Cross River Rail Environmental Impact Statement

Request for Project Change 11

Changes to the Project and changes to the Imposed Conditions

Volume 1 Application

Date: ***April 2021***

Author: ***Cross River Rail Delivery Authority***

CROSSRIVERRAIL

Queensland Government

Executive Summary

The Cross River Rail (CRR) Project is a Coordinated Project for which an Environmental Impact Statement (EIS) is required under the *State Development and Public Works Organisation Act 1971*. The CRR EIS was evaluated by the Coordinator-General, who recommended the Project proceed, subject to Imposed Conditions and recommendations. Since the evaluation of the EIS, ten Requests for Project Change (RfPCs) have been submitted to the Coordinator-General, and nine have been evaluated.

The Cross River Rail Delivery Authority (Delivery Authority) is applying to the Coordinator-General to evaluate a change to the CRR Project, and a change to the Imposed Conditions to facilitate Project Work at Clapham Yard.

Proposed Change to the CRR Project

It is proposed to change the Project Works at Clapham Yard in order to optimise the operational functionality of Clapham Yard as a stabling facility.

The Proposed Change to the Project Works at Clapham Yard consists of:

- reconfigure the layout of the Project Works at Clapham Yard, including Moorooka Station, to improve the operational functionality of Clapham Yard. The Proposed Changes to the layout are generally consistent with the Evaluated Project. The detail of the Proposed Changes to the layout is set out below:

Element	Refinement
Stabling facility	Addition of two stabling roads bringing the total to 29 stabling roads. Reconfiguration of the location and arrangements of crew, light and heavy maintenance, and administration facilities, including pedestrian and vehicle access and staff car parking.
Surface tracks	Addition of two unwired sidings for QR, Aurizon and other operations. Additional trackwork and turnouts to provide sidings and access into the Aurizon Yeerongpilly Rail Welding Facility independent of the mainline and passing loop. Reconfiguration of the planned surface track layout within Clapham Yard.
Pedestrian access	Maintain a section of the proposed east-west footbridge to provide access between Moorooka Railway Station platforms for the public. Enable future consideration of staff access to the stabling yards and any future staff facility provision.
Surface works	Drainage works, earthworks and structural works, including retaining walls, are changed to accommodate the raised height of Clapham Yard and the reconfigured elements.
Moorooka Station	The proposed third platform is moved to be co-located with the existing Moorooka Station, approximately 2m higher than the existing platforms.

- replacement of the two existing rail bridges and construction of a new grade separated structure across Moolabin Creek and into Clapham Yard with track configurations as follows:
    - one replaced bridge to be a three-track bridge for the dual gauge mainline, neck and Aurizon shunt neck;
    - one replaced bridge to be a two-track bridge for up and down suburban lines;
    - a new grade separated structure approximately 430m in length, including a bridge crossing of Moolabin Creek.

- raising of the stabling yard in Clapham Yard to achieve a 1% AEP flood immunity, with the import of approximately 240,000m^3 of fill material.

Proposed Changes to the Imposed Conditions

Proposed Changes to the Imposed Conditions are being requested as part of this RfPC. The changes proposed to the Imposed Conditions are as follows:

- Proposed Change to Imposed Condition 1 (General Conditions) to include references to the project documentation incorporating the Proposed Changes, and removing redundant references to previous drawings. The drawings in Volume 2 for the Cross River Rail Project replaces the drawings set in full.
- Proposed Change to Imposed Condition 10 (Hours of Work) to remove the existing limitation of 80 hours of continuous work for the Clapham Yard worksite so that work hours for track possessions align with the period of track possessions approved by Queensland Rail (QR).
- Proposed Change to Imposed Condition 10 (Hours of Work) to allow for haulage of spoil and delivery of materials/equipment 24 hours a day, 7 days a week for the Clapham Yard worksite.

Reason for the Proposed Changes

Further design work has been carried out in relation to the final configuration of Clapham Yard, in response to the technical requirements of key stakeholders (Queensland Rail and the Department of Transport and Main Roads), to improve the operational efficiency of Clapham Yard.

As construction planning has proceeded, Queensland Rail as the railway manager has approved rail possessions of longer duration across the SEQ rail network, which allows the Cross River Rail construction program to maximise the opportunity to access the rail corridor. As a result of these longer possessions, it is requested to amend Imposed Condition 10 to remove the existing limitation of 80 hours of continuous work at the Clapham Yard worksite and to align the hours of work for track possessions with the periods approved by Queensland Rail.

The design requirements of Queensland Rail, in particular for an increased flood immunity to be achieved for Clapham Yard, require the import of approximately 240,000m^3 of fill. This presents an opportunity for the Project to beneficially reuse spoil from other worksites, including spoil from the tunnel boring machines, to achieve the filling requirements for Clapham Yard. As a result, the spoil haulage hours for the Clapham Yard worksite need to align with the hours from other worksites, which necessitates a change to Imposed Condition 10, Table 1.

Effect of the Proposed Changes

The effects of the Proposed Changes are set out in detail in Chapters 4 to 7 and the technical reports at Volume 3.

The Proposed Changes to the Project are largely reconfiguration and refinement of the Project Works that are already part of the Evaluated Project for Clapham Yard. The Proposed Change to the Project will result in an additional crossing of Moolabin Creek and filling of Clapham Yard to achieve an appropriate flood immunity, however assessments have determined that the effect of the Proposed Change will be consistent with the Evaluated Project.

The Proposed Change to the Imposed Conditions will result in longer periods of rail possession and spoil haulage over a 24 hour day/7 day a week (24/7) period. Detailed assessments in relation to potential noise and vibration and traffic have been undertaken and demonstrated that the predicted impacts can be acceptably managed.

The CRR Project is delivered in accordance with the Environmental Management Framework (EMF) that has been established by the Coordinator-General through the Imposed Conditions. That EMF continues to be appropriate to manage the environmental effects of the CRR Project, including the Proposed Changes.

Although there may be variations to the predicted impacts, the Project must continue to meet the environmental outcomes and performance criteria in the Outline Environmental Management Plan (OEMP) that has been approved by the Coordinator-General.

It is requested that the Coordinator-General evaluate the Proposed Changes as set out in this RfPC, and amend Imposed Condition 1 and Imposed Condition 10 in accordance with the requested changes.

Table of Contents

1. Introduction

The Delivery Authority established by the *Cross River Rail Delivery Authority Act 2016* (Qld) is the proponent for the CRR Project. The CRR Project is a declared Coordinated Project for which an Environmental Impact Statement (EIS) was required under the *State Development and Public Works Organisation Act 1971* (SDPWO Act). The EIS for the CRR Project (2011 EIS) is evaluated by the Coordinator-General, who recommended that the Project proceed, subject to the Imposed Conditions in the evaluation report dated 20 December 2012. Since the 2012 evaluation report, ten Requests for Project Change (RfPC) have been submitted to the Coordinator-General. Nine of these RfPCs have had changes evaluated by the Coordinator-General. This RfPC (RfPC11) does not influence the proposed changes in RfPC10.

The authorised CRR Project is the Evaluated Project as described in Imposed Condition 1 of the Coordinator-General's Project-wide Imposed Conditions.

New stabling facilities at Clapham Yard were included in the 2011 EIS for the CRR Project. Clapham Yard was subsequently removed from the project scope in RfPC1 as at that time it was anticipated that it would be developed and commissioned as part of wider network enhancement, by entities other than the Delivery Authority.

Stabling facilities at Clapham Yard, including the Moorooka Railway Station upgrade, were reintroduced as part of the project scope in RfPC4 when it was determined that the Clapham Yard Works would be delivered by the Delivery Authority to support Cross River Rail and wider network operations.

This RfPC proposes changes to the Evaluated Project for Clapham Yard. These changes are the result of further design development and consultation with key stakeholders including Queensland Rail, and DTMR.

The following changes to the Imposed Conditions and the Evaluated Project for Clapham Yard are proposed (Proposed Changes):

- Proposed Change to the Project Works at Clapham Yard to:
    - reconfigure the layout of the Project Works at Clapham Yard, including Moorooka Station, to improve the operational functionality of Clapham Yard. The Proposed Changes to the layout are generally consistent with the Evaluated Project.
    - replace the two existing rail bridges and construct a new grade separated structure across Moolabin Creek and into Clapham Yard with track configurations as follows:
        - one replaced bridge to be a three-track bridge for the dual gauge mainline, neck and Aurizon shunt neck;
        - one replaced bridge to be a two-track bridge for up and down suburban lines; and
        - a new grade separated structure approximately 430m in length, including a bridge crossing of Moolabin Creek.
    - raise the stabling yard in Clapham Yard to achieve a 1% AEP flood immunity, including the import of approximately 240,000m^3 of fill material.
- Proposed Change to Imposed Condition 1 (General Conditions) to include references to the project documentation incorporating the Proposed Changes, and removing redundant references to previous drawings. The drawings in Volume 2 for the Cross River Rail Project replaces the drawings set in full.
- Proposed Change to Imposed Condition 10 (Hours of Work) to remove the existing limitation of 80 hours of continuous work for the Clapham Yard worksite so that work hours for track possessions align with the period of track possessions approved by Queensland Rail (QR).

- Proposed Change to Imposed Condition 10 (Hours of Work) to allow for haulage of spoil and delivery of materials/equipment 24 hours a day, 7 days a week.

1.1 Purpose

The purpose of this RfPC is to request that the Coordinator-General assess the Proposed Changes to the Evaluated Project, Imposed Condition 1 and Imposed Condition 10, in accordance with Part 4, Division 3A of the SDPWO Act. This RfPC:

- describes the Proposed Changes and their effects on the Project;
- states reasons for the Proposed Changes;
- includes enough information about the Proposed Changes and their effects on the Project to allow the Coordinator-General to make the evaluation; and
- provides replaced drawings to ensure the Proposed Changes are accurately captured in the Evaluated Project.

1.2 Consultation requirements

The Coordinator-General will determine whether the Delivery Authority will be required to publicly notify the Proposed Changes and their effects on the Evaluated Project. If public notification is required, public notices inviting submissions on the request will be published in accordance with the SDPWO Act.

The consultation period is determined by the Coordinator-General and stated on the public notification. If the request is publicly notified, any person, company or organisation may make a submission on the request. A 'properly made' submission:

- is made in writing to the Coordinator-General;
- is received on or before the deadline for submission;
- states the name and address of each submitter;
- is signed by each submitter; and
- states the grounds of the submissions and the facts and circumstances relied on in support if the grounds.

1.3 Structure of this Request for Project Change

This RfPC consists of the following volumes:

- **Volume 1 – Request for Project Change (this report) -** Volume 1 describes the Proposed Changes, the reasons for the Proposed Changes and the effects of the changes on the Project.
- **Volume 2 – Amended Drawings -** Volume 2 presents a full set of changed Project drawings for Clapham Yard including general arrangement drawings, longitudinal and cross sections, property impact plans and station arrangement drawings.
- **Volume 3 – Technical Reports -** Volume 3 provides technical information supporting the Request for Project Change.

1.4 Context of Proposed Changes

1.4.1 Clapham Yard Design Requirements

Clapham Yard is required to:

- provide safe, efficient and reliable operational capacity of ultimately 24 trains per hour in both directions;

- provide conflict-free operations and allow for consecutive trains arriving and departing (with 120 second headway) to enter and leave the yard without crossing other mainline train paths or conflicting with yard operations; and
- ensure that trains arriving or leaving the yard do not delay contiguous main line operations.

The Proposed Changes are required as a result of detailed design work to respond to the above requirements.

1.4.2 Physical extent of Clapham Yard

Clapham Yard is a railway yard operated by QR. Moorooka Railway Station is contained within the Clapham Yard footprint. The Evaluated Project currently includes stabling facilities at Clapham Yard and an upgrade of the Moorooka Railway Station (Clapham Yard Works).

The physical extent of Clapham Yard and associated areas to be included in the Evaluated Project is depicted at Figure 1.

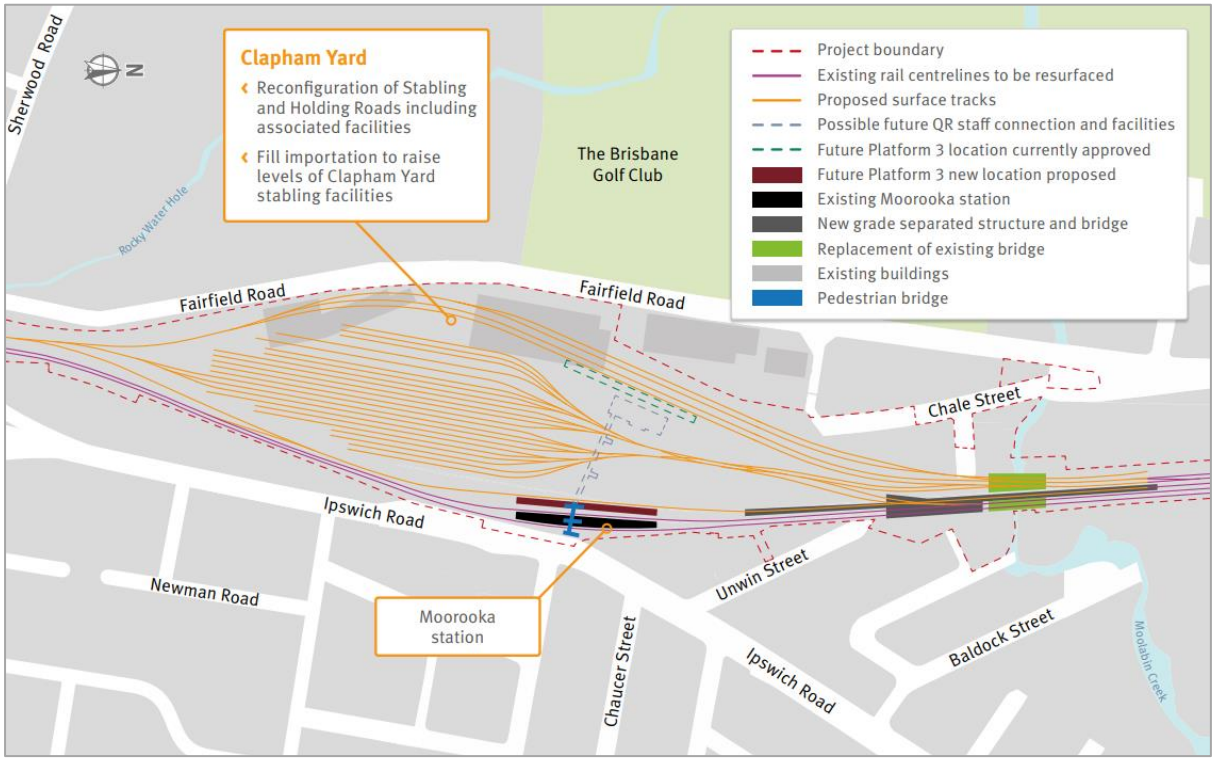

Figure 1: Clapham Yard Area

It is anticipated that there will be some minor additional temporary land access required to State owned land to facilitate the delivery of the Clapham Yard Works. The relevant land is identified Volume 2.

1.4.3 Program of works

The estimated delivery schedule for the Clapham Yard Works is set out in Figure 2 and will occur over 6 stages spread across four years. Where work stages or activities overlap, they have been scheduled to ensure that cumulative environmental impacts are avoided.

