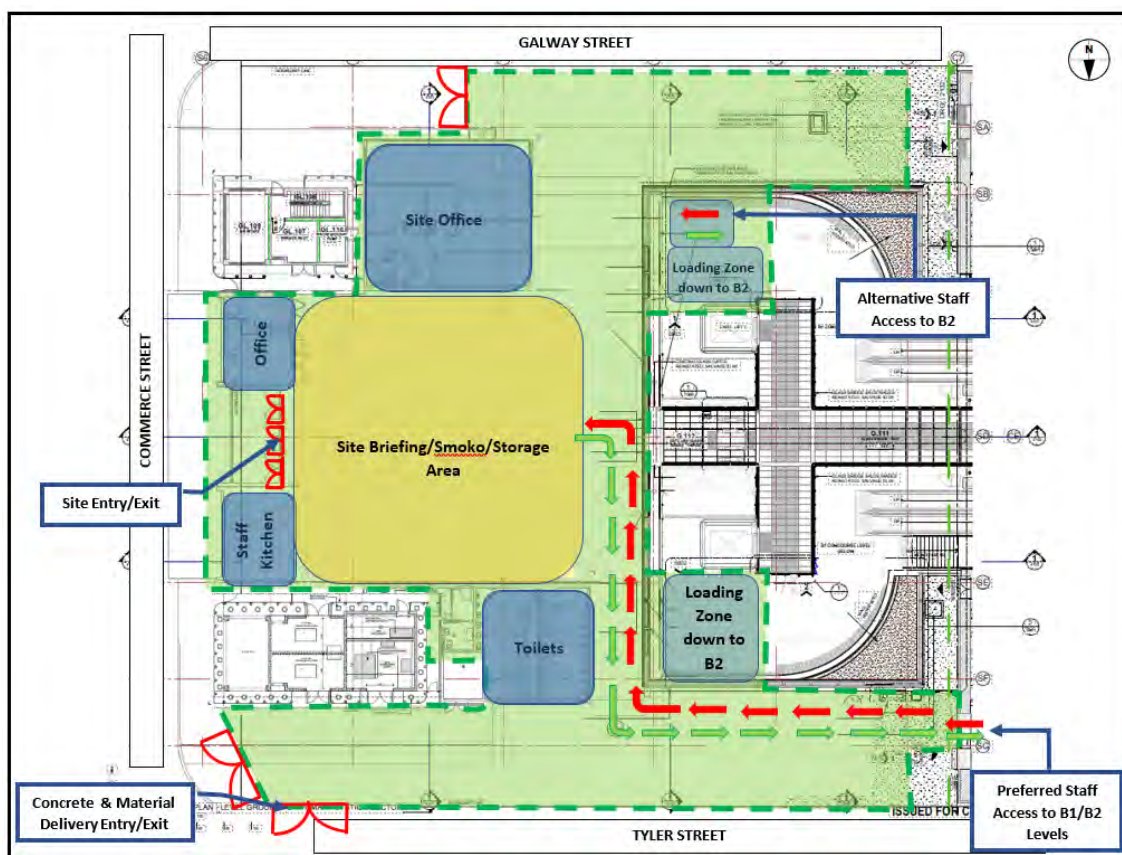


Figure 2-1 Workforce access routes in Britomart Station Levels B1 and B2

2.2.3 Equipment Associated with the Proposed Construction Support Activities

The Works will necessitate the use of the following equipment:

- Site establishment:
 - Utility and small goods vehicles.
- Temporary ventilation:
 - The axial fans will be 55 kilowatt (kw) and controlled by a variable speed drive to allow adjustments to suit the requirements in the tunnels. The fans will also be supplied with noise attenuating silencers on each end of the fan;
 - Fans will be encased in an acoustic enclosure (either noise blankets or within a container) and located on a gantry 3-5 metres above ground at the Galway and Tyler Street frontages of the Glasshouse (refer to Figure 1-2); and
 - Utility and Hiab delivery truck will be required for installation.
- Concrete deliveries:
 - Up to 40 concrete trucks per day (with three to four trucks per hour) over each period of concrete delivery;
 - Where possible concrete will be delivered using an eight-wheeler 6m³ capacity truck;
 - The preferred methodology for concrete deliveries is to back the trucks into the site compound via Tyler Street from Commerce Street. Alternatively, during peak hours, trucks will drive into

Tyler Street and undertake a three-point manoeuvre prior to driving out of the site. Concrete pump and hopper located on the north western corner of the Glasshouse, accessing the tunnels via the same location. The concrete will be pumped down into the tunnels via a truck mounted pump.

- Other deliveries:
 - Utility and small goods vehicles; and
 - Mobile crane (up to 60T)/hiab located near the North East corner of the Glasshouse.
- Up to 10 vehicle movements of minor equipment deliveries per day until completion of the Works to support the above activities.

2.3 Hours of Operation

Generally working hours will be Monday to Friday 6.30am until 6.30pm, however infrequent activities might require working outside of these hours. Concrete delivery works are planned to occur between 6.30am – 9pm Monday through to Saturday due to its short duration; however, in the event of on-site delays, deliveries could be extended until 10.30pm.

In some instances, working on public holidays to align with the KiwiRail Block of Line may be the best practicable option. If work outside the permitted times is required, it will be discussed with Auckland Council prior to Works commencing.

2.4 Site Layout and Management

Figure 2-2 below illustrates an indicative site layout for the Works.

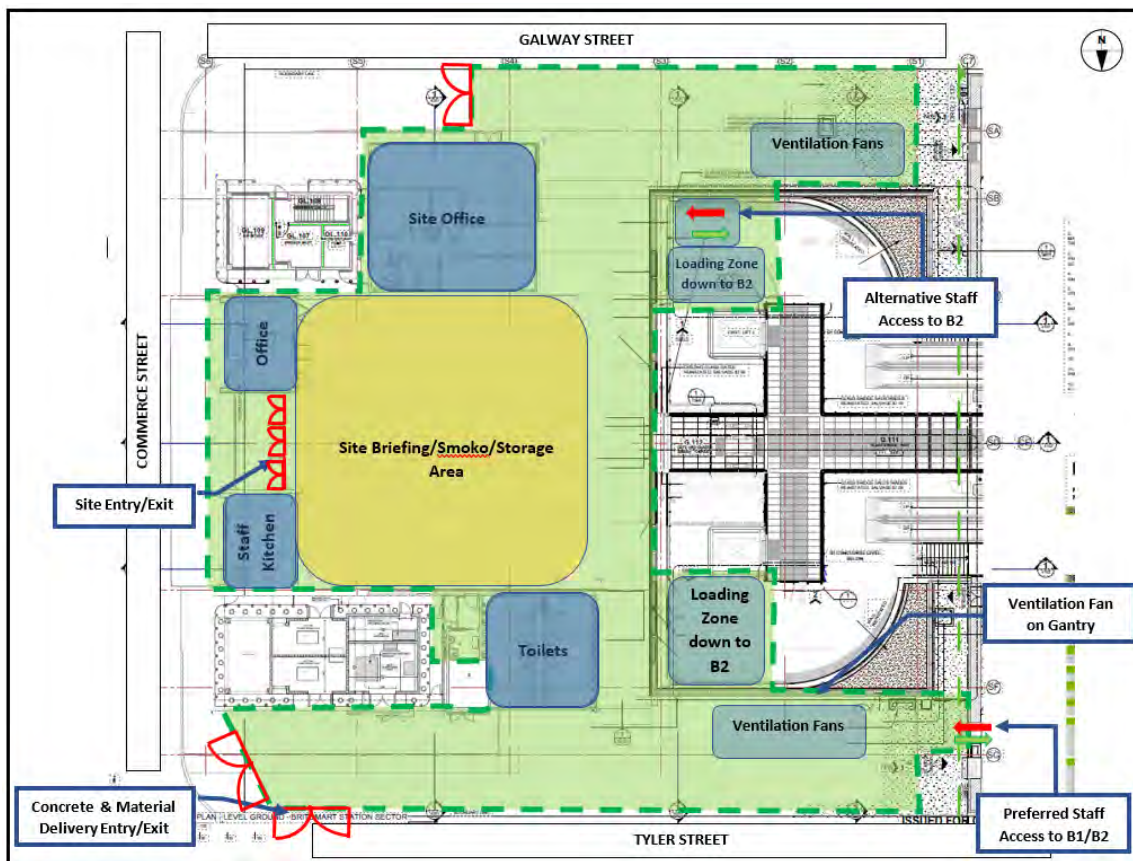


Figure 2-2 Site compound layout

The site compound, which will be used for the following activities:

- Staff facilities for those undertaking works in the CRL tunnels;
- Site offices;
- The delivery point for all materials that will not be transported via rail from Quay Park;
- Storage and holding area for equipment and materials;
- Access route in and out of the CRL tunnels via emergency stairs at the north-eastern corner of the CPO building; and
- Location for the ventilation fans to vent the CRL tunnels.

2.5 Pedestrian and Vehicular Access

Pedestrian access to Britomart Station is proposed to be maintained at all times through the western façade as well as the north eastern and south eastern corners of the CPO building as is currently provided. Pedestrian access north/south from Tyler and Galway Street between the Glasshouse and the SPA building will be closed to the public. Pedestrian access along Tyler and Galway Street will be unimpeded for the duration of the Works. For public pedestrian access routes, please refer to Figure 2-3.

General vehicle access will remain largely unrestricted along Tyler Street, although daily deliveries will occur within a loading bay on Tyler Street. Scheduled major deliveries will also have traffic management implemented.

Vehicle access along Galway Street will largely be unrestricted, however in exceptional circumstances Galway Street could be used as a secondary delivery access point, should Tyler Street not be suitable.

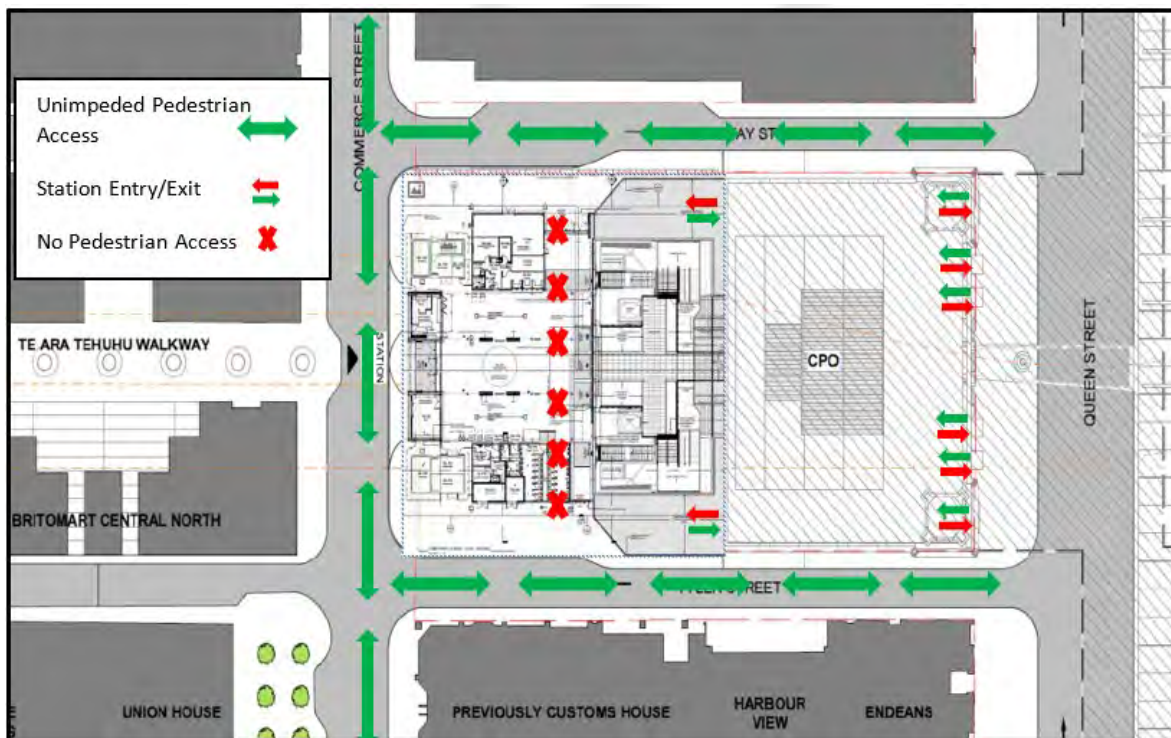


Figure 2-3 Public Pedestrian access routes

2.6 Deliveries

This section of the CEMP describes a range of deliveries that will take place during the Works.

2.6.1 Concrete Deliveries

Concrete deliveries into the CRL tunnels are required for two main activities, Stage 1 (Invert Concrete) and Stage 2 Concrete (Trackform), both which require pumped concrete from a high level into the tunnels. This is illustrated in Figure 2-4.

For the receiving and pumping of tunnel concrete, where practicable Stage 1 concrete delivery will be predominately delivered from the CRL Aotea construction site in Albert Street. However, provision is sought for concrete delivery from the Britomart Station end as a secondary 'back up' option, with a worst case 50 / 50 split between the Aotea construction site and Britomart Station. Based on the worst-case scenario, concrete delivery from the Aotea construction site would occur within quarter four of 2021, while the delivery of concrete from Britomart Station would take place within quarter one of 2022. The delivery of concrete from the CRL Aotea construction site is not addressed in this CEMP.

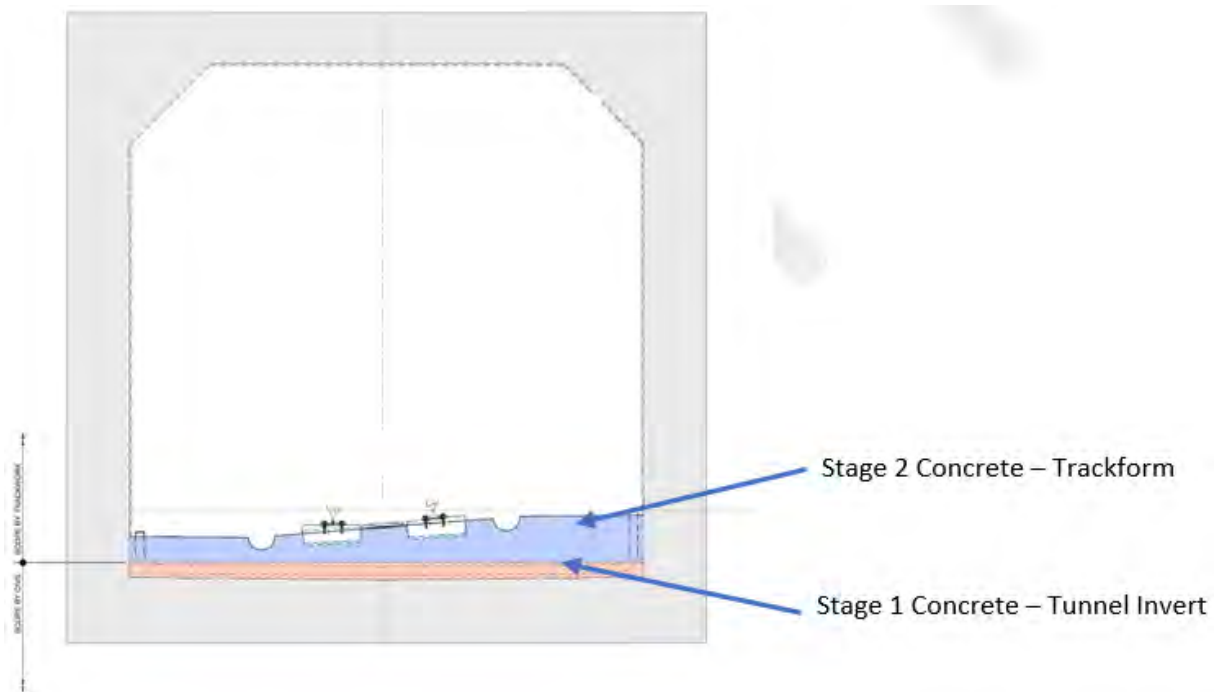


Figure 2-4 Stage 1 (Invert Concrete) and Stage 2 Concrete (Trackform) required for the Works

Concrete deliveries at Britomart Station will occur through a pump line located on the north western corner of the Glasshouse on Tyler Street. The concrete line pump and delivery truck will be positioned to the side of the Glasshouse. Where possible, concrete deliveries will be undertaken via an eight wheeler 6m³ concrete truck and pumped into the tunnels via a truck mounted pump. The location of the concrete and pump is located in Figure 2-5.