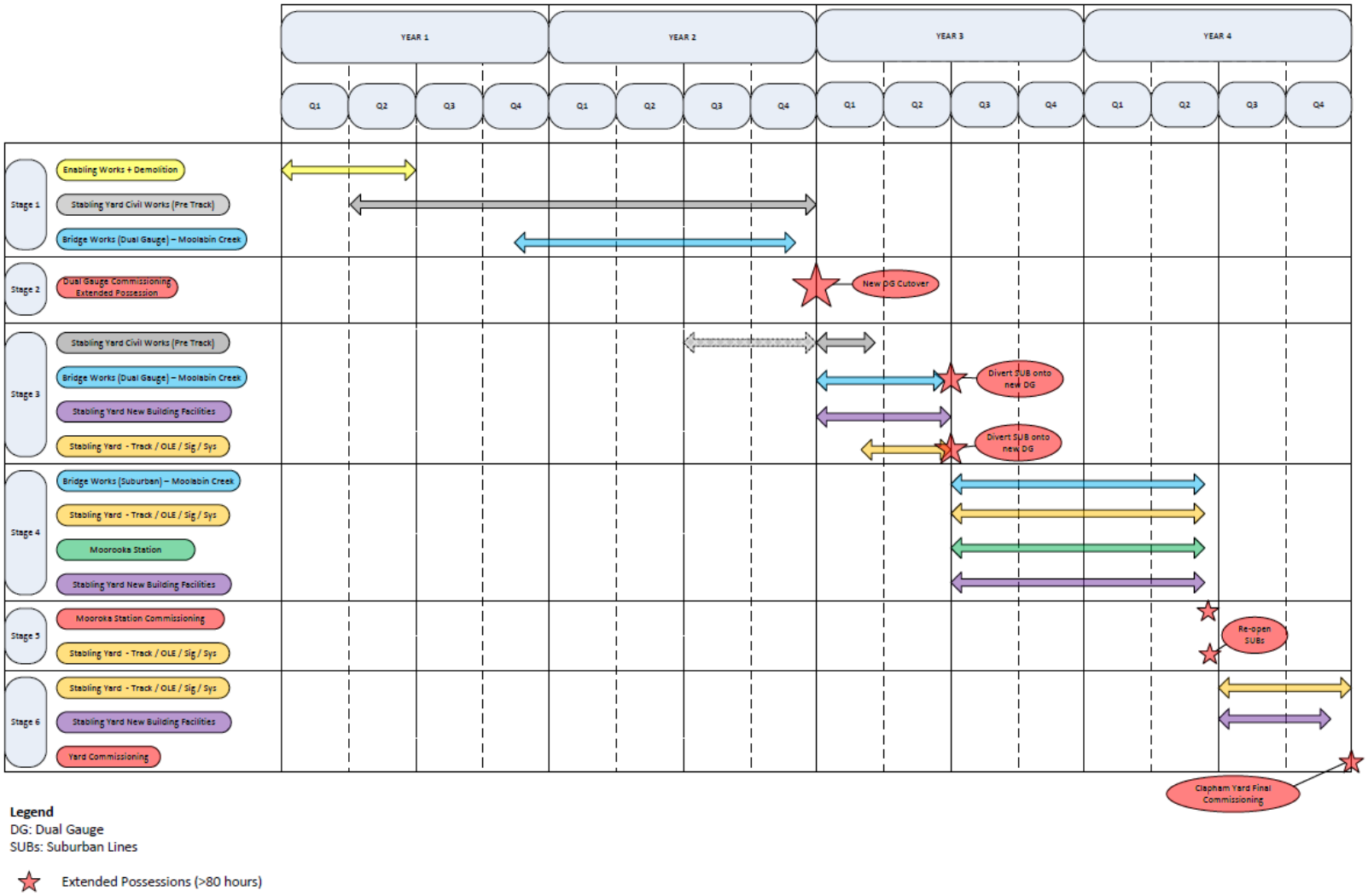

Figure 2 - Estimated delivery schedule for Clapham Yard

2. Overview of Evaluated Project

The CRR Project is a 10.2 km north-south rail line connecting Dutton Park to Bowen Hills with 5.9 km of tunnel under the Brisbane River and Central Business District (CBD). The CRR Project also includes new stations at Boggo Road, Woolloongabba, Albert Street, and Roma Street, with upgrades to the existing Exhibition Railway Station and stations from Fairfield to Salisbury.

Further information on the CRR Project and changes that have occurred since the CRR Project was originally evaluated in 2012 are detailed in:

- The Coordinator-General's evaluation report on the EIS dated 20 December 2012;
- The Coordinator-General's change report dated 9 June 2017;
- The Coordinator-General's change report dated 31 August 2018;
- The Coordinator-General's change report dated 13 March 2019;
- The Coordinator-General's change report dated 26 June 2019;
- The Coordinator General's change report dated 4 October 2019;
- The Coordinator-General's change report dated 8 May 2020;
- The Coordinator-General's change report dated 16 July 2020;
- The Coordinator-General's change report dated 19 November 2020; and
- The Coordinator-General's change report dated April 2021.

RfPC10 in relation to spoil haulage on Sundays from the Albert Street Station worksite and the Roma Street Station Worksite has been submitted but not yet evaluated by the Coordinator-General. This RfPC11 does not impact on the matters relevant to RfPC10.

2.1 Environmental Management Framework

The Evaluated Project is managed by the Environmental Management Framework (EMF), which is required by the Coordinator-General's Imposed Conditions for the Project.

The EMF for the Project comprises a number of elements:

- The **Coordinator-General's Imposed Conditions** as set out in Appendix 1 - Project-wide Imposed Conditions - Cross River Rail Project (Imposed Conditions);
- The **Outline Environmental Management Plan (OEMP)** which is required by Imposed Condition 2 and approved by the Coordinator-General;
- The **Construction Environmental Management Plan (CEMP)** (including **sub-plans**) is required by Imposed Condition 4 for all Project Works, and must be endorsed by the Environmental Monitor; and
- **Specific CEMPs** for Project Works in Extended Work Hours.

The EMF is supported by:

- a compliance and reporting regime, as set out in Imposed Conditions 5 and 6;
- two specific entities required by the Imposed Conditions to provide oversight for the implementation of the Imposed Conditions. Both entities are required to be independent, appropriately skilled and experienced and approved by the Coordinator-General. These entities are:
    - (i) the Environmental Monitor (Imposed Condition 7); and
    - (ii) the Community Relations Monitor (Imposed Condition 8).

Imposed Condition 2(a) requires an OEMP to be submitted to the Coordinator-General two months prior to the commencement of Project work and the OEMP to be approved by the Coordinator-General.

Imposed Condition 2(b) requires that the OEMP sets the environmental outcomes and performance criteria for the Project, together with possible mitigation measures, monitoring and reporting for each environmental element to achieve the environmental outcomes. The condition also requires specified sub-plans be included as part of the OEMP. These include for example:

- Construction Traffic Management Plan;
- Noise and Vibration Management Plan; and
- Air Quality Management Plan.

The Coordinator-General has approved the OEMP, consistent with Imposed Condition 2. The approved OEMP includes sub-plans that incorporate the environmental outcomes that must be met by the Project. The Approved OEMP is available on the CRR website: https://crossriverrail.qld.gov.au/planning-environment/environment-approvals/environmental-management/

Imposed Condition 4(a) requires that a CEMP must be developed by the Proponent and endorsed by the Environmental Monitor prior to the commencement of relevant Project work. That CEMP:

> *… must meet the requirements of Imposed Condition 4(c), including that it:*
>
> i. *Must incorporate the environmental outcomes and performance criteria of the Outline Environmental Management Plan;*
>
> ii. *Must demonstrate that the Imposed Conditions (Construction) will be complied with during Relevant Project Work;*
>
> iii. *Must incorporate mitigation measures to achieve the environmental outcomes where predictive studies indicate impacts beyond those provided for in the performance criteria;*
>
> iv. *Must be implemented [Imposed Condition 4(d)]; and*
>
> v. *Must be updated and endorsed by the environmental monitor for new or additional Relevant Project Work [Imposed Condition 4(g) and (g)(i)].*

The Environmental Monitor must endorse the CEMP as consistent with the OEMP and complying with the Imposed Conditions (construction) [Condition 7(c)(viii)]. That endorsement cannot be given where the requirements are not met.

The endorsed CEMP contains the detailed mitigation measures that are implemented for relevant Project Works. There are already detailed CEMPs for the Project Works that are underway, including detailed sub-plans and site management plans. The CEMPs include detail of the construction works to be undertaken and program, mitigation measures, monitoring, auditing and reporting.

The existing CEMPs are available on the Delivery Authority's website at https://crossriverrail.qld.gov.au/planning-environment/environment-approvals/environmental-management/.

An overview of the Coordinator-General Imposed Conditions EMF is provided below in **Error! R eference source not found.**.

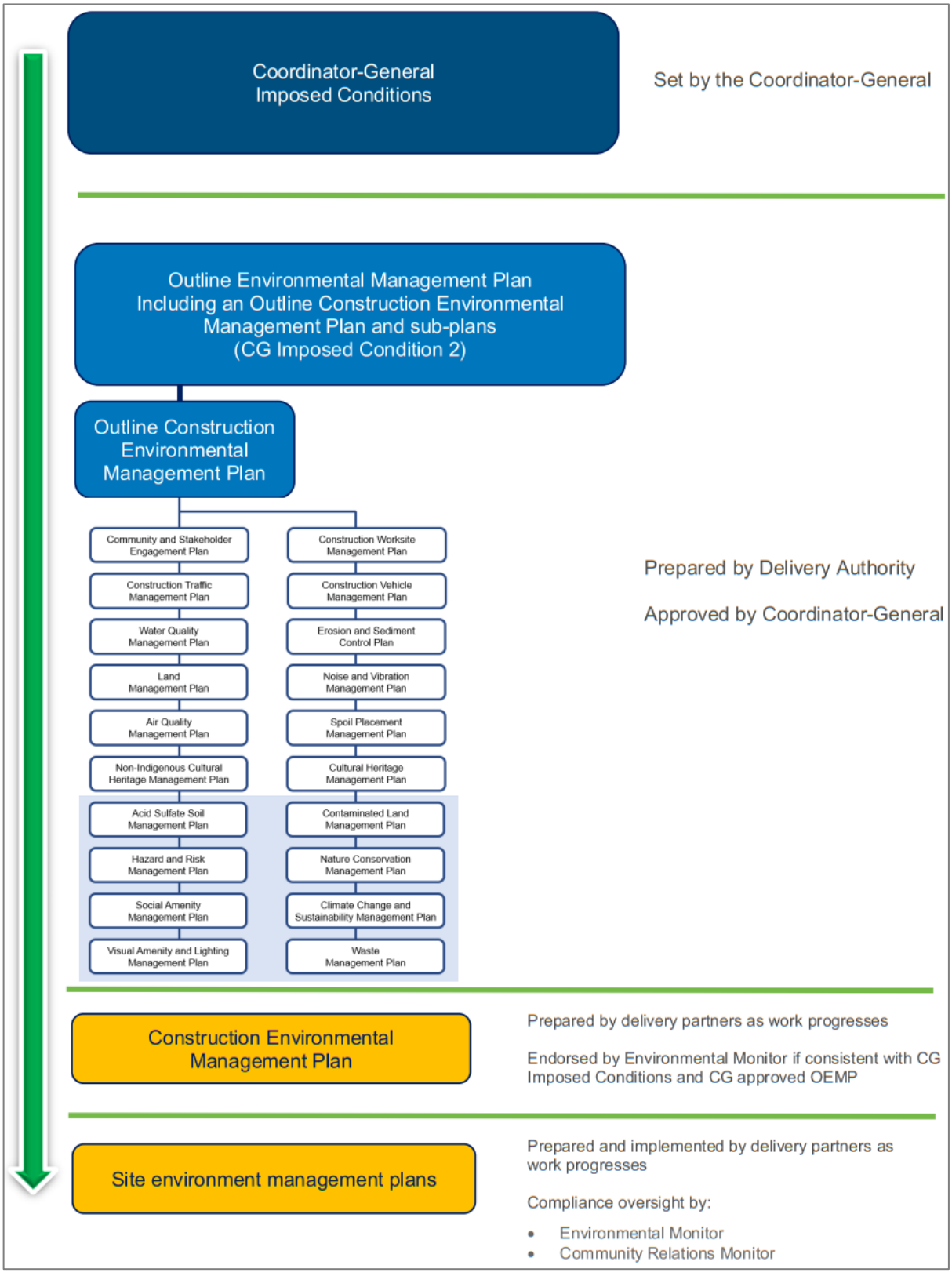

Figure 3: Coordinator-General Imposed Conditions Environmental Management Framework

2.2 Relationship to Environmental Management Framework

The Clapham Yard Works will be undertaken subject to compliance with a specific CEMP that will be endorsed by the Environmental Monitor and that must be consistent with the OEMP including by demonstrating how the environmental outcomes are achieved.

3. Amendment to drawings

The following drawings in Volume 2 are proposed to be amended:

Table 1: Proposed amendments to drawings in Volume 2

CRRDA Drawing Number	Revision	Title	RfPC11 Changes	Drawing Changes
General Arrangement Drawings				
CRR-003-CD-GA-204	H	General Arrangement – Sheet 4	Yes	Reconfiguration of new platform, stabling and holding roads including QR facilities buildings and associated access and carpark.
CRR-003-CD-GA-205	G	General Arrangement – Sheet 5	Yes	Updated to include viaduct/grade separated structure and new bridges (replacement of existing bridges) over Moolabin Creek.
CRR-003-CD-GA-211	H	General Arrangement – Sheet 11	Yes	Mined tunnel extents from RfPC4 have been removed following RfPC9 approval.
Property Impact Plans Drawings				
CRR-003-RP-GA-103	G	Property Impact Plans – Sheet 3	Yes	Changes to temporary requirement at the corner of Fairfield Road and Muriel Avenue to enable the upgrade of stormwater outlets.
CRR-003-RP-GA-104	G	Property Impact Plans – Sheet 4	Yes	Changes to temporary requirement along George Western Food property boundary on Fairfield Road resulting in reduced land requirement.
CRR-003-RP-GA-105	G	Property Impact Plans – Sheet 5	Yes	Changes to temporary requirement along Chale Street resulting in reduced land requirement. Changes to temporary requirement north of Moolabin Creek to allow for bridge construction. Cadastre correction to align with Rail Corridor fence. Changes to temporary requirement along the rail corridor south of Moolabin Creek to bring DTMR owned land within the project footprint for construction access. Changes to permanent standard requirement along the rail corridor south of Moolabin Creek to accommodate utilities.
CRR-003-RP-GA-111	H	Property Impact Plans – Sheet 11	Yes	Changes to temporary requirement at Noble Street to allow for

CRRDA Drawing Number	Revision	Title	RfPC11 Changes	Drawing Changes
				pedestrian access to Dutton Park Station (assessed during RfPC-4). Changes dropped out in RfPC-9 Response to Submissions Report due to administrative error.
Construction Site Plans Drawings				
CRR-003-CD-GA-110	G	General Construction Site Plans – Moorooka Station	Yes	Changes to the site layout including site access.

4. Proposed Change to the CRR Project - Clapham Yard

4.1 Overview of Proposed Change

SDPWO Act requirement	Overview
Proposed change	Changes to the Project Works at Clapham Yard, being: • reconfigure the layout of the Project Works at Clapham Yard, including Moorooka Station, to improve the operational functionality of Clapham Yard. The Proposed Changes to the layout are generally consistent with the Evaluated Project. The detail of the Proposed Changes is set out at section 4.2.1: • replacement of the two existing rail bridges and construction of a new grade separated structure across Moolabin Creek and into Clapham Yard with track configurations as follows: ○ one replaced bridge to be a three-track bridge for the dual gauge mainline, neck and Aurizon shunt neck; ○ one replaced bridge to be a two-track bridge for up and down suburban lines; and ○ a new grade separated structure approximately 430m in length, including a bridge crossing of Moolabin Creek. • raising of the stabling yard in Clapham Yard to achieve a 1% AEP flood immunity, with the import of approximately 240,000m^3 of fill material. Detail of the Proposed Change is set out at 4.2 below.
Reason	To optimise the operations of Clapham Yard, and meet the project requirements of key stakeholders, including DTMR and QR, as set out at 4.3 below.
Effect	The effects of this Proposed Change are generally consistent with the Evaluated Project and are described at 4.4 below.
Mitigation	The mitigation measures for this Proposed Changes are consistent with the existing EMF and are set out at 4.4 below.

4.2 Description of the Proposed Change

Since RfPC4, further design work and consultation with key stakeholders including QR and DTMR has identified the need to revisit central design elements to ensure that Clapham Yard, once constructed, meets the operational requirements for the rail network.

This Proposed Change is:

- reconfiguration of the layout of the Project Works at Clapham Yard, including Moorooka Station;
- replacement of the two existing rail bridges and construction of a new grade separated structure across Moolabin Creek and into Clapham Yard with track configurations as follows:
  - one replaced bridge to be a three-track bridge for the dual gauge mainline, neck and Aurizon shunt neck;
  - one replaced bridge to be a two-track bridge for up and down suburban lines; and
  - a new grade separated structure approximately 430m in length, including a bridge crossing of Moolabin Creek.
- raising of the stabling yard in Clapham Yard to achieve a 1% AEP flood immunity, including the import of approximately 240,000m^3 of fill material.

4.2.1 Reconfiguration of the Project Works at Clapham Yard

The Project Works in Clapham Yard described as part of the Evaluated Project have been further refined through detailed design in consultation with key stakeholders, including DTMR and QR.

The Project Works proposed to be refined at Clapham Yard are described in Table 2:

Table 2: Project refinements at Clapham Yard

Element	Refinement
Stabling facility	Addition of two stabling roads bringing the total to 29 stabling roads. Reconfiguration of the location of crew, light and heavy maintenance, and administration facilities, including pedestrian and vehicle access and staff car parking.
Surface tracks	Addition of two unwired sidings for QR, Aurizon and other operations. Additional trackwork and turnouts to provide sidings and access into the Aurizon Yeerongpilly Rail Welding Facility independent of the mainline and passing loop. Reconfiguration of the planned surface track layout within Clapham Yard.
Pedestrian access	Maintain a section of the proposed east-west footbridge to provide access between Moorooka Railway Station platforms for the public. Enable future consideration of staff access to the stabling yards and any future staff facility provision.
Surface works	Drainage works, earthworks and structural works, including retaining walls, are changed to accommodate the raised height of Clapham Yard and the reconfigured elements.
Moorooka Station	The proposed third platform is moved to be co-located with the existing Moorooka Station, approximately 2m higher than the existing platforms.

4.2.2 Moolabin Creek Crossings

There are two existing rail crossings at Moolabin Creek.

The Evaluated Project proposed the upgrade of the two existing rail crossings, and the construction of a third crossing.

The Proposed Change is to replace the two existing rail bridges and construct a new grade separated structure across Moolabin Creek and into Clapham Yard with track configurations as follows;

- one replaced bridge to be a three-track bridge for the dual gauge mainline, neck and Aurizon shunt neck;
- one replaced bridge to be a two-track bridge for up and down suburban lines; and
- a new grade separated structure approximately 430m in length, including a bridge crossing of Moolabin Creek.

4.2.3 Overall raised level of the Clapham Yard site

It is proposed to raise the proposed level of the stabling yard to achieve a 1% AEP flood immunity, in accordance with QR's flood immunity requirements.

The filling of Clapham Yard to this level will require the importation of approximately 240 000m^3 of fill. The fill is proposed to be sourced from other CRR Project worksites, including from the tunnel boring machines.

4.3 Reason for the Proposed Change

Further design work has been carried out in relation to the final configuration of Clapham Yard, in response to the technical requirements of key stakeholders (QR and the DTMR), directed at improving the operational efficiency of Clapham Yard.

Reconfiguration of the Project Works at Clapham Yard

The Proposed Change is required to optimise the configuration and design of Clapham Yard for the operational phases of the site, and to meet the requirements of key stakeholders, including DTMR and QR as follows:

- provide safe, efficient and reliable operational capacity of ultimately 24 trains per hour in both directions;
- provide conflict-free operations and allow for consecutive trains arriving and departing (with 120 second headway) to enter and leave the yard without crossing other mainline train paths or conflicting with yard operations;
- ensure that trains arriving or leaving Clapham Yard do not delay contiguous main line operations;
- support 29 stabled trains of 6 and 9-car configuration;
- support the continued mix of passenger trains and freight trains using the rail network including the ability for freight trains to pass each other on dual gauge tracks;
- support operations including turnback for revenue services and shunting that does not impede main line and yard operations;
- allow for the provision and efficient operations of facilities that are required for rail operations including train wash, decanting, light and heavy train maintenance and graffiti removal including biohazard cleans;
- allow for the future provision of staff facilities (for all staff including train crew, maintenance and cleaning staff) which account for shift patterns that may overlap including sufficient car parking, break rooms and amenities;
- provide equitable, accessible, safe and efficient access for all customers to Moorooka Railway Station, while minimising separation between platforms via direct pedestrian overpasses.

Moolabin Creek Crossings

The proposed grade separated structure, which is an elevated viaduct, will ensure the main rail lines can operate consistently and without causing disruption to the wider rail network. The grade separated structure will allow the co-location of a third platform at Moorooka Station, allowing passenger trains to get in and out of the station with minimal conflict with other trains stabled at, or moving in and out of, Clapham Yard. This is particularly important for alleviating peak hour network congestion. The structure will also allow for stabling of trains during off peak times in accordance with QR specifications and ensure sufficient stabling capacity well into the future.

Replacement of the existing structures is required to respond to the operational requirements identified as part of further Clapham Yard design activities, additional track capacity and modifications to track configurations across Moolabin Creek. The existing crossing structures are unlikely to be structurally suitable for the increased number and changes to the configuration of tracks at this crossing point.

Overall raised level of the Stabling Yard

One of the key objectives of the Clapham Yard Works is to deliver a stabling yard with a 1% AEP flood immunity, to provide protection to rail assets including rollingstock.

The QR design specifications for stabling yards require that the stabling yard achieves a 1% AEP flood immunity. At Clapham Yard, it is proposed to achieve this by filling a portion of the yard where

trains will be stabled. Without raising the level of Clapham Yard, there would be an unacceptable flooding risk to stabled rollingstock, and in the instance of a potential flooding event, trains that would ordinarily be stabled in Clapham Yard would require evacuation to alternative locations on the network to prevent damage, which would interfere with broader network operations.

4.4 Technical Areas

4.4.1 Traffic and Transport

4.4.1.1 Evaluated Project – Traffic and Transport

Condition 14 of the Project-wide Imposed Conditions for the Project, in relation to Traffic and Transport, provides that:

a) *Project construction traffic must be managed to avoid or minimise adverse impacts on road safety and traffic flow, public transport, freight rail movements, pedestrian and cyclist safety, and property access*

b) *During construction workforce car parking must be provided and managed to avoid workforce parking on local streets.*

c) *Access for emergency services to project worksites and adjoining properties must be maintained throughout the construction phase.*

d) *Practicable access is maintained to adjacent properties throughout the construction phase.*

e) *Heavy construction vehicles use only designated routes for spoil haulage and deliveries of major plant, equipment and materials, in accordance with the Construction Environmental Management Plan. The designated haulage routes for each worksite must follow major or arterial roads to the extent practicable and be developed in consultation with the Department of Transport and Main Roads and the Brisbane City Council in preparation of the Construction Environmental Management Plan.*

f) *The Construction Traffic Management Plan must be supported by a road safety assessment for the spoil haulage route.*

g) *Construction traffic must operate within the requirements of a construction traffic management sub-plan (Construction Traffic Management Plan) incorporated within the Construction Environmental Management Plan.*

h) *The Construction Traffic Management Plan must include:*

   i. *the proposed access to worksites, with local or minor roads only used where unavoidable to access a project worksite;*

   ii. *a process for advance notice to Directly Affected Persons and local communities within the vicinity of the spoil haulage routes and worksite accesses;*

   iii. *local traffic management measures developed in consultation with Brisbane City Council for key intersections:*

      A. *in Bowen Hills including Bowen Bridge Road, College Road and O'Connell Terrace;*

      B. *in the CBD including Albert Street, Charlotte Street, Elizabeth Street and Roma Street;*

      C. *at Woolloongabba including Leopard Street, Stanley Street, Vulture Street and Main Street;*

      D. *at Dutton Park including Annerley Road, Peter Doherty Street, Joe Baker Street and Boggo Road, as well as Kent Street, Cornwall Street and Ipswich Road;*

      E. *in the area of the Fairfield to Salisbury stations and Clapham Yard works.*

iv. *specific traffic management measures developed in consultation with other key stakeholders, including:*

A. *the department administering the Economic Development Act 2012 with regards traffic management in the Queens Wharf Brisbane priority development area;*

B. *Queensland Rail about maintaining access to railway stations; and*

C. *the department administering the Transport Infrastructure Act 1994 and the Brisbane City Council about maintaining operations for bus services along streets affected by the Project Works.*

i) *Project Works must be designed, planned and implemented to maintain acceptable footpath and cycle paths in areas adjacent to project worksites in terms of capacity, legibility and pavement condition. The proponent must consult with the Brisbane City Council and Queensland Rail about changes in pedestrian and cycle paths required to facilitate Project Works.*

4.4.1.2 Effect of the Proposed Change – Traffic and Transport

The elements of the Proposed Change that are specifically relevant to Traffic are:

- Rail formation construction which will require:
  - 240,000m³ of fill to construct the rail embankment to subgrade level, which will be sourced from multiple sources pending supply and demand including:
    - surplus geotechnically suitable spoil from cut activities in other part of the corridor;
    - tunnelling activities; and
    - external quarries.
  - 60,000m³ of rail formation capping material from a limited number of external quarries (as it must meet QR technical specifications); and
  - 17,000m³ of ballast rock from a limited number of external (as it must meet QR technical specifications).
- 20,000m³ of specialised fill for the construction of RSS walls.

A Traffic and Transport Technical Assessment for haulage activities associated with the Proposed Change has been undertaken and is included in Attachment A of Volume 3.

Methodology

The methodology used for the Traffic and Transport analysis included:

- reviewing the approved project scope as described in the Evaluated Project;
- identifying the implications of changing the original scope and assessing the potential traffic and transport impacts that may arise from the Proposed Changes;
- reviewing the changes to predicted traffic volumes associated with heavy vehicle movements during the bulk earthworks phase;
- reviewing the impacts associated with extended approved rail possessions;
- reviewing the current approved RIS Alliance Haulage Management Plan (HMP) and Construction Traffic Management Plan (CTMP) developed to comply with Imposed Condition 14; and
- identifying new or changed mitigation measures or updates to the plans that would be required to mitigate the identified impacts of the Proposed Changes.

Construction Impacts

A construction life cycle analysis was undertaken for the bulk import of the embankment fill volume of 240,000m³. This analysis included peak traffic movements (light vehicles and heavy vehicles

combined) during standard working hours (Monday to Saturday, 6.30am to 6.30pm). This analysis resulted in peak traffic movements that were comparable with the Evaluated Project.

A summary of the peak traffic movement requirements is provided in Figure 4.

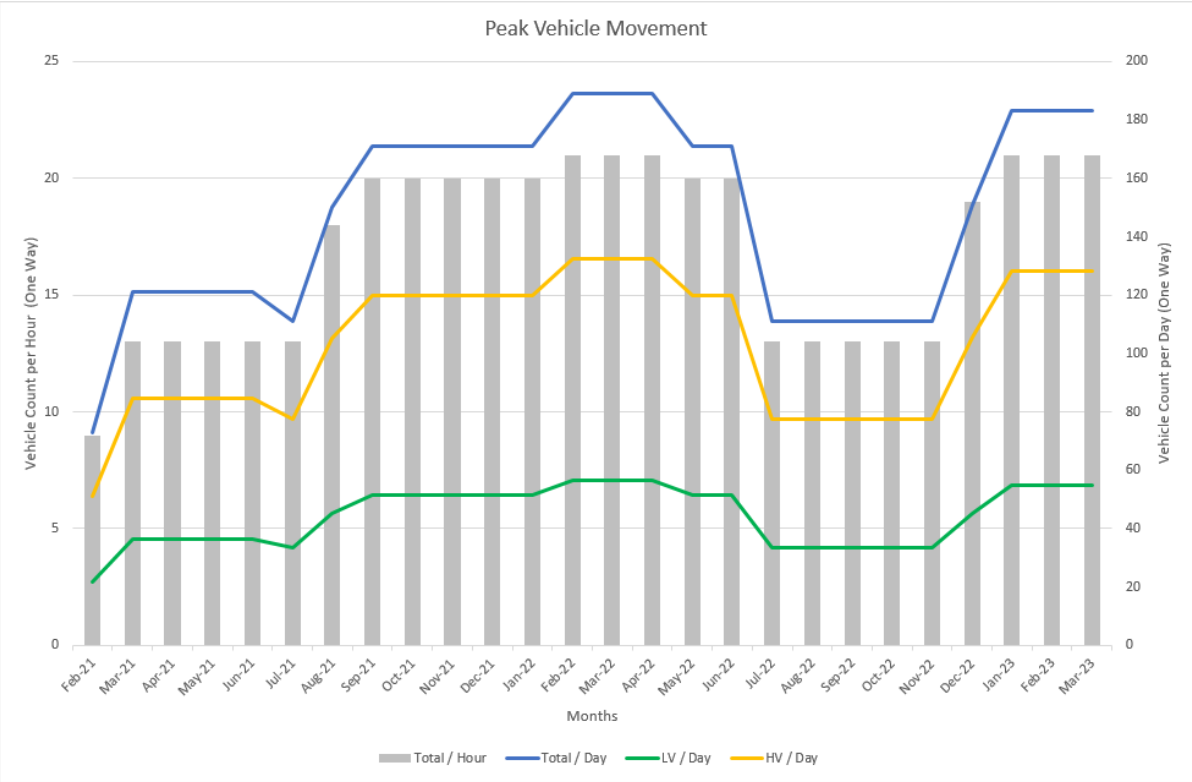

Figure 4 Peak Vehicle Movements (peak vehicle movement is for daytime off peak period 9.30-14.30)

The estimated peak traffic volume was 21 (one way) movements per hour and 189 movement per day. A 70/30 split can be assumed between the use of Heavy Vehicles and Light Vehicles.

A comparison of the estimated peak traffic movements per hour is provided in Table 3.

Table 3 Comparison of Peak Traffic Volumes - Proposed Changes and Evaluated Project

Evaluated Project	Site Access/Egress	Peak HV Movement Loads/day (one way)	Peak Traffic Movement Load/hour (one way)	Intersection Impact	Change assessment
RfPC 4 Inputs	Fairfield Road	166	17	<5%	No Change
RfPC 11 Inputs	Fairfield Road	189	21	<5%	Consistent with 2011 EIS and RfPC 4 inputs

There is only marginal variation in the Peak Traffic Movement load per hour between the Proposed Changes and RfPC4, despite the increase of heavy vehicle movements associated with the net import of fill material. This is because:

- additional construction planning activities occurred since RfPC4 which more accurately predicted heavy vehicle movements associated with concurrent activities across Clapham Yard activities. Activities requiring heavy vehicle support include:
    - construction of structural elements including bridges, requiring deliveries of concrete, steel and other prefabricated elements;
    - earthworks activities related to the import of engineering material including capping material;
    - drainage construction activities requiring delivery of prefabricated concrete pipes; and

    - dual gauge track works requiring deliveries of sleepers and ballast.
- staging of work was revised between RfPC4 and the Proposed Changes including:
    - approximately an additional year for activities requiring peak heavy vehicle support; and
    - overall development timeframe extending by approximately one year.

The extended program and adjusted delivery staging therefore allows the peak traffic movement to be only marginally increased compared to the numbers presented in RfPC4.

This RfPC also proposes to change Imposed Condition 10 to ultimately enable 24/7 haulage, which will decrease peak heavy vehicles traffic and allow vehicle movements to be more evenly spread across the day, therefore further reducing residual impacts on effected intersections.

Section 6.4 of the DTMR Guide to Traffic Impact Assessment (December 2018) provides triggers on the nature and extent of traffic impact assessment that indicate when development traffic may affect road users and existing infrastructure. Typically, when development traffic exceeds 5% of the base traffic, a detailed impact assessment is required to assess impact on elements such as, but not limited to intersection delays. As the construction traffic associated with the Proposed Changes does not exceed 5% of the base traffic, SiDRA analyses have not been undertaken.

The Chale Street/Fairfield Road intersection currently provides for a high percentage of heavy vehicle turning movements due to the industrial nature of the surrounding land use. This pattern of utilisation would continue through the Project.

Operational Impacts

Following construction and based on the concept design for Clapham Yard, impacts at Clapham Yard to traffic and transport as a result of the Proposed Changes are generally consistent with the Evaluated Project, with the exception of a slight decrease to car park provisions, but new provision of motorcycle parking.

The Proposed Change proposes 127 staff car parks and 10 motorcycle parking bays, compared to 130 car parks as presented in the Evaluated Project.

Consistent with the Evaluated Project, vehicle access to Clapham Yard will be via the existing signalised intersection of Chale Street onto Fairfield Road. Staff facilities are provided outside the main lines to limit the number of vehicles needing to cross the dual gauge lines.

Upgrades to Clapham Yard will provide improved parking capacity and integrated pathways for independent access from the carpark to the boarding platforms (at Moorooka Station). While an increase of vehicular traffic is expected on Fairfield Road due to the provision of additional parking bays at the yard, impacts to the existing road network can be mitigated with modifications to signals personalities and minor geometric changes to cater for operational traffic access and leaving Clapham Yard at shift changes.

4.4.1.3 Mitigation Measures – Traffic and Transport

Recommended mitigation measures for changed traffic impacts are consistent with the Evaluated Project requirements as documented in the existing EMF. As such, the OEMP and CEMP are not required to be updated.

An administrative amendment may be required to the Haulage Management Plan to adjust the description of the peak traffic movement numbers which currently reflect the RfPC-11 inputs.

4.4.1.4 Evaluation against current Environmental Management Framework

EMF Element	Change required (Y/N)	Description of Change
Imposed Conditions	N	N/A

OCEMP sub-plan	N	N/A
CEMP	N	N/A

4.4.2 Noise and Vibration

4.4.2.1 Evaluated Project – Noise and Vibration

Condition 11 of the Project-wide Imposed Conditions for the Project, in relation to Noise, provides that:

j) Project Works must aim to achieve the project noise goals for human health and wellbeing presented in Table 2 at a Sensitive Place.

Table 2. Imposed Conditions - Noise goals (internal) for Project Works

	Monday - Saturday 6.30am - 6.30pm	***Monday - Friday 6.30pm - 10.00pm (Gabba, CBD only)***	***Monday - Saturday 6.30pm - 6.30am Sundays, Public Holidays***	***For Blasting Monday - Saturday 7.30am - 4.30pm only***
Continuous ($LA_{eq\ adj}$) (1hr)	*AS 2107 Maximum design level*	*40 dBA $LA_{eq\ adj\ (1hr)}$*	*35 dBA $LA_{eq\ adj\ (1hr)}$*	
Intermittent ($LA_{10\ adj}$) (15min)	*AS 2107 Maximum design level + 10dBA*	*50 dBA $LA_{10,\ adj}$*	*42 dBA $LA_{10\ adj}$*	*130 dB Linear Peak*

Notes:

1. All goals are internal noise levels for human health and well-being outcomes.

2. Where internal noise levels are unable to be measured or monitored, the typical noise reductions presented in the relevant State guideline, such as the Guideline Planning for Noise Control, Ecoaccess, DEHP, January 2017 (currently under review).

3. Adjustments (adj) will be applied as outlined in the Department of Environment and Science Noise Measurement Manual Version 4 August 2013.

k) During construction monitor and report on noise and vibration in accordance with the Noise and Vibration Management Plan, a sub-plan of the Construction Environmental Management Plan.

l) Project Works predicted to or monitored as generating noise levels more than 20dBA (LA 10 adj (15 min)) above the relevant goal in Table 2. are authorised to occur in a locality only:

i. when advance notification and consultation has been undertaken with Directly Affected Persons or potentially Directly Affected Persons about the particular predicted impacts and the approach to mitigation of such impacts;

ii. where mitigation measures addressing the particular predicted or measured impacts have been developed on a 'case by case' basis in consultation with Directly Affected Persons;

iii. where the mitigation measures are incorporated in a mitigation register and implemented prior to undertaking the Project Works;

iv. between the hours 7:00am to 6:00pm Monday to Friday, with a respite period between 12:00noon and 2:00pm each day with the respite only applying where

generating noise levels more than 20dBA LA10 adj (15 min) at a Sensitive Place that is occupied;

m) The works authorised by Condition 10(d) are not subject to the requirements of Condition 11(c)(iv)

Noise Sound (or noise) consists of minute fluctuations in atmospheric pressure capable of evoking the sense of hearing. The human ear responds to changes in sound pressure over a very wide range. The loudest sound pressure to which the human ear responds is ten million times greater than the softest. The decibel (dB) scale reduces this ratio to a more manageable size by the use of logarithms.