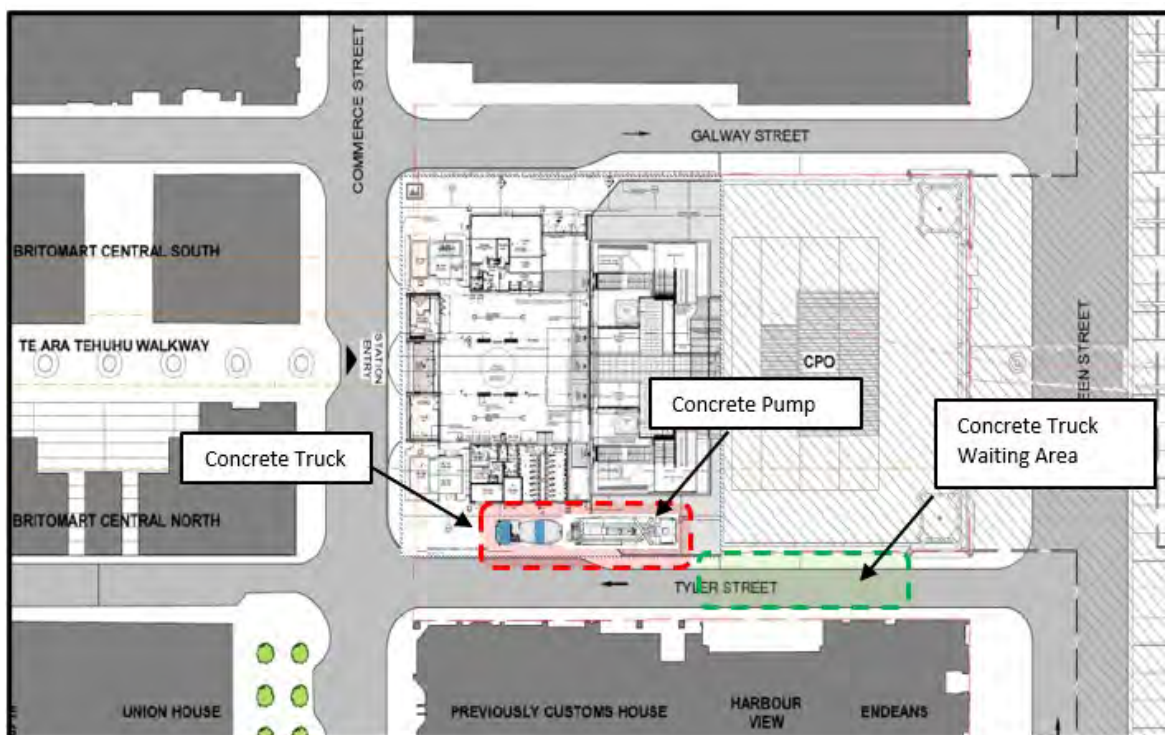


Figure 2-5 Proposed Concrete Truck/Pump Location and Arrangement at the SPA

2.6.1.1 Timing of the concrete deliveries

Stage 1 concrete will occur in two periods. The first period will occur for 15 days in quarter four 2021 and will be undertaken from the Aotea construction site. The second period of Stage 1 concrete will occur for 20 days in quarter one 2022 and be undertaken from Britomart Station as a worst-case scenario. Stage 2 concrete will occur for 10 days, however it will have an overall duration of 20 days as concrete will be delivered every second day. Stage 2 concrete deliveries will be undertaken from Britomart Station.

As previously stated, concrete delivery is planned to occur between the hours of 6.30am until 9pm Monday to Saturday; however, in the event of on-site delays, deliveries could occur until 10.30pm. The current programme indicates that the peak number of vehicle movements would be 40 trucks per day, with 3-4 trucks per hour.

2.6.2 Material Deliveries

In order to facilitate the Works, a range of other deliveries need to occur. Material deliveries into the CRL tunnels will be carried out by either rail from Quay Park, or road via the north east corner of the glass house on Tyler Street. Due to the limited rail closures and isolation windows (for example, every second week closures occur and there is limited underground storage) means some deliveries will have to occur by road.

Subsequently, the Works will divide material deliveries into the categories illustrated in Table 2-1.

Table 2-1 Material Deliveries

Activity/Material	Road/Rail
-------------------	-----------

Track and overhead line equipment (OHLE)	Rail as primary means of delivery, Road as secondary means of delivery (Glasshouse via Tyler Street)
Fire Hydrant Pipework	Rail as primary means of delivery, Road as secondary means of delivery (Glasshouse via Tyler Street)
Cabling	Road as primary means of delivery (Glasshouse via Tyler Street), Rail as secondary means of delivery where possible
Small Goods, i.e., LV Distribution boards, Mechanical Ducting, Mechanical Fans, Fire System equipment	Road (Glasshouse via Tyler Street)
Concrete (Stage 1 invert concrete and Stage 2 trackform concrete)	Road via Tyler Street and Albert Street (Stage 1 concrete)

Deliveries to the site compound area by road will be split into minor and major deliveries. Minor deliveries are expected to require limited or no traffic management and no major lifting of equipment. In comparison, major deliveries will require defined traffic management with road closures and will likely require heavy lifting equipment. Minor and major deliveries are in addition to the concrete delivery movements described in section 2.6.1 of this report.

2.6.2.1 Minor deliveries – Tyler Street Glasshouse

Minor deliveries of materials and equipment to the site compound will be required on a daily basis to facilitate the Works.

Minor deliveries of materials and equipment to the site compound will be required on a daily basis to facilitate the tunnel fit-out works and other CRL related works at Britomart Station. These movements will be focussed on the inter peak period as far as possible (between 9.30am and 3.30pm) in order to minimise traffic effects on the local area. Minor deliveries in most cases will be undertaken from the dedicated loading bay within Tyler Street Figure 2-7.

The frequency of deliveries will be largely driven by the type of construction activity that is occurring on site, however it is expected that there will be 5-10 vehicle movements per day. These deliveries are likely to be undertaken by utility ('Ute') or other small goods vehicles. To ensure safe and efficient deliveries, all deliveries will be managed by a dedicated spotter.

2.6.2.2 Major Deliveries – Tyler Street Glasshouse

Major deliveries will require heavy lifting equipment such as a crane or Hiab. These will be used to convey equipment and materials through the north-eastern corner of the Glasshouse and down into the basement (B2) level of Britomart Station (refer to Figure 2-6). This will generally require traffic management.

Major deliveries will generally be limited, as the majority of equipment used in the tunnels can be categorised as minor deliveries. Large items such as sections of rail track will otherwise be brought in by rail from Quay Park.

Major deliveries will generally be co-ordinated and arranged with AT and their Corridor Access Team under a defined traffic management plan. These deliveries will normally be established for longer periods (e.g., multiple days), however, actual work will be limited during working hours of 6:30am –

6:30pm, except for concrete delivery which will be between 6:30am and 9:00pm. The current programme indicates the peak vehicle movements of up to 40 trucks per day, at 3-4 trucks per hour.



Figure 2-6 An example of a major delivery that would have been prepared by a range of minor deliveries

2.6.3 Delivery Routes and Traffic Management

Deliveries and vehicle movements will be managed through a Construction Traffic Management Plan surrounding Tyler and Commerce Street. Figure 2-7 below illustrates the proposed delivery route for major and minor deliveries.

Temporary traffic management will be required for all delivery trucks accessing Tyler Street. A Site Traffic Management Supervisor and Traffic Controller(s), as well as signs and cones to manage daily minor deliveries. Some night attendance will also be required for deliveries; however, these will be very limited. Any required night-time deliveries will take place between 6.30pm and 10.30pm.

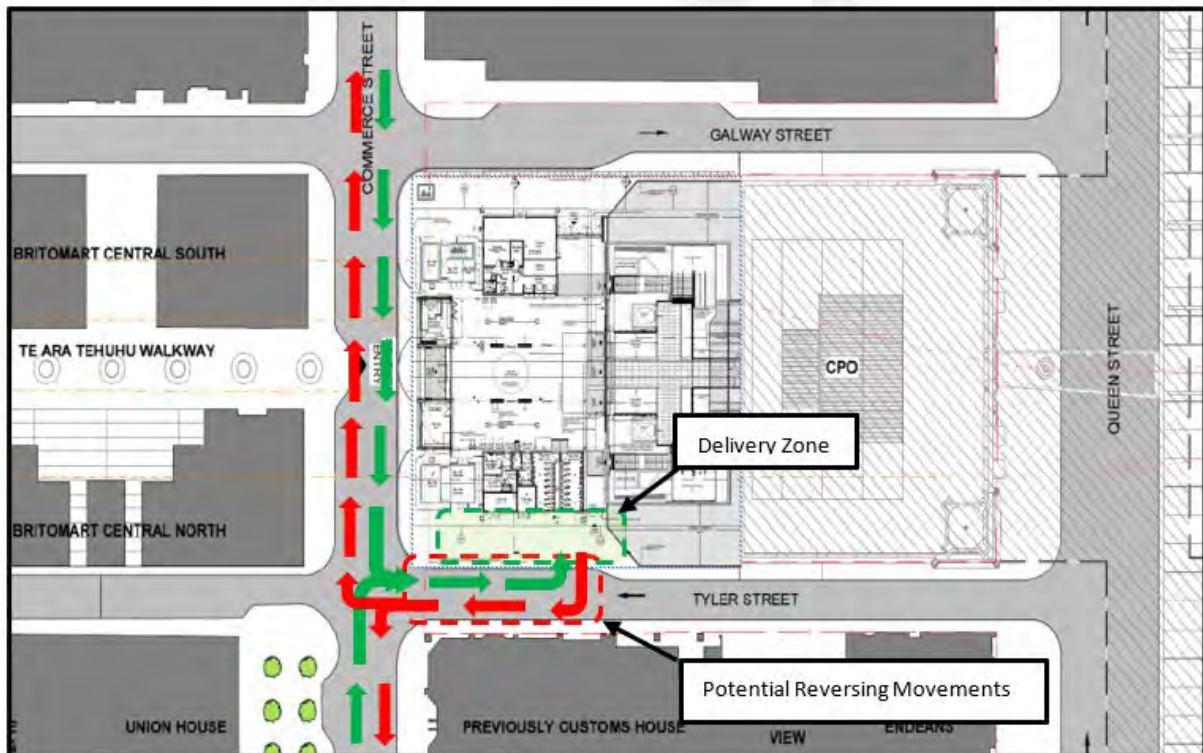


Figure 2-7 Proposed delivery route for major and minor deliveries

3 Social and Environmental Management

This CEMP presents a framework of principles, environmental policy and performance standards as well as processes for implementing appropriate environmental management. The methods for achieving this are presented in detail in the sections below.

3.1 Construction Activities and Associated Environmental Receivers

The key construction activities associated with the Works are:

- Site establishment;
- Temporary tunnel ventilation system;
- Concrete deliveries; and
- Delivery of materials.

These activities have the potential to generate adverse environmental effects – particularly in relation to transport, access and parking disruption and noise.

The MPs attached to the CEMP detail the mitigation measures specific to these effects.

Table 3-1 summarises key activities associated with the Works and potential sensitive receivers.

Table 3-1 Construction activities and associated environmental receivers

Main activity	Description of activity	Environmental receivers
Site establishment	<ul style="list-style-type: none"> ■ Conversion of the existing SPA into office, staff facilities, briefing areas, delivery point for materials and storage spaces. ■ Workforce access in and out of the CRL tunnels 	<ul style="list-style-type: none"> ■ Residents (amenity)
Temporary tunnel ventilation system	<ul style="list-style-type: none"> ■ Installation of two ventilation fans within an acoustic enclosure and located on a gantry. ■ They will ensure a safe working environment at all times. 	<ul style="list-style-type: none"> ■ Residents (noise) ■ Transport network
Concrete deliveries	<ul style="list-style-type: none"> ■ Concrete deliveries into the tunnel are required for two main activities, Stage 1 concrete and Stage 2 concrete. 	<ul style="list-style-type: none"> ■ Residents (noise) ■ Transport network
Delivery of materials	<ul style="list-style-type: none"> ■ Minor deliveries of materials and equipment to the site compound 	<ul style="list-style-type: none"> ■ Residents (noise) ■ Transport network

3.2 Environmental Risk Register

The Risk Register includes environmental risks associated with the Works. It has been set up based on the proposed methodologies for undertaking construction support activities and assessment of potential risks. The information contained in the Risk Register provides a guide for the implementation of environmental management activities, controls and monitoring, thus minimising environmental impacts.

The Risk Register is a 'living document' and will be updated as appropriate during the Works, such as to address site conditions, revised construction methodologies, new or changed construction staging, or changes to legislative requirements. The Risk Register should be reviewed at least quarterly. The Risk Register shall review and update the CEMP and sub-plans (in conjunction with Technical Specialists) to reflect updates to the Risk Register as appropriate.

3.3 Legislative and Other Requirements

3.3.1 National Legal Requirements and Policies

The Link Alliance will comply with all relevant legislation and will employ best practice environmental management procedures. Key environmental legislation for management of the Works is identified in Table 3-2 below.

Table 3-2 Key National Legislation, Regulations and Standards

National legislation, regulations, strategies and policies
Resource Management Act 1991
Land Transport Act 1998: <ul style="list-style-type: none"> Land Transport (Road User) Rule 2004 Land Transport Rule: Traffic Control Devices 2004
Land Transport Rule: Setting of Speed Limits 2003
Dangerous Goods Act (1974) and Regulations

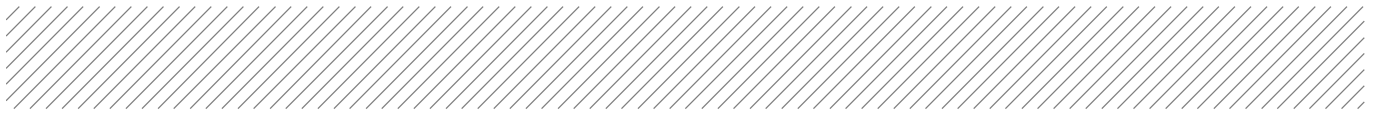
The Link Alliance will identify, maintain and continually evaluate compliance with legal and other related requirements that are applicable to the delivery of the Works.

3.3.2 Legislation, Standards and Guidelines relating to Environmental Aspects

Table 3-3 identifies legislation, standards and guidelines which are relevant to specific environmental aspects of the Works and will be read in conjunction with the relevant MPs of this CEMP.

Table 3-3 Standards, guidelines and specific statutory requirements associated with environmental aspects and detailed in the CEMP and plans

Environmental Aspect/Plan	Plan Statutory Requirements, Guidelines and Standards
Construction Environmental Management Plan	<ul style="list-style-type: none"> Auckland Unitary Plan (Operative in Part 2016) (AUP)
Construction Noise Management Plan	<ul style="list-style-type: none"> NZS 6803:1999 Acoustics – Construction Noise



Construction Traffic Management Plan	<ul style="list-style-type: none">■ NZTA Code of Practice for Temporary Traffic Management (COPTTM)■ NZTA Traffic Control Devices Manual (TCD)
--------------------------------------	---

4 Implementation and Operation

4.1 Roles and Responsibilities

Section 4.1 details roles and responsibilities for the Works and includes contact details.

4.1.1 Overview and Responsibility for this CEMP

Three main groups are responsible for the environmental management of the Works, namely:

- CRL as the wider CRL project owner, requiring authority, and holder of the resource consents with overall responsibility for compliance with consent and designation conditions and project approvals;
- The Link Alliance who are undertaking the construction works with overall responsibility for site environmental management; and
- Auckland Council who is responsible for auditing the works and monitoring compliance with designation and resource consent conditions, the CEMP and sub-plans.

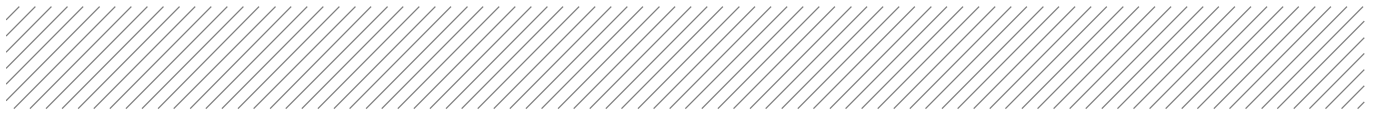
Each person involved in the Works has equal responsibility to avoid, remedy or mitigate adverse environmental effects. Section 4.1.2 provides further detail on the roles and responsibilities during the Works.

4.1.2 Specific Roles and Responsibilities

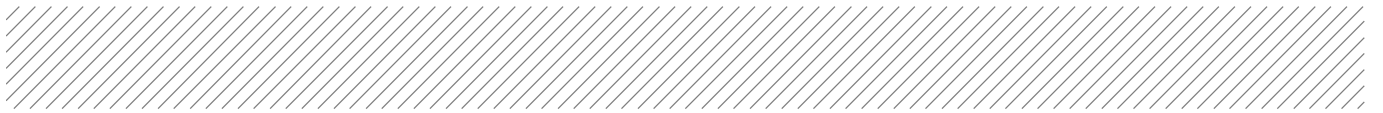
Table 4-1 describes the key Link Alliance roles and responsibilities in relation to environmental management during the construction period. The sub-plans also outline specific roles and responsibilities in relation to the implementation of the respective plans as appropriate.

Table 4-1: Specific Roles and Responsibilities – Link Alliance

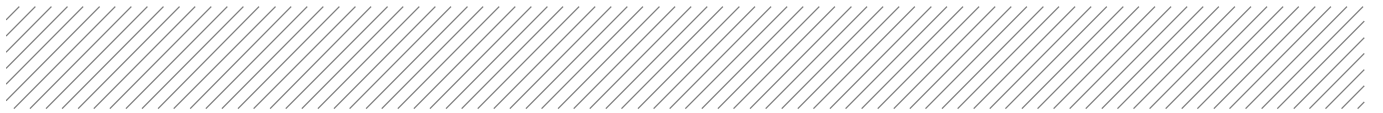
Role	Responsibilities
<ul style="list-style-type: none"> ■ Project Director – Francois Dudouit ■ Project Construction Manager – Philippe Begou 	<ul style="list-style-type: none"> ■ Overseeing project planning, acquisition, design, constructability, procurement, stakeholder engagement, communications, programme and financial control. ■ Providing strategic direction to all workstreams to provide an integrated approach to project delivery. ■ Ultimate responsibility for compliance with resource consent and designation conditions. ■ Ultimate responsibility for achieving the sustainability outcomes.



<ul style="list-style-type: none"> ■ Construction Manager – Kostas Kakis 	<ul style="list-style-type: none"> ■ Overseeing the Works construction delivery. ■ Ensuring site personnel adhere to the CEMP and sub-plans and comply with environmental operating procedures. ■ Ensuring site personnel adhere to the project communication protocols and procedures. ■ Development, management and monitoring of Construction Execution Procedures (CEPs), including the integration of environmental and sustainability requirements. ■ Providing project progress/milestone information for stakeholder briefings (e.g. CLG, Mana Whenua forum). ■ Coordinating emergency responses, along with the ESM.
<ul style="list-style-type: none"> ■ Communications and Engagement Manager – Rachel Blundell ■ Britomart Communications Lead – Michelle Parish 	<ul style="list-style-type: none"> ■ Manages a Communications and Engagement team that is the main and readily accessible point of contact for stakeholders and persons affected by the works. ■ Implementation of Link Alliance Communications for the Works and responsible for communicating key aspects of the Works to stakeholders, affected parties and the general public including: <ul style="list-style-type: none"> – Informing the community / key stakeholders of the project, construction milestones, programme and progress. – Notifying project neighbours / key stakeholders of project works that may affect them and regular liaison with the affected community. ■ Primary contact for project related complaints and enquiries. ■ Managing stakeholder enquiries and working with relevant team members to resolve complaints. ■ Immediately reporting any high-risk stakeholder / communication issues to the Project Manager and the CRLG GM Corporate Relations and Communications. ■ Assisting the CRLG Communications team with key stakeholder engagement including the Mana Whenua Forum and Local Boards. ■ Providing advice to the Project Manager / Construction Manager on critical stakeholder engagement, communications and relationship building. ■ Assisting the Construction Manager in briefing site personnel on: <ul style="list-style-type: none"> – - The mandatory site inductions regarding the standards and requirements for community relations; – - Procedures to follow if staff are approached by a member of the public or the media; and – - Behavioural procedures in and around the construction site boundaries.



<ul style="list-style-type: none">■ Environment and Sustainability Manager (ESM) – Sarah Sutherland	<ul style="list-style-type: none">■ Providing leadership to the site team to achieve project environmental objectives and outcomes.■ Updating and maintaining the environmental portion of the project Risk Register.■ Reporting on the project environmental and sustainability KPIs.■ Attending compliance meetings with Auckland Council Compliance Monitoring Officers.■ Coordinating the interfaces and communications with external agencies and stakeholders in relation to environmental management on the project in conjunction with the Communication and Consultation Manager.■ Coordinating environmental interfaces with consultants, subcontractors and suppliers.■ Collate and report environmental and sustainability performance results for the Link Alliance.■ Training staff on environmental and sustainability aspects.■ ESM is an IS Accredited Professional.
<ul style="list-style-type: none">■ Environmental Advisor – Jason Haggerty	<ul style="list-style-type: none">■ Tracking compliance information.■ Informing the Project Director/ Project Manager of environmental or sustainability non-compliances.■ Coordinating environmental interfaces with consultants, subcontractors and suppliers.■ Reviewing and updating CEMP and relevant sub-plans during works (at least annually).■ Coordinating environmental monitoring as per CEMP and sub-plans.■ Undertaking regular site inspections, auditing and checking of environmental management practices and procedures/compliance with the CEMP, sub-plans and resource consent and designation conditions.■ Submitting relevant reporting and records to Auckland Council.■ Attending compliance meetings with Auckland Council Compliance and Monitoring Officers.■ Training staff (including subcontractors) on environmental and sustainability aspects.■ Coordinating environmental emergency / incident responses and undertaking incident investigations.■ Ensuring staff are trained for the management of spills and methods to avoid them (including storage and handling of hazardous substances).■ Maintain a register of environmental incidents, non-compliances and corrective actions, and ensure implementation of these.



	<ul style="list-style-type: none"> ■ Reporting any changes to construction techniques or environmental changes which may require changes to existing / new planning approvals. ■ Support the ESM and operational teams in developing the Environmental Risk Register. ■ Collate and report environmental performance results for the Link Alliance.
<ul style="list-style-type: none"> ■ Project and Site Engineers 	<ul style="list-style-type: none"> ■ Supervising subcontractors to ensure implementation of environmental controls. ■ Undertaking daily site inspections and environmental monitoring. ■ Coordinating and implementing mitigation actions (e.g. in relation to trigger values exceedances or complaint). ■ Ensuring environmental erosion and sediment control works are installed and maintained. ■ Ensuring all staff are aware of environmental requirements and management measures are implemented and maintained to ensure ongoing effectiveness.
<ul style="list-style-type: none"> ■ Project Technical Specialists 	<ul style="list-style-type: none"> ■ Write and review sub-plans for the CEMP. ■ Attend relevant CLG meetings, where required. ■ Conduct monitoring as required by the sub-plans. ■ Communicate with the ESM to confirm compliance with the sub-plans. ■ Provide assistance to the ESM on technical matters.
<ul style="list-style-type: none"> ■ All Staff (including subcontractors) 	<ul style="list-style-type: none"> ■ Adherence to the CEMP and sub-plans. ■ Attending tool-box talks and environmental training (including becoming familiar with the requirements of the CEMP and sub-plans, as directed by the ESM). ■ Reporting environmental incidents, complaints, defects and any other problems to senior staff. ■ Ensuring that environmental management processes and procedures are followed and mitigation/protection measures are maintained and working correctly. ■ Ensuring that the site and adjacent areas are protected and respected (litter placed in bins, site kept tidy). ■ Direct all public and media enquiries to the Stakeholder and Communications Manager. ■ Use approved haul routes, site access and designated site parking (if available) to minimise disruption to the local community. ■ Work within approved construction hours. ■ Work within the conditions specified in the Permits to Notify (refer Communication and Consultation Plan for further detail).

- Show consideration for stakeholders and community members at all times.

Contact details for the Construction Manager and Link Alliance Communications and Engagement Manager are provided in Table 4-2.

Table 4-2 Contact details for project staff

Title	Name	Email	Contact no.
Construction Manager	Kostas Kakis	Kostas.Kakis@linkalliance.co.nz	+64 21 374 006
Link Alliance Communications and Engagement Manager	Rachel Blundell	Rachel.blundell@linkalliance.co.nz	+64 27 306 9156

The general public contact details (for enquiries/complaints) for the Works are as follows:

- CRL Hotline: 0800 CRL TALK (0800 275 8255)
- Email: Aotea@linkalliance.co.nz

4.2 Training and Induction

All project staff will receive appropriate training that is relevant to the environmental aspects of their work. As a minimum, all personnel will be required to complete the project induction training. Other trainings include weekly tool box talks and pre-start meetings.

4.2.1 Induction Training

The project induction will include an overview of the environmental, cultural, social and sustainability aspects of the works, including the key requirements and staff responsibilities in relation to this CEMP and the sub-plans. The purpose of the induction is to ensure that, at a minimum, all project staff:


Understand the importance of following the environmental policy, procedures and requirements of this CEMP;

- Are aware of the roles and responsibilities relating to environmental management for the Works;
- Are aware of the significant environmental, cultural and social values and issues within the vicinity of the works, the potential impact of the construction activities on these values and the management of these impacts;
- Are aware of the emergency response and incident procedures;
- Understand and implement site sustainability measures and monitoring; and
- Understand the project communications and the complaints management procedures.

4.2.2 Tool Box Talks

Weekly tool box talks will be conducted for site personnel to deliver specific training and to ensure all site staff are aware of the key environmental issues, social, cultural and sustainability matters relevant to the works. This may include (but is not limited to) the following:

- Spill kit training;

- 
- Hazardous substances handling;
 - Graffiti covering;
 - Stormwater discharge control; and
 - Correct erection of an erosion and sediment control measure or acoustic screen.

Tool box talks will provide site personnel with ongoing environmental training and information throughout the project. All tool box talk participants must sign an attendance sheet.

4.2.3 Pre-Start Meetings

Pre-start meetings will be used by the supervisors and foremen to explain the work to be done in the upcoming shift. All operational aspects of the task will be discussed, including safety and environmental issues and controls, particularly if there are new hazards or if there has been a recent incident.

An environmental management representative must attend, as applicable, to explain new environmental controls or reiterate existing controls.

5 Environmental Management

The following sections of this CEMP describe the environmental management measures that will be implemented during the Works to avoid, remedy or mitigate adverse environmental effects. MPs detailing the controls and measures for each environmental aspect area cross-referenced where relevant and form appendices to this CEMP.

5.1 Noise

A Noise Assessment was undertaken to determine the actual and potential effects associated with construction noise of the Works on the surrounding environment.

It is predicted that all construction support activities will comply with the AUP permitted activity noise levels, with the exception of concrete pumping. This activity may marginally exceed the AUP permitted activity standards for construction noise levels when measured from approximately 2 – 4 apartments located in the 148 Quay Street apartments. Concrete pumping will occur within the hours (6.30am until 9pm, however in the event of onsite delays, deliveries could be extended until 10.30pm) specified by the AUP standard. Pumping associated with the Works will occur for approximately 30 days out of a two-year period the Works will be undertaken over.

5.1.1 Mitigation measures

In order to mitigate any noise impacts from the Works, a range of mitigation measures will be implemented, including best practice measures

5.1.1.1 Construction Noise Management Plan

A Construction Noise Management Plan (CNMP) will be implemented for the duration of the Works (refer to Appendix A of the CEMP). The CNMP sets out the mitigation and management framework to manage effects according to the best practicable option. A range of mitigation measures are proposed within the CNMP, including noise barriers and attenuators on the ventilation fans. Training of personnel and appropriate equipment selection is also required as per the CNMP.


In addition, the CNMP includes appropriate consultation and engagement with the southern side apartments at 148 Quay Street. This will be particularly important if concrete pumping is required to occur until 10.30pm on some nights due to on-site delays. Written communication with other building occupants within 50 metres of the worksite will also need to occur as described in the CNMP.

5.1.1.1.1 Noise monitoring

The CNMP includes requirements related to construction noise monitoring. Construction noise monitoring will be undertaken the first time a concrete delivery takes place and in response to noise complaints. The noise monitor attached to the exterior of 148 Quay Street will also remain in place for the duration of the Works to undertake this monitoring.

5.1.1.1.2 Noise barriers

The CNMP also proposes the installation of a temporary 2 metre site hoarding along the Tyler Street southern footpath. The hoarding will be installed prior to the Works commencing and maintained throughout the Works.



Where practicable, the noise barriers will be built to the appropriate guidelines and to a minimum height of 2 metres. In addition, the panels will be abutted, battened or overlapped to provide a continuous screen without gaps. The barriers will be positioned as close as practicable to the high-noise activity to block the line-of-sight between the activity and the noise sensitive receivers.

5.1.1.1.3 Ventilation fans

Ventilation fans are required for the Works, which will run 24 hours a day, seven days a week. The fans will be encased within an acoustic enclosure (such as a noise blanket or within a container) located on a gantry at the Tyler Street and Galway Street frontages of the Glasshouse. The fans will be compliant with the AUP permitted activity noise standards. However, attenuators will be installed as recommended by the mechanical engineer while the fans are operating.

5.2 Traffic, Access and Parking

The impacts of the Works on traffic, access and parking will be confined to the proposed construction period. An Integrated Transport Assessment has been prepared for the Works to determine the potential actual effects of the Works.

Construction traffic associated with the Works is considered to be minimal, with daily truck movements estimated to be between five to ten trucks per day, with an extra peak vehicle movement of up to 40 trucks per day required during concrete pours.

For the duration of the Works, pedestrian accessibility will be maintained and the connections to public transport services will not be affected. Furthermore, pedestrian access to the neighbouring properties will be maintained, as well as their vehicle access.

It is predicted that any impacts from the Works will result in minimal adverse effects relating to the function, capacity and safety of the surrounding transport network. Furthermore, mitigation measures in the form of a Construction Traffic Management Plan (CTMP) (refer to Appendix B of the CEMP) will be implemented for the duration of the Works.

5.2.1 Mitigation measures

In order to mitigate any traffic, access and parking impacts of the Works, a range of mitigation measures will be implemented for the duration of the Works.

5.2.1.1 Construction Traffic Management Plan

The CTMP will be implemented for the duration of the Works. This details the specific temporary traffic management measures for construction transport effects along Commerce Street, Galway Street and Tyler Street. The CTMP demonstrates how the Works will be constructed, the timing of road closures, restrictions or diversions required, access to local properties and the routes for construction-related traffic.

The CTMP also details how emergency service access along Tyler Street will be maintained through the Works periods, as well as, courier and delivery access. It also notes that staff will be encouraged to use public transport, walk or cycle to further reduce traffic impacts.

The implementation of this management plan will mitigate the traffic effects on the nearby properties and all road users to an acceptable level.

5.3 Emergency and Incident Response

5.3.1 Emergency Response Plan

An environmental emergency is an event which has a detrimental effect on the surrounding environment. A detrimental environmental effect is something that causes significant harm to the environment, which is not legally allowed and requires immediate response. An environmental emergency can also be a deviation from the Link Alliance environmental management system. This means there has been a failure to follow the established process or procedures that help the contractor achieve best practice.

Examples of environmental emergencies include, but are not restricted to:

- Large volume chemical / oil spill;
- Excessive discharge of sediment to the stormwater system; and
- Hazardous substance release to air.

An Emergency Response Plan (ERP) (or Emergency Management Plan) has been prepared for the Works. The ERP will take into account three levels of emergencies, which are divided according to the severity of the emergency. For example, level 1 – minor oil spill, level 2 – moderate chemical spill and level 3 – serious chemical spill.

The contents of the ERP will include:

- Description of the potential emergency;
- The person responsible for actioning the ERP;
- The equipment required to deal with the emergency including rescue equipment;
- Emergency contact list and numbers;
- Directions to site workers and other affected persons on what they are required to do, including clear identification of the evacuation point location;
- The methods used to deal with the emergency; and
- Emergency reporting instructions (refer to incident reporting in section 5.3.2 of this CEMP).

The ERP will be displayed in noticeable locations around the site and employees will be trained in its requirements.