The symbol LA represents A-weighted sound pressure level. Noise level descriptors are as follows:

- LA10 – The A-weighted noise level exceeded 10% of a given measurement period and is utilised normally to characterise average maximum noise levels. This is a statistical descriptor which cannot be accurately added to or subtracted with other descriptors.
- LA10,adj,15min - The A-weighted sound pressure level that is exceeded for 10% of a 15 minute period when measured using a fast standardised response time. Which also is adjusted for annoying characteristics as outlined in Department of Environment and Science Noise Measurement Manual Version 4 August 2013.
- LAeq – The A-weighted equivalent continuous sound pressure level measured over a time period. This descriptor is typically used to gauge the impact of general construction noise levels.
- LAeq,adj,1hour – The A-weighted equivalent continuous noise level over a 1 hour period which includes adjustment factors for annoying characteristics as outlined in Department of Environment and Science Noise Measurement Manual Version 4 August 2013.

Condition 11 of the Project-wide Imposed Conditions for the Project, in relation to Vibration, provides that:

a) Project Works must aim to achieve the construction vibration goals in Table 3.

Table 3. The construction vibration goals

Receiver type	**Cosmetic damage**			**Human comfort (mm/s PPV)**		**Sensitive building contents (pp/s PPV)**
	Continuous vibration (mm/s PPV)	***Transient vibration (mm/s PPV)***	***Blasting vibration (mm/s PPV)***	***Day***	***Night***	
Residential	According to BS7385 reduced by 50%[4]	According to BS7385	50[1]	According to AS2670	0.5[2]	-
Commercial	According to BS7385 reduced by 50%[4]	According to BS7385	50	According to AS2670	-	0.5[3]
Heritage structures	2	-	10	-	-	-
Notes: ***1. All residential receivers in the vicinity of the Project blasting sites are regarded as reinforced or framed structures (i.e. BS7385)***						

2. Residential sleep disturbance

3. Equipment specific vibration criteria are required for highly sensitive equipment (i.e. electron microscopes, MRI systems or similar), as part of future site-specific detailed investigations

4. If resonance is present, or if investigation to detect resonance were not able to be undertaken due to a lack of access

b) *Where vibration protection criteria are available for sensitive building contents, predictive modelling must take into account the manufacturer's specifications for tolerance to vibration. To the extent reasonable and practicable, those specifications apply in lieu of the construction vibration goals in Table 3. Where predictive modelling indicates the specified criteria would not be achieved by the Project Works, such works may proceed only in accordance with specific mitigation measures agreed with the potentially Directly Affected Persons.*

c) *(g) Project Works predicted to or monitored as generating vibration levels more than 2mm/s for continuous vibration and 10mm/s for transient vibration may occur only:*

   i. *between the hours 7:00am to 6:00pm Monday to Friday, with a respite period between 12:00noon and 2:00pm each day with the respite only applying where generating vibration levels more than those levels nominated in Table 3 (Human Comfort) at a Sensitive Place that is occupied; or*

   ii. *in accordance with the mitigation measures developed in consultation with and agreed by Directly Affected Persons that are incorporated in the Mitigation Register.*

4.4.2.2 Effect of the Proposed Change – Noise and Vibration

A Noise and Vibration Technical Report has been prepared to assess the impact of the Proposed Change and is included in Volume 3 of this RfPC.

The major components of the Clapham Yard Works relating to Noise and Vibration, including the Proposed Changes, are:

- reconfiguration of the layout of the Project Works at Clapham Yard, including Moorooka Station, to improve the operational functionality of Clapham Yard;
- replacement of the two existing rail bridges and construction of a new grade separated structure across Moolabin Creek and into Clapham Yard with track configurations; and
- raising of the stabling yard in Clapham Yard to achieve a 1% AEP flood immunity, including the import of approximately 240,000m^3 of fill material.

Based on the proposed construction methodology for Clapham Yard, these activities are likely to generate the highest level of noise impacts to nearby Sensitive Places across all phases of construction.

4.4.2.3 Construction Noise and Vibration Impacts

Methodology

For noise impacts, the CONCAWE industrial prediction model was used to determine the magnitude of the noise impact at the nearest Sensitive Place. A conservative reduction of 7 dB(A) for partially closed windows for a typical Queenslander type residential Sensitive Place has been assumed as per *Guideline Planning for Noise Control, Ecoaccess, DES, January 2016* (GPfNC).

For Vibration Impacts, the vibration impacts due to construction works have been assessed based on formulae from BS 5228-2:2009 *Code of Practice for Noise and Vibration Control on Construction and Open Sites Part 2 Vibration*. Conservative parameters were selected for the formulae to estimate the 'worst-case' vibration impacts.

Table 4 summarises the scenarios that have been assessed and the purpose of the predictive modelling:

Table 4 Acoustic assessment scenarios and purpose

Construction Scenarios	Dominant Noise Source	Purpose of Assessment
Scenario 1 – Building Demolition Standard and Non-Standard Hours	30t excavator with a hammer SWL of 118dB(A)	Review of scale, duration and Intensity of the proposed activities inclusive of their geographical location in relation to Sensitive Places to ascertain whether changes to the EMF are required
Scenario 2 – Earthworks – Clear and Grade Operations Standard and Non-Standard Hours	Grader SWL of 114dB(A)	Review of scale, duration and Intensity of the proposed activities inclusive of their geographical location in relation to Sensitive Places to ascertain whether changes to the EMF are required
Scenario 3 – Moolabin Creek bridges Construction	Bored piling rig SWL of 111dB(A)	Review of scale, duration and Intensity of the proposed activities inclusive of their geographical location in relation to Sensitive Places to ascertain whether changes to the EMF are required

All construction scenarios described in the Noise and Vibration report are based on noise generating intermittent noise types (i.e. noise that gives fluctuations of 4dB or greater). The noise goal descriptors for intermittent noise are expressed as LA_{10adj}. Therefore, predicted exceedances in each scenario assessed in the Noise and Vibration Technical Report are associated with the plant/equipment with the loudest sound power level being used as part of the activity for 90 seconds or more.

As a result, when there are predicted exceedances, this is a representation of the worst-case scenario during the activity but is not reflective of the noise levels that will be generated for the duration of the activity.

Additionally, where two scenarios are to occur concurrently within the same general area, for example building demolition and earthworks, there will not be a cumulative noise impact resulting in higher predicted noise levels when assessing potential exceedance against the intermittent noise goals. The loudest equipment would be the driver for identifying the DAPs. In this instance a 30t excavator with a hammer used during demolition (SWL of 118 dB(A)) would be the dominant noise source of a grader used for earthworks (SWL of 114 dB(A)).

Therefore, the scenarios presented in the Noise and Vibration Technical Report are the worst-case impacts associated with the most noise intensive activities to be carried out during construction, whether or not they are occurring concurrently.

Results (Noise)

The outcomes of the noise assessment set out in the Noise and Vibration Technical Report are shown in Table 5 which provides a summary of the maximum predicted noise impacts for residential, commercial and industrial Sensitive Places.

Table 5 Maximum Predicted Construction Noise Levels at Nearby Sensitive Places

Sensitive Place Classification	Maximum predicted L_{A10} (dB(A)) Noise Level at Nearest Sensitive Place (Internal[1])			
	Building Demolition	General Earthworks	Bridge Construction	Comments
Residential **Standard Hours - 55 dBA** **Non-Standard Hours – 42 dBA**	65	65	55	**Noise goals** Exceedances predicted during Standard and Non-Standard Hours for all scenarios
Residential Noise Goal +20 (dBA)	Standard Hours –75 (55+20) Non-Standard Hours – 62 (42+20)			**Noise goals + 20 dB(A)** No exceedances predicted during Standard Hours of Works. Exceedance predicted during Non-Standard Hours for works associated with building demolition and General Earthworks. Whilst Building demolition is not proposed to be undertaken during Non-Standard Work Hours, General Earthworks are proposed to be undertaken during Non-Standard Hours.
Commercial **Standard Hours - 55 dBA** **Non-Standard Hours – 42 dBA**	63	50	44	**Noise goals** Exceedances predicted during Standard Hours for building demolition only. General earthworks and bridge construction are deemed managed during Standard Hours Exceedances predicted during Non-Standard Hours for all scenarios
Commercial Noise Goal + 20 (dBA)	Standard Hours –75 (55+20) Non-Standard Hours – 62 (42+20)			**Noise goals + 20 dB(A)** No exceedances predicted during Standard Hours for all scenarios. Exceedance predicted during Non-Standard Hours associated with building demolition works. Building demolition is not proposed to be undertaken during Non-Standard Hours.
Industrial **Standard Hours - 60 dBA** **Non-Standard Hours – 42 dBA**	78	65	54	**Noise goals** Exceedances precited during Standard and Non-Standard Hours for all scenarios

[1] A 7dBA façade attenuation has been assumed to enable direct comparison with predicted noise impacts described in RfPC-4

Sensitive Place Classification	Maximum predicted L_{A10} (dB(A)) Noise Level at Nearest Sensitive Place (Internal[1])			
	Building Demolition	General Earthworks	Bridge Construction	Comments
Industrial Noise Goal +20 (dBA)	Standard Hours – 80 (60+20) Non-Standard Hours – 62 (42+20)			**Noise goals + 20 dB(A)** No exceedances predicted during Standard Hours. Exceedance predicted during Non-Standard Hours associated with building demolition and general earthwork. Whilst Building demolition is not proposed to be undertaken during Non-Standard Work Hours, General Earthworks are proposed to be undertaken during Non-Standard Hours.

When the construction works occurring during Standard Hours exceed the relevant noise goal, they do not exceed the relevant noise goal + 20dBA. Where noise goals are exceeded by less than 20dBA, mitigation measures included in the Construction Environmental Management Plan and the Noise and Vibration Sub-plan must be adhered to.

Where noise impacts from the Project Works are predicted to be above the noise goals + 20 dB(A), the Project Works may proceed subject to compliance with Imposed Condition 11(c), including through increased engagement with Directly Affected Persons and appropriate mitigation measures. The DAP engagement process is detailed in Appendix 1 of the Noise and Vibration Technical Report included in Volume 3.

The worst-case construction activity modelled in the Evaluated Project was predicted to result in noise impacts of up to 65 dB(A) at residential receivers, 63 dB(A) at commercial receivers and 78 dB(A) at industrial receivers. The noise impacts at residential receivers are predicted to increase by up to 3 dB(A) compared to the Evaluated Project. An increase of 3 dB(A) can be avoided as per the current Imposed Conditions and management measures detailed in the Noise and Vibration Sub-Plan.

Full details of the Noise Assessment are included at Attachment B Technical Report: Noise and Vibration of Volume 3.

Results (Vibration)

The outcomes of the vibration assessment set out in the Noise and Vibration Technical Report are shown in Table 6. Table 6 provides a summary of predicted impacts from vibration intensive construction activities[2] at residential, commercial and industrial and heritage places.

Table 6 Predicted Construction Vibration Levels at Nearby Sensitive Places

[2] Scenario 3 does not have vibration intensive equipment more details are presented in section **Error! Reference source not found.**

Scenario / Impact type	Receptor Type	Vibration Goal in mm/s (Imposed Condition 11e, Table 3)	Required Setback Distance to meet the goal	Number of receptors where vibration is exceeded	Vibration Goal in mm/s (Imposed Condition 11g)[3]	Required Setback Distance to meet the goal	Number of receptors where vibration is exceeded
Scenario 1 – demolition (hydraulic hammer)							
Cosmetic Damage	Residential	15.0	11	0	15.0	11	0
	Commercial and Industrial	50.0	4	0	50.0	4	0
	Heritage	2.0	77	0	2.0	77	0
Human Comfort (day)	Residential[3]	1.0	153	15	10.0	16	0
	Commercial and Industrial[4]	2.0	77	17	10.0	16	2
Human Comfort (night)	Residential[3]	0.5	306	89	10.0	16	0
Scenario 2 – earthworks (vibratory roller)							
Cosmetic Damage	Residential	15.0	6	0	15.0	6	0
	Commercial and Industrial	50.0	2	0	50.0	2	0
	Heritage	2.0	28	0	2.0	28	0
Human Comfort (day)	Residential[4]	1.0	45	0	10.0	8	0
	Commercial and Industrial[5]	2.0	28	1	10.0	8	0
Human Comfort (night)	Residential[3]	0.5	73	2	10.0	8	0

Two industrial places are predicted to exceed the vibration goal for the Human Comfort under Condition 11g (10mm/s), located on Fairfield Road and Chale Street respectively, however these two places are located within the land required for Clapham Yard and therefore will be vacated prior to demolition works commencing.

[3] The has been based on the transient vibration respite limit as per Imposed Condition 11(g).

[4] This number is related to the total number of buildings. Buildings such as residential apartment blocks may include multiple receptors

[5] As Table 3 in the Imposed Conditions references a standard that does not include PPV human comfort criteria, the lower limit has been based on DIN 4150-3 Structural Vibration Part 3 – Effects of vibration on structures.

The noise and vibration impacts produced by the Project Works generally align with the magnitude of the construction noise and vibration impacts assessed within the Evaluated Project for residential Sensitive Places.

4.4.3 Operational Noise and Vibration Impacts

The Proposed Change includes a new alignment for the Clapham Yard stabling roads and an increase in the terrain height within Clapham Yard. The sound power source levels for idling trains and through train movements have been revised compared to the Evaluated Project, based on updated data from QR. The capacity of the stabling yard and the number of idling trains remains unchanged compared to the Evaluated Project.

The Imposed Conditions provide noise criteria for operational noise at Sensitive Places of 65 dB(A) $L_{A,eq}$ and a Single Event Maximum (SEM) of 87 dB(A).

The noise modelling included an assessment of operational noise at Sensitive Places within 100m of the boundary of Clapham Yard. A summary of the noise assessment against the noise criteria is presented in Table 7.

Table 7 Predicted Operational Noise Impacts at Nearby Sensitive Places

Sensitive Place Classification	Above $L_{A,eq\ (24h)}$ Criterion	Maximum Predicted $L_{A,eq\ (24h)}$ (dB(A))	Above SEM Criterion	Maximum Predicted SEM (dB(A))
Residential	21	72	3	89
Commercial	19	78	7	95
Industrial	38	78	13	96

The noise level at nearby Sensitive Places is dominated by the noise emissions of the through rail traffic. The noise produced by the trains idling in the stabling yard does not have a significant effect on the overall noise levels.

Although Table 7 shows the predicted noise levels in exceedance of the noise criteria at multiple residential, commercial and industrial Sensitive Places in close proximity to Clapham Yard, the magnitude of the operational noise impacts is consistent with the Evaluated Project. Design measures to achieve the environmental design requirements will be implemented in accordance with Imposed Condition 3.

4.4.3.1 Mitigation Measures – Noise and Vibration

The noise and vibration impacts as a result of the Proposed Changes generally align with the magnitude of the construction noise and vibration impacts assessed within the Evaluated Project for residential Sensitive Places.

Mitigation measures will be applied to manage the impacts of the Proposed Change, which include:

- conducting consultation with identified DAPs to provide information on the duration of works and level of noise impacts. Further details on how DAP engagement is triggered and carried out is presented in Appendix 1 to the Noise and Vibration report at Volume 3 of this RfPC;
- monitoring of noise levels during high noise emission works to confirm noise impacts and the accuracy of the predicted noise levels to nearby Sensitive Places;
- noise and/or vibration monitoring in response to complaints;
- positioning construction equipment further from Sensitive Places, where feasible;
- reviewing construction methodologies to assess if alternative equipment can be used (e.g. substituting a 13T excavator for a 6T excavator would theoretically achieve a 4dB(A) reduction for the same Project works within the same footprint); and

- where there is no alternative to undertaking construction works during Non-Standard Hours, noise intensive works should be scheduled during less disruptive periods of the Non-Standard Working Hours shift, such as in the early evening.

Further detail regarding the mitigation measures for the Proposed Changes is provided in Section 3.1 of the Noise and Vibration Technical Report included in Volume 3.

As the mitigation measures are consistent with the existing EMF, no changes are required to the Project OEMP, the CEMP nor the Imposed Conditions.

4.4.3.2 Evaluation against current Environmental Management Framework – Noise and Vibration

EMF Element	Change required (Y/N)	Description of Change
Imposed Conditions	N	N/A
OCEMP sub-plans	N	N/A
CEMP	N	N/A

4.4.4 Hydrology

4.4.4.1 Evaluated Project – Hydrology

The Imposed Conditions for the Project require a Flood Management Plan for construction worksites affected by tributary or creek flooding.