5.3.2 Incident Response

An environmental incident is an occurrence which has (or potentially could have had) a negative or 'adverse' effect on the environment (including environmental emergencies – refer to section 5.3.1). An adverse effect is something that causes (or could have caused) environmental harm. This means there has been a failure to follow the established process or procedures that help the project achieve best practice (e.g. failure to report a spill).

Environmental incidents include but are not restricted to:

- Spills;
- Unforeseen impacts on areas of high environmental value such as archaeology or built heritage; and
- Consent non-compliances (e.g. noise, sediment).

The spill response procedure is summarised in section 5.3.3 of this CEMP. Responses to various environmental incidents is outlined in the relevant sub-plans and in the ERP. For serious incidents, the



immediate response may involve stopping works until a solution to managing the incident is developed and implemented.

5.3.3 Spill Response

During the Works, the ESM will be responsible for providing training and orientation to employees or subcontractors that addresses the proper action regarding spills.

The Link Alliance will ensure that spill response materials are available, commensurate with the type, quantity and storage arrangements for hazardous substances on site. A general Emergency Spill Response Plan (ESRP) will be prepared for the wider CRL construction works at Britomart Station. The ESRP includes provision that in the event of all spills over 20 litres, or any spill of environmentally hazardous substances, which has entered the stormwater system, a water body or has contacted unsealed ground, the spill will be reported immediately to the Auckland Council's 24-hour Pollution Hotline (09-377-3107).

As deemed necessary, vehicles (e.g. utility vehicles), heavy equipment, pumps and generators will be covered by adjacent spill kits that, at a minimum, will contain:

- Sufficient oil absorbent material to contain (e.g. oil absorbent boom) and clean-up any drips, leaks, or spills (e.g. ruptured hydraulic line); and
- Plastic bags to contain any contaminated absorbents, soils, or wastes. Bags containing used cleanup material will be transported to the designated hazardous material/waste storage area for proper drumming, labelling, and classification prior to off-site disposal.

Spill kits will be located at the water treatment chemical storage area, main hazardous goods storage area, main office and at each vehicle entrance. Signage related to spill response procedures will be located at each vehicle entrance to the site during each stage of the Works. Each spill kit will have a register of contents and an inspection sheet. Spill kits will be inspected monthly to ensure all contents are present. The inspection sheet shall be signed during each inspection.

5.3.4 Recording and Reporting of Incidents


Environmental incidents will be recorded and reported in accordance with the Link Alliance environmental incident reporting and investigation process. The Link Alliance has developed an HSE incident report form and this form will be completed in the event of an environmental incident. The incident report form requires event details (i.e. event type), description of the incident, corrective action and an initial risk assessment. The cause of all incidents will be subject to an investigation, organised by the ESM to determine the root causes of the incident and to monitor the implementation of appropriate corrective /remedial action. The results of investigations and lessons learnt previously on the project will be shared at the tool box sessions. This will ensure that a repeat incident is avoided.

In the event of an environmental incident, the ESM will inform the Project Manager and Auckland Council with a specific notification timeframe (and associated information) depending on the incident severity level.

A summary and review of incidents for the duration of the project and for the relevant month will be included in the project Monthly Report (refer to section 6.5 of this CEMP).

5.3.5 Complaint Process

A Communication and Consultation Plan (CCP) has been developed for the wider CRL construction works at Britomart Station. This details the strategy, tools and process to manage communication between the Link Alliance, its stakeholders and the community throughout the construction and monitoring periods for the project. The CCP sets out how the Link Alliance will inform the community of



project progress and construction dates, foster good relationships with the community, obtain feedback from stakeholders, and outline how complaints and queries will be responded to.

In addition to the procedure listed in the CCP, each sub-plan provides detail on the project complaints process. For example, any complaints related to noise will be recorded in a Project Complaints Register. These complaints must be promptly investigated to resolve the cause of the complaint.

6 Monitor and Review

6.1 Environmental Monitoring

Scheduled monitoring of environmental performance will be undertaken during the Works. This ensures the overall effectiveness of the environmental controls and allows areas of non-compliance to be identified so corrective actions can be taken.

The individual MPs specify the monitoring for each environmental component, the frequency of monitoring required and the responsible person, as required within contract documentation or environmental approvals. Monitoring will take place on a routine basis, with additional monitoring required as appropriate, i.e. in the event of a complaint or incident.

The ESM will be responsible for implementation of on-site measurements of environmental aspects. Monitoring results will be reported to the relevant parties in accordance with the designation and resource consent conditions.

6.1.1 Collaborative Working

The Link Alliance will adopt a collaborative working process during the Works with the Auckland Council Consent Monitoring Officers. The key personnel involved in the collaborative working process are listed in Table 6-1, and will meet regularly to discuss:

- Compliance the CEMP and sub-plans;
- Significant changes to the CEMP and sub-plans;
- Any matters of non-compliance and how they have been addressed;
- The results of, need for, and frequency of site inspections;
- Environmental monitoring results; and
- Any other agenda items agreed by the key contacts.


Table 6-1 Collaborative Working Contacts

Organisation	Title	Name
Auckland Council	Compliance Monitoring Officer	Tim O'Grady
CRL Representative	Principal Planner	Richard Jenkins
Link Alliance	Environment and Sustainability Manager	Sarah Sutherland

6.1.2 Collaborative Meeting

At least five working days prior to the Works commencing the key contacts will mutually agree on an initial schedule for a collaborative meeting. The meeting will be held at least monthly unless a different timeframe is agreed with Auckland Council.

The collaborative working process will operate for the duration of the Works.



The ESM will be responsible for co-ordinating any changes to the CEMP or sub-plans required as a result of the collaborative working process and communicating these updates or information resulting from the collaborative working process with the Works team.

As key milestones are reached and/or if issues arise then collaborative meetings will also take place as necessary.

6.2 Environmental Inspections

Weekly environmental inspections will be conducted by the ESM (or a delegate) during the Works. The findings of these inspections, any required remedial actions, the person responsible for implementing the actions and the required timeframe will all be recorded. These shall be monitored to ensure they are closed out in the necessary timeframe.

6.3 Environmental Auditing

Internal (by the Works staff) environmental auditing will be undertaken to determine whether the environmental management system conforms to planned arrangements and is being properly implemented and maintained.

Internal auditing will take place on a quarterly basis by the ESM (or a delegate). Internal environmental audits focus on environmental and sustainability matters within a single operational procedure/group of related operational procedures. Environmental management procedures are provided in section 5 of this CEMP.

External Environmental and Sustainability Audits (by a suitably qualified consultant) will be completed as per the project Audit Schedule, and at least annually, to assess the effectiveness of the Environmental Management System.

Audit findings (internal and external) will be provided to the Works Construction Manager/Project Manager within two to four weeks of the audit. Recommendations on corrective/preventive actions will be provided to address any environmental/sustainability matters to be improved or as a result of non-compliances.

6.4 Corrective and Preventative Action

Corrective or preventive actions identified during environmental audits shall be appropriately based on the magnitude of the problem and the environmental harm encountered.


The Project Director is responsible for closing out the corrective or preventative actions resulting from environmental inspections, audits and external regulatory compliance monitoring. Assessment and follow-up reviews on the effectiveness of corrective and preventive actions will be undertaken and the outcomes documented, communicated and implemented.

Compliance will be included as a regular agenda item at management and project meetings. Minutes will be kept for each meeting and will record and assign actions to individuals where appropriate.

6.5 Reporting

Reporting requirements will evolve as the Works progresses. In the early phase the focus is on establishment of systems, controls and competence of all personnel, while later the emphasis will shift to monitoring performance. Near to completion of the Works the focus will shift to final reports to address approval requirements.

The ESM manages environmental reporting and is responsible for submitting the reports required externally. Reporting requirements include:

- 
- Project internal reporting requirements; and
 - Specific reporting to Auckland Council where required (as per specific sub-plans).

6.6 Document Control

The ESM is responsible for ensuring that all relevant documentation is submitted and maintained within the project filing and document control system. This documentation will include (but is not limited to):

- Original CEMP document and subsequent versions (including sub-plans);
- All records of environmental monitoring;
- All environmental incident reports and investigation outcomes;
- Formal and informal audit and environmental inspection reports;
- Minutes of environmental meetings; and
- Records of environmental training.

6.7 CEMP Review


This CEMP (including sub-plans) will be updated, with the necessary approval, over the course of the Works to reflect material changes associated with changes to construction techniques, the natural environment or due to unresolved complaints. Approval from Auckland Council will be required for any relevant revisions of this CEMP and sub-plans that are of a material nature. In addition, they may be updated in response to any unforeseen adverse effects arising from construction, unresolved complaints or environmental incidents (refer to section 5.3 of this CEMP for further detail). A review may also be initiated by Auckland Council as a result of comments or recommendations received from Auckland Council or during communication and consultation.

6.7.1 Management Review

A management review of the CEMP and other sub-plans will take place at least annually by the project management team (Link Alliance). The management review will be organised by the ESM and will take into consideration:

- Compliance with the designation and/or consent conditions, the CEMP and sub-plans (including site specific plans) and material changes to these plans;
- Any significant changes to construction activities or methods;
- Key changes to roles and responsibilities within the project team;
- Changes in industry best practice standards;
- Changes in legal or other requirements;
- Results of inspections, monitoring and reporting procedures associated with the management of adverse effects during construction;
- Comments or recommendations from Auckland Council regarding the CEMP and sub-plans;
- Unresolved complaints and any response to complaints and remedial action taken to address the complaint.

The review process will also look at environmental controls and procedures to ensure they are still applicable to the activities being undertaken. Reasons for making any changes to the CEMP or sub-plan(s) will be documented. A copy of the original CEMP or sub-plan(s) and subsequent revisions will



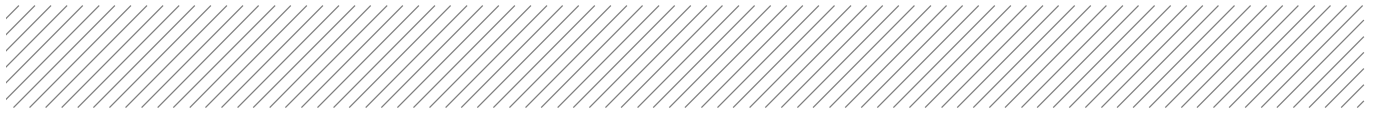
be kept for the project records and marked as obsolete. Each new/updated plan version will be given a revision number and date to prevent obsolete documentation being used.

6.7.2 Review Approval Process

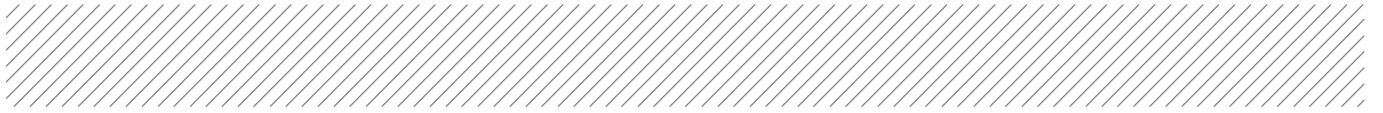
Any affected parties will be notified of any material changes to the CEMP or sub-plans and provided an opportunity to provide feedback. Any material changes to the CEMP or MPs shall be subject to an independent peer review.

Appendices





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Appendix A

Construction Noise

Management Plan



MARSHALL DAY
Acoustics 

CRL BTC DESIGNATION ALTERATION
CONSTRUCTION NOISE MANAGEMENT PLAN
(CNMP)

Rp 002 20210287 | 15 June 2021

Project: CRL BRITOMART TRANSPORT CENTRE

Prepared for: Aurecon
PO Box 9762
Newmarket
Auckland 1149

Attention: Helen McLean

Report No.: Rp 002 20210287

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Document Control

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Draft	-	For client review	20 Apr 2021	Craig Fitzgerald	James Whitlock
Draft	r01	Following client review and methodology update	10 June 2021	James Whitlock	Consenting team
Draft	r02	For consent	15 June 2021	James Whitlock	Consenting team

Cover Photo: Creative Agency 514-806-1644

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APPENDIX A GLOSSARY OF TERMINOLOGY

APPENDIX B NOISE CONTOURS

HOW TO USE THIS DOCUMENT

This Construction Noise Management Plan (CNMP) will be read by people with different perspectives and levels of expertise. Constructors, CRL, Auckland Council, experts and affected parties must all be able to extract the information they need from this document.

The primary function of this CNMP is to advise the constructor about the location of sensitive noise and vibration receivers, and what management and mitigation measures need to be used to reduce adverse effects. These measures have been chosen because they are the best practicable option (BPO) and/or because of agreements with certain parties.

If you are working for the constructor:

- Project noise standards are in Section 2.
- High noise activities, and associated safe distances are in Section 2.3. Check to make sure all relevant activities have been included
- Best practice mitigation measures are in Section 3.0. Review construction methodology
- Engagement with affected receivers is Section 4.0. Ensure effective communication and be aware of community sensitivity

If you are involved in the regulatory process:

- Project noise standards are in Section 2.1
- Review Section 2.3 and 2.4 for high noise activities, and safe distances
- Review Section 2.4 for affected receivers

If you are an affected party:

- Contact details of key personnel in Section 1.5. These are the people responsible for managing noise from the worksite
- Note Section 2.3 and 2.4 for high noise activities, and safe distances
- Note Section 2.4 for affected receivers. Check if your address is included
- Note Section 3.0 to understand the general mitigation that should be in place to manage noise

1.0 INTRODUCTION

1.1 Overview

This CNMP supports the City Rail Link Limited (CRL) Notice of Requirement (NOR) to alter CRL Designation 2501 at Britomart Station pursuant to section 181(1) of the Resource Management Act 1991 (RMA).

The purpose of the alteration is to provide for retention of the Station Plaza Accommodation (SPA) building, so that the building and surrounding Station Plaza area can be used as a construction support facility for works in the CRL tunnels located within the adjoining Designation 2500-1 to the west.

A full description of the activities associated with the NOR is contained in the Assessment of Effects on the Environment (AEE), Form 18 and Constructability Report (Appendix A to the AEE).

None of the proposed activities generate high vibration levels, so this management plan only addresses construction noise.

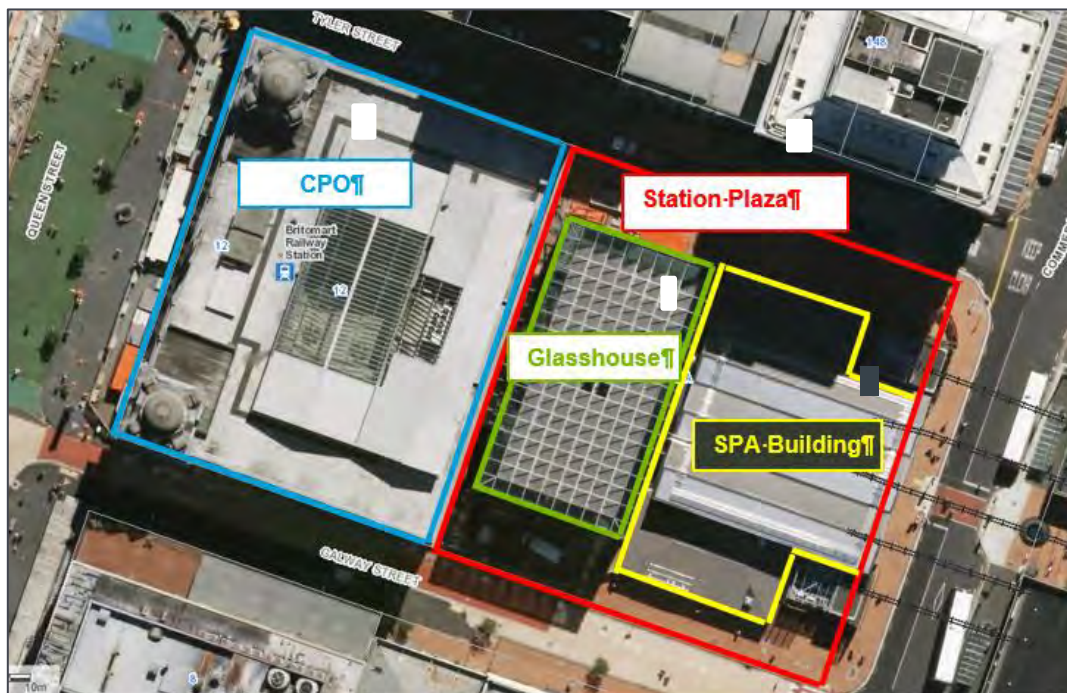
1.2 Project Description

In summary the activities associated with the NOR ('the Works') are:

- Site office, worker accommodation and some storage of materials within the SPA building
- Establishing and operating ventilation equipment in the Station Plaza area (to provide ventilation for workers in the CRL tunnels to the west)
- Access for workers and deliveries of equipment and materials via the Glasshouse and former Chief Post Office (CPO) building
- Receiving and pumping concrete into the CRL tunnels (to construct the railway track bed) from the Station Plaza area in Tyler Street

The location of the Works associated with the NOR is shown in Figure 1.

Figure 1: Station Plaza and Station Plaza Accommodation (SPA) building at Britomart Transport Centre



1.3 Purpose of this CNMP

This CNMP forms part of a suite of technical reports that accompany and form part of the NOR. Its purpose is to identify and provide for implementation of the Best Practicable Option (BPO) to avoid, remedy or mitigate adverse construction noise effects from the Works. This requirement aligns with CRL Designation 2500-1 condition 36 and BTC Designation 2501 condition 28, although different noise performance standards apply to these construction support works (refer Section 2.1).

This CNMP will be implemented throughout the Works period. It should be considered a 'living document' that will be expanded and updated as the Works progress. It is the primary tool for managing the Works' construction noise effects.

A glossary of terminology is included in 0.

1.4 Works timeframe and hours of operation

The Works period will follow on directly from the current CRL C1 works and extend through to Q4 2023.

Work inside the SPA, Glasshouse, and down on track level will occur 24/7 and is expected to comply with the noise limits. The ventilation fans will also run 24/7.

Concrete pumping will only occur during daytime hours (refer Table 2). There will be up to 40 truck deliveries per day.

The concrete delivery will be in two stages, as follows:

- Stage 1 – delivery planned from the Albert Street end of the tunnels (already provided for by CRL Designation 2500-1), with Britomart Station end as a backup option (worst-case 50/50 split). Assuming the worst-case scenario, Albert Street delivery (15 days) would be Q4 2021 and Britomart delivery (20 days) would be in Q1 2022
- Stage 2 – Britomart delivery only in Q2 2022. Delivery will occur over 20 days, with deliveries every second day i.e. 10 delivery days

On concrete delivery days, pumping will occur between 6.30am – 9pm Monday to Saturday, but in the event of on-site delays could extend to 10.30pm i.e. use the full extent of the AUP daytime hours (refer Table 2).

1.5 Contact Details

Contact details for the relevant personnel are listed in Table 1. The Project Manager is responsible for implementing this CNMP.

Table 1: Contacts

Role	Name	Organisation	Phone	Email
Construction Manager	Kostas Kakis	CRL	+64 21 374 006	Kostas.Kakis@linkalliance.co.nz
Communications lead	Rachel Blundell	CRL	+64 27 306 9156	Rachel.blundell@linkalliance.co.nz
Acoustic Specialist	James Whitlock	Marshall Day Acoustics	0212546651	james.whitlock@marshallday.co.nz

1.6 Document Review

This CNMP is a live document that will be reviewed at least annually, or:

- As a result of a material change to the Works
- To address unforeseen adverse noise effects arising from the Works

2.0 CONSTRUCTION NOISE

2.1 Performance Standards

The Station Plaza and all surrounding sites are zoned *Business – City Centre* in the AUP. This means that the construction noise levels from Auckland Unitary Plan (AUP) Table E25.6.28.2 apply (at 1 metre from the façade of any neighbouring building) – refer Table 2 below.

Table 2: Construction noise limits (from AUP Table E25.6.28.2)

Construction of 15 consecutive calendar days or more (total duration of works)		
Time	L _{Aeq} (30 min)	L _{Fmax}
Monday to Friday 6.30am – 10.30pm	75 dB	90 dB
Saturday 7am – 11pm	80 dB	90 dB
Sunday 9am – 7pm	65 dB	85 dB
All other times (night-time)	60 dB	75 dB

2.2 High noise activities

Of the Works listed in Section 1.2, only the concrete pumping and ventilation fans are high noise activities. All other activities are expected to comply.

Noise level data for concrete pumping and ventilation fans are shown in Section 2.3.

2.3 Predicted Noise Levels

Table 2 shows the noise source data for concrete pumping and ventilation fans, predicted levels at various distances and the setback distances needed to comply with the limits.

Table 2: Data for high noise equipment

Equipment	Sound Power Level (dB L _{Aeq})	Noise Level (dB L _{Aeq})			Setback (m)	
		10 m	20 m	50 m	Daytime 75 dB L _{Aeq}	Night-time 60 dB L _{Aeq}
Concrete truck and pump discharging	103	68	62	53	14	N/A
Ventilation fan (with acoustic baffle)	77	52	46	37	1	4

Table 3 shows the predicted noise levels at 1 metre from the façades of neighbouring buildings. The potential exceedances are shaded grey. The table will be kept up to date by the Acoustic Specialist when new information becomes available, e.g. through noise monitoring (Section 5.0).

The predicted levels include shielding of ground floor receivers by a 2 metre site hoarding along the Tyler Street footpath.

Table 3: Predicted noise levels

Receiver	Predicted noise level (dB LAeq)		Compliant?
	Concrete pump	Vent fan	
2 Queen St	63	36	Yes
152 Quay St	73	36	Yes
148 Quay St	76	41	No
8 Customs St East	59	36	Yes
10 Customs St East	59	40	Yes
2 Commerce St	64	< 35	Yes
25 Galway St	64	< 35	Yes

Appendix B shows noise contour maps for each activity. The neighbouring buildings are coloured according to the highest noise level incident on their façade. The insert in each plan shows a 3D ‘soundsplash’ of how the sound projects up the building façades.

The results show that concrete pumping may marginally exceed the construction noise limit at one building (148 Quay Street) and that operation of the ventilation fans will readily comply 24/7.

The exceedance at 148 Quay Street is limited to the lower two floors (not including ground floor) at the western end of the building – refer the sound splash insert (Appendix B). These receivers are directly adjacent the concrete pump, and look over the 2m site hoarding.

3.0 MITIGATION AND MANAGEMENT

Compliance is predicted for most receivers for most of the Works period, but best practice must still be used to ensure good site control and to ensure that other activities do not become noisy.

The following specific mitigation has been recommended:

- A 2 metre site hoarding along Tyler Street (refer Section 3.5)
- Attenuators for the ventilation fans (1.6m x 1.6m x 1.5m), as specified by the mechanical engineer

3.1 Training

All personnel will participate in an induction training session before commencement of the Works, with attention given to the following matters:

- Construction noise limits
- High noise activities
- Noise mitigation and management procedures
- Sensitive receivers and any agreements made through engagement

As the Works progress, any updates of noise matters will be addressed during regular site meetings and/or 'toolbox' training sessions.

3.2 Equipment Selection

When selecting construction equipment, the following are considered to be best practice:

- Use quieter construction methodologies where practicable and available
- Use electric motors rather than diesel engines where practicable
- Use rubber tracked equipment rather than steel tracked equipment where practicable
- Use equipment that is suitably sized for the task
- Maintain equipment well to minimise rattles, squeaks etc
- Fit engines with exhaust silencers and engine covers where practicable
- Avoid tonal reversing or warning alarms (beepers). Alternatives include broadband alarms (squawkers/quackers), flashing lights, proximity sensors, reversing cameras and spotters

3.3 Scheduling

Scheduling is an important management tool, particularly where a receiver expresses concern about construction works at a certain time of day. Where necessary, high noise activities will be programmed to minimise disturbance.

3.4 Best practice measures

Complaints can arise even if the noise levels comply with the Works limits. To minimise complaints, the following common mitigation measures are recommended:

- Avoid unnecessary noise. This means managing the site to ensure:
 - No shouting
 - No unnecessary use of horns
 - No loud site radios
 - No rough handling of material and equipment

- No unnecessary steel on steel contact (e.g. during the loading of scaffolding on trucks)
- No high engine revs. This includes choosing the right sized equipment and turning engines off when idle
- Minimise construction duration near sensitive receivers
- Locate any stationary equipment away from noise sensitive receivers and/or screen them behind site buildings and material stores
- Orient mobile machinery to maximise the distance between the engine exhaust and the nearest sensitive building façade (e.g. excavators)
- Consultation should be complete prior to commencing high-noise activities (Section 2.2)
- Undertake noise monitoring (Section 5.0)

3.5 Noise Barriers

3.5.1 Temporary Noise Barriers

A temporary 2 metre site hoarding will be installed along the Tyler Street southern footpath – refer plans in Appendix B for its extent. The hoarding will be installed prior to works commencing and maintained throughout the Works.

If any other noisy activities are identified, barriers should be the first mitigation measure to be investigated. Effective noise barriers typically reduce the received noise level by 10 decibels.

Where practicable, the following guidelines will be used in designing and installing temporary noise barriers:

- The panels will have a minimum surface mass of 6.5 kg/m². Suitable panels include 12 mm plywood or the following proprietary ‘noise curtains’: proprietary
 - SealedAir ‘WhisperFence 24dB’ (www.sealedair.com)
 - Hushtec ‘Premium Series Noise Barrier’ (www.duraflex.co.nz)
 - Soundbuffer ‘Performance Acoustic Curtain’ (soundbuffer.co.nz)
 - Hoardfast ‘Fast Wall Premium PVC partition panels’ (www.ultimate-solutions.co.nz)
 - Safesmart ‘Acoustic Curtain 6.5kg/m²’ (www.safesmartaccess.co.nz)
 - Alternatives will be approved by a suitably qualified and experienced acoustic specialist
- The panels will be a minimum height of 2 m, and higher if practicable to block line-of-sight
- The panels will be abutted, battened or overlapped to provide a continuous screen without gaps at the bottom or between panels
- Barriers will be positioned as close as practicable to the high-noise activity to block line-of-sight between the activity and noise sensitive receivers. A site hoarding at the boundary may not be effective for all receivers. Add extra barriers close to high-noise activities to ensure effective mitigation for sensitive receivers on upper floors.

4.0 ENGAGEMENT

4.1 Communication

4.1.1 Before Works

Written communication (e.g. newsletter) will be provided to building occupants within 50 m of the site at least 1 week prior starting the Works. It will include:

- Details of the overall Works, its timing and duration
- Contact details and names of personnel whose job is to receive complaints and enquiries - refer Section 1.5 of this CNMP
- Acknowledge that some activities (listed in this document) are predicted to generate high noise levels and may result in disturbance for short periods

4.1.2 During Works

Once the Works have begun, ongoing communication is important. Regular communication during the Works will include:

- Public site signage that includes contact details
- Details of upcoming activities that may result in disturbance
- Any changes to scheduled timing and duration of activities

4.2 Consultation

Consultation will be undertaken with the south-facing occupants of 148 Quay Street. These are the neighbours who overlook the noisiest activities, and where noise may exceed the limits.

The purpose of consultation is to address concerns about noise on a case-by-case basis. The Project Manager will address any concerns and complaints in accordance with this Section. A copy of all correspondence will be made available to Council upon request.

Some receivers may not want ongoing consultation, in which case they will be included in the communication list (Section 4.1).

The following process will be implemented by the Project Manager (or nominated person):

- Review the construction methodology, mitigation measures and management strategies to ensure they represent the BPO. The BPO considers:
 - Practicability
 - Predicted noise/vibration benefits
 - The interests of affected parties
 - Implications for Project timing and duration
 - Cost
- Consultation with affected parties to understand their sensitivities, including times they are home. The objective is to establish a collaborative approach to managing adverse noise effects
- A project representative will be contactable at all times during work hours
- A record of consultation will be kept at the site office and be available to affected parties and Council if requested
- Implement any measures agreed with the affected party in good faith
- Monitor the activity to verify the extent of any adverse effects

4.3 Complaints Response

All construction noise complaints will be recorded in a complaints file that is available to affected parties and Council on request. For each complaint, an investigation will be undertaken as soon as practicable using the following steps:

- Acknowledge receipt of the concern or complaint and record:

- The name, address and contact details of the complainant (unless they elect not to provide)
- Time and date the complaint was received and who received it
- Time and date of the activity that caused the complaint (estimated where not known)
- The complainant's description of the activity and its resulting effects
- Any relief sought by the complainant (e.g. scheduling of the activity)
- Identify the relevant activity and review the activity log to verify the complaint (or otherwise)
- If a complaint relates to building damage, inform the on-duty site manager as soon as practicable and stop the offending works pending an investigation.

In most cases, stopping the activity will provide immediate relief. But in some cases, this may not be practicable for safety or other reasons, in which case the complainant will be kept updated regularly during the time it takes to stop the activity

- Review data from long-term monitors to identify the time in question and, if possible, confirm exceedance
- Review the predicted noise levels to determine if the activity was identified as high-noise. Consider attended monitoring to verify the underlying reference level assumptions
- Review the mitigation and management measures in place to ensure the BPO has been applied. Review the relief sought by the complainant. Adopt further mitigation and management measures as appropriate
- Report the findings and recommendations to the Project Manager, implement changes and update this CNMP as appropriate
- Report the outcomes of the investigation to the complainant, identifying where the relief sought by the complainant has been adopted or the reason(s) otherwise

5.0 NOISE MONITORING

There are two types of noise monitoring:

- **Attended monitoring:** This is where a suitably qualified acoustic engineer visits the site and measures levels in real time. This enables immediate assessment of the activities, whether they are being carried out in the correct location, using the correct equipment, and whether any BPO measures are being correctly applied (refer Section 3.0).
- **Long-term monitoring:** This is where a fixed noise monitor measures continuously for a long period of time. Exceedance alerts are automatically sent to the Project Manager (or nominated person) for them to act on.

A long-term noise monitor is attached to the exterior of 148 Quay Street – southern (Tyler Street) side of the building at first floor level. It was installed to monitor noise from CRL C1 activities, and will be retained for the duration of the Works. It measures noise levels continuously and automatically uploads them to cloud software, and alerts construction team personnel of any exceedances.

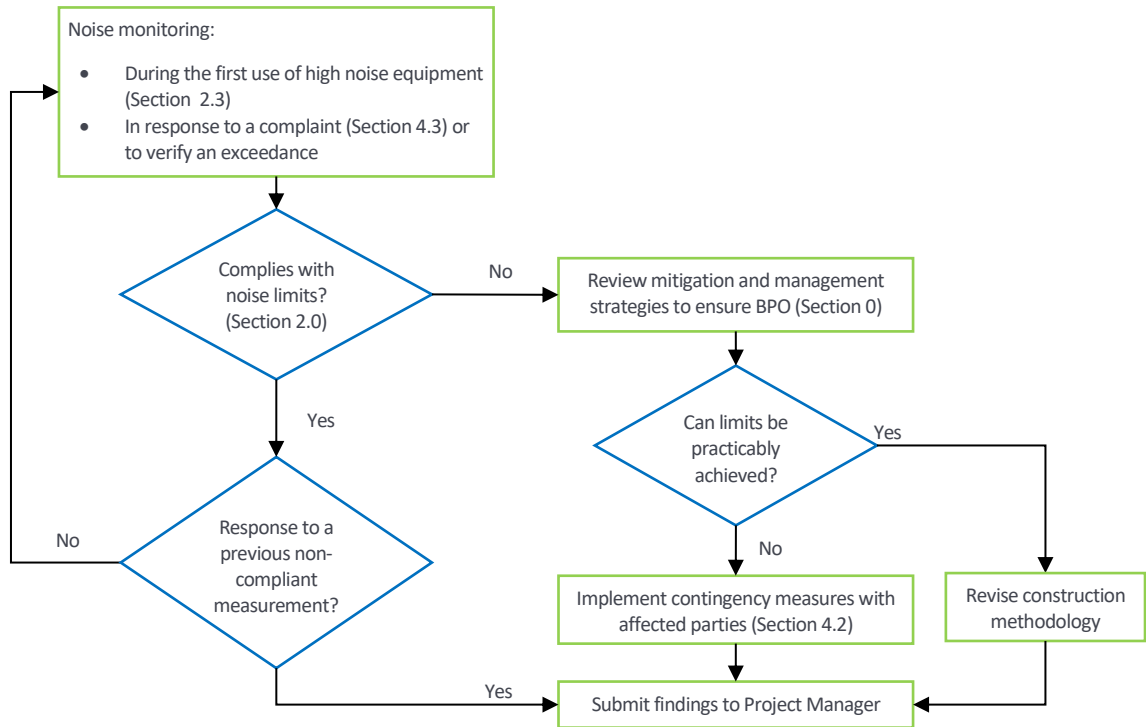
Attended monitoring will be used where the long-term noise monitor is unable to capture the noise source of interest.