Imposed Condition 17 Construction Surface Water relevantly provides that:

Condition 17. Surface water

(a) A Flood Management Plan that applies to all worksites affected by tributary or creek flooding (in a 5 year ARI flood event and stormwater during a 2 year ARI rainfall event) must be endorsed by the independent Environmental Monitor prior to the commencement of Relevant Project Work. A Flood Management Plan is not relevant to flooding of the Brisbane River (main channel).

(b) The Flood Management Plan must include, as a minimum:

i. general description of the Relevant Project Works

ii. flood assessment

iii. specific flood management measures, including:

A. appropriate storage of materials and equipment

B. early warning indicators

C. risk management for predicted rainfall events

D. risk management for predicted tidal flooding events for works in the tidal zone

E. risk management for unpredicted flood events

iv. Tidal works management for works in the tidal zone, including:

A. barge and marine equipment details

B. barge mooring plan

C. vessel traffic management plan

D. marking of navigational hazards.

(c) *Project works must be designed and implemented to avoid afflux or cause the redirection of uncontrolled surface water flows, including stormwater flows, outside of worksites.*

4.4.4.2 Effect of the Proposed Change – Hydrology

The components of the Proposed Change at Clapham Yard that are relevant to hydrology are:

- the location of the new 3 track dual gauge bridge on the outer western side of existing rail bridge over Moolabin Creek; and
- the location of the new bridges for up and down suburban trains on the outer eastern side of the rail corridor to replace the existing up suburban rail bridge over Moolabin Creek.

Assessment Methodology

Preliminary flood modelling has been undertaken for both the proposed developed conditions and potential temporary conditions during construction. This assessment has been undertaken using the existing and current TUFLOW models, reports and other available information compared to RfPC4. This preliminary flood modelling has been used to assess local flood risk, estimate flood levels for required design immunity and assess potential flood impacts during construction and operation.

Construction Impacts

Construction activities within the Clapham Yard fill platform will not be in excess of the permanent fill for the Yard. Therefore, similar to the permanent situation, there will not be Brisbane River flood impacts during construction. This represents no change to the Brisbane River flood impacts compared to the Evaluated Project.

The Evaluated Project identified there may be a need to construct a temporary bridge for the piling works due to the restricted work area as the new bridge described as part of the Evaluated Project was to be located within existing rail bridge structures.

The revised bridge works for the changed Project will extend the period of construction within Moolabin Creek compared to the Evaluated Project. Approximately 12 months of instream works will be required for each of the three bridges, (dual gauge bridge construction/demolition, suburban line bridge construction/demolition and construction of the new grade-separated structure) with some of these activities happening concurrently. Figure 5 outlines an indicative location and schedule for the instream works.

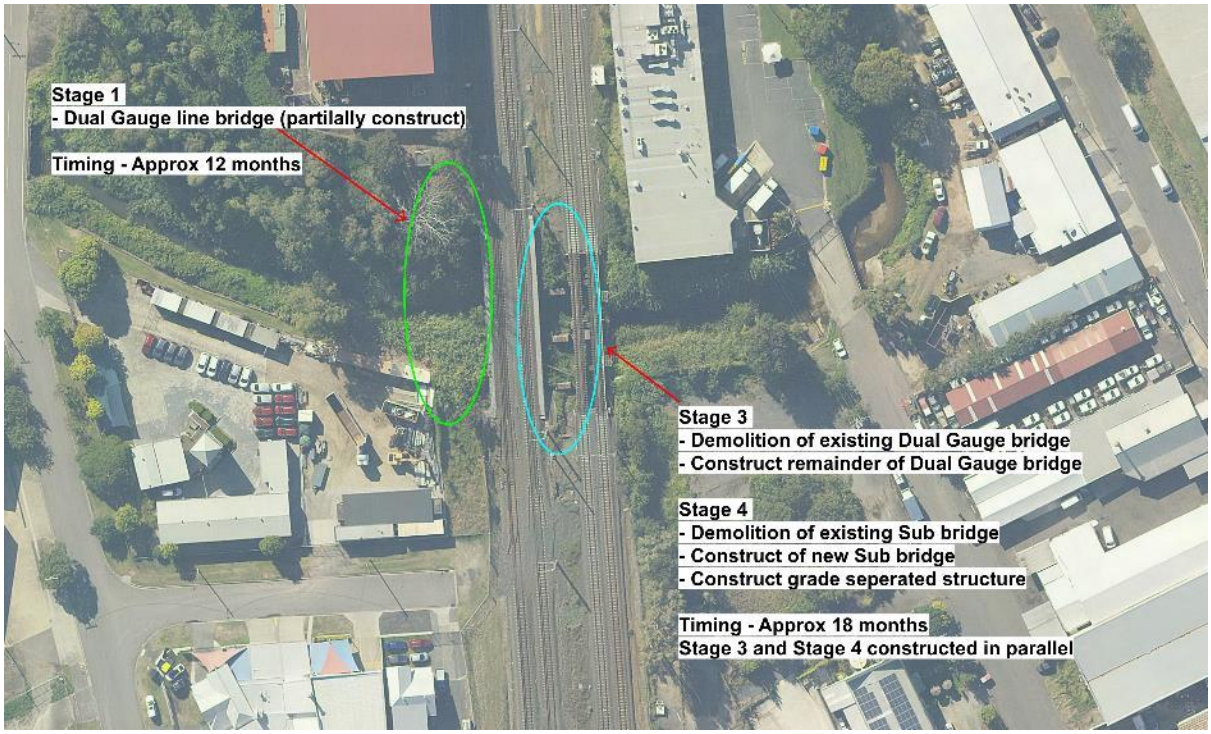

Figure 5: Staging and duration of In-stream works

Full results of Brisbane River and Moolabin Creek flood modelling are included in Section 2.1.4.3 and 2.1.4.4 of the Hydrology Technical Report in Volume 3.

This assessment represents a detailed examination of the flood impacts of the instream works required to construct the Moolabin Creek bridges and explicitly considers instream activities required for the construction of the bridges and the current refined design requiring upgrade, realignment and construction of additional structures. All the existing bridges within Moolabin Creek are now being decommissioned and replaced and there is the addition of a new grade separated structure crossing the Creek. The duration of construction works within the Creek has increased to facilitate the demolition and construction staging of the three new structures.

While this more detailed assessment has identified changes in the location of potential temporary flood impacts during construction, these impacts are similar in magnitude and extent to the Evaluated Project.

Operational Impacts

Brisbane River

In a Brisbane River flood event, the area of Clapham Yard acts as a large backwater storage area with significant depths of inundation but generally slow-moving water. This means that changes within the floodplain have only limited impacts on flood levels within a Brisbane River flood event.

The potential impacts of the proposed Clapham Yard have been assessed within the BRCFS TUFLOW model which demonstrates that the earthworks associated with the preferred design option produces off-site flood impacts of less than 10mm.

On this basis, the effect described in the Evaluated Project has not changed.

Moolabin Creek

Local catchment flood events in Moolabin and Rocky Waterholes Creek are associated with faster-moving flow within the creek and floodplain adjacent to the creeks. This means that changes within (i.e. bridges) or adjacent to the creeks may have significant impacts on flooding in a creek flood event.

Three new bridge structures are proposed across or in the vicinity of Moolabin Creek:

- replacement of the current bridge for the dual gauge loop and Aurizon Rail Welding Facility shunt neck with a new bridge (downstream bridge) (3x track);
- grade separated structure elevated above the floodplain;
- replacement of the current suburban line bridges for the Up and Down Suburban Lines (2x tracks).

Concept level hydraulic modelling of the changes to the bridge structures across Moolabin Creek was assessed using the provided BCC Moolabin Creek model. The track levels of the three new bridges are not predicted to be affected by local Moolabin Creek flooding in a 1% AEP event.

The modelling demonstrates that the new bridge structures across Moolabin Creek are not predicted to cause any significant change in flood behaviour in the 1% AEP event. These flood models will be updated in accordance with Australian Rainfall and Runoff (2019) and reassessed through the design process. Minor channel works may be required as part of the Project Works to meet the Environmental Design Requirements and this will be determined during detailed design.

On this basis, the Impact described in the Evaluated Project has not changed.

4.4.4.3 Mitigation Measures – Hydrology

The impacts to hydrology as a result of the Proposed Changes are generally consistent with the hydrology impacts assessed for the Evaluated Project.

The following previously proposed mitigation measures will be undertaken:

- detailed flood modelling of Clapham Yard and the Moolabin Creek bridges will be undertaken throughout all design phases to confirm that the design will not cause property damage from flood impacts to third parties for events up to and including the 1 in 100 AEP flood event;
- flood resilience under climate change will be assessed (noting the constraints of the brownfield site in improving flood resilience);
- consultation with BCC in relation to flooding will continue through all design phases;
- implementation of the endorsed Flood Management Plan, including update where required as construction planning progresses.

No additional mitigation measures are required due to the Proposed Change.

As the mitigation measures are consistent with the existing EMF, no changes are required to the Project OEMP, the CEMP nor the Imposed Conditions.

4.4.4.4 Evaluation against current Environmental Management Framework

EMF Element	Change required (Y/N)	Description of Change
Imposed Conditions	N	N/A
OCEMP sub-plans	N	N/A
CEMP	N	N/A

4.4.5 Air Quality

4.4.5.1 Evaluated Project – Air Quality

The Imposed Conditions establish the air quality goals for construction. Imposed Condition 13 Air Quality provides that:

(a) Project Works must aim to achieve the goals in Table 4.

Table 4. Air quality criteria and goals

Criterion	*Air quality indicator*	*Goal*	*Averaging Period*
Human Health	*Total Suspended Particulates (TSP)*	*90 µg/m^3*	*1 year*
	Particulate matter (PM10)	*50 µg/m^3*	*24 hours*
		25 µg/m^3	*1 year*
Nuisance	*TSP*	*80 µg/m^3*	*24 hours*
	Deposited Dust	*120 mg/m^2/day*	*30 days*

Notes:

1. When monitored in accordance with the most recent version of AS3580.9.6 Determination of suspended particulate matter – PM10 high volume sampler with size-selective inlet – Gravimetric method. OR AS/NZS 3580.9.9: 2017 Methods for sampling and analysis of ambient air Determination of suspended particulate matter - PM10 low volume sampler - Gravimetric method.

2. When monitored in accordance with the most recent version of AS/NZS 3580.9.3:2003 Determination of suspended particulate matter - Total suspended particulate matter (TSP) - High volume sampler gravimetric method or (TSP) low volume sampler – Gravimetric method.

3. When monitored in accordance with the most recent version of AS3580.10.1 Methods for sampling and analysis of ambient air – Determination of particulate matter – Deposited matter – Gravimetric method

During construction monitor and report on air quality in accordance with the Air Quality Management Plan, a sub-plan of the Construction Environmental Management Plan.

Imposed Condition 2 requires that the Project must achieve the Environmental Design Requirements. The Environmental Design Requirements (EDR 2) relevantly state:

b) The Project is designed so that it does not cause the air quality objectives specified in Table 5 (reproduced below in Table 8) to be exceeded.

Table 8 Ambient Air Quality Outcomes

Pollutant	Air Quality Objective	Averaging period
Total suspended particulates (TSP)	90 µg/m^3	Annual
Particulate matter (PM_{10})	50 µg/m^3	24 hours
	25 µg/m^3	Annual

The air quality objectives specified in EDR 2(b) are the same air quality objectives used in the previous CRR air quality assessments. The applicability of the previous air quality assessments to the Proposed Change, and the outcomes of these assessments with respect to air quality impacts have been considered.

4.4.5.2 Effect of the Proposed Change – Air Quality

Air quality impacts as a result of the Proposed Changes are anticipated to be generally comparable with the impacts as described for the Evaluated Project. A full Air Quality Assessment has been undertaken and is provided in Volume 3 at Attachment D Technical Report: Air Quality. The following sections provides an overview on the change in impacts to air quality for the Proposed Change.

Air Assessment Methodology

The methodology used for the assessment of air quality impacts includes:

- reviewing the project scope as described in the Evaluated Project;
- identifying the potential air quality impacts of the Proposed Changes;
- undertaking quantitative assessment in the form of dispersion modelling where relevant
- review the current endorsed Construction Environmental Management Plan (C-EMP) and associated Air Quality Management Plan (AQMP) developed to comply with Imposed Condition 13; and
- identifying any new or changed mitigation measures or updates to the Plans that would be required to mitigate the identified impacts of the Proposed Changes.

To assess potential air quality impacts during high-risk dust emission construction activities such as earthworks activities, two modelling scenarios were investigated based on Stage 1 of the Clapham Yard works (Scenario 1 and 2).

For the assessment of the Moorooka station a single scenario has been modelled (Scenario 3) representing trackwork and Moorooka station upgrade designated to occur during State 4 of the Clapham Yard and Moorooka station works.

The modelling scenarios and the activities assessed for Clapham Yard and Moorooka Station are described in Table 9.

Table 9 Modelling scenarios for construction activities

Scenario	Description	Emission sources assessed
Clapham Yard		
Scenario 1	**Surface excavation works**	• Surface excavation (average of 111 tonne/day) • Vehicle travel on haul roads, consisting of: • Haulage of excavated material, average of 60 truck and dog movements per day

Scenario	Description	Emission sources assessed
		• General light vehicle traffic, average of 15 light vehicles per day • Total haul road length of approximately 1,060m • Wind erosion of exposed areas (approximately 54,000m^2 of exposed area)

Scenario 2	**Import and placement of fill material**	• Unloading fill material from haul trucks (average of 3,666 tonne/day)
		• Vehicle travel on haul roads, consisting of:
		  • Haulage of excavated material, average of 128 truck and dog movements per day
		  • General light vehicle traffic, average of 16 light vehicles per day
		  • Total haul road length of approximately 1,060 m
		• Dozer operation (distribution and compaction of fill) (two dozers, operating 9 hours per day and night shift)
		• Wind erosion of exposed areas (approximately 54,000 m^2 of exposed area)

Moorooka Station		

Scenario 3	**Bulk earthworks backfilling**	• Unloading material from haul trucks (average of 259 tonnes/day)
		• Vehicle haulage on un-sealed roads, consisting of:
		  • Material haulage, average of 22 body trucks per day
		  • Total haul road length of approximately 150 m per station
		• Wind erosion of exposed areas (approximately 1,700 m^2 of exposed area at each station)

Construction Impacts

Clapham Yard

Modelling Results

The modelling results with the inclusion of the targeted works specific mitigation measures are summarised as follows:

- PM_{10} 24 hour (health):
  - Scenario 1: No exceedances of the 24-hour goal of 50 µg/m^3 are predicted at any of the modelled receptors.
  - Scenario 2: Exceedance of the 24-hour goal of 50 µg/m^3 is predicted at receptors R7, R8, R14, R17, R20 and R23, which represent industrial and commercial receptors. No exceedances are predicted at residential receptors. Further discussion of these predicted exceedances is provided below.
- TSP 24 hour (nuisance):
  - Scenario 1: No exceedances of the 24-hour goal of 80 µg/m^3 are predicted at any of the modelled receptors.
  - Scenario 2: Exceedances of the 24-hour goal of 80 µg/m^3 are predicted at several modelled receptors, including at residential receptors. Further discussion of these predicted exceedances is provided below.
- Dust deposition (nuisance):
  - Scenario 1: Exceedance of the 120 mg/m^2/day goal is predicted at receptors R6 and R7, which represent industrial uses. Further discussion of these predicted exceedances is provided in Section 0.

  - Scenario 2: A single exceedance of the 120 mg/m^2/day goal is predicted at receptor R6, which represents an industrial receptor. The predicted deposition rate is 121 mg/m^2/day, which is 1 mg/m^2/day above the goal. Due to the margin of exceedance and the land use of the receptor this result is not considered significant and is not considered further.

- PM_{10} annual average (health):
  - Scenarios 1 and 2: No exceedances of the annual average goal of 25 µg/m^3 are predicted at any of the modelled receptors.
- TSP annual average (health):
  - Scenarios 1 and 2: No exceedances of the annual average goal of 90 µg/m^3 are predicted at any of the modelled receptors.

For full results of the Air Modelling for Scenario 1 and 2, including air contour maps, please see section 2.2.1.1 Air Impact Assessment included at Attachment D of Volume 3.

Discussion of Air Quality Impacts

Health Impacts

The air quality goals which are set for the protection of human health and are of primary concern. These goals are the PM_{10} 24 hour, PM_{10} annual average and TSP annual average goals. Exceedance of the PM_{10} 24 hour goal of 50 µg/m^3 is predicted for Scenario 2 at industrial and commercial receptors. No exceedances are predicted at residential receptors.

None of the commercial or industrial uses represented by receptors are expected to include accommodation and therefore the exposure of occupants within these buildings is expected to be shorter than 24 hours. It is also noted that at the receptors where exceedances are predicted, a maximum of two exceedances (two days) were predicted over the entire year of meteorological data used in modelling. Import and placement of fill material (Scenario 2) is anticipated to require 24 weeks to complete, and therefore the likelihood of the predicted PM_{10} 24-hour exceedances occurring is further reduced.

For these reasons, the risk of significant air quality impacts to health to occupants of the commercial or industrial uses near Clapham Yard as a result of PM_{10} 24-hour concentrations is considered to be low and no further mitigation is required.

Predicted annual average PM_{10} and TSP concentrations at all sensitive places are below the annual average air quality goals for both pollutant species (25 µg/m^3 for PM_{10} and 90 µg/m^3 for TSP) for both modelled scenarios.