Construction noise will be monitored:

- The first time a concrete delivery is undertaken on site
- In response to a reasonable noise complaint (Section 4.3)
- At 1m from the building façade facing the Station Plaza construction support area, or a proxy position adjusted for distance
- By a suitably qualified and experienced specialist (e.g. Member of the Acoustical Society of New Zealand) in accordance with the requirements of New Zealand Standard NZS 6803: 1999 *“Acoustics - Construction Noise”*
- For an appropriate duration, reported with the measured level (e.g. 65 dB $L_{Aeq(30min)}$)
- The results will be used to update Section 2.3 if appropriate

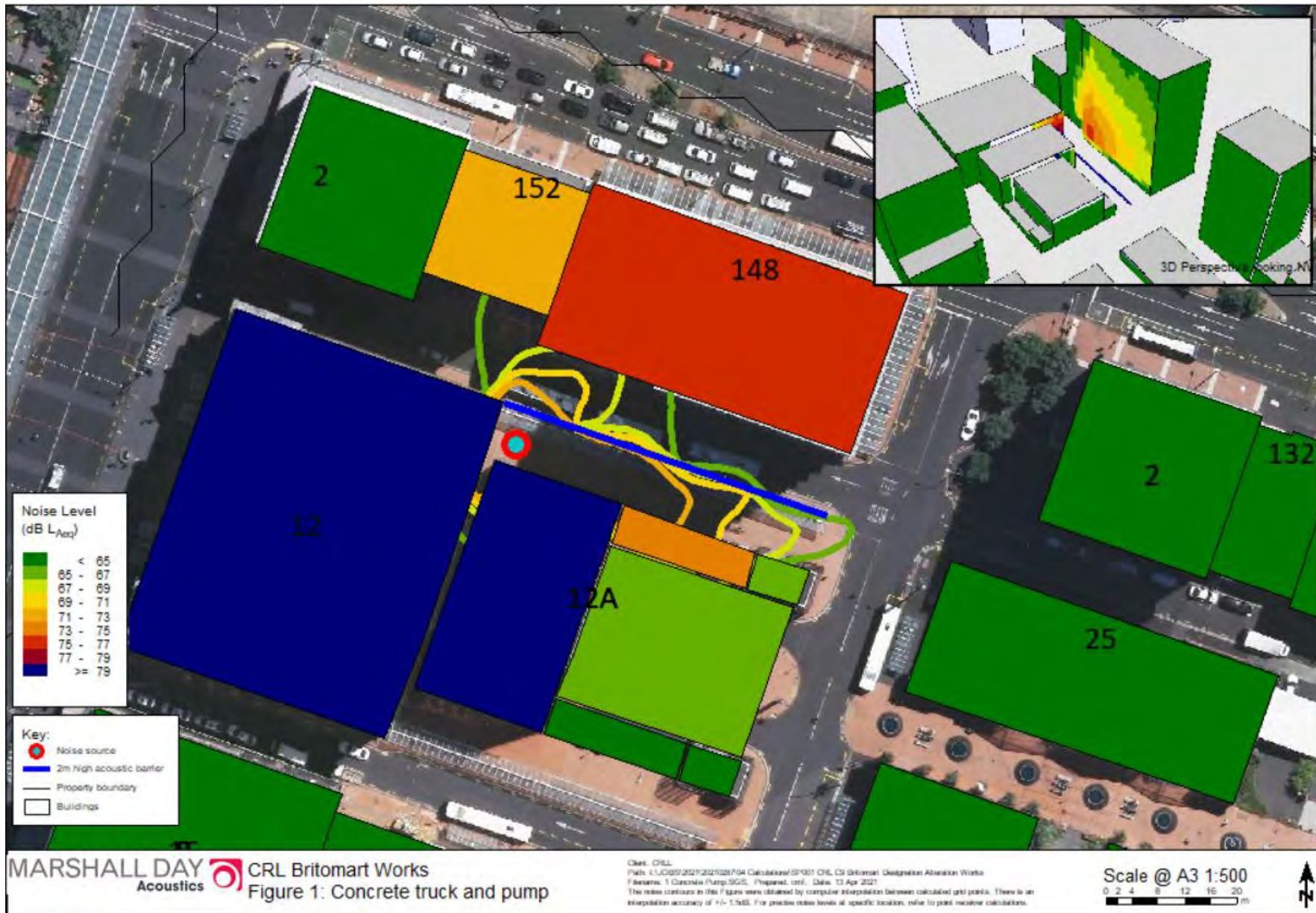
A noise monitoring flowchart is presented in Figure 2.

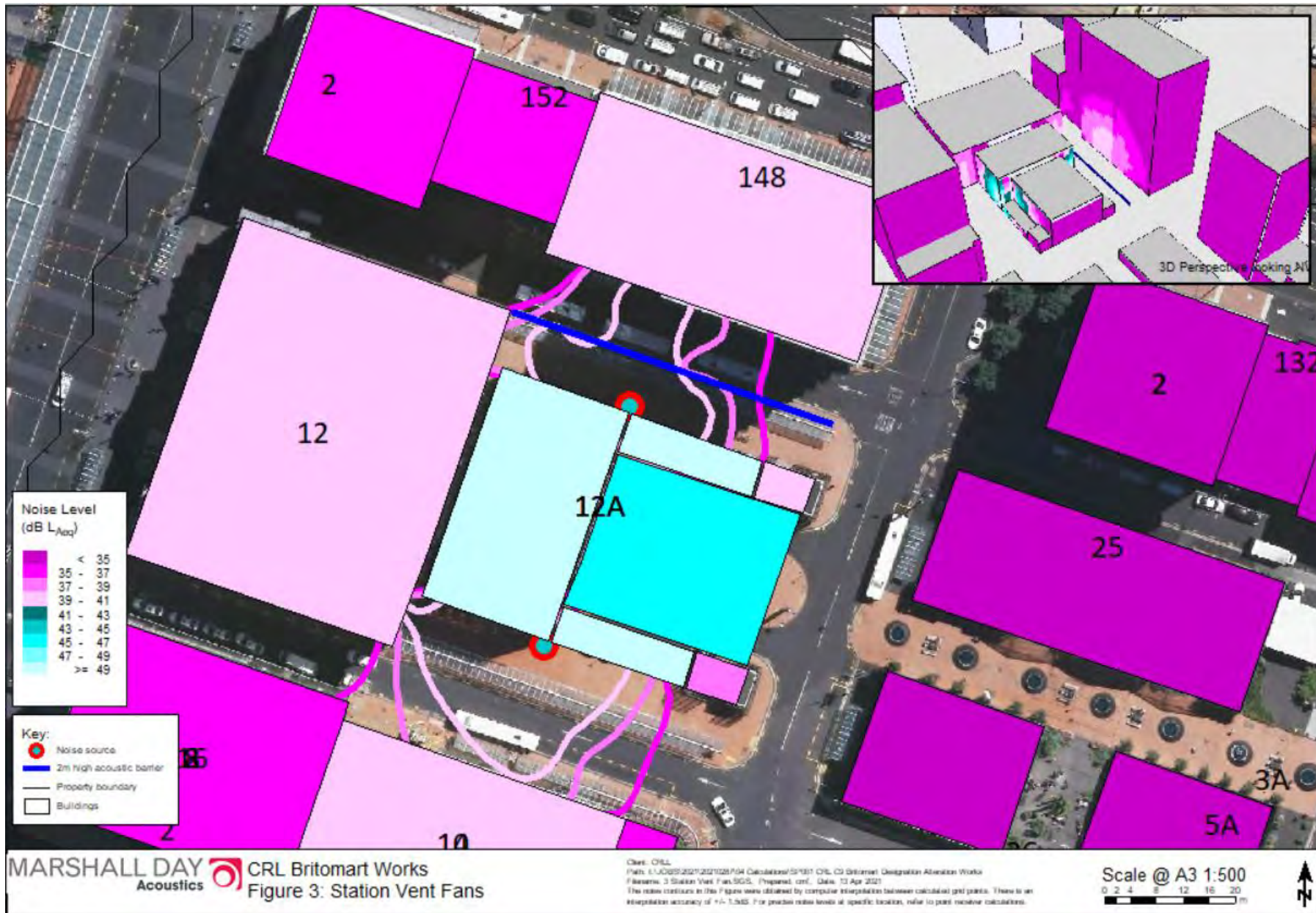
Figure 2: Noise Monitoring Flow Chart

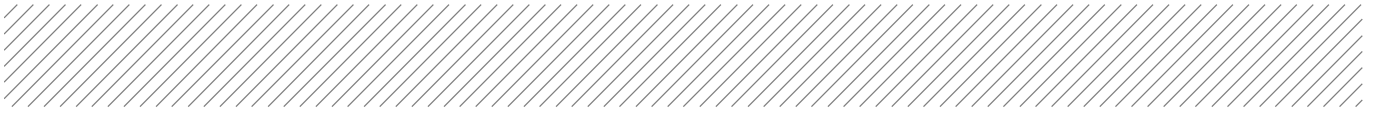


APPENDIX A GLOSSARY OF TERMINOLOGY

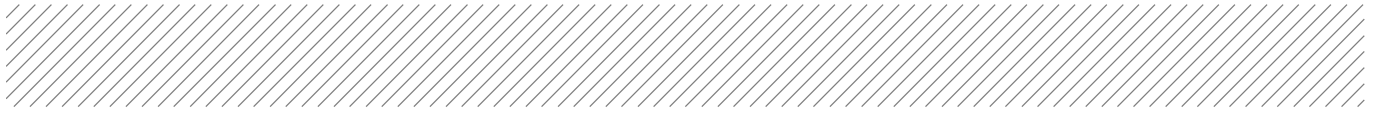
Noise	A sound that is unwanted by, or distracting to, a receiver.
dB	Decibel (dB) is the unit of sound level. Expressed as a logarithmic ratio of sound pressure (P) relative to a reference pressure (Pr), where $dB = 20 \times \log(P/Pr)$.
dB(A)	The unit of sound level which has its frequency characteristics modified by a filter (A-weighted) to more closely approximate the frequency bias of the human ear. A-weighting is used in airborne acoustics.
L_{Aeq}(t)	The equivalent continuous (time-averaged) A-weighted sound level commonly referred to as the average level. The suffix (t) represents the period, e.g. (8 h) would represent a period of 8 hours, (15 min) would represent a period of 15 minutes and (2200-0700) would represent a measurement time between 10 pm and 7 am.
L_{AFmax}	The A-weighted maximum noise level. The highest noise level which occurs during the measurement period.
NZS 6803:1999	New Zealand Standard NZS 6803: 1999 “Acoustics - Construction Noise”
Sensitive Noise and Vibration Receivers	Receivers that may be disturbed during rest, concentration, communication or prayer. These include (but are not limited to): <ul style="list-style-type: none"> • Dwellings • Offices • Schools, including Child Care Centres and tertiary facilities • Libraries • Hospitals • Rest Homes • Marae and other Cultural Centres • Churches • Hotels or other accommodation facilities







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Appendix B

Construction Traffic

Management Plan

**City Rail Link: Britomart
Transport Centre**

Construction Traffic
Management Plan

June 2021

flow

TRANSPORTATION SPECIALISTS

Project: City Rail Link: Britomart Station
Title: Construction Traffic Management Plan
Document Reference: \\Flow-dc01\Projects\aur\017 CRL Britomart
NoR\Reporting\R2B210622 - Construction Transport Management
Plan Britomart Station.DOCX
Prepared by: Parag Gupta/Harry Ormiston
Reviewed by: Ian Clark
Revisions:

Date	Status	Reference	Approved by	Initials
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22 June 2021	Final	R2A210621	I Clark	

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EXECUTIVE SUMMARY

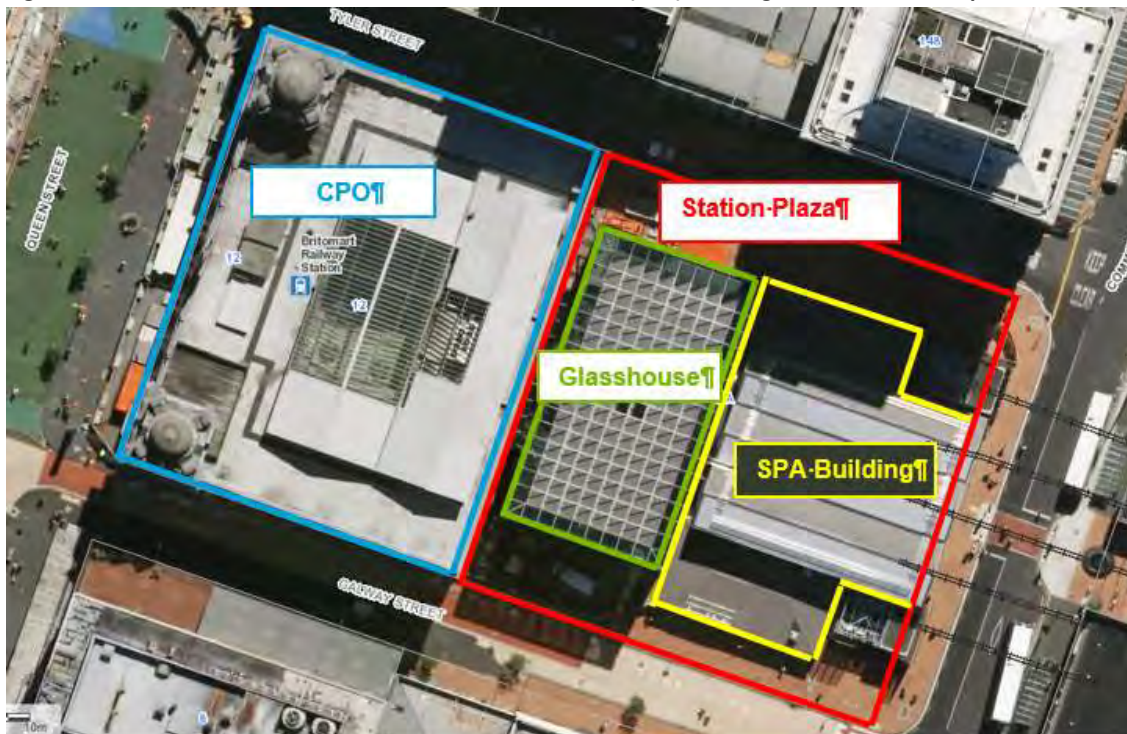
This Report is a Construction Traffic Management Plan (CTMP) to support the City Rail Link Limited (CRL) Notice of Requirement (NOR) to alter CRL Designation 2501 at Britomart Station pursuant to section 181(1) of the Resource Management Act 1991 (RMA).

The purpose of the alteration is to provide for retention of the Station Plaza Accommodation (SPA) building within the Britomart Transport Centre (BTC), so that the building and surrounding Station Plaza area can be used as a construction support facility for works in the CRL tunnels located within the adjoining Designation 2500-1 to the west.

A full description of the activities associated with the NOR is contained in the Assessment of Effects on the Environment (AEE), Form 18 and Constructability Report (appended to the AEE).

The location of the Works associated with the NOR is shown in Figure ES1.

Figure ES1: Station Plaza and Station Plaza Accommodation (SPA) building at Britomart Transport Centre



The purpose of this report is to establish a framework for which future construction activities can operate under, while managing any temporary effects on the surrounding transport network.

In summary

- ◆ Access to and from the wider strategic transport network can be provided via Quay Street
- ◆ Temporary truck access to the Site can be accommodated by a temporary site access on Tyler Street

- ◆ We anticipate up to 80 truck movements (40 trucks) will be generated per day during the concrete pour phases¹. We consider that these movements can be easily accommodated by the surrounding road network
- ◆ Temporary traffic management will be required to control access and egress of heavy vehicles
- ◆ Any heavy vehicle reversing within the public road must be supervised by a “spotter” to ensure the safety of other road users
- ◆ An approved site-specific Transport Management Plan (SSTMP) will impose an appropriate temporary speed limit on the street through the works
- ◆ Any works requiring a stop-go on Commerce Street, to enable trucks to reverse into Tyler Street, will be limited to periods outside of the weekday peaks, unless reversing within these peaks is agreed with the corridor access team at Auckland Transport
- ◆ Pedestrian access to and from Britomart Station will be discussed and agreed upon with Auckland Transport, with any decisions forming part of the CTMP
- ◆ Access to properties on Tyler Street will be maintained at all times, except for short duration interruptions when construction vehicles enter and exit the site.

Provided that the recommendations of this CTMP are adopted as part of the CTMP for the construction works, we consider that there will be only minor effect to nearby properties and road users during the construction period.

¹ A maximum of forty trucks per day is expected over 20 days with Stage 1, in the first quarter of 2022. A similar number of trucks per day is expected over 10 days with Stage 2, during the second quarter of 2022

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1 INTRODUCTION

1.1 Background

This report has been developed by Flow Transportation Specialists (Flow) and it provides a Construction Traffic Management Plan (CTMP) to support the City Rail Link Limited (CRL) Notice of Requirement (NOR) to alter CRL Designation 2501 at Britomart Station pursuant to section 181(1) of the Resource Management Act 1991 (RMA). The purpose of this report is to establish a framework under which future construction activities can operate, while managing any temporary effects on the surrounding transport network.

1.2 Project Description

The purpose of the alteration is to provide for retention of the Station Plaza Accommodation (SPA) building within the Britomart Transport Centre (BTC), so that the building and surrounding Station Plaza area can be used as a construction support facility for works in the CRL tunnels located within the adjoining Designation 2500-1 to the west.

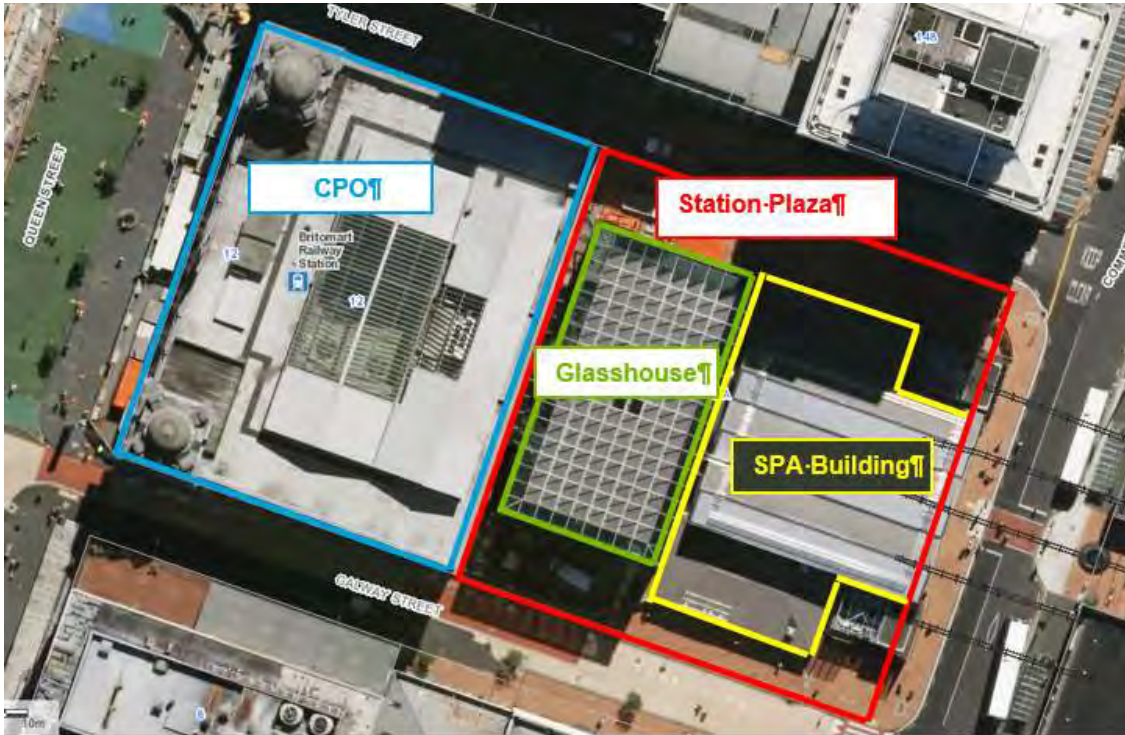
A full description of the activities associated with the NOR is contained in the Assessment of Effects on the Environment (AEE), Form 18 and Constructability Report (Appendix B to the AEE).

In summary, the activities associated with the NOR are:

- ◆ Site office, worker accommodation and some storage of materials within the SPA building
- ◆ Establishing and operating ventilation equipment in the Station Plaza area (to provide ventilation for workers in the CRL tunnels to the west)
- ◆ Access for workers and deliveries of equipment and materials via the Glasshouse and former Chief Post Office (CPO); and
- ◆ Receiving and pumping concrete into the CRL tunnels (to construct the railway trackbed) from the Station Plaza area adjoining Tyler Street.

The location of the Works associated with the NOR is shown in Figure 1.

Figure 1: Station Plaza and Station Plaza Accommodation (SPA) building at Britomart Transport Centre



2 CTMP OVERVIEW

2.1 CTMP objectives

The objectives of the CTMP are to ensure that

- ◆ Movement is retained along Commerce Street throughout the Works period, with the retention of one general traffic in each direction, pedestrian movement areas, pedestrian crossings and bus movements and restricting any traffic management requiring implementation of a stop/go on Commerce Street during the weekday peak periods, unless approved by the corridor access team at Auckland Transport.
- ◆ Movement is retained along Tyler Street throughout the Works period by providing a general traffic lane of at least of 3 m wide along the northern side of the construction zone on Tyler Street
- ◆ Local access is retained along Tyler Street, with access to properties on the northern side, including appropriate vehicle manoeuvring area to access car parking, and loading docks and a footpath with minimum width of 1.5m
- ◆ Pedestrian connections are maintained from Tyler Street through to the Te Komititanga public space in Lower Queen Street
- ◆ Pedestrian access to the Britomart rail station to the satisfaction of Auckland Transport
- ◆ Construction Access from Commerce Street is restricted, with any vehicle requiring reversing into site limited where necessary, reducing potential adverse effects on the bus services and north-south traffic movements.

2.2 CTMP priority

The following priority is assumed for movements along and across Commerce Street during the construction phase

- ◆ Pedestrian and public transport will be afforded the highest priority, along with other essential movement, including emergency services
- ◆ Essential vehicle access to properties within or adjacent to the construction areas will be maintained. Such vehicles include service and delivery vehicles
- ◆ Private car travel will be given the lowest priority, particularly extraneous vehicles, which should be encouraged to avoid passing through the city centre.

The following priority is assumed for movements along and across Tyler Street during the construction phase

- ◆ Pedestrians will be afforded the highest priority, along with other essential movement, including emergency services
- ◆ Essential vehicle access to properties within or adjacent to the construction areas will be maintained. Such vehicles include service and delivery vehicles.

3 CONSTRUCTION OVERVIEW

3.1 Construction Timing

There are expected to be two periods of time when concrete is to be delivered to the site:

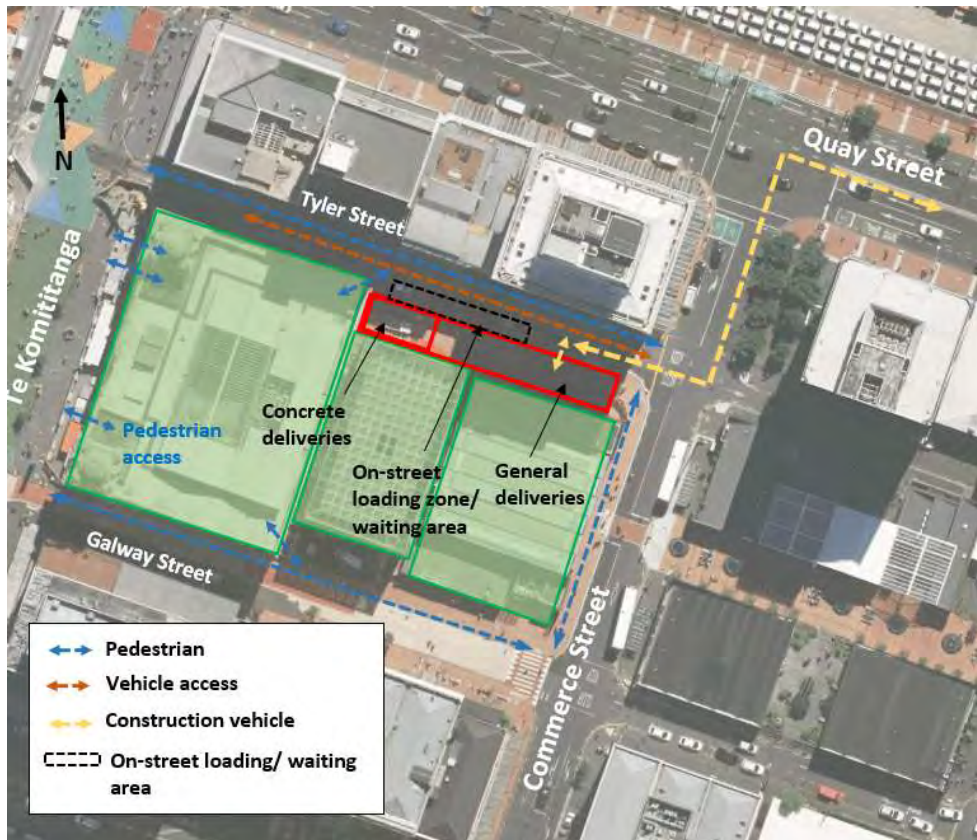
- ◆ The first two period will occur in the first quarter of 2022, over 20 days
- ◆ A second pour is programmed to take place during quarter 2 in 2022. Concrete will be delivered for 10 days, every second day.

In total then, 30 days out of the construction program will result in truck movements associated with these concrete pours. Deliveries are to take place between 6.30am and 9.30pm, on Mondays through to Saturdays. However, in the event of on-site delays, deliveries could extend to 10.30pm. These movements will take place using eight-wheeler delivery trucks capable of delivering 6m² of concrete.

3.2 Construction Works Access

The site access point is to be provided on the north-eastern side of the Works shown in Figure 2.

Figure 2: Site access



3.3 Construction Vehicle Movements

The number of construction vehicles accessing the site is based on each of the main stages of the Works. These are:

- ◆ **Support Works:** Works to support the initial buildings works within the Britomart Station (delivery and storage of concrete blocks, steelwork etc.)
- ◆ **General Deliveries:** Deliveries of electrical and rail system-related equipment
- ◆ **Concrete Deliveries:** Delivery of concrete, to be pumped down into the tunnels.

It is estimated that there will be between 5-10 vehicles per day, outside the periods of the two concrete pours (see Section 3.3.1 below). These will be mainly utes and other small delivery vehicles, which may use either Tyler Street or Galway Street. These movements will be focussed on the inter peak period as far as possible (between 9.30am and 3.30pm) in order to minimise traffic effects.

Trucks will travel via Quay Street and enter the site from Commerce Street. This will provide reasonable access from the State Highway network and restrict the number of construction vehicles passing through the city and busier streets. Vehicles exiting the site will do so from the east of the site, turning left onto Commerce Street. The egress will be maintained appropriately by an STMS. The routing of construction vehicles is shown in Figure 2 above.

3.3.1 Concrete delivery

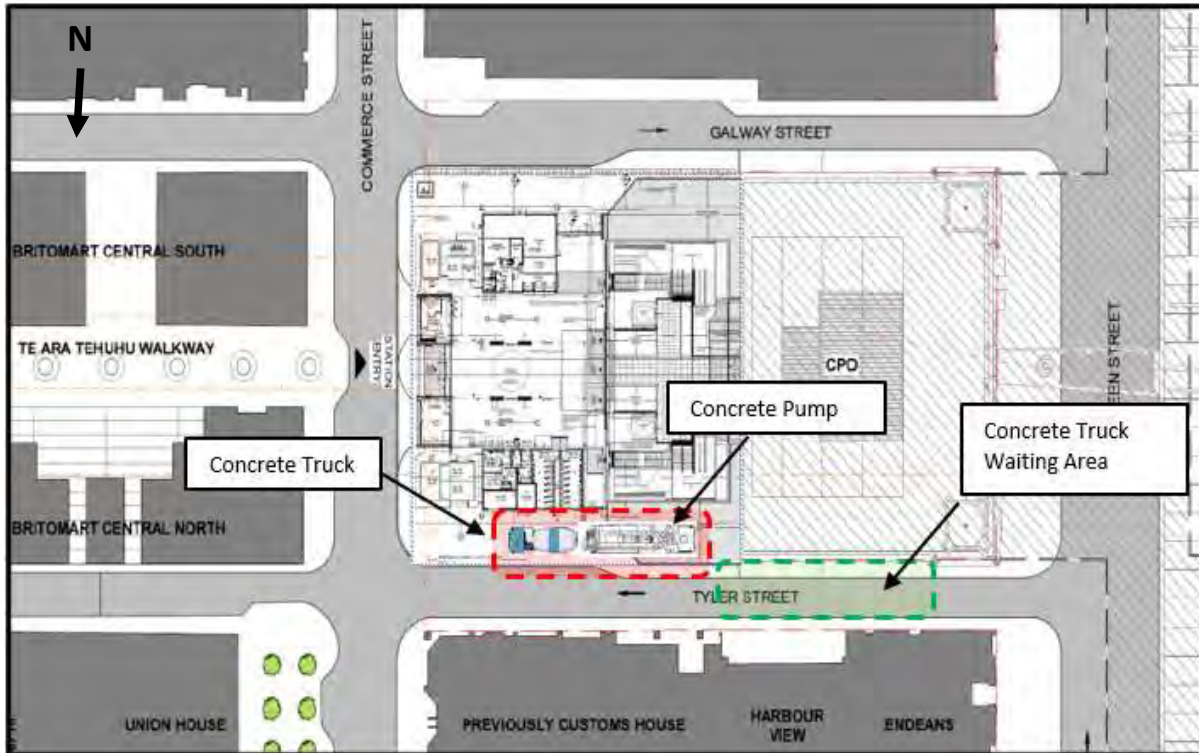
During concrete pours, higher truck movements will be expected.

We are advised that the two periods of concrete pours will lead to the following numbers of trucks:

- ◆ Stage 1, up to 40 truckloads per day. These movements are expected to take place at a fairly consistent rate throughout the day (within the hours set out in Section 3.1 above), meaning that a conservative maximum frequency is likely to be up to 10% of the daily total within a single hour
- ◆ Stage 2: up to 40 truckloads per day, every second day. Again, these deliveries are likely to take place throughout the day, meaning that a maximum frequency may be 10% of the daily flow, within a single hour.

Figure 3 below shows the location of the concrete truck/pump station.

Figure 3: Proposed Concrete truck/pump station



With the concrete pump located to the west of the site (closest to the CPO building), some truck drivers will wish to reverse into the site from Commerce Street. The reversing of vehicles into site will require implementing a stop/go arrangement on Commerce Street. The stop-go would hold all traffic and pedestrians at suitable locations to enable the truck to reverse into the site. This is not an uncommon practice, particularly for concrete deliveries, and can be appropriately managed through standard traffic management protocols.

The stop/go traffic management set-up on Commerce Street has been discussed with the Auckland Transport's Corridor Access Team. Given the quantum of bus movements southbound on Customs Street, Auckland Transport considers a stop-go set-up would be unacceptable during weekday peak periods, but permissible outside of the identified peaks. The peak periods, where reversing of vehicles would unlikely be permitted, have been identified as between **7 AM and 9:30 AM, and 3 PM and 6 PM** during weekdays.

Therefore, with the concrete pump to be located to the west of the site (closest to the CPO building), the following arrangements are proposed:

- ◆ During the weekday peak periods, trucks will enter Tyler Street from Commerce Street in a forward direction. They will manoeuvre within Tyler Street either before or after unloading, then will re-enter Commerce Street in a forward direction. This manoeuvre has been tested on site (under STMS control) using the type of concrete truck proposed to be used during the Works, and it can be achieved, although it requires a series of forward and reverse manoeuvres within Tyler Street to achieve a U-turn

- ◆ Outside of the weekday peak periods, trucks will reverse into the site from Commerce Street, which will require implementing a stop-go arrangement on Commerce Street. The stop-go would hold all traffic and pedestrians at suitable locations to enable the truck to reverse into the site. This is not an uncommon practice, particularly for concrete deliveries, and can be appropriately managed through standard traffic management protocols.