Nuisance Impacts

The TSP 24 hour and dust deposition air quality goals are set to prevent nuisance rather than health impacts and are therefore considered to have less potential to generate significant impacts.

The dust deposition goal of 120 mg/m^2/day is predicted to be exceeded for Scenario 1 at industrial receptors located on the eastern boundary of Clapham Yard.

It is noted that the dispersion modelling for the EIS predicted exceedances of the dust deposition goal of 120 mg/m^2/day outside the Clapham Yard boundary at residential receptors to the south-east and commercial and industrial receptors along the western boundary of the site. Although the location of the exceedances is different for the revised Clapham Yard layout, the predicted dust deposition impact is comparable with respect to impacts to non-residential uses.

Exceedances of the TSP 24-hour goal of 80 µg/m^3 are predicted at several receptors, including commercial and industrial uses in addition to residential dwellings located to the south-east of the Clapham Yard on Ipswich Road. Predicted TSP 24-hour concentrations are above the air quality goal at modelled receptors, with the worst affected receptors being the commercial and industrial uses located on Fairfield Road, the industrial uses on Ipswich Road and Unwin Street and the residential receptors on Ipswich Road.

Dispersion modelling for the EIS did predict exceedances of the TSP 24-hour goal outside the Clapham Yard boundary. However, the predicted margin of exceedance of the TSP 24-hour nuisance air quality goal for the Proposed Changes at Clapham Yard is significantly higher than for the EIS, and this represents a change to air quality impacts.

Due to the uncertainty in the model predictions, and that the predicted change to air quality impacts relates to nuisance dust rather than health impacts, it is considered acceptable for construction of Clapham Yard to occur on the provision that construction work is supported by on-site air quality monitoring to assist in the mitigation of dust nuisance impacts, and in accordance with the existing mitigation measures.

To support the mitigation of construction dust emissions and to assist in reducing potential impacts to residential receptors, air quality monitoring targeting dust deposition and airborne concentrations of TSP and PM_{10} will be undertaken at a location representative of the residential receptors on Ipswich Road.

Moorooka Station upgrade

Modelling Results

The modelling results are summarised as follows:PM_{10} 24 hour (health): No exceedances of the 24 hour goal of 50 µg/m^3 are predicted at any of the modelled receptors.

- PM_{10} annual average (health): No exceedances of the annual average goal of 25 µg/m^3 are predicted at any of the modelled receptors.
- TSP annual average (health): No exceedances of the annual average goal of 25 µg/m^3 are predicted at any of the modelled receptors.
- TSP 24 hour (nuisance): No exceedances of the 24 hour goal of 80 µg/m^3 are predicted at any of the modelled receptors.
- Dust deposition (nuisance): No exceedances of the 30 day average 120 mg/m^2/day goal are predicted at any of the modelled receptors.

For full results of the Air Modelling for Scenario 1 and 2, including air contour maps, please see section 2.2.2.1 of the Air Impact Assessment included at Attachment D of Volume 3.

Discussion of Air Quality Impacts for Moorooka Station

No exceedances of the air quality goals have been predicted at modelled receptors for the Moorooka station upgrade.

Overall, no significant air quality impacts are anticipated due to the proposed construction schedule for Moorooka Station.

Operational Impacts

In their entirety, the EIS and the assessments undertaken for subsequent project changes considered operational air quality impacts from the following sources:

- motor vehicles;
- freight and passenger trains;
- surface station upgrades; and
- tunnel and station ventilation.

Based on the results of the operational air quality assessments undertaken for the Project to date which are applicable to Clapham Yard, it is concluded that the contribution of emissions from operational trains would be insignificant and unlikely to be measurable. Potential coal dust emissions from coal trains would be managed by the rail operator (Aurizon) through their Coal Dust Management Plan.

The EIS and the assessments undertaken for subsequent project changes identified that operational air quality impacts complied with the operational air quality objectives set out in air quality EDR 2(b).

As the proposed change will not increase the capacity of Clapham Yard, no further design considerations are required for the Project.

4.4.5.3 Mitigation Measures – Air Quality

The air quality impacts as a result of the Proposed Changes are generally consistent with the construction air quality impacts assessed for the Evaluated Project.

Mitigation measures for the Proposed Change are consistent with the mitigation measures that are already applied for the Project through the EMF and are presented in Table 10.

Table 10 Mitigation measures and control factors for Clapham Yard and Moorooka station construction activities

Construction activity	Mitigation method	Control factor (%)
Scenario 1: Clapham yard - Surface excavation works		
Vehicle travel on haul roads	Road watering	50%
Excavators (loading to trucks)	Water sprays and pre-conditioning	50%
	Hoarding[1] (existing rail noise barrier)	30%[2]
Scenario 2: Clapham Yard - Import and placement of fill material		
Vehicle travel on haul roads	Polymer binding agent	90%[3]
Bulldozers on spoil	Hoarding[1] (existing rail noise barrier)	30%
Unloading fill material from haul trucks	Water sprays (material also has a required moisture content)	70%
	Hoarding[1] (existing rail noise barrier)	30%[2]
Scenario 3: Moorooka Station- Bulk earthworks backfilling		
Vehicle travel on haul roads	Road watering	50%
Unloading fill material from haul trucks	Water sprays	70%

Table Notes:

1. Only applied for predictions for receptors to the south-east of Clapham Yard, where the existing rail noise barrier is located.
2. 30% reduction applied to resulting emissions after correction for water sprays (70% reduction).
3. Assumed based on the anticipated travel on untreated (without polymer) sections (e.g. for unloading, manoeuvring, etc) being equal to 10%.

As the mitigation measures are consistent with the existing EMF, no changes are required to the Project OEMP, the CEMP nor the Imposed Conditions.

4.4.5.4 Evaluation against current Environmental Management Framework

EMF Element	Change required (Y/N)	Description of Change
Imposed Conditions	N	N/A
OCEMP sub-plans	N	N/A
CEMP	N	N/A

4.4.6 Soils and Contaminated Land

4.4.6.1 Evaluated Project – Soils and Contaminated Land

Appendix 1 of the Coordinator General's Change Report – design refinements and condition changes 2020 dated December 2020 sets out Project-wide Imposed Conditions for the Project, including in relation to Soils.

Imposed Condition 18 Erosion and Sediment Control in relation to soils provides that:

(a) *An erosion and sediment control sub-plan that is consistent with the Guidelines for Best Practice Erosion and Sediment Control (International Erosion Control Association, 2008) and the Department of Transport and Main Roads' Technical Standard MRTS52 – Erosion and Sediment Control must be submitted as part of the Construction Environmental Management Plan.*

Imposed Condition 19 Acid Sulfate Soils in relation to soils provides that:

(a) *Acid sulphate soils must be managed in accordance with the methods and requirements of the latest edition of the Queensland Acid Sulphate Soil Technical Manual.*

4.4.6.2 Effect of the Proposed Change – Soils and Contaminated Land

Soil disturbance associated with the Proposed Changes for Clapham Yard works are likely to comprise:

- import of approximately 240,000 m^3 of fill material;
- construction of the Moolabin Creek Bridges. Earthworks will comprise abutment construction and piling to a depth to be determined during detailed design; and

The Proposed Change also requires additional land that extends beyond the current Evaluated Project boundary. The construction works at Clapham Yard will now have temporary and permanent impacts on six additional parcels of land, including:

- Lot 1 on RP37619;
- Lot 9 on SP119390;
- Lot 67 on RP37616;
- Lot 68 on RP37616;
- Road Reserve of Chale Street / Moolabin Creek Unallocated State Land; and
- Road Reserve of Fairfield Road / Rocky Water Holes Creek Unallocated State Land.

Construction Impacts

CRR Project has undertaken a significant in-situ soil characterisation effort as part of the ongoing design. This has led to the development of area-specific management protocols consistent with the current legislative requirements under the *Environmental Protection Act 1994* and Imposed Condition 19. These protocols are designed to adapt to any increase of disturbance, and/or changes to volumes of soils to excavated as part of the Project.

The increase of the footprint if unmitigated may result in additional impacts compared to the Evaluated Project.

Contaminated land, potentially contaminated land, ASS, PASS and other soils of concern are appropriately and consistently managed with the existing mitigation and management measures that have been developed for the Project. As a result, the construction impacts associated with the Proposed Changes are not expected to have any change in impacts to those already identified and impacts to the receiving environment can be managed in accordance with the existing EMF.

Based on the current knowledge of the latent conditions and environmental settings throughout Clapham Yard and the management processes already being implemented the changed project is considered unlikely to adversely affect the receiving environment.

Operational Impacts

The permanent landforms once the Clapham Yard is operational will be stabilised via the following means:

- hardscaping via asphalt pavement on internal access road and car parks and capping material and ballast rock on rail infrastructure; and
- soft scaping (through revegetation either via seeding or landscaping) in the remainder of the areas.

The Project must achieve the Environmental Design Requirements, which include that the project design achieves no increase in pollutant loads for water, released from the surface works to surface waters.

The erosion risk associated with operations is therefore assessed to be low.

Ballast rock and capping material are required to meet engineering specifications and therefore are virgin quarry materials. The risk of introduction of new or additional contamination as a result of the Clapham Yard redevelopment via these media is therefore negligible.

The geotechnical assessment undertaken to date includes settlement and stabiliser assessment. It also takes into consideration the groundwater conditions on site. The geotechnical assessment has conservatively adopted the assumption that the groundwater table is near surface. The long-term operational risk associated with settlement is that the rail formation formations and other ancillary permanent design elements become unstable resulting in an increases potential for groundwater table movement that would result in:

- inundation of AASS/PASS material; or
- exposure of PASS material to oxidation process.

The purpose of the geotechnical assessment is to inform whether significant ground improvement regimes are required to mitigate post construction settlement.

The assessment indicates that the estimated post construction settlement and stability with net filling is within the Project technical requirements. Hence, any ground improvement regime is not essential. Consistent with the existing technical requirements for the Project, mitigation measures include the installation of settlement plates and pegs to monitor the consolidation settlement so that timely intervention can be taken to mitigate any unexpected ground behaviour.

On the basis of the above and based on the knowledge of PASS / AASS distribution across the site the risk of operational impact associated with PASS / AASS is concluded to be negligible.

4.4.6.3 Mitigation Measures – Soils and Contaminated Land

The soils and contaminated land impacts as a result of the Proposed Changes are generally consistent with the soil and contaminated land impacts assessed for the Evaluated Project.

Mitigation measures for the Proposed Change that are consistent with the mitigation measures that are already applied for the Project through the EMF remain appropriate to avoid and mitigate the risk of impacts.

As the mitigation measures are consistent with the existing EMF, no changes are required to the Project OEMP, the CEMP nor the Imposed Conditions.

4.4.6.4 Evaluation against current Environmental Management Framework

EMF Element	Change required (Y/N)	Description of Change
Imposed Conditions	N	N/A

OCEMP sub-plans	N	N/A
CEMP	N	N/A

4.4.7 Nature Conservation

4.4.7.1 Evaluated Project – Nature Conservation

No specific Imposed Conditions or Environmental Design Requirements relate to Nature Conservation.

4.4.7.2 Effect of the Proposed Change – Nature Conservation

The Project Changes most relevant to Nature Conservation are as follows:

- Reconstruction of two existing and the construction of one new rail bridge over Moolabin Creek to the west of the existing bridges.

Assessment Methodology

A desktop assessment was conducted to identify any potential environmental / natural risks associated with the Proposed Change. The following is a list of desktop information used to inform this assessment:

- Commonwealth EPBC Protected Matters: Search Tool (PMST)
- Vegetation Management Support Mapping
  - Protected Plants Flora Survey Trigger Mapping
- Department of Environment and Science (DES) Wildlife Online Database
- State Planning Policy
- State Assessment and Referral Agency Mapping
- Brisbane City Council
  - Planning Scheme Overlays
  - Natural Assets Local Law
- Evaluated Project Technical Information
- Recent Field Assessment undertaken by CRRDA, including.
  - Southern Corridor (Fairfield to Salisbury, inclusive of Clapham Yard)

Full results of the above-mentioned Desktop and Field Assessment are included in Volume 3, Attachment F Technical Report: Nature Conservation.

Construction Impacts

The elements of the Proposed Change at Moolabin Creek relevant to Nature Conservation consist of the reconstruction of two existing rail bridges and the construction of one new grade separated rail bridge. The change will result in an increased disturbance area to the west of the existing bridges of approximately 2,500m^2.

The field assessment undertaken of the whole Southern Corridor, including Clapham Yard, found that this area is of low ecological value and is unlikely to include any vegetation of value.

This impacted area will be cleared and rehabilitated in accordance with the provisions of the EMF and other required environmental approvals.

Rehabilitation will include planting the temporary riparian vegetation disturbance with trees, shrubs and grasses endemic to the area, sufficient to re-establish a riparian environment and protect bed and banks from erosion. Due to the current degraded nature of the disturbance area, the rehabilitation works will have net improvement on the existing environment.

Once all required rehabilitation has occurred, no additional impacts are anticipated to ecological values of Moolabin Creek compared to the Evaluated Project.

Operational Impacts

The Proposed Changes at Moolabin Creek consist of bridging structures which will be designed to ensure fish passage is maintained. Whilst some permanent vegetation loss will occur associated with scour protection requirements at the bridges and drainage outlet, the extent of the scour protection will be minimised to the minimum area necessary to achieve the technical requirements to protect the new infrastructure.

4.4.7.3 Mitigation Measures – Nature Conservation

The nature conservation impacts as a result of the Proposed Changes are generally consistent with the impacts assessed for the Evaluated Project.

The existing CEMP Biosecurity Management Sub-Plan and Nature Conservation Management Sub-Plan as part of the EMF adequately recognise the legal and other requirements applicable to these works and therefore no changes to the management measures are proposed.

As the mitigation measures are consistent with the existing EMF, no changes are required to the Project OEMP, the CEMP nor the Imposed Conditions.

4.4.7.4 Evaluation against current Environmental Management Framework

EMF Element	Change required (Y/N)	Description of Change
Imposed Conditions	N	N/A
OCEMP sub-plans	N	N/A
CEMP	N	N/A

4.4.8 Landscape and Visual Amenity

4.4.8.1 Evaluated Project – Landscape and Visual Amenity

Imposed Condition 2 requires that the Project must achieve the Environmental Design Requirements. Environmental Design Requirement Condition 9 outline the design requirements relating to Landscape and Visual Amenity. EDR 9 states:

9 Visual amenity and lighting

(a) The Project design seeks to minimise the visual impact of the above-ground infrastructure with regards to its scale, height and bulk. Specific urban design and visual impact studies are required to inform detailed design for:

i. the station ventilation outlets and intake structures;

ii. the above-ground electricity feeder stations;

iii. the portals and transition structures; and

iv. noise barriers and other impact mitigation devices or structures.

(b) Where required, noise barriers are designed to reduce the visual impacts to surrounding properties and roadways by:

i. incorporating urban design treatments and landscape elements such as massed plantings;

ii. using clear or transparent materials to maintain existing expansive views beyond the rail corridor, subject to security and maintenance considerations being evaluated; and

iii. avoiding the use of highly reflective materials and materials that support graffiti.

(c) Landscaping, urban design and public art treatments sympathetic to heritage landscape and streetscape values are incorporated into the design of Project Works at stations and thoroughfares accessing stations.

Although the Clapham Yard works are not specifically mentioned in Environmental Design Requirement Item 9, a Landscape and Visual Amenity Assessment was prepared to assess the impact of the design changes in compliance with item (a). The full Landscape and Visual Amenity Assessment is found at Volume 3 at Attachment G Technical Report: Landscape and Visual Amenity.

4.4.8.2 Effect of the Proposed Change – Landscape and Visual Amenity

The elements of the Proposed Change that are relevant to landscape and visual amenity are:

- the inclusion of the grade separated structure over Moolabin Creek;
- the change in location of the Moorooka Station western platform to be located adjacent to the eastern platforms with the associated provision of accessible pedestrian footbridge for station platform access;
- earthworks and associated retaining walls required to provide flood immunity for Clapham Yard.

Construction Impacts

During construction, the visual impacts are likely to remain relatively unchanged from what was presented for the Evaluated Project. Heavy machinery will be present at the site and fluctuating volumes of vehicle traffic entering and exiting the site will be visible. Service infrastructure will be installed, and earthworks are anticipated to change the immediate visual amenity of the existing site.

Operational Impacts

Overall, the Proposed Changes are unlikely to result in significant changes to the visual impact presented by the Evaluated Project for Clapham Yard during the operational phase. Generally, Clapham Yard is as described for the Evaluated Project. Where there are changes to what was presented for the Evaluated Project, the changes are considered to be relatively minor and would be accommodated within the context of the rail and industrial land use environment.

The Proposed Changes will be situated within a rail corridor and industrial land use environment. The Proposed Changes are considered to be consistent within the context of this visual environment. Therefore, it is judged that there will be no significant temporary or permanent change in impacts to the landscape or visual amenity.

4.4.8.3 Mitigation Measures – Landscape and Visual Amenity

Recommended mitigation measures for the changed landscape and visual amenity impacts arising from the Proposed Changes are generally consistent with the Evaluated Project requirements set out in the approved OEMP and implemented through the endorsed CEMP.

As the mitigation measures are consistent with the existing EMF, no changes are required to the OEMP, the CEMP nor the Imposed Conditions.