Construction traffic is to comply with the posted speed limit. An approved Site-specific Transport Management Plan (SSTMP) will impose an appropriate temporary speed limit on the street through the works, which will need to be approved by Auckland Transport.

3.4 Temporary Traffic Management Measures

Temporary traffic management measures will be required to manage interactions between construction traffic and other road users.

The following changes to footpaths will occur during construction

- ◆ Pedestrian access will be maintained along Tyler Street. However, during major deliveries, there will need to be some temporary short-term access restrictions for pedestrian safety reasons. Typically this may amount to a few minutes of pedestrian restricted movement while trucks are escorted to the site compound or undertake a delivery
- ◆ Similarly there may be short duration closures of the pram crossings on Tyler Street, at the intersection with Commerce Street, when construction vehicles are entering or exiting Tyler Street
- ◆ Pedestrian access to and from Britomart Station will be discussed and agreed upon with Auckland Transport, with any decisions forming part of the CTMP
- ◆ Appropriate wayfinding signage will be implemented to ensure pedestrians are informed of diversions required, minimising confusion throughout the Works.

The following changes to public transport, service vehicles and general traffic will occur during construction

- ◆ Cognisant of the reliance on public transport into and out of the city, and the role it plays as an alternative to the private vehicle, it is central to the CTMP to identify measures to maintain bus patronage during the works
- ◆ Any works requiring a stop-go on Commerce Street will not be permitted during the weekday peak periods, unless agreed with the corridor access team at Auckland Transport
- ◆ Further, vehicle capacity for general vehicles will be maintained to existing capacities, through the Works site, with a probability of traffic transferring to alternative routes that are already experiencing delays.

3.5 Property access

The Works will not infringe on Commerce Street. Existing property access, car parking, and loading areas connected to or located on Commerce Street will remain operational for the Works duration.

Table 1 identifies the properties on Tyler Street that have accesses adjacent to the Works, which will be maintained during the Works period. It is not proposed to close access for vehicles and/or pedestrians at any stage during the Works – either onto or from Tyler Street, except for short duration interruptions when construction vehicles enter and exit the site.

Table 1: Affected Properties

Road	Location	Properties	Mitigation
Tyler Street	Commerce St to Queen St	Access and egress for 148 Quay Street parking Access and egress for 148 Quay Street loading dock Access and egress for 152 Quay Street parking Access and egress for Endeans building for deliveries	Pedestrian access is to be maintained. Vehicle access will be retained for all properties on the northern side, with a suitable manoeuvring area to enter and exit the car park safely.

3.6 Emergency Services access

Emergency service access to properties along Tyler Street will be maintained during the Works period. Similarly, emergency services bound for other locations may use Commerce Street. The proposed Works site and traffic management will not adversely impact the ability to travel through Commerce Street.

However, as part of the CTMP, Emergency services will be notified of the Works, as is standard with any traffic management plans. Any recommendations will be reflected in the Construction Traffic Management Plans, and more importantly, the Traffic site set-up.

3.7 Couriers, deliveries and taxis

During the Works, courier and delivery access to properties on the northern side of Tyler Street would not be impacted. We further note that two loading areas have been reinstated on Quay Street directly fronting properties at 148 and 152 Quay Street. The reinstatement should ease the quantum of deliveries occurring on Tyler Street.

With no taxi stands on this section of Commerce or Tyler Street, taxis would only be indirectly affected by the Works.

3.8 Construction Offices and Staff

The site office will be located within the SPA building with no car parking provided for staff or visitors. A maximum of 50 staff working at the site at any one time is expected. All staff will be encouraged to use public transport, walk or cycle to enter the city to reduce traffic further.

3.9 Quay Street projects

We understand that the current construction works on Quay Street will be completed by end of June 2021. However, there will be some works associated with the redevelopment of 1 Queen Street, which will require some traffic management on Quay Street.

4 CONCLUSIONS

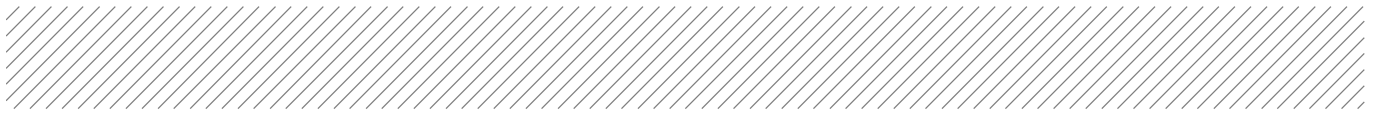
This CTMP demonstrates that, subject to further development of our report prior to works commencing, the CRL works at Britomart Station can be appropriately managed to minimise effects on nearby properties and all road users.

In summary

- ◆ Access to and from the wider strategic transport network can be provided via Quay Street
- ◆ Temporary truck access to the Site can be accommodated by a temporary site access on Tyler Street
- ◆ We anticipate up to 80 truck movements (40 trucks) will be generated per day during the concrete pour phases². We consider that these movements can be easily accommodated by the surrounding road network
- ◆ Temporary traffic management will be required to control access and egress of heavy vehicles
- ◆ Any heavy vehicle reversing within the public road must be supervised by a “spotter” to ensure the safety of other road users
- ◆ An approved site-specific Transport Management Plan (SSTMP) will impose an appropriate temporary speed limit on the street through the works
- ◆ Any works requiring a stop-go on Commerce Street, to enable trucks to reverse into Tyler Street, will be limited to periods outside of the weekday peaks, unless reversing within these peaks is agreed with the corridor access team at Auckland Transport
- ◆ Pedestrian access to and from Britomart Station will be discussed and agreed upon with Auckland Transport, with any decisions forming part of the CTMP
- ◆ Access to properties on Tyler Street will be maintained at all times, except for short duration interruptions when construction vehicles enter and exit the site

Provided that the recommendations of this CTMP are adopted as part of the CTMP for the construction works, we consider that there will be only minor effect to nearby properties and road users during the construction period.

² A maximum of forty trucks per day is expected over 20 days with Stage 1 and a similar number of trucks per day is expected over 10 days with Stage 2



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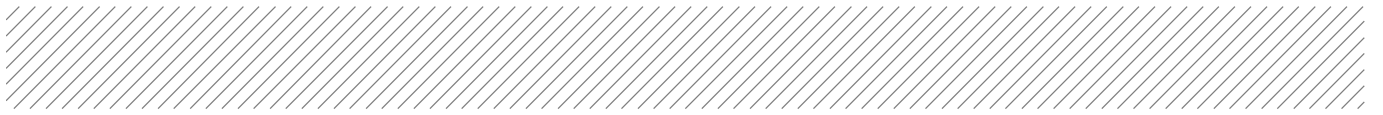
aurecon

Auckland Office

Level 4, Aurecon House
139 Carlton Gore Road
Auckland 1023
New Zealand
T +64 9 520 6019
F +64 524 7815

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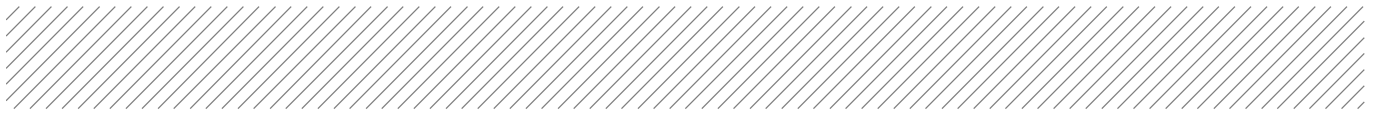
Appendix E

Auckland Unitary Plan (Operative in Part) Assessment

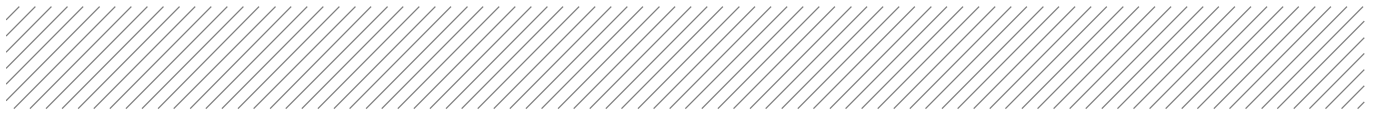
The relevant objectives and policies in relation to the Works are assessed in Table 9-1.

Table 9-1 Auckland Unitary Plan (Operative in Part) Statutory Assessment

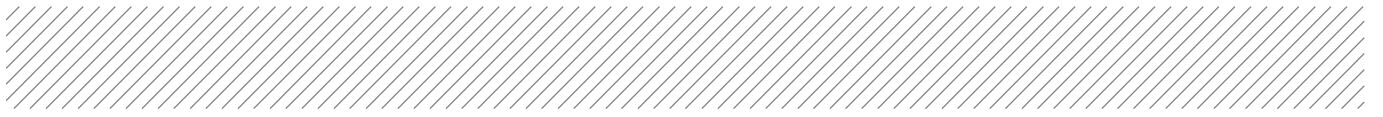
Objective/Policy	Comment
Chapter D17 Historic Heritage Overlay	
<p>D17.2 Objective (1)</p> <p><i>The protection, maintenance, restoration and conservation of scheduled historic heritage places is supported and enabled.</i></p>	<p>The Works will be undertaken in a manner that ensures the protection of scheduled historic heritage places (described in Table 3-1). The Works involve a number of activities including site establishment, temporary tunnel ventilation, concrete deliveries, deliveries and storage of materials. These works will be contained within the site (with loading bays for deliveries located adjacent to the site on Tyler Street) and will not result in vibratory impacts beyond what is permitted under the AUP. No alteration to existing heritage buildings is required and no additional land disturbance will occur to the pre-1900 reclamation land the Works are located on and in.</p> <p>Furthermore, the Station Plaza Accommodation was originally designed to provide a high standard of amenity and functionality. As such, allowing the Station Plaza Accommodation to remain in place for the duration of Works will not result in any additional visual adverse effects to the surroundingscheduled historic heritage places. .</p>
<p>D17.3 Policy (24)</p> <p><i>Enable the operation, maintenance, repair and upgrading of network utilities and small-scale electricity generation facilities, and connections to buildings for network utilities within scheduled historic heritage places in a manner that avoids, remedies or mitigates new adverse effects on the heritage values.</i></p>	<p>The footprint of the Works is adjacent to scheduled buildings. The nature of the Works (being contained within the site and not resulting in vibratory impacts beyond what is permitted under the AUP), will not result in adverse effects on heritage values. As such, it is considered that the Works are consistent with the objectives and policies of Chapter D17.</p>
Chapter D25 City Centre Port Noise Overlay (NA)	



<p>D25.2 Objective (1)</p> <p><i>The port is protected from reverse sensitivity effects arising from activities sensitive to noise.</i></p>	<p>There are no activities sensitive to noise that are proposed as part of the Works. As such, the Works are consistent with the objectives and policies of Chapter D25.</p>
<p>Chapter E25 Noise and Vibration</p>	
<p>E25.2 Objective (1)</p> <p><i>People are protected from unreasonable levels of noise and vibration.</i></p>	<p>As described in section 6 of this AEE, the construction noise impacts from the Works will be managed in accordance with the Construction Noise Management Plan to ensure any adverse effects are mitigated. As such, it is considered that the Works are consistent with the objectives and policies in Chapter E25.</p>
<p>E25.2 Objective (4)</p> <p><i>Construction activities that cannot meet noise and vibration standards are enabled while controlling duration, frequency and timing to manage adverse effects.</i></p>	<p>The purpose of the Construction Noise Management Plan is to ensure the mechanism for managing exceedances of noise and vibration standards, resulting from the Works is in place prior to the Works commencing. The Management Plan achieves a balance between the impact of noise effects on receivers and the need to undertake the Works in the most efficient manner.</p>
<p>E25.3 Policy (10)</p> <p><i>Avoid, remedy or mitigate the adverse effects of noise and vibration from construction, maintenance and demolition activities while having regard to:</i></p> <ul style="list-style-type: none"> <i>(a) the sensitivity of the receiving environment; and</i> <i>(b) the proposed duration and hours of operation of the activity; and</i> <i>(c) the practicability of complying with permitted noise and vibration standards.</i> 	<p>The effects of construction noise will be managed through the implementation of the Construction Noise Management Plan. As such, this will ensure that any adverse noise impacts are avoided, remedied and mitigated.</p>
<p>Chapter E27 Transport</p>	
<p>E27.2 Objective (2)</p> <p><i>An integrated transport network including public transport, walking, cycling, private vehicles and freight, is provided for.</i></p>	<p>The CRL, which the Works are a component of, will provide for an integrated public transport network through providing additional capacity for the passenger transport system and increasing accessibility to the city centre. Through increasing accessibility to the city centre, the CRL also provides an opportunity to stimulate economic development. In addition, the CRL provides a catalyst for inner city re-development by creating new major transport hubs around the existing and new underground rail station, which will stimulate land use intensification and regeneration of central city areas.</p> <p>As such, it is considered that the Works are consistent with the objectives and policies of Chapter E27.</p>
<p>E27.3 Policy (13)</p> <p><i>Provide for park-and-ride and public transport facilities which are located and designed to support the public transport network by:</i></p> <ul style="list-style-type: none"> <i>(a) locating in proximity to public transport stations, stops and terminals;</i> <i>(b) growing public transport patronage to assist in relieving congested corridors by encouraging commuters to shift to public transport;</i> <i>(c) making public transport easier and more convenient to use, thereby attracting new users;</i> <i>(d) improving the operational efficiency of the public transport network;</i> 	



<p>(e) extending the catchment for public transport into areas of demand where it is not cost-effective to provide traditional services or feeders;</p> <p>(f) reinforcing existing and future investments on the public transport network; and</p> <p>(g) providing free, secure and covered parking for bicycles.</p>	
<p>Chapter I201 Britomart Sub-Precinct B</p>	
<p>I201.2 Objective (1)</p> <p><i>An attractive, safe and lively environment that reflects the importance of the precinct's role as a regional transport interchange, and provides a link between the core central business district and the harbour edge.</i></p>	<p>The Works will facilitate and enable the construction of the CRL. The CRL will unlock the Auckland rail network through Britomart and allow for more train movements on the Auckland rail network. This will allow people to better access the city centre area by train and increase rail patronage. The CRL will also provide significant additional capacity to the passenger transport system. As such, the Works, as a component of the CRL, reflect the importance of the Britomart Precinct by enabling a high functioning regional interchange and enhancing transport links. The use of the SPA will ensure the majority of the construction support area associated with the Works is screened from view at road level.</p>
<p>I201.2 Policy 4</p> <p><i>Require buildings and public open spaces to achieve a high standard of urban design while maintaining or enhancing the values of heritage buildings within the precinct.</i></p>	<p>The SPA was designed to a high standard of amenity and functionality. The installation of ventilation fans is also required to provide oxygen to the CRL tunnels in order to provide safe working conditions. This equipment is small in nature compared to the surrounding form and intensity of development within the Britomart Precinct and are temporary. As such, it is considered that the Works are consistent with the objectives and policies of Chapter I201.</p>
<p>I201.3 Policy (7)</p> <p><i>Manage the scale, form and intensity of development to maintain the character of the Britomart Precinct.</i></p>	
<p>Chapter H8 Business City Centre Zone</p>	
<p>H8.2 Objective (8)</p> <p><i>Development in the city centre is managed to accommodate growth and the greatest intensity of development in Auckland and New Zealand while respecting its valley and ridgeline form and waterfront setting.</i></p>	<p>The Works are a component of the CRL, which will unlock the Auckland rail network and increase the accessibility through public transport. This will assist in accommodating the growth expected within Auckland. The CRL, particularly within Britomart Station, will also create an integrated regional transport system within Auckland Central. The Works do not involve the construction of any additional permanent structures above ground and will not impact on the appearance of the area in the long term.</p>
<p>H8.2 Objective (11)</p> <p><i>The city centre is accessible by a range of transport modes with an increasing percentage of residents, visitors, students and workers choosing walking, cycling and public transport.</i></p>	<p>The city centre will remain accessible to persons using the public streets surrounding the SPA. In particular, access to the transport centre via the CPO will not be impeded.</p>





aurecon

Auckland Office

Level 4, Aurecon House
139 Carlton Gore Road
Auckland 1023
New Zealand
T +64 9 520 6019
F +64 524 7815

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