4.4.8.4 Evaluation against current Environmental Management Framework

EMF Element	Change required (Y/N)	Description of Change
Imposed Conditions	N	N/A

OCEMP sub-plans	N	N/A
CEMP	N	N/A

5. Proposed Change to Imposed Condition 1 (General Conditions)

5.1 Overview of Proposed Change

SDPWO Act requirement	Overview
Proposed change	Changes to Condition 1 (General Conditions) to require the Project to be undertaken generally in accordance with the project documents, including the Proposed Changes, and to remove redundant references to previous drawings. The Proposed Change is set out at 5.2 below.
Reason	To update the Evaluated Project to reflect this RfPC.
Effect	The Project will be required to be carried out generally in accordance with the updated description of the Evaluated Project, including the Proposed Changes.
Mitigation	As set out in section 4 above.

5.2 Description of Proposed Change

The Proposed Change is to ensure that Condition 1 incorporates the Project Changes as proposed by this RfPC, so that the Project will be required to carried out generally in accordance with the updated description of the Evaluated Project, to include the Proposed Changes for the Clapham Yard Works.

The Proposed Change is to Imposed Condition 1(a) as follows:

Condition 1. General conditions

(a) The project must be carried out generally in accordance with:

(i) the Cross River Rail Request for Project Change dated April 2021;

(ii) the drawings provided at Volume 2, Cross River Rail Request for Project Change dated April 2021;

(iii) the Cross River Rail Request for Project Change dated November 2020, as amended by the Response to Submissions Report for the Cross River Rail Request for Project Change dated March 2021;

~~*(iv) the drawings provided at Volume 2, Cross River Rail Request for Project Change dated November 2020, as amended by the drawings provided at Attachment D of the Response to Submissions Report for the Cross River Rail Request for Project Change dated March 2021;*~~

(iv) the Cross River Rail Request for Project Change dated August 2020;

-(iv) the Cross River Rail Request for Project Change dated May 2020;

-(v) amendments to the Project identified in the Cross River Rail Request for Project Change dated June 2018;

(vi) amendments to the Project identified in the Cross River Rail Request for Project Change dated November 2018

(vii) the Cross River Rail Request for Project Change dated April 2019.

5.3 Reason for Proposed Change

The reason for the Proposed Change to Imposed Condition 1 is to ensure that the Condition reflects the Evaluated Project, including the Proposed Changes.

5.4 Effect of the Proposed Change

The effect of the Proposed Change to Imposed Condition 1 is set out at section 4 above.

6. Proposed Change to Imposed Condition 10 (Hours of Work) - extended hours work

6.1 Overview of Proposed Change

SDPWO Act requirement	Overview
Proposed change	For Condition 10, Table 1, for the Clapham Yard Worksite in the column headed "Extended hours work": • Delete the words "80 hours continuous work" • Insert the words "Up to 24 hours per day, for the duration of the possession"
Reason	To remove the limitation of 80 hours of continuous work for the Clapham Yard worksite, and allow for works for rail possessions for the Clapham Yard worksite to align with the duration of possessions as approved by QR.
Effect	The effects of the Proposed Change are generally consistent with the Evaluated Project and are described at 6.4 below.
Mitigation	The mitigation measures for this Proposed Changes are consistent with the existing EMF and are set out at 6.4 below.

6.2 Description of Proposed Change

It is proposed to amend Imposed Condition 10 to remove the existing limitation of 80 hours of continuous work within the rail corridor for Clapham Yard so that work hours for track possessions align with the period of the track possessions approved by QR. The limitation of 80 hours of continuous work are proposed to be replaced by an allowance for up to 24 hours per day, for the duration of the approved rail possession.

For Condition 10, Table 1, for the Clapham Yard Worksite in the column headed "Extended hours work":

- Delete the words "80 hours continuous work"
- Insert the words "Up to 24 hours per day, for the duration of the possession"

6.3 Reason for Proposed Change

This Proposed Change would support the Clapham Yard Works by allowing for 24 hour a day, 7 day a week continuous work during and consistent with approved QR rail possessions.

Track possessions of greater than 80 hours have been identified as being required to meet the timeframes for the Clapham Yard works. Certain parts of the Clapham Yard works require extensive and complex activities to be delivered within the existing rail corridor, necessitating increased duration of possessions to enable completion of works packages. This change has been proposed as discussions to date have indicated that QR is likely to approve longer rail possessions (up to 7 days) allowing the CRR Project to be delivered more efficiently.

These rail possessions will be subject to the outcome of the standard QR rail corridor possession approval processes, including the development of a Rail Access Management Plan (RAMP). These processes involve extensive collaboration with QR to ensure that the works proposed for the possession period can only be undertaken during a possession, and that all efforts to minimise any impacts to stakeholders are implemented. Key stakeholders for this QR-led process include Directly Affected Persons, rail commuters and freight users.

This Proposed Change to Imposed Condition 10 will allow possession periods to be used more efficiently, reducing the establishment and restoration timeframes compared to multiple shorter possessions, allowing an overall reduction in the number of rail possessions.

Rail possessions are generally planned to coincide with the delivery of major changes to infrastructure or commissioning that cannot feasibly be completed in shorter timeframes. For the Clapham Yard works, the proposed extended rail possessions will relate to the new dual gauge tracks, and time periods will include works related to the inclusion of new dual gauge lines, including:

- commissioning of the dual gauge line
- diversion of suburban lines onto the dual gauge lines
- reopening of the suburban lines; and
- final commissioning of Clapham Yard.

Extended possessions are planned at times that cause the least disruption to customers, such as Easter and Christmas. These are times already characterised by low passenger and freight volumes. Prolonged work periods are essential to delivering significant portions of work that require extended periods with no rail traffic.

Wherever possible, any works that form part of the Clapham Yard Works that can be undertaken prior to the extended possession have been planned in order to minimise the duration of the extended closure so far as is reasonably practicable. Without the ability to deliver works within extended possessions it is not possible to deliver critical elements of the Clapham Yard Works relating to the dual gauge lines on schedule.

6.4 Technical Areas

6.4.1 Noise and Vibration

6.4.1.1 Evaluated Project – Noise and Vibration

Imposed Condition 11 Construction Noise and Vibration in relation to noise provides that:

a) *Project Works must aim to achieve the project noise goals for human health and wellbeing presented in Table 2 at a Sensitive Place.*

Table 2. Imposed Conditions - Noise goals (internal) for Project Works

	Monday - Saturday 6.30am - 6.30pm	**Monday - Friday 6.30pm - 10.00pm (Gabba, CBD only)**	**Monday - Saturday 6.30pm - 6.30am Sundays, Public Holidays**	**For Blasting Monday - Saturday 7.30am - 4.30pm only**
Continuous ($LA_{eq\ adj}$) *(1hr)*	*AS 2107 Maximum design level*	*40 dBA* $LA_{eq\ adj\ (1hr)}$	*35 dBA* $LA_{eq\ adj\ (1hr)}$	
Intermittent ($LA_{10\ adj}$) *(15min)*	*AS 2107 Maximum design level + 10dBA*	*50 dBA* $LA_{10,\ adj}$	*42 dBA* $LA_{10\ adj}$	*130 dB Linear Peak*

Notes:

1. All goals are internal noise levels for human health and well-being outcomes.

2. Where internal noise levels are unable to be measured or monitored, the typical noise reductions presented in the relevant State guideline, such as the Guideline Planning for Noise Control, Ecoaccess, DEHP, January 2017 (currently under review).

3. Adjustments (adj) will be applied as outlined in the Department of Environment and Science Noise Measurement Manual Version 4 August 2013.

b) *During construction monitor and report on noise and vibration in accordance with the Noise and Vibration Management Plan, a sub-plan of the Construction Environmental Management Plan.*

c) *Project Works predicted to or monitored as generating noise levels more than 20dBA (LA 10 adj (15 min)) above the relevant goal in Table 2. are authorised to occur in a locality only:*

   i. *when advance notification and consultation has been undertaken with Directly Affected Persons or potentially Directly Affected Persons about the particular predicted impacts and the approach to mitigation of such impacts;*

   ii. *where mitigation measures addressing the particular predicted or measured impacts have been developed on a 'case by case' basis in consultation with Directly Affected Persons;*

   iii. *where the mitigation measures are incorporated in a mitigation register and implemented prior to undertaking the Project Works;*

   iv. *between the hours 7:00am to 6:00pm Monday to Friday, with a respite period between 12:00noon and 2:00pm each day with the respite only applying where generating noise levels more than 20dBA LA10 adj (15 min) at a Sensitive Place that is occupied;*

d) *The works authorised by Condition 10(d) are not subject to the requirements of Condition 11(c)(iv)*

Noise Sound (or noise) consists of minute fluctuations in atmospheric pressure capable of evoking the sense of hearing. The human ear responds to changes in sound pressure over a very wide range. The loudest sound pressure to which the human ear responds is ten million times greater than the softest. The decibel (dB) scale reduces this ratio to a more manageable size by the use of logarithms.

The symbol LA represents A-weighted sound pressure level.2 Noise level descriptors are as follows:

- LAmax – The maximum A-weighted noise level associated with a sampling period
- LA1 – The A-weighted noise level exceeded for 1% of a given measurement period. This parameter is often used to represent the typical maximum noise level in a given period
- LA10 – The A-weighted noise level exceeded 10% of a given measurement period and is utilised normally to characterise average maximum noise levels
- LAeq – The A-weighted average noise level, is defined as the steady noise level that contains the same amount of acoustical energy as a given time-varying noise over the same measurement period
- LA90 – The A-weighted noise level exceeded 90% of a given measurement period and is representative of the average minimum background noise level (in the absence of the source under consideration), or simply the "background" level.

6.4.1.2 Effect of the Proposed Change – Noise and Vibration

This RfPC requests that the Coordinator-General evaluate the following Proposed Changes, relevant to noise impacts:

- noise impacts associated with the works proposed to occur during extended rail possession periods.

During RfPC8, works related to rail possessions were modelled. Table 11 summarises the scenarios that have been assessed and the purpose of the predictive modelling:

Table 11 Acoustic assessment scenarios and purpose

Construction Scenarios	Dominant Noise Source	Purpose of Assessment
Scenario 4 Works within the rail corridor - overhead line and signal upgrade work Standard and Non-Standard Hours	Concrete saw / Rail saw SWL of 118dB(A)	Support the change request to remove the 80hrs restriction on approved rail possessions at Clapham Yard
Scenario 5 Works within the rail corridor - construction Standard and Non-Standard Hours	Concrete saw / Rail saw, Tamping equipment and Regulator SWL of 118dB(A)	Support the change request to remove the 80hrs restriction on approved rail possessions at Clapham Yard

The outcome of the predictive modelling for the Moorooka Station area are reproduced in the below Table 12.

Table 12: Moorooka Station Noise Assessment and Predicted Impacts (extracted from RfPC8 - Volume 3)

Sensitive receptor type[6]	Distance from nearest construction source (m)	Activity scenario	Project noise goal (LA10 dBA) (internal & external)			Predicted noise level (dBA) - worst case	
			Residential day	Residential evening	Residential Night	External	Internal
Commercial Residential - House (2 Storey)	150m - BlackburnStreet	Scenario 1	50 (int) 57 (ext)	50 (int) 57 (ext)	42 (int) 49 (ext)	66	56.5
Commercial Residential - House (2 Storey)	150m - BlackburnStreet	Scenario 2	50 (int) 57 (ext)	50 (int) 57 (ext)	42 (int) 49 (ext)	66	56.5

A worst-case scenario for track works during 'extended works' as part of rail possession would result in noise impacts 14.5 dB(A) above the Noise Goals for Non-Standard Hours.

This noise impact would still remain within the noise goal + 20 dBA, not triggering Imposed Condition 11(c) and the additional management with the Directly Affected Persons (DAPs). However, to further mitigate this impact, additional detailed noise assessment and planning will be completed prior to these works commencing consistent with the existing EMF processes.

It also is noted that this noise impact relates to the use of tools and equipment with the highest SWL of 118dB(A), which typically are rail/concrete saw and specialised track equipment for the tamping and regulation of ballast.

Rail/concrete saws are typically used at the start of a rail possession when existing tracks requires to be cut in discrete areas along the existing rail network. When rail-saws must be used to cut track, this activity is of very short duration (typically 10-15 minutes per cut).

[6] Assumed façade reduction 7 dBA, plus 2.5 dBA facade reflection for Residential (House)

Similarly, the use of tamping and regulation equipment occurs during discrete periods of the rail possessions. Tamping and regulation equipment are mobile equipment that travel along the newly laid tracks therefore not remaining at one location for extended periods of time.

The transient and discrete nature of these sub-activities associated with track works during rail possessions means that the worst-case noise impact presented in Table 12 is not representative of the noise level the closest sensitive places will experience for the duration of the extended Rail Possessions.

6.4.1.3 Mitigation Measures – Noise and Vibration

Recommended mitigation measures for changed noise and vibration impacts are consistent with the Evaluated Project requirements as documented in the existing EMF.

As the mitigation measures are consistent with the existing EMF, no changes are required to the Project OEMP, the CEMP nor the Imposed Conditions.

6.4.1.4 Evaluation against current Environmental Management Framework – Noise and Vibration

EMF Element	Change required (Y/N)	Description of Change
Imposed Conditions	Y	Proposed Change to Imposed Condition 10 as described in this RfPC.
OCEMP sub-plan	N	N/A
CEMP	N	N/A

7. Proposed Change to Imposed Condition 10 (Hours of Work) – spoil haulage

7.1 Overview of Proposed Change

SDPWO Act requirement	Overview
Proposed change	For Condition 10, Table 1, for the Clapham Yard Worksite in the column headed "Spoil haulage and materials/equipment delivery (excluding concrete deliveries)": • Delete the existing text in the cell • Insert the words "24 hours, 7 days"
Reason	To facilitate the haulage of spoil to Clapham Yard from other Cross River Rail Worksites as it becomes available, allowing to be beneficially reused within the Project.
Effect	The effects of the Proposed Change are generally consistent with the Evaluated Project and are described at 7.4 below.
Mitigation	The mitigation measures for this Proposed Changes are consistent with the existing EMF and are set out at 7.4 below.

7.2 Description of Proposed Change

It is proposed to amend Imposed Condition 10 to allow for 24 hour a day, 7 day a week spoil haulage and materials/equipment delivery at Clapham Yard.

For Condition 10, Table 1, for the Clapham Yard Worksite in the column headed “Spoil haulage and materials/equipment delivery (excluding concrete deliveries)”:

- Delete the words “Monday to Friday: 6.30am-7.30pm, 9.00am-2.30pm, 4.30pm-6.30pm Saturday: 6.30am-6.30pm”
- Insert the words “24 hours, 7 days”

7.3 Reason for Proposed Change

This Proposed Change will support 24 hour a day, 7 day a week spoil haulage, including by removing the lockout period for spoil haulage for the Clapham Yard Worksite.

The Clapham Yard worksite has limited laydown and storage space resulting in substantial reliance on daily transport (throughout the shift) of equipment and materials from staging areas or subcontractor yards or suppliers. As Clapham Yard is augmented, space restrictions increase as greenfield corridor land becomes unavailable.

At the same time, the delivery of permanent materials such as embankment / formation fill, gravel and concrete must be delivered on an as-needs basis to support the daily construction program (for example, concrete pours are typically booked in the mornings and can run for several hours). The presence of two delivery embargo windows mid-shift effectively reduces the main window of haulage to the period between 9:00am to 2:30pm (3.5 hours).

The current program of bulk earthworks coincides with the tunnel spoil from other Project sites becoming available. There is an opportunity to reduce reliance on external quarries extracting virgin fill material by redirecting spoil from the tunnelling operations away from spoil disposal sites to Clapham Yard.

The Southern Portal worksite is permitted to haul spoil from the tunnel 24hours, 7days under the current Imposed Conditions, as does the Woolloongabba worksite (except Monday to Friday, 7:00am to 9:00am and 4:30pm to 6:30pm). However, under the current Imposed Conditions Clapham Yard:

- cannot receive fill/spoil and continuously Monday to Friday during time and at night-time and

- cannot receive fill/spoil 24 hours, 7 days any other day

The removal of the day-time haulage restrictions would support the efficient delivery of the Clapham Yard bulk earthworks, whilst the allowance to haul fill material during night would support the beneficial reuse of spoil materials from other Cross River Rail worksites. It would also enable a spread of peak heavy vehicles across a 24-hour period, thus reducing daytime peaks, supporting improved road safety and managing any potential traffic congestion impacts on Fairfield Road.

Therefore, the key reasons for this Proposed Change to Imposed Condition 10 are:

- to facilitate the beneficial reuse of spoil material as it becomes available from other Cross River Rail worksites, primarily through tunnelling activities;
- reduce peak period spoil haulage traffic, by spreading heavy vehicle movements required to import 240 000 m^3 of spoil to Clapham Yard over 24 hours rather than current shorter window under Imposed Condition 10.

Once on site, placement of spoil outside of the standard 6.30am-6.30pm period will be undertaken during an approved rail possession period or through the Managed Works Permit process.

7.4 Technical Areas

7.4.1 Traffic and Transport

7.4.1.1 Evaluated Project – Traffic and Transport

Condition 14 of the Project-wide Imposed Conditions for the Project, in relation to Traffic and Transport, provides that:

a) *Project construction traffic must be managed to avoid or minimise adverse impacts on road safety and traffic flow, public transport, freight rail movements, pedestrian and cyclist safety, and property access*

b) *During construction workforce car parking must be provided and managed to avoid workforce parking on local streets.*

c) *Access for emergency services to project worksites and adjoining properties must be maintained throughout the construction phase.*

d) *Practicable access is maintained to adjacent properties throughout the construction phase.*

e) *Heavy construction vehicles use only designated routes for spoil haulage and deliveries of major plant, equipment and materials, in accordance with the Construction Environmental Management Plan. The designated haulage routes for each worksite must follow major or arterial roads to the extent practicable and be developed in consultation with the Department of Transport and Main Roads and the Brisbane City Council in preparation of the Construction Environmental Management Plan.*

f) *The Construction Traffic Management Plan must be supported by a road safety assessment for the spoil haulage route.*

g) *Construction traffic must operate within the requirements of a construction traffic management sub-plan (Construction Traffic Management Plan) incorporated within the Construction Environmental Management Plan.*

h) *The Construction Traffic Management Plan must include:*

   i. *the proposed access to worksites, with local or minor roads only used where unavoidable to access a project worksite;*

   ii. *a process for advance notice to Directly Affected Persons and local communities within the vicinity of the spoil haulage routes and worksite accesses;*

   iii. *local traffic management measures developed in consultation with Brisbane City Council for key intersections:*

A. *in Bowen Hills including Bowen Bridge Road, College Road and O'Connell Terrace;*

B. *in the CBD including Albert Street, Charlotte Street, Elizabeth Street and Roma Street;*

C. *at Woolloongabba including Leopard Street, Stanley Street, Vulture Street and Main Street;*

D. *at Dutton Park including Annerley Road, Peter Doherty Street, Joe Baker Street and Boggo Road, as well as Kent Street, Cornwall Street and Ipswich Road;*

E. *in the area of the Fairfield to Salisbury stations and Clapham Yard works.*

iv. *specific traffic management measures developed in consultation with other key stakeholders, including:*

A. *the department administering the Economic Development Act 2012 with regards traffic management in the Queens Wharf Brisbane priority development area;*

B. *Queensland Rail about maintaining access to railway stations; and*

C. *the department administering the Transport Infrastructure Act 1994 and the Brisbane City Council about maintaining operations for bus services along streets affected by the Project Works.*

i) *Project Works must be designed, planned and implemented to maintain acceptable footpath and cycle paths in areas adjacent to project worksites in terms of capacity, legibility and pavement condition. The proponent must consult with the Brisbane City Council and Queensland Rail about changes in pedestrian and cycle paths required to facilitate Project Works.*

7.4.1.2 Effect of the Proposed Change – Traffic and Transport

The current Imposed Conditions for Spoil Haulage and Materials/Equipment Delivery (excluding concrete deliveries) for works at Clapham Yard are consistently Monday to Saturday, 6.30 AM to 6.30 PM with heavy vehicle restrictions between 7:30-09:00 AM and 2:30-4:30 PM, Monday to Friday.

Table 13 provides a visual representation of the Imposed Condition.

Table 13 Heavy Vehicle Movements Imposed Conditions – Clapham Yard

<table>
<tr><th>Time</th><th>Monday</th><th>Tuesday</th><th>Wednesday</th><th>Thursday</th><th>Friday</th><th>Saturday</th><th>Sunday</th></tr>
<tr><td>12:00AM to 6.30 AM</td><td colspan="6">No Spoil Haulage and Materials / Equipment Delivery Allowed</td><td rowspan="7">No Spoil Haulage and Materials / Equipment Delivery Allowed</td></tr>
<tr><td>6.30 AM to 7.30 AM</td><td colspan="5">Spoil Haulage and Materials / Equipment Delivery Allowed</td><td rowspan="5">Spoil Haulage and Materials / Equipment Delivery Allowed</td></tr>
<tr><td>7.30AM to 9.00 AM</td><td colspan="5">No Spoil Haulage and Materials / Equipment Delivery Allowed</td></tr>
<tr><td>9.00 AM to 2.30 PM</td><td colspan="5">Spoil Haulage and Materials / Equipment Delivery Allowed</td></tr>
<tr><td>2.30 PM to 4.30 PM</td><td colspan="5">No Spoil Haulage and Materials / Equipment Delivery Allowed</td></tr>
<tr><td>4.30 PM to 6.30 PM</td><td colspan="5">Spoil Haulage and Materials / Equipment Delivery Allowed</td></tr>
<tr><td>6.30 PM to 12.00 AM</td><td colspan="6">No Spoil Haulage and Materials / Equipment Delivery Allowed</td></tr>
</table>

The effect of this Proposed Change will be to permit 24 hour a day, 7 day a week haulage with reduced traffic peaks.

7.4.1.3 Mitigation Measures – Traffic

Recommended mitigation measures for changed traffic impacts are consistent with the Evaluated Project requirements as documented in the existing EMF.

As the mitigation measures are consistent with the existing EMF, no changes are required to the Project OEMP of the CEMP.

Beyond the Proposed Change to Imposed Condition 10, no further modifications to the CRR Project Imposed Conditions have been identified with respect to the traffic impacts.

7.4.1.4 Evaluation against current Environmental Management Framework

EMF Element	Change required (Y/N)	Description of Change
Imposed Conditions	Y	Proposed Change to Imposed Condition 10 as described in this RfPC.
OCEMP sub-plan	N	N/A
CEMP	N	N/A

7.4.2 Noise and Vibration (Traffic Noise)

7.4.2.1 Evaluated Project – Traffic Noise

There are no specific Imposed Conditions related to construction traffic noise. Imposed Condition 14(e) states:

Heavy construction vehicles use only designated routes for spoil haulage and deliveries of major plant, equipment and materials, in accordance with the Construction Environmental Management Plan. The designated haulage routes for each worksite must follow major or arterial roads to the extent practicable and be developed in consultation with the Department of Transport and Main Roads and the Brisbane City Council in preparation of the Construction Environmental Management Plan.

Where the construction phase of CRR is adding heavy vehicles to the existing road network, it is appropriate to consider the incremental change in noise levels due to the changes in traffic volume.

A change of up to 3 dBA in the level of a dynamic noise, such as passing vehicles is difficult for most people to detect, whilst a 3 dBA to 5 dBA change corresponds to a small but noticeable change in loudness. A 10 dBA change corresponds to an approximate doubling or halving in loudness.

It is acknowledged that people are likely to notice increased traffic based on visual clues and perception of vehicle pass-by frequency before they will objectively notice an increase in the average noise level.

For assessment purposes it is common to set the threshold of significance in relation to changes in the noise emission level from roads at 2 to 3 dBA.

Other relevant literature to the assessment of construction traffic noise impact has been reviewed, inclusive if the DTMR Code of Practice Volume 2 (CoP2)- Construction Noise and Vibration (2016).

Section 3.2.1.2 of the CoP2 state the following with regards to construction traffic:

Haulage/transportation associated with construction activities on public roads within the project area or beyond has the potential to create traffic noise issues for existing sensitive receptors. The following criteria shall be used to limit traffic noise caused by construction traffic:

- *Construction traffic should not increase the pre-construction traffic noise level $L_{A10,1\ hour}$ by more than 3 dB(A).*

The increase due to construction traffic should be considered against the median minimum $L_{A10,1\ hour}$ noise levels for each of the relevant hours within each work period. If measurements are unavailable, the increase should be considered against the predicted pre-construction $LA_{10,1\ hour}$ noise level.

For the impact assessment of construction traffic noise the noise goal in Table 14 has been used.

Table 14: Noise Goal - Construction Traffic Impact assessment

Type of Roads	Goal
Existing Roads	3dBA change in existing $LA10_{(1\ hour)1}$ 2dBA change in existing $LA10_{(12hour)2}$, and $L10_{(18hour)3}$
1 LA10(1hour) for the peak number of heavy vehicle movements during any hour between 12 midnight and 6am as stated in Section 9.4.2 of the EIS. 2 LA10(12hour) is the average LA10 traffic noise level between the hours of 6:30am and 6:30pm as stated in Section 9.4.2 of the EIS. 3 LA10(18hour is the average LA10 traffic noise level between the hours of 6 am and 12 midnight.	

7.4.2.2 Effect of the Proposed Change – Traffic Noise

The effect of construction related traffic noise as part of the Proposed Change has been assessed using the CoRTN prediction algorithm. This assessment methodology has been adopted to assess the difference in noise emissions from roads with the changed construction traffic for Clapham Yard. The following periods have been assessed to cover the potential for 24 hour a day, 7 day a week working hours at the worksite of Clapham Yard:

- LA10(12hour) for the hours between 6:30am and 6:30pm;
- LA10(18hour) for the hours of 6:00am and 12:00am midnight; and
- LA10(1hour) for the vehicle movements during any hour between 12:00am midnight and 6:00am.

On a given roadway, the essential modelling inputs that the additional construction traffic will alter are the percentage of heavy vehicles and total vehicle numbers utilising that roadway. For the assessment of typical construction truck volumes, 70% of the peak daily frequencies have been adopted as being representative of total truck movements, with the remainder being light vehicle traffic (consistent with the Traffic and Transport Report).

For existing road traffic data, it has been assumed that light vehicles represent 80% of the traffic volumes and heavy vehicles represent 20% of the traffic volumes.

As a conservative assessment approach, the day-time hourly peak movements for the day production rates were assumed to occur during all hours. These movements were combined with the quietest hour of traffic movements between the hours of 12:00am to 6:00am to be representative of the highest increase in noise impacts for the LA10(1hour) prediction. The increase in noise levels for each period is presented in Table 15.

Table 15 Predicted increase in noise levels due to construction traffic

Worksite	Change in Road Traffic Noise level due to the Project, dB(A)		
	LA10(18hour)	LA10(12hour)	LA10(1hour)
Noise Goal (**Error! Reference source not found.**)	<2dBA	<2dBA	<3dBA
Clapham Yard	+0.1[1]	+0.2[1]	+2.6[1,2,3]

Worksite	Change in Road Traffic Noise level due to the Project, dB(A)		
	LA10(18hour)	LA10(12hour)	LA10(1hour)

Notes

1. The CoRTN assessment has used the worst case hourly vehicle movements (one way)
2. The LA10(1hours) covers an 18 hour window. The data from the quietest window of existing traffic movement was used to assess the predicted change therefore the data presented are a worst case increase scenario
3. Road adjacent to industrial/commercial receivers only

As shown in Table 7, the maximum increase in traffic noise is +2.6dBA LA10(1hour). This is below the goal of 3dBA and therefore, the proposed change is not considered to have an increased impact compared to the Evaluated Project.

7.4.2.3 Mitigation Measures – Traffic Noise

No specific mitigation measures for traffic noise are required for the Proposed Changes.

7.4.2.4 Evaluation against current Environmental Management Framework – Traffic Noise

EMF Element	Change required (Y/N)	Description of Change
Imposed Conditions	Y	Proposed Change to Imposed Condition 10 as described in this RfPC.
OCEMP sub-plans	N	N/A
CEMP	N	N/A

7.4.3 Noise (Earthworks)

7.4.3.1 Evaluated Project – Noise (Earthworks)

Condition 11 of the Project-wide Imposed Conditions for the Project, in relation to Noise, provides that:

e) Project Works must aim to achieve the project noise goals for human health and wellbeing presented in Table 2 at a Sensitive Place.

Table 2. Imposed Conditions - Noise goals (internal) for Project Works

	Monday - Saturday 6.30am - 6.30pm	Monday - Friday 6.30pm - 10.00pm (Gabba, CBD only)	Monday - Saturday 6.30pm - 6.30am Sundays, Public Holidays	For Blasting Monday - Saturday 7.30am - 4.30pm only
Continuous ***($LA_{eq\ adj}$) (1hr)***	*AS 2107* *Maximum design level*	*40 dBA* *$LA_{eq\ adj\ (1hr)}$*	*35 dBA* *$LA_{eq\ adj\ (1hr)}$*	
Intermittent ***($LA_{10\ adj}$) (15min)***	*AS 2107* *Maximum design level + 10dBA*	*50 dBA* *$LA_{10,\ adj}$*	*42 dBA* *$LA_{10\ adj}$*	*130 dB Linear Peak*

Notes:

1. All goals are internal noise levels for human health and well-being outcomes.

2. Where internal noise levels are unable to be measured or monitored, the typical noise reductions presented in the relevant State guideline, such as the Guideline Planning for Noise Control, Ecoaccess, DEHP, January 2017 (currently under review).

3. Adjustments (adj) will be applied as outlined in the Department of Environment and Science Noise Measurement Manual Version 4 August 2013.

f) During construction monitor and report on noise and vibration in accordance with the Noise and Vibration Management Plan, a sub-plan of the Construction Environmental Management Plan.

g) Project Works predicted to or monitored as generating noise levels more than 20dBA (LA 10 adj (15 min)) above the relevant goal in Table 2. are authorised to occur in a locality only:

i. when advance notification and consultation has been undertaken with Directly Affected Persons or potentially Directly Affected Persons about the particular predicted impacts and the approach to mitigation of such impacts;

ii. where mitigation measures addressing the particular predicted or measured impacts have been developed on a 'case by case' basis in consultation with Directly Affected Persons;

iii. where the mitigation measures are incorporated in a mitigation register and implemented prior to undertaking the Project Works;

iv. between the hours 7:00am to 6:00pm Monday to Friday, with a respite period between 12:00noon and 2:00pm each day with the respite only applying where generating noise levels more than 20dBA LA10 adj (15 min) at a Sensitive Place that is occupied;

h) The works authorised by Condition 10(d) are not subject to the requirements of Condition 11(c)(iv)

Noise Sound (or noise) consists of minute fluctuations in atmospheric pressure capable of evoking the sense of hearing. The human ear responds to changes in sound pressure over a very wide range. The loudest sound pressure to which the human ear responds is ten million times greater than the softest. The decibel (dB) scale reduces this ratio to a more manageable size by the use of logarithms.

The symbol LA represents A-weighted sound pressure level. Noise level descriptors are as follows:

- LA10 – The A-weighted noise level exceeded 10% of a given measurement period and is utilised normally to characterise average maximum noise levels. This is a statistical descriptor which cannot be accurately added to or subtracted with other descriptors.
- LA10,adj,15min - The A-weighted sound pressure level that is exceeded for 10% of a 15 minute period when measured using a fast standardised response time. Which also is adjusted for annoying characteristics as outlined in Department of Environment and Science Noise Measurement Manual Version 4 August 2013.
- LAeq – The A-weighted equivalent continuous sound pressure level measured over a time period. This descriptor is typically used to gauge the impact of general construction noise levels.
- LAeq,adj,1hour – The A-weighted equivalent continuous noise level over a 1 hour period which includes adjustment factors for annoying characteristics as outlined in Department of Environment and Science Noise Measurement Manual Version 4 August 2013.

7.4.3.2 Effect of the Proposed Change – Noise (Earthworks)

As the increase of haulage hours to 24/7 would involve the dumping and potential moving of material, additional modelling was undertaken to determine the impacts of these works and whether they can be undertaken as 'managed works'.

Table 16 below summarises the scenarios that have been assessed and the purpose of the predictive modelling:

Table 16 Acoustic assessment scenarios and purpose

Construction Scenarios	Dominant Noise Source	Purpose of Assessment
Scenario 2A – Earthworks – Embankment Fill Construction using same equipment as daytime Non-Standard Hours	Grader SWL of 114dB(A)	Support the change request to authorise haulage over 24hr/7days
Scenario 2B Earthworks – Embankment Fill Construction using same equipment as daytime Non-Standard Hours	Dozer SWL of 109dB(A)	Support the change request to authorise haulage over 24hr/7days
Scenario 2C Earthworks – Embankment Fill Construction - Import of Fill Only Non-Standard Hours	Truck and Dogs SWL of 106dB(A)	Support the change request to authorise haulage over 24hr/7days

The modelling showed:

- Scenario 2A can proceed as managed works as long as the proposed earthworks are marginally reduced to provide a minimum offset of 111m from the residential receivers. This offset would only marginally reduce the placement area and therefore out of hours earthworks are viable.
- Scenario 2B can proceed as managed works as long as the proposed earthworks are marginally reduced to provide a minimum offset of 59m from the residential receivers.
- Scenario 2C can proceed without further management measures as works are predicted to be managed works.

7.4.3.3 Mitigation Measures – Noise (Earthworks)

No additional mitigation measures are required.

7.4.3.4 Evaluation against current Environmental Management Framework

EMF Element	Change required (Y/N)	Description of Change
Imposed Conditions	Y	Proposed Change to Imposed Condition 10 as described in this RfPC.
OCEMP sub-plan	N	N/A
CEMP	N	N/A

8. Conclusion

The Proposed Change to the Evaluated Project is proposed to optimise the operations of the Clapham Rail Yard, with conditions changes required to support construction activities.

The EMF established by the Coordinator-General's Imposed Conditions continues to be appropriate to manage the environmental effects of the CRR Project. As is already required by the EMF, a site-specific CEMP will be developed in order to ensure the environmental outcomes in the approved OEMP continue to be achieved with the Proposed Changes.

The Cross River Rail Delivery Authority, as the proposed for the CRR Project, requests that the Project, including the Proposed Changes, proceed, subject to the Imposed Conditions and the changes to those Imposed Conditions set out in this RfPC.